

LEGEND

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| 1. Interchange with B&O R.R. | 6. Inspection Pits and Tower. | 11. Car Repair Facilities — 3 tracks — 93 car capacity. | 15. Departure Yard Office. |
| 2. Diesel Servicing Facilities. | 7. Hump and Underpass. | 12. Retarder Tower. | 16. Departure Yard. |
| 3. Caboose Tracks. | 8. General Yard Office. | 13. Group Retarders. | 17. Auxiliary Tracks for Local and Industrial Service — 10 Tracks — 22 car capacity. |
| 4. Receiving Yard. | 9. Motion Weighing Track Scale. | 14. Classification Yard. | |
| 5. Hump Lead Tracks. | 10. Master Retarder. | | |

Communications is Everywhere at P&LE's

Separate communications systems must be provided for particular activities carried out in the operation of a modern retarder classification yard so that these activities can be performed efficiently and without interference to others. Interconnection between the various separate communications systems must also be provided, because the action of one group will affect others in the handling of trains in the yard. Also, supervisors must be kept informed concerning operations, as well as being able to give instructions to individuals working in the various activities. Thus the situation resolves into two parts: (1) who talks to whom? and (2) what specific communications facilities must be provided? The answers to these two questions, as related to Gateway yard at Youngstown,

Ohio, on the Pittsburgh & Lake Erie, are presented in this article.

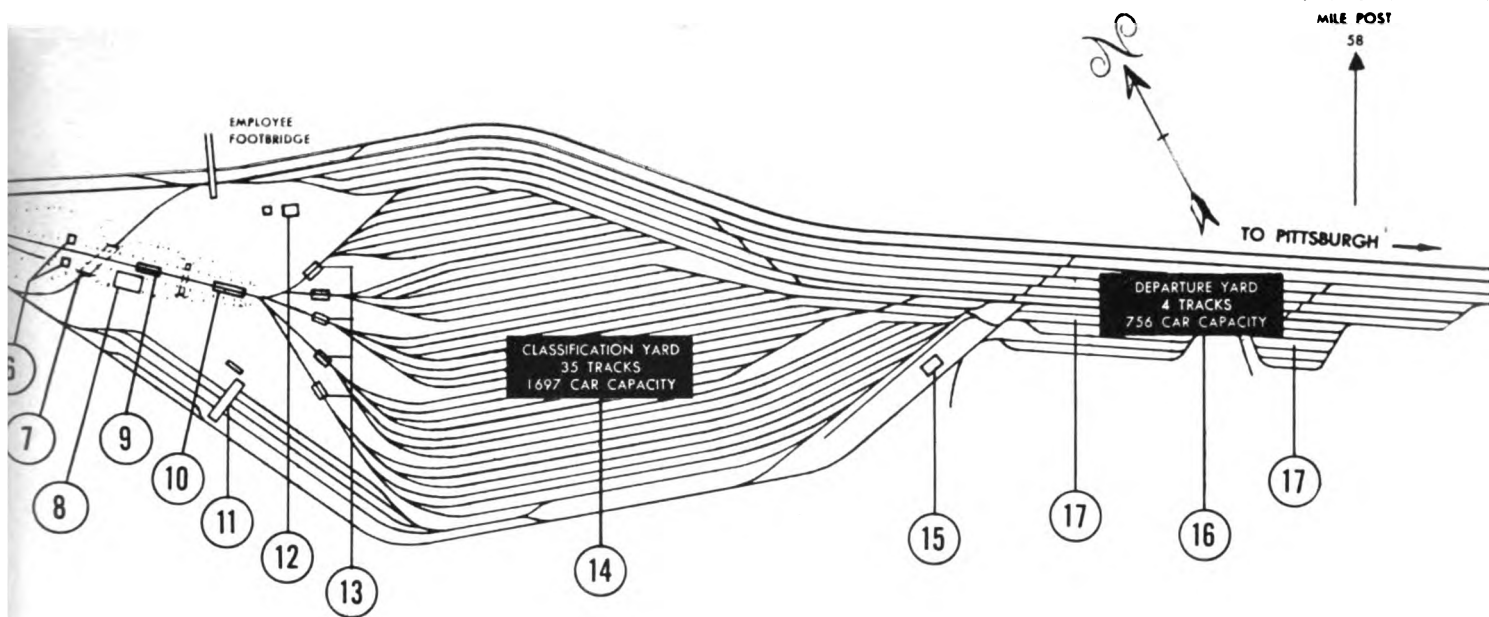
COMMUNICATIONS EVERYWHERE! These two words precisely describe the facilities at the Pittsburgh & Lake Erie's Gateway yard in Youngstown, Ohio. A brief rundown on the various communications systems is in order before we get into a description and reasons for each system.

For car checking purposes, three different types of communications systems are provided. (1) To check trains arriving from the north, that is, from Ashtabula or Cleveland, telephone recording is provided, whereby a man at the west end of the receiving yard speaks car initials and numbers into a telephone handset. His voice is sent over a telephone wire pair to disc type recorders in the hump building TV room. (2) A television camera, set on a pole opposite the hump building, is directed to view the sides of freight cars in trains arriving from the south and Pittsburgh. The television viewer is also in the hump building TV room. (3) As cars are pulled from classification tracks for

makeup into trains in the departure yard, their initials and numbers are read off by a car checker using a portable radio transmitter. His voice is picked up by a radio receiving station, which feeds the audio over wire line to the disc recorders at the hump tower.

Radio Used Throughout Yard

The 26 yard engines are equipped with two-way radio. The two hump engines (three 600-hp diesels coupled) have radio on a frequency of 160.41 mc. Two puller engines, which pull cars from the classification tracks and shove them into the departure yard for making up outbound trains, have two-channel, two-way radio. Crew foremen who work with these engines have portable radio transmitters which they use to give instructions to their puller engineers. As there are two puller crews, each puller engine must have its own separate frequency for receiving calls from the Handie-Micro-Talkie transmitters. Each puller engine also has a separate frequency for its radio transmitter. The use of four frequencies for this system provides a private radio system for each, so that in-



Nine radio frequencies are used in this yard: 159.69 mc—Dick Tracy for foreman of puller engine No. 1; 160.35 mc—Dick Tracy for foreman of puller engine No. 2; 161.79 mc—radio receiver of puller engine No. 1; 160.95 mc—radio receiver of puller engine No.

2; 160.89 mc—general yard frequency; 160.41 mc—hump frequency; 160.65 mc—Dick Tracy for car checking in class yard; 161.61 mc—transmitting frequency for car inspection walkie-talkies; and 159.57 mc—receiving frequency for car inspection walkie-talkies

Gateway Yard in Youngstown, Ohio

structions given by a foreman are received only by his puller engineer. How this unique system operates will be described later in the article. The second frequency is on the yard system.

Another separate radio system is provided for car inspectors who work in the receiving, classification and departure yards. These men carry walkie-talkies, which operate in conjunction with repeater stations. A radio-equipped jeep is used for carrying the inspectors to the different yards and for bringing tools and equipment to them.

Five Talk-Back Speaker Systems

The five talk-back speaker systems located in various portions of Gateway yard are each identified as being associated with a particular supervisory individual. Identification is by means of color stripes above and below the signal push-button on the speaker mast.

(1) The 22 talk-back speakers in the red system are located in the eastern (bowl) end of the classification yard, and are controlled by the East End yardmaster.

(2) The 58 talk-back speakers in the yellow system are in areas



Hump conductor has radio, intercoms and talk-back speakers for communications. He punches track numbers for cuts on his automatic switching console

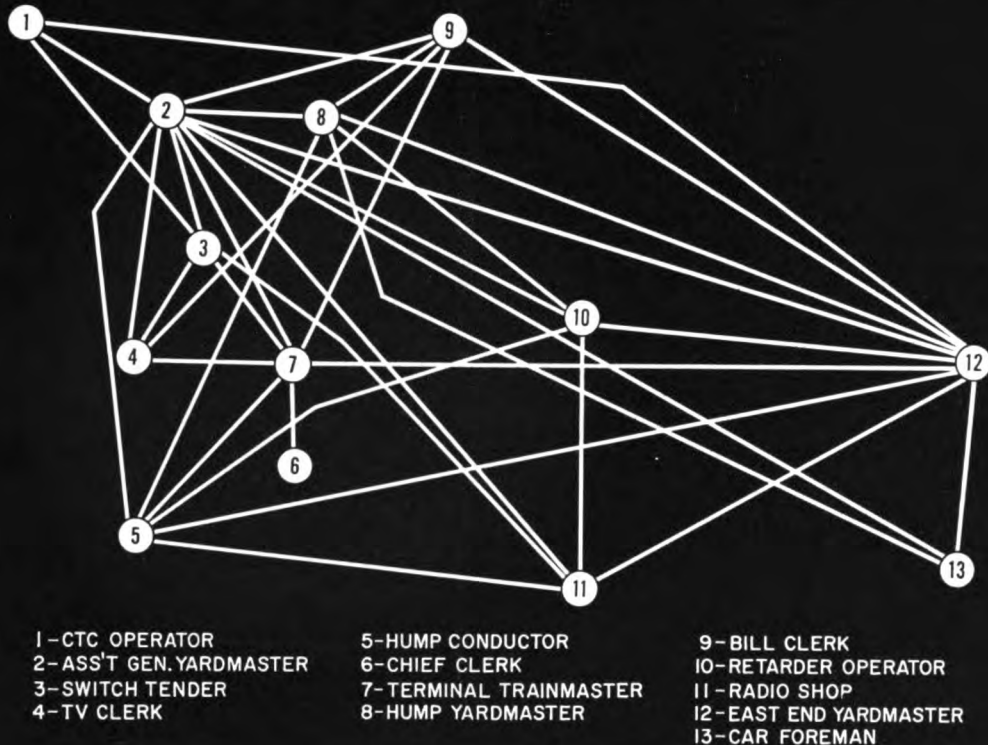
where work is under the supervision of the assistant general yardmaster in the hump tower building. These areas include the westerly end of the departure yard, the east end of the car repair yard, the hump approach and both ends of the receiving yard. Also, a few yellow speakers are in the diesel servicing area.

(3) The black talk-back speaker system, including 38 talk-backs, is located at the east and west ends of

the receiving yard, and at the diesel servicing facilities. These speakers are along the leads to the receiving yard, being controlled by the switch tender. He controls the non-interlocked power switches to line routes for inbound trains entering the receiving yard.

(4) For providing direct two-way communications between signal maintainers, the retarder operator and the relay room in the retarder tower, a separate blue talk-back

BASIC INTERCOM CIRCUITS GATEWAY YARD



Intercom circuits provide direct communications between supervisors who must get in touch with each other quickly and without delay. These circuits run between communications consoles of the various

individuals. Many of these men also have their own talk-back speaker systems for working with men under their immediate jurisdiction. Instructions are quickly passed on to everyone

speaker system is in the retarder area of the classification yard.

(5) A green talk-back speaker system consists of four speakers located at the hump crest. These speakers are controlled by the hump conductor, so that he may give direct and instantaneous verbal instructions to the pin puller and other personnel along the hump lead.

Intercom connections are available between the consoles which control these various talk-back speaker systems. Thus, each supervisory individual, who has his own talk-back speaker system, can quickly contact another supervisory individual. For example, the hump conductor (green talk-back speaker system) has direct intercom to the assistant general yardmaster (yellow talk-back speaker system) upstairs in the hump tower building. Thus, instructions for supervision concerning more than one group of individuals in the yard, can be quickly passed to the various supervisors in charge of these functions.

In addition to the separate talk-

back speaker systems throughout the yard, various intercom circuits are provided between the various offices (see plan). A special "round robin" intercom was installed, connecting those persons concerned with humping operations. They include the pit car inspectors. An inspector is on each side of the hump lead at just below track level, so that he can look at the sides, underframe and running gear of a car. In case of defects, he can so inform the various persons so that humping operations can be stopped and the load corrected. In addition to the inspectors at the hump, the hump yardmaster, the assistant general yardmaster, the hump conductor and the retarder operator are on this "round robin" intercom circuit.

Dial Telephones in Various Offices

In addition to direct intercom between the various offices throughout the yard, there is a dial telephone system. A person having an extension on this system can dial

any other extension on the system.

The pneumatic tube system was installed to carry waybills from the car checker's building at the west end of the receiving yard to the TV room in the hump tower building. Another tube connects the TV room with the assistant general yardmaster on the top floor of the hump tower. A third tube runs from the assistant general yardmaster's office to the hump conductor's office and retarder tower. Thus, when the switch list has been prepared it is sent by pneumatic tube to the assistant general yardmaster, hump conductor, and the retarder tower.

Car Checking Communications

The three different types of communications system chosen for car checking were selected on the basis of providing the most efficient means for the particular situation involved. Trains which arrive from the north and west, such as Cleveland and Ashtabula, pass a small building as they enter the yard. Here conductors of arriving trains

bring their waybills, which are then sent by pneumatic tube to the yard office. As it would be convenient for a man at this point to read initials and numbers of cars as they pass, the only problem was to provide an economical means of transmitting this information back to the yard office. A cable had to be strung down here for phone service into this West End office, it was a simple matter to add circuits for car checking purposes. Accordingly, a Gray Audograph telephone handset was installed and connected to control circuits going back to the TV clerk in the hump tower building. The TV clerk sees to it that blank recording discs are kept in the Gray Audograph recorders. These discs hold 30 minutes of recording time, and thus two discs are more than ample to hold car checking information on a 120-car freight train. The car-checking telephone handset works in the

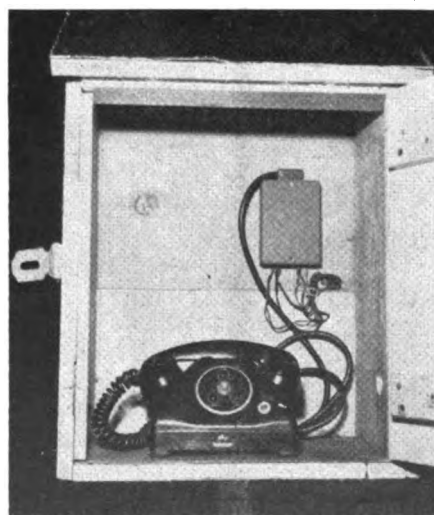
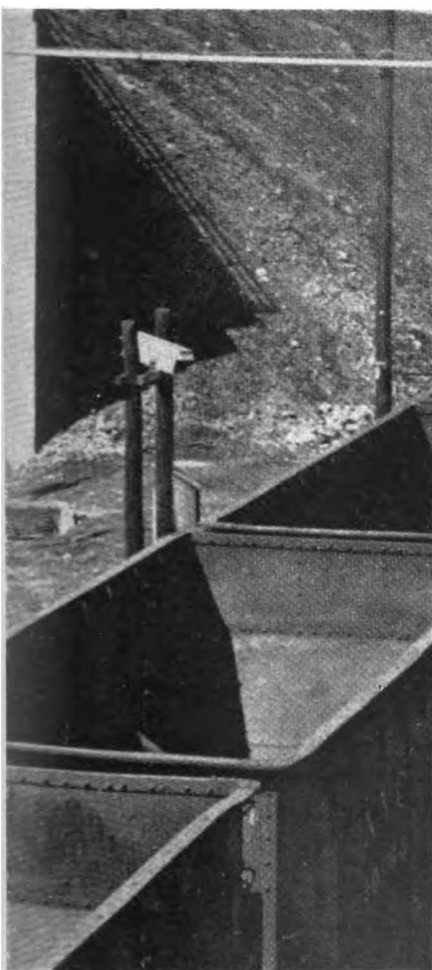
conventional push-to-talk manner and, thus, the recorder is recording only while the push-to-talk handset button is pressed. A feature of the handset is a listening pushbutton which the car checker can press to play back a portion of his recording. He may do this at the beginning of the recording to be sure that the equipment is operating properly.

The second telephone recording handset was located in a wood pole box near the television camera for checking inbound freight trains from the south. Although, at this point, car checking is normally done by television, telephone checking facilities are available in case of emergency or with the television out for repairs.

TV Checks Trains From the South

Trains from Pittsburgh come in on the main line, down the north

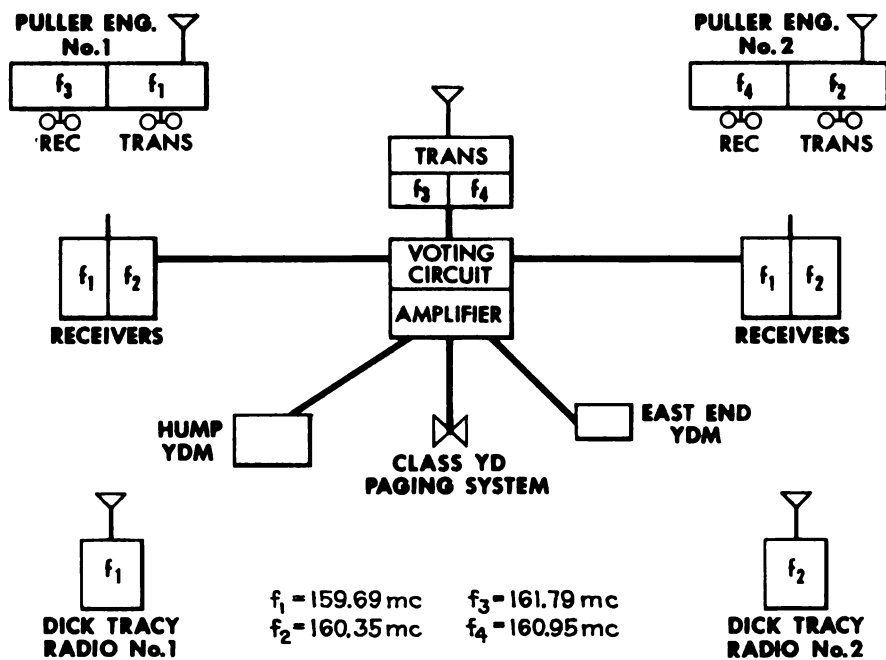
side of the classification yard, and enter the East End of the receiving yard. Although the TV clerk can look out his north office window and view these trains arriving from the south, there are times during rainy weather, or when a cut of cars is passing on the hump track, that his view of these inbound trains is partially or completely blocked. Therefore, a TV camera is located adjacent to the main line at this point, just north of the hump tower building. Designed for remote adjustment of its lens iris and focus controls for varying light and weather conditions, the camera observes the sides of freight cars moving toward the receiving yard. The camera and four 1,000-watt mercury vapor spotlights, for illumination in haze and at night, are mounted on a cross brace (a sort of H-frame made from two telephone poles) with control, power and lighting cables running underground



TV clerk in general yard office (near hump) views passing inbound train on his TV screen. He "talks" initials, number and kind of car into the recorder handset. Later he transcribes the consist from the plastic disc recording. A similar recorder makes a record of checking "phoned" in by a clerk at the west end of the yard for trains from the north (see below)

Telephone is used for car checking for trains from Ashtabula and Cleveland (north and west). Pressing push-to-talk button starts a recorder in the TV clerk's office

Television camera, in weatherproof housing, "grabs car numbers" of inbound freight train from Pittsburgh and the south



Simplified block diagram shows basic components of the puller engine radio system which provides separate communications between a puller engine foreman and his puller engine crew

into the hump tower building.

The TV monitor with its viewing screen and the camera control equipment are mounted in portable metal cases, similar to suitcases, on a table in the TV clerk's office. Since the television system is on most of the time, all tubes are warm and operating properly when the TV clerk is notified by the assistant general yardmaster of a train approaching Gateway Yard from the south. The TV clerk, using the hand microphone connected to the recorder, reads car initials and numbers of the passing freight cars. Later, using stethoscope-type earphones or loudspeakers he transcribes the recorded information.

The television camera, control equipment and monitor, are made by General Precision Laboratory, Inc. One of the reasons for selecting the GPL equipment is that only the camera, in its weatherproof housing had to be mounted out at the viewing site. All camera controls, including the TV monitor, could be remotely located in the TV clerk's office. The advantage of this arrangement is that a minimum of construction was necessary at the camera site, thus only two wood poles and two cross timbers were required to support the camera and the four spotlights. The camera angle, position and size of its lens were selected to obtain a

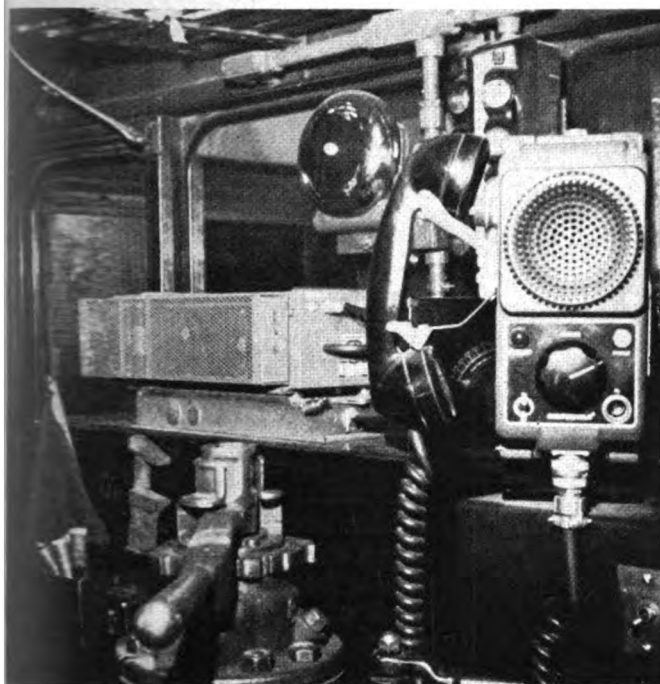
field of view sufficient in magnitude so that the identifying numbers of all types of cars can be read despite their varying heights. With an object distance between camera and cars of approximately 13 ft, a ½-in. lens is used. The windshield wiper, on both sides of the front glass of the weatherproof case enclosure are also remotely controlled from the TV clerk's office. This has proved most helpful during rainstorms, when the clerk has been able to car check incoming trains with no difficulty whatsoever.

Radio Checking in Class Yard

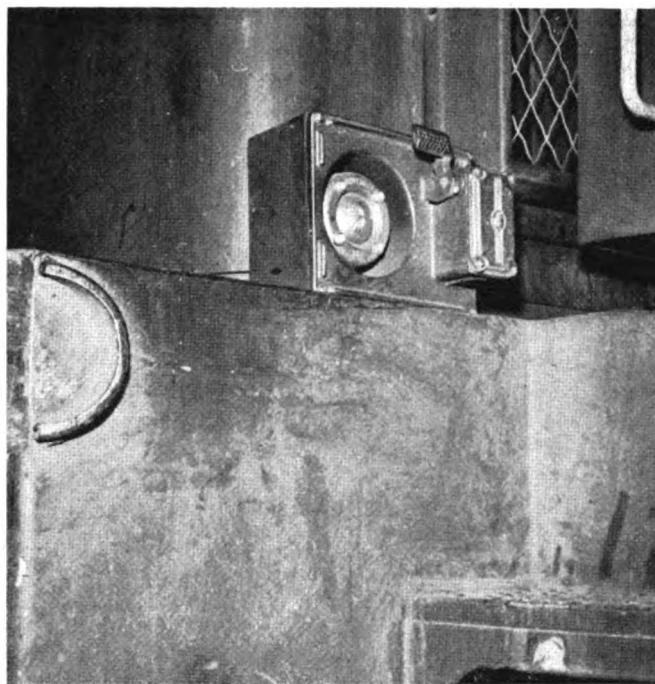
As cars are pulled from the classification tracks to be made up into outbound trains in the departure yard, a third means of car checking is employed. A clerk, carrying a small portable Handie-Micro-Talkie, popularly known as a Dick Tracy radio transmitter, goes out into the bowl end of the classification yard near the East End yard office. Looking up at a nearby floodlight tower, he notices whether the red lamp mounted on the tower, approximately 30 or 40 ft up, is lighted or not. If the lamp is lighted he knows that the recorder in the TV clerk's office is not in the recording position, and therefore he cannot car check. Seeing the red lamp on the tower lighted, the clerk

calls the recording office on the telephone saying, "The red light is on and I am down here ready to check some cars. Will you put on the recorders?" Hearing this call, the TV clerk, first seeing that blank discs are in the recorders, turns a recorder on. This action extinguishes the red lamp on the floodlight tower. Now that the lamp is dark the man in the yard knows that the recorders are ready. He therefore presses his push-to-talk button and speaks the car initials and numbers into his Dick Tracy. Each time he presses his push-to-talk button the red lamp on the tower will come on. This indicates that his radio transmission is received. This is accomplished by dropping a relay when the carrier is received by the base receiving radio station. When the man has recorded 28 minutes of information, the red tower light will burn steady, regardless of whether the man presses his push-to-talk button or whether he releases it. This indicates that he is to stop car checking as there are only two minutes of blank space left on the recording disc. Simultaneously with the lighting of the red lamp on the floodlight tower, an indication lamp on the recording machine is also lighted. This informs the TV clerk that the machine has only two minutes left of recording. Therefore, he operates a switch turning on the second recorder. When he does this, the red lamp on the tower is extinguished. The car checking clerk, now seeing the red lamp on the tower go out, knows that he can continue car checking operations.

Two puller engines work at the bowl end of the classification yard pulling cars for making up outbound trains in the departure yard. To provide communications between the switch crew foreman and his engines, and to make each puller engine communication system separate from the other, a unique radio system was developed, using four radio frequencies. The switch crew foreman uses a Dick Tracy radio transmitter. Talking through base repeater stations and a separate transmitting station, he gives instructions to his engine. The foreman's instructions are also broadcast over the class yard paging speakers, so that other men



All yard engines have dual-channel radio with the transistor power supply for direct operation on 64-volts d.c.



Locomotive footboard speaker is for radio use only. It is a weather-proof, ground-line type of talk-back speaker

working in the class yard are informed when cars are to be pulled at the lower end. Because the foreman carries only a transmitter, he hears answers to his instructions over the paging speakers.

Unique Radio for Puller Engines

In detail, here is how the system operates (see block diagram). Switch crew foreman of puller engine No. 1 has a Dick Tracy that transmits on frequency F-1. When he pushes his press-to-talk button on his portable transmitter, his voice is broadcast at 159.69 mc. This transmitter has a 100-milliwatt output and an approximate range of 1,500 ft. The two base receiving stations are approximately 3,000 ft apart with their antennas, atop 110-ft floodlight towers. The foreman's broadcast may be picked up by either or both base receiving stations. If it is picked up by both stations, the audio signal is fed into a voting circuit, which selects the strongest signal and automatically cuts out the signal of the other receiver. The strongest signal keys the transmitter of a base station located approximately midway between the two receiving stations. The base transmitter then broadcasts the switch crew foreman's voice at frequency F-3, 161.79 mc, which puller engine No. 1 receives.

Simultaneously with this rebroadcasting, the switch crew foreman's voice is also fed into amplifiers of the class yard paging speaker system.

To answer the switch crew foreman, the engineer of puller engine No. 1 uses his radio, which transmits on frequency F-1, 159.69 mc. The base receiving stations pick up this transmission, the voting circuit selects the stronger one, cuts out the weaker signal, and the engineer's voice is broadcast on the paging speakers, so that the switch crew foreman hears the answer. Another advantage of having the paging speakers broadcast the switch crew foreman's radio transmission is that the foreman of puller engine No. 2, hearing the foreman of engine No. 1 talking, will keep off the air.

If the East End yardmaster or the hump yardmaster desires to give instructions to either of these puller crews, they do so by paging over the class yard paging system. The foreman called answers by using his portable radio transmitter. He pushes his press-to-talk button twice (within 2 seconds) to contact the East End yardmaster, or pushes three times to talk to the hump yardmaster. This action picks up a relay to light a light above a key, which operated, puts the paging speaker amplifier onto a line to

the console of the yardmaster called. Thus, when the base receiver picks up the foreman's voice and feeds the audio to the paging speaker system, it will also feed it into the particular yardmaster's console.

All base station radio equipment, either transmitters or receivers, is the single-package type mounted in wood pole boxes at the floodlight tower bases where the stations are located. The high-gain antennas atop the towers are fed by $\frac{3}{8}$ -in. copper coax with dry air at 12 psi. These antennas must receive two frequencies, 159.69 mc from puller engine foreman No. 1, and 160.35 mc from puller engine foreman No. 2. A tuned cavity resonator is used to separate the two frequencies.

Yard Radio on 26 Engines

All 26 engines working in Gateway Yard have the Motorola AAR single-package radio unit with the transistor power supply for direct operation on 64 volts d.c. These are dual-channel radios, one channel being on the yard frequency of 160.89 mc, and the second channel may be the road, hump or puller engine frequency, depending upon the normal work assignment of the locomotive. The radio is mounted inside the engine cab over the con-



Cable was trenched in using this model 702 ditcher and a tractor with a back hoe

tactor compartment and is readily accessible for the radio maintainer. A whip antenna is mounted on the cab roof with an RG-8/U co-axial cable lead-in. The handset, speaker and control head are on the throttle stand within easy reach of the engineer and fireman. All engines are equipped with footboard speakers, which have radio control only. The speakers may be used for radio receiving or sending, but are not available for intercom between the cab and the footboard. Because of the rugged conditions under which these footboard speakers must operate, they are conventional ground-line talk-back speakers (the type mounted at tie-level in yards, where clearances are restricted). These speakers are watertight, weatherproof, contain a transistor amplifier, and have a heavy-duty footswitch, which may be pressed by hand or by foot. Although some railroads feel that footboard speakers are more bother, maintenance-wise, than they are worth,

the P&LE has found that these rugged ground-line speakers are maintenance free. Also, they save the switch crew foreman considerable time when he is called on the radio by the yardmaster, because he does not have to climb up into the cab to answer.

The two hump engines, each of which is made up of three 600-hp diesel engines, coupled, have hump frequency radio of 160.41 mc. The base station radio equipment for hump radio and yard radio are single-package units. The hump base station is in a wood booth at the base of a floodlight tower opposite the car inspector's pit, on the approach to the hump. The yard base station is located at a 100 ft tower at the east end of the receiving yard. A Mark Products high-gain antenna, enclosed in Plexiglas, is for the yard radio. A 3/8-in. copper coaxial line with dry air at 12 psi runs from the antenna atop the floodlight tower, approximately 120 ft, down to the base station equip-

ment. A similar antenna is used for the hump radio frequency. This antenna is mounted on a side bracket, approximately 30 ft above the rail.

Several remote controls of these two base stations are located around the yard. The following people have a radio key on their communications consoles, enabling them to control the yard base radio station: Assistant general yardmaster, hump yardmaster, switch tender in the hump tower building, who has control of the lead switches in the receiving yard; terminal trainmaster and East End yardmaster. Remote control of the hump radio base station is available to these men: Assistant general yardmaster, hump yardmaster, switch tender, and hump conductor.

Car Inspectors Have Radio

Car inspectors working in the old flat yards at Youngstown carried walkie-talkies. These transistorized, 9-lb packsets transmitted on 161.61 mc and received on 159.57 mc. This car inspectors' radio system was transferred into the new Gateway Yard with base station receivers in the class, departure and receiving yards, and a transmitting station near the hump. Several offices have remote controls for the car inspection base station transmitter, enabling them to talk to car inspectors. These include the car foreman, hump yardmaster, West End inspector's building at the West End of the receiving yard, the East End inspection building at the East End yardmaster's office, various other car inspectors' buildings located around the Gateway Yard, the assistant general yardmaster, the hump yardmaster and the East End yardmaster.

As Gateway Yard is over six miles long, a jeep station wagon was equipped with radio for use by the car inspectors. The inspectors often work other small yards at locations around Youngstown, in addition to Gateway. It has been a tremendous time saver and advantage to be able to drive them to the various work locations with the jeep. During a recent month the jeep covered 5,300 miles in transporting inspectors and materials around the

(Continued on page 42)

P&LE Yard Communications

(Continued from page 36)

Youngstown area, including Gateway Yard. The biggest time saving is that when the driver takes inspectors out to a work location he can now be contacted by radio en-route. Formerly, he would leave the office, take the men to their work location, and either return directly to the car foreman, or he would stop on the way and telephone in to receive further instruc-



Base station radio equipment is the single-package type operating on 117-volts a.c.

tions. Also considerable back-hauling has been eliminated.

Inspectors use radio to call the foreman for tools or materials if they can repair a car in the yard. They call the foreman to have him come out and look at a car to determine whether it should be bad ordered and sent to the rip track. In checking a train in the receiving yard or in the departure yard, inspectors often work in pairs, one working from each end of the train. They have found the radio to be most helpful when they set out or remove their blue flags. They coordinate their actions, informing each other whether they are to set out or remove the flags. And thus they know that they are working in complete safety. If a car inspector desires to talk to the East End yardmaster, he presses his handset microphone button two times (within 2 seconds), or if he desires to talk to the hump yardmaster he presses the microphone button three times in succession. This signaling is similar to that employed by the puller engine foreman. The



Jeep station wagon for car inspectors has radio. It travels over 5,000 miles monthly

car inspection base receivers will feed audio to the specific yardmaster's console, and will light an indication lamp and sound a buzzer to attract the yardmaster's attention. Calls by the inspectors are received in the car foreman's office.

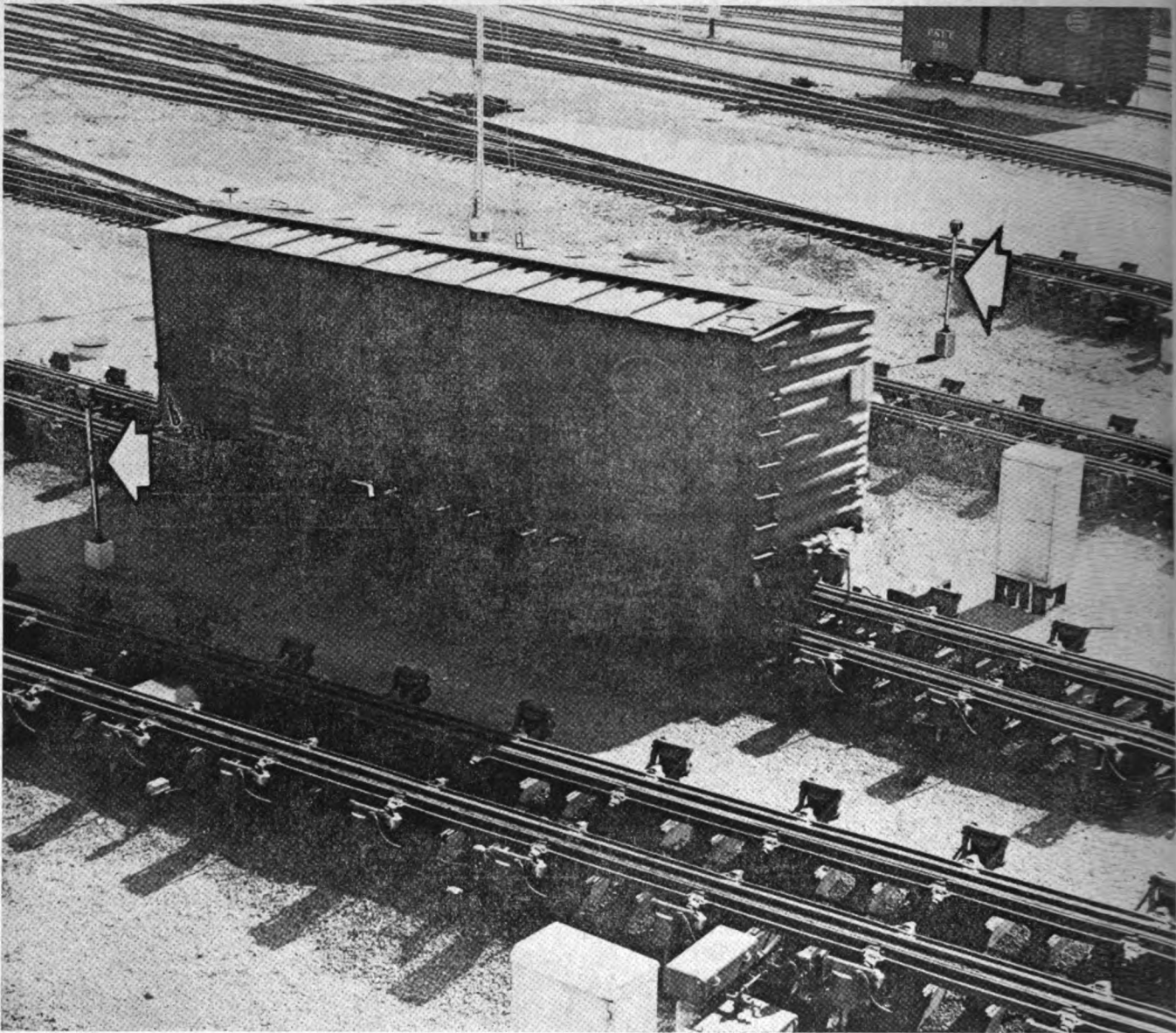
When an inspector makes a call, his voice is broadcast by his walkie-talkie at 161.61 mc and picked up by a receiving base station, which feeds audio over a twist pair into the car foreman's office. The audio also keys the base station's transmitter, which sends out the inspector's voice at 159.57 mc. Other inspectors in the yard hear this call on their walkie-talkies. Radio intercom circuits were provided between all remote control radio consoles. For example, this radio intercom circuit is used extensively by the car foreman to give instructions to his inspectors when they are in the various inspection offices about the yard. Before Gateway Yard was built, the car foreman used a yard line, which being of the common party-line type, he would have to wait until

others were through using it before he could use it. When the car foreman uses the radio intercom, his voice comes out on the various other inspection office radio consoles, but this has not been a detriment, as the foreman will identify the party he is calling. He has found this a big advantage in giving his inspectors a safety message each day, at the beginning of their tour of duty. Occasionally he will give out general instructions pertaining to all inspectors and thus reaches all offices simultaneously. All radio equipment for this yard was furnished by Motorola, Inc.

In general, separate talk-back speaker systems have been installed for particular functions, as was noted earlier in this article. The majority of these speakers are rated at 8 watts, mounted in pairs, back-to-back, on pipe masts. A pushbutton for signaling is located on the mast within easy reach for a man on the ground. Colored stripes are painted above and below each pushbutton to indicate the system to which the speakers belong. If a speaker pair belongs to more than one system, the speakers are separated. A speaker facing in one direction will be associated with the colored band around the pushbutton on the same side of the mast. The speaker on the opposite side of mast, and its associated pushbuttons will have a different colored band.

Quadded Cable to Speakers

Quadded cable is used for these speakers, each wire having a clear polyethylene wrap 2/64 in. thick, two thicknesses of aluminum shield, over which is a 2/64-in. polyethylene outside wrap. Ansonia Wire & Cable Co. manufactured this cable to NYC specifications. As there is always a chance of future expansion in the yard, a quadded cable is brought to each talk-back speaker location. Although most back-to-back speakers are on the same system, the use of a quadded cable enables the P&LE, if future demands require it, to separate the two speakers, putting one on each pair of the quad for separate systems. The cable was trenched in, using a rubber-tired tractor with a back hoe, and a Barber-Greene model 702 ditcher. The cable was



Talk-back speakers (arrows) throughout retarder area are on a separate system mainly used by signal maintainers and the retarder operator

buried in the trench and backfilled by hand. Where necessary, the cable was spliced, using Scotchcast plastic splice compound. Scotch 3M electrical tape, or Bishop bi-seal tape was used for the outer wrapping around the splice.

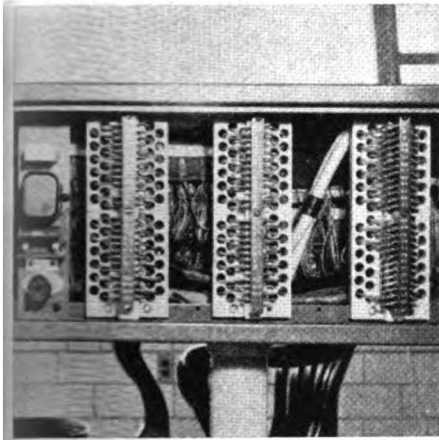
At the offices where loudspeaker consoles were installed, the wiring from the various keys in the console is brought from the keys to a terminal block in the rear of the console. From this block, multi-conductor cable is run downstairs to main frames in the various buildings. From the main frame, the wiring goes to amplifiers, to a terminal board. From here the quadded cable runs to the various talk-back speakers. The advantages of this wiring distribution are that changes can be made in the com-

munications room in the basement of towers without disturbing the wiring in the console. Also, by using a terminal block in the console itself, the wiring is neat and orderly so the maintainer can easily trace circuits.

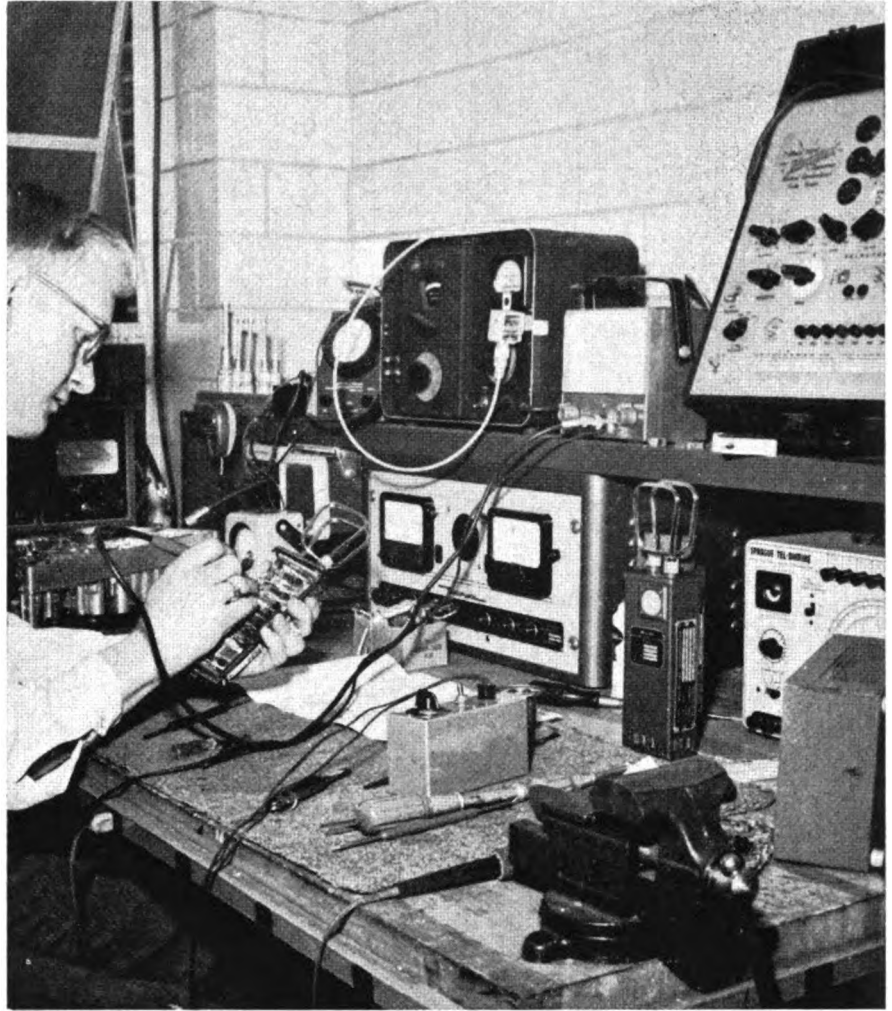
To facilitate signal maintenance on the retarders and switch machines in the classification yard, a separate signal maintainers' circuit was installed. This connects the signal shop on the ground floor of the retarder tower to the retarder operator at the top, the assistant general yardmaster, the hump conductor, the signal relay room in the retarder tower, the signal relay room in the hump office and the switchtender's console. Jacks on this signal maintainer's communication circuit are in all signal hous-

ings. The circuits among the relay housings and in the retarder area are common, thus the signal maintainer carrying a small amplifier with a speaker and push-to-talk button, can talk to fellow maintainers in one of the relay rooms or to the switch tender. Also, two maintainers could plug in to two different housings in the retarder area and talk to each other. This has been very helpful when testing or checking operation of equipment. A man in the field can watch the operation of a switch which the switch tender controls, and a man in one of the relay rooms can see that the relays are functioning correctly.

A combination of paging speakers and Automatic Electric type 43 telephones provide communica-



Wiring from keys in communications console is brought from the keys to a terminal block in the back of the console. From this block, multi-conductor cable carries the circuits to the mainframes (usually downstairs in the building). The terminal block arrangement in the console makes it easier for the maintainer to trace circuits when changes must be made



Radio shop in basement of the hump building is completely equipped to maintain and repair radio, intercom, talk-back and paging speaker equipment. Two radio maintainers are on duty

tions in the diesel servicing area. A similar system is installed in the car repair area, including the car repair building. As these systems operate in a like manner, the description of the system in the diesel servicing area will suffice.

Paging speakers are located on posts and other structures in and around the diesel servicing area, including inside the diesel shop. Telephones are within easy reach of a man standing on the ground or on the floor of the diesel shop. These are connected to form a party line. If the diesel foreman is out in the service area and he is wanted by someone in that area, the person requesting the foreman goes to one of the nearby telephones, lifts the receiver and presses a button in the phone box. This actuates a buzzer in the diesel foreman's office. A clerk in the office goes to the desk, picks up the telephone there, and is directly connected with the man out in the area. The man gives his request to the clerk. The clerk then depresses a spring-return key, which actuates

the paging speaker system. Talking into the same telephone, he pages the diesel foreman. The foreman, hearing this call, goes to the nearest telephone and lifts the handset. He is connected into the party line, and can talk directly to the man who is calling him. This has been a tremendous time saver, not only in the diesel area, but also in the car area, for calling the foreman. When repairing cars, carmen have found it to be an advantage to be able to call the shop office and have someone bring special tools or materials to them. The amplifiers, talk-back and paging speakers, as well as the consoles in the various offices, for these intercom, paging and talk-back speaker communication systems were furnished by the Electronic Communication Equipment Co.

Modern Radio Shop in Hump Building

A modern communications and radio repair shop is in the basement

of the hump building. Two radio maintainers, who also service the talk-back speaker, intercom and paging systems, are assigned to this shop. A separate intercom circuit is provided between the shop and the following persons, the circuits terminating in their communications consoles: hump conductor, assistant general yardmaster, East End yardmaster, retarder operator and switch tender.

Thus, it is evident that there are a multitude of communications systems in a modern retarder classification yard, and that each system is designed for a particular function to keep a particular group of people promptly informed concerning their job in the yard. Two people were primarily responsible for the design and installation of the communications system in this yard. They are D. W. Shackley, Superintendent of Communications, and John Rock, Chief Communications Inspector of the Pittsburgh & Lake Erie's communications department.