The communications control console is on the yardmaster's desk in an office on an elevated tower

WABASH Installs Yard Communication System

AT Moberly, Mo., the Wabash has made an extensive installation of yard communications equipment which has facilitated yard operations, and, therefore, improved freight service to the public. Moberly, located in the north central part of Missouri, is the crossroads of several Wabash lines: east to St. Louis, 147 miles; west to Kansas City, 131 miles; northwest to Omaha, 267 miles; north to Des Moines, 193 miles; and northeast to Decatur, 212 miles.

Moberly is a terminal for freight trains to or from all these five lines. About 20 to 28 freight trains arrive here daily, and about the same number depart. Six of the trains enroute between St. Louis and Kansas City are held in the yard for a very short time, just long enough to take off certain blocks of cars, and to add others. This usually requires less than 30 minutes from arrival to departure. The remaining 15 to 22 trains daily are broken up; classified, and made up as entirely new trains. Flat switching is used throughout the yard. The traffic varies from 2,300 to 2,800 cars daily inbound, and the same number outbound. In this yard, the Wabash has two diesel switch engines which are in service around the clock daily. Two steam engines are in service the third trick, and one such engine on each of the first two tricks. Three switch crews are on duty the first two tricks daily, and four crews the third trick.

The yard is just west of the Moberly station, and extends east and west along the north side of the main track of the line toward Kansas City. This yard has nine long tracks and various short tracks, the overall length of the yard being about 1.5 miles. Shops, enginehouses, car repair tracks and storehouses are located just north of this yard. A second yard, with seven tracks about 3,300 ft. long, extends northward and connects with the Des Moines line.

New Communications System

In the new communications system, 59 outdoor type double-unit talk-back loudspeakers are located along the switching leads and various other places throughout the yard and terminal area, where switching crews, switchmen, car repair men and other men are at work. Three of these speakers are located in the roundhouse. Also, 12 single-unit indoor type talk-back loudspeakers are located in buildings and offices, such as the yard office, switch shanties, car repair foremen's office, and storekeeper's office. All of these 71 talk-back speaker locations are connected by circuits to a control panel on the desk in the yard-

Project on the Wabash at Moberly, Mo., includes 71 talk-back speaker locations and 6 paging speaker locations in yard area, as well as an intercom system connecting 5 offices

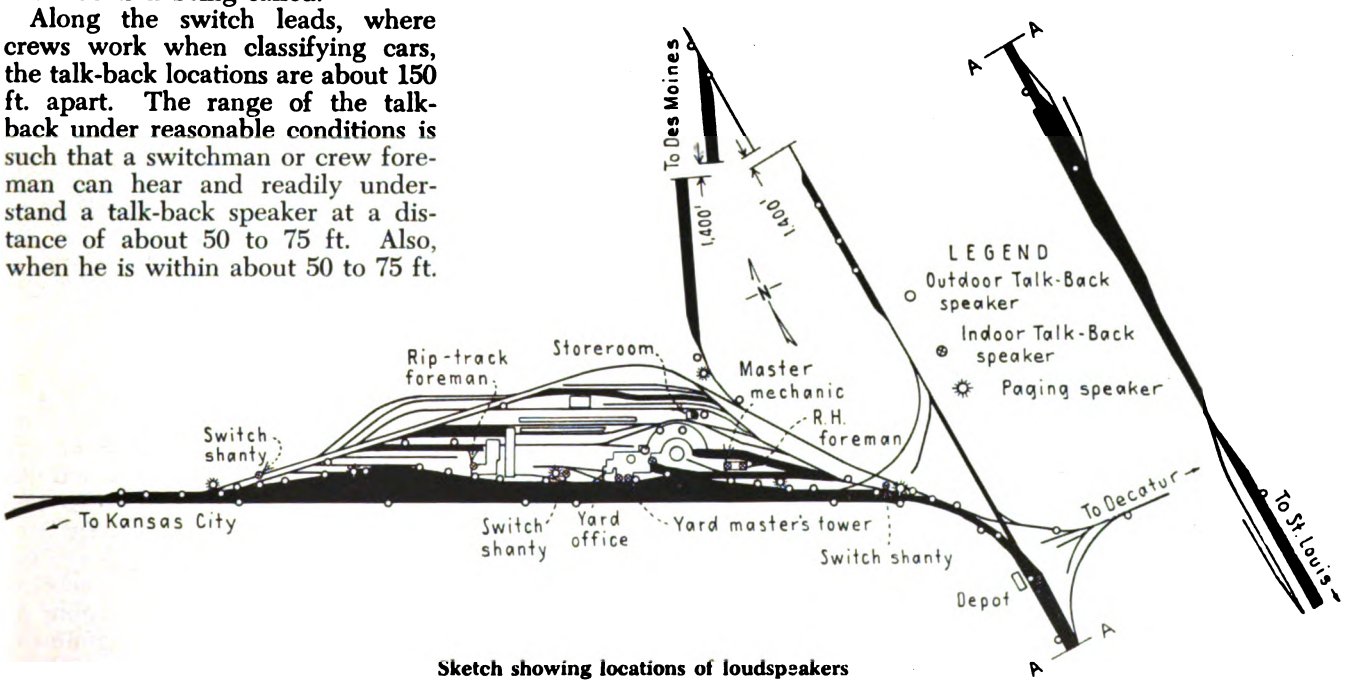
master's office which is in a tower about 52 ft. above ground level, at a location where he can see switch engines at work in most all of the yard area. As shown in the picture, this office is on top of the peak of the roof of the shop, this being the only location that would have a view of the yard, as well as other tracks to the north and west of the shop. A new steel structure, built up from foundations in the ground, extends up through the shop building to support the new office.

The yardmaster's office is on top of a tower 52 ft. above the ground

On the yardmaster's control console, there is a key and an indication lamp corresponding with each of the 71 talk-back speaker locations. If he wants to talk to a man within range of a certain talk-back, he pushes down on the key corresponding with that talk-back. This connects the office set to the circuit to that talk-back. Then, when the yardmaster speaks, he presses his push-to-talk foot switch, which connects his outgoing amplifier to the circuit. When he stops talking, he takes his foot off the foot switch, which connects the incoming circuit to the loudspeaker in the center of the panel on his console, so that he can hear the answer made by the man at or near the talk-back location being called.

Along the switch leads, where crews work when classifying cars, the talk-back locations are about 150 ft. apart. The range of the talk-back under reasonable conditions is such that a switchman or crew foreman can hear and readily understand a talk-back speaker at a distance of about 50 to 75 ft. Also, when he is within about 50 to 75 ft. of a talk-back, his voice, in reply, will be picked up and transmitted to the yardmaster. With favorable conditions, these distances would be 100 to 150 ft. Thus, brief conversations, back and forth, to secure information or issue instructions are made quickly and without the man in the field being required to go near the talk-back.

If a switch foreman, switchman or other employee, wants to call the



Sketch showing locations of loudspeakers

Paging speakers on platform on top of wood pole

yardmaster, he goes to a talk-back location, pushes a button and releases it. This grounds the center tap of the local impedence-matching transformer, which causes a corresponding relay at the yardmaster's office to pick up, closing a contact that lights an indicating lamp, and sounds a buzzer over the key for this circuit on the yardmaster's panel. When the yardmaster is ready to answer, he presses the key under the lighted lamp. This releases the stick relay which cancels the buzzer and indicating light and connects his office equipment to the circuit to the talk-back location which originated the call. The conversation is then conducted as previously explained.

Group Paging on Talk-Backs

If the man being called does not answer, the yardmaster concludes that the man being called must be at some other location. Therefore, the yardmaster can "page" the man by either of two methods: (1) by throwing a corresponding key, the yardmaster establishes "group" paging of 2 or 6 talk-backs in a given area, and he then makes the call through all these talk-backs in the group. If this does not bring a response, the yardmaster throws a corresponding key that connects his outgoing set to paging loudspeakers. There are six of these locations, each having two or three large-sized 25-watt loudspeakers with 21 in. diameter horns. These speakers can be heard for several hundred feet. A possible objection to using these large paging speakers during the night hours is that the sound carries so far that residents in the vicinity might complain. For this reason, the new practice of group paging with talk-backs has proven to be of considerable advantage.

Intercom System

In addition to the talk-back speaker and paging speaker system, the new communications facilities also include an intercom system, with units in the offices of the chief dispatcher, the yardmaster, the master mechanic, the trainmaster and the division superintendent.

This intercom system centers in the master set in the chief dispatcher's office, shown in one of the pictures herewith. The chief dispatcher can call any one of the four other offices by pushing down on a corresponding key and speaking. Thus, he originates his call by voice. He pushes down on his key when he speaks, and allows this key to return to center position to listen.

The offices of the chief dispatcher, the superintendent and trainmaster are all on the second floor of the passenger station building. These three intercom sets are connected by one circuit. Therefore, any one of these, i.e., chief dispatcher, superintendent and trainmaster, can call each other by operating a corresponding key and talking directly into the speaker.

If the chief dispatcher wants to call the yardmaster, he presses the key marked "YM" and talks. The yardmaster responds without operating either key or foot switch. When the yardmaster originates a call, he presses key marked "CD" which registers a light and sound buzzer on the chief dispatcher's set. When the chief dispatcher responds, he operates a talk-listen key and carries on the conversation. Communication between the chief dispatcher and the roundhouse foreman is handled in a similar manner.

Benefits of System

Prior to the installation of the new yard communication systems, the yardmaster spent most of his

Talk-back speaker location

time walking from one part of the yard to another in an effort to contact switching crews, car repairmen and other forces. As he could be at only one place at a time, he had difficulty in meeting changing circumstances, and in too many instances he was busy correcting troubles, rather than being able to anticipate difficulties and eliminate them before delays occurred. Now,

IN OFFICES Talk-back Loudspeakers	
5	freight depot
20	switch shanty
44	roundhouse foreman
45	master mechanic
49	storehouse
62	diesel shop
68	roundhouse
69, 70	yard office
74	switch shanty
94	repair track foreman
109	switch shanty west end

OUTDOORS Talk-back Locations			
3A		64H	
4A		65H	
6A		66H	
7A		67H	
9B		73J	
10B		77J	
13B		99J	
14B		114J	
15B		75K	
17C		78K	
18C		95K)	repair track
19C		98K	
23C		104K	
24C		76L	
26D		79L)	
27D		93L)	along
28D		96L)	switch
29D		97L)	lead
33E		103M)	scale track
34E		105M)	along
36F		106M)	switch
37F		107M)	lead at
38F)		108M)	west end
39F)	along	113N)	west
40F)	switch	115N)	end
43F)	lead	116N)	yard
46G		117N)	west end and
47G		118N)	connection to
48G		119N)	main track
63H			

the yardmaster stays in his elevated office, and, by means of conversations going back and forth between him and various men throughout the yard, operations of the yard are expedited in many ways.

For example, the yardmaster can keep in touch constantly with the yard crews to receive information on the progress of work underway, and to issue new directions based on changing circumstances. For instance, the yardmaster may direct a crew to clear a lead so that an approaching train can pull in without delay.

When an inbound road train arrives and stops at the yard entrance switch, the yardmaster uses the loudspeaker at that switch to tell the head brakeman the track number on which the train is to pull in. In one instance, a switchman noticed a bad-order condition on the third car from the rear of a train as it was pulling into the yard. He used the nearest talk-back speaker to tell the yardmaster. The yardmaster used the speaker system to tell the car foreman. As a result, the defect was corrected promptly so that the car made connection for the outgoing train.

The fact that the yardmaster has contact with both the front and rear ends of trains entering or departing from the yards by means of the talk-back and paging speakers make it possible to relay information from rear to front end or vice versa promptly, thus eliminating delays especially in foggy weather.

On the six through trains daily, between Kansas City and St. Louis, the principal yard work at Moberly is to take off and set on blocks of cars. Then the train is coupled up ready to go. Under such circumstances previously, there was considerable delay in getting word to the engineer concerning the number of cars and tonnage on his train. Now, the yardmaster gives a brief statement via the loudspeaker nearest the engine, and the engineer is ready to go.

Under previous practice, about the best that the yardmaster could do was make an estimate within 30 min. of the time a train would actually be ready to depart. Now he can see and hear progress every minute, and he can look ahead 30 to 45 min. and tell the dispatcher when a train will be ready to depart, and not miss more than 5 minutes. This is a great help to the dispatchers in lining up to have everything prepared for trains to go at once when ready, and for planning meets that are based on fact, not on "called for 10 a.m.". Thus, the benefits of the yard communication system extend out on the road too. The benefits in expediting yard operations brought about by the yard communication system at Moberly have been such that the Wabash is considering similar installations at other yards.

The amplifier equipment for the talk-backs and paging speakers is in a sheet-metal case on the floor below the yardmaster's office. This apparatus includes: (1) a microphone pre-amplifier; (2) a receiving amplifier for incoming speech; (3) a standard 20-watt amplifier for outgoing speech and (4) a standard 65-watt amplifier for paging speakers. The amplifiers are in duplicate. If the set in service fails, the standby can be cut in service by operating a small key switch mounted under the yardmaster's desk. The microphone on the yardmaster's console, is the dynamic type designed for voice frequencies.

The amplifier equipment is normally fed from 120-volt a.c. commer-

Chief dispatcher uses intercom system

cial supply. The relays and local circuits including the lamps in the yardmaster's control console are fed at 24 volts d.c. which is supplied by a selenium rectifier. If the incoming commercial a.c. power fails, a relay is released which automatically starts an Onan gasoline engine driven a.c. generator, which at 1,800 r.p.m. will deliver 13 amp. at 115 volts single-phase a.c. This will take over the feed to the amplifiers and to the rectifier to feed the d.c. circuits and also the lights in the central tower.

Wiring Distribution

A two-conductor insulated 4-in. lay communication twisted pair, extends from the control tower to each talk-back speaker and paging speaker location. In addition to the pair in service, each speaker is protected by running one spare to each group and looping this wire into each speaker mast of the group without cutting. These wires are No. 16 gage, 26 strands of No. 30 tinned copper. Each of the two conductors is insulated with 0.030 in. wall of polyethylene and a 0.030 outer jacket of polyvinyle chloride, a total of 325,000 ft. of twisted pair being used on this project.

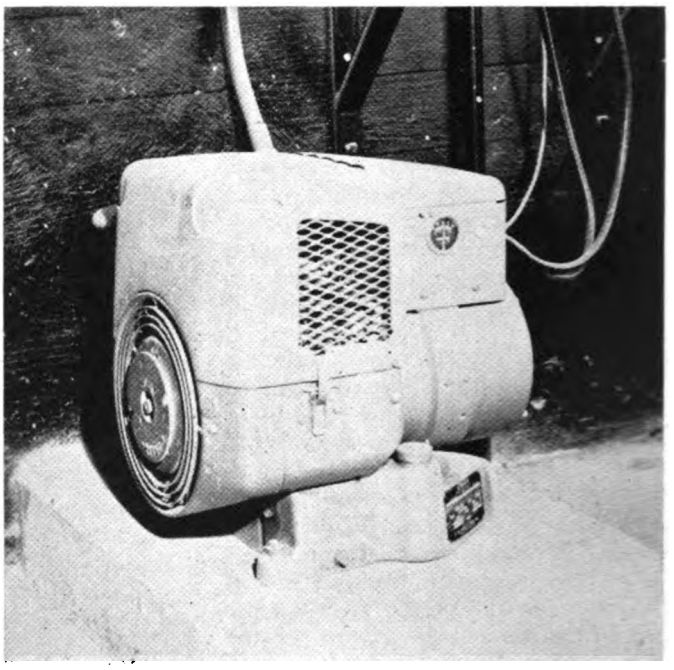
These insulated wires were buried, trenches being dug about 10 in. wide and 36 in. deep. In all open spaces these trenches were dug by a Jeep trench digger.

A layer of sand 3-in. deep was placed in the bottom of the trenches. The wire was placed on this sand and more sand, about 3 in. thick, was placed over the wires. The "high level" wires going to the paging speakers were buried with the other wires, but were separated by placing them on the opposite side of the trench from the two-way talk-back circuits.

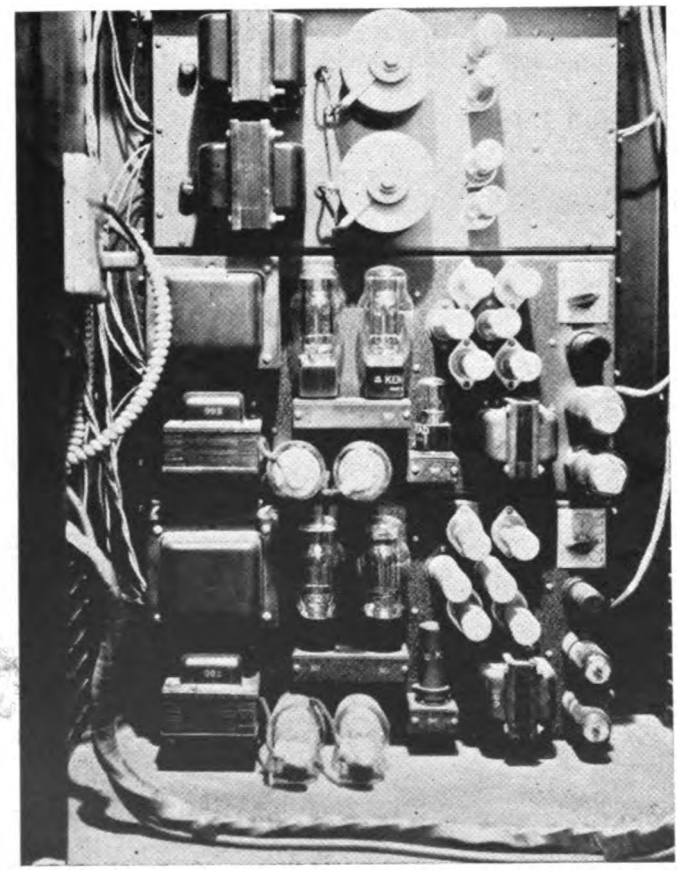
Wires coming down from the tower are terminated in a junction box at the ground line. Also, junction boxes are located at various places about 600 to 800 ft. apart. In the boxes and cases, the wires extend to terminal posts mounted in bakelite strips as shown in the picture.

In some instances, talk-back speakers are on 2-in. masts attached to the top of these junction box cases. Generally, the talk-back speakers are mounted on 2-in. pipe masts with cast iron bases bolted to pre-cast concrete foundations. A weatherproof push-button—for calling—is mounted in a fitting in this mast. At the top of the mast there is a special pipe fitting which houses the impedence - matching transformer. The two talk-backs are mounted on this fitting as shown. These are 15-watt speakers with 8 ⅞-in. diameter horns.

The paging speakers are rated at 25 watts, and have 21 in. diameter horns. These paging speakers are in groups of either two or three to the group. Each such group is on a 5 ft. 6 in. square platform 23 ft. above the ground, on top of a treated pine pole. The purpose of the platform is to provide a safe and convenient place for a man to install and maintain these speakers.



This gasolene-engine - driven a.c. generator takes the load if the incoming a.c. power fails



The amplifier equipment is mounted in a case on first floor beneath tower office

This new communications system at Moberly was planned and installed by the Wabash, under the direction of G. A. Rodger, superintendent signals and communications. The yardmaster control console with relays in place and amplifier cabinet completely wired was furnished by R. W. Neill Company, Chicago. This company also furnished the intercom units, paging speakers, talk-back speakers and associated accessories.