

# *Attendant's Equipment for Small Dial PBX's*

R. D. WILLIAMS *Switching Development*

**Early in the evolution of dial PBX's, the volume of calls requiring operator assistance would frequently be too small to justify a switchboard. A cordless turret was therefore developed for such applications, so that an attendant could perform other duties in addition to handling telephone calls. Smaller key equipment was subsequently developed. The latest version of this key equipment is a modular design featuring push-buttons instead of lever-type keys and a modern streamlined housing.**

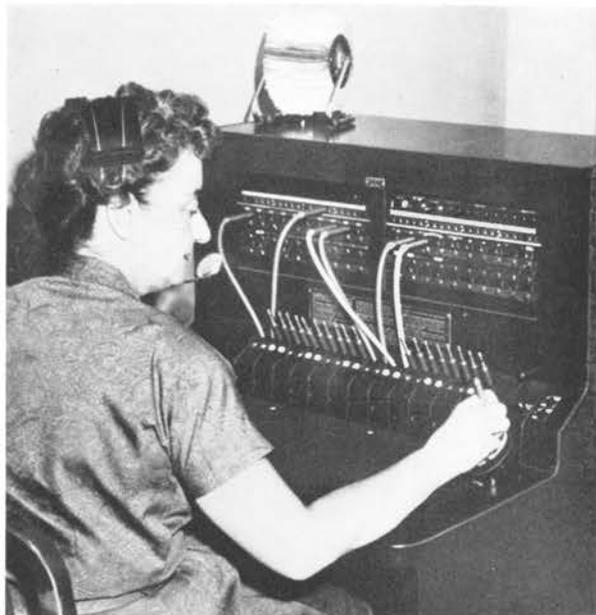
In the early days of small dial PBX's, generally there was not sufficient work for a PBX attendant to keep her busy all the time. One or more cord-type switchboard positions, such as that shown in Figure 1, could be used to full advantage only in a large dial PBX or in a manual PBX. The attendant at a small dial PBX did not usually handle enough calls to justify attendant's equipment the size of a switchboard. Consequently, in the 1920's the 740-type PBX's were designed so as to use an attendant's turret. This turret, as shown in Fig. 4, was a key-operated device that could be located on a desk or a table and leave the attendant free to handle other business, such as typing or acting as a receptionist, in addition to handling telephone calls.

About a year ago, new designs were completed to permit the use of a more compact turret known as the 101-type key equipment,<sup>o</sup> originally designed for multi-line answering and key telephone secretarial service. This turret can be mounted on a desk, Figure 2, or recessed into a desk or table top.

Recently, the more modern key cabinet shown in the headpiece was developed. This provides essentially the same service features as the earlier 101-type equipment except that mechanically interlocking pushbuttons are used instead of lever-type keys.

Each unit of the 101-type key equipment has five two-way pickup keys with two supervisory lamps above and two lamps below each key. Ten different

trunks can be served by these five keys by operating them either up or down in response to signals on the associated lamps. An incoming call flashes one of the two lamps associated with the trunk and sounds a buzzer at the rate of 60 interruptions per minute. The attendant answers the call by operating the indicated pickup key and the flashing lamp then remains lighted. When the destination of the call



*Fig. 1 — A 556A switchboard used with the 740E private branch exchange.*

<sup>o</sup> RECORD, August, 1937, page 370.



Fig. 2 — 101 key equipment used for night service at the Laboratories in New York City.

has been determined, the attendant momentarily operates the common hold key (the white-handled key in Figure 2), waits for dial tone, dials the desired number into the PBX, restores the pickup key, and hangs up. The second lamp (station line lamp) associated with the trunk "winks" at the rate of 30 interruptions per minute until the extension answers, and then remains lighted. When the call is finished and both the outside and inside parties hang up, the connection is automatically released and the lamps are extinguished.

After the attendant has released from the call, the PBX station user can recall the attendant, to transfer the call or request information, by momentarily depressing his switchhook. This causes the station line lamp associated with the trunk to which he is connected to flash continuously at the rate of

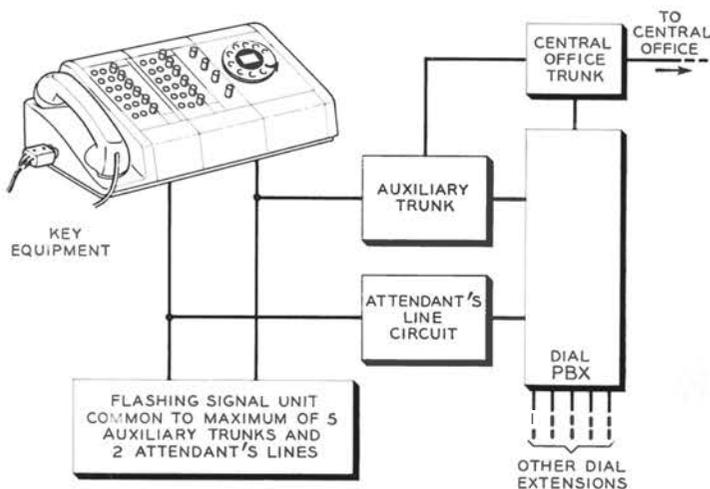


Fig. 3 — How key equipment is used with a dial PBX.

120 interruptions per minute. The attendant answers this recall by re-operating the pickup key indicated by the flashing lamp. If it is desired to transfer the call, the attendant merely operates the common hold key momentarily to disconnect the first extension, and then re-operates the hold key, waits for dial tone, and dials the number of the second extension.

Ordinarily, PBX stations can make calls to outside points by dialing 9 and then continuing to dial the call after receiving a second dial tone. In some cases, though, certain stations may be restricted from making outside calls directly; these calls may be made via the attendant who is reached by dialing 0.

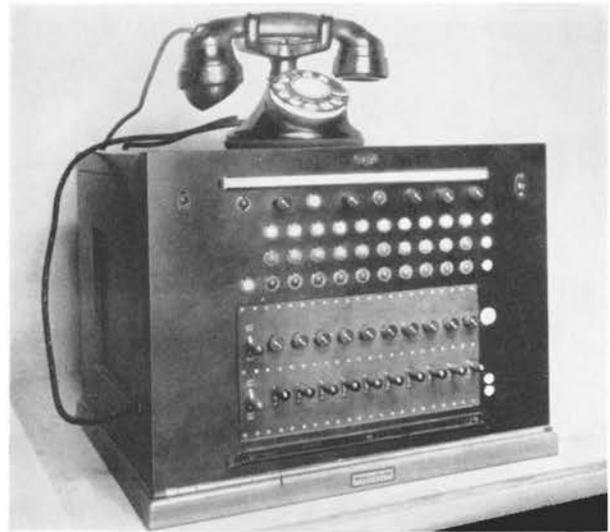


Fig. 4 — Early attendant's turret for a 740 A PBX.

These new smaller equipments and the associated circuitry provide advantages over the earlier turret shown in Figure 4, not only with respect to the physical size and appearance of the attendant's equipment, but also with respect to supervisory signals transmitted to the central office. With the older equipment, when an extension flashed to recall the attendant, the switchhook signals were also sent to the central office; in some cases, this flashing caused the central office to disconnect the call. The new arrangement, however, delays the transmission of switchhook signals to the central office for from one to two seconds, eliminating the possibility of premature disconnection. Also, a single momentary operation of the switchhook automatically causes the station line lamp to flash continuously until the attendant answers. Release of calls without involving the attendant is a further operating advantage.

Each unit of the 101 key equipment can accommodate a total of ten central-office trunks, attendant trunks, or attendant lines. The new modular key equipment can accommodate six circuits per modular unit. As many units as necessary can be grouped together to provide access to the desired number of circuits. In those cases where four central-office trunks and one attendant trunk is adequate to serve a PBX, a 6-button key telephone set<sup>o</sup> can be used instead of one of these key equipments. This provides a combined trunk and line lamp with each pickup key, but otherwise the equipment operates

<sup>o</sup> RECORD, June, 1940, page 315.

in the same general manner as the 101 equipment.

The new key equipment arrangement may be used as the main attendant's position for small PBX's, or it may be used as an attendant's or night watchman's auxiliary position in conjunction with a switchboard. The advantage of the key equipment for night service is that a watchman or similar night employee can complete calls to any PBX extension. From an extension user's viewpoint, his service is the same at night as in the daytime. The block diagram of Figure 3 shows how auxiliary trunk circuits interconnect the key equipment, the central-office trunks, a switchboard, and the PBX switching equipment.



#### THE AUTHOR

R. D. WILLIAMS was graduated from Case Institute of Technology in 1945 with a B.S. degree in E.E., spending three of his years there in the V-12 program. After a tour of duty with the Navy as a Radar Officer, he joined the Laboratories in 1946, engaging in trial installations of No. 5 crossbar. In 1947 he was concerned with equipment engineering on dial PBX and small community dial offices, and then turned his attention to circuit engineering on step-by-step circuits. Currently he is with a PBX circuit group. Mr. Williams is a member of Tau Beta Pi, Eta Kappa Nu and Theta Tau.

### *Dot-and-Dash Coded Wire*

A new wire developed jointly by Laboratories and Western Electric engineers uses a dot-and-dash system of color coding to make it possible to identify and connect various combinations of wires. It is being used initially for local cable in No. 5 crossbar central office equipment, and will ultimately be used in switchboard cable as well.

The wire, insulated with polyvinyl chloride plastics, may eventually replace the more familiar wire spirally wound with colored textile insulation for central office use. The color coding of the new wire is much simpler than that used with the older type. A switchboard cable, for example, may include from 12 to 312 conductors in combinations of pairs and singles, and 24 different color combinations for the pairs and an additional 24 color combinations for the singles are required. With the new dot-and-dash method, the three wires constituting a pair with its associated single can be the same color—the first wire in a pair is identified by a series of single

dots, and the second by a series of double dots. The single wire in the combination is identified by a series of repeated dashes. With eight different colors of plastic coating and four different colored inks, many combinations are possible.

In addition to the identification feature, the new wire is less expensive to manufacture, is more fire and moisture resistant, has a smaller diameter and has better insulating properties than the textile covered wire.

*Left, plastic-insulated dot-and-dash wire, and right, textile covered, spiral-wound wire.*

