# 1A AND 1A1 KEY TELEPHONE SYSTEMS

## IDENTIFICATION

### 1.00 GENERAL

**1.01** This section is reissued: ↰
- To bring Table A up to date to show the latest manufactured units.
- To add information for conferencing feature and make-busy feature. ↲

**1.02** 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:
  (a) Steady or flashing (incoming calls).
  (b) Steady busy.
  (c) Steady or winking hold.
- Make-busy circuit. ←
- Manual or dial selective intercommunicating and signaling.
- Conferencing on two PBX lines. ←
- Manual or automatic exclusion.
- Cutoff or transfer of audible signals or other features.

**1.03** The 1A system line circuit features relays that 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. Local power from transformers, rectifiers, batteries, central office cable pairs, etc, is required to provide auxiliary service features such as visual and audible signals, intercommunicating, automatic time-out, etc.

**1.04** The 1A1 system line circuits feature relays which require an *A* lead between station and line equipment for control. One individual ground (*A1* lead) per station must be furnished to supply *A*-lead control through the station switchhook contacts. Local power must be furnished at 1A1 system installations since there are no supervisory relays connected in series with the central office or PBX line.

### 2.00 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 set must be equipped with the required key buttons, or separately mounted keys must be provided.

#### 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, if provided, to a steady busy signal. When a time-out feature is provided, the locked-in relays will release and extinguish the incoming signal if the call is not answered within approximately 30 seconds and no other line in the system is busy.

#### HOLD

**2.03** A holding feature is provided for use by the customer 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 busy lamp visual signal, if provided, will remain lighted while the line is being held. However, when the wink circuit is provided, the steady busy signal is interrupted momentarily and has the appearance of a wink. The hold key is arranged to release any operated line pickup key.

## CUTOFF AND EXCLUSION

### Manual

**2.05** 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:

- *Cutoff*—The turnbutton key in the set may be operated manually to disconnect or may be restored manually to reconnect various circuit arrangements such as extension ringer, etc. Additional cutoff keys, when required, may be externally mounted.
- *Exclusion*—The exclusion key is part of the switchhook assembly; it 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, other stations having access to the same line, or a common ringer in the set.

### Automatic

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

**2.07** *Cutoff, Automatic*—Optional arrangements are provided to cut off stations from the line as follows:

- Station can cut off others but cannot be cut off.
- Station can cut off others and can be cut off, except during a call.
- Station or group of stations cannot cut off others but can be cut off, except during a call.
- Station or group of stations cannot cut off others but can be cut off at any time.

**2.08** *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.

## SIGNALS

### Audible

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

### Visual

**2.10** Visual signals are furnished as an illuminated button of the key telephone set or as a separately mounted lamp indicator with service features as follows:

- Flashing signal, either locked-in or non-locked-in line lamp—an incoming signal.
- Steady signal—a busy signal.
- Steady or wink signal—a holding signal.

## MAKE-BUSY LAMP AND KEY CIRCUIT

**2.11** This circuit provides a means to busy a central office or PBX line or a group of lines to incoming traffic. Outgoing traffic is not affected.

**2.12** The circuit would primarily be used on large installations where a group of lines would be made busy during off-peak hours.

**2.13** This circuit connects to standard central office or PBX common equipment circuits which provide a make-busy feature. A separate control pair is required to the central office or PBX equipment for each line or group of lines made busy.

## INTERCOMMUNICATING

### Manual

**2.14** 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.

**2.15** The intercommunicating line may be provided with a line and busy lamp and associated KTU, which in addition to controlling these signals may also control the time-out feature when this feature is provided.

**2.16** Generally associated with the talking line are coded or noncoded pushbutton and buzzer signaling arrangements. The signaling buttons may be a part of the key telephone set or may be externally mounted 1-, 4-, 8-, or 12-key button assemblies, or any combination of these keys. The buzzer may be mounted either externally or in the set as required.

**2.17** 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**

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

**2.19** 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 of the selector switch 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.

**2.20** 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.

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

**2.22** Dial selective intercommunicating is provided with many additional features in the 6A rather than the 1A or 1A1 key telephone system circuits.

**CONFERENCING**

**2.23** Two PBX lines may be bridged for conferencing purposes under control of an exclusion key or nonlocking key at a key station. This can be accomplished without returning the handset to the mounting and without the assistance of an operator.

**PRIVATE LINE**

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

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

**2.26** A private line, arranged for signaling automatically from either end when the handset is lifted, is referred to as an *automatic tie line.*

**2.27** A private line, arranged for signaling in one direction automatically and in the other manually, is 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**

**2.28** Filters are available to suppress dial induction, buzzer induction, and radio signals. See C Section covering 61-type filters and C Section covering identification and radio signal suppression in telephone sets.

## 3.00 KEY TELEPHONE UNITS

**3.01** Key telephone units are used to provide the various features described in 2.00 and are available in the following three basic types:

- Bent-angle brackets (single or double, see Fig. 1).
- Strip mounted on 19-inch mounting plates (see Fig. 2).
- Panel mounted (see Fig. 3).

**3.02** The bent-angle bracket and strip-mounted units are used primarily for 1A key telephone systems; the panel-mounted units are used primarily for 1A1 key telephone systems. These units may be mounted in standard equipment cabinets and on apparatus mountings.

**3.03** The 238A and 239A key telephone units (see Fig. 4) are designed for large-capacity centralized installations of 1A1 system equipment. The grouping capability of the line circuits for time-out and separate lamping purposes permits wide latitude in installation flexibility. Some of the typical application combinations offered by the two units are shown in Fig. 5.

**3.04** Tables A and B list the key telephone units used for 1A and 1A1 key telephone systems, respectively.

**3.05** The more commonly required feature combinations, completely wired and mounted on an apparatus mounting or in an equipment cabinet, are available as key telephone units. Table C lists the codes, features or options, and mountings or cabinets of these units.


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

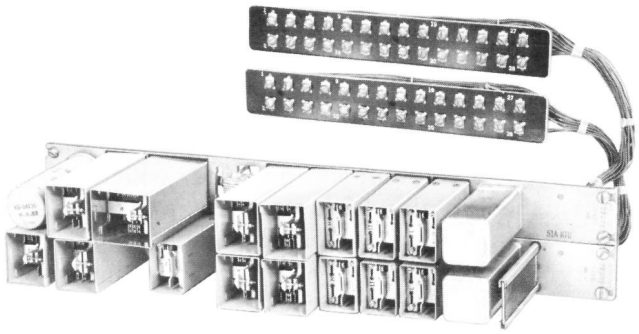
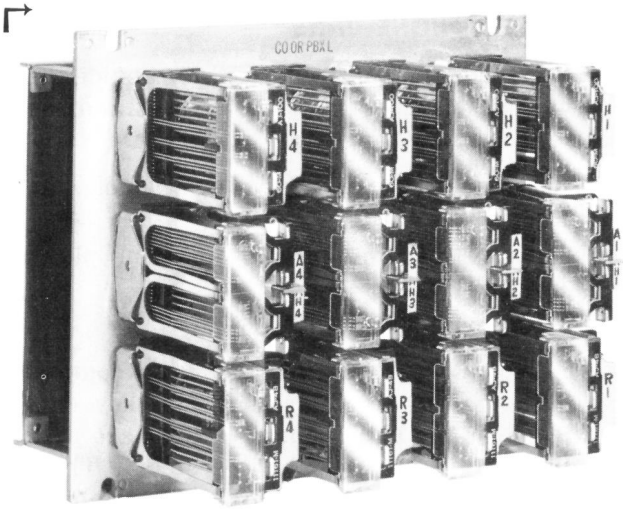
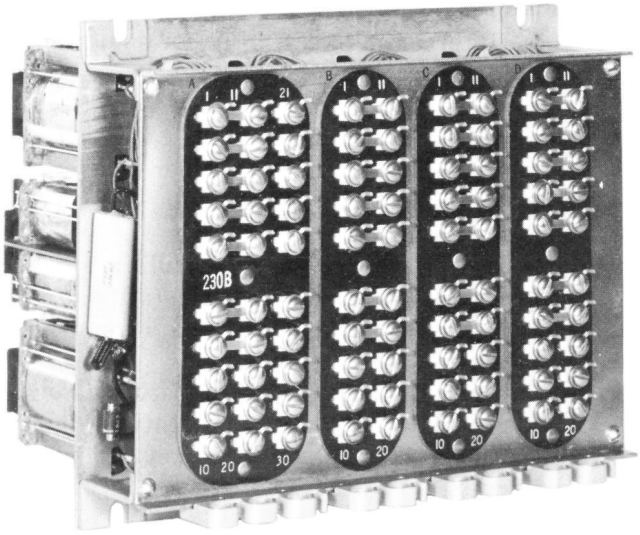


Fig. 2 — 1A Key Telephone System, 51A KTU




Front View




Rear View

Fig. 3—1A1 Key Telephone System, 230B KTU

## 4.00 STATION APPARATUS

### TELEPHONE SETS

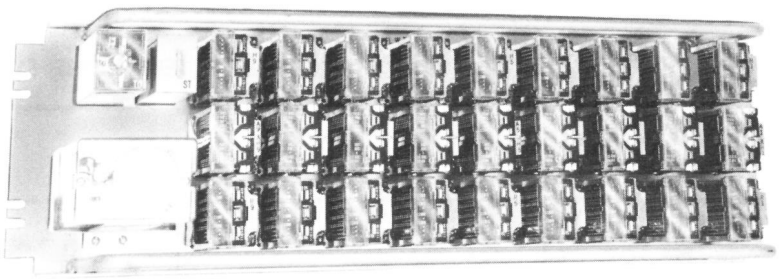
**4.01** Generally, common battery telephone sets with or without keys may be used with the 1A key telephone system.

**4.02** Telephone sets which provide *A* lead control such as the following may be used with the 1A1 key telephone system:

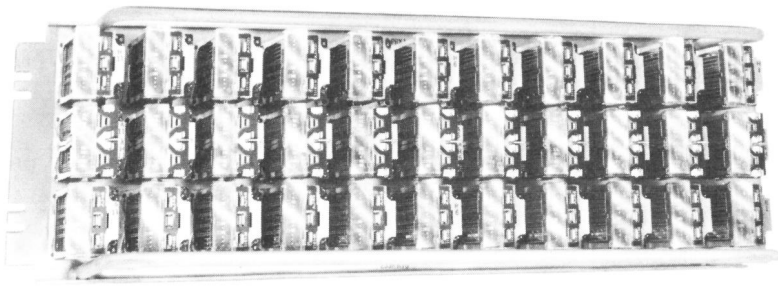
| | | |
|---|---|---|
| | 212A, B, C, L | 535A, B |
| | 402A, C | 536A, B |
| | 440E, G series | 554A, B |
| | 460E, G series | 558C, D |
| | 500L, M, R, S | 540 series |
| | 502A, B | 560 series |
| → | 511C, D | 630 series |
| | 532A, B | 701B |

→ ***Note:*** The Call Director telephone sets (630 series) with and without station line concentrator equipment are covered in SD-69387 and SD-69367, respectively, and in the C Sections under Station Sets.

238A Front View



239A Front View



239A Rear View

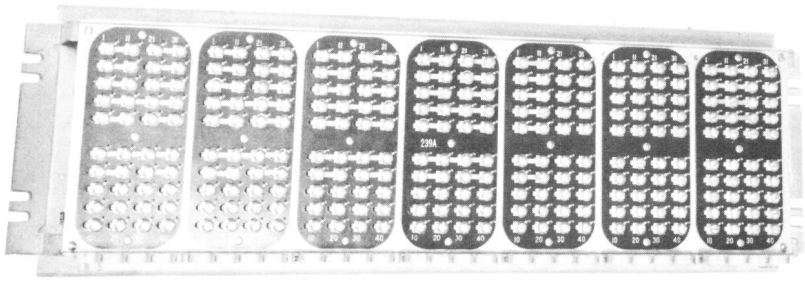


**Fig. 4 — Key Telephone Units**

## SEPARATELY MOUNTED KEYS

**4.03** In general, the separately mounted keys provide the same feature combinations as the 400- or 500-type sets with the exception of the exclusion feature.

*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. Connections for the 1A1 key telephone units to 101-type key boxes are covered in the C Section entitled 101A and 101B Key Equipment.

**4.04** Station number cards and designation strips available are covered in other C Sections.

## 5.00 POWER SUPPLY

The power supply for the 1A and 1A1 key telephone systems is covered in other C Sections.

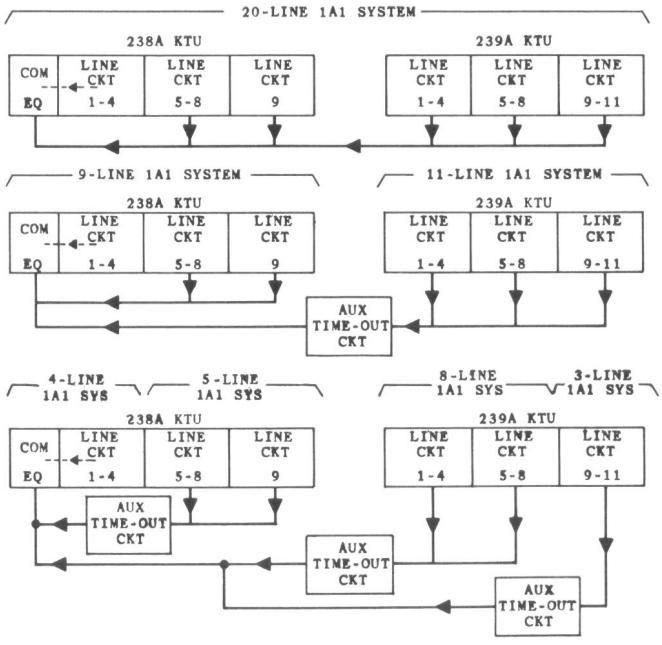



**Fig. 5 — Typical 1A1 System Combinations**

## TABLE A

## 1A KEY TELEPHONE SYSTEMS

| KTU Code | Features or Options | | Quantity |
|---|---|---|---|
| 1A | Hold circuit | Standard | 1 per line |
| 1B | | Special (for 555 PBX line) | |
| 2A | Battery feed coil (14 to 26 volts) | | 1 per intercom |
| 3A | Intercom signaling circuit | | |
| 5A | Auxiliary hold circuit | | 1 per line |
| 6B | Supervisory and busy lamp circuit | Standard | |
| 6C | | Special (for 555 PBX line) | |
| 7A | Private line circuit | | |
| 8A | Terminal panel assembly | Blank | As required |
| 8C | | For U-type relays | |
| 10A | Automatic exclusion circuit | | 1 per line |
| 11A | Ringing feed lamp circuit | | 1 per central office generator feed |
| 12B | Dry cell battery feed coil (4½ volts) | | 1 per intercom |
| 13C | 2-way automatic signaling intercom circuit | | |
| 14A | Ringup relay circuit | Manual area | 1 per line |
| 15D | | Dial area | |
| 16A | Common audible signal control circuit | | 1 per group of common aud signal |
| 17B | Switching relay circuit | | As required |
| 18D | Busy and supervisory relay circuit | Standard | 1 per line |
| 18E | | Special (for 555 PBX line) | |
| 19B | Flashing circuit | | 1 per 6 lines |
| 20A | Common audible control circuit manual | | 1 per group of common aud signal |
| 21A | Fusing unit | | 1 per 6 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 |
| 26B | Automatic cutoff circuit | | 1 per line |
| 27A | Capacitor circuit 4 uf | | 1 per line |
| 28A | Equalizing resistor circuit | | 1 per station |
| 29A | Cut-through relay | | |
| 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 |
| 34A | Make-busy circuit | | 1 per line or group of lines |
| 51A | Two central office or PBX line circuits with common equipment for 6 or less lines | | As required |
| 52A | Central office or PBX line circuit | | 1 per line |
| 53A | Tie line circuit | Automatic | 2 per line (1 at originating and 1 at terminating end) |
| 54A | | Ringdown | |
| 55A | Station line circuit | | 1 per line |
| 56A | Private line circuit | | |
| 57A | 9-station dial-selective signaling intercom circuit (additions and maintenance only) | | 1 per system |

## TABLE B

## 1A1 KEY TELEPHONE SYSTEMS

| KTU Code | Features or Options | | Quantity | Panel Width | |
|---|---|---|---|---|---|
| | | | | inches | 7/16-inch centers |
| 201C | Fuse-mounting unit and bridging terminal | | 1 per 7 fuses | 2 5/32 | 5 |
| 202B | Central office or PBX line circuit (grounded ringing) | | 1 per line | 3 1/32 | 7 |
| 202D | Central office or PBX line circuit (Metallic or grounded ringing) | | 1 per line | 2 19/32 | 6 |
| 203A | Tie line circuit | Automatic | 2 per line (1 at originating end 1 at terminating end) | 3 15/32 | 8 |
| 204A | | Ringdown | | 3 29/32 | 9 |
| 205A | Station line circuit | | 1 per line | 3 29/32 | 9 |
| 207C | Dial-selective intercom circuit, selector only (6A key tel system) | | 1 per system | 5 7/32 | 12 |
| 208A | Flashing signal, intercom, and automatic cutoff control circuit | | 1 per 3 dial-selective intercom sta | 3 15/32 | 8 |
| 209A | Flashing intercom signal, time out | Without wink | 1 per 6 lines | 4 25/32 | 11 |
| | | With wink | 1 per 5 lines | | |
| 210A | Wink circuit | | 1 per 5 lines | 2 19/32 | 6 |
| 211A | Manual intercom, ringing lamp, noise suppression, interrupted audible signal circuit | | 1 per group of common aud sig | 3 1/32 | 7 |
| 212A | Three central office or PBX lines and common equipment for 6 or less lines (grounded ringing) | | As required | 9 5/32 | 21 |
| 213B | Joint-use line circuit with holding | | 1 per line | 4 25/32 | 9 |
| 227A | Visual and audible signal control circuit | | As required | 3 1/32 | 7 |
| 228A | Blank 40-terminal apparatus unit for bridging or miscellaneous purposes | | | 3 15/32 | 8 |
| 229A or B | Auxiliary relay circuit | | As required | 3 1/32 | 7 |
| 230B | Four central office or PBX line circuits (metallic or grounded ringing) | | 1 per 4 lines | 8 9/32 | 19 |
| 232B | Time-out and manual intercom circuit. When equipped with a KS-15900, L1 electromechanical interrupter, the unit will provide flashing, winking, ringing, and busy-tone signal interruptions. | | 1 per system | 3 15/32 | 8 |
| 233A | Ten central office or PBX line circuits (metallic or grounded ringing). Circuits terminate in pairs on the back of the units in five KS-16671, L1 plugs. A-type connector cables must be used for cabling to distributing frame or equivalent. Lamp fusing is provided on the unit. | | 1 per 10 lines | 23 | 49 |
| 237B | Bridging circuit for conferencing on 2 PBX lines | | 1 per 2 PBX lines | 2 3/5 | 6 |
| 238A | Nine central office or PBX line circuits and common equipment. Common equipment furnished is a KS-15900, L1 interrupter, providing features listed for 232B KTU, plus time-out and motor start relays. For time-out purposes, circuits are furnished in three inter-strapped groups of 4-4 and 1 lines. Straps are removable for connecting individual line groups to supplemental time-out and KS-15900, L1 interrupter apparatus. Relay battery and lamp signal supplies are arranged in four pairs plus a single circuit grouping arrangement. | | 1 per 9 central office or PBX lines | 23 | 49 |
| 239A | Eleven central office or PBX line circuits furnished in three inter-strapped groups of 4-4-3 lines. Each group can be associated with one or more time-out and auxiliary common equipment controls. Relay battery and lamp signal supplies are in five pairs plus a single circuit grouping arrangement. | | 1 per 11 central office or PBX lines | 23 | 49 |

## TABLE C

## 1A AND 1A1 KEY TELEPHONE SYSTEMS

## PACKAGED UNITS

| Key Tel System | KTU or KSU Code | Features or Options | | | | Apparatus Cabinet or Mounting |
|---|---|---|---|---|---|---|
| | | Central Office or PBX Lines with Common Equipment | Intercom Circuit | | Rectifier-Transformer J86731D, L1 | |
| | | | Manual with Line Lamp | Dial | | |
| 1A | 50A* | 2 | • | | | 4-plate Apparatus Cabinet per ED-91472-70 |
| | 50B* | 3 | • | | | |
| | 50C* | 4 | • | | | |
| 1A1 | 200D | 3 | | | | 16A Apparatus Mounting‡ |
| | 200E | 4 | | | | |
| | 200F type* | 4 to 6 | • | • | | 31A Apparatus Mounting‡ |
| | 200G type† | 4 to 9 | • | • | | 26A Apparatus Mounting |
| | 200K type* | 4 to 7 | • | • | • | 16A Apparatus Mounting‡ |
| | 300 type†§ | 4 to 6 | • | • | • | 177A Backboard 31B Apparatus Mounting or ED-69462-01 Cabinet Assembly |
| | 301 type§ | | | | | |
| | 302 type§ | | | | | |
| | 310 type†§ | 4 to 13 | • | • | • | 16C Apparatus Mounting |
| | 311 type§ | | | | | |

* Manufacture discontinued.
† For additional information refer to the C Section covering these key telephone units.
‡ Includes cover.
§ Key service unit.