

THE PUSH BUTTON INTERLOCKING PLANT AT CLEARING YARD

The interchange yard of the Belt Railway of Chicago, at Clearing, Ill., which was recently constructed to provide a standing capacity of 12,400 cars and an operating capacity over the hump of 400 cars per hour, was opened for the traffic of the Belt Railway on June 1. About 2,500 cars per day are being handled through the yard at present, although this number will be greatly increased when the ultimate plan is carried out for the 12 owning roads to interchange traffic at this central yard. The complete layout is divided into a classification yard, receiving yard, departure yard, bad order yard, etc., for east and southbound traffic and a similar layout for north and westbound traffic.

Each classification yard contains 55 tracks with an average capacity of 45 cars; each departure yard, 12 tracks with an average capacity of 70 cars, and each receiving yard, 16 tracks with an average capacity of 70 cars, requiring a total of 131 mi. of track in the entire yard. The approach grade to the hump is 0.6 per cent, the initial grade from the hump, 4 per cent; the grade through the ladders, 0.9 per cent, and through the body tracks, 0.4 per cent. The entire yard is laid with 80-lb. A. S. C. E. rail, rock ballast under ladders and leads, and cinder ballast under the other tracks.

There are four hump tracks, two in each direction. Cars can be classified from either hump track to any one of the 55 classification tracks, or in case two trains are working in the same direction at the same time, one on each hump track, cars from each train can be classified in one-half of the classification yard simultaneously. Two approach tracks lead to each hump track in order to allow trains to be brought up while other trains are being classified.

INTERLOCKING LAYOUT.

The switches in the ladders of the classification yard and the signals governing train movements over the hump are controlled by two Union Switch & Signal Company's electro-pneumatic push-button machines located in a two-story tower mounted on a structural steel bridge spanning the hump tracks at a point near the center of the two humps. The walls of the tower are of metal lath and cement mortar and the roof is of asbestos shingles. The upper floor is divided into three rooms, the middle one being used as a clerical room for the yard men, and the two end ones containing the 72-unit push-button machines. On the lower floor are the relay rooms, located directly under the machine rooms. The machines are so located that the operators have a full view of the yards. It is not necessary, however, to actually see when a cut of cars has cleared a switch, for the indicator above each push button shows whether a section of track at the corresponding switch is occupied or not. An indication is also provided when the switch is in the full normal and full reverse position. In addition, the push button is electrically locked when a car is on the track circuit controlling the switch. Special electric locks are applied to the buttons governing the crossovers at the ends of the ladder tracks to prevent setting up conflicting routes at these points simultaneously. Each machine has 64 working buttons, 60 for the 65 switches and four for the two signals, allowing eight spare spaces for future developments.

The switches are operated by electro-pneumatic, motion-plate switch movements, no locks being used. This prevents a switch from opening if the air pressure should fail. A pot signal is connected to each switch, these being of the revolving type with electric lights, current being provided by a 110-volt, a. c. circuit for each classification yard. Alternating current track circuits are installed for the control of the indicators and electric locks in the machine, these circuits actuating galvanometer type, three-position relays in the tower.

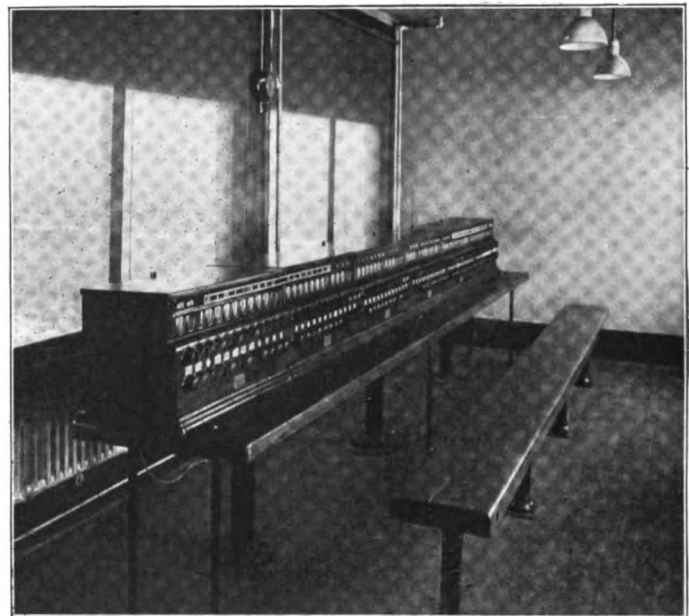
The electric power is generated at 2,300 volts, 60-cycles, in a power house adjacent to the hump and is transformed to 220 volts for distribution to the track transformers for feed-

ing the track circuits, and to 440 volts for the operation of the two motor-generators for charging duplicate sets of seven cells of 480-a.h. storage battery, which supply the 14-volt, direct current, control circuits for the indicators and locks in the machines and for the electro-pneumatic switch movements.

POWER DISTRIBUTION.

The electrical conductors from the power house are run to the tower part way in a concrete conduit, and part in a specially built metal conduit. A concrete tunnel is provided for the wires under the hump, from which the wires are carried up one leg of the tower on insulators. They are run across the lower chord of the structure in specially built metal conduit to the center of the relay rooms. At these points the wires are brought up to slate terminal boards fastened to the iron relay rack. The insulated cables and single electrical conductors for controlling the switches from the machine are run in vitrified conduit laid in an approximately 4-in. wall of concrete about 2 ft. underground, with concrete manholes located about 100 ft. apart and at the turns.

The wires from the manholes to the switches, pot signals and track circuits are run in 2-in. galvanized pipe which is



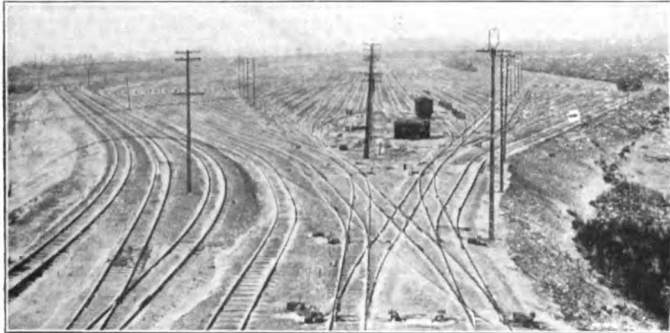
One of the Two 72-Unit Electro-Pneumatic Push Button Machines.

connected with a galvanized nipple embodied in the wall of the concrete manholes. Compressed air is supplied to the signal and switch mechanisms by the same compressor that serves the adjacent car and locomotive shops, the pressure being 80 to 100 lbs. This compressed air is distributed in 3-in. extra heavy galvanized pipe laid underground and adjacent to the vitrified conduit carrying the insulated wires, from which laterals serve the switches. All manholes are drained to a 12-in. sewer.

TRAIN OPERATION.

For controlling the trains that are being classified over the hump semaphore signals are located on the bridge over the center of each hump track, and about 1,500 ft. from the tower, semaphore signals have been installed, two on each side of the approach track, which are arranged to repeat the indication given by the signal on the tower. The trainmen in pushing a train of cars forward or over the hump to be classified, are governed by the semaphore signal for the approach track they are using, and by the signal at the tower. The indications are as follows: Arm horizontal or a red light at night, stop; arm at 45 deg. or a green light at night, proceed very slowly, not to exceed two miles per hour; arm vertical or a white light at night, proceed slow,

not to exceed four miles per hour. In addition to the semaphore indications, trainmen are governed by the sound of an air whistle, located to the left of the approach tracks, about 1,500 ft. from the tower. The indications of this whistle are as follows: One short blast, stop; two short blasts, start (move train toward hump); three short blasts, back up (move train away from hump). The use of the audible indication does not relieve enginemen from observing the

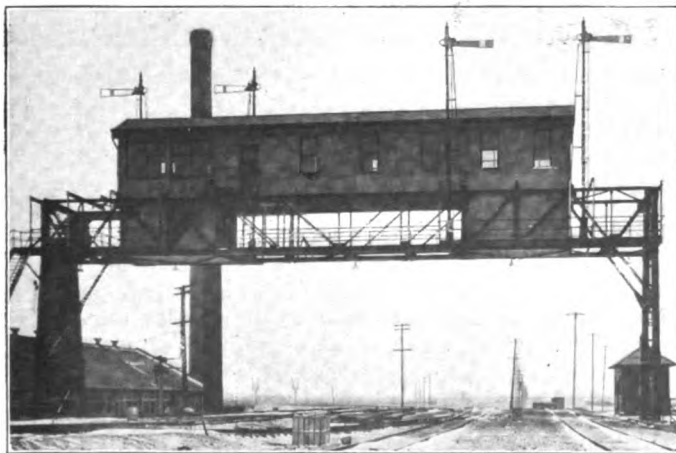


General View of One-half of the Clearing Yard, Looking from the Hump.

semaphore signal indications as the audible indications are used only for emergency purposes and trainmen are cautioned to keep a close watch on the semaphore signals.

The semaphore signals are controlled by the machine operator, and also by the car cutter at the hump. The signals may be put to the stop position by either when conditions require, the machine operator shifting a push button controlling the signal and the car cutter removing a plug from a socket at the bottom of a cabinet located on a support between two of the hump tracks near the place where cars are cut. To give a clear or caution indication it is necessary for the car cutter to insert the plug in the socket and for the machine operator to reverse the push button controlling the signal. A push button is also located on the machine table and another at the bottom of the car cutter's cabinet, which may be used by either an operator or the car cutter to give the audible signals when conditions require it.

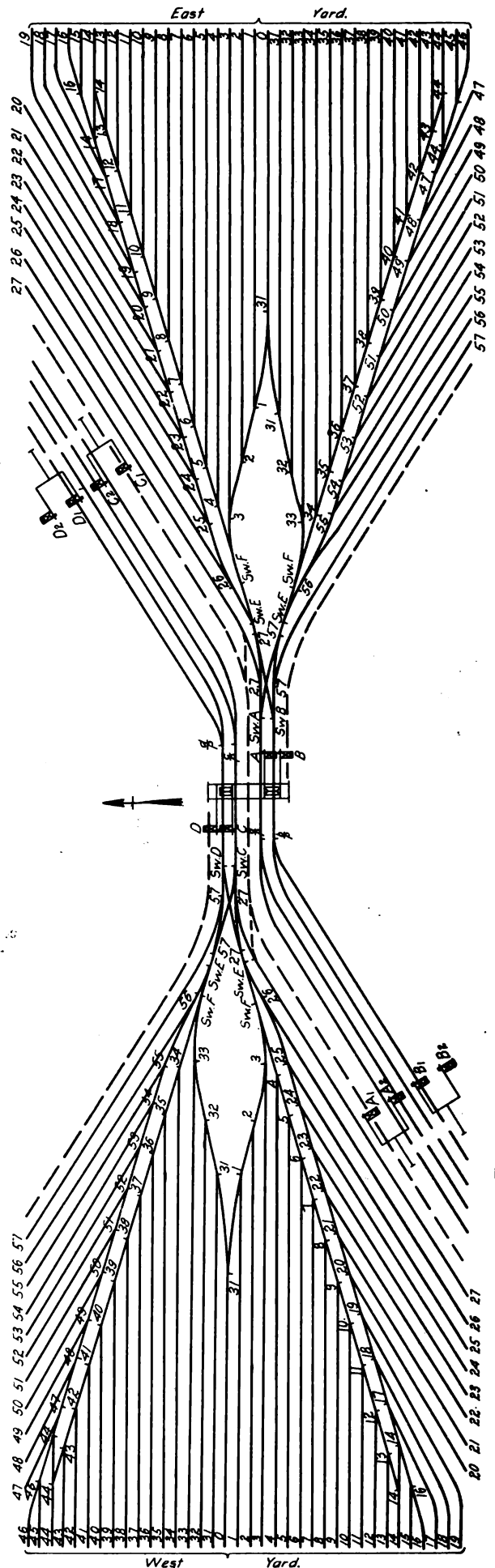
The machine operators are under the direction of the signal department. They were instructed and drilled in



The Clearing Yard Tower, Mounted on a Bridge Over the Hump.

the handling of the machines and switches prior to the opening of the yards for traffic, and as a result of this practice the operation of this yard by gravity has been very successful since its opening.

The installation was made by the Union Switch & Signal Company, under the direction of F. E. Jacob, signal engineer, and F. E. Beutler, assistant signal engineer of the Chicago & Western Indiana and the Belt Railway.



Track and Interlocking Layout at the Clearing Interchange Yard Near Chicago.