



The 755 PBX

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TO apply the crossbar switch and the U-type relay to private branch exchange service, a new dial PBX has been developed for residences and smaller business houses. This 755A dial PBX will replace the 750A* and by reason of its four trunks and twenty station lines it will have a wider field of use. The power requirement is much less than that of the 750A; and it is expected, because of the improved design of the new switches and relays, that the maintenance effort will be reduced.

The basic function of the new PBX is to establish connections between central office trunks and its local stations, or between two or more of these stations. The actual talking

*RECORD, February, 1930, p. 278.

connection is made at the crossbar switch, but for the complete functioning of the PBX six control circuits are employed: the line circuit; the trunk circuit; the link circuit; the common control and cut-off circuit; the common timing, tone, and ringing circuit; and the "link-allotter" circuit. There is one each of the three latter circuits for each PBX regardless of the number of lines or trunks; but there is one line circuit for each line, and one trunk circuit for each trunk. The link is the circuit employed for making a local connection between two lines, and from one to three may be employed as desired. Each of the crossbar switches will accommodate ten lines, and where ten lines or fewer are to be used, only

one switch will be installed, but for more than ten lines and up to the full capacity of twenty lines, two will be employed.

This PBX is designed to employ a handset on which are mounted the dial and the key buttons used to set up the various trunk and local calls. One of these buttons is used for local calls, one for holding, and the others for making connections to the four trunks. Where desired, however, the usual types of telephone sets may be used in place of the combined handset and when this is done, the buttons will be provided in a separate unit.

Each local station is connected to a set of contacts in a vertical column of the crossbar switch, while the trunks and links are connected to sets of contacts in the horizontal rows. A connection between a trunk or a link and a local station is thus established by operating the selecting magnet

corresponding to the trunk or link, and a holding magnet corresponding to the local station. A complete link circuit includes two of the selecting magnets—one to make connection to the calling station, which is called the originating magnet, and one to make connection to the station called; which is called the completing magnet.

A local call illustrated schematically in Figure 1, as originating at station No. 36, is made by pressing the "local" key, and lifting the handset off the mounting. The line circuit then operates to signal the common control and cut-off circuit that a call has started. The common control circuit then determines from the link-allotter circuit that an idle link is available, and operates the start relay in the link circuit. The link originating magnet is then operated, and immediately afterward the common control circuit operates the holding

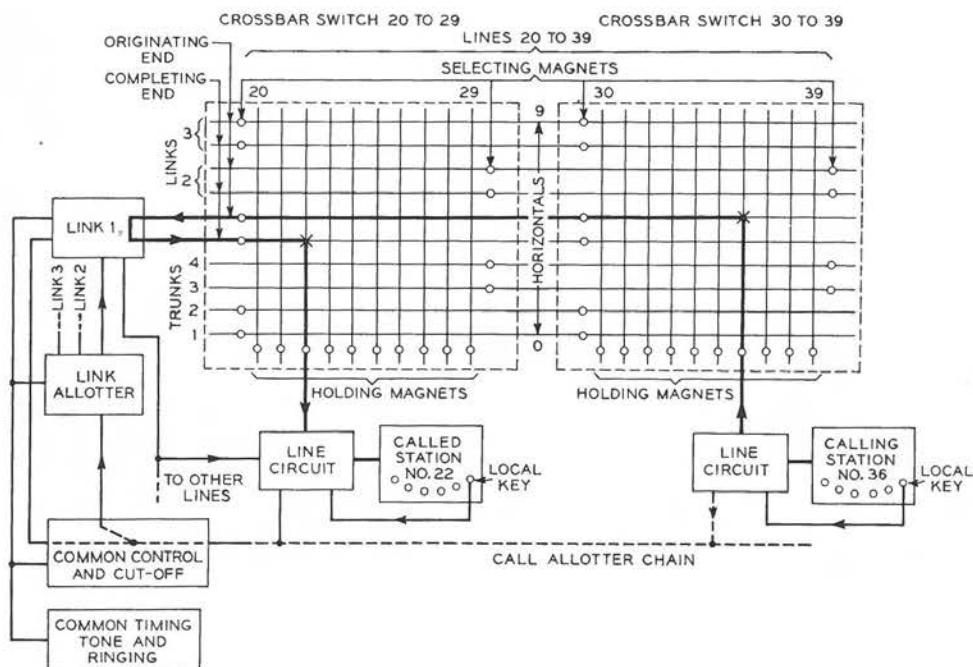


Fig. 1—Block schematic illustrating the setting-up of a local call

magnet associated with the calling line, which closes the crossbar contacts to connect the calling line to the link. The common control circuit then releases the link originating magnet, and restores itself to normal, ready for another call.

Dial tone is received through the link by the calling station, which then dials. Pulsing and register relays in the link circuit record the two digits dialed, and at the completion of dialing the link tests the called line and returns a busy signal if it is busy. If the called line is found to be idle, the link signals the common control circuit which operates the completing magnet of the link and the hold magnet of the called line. The link completing magnet is then released and the common control circuit again returns to normal. The link then rings on the called line, and when the

station answers provides a talking path between the two stations. The common control circuit is used only for a very short period at a time, and may thus serve two or more calls during approximately the same interval. If it is in use on one call when needed on another, the delay while waiting for it to become idle is only a fraction of a second and is unnoticeable.

The establishment of a trunk call is illustrated by the block schematic of Figure 2. To make such a call, the subscriber presses the trunk key corresponding to the trunk over which he wishes to make the call, and then lifts the handset. The line circuit immediately operates to signal the common control circuit, which then operates the selecting magnet corresponding to that trunk, and immediately afterward operates the holding

magnet of the calling line. The station is then connected directly to the trunk as shown in the diagram. Dial tone will be returned by the central office, and the progress of the call will then proceed in the usual manner. All apparatus is returned to normal when the handset is replaced on the mounting.

Inward trunk calls are indicated to the stations by the lighting of a lamp or the operation of an audible signal, either of which occurs when the central office rings on the trunk. Any of the key stations may an-

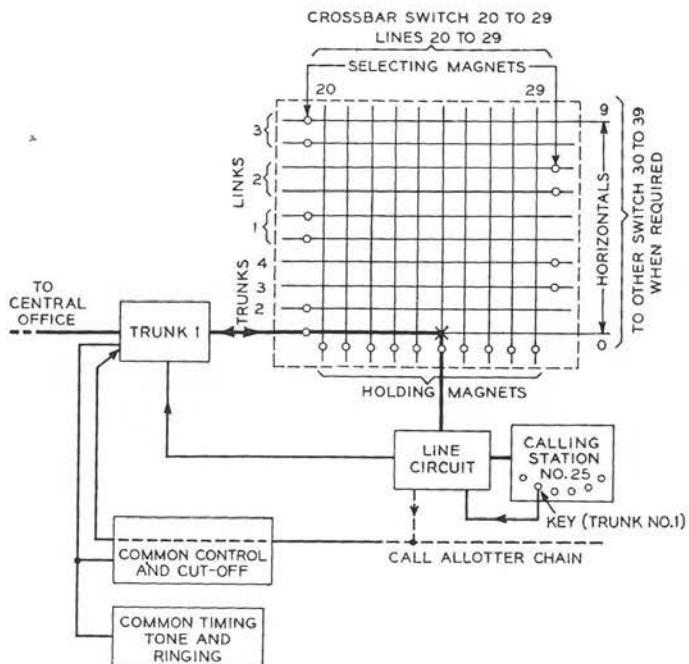


Fig. 2—Block schematic illustrating the setting-up of a trunk call through the 755A PBX

surer by pressing the key button associated with that trunk, and lifting the handset. The line circuit, the common-control circuit, and the cross-bar switch function as on outgoing calls, and the station is connected to the trunk. If the call is for some station other than the one answering, the hold button is pressed, which then connects a holding bridge across the trunk and releases the trunk key. The station wanted is then called as for local calls, and informed that there is a call for it. This station then operates its trunk key, which releases the local connection and the hold on the trunk, and connects its own handset to the trunk—the station that originally answered being then free to originate or receive other calls.

The equipment, shown in Figure 3, is arranged on a unit basis to make it possible to equip only the combination of lines, trunks, and links required for a particular installation. The same framework and equipment arrangement is used for all installations so that units may be added as required by traffic growth. Station line circuits are arranged in four-circuit units with either two or four circuits equipped, so that station line growth is in steps of two circuits at a time. Trunk circuits are arranged on two-circuit units with either one or two circuits equipped so that trunks may be added one at a time. Each link is a separate unit, and links may be added one at a time. The PBX is equipped initially with a local cable including all the wiring between units, switches, and terminal strips

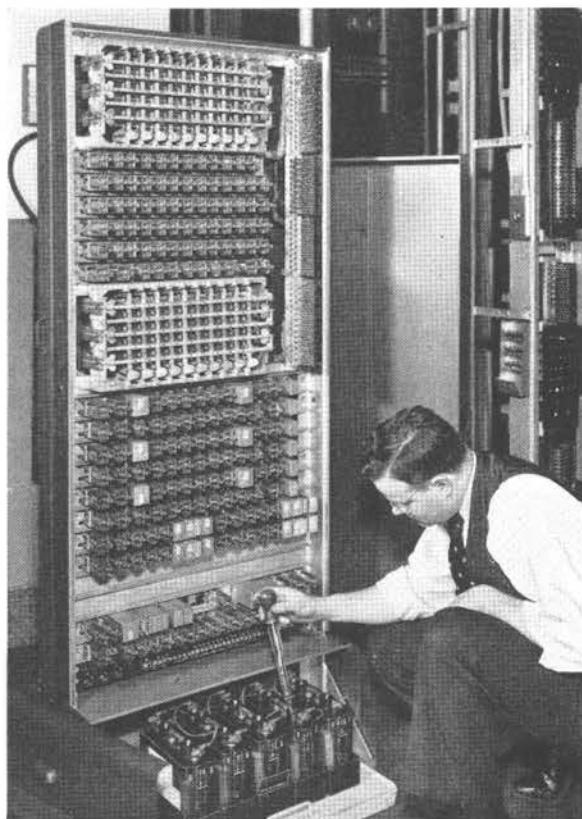


Fig. 3—Installation of the 755A PBX for the 195 Broadway Corporation

for a maximum capacity. The apparatus on each unit is wired, adjusted, and tested as the unit is stocked, so that after a unit is installed in a PBX, it is necessary only to connect the inter-unit leads and to perform an operational test.

Three classes of trunk service are available for the stations. "Non-lock-out" service allows the station to connect to a trunk whether it is busy or not; "lock-out" service allows the station to connect only to idle trunks; and "restricted" service prevents a station from making outgoing trunk calls, but allows it to answer or transfer incoming calls, or pick up transferred trunk calls. A station may be arranged to have the

same class of service on all trunks or a different class on each trunk. This allows several stations to have preferential service on different trunks. The class of service is changed merely by strapping on the terminal strips at the ends of the line units.

Restricted stations may not be provided with the key-button handset, but trunk service may be given these stations through the aid of some key station designated as the control station. This station sets up the incoming or outgoing trunk call for the restricted station with an auxiliary key, and the station is then free to make other calls.

By use of a spare push button, a station may be enabled to pick up calls directed to another, and may thus perform secretarial functions. A lamp may be installed at the secretarial position to indicate calls incoming to the supervised position. On an incoming call the lamp flashes and after it is answered and the line is busy, it lights steadily, or if preferred may be arranged to go out. This provides an indication as to whether the supervised position has answered, and thus whether or not she should come in on the line.

Other features available with this new PBX are line hunting and con-

ference service. The former provides for automatically routing calls to another line if the one called is busy. By this means heavy traffic to one number may be routed to another so that important calls will not be lost or delayed. The conference feature permits three lines to be connected together. To set up such a connection, the originating station calls one of the parties, tells him that a conference is to be held, and asks him to hang up until his line rings again. Without disconnecting, the originating party then calls the third party, and ringing will occur on both lines. When ringing ceases, indicating that the third party has answered, the second party lifts his handset, and the connection is established.

Ringing for the new PBX is usually supplied over feeder wires from the central office, but tones are generated at the PBX by a buzzing relay, as with the 750 PBX. Batteries for the PBX are located in a compartment in the base of the cabinet, and are ordinarily charged over cable pairs from the central office, but the charging is automatically controlled by relays at the PBX. Where conditions make it desirable a local ringing machine may be employed and a rectifier for charging the batteries.