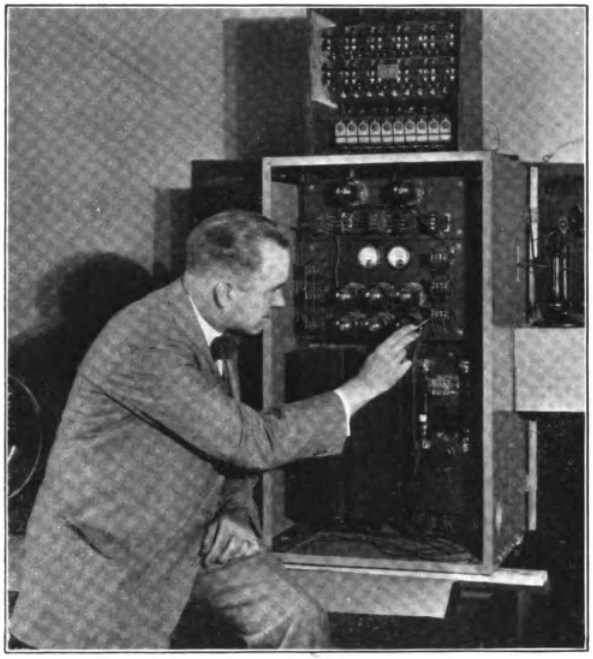
THE WHY OF THE TELEVOX

By R. J. WENSLEY

Switchboard Engineer, Westinghouse Electric and Manufacturing Co.

UNLEASHED by the sight of two mechanisms carrying on an animated telephonic conversation with one another and executing orders delivered over the phone, the vivid imagination of the newspaper reporters and special writers have run riot and many remarkable and unexpected attributes have been thrust on the Televox. It is the purpose of this article to give the real and serious purpose back of this development. Even granting the theoretical possibility of such a device, it is not intended that a home model be put on the market with the ability to prepare soup when given the proper code of whistles over the phone from the afternoon bridge club. But in all seriousness the device may make the preparation of the soup possible by enabling the power system dispatcher to reroute the supply of electricity so that service may be quickly restored to the electric range after a storm, fire or other disaster. The Televox was developed to supplement but not supplant supervisory control systems which have come into such general use in the last few years. The use of small distributing substations is becoming more and more the accepted method of supplying the electrical needs of large cities. To carry this plan to its logical conclusion these stations must be unattended. Wholly reliable means are available for the periodic reclosing of the local distribution feeders. It is not so simple to control the incoming high tension feeders which may form part of a ring or other complicated network. It is most desirable that the system operator be given some means by which he can issue instructions to the apparatus in the unattended stations and receive replies that his instructions have been obeyed. For important or large substations where the expense is warranted, there is no better method than by the use of one of the available types of supervisory control. These systems require individual control circuits of from two to four wires. These wires may be specially installed for the purpose or may be leased from the telephone company. In either case there is considerable expense involved. For the more important stations this expense is fully warranted, but for the lesser stations the tendency among many power companies is to take a chance and depend on quick transportation to get a man to the station after an outrage. If a man were actually in the station, the solution would be quite simple. The dispatcher would pick up his telephone, call the substation and order certain breaker movements. But, as we have have already stated these stations are too small to justify human attendance, hence, the telephone is useless.



MR. WENSLEY IS SEEN EXPLAINING THE ACTION OF THE INSTRUMENT WHICH CARRIES ON TELEPHONE CONVERSATION. TELEVOX, AS THE INSTRUMENT IS CALLED, AUTOMATICALLY EXECUTES COMMANDS SENT OUT BY THE POWER PLANT DISPATCHER

The public telephone systems have been brought to a high state of perfection. Recent improvements in operating technique have greatly speeded the connection time of the Bell system. In spite of the timeworn jokes regarding the slowness of the exchange operators it is now a matter of common comment that connections are secured with an accuracy and speed that leave but little to be desired.

With this great and reliable means of public communication available in every corner of our cities and towns it seemed a pity that it could not be used for the purpose of controlling these small, unattended stations. If there were only a machine with sufficient intelligence to answer the telephone and carry out a few simple instructions and give some replies, the problem would be solved.

In response to this need came the Televox. This is literally a machine endowed with enough apparent intelligence to carry on a conversation over a standard telephone through exchanges and their connecting cables in exactly the same manner as would a human operator, were such available. This device must not transgress the rules laid down by the telephone companies regarding attachments to their lines or instruments. Every effort is put forth by these companies to maintain their service at a high degree of efficiency. This could not be done were unauthorized persons permitted to make changes in the electrical circuits or the telephone instruments themselves. The telephone companies' very rigid but justifiable restrictions, therefore, made it necessary that the Televox actually "listen" to the receiver and "speak" into the transmitter.

The standard telephone systems provide channels which will carry all frequencies between 300 and 2800 cycles with a reasonably small attenuation. The operating tones or "voice" of the Televox must stay within these limits. For the first sample, which is the one that has received such wide publicity, tones corresponding to 600, 900 and 1400 cycles were chosen. It will be noted that the upper frequency falls between the second harmonics of the two lower frequencies. This is necessary to prevent possible false operation due to the harmonic operation of the amplifier for the higher frequency, should this be a multiple of one of the lower frequencies.

The first model, described in this article, is an experimental device and is necessarily crude. It in no way exhausts the possibilities in this new form of control.

The dispatcher's equipment consists of three tuning fork oscillators, a two-stage audio amplifier, a loud speaker unit and three push puttons. The standard desk telephone is placed on the desk in front of the loud speaker unit.

At the substation there is a larger cabinet which contains a two-stage amplifier, three ladder type filters and three individual frequency amplifiers. Relays in the plate circuits of the output tubes in these final amplifiers operate the selective portion of the equipment. A set of telephone relays and selector switches comprise the selective equipment. On the side of the box is a shelf on which the standard desk telephone is placed. The receiver is left off the hook and is placed on a microphone which forms the electrical "ear" of the unit. A weighted arm projects from the side of the box to depress the hook switch on the phone. This is arranged to be lifted by a magnet inside the cabinet. The telephone may be lifted from the shelf and used in the ordinary manner without the necessity for detaching or disconnecting any device. When finished with its use as an ordinary telephone, the instrument is replaced on the shelf and is immediately in readiness for automatic operation.

All language is but a succession of sound strung together in various combinations. As there are but few operations to perform, the language need not be complicated. The three frequencies before mentioned are used as three monotone syllables and all the various commands are translated into a language composed of these. This might be called "Televoxanto" with apologies to Esperanto.

Let us vision a scene in the dispatcher's office of a central station equipped with the Televox.

The telephone rings. "Dispatcher speaking."

"This is the service department. We have three calls from 26th and Y Sts."

"All right. We'll investigate and call you back."

The dispatcher hangs up and turns to his system map. "Let's see. That will be feeder 16-S-5 out of sub. 16."

The dispatcher consults his telephone index and picks up his telephone receiver. "A line please," this to the private branch operator.

"Number please."

"Valley 6000."

"Thank you ... ... 6000."

And then the dispatcher hears in the telephone receiver, "Buzz ... buzz ... buzz ... buzz ... buzz ... buzz ... buzz," which translated from Televoxanto into English says, "This is the Televox at Substation 16 speaking. What can we do for you?"

The dispatcher places his phone in front of the speaker unit on the front of his Televox cabinet and pushes the button marked 1400 five times. The loud speaker says, "Tweet .... tweet .... tweet .... tweet .... tweet," which says to the substation, "Connect me with breaker number five and tell me if it is open or closed."

And then the buzzer at the substation buzzes out the information that breaker number five is open. The dispatcher pushes the button marked 900 and the loudspeaker says "Toot," which is short for "Close it." The buzzer then says that the breaker closed but opened again almost immediately. "Close it again." This time the buzzer says that the breaker stays in.

The 600 cycle button causes the speaker to say "Whoop," which is the way the Televox has of saying, "That is all. Goodbye." The substation hangs up; the dispatcher hangs up but immediately calls the service department and asks them to call the persons making the complaint to see if service has been satisfactorily restored, also to send out a man to patrol the line and locate the trouble if possible.

An ordinary ringing signal relay of the type used for operating special loud gongs or signal devices

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17306 Kansman Boulevard, Shaker Heights, Cleveland, Ohio.

'17

Mr. Howard W. Sheldon is chemical engineer and assistant to the engineering superintendent for the Vacuum Oil Company, Paulsboro, N. J.

'20

Ian D. Patterson has been appointed chief chemist of the new tire factory of the Goodyear Tire and Rubber Company which is to be opened this fall in Wolverhampton, England. Mr. Patterson has been with the Goodyear Company for seven years, first in the chemical engineering division and later in the chemical department as research compounder.

Mr. Lew Wallace Thayer, B. S., is now employed by the Toledo Alloyed Castings Co., Toledo, Ohio.

'22

Philip J. Beatty is now engaged as efficiency engineer for the R. R. Donnelly & Sons, printers, of Chicago.

Frank Trevorrow is in Honolulu, T. H., superintending the erection of a Diesel engine driven power plant. He will return in about one year.

Alden G. Hoyt is located in the Richmond, Virginia, office of the General Electric Company, at 700 East Franklin Street.

'23

A. D. Oetjen has been transferred to the Chicago office of the Standard Oil Company, and now lives in Chicago.

'24

Mr. Leland Fought, who has been manager of the Tulsa, Okla., office of the E. B. Badger and Company, manufacturers of petroleum refinery equipment, died November 7th, after a very brief illness.

Marvin F. Hall is doing inspection work for the Massachusetts Lighting Companies, with headquarters at Boston.

Mr. Maxwell Ludlum Whitacre is now working with the National Aniline Chemical Company, Buffalo, N. Y., and his address is 67 Ashland Pl., Buffalo, N. Y.

'25

Kenneth C. Manwaring is working for Byllesby Engineering and Management Co. at Bennots Island Power Station, Pittsburgh, Pa. His address is 5619 Bauer Boulevard.

Robert M. True has resigned his position as chemist for the Chemical Paper Manufacturing Company at Holyoke, Mass., to take up a similar position with the Crocker McElwain Co., manufacturers of high grade bond and writing papers and Mr. True will be in charge of their technical work.

Roy A. Brown is instrument man with the C. R. I. & P. Railway Co. in Trenton, Mo.

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is installed by the telephone company and furnishes the initiating means for the rest of the substation equipment. The relay makes contact when the bell rings, thus energizing the magnet which lifts the weight from the hook switch and completes the circuit to the amplifying tube filaments. After an interval of about thirty seconds during which the substation buzzer sends out the station code at intervals, the actuating circuits will be opened by a timing device unless the dispatcher sends one or more 1400 cycle tones. This is to take care of wrong number calls which are inevitable as long as human beings use the telephone.

For portable use the device can be operated by three carefully tuned pitch pipes of the proper tones. This enables the line repair man to operate the substation breakers from any telephone in private houses or pay stations near the case of trouble. Testing of defective circuits is thus greatly expedited.

Means are available for reading meters, ascertaining the height of water in reservoirs, reading the temperature of transformers or other devices or in fact doing almost anything that needs to be done in the controlling of a distant substation.

Inquiry is frequently made as to the possibility of interference from the high frequency tones used in the Telavox. A little reflection will reveal the fact that the tones used are within those normally used in voice transmission. The volume is limited by the ability of the telephone transmitter to convert sound into electrical vibrations. The Televox therefore will not create any interference unless the circuit is so bad that cross-talk exists during ordinary conversation. This condition is not allowed to continue very long after the telephone company learns of it. And so we can answer with entire confidence that the Televox will not cause any more interference than ordinary conversation.

There will be many uses for Televox that are not apparent at this time. There must be many places where inexpensive remote control would fill a real need were the expense of control circuits eliminated. Such applications will undoubtedly develop as the capabilities of the Televox become better known.

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Fifty Thousand Watt Transmitter

New York.—A 50,000 watt broadcasting station? Why it was only the other day that we talked of "high-powered" stations of 1000 watts—and "very high-powered" ones of 5000 watts!

But things move fast in this newest of big industries—radio—and if you have been twirling the dials of your receiving sets on Fridays somewhere be-