

**SERVICE-OBSERVING  
ARRANGEMENTS USING KEY  
EQUIPMENT FOR TELEPHONE COMPANY  
BUSINESS OFFICES  
DESCRIPTION AND USE**

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attendant's positions are made up of one or more 10-line key units equipped with an attendant's telephone jack, and for training purposes may be equipped with additional jacks to a maximum of 20 sets of attendant's headset jacks. A loudspeaker and a loudspeaker cutoff key may be provided instead of the additional jacks. The equipment units are normally assembled side-by-side in several different mounting arrangements. In large installations they may be mounted in any other practicable arrangement to meet local requirements.

1.05 Monitoring is done by supervisors or managers using either push-button or lever-type keys which are mounted separately from the supervisor's or manager's telephone. Push-button-type keys may be mounted in the knee well or on the side of the desk as specified at the time of installation. The lever-type keys are normally mounted in a drawer of the desk.

**1. GENERAL**

1.01 This section, which replaces Section C55.109 Issue A, describes service-observing and monitoring equipment and its use in Telephone Company business offices.

1.02 The equipment has been developed to meet the requirements of the Telephone Company for both monitoring and service observing at its various business offices.

1.03 Service observing is done by a clerk assigned to the business office, while simultaneous observing is done by a traveling clerk assigned to the district. The simultaneous observer uses the same type of equipment (but located in a different room) as the service observer and the key equipments of the two are connected in parallel. Monitoring is done by the supervisor or manager, depending on the size of the office. In large installations the supervisors monitor on the service representatives, while the manager has equipment to allow him to select a particular supervisor and monitor with him on a service representative.

1.04 Service-observing and simultaneous-observing positions use 101-type key units. The

**2. APPARATUS AND EQUIPMENT KEY UNITS**

2.01 The 10-line key units are furnished in "supplementary" types only (no flash, ring and hold key; no buzzer cutoff key; no battery cutoff key). The key units are arranged for right to left growth.

2.02 Sketch A illustrates a typical service-observing and simultaneous-observing installation showing the various features and options available.

2.03 The key units may be mounted on a table or desk top, or flush with the top of the desk or table. Frameworks are available in the one, two, three, or four units in flush-mounted or cabinet arrangement.

2.04 A detachable cardholder, coded 9A, and a wider designation strip are available if the writing space is inadequate on the designation strip furnished with the key equipment. This 9A cardholder is covered in Section C37.321, Designation Strips and Cards - Description and Use.

2.05 Sketch B illustrates a typical monitoring installation, showing the various features and options available.

**Equipment Units**

2.06 The relay units may be mounted in standard equipment cabinets on 19-inch relay racks, or by means of adapter ED-68189-01 on 23-inch relay racks. The relay units are furnished on 19-inch by one and 3/4-inch mounting plates and on single-bracket units for mounting on ED-69143-01 mounting assemblies.

**Telephone Sets**

2.07 The service-representative's telephone is a set having a hold key, two pickup keys, and a turn-button key. The telephone circuit is modified for use with service-observing and monitoring equipment by replacing the regular cord with one having two additional conductors. These two added conductors are connected internally to the induction coil of the telephone set, and externally to the monitoring coil mounted at the representative's desk.

2.08 Only one monitoring coil per observed telephone per installation is required, regardless of the number of monitoring taps necessary at any installation.

2.09 The managers and supervisors use a telephone set having a hold key, two pickup keys, and a turn-button key. The telephone circuit is modified for monitoring by replacing the regular cord with one having four additional conductors. These four extra conductors are connected to a separately mounted talk-monitor transfer key so that operation of this key transfers the line side of the induction coil in the set, from the pickup keys on the telephone set to separately mounted monitoring pickup keys.

2.10 The service observer uses a single-receiver headset.

**3. SIGNALING**

**Service Observing**

3.01 Calls are indicated by the white and green lamps designated "line" and "busy" on the 10-line key units. Following are the detailed operations:

**Two-way Line**

3.02 An incoming call lights the white lamp during the ringing period. When the call is answered the white lamp lights steadily.

**One-way Line**

3.03 Outgoing calls light the green lamp during the call.

3.04 The lamps for the one-way and 2-way lines of a particular service-representative's telephone are associated with the same key on the 10-line key unit.

**PBX Trunks**

3.05 An incoming call lights the white lamp during the ringing period. When the call is answered the white lamp lights steadily.

**Microphone Lines**

3.06 The white lamp will light steadily when the service representative operates a push-button key to signify that a personal contact is taking place. When a monitoring or service-observing key is operated to connect with the line, the lamp is extinguished. If no key is operated the lamp will time-out in about 20 seconds.

**Monitoring**

3.07 No lamps are associated with the manager's and supervisor's monitoring circuits.

**4. EQUIPMENT FEATURES**

**Two-way Line**

4.01 The line and busy-lamp circuit (KI-2133-1, Figure 2) provides for the operation of the white lamp used for the line and busy indication on the 2-way line.

**One-way Line**

4.02 The busy lamp circuit for one-way line (KI-2133-1, Figure 1) provides for the operation of the green lamp used for the busy indication on the one-way line.

**PBX Line (Trunk-Timing Circuit)**

4.03 The line and busy-lamp circuit for PBX-trunk monitoring (KI-2133-1, Figure 3) provides for the operation of the white lamp used for the line and busy indication on the PBX trunk. It provides a monitoring coil to prevent any "click" on the line that might be caused by an observer connecting to or disconnecting from a line in service.

**Microphone Line**

4.04 The desk-microphone circuit and the desk-microphone-relay circuit (KI-2133-2, Figures 14 and 15) provide the transmitter battery supply for the desk microphone under control of

a push-button key at the service-representative's desk. They provide for the steady white lamp and the time-out of the lamp and microphone battery supply if the microphone line is not picked up for observing within about 20 seconds.

4.05 Microphones can be monitored at any time regardless of the lamp being on or off.

#### Key and Telephone Circuits

##### Service Observing (Drawing KI-2133)

4.06 The key unit for attendant's position (KI-2133-1, Figure 5) provides means for connecting the observer's headset (KI-2133-1, Figures 7, B, or D) to any of the lines on the key units.

4.07 A grouping key (KI-2133-1, Figure 6) may be provided at large installations so that one attendant may observe on two or more groups of cabinets during periods of light traffic. (Example: Six 10-line key cabinets can be divided into two groups of three cabinets so that two attendants can monitor on three cabinets each, or by operating the key, one attendant can monitor on all six cabinets.)

4.08 When using grouping keys, do not provide a loudspeaker for each attendant's circuit, the loudspeaker being provided for and connected only to the attendant's circuit not affected by the operation of a grouping key. (The one attendant that can pick up all lines when the key cabinets are grouped.)

##### Monitoring (KI-1985)

4.09 The circuits shown on this drawing provide means for connecting the manager's or supervisor's telephone set to telephones or microphones for monitoring purposes. It also provides means for connecting the manager's telephone set to supervisor's monitoring circuits for simultaneous monitoring with a supervisor.

4.10 When monitoring on telephones only, the observed-telephone circuit terminates on locking-type push-button keys. These keys may be stacked to increase the number of lines monitored.

4.11 When monitoring on either the telephone or microphone, the observed lines terminate on three-position lever-type keys which may be mounted in the top drawer of a desk.

##### Amplifiers (Drawings KI-1985 and KI-2133)

4.12 Each service-observer's headset and each manager's or supervisor's telephone set used for monitoring has an associated high-gain voice-frequency (V3) amplifier. The pickup keys connect the associated lines to the input of the amplifier. The output of the amplifier is connected

at the observer's headset or the manager's or supervisor's telephone.

4.13 Provision has been made for an optional volume control (attenuator) in the service-observer's circuit. It is not normally required but can be used in hard-of-hearing cases to provide the observer with a handy method of adjusting the volume. If the volume control is used, the amplifier gain control should be set at a higher level than it would be otherwise.

##### Power

4.14 The lamp and relay equipment used for service observing is designed to operate on a 14- to 26-volt battery. This power may be obtained from the same source supplying the business-office station system.

4.15 The voice-frequency (V3) amplifiers require a separate power-supply unit. (Power-supply unit for V3 amplifiers is shown on the drawings.) This unit can supply power for a maximum of eight amplifiers. The amplifiers may remain on at all times or a switch may be provided to turn off the power supply. A source of 115-volts, 60-cycle ac is required to operate this power-supply unit.

## 5. INSTALLATION

5.01 A detailed list of material, except for relay racks, apparatus cabinets, and cables and wire is shown on each drawing associated with this section.

5.02 Information relative to locating, mounting, and wiring of various key-telephone units, relay units on mounting plates, fuse panels, and small power plants as covered in Sections C53.506 and C53.507, Key Equipment and Station Systems - Cabinets, will in general apply to the use of these units on relay racks. Information on relay racks is covered in Sections C53.902 and C53.903, Relay Rack for Key Equipment and Station Systems.

5.03 Installation of this equipment shall be made in accordance with the drawings covering the circuit arrangements, and Sections C36.306, C53.405, C53.406, C54.311, and C62.121.

5.04 Following is a list of drawings associated with this equipment:

KI-1985 -1, -2, -3	Business-Office Monitoring - Arrangement to Allow Business-Office Managers or Supervisors to Monitor on Telephones or Microphones
KI-2133 -1, -2, -3	Service Observing Using 10-Line Key Units to Observe on Telephones, Microphones, and PBX Trunks

K-3725 Line Group-Busy Circuit to Operate a Chime and Flash Lamp When All Lines in the Group are Busy

Capacitor CAPACITOR, NO. 439A  
One per amplifier KI-2133-2 Figure 15

## 6. SUPPLIES

6.01 This section lists in alphabetical order the apparatus and equipment that may be required in connection with the installation and maintenance of the service-observing and monitoring equipment.

6.02 Paragraph 6.04 lists the apparatus, equipment units, etc., needed for new installations and additions to existing installations. For maintenance reasons it may be necessary to replace individual pieces of apparatus or parts thereof.

6.03 When ordering by "ED" or "J" code numbers, it is necessary to specify the group or list number and the quantity of groups or lists desired.

6.04 Supplies required are as follows:

INDEX	ORDERING INFORMATION AND DESCRIPTION
Amplifier	J-68647B L2, VOICE-FREQUENCY AMPLIFIER E/W 403B ELECTRON TUBE One per KI-2133 Figure 8 One per KI-1985 Figure 10
Assembly	ED-69143-01 G1, MOUNTING-PLATE ASSEMBLY 19-inch mounting plate for angle-bracket units One per two KI-2133 Figures 1 and 2 Two per six KI-2133-1 Figure 3 One per eight or less KI-2133-1 Figure 8A, or KI-1985 Figure 10A
	ED-91929-01 G32, EQUIPMENT UNIT One per microphone KI-2133-2 Figure 14
	ED-91938-01 G17, EQUIPMENT UNIT One per PBX trunk KI-2133-1 Figure 3
Box	BOX, APPARATUS, NO. 105B Required to mount the monitoring coil at the service-representative's desk

CAPACITOR, NO. 441A  
One per PBX trunk KI-2133-1 Figure 3

Coils COIL, REPEATING, NO. 189D  
One per telephone KI-2133-1 Figure 4, or KI-1985 Figure 16  
One per KI-2133-1 Figure 3

Cords CORD, NO. D14G-3  
One per service-representative's telephone KI-2133-2 Figure 13, or KI-1985-1 Figure 1

CORD, NO. D17A-3  
One per manager's or supervisor's telephone KI-1985-1 Figure 6

CORD, NO. L2D  
One per headset KI-2133-1 Figure B

CORD, NO. L2W  
One per headset KI-2133-1 Figure D

Filter FILTER, NO. 45A  
One per microphone KI-2133-2 Figure 14

Headband HEADBAND, NO. 11A  
One per head-telephone set KI-2133 Figure B or D

Knob H.R.S.-3, NATIONAL CO. KNOB or EQUIVALENT  
One per KI-2133-1 Figure 12  
One per KI-1985-2 Figure 14

Inductor INDUCTOR, NO. 85A  
One per microphone KI-2133-2 Figure 15

Jack JACK, NO. 223, or JACK, NO. 364  
Two per KI-2133 Figure 7

JACK, NO. 215, or JACK, NO. 396  
Two per KI-2133 Figure 7

JACK, NO. 404B-9  
One per KI-2133-1 Figure 7 when specified

Key KEY, NO. 479CJ  
Used in H-2949 key mounting KI-1985-2 Figure 9  
For new installations see Mounting (Key)

Key (Cont'd)	<p>KEY, NO. 551A or EQUIVALENT One per microphone KI-2133-2 Figure C</p> <p>KEY, NO. 6017D One per loudspeaker KI-2133-1 Figure 10A One per manager monitoring only on service-representative's telephones</p> <p>KEY, NO. 6017J One per attenuator KI-2133-1 Figure 6</p> <p>KEY, NO. 6021C-3 Push-button key for managers monitoring with supervisors, KI-1985-1 Figure 13</p> <p>KEY, NO. 6023A-3, SPECIAL PER D-141709 Push-button key to pick up attendant's telephone circuits One per each KI-1985-1 Figure 3, and Figure 4</p>	<p>PLATE, MOUNTING, NO. 220A One and 3/4-inch by 23-inch mounting plate equipped with 12 sockets One per 12 V3 amplifiers KI-2133-1 Figure 8 (8B), or KI-1985-2 Figure 10 (10B)</p> <p>PLATE, MOUNTING, NO. 600ED DRILLED FOR 85A INDUCTOR, POSITIONS 15, 40, 65, 115, 140, 165, 190, 215, 240 One per ten microphones KI-2133-2 Figure 15</p> <p>PLATE, MOUNTING, NO. 600BP DRILLED FOR 439A CAPACITOR, POSITIONS 1 to 16 One and 3/4-inch by 19-inch mounting plate One per ten microphones KI-2133-2 Figure 15</p> <p>PLATE, MOUNTING, NO. 600BP DRILLED FOR 441A CAPACITOR, POSITIONS 1 to 16 One and 3/4-inch by 19-inch mounting plate One per ten PBX trunks KI-2133-1 Figure 3</p>
Loudspeaker	<p>SET, LOUDSPEAKER, NO. 100F One per KI-2133-1 Figure 11</p>	<p>PLATE, MOUNTING, NO. 601A DRILLED FOR AND TAPPED FOR .138-32 MACHINE SCREWS One and 3/4-inch by 19-inch mounting plate One per ten V3 amplifiers KI-2133-1 Figure 8, or KI-1985-2 Figure 10B</p>
Mounting (Jack)	<p>MOUNTING, JACK, NO. 80 One per two 215- or 233-type jacks</p> <p>MOUNTING, JACK, NO. 199A One per four 364- or 396-type jacks</p>	<p>PLATE, MOUNTING, NO. 737J One and 3/4-inch by 19-inch mounting plate Two per ten microphones KI-2133-2 Figure 15</p>
Mounting (Key)	<p>H-2949 G1, KEY MOUNTING Special mounting for lever-type keys for installation in a desk drawer. This basic unit is equipped with one 479EL key (talk-monitor transfer) and has a capacity of ten 479CJ keys used to pick up microphone or telephone lines. On initial installations the additional keys may be ordered as listed below.</p> <p>H-2949 G2, KEY MOUNTING Equipment for one key used for telephone and microphone monitoring. For subsequent additions up to a maximum of ten keys, see listing for 479CJ key.</p>	<p>PLATE, MOUNTING, NO. 600ED DRILL PER ARRANGEMENT "A" FOR 189D REPEATING COIL IN POSITIONS 20, 49, 78, 107, 136, 165, 194, 223, 252 One and 3/4-inch by 19-inch mounting plate One per nine PBX trunks KI-2133-1 Figure 3</p>
Plate (Mounting)	<p>PLATE, MOUNTING, NO. 219A One and 3/4-inch by 19-inch mounting plate equipped with ten sockets One per ten V3 amplifiers KI-2133-1 Figure 8 (8B), or KI-1985-2 Figure 10 (10B)</p>	<p>Plug</p> <p>PLUG, NO. 283B-9 One per headset KI-2133-1 Figure D</p> <p>PLUG, NO. 289B One per headset KI-2133-1 Figure B</p>

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Potentiometer	KS-14135 L1, POTENTIOMETER One per attenuator KI-2133-1 Figure 12 One per attenuator KI-1985 Figure 14		P-269797 EQUIPMENT UNIT E/W 218A MOUNTING PLATE POSITION 11 One per KI-2133-1 Figure 8A One per KI-1985-2 Figure 10A
Receiver	RECEIVER NO. 723A One per headset KI-2133-1 Figures B and D	Power	J-68638A L1, POWER-SUPPLY UNIT One and 3/4-inch by 19-inch mounting plate One per eight amplifiers KI-2133-1 Figure 8, or KI-1985-2 Figure 11
Relay	RELAY, NO. 271A One per installation equipped with microphones KI-2133-2 Figure 15  RELAY, NO. U419 One per microphone KI-2133-2 Figure 15  RELAY, NO. U421 One per microphone KI-2133-2 Figure 15	Set	SET, TELEPHONE, NO. 440GG (DIAL) or 440GE (MANUAL) One per service representative if not already installed KI-2133-2 Figure 13, or KI-1985-1 Figure 1
Resistor	KS-8512 L11C, 22-OHM RESISTOR One per amplifier KI-2133-1 Figure 8; or KI-1985-2 Figure 10  KS-13490 L1, 300-OHM RESISTOR Four per attenuator KI-2133-1 Figure 12, or KI-1985-2 Figure 14	Transmitter	TRANSMITTER, NO. 1016R (RIGHT) or 1016L (LEFT) Desk microphone one per public-office position if not already installed
Piece Parts	P-188945 CENTERING WASHER .173 inch by 9/16 inch by .020 inch Twenty per KI-2133-1 Figure 8B, or KI-1985-2 Figure 10B  P-210577 O.H.M. SCREW .138-32 by 4-1/8 inches Ten per KI-2133-1 Figure 8B, or KI-1985-2 Figure 10B  P-220193 WASHER (ASBESTOS) .188 inch by .750 inch by .063 inch Twenty per KI-2133-1 Figure 8B, or KI-1985-2 Figure 10B	Unit	UNIT, TELEPHONE, KEY, NO. 5A One per one-way line KI-2133-1 Figure 1 One per 2-way line KI-2133-1 Figure 2  UNIT, TELEPHONE, KEY, NO. 6B One per PBX trunk KI-2133-1 Figure 3  UNIT, TELEPHONE, KEY, NO. 8C One per telephone KI-2133-2 Figure 13, or KI-1985-1 Figure 16  UNIT, TELEPHONE, KEY, NO. 14A One per 2-way line KI-2133-1 Figure 2 One per PBX trunk KI-2133-1 Figure 3
		Unit (Key)	101A or B, KEY UNIT See Section C53.407 101A and 101B Key Equipments



