A Pennsylvania freight conductor uses the new Carryphone portable telephone to keep in touch with his engineman while making a routine inspection of his train. The Carryphone operates in conjunction with the inductive train telephone system installed by the Pennsylvania on 1,056 miles of main tracks between Harrisburg and Pittsburgh, and on the Belvidere-Delaware branch in Northern New Jersey

Carryphone on the Pennsylvania

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ROUNDING out its inductive train communication system, perfected after years of co-operative activity with the Union Switch & Signal Company, the Pennsylvania Railroad recently placed in service a portable unit called the Carryphone.

The Carryphone is a portable inductive telephone set for use of trainmen and other employees, primarily as an adjunct of the inductive trainphone system which is now in regular use between Trenton, N. J., and Phillipsburg, N. J., on the Belvidere Branch of the New York division, and between Harrisburg, Pa., and Pittsburgh, Pa., on the Middle and Pittsburgh divisions of the Pennsylvania. This new telephone apparatus similar in many respects to a "walkie-talkie," but employing induction instead of space radio, is also suitable for many purposes not involving use of the existing train communication systems. It is expected to be found valuable on wreck trains and work trains where the operation of derricks and machines of various kinds must be co-ordinated and directed from one location on the ground, as well as in many other fields of railroad operations.

In *Railway Signaling* for March, 1944, progress in the development of an inductive train telephone system, then on trial on the Belvidere Branch of the Pennsylvania, was described. At that time, joint development and experimentation in the field of train communication by the Pennsylvania and the Union Switch & Signal Company, had produced a workable inductive telephone system, employing 5,700-cycle current and amplitude modulation. Later in the same year, trials of a system employing 88-kilocycle and 144-kilocycle frequencies, with frequency modulation, warranted its adoption in place of the earlier one. Trials and development work on the branch line with the new scheme have continued, and together with the large-scale experiment on the four-track main line of the Pennsylvania, between Harrisburg and Pittsburgh, has produced a train communication system satisfactorily meeting railroad requirements. Today, about 300 locomotives, 100 cabin cars and 16 wayside stations are in regular service on 1,056 miles of main tracks.

The Carryphone embodies features of the parent system, and operates on 88 kc., one of the frequencies of this two-frequency system. Just as the inductor loop on the locomotive and cabin car creates a magnetic field, inducing currents in adjacent wire lines and track, so does a small 30-in. loop on the Carryphone perform the same functions on a smaller scale. In like manner, the receivers on the locomo-

tives and cabin cars are provided in miniature in the Carryphone.

Details of design of the Carryphone are: Cabinet, size—16½ in. long, 12¾ in. high, 4⅞ in. wide; Inductive loop—5 turns, ¼-in. tubing, 30-in. in diameter; Weight—29 lb.; Power—two storage batteries—6 volts and 2 volts; Capacity—45 minutes' transmission, or 6 hours' reception, approximately 2 hours' ordinary service; Transmitter output—2.5 watts; Telephone—hand-set with "push-to-talk" button; Volume control—automatic; Range—Carryphone to Carryphone or train—2 to 3 miles, Carryphone to wayside station—70 to 15 miles.

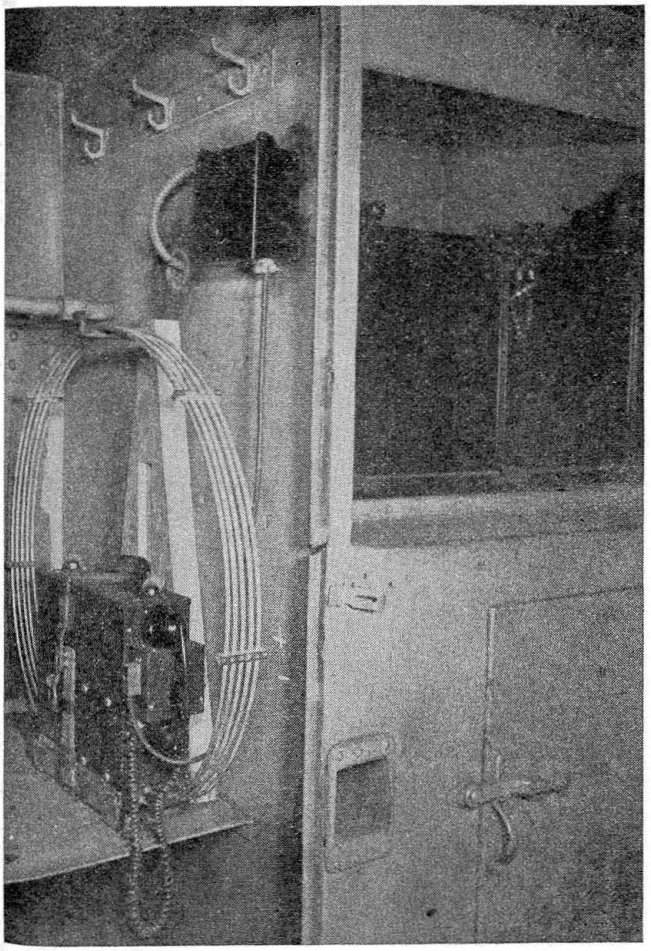
The Carryphone apparatus is installed in the cabin car for the use of the train crew. When placed in the receptacle provided for it, the batteries of the Carryphone are automatically connected with the batteries serving the larger trainphone system; thus, the Carryphone batteries are charged and ready for service.

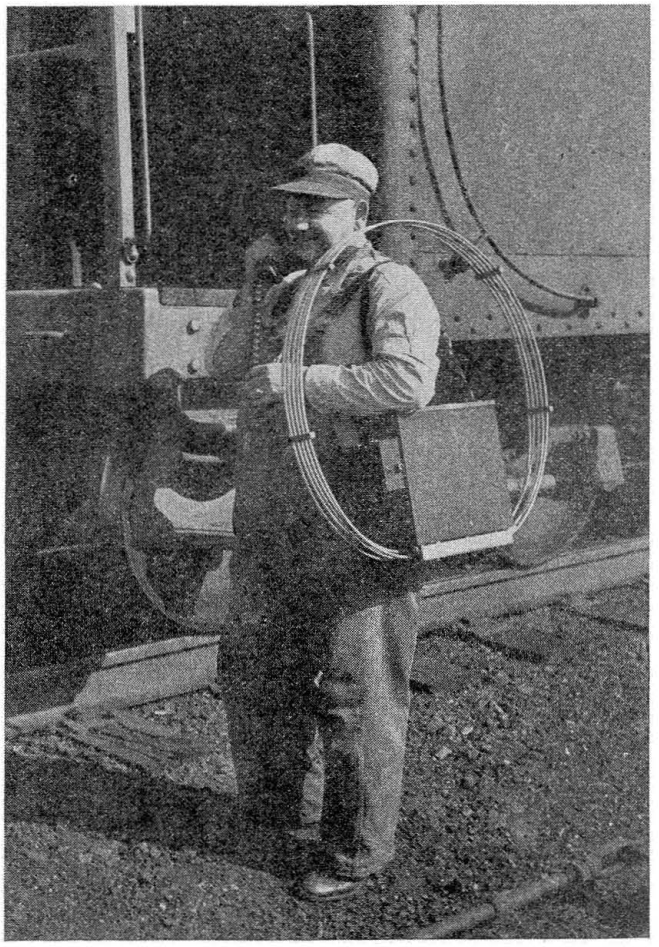
The operation of the Carryphone is in no wise dependent upon the trainphone apparatus on adjacent cabin cars and locomotives. It works as an independent unit of the trainphone system; in fact, an employee with a Carryphone may drop off of a train anywhere, and while the train proceeds on its way, he may communicate with wayside stations and his train and other trains in his vicinity.

The Carryphone is suspended at the side of the operator by a shoulder strap, the telephone hand-set being thus readily removed and replaced while walking or standing. To use it, all that is necessary to establish contact with a station is to remove the telephone hand-set from the side of the cabinet, and broadcast the name of the station called. When the station responds, telephone conversation is conducted by the push-to-talk method, similar to the trainphone on trains. The Carryphone works satisfactorily at distances up to about 100 ft. from pole lines.

Train crews find the Carryphone to be a convenient tool, and use it frequently. For example, a hot box on a car in the middle of a train having been reported to the conductor and engineman of a train by trainphone, it was agreed between them on the trainphone that the train should be stopped at once, and the conductor make an inspection. The conductor taking the Carryphone with him, found the condition of the journal such as to require the car to be set off, and so advised the engineman directly on the Carryphone. The car was set off, train reassembled, and it was able to proceed without delays which otherwise would have been incurred without this newest method of communication.

A number of instances have occurred where the conductor of a freight train, after conversation on the trainphone system with the engineman of his train and wayside station, or with other trains in the vicinity, has found the Carryphone to be of great assistance in taking care of unusual conditions. The delays resulting from unforeseen adverse circumstances or unusual conditions are minimized by the use of the Carryphone in planning and carrying out work involved.





Left—The Carryphone in place in a Pennsylvania cabin car. When resting in the special receptacle prepared for it, its tiny storage batteries are automatically connected with the larger batteries of the cabin car train telephone unit, and are kept fully charged. Lifted out of the receptacles, it is ready for independent use. Right—The new Carryphone, weighing about 29 lb., has a range of up to three miles when used to communicate with another Carryphone or with a train equipped with the train telephone, and of up to 15 miles when used call to a wayside control tower. The loop, consisting of five turns of ¼-in. metal, is 30 in. in diameter and provides means by which messages are received and transmitted by induction, using the track and wayside pole lines as channels