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A Super PBX for War Service

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Equipment Development

The expanding load on our War Department, particularly in the tense months since Pearl Harbor, made it necessary a short time ago to provide a dial PBX with an ultimate capacity of 15,000 lines. Although local calls within the PBX do not require the assistance of an operator, all incoming calls pass through a manual switchboard, and the operators here must be able to reach any of the projected 15,000 lines.

The method adopted not only meets the present requirements but could be used for a PBX of greater size. The principle involved is simple, and only basically standard equipment is used. Between

BETWEEN the length of an operator's arms and the size of a manual central office there might seem to be little relationship, but, actually, the one determines the other. An operator must be able to reach the jacks for all the lines in the office, and thus the distance she can reach definitely limits the size of the office. With present equipment and construction methods, only slightly more than 10,000 jacks can be placed within normal reach. This limitation has had little influence on PBX design because, until this year, the largest PBX has not required more than 6,000 lines.

the jacks in the switchboard and the station lines, step-by-step attendant connectors are interposed. The extension lines are usually arranged in groups of 100, and the lines of each group are multiplied to the banks of a set of ten attendant connectors. Each of these connectors has jacks in the switchboard multiple, and may thus be reached by any of the operators.

To complete a call, an operator plugs into one of the ten jacks associated with the connectors serving the particular 100 group that includes the extension called, and then dials the last two digits of the number. The



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A section of the switchboard at the private-branch exchange in the War Department's new office building in Washington. The information section is shown on the opposite page



War Department's PBX has regular central-office testing facilities

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Close-up of an information center

jacks have idle-trunk indicating lamps and thus no time is wasted in busy testing. Ringing is applied automatically from the operator's cord circuit. At the termination of conversation, a supervisory lamp lights in front of the operator, and when the cord is removed, the equipment is restored to normal to be ready for the next call.

This arrangement is not the only novel feature of the new War Depart-

ment PBX. In any large PBX it is necessary to provide both information and intercepting service. The former provides users of the system with a ready means of getting the numbers of new extensions or other assistance, and the latter insures that changed or abandoned numbers or errors in dialing or equipment do not result in wrong connections or wasteful delays. With smaller installations, information service is usually provided by operators, either at key equipments such as the 101 type* or at some of the switchboard positions, while intercepting service is usually handled over jack-ended trunks in the switchboard multiple.

These methods seemed unsuitable for this new PBX. To handle even the regular traffic of a PBX of this size required an exceptionally large switchboard, and it did not seem desirable

*RECORD, August, 1937, page 370.



J. W. WOODARD's telephone career began in 1911 with an independent step-by-step dial system operating company in New England. In 1913 he spent nine months with the New England Telephone and Telegraph Company and then returned to the independent field. He entered the Hawthorne plant of the Western Electric Company late in 1917 and here was concerned with central-office equipment engineering. Since 1920, when he came to West Street, Mr. Woodard has been in the Equipment Development Department where he is now in charge of the current development group. This group provides engineering services to the Western Electric Company and the Associated Operating Companies in connection with central-office equipment. This work now involves many war projects.

to increase the size of the board further by requiring it to handle the other services. Moreover, it was expected that the number of changes caused by a rapidly changing personnel would place more than the usual load on both the information and intercepting operators. Particularly fast service was also desired, and in view of these various factors, a combined information and intercepting system was developed based on arrangements tried in the field.

Each attendant at the combined information and intercepting desk has a step-by-step trunk finder associated with her position, and incoming traffic of either type is distributed automatically to the various attendants as they become idle. The position equipment makes use of colored lamp caps and tones of different pitches to

indicate the class of the incoming call. The desk consists of 36 operator positions, and is equipped with rotary files provided by the customer. This system provides the high grade of service required, and was made available in a very short time.

Still another unusual feature was the provision of the same type of testing facilities that is used in regular central offices.

The PBX has a large number of direct circuits to the toll boards in Washington. Because of the long loops involved, these circuits are provided with 96-volt talking battery supply at the toll office, in order to provide adequate current to the station transmitters on toll calls.

This new PBX was put in service early last September and has met the unusual requirements encountered.

To find out if wind sway causes sheath abrasion when two cables are lashed to one suspension strand, accelerated tests are conducted at the Chester Field Laboratory by swinging cables with ropes which are attached to a motor-operated crank. D. C. Smith of the Outside Plant Development Department is the engineer.

