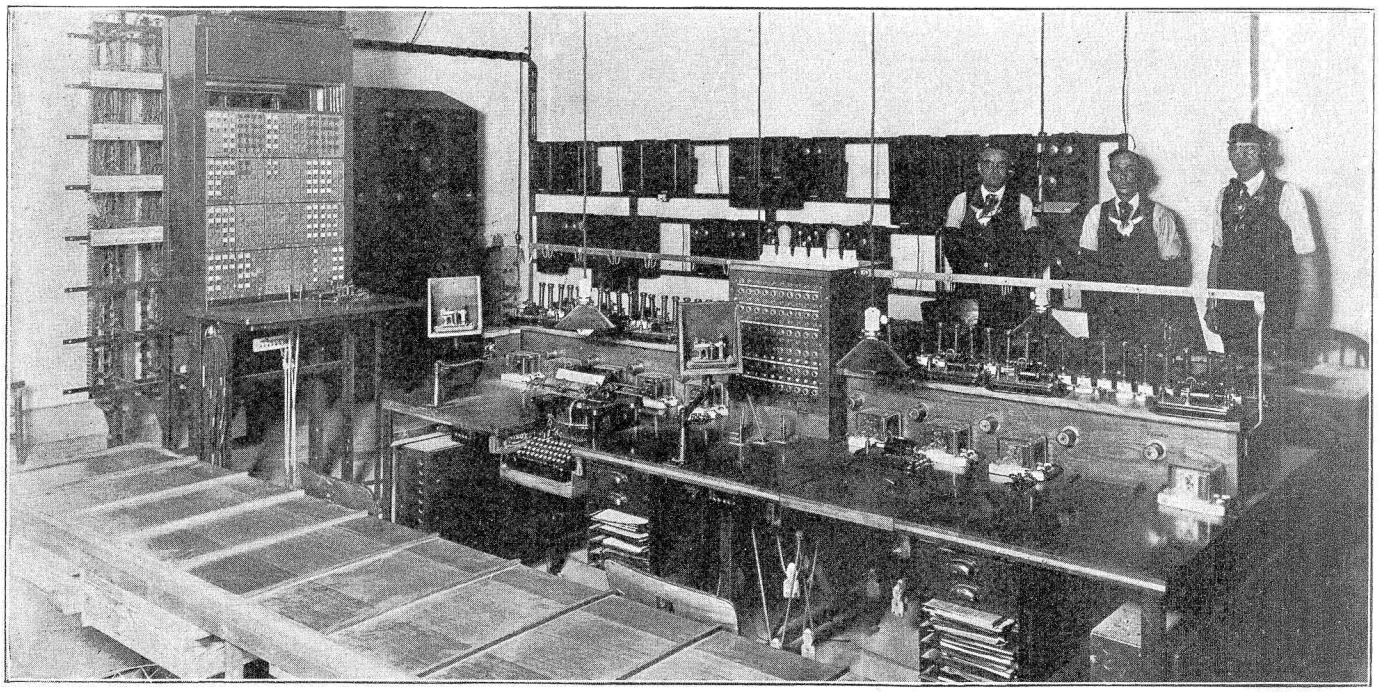
The report censured the operator for exercising poor judgment in using the calling-on signal for a movement of this kind when a passenger train was standing in the block; a positive block should have been maintained; but it says that the practice had grown up at this place, apparently from lack of supervision. The legitimate use of the calling-on signal was that of facilitating the movement of pusher engines used on freight trains, and it should have been confined to this. A train receiving the permissive indication of the calling-on signal is not required to come to a stop; so, therefore, the arrangement is not so safe as ordinary automatic block signal practice.

The fireman, who had been accepted, seven years ago, as competent to act as engineman, was found to be faulty in his understanding of the indication of the permissive indication of the calling-on arm. He thought it was the same as the 45 deg. position of an automatic block signal, permitting the train to proceed, expecting to be stopped at the next block signal. And the conclusion that the report seems to reach was that the engineman's carelessness was probably due to this impression; that this signal, displaying a yellow light, was to be taken the same as an automatic block signal displaying a yellow light. Still, it appears that the line of road was straight, the weather clear, and the grade level or nearly level; so that the presence of the smoke or steam—a point which was disputed—was the only element which could have hindered the engineman from seeing the red tail lights of the standing train. The engineman said that he did not see the red light carried by the flagman, who was back 200 to 400 ft.

Modern Telegraph Office at Indianapolis

The Installation of Up-to-Date Plant Equipment Expedites Business and Increases Efficiency in Handling Railroad Work

A NEW telegraph office was recently installed at the Indianapolis, Ind., union station in connection with rearrangements made necessary by the track elevation work in progress. The apparatus installed consists of modern up-to-date plant equipment, making a complete and efficient working unit. From one to three men are employed on each trick. The operators in this office handle train orders and railroad message traffic for the Indianapolis Union, the Pittsburgh, Cincinnati, Chicago & St. Louis, the Cleveland, Cincinnati, Chicago & St. Louis, the Cincinnati, Indianapolis & Western, the Chicago, Indianapolis & Louisville, the Illinois Central and the Lake Erie & Western. Some idea of the number of messages coming into this office may be gained from the fact that wires from six divisions of the Pennsylvania Lines and from four divisions of the Big Four enter the office in addition to those of the other roads mentioned above.



General View of Office, Showing Operators' Table, Distributing Frame, Test Board and Selectors

The office is located in a room 49 ft. long by 24 ft. 5 in. wide, underneath the train shed tracks, making it easy of access for the conductors and trainmen entering the Union Station. The room is longest north and south. A portion 23 ft. 6 in. long on the south end is reserved for the telegraph office and equipment and the remainder is for the use of conductors and trainmen, a large counter separating the two parts of the room. The location of the office is such that it is necessary to make provision for artificial light and ventilation.

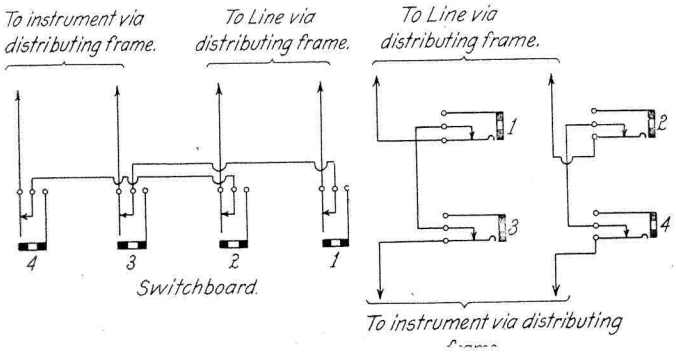
In the operating room is located the quartette operating table, in the center of which is the jack box with the pilot signals on top. The telegraph selectors are mounted along the center and immediately above them are located the line telegraph relays. The distributing frame and the test board are located at the south end of the room, while the telephone selectors are located on the west wall. On each side of the quartette operating table and immediately back of the operators is located a train order table with the top divided and marked with the names of the vari-

ous roads. These tables are provided so that all orders or clearances which have not been delivered are in plain sight, eliminating the chance of their being overlooked.

A total of 22 telephone and 18 telegraph circuits were transferred from the old to the new location. Of these, the Big Four has 12 telephone and four telegraph circuits; the Pennsylvania has 5 telephone and 6 telegraph circuits; the Lake Erie & Western 1 telephone and 2 telegraph circuits; the Monon 2 telegraph circuits; the Illinois Central 1 telephone and 1 telegraph circuit; the Indianapolis Union 2 telephone circuits and the C. I. & W. 1 telephone and 3 telegraph circuits.

The wires for the new "UN" telegraph office were brought from the terminal frames in the underground terminal room through a tunnel to a point directly beneath the distributing frame in the telegraph office, in a 62 pair cable. All telegraph wires loop from the underground terminal room board to the distributing frame in the office and back to the underground terminal room, while all telephone wires are bridged across the circuits entering the underground terminal room. The conduit system for the adjacent track elevation work terminates in this room and circuits are carried from there to the Western Union uptown office.

The distributing frame in the telegraph office consists a double-sided frame of 5 units accommodating 480 cable strands and 200 protectors on the vertical side and 480



Telegraph and Telephone Switch Board Wiring

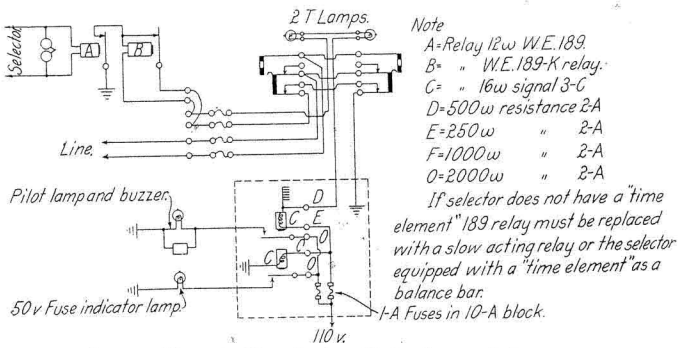
switch board terminals on the horizontal side. The incoming cable is terminated on the vertical units numbered 1 to 100, the conductor assignment conforming to a list as previously prepared.

Space was provided on the quartette contralization table for 40 telephone and 20 telegraph line jacks. Each jack and filler button is provided with two line conductors. The telephone conductors are carried in a 40-pair office cable which is carried under the floor to the distributing frame. Each space for a telephone jack has an associated lamp space for signaling. The lamps are connected to the corresponding selectors through the distributing frame and, to accommodate the lamp signals, a second 40-pair lead office cable was installed. For the accommodation of miscellaneous wires such as buzzers, circuits, battery leads to master sets, etc., a 20-pair lead office cable was provided between the terminal cabinet on the telegraph table and the distributing frames.

To provide testing facilities, a reduced section of standard Western Union pin jack switchboard was provided, the telephone and telegraph circuits being wired as shown in the drawing. All telephone circuits were grouped on the left of the board and all telegraph circuits on the right. Different colored designation cards were used for the different railroads. One Morse testing set circuit and one telephone test were installed on the switchboard. Each jack was provided with a designation cord conforming to a typical one. In addition the following color scheme was used to designate the various railroads: Big Four, white; Pennsylvania, red; C. I. & W., blue; L. E. & W., yellow; I. U., green; Monon, salmon; I. C., slate; I. V., brown.

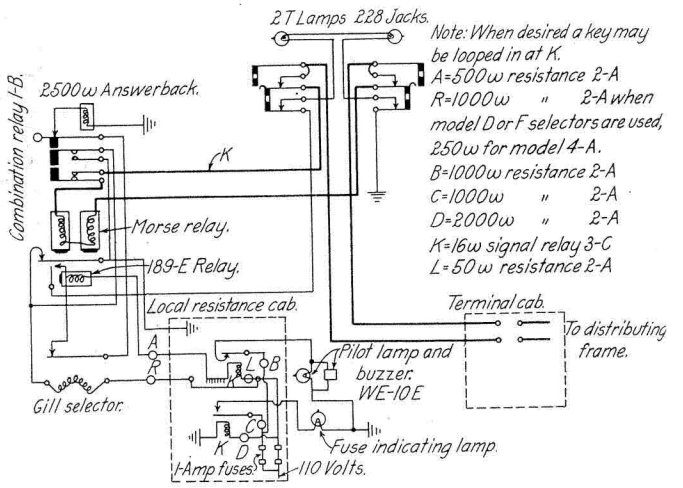
Telephone and Telegraph Circuits

The telephone circuits were wired up with a 12-ohm relay connected in multiple with the selector bell which picks up when the bell rings. A contact on this relay competes the circuit for another relay which is in turn kept energized through a front contact on it so that it



Lamp Signal Circuit for Telephone Selectors

remains closed when the contact of the 12-ohm relay opens a little later. The two line signal lamps in the jack board and the pilot relay, which causes the pilot lamp to light, are in series with this circuit relay and are lighted when this relay is picked up by the 12-ohm relay mentioned above. The pilot light for the telephone is red and is mounted on top of the jack board on the operating table. When the operator plugs in to answer a call, the circuit is opened and is restored to normal, thus putting out the red pilot light and the two lights on the jack board. To indicate to the operator when any failure of the power supply occurs, a 16-ohm relay was bridged across the office side of the fuses, protecting the power circuit which is normally energized. Should a fuse be blown, this circuit is broken and a circuit is established through an indicating fuse, a 2,000-ohm resistance unit, the back contact of this relay and a 50-volt fuse-indicating lamp, causing this to light up. The fuse-indicating



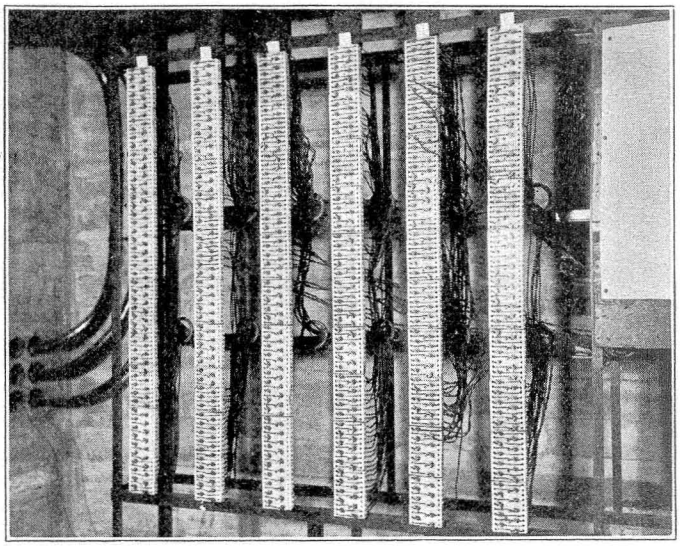
Telegraph Concentration Unit Circuit Wiring

lamp is green and is also mounted on top of the jack box.

The telegraph circuits were wired with a 100-ohm Morse line relay so arranged that its armature operates the Gill selector, and the selector contact closes another relay, which then remains closed through its front contact as in the case of the telephone circuit. This operates the signal lamps and the pilot relay, the lamps in this

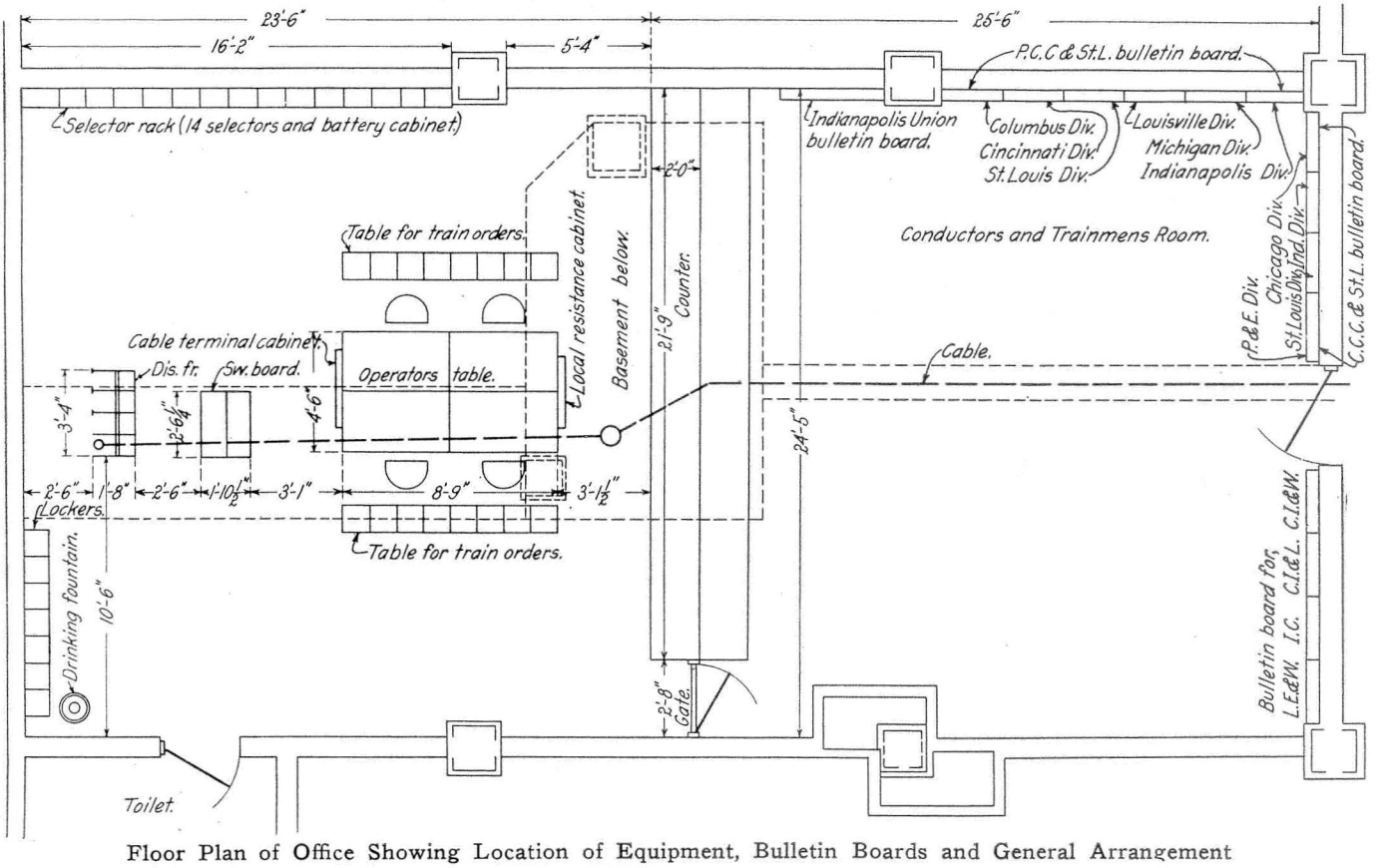
case being white. The closing of the selector contact also causes the operation of the answer back. This is so arranged that the upper contacts close, shunting the relay contact before the line is opened an instant later by the power contact. The opening of these line contacts causes a signal to be sent back over the line telling the calling operator that the call has gone in. As in the case of the telephone, when the operator plugs his master set in series with the line, the lower contacts open, breaking the circuit and restoring it to normal. Two magnetic wall telephones were installed in the conductor's and trainmen's office and wired to plugs in the front of the jack box so that calls could be made on any circuit.

The cable terminal box and the local resistance cabinet are located at each end of the operator's table, these boxes being bolted to the angles at the ends of the tables. The cable from the distributing frame is brought to the cable terminal box and determined with the conductors bearing the same number they had in the distributing frame. The incoming power is brought to the local resistance cabinet in metal conduit and the live side is terminated on six fuse blocks fused with one ampere fuses. Two fuse blocks are used to feed the telephone locals and two additional fuse blocks are used to feed the telephone locals. The leads from each fuse block for the telephone locals first pass through a 250-ohm resistance unit, then a 16-ohm signal relay to the protective resistances in the receptacles. The circuits going through the contacts of these relays pass through another fuse block and through 500-ohm resistances which close the circuit of the pilot equipment. Across the office side of the telephone fuse blocks, the telephone fuse indicating relays are bridged, protected by 1,000-ohm resistance units. From the back contacts of these relays, the fuse-indicating lamp is bridged to ground while the armatures are connected through a 250-ohm resistance to the 110-volt lead. The telegraph local equipment is wired in a similar manner except that the limiting resistances are mounted on top of the table near the Morse line relays located above the telegraph selectors. The four master telegraph sets are supplied with power from a local generator through a fuse in the local resistance cabinet. The telegraph cords are shortened to such a length as to prevent their being used in telephone jack.



Part of Terminal Frame in Underground Terminal Room

The preparation of the plans and the installation were carried out under the jurisdiction of C. S. Rhoads, superintendent of telegraph of the Big Four. The installation was made under the direct supervision of J. G. Gilgrist, assistant superintendent of telegraph, and John L. Niesse, telegraph and telephone engineer of the Big Four. R. D. Meredith, chief installer, handled the installation work.



Floor Plan of Office Showing Location of Equipment, Bulletin Boards and General Arrangement