1A AND 1A1 KEY TELEPHONE SYSTEM
DESCRIPTION

1. GENERAL

1.01 This section describes 1A and 1A1 key telephone systems and is reissued to include information formerly contained in C53.156, 1A1 Key Telephone System, Description.

1.02 Due to extensive changes, marginal arrows have been omitted.

1.03 The 1A and 1A1 key telephone systems provide the following station switching service features: Pickup of one or more lines, holding on central office or PBX lines, visual line signals (steady or flashing incoming, steady busy, and steady or winking hold), manual or dial selected intercommunicating and signaling, manual or automatic exclusion and cutoff of other stations, and manual cutoff or transfer of audible signals.

1.04 The 1A line circuit features five relays on a supervisory relay basis and will operate and hold on common battery lines. In addition to the tip and ring conductors required between stations and apparatus serving the installation, a balance lead and a hold lead must be provided to stations arranged for hold.

1.05 The 1A system relay apparatus is designed in two different physical arrangements: On small angle-bracket mounting plates holding one or two relays (which mount in 105-type apparatus boxes generally), and on 1-3/4- by 19-inch strip-mounted facilities (50-type KTU) designed to be installed in equipment cabinets. Local power from transformers, rectifiers, building floated batteries, central office cable pairs, etc., is required to provide auxiliary service features such as intercommunicating, visual and audible signals, automatic time out, etc.

1.06 The 1A1 system line circuit features three relays and requires an **A** lead between station and line equipment for controlling common battery or private lines. An individual ground (A1 lead), preferably one per station, must be furnished

to supply **A** lead control through the station hook-switch contacts. Local power must be furnished at 1A1 system installations since there are no B-type supervisory relays connected in series with the central office or PBX line (as in the 1A system) to release or apply a holding condition.

1.07 The 1A1 system apparatus is designed on unit panel-type mounting plates (200 series KTU) and supersedes the strip-mounted (50-type KTU) portion of the 1A system line circuit and allied facilities.

2. FEATURES

Line Selection

2.01 The pickup feature enables all types of lines such as central office, PBX, intercommunicating, or tie lines to be picked up. When more than one line is picked up, the station must be equipped with a set containing the required key buttons or must be provided with separately mounted keys.

Incoming Signals

2.02 Incoming signals are indicated audibly and/or visually. The visual and audible signals may be either steady or intermittent in operation. When a call is answered, relay operation silences the audible signal and changes the flashing line lamp, when provided, to a steady busy signal. With a time-out feature provided, if the call is not answered within approximately 30 seconds, the locked-in relays will release and extinguish the incoming signal.

Hold

2.03 A holding feature is provided for use by the subscriber and permits holding a central office or PBX line while using a second line at the same station. When the hold key is depressed, the hold circuit in the 1A system is operated over the **H** lead, through the pickup and hold keys and the telephone circuit. The 1A1 system holding circuit is operated by removing the ground furnished over the **A1** lead, causing the **A** relay to release and the **H** relay to operate.

2.04 The hold lamp visual signal, when provided, will remain lighted while the line is being held. However, when the wink circuit is provided, the steady hold signal is interrupted momentarily and has the appearance of a wink. The hold key is arranged to release any operated line pickup key.

2.05 When a 1A system is connected to a 555 PBX, certain units may not receive adequate operating current. For detailed information, see Section C53.158, 1A and 1A1 Key Telephone System—Installation.

Cutoff and Exclusion—Manual

2.06 The cutoff and exclusion features are similar and differ only in the manner in which they are provided. Both of these features are controlled by the operation of a mechanical device as follows:

(a) Cutoff: The turn button key in the set may be operated manually to disconnect, or may be restored manually to reconnect various circuits such as extension station, extension ringer, etc. Additional cutoff keys, when required, may be externally mounted.

(b) Exclusion: This key is part of the hook-switch assembly, and is operated manually by pulling the plunger up, and restored automatically when the handset is placed on the mounting. This key may be used to cut off extensions or other stations having access to the same line, or may be used to cut off a common ringer in the set.

Cutoff and Exclusion—Automatic

2.07 The circuit functions of both features are based on the station supervisory relay operation.

2.08 Cutoff-automatic: Optional arrangements are provided to cut off stations from the line as follows:

(a) Station can cut off others and cannot be cut off.

(b) Station can cut off others and can be cut off except during a call.

(c) Station or group of stations cannot cut off others and can be cut off except during a call.

(d) Station cannot cut off others and can be cut off at any time.

2.09 Exclusion-automatic: A main station may be arranged to cut off automatically one or more secondary stations regardless of whether or not the stations are in use.

Audible Signals

2.10 The ringer may be connected to an individual line or may be wired as a common ringer for a group of lines. A bell or buzzer may be used as a common signal for one or two groups of stations.

Visual Signals

2.11 Where visual signals are required, they may be furnished either as an illuminated button of the key telephone set or as a separately mounted lamp indicator with service features as follows:

(a) Flashing incoming signal—either locked-in or non-locked-in line lamp.

(b) Steady signal—a busy signal.

(c) Steady or wink signal—a holding signal.

Intercommunicating

2.12 The intercommunicating feature enables two or more stations to be connected to a common talking line, usually on the same premises. A person may communicate with other persons at one or more stations connected in the system without the use of a central office or PBX line.

2.13 The intercommunicating line may be provided with a line and busy lamp and associated key telephone units, which, in addition to controlling these signals, may also control the time-out feature when this feature is provided in the system.

2.14 Generally associated with the talking line are coded or noncoded push button and buzzer signaling arrangements. The signaling buttons may be a part of the key telephone set or may be externally mounted 1-, 4-, or 8-key button assemblies. The buzzer may be mounted either externally or in the set as required.

2.15 An intercommunicating line arranged to signal automatically from one end to the other by removing the handset from the mounting, and to signal manually in the other direction, is usually referred to as a **one-way automatic intercommunicating line.** When the same type line is arranged to signal automatically from either end to the other end, it is usually referred to as a **2-way automatic intercommunicating line.**

Dial Selective Intercommunicating

2.16 This feature is a dial-selective signaling intercommunicating line, which may be furnished in the 1A system as a strip-mounted or in the 1A1 system as a panel-mounted unit.

2.17 When the intercommunicating line is seized, any station number from 2 to 0 may be dialed. The rotating wiper of the selector switch steps with the dial pulses and connects the signaling circuit to the signaling circuit of the station being dialed. The audible signal is operated **once** for a period of about 2 seconds. By redialing the same digit after a reasonable pause, the station can be resignaled.

2.18 The intercommunicating line visual signal, when provided, will light as a steady busy signal at each station when a call is originated. After dialing, the busy signal at the called station becomes a flashing line lamp. When the called station answers, the flashing line lamp reverts to a steady busy signal.

2.19 On an optional basis, the calling station may be arranged to cut off all stations from the line and to reconnect **only** the station number which has been dialed.

Private Line

2.20 A private line, as it is usually referred to, is a metallic circuit between two locations, which may or may not be on the same premises. It is used when two subscribers desire rapid communication with each other without the necessity of routing the call through a central office or a PBX. The kind of private line is determined by the type of terminating equipment used.

2.21 A private line arranged so that either end can be manually signaled by the other is generally referred to as a **ringdown tie line.**

2.22 A private line arranged for signaling automatically from either end, when the handset is lifted (or by key operation), is generally referred to as an **automatic tie line.**

2.23 A private line arranged for signaling in one direction automatically and in the other manually is usually referred to as a **station line circuit.** This circuit differs from the ringdown tie line in that the station end requires no line circuit or other additional equipment.

Radio Frequency Noise Suppressor

2.24 Filters are available to suppress dial induction, buzzer induction, and demodulated radio signals. See Section C55.802, 61-Type Filters—Description and Use, and Section C55.804, Radio Signal Suppression in Telephone Sets—1542A Inductor.

3. KEY TELEPHONE UNITS

1A Key Telephone System Equipment

3.01 The 1A key telephone system uses bent angle-bracket units, single or double, as relay equipment (See Fig. 1). For small installations the units may be mounted in the 105-type apparatus box (see Fig. 2). For large installations the units may be mounted on bent angle bars in a standard equipment cabinet.

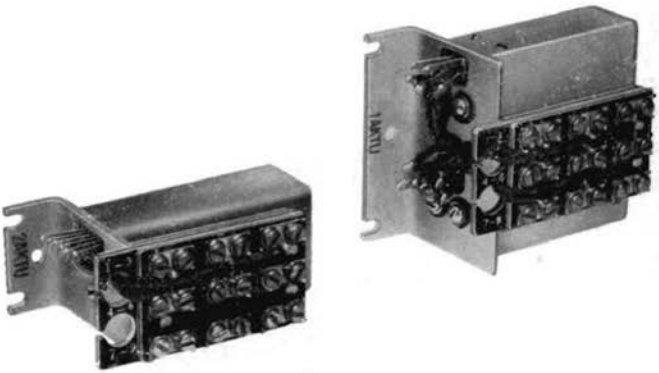

Fig. 1—1A Key Telephone System, Single and Double Units

3.02 Where the 1A key telephone system provides 19-inch mounting-plate units as relay equipment (Fig. 3), they may be mounted in an equipment cabinet. It may be necessary to use bent angle units (Fig.1) to provide certain optional service features and, in such cases, a mounting bracket will be required. For specific information on mounting features see Section C53.505, Key Equipment and Station System Cabinets—Description and Supplies.

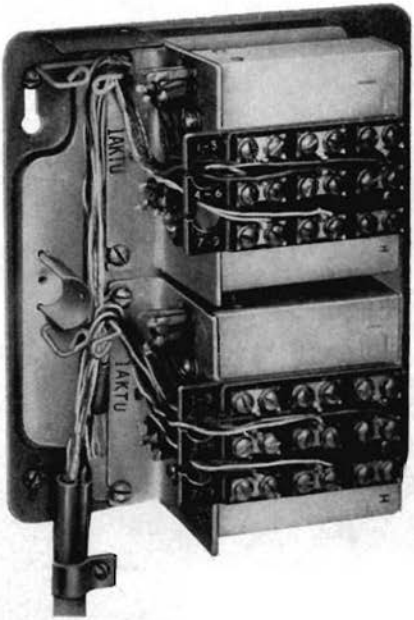

Fig. 2—105-Type Apparatus Box with Typical Units

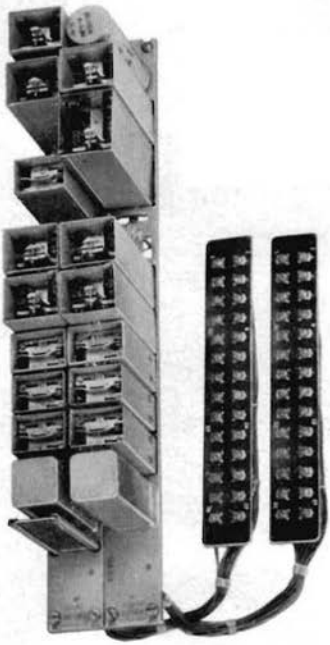

Fig. 3—1A Key Telephone System, 51A Key Telephone Unit

3.03 The key telephone units used for the 1A system are listed in Table A.

TABLE A

1A Key Telephone System

KTU Codes	Features or Options	Number Required
1A	Hold Circuit,	1 per line
1B	Special (for 555 PBX Line)	1 per line
2A	Battery Feed Coil 14 to 26 volts	1 per intercom
3A	Intercom Signaling Circuit	1 per intercom
5A	Auxiliary Hold Circuit	1 per line
6B	Supervisory and Busy Lamp Circuit,	1 per line
6C	Special (for 555 PBX Line)	1 per line
7A	Private Line Circuit	1 per line
	Terminal Panel Assembly,	
8A	Blank	As required
8C	For U-Type Relays	As required
10A	Automatic Exclusion Circuit	1 per line
11A	Ringing Feed Lamp Circuit	1 per CO generator feed
12A	Dry Cell Battery Feed Coil	1 per intercom
13B	2-Way Automatic Signaling Intercom Circuit	1 per intercom
	Ringup Relay Circuit,	
14A	Manual Area	1 per line
15D	Dial Area	1 per line
16A	Common Audible Signal Control Circuit	1 per installation
17B	Switching Relay Circuit	1 per line
18D	Busy and Supervisory Relay Circuit,	1 per line
18E	Special (for 555 PBX Line)	1 per line
19B	Flashing Circuit	1 per 6 lines
20A	Common Audible Control Circuit—Manual	1 per installation
21A	Fusing Unit	1 per 7 fuses
22 type	Resistor Units (for DC Lamp Operation)	As required
23A	Noise Suppression Circuit	1 per system
24A	Telephone Set Induction Coil Unit	1 per station
25B	Automatic Cutoff Control Circuit	1 per line

TABLE A (Contd)

KTU Codes	Features or Options	Number Required
26B	Automatic Cutoff Circuit	1 per line
27A	Capacitor Circuit (4 mf)	1 per line
28A	Equalizing Resistor Circuit	1 per station
29A	Cut Through Relay	1 per station
30A	Time Out Circuit	1 per installation
31A	Battery Feed Relay	1 per line
32A	Equalizer Unit	1 per station
33A	Wink Circuit (Used with 17B KTU)	1 per 5 lines
50A	Two CO or PBX Lines and Common Equipment	1 per 2 lines
50B	Three CO or PBX Lines and Common Equipment	1 per 3 lines
50C	Four CO or PBX Lines and Common Equipment	1 per 4 lines
51A	Two CO or PBX Lines and Common Equipment	1 per 2 lines
52A	One CO or PBX Line	1 per line
53A	One Automatic Tie Line	1 per line
54A	One Ringdown Tie Line	1 per line
55A	One Station Line Circuit	1 per line
56A	One Private Line Circuit	1 per line
57A	One Dial Selective Signaling Intercom	1 per 9 stations

3.04 The more commonly required feature combinations of completely equipped and wired units, supplied for both 1A and 1A1 systems, are equipped with the common flashing and time-out features as follows:

(a) In the 1A system the 50A, 50B, and 50C key telephone units each consist of a 4-plate apparatus cabinet equipped and wired for two, three, or four central or PBX lines, respectively.

(b) In the 1A1 system the 200A, 200D, and 200E key telephone units each consist of a 6-plate apparatus cabinet equipped and wired for two, three, or four central office or PBX lines, respectively.

1A1 Key Telephone System Equipment

3.05 In the 1A1 key telephone system, panel-type units are provided for relay equipment. These units may be mounted in standard equipment cabinets. Where it is necessary to use bent angle-bracket units to provide certain features, a mounting bracket will be required (see Figs. 1 and 4).

TABLE A (Contd)

KTU Codes	Features or Options	Number Required

3.06 A 1A1 key telephone system equipment installation is shown in Fig. 4.

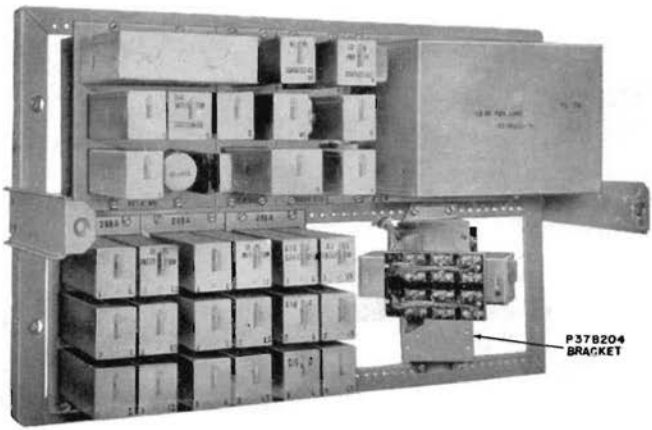

Fig. 4—Typical Installation, 1A1 Key Telephone Units

3.07 The 212A key telephone unit is a basic equipment unit which features the components of three 202B (central office or PBX line circuit) and one 209A KTU (flashing and time out) on one mounting plate. When using this unit, as many as four separate 3-line systems of 1A1 equipment can be housed in a single 6-plate cabinet (see Fig. 5).

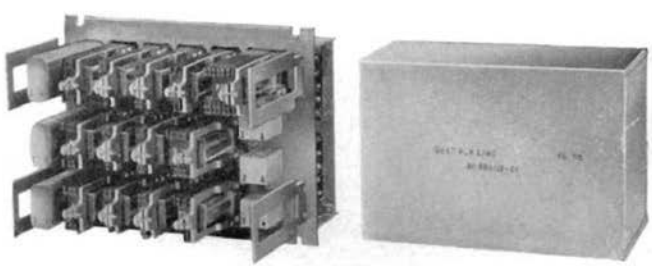

Fig. 5—1A1 Key Telephone System, 212A Unit

3.08 The 213A key telephone unit is a joint-use line circuit which is used when the 1A1 system operates in conjunction with the 1A system and the 100-, 101-, and 102-type key equipment. This panel-mounted unit provides for one central office or PBX line circuit and the common equipment such as line, busy, and hold signals.

3.09 The key telephone units used in the 1A1 system are listed in Table B.

TABLE B

1A1 Key Telephone System

Codes KTU	Features or Options	Number Required
201B	Fuse Mounting Unit and Bridging Terminal	1 per 7 fuses
202B	Central Office or PBX Line Circuit	1 per line
203A	Automatic Tie Line Unit	1 per line
204A	Ringdown Tie Line Unit	1 per line
205A	Station Line Circuit	1 per line
207A	Dial Selective Intercom Line Selector	1 per 9 station intercom lines
208A	Flashing Signal, Intercommunicating Line and Automatic Cutoff Control Circuit	1 per 3 intercom stations
209A	Flashing, Intercom Signal, Time Out	
	Without Wink	1 per 6 lines
	With Wink	1 per 5 lines
210A	Hold Lamp Wink Circuit	1 per 5 lines
211A	Miscellaneous Common Equipment	1 per system
200A	Two CO or PBX Lines with Common Equipment	1 per 2 lines
200D	Three CO or PBX Lines with Common Equipment	1 per 3 lines
200E	Four CO or PBX Lines with Common Equipment	1 per 4 lines
212A	Three CO or PBX Lines with Common Equipment	1 per 3 lines
213A	Joint Use Line Circuit with Holding	1 per line

4. STATION APPARATUS

Key Telephone Sets

4.01 The 500 and certain 400 series key telephone sets provide the various set features required for the 1A and 1A1 key telephone systems.

4.02 The following sets can be used with both **1A and 1A1** key telephone systems: The 402- and 502-type sets and all 540- and 560-type sets; the 440- and 460-type sets when the **second** letter of the set code suffix is either **E** or **G.** The following sets can be used **only** with **1A** key telephone systems: the 410-, 411-, 510-, and 511-type sets; the 440- and 460-type sets when the **second** letter of the set code suffix is either **A** or **C.** For specific information refer to Section C53.152, 1A and 1A1 Key Telephone Systems—Supplies.

4.03 The 500L and 500M sets are for use at installations which require the ringer circuit to be brought separately through mounting cords. See Section C63.441, 500 Series Telephone Sets—500-Type Connections.

Externally Mounted Keys

4.04 In general, the **separately mounted keys** provide the same feature combinations as the 400- or 500-type sets **with the following exceptions:**

(a) The exclusion feature.

(b) The combination of central office and private line with common signaling and hold keys.

(c) The provision of more than one signal key in combination with pickup keys.

(d) The provision of a signaling key with a cutoff key.

The key feature combinations which they provide are listed in Section C53.152, 1A and 1A1 Key Telephone Systems—Supplies, and are covered on drawing SD-69207-01.

Note: When the 101-type key equipment key box is used with the **1A** or the **1A1** key telephone equipment, refer to SD-69196-01 and SD-69195-01, respectively.

4.05 Station number cards and designation strips available are covered in the following sections: C37.311, Station Number Cards and Card Holders; and C37.321, Designation Strips and Cards—Description and Use.

5. POWER SUPPLY

5.01 The power supply for the 1A and 1A1 key telephone systems is covered in Section C53.511, Power Supply Arrangements for Station Apparatus and Use.