

**BELL SYSTEM PRACTICES**  
**Station Installation and Maintenance**

**SECTION C53.271**  
**Issue 4, January, 1954**  
**AT&T Co Standard**

## **KEY EQUIPMENT NO. 100**

### **DESCRIPTION**

#### **1. GENERAL**

1.01 This section describes the No. 100 key equipment station apparatus, designed to meet the service requirements of subscribers for key and lamp equipment which will permit one or more persons, each having his own telephone, to answer, originate and hold telephone calls on a common group of central office, PBX, or automatic tie lines multiplied from one instrument to the next. It is reissued to include information formerly contained in the addendum, to delete information regarding sidetone set apparatus and desk stands, and also other minor changes to bring the section up to date.

1.02 The lines terminating in the No. 100 key equipment may be of three general types, common battery central office lines of either manual or dial type, PBX extension lines, and automatic tie lines.

1.03 In the case of tie lines terminating in No. 100 key equipment at both ends, central office equipment is not required, the line being merely looped through the central office wherever required by plant conditions. In some cases, however, the tie line may terminate in No. 100 key equipment at one end and a station set at the other, in which case central office equipment is necessary and the No. 100 key equipment is arranged as for a central office or PBX line.

1.04 No. 100 key equipment consists of two major parts: the key, lamp, audible signal, and talking equipment, which mounts on the subscriber's desk and the relay equipment which mounts either in an apparatus cabinet or on a relay rack. A typical arrangement is illustrated in Fig. 1.

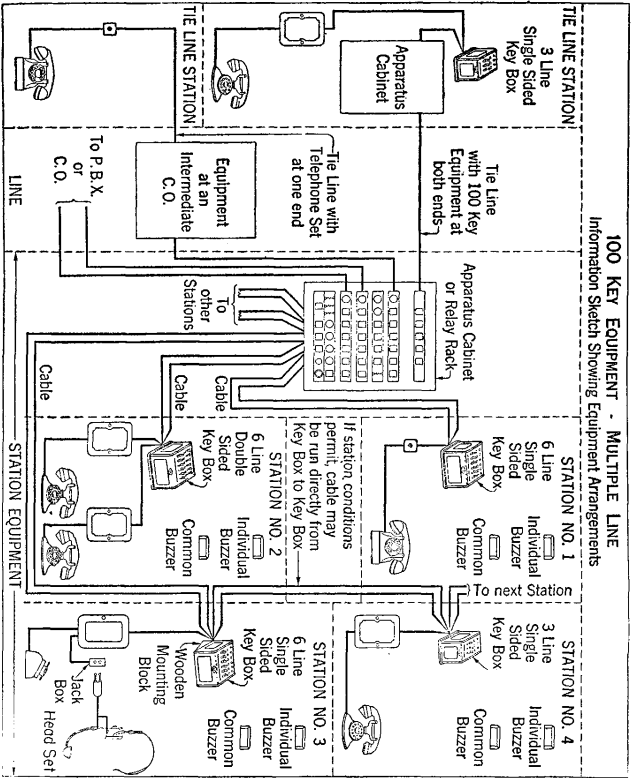
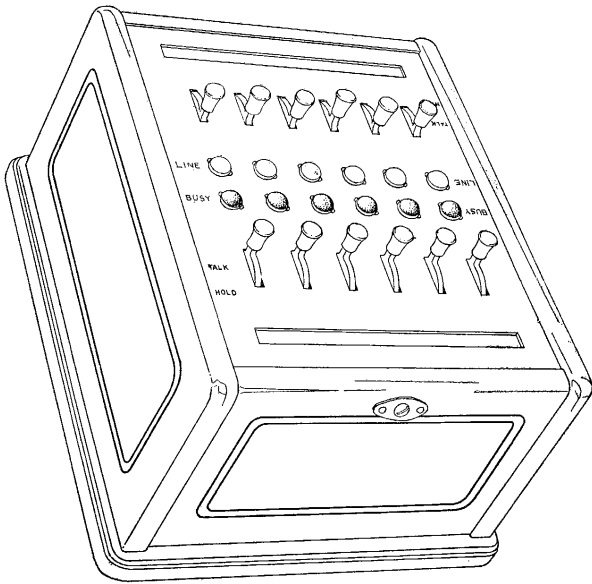


Fig. 1

## 2. DESK EQUIPMENT

2.01 **The key boxes** are small walnut birch finished wooden boxes arranged to mount on the top or side of an office desk and are made in four varieties. The first two are of 3- and 6-line capacity arranged for operation by one person only and equipped with one key, one line<sup>o</sup> lamp, and one busy lamp per line. The other two, also of 3- and 6-line capacity, are arranged for operation by two persons seated at a double desk with the key box in the center of the desk and are equipped with two key units, one line lamp and one busy lamp per line.



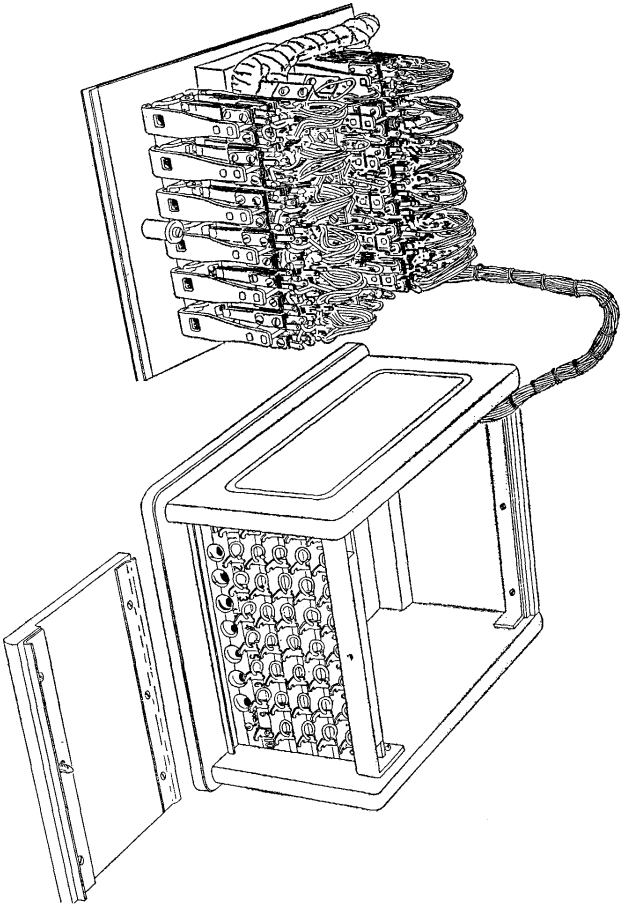
**Fig. 2—No. 100 Key Equipment—6-Line Double-Sided Key Box—Closed View**

2.02 Where single-sided key boxes are mounted on the top of the desk and it is desired that they be tilted toward the user, an inclined wooden base is provided. Where it is desired to mount 3-line single-sided key boxes on the right or left side of desks, a metal bracket with a mahogany walnut finish is provided.

2.03 Where installations exceed six lines, two or more key boxes are mounted on the desk side by side to give the desired capacity.

2.04 The face equipment consists of a metal plate on top of the key box, in which are mounted the necessary keys and lamps. The line lamps are equipped with an amber lamp cap and indicate incoming calls. The busy lamps are equipped with a green lamp cap and indicate talking or holding on the line.

2.05 The faceplate is built up of two plates, one beneath the other. Lamps and lamp caps may be removed without disturbing any part of the key box except on certain earlier type key boxes where the outer plate of the faceplate must be removed as described below to gain access to the lamps and caps. The keys and lamps are attached to the inner plate, which, in turn, is held to the outer plate by concealed screws. The outer plate is finished in old brass and is so constructed that no mounting screws are visible. The outer plate is detachable from the inner plate by the removal of two screws and the key handles. With the outer plate removed, key attaching screws are accessible for removal. The faceplate, with keys and lamps, may be easily detached from the framework of the key box for maintenance and inspection by unfastening the screw in the front of the key box. Associated with each row of keys is a designation strip which may be changed by opening the front of the key box raising the key and lamp plate and sliding the card and transparent strip out toward the right. The face equipment of a 6-line double-sided key box is shown in Fig. 2 and an open view of the key box is shown in Fig. 3.



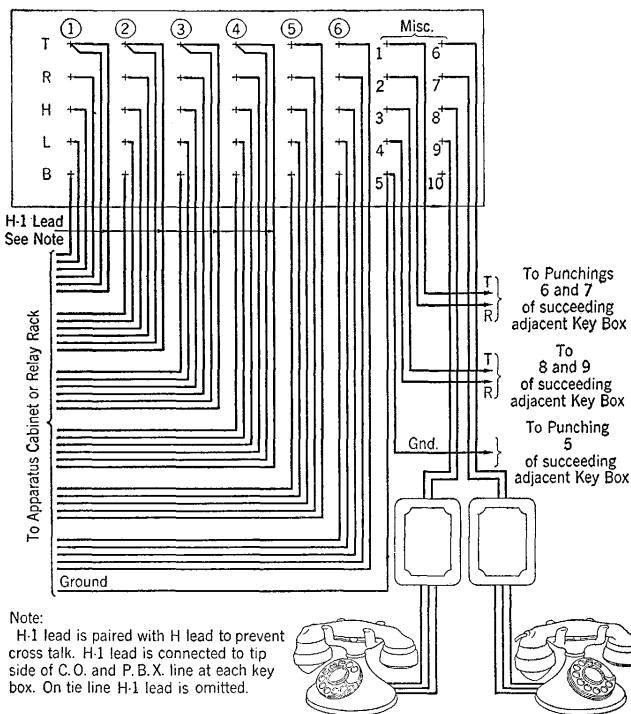
**Fig. 3—No. 100 Key Equipment 6-Line Double-Sided Key Box—  
Open View**

2.06 **The key box terminals** on which the cabling from the keys and lamps terminate are located in the front of the key box and access to them may be gained by removing the front of the box. There are five terminals for each line terminated in the key box, plus ten extra terminals used for ground, telephone circuit, spares, etc. The arrangement of terminals for a 6-line double-sided key box is shown in Fig. 4.

2.07 The cable from the apparatus cabinet is brought into the key box through a hole in the base or if a tilting block is used through the hole provided in the back of the tilting block. Where two or more key boxes are mounted side by side, the cable is split between the two boxes and the necessary jumpers are run between the boxes. There are six conductors per line, T, R, H, L, B, corresponding to tip, ring, hold, line lamp, busy lamp, and on central office and PBX lines an added hold lead (H1) which is connected to the tip side of the line at each key box to prevent crosstalk. On tie lines not requiring central office equipment, the H and H1 leads are omitted.

2.08 Lines to key boxes may be multiplied a maximum of twelve times either by multiplying from key box to key box or a number of key boxes may be wired to the circuit unit and multiplied at terminal strips in the terminal box or the apparatus cabinet.

2.09 **The audible signal equipment** used for indicating incoming calls consists of two types, a common signal which operates whenever an incoming call is received on any line and an individual signal which operates on incoming calls on a particular line of the group, it being assumed that one or more lines may be assigned to each employee for preferential answer. Alternating current buzzers are generally used for the audible signals, but where required ringers without condensers, loud ringing bells or relays for operating auxiliary signaling equipment may be provided in place of the ac buzzers. Arrangements have also been made whereby a common dc buzzer can be used where ringing current is not available. The buzzer or ringer cutoff or transfer keys, if provided, are usually mounted on the side of the subscriber's desk.



**Fig. 4—Terminal Arrangement—6-Line Double-Sided Key Box**

2.10 Telephone sets, head telephone sets, and hand telephone sets are furnished for use with the No. 100 key equipment. Where hand telephone sets and head telephone sets are used, a 684C subscriber set or equivalent is required for the talking circuit.

2.11 The 684C-3 subscriber set (common battery) is satisfactory for use in most installations where conductor loops of connecting circuits are moderate in length. Where the allowable conductor loop resistance (determined either by transmission or signaling) will be exceeded by the use of the common battery set on longer loops, the 634YD (local battery) subscriber set together with a 2A and a 27A key telephone unit (condenser and retardation coil for filtering battery supply) should be used.

2.12 When computing the approximate allowable conductor loop resistance from a signaling standpoint the dc resistance of the 684C-3 set with the 396A transmitter may be assumed to be 300 ohms and that of the 634YD set 30 ohms.

2.13 If a separately mounted dial is specified, locate the dial mounting as requested by the customer.

### **3. CIRCUIT UNIT EQUIPMENT**

3.01 Circuit equipment units associated with No. 100 key equipment are mounted in an apparatus cabinet or on a relay rack in any suitable location on the subscriber's premises.

### **4. TERMINAL BOX**

4.01 A terminal box having a walnut finish is furnished for use at installations where an earlier type wooden apparatus cabinet is employed and its purpose is to provide a convenient location for multiplying the leads from the apparatus cabinet to each key box. It is especially desirable where, due to floor conduit or other limitations, it is not possible to multiple directly from one desk to the next. The dimensions of the box are such that it has the same horizontal cross section as the wood apparatus cabinet and will, therefore, present a good appearance when mounted either above or below the apparatus cabinet. The terminal box contains terminal strips on which all leads from the apparatus cabinet are terminated and from which these leads may be multiplied to as many as six key boxes in different locations, but on the same premises. The terminal box has a capacity for four terminal strips to multiple a maximum of 12 lines. Where relays are mounted in a metal apparatus cabinet, leads to key boxes are multiplied at the cabinet, and terminal box is omitted.

### **5. TIMING CIRCUIT AND GROUND CUTOFF KEY**

5.01 Either a timing circuit or a ground cutoff key is provided for use in connection with central office or PBX lines or tie lines using central office or PBX line units as covered in Paragraph 1.03. On tie lines using tie line units, the



line lamps and audible signals are automatically retired when the calling station abandons the call.

5.02 The timing circuit holds the line signals operated on an incoming call for a period of approximately four seconds after ringing current is on the line and automatically retires the line signal after that interval unless ringing current is again applied to the line. The four-second interval is sufficient to hold the line signals operated over the silent interval of machine ringing.

5.03 The ground cutoff key, when normal, allows the line signals to lock in on an incoming call, but when operated, as with the key equipment unattended, causes the line signals to operate on an incoming call only while ringing current is on the line. A surface mounted indicating tumbler switch or approved equivalent is commonly used for this purpose.

## **6. METHOD OF OPERATION**

### **Incoming Calls**

6.01 On central office and PBX lines the application of ringing current to a line causes the line lamp and audible signal associated with the line to operate at each key box at which the line appears. Operation of the associated line key at any station to the first downward or talk position and removing the receiver from the switchhook retires the line lamp and audible signal and lights the busy lamps and connects the telephone set to the line. Keys are wired so that the set can not be connected to more than one line at the same time. To prevent line lamps and signals from operating for long periods, two arrangements are furnished as described in Paragraphs 5.01 to 5.03.

6.02 On tie lines when a call is originated at the distant station by the removal of the receiver from the switchhook (and also the operation of a key to the talk position, where keys are provided) the line lamps associated with the line are lighted at each key box at the called stations. While the line lamps burn the common and individual audible signals also operate continuously. These lamps remain lighted until the call is answered or the distant station abandons the call. An exception to this is the case where the tie line terminates in a station set at one end and employs equipment at an intermediate central office (see Fig. 1). In this case the line terminates in a CO or PBX unit and the signals lock in under control of the ground cutoff key or relay timing circuit. The call is answered at any station by operating the key associated with the line to the

first downward or talk position and removing the receiver from the switchhook. When this is done, the line lamps are extinguished, the associated signals cease operating and the busy lamps at each key box are lighted. The subscriber now talks on the tie line.

### **Outgoing Calls**

6.03 When a subscriber desires to make an out call, he selects an idle line, that is, one on which no lamps are lighted. The key associated with the line is then operated to the talk position and the receiver is removed from the switchhook causing the busy lamp to light at each key box. The subscriber is now ready to originate a call.

### **Holding**

6.04 If a subscriber is talking on a line and desires to hold, he may do so by operating the key associated with the line to its lowest position, in which position it locks, the busy lamp remaining lighted. If he now desires to make an out call on another line or answer another incoming call, the key associated with the second line is operated to its talk position and the conversation begins. At the end of the conversation on the second line the talk key is restored to normal and the subscriber may then resume the conversation on the first line by restoring its key to the talk position.

6.05 The holding circuit is arranged so that if with the receiver on the switchhook, one key or a number of keys are accidentally operated to the hold position, the hold bridge will not be placed on the lines.

### **Intercommunicating Line**

6.06 The signaling for calls on the intercommunicating line is usually accomplished by means of a buzzer circuit provided separately. Connection is made to the intercommunicating line by removing the receiver from the switchhook and operating the associated key box key or separately mounted key to the talk position.

## **7. BATTERY SUPPLY**

### **General**

7.01 The usual source of current for operation of the circuits for small installations consisting of a few lines is either 14-26-volt battery feed pairs from the central office or where available, an 8-cell battery associated with a PBX board on the same premises or a centralized building storage battery.

7.02 The power plant for larger installations will usually consist of an 8-cell 15-ampere hour 15-20-volt power plant, the battery of which is floated over cable pairs or charged locally from commercial power.

7.03 Ringing current for individual and common ac buzzers associated with line lamps may be obtained over a cable pair from the central office or, where a PBX is involved, from the ringing bus bar at the PBX.

## 8. CIRCUITS AND CIRCUIT DESCRIPTIONS

8.01 Table 1 is a list of the circuit equipment and cabling drawings pertaining to the No. 100 key equipment. The circuit drawings and associated circuit requirements and circuit descriptions are available in blueprint and handbook form.

Table 1

	<u>Title</u>	<u>Drawing</u>
Circuit		
	CO or PBX Line, Auxiliary Signal Circuit and Intercommunicating Circuit	SD-69000-011 -012 -013
	Tie Line and Auxiliary Signal Circuit	SD-69001-011 -012 -013
	Attendant's Telephone and Dial Circuit Equipment and Cabling 3-Line Single-Sided Key Box	SD-69162-01 ← ED-69003-01
	3-Line Double-Sided Key Box	ED-69018-01
	6-Line Single-Sided Key Box	ED-69016-01
	6-Line Double-Sided Key Box	ED-69019-01
	19-inch Mounting Plate Units for Relay Rack or Cabinet Mounting	ED-69065-01
	Switchboard Cabling at Relay Rack	ED-90976-01
	Terminal Box Equipment and Cabling	ED-69008-01