

A view looking west with the old Tower B in the foreground and the bridge over the Missouri river in the background



Remote Control INTERLOCKING Coordinates Train Movements

Union Pacific multiple-track junction layout, at east end of Missouri river bridge, now controlled from Tower A at Omaha--- Unique wheel counter is part of project on these tracks used by seven railroads

THE eastern terminus of the Union Pacific is at Union Pacific Transfer at Council Bluffs, Iowa, about two miles east of the Missouri river. At Council Bluffs, the Union Pacific has extensive enginehouses, ice docks, yards and transfer depots for mail, express and l.c.l. freight. At the Transfer, the Union Pacific connects with seven railroads to the east, the Chicago & North Western, the Chicago, Rock Island & Pacific, the

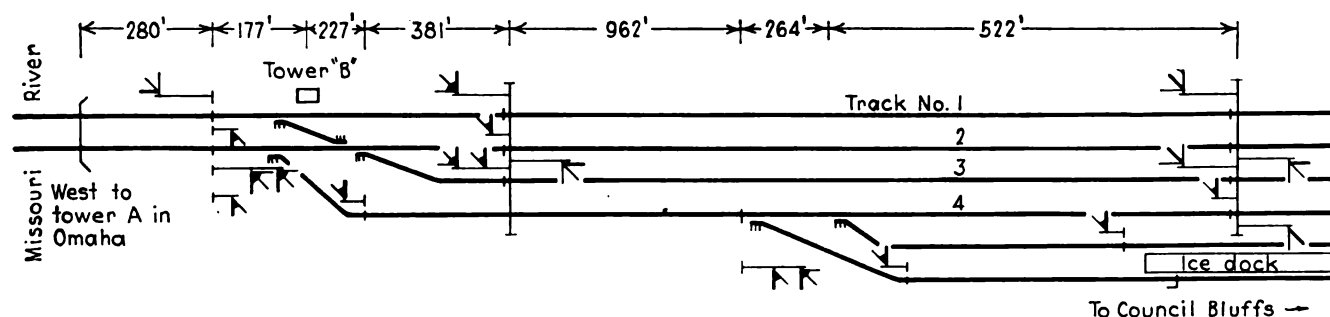
Wabash, the Illinois Central, the Chicago, Milwaukee, St. Paul & Pacific, the Chicago Great Western and the Chicago, Burlington & Quincy. Passenger trains of all these seven railroads use the Union Pacific tracks and bridge over the Missouri river between Council Bluffs and Omaha, which is just west of the river.

The Union Pacific has four main tracks westward from Council Bluffs for two miles to Tower B, where

there is a junction to two main tracks over the Missouri river bridge to Omaha. Interlocking B is located 2 miles west of Council Bluffs and 275 ft. east of the east end of the bridge. This interlocking formerly included 2 single switches, 1 cross-over, 6 derails and 8 signals, controlled from a 16-lever Type F electric interlocking machine in a tower on the north side of the track. All the trains, transfer cuts and switching moves that are operated through interlocking B, also move through Tower A which is just west of the bridge and at the east throat of tracks in the Union Station at Omaha.

New Rail and Interlocking

Last year, new 133-lb. rail was laid throughout the entire area of interlocking B, and, as part of the



Track and signal plan of interlocking east side of Missouri river which is now controlled remote from tower in Omaha

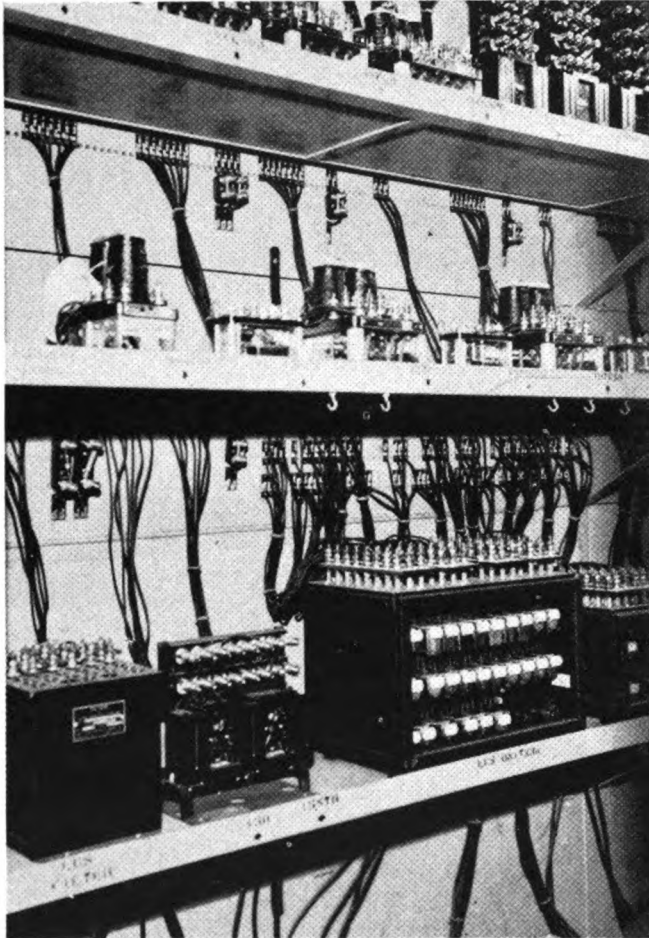
program, it was decided to rebuild this interlocking B, and control it from Tower A in Omaha. At interlocking B, the old interlocking machine was discarded. New low-voltage dual-control switch machines were installed, not only at the four switches in the old interlocking B area, but also at two turnouts from track 4 to the ice docks, about 1,800 ft. east of old Tower B. New search-

four main tracks between Tower A at Council Bluffs and interlocking B, and two buttons at lower right on panel apply to the two main tracks between interlocking B and Tower A at Omaha. Indication lamps repeat the position of switches and signals in the customary manner. In this project, the controls are sent out and the indications are returned by U. S. & S. Co. line code

55 cells of 120-a.h. Exide battery, was split up and used at different locations to feed the new 26-volt switch machines, and various other local circuits. Each track circuit is fed by a cell of Edison B4 storage battery.

Fireproof Relay Racks

New relay racks were built in the old battery room at Tower B. These racks are made of 2 in. by 2 in. by ¼ in. angle iron frame, with ½ in. transite board for shelves and terminal board. The wiring in these racks is insulated 19-strand No. 16 flexible. Cables coming into this room are brought up behind a terminal board made of ½ in. transite board. This board is on an angle iron frame which is hinged at the



The new relay racks were made of angle-iron frame with ½-inch transite board for the shelves and the terminal boards

light signals, wiring and relays were installed throughout. Thus, in effect, the interlocking now in service is entirely new.

This new interlocking B, including four single switches, one crossover and 10 home signals, is controlled remotely by a two-wire line code from a new panel type machine in the tower at interlocking A, one mile west of interlocking B. As shown in one of the pictures herewith, this control machine has 4 levers for control of switches or crossovers, and 4 levers for control of signals.

Direction of Traffic

Direction of traffic is established by push-to-turn buttons. Four of these buttons, in a vertical row at the left end of the panel, apply to

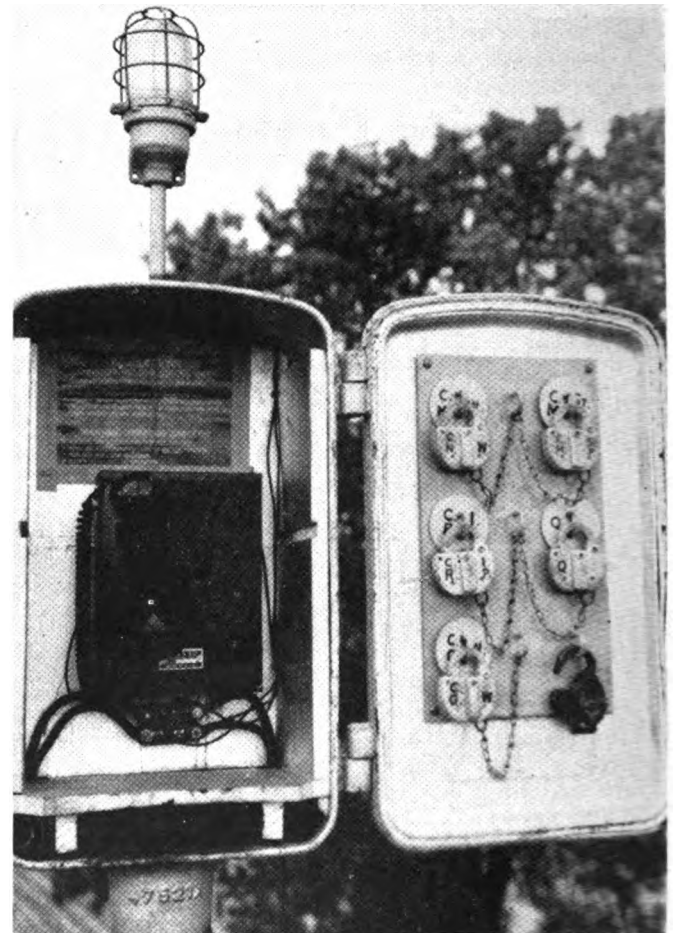
Six padlocks allow trainmen from eight different railroads to unlock the dual-control switch machines in this plant

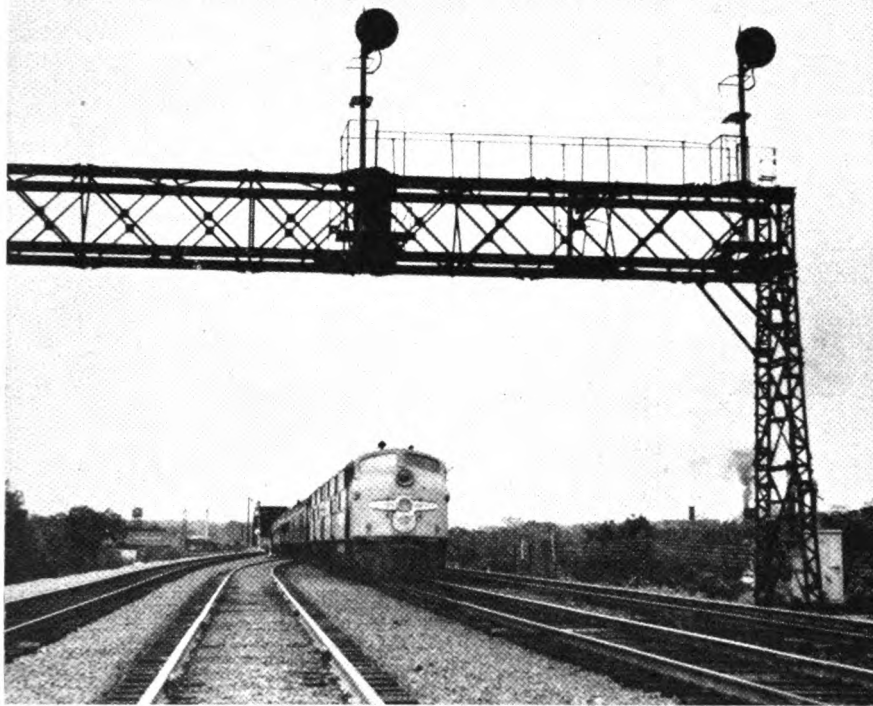
equipment type L, Form 506A. One field station is at the old Tower B, and a second field station is in a new sheet-metal house at the switches which connect tracks No. 4 to the ice dock tracks.

The new switch machines are the low-voltage type operating on 26 volts, whereas the old switch machines were the 110-volt type. As a part of the changeover, the previous 110-volt battery, consisting of

right side so that the board can be swung out to permit a man to work at the rear. This saves space, and facilitates construction, inspection and maintenance. At the east end of the interlocking, the relays, code equipment and battery are in a new sheet-metal house, an interior view of which is shown in one of the pictures.

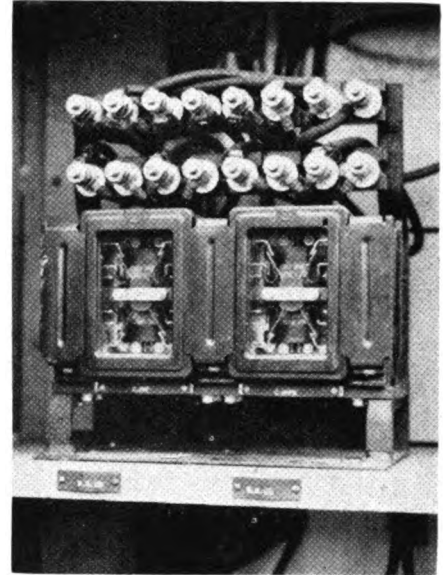
As part of the project, new aerial cables were installed. A two-con-





An eastbound Union Pacific train passing under the westward home signal bridge.

for the others. In the box is a telephone by means of which trainmen may call the towerman at Tower A. The box is normally closed, but not locked. Thus, a complicated problem was solved by seven U.P.



Relays count car wheels

ductor No. 6 copper cable carries the line code circuit between Tower A and interlocking B. Twelve-conductor No. 14 cable is used in different sections as required. The new signals are the searchlight type. High signals are on bridges or high masts. Dwarf signals on main tracks are on 4 in. masts, 6 ft. high. This practice raises the dwarfs so that deep snow will not interfere.

Problem of Padlocks

All the switches in this interlocking are now operated by new dual-control switch machines, so that in case of a failure or special move, a trainman can unlock a Union Pacific padlock on the latch and throw the switch by hand. An obstacle encountered was that trains of seven other railroads operate over the section of the Union Pacific between the Transfer and Omaha. To provide all the trainmen involved with Union Pacific switch padlock keys, and expect these trainmen to have them when needed to operate one of these dual-control switches, was considered to be entirely impracticable. The Union Pacific signal forces

developed a device to overcome this obstacle.

Key on Disk

Seven U.P. switch keys are each welded to a metal disk, 1/16 in. thick and 6 in. in diameter, these disks being big and heavy so that trainmen will not be likely to carry them away thoughtlessly. Each disk has a slot hole which fits over a staple of 1/4-in. rod, extending out from a board on the inside of the door of a cast-iron case. The hasps are big enough for standard switch padlocks. Thus one such disk is locked with a C.&N.W. padlock, the next with a Milwaukee padlock, etc.,

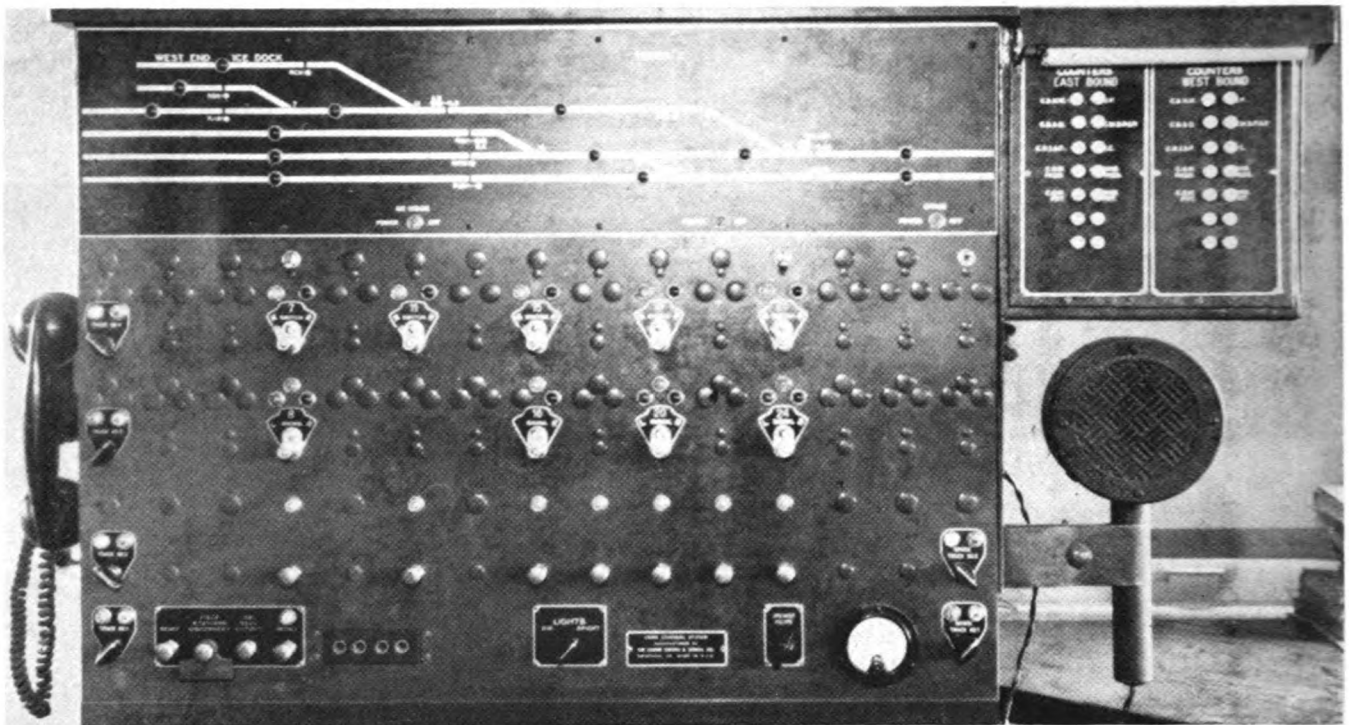
switch keys, padlocked from each railroad, and one good idea.

Automatic Wheel Counter

As discussed previously, trains of seven railroads, in addition to the Union Pacific, use these Union Pacific tracks and bridge between Council Bluffs and Omaha. Operating expenses and other items are charged to the different railroads on the basis of a count of the car and locomotive wheels operated each month over these tracks and the bridge. After several years of experiments, a very satisfactory and reliable system of wheel counters

The switch machines are the dual-control type, note the use of the adjustable rail braces on three of ties including No. 0





Buttons for selecting counters are in box attached to end of interlocking control panel

has been installed for the purpose outlined above.

A 30-in. Track Circuit

A short track circuit is located in each of the two main tracks just west of the junction of tracks No. 3 and 4 with tracks No. 1 and 2. The one rail section is 30 in. in length so that no two car wheels can occupy this rail section. From this short rail section a connection extends through one cell of lead storage battery and through the two coils of a biased relay, and back to the opposite rail. When a pair of locomotives or car wheels pass, the circuit is completed through the wheels and axle, to cause the relay to operate. Through contacts in each relay, line circuits extend across the river to Tower A at Omaha to operate KP line relays, one for each track. On the right side of the new interlocking control machine at Tower A, there is a push-button control box, with 10 buttons for eastbound and 10 buttons for westbound trains. The buttons are for U.P., C.&N.W., C.B.&Q., C.R.I.&P., C.M.St.P.&P., I.C., Wab. passenger, Wab. freight, C. G. W. passenger and C. G. W. freight.

Pushbutton Selector

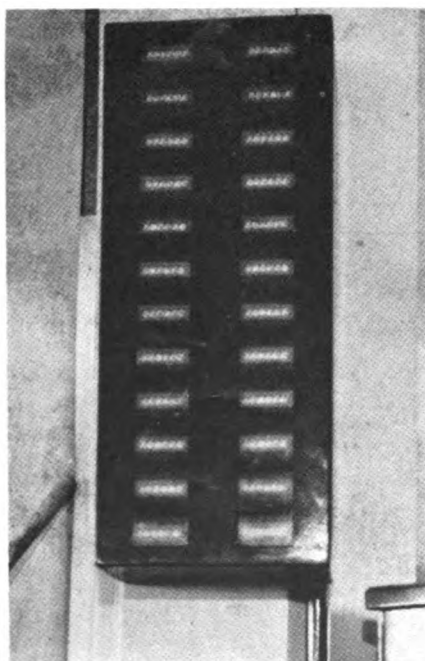
The towerman at Tower A has advance information of the identity of the trains for which he is to line up a route at interlocking B. His first manipulation must be to push the counter selector pushbutton for

the railroad and direction of the approaching train, as for example C.&N.W. westbound. When he pushes the button all the way down, a contact is closed to pick up a stick relay that is connected in the signal route network circuits so that this stick must be energized in order for code to go out to clear the signal at interlocking B. When an indication comes back, to show that signal has cleared, the stick is then released.

When the towerman removes his finger from the pushbutton, it springs back part way, which opens the stick pick up circuit, but leaves a second circuit closed to feed 110-volt battery through the operating coil of the proper counter and a front contact of the line relay, which is controlled by the pick up and release of the relay on the special track circuit, the proper counter is operated one unit. When the rear pair of wheels on a train passes, the counter ceases to operate. The selection button, in this instance the C.&N.W. westbound, remains in the pushed position until the towerman pushes a different counter selector button preparatory to lining up for another train. The counter system for the eastbound track and westbound track are entirely separate and can be in service simultaneously if trains are using both tracks at once.

Each of the 20 counters will count up to 999,999. Readings are made once a month. These counters were made by the Veeder-Root Company, New Haven, Conn.

The new interlocking B, including the remote control from Tower A, was planned and installed by Union Pacific signal forces. The major items of equipment, including switch machines, signals, relays and interlocking control machines were made by the Union Switch & Signal Company.



Cabinet has 24 counters