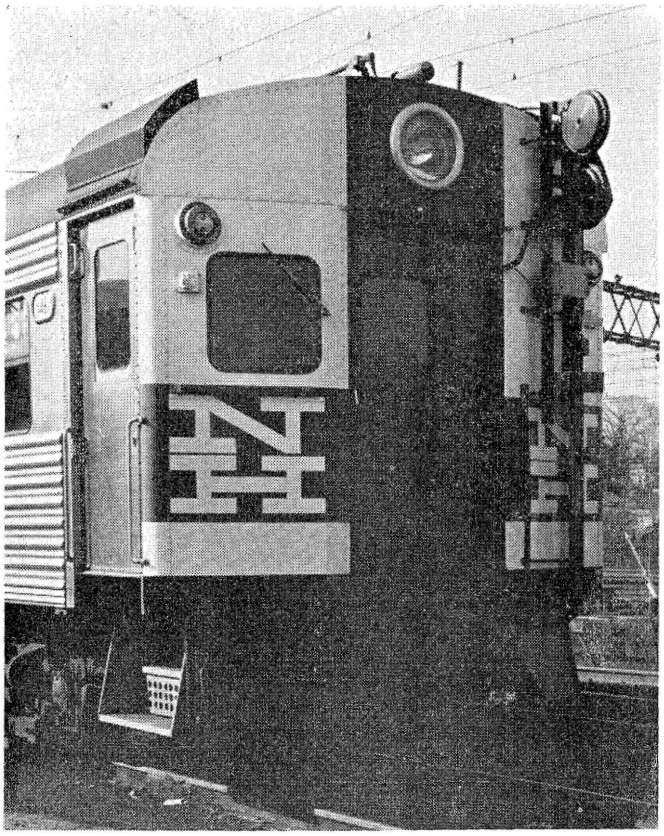
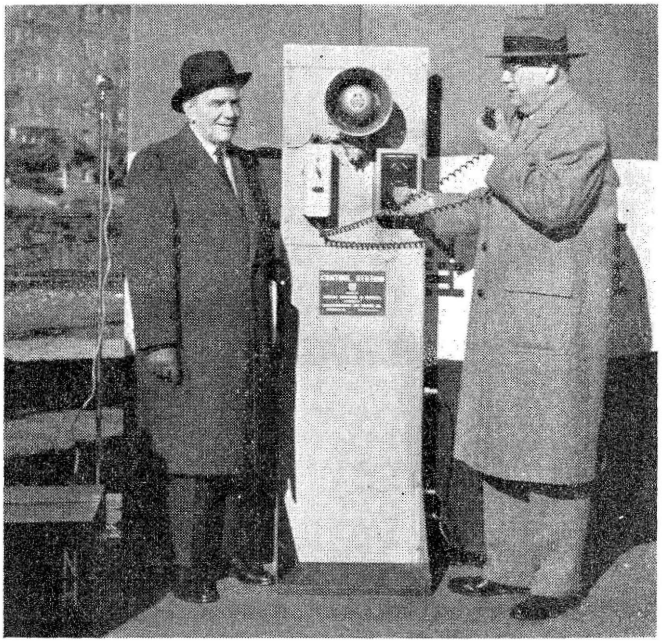


TWO RECEIVING COILS are mounted outside and on the front end of car, shown upper right in this picture



AT THE WAYSIDE CONTROL STATION, P. B. McGinnis, president, New Haven, at left, expresses his wishes concerning the movement of the train, and George Baughman, vice-president, Union Switch & Signal Division, Westinghouse Air Brake Co., operates the levers which establish controls for operation of train. At the same time he uses telephone transmitter, in his left hand, to tell riders on train, what controls are being sent to the train

Train Runs by Wayside Control

Loaded with observers, but with no one in the operator's cab, a multiple-unit car in electrified territory, starts, stops and runs either direction

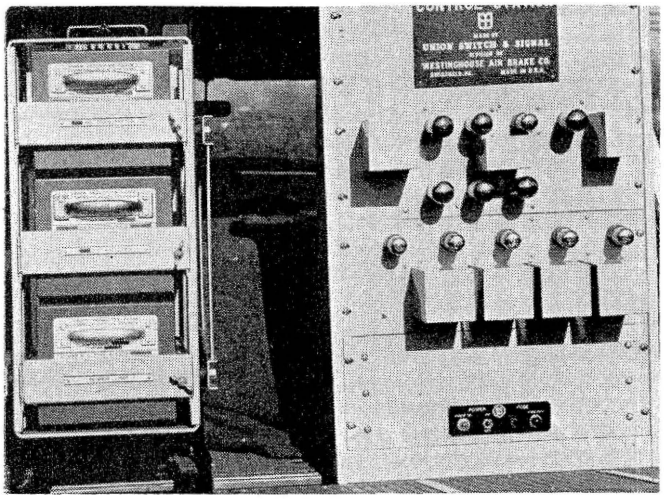
REMOTE WAYSIDE CONTROL of the operation of a train, the first in the United States, was accomplished on an experimental run by the New Haven on December 1 on 7.5 mi. of track in electrified territory between New Rochelle, N.Y. and Rye. With no person at the controls on the train, its operation was controlled by a leverman at a panel at Larchmont station.

Lever No. 1 selects either "eastward" or "westward" running. When lever No. 2 is in the "neutral" position the train brakes are released and power is cut off. When this lever is turned to the "run" position, power is applied and the train runs in the direction selected by Lever No. 1. When lever No. 2 is placed in the "stop" position, a service application of the brakes was made, bringing the train to a stop.

These controls were transmitted from the wayside to the train by means of inductive type remote control equipment. The electronic portion of the wayside equipment consists of a power supply, an audio oscillator and a carrier modulator. The equipment creates a carrier frequency by means of an oscillator, modulates this carrier with certain audio frequencies and amplifies this modulated carrier to the desired level of signal current. The output of the carrier modulator is connected to the existing line wires which parallel the track. The position of the two miniature-type levers on the wayside locomotive control panel determines which audio frequencies are to be introduced into the carrier modulator. When the lever is in the "run" position, a pair of audio frequencies is introduced into the modulator—when the lever is in the "neutral" position only one audio frequency is used—and when the lever is in the "stop" position no audio frequencies are present.

The control commands from the wayside station are transmitted to the locomotive through inductive coupling between the modulated carrier current flowing in the line wires and a receiving coil mounted on the locomotive. The locomotive equipment is tuned to accept and act on the received signal indications from the wayside locomotive control panel.

To run the train east the carrier frequency of 94 kc is modulated by two audio frequencies, 1,125 and 535 cycles per second. East direction is established and brakes released by the 1,125 cps, while the combination of 1,125 and 535 cps, applies propulsion power. Similarly, the train runs west when 225 and 535 cps are



ELECTRONIC EQUIPMENT at wayside station. Apparatus at right, part of system for remote control of train

applied to the carrier. In this case, 225 cps establishes west direction and releases the brakes, while the combination of 225 and 535 applies propulsion power. To stop, modulation is removed. A carrier frequency of 144 kc is used for telephone communication.

Inductive Train Communication

In order to establish two-way voice communication between the train and the wayside station, a standard type inductive train communication equipment was installed on the train and at the wayside station. This equipment, like the remote control equipment, operates on the inductive principle. This equipment permitted the person exercising the control at the wayside station to announce to the passengers on the train any change in the control function so that the change could be anticipated by those on the train.

Automatic Train Control

In order that this demonstration be conducted with complete safety, the locomotive was equipped with automatic train control, including cab signals. This train-carried equipment is continuously responsive to rail-carried currents which reflect track conditions in advance of a train, and the cab signal continuously indicates track and traffic conditions ahead. If the train should be moving and traffic conditions in advance are such that it is not safe for the train to continue, the brakes will be automatically applied and the train will be brought to a stop regardless of the controls being issued from the wayside station. The cab signal and train control equipment in this demonstration is of the most modern type developed, and for the first time employs the use of junction-type silicon transistors in place of vacuum tubes.

The train used in this experimental run consisted of a multiple-unit, electrically-operated car. However, the remote wayside controls system could be applied equally well to an electric locomotive or a diesel-electric locomotive, with a full complement of cars. Furthermore the wayside control systems are sufficiently flexible that they may be applied on one or more tracks, and on extended territories.

The special control equipment on the train and at the wayside, which was used in this demonstration, was furnished by the Union Switch & Signal Division of Westinghouse Air Brake Company.

Communications Review

(*Continued from page 38*)

estimates have indicated, a complete TV system for a yard, including remote controls for wide-angle and telephoto shots, will offset the expense of building towers at each end of the yard. More tests will also be conducted to determine the value of TV to railroad operations, because of the low cost for a portable outfit (about $2500 according to one manufacturer) with a camera, viewer or monitor and a few hundred feet of coaxial cable.

For publicity, and to show what TV could do, the Denver & Rio Grande Western, in 1955, made a live telecast from a moving train. TV cameras were mounted in the nose of a diesel locomotive, and their pictures of the scenery and right-of-way were viewed on receivers in the train's coaches. Part of the telecast was broadcast to the nation via microwave relay. A microwave "dish" in a Vista Dome car "shot" the pictures to a hillside "dish" which relayed them to the commercial TV station for network telecasting.

Intercoms Save Time and Motion

Loudspeaker systems will continue to be installed in yards, offices, freighthouses and passenger stations. A new twist in passenger station systems is in reproducing recorded train announcements. An automatic train announcing system, employing 20 miniature magnetic tape recorders, has been installed in the El Paso, Tex. station by the Southern Pacific (RS&C Sep., p. 60). Train arrivals and departures are recorded on the tape (in Spanish and English), and near train time, the stationmaster simply pushes a button selecting the proper announcement, which is played into the station's loudspeaker system. The day of "unintelligible" train announcements may be over, because the use of recordings provides well-prepared, pleasant-sounding announcements.

More existing freighthouses will be modernized and brought up to peak efficiency with the installation of centralized checking systems. These systems use loudspeakers or telephones to provide communications between the men in the freight cars unloading freight and the clerk in the office with the waybills. Loudspeaker communications will also be installed more extensively in small yards, offices and shops.

Several railroads continued to expand their private automatic telephone systems in 1955, among them the Atlantic Coast Line. Automatic dial telephones can be used to coordinate operations in a large terminal area, an example being the Canadian Pacific's installation at Montreal, Que. Last year the Southern Pacific installed intercity dial telephone system in California, and is extending this intercity dialing to the entire railroad.

Keep Your Management Informed

Because of the many new types of communications equipment and systems now available, communications officers should keep their managements informed concerning this equipment and how these systems may be economically and efficiently applied to their railroads to improve operations. Close liaison between communications and other departments of a railroad is essential when planning improvements and expansions in freighthouses, yards, offices and shops, as well as for centralized car reporting and accounting, and other data processing systems.