RAILWAY TELEPHONY.

Howard W. Fairlie.

Composite and Simplex Systems.

The extensive adoption of the telephone for the purpose of train dispatching is an event of comparatively recent occurrence. The apparatus designed for this purpose is the result of painstaking study and long experience in other branches of telephony. The arrangement of telephone train dispatching systems is the outgrowth of continued effort of telephone engineers to overcome defects as they have appeared in practice.

As a result of this specialization, we now have apparatus that has become standardized with the railroad world. We are told by the telephone manufacturers that in Canada and the United States there are already over fifty thousand miles of railroad being operated in this manner. Investigation goes to show that this is a conservative estimate.

With nearly every one of these lines this change has been made within the last three years. The experience of the railroad has surely fulfilled the prophesied popularity of the telephone in this new field.

Use of Composite and Simplex Systems.

It is not the purpose in this paper to touch on any of these more highly developed systems. On the contrary, the end in view is to present in as plain a way as possible, two simple methods of using one line for both telegraph and telephone purposes at the same time. There are many roads whose present circumstances do not seem to warrant the immediate installation of a straight telephone train dispatching system.

It is to these railways that the Composite and Simplex systems appeal with the strongest force. They are by no means new inventions; neither are they complicated any more than an ordinary telegraph or telephone line is. For railroad engineers who are interested in the possibilities of the telephone in this sphere, the following brief description is addressed. Every device that means a saving of time is a boon to the railway official, and the telephone is, in the matter of communication, the greatest of these.

Advantages of Telephone.

When we come to discuss regular dispatching systems, the advantages may be taken up in greater detail, but any railway engineer can appreciate the saving in time by being able to communicate anywhere within the system without the intermediary of a third person with really a different language spelt out laboriously word by word. Questions and answers are freely exchanged and with the consequent saving of time and temper.

Increased Telegraph Efficiency.

Wherever there is a telegraph line employing the usual single wire, that same line may be converted into a combination telephone and telegraph line without the least change in line construction. The only change necessary is the installation of the telephone instrument with its small accessory details, such as protectors, etc. Of course, it will be a grounded telephone line that is obtained, but where it was possible before to send but one message at a time, and that in the Morse code, the operators may now send two without the least interference, and one of these will be a direct conversation. This is known as a Composite telephone and telegraph system, and its application is almost altogether for railway service.

Composite Circuit Details.

In Fig. 1 is a general diagram of a composite line. Examination shows it to be an arrangement without the least complexity. Terminal telegraph stations are just as in a straight Morse circuit. A simple intermediate telegraph station simply has its relay bridged by a condenser and resistance. Where a line is looped through an office, each relay is bridged with a resistance as before and a condenser in parallel with the two instruments.

Composite Telephone Instruments.

All that remains is the connections of the telephone sets. Whether these are wall type office instruments or portable sets, their arrangement is identical. They are simply bridged



from the line pole that connects the line wire to the set by a flexible cord. The set is self contained and the ground connection is made by a cord and rail-clamp. The wall set which is shown in Fig. 2 is also practically complete in itself. The only exception to this is with the sets at each end of the line. (See Fig. 1). Each of these are accompanied by a 48-A retardation coil and a 27-B condenser, mounted conveniently on the wall. The retardation coil is in series with the line, and is to prevent the telephonic currents passing to earth over the ends of the line. This it does on account of the high frequency of these currents, while the telegraph currents are not impeded, because they are of much lower frequency than those from the telephones. The action of the condenser along with the coil is such that the telegraphic currents produce no disturbances in the telephone instruments.

A typical installation that will illustrate most of the connections is shown in Figure 3. This is a station with both a composite telephone and a Morse instrument.