

**PRIVATE LINE SERVICE TERMINATIONS  
STATION ENGINEERING INFORMATION  
STATION EQUIPMENT (VOICE)**

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*Comments concerning contents, usability, and adequacy of this practice will be welcome. Mail comments directly to the Bell System Practices*

**SECTION 812-002-221**

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**1.02** This section is reissued to:

- Add information on SS-3 Selective Signaling System
- Add information on Customer's Premises Facility Terminal (CPFT) for F-Type Signaling System
- Provide current reference information.

**1.03** This section will serve as an aid to those who are engaged in the provision of these services by providing:

- Uniform Service Order Code (USOC) information and tables
- General explanation of private line service equipment and arrangements
- Illustrations of private line service arrangements
- Tables with pertinent information for the private line service arrangements.

**1.04** General notes for all tables and figures appear on a foldout on the last page of this section.

**1.05** For general information for the entire Private Line Service Terminations series, refer to Section 812-002-200.

**1.06** General rules for setting screw-type switches in terminating sets are provided in Section 851-300-101.

**1.07** Section 812-002-201, Uniform Service Order Code (USOC) Index of Definitions and Applications, complements this section with additional information and references. It provides coordination for the entire Private Line Service Terminations series, and will be maintained to reflect changes in the related sections.

**2. PRIVATE LINE SERVICE TERMINATIONS SERIES**

**2.01** The following sections constitute the Private Line Service Terminations series. All of these are related sections.

SECTION	TITLE
812-002-200	General Information
812-002-201	Uniform Service Order Code (USOC) Index of Definitions and Applications
812-002-210	◆PBX Terminations (Tie Trunk and SS-3)◆
812-002-211	PBX Terminations (Foreign Exchange and Wide Area Telecommunications Service)
812-002-215	Telephoto Station Arrangements
812-002-221	Station Equipment (Voice)
812-002-230	Station Equipment (Data Voiceband)
812-002-231	Station Equipment (Data Wideband)
812-002-250	Alternate Arrangements
812-002-270	Engineering Sketches and Signaling Devices
812-002-290	V4 Repeater Mountings and Components

**3. INDEX OF FIGURES**

**3.01** The following is an index of private line station arrangements in this section:

Fig. 1—Private Line Station Arrangement (2-Point Service)

Fig. 2—Private Line Station Arrangement—Foreign Exchange Trunk or Off-Premises Station (2-Point Service)

Fig. 3—4-Wire Private Line Station Arrangement SD-69566-01

Fig. 4—4-Wire Private Line Station Arrangement—SS-1A Selective Signaling

Fig. 5—Private Line Station Arrangement—E and M Lead Signaling (2-Point Service)

Fig. 6—◆4-Wire Private Line Station Arrangement—SS-3 Selective Signaling◆

Fig. 7—◆Block Diagram of Customer's Premises Facility Terminal (CPFT)◆

#### 4. INDEX OF TABLES

**4.01** The following is an index of tables in this section. These provide additional information for implementing private line station service.

Table A—USOC Descriptions and Applicable Figures

Table B—USOC and Associated Suffixes With Applicable Figures

Table C—Private Line Station Arrangement—Equipment Information (Fig. 1)

Table D—USOC Descriptions (Private Line Station Arrangement) (Fig. 1)

Table E—Private Line Station Arrangement—Foreign Exchange Line or Off-Premises Station—Equipment Information (Fig. 2)

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Table K—Private Line Station Arrangement—E and M Lead Signaling—Equipment Information (Fig. 5)

Table L—USOC Descriptions (Private Line Station Arrangement—E and M Lead Signaling) (Fig. 5)

Table M—4-Wire Private Line Station Arrangement—SS-3 Selective Signaling—Equipment Information (Fig. 6)

Table N—USOC Description (4-Wire Private Line Station Arrangement—SS-3 Selective Signaling) (Fig. 6)

Table O—Application of Type F Auxiliary Signaling Units for Customer's Premises Facility Terminal

Table P—Customer's Premises Facility Terminal Strapping Options (Fig. 7)

Table Q—Ordering Guide—Lamp Indicators

Table R—Low Voltage AC and DC Signals

Table S—High Resistance 4-Type Buzzers

Table T—Mounting Brackets

Table U—Ordering Guide—Loud Ringing Signaling Devices

Table V—Ordering Guide—Associated Apparatus, KS-16301

Table W—Signals, KS-16301—Operating Current Requirements

Table X—Relays, KS-16301—Operating Requirements

Table Y—◆Loudspeaker Set Selection◆

#### 5. UNIFORM SERVICE ORDER CODE (USOC) INFORMATION

**5.01** Table A will provide the USOC description and the figure application of USOCs covered in this section. Table B provides the USOC and associated suffixes with the figure application.

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**5.02** Each private line service arrangement in this section is accompanied by a table providing USOC information for that particular arrangement. See Part 4 of this section.

**5.03** Section 812-002-200 will explain in more detail the USOC concept. Section 812-002-201 gives detailed information on the individual USOCs.

### 6. PRIVATE LINE SERVICE—STATION EQUIPMENT

**6.01** Various private line and station terminating equipment must be provided for 2-point or multipoint private line services terminating in 2- or 4-wire key- or nonkey-type telephone sets.

**6.02** The following is information on the more commonly used private line service terminations and associated equipment for 2- and 4-wire station arrangements.

#### 1A1 Key Telephone Systems (2-Wire Terminations)

**6.03** The 1A1 Key Telephone System uses combined telephone sets equipped with keys, or telephone sets with externally-mounted keys. These sets will enable a number of stations to connect to any one of a number of central office, PBX, private, or intercommunicating lines by operating the key associated with the line over which the call is to be made or answered. The capacity of any station is limited to the number of keys and buttons available for pickup, switching, signaling, or control purposes.

**6.04** With the 1A1 Key Telephone System provision is made for:

- Visual and audible signaling and holding functions on central office or PBX lines.
- Manual or automatic signaling over private lines.
- Manual signaling with intercommunicating lines without the assistance of an intervening attendant.
- Common audible signals on incoming calls.
- Exclusion of other stations.
- Various cutoff and transfer features.

- A dial selective signaling intercommunicating line operative on subscriber premises.

**6.05** The 1A1 Key Telephone System is designed primarily for use in connection with key telephone sets, although provision is made for the use of other telephone sets with similar keys mounted separately.

**6.06** Visual signals may be provided by lamps associated with the pushbuttons of the key telephone sets or in separate indicators arranged for from one to four lamps.

**6.07** The lamps are lighted steadily to indicate a busy line, are flashed approximately one-half second per second to indicate an incoming call not yet answered, and as an optional feature may be winked or extinguished for approximately 0.025 second per second to indicate a held line.

**6.08** A time-out feature is provided on a system basis to release locked-in flashing signals when an incoming call is not answered. This time-out feature does not function on visual hold signals, although neglected held lines which appear as permanent signals at a central office or to PBX operators may be released by opening the line momentarily.

**6.09** Stations may be excluded when desired by operation of the exclusion key, which is provided in combined telephone sets. The exclusion key is restored automatically when the handset is returned to the mounting.

**6.10** The following are associated key telephone units (KTUs) for 2-wire terminations and the function of each:

- **204A KTU**—For manual ringdown tie trunk. Provides key signaling to the called station and connections to telephone sets. It will also control other KTUs for visual and/or audible signals (Fig. 1). Since there is no 2-second spurt automatic ringing arrangement equipment for the 1A1 KTS, a 419A KTU may be used and wired per Section 812-002-270. Refer to 6.14.
- **202D KTU (or equivalent)**—Connects a key telephone set to a Foreign Exchange Trunk, or an Off-Premises Station. These KTUs will provide line pick-up, hold feature, control

of other KTUs for visual and audible signals, and ringing options (Fig. 2).

### 1A2 Key Telephone Systems (2-Wire Terminations)

**6.11** The 1A1 Key Telephone System uses combined telephone sets equipped with keys, or telephone sets with externally-mounted keys. These sets will enable a number of stations to connect to any one of a number of central office, PBX, private, or intercommunicating lines by operating the key associated with the line over which the call is to be made or answered. The capacity of any station is limited to the number of keys and buttons available for pickup, switching, signaling, or control purposes.

**6.12** With the 1A2 Key Telephone System provision is made for:

- Visual and audible signaling and holding functions on central office or PBX lines
- Manual or automatic signaling over private lines
- Manual signaling with intercommunicating lines without the assistance of an intervening attendant
- Common audible signals on incoming calls
- Exclusion of other stations
- Various cutoff and transfer features
- A dial selective signaling intercommunicating line operative on subscriber premises.

**6.13** The 1A2 Key Telephone System features solid state, printed wiring board, plug-in type KTUs. Service features are similar to those of the 1A1 system. However, the 1A2 system provides for the time-out of locked in visual and audible signals on a per line basis rather than on a system basis.

**6.14** The following are associated KTUs for 2-wire terminations and the functions of each:

- **414A KTU**—For manual ringdown tie trunk used to connect a telephone set to a private line terminated at a distant location. A nonlocking key on a telephone set or an

externally-mounted key is required for signaling (Fig. 1).

- **419A KTU**—For automatic ringdown tie trunk used to connect a telephone set over a private line to the distant end. It will transmit a 2-second spurt of ringing voltage to the distant end when the handset is lifted off the telephone set and a line key is depressed. It also provides for locked-in visual and/or audible signaling (Fig. 2).

- **400D KTU**—Connects a key telephone set to a Foreign Exchange Trunk or an Off-Premises Station. It is similar in features to the 202D KTU in the 1A1 Key Telephone System (Fig. 2).

### 2-Wire Private Line Station Termination (E and M Lead Signaling) (SD-69292-01)

**6.15** The 2-wire private line station termination (SD-69292-01) uses various types of KTUs and associated apparatus (Fig. 5).

**6.16** The E and M signaling system uses DX Signaling Circuit SD-1C363-01.

**6.17** The distant end of this type of private line will terminate in tie trunks similar to dial repeating tie trunk SD-65718-02 or SD-69292-01.

### 4-Wire Private Line Terminating Circuit (SD-69566-01)

**6.18** The 4-wire private line terminating circuit equipment (SD-69566-01) provides termination for lines and stations in a 4-wire private line system using 20 Hz, E and M lead, SS-1 or SS-3 selective signaling (Fig. 3, 4, and 6).

**6.19** This 4-wire private line terminating circuit may be used with the following 4-wire private line services:

- Manual ringdown tie trunks with simplex signaling (Fig. 3)
- Code selective signaling on simplex basis (Fig. 3)
- Voice call signaling with loudspeakers (Fig. 3)
- SS-1A Selective Signaling (Fig. 4)

- SS-3 Selective Signaling (Fig. 6).

**6.20** The following is a description of the units that comprise SD-69566-01 and the function of each. All units are either 2- by 23-inch or 6-15/16 inch high KTU-type mounting plates arranged for mounting on miscellaneous relay racks or cabinets on customer premises. See Section 480-615-100 for additional information.

#### **2- by 23-Inch Mounting Plate Units**

- The terminating unit (J53045A) is required for terminating one 4-wire private line and is equipped to provide a low-impedance bus connection to a multiple of station sets, conferencing between stations at the same branch location, and transmission testing from the central office. This single-plate unit is equipped with a wire-wrap terminal strip for installer connections.
- The multiple station line pickup relay unit (J53045B) provides a means of connecting each station set or CALL DIRECTOR set to the 4-wire system. Terminations of more than one 4-wire private line on a key set may be provided by additional line terminating and pickup units. When voice signaling is used, the pickup relays provide automatic loudspeaker muting. This unit will provide for connecting five 4-wire private lines to one key station set, or five station sets to one line. This single-plate unit is equipped with six wire-wrap terminal strips for installer connections.
- The 4-wire private line station unit (J53045C) provides talking battery and ground for the station set(s) and converts loop dialing to 1- and 2-lead dialing for use with selective signaling applications. The circuit also provides for push-to-talk by relay operation which connects the station set transmit pair to the low impedance transmitting bus. This unit is available to provide connections for two station sets. It is intended to be used in conjunction with the multiple station line pickup relays at locations requiring a number of station sets to access one or more 4-wire private lines. This single-plate unit is equipped with two wire-wrap terminal strips for installer connections.

#### **KTU Mounting Plate Units**

- The 4-wire private line station and pickup relay unit (J53045D) combines one pickup relay circuit and one station circuit into a key telephone unit for use with single station set installations. Similar units associated with the same 4-wire private line may be interconnected. It is intended that this unit may be used in customer locations with few station sets having access to only one 4-wire private line. This single 6-15/16 by 3-15/16 inch mounting plate unit is equipped with a screw-type terminal strip for installer connections.
- The 4-wire private line exclusion unit (J53045E) provides local exclusion and a means of disabling the pickup relays of selected groups of telephones. It may be arranged for excluding 15 excluder station sets from one master excluder, and either 4 or 5 excluder stations. It may also be interconnected with similar units associated with the same 4-wire private line. This single 6-15/16 by 3-1/32 inch mounting plate unit is equipped with screw-type terminal strip for installer connections. For additional information on exclusion, see Section 480-615-100.
- The 4-wire private line selective signaling unit (J53045F) permits visual and/or audible signaling for three 2-digit codes when selective signaling is provided. Since selective signaling systems provide momentary incoming signal to stations, this unit in conjunction with other signaling equipment is used to repeat and control the signal. A 232B KTU visual and audible signaling circuit will provide interrupted ringing and flashing line lamp signals with time-out. A 30A KTU will also provide time-out, with steady line lamp indications. One unit is required for each three or less stations for 4-wire private line equipped with selective signaling. This single 6-15/16 by 3-1/32 inch mounting plate unit is equipped with a screw-type terminal strip for installer connections.
- The 4-wire private line ac signaling unit (J53045G) is required when 20 Hz simplex signaling is provided. It operates in conjunction with 30A, 232B KTU, or J53045L to furnish

time-out and line lamp signals. The unit contains ED-69525-01, Group 1 wired-in circuit pack assembly as part of the signaling detection circuit for simplex-type signaling. The loopback option cannot be used when simplex signaling is required. This single 6-15/16 by 3-5/8 inch wide mounting unit is equipped with a screw-type terminal strip for installer connections.

- Dialing, group code, or loudspeaker control unit (J53045H) may be used to provide any one of three different functions as required. Each unit is arranged for two circuits.
  - (a) **Dialing Unit:** This arrangement operates in conjunction with the station circuit and the pickup relay circuit. It facilitates dialing when selective signaling is provided. The unit prevents mutilation of dial pulses when a second station at the same location goes off-hook. When selective signaling with privacy is furnished, a separate dialing unit is required for each station set. The dialing unit then provides separate 1- and 2-leads to each selective signaling common or station control unit. When used for dialing, this unit will be marked as such.
  - (b) **Group Code Unit:** This arrangement provides a means of simultaneously signaling two groups of five stations each or one group of ten stations at one customer location by dialing one 2-digit code. When used as a group code unit it will be marked as such.
  - (c) **Loudspeaker Control Unit:** This arrangement provides for controlling a single loudspeaker from several station sets. The loudspeaker is muted when any one of the associated station sets goes off-hook. When used for loudspeaker control this unit will be marked as such. This single 6-15/16 by 3-1/32 inch wide mounting plate is equipped with a screw-type terminal strip for installer connections.
- The time-out interrupter unit (J53045L) provides a timed lockup interval that can be manually set to give a guaranteed minimum lockup time of 30 to 75 seconds for the selective signaling receiver circuit. This unit provides a means of interrupted ringing and busy-tone application. This single 6-15/16 by 3-29/32 inch wide mounting plate

is equipped with a screw-type terminal strip for installer connections.

- The 4-wire private line ED-69524-01, Group 1 circuit pack assembly provides the loop-back feature which permits line tests from remote test centers. The loop-back relay operated provides a transmission path from the test center through the receive loop and receive amplifier, the level compensating pad, and transmit amplifier, and back to the test center.
  - 229B KTU—May be used instead of the multiple station line pickup relay unit for single station set additions. Two 229B KTUs may be used with a station relay unit (J53045C) to provide a 2-station set customer location.
- 6.21** The following units are not part of SD-69566-01, but in some applications are used with that circuit:
- **30A KTU**—Provides time-out with steady lamp indications. Used with 4-wire private line selective signaling unit (J53045F) or 4-wire private line ac signaling unit (J53045G).
  - **232B KTU**—Provides interrupted ringing and flashing line lamp signals with time-out. Used with 4-wire private line selective signaling unit (J53045F) or 4-wire private line ac signaling unit (J53045G).
  - **J53045J Auxiliary Circuit for 4-Wire Private Line Service (Powered From Central Office) SD-69902-01**—Designed to permit talking, signaling, and the operation of one loudspeaker from a 4-wire private line loop facility in case of local commercial power failure or local loss of -24 or -48 volt power (Section 480-010-100).

#### SS-1A Selective Signaling System

- 6.22** The SS-1A Selective Signaling equipment will provide private line services to function as described in 7.14.
- 6.23** The following is a description of the SS-1A equipment units SD-69594-01. The equipment

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is arranged in two basic configurations, nonprivacy and privacy:

- **J53047A,L1**—The send and receive unit for nonprivacy version. It consists of a decoder, keyer, code relay, and a 4-wire private line terminating unit (J53045A,L1). It also includes a fuse panel with special terminal strips for optional strapping. A mounting is provided for an SF signaling unit (J98614DE) which is ordered separately.
- **J53047A,L1 and L2**—The privacy version of SS-1A requires both L1 and L2. Provides common control, station lockout, and a first station control circuit.
- **J53047B**—The station control unit for the nonprivacy version. This unit has a capacity of up to six stations on a 2- by 23-inch mounting plate.
- **J53047C**—A station control unit with manual privacy. This manual privacy unit also includes control circuits for three stations and when combined with the station control unit (J53047D) provides maximum capability.
- **J53047D**—A station control unit with privacy. This unit has the capability of providing maximum capacity. It provides control of up to five stations on a 2- by 23-inch mounting plate. In the privacy configuration, the send and receive unit provides a control circuit for the first station.

### SS-3 TOUCH-TONE® Selective Signaling System

**6.24** SS-3 Selective Signaling equipment will provide private line services to function as described in 7.31.

**6.25** The following is a description of SS-3 equipment units SD-1G265-01. The equipment is arranged in two basic configurations, nonprivacy and privacy:

- **J1G027A,L1**—Assembly, equipment, and wiring for one basic location unit. Includes an AR381 circuit pack which supplies the power necessary for codes one through eight.
- **J1G027A,L2**—One AR537 circuit pack required in addition to List 1 to provide nonprivacy circuits.
- **J1G027A,L3**—One AR539 circuit pack (four codes per circuit pack) required in addition to List 1.
- **J1G027A,L4**—One AR540 circuit pack (eight codes per circuit pack) required in addition to List 1.
- **One J58844C,L4**—“TOUCH-TONE®” calling receiver is required for each J1G027A, List 1 basic location unit.
- **J1G027B,L1**—Assembly equipment and wiring for one auxiliary code unit capable of providing a maximum of 16 additional code circuits when used with various combinations of Lists 2 and 3.
- **J1G027B,L2**—One AR539 circuit pack (four codes per circuit pack) required in addition to List 1.
- **J1G027B,L3**—One AR540 circuit pack (eight codes per circuit pack) required in addition to List 1.
- **J1G027C,L1**—Assembly, equipment, and wiring for privacy station unit equipped with four station circuits.
- **J1G027C,L2**—One AR541 circuit pack required in addition to List 1 to provide four additional station circuits.
- **J1G027C,L3**—Assembly, equipment, and wiring required to provide additional power when more than eight station circuits are used.
- **J1G027D,L1**—Assembly, equipment, and wiring for one privacy location unit includes one AR538 circuit pack which is mounted in the basic location unit J1G027A.
- **J1G027D,L2**—One 227D amplifier for privacy override.
- **J1G027E,L1**—Assembly, equipment, and wiring for one automatic clear unit.

### SS-3 "TOUCH-TONE" Selective Signaling Package Units

**6.26** Two package SS-3 units are available wired and assembled with the 4-wire line terminating circuit and "TOUCH-TONE" receiver:

- **J1G028A Unit**—Assembled and wired for four stations in the nonprivacy arrangement (see Section 982-328-100 and SD-1G282-01).
- **J1G028B Unit**—Assembled and wired for four stations in the privacy arrangement (see Section 982-328-100 and SD-1G282-01).

### Customer's Premises Facility Terminal For F-Type Signaling System

**6.27** The Customer's Premises Facility Terminal (CPFT) for F signaling terminates one or two 4-wire metallic facilities and is intended for special service applications requiring single-frequency (SF) signaling installations on customer's premises (Fig. 7). Each CPFT provides equipment mounting for:

- Dual-unit F signaling plug-ins
- Gain and equalizer units of the V4 family
- A common 2600-Hz tone supply
- A 20-Hz ringing supply
- An optional 115-volt ac power supply
- An optional 332 relay for loopback maintenance.

The CPFT also permits the following:

- Use of -48 volt dc power where available
- Jack access to transmission leads, signaling leads, and power supply outlets
- Access for use of external echo suppression or equalization
- Easy access to external connections and strapping options.

**6.28** The basic CPFT unit is a shelf assembly (J99349A,L1) 8 inches high by 23 inches wide by 12 inches deep and may be bay mounted.

For floor or counter top installation, the cabinet (J99349A,L2) is available. The dimensions of the cabinet are 24 inches high by 14 inches wide by 12 inches deep. A backboard (J99349A,L3) is also available for wall mounting the cabinet.

**6.29 V4 Telephone Repeater:** The 4-wire metallic line of the facility connects through the 66K1 connecting block to the 359-type equalizer. The 359-type equalizer provides means of obtaining the frequency response and cable facility characteristics required for the type of service. The 227-type amplifier or 849-type network are provided to meet transmission objectives and to adjust the receive and transmit gains to the level required for proper operation of the F-type signaling equipment. Selection of V4 equipment should be made on the basis of Section 852-307-101.

**6.30 Power and Tone Unit (J99349AA,L1):** The power and tone unit is a plug-in device that provides:

- Fused -24 volt dc from its internal regulator to the FU( ) unit
- 20-Hz ringing supply
- Precise 2600-Hz oscillator for SF signaling units.

**6.31 Optional 115-volt AC Power Supply (J99349AB,L1):** The ac power supply is an optional plug-in unit provided when -48 volt dc cannot be externally obtained.

**6.32 FU( ) Signaling Converter Circuit:** The FU( ) is a plug-in device that is used in conjunction with an auxiliary unit to convert received ac tone signals to dc and vice versa. One FU( ) unit and one F auxiliary unit are required for each circuit.

**6.33** Any F-type auxiliary unit, as required for a specific application, may be used. Table O lists the types of units that can be used for various types of services. Table P lists the options available in the package and their expected area of application.

**6.34 332A Relay Unit:** The 332A relay is an optional plug-in unit to provide equal level loop-back of receive-to-transmit transmission path through a 23-dB pad. The 332A relay must be

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controlled externally by providing a ground either by remote operation over simplex leads of the 4-wire circuit or by local key arrangement.

### 7. PRIVATE LINE STATION ARRANGEMENTS

**7.01** The private line station arrangements described in this section provide multipoint and 2-point private line telephone service over toll and exchange facilities in which all stations can communicate with all others with substantially the same grade of transmission.

**7.02** Private line telephone circuits usually terminate in a station (an instrument or a jack circuit for a plug-in instrument), a PBX, and/or key equipment. The equipment at a customer location can be classified as being either common equipment or station equipment. The common equipment is the private line circuit termination that is common to all stations at a customer location. The station equipment is the telephone set, CALL DIRECTOR set, etc, that is furnished at each station.

**7.03** This section describes arrangements for providing multipoint and 2-point private line service. Many of the features are also applicable to 2-point private line circuits.

**7.04** Frequently, circuits with special operating and/or equipment features will be provided for a specific customer. In these cases, the necessary instruction should be prepared by each of the Operating Companies involved to facilitate the operation of the circuit.

**7.05** Only the most commonly used standard arrangements are covered in this section. Each arrangement has tables to provide additional information.

#### Private Line Station Arrangement (Fig. 1)

**7.06** Private Line Station Arrangement (Fig. 1) will function as one of the following 2-point services:

- 2-way manual ringdown tie trunk
- Automatic Ringdown Tie Trunk with 2-second spurt ringing
- One-way manual ringdown and one-way automatic ringdown.

**7.07** The following is a description of the functions listed in 7.06:

- **Manual Ringdown:** For signaling, a push-button or lever is provided which, when operated, will cause a ringing signal of 20 Hz to be transmitted to distant points on a simplex path. This type service will most commonly terminate in a 1A1 or 1A2 Key Telephone System for 2-point service.
- **Automatic Ringdown with 2-Second Spurt Ringing—**Similar to ringdown signaling except the requirement for the operation of a ringing key is eliminated. This arrangement transmits 2-second ringing to the line automatically when the telephone is in the off-hook condition. This service is normally provided on a 2-point service. A signal control arrangement is usually provided at both ends on a locked-in signal basis, because only a single ring of 2 seconds is transmitted, and if not recognized, the calling station will encounter unnecessary delay in completing the call. Both ends of the automatic ringdown tie trunk are normally terminated in 1A1 or 1A2 Key Telephone System or a combined handset.
- **One-Way Manual Ringdown and One-Way Automatic Ringdown—**A key signaling and automatic arrangement furnished between two points. The key signaling termination requires the operation of a ringing key at one end. The other end signals automatically by presenting an off-hook condition at the key or nonkey station. This arrangement normally terminates in 1A1 or 1A2 Key Telephone Systems.

**7.08** Tables C and D provide equipment information and USOC descriptions, respectively, for the arrangement shown in Fig. 1.

#### Private Line Station Arrangement—Foreign Exchange Line or Off-Premises Station (Fig. 2)

**7.09** The Private Line Station Arrangement shown in Fig. 2 will function as a Foreign Exchange or Off-Premises Station Service. The following is a description of these services:

- **Foreign Exchange—**This type service is normally furnished on a 2-point basis. It

provides telephone service in an exchange foreign to the one in which the customer is located.

- **Off-Premises Station**—This type service is furnished for termination in a key telephone set or single line nonkey telephone set station which is part of a PBX but is located remotely from the PBX. The line between the PBX and the Off-Premises Station may pass through one or more central offices. The Off-Premises Station will have all the operating capabilities of a normal station on the PBX.

**7.10** Tables E and F provide equipment information and USOC descriptions respectively for the arrangement shown in Fig. 2.

**4-Wire Private Line Station Arrangement SD-69566-01 (Fig. 3)**

**7.11** The 4-Wire Private Line Station Arrangement shown in Fig. 3 uses SD-69566-01. This arrangement will function as one of the following:

- Manual Ringdown with Simplex Signaling
- Code Selective Signaling on a Simplex Basis
- Voice Call Signaling with Loudspeaker.

**7.12** The following is a description of the functions listed in 7.11:

- **Manual Ringdown**—For signaling, a pushbutton or lever key is provided which, when operated, will cause a ringing signal of 20 Hz to be transmitted to distant points on a simplex path. This type service will most commonly terminate in a 1A1 or 1A2 Key Telephone System for 2-point services.
- **Code Selective Signaling**—This type service permits any station on a multipoint arrangement to signal any other station or group of stations selectively. It eliminates the main objection encountered in nonselective key signaling arrangements since only the called station or group of stations will receive the signal. A predetermined calling code via ringing key consisting of one or more rings is assigned to each station or group of stations. The central office responds to the number of rings and applies ringing

only to that station or stations intended to receive a ring. This multipoint service will terminate in 4-wire private line terminating equipment per SD-69566-01.

- **Voice Call Signaling With Loudspeaker**—This service is most commonly used on multipoint circuits. With this type signaling, the called stations are summoned to the circuit by means of loudspeakers. When the handset of the called party goes off-hook, the loudspeaker will be cut off. Normal conversation is then possible on the line. This type service will terminate in 4-wire private line terminating equipment SD-69566-01.

**7.13** Tables G and H provide equipment information and USOC descriptions, respectively, for the arrangement shown in Fig. 3.

**4-Wire Private Line Station Arrangement—SS-1A Selective Signaling (Fig. 4)**

**7.14** The arrangement shown in Fig. 4 will function as one of the following:

- SS-1A Send and Receive with or without privacy
- SS-1A Send Only without privacy
- SS-1A Receive Only without privacy.

**7.15** The following information is a description of the SS-1A Selective Signaling System.

**7.16** The SS-1A system is provided on a multipoint basis and is installed on the customer premises. This equipment permits individuals at telephone stations to selectively signal other telephone stations, or to signal a number of such stations simultaneously. A typical station is an assembly of SS-1A signaling equipment and associated telephone sets or PBX terminations.

**7.17** A separate 2-digit code is assigned to each station so that it can be individually signaled. When a signal is sent from one telephone set, it is received and decoded at all other stations of the SS-1A system. Only that telephone set (or group of sets) assigned the code involved is rung. The assignment of one or more group codes to which a number of telephone sets respond

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simultaneously can be used to establish conference calls.

**7.18** Two pulls of a standard rotary dial are used to generate each 2-digit code. The digit 1 is not used in any station code since it is reserved as a means of canceling a misdialed initial digit. A total of 81 codes may be assigned within any one SS-1A system.

**7.19** The dc pulses of the dial are converted to frequency-shifted tone pulses for transmission over the 4-wire private line facility. The tone pulses are restored to dc pulses on the E lead by standard single frequency (SF) units and are used at the receiving points to initiate ringing of the proper telephone set.

**7.20** SS-1A privacy arrangements are available which prevent the intrusion of another station into a conversation established between two stations. Additional stations may be dialed into a privacy call by one of the stations already engaged in the call. Certain stations equipped with a privacy override key can temporarily void a privacy call to request permission to pass priority or emergency traffic.

**7.21** Interarea switching is a feature of the SS-1A system that allows a station of one system to dial into an adjoining system.

**7.22** By using access circuits, stations of the SS-1A system can dial into central offices or into PBX systems. PBX stations can dial into the SS-1A system when so arranged. Communication with stations of a manual PBX is also possible.

**7.23** SS-1A service normally terminates in a 4-wire private line termination per SD-69566-01 as shown in Fig. 4.

**7.24** Tables I and J provide equipment information and USOC descriptions respectively for the arrangement shown in Fig. 4.

### **Private Line Station Arrangement—E and M Lead Signaling (Fig. 5)**

**7.25** The Private Line Station Arrangement using E and M Lead Signaling in Fig. 5 will function as one of the following:

- Automatic Signaling Outgoing—Automatic Incoming

- Dial Outgoing—Automatic Incoming.

**7.26** This 2-point service arrangement provides a 2-wire private line station termination for use with E and M lead signaling systems. The E lead receives incoming signaling information from the distant end. The M lead transmits outgoing signaling information.

**7.27** DX signaling is added to the basic 2-wire private line E and M lead tie trunk circuit to provide extension to the E and M leads.

**7.28** This type service utilizes a key or nonkey telephone set termination on the E and M lead tie trunk per SD-69292-01.

**7.29** The distant end of the service will terminate in tie trunk equipment per SD-65718-02, SD-69292-01, or equivalent.

**7.30** Tables K and L provide equipment information and USOC descriptions, respectively, for the arrangement shown in Fig. 5.

### **4-Wire Private Line Station Arrangement—SS-3 Selective Signaling (Fig. 6)**

**7.31** The arrangement shown in Fig. 6 will provide SS-3 send and receive capabilities with or without the privacy feature.

**7.32** The following is a description of SS-3 selective signaling system.

**7.33** A maximum of 648 3-digit codes may be assigned to stations associated with the 4-wire facility.

**7.34** A single code may be assigned to one station (station code) or may be associated with any number of stations (group code).

**7.35** The SS-3 system employs TOUCH-TONE frequencies transmitted over the 4-wire facility and received by a TOUCH-TONE receiver at each customer location. The TOUCH-TONE receiver translates signals into dc pulses compatible with control logic. Receipt of a valid code at the 4-wire terminating circuit applies ringing current to the signaled station.

**7.36** A private system has all of the features outlined above. Additional logic is added to

control the stations connected to the 4-wire line in order to ensure that any conference line is private.

**7.37** An optional privacy override feature permits a station so equipped to override the busy tone and be connected to the line. This overriding is accomplished by depressing a nonlocking override on the station set.

**7.38** SS-3 service normally terminates in a 4-wire private line termination per SD-69566-01 as shown in Fig. 6.

**7.39** Tables M and N provide equipment information and USOC descriptions, respectively, for arrangements shown in Fig. 6.

## 8. REFERENCE INFORMATION

**8.01** The following sections will serve as an aid to those who desire more detailed information on the subjects covered in this section. Titles are condensed and rearranged for use as a ready reference.

### Key Telephone Systems

518-114-105	1A1 Key Telephone System Identification
518-114-110	1A1 Key Telephone System Installation and Maintenance
518-114-110	1A1 Key Telephone System—Key Telephone Units
518-215-405	1A2 Key Service Units—Identification and Installation
518-215-100	1A2 Key Telephone System—Identification
518-215-400	1A2 Key Telephone Units—400 Series Identification

### Telephone Sets—2/4 Wire

502-580-401	500AD-Telephone Set
502-610-412	682AA and 683AA Telephone Sets
502-610-400	608A and 618A Telephone Sets

### Speakerphone Systems

502-610-412	3-Type Speakerphone System for 682AA and 683AA Telephone Sets
512-620-430	3-Type Speakerphone System for 568HAA Telephone Set
512-620-430	Speakerphone Control Unit-2/4W

### Loudspeakers

463-220-100	106-Type Loudspeaker
463-221-100	107-Type Loudspeaker

### Private Line CKTS

480-615-100	Four-Wire Private Line Terminating CKT SD-69566-01—Identification Connections, and Line Up Procedures
812-017-151	Four-Wire Private Line SD-69566-01 Equipment Design Requirements
981-249-100	Four-Wire Private Line—General Description

### Signaling CKTS

975-240-100	Type E Single Frequency Signaling System—General Description
975-230-100	DX Signaling Systems—General Description

### Signaling Systems

801-640-153	Duplex Signaling CKT (DX1) SD-1C363-01—Equipment Design Requirements
179-314-501	Single Frequency Signal Units—E Type
480-622-200	SS-1A Selective Signaling Systems—Identification, Installation, Connections and Service Options
801-605-150	SS-1A Interarea Switching and Central Office—PBX Access Unit

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812-016-155 SS-1A Selective Signaling System—Equipment Design Requirements

982-326-100 SS-1A Selective Signaling System—Identification, Installation, Connections, and Service Options

812-002-210 PBX Tie Lines For SS1-1A Selective Signaling

480-625-210 SS-3 TOUCH-TONE Selective Signaling System-Identification, Installation, Connections, Operational Tests and Maintenance

811-019-150 SS-3 TOUCH-TONE Selective Signaling System (J1G027)

982-328-100 SS-3 TOUCH-TONE Selective Signaling System-General Description

**Customer's Premises Facility Terminal**

332-601-100 Customer's Premises Facility Terminal for Type F Signaling System-Description

332-601-200 Customer's Premises Facility Terminal for Type F Signaling System—Identification, Connections, and Installation

332-601-500 Customer's Premises Facility Terminal for Type F Signaling System—Maintenance and Lineup Procedures

801-643-155 (J99349) Customer Premises—Signaling and Transmission Equipment

**Telephone Repeaters**

332-104-100 V4 Telephone Repeater

332-104-500 V4 Telephone Repeater Initial Line Up

332-104-102 24V4B Telephone Repeater

**Loop Signaling Repeater**

801-025-150 Loop Signaling Repeater (LSR) Equipment Design (SD-1C359-01) Requirements

**Manual or Dial Long Line**

809-204-150 Manual or Dial Long Line (SD-66086-01)

**Miscellaneous Sections**

032-120-101 Fixed Resistors and Capacitors

169-682-302 Rectifiers

463-140-100 Equipment Cabinets, Apparatus Mounting and Brackets

512-220-100 Pushbutton Keys—Identification and Installation

812-002-250 Alternate Arrangements Designs

812-002-270 Engineering Sketches and Signaling Devices

812-111-150 Voice Control Switch Unit—Equipment Design Requirement

**TABLE A**  
**USOC DESCRIPTIONS AND APPLICABLE FIGURES**

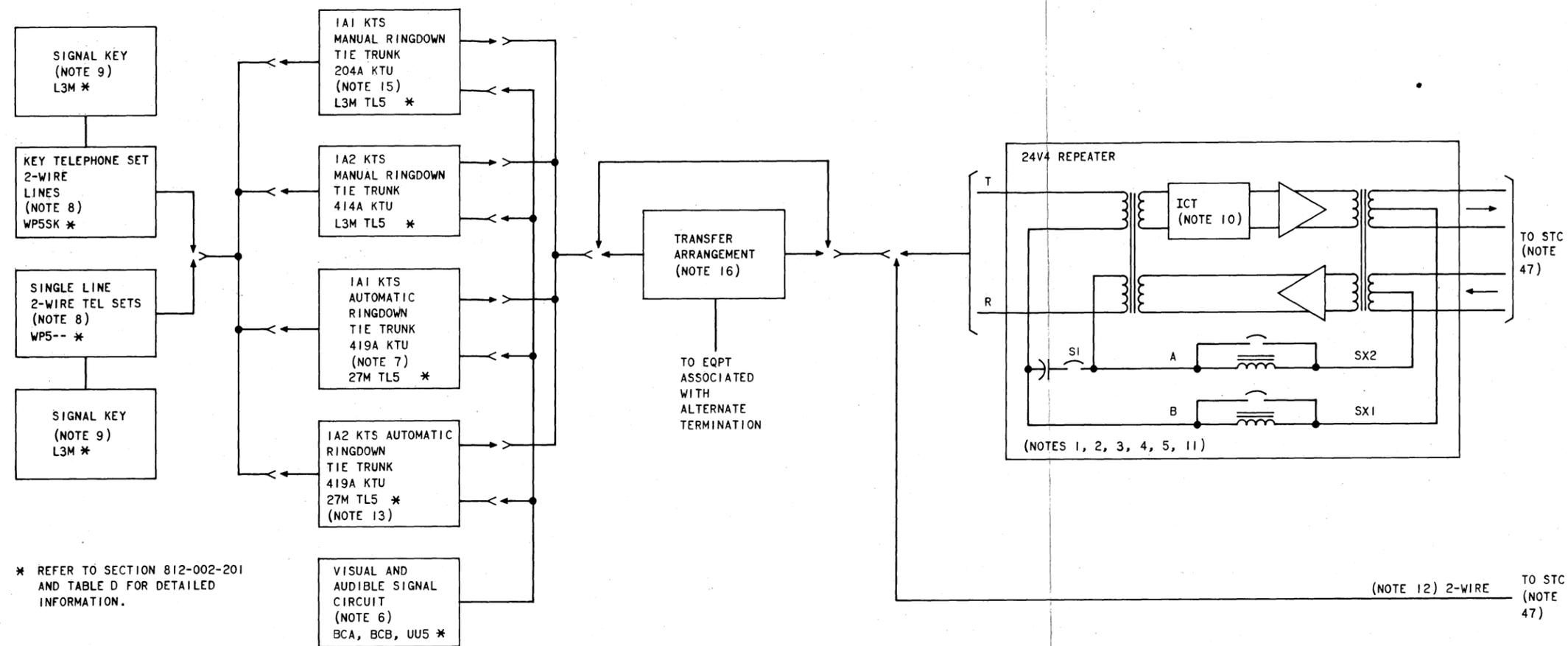
USOC	DESCRIPTION	APPLICABLE FIGURE
BCA	Steady Incoming Signal Without Time-Out	1, 3, 4, 6
BCB	Intermittent Incoming Signal Without Time-Out	
UU5	Steady Incoming Signal With Time-Out (.5 to 200 Seconds)	
7FW	Intermittent Incoming Signal With Time-Out (.25 to 300 Seconds)	
27E	Two Point Dial Tie Line	See Table B
27M	2-Way Automatic Ringing Arrangement With 2-Second Spurt Ringing	1
27S	Voice-Operated Busy Arrangement	4, 6
TL5	One-Way Key Signaling and One-Way Automatic Signaling	1
L3Z L3M	Pushbutton Key Signaling	1, 3
1YX	Push-To-Talk or Transfer Key	(Optional) 1, 2, 3, 4, 5, 6
9BX	Indicating Lamp — Located in Same Building	(See Tables B and Q through X)
GJP	Indicating Lamp — Located in Different Building	
KGP	Indicating Lamp — Located on Different Premises — Same Exchange	
LS4	Loudspeaker 106-type	3, 4A, 6
LS7	Loudspeaker amplifier	
SP3	Speakerphone	3, 4, 6
W5U	Central Office Code Selective Ring Equipment	Located at serving test center
WP5	Service Terminal for First Station Termination	See Table B
WP7	Service Terminal for Additional Station Termination	
WPB	Interexchange Channel 25 Miles or Less	
WP9	Interexchange Channel Over 25 Miles	
LX4	SS-1A Send and Receive Arrangement	4
JDH	Privacy Arrangement — First Station Termination	
NDH	Privacy Arrangement — Second, Third, Etc, Stations	
KY4	SS-1A Send Only Arrangement	
LM4	SS-1A Receive Only Arrangement	4
F4F	SS-1A Loudspeaker Filter Network	4A
LQ4	Interarea Switching Arrangement With Two SS-1A Systems	4 (Optional)
LV4	Activation or Changes on Existing SS-1A Stations	
N42	Central Office and PBX Access Line	4 (Optional)

TABLE B  
USOC AND ASSOCIATED SUFFIXES WITH APPLICABLE FIGURES

USOC	SUFFIX*	DESCRIPTION OF STATION TERMINATION	APPLICABLE FIGURE
WP5 WP7 WP9 WPB	SC	Single Line Combined Telephone Set	1, 2, 3, 4, 5, 6 (Note)
	SK	Key Equipment, Order Turrets, <i>CALLDIRECTOR</i> Set	
	SR	Single Line Combined Telephone Set With Plug and Jack	
	SV	Head Telephone Set With Jack and Plug	
	SW	Single Line Combined Wall Telephone Set	
	SY	Special Telephone Instruments	
27E	DT	Single Line Combined Dial Telephone Set	5, 6
	KE	Key Equipment, Order Turrets, <i>CALL DIRECTOR</i> Set	
1YX	KA	2-Way Transfer Key	1, 2, 3, 4, 5, 6
	K7	Hand-Operated Push-To-Talk Key	
9BX	LP	Lamp Indicator Actuated by Ringing Current	
	AB	General Purpose Indicating Lamp Located in Same Building	
GJP	AD	General Purpose Indicating Lamp Located in Different Building	
KGP	AP	General Purpose Indicating Lamp Located on Different Premises, Same Exchange	

\* Refer to Section 812-002-201 for detailed description of the USOC and associated suffix.

*Note:* WP9( ) and WPB( ) codes are shown in Fig. 2 only.



\* REFER TO SECTION 812-002-201 AND TABLE D FOR DETAILED INFORMATION.

Fig. 1—Private Line Station Arrangement

TABLE C

## PRIVATE LINE STATION ARRANGEMENT – EQUIPMENT INFORMATION (FIG. 1)

TYPE OF SERVICE (2-POINT)	TYPE OF EQUIPMENT	UNIT	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
2-Way Manual Ringdown Tie Trunk	1A1 KTS	204A KTU	69203-01	3		53	518-114-105 518-114-108 518-114-110	5,6,13
	1A2 KTS	414A KTU	69559-01	1	1		518-215-100 518-215-405 518-215-400	
Automatic Ring- down Tie Trunk With 2-Second Spurt Ringing	1A1 KTS	419A KTU	Special Design (Note 7)	4	4		812-002-270	5,6,7, 13
	1A2 KTS	419A KTU	69559-01	4	4		518-215-100 518-215-405 518-215-400	5,6,13
2-Way Manual Ringdown Tie Trunk or Automatic Ring- down Tie Trunk With 2-Second Spurt Ringing or One-Way Manual Ringdown and One-Way Automatic Ringdown (Equipment As Required)	24V4B Repeater	J-98615BA-( )	99739-01	1			332-104-100 332-104-102	1,2,3 4,5
		J-98615BB-( )		2			332-104-500	
	Key Tel Sets and Combined Tel Sets	2-Wire Type Tel Sets					Division 502	8
	Signal Key	551A-Type Key (or Equiv)					512-220-100	9
	Idle Circuit Termination (ICT)	17B KTU 18D KTU	Special Design ICT				812-002-270	10,14
	600-Ohm Resistor	227C (or Equiv)	Argt (Note 10)				032-120-101 812-002-270	10
	Visual and Audible Ckt	232B KTU E/W Interrupter	69294-01	27			518-114-110	6
	P37B204	Mounting Bracket For KTUs					463-140-100	
	67A	19-Inch Mounting Bar						
67B	23-Inch Mounting Bar							

**TABLE D**  
**USOC DESCRIPTIONS**  
**PRIVATE LINE STATION ARRANGEMENT (FIG. 1)**

TYPE OF SERVICE	USOC*	OPTION AND/OR DESCRIPTION
2-Way Manual Ringdown Tie Trunk	WP5(‡)	Service Terminal for First Station Termination. Suffix Denotes Station Tel Set.
	WP7(‡)	Additional Station Termination (As Required)
	L3M	Pushbutton Key Signaling
Automatic Ringdown Tie Trunk With 2-Second Spurt Ringing	WP5(‡)	Service Terminal for First Station Termination. Suffix Denotes Station Tel Set.
	WP7(‡)	Additional Station Termination (As Required)
	27M	Automatic Ringing Arrangement With 2-Second Single Spurt Ringing
One-Way Manual Ringdown and One-Way Automatic Ringdown	WP5(‡)	Service Terminal for First Station Termination. Suffix Denotes Station Tel Set.
	WP7(‡)	Additional Station Termination (As Required)
	TL5	One Way Key Signaling and One Way Automatic Signaling
Signal Control Arrangements Associated With Simplex Signaling (Optional Basis) †	BCA	Steady Incoming Signal Without Time-Out
	BCB	Intermittent Incoming Signal Without Time-Out
	7FW	Intermittent Incoming Signal With Time-Out
Manual Ringdown Tie Trunk With Transfer Arrangement To Data or PBX Location	1YXKA (Optional)	2-Way Transfer Key
	9BX(‡) (Optional)	Indicating Lamp — Located in Same Building
	GJP(‡) (Optional)	Indicating Lamp — Located in Different Building
	KGP(‡) (Optional)	Indicating Lamp — Different Premises, Same Exchange

\*Refer to Section 812-002-201 for detailed description of the USOC and associated suffix.

†Provide signal control arrangement wherever USOC 27M is called for on the Universal Service Order (USSO).

‡Refer to Table B for description of suffixes with associated USOCs.

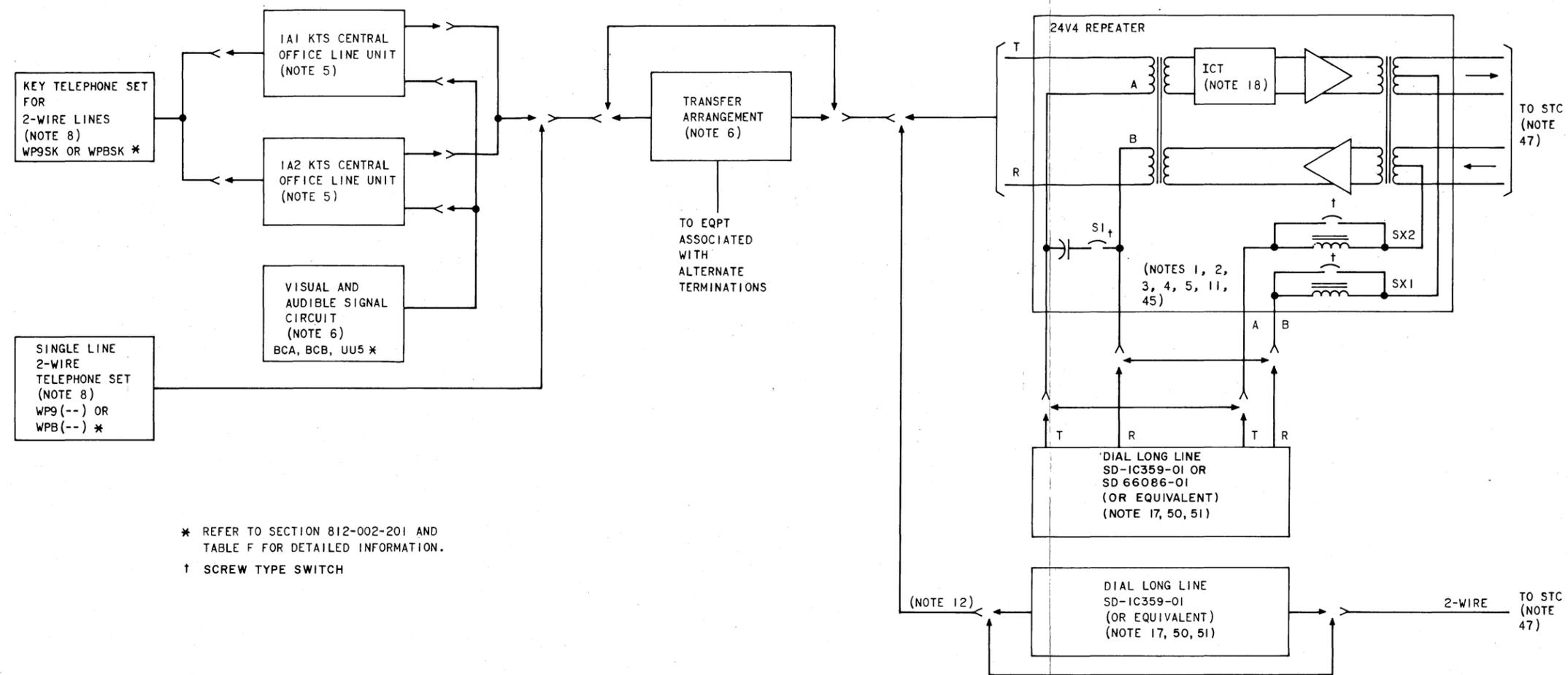


Fig. 2—Private Line Station Arrangement—Foreign Exchange Trunk or Off-Premises Station

TABLE E

PRIVATE LINE STATION ARRANGEMENT – FOREIGN EXCHANGE LINE OR OFF-PREMISES STATION  
EQUIPMENT INFORMATION (FIG. 2)

TYPE OF SERVICE (2-POINT)	TYPE OF EQUIPMENT	UNIT	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
Foreign Exchange Line or Off-Premises Station	24V4B Repeater	J98615BA-( )	99739-01	1			332-104-100	1,2,3, 4,5
		J98615BB-( )		2			332-104-102 332-104-500	
	1A1 KTS	CO or PBX Line Unit 202D KTU (or Equiv)	69270-01	4			518-114-105 518-114-108 518-114-110	5,6
	1A2 KTS	CO or PBX Line Unit 400D KTU	69513-01	4			518-215-100 518-215-405	
			69617-01	1			518-215-400	
	Loop Sig RPTR	J99234T-( )	1C359-01	1,2, D		8	801-025-150	17,44, 50
	Dial Long Line	J59009AD-( )	66086-01	1		51	809-204-150	
	Visual and Audible Ckt	232B KTU E/W KS-19384 Interrupter	69294-01	27			518-114-110	6
	2-Wire Type Tel Sets	Single Line Tel Sets, Key Tel Sets, Call Directors, etc					Division 502	8
	Idle Circuit Termination (ICT)	17B KTU 18D KTU	Special Design ICT Argt (Note 14)				812-002-270	10,14
	600-Ohm Resistor	227C (or Equiv)		032-120-101 812-002-270				
	P37B204	Mounting Bracket For KTUs					463-140-100	14
	67A	19-Inch Mounting Bar						
67B	23-Inch Mounting Bar							

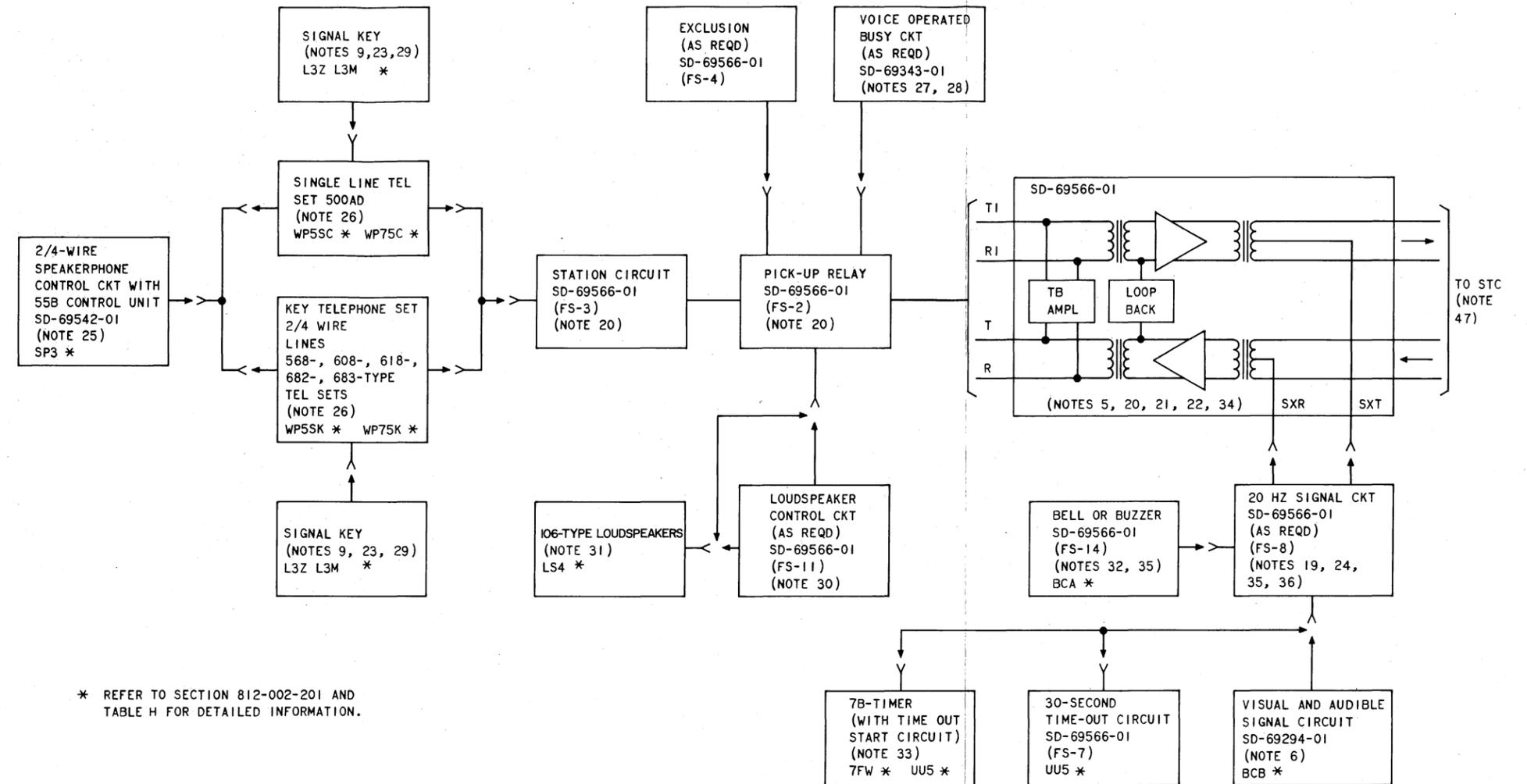
**TABLE F**  
**USOC DESCRIPTIONS**  
**FOREIGN EXCHANGE LINE OR OFF-PREMISES STATION FROM PBX (FIG. 2)**

TYPE OF SERVICE	USOC*	OPTION AND/OR DESCRIPTION
Foreign Exchange Line (Terminated in Key or Non- Key Type Telephone Set) (Station End) †	WP9(‡)	Service Terminal For Main Station Termination. Suffix Denotes Station Telephone Set (Where The Interexchange Channel Exceeds 25 Miles).
	WPB(‡)	Same As WP9 Except the Interexchange Chan- nel Is Less Than 25 Miles
Off-Premises Station From a Dial PBX. (Terminated in a Single Line Non-Key Type Telephone Set) (Station End) †	WP5(‡)	Service Terminal For First Station Termination Suffix Denotes Station Telephone Set
	WP7(‡)	Additional Station Termination (As Required)
	27EDT	Arrangement Permits Direct Customer Dialing Between Stations on a 2-Point Tie Line (Non-Key Type Telephone Set)
Off-Premises Station From a Dial PBX. (Terminated in Key Type Telephone Equipment) (Station End)†	WP5(‡)	Service Terminal for First Station Termination Suffix Denotes Station Telephone Set
	WP7(‡)	Additional Station Termination (As Required)
	27E KE	Arrangement Permits Direct Customer Dialing Between Stations on a 2-Point Tie Line (Key Telephone Set)
Foreign Exchange Line With Transfer Arrangement to PBX	1YXKA (Optional)	2-Way Transfer Key
	9BX(‡) (Optional)	Indicating Lamp — Located in Same Building
	GJP(‡) (Optional)	Indicating Lamp — Location in Different Building
	KGP(‡) (Optional)	Indicating Lamp — Different Premises, Same Exchange

\* Refer to Section 812-002-201 for detailed description of the USOC and associated suffix.

† The station end of a Foreign Exchange line and an Off-Premises station is the tel set end of the 2-point private line. The switching end of a Foreign Exchange line is the central office. The switching end of an Off-Premises station is the station line circuit of the PBX.

‡ Refer to Table B for description of suffixes with associated USOCs.



\* REFER TO SECTION 812-002-201 AND TABLE H FOR DETAILED INFORMATION.

Fig. 3—4-Wire Private Line Station Arrangement SD-69566-01

TABLE G  
 4-WIRE PRIVATE LINE STATION ARRANGEMENT SD-69566-01  
 EQUIPMENT INFORMATION (FIG. 3)

TYPE OF SERVICE (MULTIPOINT)	UNIT	DESCRIPTION	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
Manual Ringdown With Simplex Signaling (20 Hz) or Code Selective Signaling on Simplex Basis (20 Hz)	J-53045G-( )	One AC Signaling Ckt	69566-01	8	6	8	480-615-100	5,6,19, 20,21
	30A KTU	One Time-Out Relay		7	30A KTU	FS 7	812-017-151	22,23,
	232B KTU	One Visual and Aud Sig Ckt	69294-01	27			981-249-100	24,46
	551A-	Signaling Key					512-220-100	9,23
	J53022DE- J53022DF-	Voice Control Switch Ckt	69343-01	2		3	463-240-100	27,28
	234A Switch			2,5		3	812-111-150	
	234B Switch			5				
Voice Call Signaling	J53045H-( )	Loudspeaker Control Ckt	69566-01	11	9	11	480-615-100 812-017-151 981-249-100	30
	106-Type	Loudspeaker		12		FS 12	463-220-100	31
Manual Ringdown With Simplex Signaling (20 Hz) or Code Selective Signaling on Simplex Basis (20 Hz) or Voice Call Signaling	J53045A-( )	One 4-Wire Term. Ckt	69566-01	1	1,10, 11	1	480-615-100	5,20, 21,22, 23,24
	J53045B-( )	Five Pickup Relay Ckts		2	2	2,3		
	J53045C-( )	Two Station Ckts		3	3	4	812-017-151	
	J53045D-( )	One Pickup Relay and Station Ckt		2,3	2,3	5		
	J53045E-( )	One Exclusion Ckt		4	4	6	981-249-100	
	J53045J-( )	Aux Circuit (Powered from CO)	69902-01	1	1,6	1	480-010-100	
	229B	One Pickup Relay	69566-01	2	12	12	480-615-100 812-017-151 981-249-100	
	J-53041D-( )	2/4 Wire Speakerphone Control	69542-01	1,2, 4	1	1,2, 3	512-620-430	

TABLE G (Cont)

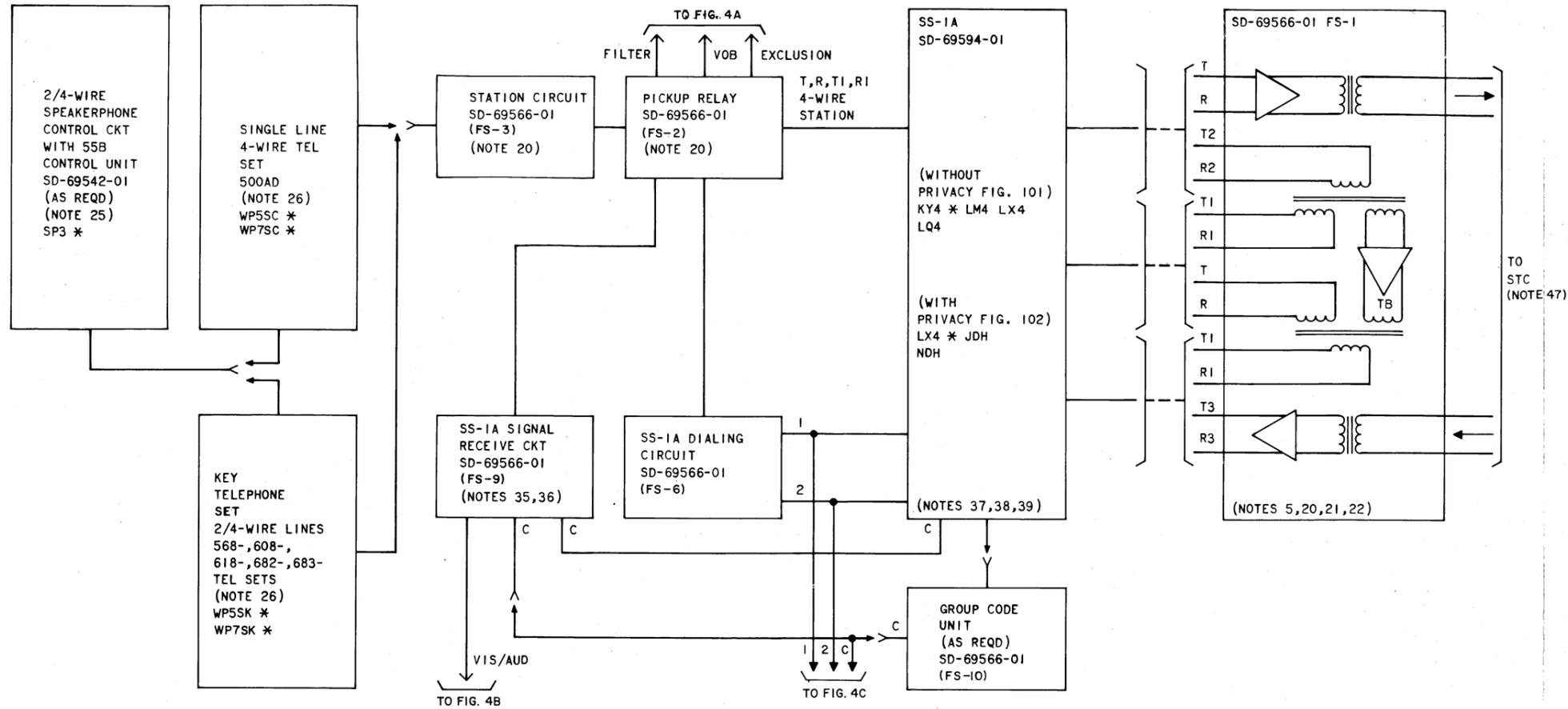
TYPE OF SERVICE (MULTIPOINT)	UNIT	DESCRIPTION	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
Manual Ringdown With Simplex Signaling (20 Hz) or Code Selective Signaling on Simplex Basis (20 Hz) or Voice Call Signaling	Optional 55B Con- trol Unit Modified For 2/4W Lines	3-Type Speakerphone System	69403-01	9			512-620-430 502-610-412	25
	568-Type Tel Set	2- and 4- Wire Tel Sets	69425-01 69455-01				480-615-100	9
	608- and 618- Type Tel Set							
	682- and 683- Type Tel Set							
	500AD	Single Line 4-Wire Tel Set					502-580-401	
G5BR	Handset For Push To Talk					480-615-100 501-210-102	26	

TABLE H  
USOC DESCRIPTIONS  
4-WIRE PRIVATE LINE STATION ARRANGEMENT – SD-69566-01 (FIG. 3)

TYPE OF SERVICE	USOC*	OPTION AND/OR DESCRIPTION
2-Way Manual Ringdown Tie Trunk With Simplex Signaling (4-Wire)	WP5(†)	Service Terminal For First Station Termination. Suffix Denotes Station Tel Set
	WP7(†)	Additional Station Termination (As Required)
	L3M	Pushbutton Key Signaling
Code Selective Signaling on Simplex Basis (4-Wire)	WP5(†)	Service Terminal For First Station Termination. Suffix Denotes Station Tel Set
	WP7(†)	Additional Station Termination (As Required)
	L3Z	Pushbutton Key Signaling
	W5U	Central Office Code Selector Signal Unit
Voice Call Signaling With Loudspeaker	WP5(†)	Service Terminal For First Station Termination. Suffix Denotes Station Tel Set
	WP7(†)	Additional Station Termination (As Required)
	LS4	Loudspeaker 106-type
Signal Control Arrangements For Above Services Associated With Simplex Signaling. Only One of These Signal Controls is Required. Provided on an Optional Basis.	BCA	Steady Incoming Signal Without Time-Out
	BCB	Intermittent Incoming Signal Without Time-Out
	UU5	Steady Incoming Signal With Time-Out
	7FW	Intermittent Incoming Signal With Time-Out
Features Provided on an Optional Basis	SP3	Speakerphone Termination
	1YXK7	Push-To-Talk Arrangement
	27S	Voice Operated Busy Arrangement

\* Refer to Section 812-002-201 for detailed description of the USOC and associated suffix.

† Refer to Table B for description of suffixes with associated USOCs.



\* REFER TO SECTION 812-002-201 AND TABLE J FOR DETAILED INFORMATION.

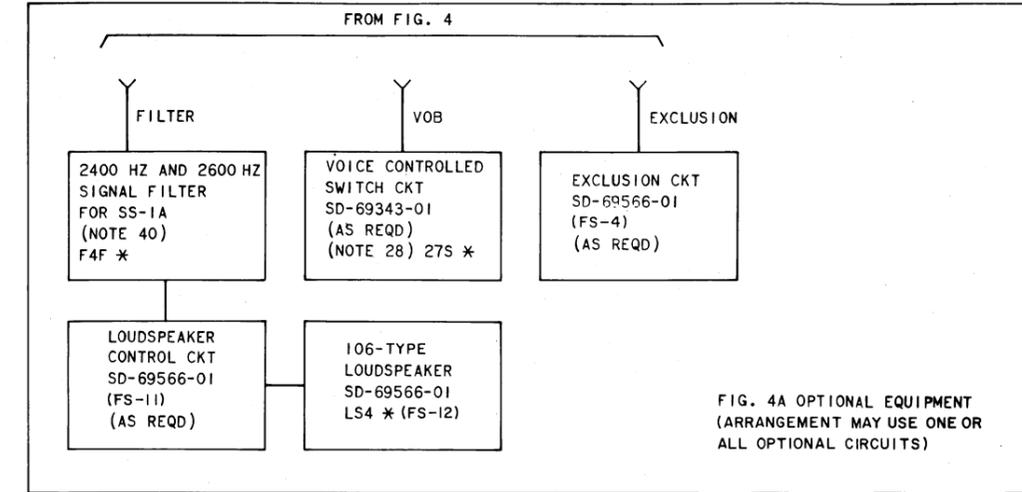


FIG. 4A OPTIONAL EQUIPMENT (ARRANGEMENT MAY USE ONE OR ALL OPTIONAL CIRCUITS)

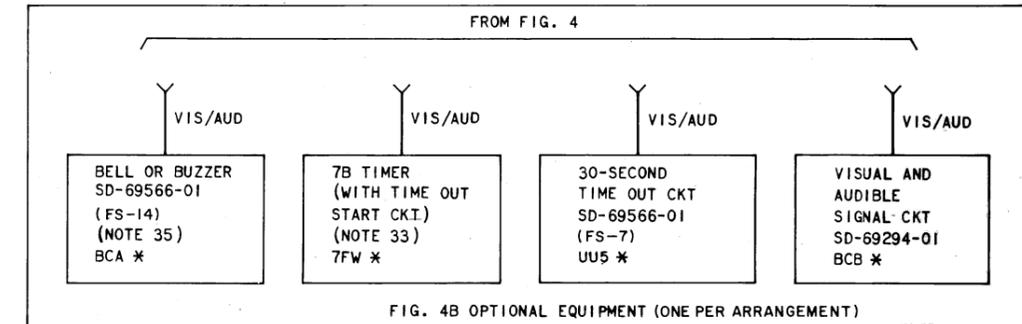


FIG. 4B OPTIONAL EQUIPMENT (ONE PER ARRANGEMENT)

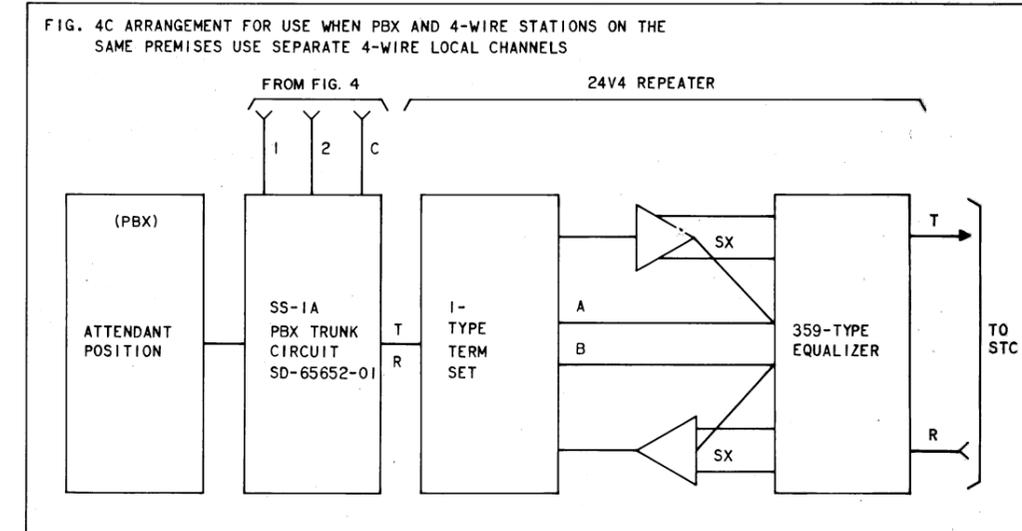


Fig. 4—4-Wire Private Line Station Arrangement—SS-1A Selective Signaling

TABLE I  
4-WIRE PRIVATE LINE STATION ARRANGEMENT  
SS-1A SELECTIVE SIGNALING – EQUIPMENT INFORMATION (FIG. 4)

TYPE OF SERVICE	UNIT	DESCRIPTION	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
SS-1A Selective Signaling	J53045A-( )	One 4W Terminating Ckt	69566-01	1	1,10,11	1	480-615-100 812-017-151 981-249-100	5,6 20,21 22
	J53045B-( )	Five Pickup Relay Ckts		2	2	2,3		
	J53045C-( )	Two Station Ckts		3	3	4		
	J53045D-( )	One Pickup Relay and Station Ckt		2,3	2,3	5		
	J53045E-( )	One Exclusion Ckt		4	4	6		
	J53045F-( )	Selective Signaling Receive Ckt (3 Codes)		9	7	9		
	J53045H-( )	Two SS-1A Dialing Ckts or One Group Code Ckt for Five Stations		6 or 10	5 or 8	7 or 10		
	J53045L-( )	Time-Out Interrupter		18	16	18		
	229B KTU	One Pickup Relay Ckt		2	12	12		
	30A KTU	One Time-Out Ckt		7		FS 7		
	232B KTU	One Visual and Audible Signal Ckt	69694-01	27			518-114-110	
	J53047A-( )	Send and Receive Ckt for SS-1A, 1 to 81 Codes Providing List Numbers for the Following Arrangements: A. With Privacy B. Without Privacy C. Loopback Test Ckt D. On Premises Talkback Amp E. 4W Private Line	69566-01 69594-01		1,10,1,2,3,6,8	1 1	480-622-200 812-016-155 982-326-100 801-605-150	37,38 39

TABLE I (Cont)

TYPE OF SERVICE	UNIT	DESCRIPTION	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
SS-1A Selective Signaling (Cont)	J53047B-( )	Station Control and Gate Ckt Without Privacy	69594-01		5,7	4	480-622-200 812-016-155 982-326-100 801-650-150	37,38 39
	J53047C-( )	Station Control and Gate Ckt With Manual Privacy			4,5 6	2		
	J53047D-( )	Station Control and Gate Ckt With Privacy			5,6	3		
	J98613DE-( )	E4B Inband Single Frequency Ckt	98124-03		1		179-314-501 975-240-100	
	KS-15620, L14	-48 Volt Rectifier					169-682-302	
	J53045J-( )	Auxiliary Ckt Powered From CO	69902-01	1	6,8	1	480-010-100	
SS1-A Selective Signaling (Optional Equipment)	106-Type	Loudspeaker	69566-01	12		FS 12	463-220-100	31
	107A	Loudspeaker					463-221-100	
	J53041D-( )	2/4W Speaker-phone Control	69542-01		1		512-620-430	
	568-Type Tel Set	2/4W Key Tel Set	69425-01 69455-01				480-615-100	
	608- and 618-Type Tel Set							
	682- and 683-Type Tel Set							
	500AD Tel Set	Single Line 4/W Set					502-580-401	
	55B Control Unit Modified for 2/4 W Lines	3-Type Speaker-phone System	69403-01		9		512-620-430	25
	G5BR-	Handset for Push to Talk					480-615-100 501-210-102	26
	J53022DE- J53022DF- 234A Switch 234B Switch	Voice Control Switch Ckt	69343-01		2,5	2	463-240-100 812-111-150	27

TABLE I (Cont)

TYPE OF SERVICE	UNIT	DESCRIPTION	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
SS-1A Selective Signaling (Optional Equipment) (Cont)	200M	2600 Hz Filter Network					812-002-270	40
	200N	2400 Hz Filter Network						
	ED-90185-50	GRP3 MTG Bars for 23 Inch Mounting Space						
		GRP8 MTG Bard for 19 Inch Mounting Space						
	J99252BW	Central Office And PBX Access Line Unit	98093-01	35		48	480-621-200	
				36		52		
			38		53			
J99252BU	Interarea Switching Ckt		32		50			

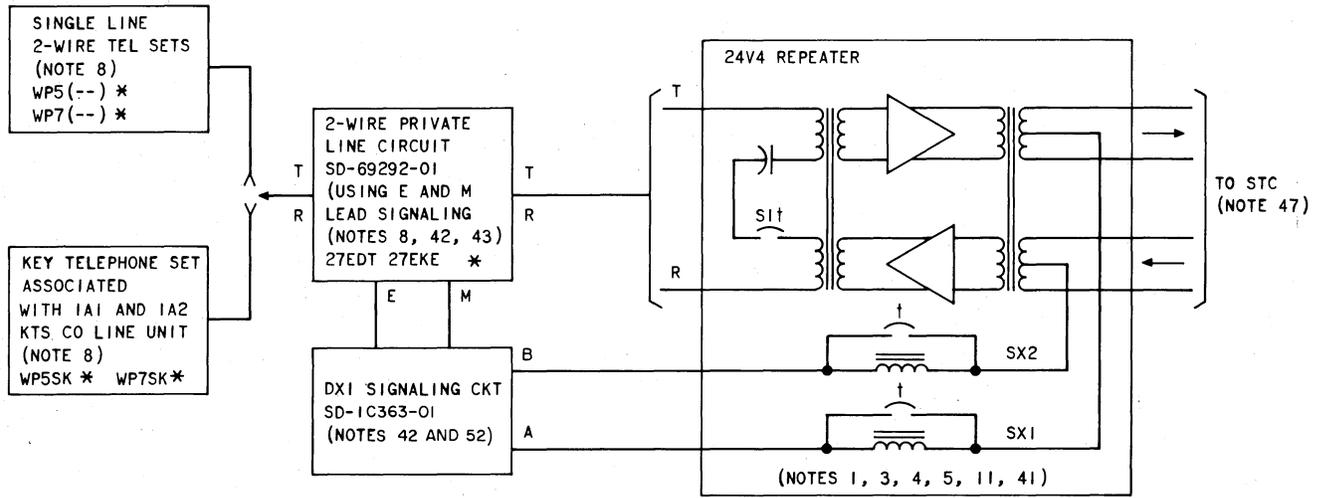
TABLE J

**USOC DESCRIPTIONS**  
**4-WIRE PRIVATE LINE STATION ARRANGEMENT**  
**SS-1A SELECTIVE SIGNALING (FIG. 4)**

TYPE OF SERVICE	USOC*	OPTION AND/OR DESCRIPTION
SS-1A Equipped With Privacy Send and Receive (4-Wire)	WP5(†)	Service Terminal for First Station Termination
	LX4	SS-1A Send and Receive Arrangement
	JDH	Privacy Arrangement — First Station Termination
	WP7(†)	Additional Station Termination (As Required)
	NDH	Additional Privacy Arrangement for Second, Third, Etc Stations
SS-1A Without Privacy Send and Receive (4-Wire)	WP5(†)	Service Terminal for First Station Termination
	LX4	SS-1A Send and Receive Arrangement
	WP7(†)	Additional Station Termination (As Required)
SS-1A Send Only	WP5(†)	Service Terminal for First Station Termination
	KY4	SS-1A Send Only Arrangement
	WP7(†)	Additional Station Termination (As Required)
SS-1A Receive Only	WP5(†)	Service Terminal for First Station Termination
	LM4	SS-1A Receive Only Arrangement
	WP7(†)	Additional Station Termination (As Required)
Signal Control Arrangements For Above Services. Only One of These Signal Controls is Required. Provided on an Optional Basis	BCA	Steady Incoming Signal Without Time-Out
	BCB	Intermittent Incoming Signal Without Time-Out
	UU5	Steady Incoming Signal With Time-Out
	7FW	Intermittent Incoming Signal With Time-Out
Features Provided on on Optional Basis	SP3	Speakerphone Termination
	1YXK7	Push-To-Talk Arrangement
	27S	Voice-Operated Busy Arrangement
	LS4	Loudspeaker
	N42	Dial Arrangement to Permit Station to Select a Central Office Line or PBX
	F4F	SS-1A Loudspeaker Filter Network for Suppressing Signal Tones
	LQ4	Interarea Switching Arrangement With Two SS-1A Systems on Premises
	LU4	Activation or Changes on an Existing SS-1A Station

\* Refer to Section 812-002-201 for detailed description of the USOC and associated suffix.

† Refer to Table B for descriptions of suffixes with associated USOCs.



\* REFER TO SECTION 812-002-201 AND TABLE L FOR DETAILED INFORMATION.  
 † SCREW TYPE SWITCH

**Fig. 5—Private Line Station Arrangement—E and M Lead Signaling**

**TABLE K**  
**PRIVATE LINE STATION ARRANGEMENT**  
**E AND M LEAD SIGNALING**  
**EQUIPMENT INFORMATION (FIG. 5)**

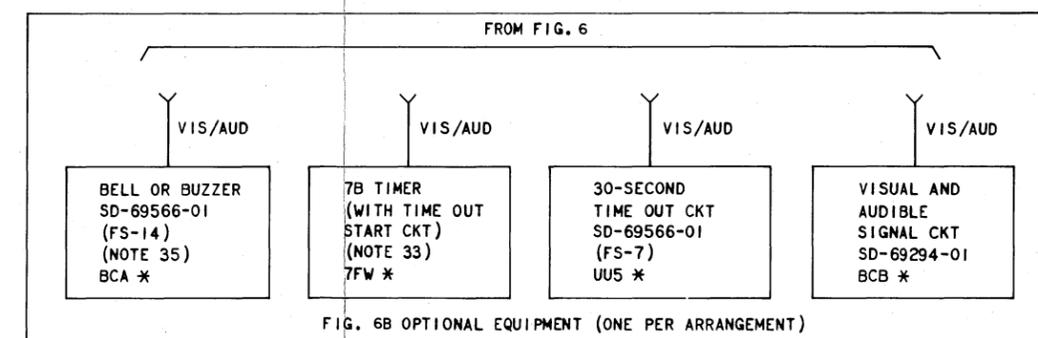
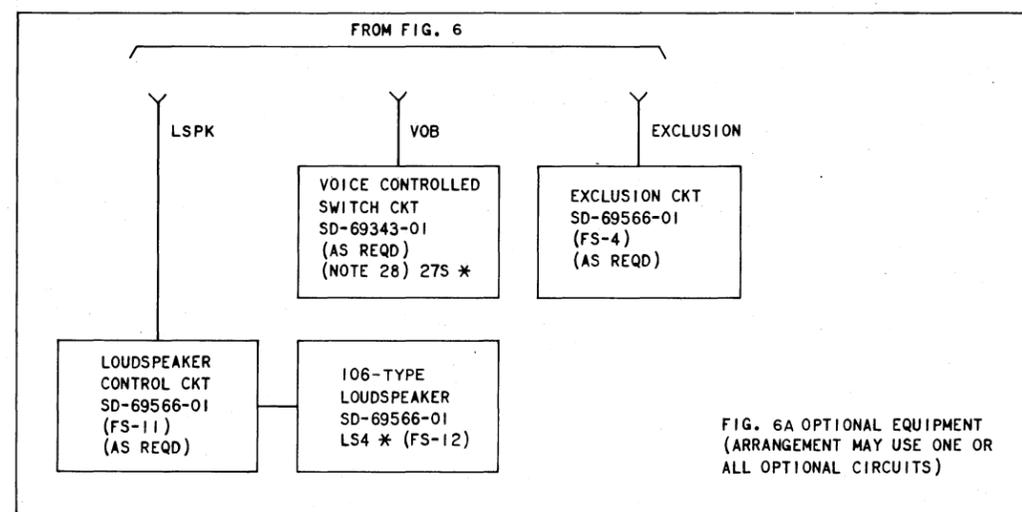
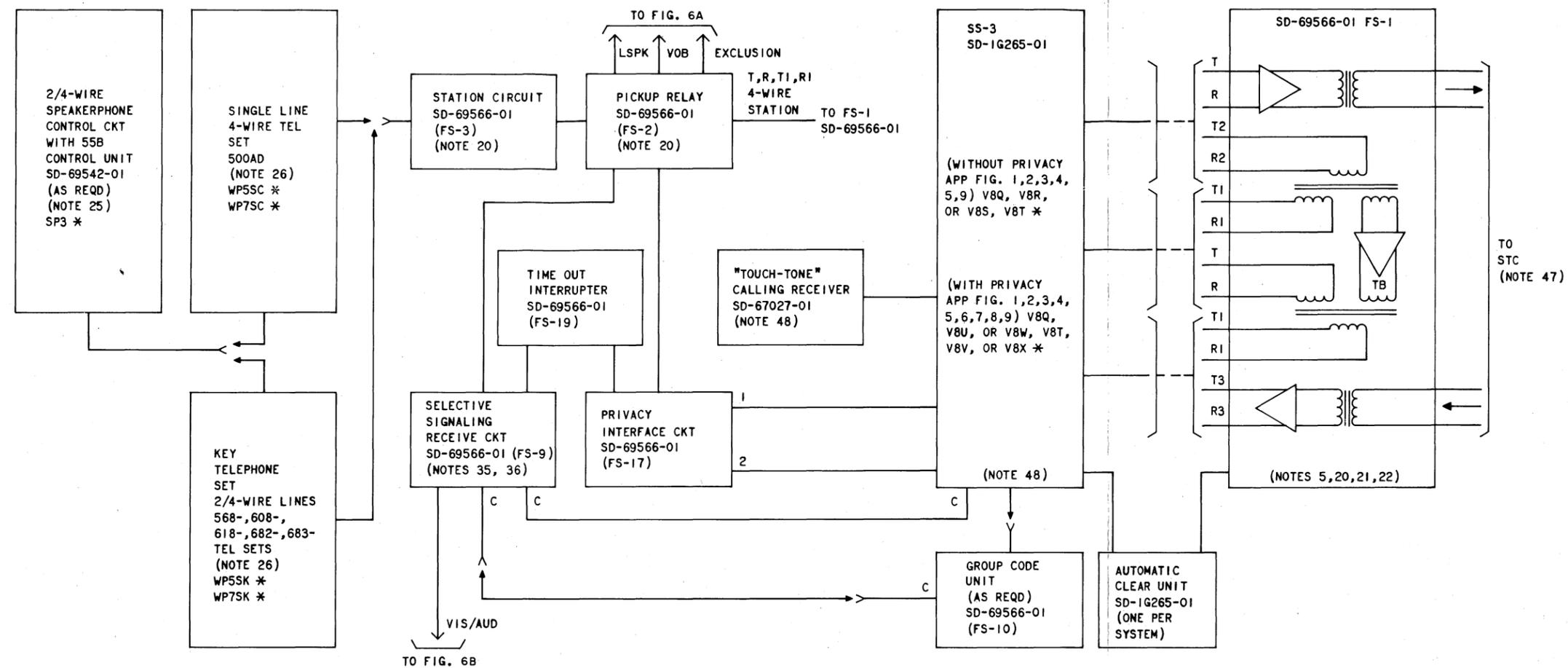
TYPE OF SERVICE	UNIT	DESCRIPTION	SD-	FS OR FIG.	APP FIG.	CAD	APPLICABLE SECTION	NOTES
Automatic Outgoing — Automatic Incoming or Dial Outgoing — Automatic Incoming	J98615BA	24V4B Repeater	99739-01	1			332-104-100 332-104-102 332-104-500	1,3,4,5 11,41
	J98615BB	24-Volt Filter for 1 to 12 Amplifiers		2				
	J98605AG	DX1 Signaling Ckt	95487-01 1C363-01	4		55	801-640-153 975-230-100	
	7A KTU	2-Wire Private Line Circuit Arranged For One-Way Dial and One-Way Automatic Operation Using E and M Signaling or 2-Way Automatic Using E and M Lead Operation	69292-01	1,2,3				42,43
	11A KTU							
	28A KTU							
	31A KTU							
	17B KTU							
	ED-91938-32 G27							
	8C KTU E/W Y235 Relay							
	8C KTU E/W Y235 Relay							
	KS-15529 Static Ring Generator							
	2-Wire Type Telephone Sets	Single Line Type, Key Telephone Sets, Call Directors					502 Division	8
	KS-15620, L14	—48 Volt Rectifier					169-682-302	
	P37B204	Bracket for Mounting KTUs					463-140-100	
67A	19-Inch Mounting Bar							
67B	23-Inch Mounting Bar							

TABLE L  
 USOC DESCRIPTIONS  
 PRIVATE LINE STATION ARRANGMENT –  
 E AND M LEAD SIGNALING (FIG. 5)

TYPE OF SERVICE	USOC*	OPTION AND/OR DESCRIPTION
Automatic Outgoing – Automatic Incoming or Dial Outgoing – Automatic Incoming (Terminated in Single) Line-Type Telephone Set)	WP5(†)	Service Terminal for First Station Termination. Suffix Denotes Station Tel Set
	WP7(†)	Additional Station Termination (As Required)
	27EDT	Arrangement Permits Direct Customer Dialing Between 2-Points or Automatic Signaling Between 2-Points Using a Tie Trunk Equivalent to SD-65718-02 at the Far End.
Automatic Outgoing – Automatic Incoming or Dial Outgoing Automatic Incoming (Terminated in Key-Type Telephone Set)	WP5(†)	Service Terminal for First Station Termination. Suffix Denotes Station Tel Set
	WP7(†)	Additional Station Termination (As Required)
	27EKE	Arrangement Permits Direct Customer Dialing Between 2-Points or Automatic Signaling Between 2-Points Using a Tie Trunk Equivalent to SD-65718-02 at the Far End

\* Refer to Section 812-002-201 for detailed description of the USOC and associated suffix.

† Refer to Table B for description of suffixes with associated USOCs.



\* REFER TO SECTION 812-002-201 AND TABLE N FOR DETAILED INFORMATION.

Fig. 6—4-Wire Private Line Station Arrangement—SS-3 Selective Signaling

TABLE M  
 4-WIRE PRIVATE LINE STATION ARRANGEMENT  
 SS-3 SELECTIVE SIGNALING – EQUIPMENT INFORMATION (FIG. 6)

TYPE OF SERVICE	UNIT	DESCRIPTION	SD-	FS OR FIG	APP FIG	CAD	APPLICABLE SECTION	NOTES
SS-3 Selective Signaling	J53045A-( )	One 4W Terminating Ckt	69566-01	1	1,10,11	1	480-615-100 812-017-151 981-249-100	5,6,20,21,22
	J53045B-( )	Five Pickup Relay Ckts		2	2	2,3		
	J53045C-( )	Two Sta Ckts		3	3	4		
	J53045D-( )	One Pickup Relay and Sta Ckt		2,3	2,3	5		
	J53045E-( )	One Exclusion Ckt		4	4	6		
	J53045F-( )	Selective Signaling Receive Ckt (3 Codes)		9	7	9		
	J53045H-( )	Group Code Ckt		10	8	10		
	J53045K-( )	Privacy Interface Ckt		17	13	13,14,15,16,17		
	J53045L-( )	Time-Out Interrupter		19	15	18		
	229B KTU	One Pickup Relay Ckt		2	12	12		
	30A KTU	One Time-Out Ckt		7		FS 7		
	232B KTU	One Visual and Audible Sig Ckt	69294-01	27			518-114-110	
	J1G027A-( )	Basic Location Unit	1G265-01 1G282-01	2,5,6,9	1,2,3,4,5,9	1,2,3,4	480-625-210 811-019-150 982-328-100	48, 49
	J1G027B-( )	Auxiliary Code Unit		2,4,6,9	3,4	5,6		
J1G027C-( )	Privacy Station Unit	4		7	7,8,9			
J1G027D-( )	Privacy Location Unit	6		5,8	10			
J1G027E-( )	Automatic Clear Unit	7		6	11			
J1G027G-( )	Manual or Dial PBX Unit		11	11	13,14			
J58844C-( )	TOUCH-TONE® Calling Receiver	67027-01				809-140-152	48	
KS-20575	+24 Volt Rectifier							
J53045J-( )	Auxiliary Ckt Powered from CO	69902-01	1	6,8	1	480-010-100		
20C2	Power Unit with Cord					167-440-201		

TABLE M (Cont)

TYPE OF SERVICE	UNIT	DESCRIPTION	SD-	FS OR FIG	APP FIG	CAD	APPLICABLE SECTION	NOTES
SS-3 Selective Signaling (Optional Equipment)	106-Type	Loudspeaker	69566-01	12		FS 12	463-220-100	31
	568-Type TEL SET	2- and 4-Wire Key Tel Set	69425-01 69455-01				480-615-100	
	608- and 618- Type Tel Set							
	682- and 683- Type Tel Set							
	500AD Tel Set	Single Line 4-Wire Tel Set					502-580-401	
	J53041D-( )	2/4-Wire Speakerphone Control	69542-01		1		512-620-430	
	55B Control Unit Modified for 2/4-W Lines	3-Type Speaker- phone System	69403-01		9			25
	G5BR-	Handset for Push to Talk					480-615-100 501-210-102	26

**TABLE N**  
**USOC DESCRIPTIONS**  
**4-WIRE PRIVATE LINE STATION ARRANGEMENT**  
**SS-3 SELECTIVE SIGNALING (FIG. 6)**

TYPE OF SERVICE	USOC*	OPTION AND/OR DESCRIPTION
SS-3 Selective Signaling Without Privacy Send and Receive (4-Wire)	WP5(†)	Service Terminal for First Station Termination
	V8Q	SS-3 Basic Send and Receive Arrangement
	V8R	Incremental Arrangement — Group of 4 Codes Installed Initially With USOC V8Q
	V8S	Incremental Arrangement — Group of 4 Codes Installed Subsequent to USOC V8Q
	V8T	Additional TOUCH-TONE® Instrument (Including One Signaling Code)
	WP7(†)	Additional Station Termination (As Required)
SS-3 Selective Signaling With Privacy Send and Receive (4-Wire)	WP5(†)	Service Terminal for First Station Termination
	V8Q	SS-3 Basic Send and Receive Arrangement
	V8R	Incremental Arrangement — Group of 4 Codes Installed Initially With USOC V8Q
	V8S	Incremental Arrangement — Group of 4 Codes Installed Subsequent to USOC V8Q
	V8T	Additional TOUCH-TONE Instrument (Including One Signaling Code)
	V8U	Privacy Arrangement Including Override Feature — First Four Instruments Installed Initially With USOC V8Q
	V8W	Privacy Arrangement Including Override Feature — First Four Instruments Installed Subsequent to USOC V8Q
	V8V	Privacy Arrangement Including Override Feature — First Four Instruments Installed Initially With USOC V8T
	V8X	Privacy Arrangement Including Override Feature — First Four Instruments Installed Subsequent to USOC V8T
WP7(†)	Additional Station Termination (As Required)	
Signal Control Arrangements for Above Services. Only One of These Controls is Required on Optional Basis	BCA	Steady Incoming Signal Without Time Out
	BCB	Intermittent Incoming Signal Without Time Out
	UU5	Steady Incoming Signal With Time Out
	7FW	Intermittent Incoming Signal With Time Out
Features Provided on an Optional Basis	SP3	Speakerphone Termination
	1YXK5	Cutoff Key for Override Feature
	1YXK7	Push-To-Talk Arrangement
	LS4	Loudspeaker

\* Refer to Section 812-022-201 for detailed description of the USOC and associated suffix.

† Refer to Table B for description of suffixes with associated USOCs.

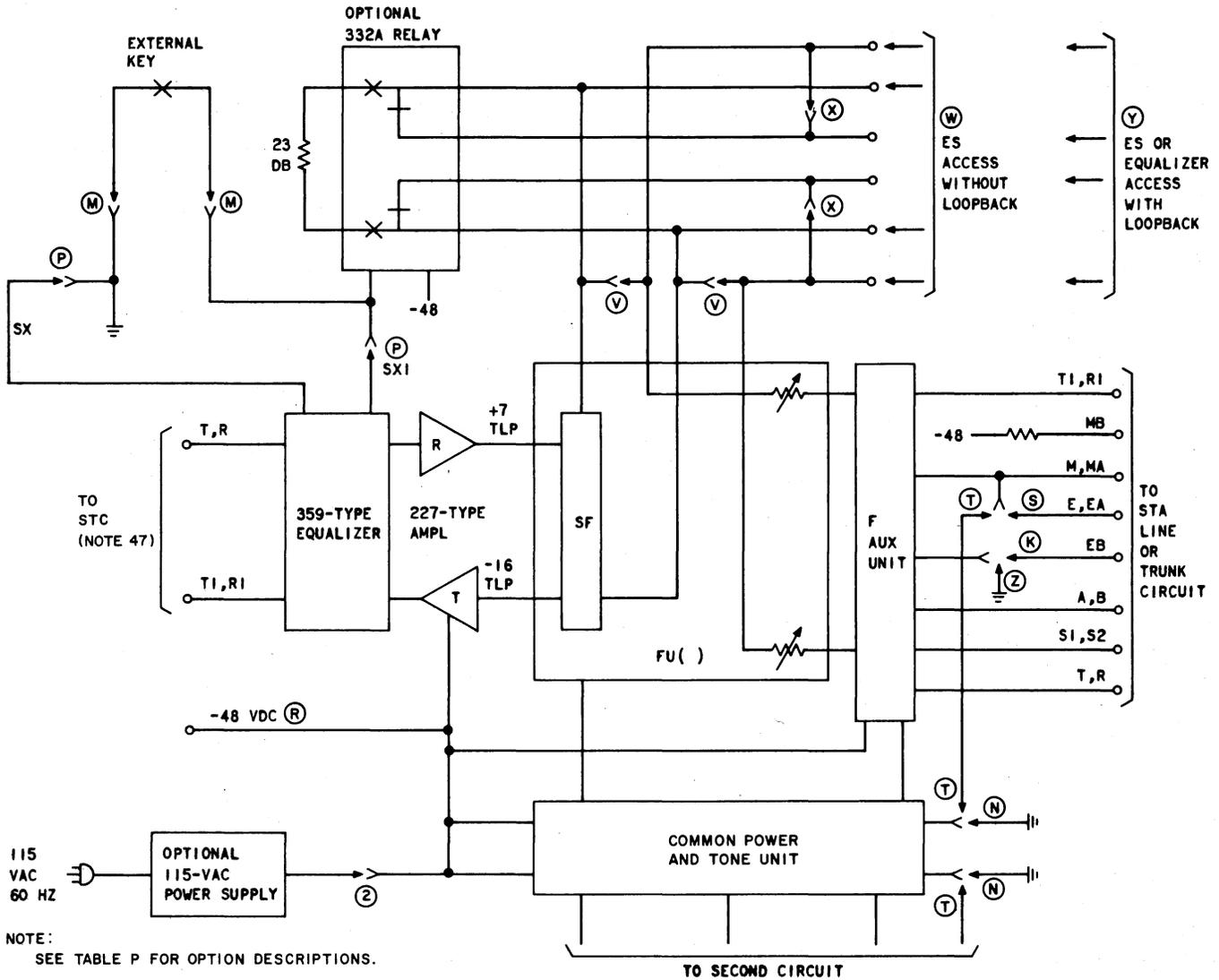


Fig. 7—Block Diagram of Customer's Premises Facility Terminal (NOTE)

**TABLE O**  
**APPLICATION OF TYPE F AUXILIARY SIGNALING UNITS**  
**FOR CUSTOMER'S PREMISES FACILITY TERMINAL**

SERVICE	UNIT USED	NOTES	SECTION	TERM.	
Special access: FX trunks, FX lines, OPS, OPX, WATS, LD  Also: Some 1-way tie trunks and private lines using loop or ground start supervision	FLA	Switch end (CO)	179-365-101	900Ω	
	FLB			600Ω	
	FSA	Station end		900Ω	
	FSB			600Ω	
	Special cases for 4-wire extensions not normally used at customer's premises	FPA		Switch end (CO)	600Ω
		FRA		Station End	600Ω
2-way tie trunks	Requires modification of some PBX trunk circuits such as SD-65718	FAC	179-364-101	900Ω	
		FAD		E & M	600Ω
	Not recommended because external 1-type term. set is required	FBA		4-wire	Requires external term. set
			E & M		
	Special case for use with existing DX connected tie trunk	FGA	2-wire DX	179-367-101	900Ω
		FHA	4-wire DX		600Ω
Private line and 1-way tie trunks	E&M circuits such as SS1	FAC	179-364-101	900Ω	
		FAD		600Ω	
		FBA		600Ω	
	DX Circuits	FGA	2-wire	179-367-101	900Ω
		FHA	4-wire		600Ω
	Ringdown (DIB EQUIV)	FGM	2-wire		900Ω
		FHM	4-wire	600Ω	
	1-way automatic	FCA	Orig end	179-364-101	2-wire
		FDB	Term. end		900Ω
	PLR for tandem links	FBM	4-wire		600Ω

TABLE P  
CUSTOMER'S PREMISES FACILITY TERMINAL  
STRAPPING OPTIONS

OPTION	FUNCTION
V	Provides transmission path if neither ES, equalizer, nor loopback is used.
X	Provides transmission if only loopback is required.
W	Required if ES or equalizer is used without loopback.
Y	Required if ES or equalizer is used with loopback.
P	Provides for simplexing of loopback control on 4-wire facility.
M	Required for local loopback control.
Z	Provides ground on EB lead for conventional E and M lead operation.
S	Required for access to E lead if ringing control operation is not used.
T	Provides for control of ringing supply by the F signaling unit (ringing on with E lead open).
N	Provides ground turnoff of ringing supply (required on both circuits). <i>Note:</i> Option (T) may be used for one circuit and option (N) for the other, but if a ground is not provided simultaneously to both circuit controls, the ringing supply will operate continuously.
R	Required to connect to local -48 Vdc where available.
2	Provides optional 115-Vac power supply operation.
K	Required if looped E lead is used.
<i>Note:</i> All strapping is made on the 66K1 connecting block per SD-1C475-01, CAD 1.	

TABLE Q  
ORDERING GUIDE – LAMP INDICATORS

NAME	CODE OR NUMBER	COLOR	NO. OF LAMP POSITIONS	COLOR OF LENS FURNISHED	MOUNTING CORD†	DESIGN FEATURES	USOCs§
Indicator Base*	1A	Light olive gray	1		Inside Wire	Basic indicator unit with a 1-type lens, must be rigidly mounted, may be used with one or more 2A indicator bases to form a multiple indicator.	
	2A	(-49)	1			Supplementary lamp unit which mates with the 1A indicator base.	
Indicator Lens	1A	White				One lens required for each indicator base (must be ordered separately).	
	1B	Blue					
	1C	Green					
	1D	Amber					
	1E	Red					
	1F	Clear					
Kit	D-180380	—	1	Clear		An adapter which enables the 1A or 1B indicator base to use a GE-K1D neon glow lamp in place of the 51A incandescent lamp. Includes one 1F lens.	
Lamp Indicators ‡	14B	Light olive gray (-49)	3	White Green Red	D4BD-49	Nonflush type, may be mounted in horizontal or vertical fixed position, may be terminated on a mounting cord and mounted without fastening on a horizontal surface; a nonskid pad is furnished for use when the indicator is not mounted in a fixed position.	
	15D		1	White	D3BP-49		
	15E			Red			
	15F			Green			
	15G			Amber			
	16A		3	White Green Red	NONE		
	17C		2	Green Red	D3BP-49		Nonflush type, may be mounted in horizontal or vertical fixed position, may be terminated on a mounting cord and mounted without fastening on a horizontal surface, a nonskid pad is furnished for use when the indicator is not mounted in a fixed position.
	17D			White Red	D4BD-49		
	17E			Red Red			
	17F			White Amber			
	18B		3	White Green Red	D4BD-49		
	18C			Green Amber Red			
	20B		4	Red White Green Amber	D6W-49		
	21B (MD)		1				
21C	Clear	D3BP-49					

\* Use 51A lamps with 10-volt power supply and 52A lamps with 24-volt power supply. Lamps must be ordered separately.  
 † Associated mounting cord, when required, must be ordered separately.  
 ‡ Use a switchboard lamp or key equipment lamp. Lamp must be ordered separately.  
 § The USOCs listed apply to special busy indicator lamp arrangements. Refer to Section 812-002-201 or Intercity Service Manual (ISM) for a comprehensive description of the USOCs. See Section 463-210-100 for additional information on the lamp indicators.

TABLE R

LOW VOLTAGE AC AND DC SIGNALS

ORDERING GUIDE		OPERATING FEATURES		
SIGNAL	CODE ‡	VOLTAGE RANGE		APPROX DC RES*
		DC (VOLTS)	50-60 CYCLES AC	
Bell E/W Gong	7A-49	14-40	25-50	270
	7C-49	2-5	4-9	2.6
	7D-49	3-10	6-18	15.8
	7E-49	10-20	18-30	105
	7F-49†	24-60	35-60	682
	KS-13783, L1	5-7	—	10
	KS-13783, L2	5-7	—	10
Buzzer	7A-49	14-40	15-21	270
	7B-49	2-6	4-9	10.5
	7C-49	2-8	3-8	2.6
	7D-49	4-15	4-15	15.8
	7E-49	10-20	10-20	105
	7F-49†	20-60	20-60	682
	KS-8108, L2	3-4	3-4	.5
	KS-8109, L2	14-30	14-30	55
	KS-8110, L2	24-50	24-50	300
	KS-20419, L1	—	6-10	60

\* Multiply these values by 3 when computing current drain, except as noted in †.

† May also be operated with 16- to 20-cycle ringing current. Effective impedance is then 850 ohms and approximately 3500 ohms in series with 2- $\mu$ f capacitor.

‡ The following USOCs apply to the special signaling arrangements:

- 1ZX (BZ)
- 1ZX (EB)
- 1ZX (GB)
- 1ZX (6B)
- 1ZX (7B)

Refer to Section 812-002-201 or Intercity Service Manual (ISM) for a comprehensive description of the USOCs. See Section 501-120-100 for additional information on buzzers and bells.

TABLE S

HIGH RESISTANCE 4-TYPE BUZZERS\*

ORDERING GUIDE	OPERATING VOLTAGE		APPROX RESISTANCE
	24 VOLT DC	AC RINGING CURRENT	
4B		●	1200
4C	●	●	1200
4E		●	1400
4F	●	●	1200

\* The following USOCs apply to the special signaling arrangements;

- 1ZX (BZ)
- 1ZX (EB)
- 1ZX (GB)
- 1ZX (6B)
- 1ZX (7B)

Refer to Section 812-002-201 or Intercity Service Manual (ISM) for a comprehensive description of the USOCs. See Section 501-120-100 for additional information on buzzers and bells.

TABLE T  
MOUNTING BRACKETS

BUZZER	BRACKET CODE	PARTS FURNISHED WITH BRACKET	INTENDED USE	RESTRICTED USE
7-type and No. 152A Capacitor	36A	<ul style="list-style-type: none"> <li>● (2) Leads</li> <li>● Screws to mount buzzer and 152A cap.</li> <li>● (2) Screws for mounting bracket</li> </ul>	410-, 411-, 440-, 441-, 460-, and 461-type key tel. sets	Remove buzzer cover on 410- and 411-type sets
	44B	<ul style="list-style-type: none"> <li>● (2) Leads</li> <li>● Screws to mount buzzer and 152A cap.</li> <li>● (2) Screws for mounting bracket</li> </ul>	All 500 Series Tel. Sets	44A (MD) bracket not for use with 540-, 560-, and 592-type tel. sets
7-type	60A*	(2) Screws to mount buzzer to bracket.	168-type Backboard	
7-type or KS-8108, 9, and 10 type	65A†	<ul style="list-style-type: none"> <li>● (2) Buzzer mounting screws</li> <li>● (2) Insulating washers</li> </ul>	600 Series <i>CALL DIRECTOR</i> sets	Not for use in 636-, 637-, 638-, and 639-type
KS-8108, 9, and 10 type or KS-20419,L1	70A‡	(2) Buzzer mounting screws	500 Series Tel. Sets	Not for use in 510- or 500 key-type sets E/W exclusion switch §
7-type KS-8108, 9, and 10 type or KS-20419,L1	71A†	<ul style="list-style-type: none"> <li>● (2) Nylon buzzer mounting screws</li> <li>● (2) Insulating washers</li> </ul>	636-, 637-, 638-, and 639-Type <i>CALL DIRECTOR</i> sets	Mount 7-type buzzers (less cover)

\* The mounting screws used to secure the 168-type backboard also hold the 60A bracket.

† The 65A and 71A mount on the dial mounting plate with a dial mounting screw.

‡ 70A bracket mounts astride ringer coil and is fastened with the same screws that hold core to ringer frame. The spade-tipped leads on F terminal contact with the buzzer case. Boss is also provided on the 70A bracket to ensure adequate clearance.

§ Where both ringer and buzzer signals are needed in these sets replace the C4A ringer with an H1A ringer.

**TABLE U**  
**ORDERING GUIDE**  
**LOUD RINGING SIGNALING DEVICES**

SIGNAL	LOCATION	STROKE	OPERATING VOLTAGE	CURRENT (AMPERES)	OUTPUT (db)	RELAY OPERATION†‡	USOCs§	SEE TABLE
<b>BELL</b>								
KS-8547,L1	Hazardous Indoor	Vibrating	115V ac	0.10			7HX(BP)	
KS-8547,L2	Hazardous Outdoor	Vibrating	115V ac	0.10				
KS-8547,L3*	Hazardous Indoor	Single	115V ac	0.12				
KS-8547,L4*	Hazardous Indoor-Outdoor	Single	115V ac	0.12				
KS-16301,L3	Indoor Outdoor	Vibrating	115V ac		100		1ZX(6B)	S
KS-16301,L4	Indoor Outdoor	Single	115V ac		98			S
KS-16301,L20	Indoor Outdoor	Vibrating	18V ac		100			S
KS-20375,L1†	Indoor	Vibrating	18V ac		100			
<b>CHIME</b>								
KS-8229,L13*	Indoor	Single	115V ac			48V dc	7QX(24)	
KS-8229,L14*	Indoor	Single	115V ac	0.07		48V dc		
KS-8220,L15*	Indoor	Single	115V ac	0.07		Ringing Current		
KS-8229,L23*	Indoor	Single	115V ac	0.07			7QX(98)	
KS-16301,L1	Outdoor Indoor	Single	115V ac					S
<b>HORN</b>								
KS-16301,L2	Indoor Outdoor		115V dc		100		6AM(HO)	S
KS-16301,L5	Indoor Outdoor		115V ac		105			S
KS-16301,L6	Indoor Outdoor		48V ac		100			6AM(HP)
<b>SWITCH, RELAY</b>								
KS-20614	Indoor					Ringing Current		

\* May be ordered equipped for 115V dc operation.

† Mounts on 2-inch rectangular outlet box, 4-inch square or octagonal outlet box, or single or double gang plaster ring.

‡ ● 48V ac relays, will operate on 9V minimum.

● 48V dc relays, will operate on 17V minimum.

● Ringing current relays will operate on 53V minimum with wide airgap and 34V minimum with close airgap.

§ The USOCs listed apply to loud ringing signaling arrangements. Refer to Section 812-002-201 or Intercity Service Manual (ISM) for a comprehensive description of the USOCs. See Section 463-110-XXX for additional information on the signaling devices.

TABLE V  
 ORDERING GUIDE  
 ASSOCIATED APPARATUS, KS-16301

ASSOCIATED APPARATUS	LOCATION	USE WITH				POWER CORD PROVIDED	FOR CONDUIT INST	SEE TABLE
		BELL	HORN	CHIME	RELAY			
BACKBOX								
KS-16301,L8*	Indoor	•	•	•	•	Yes	No	
KS-16301,L9*†	Indoor	•	•	•	•	No	Yes	
KS-16301,L11*	Outdoor	•	•	•	•	No	Yes	
KS-16301,L19*	Outdoor	•	•	•	•	Yes	No	
OUTLET								
KS-16301,L18†	Outdoor							
RELAY								
KS-16301,L15	Indoor			•				T
KS-16301,L16	Indoor			•				T
KS-16301,L17	Indoor			•				T

\* Mounting hardware not furnished.

† Use with KS-16301,L19 backbox.

TABLE W  
 SIGNALS, KS-16301  
 OPERATING CURRENT REQUIREMENTS

SIGNAL	LIST NO.	OPERATING CURRENT IN AMPERES		
		MFD BY SPERTI-FARADAY COMPANY	MFD BY WHEELOCK SIGNAL COMPANY	MFD BY EDWARDS COMPANY, INC.
Bell	3	0.084	0.113	0.075
	4	0.89	1.22	—
	20	—	0.20	—
Chime	1	1.32	1.22	—
Horn	2	0.125	0.36	0.075
	5	0.63	0.65	0.170
	6	0.55	1.70	0.490

TABLE X  
RELAYS, KS-16301  
OPERATING REQUIREMENTS

RELAY	OPERATING VOLTAGE	OPERATING CURRENT AT MAX VOLTAGE	DC RESISTANCE OF RELAY COIL	IMPEDANCE OF RELAY COIL	RELAY CONTACT CARRYING CAPACITY
LIST NO.		AMPERES	OHMS	OHMS	AMPERES
15	18 to 48 volts dc	0.011	4500	—	5
	30 to 48 volts 60 Hz ac	0.025	1000	1920	
	39 to 90 volts 20 Hz ac (ringing voltage)	0.012	4500	7550*	
16	9 to 48 volts 60 Hz ac	0.404	26.3	118	
17	12 to 78 volts dc	0.069	1130	—	

\* Includes 0.45-mf series capacitor.

◆ TABLE Y ◆  
LOUDSPEAKER SET SELECTION

CODE (Note)	POWER REQUIRED	SECTION	SD
106A (MD)	48 Volts dc 24 Volts dc Combination 12 and 30 Volts dc	463-220-100	95279-01
106B (MD)			
106C (MD)			
106D			95279-02
106E			
106F			

Note: The 106A, B and C codes are replaced by the 106D, E and F codes, respectively.

## GENERAL FIGURE AND TABLE NOTES

1. Switch S1 of the terminating set should be closed to insert the midpoint capacitor in the 2-wire side.
2. The simplex inductors should not be included in the circuit.
3. Refer to Section 332-104-102 for strappings, connections, and power requirements for the 24V4B repeater.
4. Refer to Section 332-104-500 for initial line up of V4 repeater.
5. Refer to Section 518-010-106 for selection of power supply units.
6. Provide visual and audible signal circuit per SD-69294-01 (or equivalent as shown in Division 518).
7. Provide 2-second spurt automatic ringing arrangement per Section 812-002-270 (USOC 27M) when associated with 1A1 Key Telephone System
8. Considerable transmission loss will be encountered if more than two stations are off-hook simultaneously.
9. Pushbutton signaling key may be mounted externally or a key associated with a key telephone set may be converted to nonlocking.
10. Provide idle circuit termination in transmit path of 4-wire side of 24V4B repeater on all multipoint circuits as shown in Section 812-002-270.
11. Refer to Section 812-002-290 for a more detailed description of 24V4 repeater and its associated equipment.
12. The 24V4B repeater is not required for 2-wire line terminations.
13. When one-way manual ringdown and one-way automatic ringdown-type service is required between two points, a 204A KTU or 414 A KTU should be provided at the manual end. A 419A KTU should be provided at the automatic end (USOC TL5).
14. KTUs providing idle circuit termination (per Section 812-002-270) may be mounted on brackets and associated mounting bars.
15. When termination of a ringdown tie trunk is in a 2-wire single line combined handset (HSC), provide a 204A key telephone unit for talk battery and audible signaling.
16. For applications of transfer arrangements (if required), refer to Section 812-002-270 and 812-002-250. Signaling must be compatible when transferring from station to PBX or station to data location.
17. If the loop resistance exceeds the range of serving equipment, a Dial Long Line unit is required.
18. Provide idle circuit termination for Foreign Exchange and Off-Premises Station service per Section 812-002-270.
19. Provide locked-in signaling when code selective signaling is required (USOC W5U).
20. Choice of units associated with 4-wire Private Line Terminating Circuit SD-69566-01 (J53045-) will depend on size of installation and type of station apparatus associated with a specific private line service.
21. Provide talk back amplifier on customer premises.
22. Provide loop back arrangement as required.
23. Signaling key is not required for receive only 20 Hz simplex signaling arrangement and voice call circuits.
24. Visual and audible circuit is not required for a send only 20 Hz simplex signaling arrangement and voice call circuits.
25. Modify 55B control unit for 3-type speakerphone when applied to 2/4 wire terminations (per SD-69542-01 or Section 512-620-430).
26. Refer to Section 480-615-100 for application of G5BR push-to-talk handset for 4-wire termination.
27. Unit J53022DE is arranged for dc power supply. Unit J53022DF is arranged for ac power supply.
28. When voice-operated busy circuit is provided, wire to receive loop of SD-69566-01 per 812-002-270.
29. Signaling key not required when voice call signaling is used.
30. Provide loudspeaker control when several stations will control a single loudspeaker.
31. Refer to Section 463-220-100 for internal wiring of 106-type loudspeaker.
32. Provide 7-type buzzer 20 Hz ac ringer or equivalent.
33. Refer to Section 812-002-270 for wiring and connections of the 7B timer control circuit (USOC UU5 and 7FW).
34. For more information on the 227-type amplifiers used in Private Line Terminating Circuit SD-69566-01, see Section 812-002-290.
35. Provide battery to LK lead in SD-69566-01 when steady audible without time out is required.
36. When auxiliary signaling devices are required (indicating lamps, bells, buzzers, gongs, chimes, or horns) refer to Tables Q through X for information.
37. A *receive only* or *send only* unit is not provided with SS-1A (J53047). The *send and receive* unit can be provided as a basic unit (J53047A). This unit can then be used for the type of application desired by varying equipment list numbers on J drawing specifications. See Section 812-016-155.
38. For optional equipment such as central office and PBX access line circuit, interarea switching circuit, and monitor lamp display test circuit required as additions to the SS-1A circuit, refer to Section 801-605-150 (J99252-) SS-1 and SS-1A systems are compatible.
39. Refer to Sections 480-621-202 and 811-016-180 when provisions for TOUCH-TONE® are required for SS-1A.
40. For wiring and mounting information on SS-1A loudspeaker filter network, refer to Section 812-002-270.
41. The simplex inductors should be included in the circuit.
42. This circuit operates similar to SD-65718-02.
43. KTUs may be mounted on brackets and associated mounting bars (see Table L).
44. When a loop to loop dial long line is used for signaling only, provide modifications as outlined in Section 812-002-270.
45. Terminating sets with inductors in series with A and B leads shall be provided when dial long line is used (Terminating Sets 1K, 1L, 1M, 1N).
46. The use of the J53045G unit precludes using the loop back option.
47. Refer to Section 812-002-200 for typical end to end arrangement for this figure.
48. One J58844C,L1 TOUCH-TONE calling receiver is required for each J1G027A,L1 basic location unit.
49. SD-1G282-01 provides connection information for SS-3 package units. J1G028A is an SS-3 4-station nonprivate package unit. J1G028B is an SS-3 4-station private package unit.
50. SD-1C359-01 requires a 48-volt power supply. SD-66086-01 requires a 24-volt power supply.
51. SD-1C359-01 replaces SD-96555-01.
52. SD-1C363-01 replaces SD-95487-01.