



The Telephone As a Conference Aid

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Special Products Development

THE rapid progress made by scientific and business effort in modern times is, to a large extent, the result of the subdivision of tasks and the specialization of activities. Many minds are brought to bear on the problems of the moment, and each contributes his share from his particular point of view. When those who are thus related in business activity are separated, the telephone becomes a very important factor, and its advantages constantly contribute to the speed of the work. It has become increasingly evident, furthermore, that the possibility of having a telephone conversation simultaneously with several people at one or both ends of the line adds materially to the speed and effectiveness with which important conclusions can be reached.

To provide for this service, a small compact unit, known as the 100-type

loud speaker set, was developed in 1933. This set is housed in a small wood cabinet, weighing approximately eleven pounds. It has sufficient sound output to serve a group of from seventy-five to one hundred people under favorable room conditions, and is provided with a volume control and a power switch. The set operates on ordinary 110-volt direct or 25- to 60-cycle alternating current, and may be connected to any lighting fixture or outlet. Heater tubes are used in the amplifier and require about forty-five seconds to obtain maximum efficiency after the power is turned on. The power switch provided has three positions. In the first position, the power is turned off. In the intermediate position a reduced amount of power is drawn from the line, which keeps the heater elements sufficiently hot to insure a quick response when

the loud speaker is needed. When the power switch is in this position, however, the set is inoperative. When the power switch is turned to the third position, the set is immediately ready to operate, maximum gain being reached in a few seconds. When it is desired to have the loud speaker ready for operation on short notice, the power switch is placed in the intermediate position. A small pilot lamp is provided to indicate the position of the power switch, the lamp being dark for the "Off" position, dim for the intermediate position, and bright for the "On" position.

Two forms of service are available. In the first, the telephone line is terminated in a two-position key so designed that the line can be connected to either the telephone set or the loud speaker. This key, arranged for mounting on the side of the desk, has two sets of transfer contacts so adjusted as to give a make-before-break sequence to prevent opening of the line circuit during the switching operation. This service is applicable where an address of some length is to be received over the line during which time it is not desired to use the line for talking in the other direction.

In the second type of service the line is terminated in a three-position key. Two positions of the key provide the same facilities as described above. In the third key position the subscriber set is connected to the line with the loud speaker set bridged across the receiver. The third key position is employed with ordinary telephone conversations where rapid alternations in the conversation occur, and with more than one listener at one or both ends of the line, under which conditions it would be inconvenient to the user to switch the key rapidly from the talking to the listening posi-

tion. With the key in position three, however, there is an electrical path from the transmitter to the loud speaking receiver and an acoustic path from the latter to the transmitter. If the gain in these two paths in series exceeds the losses, a sustained tone or howling results. This imposes a limitation on the gain possible, and on the proximity of the transmitter and loud speaker. A material advance has been made, however, by the design of several networks, which are included in the subscriber set furnished for this service. They are designed to equalize the transmission characteristics between the transmitter and the loud speaker, and also to minimize disturbances of large magnitude but of short duration which would tend to build up to a continuous singing condition. As a result of these two networks, it is possible to employ about fifteen db more net gain in the amplifier than without their use. Upon installation of the apparatus a variable potentiometer in the subscriber's set is adjusted to give the best performance safe from howling for the particular location and subscriber's loop.

The procedure employed in using this equipment is simple. The power switch of the 100-type loud speaker set is turned to the intermediate position in advance of the time its use is required. With the key thrown to connect the telephone set to the line, the call is answered or originated in the regular way with the standard hand telephone set or desk stand. To receive the incoming conversation on the loud speaker, the power switch on the loud speaker is thrown to the operate position and the key is thrown to the desired position. When the conversation is completed, the key is restored to the telephone-set position and the handset or receiver

returned to the mounting so as to operate the switchhook. The loud speaker power switch is then turned either to the intermediate or to the "Off" position, depending on whether or not it is expected that its use will again be required in the near future.

The 100-type loud speaker set and associated equipment may be installed on a permanent basis, or as occasion demands, on a temporary basis to serve a particular subscriber group for the time the service is required. The loud speaker sets and their associated equipment are installed and maintained by the telephone company, like the normal telephone installation.

The effect of the addition of the loud speakers to the telephone when used for conference purposes is to broaden its usefulness substantially. It permits those already present in the office, and others who may be called

in, to hear the distant person's conversation and if desired, to participate in the discussion as their questions are repeated by the person using the transmitter. The use of the loud speaker saves time and money, expedites decisions, stimulates action, and reduces misunderstandings and errors. In addition, conference telephone service with loud speakers has a particular appeal to business executives since it enables them to get their message over to a group of employees in their own words without change in meaning or emphasis. Employees hear the executive's voice directly as though he were speaking to them personally so that his personality and enthusiasm are carried to them also. This is particularly desirable in selling campaigns, since in practically all lines of business today, better salesmanship and better supervision of sales forces are becoming increasingly important.

Contributors to This Issue

N. F. SCHLAACK received the B. S. degree in electrical engineering from the University of Michigan in 1925 and immediately joined the technical staff of the Laboratories. Here as a member of the Research Department he has been engaged primarily in development of short and ultra-short-wave transmitting equipment for various applications.

F. A. KUNTZ came to the Laboratories in 1919 after having had eleven years of practical experience elsewhere. He has since been engaged in station apparatus development problems and has specialized on telephone booths and accessories. In connection with this work he has been in touch with the manufacturing aspects involved through contact with the West-

ern Electric Company's Queensboro Works. He received the degrees of B.A., B.Sc. and E.E. from the Catholic University of Washington, D. C.

A. P. JAHN received a B.S. degree from Cornell University in 1923. After two years with the U. S. Forest Service he joined the Department of Development and Research of the A. T. and T. Company where he was engaged in studies concerning the design and preservative treatment of timber products used in the outside plant. In 1934 he came to the Outside Plant Development group of the Bell Telephone Laboratories. His duties here have been principally in connection with problems dealing with miscellaneous materials and such items as body belts and