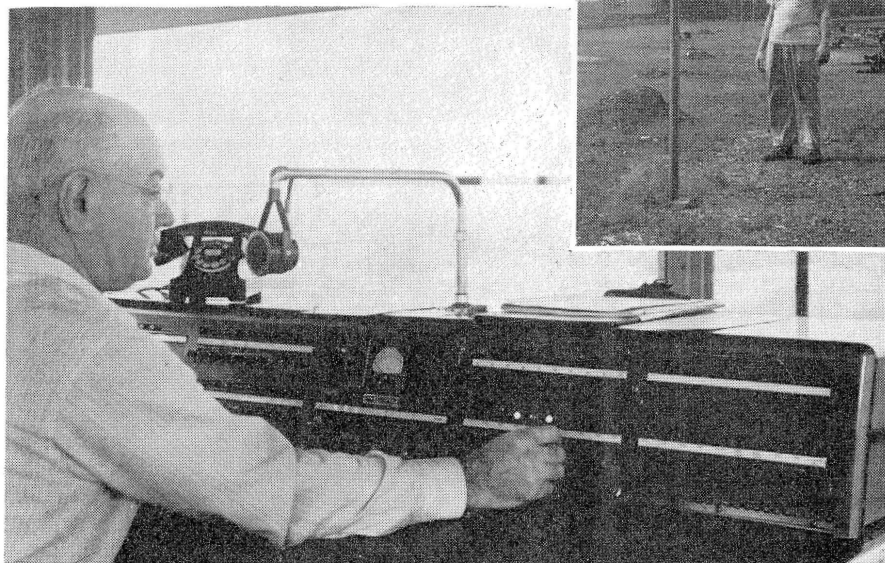


Below—Yardmaster in tower at south end of the yard manipulating key on console to answer a call from a yardman



Above—Yardman at the south end of the yard conversing with yardmaster in south tower through one of the talk-back speakers

Loudspeakers on the “J”

To SPEED up the operation of its East Joliet (Ill.) Yard, 32 mi. southwest of Chicago, the Elgin, Joliet & Eastern has installed an extensive system of two-way talk-back and paging loudspeakers, which are controlled from two new modern communication towers—one dominating the north end of the yard and the other the south end. The project is expected to effect substantial annual savings in operating expenses, which should amortize the cost of the installation in about two years.

Nature of Business

The E.J.&E. is a 238-mi. completely-Dieselized switching and belt line around the city of Chicago. Often referred to as the “Chicago Outer

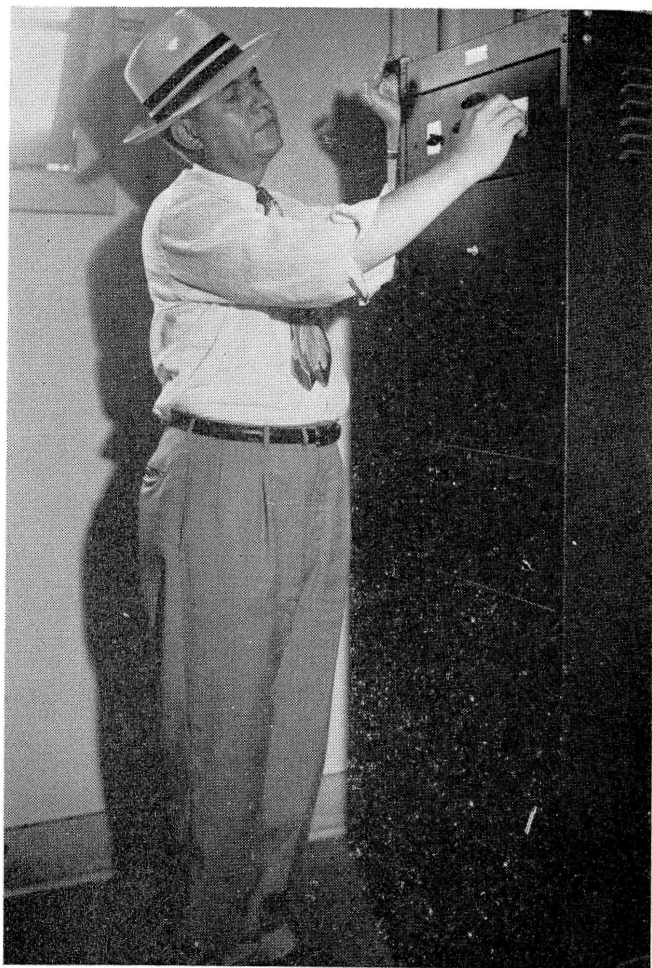
Belt Line” or the “J,” it extends 57 mi. west from Porter, Ind., to Joliet, thence 73 mi. to Waukegan, Ill. In this distance, the railroad has 36 interchange points with 36 different railroads entering Chicago, thus enabling freight shipments not destined to or from Chicago to be routed around the city. The railroad serves big industrial areas, such as the steel mills, refineries, cement plants and others in the South Chicago, Whiting, East Chicago, Indiana Harbor, Buffington and Gary districts, as well as similar areas at Waukegan and intermediate points. Consequently, the principal function of the East Joliet Yard is to classify cars into trains for delivery to interchange points with other railroads, to various industries along the

New yard intercom system on the Elgin, Joliet & Eastern at Joliet, Ill., includes 96 talk-back and 30 paging speakers which are controlled from consoles in two modern communication towers.

line, and vice versa. The road's principal shops and roundhouse are also located at East Joliet.

A Flat Yard

The yard consists of 58 mi. of track, in which flat switching is employed, an interesting feature of which is that each of the new towers has jurisdiction over both *westbound* and *eastbound* classification in their respective ends of the yard. This is in contrast to some installations wherein one



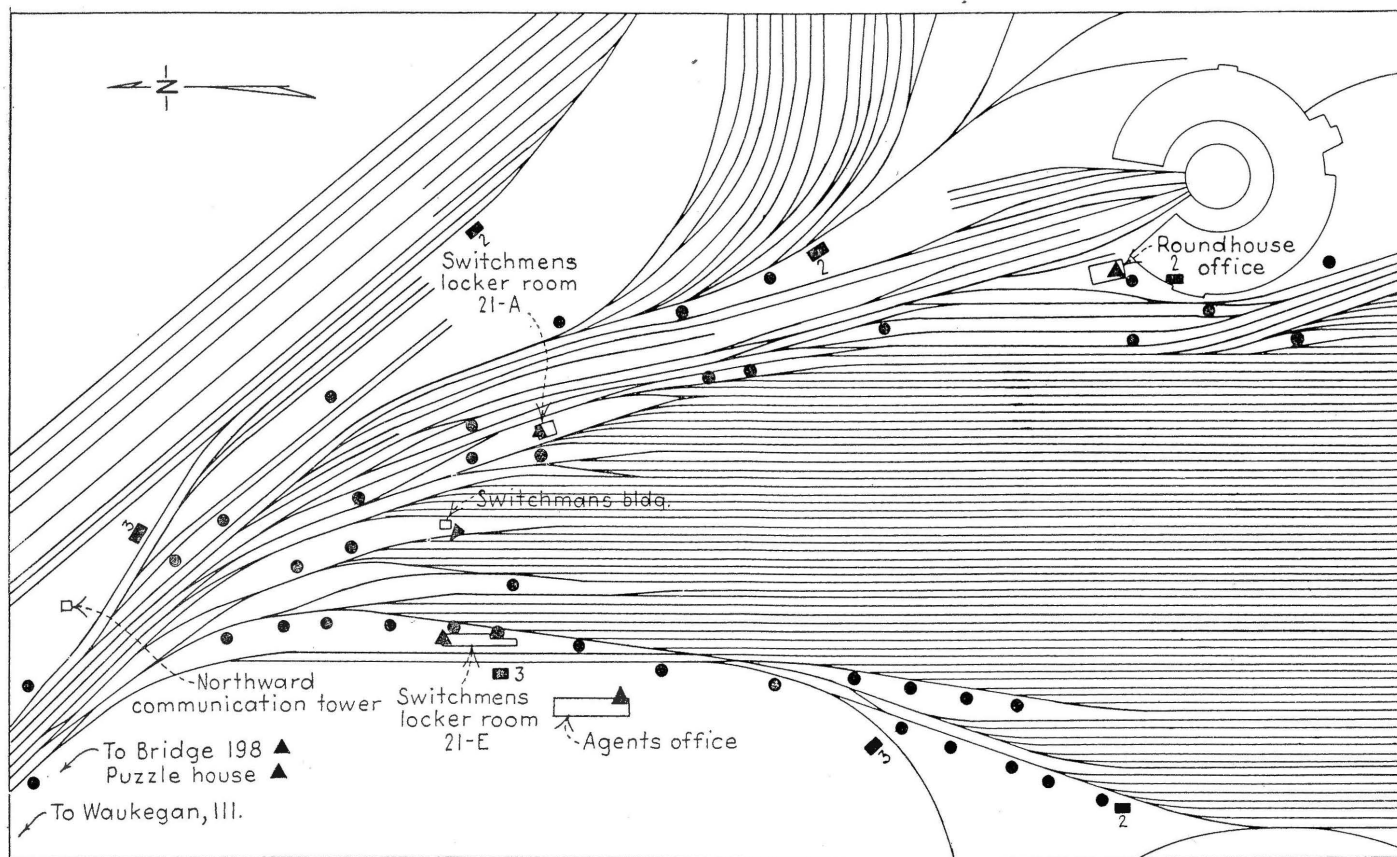
W. K. Waltz, signal engineer, adjusting volume on main amplifiers on the bottom floor of the south tower

tower has jurisdiction over classification in one direction and the other in the opposite direction.

East Joliet Yard has a standing capacity of 3,500 cars, with an average of 4,000 cars being handled every 24 hr., the maximum number of cars ever having been handled through the yard in a 24-hr. period being 4,674. Prior to the installation of the new communication facilities, the yard came under the jurisdiction of two yard offices, one located near each end of the yard. Switching instructions were given to yard crews before they left the yard offices and, thereafter by telephone when the crews called in. If a crew did not call in and a yardmaster had to contact them, it meant considerable walking and running around for him or waiting until they returned to the office, thus consuming time, especially during bad weather.

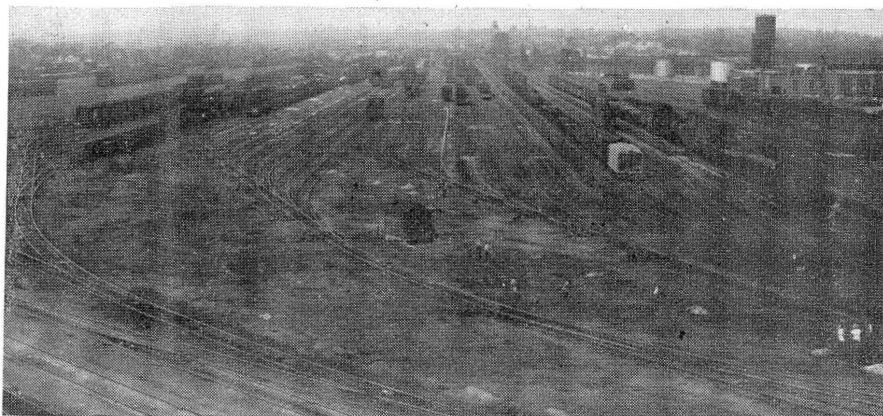
A Different Story Now

Now, however, the yardmasters in their new 62-ft. towers have an unobstructed view of the sections of the yard over which they have jurisdiction and, by means of the new communication system, can contact crews almost instantly. In addition, the handling of waybills and other papers has been expedited tremendously by the installation of pneumatic tubes. Trains



Simplified diagram of the yard, showing locations of paging

General view of yard, looking north from catwalk of the south tower. Roundhouse and shops are at right



entering the south end of the yard leave their waybills and train lists at the south yard office to be sent via a 5½-in. tube to the agent's office, near the north end of the yard, for processing and preparation of consist. When completed, the consist is returned to the south yard office, and a copy sent to the south tower via a 3-in. tube. A similar system of tubes connecting the north tower and offices in the north end of the yard is to be installed in the near future.

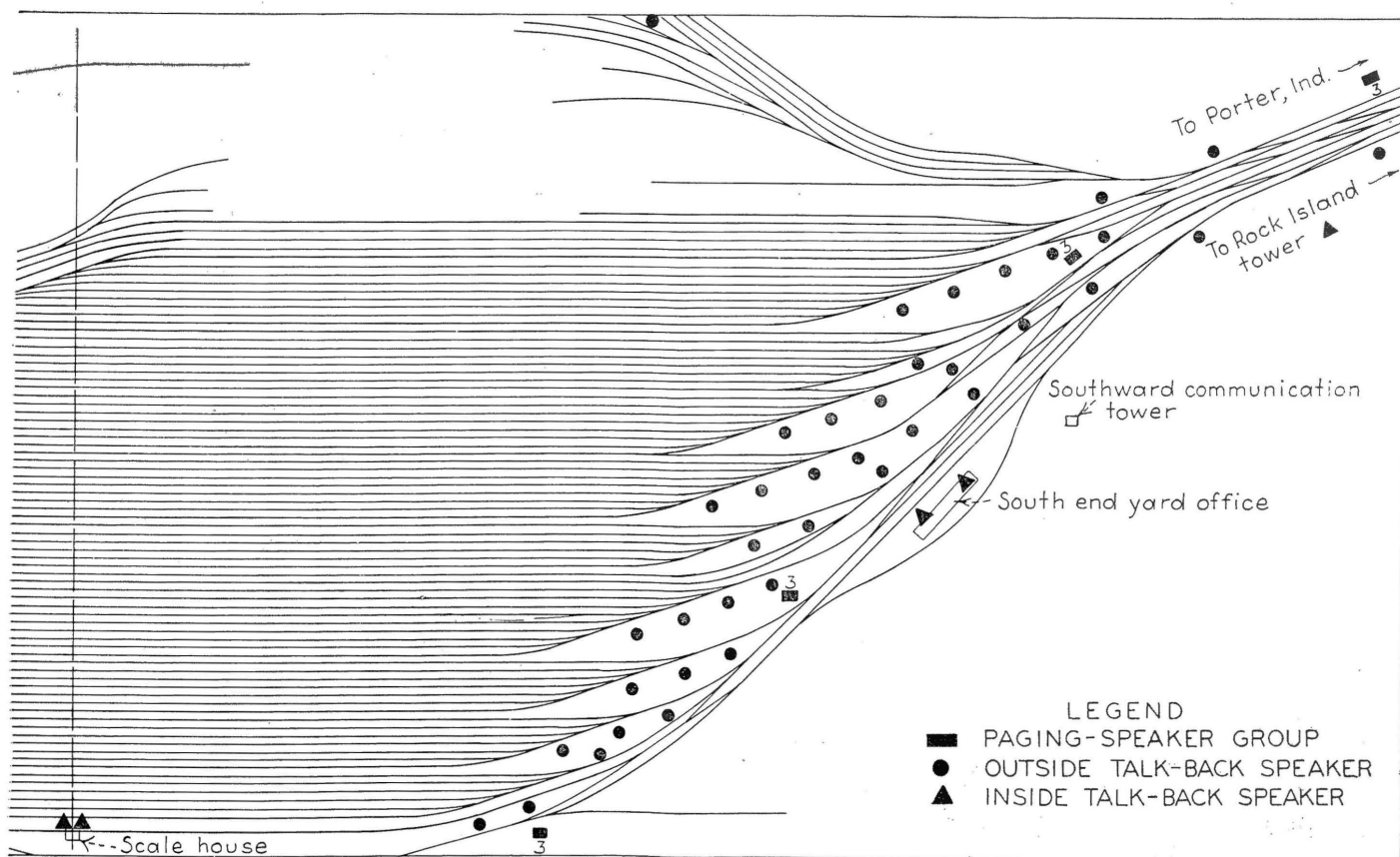
If the yardmasters know exactly where a yardman is and want to contact him, he manipulates a key on a control panel in front of him and calls the man over one of the 96 talk-back speakers located along the ladder tracks, at other strategic points and in certain offices throughout the yard. The man then replies by talking back into the speaker on which he was called. If the yardmaster does not know exactly where the man is that he wants, then he manipulates another

key to operate a more powerful paging speaker or group of speakers, 30 of which are located at strategic points along the outside edges of the yard. The man called then goes to the nearest talk-back location, and presses a button, which lights a lamp on the yardmaster's console and sounds a buzzer, after which the yardmaster acknowledges the call by operation of the key under the lamp.

Inside Talk-Backs Also

The system also includes two-way speakers for intercom service between the two towers and, as mentioned previously, between the towers and certain important offices through-

out the yard. For example, inside talk-backs controlled from the northward tower are located at Bridge 198 (a drawbridge one mile north of the yard on the main line), the puzzle switch house, agent's office, roundhouse office, west scale house and switchman's buildings 21-E and 21-A. Similarly, at the south end of the yard, inside talk-backs are located in the Rock Island tower (main line crossing 0.5 mi. south of yard), switchmens' lunch room in the south end of the yard office building, and in the south yard office. Bell System telephone service is also provided in each tower for branch exchange and outside calls. Thus, with these modern



speaker groups and outside and inside talk-back speaker locations

communication facilities between the yardmasters and the men on the ground and in various offices at all times, operating efficiency of the yard as a whole has been increased and the movement of cars expedited tremendously. Bearing fruit not only from the standpoint of the railroad, the system has also enabled quicker and better service to shippers and other railroads with which it interchanges. Cars are handled more quickly and, in turn, road trains can be gotten into the yard more promptly than before, thus eliminating the necessity of their "holding the main" until given clearance into the yard for classification.

Fire-Resistant Towers

The two new communication towers are 62 ft. above ground and identical inside and out, being of structural steel construction. Each tower consists of three fire-resistant stories with an



overhanging copper roof atop an open steel framework, the upper portion of the tower being finished with Transite shingles on the outside and Sheetrock on the inside. The yardmaster's office, loudspeaker control panel and terminal for the pneumatic tube system are located on the top floor; clothes lockers and wash room on the second floor; and the main amplifiers, relay rack and blower for the pneumatic tube system on the bottom floor.

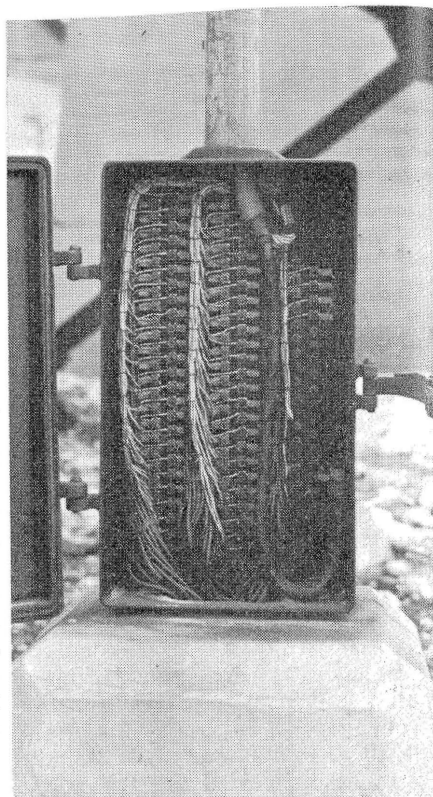
The yardmaster's office is surrounded by large double-glazed windows to give him an unobstructed view of the yard and a small door in one side provides access to a catwalk which surrounds the tower and facilitates cleaning of the windows. The yardmaster's office is air-conditioned by a Philco air-conditioning unit during the warm months of the year, and all floors are heated during cold weather by Westinghouse unit-type electric heaters, thermostatically controlled on each floor. Two 2,000-watt units are used in the yardmaster's office and one 3,000-watt unit is used on each of the other two floors.

Talk-Backs and Pagers

There are 44 outside and 7 inside two-way talk-back locations controlled from the northward tower, totaling 51, and 41 outside and 4 inside locations controlled from the southward tower. Thus, there are a total of 96 two-way talk-back locations throughout the entire yard. The outside talk-backs, for the most part, are spaced approximately 90 ft. apart along the ladder tracks at the ends of the yard where the switching is done. Each location consists of two Jensen Type TW-102 8-in. Hypex speakers—one facing in each direction down the track—mounted on a pipe mast about 8 ft. above the ground. The inside talk-back speakers are the Jensen TW-105 cabinet type.

There are a total of 30 paging loudspeakers throughout the yard. Seven of these are controlled from the north tower, three groups having two speakers each and four having three speakers each—a total of 18 speakers. There are four paging groups in the south end of the yard, each consisting of three speakers—a total of 12 speakers. These paging speakers are the Jensen H-201 15-in., 500-ohm type, with a range under normal conditions of about 600 ft. The paging groups are spaced roughly

Group of three paging speakers on floodlight tower at the north end of the yard



Cable terminal box at base of south tower

600 ft. apart along the outside edges of the yard, the speakers being mounted from 20 to 40 ft. above ground on telephone poles or floodlight towers.

Loudspeaker Consoles

The loudspeaker console in each tower is mounted atop a standard steel office desk. A dynamic type microphone is mounted on an extension arm directly in the center and on top of the control panel. There are six paging keys in the center of each console. Five of these are two-position keys, the upper positions controlling five individual groups, and the lower positions controlling five more groups. The sixth key is for master paging, if the yardmaster wants to blanket his end of the yard. Sixty two-position keys are provided for the control of talk-back speakers, and blank spaces are provided on the panel for the installation of 20 more keys if required. These keys are moved downward to answer a call. A volume-control knob for the system is at the center of the panel.

Above each talk-back key is a yellow telephone-type lamp, which is lighted whenever the button at the corresponding speaker location in the field is pressed to signal the yardmaster that he is wanted. A green lamp is provided over the talk-back key for the intercom feature between towers, to distinguish it from others. These lamps are controlled by ground-return signaling circuits from the push button at all talk-back locations.

An interesting feature of the lamps is that they may also be lighted by the yardmaster moving the talk-back control keys upward. This feature provides a marker for waiting or incomplete calls, and facilitates testing of the lamps.

Duplicate Amplifiers

Each tower includes duplicate amplifier equipment for standby in emergencies, such as in the event of an equipment failure, thus enabling uninterrupted communication service. The standby equipment can be cut in by means of a switch on the console in the yardmaster's office.

The two-way talk-back speakers are operated by R. W. Neill Type 410-A 20-watt two-way amplifiers. Type 461-B 65-watt amplifiers are used for

The two towers are identical in construction. View shows north tower

master paging and Type 421-A 20-watt amplifiers for single paging. Each amplifier system has its own individual selenium rectifier power supply for associated equipment, rather than just one power supply for the entire system—a distinct advantage for testing and in the event of equipment failures.

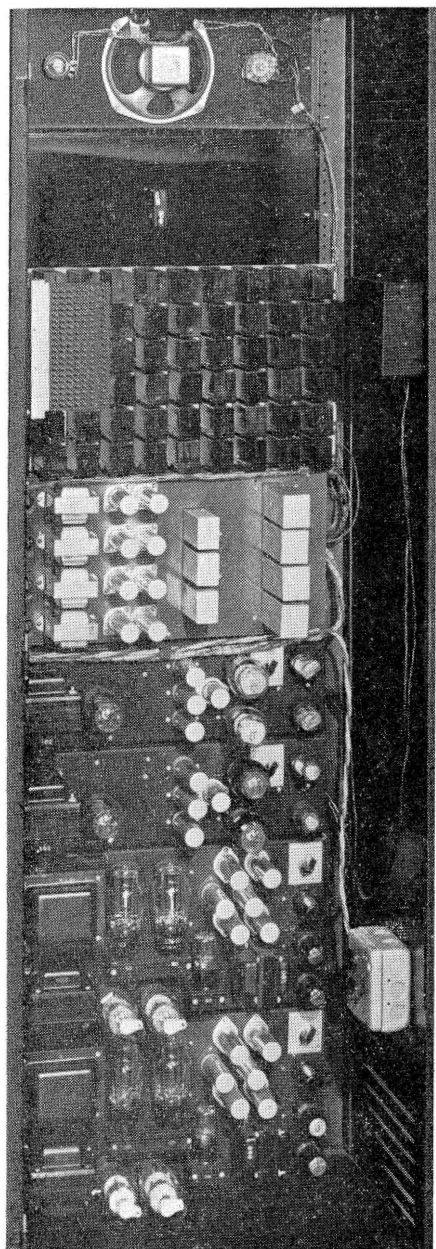
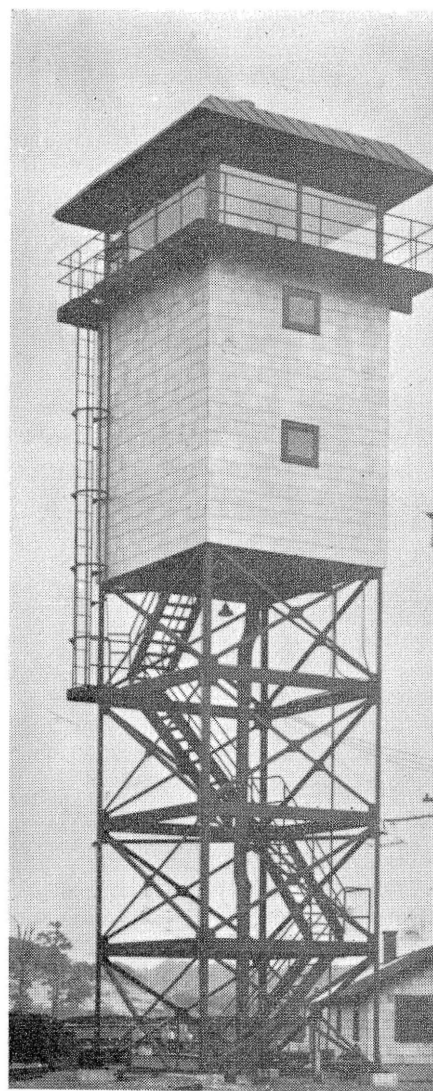
Power at each tower is received from a 2,300-volt, 60-cycle a.c. line, through a 15 kva. oil-cooled transformer, which supplies 110-220 volts for the communication system, lighting and heating of the towers.

Special Cable Used

At the south end of the yard, the majority of wire and cable runs to talk-back and paging speaker locations is underground, except in one or two instances where great distances are involved between the tower and speakers and, in which cases, aerial cable is used. At the north end of the yard, however, tracks and heavy traffic made underground construction impracticable. For this reason, aerial cable, installed on the existing pole line, was used practically throughout. It is terminated at advantageous points along the pole line in Western Railroad Supply Company terminal boxes, with underground construction extending from the poles to the individual speaker locations.

The aerial cable used on this project is Amphenol Type-14-241 special shielded high-frequency, consisting of 10 and 15-pair plastic-insulated and color-coded No. 14 conductors with a braided metallic shield to minimize interference. This cable shield is also bonded to ground at various intervals to further minimize interference and to protect it from lightning damage. Aerial cables are supported by $\frac{3}{8}$ -in. Copperweld or galvanized iron messenger with Davidson cable hangers. The underground cable is Amphenol Type-VP-16 special plastic insulated No. 16 stranded twisted pair, all of which is laid in 30-in. ditching about 8 in. wide. To protect the cable from damage, due to cinders, about 6 in. of sand was laid in the bottom of the ditch, so as to completely surround the cable before the ditch was back-filled. The cost of digging the ditching by hand, sanding and back-filling averaged between 33 and 34 cents per foot.

The underground cables from the tower and from the individual speakers in each group terminate in a concrete junction box near the group.



Main amplifiers on bottom floor of towers

About 5 ft. of slack cable is left in the junction box to allow for future changes or repairs. Underground cables entering the towers are terminated on Western Electric telephone-type terminal strips, in a Western Railroad Supply Company box at the base of the towers. From this box, cables extend to the main relay rack and amplifiers on the first floor of the towers in 2-in. galvanized iron conduit. All other communication and electrical wiring in the building is in the same type conduit with Crouse-Hinds fittings.

This yard loudspeaker installation was installed under the direction of F. G. Campbell, chief engineer; field and design supervision was supplied by W. K. Waltz, signal engineer, F. J. Halbkat, signal office engineer, B. Anderhous, junior communications engineer, and C. B. Williams, communications equipment maintainer. The major items of the communication equipment were furnished by the R. W. Neill Company. The underground and aerial cable was furnished by the American Phenolic Corporation.