14A COMMUNICATION SYSTEM
(COM KEY* 1434)

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1. GENERAL

1.01 This section contains identification, installation, connection, operation, and maintenance information for the 14A Communication System.

1.02 This section is reissued to:

- Add information on the 580B key service unit (KSU) and show the 580A KSU rated MD
- Add information on the KS-21939,L2 loudspeaker which replaces the KS-16846,L2,

and change code of K8 loudspeaker to KS-21880,L1

- Add D-180759 kit of parts for installing 215C1 power unit
- Show new method, using nomograph, for determining number of additional leads required in satellite installations
- Add satellite information using 14A1-type terminal blocks
- Add information on new music-on-hold circuit [498A KTU and 116A1 circuit module (CM)]
- Add 400G and 400H KTUs
- Add use of 415A KTU in 580B KSU
- Delete two optional features and add these as basic features (Recall and Ring Transfer) in Part 4.

1.03 Further information may be found in:

- 463-341-102—Protective Connecting Arrangement FTP (33A Voice Coupler, SD-69911-01)
- 503-603-120—575AM and 2575AM Telephone Sets; Identification, Installation, Connections and Maintenance
- 503-701-110—832- and 2832-Type Telephone Sets; Identification, Installation, Connections and Maintenance
- 503-702-110—833- and 2833-Type Telephone Sets; Identification, Installation, Connections and Maintenance
- 512-620-487—Speakerphone System—3-Type; 832-, 833-, 2832- and 2833-Type Telephone Sets, Connections
- 512-740-471—Speakerphone System 4A; 832-, 833-, 2832- and 2833-Type Telephone Sets
- 518-010-105—Key Telephone System—Grounding and Special Protection Requirements
- CD- and SD-69653-01, Issue ▶3◀ —14A Communication System Circuit
- CD- and SD-69655-01, Issue 2—833A and 2833A Telephone Circuits for Use With 14A Communication System
- CD- and SD-69657-01, Issue 2—7A1, 7B1, ▶and 7C1◀ Station Busy Selector Consoles for Use With 14A Communication System, ▶21A Communication System, 1A2 Key Telephone System◀
- CD- and SD-69915-01, Issue 1—7A or 14A Communications System Customer Paging System Interface Circuit
- CD- and SD-69922-01, Issue ▶2◀ —Audio Features, 451-Type ▶and 498A◀ KTU
- CD- and SD-69924-01, Issue 1—7A Communication System External Signaling Circuit
- CD- and SD-69931-01, Issue 1—TOUCH-TONE® Adapter Circuit
- ▶CD- and SD-69942-01, Issue 1—400H KTU◀

If this section is to be used with equipment or apparatus reflecting a later issue of the drawing(s), reference should be made to the CDs and SDs to determine the extent of the changes and the manner in which the section may be affected.

1.04 In installations which require more than 18 stations but no more than 7 CO/PBX lines, refer to Section 518-450-103. This section details the use of 832- or 2832-type telephone sets with a 580-type KSU (COM KEY 734).

1.05 Condensed functional schematics of consoles and key telephone units are located at the end of this section.

2. DESCRIPTION OF APPARATUS

2.01 The 14A Communication System will accommodate a maximum of 14 CO/PBX lines and 34 stations. It is wired for a 3-path intercom. A 580-type KSU houses the power supplies and KTU mountings. Telephone sets (833- and 2833-type) are special 20-button desk and wall sets providing basic services such as pickup, hold, recall, illumination, voice and tone signaling, multiline conferencing, and automatic button restoration (ABR). Optional system features are privacy

(lockout), privacy release, station restriction, loudspeaker paging (with or without background music), power failure ringing, music-on-hold (utilizing a customer-provided music source), intercom preset conference, station busy console with direct station selection (DSS), station busy console with message waiting (MW), TOUCH-TONE adapter, speakerphone, external signaling circuit, and connection to a customer-owned and maintained (COAM) paging system.

2.02 In the 14A Communication System, each station has access to all CO/PBX lines and the three intercom paths. One station, selected as the attendant station (intercom code 0), is the only station factory-wired in the KSU for CO/PBX ringing on a common audible basis. Options are provided to permit CO/PBX lines to ring at other stations. ⧫A maximum of three stations can be equipped with consoles to serve as attendant stations. The second and third attendant stations can be assigned any intercom code from 7 to 39.⧫

2.03 As factory-wired, incoming calls on the CO/PBX lines are answered at the attendant station. The attendant ascertains the person or station being called and places the incoming call on hold. The attendant may then page the called party, or dial the called station over an intercom path, to announce the incoming call. The attendant may reenter the call by depressing the associated CO/PBX line button.

2.04 The attendant station (station code 0) is the only station that can divert its common audible ring via the optional ring transfer (formerly referred to as night transfer) feature.

2.05 Any station may be optionally wired for CO/PBX ringing on a single line or for common audible ringing. Ringing is tone signaling. Stations cannot be wired for both common audible and CO/PBX ringing. In the 14A Communication System, as many as 10 stations may be wired for common audible ringing.

Note: To reduce C battery crosstalk, KSUs manufactured before June 1975 should be modified as shown in Fig. 81.

2.06 Intercom station codes are 0 (attendant station) and 7 through 39. Codes 1, 2, and 3 are the first digits of the 2-digit station codes; codes 4, 5, and 6 are paging codes.

580-TYPE KSU

2.07 The 580A (MD) KSU (Fig. 1 and 2) is a 120A apparatus box with a removable front and rear cover and is designed for floor mounting only (Fig. 1 and 2). It contains the following components:

- Two internally mounted power supplies and a KS-15900, L1 interrupter —

  29C1 power supply, SD-81877-01—refer to Section 167-446-101.

  67C1 power supply, SD-82090-01—refer to Section 167-454-101.

- 15 internally mounted 66-type connecting blocks for option, station, and console connections.

- Fuse panel (Fig. 3) which provides power distribution to connectors and station blocks.

- Status lamps (Table A and Fig. 3) to indicate status of CO/PBX and intercom lines.

- Designation strip holder and tab assembly serving as a retainer to lock KTUs in place.

- 424C, 444-type, 453B, 454B, 455B, and 456B KTUs (furnished with the KSU).

- Connectors to mount four 8-inch and twenty-five 4-inch KTUs.

- ⧫Current production (serial number 6184 and higher) wired to make 440A and 478A KTUs (TOUCH-TONE adapters) completely interchangeable.⧫

2.08 ⧫The 580B KSU is the same as the 580A except:

- All wiring for use of a 451-type KTU (music-on-hold) in J27 and J29 has been removed and replaced with wiring for the 498A KTU.

- "C" battery has been added to J26 for future use.

- Additional leads for planned feature additions have been brought out on terminals 1A to 15A of block 6.

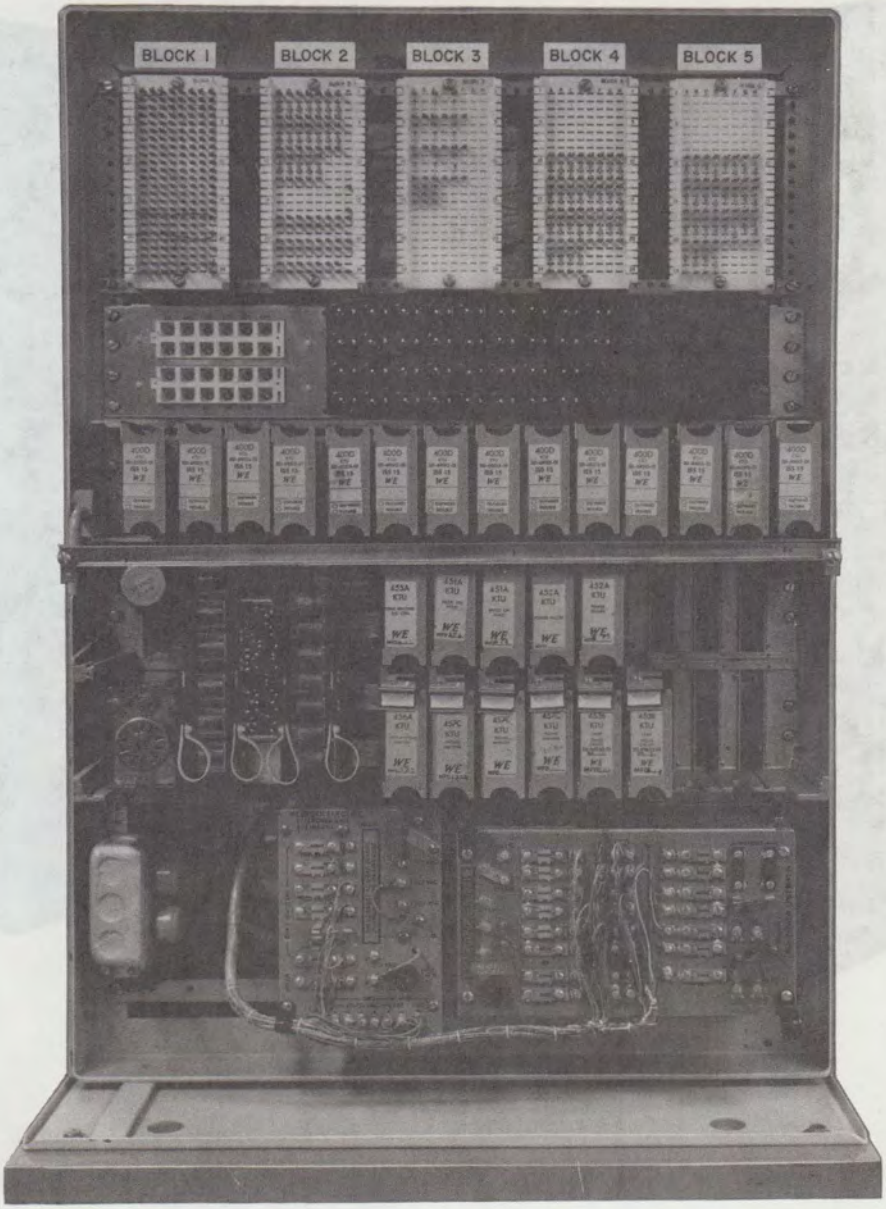


Fig. 1—580-Type KSU (Cover Removed)

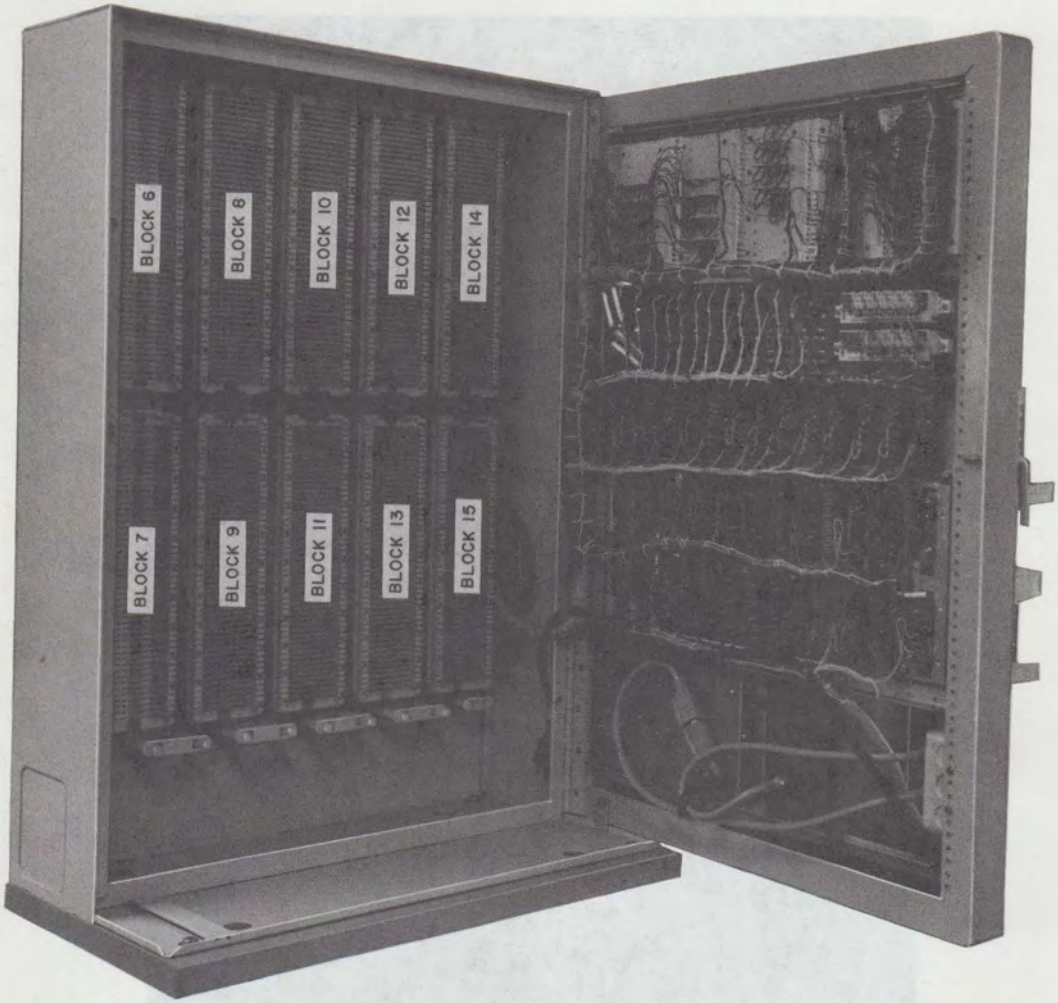


Fig. 2—580-Type KSU (Gate Open)

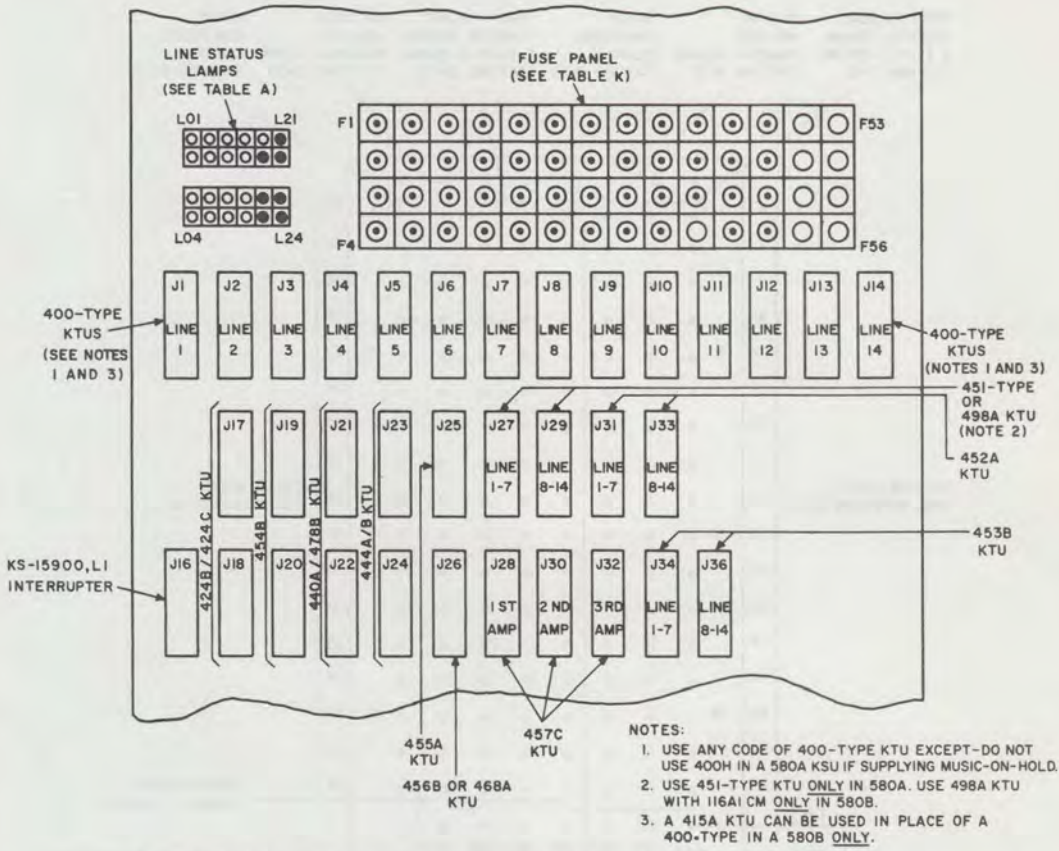


Fig. 3—580-Type KSU, Fuse Panel, Lamp Panel, and KTU Connector Arrangement

- "A" battery and "A" ground have been added to jacks 1 through 14 to permit use of a 415A KTU (automatic, dc signaling, private line circuit) in place of a CO/PBX line circuit.

- The 424C, 444-type, 453B, 454B, 455B and 456B KTUs are not supplied with the 580B KSU and must be ordered separately.◀

2.09 All wiring connections are made on connecting blocks located in the KSU (Fig. 2). As all stations pick up all lines and each line appears on the same button at all telephone sets, all equipment connections are factory-wired to the connecting blocks.

All station connections are made on the station connection field blocks using standard color-code cutdown. Except for satellite wiring plans and multiple consoles, this eliminates the need for an external cross-connection field.

2.10 Fifteen 66-type connecting blocks are mounted in the KSU:

(a) Connecting block 1 (Fig. 4) provides the terminals on which option straps are placed for connecting power failure ringing, CO ringing, preset conference, and ring transfer.

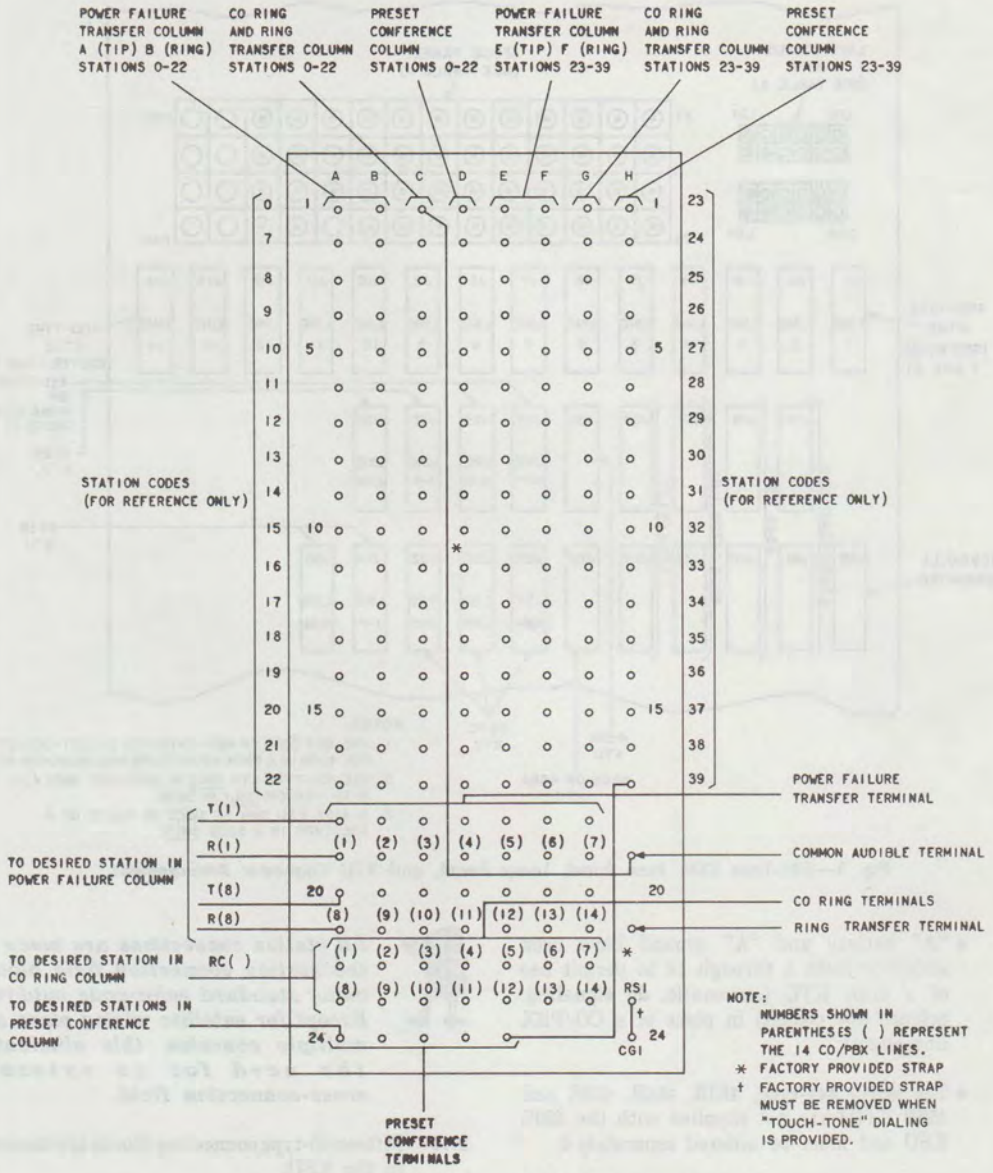


Fig. 4—Terminal Arrangement for Connecting Block 1

(b) Connecting block 2 (Fig. 5) contains the diode arrangement for intercom preset conference and common audible signaling. Terminals are provided for connecting paging speakers and/or 20A-49 apparatus units.

(c) Connecting block 3 (Fig. 6) contains the diode arrangement used with zone paging. Straps are placed on connecting block 3 to connect the zone to be paged to the desired code.

(d) Connecting blocks 4 and 5 (Fig. 7) contain the polarity guard diodes for the CO/PBX lines.

(e) Connecting blocks 6 and 7 (Fig. 8) provide terminals for connecting station code 0 (attendant station) and station code 7, the incoming CO/PBX lines, the optional 33A voice coupler, and the optional MW or DSS consoles.

(f) Blocks 8 through 15 provide the balance of the station terminations (Fig. 8).

2.11 The block and column on which a station is cut down determines the intercom code assigned to that station. Intercom codes available are 0, and 7 through 39.

2.12 The fuse panel in the 580-type KSU utilizes 70-type fuses which give a visual indication of fuse status. The 29- and 67-type power units are equipped with 24-type fuses which do not provide a fuse status indication (Table K).

2.13 The lamp panel in the 580-type KSU provides a status lamp for each CO/PBX line and intercom path. The lamps give the same indication of line status (flash, steady, wink) as the line lamps on the telephone sets. See Fig. 3 and Table A.

TABLE A

LINE STATUS LAMPS

DESIG	LAMP CODE	FUNCTION
L1	51A	1st CO/PBX Line Lamp
L2		2nd CO/PBX Line Lamp
L3		3rd CO/PBX Line Lamp
L4		4th CO/PBX Line Lamp
L5		5th CO/PBX Line Lamp
L6		6th CO/PBX Line Lamp
L7		7th CO/PBX Line Lamp
L8		8th CO/PBX Line Lamp
L9		9th CO/PBX Line Lamp
L10		10th CO/PBX Line Lamp
L11		11th CO/PBX Line Lamp
L12		12th CO/PBX Line Lamp
L13		13th CO/PBX Line Lamp
L14		14th CO/PBX Line Lamp
L15		1st Intercom Path Lamp
L16		2nd Intercom Path Lamp
L17		3rd Intercom Path Lamp
L18 Through L24		Spare

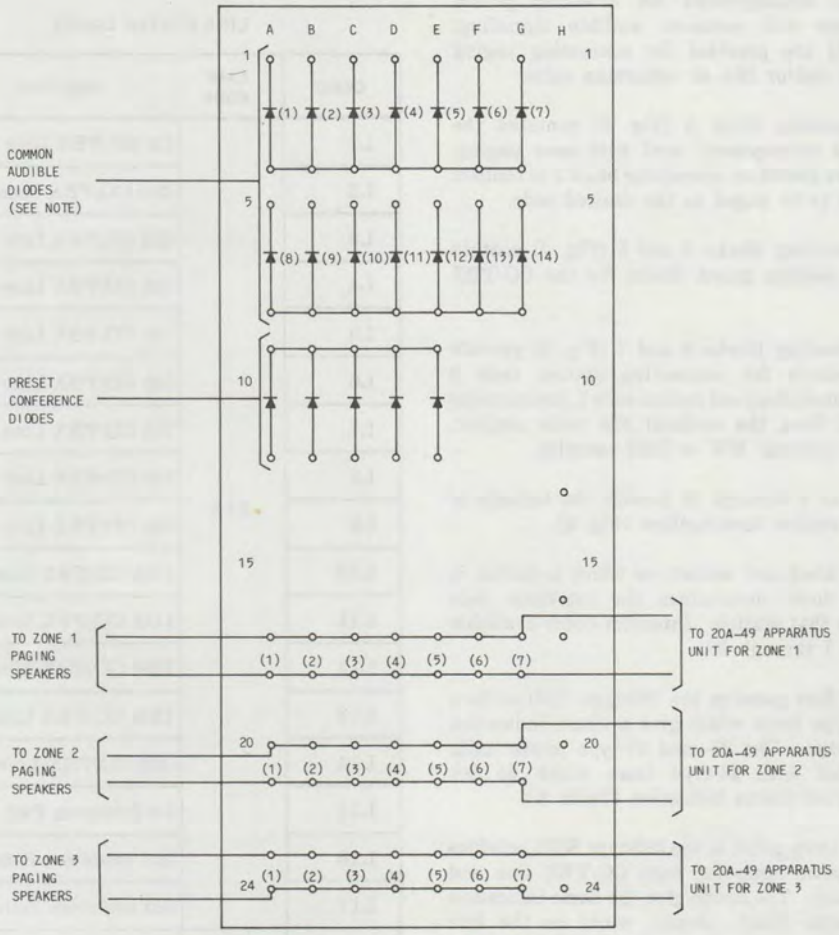
CONSOLES

A. 7A1 Selector Console (Station Busy Console With DSS)

2.14 The 7A1 selector console (Fig. 9) is a 40-button console providing a 33-button DSS field with station busy lamps. Of the seven remaining buttons, three are used as paging buttons, one is used as an intercom recall button, and three buttons are not used. Ivory (-50) is the standard console color, and a 7A2—* faceplate must be ordered with each console. ◗Current production consoles are equipped with an ivory mounting cord. Earlier production had a satin-silver cord.◖ The 7A1 selector console is normally used, in addition to the attendant's telephone set, to provide DSS on the intercom.

B. 7B1 Selector Console (Station Busy Console With MW)

2.15 The 7B1 selector console (Fig. 10) is a 40-button console providing a 33-button



NOTE:
ATTENDANT COMMON AUDIBLE IS PROVIDED BY THE 14 DIODES SHOWN. TO REMOVE A CO/PBX LINE FROM THE COMMON AUDIBLE GROUP, REMOVE THE DIODE ASSOCIATED WITH THAT LINE.

Fig. 5—Terminal Arrangement for Connecting Block 2

message waiting field. Seven buttons are not used. Ivory (-50) is the standard console band mounting cord color, and a 7A2—* faceplate must be ordered for each console. The 7B1 selector console is normally used, in addition to the attendant's telephone set, to provide the message waiting feature.

*Refer to Table B for color suffix.

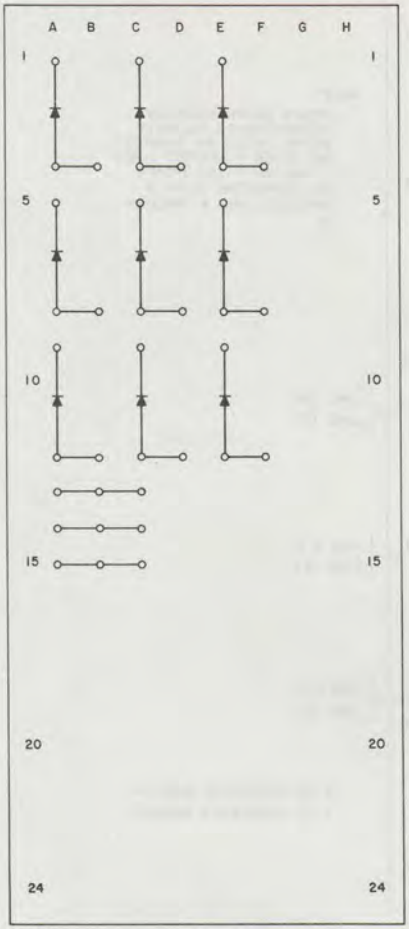


Fig. 6—Terminal Arrangement for Connecting Block 3

Note: Connections are provided for one DSS or one MW console in the 580-type KSU. Additional consoles may be supplied (maximum of 3), but external connections and auxiliary power are required.

EXTERNALLY MOUNTED APPARATUS

A. 33A Voice Coupler

2.16 The 33A voice coupler (Fig. 11) is an interconnecting unit which provides a point of connection for a customer-provided music source used with music-on-hold and/or background music. The unit is 1-13/16 inches deep by 2-3/4 inches high by 4-3/8 inches in length and is wall-mounted externally from the KSU. A potentiometer (with screwdriver adjustment slot) controls the level of the background music. The unit contains two fuses for protection against hazardous voltages from the customer-provided music source.

B. 20A-49 Apparatus Unit

2.17 The 20A-49 apparatus unit provides a point of connection or interface to a customer-owned and maintained (COAM) paging system. Also, the 20A-49 apparatus unit is used with a large high-power paging system provided by the telephone company. The unit is 1-13/16 inches deep by 2-3/4 inches high by 4-3/8 inches in length and is wall-mounted externally to the 580-type KSU. It presents a load to the 457C KTU equivalent to one loudspeaker and provides an output impedance to the COAM equipment of approximately 300 ohms. The output is transmitted to the COAM paging equipment through a transformer that is both electrostatically and electromagnetically shielded to minimize the possibility of introducing noise. A potentiometer (with screwdriver adjustment slot) is provided to adjust the signal level. Connections are made on five screw terminals. ◗A contact closure is not provided in the unit.◖

C. 22A-49 Apparatus Unit

2.18 The 22A-49 apparatus unit is an external signaling circuit that activates a signaling device which is external to the telephone sets. The 22A-49 apparatus unit provides a contact closure or opens a contact. The contact closure is used to operate KS-16301 type signaling devices (Section 463-110-100) or other external alerting devices. The contact open may be used to operate signaling devices that are activated by an open circuit. The unit is 1-13/16 inches deep by 2-3/4 inches high by 4-3/8 inches long and is wall-mounted

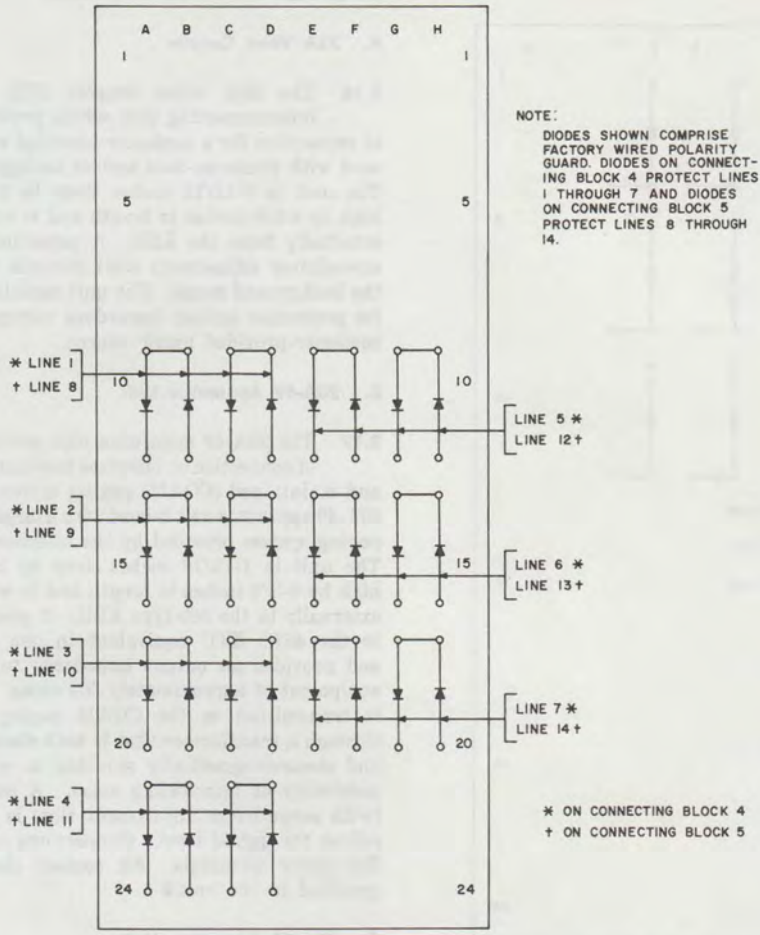


Fig. 7—Terminal Arrangement for Connecting Blocks 4 and 5

externally to the 580-type KSU. Connections are made on six screw terminals. The 22A-49 apparatus unit may be used to activate an external signaling device for:

- Common audible
- Station codes
- Station line ringing
- Ring transfer.

◗***Note:*** The 22A-49 apparatus unit provides a steady signal; interrupted ringing is not provided.◖

D. ◗KS-21880,L1◖ Loudspeaker

2.19 The KS-21880,L1 loudspeaker (Fig. 12) is an indoor loudspeaker used for paging. It is 11 inches high by 10 inches wide by 6-1/2 inches deep. It has a potentiometer (with screwdriver adjustment slot) for volume control. The KS-21880,L1 loudspeaker is furnished with a walnut (woodgrain)

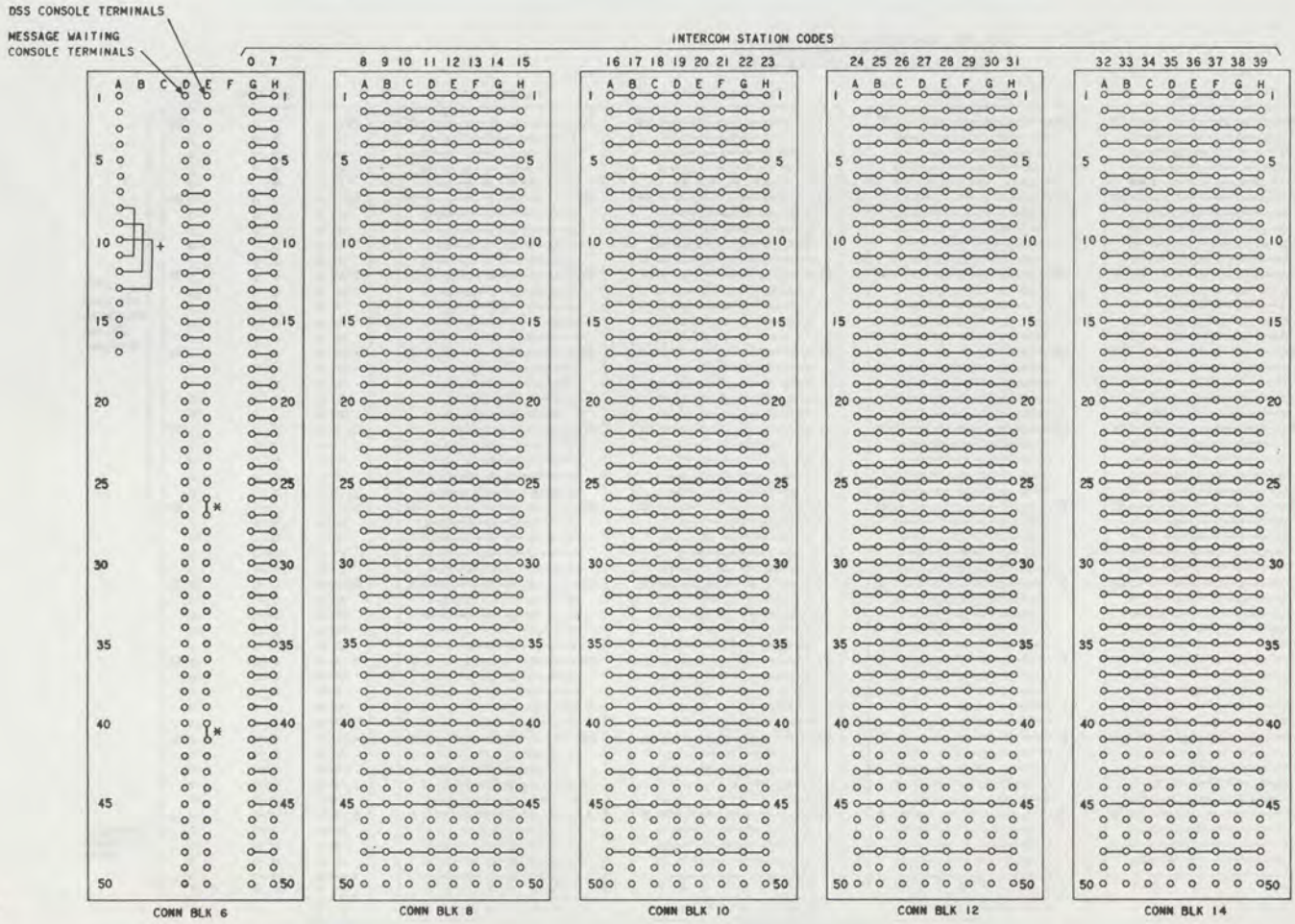


Fig. 8—Terminal Arrangement for Connecting Blocks 6 through 15 (Sheet 1 of 2)

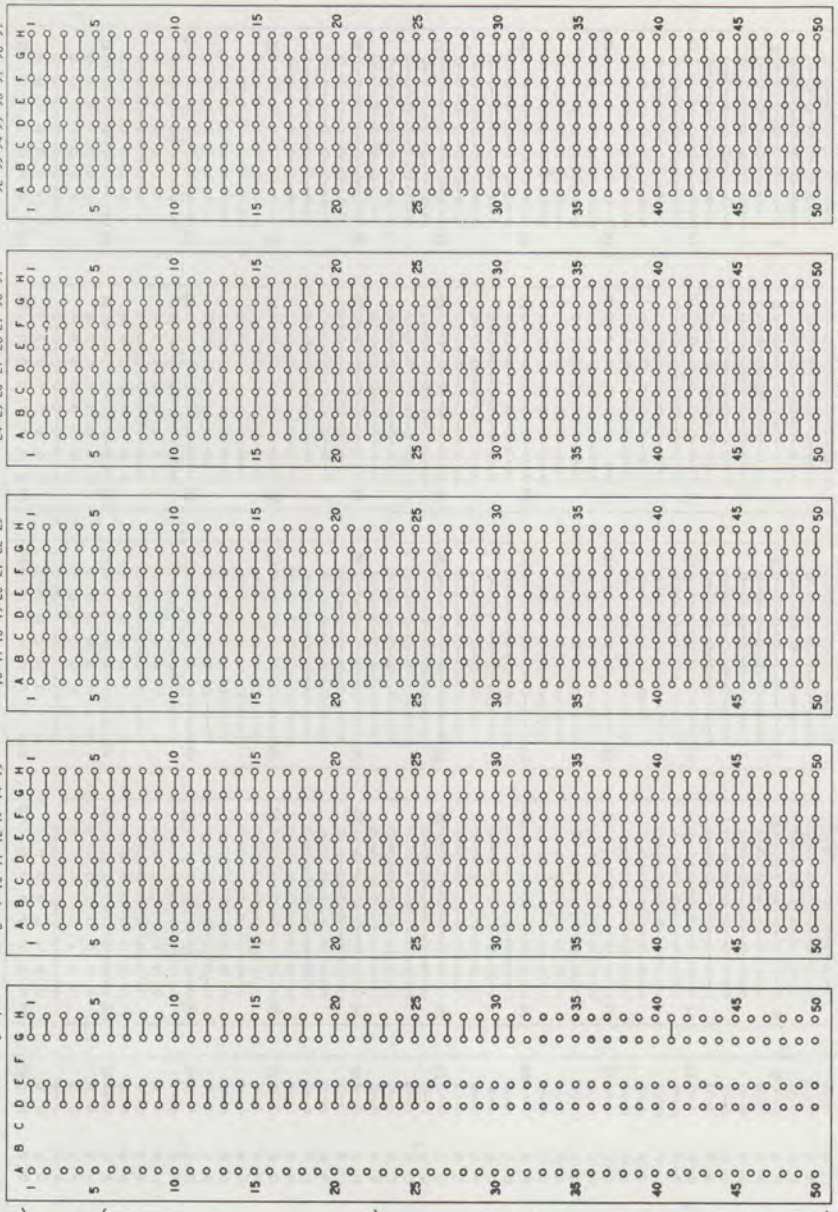


Fig. 8—Terminal Arrangement for Connecting Blocks 6 through 15 (Sheet 2 of 2)

Fig. 9—7A1 Selector Console (DSS)

finish only. ◗The K8 loudspeaker is directly interchangeable with the KS-21880,L1.◖

E. ◗KS-21939,L2 Loudspeaker◖

2.20 The KS-21939,L2 loudspeaker replaces the KS-16846,L2. It is a horn-type loudspeaker approximately 9-5/8 inches in diameter and is equipped with a screwdriver-adjusted volume control. The loudspeaker can be surface-mounted using the three holes in the swivel base; or, if desired, a List 3 can be ordered which is equipped with an adapter for mounting on a 1/2-inch pipe. The KS-21939,L2 is for use at all indoor or outdoor installations requiring a horn-type speaker, and it can be used as a direct replacement for the KS-16842,L2 at existing installations where a volume control is required.◖

KEY TELEPHONE UNITS

2.21 The circuitry for the 14A Communication System is provided by 400-series KTUs. Condensed functional schematics of the KTUs used in the 14A System are located at the end of this section.

A. 400-Type KTU (CO or PBX Line Circuit)

2.22 ◗The 400-type KTU is a 4-inch unit which provides the telephone set with CO or PBX line service. One 400-type line circuit is required for each line. If the units are being installed in a 580A KSU, any code of line circuit can be used, except a 400H cannot be used if music-on-hold is being supplied—the 400H is not compatible with the 451B KTU which must be used in the 580A. Any 400-type KTU, whether equipped with music-on-hold or not, may be installed in a 580B

Fig. 10—7B1 Selector Console (MW)

KSU. In a 580B, a 498A KTU equipped with a 116A1 circuit module (CM) must be used for music-on-hold. The 400-type KTUs occupy connectors J1 through J14 in the 580-type KSU. Additional information on the 400-type KTU may be found in Section 518-215-400 and CD/SD-69513-01 (400A, B, C, D), CD/SD-69651-01 (400G), or CD/SD-69942-01 (400H).◀

B. ▶415A KTU (Automatic, DC Signaling, Private Line Circuit)

2.23 The 415A KTU is a 4-inch, 18-contact KTU for connecting stations in the system to a private line terminated at a distant station. Another 415A KTU, or other private line KTU which will respond to a dc signal, is required at the distant end. The 415A can be installed in any of the CO/PBX jacks ***of the 580B only. Do not use a 415A in the 580B KSU if music-on-hold is furnished.*** The 580A does not have "A" battery and ground wired to these jacks and, therefore, will not accept the circuit. Additional information on the 415A KTU can be found in Section 518-215-400 and CD/SD-69559-01.◀

C. 424-Type KTU (Dial Intercom, 19-Code Selector Circuit)

2.24 The 424-type KTU is an 8-inch dial selective intercom unit. (Additional information on the 424B/424C KTU may be found in CD- and SD-69567-01.) One 424-type KTU is required in this system and occupies connectors J17 and J18

TABLE B

COLOR ORDERING GUIDE

SPEAKERPHONE* LOUDSPEAKER, AND TRANSMITTER		TELEPHONE SETS, SELECTOR CONSOLES, HANDSETS, HOUSINGS, HANDSET CORDS		FACEPLATES	
SUFFIX	COLOR	SUFFIX	COLOR	SUFFIX	COLOR
— 3	Black			—100	Avocado
				—108	Teak
				—109	Walnut
				—111	Gold
—50	Ivory	—50	Ivory	—112	Orange
				—113	Brown
				—114	Red
				—115	Blue
				—118	Black
—51	Green				
—53	Red				
—56	Yellow				
—58	White				
—60	Light Beige				
—62	Aqua Blue				

* The 4A speakerphone is not available in Ivory (—50). A D-180508 kit of parts is required to change the speakerphone to Ivory. Refer to Section 512-700-100 for kits of parts for other colors.

in the 580-type KSU. In the 14A Communication System, the 424-type KTU provides:

- Rotary dial selection
- 19 dial codes (nine single-digit and ten 2-digit codes).

Note: In the 14A Communication System, the first digits of the 2-digit codes are 1, 2, and 3; therefore, 1, 2, and 3 are not available as single-digit codes. Codes 4, 5, and 6 are dedicated to paging which leaves codes 0 (attendant station) and 7 through 39 available for station codes.

The 424C KTU provides circuit improvements over the 424B, such as greater tolerance to TOUCH-TONE dialing and elimination of speaker

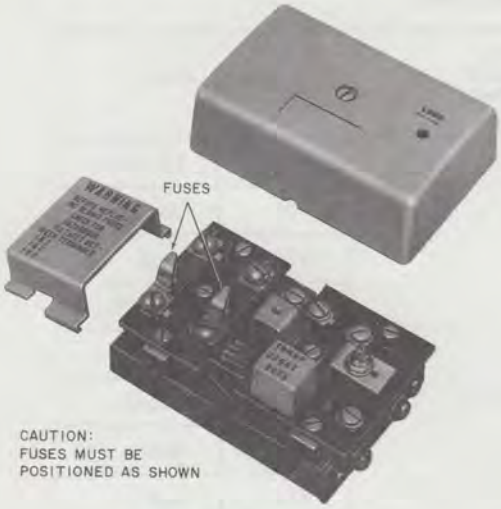


Fig. 11—33A Voice Coupler

clicks. The 424B KTU can only be used in COM KEY 14 installations when these troubles are not encountered. In addition, the 424C must be used if a 478B KTU is used as the TOUCH-TONE adapter. The 424A KTU is not to be used in COM KEY 14.

D. 440A or 478B KTU (TOUCH-TONE Adapter Circuit)

2.25 The 440A and 478B are 8-inch units that provide TOUCH-TONE dialing on intercom when used with the 424-type KTU. Additional information on the 440A KTU may be found in CD- and SD-69906-01 and on the 478B KTU in CD- and SD-69931-01. The 440A and 478B are electrically interchangeable, provided the 580A KSU has A GRD on pin 3 and B GRD on pin 15 of connectors J21 and J22. All 580-type KSUs with a serial number of 6184 or higher will have this option factory-wired. ▶For 580A KSUs with a lower serial number, a D-180720 kit of parts is supplied with the 478B KTU which permits application of the proper grounds. An instruction sheet (Fig. 13) is supplied with the kit of parts.◀ One TOUCH-TONE adapter is required in this system and occupies connectors J21 and J22 in the KSU.

E. 444-Type KTU (Selector Extender Circuit)

2.26 The 444A KTU is an 8-inch, 80-contact unit which expands the 19 codes of the 424C KTU (19-code selector circuit) to a total of 37 codes. ▶The 444B KTU is the same as the 444A except two option plugs have been added which have application only in the 21A Communication System. In the 14A System, the 444B should be used as supplied from the factory, that is, with the option plugs in positions 2-3 and 5-6.◀ When using the 444-type KTU, two more transfer digits are factory assigned and these digits may not be used as station codes. Digits 2 and 3 are used as the second and third transfer digits. (Additional information on the 444-type KTU may be found in CD- and SD-69653-01.) One 444-type KTU is required in this system and occupies connectors J23 and J24 in the 580-type KSU.

F. ▶451A, 451B, or 498A KTU (Music-On-Hold Circuit)

2.27 The music-on-hold circuit is a 4-inch unit that is used with an externally mounted 33A voice coupler to connect a customer-provided music source to lines that are placed on hold. If a 580A KSU is used, a 451-type KTU must be used. Do not use a 400H as a line circuit with a 451-type KTU. The 451-type KTU contains seven circuits requiring two per system installed in J27 and J29 of the 580A KSU. (Additional information on the 451-type KTU may be found in CD/SD-69922-01.)

2.28 If a 580B KSU is used, the music-on-hold circuit must be a 498A KTU equipped with a 116A1 CM and the line circuit any 400-type KTU. The 451-type KTU is not electrically compatible in a 580B KTU. The 498A KTU alone contains four circuits; an additional three circuits can be added by connecting a 116A1 CM to the KTU. When used with the 14A System, the 498A KTU should always be equipped with a 116A1 CM. The 498A KTUs equipped with circuit modules are installed in J27 and J29 of the 580B KSU. (Further information on the 498A KTU and 116A1 CM may be found in CD/SD-69922-01.)◀

G. 452A KTU (Power Failure Ringing Circuit)

2.29 The 452A KTU is a 4-inch unit that automatically "cuts through" up to seven CO/PBX lines to external line ringers in the event of a power failure. (Additional information on the 452A KTU

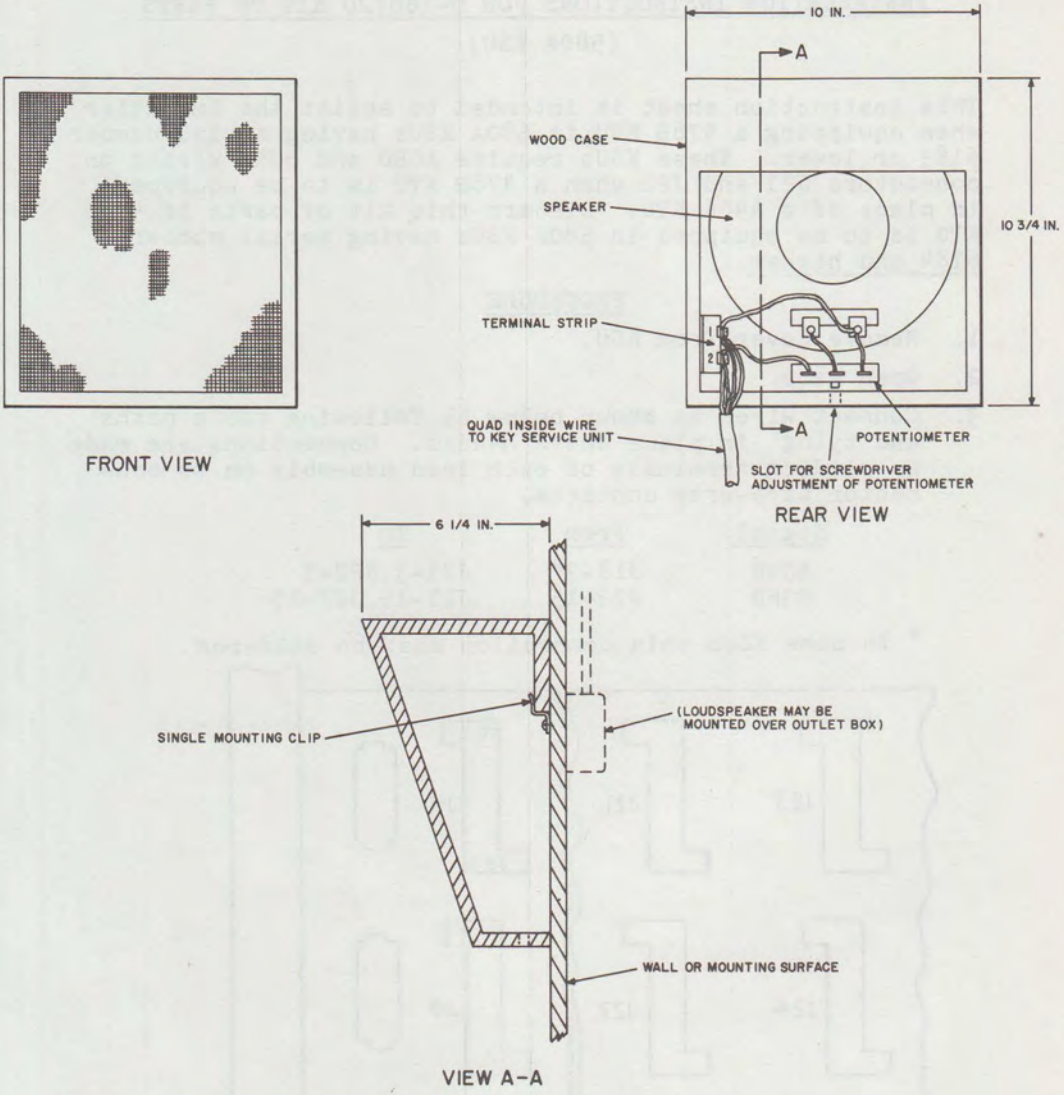


Fig. 12—KS-21880,L1 Loudspeaker, Connections and Mounting

INSTALLATION INSTRUCTIONS FOR D-180720 KIT OF PARTS
(580A KSU)

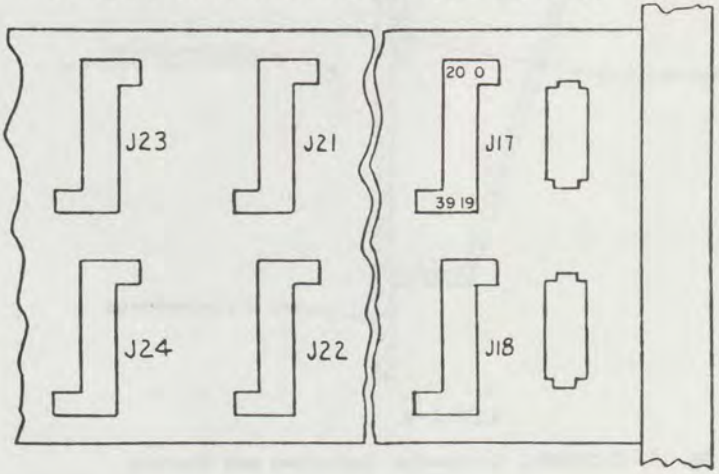
This instruction sheet is intended to assist the installer when equipping a 478B KTU in 580A KSUs having serial number 6183 or lower. These KSUs require AGRD and BGRD wiring on connectors J21 and J22 when a 478B KTU is to be equipped in place of a 440A KTU. Discard this kit of parts if 478B KTU is to be equipped in 580A KSUs having serial number 6184 and higher.

PROCEDURE

1. Remove cover from KSU.
2. Open gate.
3. Connect wires as shown below by following cable paths and tying in place where needed. Connections are made by sliding terminals of each lead assembly on to connector wire-wrap contacts.

Signal	From	To
AGRD	J18-3*	J21-3,J22-3
BGRD	J23-15	J21-15,J22-15

* In some KSUs this connection must be soldered.



4. Plug 478B KTU in connectors J21 & J22.
5. Reassemble cover on to KSU.

Fig. 13—Facsimile of Instruction Sheet for D-180720 Kit of Parts

may be found in CD- and SD-69652-01.) Two 452A KTUs are required in this system (one for each seven CO/PBX lines used) and occupy connectors J31 and J33 in the 580-type KSU.

H. 453B KTU (Lamp Driver Circuit)

2.30 The 453B KTU is a 4-inch unit that provides additional lamp current necessary to power the system lamps. Each KTU can serve up to seven CO/PBX lines. In the 14A System, the 400-type line circuits supply the lamp current for the line status lamps and the first ten stations. The lamps for the remaining 24 stations are driven from the two 453B KTUs which occupy connectors J34 and J36. (Additional information on the 453B KTU may be found in CD- and SD-69653-01.)

I. 454B KTU (3-Path Intercom Access Circuit)

2.31 The 454B KTU is an 8-inch unit that contains three separate intercom paths. Path selection is based on operation of an associated intercom button on the key telephone sets. The 454B KTU also provides dial tone, seizes the code selector (424C KTU), and provides flashing lamp signal during selection and steady lamp during busy mode. The unit occupies connectors J19 and J20 in the 580-type KSU. (Additional information on the 454B KTU may be found in CD- and SD-69930-01.)

J. 455A KTU (Tone Ringing Signal Generator Circuit)

2.32 The 455A KTU is a 4-inch unit containing the tone ringing generator that provides tone ringing on incoming CO/PBX calls. The 455A KTU occupies connector J25 in the 580-type KSU. (Additional information on the 455A KTU may be found in CD- and SD-69652-01.)

K. 456B KTU (Voice and Tone Alerting Circuit)

2.33 The 456B KTU is a 4-inch unit that provides the following features on intercom calls:

- Ringback tone to calling party
- Tone alerting signal to called party
- Voice signaling to called party
- Input signal to paging amplifier.

2.34 The 456B KTU occupies connector J26 in the 580-type KSU. (Additional information on the 456B KTU may be found in CD- and SD-69652-01.)

> ***Note:*** The 456A KTU is rated MD but can be used in installations where paging feedback or radio frequency interference (RFI) is not encountered. Paging feedback can also be an installation problem and changing to the 456B will only help in marginal cases.

L. 457C KTU (Paging Amplifier Circuit)

2.35 The 457C KTU is a 4-inch unit that contains the paging amplifier circuitry for paging and for customer-provided background music. The customer-provided music source can be connected to the paging speakers while the paging circuit is not in use. Three 457C KTUs can be used in the 14A System and seven loudspeakers can be connected to each unit. For paging, each 457C KTU may be accessed by a separate intercom code (for zone paging) or one intercom code may activate a combination of units. The 457C KTUs occupy connectors J28, J30, and J32 in the 580-type KSU. (Additional information on the 457C KTU may be found in CD- and SD-69652-01.)

KITS OF PARTS

A. D-180486 Kit of Parts (Privacy Circuit)

2.36 A D-180486 kit of parts provides the privacy or lockout feature in a telephone set. A station equipped with a privacy circuit is prevented from picking up a busy CO/PBX line. The privacy circuit does not provide privacy on the intercom lines. The D-180486 kit of parts can be added to all 833/2833-type telephone sets with the exception of the 833B/2833B(MD) and 833BM/2833BM, 833DM/2833DM telephone sets which are manufactured with an operational privacy circuit.

B. D-180656 Kit of Parts (Shelf for Wall Mounting Telephone Sets)

2.37 The D-180656 kit of parts (Fig. 21) provides a method for wall mounting COM KEY telephone sets. The kit consists of a shelf assembly (ivory colored) and a retaining clamp. The shelf will incline the telephone set 15 degrees from the horizontal to facilitate its use.

C. ◗D-180759 Kit of Parts (for Adding 215C1 Power Unit to 580-Type KSU)

2.38 The D-180759 kit of parts provides for mounting a 215C1 power unit (required for multiple consoles) in 580A KSUs having a serial number lower than 14425. The kit consists of a new electrical outlet box, mounting bracket, and necessary hardware. The existing electrical box must be replaced with the box supplied with the kit. The 215C1 power unit is then mounted on the bracket which is part of the box.

D. D-180720 Kit of Parts (for Adding 478B KTU to Earlier Model KSUs)

2.39 The D-180720 kit of parts is supplied with the 478B KTU and is required only when adding the KTU to 580A KSUs having a serial number below 6184. The kit consists of two wire assemblies equipped with terminals which are used to supply A GRD and B GRD to J21 and J22 of the KSU. Instructions (Fig. 13) are supplied with the kit of parts.◖

TELEPHONE SETS

A. Full Service Telephone Sets

2.40 The 833- and 2833-type telephone sets are 20-button key telephone sets designed for use with the 14A Communication System. The sets are equipped with a loudspeaker for tone and voice signaling. A volume control is provided to control the level of the signal. Conferencing of two or more CO/PBX lines is accomplished by simultaneously depressing the buttons associated with the lines to be conferenced. ***Transmission cannot be guaranteed using this type of conferencing.*** CO/PBX lines cannot be conferenced with intercom lines. Automatic button restoration (ABR) restores all depressed buttons when the handset is replaced. The lamp under the HOLD button can be provided for use as a message waiting indicator.

> ***Caution: If multiple buttons are depressed at an idle station, the system may be disabled.***

2.41 Telephone sets for the 14A Communication System are available in ivory (-50) only and are shipped from the factory with throw-away, protective faceplates. For each set, it is necessary to order a colored faceplate from the complement of nine vinyl-clad metal decorator faceplates that are available (see Table B). ◗Current production sets are equipped with an ivory (-50) mounting cord. Earlier production had a satin-silver (-87) cord.◖

833A (MD) Telephone Set

2.42 The 833A (MD) telephone set is a rotary dial desk-type key set. The set has 14 CO/PBX line buttons, 3 intercom line buttons, a HOLD button, a RECALL button, and a PRIV RLS (privacy release) button. The PRIV RLS button is ***not*** factory-connected and must be connected in the field when privacy release is to be provided. A privacy circuit (D-180486 kit of parts) can be installed in the set when privacy is required.

833B (MD) Telephone Set

2.43 The 883B (MD) telephone set is a rotary dial desk-type key set. The set has 14 CO/PBX line buttons, 3 intercom line buttons, a HOLD button, RECALL, a PRIV RLS button, and a privacy circuit. All buttons and the privacy circuit are factory-connected.

833BM Telephone Set

2.44 The 833BM telephone set is the same as the 833B (MD) telephone set except modular handset components are added.

833C (MD) Telephone Set

2.45 The 833C (MD) telephone set is a rotary dial desk-type key set. The set has 14 CO/PBX line buttons, 3 intercom line buttons, a HOLD button, a RECALL button, and a RING TR (ring transfer) button. The RING TR button is not factory-connected and must be connected in the field when the set is used to provide ring transfer. A privacy circuit (D-180486 kit of parts) can be installed in the set when privacy is required.

> ***Note:*** In early production 833C telephone sets, the RING TR button was factory-connected.

833CM Telephone Set

2.46 The 833CM telephone set is the same as the 833C (MD) telephone set except modular handset components are added.

833DM Telephone Set

2.47 The 833DM telephone set is the same as the 833BM except it is designed for wall mounting.

833EM Telephone Set

2.48 The 833EM telephone set is the same as the 833CM except it is designed for wall mounting.

2833A (MD) Telephone Set

2.49 The 2833A (MD) telephone set is the same as the 833A (MD) telephone set except it is equipped with a TOUCH-TONE dial.

2833B (MD) Telephone Set

2.50 The 2833B (MD) telephone set is the same as the 833B (MD) telephone set except it is equipped with a TOUCH-TONE dial.

2833BM Telephone Set

2.51 The 2833BM telephone is the same as the 833B (MD) telephone set except it is equipped with a TOUCH-TONE dial and modular handset components have been added.

2833C (MD) Telephone Set

2.52 The 2833C (MD) telephone set is the same as the 833C (MD) telephone set except it is equipped with a TOUCH-TONE dial.

2833CM Telephone Set

2.53 The 2833CM telephone set is the same as the 833C (MD) telephone set except it is equipped with a TOUCH-TONE dial and modular handset components have been added.

Note: Early production 833C (MD) and 2833C (MD) telephone sets had the RING TR (ring transfer) button connected at the factory.

2.54 The 2833DM telephone set is the same as the 2833BM except it is designed for wall mounting.

2833EM Telephone Set

2.55 The 2833EM telephone set is the same as the 2833CM except it is designed for wall mounting.

B. Intercom-Only Telephone Sets

575AM-50 Telephone Set

2.56 The 575AM-50 telephone set is a rotary dial, 6-button key set ***arranged for intercom service only.*** The set is equipped with a loudspeaker for tone and voice signaling. A volume control is provided to control the level of the signal. The first button (hold button position) is a red nonfunctional button (blocked nonoperative) which may be illuminated for use as a message waiting indicator. The second, third, and fourth buttons are illuminated intercom pickup buttons. The fifth and sixth are not illuminated and are blocked nonoperative.

2.57 As shipped from the factory, only two intercom buttons (buttons two and three) are wired operational. When the 575AM-50 telephone set is used with the 14A System, it is necessary to connect mounting cord leads black-green and green-black to terminals 3T and 3H (of the terminal strip) and the black-brown lead to terminal L3 (of the lamp socket) in order to activate the third intercom button.

2.58 The intercom pickup buttons on the 575AM-50 telephone set do not automatically restore to the nonoperated position when the handset is placed on-hook.

2575AM-50 Telephone Set

2.59 The 2575AM-50 telephone set is the same as the 575AM-50 telephone set except it is equipped with a TOUCH-TONE dial.

3. INSTALLATION

PLANNING

3.01 Survey the area to be served by the 14A Communication System. Select a location for the 580-type KSU that:

- Provides a safe working location

- Provides floor space away from foot traffic and is protected from vehicular traffic
- Has customer approval and is in his best interest
- Has adequate light and is always accessible
- Is protected from water damage or blows incidental to cleaning
- Is central to station locations to permit shortest cable runs
- Is clean, dry, well-ventilated, and free from corrosive fumes
- Is not subject to extreme temperatures
- Is near a commercial ac power receptacle not under the control of a switch.

The floor should be level and not subject to heavy vibrations.

3.02 Arrangements should be made for the customer to provide a commercial ac power receptacle in accordance with the following:

- Not under control of a switch.
- Separately fused.
- Receptacle should be grounded 3-wire type.

3.03 Select appropriate apparatus according to job requirements.

Caution: The paging features of the 14A System can be inadequate for paging in noisy locations. A preinstallation survey should be made of noisy areas where paging is to be provided (see Section 981-251-100). The results of the survey may indicate:

- ***Additional loudspeakers, located closer together, will be required.***
- ***An auxiliary paging system (telephone company or customer-provided) will be required.***

An auxiliary paging system requires the use of a 20A-49 apparatus unit.

ORDERING GUIDE

3.04 ***Apparatus for Basic Service:***

- Cable, Connector, A50B (order one for each 833- or 2833-type telephone set; length must be specified)
- Plate, Face, 833A—* (order one for each 833-type telephone set)
- Plate, Face, 2833A—* (order one for each 2833-type telephone set)
- Set, Telephone, 833BM-50 or 833DM-50 (has privacy release button; order as required for full service rotary dial stations)—faceplate must be ordered separately
- Set, Telephone, 833CM-50 or 833EM-50 (has ring transfer button; order as required for rotary dial station)—faceplate must be ordered separately
- Set, Telephone, 2833BM-50 or 2833DM-50 (has privacy release button; order as required for TOUCH-TONE dial stations)—faceplate must be ordered separately
- Set, Telephone, 2833CM-50 or 2833EM-50 (has ring transfer button; order as required for TOUCH-TONE dial station)—faceplate must be ordered separately
- ▶Unit, Service Key, 580B (424C, 444-type, 453B, 454B, 455A, and 456B KTUs are ***not*** included and must be ordered separately)
- Unit, Telephone Key, 400H (order one for each CO line as required in 580B KSU) (not compatible in 580A KSU with music-on-hold)
- Unit, Telephone Key, 400D or 400G (order one for each CO/PBX line as required in a 580-type KSU)◀
- Cord, Power (order required length)

  824013288 (P-40J328)—4 foot
  824013296 (P-40J329)—6 foot
  824010995 (P-40J099)—12 foot

*Refer to Table B for color suffix.

3.05 ***Optional Apparatus (order as required):***

- Cable, Connector, A25B (order one for each 575AM-50 or 2575AM-50 telephone set; length must be specified)
- Cable, Connector, A50B (order one for each selector console; length must be specified)
- Console, Selector, 7A1-50 (Station Busy Console with DSS)—order faceplate separately
- Console, Selector, 7B1-50 (Station Busy Console with MW)—order faceplate separately
- Coupler, Voice, 33A (order when music-on-hold or background music is provided)
- Diode, 446F, or equivalent (order one for each rotary dial station to be restricted)
- Key, 6041G-50 (order one when flexible station ring transfer is provided)
- Kit of Parts, D-180486 [Privacy Circuit—order one for each 833A/2833A(MD), 833C/2833C(MD), 833CM/2833CM, 833EM/2833EM telephone set to be equipped with privacy]
- Kit of Parts, D-180656 (Shelf Assembly—order one for each 833 and 2833 desk-type telephone set to be wall-mounted)
- ⧫Kit of Parts, D-180759 (order one for each 580A KSU with serial number less than 14425 where 215C1 power unit is required for multiple consoles)⧫
- Plate, Face, 7A2—* (order one for selector console)
- Ringer, E1C (order one for each CO/PBX line to be wired for power failure ringing)
- Loudspeaker, ⧫KS-21939,L2 (outdoor or indoor loudspeaker—order as required for paging locations requiring a surface-mounted horn-type loudspeaker)⧫
- ⧫Loudspeaker, KS-21939,L3—same as List 2 but arranged for mounting on 1/2-inch pipe⧫
- Loudspeaker, ⧫KS-21880,L1⧫ (indoor loudspeaker—order as required for indoor paging locations)
- Set, Telephone, 575AM-50 (order as required for intercom-only rotary dial stations)
- Set, Telephone, 2575AM-50 (order as required for intercom-only TOUCH-TONE stations)
- Speakerphone, 3B—order one of each of the following for each station to be equipped with speakerphone:

  Cord, D10R—* (specify length: 1 foot 4 inches, 9, 12, or 25 foot)

  Loudspeaker, 760A—*

  Transformer, 2012B

  Transmitter, 666B—*

  Unit, Control, 55B
- Speakerphone, 4A—order one for each station to be equipped:

  Adapter, 223-A-49 (includes M16C and M2FG cords)

  Loudspeaker, 108A—*

  Transmitter, 680A—*

  Kit of Parts, D-180508

  Unit, Power, 85B1-49
- Unit, Apparatus, 20A-49 (order when 14A System is connected to a customer's paging system or to a separate paging system provided by the telephone company)
- Unit, Apparatus, 22A-49 (order when signaling devices, external to telephone sets, are required)—signaling devices, bells, buzzers, horns, gongs, etc, and an external power supply must be ordered separately

*Refer to Table B for color suffix.

- Unit, Power, 215C1 (auxiliary power supply for multiple consoles)
- ◆Unit, Telephone Key, 415A (Automatic, DC Signaling, Private Line Circuit; order as required)◆
- Unit, Telephone Key, 440A (TOUCH-TONE Adapter Circuit) (order one for 14A System when TOUCH-TONE dialing is provided)
- Unit, Telephone Key, 451A or 451B (Music-On-Hold Circuit) (one unit for seven CO/PBX lines; order as required)
- Unit, Telephone Key, 452A (Power Failure Ringing Circuit) (one unit for seven CO/PBX lines; order as required)
- Unit, Telephone Key, 457C (Paging Amplifier Circuit) (one unit for each paging zone of up to seven loudspeakers; order as required)
- Unit, Telephone Key, 478B (TOUCH-TONE Adapter Circuit) (order one for 14A System when TOUCH-TONE dialing is provided)
- ◆Unit, Telephone Key, 498A (when equipped with a 116A1 CM, supplies music-on-hold for seven lines in a 580B KSU).
- Module, Circuit, 116A1 (order one for each 498A KTU)◆

3.06 ***Replaceable Components:***

(a) ***580-Type KSU —***

- Fuse, 24B (3A)
- Fuse, 24C (2A)
- Fuse, 24F (5A)
- Fuse, 70A (1-1/3 amperes)
- Fuse, 70G (1/2 ampere)
- Fuse, 70H (3/4 ampere)
- Fuse, Bussman MDL-2 (2 amperes)
- Fuse, Bussman MDX-5 (5 amperes)
- Interrupter, KS-15900, L1
- Lamp, 51A
- Unit, Telephone Key, 424B or C (19-Code Selector Circuit)
- Unit, Telephone Key, 444A (Selector Extender Circuit)
- Unit, Telephone Key, 453B (Lamp Driver Circuit)
- Unit, Telephone Key, 454B (3-Path Intercom Access Circuit)
- Unit, Telephone Key, 455A (Tone Ringing Signal Generator Circuit)
- Unit, Telephone Key, 456B (Voice and Tone Alerting Circuit)
- Unit, Power, 29C1
- Unit, Power, 67C1.

(b) ***7A1 and 7B1 Selector Consoles —***

- Base, 7A1 (for 7A1 selector console)
- Base, 7B1 (for 7B1 selector console)
- Cord, Mounting, D100J-50
- Housing, 6A1-50
- Key, 647AG5 or 647J5 (bottom key in 7A1)
- Key, 647J5C (top three keys in 7A1)
- Key, 647AF5 or 647C5 (all four keys in 7B1)
- Lamp, 51A
- Plate, Face, 7A2— (see Table B for color).

(c) ***33A Voice Coupler —***

- Fuse, 35P (3/4 ampere).

(d) ***575AM and 2575AM Telephone Sets —***

- Cord, D20P-87 (mounting cord)
- Cord, H4DU-50 (handset cord)

- Dial, 9CA (rotary dial)
- Dial, 35Y3A (TOUCH-TONE dial)
- Key, 636A
- Lamp, 51A
- Set, Hand, G15A-50.

(e) ***832- and 2832-Type Telephone Sets —***

- Refer to Section 503-701-110.

(f) ***833- and 2833-Type Telephone Sets —***

- Refer to Section 503-702-110.

INSTALLING

3.07 Use care when transporting and unpacking apparatus so as to prevent damage to components.

A. 580-Type KSU

Warning: The 580-type KSU weighs approximately 230 pounds excluding the plug-in units and requires extreme care in unpacking and handling to avoid personal injury or damage to the apparatus.

3.08 The lift-off cover should be removed and the hinged gate securely latched (closed) prior to moving or lifting the apparatus cabinet. ***Accidental opening of the gate could result in personal injury and/or damage to the apparatus.***

3.09 To install the 580-type KSU:

(1) Place cabinet in selected location and level.

(2) Remove lift-off cover.

(3) ***Secure cabinet to floor*** using appropriate fasteners.

(4) Unlatch gate and open it slowly while observing that the cabinet is securely attached to floor and does not move or tilt.

(5) Close gate slowly while observing that wiring forms and cords do not pinch or bind.

(6) Connect a 14-gauge ground wire from the LOC GRD terminal of the power units to an acceptable local ground as a circuit ground. If a 3-wire grounded receptacle is not available, ***a frame ground*** (No. 14 gauge wire) ***must*** be connected from the case of the power units to an acceptable local ground.

Caution: Do not strap the circuit ground to the frame or case of the power units. The susceptibility of surge damage to semiconductor components used in 400-series KTUs requires that grounding procedures be followed. Properly grounded installations will minimize service failures that can result from surge voltages or differences between dissimilar grounds.

(7) Terminate CO/PBX or private lines on connecting block 7, column A, terminals 23 through 50. See Fig. 14.

(8) Terminate station cables. Cut down the A50B connector cables on connecting blocks 6 and 7, 8 and 9, 10 and 11, 12 and 13, or 14 and 15 as shown in Fig. 15. The intercom code assigned to each column is shown at the top of the blocks in Fig. 15. ***A direct cable run to any station may not exceed 667 feet of 24-gauge cable.***

(9) Place or remove option straps (if required) and connect optional apparatus (such as selector consoles, loudspeakers, etc).

(10) Install power cord. ***Do not connect to ac source at this time.***

(11) Close and latch gate.

(12) Dress and attach all connector cables and inside wires, connected to the KSU, in a neat manner. Clean up and properly dispose of all scrap wire.

(13) Install KTUs necessary to provide required services. See Fig. 3 for KTU connector arrangement.

Fig. 14—Connections for Incoming CO/PBX Lines

B. Satellite Wiring Plan

3.10 The 14A System is designed for "home run" (direct) cabling from each telephone set to the KSU. Where it is more practical to serve a group of stations from a secondary location, a "satellite" wiring plan can be used. The satellite wiring plan is a connecting block arrangement for station terminations served by connecting cables from the KSU. ***No more than 17 stations can be served from a satellite location.***

3.11 Cabling is required between the KSU and the satellite location to provide the following leads:

- Those leads common to all stations, such as T, R, and A of the CO/PBX lines, T and R of the intercoms, etc. Only one appearance of these leads is required at the satellite.
- Six leads for ***each*** station code working from the satellite location. These are the VS, CO, SB, ±10V, ET, and ER leads.
- Additional leads required to cover Al, lamp, and lamp ground restrictions. These restrictions limit the voltage drop in the lamp loop to less than 2 volts and require a low resistance A to Al lead.

3.12 Two methods are covered for providing the proper amounts of terminations and leads at a satellite location. One method employs prewired 14A1-type terminal blocks. The second uses standard 66-type connecting blocks and a nomograph which help to determine the number of extra lamp and lamp ground leads required. Both methods take into consideration that the lamp leads are distributed in the KSU as follows:

(a) Lamp leads for the line status lamp in the KSU and station codes 0 and 7 through 15 are wired directly from the 400-type KTU.

(b) Lamp leads for codes 16 through 39 are wired from the 453B (lamp driver) KTU.

A station code grouping arrangement should be used where possible when satelliting. A satellite consisting of stations in the 0 and 7 through 15 (group A) or of stations 16 through 39 (group B) is the best arrangement. If stations from both groups must be intermixed in a satellite location, the lamp and lamp ground leads must be independently considered, whether using the 14A1-type terminal blocks or the standard blocks and the nomograph.

3.13 All satellite wiring arrangements should limit the total distance from the KSU to the satellite ***plus*** from the satellite to the station to 667 feet.

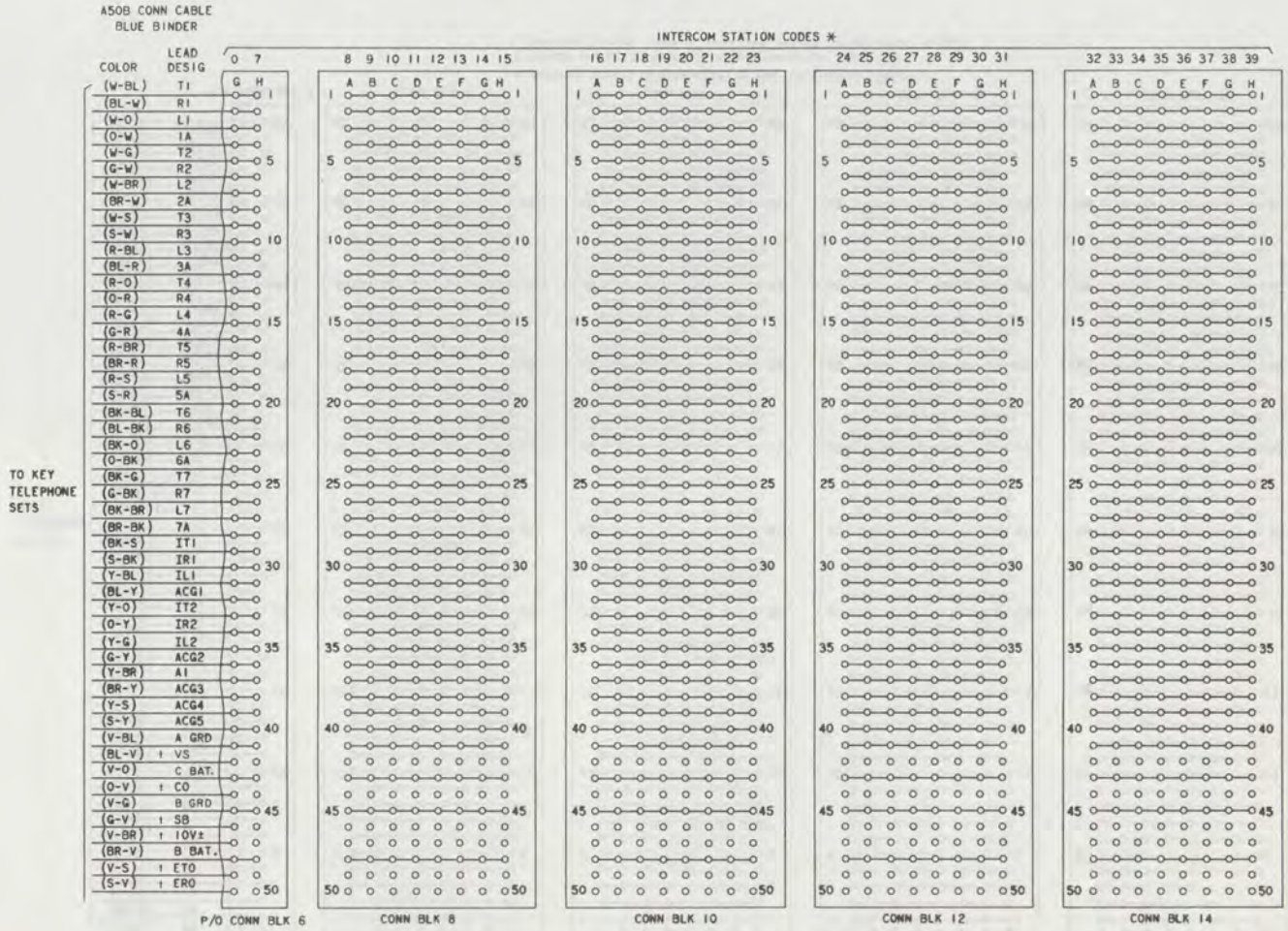
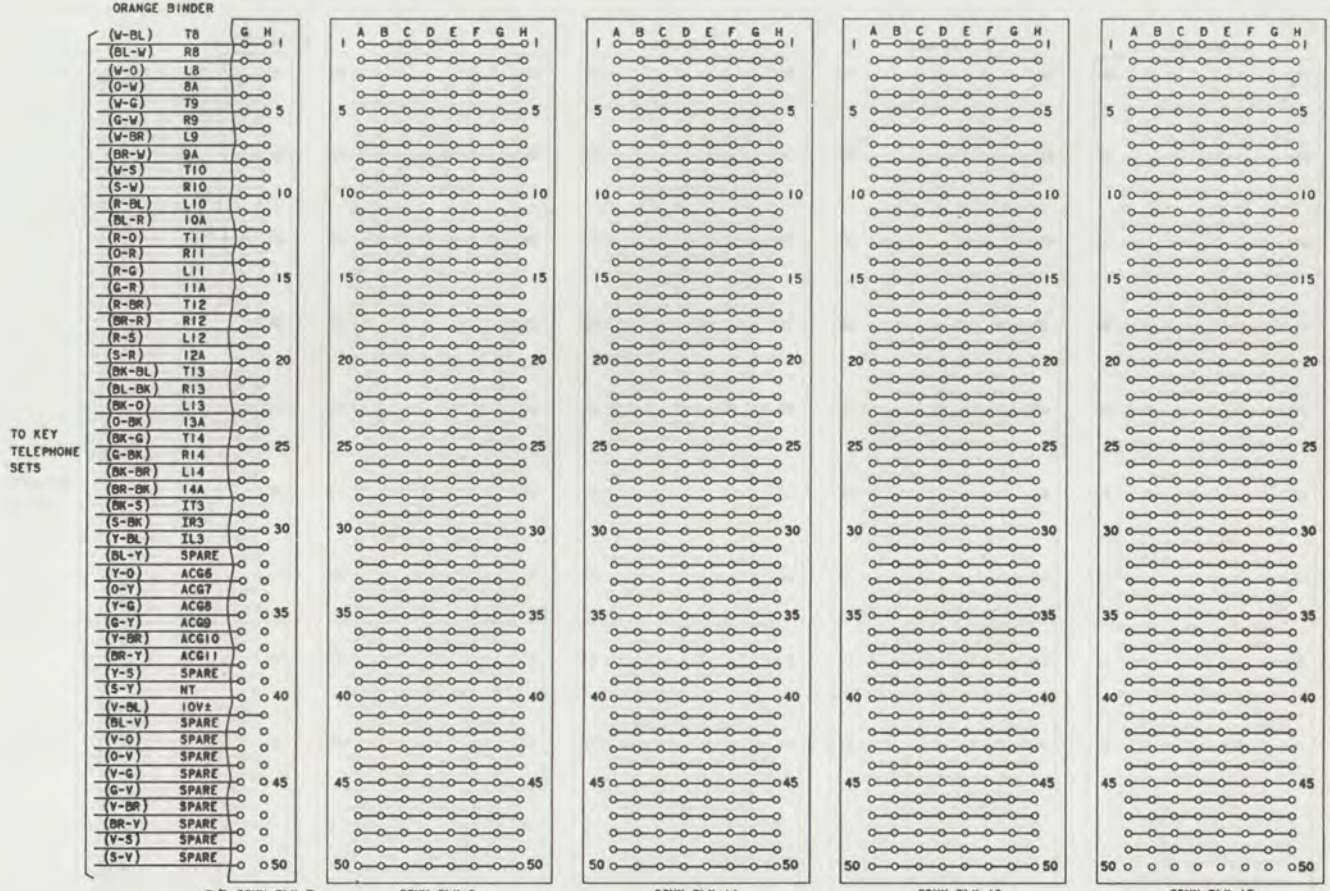


Fig. 15—Station Connections (Sheet 1)



* STATION CODE 0 IS DEDICATED TO THE ATTENDANT STATION.

† THESE SIX LEADS MUST BE RUN SEPARATELY FOR EACH STATION (7-34) WHEN A SATELLITE WIRING ARRANGEMENT IS USED.

Fig. 15—Station Connections (Sheet 2)

C. ▶Satellite Plan Using 14A1-Type Terminal Blocks

3.14 The 14A1-type terminal blocks consist of a 66-type connecting block factory-wired to KS- connectors. Connector cables are used from the connectors to the KSU—the station telephone set cables being fed from the satellite are terminated on the 66-type connecting block. Each 14A1-type terminal block will accommodate eight 25-pair station cables. One 14A1-100 terminal block is required for the first binder of each eight satellite stations, and one 14A1-75 is required for the second binders. Station codes assigned to group A and group B can be intermixed; or, if enough stations are fed from the satellite, group A stations can be bunched on one set of terminal blocks and group B on another.

3.15 If stations from groups A and B are to be intermixed on the same block, the station cables must be terminated on an assigned column and the B bridging clips properly positioned as shown in Fig. 16. Station cables are terminated on the 66-type connecting block following the even-count color code.◀

3.16 ▶Connections between the terminal blocks and the KSU are made using connector cables plugged into the connectors on the blocks. The raw ends of the connector cables are terminated in the KSU as shown in Fig. 17 and 18. The terminations are made on the rows and columns of the KSU connecting blocks that would normally contain the station cables.◀

3.17 ▶For the purpose of illustration, assume a satellite made up of station codes 7, 10, 14, 16, 20, 23, 30, and 33. One 14A1-100 terminal block will be required for the first binder of the station cables and one 14A1-75 for the second binder. Three stations (7, 10, 14) are in lamp group A and five stations (16, 20, 23, 30, 33) are in lamp group B, requiring terminations and the placing of the bridging clips for a 3/5 combination as shown in Fig. 16. The station cables are terminated so that the three stations of group A appear on columns A, B, and C (codes 7, 10, 14, respectively), and the five stations of group B are on columns D, E, F, G, and H (codes 16, 20, 23, 30, 33, respectively) as shown in Fig. 19.◀

3.18 ▶Connector cables are plugged into the connectors of the terminal blocks and routed to the KSU. The cables are terminated in the KSU as shown in Fig. 17 and 18. For this example, cable No. 1 from the 14A1-100 is terminated where the cable for the station appearing on column H of the terminal block (code 33) would be terminated if home-run, that is, block 14, column B. Cable No. 2 provides the additional lamp and lamp ground leads plus the individual code leads for the stations on columns G and A of the 14A1-100 (codes 30 and 7), so it is terminated on block 12, column G, and block 6, column H. In addition, the four A1 leads can be obtained on any of the spare terminations of the satellite stations. Cables 3 and 4 are terminated in a like manner on the designated blocks and columns. The three cables from the 14A1-75 are also terminated in the KSU on the blocks and columns shown in Fig. 19 and provide access to the second binder leads plus the additional lamp and lamp ground leads.◀

D. ▶Satellite Plan Using Nomograph

3.19 The same basic rules apply for satellites using standard 66-type connecting blocks as with the 14A1-type terminal blocks. Sufficient conductors must be run from the KSU to the satellite to provide a one-time appearance of all common station leads, individual code leads, and enough L and LG multiples (see 3.12).

3.20 The number of additional conductors required per L and LG lead is determined using the nomograph shown in Fig. 20. To use the nomograph, it is necessary to know three items:

(a) The distance from the KSU to the satellite location

(b) Number of stations to work from the satellite

(c) Distance from satellite location to furthest station working from satellite.

By plotting the values on the proper scales and connecting them, the required number of additional conductors required per L and LG lead can be determined. The three required values are plotted on scales A, B, and E, respectively, on Fig. 20. The number of additional leads required per L and LG lead will be found on scale D. Scales C1 and C2 are used only to establish reference points.◀

3.21 ▶To illustrate the use of the nomograph, assume a satellite location is 400 feet from the KSU, eight stations are to be fed from the

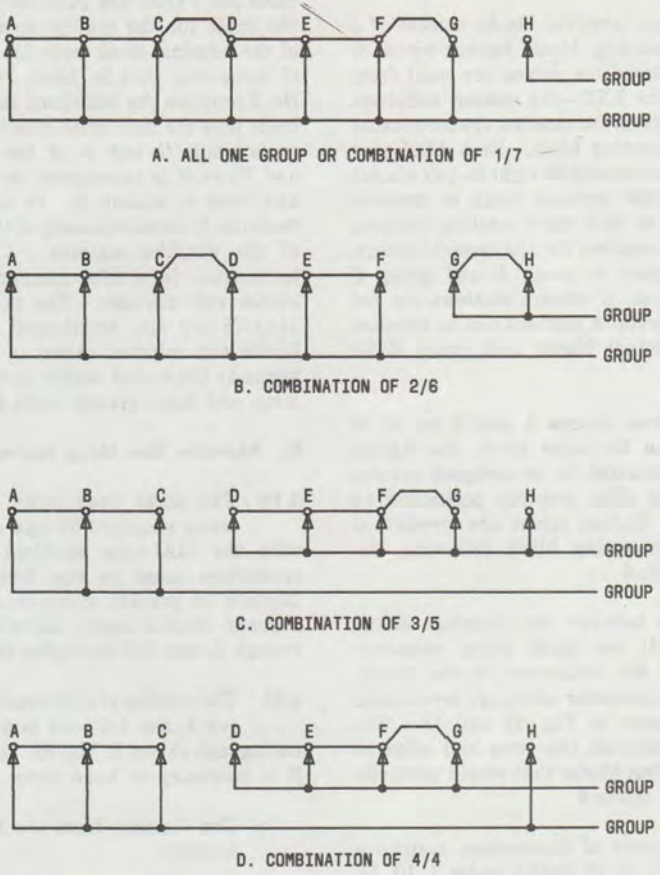


Fig. 16—Terminal Assignments and Bridging Clip Locations—14A1-Type Terminal Blocks

satellite, and the farthest station is 175 feet from the satellite. These figures are used as an example shown on Fig. 20 and are shown as dotted lines. To determine the number of extra leads required, use the nomograph as follows:

(1) Locate the distance from the KSU to the satellite on scale A (400 feet).

(2) Locate number of stations served by satellite on scale B (8 stations).

(3) Using a straight edge, connect the points on A and B and extend the line until it crosses scale C1.

(4) Note the point at which the line crosses C1 (approximately 33); find the same point on C2 and mark.

(5) Locate the distance from the satellite to the furthest station (175 feet) on scale E.

(6) Using a straight edge, connect points on C2 and E.

(7) The point where the line from C2 to E crosses scale D indicates the number of additional conductors required (6 in the example) for each L and LG lead.

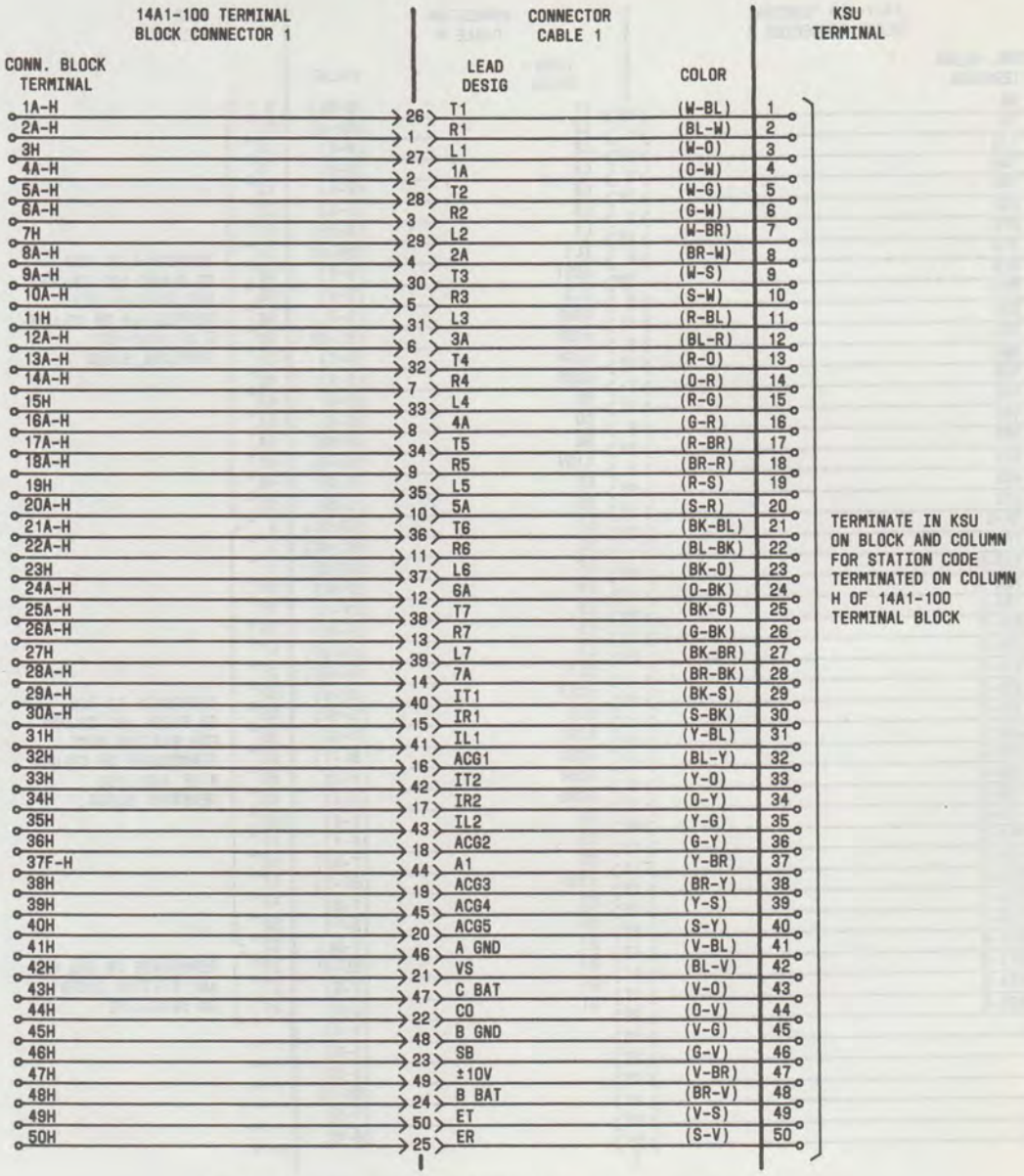


Fig. 17—Connections for 14A1-100 Terminal Block (Sheet 1 of 4)

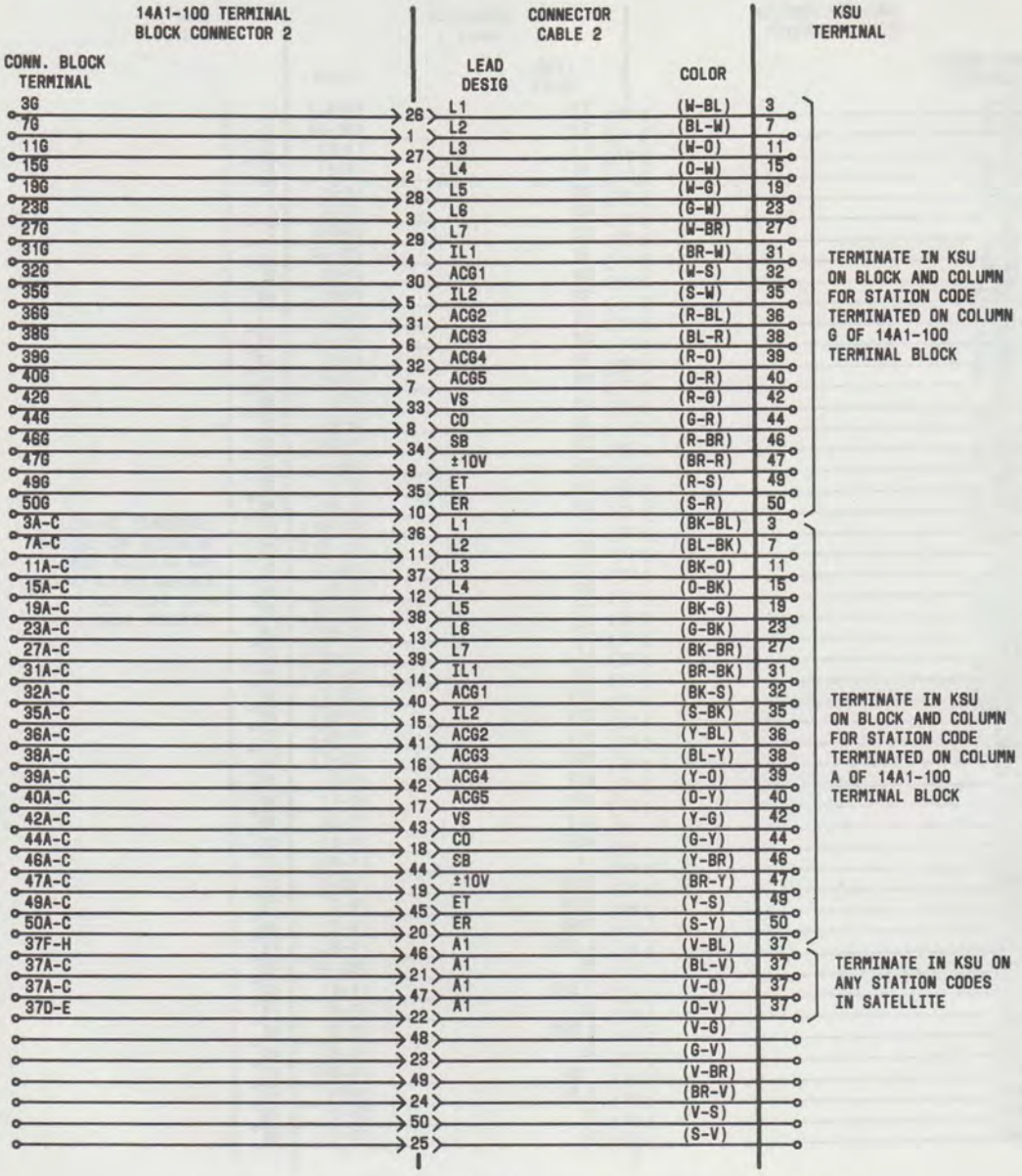


Fig. 17—Connections for 14A1-100 Terminal Block (Sheet 2 of 4)

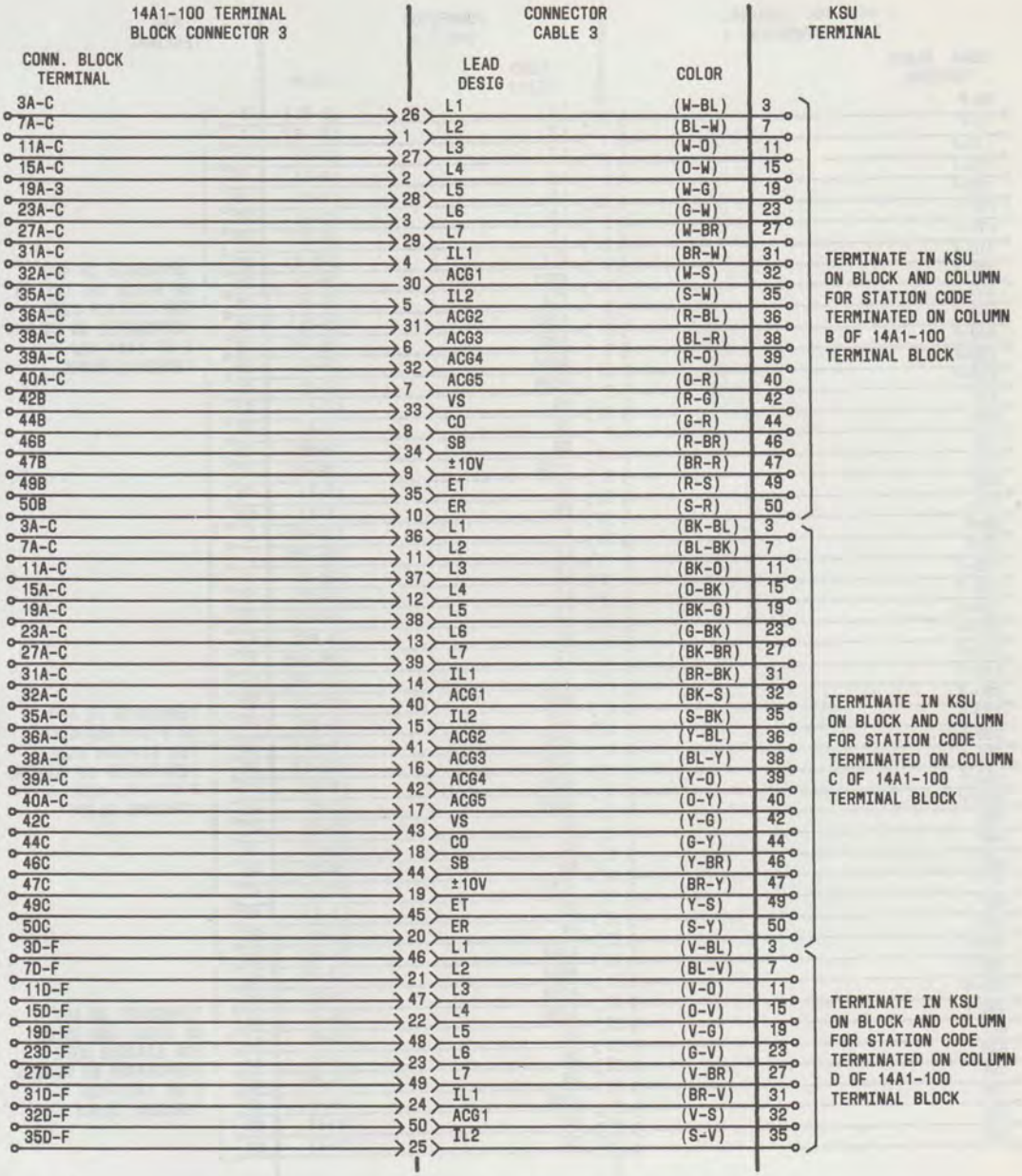


Fig. 17—Connections for 14A1-100 Terminal Block (Sheet 3 of 4)

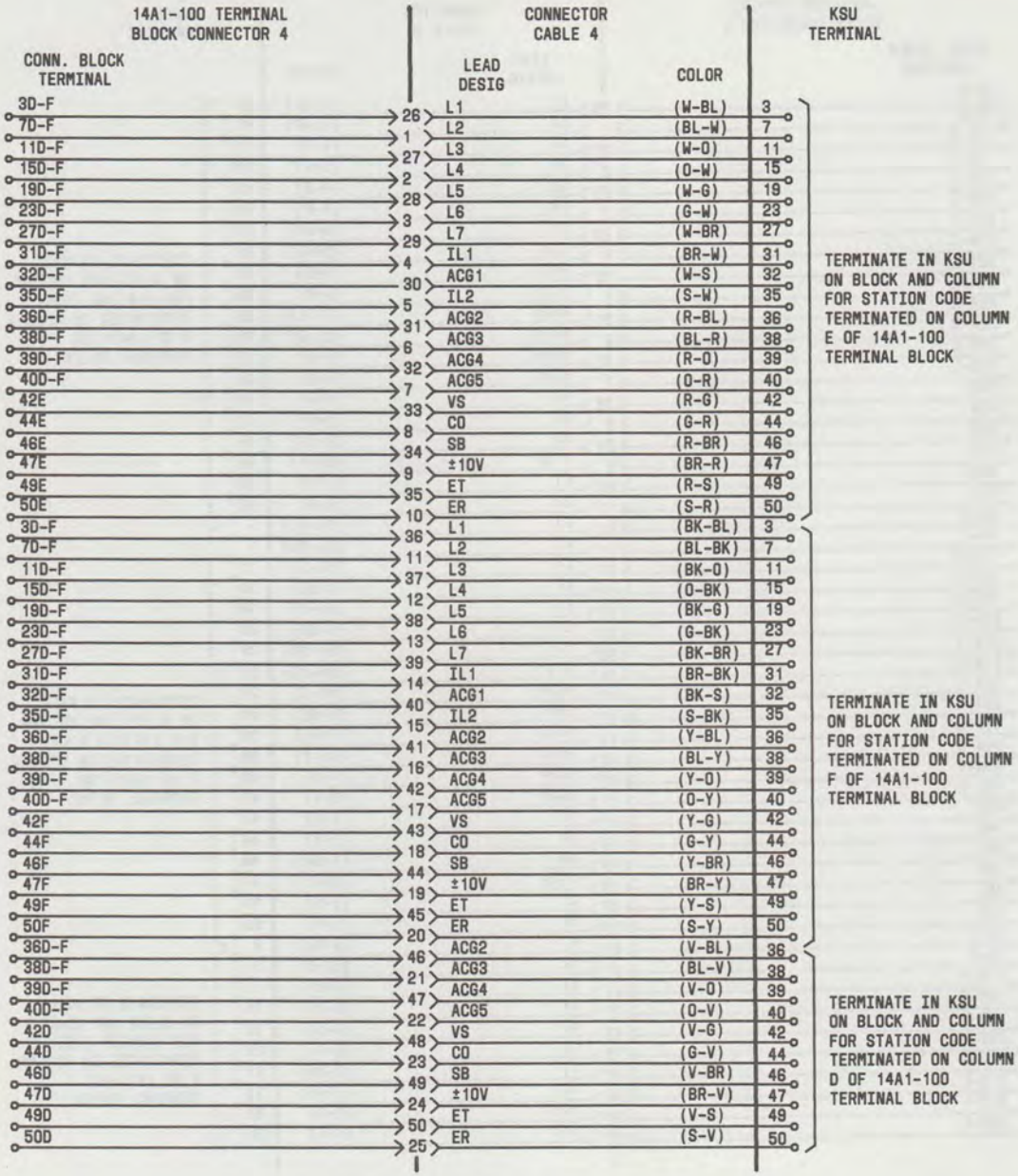


Fig. 17—Connections for 14A1-100 Terminal Block (Sheet 4 of 4)

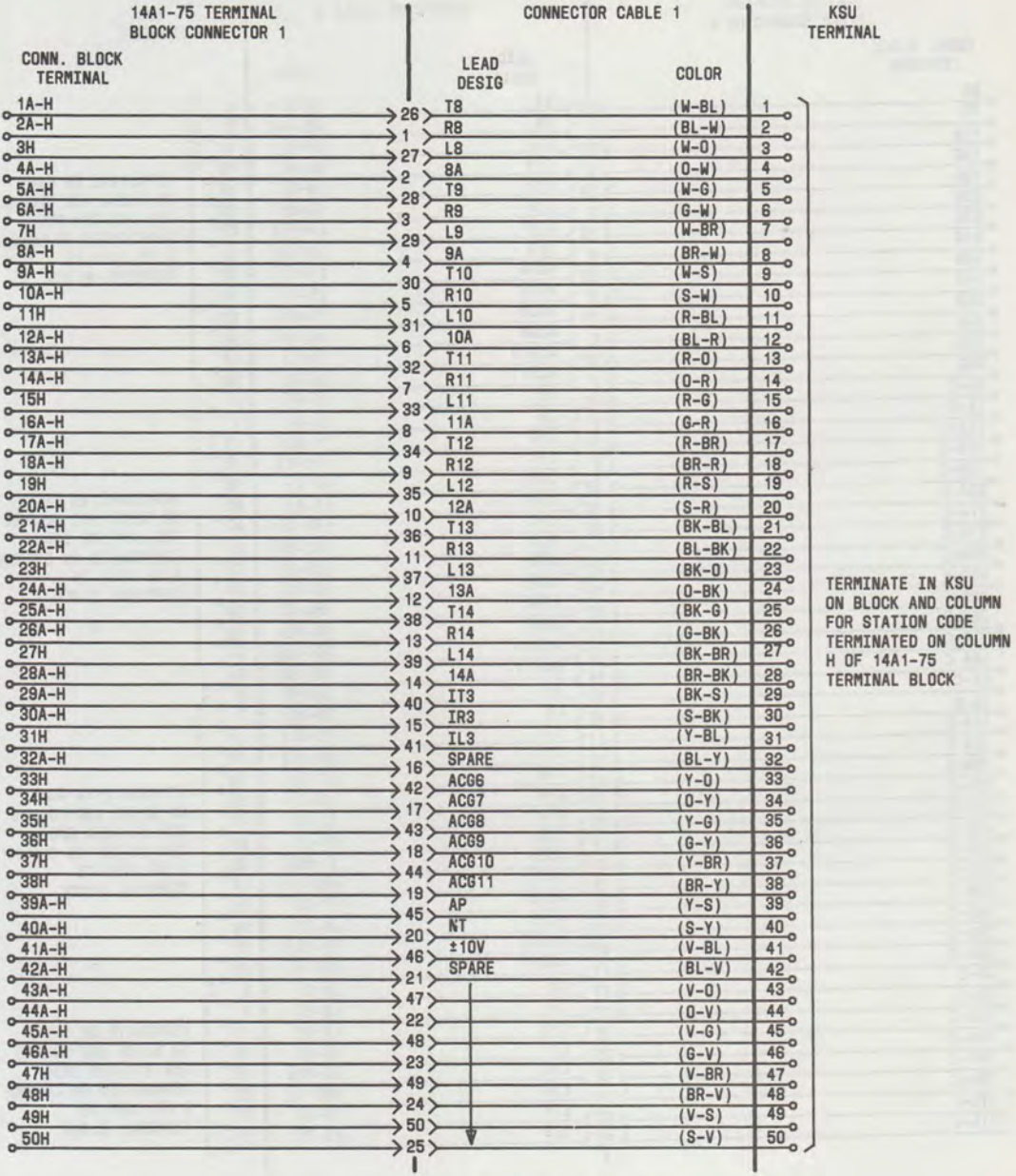


Fig. 18—Connections for 14A1-75 Terminal Block (Sheet 1 of 3)

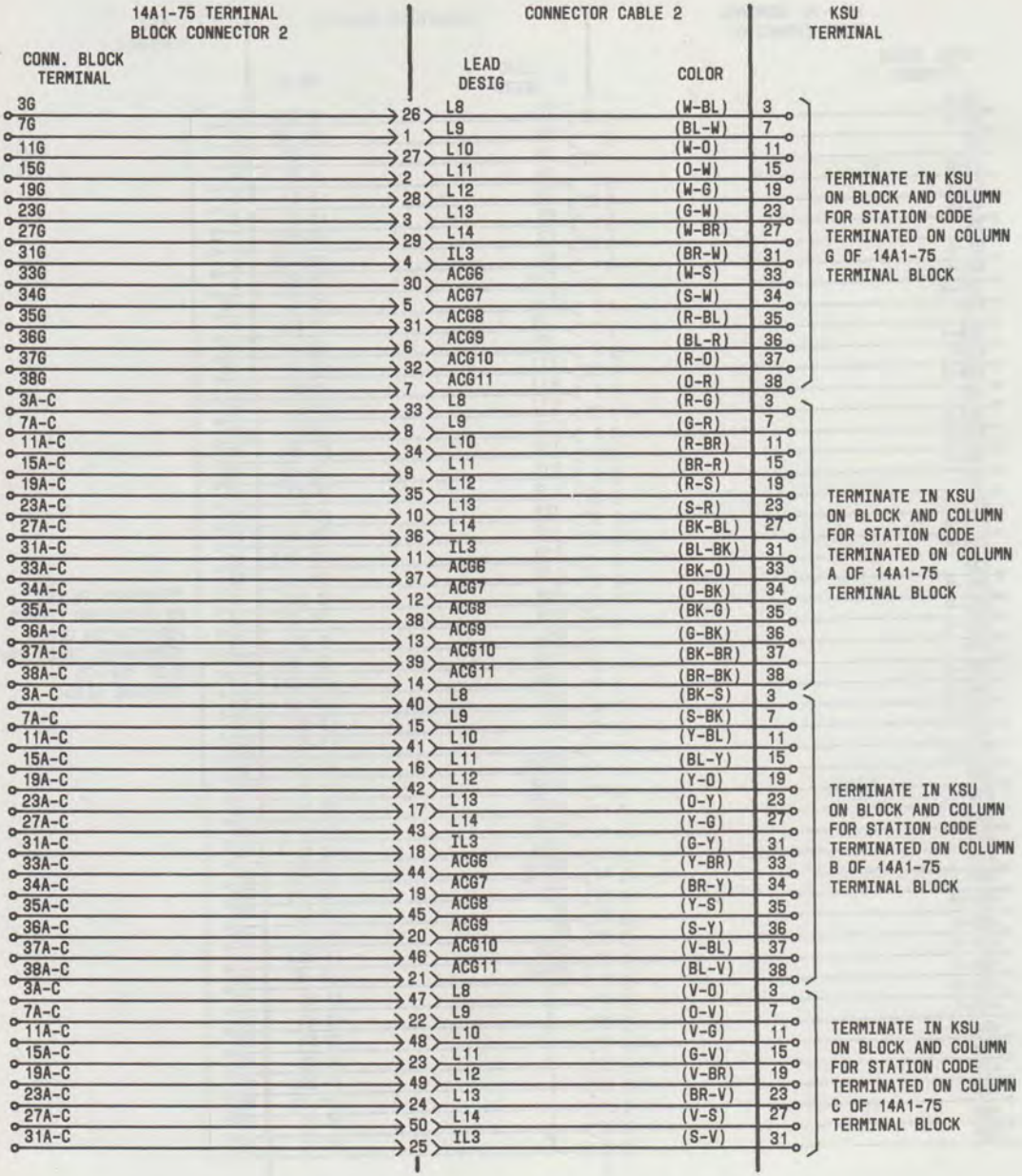


Fig. 18—Connections for 14A1-75 Terminal Block (Sheet 2 of 3)

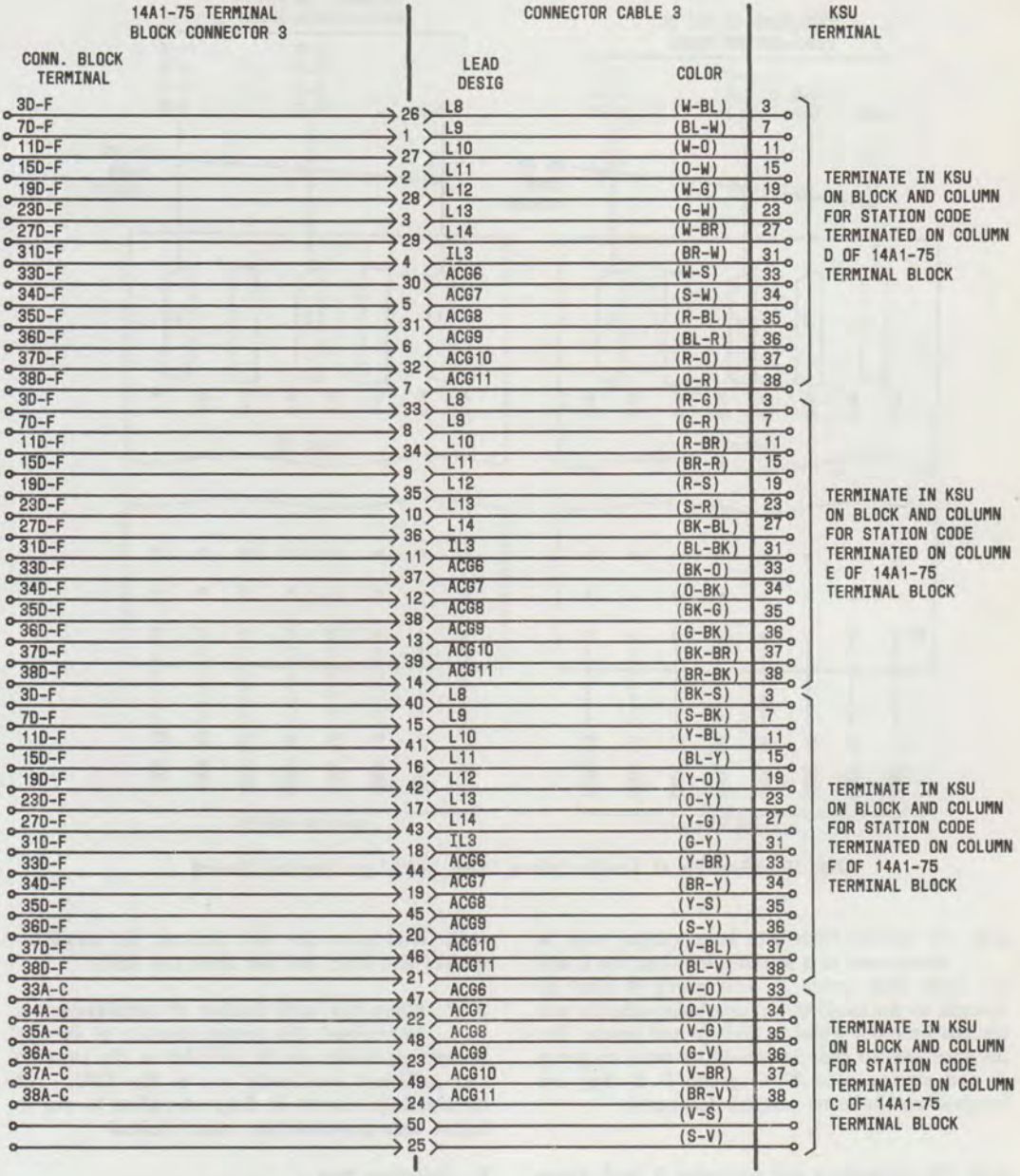


Fig. 18—Connections for 14A1-75 Terminal Block (Sheet 3 of 3)

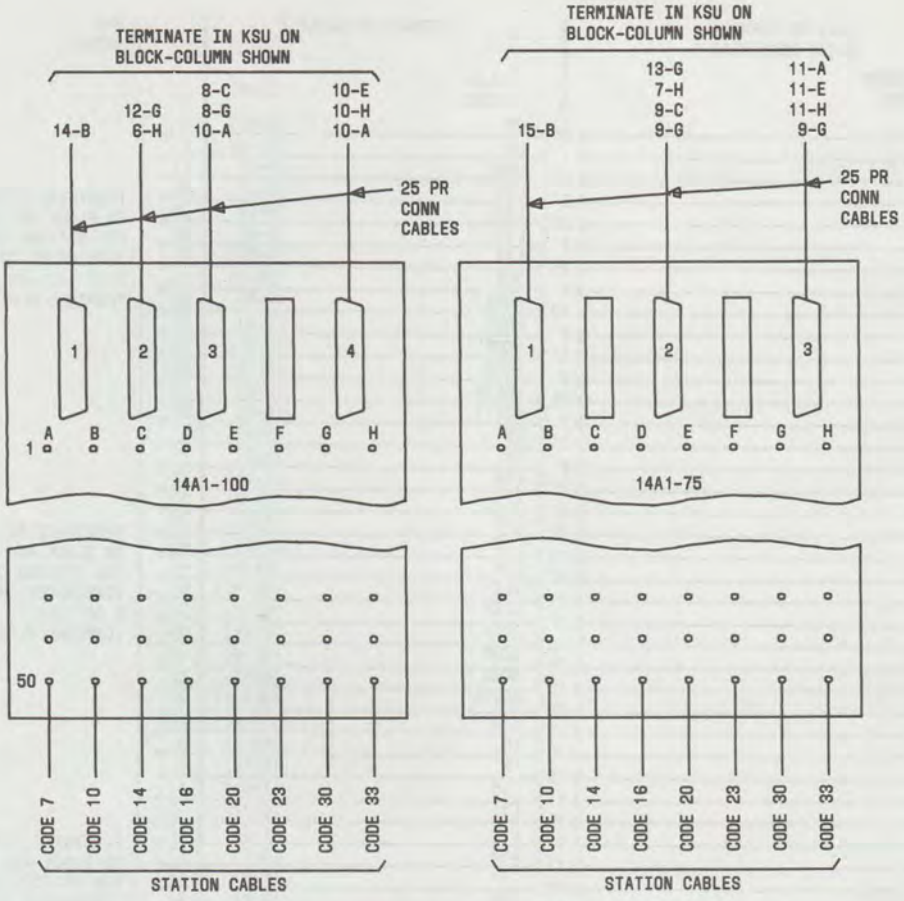


Fig. 19—Example of Satellite Wiring Using 14A1-Type Terminal Blocks

3.22 If stations from both lamp groups must be intermixed in a satellite location, the L and LG leads from group A ***and*** group B must be brought to the satellite location independently and the station codes wired to their proper group. For instance, station code 14 should be wired to group A and station code 26 to group B if they are involved on the same satellite location.

3.23 To maintain a low resistance A lead, where a satellite is more than 200 feet from the KSU, add four additional (24-gauge) cable conductors (five total conductors) for the A1 lead. Additional cable conductors are not required for satellites located less than 200 feet from the KSU.

3.24 Once the total number of terminations is determined, the proper number of 66-type connecting blocks can be provided at the satellite and sufficient conductors run to the KSU. All terminations should be fully identified to aid in future rearrangements or repair visits.

E. Telephone Sets

3.25 Install telephone sets at desired locations. Install any telephone set options at this

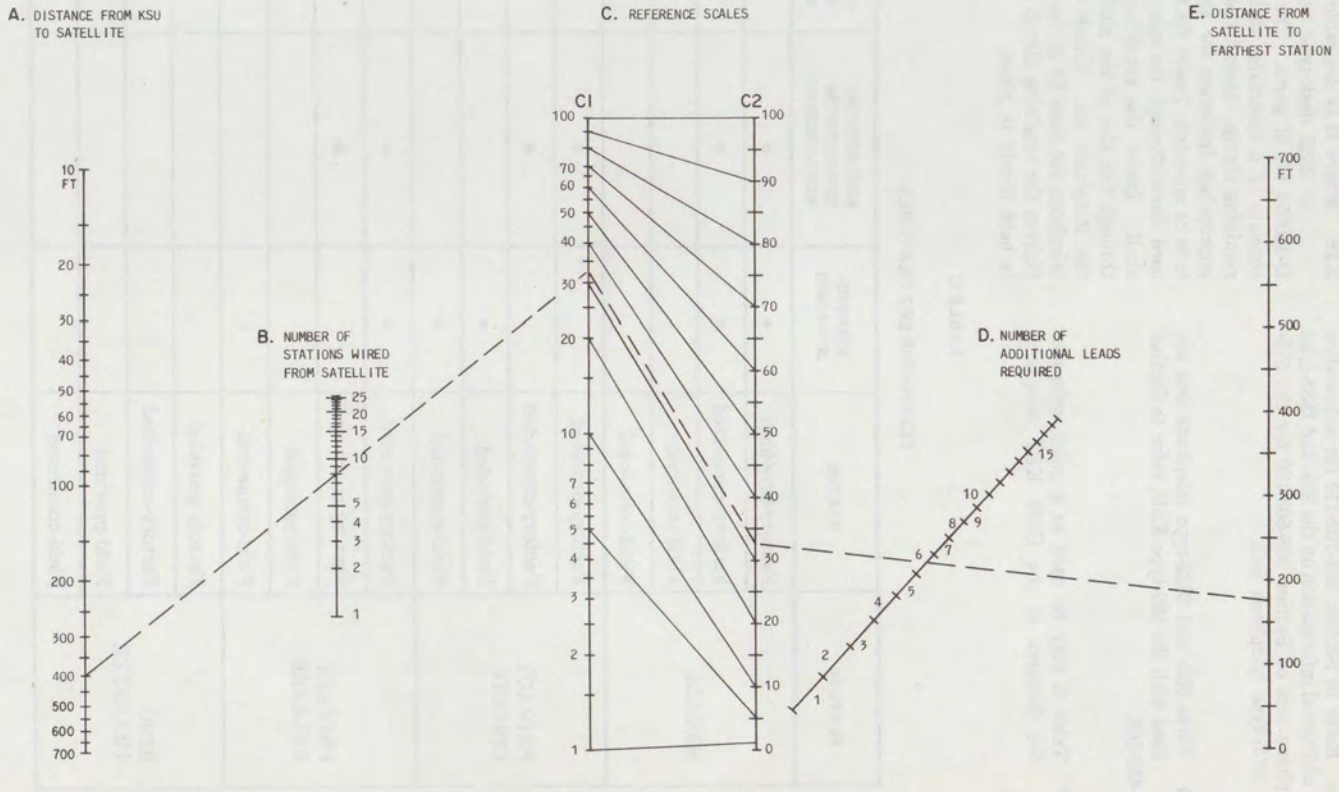


Fig. 20—Satellite Nomograph

time. Refer to Section 503-702-110 for schematics and additional information on the 833- and 2833-type telephone sets or Section 503-603-120 for the 575- and 2575-type telephone sets.

3.26 When 832- and 2832-type telephone sets are used with the 580-type KSU, refer to Section 518-450-103.

3.27 Table C may be used as a quick reference for features of the COM KEY telephone sets.

3.28 Where it is desirable to wall-mount an 833 or 2833 desk-type telephone set, install a D-180656 kit of parts. The kit of parts (Fig. 21) consists of a mounting shelf and a telephone set retaining clamp. Install the mounting shelf using appropriate fasteners for the surface on which it is to be mounted. Insert the telephone set mounting cord down through the opening at the rear of the shelf. Insert the retaining clamp (screw down) through the slot of the shelf, up into the base of the telephone set. Check that the pads on the telephone set base fit in the slots in the shelf and tighten the retaining clamp until the telephone set is held firmly in place.

TABLE C

TELEPHONE SET FEATURES

FEATURE	STATUS	833A(MD) 2833A(MD)	833B/2833B(MD) 833BM/2833BM 833DM/2833DM	833C/2833C(MD) 833CM/2833CM 833EM/2833EM
RECALL	Factory-provided	•	•	•
	Factory-connected	•	•	•
	Field-provided			
	Field-connected			
PRIVACY CIRCUIT	Factory-provided		•	
	Factory-connected		•	
	Field-provided	•		•
	Field-connected	•		•
PRIVACY RELEASE	Factory-provided	•	•	
	Factory-connected		•	
	Field-provided			
	Field-connected	•		
RING TRANSFER	Factory-provided			•
	Factory-connected			
	Field-provided			
	Field-connected			•

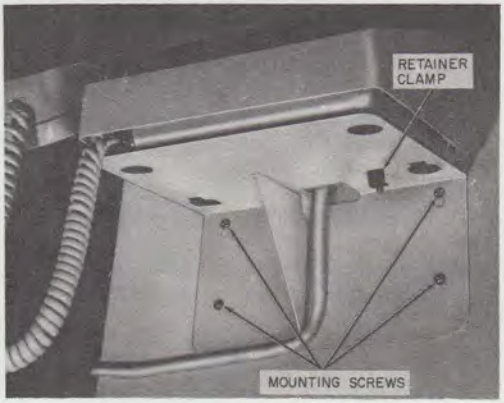


Fig. 21—Shelf for Wall Mounting COM KEY Telephone Set (D-180656 Kit of Parts)

3.29 The 833DM, 833EM, 2833DM, or 2833EM telephone sets can also be installed at wall-mounted stations. Install as follows:

(1) Place 833A-50 adapter supplied with set in position on mounting surface and mark location of mounting screw holes. Adapter should be positioned with slots at bottom.

(2) Drill holes and place two fasteners for keyhole slots in top left and right corners.

(3) Remove faceplate and housing from telephone set, if in place.

(4) If connector cable will be brought into the rear of the set, route cable through slot in bottom of adapter and fasten adapter to wall using keyhole slots plus a third screw through bottom tab of adapter. Coil slack in mounting cord so that it can be stored in adapter, plug connector cable into the mounting cord, and mount set on adapter using keyhole slots and rivets in base pan.

(5) If mounting cord is to run down wall, feed cord through slot in adapter, and fasten adapter to wall using keyhole slots and screw in bottom tab. Mount set on adapter.

(6) Fasten bottom of set to adapter using base pan retaining clip and self-tapping screw.

(7) Replace housing and faceplate.

4. FEATURES (IDENTIFICATION, OPERATION, CONNECTIONS, AND TESTING)

BASIC FEATURES

A. Automatic Button Restoration (ABR)

4.01 Automatic button restoration is a feature of the 833- and 2833-type telephone sets. When the handset is placed on-hook, all depressed buttons automatically return to the nonoperated position. The ABR feature prevents inadvertent intrusion on calls that may be in progress and insures that multiple buttons will not be left depressed on an idle set causing an undesired conference.

4.02 The intercom-only telephone sets, 575AM-50 and 2575AM-50, do not have ABR.

4.03 The 833- and 2833-type telephone sets are operated the same as other sets except when flashing the switchhook. When switchhook flashing, the line button(s) associated with the line(s) being used must be held depressed while the switchhook is momentarily operated. For this reason, the RECALL button should be used for flashing.

4.04 Automatic button restoration is a mechanical function of the telephone set, no wiring is required, and field adjustment of the mechanism is not recommended.

B. Common Audible

4.05 Common audible is derived through diodes located on connecting block 2 (Fig. 5). As factory-wired, there is a diode for each CO/PBX line connected to a common audible terminal. A factory-provided strap (on the installer's side of connecting block 1) connects the common audible terminal to station code 0. With this arrangement, whenever there is an incoming call on any of the CO/PBX lines, the attendant station receives ***tone ringing.*** A flashing line lamp identifies the calling line.

4.06 The common audible signal can be changed to a station, or stations other than or in

addition to the attendant station. To change the common audible ringing, on connecting block 1:

(1) Remove the factory-provided strap between terminals H19 and C1.

(2) Run a (continuous) strap from the common audible terminal, H19, to the CO/PBX ring terminal(s), in column C or column G, associated with the station(s) selected for common audible ringing (see Fig. 4).

Note: No more than 10 stations, including the attendant station, can be wired for common audible ringing in systems using a 580-type KSU manufactured after July 1, 1975, or modified as indicated by an asterisk (*) stamped adjacent to the code on the KSU backplate. Systems manufactured prior to that date must be modified per Fig. 81 to increase the number of stations wired for common audible from one to ten.

4.07 A CO/PBX line can be removed from the common audible group by removing the corresponding common audible diode. The common audible diodes are located on connecting block 2 (Fig. 5). When a CO/PBX line is removed from the common audible ringing arrangement:

- The CO/PBX line must be connected to ring a selected station(s) via a CO ringing arrangement.
- The ringing cannot be transferred through the ring transfer arrangement.

C. Multiline Conferencing

4.08 Multiline conferencing is a feature of the telephone sets used in the system. Since there is no amplification involved, this type conferencing is limited. ***When lines are conferenced, using this manner of conferencing, distant stations may have trouble hearing each other and transmission is not guaranteed.***

4.09 Conferencing is accomplished by simultaneously depressing the CO/PBX line buttons of the lines to be conferenced.

Intercom and CO/PBX lines cannot be conferenced together.

4.10 All lines that are conferenced together may be put on hold simultaneously by depressing the HOLD button.

4.11 To make a call during a conference:

(1) Depress HOLD button—all buttons restored; conferenced parties cannot hear each other.

(2) Select an idle line and depress line button.

(3) Dial call.

(4) If it is desired to add this call to the conference, hold this CO/PBX line button down and simultaneously depress the conferenced CO/PBX line buttons.

(5) To reenter conference, simultaneously depress the CO/PBX line buttons of the lines conferenced.

4.12 If it is desired to add another line to a conference, hold the line buttons of the conferenced lines down and depress the line button of the CO/PBX line to be added to the conference.

4.13 To prevent disconnecting one of the participants when setting up a conference, ensure that the conferenced CO/PBX line buttons are held down while adding another station.

Remember: The system may be disabled if multiple buttons are depressed at an idle station.

4.14 Conferencing is a mechanical function of the telephone set and requires no wiring.

D. Pickup, Hold, and Illumination

4.15 The system provides pickup on CO/PBX and intercom lines and hold on CO/PBX lines. Lamps provide the following information: steady lamps are for line busy, flashing lamps for incoming calls, and winking lamps for lines on hold.

4.16 The CO/PBX and intercom lines appear on the same buttons at all stations. By observing

the lamps associated with the CO/PBX and intercom line buttons, the station user can readily determine the status of each line. Any station user can pick up any idle line or place any CO/PBX line on hold. Lamp and hold functions are provided by the 400-type KTU.

E. 3-Path Intercom

4.17 The intercom circuit has three talking paths. A path is selected by depressing one of the three intercom buttons on the telephone set. There is no privacy on any path and any station may enter into an existing call.

4.18 When it is desirable for a station to pick up only the three intercom lines and not have access to the CO/PBX lines, a 575AM-50 or a 2575AM-50 telephone set can be used. Both sets are connected to the 580-type KSU by an A25B connector cable. See Fig. 22 for connections.

4.19 The selector, used to select and alert the called stations, is shared among the three intercom paths. The alerting signal at the called station is a tone burst followed by a voice signal (message) from the calling station. The lamp functions on the intercom lines are as follows: When the selector has seized a path, the lamp associated with the seized path will flash on all telephone sets. The flashing lamp indicates which line should be answered by the called station. When the called station answers, the intercom line lamp changes from flash to steady. When the intercom path is idle, the associated lamp is dark.

4.20 To place an intercom call:

(1) Select an idle intercom path and depress the associated intercom line button.

(2) Lift telephone handset.

Note: If a lamp is flashing on another intercom path, ▶other stations should not attempt intercom calls◀ until the selector is released (and lamp goes steady or dark). While the selector is seized by another station, no dial tone is heard.

(3) Dial selected station—tone burst signals called station.

(4) Calling station may make announcement or wait for called station to answer. When called party depresses intercom line button and goes off hook, intercom lamp will go steady.

4.21 Intercom is factory-wired, requiring the 424B or C, 444-type, 454B, and 456B KTUs. See Fig. 3 for connector locations. The intercom code of a station is determined by the column on connecting blocks 6 and 7, 8 and 9, 10 and 11, 12 and 13, or 14 and 15, on which the station connector cable is terminated. See Fig. 15.

F. Tone and Voice Signaling

4.22 All stations in the 14A System are alerted by a distinctive tone signal. CO/PBX ringing is a frequency-shifting tone (900 and 1100 Hz) provided by the 455A KTU. Intercom ringing is a single tone (500 Hz) provided by the 456B KTU. In the event a station is simultaneously signaled by an incoming CO/PBX call and an intercom call, the intercom signal is given preference.

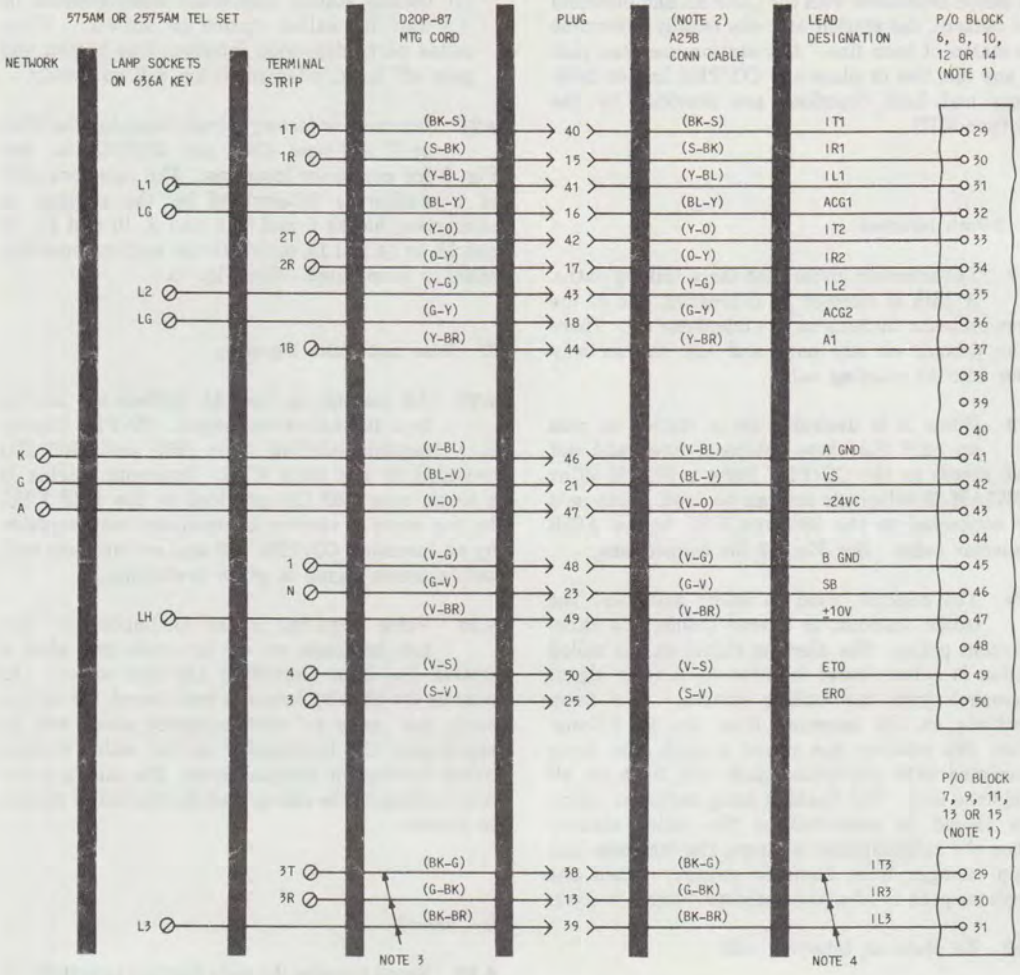
4.23 Voice signaling is the announcement that can be made on an intercom call after a station has been alerted by the tone signal. As soon as the alerting tone has been heard, the calling party can make an announcement which will be heard over the loudspeaker at the called station. After making an announcement, the calling party may terminate the call or wait for the called station to answer.

G. ▶Recall

4.24 Recall provides the same function as switchhook flash without restoring the line buttons. Recall is accomplished by momentarily depressing the RECALL button on the telephone set. Depressing the RECALL button opens the ring side of the line(s) in the telephone set. The RECALL button is designated by an amber cap.

Caution: When CO/PBX lines are conferenced and the RECALL button is depressed, the conferenced lines may be disconnected.

4.25 All 833- and 2833-type telephone sets are equipped with a RECALL button.◀



NOTES:

1. TERMINATE CONNECTOR CABLE FOR INTERCOM ONLY STATION ON SAME BLOCK(S) AND COLUMN AS 833- OR 2833-TYPE SETS.
2. LEADS SHOWN ARE ONLY ONES REQUIRED. BALANCE OF CONNECTOR CABLE CAN BE TERMINATED EXCEPT WHEN 3RD IC PATH IS REQUIRED.
3. THE BK-G, G-BK AND BK-BR LEADS ARE INSULATED AND STORED IN THE TEL SET. IF THE 3RD INTERCOM PATH IS PROVIDED THESE LEADS MUST BE TERMINATED AS SHOWN.
4. TERMINATE LEADS ONLY WHEN 3RD INTERCOM PATH IS PROVIDED.

Fig. 22—Connections for Intercom-Only Telephone Sets

H. ▶Ring Transfer

4.26 Ring transfer switches the common audible CO/PBX ringing from the attendant station (code 0) to an alternate station or stations in the 14A System. A CO/PBX line that has been removed from the common audible group cannot have its incoming ring transferred via the ring transfer arrangement. Ring transfer can be wired for fixed station or for flexible station transfer. With fixed station ring transfer, incoming calls are transferred to a specific station or group of stations as fixed by an option strap in the KSU. For information on flexible ring transfer, refer to **OPTIONAL FEATURES.**

4.27 To operate ring transfer wired for fixed station transfer, depress the RING TR (ring transfer) button on the attendant telephone set (locking it down). To transfer ringing back to the attendant station, depress the RING TR button again which releases it. While the RING TR button is depressed, the lamp under it is lit (steady).

4.28 Attendant stations which are to control ring transfer must be equipped with an 833CM, 833EM, 2833CM, or 2833EM telephone set which is factory-equipped with a ring transfer button. However, the ring transfer button is not factory-connected and must be connected in the field. To connect the ring transfer button, open the telephone set, move the O-BK lead from terminal 7 to terminal 11, and move the O-V mounting cord lead from terminal 1 to terminal 23 on the telephone set terminal board (see Fig. 23).

> ***Note:*** First production models of the 833C (MD) and 2833C (MD) telephone sets had the ring transfer button factory-connected.

4.29 For fixed station ring transfer, in the KSU, run a strap from the RT terminal (column H, terminal 21) on connecting block 1 to station(s) code terminal(s) (in column C or column G) selected for ring transfer. For example, Fig. 23 shows station 12 connected for fixed ring transfer. When more than one station is to be connected for ring transfer, run a continuous strap from the RT terminal to all station code terminals of the stations selected for ring transfer. No more than ten stations can be wired to ring on ring transfer.

4.30 To test fixed ring transfer:

(1) Depress the RING TR button at the attendant station, locking it down—lamp under button lights (steady).

(2) Select an idle CO/PBX line, depress line button, lift handset, and dial another CO/PBX line—station selected for ring transfer rings (tone burst is heard).

(3) Depress RING TR button on the attendant station, releasing it—lamp under button goes off. Tone ringing is heard at attendant station.

(4) Replace handset.◀

OPTIONAL FEATURES

A. Station Line Ringing

4.31 The station line ringing feature permits a station not wired for common audible to receive the ringing on a selected CO/PBX line. Any combination of stations may be connected for ringing on a one line-per station basis.

> ***Remember:*** The station line ringing and common audible ringing is tone ringing.

4.32 Terminals representing each CO/PBX line are located on connecting block 1, rows 22 and 23 (see Fig. 4). To connect a station for station line ringing, on connecting block 1 select the terminal in column C or column G associated with the station to ring. Then determine the terminal in row 22 or row 23 associated with the CO/PBX line selected for ringing. Next, run a strap, RC( ) lead, from the CO ring terminal to the station code terminal. Fig. 24 illustrates station 18, plus the attendant, connected to ring on line 5 and station 31 to ring on line 10.

4.33 To remove the CO/PBX lines from the common audible group, remove the common audible diode as described in 4.07.

B. External Signaling Circuit

4.34 When external signaling devices (such as bells, gongs, chimes, lights, or buzzers) are to be connected to the 14A System, a 22A-49 apparatus unit must be provided. The 22A-49 apparatus unit is externally mounted, and connections

CONNECTIONS TO ACTIVATE RING TRANSFER BUTTON IN 833CM, 833EM, 2833CM AND 2833EM TELEPHONE SETS

LEAD	COLOR	MOVE LEAD IN TEL SET	
		FROM TERM.	TO TERM.
RT KEY	O-BK	7	11
MTG CORD	O-V	1	23

* REFER TO SECTION 512-210-103 FOR ORDERING INFORMATION ON 6041G - KEYS

OPTIONS:
(J) FIXED STATION RING TRANSFER.
ANY STATION MAY BE SELECTED FOR RING TRANSFER. TRANSFER TO STATION 12 IS SHOWN HERE.
(H) FLEXIBLE STATION RING TRANSFER.
ANY ONE OF UP TO FIVE STATIONS MAY BE SELECTED FOR RING TRANSFER THROUGH 6041G - KEY

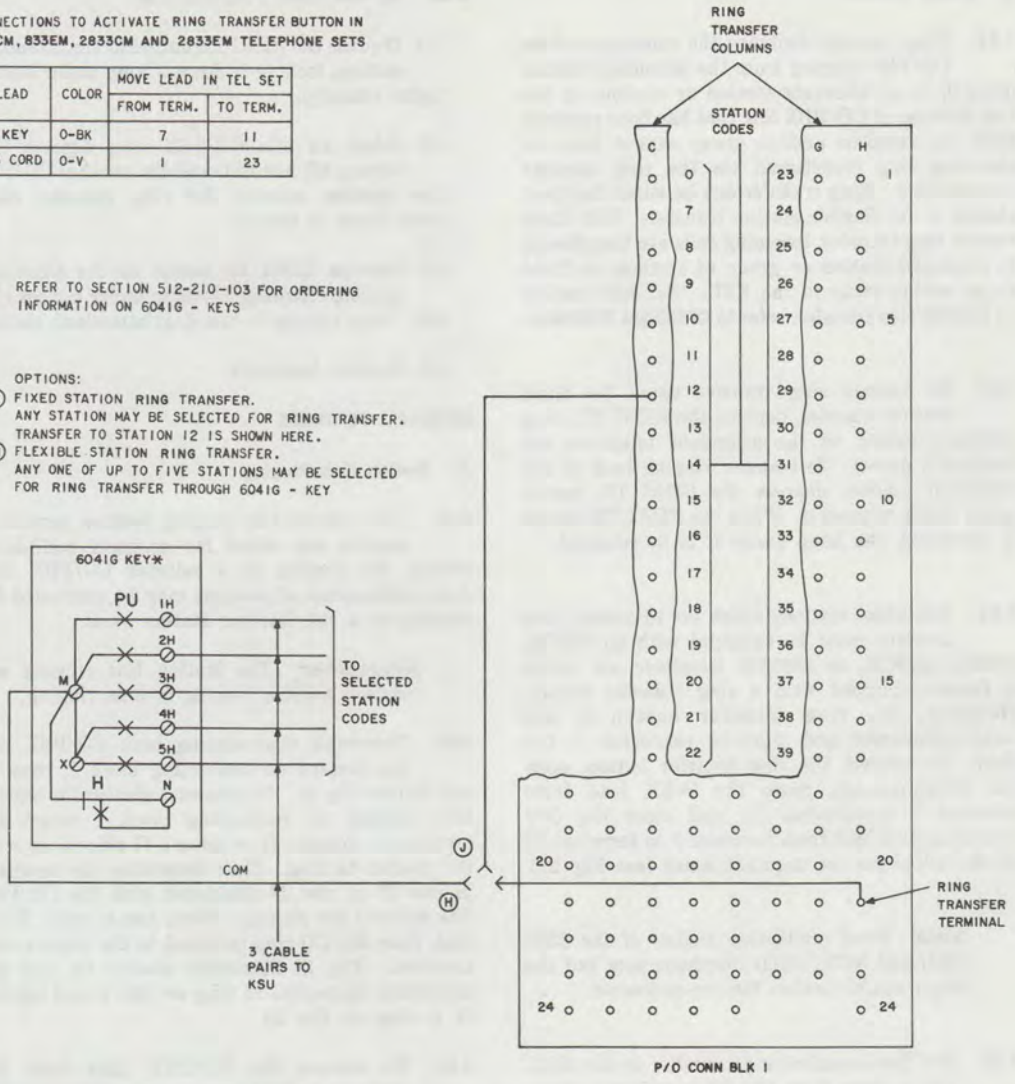
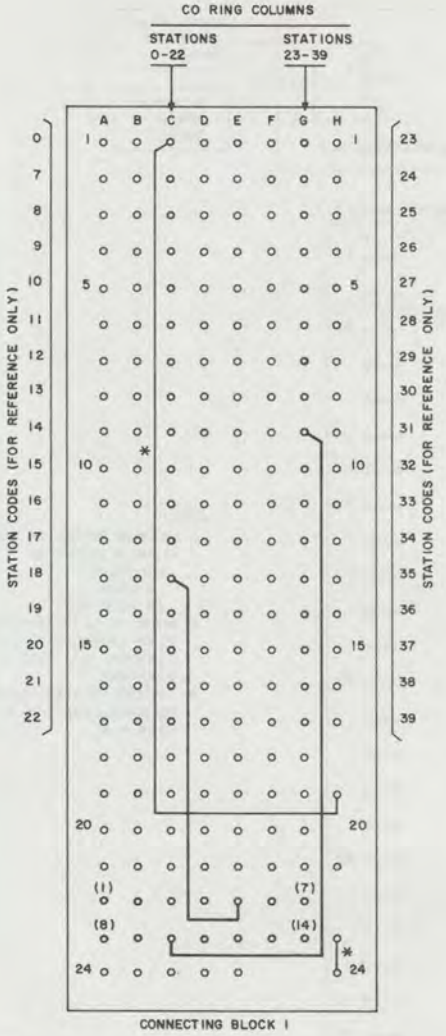


Fig. 23—Connections for Ring Transfer

are made to the KSU with inside wire. In addition, an external power supply must be provided to operate the signaling devices. The 22A-49 apparatus unit may be used to activate signaling devices that are operated by an open circuit (through a relay break contact) or that are operated by a circuit closure (through a relay make contact).

Caution: The 22A-49 apparatus unit contains a nonadjustable, mercury-wetted



NOTES:
1. NUMBERS IN PARENTHESIS ( ) REPRESENT THE 14 CO/PBX LINES.
2. CONNECTIONS AS SHOWN CAUSE STATION 18 TO RING ON LINE 5 AND STATION 31 TO RING ON LINE 10.
3. RUN CONTINUOUS STRAP.
4. WHERE IT IS NECESSARY TO "STACK" LEADS ON A TERMINAL USE 18382 ADAPTERS.

* FACTORY PROVIDED STRAP ON INSTALLERS SIDE OF BLOCK.

Fig. 24—Connections for Station Line Ringing

sealed contact relay and must be mounted in a vertical upright position.

4.35 The 22A-49 apparatus unit is used to activate external signaling devices connected for:

- Station codes (see Fig. 25)
- Common audible (see Fig. 26)
- Station line ringing (see Fig. 26)
- Ring transfer (see Fig. 26).

4.36 One 22A-49 apparatus unit is required for each station code or each CO/PBX line equipped with an external signaling device. The maximum resistance of each lead between the KSU and the 22A-49 apparatus unit is 25 ohms.

4.37 The KS-16301 type auxiliary signals are recommended as external signaling devices for use with the 14A System. See Fig. 27 for connections. Refer to Section 463-110-100 for identification, installation, operation, maintenance, and ordering information on the KS-16301 type signals.

4.38 The external power supply used to operate the signaling devices must be properly fused and have the capacity to adequately power the signaling devices. The ac power receptacle should meet requirements per 3.02. Information found in Sections 167-416-201, 167-440-201, or 167-446-101 may be used as a guide toward selecting an appropriate power supply. Do not use a power supply that exceeds the contact rating of the 22A-49 apparatus unit which is 130 volts, 1.5 amps, 25 volt/amps.

C. Preset Conference on Intercom

4.39 The preset conference feature allows five stations to be signaled simultaneously by dialing station code 39. When preset conference is provided, by dialing code 39, any station can establish a conference with the stations that have been connected for preset conference. The station capacity of the 14A System is reduced to 33 stations when preset conference is provided, as code 39 is forfeited for use as a station code. Where a station is connected for preset conference and station line ringing, the signaling of the preset conference takes precedence over station line ringing.

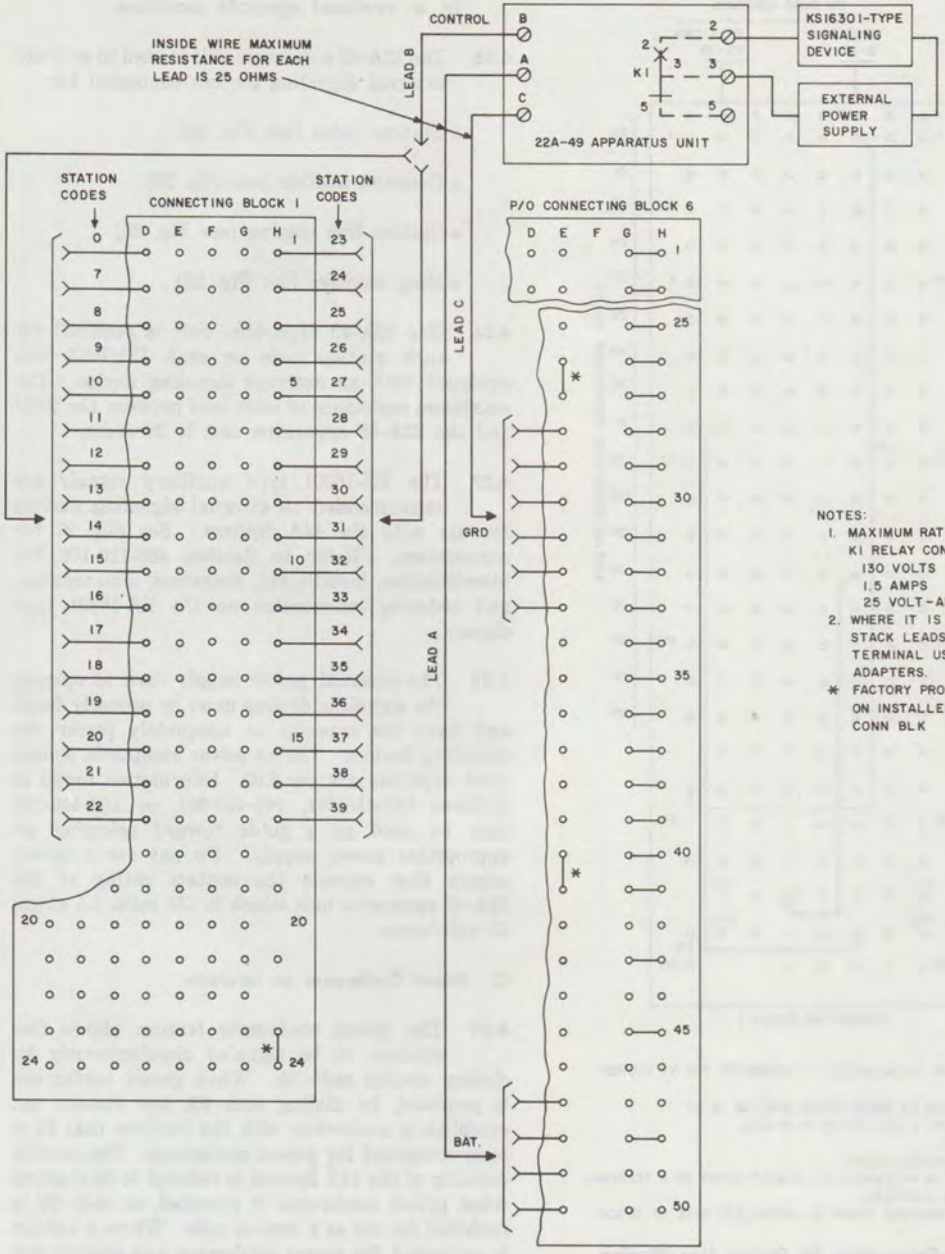


Fig. 25—Station Code Connections for External Signaling Circuit (22A-49 Apparatus Unit)

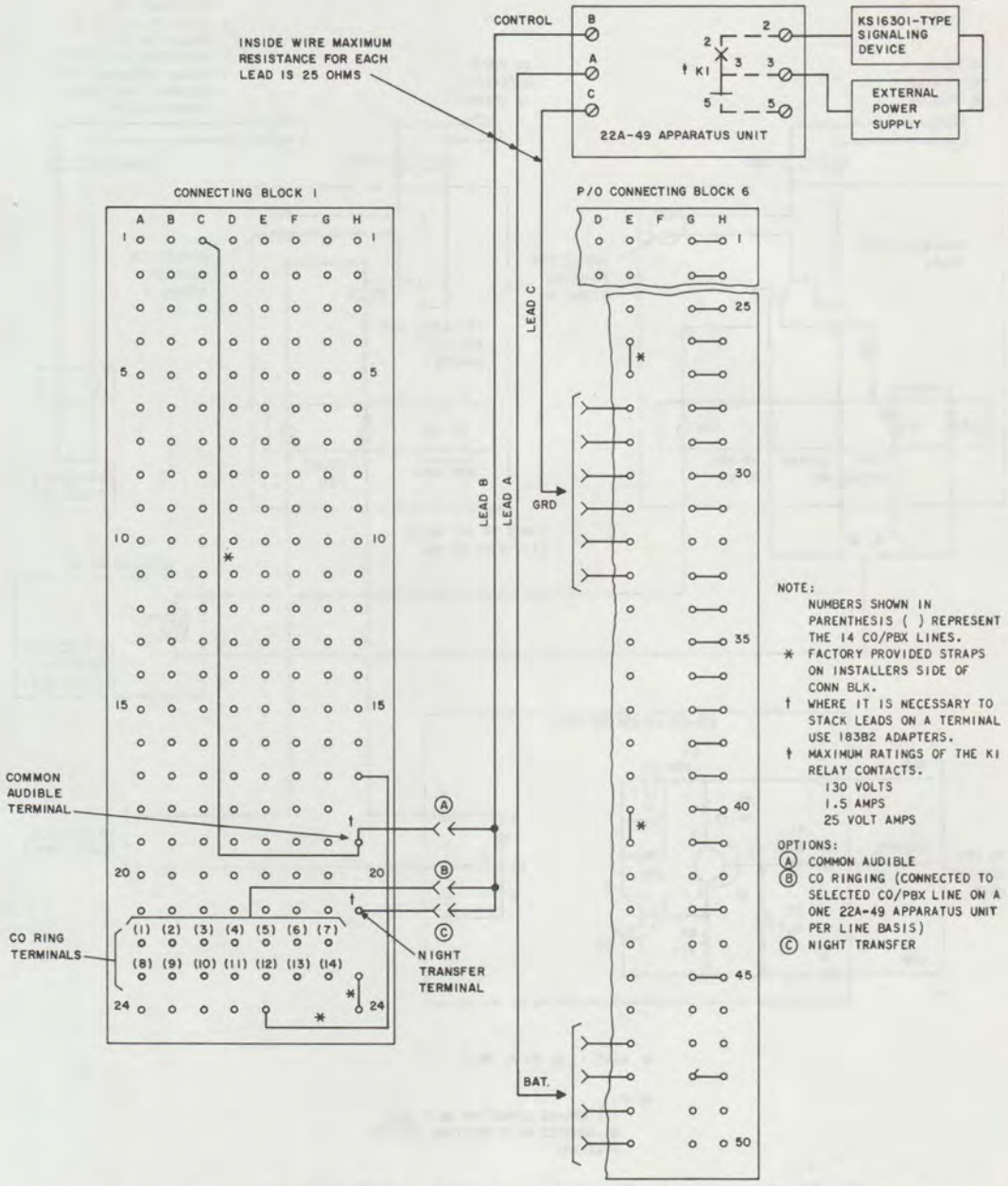
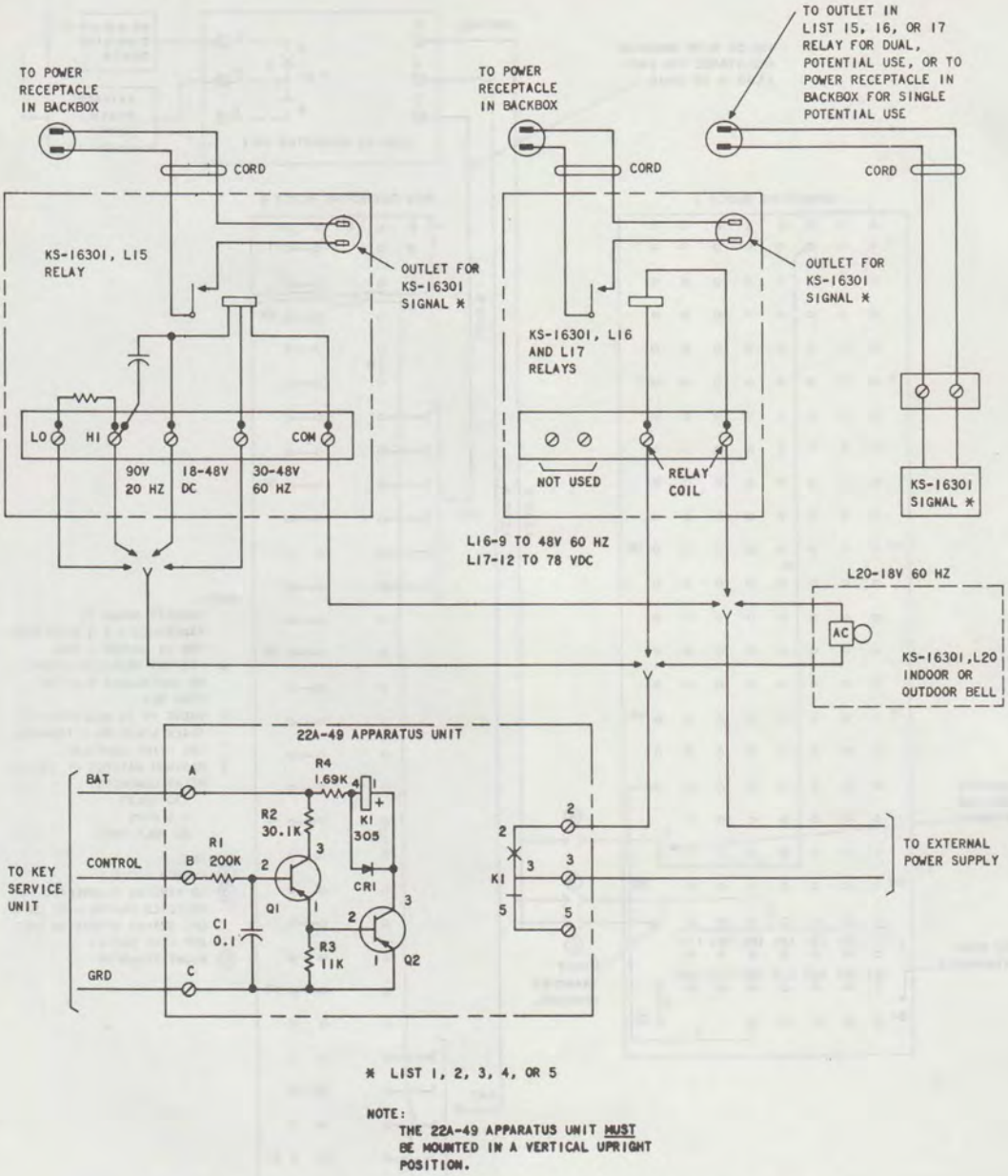


Fig. 26—Common Audible, Station Line Ringing or Ring Transfer Connections for External Signaling Circuit (22A-49 Apparatus Unit)



* LIST 1, 2, 3, 4, OR 5

NOTE:
THE 22A-49 APPARATUS UNIT MUST BE MOUNTED IN A VERTICAL UPRIGHT POSITION.

Fig. 27—Connections for 22A-49 Apparatus Unit and KS-16301 Type Signals

4.40 Any station may originate a preset conference call but only those stations wired for preset conference will be alerted. An attendant may use DSS code 39 if the attendant station is equipped with the optional DSS console. To use preset conference:

(1) Select idle intercom path and depress associated button.

(2) Lift handset.

(3) Dial code 39 (attendant may use DSS code 39 on DSS console)—tone burst signals all stations wired for preset conference.

(4) All preset conference stations will receive announcement simultaneously.

(5) Called stations must depress intercom line button and go off-hook to hold conference or talk to each other.

4.41 Connections for preset conference are made as follows:

(1) Locate the preset conference terminals, row 24, on connecting block 1 (Fig. 28).

(2) Locate the station code terminals, column D or H, on connecting block 1, and identify the terminals associated with the stations to be connected for preset conference (Fig. 28).

(3) Remove the factory-provided strap between terminals E24 and H17.

(4) Strap the terminals in the preset conference row to the desired station terminals in column D or H (Fig. 28).

(5) Test the preset conference arrangement by having code 39 dialed from a nonconference station and verifying that all conferenced stations are signaled.

Note: The preset conference diodes are located on connecting block 2 between rows 9 and 12 (Fig. 5).

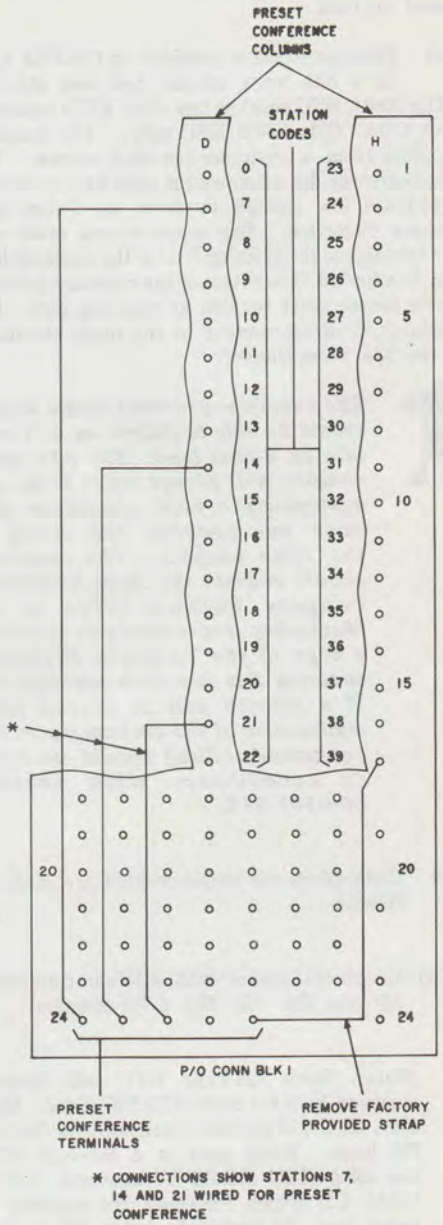


Fig. 28—Connections for Preset Conference on Intercom

D. Music-On-Hold

4.42 The music-on-hold feature transmits music (from a customer-provided music source) to

calling or called parties on CO/PBX lines that are placed on hold.

4.43 ▶Music-on-hold is provided on CO/PBX lines by a 33A voice coupler and two 451-type KTUs (580A KSU only) or two 498A KTUs equipped with 116A1 CMs (580B KSU only). The music is supplied from a customer-provided source. The customer-provided music source must have an output impedance low enough to drive an 8-ohm load without distortion. The music source must also be adjustable so the listening level of the music-on-hold may be adjusted. The output of the customer-provided music source must furnish ac coupling only, thus blocking all direct current to the input terminals of the 33A voice coupler.

The customer-provided music source should be able to deliver up to 1 watt into an 8-ohm load. The 33A voice coupler will accept input from any customer-provided apparatus that does not operate the fuses in the voice coupler. The customer should contact the local Telephone Company Business Office or the Marketing Representative to obtain a copy of the Technical Reference covering this interface specification. If a service call is caused by a malfunction of the customer-provided equipment, billing should be made in accordance with Section 660-101-312.

4.44 Connections for music-on-hold are made as follows:

(a) Install 451-type or 498A KTUs in connectors J27 and J29. See Fig. 3 for location.

Note: Each 451-type KTU will provide music-on-hold for seven CO/PBX lines. Each 498A KTU will provide music-on-hold for four CO lines. When used in a 580-type KSU, the 498A KTU should be equipped with a 116A1 CM which increases the capacity to seven lines. To install the 116A1 CM, remove the screw in the standoff on the 498A KTU, plug the CM into the KTU, and replace the screw to secure the CM.

(b) Install 33A voice coupler (Fig. 11) as follows:

(1) Remove cover from voice coupler.

Caution: Ensure that 35P fuses are installed with the springs at the bottom. If fuses are improperly installed, operated fuses may cause damage to customer's amplifier.

(2) Mount voice coupler externally to the KSU (wherever customer desires).

(3) Connect voice coupler to 580-type KSU as shown in Fig. 29.

(4) Have customer connect voice coupler to his music source as shown in Fig. 29.

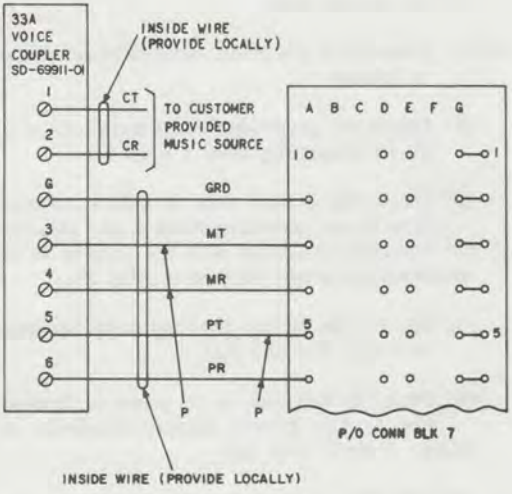


Fig. 29—Connections for 33A Voice Coupler

(5) Replace cover on voice coupler.

(c) Adjustment procedures for music-on-hold are as follows:

(1) Turn potentiometer on 33A voice coupler to full counterclockwise position.

(2) From any station, select a CO/PBX line, (eg, line 1) and dial a second CO/PBX line (eg, line 2).

(3) Leaving the handset off-hook at the first station, at a second 14A station, answer the incoming call and place call on HOLD.

(4) Return to the first station and have customer adjust his music source to a comfortable listening level while listening at the first station.

(5) Disconnect call making sure handsets are on-hook and all buttons are restored to the unoperated position.◀

E. ▶Flexible◀ Ring Transfer

4.45 The flexible ring transfer arrangement utilizes a 6041G key to permit any one of up to five stations or groups of stations to be selected for ring transfer of incoming CO/PBX calls.

4.46 To operate flexible ring transfer, depress button on the 6041G key associated with the station or stations to receive incoming CO/PBX calls. Then depress the RING TR button on the attendant station (locking it down). While the RING TR button on the attendant station is depressed, the lamp under it is lit (steady). To transfer ringing back to the attendant station, depress the RING TR button again (which releases it) and operate the HOLD button on the 6041G key.

4.47 To install flexible ring transfer:

(1) Install a 6041G key at the attendant station.

(2) Provide three cable pairs or six 24-gauge conductors between the 6041G key and the KSU.

(3) Connect one conductor (common lead) to terminal M of the 6041G key (see Fig. 23 or 30).

(4) Terminate the remaining conductors on terminals 1H, 2H, 3H, 4H, and 5H of the 6041G key, as required.

(5) At the KSU, terminate one conductor (common lead) on the RT terminal (column H, terminal 21) of connecting block 1.

(6) Terminate the remaining conductors on the terminals of connecting block 1, column C or column G, corresponding to the codes of the stations selected for ring transfer (see Fig. 23).

(7) Install designation strip on the 6041G key. Designate the HOLD button as RELEASE and label the remaining buttons, according to the stations they connect, for ring transfer.

Remember: Incoming ringing on the CO/PBX lines that have been removed from the common audible group cannot be transferred via the ring transfer arrangement.

4.48 To test flexible ring transfer:

(1) Depress a button on the 6041G key.

(2) Depress the RING TR button at the attendant station, locking it down—lamp under button lights (steady).

(3) Select an idle CO/PBX line, depress line button, lift handset and dial another CO/PBX line—station associated with the depressed button of the 6041G key rings (tone burst is heard).

(4) While CO/PBX line is ringing, depress other buttons on the 6041G key, making sure the station associated with each button rings.

(5) Depress RING TR button on the attendant station, releasing it—lamp under button goes off and tone ringing is heard at attendant station.

(6) Depress the RELEASE button on the 6041G key and replace handset.

Note: The lamps associated with the buttons of the 6041G key do not light.

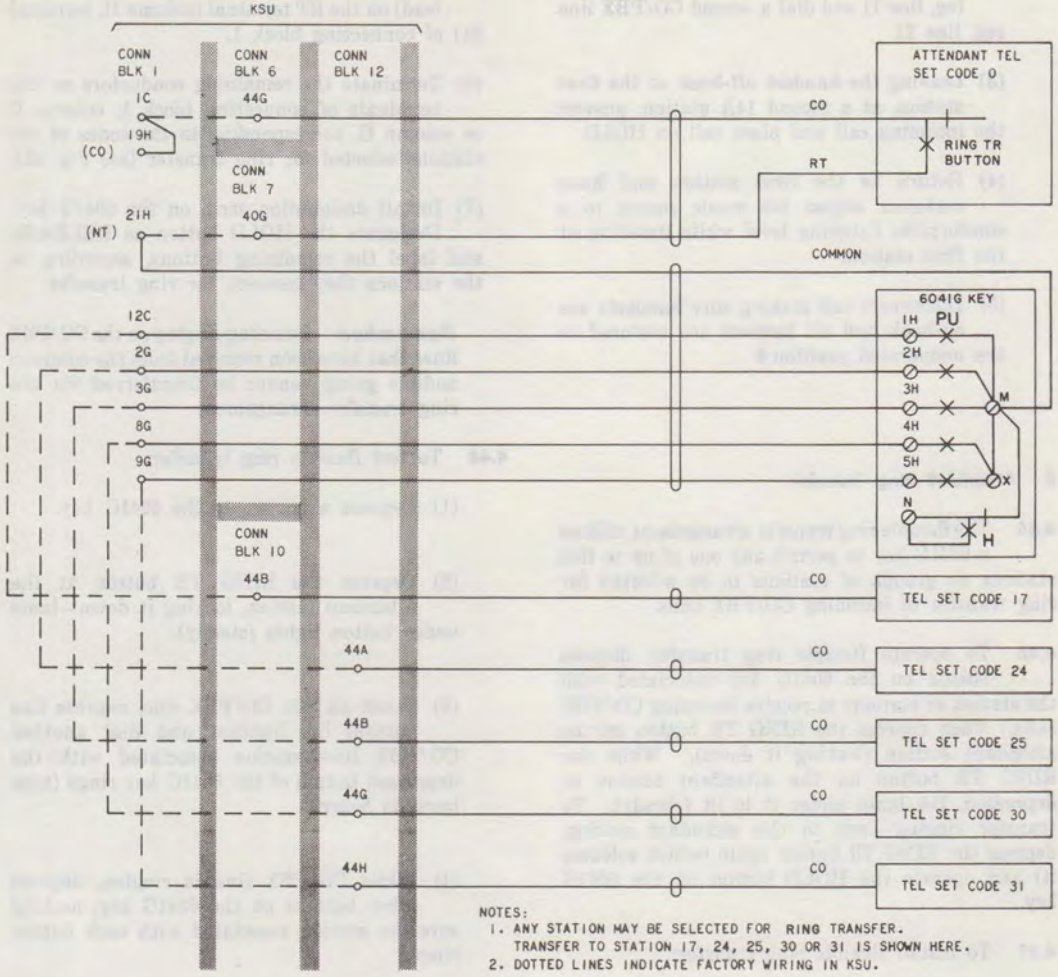


Fig. 30—Example of Connections for Flexible Station Ring Transfer

F. Loudspeaker Paging and Background Music

Paging

4.49 In the 14A System paging may be:

(a) Connected to as many as 21 loudspeakers, using indoor and outdoor speakers

(b) Provided in three separate zones or areas using as many as seven indoor and/or outdoor speakers for each zone

(c) Connected to a customer's paging system

(d) Connected to a separate paging system provided by the telephone company.

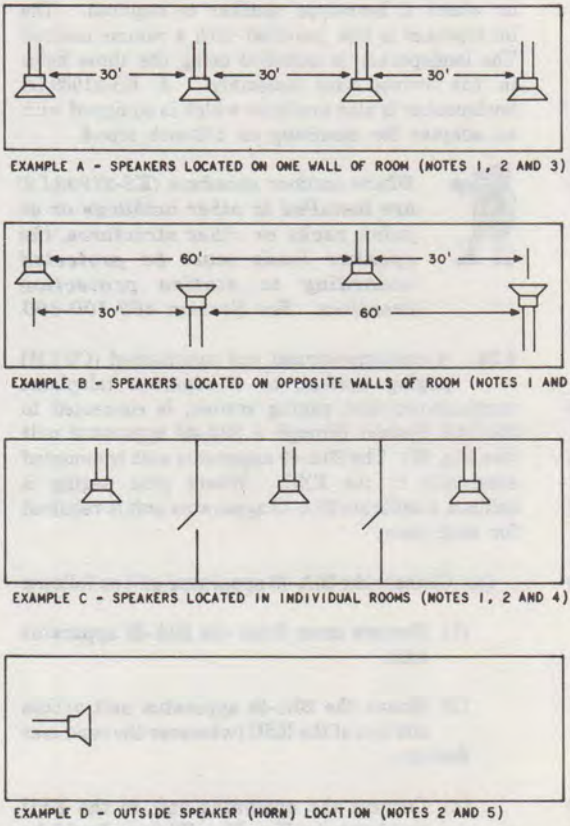
4.50 A paging system should be loud enough to be heard but not loud enough to annoy anyone located near the speakers. The number and locations of speakers are influenced mainly by the environment in which the speakers will be located. Fig. 31 shows several examples of speaker placement. Refer to Section 981-251-100 for information on loudspeaker paging systems. It may be necessary to experiment, on site, to achieve the desired results.

Caution: Avoid placing loudspeakers directly in front of or close to stations that will utilize the paging system. An undesirable oscillation (squeal) can result from such speaker placement. A separation of 60 feet between telephone sets and loudspeakers is recommended.

4.51 Paging may be activated by dialing an intercom code for each zone, by dialing an intercom code for two zones, or by dialing an intercom code for all zones or various combination of zones (see Table D). Intercom codes 4, 5, and 6 are used for paging, and straps must be placed on connecting block 3 to connect the codes. The diodes associated with the zone paging arrangement are located on connecting block 3 (see Fig. 6).

4.52 Connections for paging are made as follows:

(1) Install 457C KTUs (one for each zone or one for each seven speakers) in connectors



NOTES:
1. EXAMPLES A, B AND C ARE FOR QUIET OR OFFICE TYPE ENVIROMENTS, LESS THAN 65DB SOUND PRESSURE LEVEL (SPL). ALL SPEAKERS SHOULD BE LOCATED AT LEAST 60 FEET FROM ANY STATION USED FOR PAGING.
2. SPEAKER WIRING SHOULD BE RUN SEPARATELY, NOT PART OF A VOICE CABLE. QUAD CABLE SHOULD BE USED WITH BOTH PAIRS CONNECTED. SPEAKERS SHOULD BE HUNG AS CLOSE TO THE CEILING AS POSSIBLE. MAXIMUM SPEAKER DISTANCE FROM THE KSU IS 320 FEET USING QUAD WIRE.
3. SPEAKERS REACH A DEPTH OF 30 FT. IF ROOM IS OVER 30 FT. WIDE, FACING SPEAKERS SHOULD BE USED.
4. ONE SPEAKER WILL SERVE A ROOM UP TO 25 FT. BY 25 FT.
5. ONE SPEAKER (HORN) MOUNTED 20 FT. ABOVE GROUND LEVEL WILL COVER AN AREA APPROXIMATELY 80 FT. BY 100 FT. IF THE HORN IS MOUNTED LESS THAN 20 FT. ABOVE GROUND LEVEL, TWO HORNS MUST BE USED. HORNS SHOULD NOT BE MOUNTED LESS THAN 15 FT. ABOVE GROUND LEVEL. IF MORE THAN ONE HORN IS USED, THEY SHOULD BE MOUNTED VERTICALLY, RATHER THAN SIDE-BY-SIDE.

Fig. 31—Example of Paging Speaker Locations

TABLE D

CODE CONNECTIONS FOR ZONE PAGING

TO ACTIVATE AMPLIFIER	WITH CODE	CONN BLOCK 3 STRAP FROM TERM.	CONN BLOCK 3 STRAP TO TERM.
1st 457C KTU in Connector J28	4	4B	13A
	5	8B	13B
	6	12B	13C
2nd 457C KTU in Connector J30	4	4D	14A
	5	8D	14B
	6	12D	14C
3rd 457C KTU in Connector J32	4	4F	15A
	5	8F	15B
	6	12F	15C

J28, J30, and J32 in the KSU. See Fig. 3 for connector locations.

(2) Where background music is provided, install the 33A voice coupler according to 4.44(b).

(3) Install loudspeakers and connect them to the KSU using quad inside wire with both pairs connected (see Fig. 32). To stack leads on the connecting block terminals, use 183B2 adapters. Speaker wiring should be run separately and should not be part of a voice cable. Speakers, connected with 24-gauge quad inside wire (having both pairs connected), may be located a ***maximum of 320 feet*** from the KSU.

Note: If the customer does not have music-on-hold but does have background music, turn the potentiometer of the 33A voice coupler fully clockwise. Have the customer adjust his music to the desired level.

4.53 The ▶KS-21880,L1◀ (Fig. 12) or the K8 loudspeaker is an indoor speaker. It is wall-mounted or may be mounted over an outlet box. A mounting clip is furnished with the speaker. Indoor speakers should be hung as close to the ceiling as possible. To mount the speaker (see Fig. 12), screw mounting clip to wall or outlet box, slip speaker baffle over mounting clip and pull speaker down until it is firmly held by the mounting clip. Speaker volume is controlled by a potentiometer (with screwdriver adjustment slot) located in the bottom of the speaker. Adjust speaker volume after speaker is mounted.

Speaker volume will be affected by changes in room content. The addition of furniture, fixtures, draperies, carpeting or wall covering may necessitate increasing speaker volume.

4.54 ▶The KS-21939,L2 loudspeaker is applicable to locations with adverse weather conditions or where a horn-type speaker is required. The loudspeaker is also provided with a volume control. The loudspeaker is installed using the three holes in the swivel base assembly. A KS-21939,L3 loudspeaker is also available which is equipped with an adapter for mounting on 1/2-inch pipe.◀

Where outdoor speakers (KS-21939,L2) are installed in other buildings or on poles, racks or other structures, the speaker leads must be protected according to station protection practices. See Section 460-100-400.

4.55 A customer-owned and maintained (COAM) paging system, or a separate telephone company-provided paging system, is connected to the 14A System through a 20A-49 apparatus unit (see Fig. 33). The 20A-49 apparatus unit is mounted externally to the KSU. Where zone paging is utilized, a separate 20A-49 apparatus unit is required for each zone.

(a) Connect the 20A-49 apparatus unit as follows:

(1) Remove cover from the 20A-49 apparatus unit.

(2) Mount the 20A-49 apparatus unit within 200 feet of the KSU (wherever the customer desires).

(3) Connect the apparatus unit to the KSU as shown in Fig. 33. Wiring should be

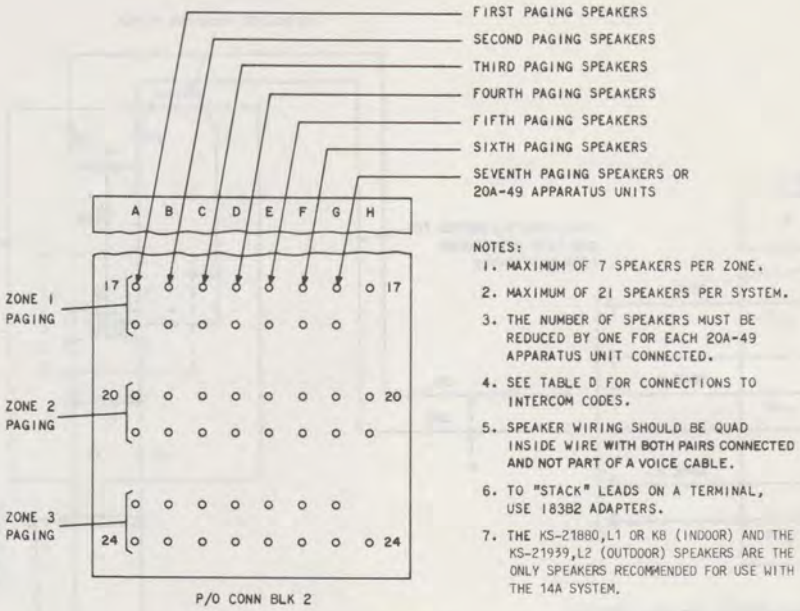


Fig. 32—Connections for Paging Speakers

run separately and not be a part of the voice cable.

(4) Have customer connect his paging system to the 20A-49 apparatus unit, using shielded wire, as shown in Fig. 33.

(5) Replace cover on the apparatus unit.

(b) Adjustment procedure for the 20A-49 apparatus unit is as follows:

(1) Turn potentiometer to the full counterclockwise position.

(2) Select an intercom line and dial the paging code associated with the apparatus unit.

(3) Using normal voice level, make test announcements while turning the potentiometer clockwise until a voice level suitable for the customer's equipment is reached.

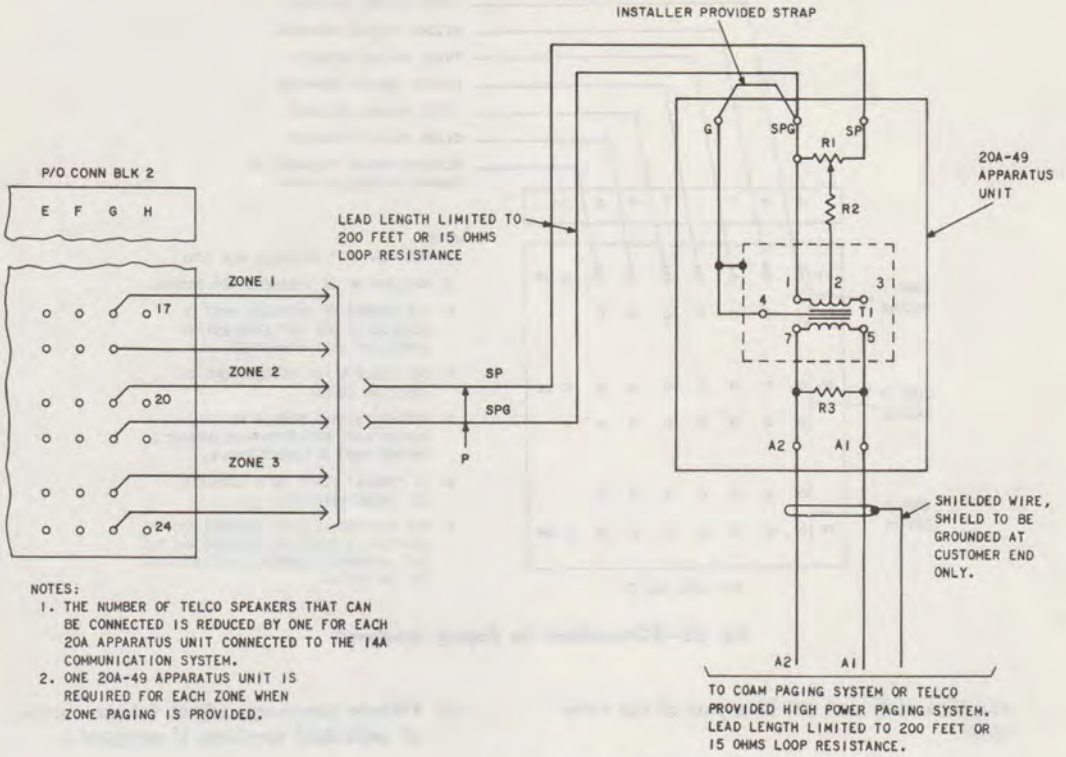
(4) Where necessary, adjust volume control of individual speakers, if equipped.

(5) Disconnect call.

Note: Where the customer's paging equipment has full control of the paging volume, turn the potentiometer of the 20A-49 apparatus unit to the full clockwise position.

(c) Where zone paging is provided, repeat the adjustment procedure for each zone.

The 20A-49 apparatus unit provides a nominal 300-ohm output to a customer-owned paging system. It does not provide a means to activate the customer's equipment; therefore, the customer's equipment must be in the ON mode at all times. If a service call is caused by a malfunction of the customer-provided equipment, billing should be made in accordance with Section 660-101-312.



NOTES:
1. THE NUMBER OF TELCO SPEAKERS THAT CAN BE CONNECTED IS REDUCED BY ONE FOR EACH 20A APPARATUS UNIT CONNECTED TO THE 14A COMMUNICATION SYSTEM.
2. ONE 20A-49 APPARATUS UNIT IS REQUIRED FOR EACH ZONE WHEN ZONE PAGING IS PROVIDED.

Fig. 33—Connections for 20A-49 Apparatus Unit

Background Music

4.56 When the paging system is not being used, a customer-provided music source may be used to provide background music over the paging speakers. For background music (or music-on-hold), a 33A voice coupler must be installed and connected between the KSU and the customer-provided music source (as described in 4.44). Music, from the customer's music source, is fed through the voice coupler to the 457C KTUs (amplifier circuits) and from the 457C KTUs to the paging speakers. When a paging code (code 4, 5, or 6) is dialed, the selector causes the amplifier circuit to switch to the paging mode, opening the music from the amplifier. On completion of the paging call, the amplifier circuit switches from the paging mode and restores the music to the amplifier and the paging speakers.

4.57 Alignment procedure for paging and background music is as follows:

(1) Dial paging code(s).

(2) While a test paging announcement is being made, adjust the potentiometer on each loudspeaker for desired speaker volume.

(3) Disconnect paging call.

(4) Have customer adjust the potentiometer on voice coupler for comfortable level of background music over paging system.

(5) Inform customer, after alignment is complete, that if any changes are made in the gain of his music source, the background music and music-on-hold will be affected.

Note: If the customer has paging and music-on-hold but does not want background music, the potentiometer on the voice coupler should remain in the counterclockwise position.

4.58 The alignment procedure for paging and background music with a COAM paging system will vary according to the type of equipment used by the customer. Where the customer-provided music source is connected directly to the paging system, the customer will make all adjustments. When the customer-provided music source is connected to the KSU through a 33A voice coupler, the following may be used as a guideline for alignment:

(a) Where the customer has paging and music-on-hold but does not have background music, adjust the potentiometer on the 33A voice coupler fully counterclockwise and adjust the potentiometer on the 20A-49 apparatus unit to suit the customer's paging equipment.

(b) Where the customer has paging and background music but does not have music-on-hold, adjust the potentiometer of the 33A voice coupler fully clockwise and adjust the potentiometer on the 20A-49 apparatus unit to suit the customer's paging equipment.

G. Power Failure Ringer

4.59 Where power failure ringing is provided, a power failure ringer (E1C) must be installed near the telephone sets designated to answer incoming calls in the event of a power failure. Connections (Fig. 34) may be made by one of the following methods:

(1) From telephone set terminals 20 and 21 to E1C ringer terminals 5 and 6 (using inside wire).

(2) From A50B cable connector (using adapter) pins 25 and 50 to E1C ringer terminals 5 and 6 (using inside wire).

(3) From connecting block 6, terminals 49 and 50, column H; or connecting blocks 8, 10, 12, or 14, columns A through H, rows 49 and 50 (see Fig. 8 for specific station code block and columns).

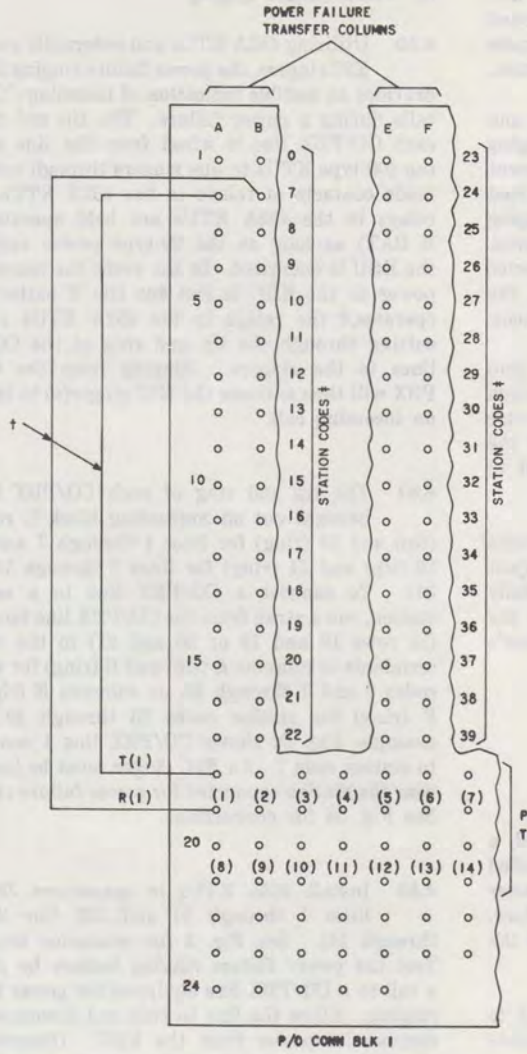
H. Power Failure Ringing

4.60 Utilizing 452A KTUs and externally mounted E1C ringers, the power failure ringing feature provides an audible indication of incoming CO/PBX calls during a power failure. The tip and ring of each CO/PBX line is wired from the line side of the 400-type KTUs to line ringers through normally made contacts of relays in the 452A KTUs. The relays in the 452A KTUs are held operated (by B BAT) as long as the 29-type power supply in the KSU is energized. In the event the commercial power to the KSU is lost or the B battery fuse operates, the relays in the 452A KTUs release, cutting through the tip and ring of the CO/PBX lines to the ringers. Ringing from the CO or PBX will then activate the E1C ringer(s) to indicate an incoming call.

4.61 The tip and ring of each CO/PBX line is brought out on connecting block 1, rows 18 (tip) and 19 (ring) for lines 1 through 7 and rows 20 (tip) and 21 (ring) for lines 8 through 14 (Fig. 34). To connect a CO/PBX line to a selected station, run a strap from the CO/PBX line terminals (in rows 18 and 19 or 20 and 21) to the station terminals in columns A (tip) and B (ring) for station codes 0 and 7 through 22, or columns E (tip) and F (ring) for station codes 23 through 39. For example, Fig. 34 shows CO/PBX line 1 connected to station code 7. An E1C ringer must be installed near the station connected for power failure ringing. See Fig. 34 for connections.

4.62 Install 452A KTUs in connectors J31 (for lines 1 through 7) and J33 (for lines 8 through 14). See Fig. 3 for connector locations. Test the power failure ringing feature by placing a call to a CO/PBX line equipped for power failure ringing. Allow the line to ring and disconnect the commercial power from the KSU. Observe that the E1C ringer is activated by ringing supplied by the CO or PBX. Repeat test for all CO/PBX lines equipped for power failure ringing.

Note: If it is necessary to test the power failure ringing feature while the customer is using the 14A System, instead of disconnecting the commercial power from the KSU, remove fuse 12 from the 29-type power supply (see Table K).



* - NUMBERS SHOWN IN PARENTHESIS ( ) REPRESENT THE 14 INCOMING CO/PBX LINES. NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON THE BLOCK.

† - CONNECTIONS SHOWN PROVIDE POWER FAILURE IN THE STATION CABLE FOR STATION 7. FOR EACH STATION EQUIPPED WITH POWER FAILURE TRANSFER, AN EXTERNAL RINGER (EIC) MUST BE INSTALLED.

‡ - A GIVEN STATION MAY PICK UP ONLY ONE POWER FAILURE LINE.

§ - USE INSIDE WIRE FOR RINGER CONNECTIONS.

CONNECT POWER FAILURE RINGER (EIC) BY ONE OF THE FOLLOWING METHODS:

	FROM TEL SET TERMINAL	TO RINGER TERMINAL	LEAD DESIGNATION
1 §	20	5	ER
	21	6	ET
2 §	FROM A50B CABLE CONNECTOR (USING ADAPTER)	TO RINGER TERMINAL	LEAD DESIGNATION
	PIN 25	5	ER
	PIN 50	6	ET
3 §	FROM CONN BLK 6,8,10, 12 OR 14 IN KSU	TO RINGER TERMINAL	LEAD DESIGNATION
	TERM 50	5	ER
	TERM 49	6	ET

Fig. 34—Connections for Power Failure Ringing

I. Privacy

4.63 Privacy prevents a station, so equipped, from bridging into a CO/PBX call. Privacy is a station feature and each station to be excluded (locked out) must be equipped with a privacy circuit board. The privacy circuit operates only when that telephone set attempts to bridge onto a busy CO/PBX line (line lamp lit steady).

4.64 The privacy circuit is ***not*** operational when a CO/PBX line is ringing, on hold, or not in use. The privacy circuit does not operate on the intercom paths.

4.65 The privacy circuit monitors the "A" lead to determine the status of CO/PBX line. A ground or positive potential on the "A" lead indicates the line is busy and operates the privacy circuit. Any station equipped with a privacy circuit attempting to bridge in will be excluded. A negative potential on the "A" lead does not cause the privacy circuit to operate.

4.66 A privacy circuit, D-180486 kit of parts, must be added to an 833A/2833A(MD), 833C/2833C(MD), 833CM/2833CM, or 833EM/2833EM telephone set used as a privacy station. The 833/2833B-, BM-, and DM-type telephone sets are wired at the factory with the privacy circuit operational. To install the D-180486 kit of parts:

(1) Remove faceplate from telephone set.

(2) Mount privacy circuit board on the two standoffs located at the left front of the telephone set base (Fig. 35).

(3) Fasten circuit board to standoffs using mounting screws furnished with the telephone set.

(4) Connect leads according to Table E.

(5) Make sure all connections are tight and terminals are not crossed or shorted. Close telephone set.

(6) Test the operation of the privacy circuit in the following manner:

(a) At station being tested, lift handset and depress a CO/PBX line button on an idle line—dial tone should be heard.

(b) Operate dial to break dial tone (unless station being tested is a restricted station).

(c) Replace handset.

(d) At a second station, lift handset, depress a CO/PBX line button on an idle line, and leave handset off-hook.

(e) At station being tested, lift handset and depress same CO/PBX line button as on the second station—dial tone should not be heard.

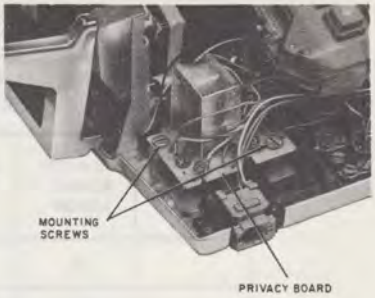


Fig. 35—Privacy Circuit Board Mounted in Telephone

(f) Replace handset at both stations.

(g) At station being tested, lift handset and depress an intercom line button on an idle intercom path—dial tone should be heard.

(h) Operate dial to break dial tone.

(i) Replace handset and make sure all line buttons are restored at station being tested and all other stations used during testing.

(j) Test all stations equipped with a privacy circuit.

4.67 To convert a privacy station to a nonprivacy station, it is necessary to open the telephone set and remove the O lead of the privacy circuit board from terminal 8 on the telephone set terminal board and insulate and store (Table F). The O lead of the privacy circuit board is the privacy circuit power lead.

Note: If privacy is being removed from the entire system, remove fuses 42 through 45 on the KSU power panel rather than rewiring each set. Stations 0 and 7 must still be rewired since the fuse for these stations also serves the DSS feature.

J. Privacy Release

4.68 Privacy release is a feature which permits a station to allow another station equipped with a privacy circuit to bridge into a CO/PBX

TABLE E

833A/2833A(MD), 833C/2833C(MD), 833CM/2833CM, AND 833EM/2833EM TELEPHONE SET CONNECTIONS FOR PRIVACY CIRCUIT (D-180486 KIT OF PARTS)

TEL SET LEADS	PRIVACY BOARD LEADS	CONNECT TO TEL SET TERM.	MOVE LEAD	
			FROM TEL SET TERM.	TO PRIVACY BOARD TERM.
	O	8		
	BR	F on net.		
	S*	15		
	BK	12		
	BL	6		
R			13	P2
G-W			13	P1
Y			6	R1
O			F on net.	T

* In the 833A and 2833A telephone sets only, store (S) lead under screw terminal S2 on privacy board when privacy release is provided.

TABLE F

TELEPHONE SET CONNECTIONS TO DISABLE PRIVACY CIRCUIT

COLOR	MOVE LEAD IN TEL SET	
	FROM TERM.	Insulate and Store
0	8	

call. When any station is off-hook with a CO/PBX line button depressed, all stations equipped with a privacy circuit will be locked out from that CO/PBX line. Only stations equipped with a privacy release (PRIV RLS) button can allow a privacy station to bridge into a CO/PBX call.

4.69 To permit a privacy-equipped station to bridge into a CO/PBX call:

(1) Depress (and hold down) the PRIV RLS button.

(2) Observe that CO/PBX line lamp changes from steady to wink.

The CO/PBX line lamp changing from steady to wink is an indication for the privacy-equipped station to bridge into the call.

(3) Observe that CO/PBX line lamp changes from wink to steady, which indicates privacy-equipped station has bridged into the call.

(4) Release the PRIV RLS button.

4.70 To allow an additional privacy-equipped station to bridge into a CO/PBX call, both stations must depress their PRIV RLS buttons simultaneously. When the PRIV RLS buttons are depressed, the line lamp will change from steady to wink. As the third station bridges into the call, the line lamp will become steady. The PRIV RLS buttons are then released.

4.71 The 833A/2833A(MD), 833B/2833B(MD), 833BM/2833BM, and 833DM/2833DM telephone sets have factory-provided privacy release buttons. The privacy release button in the 833A/2833A(MD) sets must be connected in the field (see Table G). The privacy release button in the 833B/2833B(MD), 833BM/2833BM, and 833DM/2833DM sets is factory-connected.

4.72 Where privacy release is no longer desired, the privacy release button may be disabled by opening the telephone set and moving the O-BK lead of the privacy release button from telephone set terminal 10 to terminal 15 (see Table H).

K. Speakerphone

4.73 Normal speakerphone service may be provided at all stations in the 14A System. Connect the speakerphones as follows.

(a) ***3B Speakerphone:*** Connect the D10R cord between the telephone set and the 55B control unit. Connect the 666B transmitter, 760A loudspeaker, and 2012B transformer to the 55B control unit. See Table I for connections. Plug 2012B transformer into ac receptacle. (Refer to Section 512-620-487 for illustrations and more detailed information on 3B speakerphone connections.)

(b) ***4A Speakerphone:*** Install 223A adapter within cord length (7 feet) of telephone set. Connect M16C cord to telephone set as shown in Table J. Plug loudspeaker, transmitter, and power cords into 223A adapter. Plug 85B1 power unit into ac receptacle. (Refer to Section 512-740-471 for illustrations and more detailed information on 4A speakerphone connections.)

Note: Speakerphone does not prevent normal operation of a telephone set.

4.74 To originate a call using the 3B or 4A speakerphone:

(1) Depress line button associated with an idle CO/PBX line.

(2) Momentarily depress transmitter ON button. ON lamp lights and dial tone is heard through the loudspeaker.

TABLE G

833A/2833A TELEPHONE SET CONNECTIONS FOR PRIVACY RELEASE BUTTON

LEAD COLOR	REMOVE LEAD FROM TEL SET TERMINAL	CONNECT LEAD TO	
		TEL SET TERMINAL	PRIVACY BOARD TERMINAL
BK*	15	2§	S2
S†	15		S2
BK-BL‡	27	15	
G-W‡	27	2§	S2

* Tel set lead.

† If tel set has a privacy circuit and privacy release circuit is now being added.

‡ Leads from privacy release key.

§ If tel set does not have privacy circuit.

TABLE H

TELEPHONE SET CONNECTIONS TO DISABLE PRIVACY RELEASE BUTTON

COLOR	MOVE LEAD IN TEL SET	
	FROM TERM.	TO TERM.
O-BK	10	15

(3) Dial number in normal manner.

(4) When called party answers, transmitter and loudspeaker are used to carry on the conversation. Adjust volume level as desired.

4.75 To answer an incoming call using the 3B or 4A speakerphone:

(1) When audible tone indicates an incoming call, depress CO/PBX button associated with flashing lamp; or when notified by the attendant of an incoming call, depress the CO/PBX line button associated with the line indicated.

(2) Momentarily depress the transmitter ON button (audible signal is silenced) which connects speakerphone to the line.

(3) Answer call using transmitter. Transmitter and loudspeaker are used to carry on the conversation. Adjust the volume level as desired.

4.76 To disable transmitter when it is not desirable to transmit conversation from the surrounding area to the distant station:

(1) Depress transmitter ON button during entire period transmitter is to be disabled.

Note: With transmitter disabled, conversation will not be transmitted to the distant station; however, the distant party may be heard over the loudspeaker.

(2) Release the ON button and system is restored to hands-free operation.

4.77 To transfer from handset to speakerphone operation:

(1) Put CO/PBX line on hold.

(2) Replace handset.

(3) Turn speakerphone on.

(4) Depress line button.

4.78 To transfer from speakerphone to handset operation, lift handset and call is automatically transferred to handset. When it is desired to transfer back to speakerphone operation, refer to 4.77 to prevent disconnect.

4.79 To terminate a call on speakerphone, momentarily depress the transmitter OFF button and ***restore any depressed line buttons.***

4.80 Use the RECALL button for flashing instead of the switchhook. It is necessary to hold line button depressed if switchhook is used for flashing in order to avoid dropping the line.

L. Station Busy Console (7A1) With DSS

4.81 After selecting an idle intercom line and depressing the appropriate button on the 7A1 console, an attendant may signal any station over the intercom or make announcements over the paging system. The console also provides the attendant with a visual indication of a busy station. Thirty-three buttons in the DSS field on the console correspond to the station codes (codes 7 through 39); three buttons are associated with paging, one button is arranged for recall, and three buttons are spare (Fig. 9).

Note: The schematic for the 7A1 selector console is located at the end of this section.

4.82 Any station having the handset off-hook lights a lamp under the associated button on the 7A1/DSS console as a visual indication of a busy station. The operated switchhook contacts of a telephone set extend ground over an SB( ) lead, through the KSU, to the 7A1 console, thus lighting the lamp under the associated button in the DSS field.

4.83 To perform DSS from the 7A1 console:

(1) Lift handset on the associated telephone set.

TABLE I

3-TYPE SPEAKERPHONE CONNECTIONS

LEAD DESIG	CORD COLORS			CONNECT LEADS FROM				CONNECT LEADS TO 55B CONTROL UNIT TERM. ‡
	DIOR	T7A	R2FK	TEL SET TERM.	TRMTR TERM.	LSPK TERM.	TRNSF TERM.	
P4¶¶	W-S			24				13
IR†								6
P3¶¶	S-W			30				4
IT†								15
T1	W-BL			25†				1
				RR§¶¶				
R1	BL-W			6				10
LK	W-BR			29				35
AG	BR-W			8				11
A1	W-G			10				2
	O-W			19¶				32
	W-O			**				23
LK	G-W*	BK-O			8			35
F1		G-Y			7			17
S		O-BK			5			18
A1		Y-O			6			19
M2		BK-S			3			16
P1		BL-R			2			8
M1		S-BK			1			7
SP2			G			††		20
SP1			R			††		29§§
TF1							‡‡	27
TF2							‡‡	36

* Insulate and store G-W lead.
† For TOUCH-TONE telephone set.
‡ Strap terminal 4 and 5 on control unit when used with TOUCH-TONE telephone sets.
§ Located on network.
¶ Also remove W-S lead from telephone set amplifier terminal 1 and connect it to terminal 19.
** Connect W-O lead to terminal 1 on telephone set amplifier.
†† Loudspeaker terminals are not designated.
‡‡ Use inside wire. Transformer terminals are not designated.
§§ Connect lead to terminal 30 if a reduction in volume is desired.
¶¶ For rotary dial telephone set.

Note: Move O lead from tel set terminal 27 to terminal 22 when using tel sets equipped with new line switch.

TABLE J

4-TYPE SPEAKERPHONE CONNECTIONS

M16C CORD		TEL SET LEAD	REMOVE FROM AMPLIFIER TERM.	CONNECT TO	
LEAD DESIG	LEAD COLOR			TEL SET TERM.	AMPLIFIER TERM.
A1	W-BR			10	
AG	W-O			8	
R1	BL-W			6	
T1	W-BL			25* RR† (on net.)	
IR* P4†	G-W			24	
IT* P3†	W-G			30	
LK	O-W			29	
		W-S	1	19‡	
	S-W			19‡	
	BL-R				1

* TOUCH-TONE telephone sets.

† Rotary telephone sets.

‡ Spare terminal.

(2) Select idle intercom path and depress intercom button.

(3) On the 7A1 console, momentarily depress button on DSS field corresponding to intercom station code of desired station—tone burst signals called station.

(4) Announcement may now be made to called station (or line held until called station answers).

If second call is to be made or call is for another station, proceed as follows:

(1) Momentarily depress RECALL button on DSS console—dial tone will be returned.

(2) Momentarily depress button on DSS field corresponding to desired station—tone burst signals called station.

(3) Announcement may now be made to called station (or line held until called station answers).

Note: The selector may be repeatedly recalled (without losing the seized intercom path) by repeatedly depressing the RECALL button (on the DSS console) and a DSS button. If intercom call is answered at any point, caller must either hang up and start over or depress the RECALL button on the associated telephone set.

4.84 To page from the 7A1/DSS console:

(1) Lift handset on associated telephone set.

(2) Select an idle intercom path and depress intercom button.

(3) Select PAGE button on DSS console associated with zone to be paged.

(4) Momentarily depress PAGE button—tone burst will be heard over paging system loudspeakers.

Note: Where zone paging is not provided, momentarily depress the button designated for paging.

(5) Speak into handset transmitter to make announcement.

(6) Replace handset.

4.85 The A50B connector cable from the 7A1/DSS console is cut down on connecting blocks 6 and 7, column E, using standard cutdown. See Fig. 36 for connections. ***The D0 to D1 (26E to 27E) and CG0 to CG1 (40E to 41E) straps on connecting block 6 must be removed when the console is installed and replaced if the console is removed.***

M. Station Busy Console (7B1) With MW

4.86 By depressing the appropriate button on the 7B1 console, an attendant may light the lamp under the HOLD button of a station to indicate there is a message waiting for the station user. The console also provides the attendant with a visual indication of a busy station. Thirty-three buttons in the message waiting field on the console correspond to the station codes (7 through 39); seven buttons are not used (Fig. 10).

Note: The schematic for the 7B1 selector console is located at the end of this section.

4.87 When a station is unattended and the station user is to be informed of a message, the attendant selects and depresses the button, on the message waiting console, associated with the user's station. The button on the console will lock down causing the lamp under the HOLD button of the station user's telephone set to light (steady). The lighted HOLD button alerts the station user to call the attendant. When the station user calls the attendant, the attendant conveys the message to the station user, then depresses the associated MW button on the console to restore it. When the associated button on the message waiting console is restored, the lamp under the HOLD button of the station user's telephone set is extinguished.

4.88 The station busy feature of the 7B1/MW console is identical to the 7A1/DSS console features described in 4.82.

4.89 The A50B connector cable from the message waiting console is cut down on connecting blocks 6 and 7, column D, using standard cutdown. See Fig. 37 for connections. The factory-provided straps on connecting block 6 (26E to 27E and 40E to 41E) must be in place when the 14A System is not equipped with a DSS console.

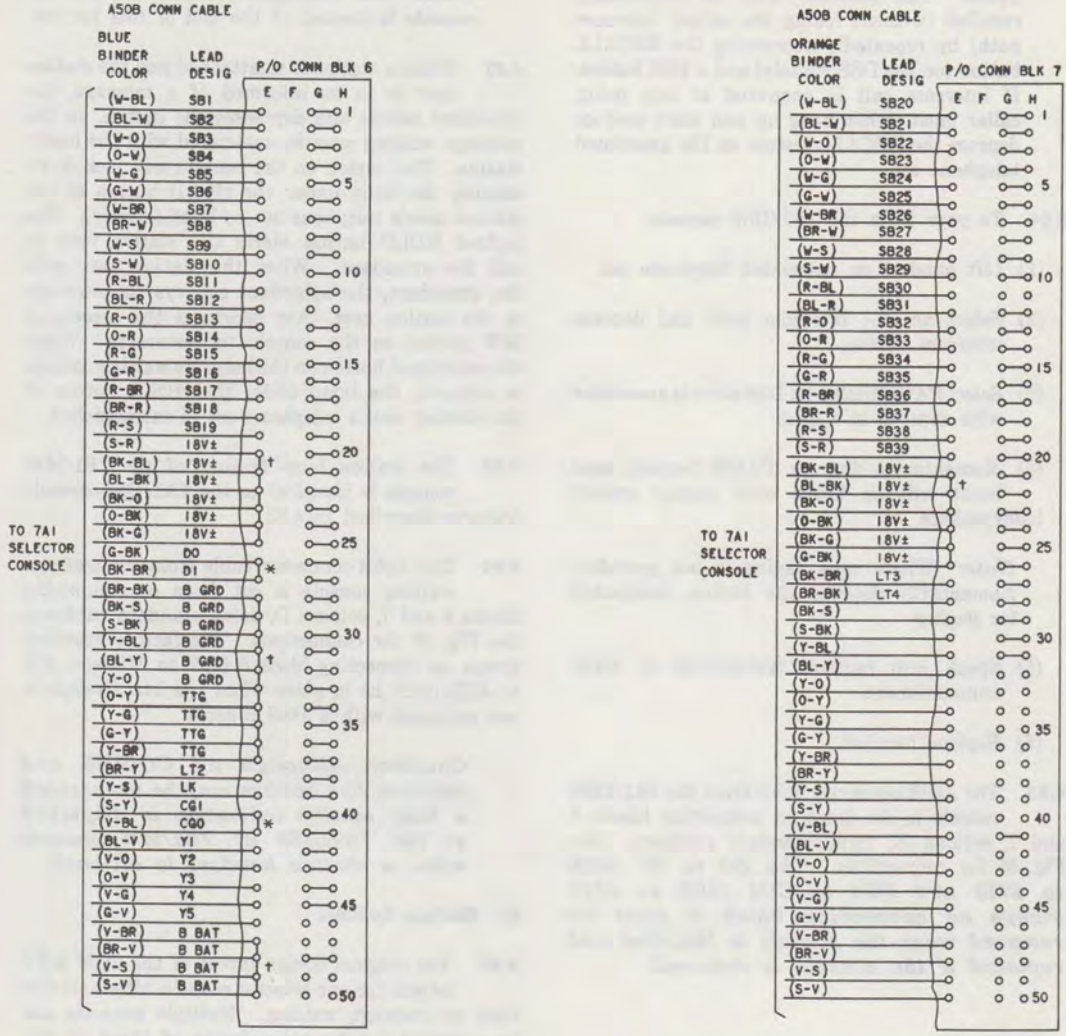
Caution: Although all CO/PBX and intercom line buttons may be unoperated, a busy station indication is displayed at the 7A1/DSS or 7B1/MW console when a station handset is off-hook.

N. Multiple Consoles

4.90 The original design intent of the COM KEY 14 was for one selector console, either station busy or message waiting. Multiple consoles can be provided (up to a maximum of three of any combination); but additional power and, in some cases, additional terminations are required.

Note: When more than one MW console is installed, the MW signal can only be retired at the console originating the signal since the key must be physically released.

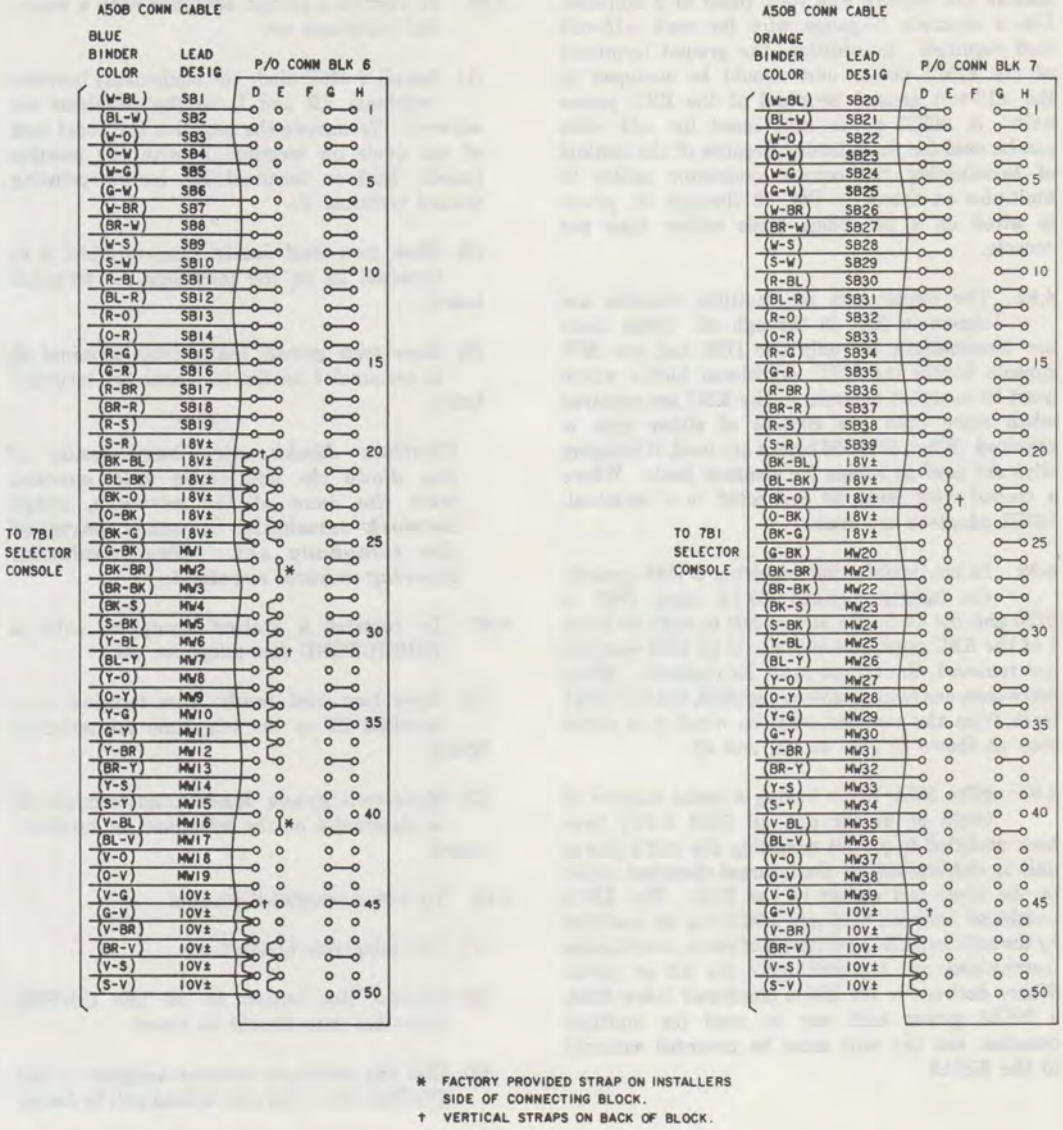
4.91 The additional power is required because the ±18-volt supply in the KSU is capable of powering only one console. Each additional



* FACTORY PROVIDED STRAPS MUST BE REMOVED WHEN CONSOLE IS CONNECTED. IF CONSOLE IS REMOVED, THE STRAPS MUST BE REPLACED.

† VERTICAL STRAPS ON BACK OF BLOCK

Fig. 36—Connections for 7A1 Selector Console (Station Busy Console With DSS)



* FACTORY PROVIDED STRAP ON INSTALLERS SIDE OF CONNECTING BLOCK.
† VERTICAL STRAPS ON BACK OF BLOCK.

Fig. 37—Connections for 7B1 Selector Console (Station Busy Console With MW)

console will require ±18 volts fused at 2 amperes. Use a separate 18-gauge wire for each ±18-volt lead required. In addition, the ground terminals of the 215C1 power unit should be strapped to the ±18-volt ground terminal of the KSU power unit. A 215C1 power unit fused for ±18 volts can be used for three leads. Because of the method of terminating the console connector cables in multiples as shown in Fig. 38 through 44, power is wired on a per block basis rather than per console.

4.92 The connections for multiple consoles are shown in Fig. 38 through 44. Since there are terminations for only one DSS and one MW console within the KSU, additional blocks which must be mounted external to the KSU are required when more than one console of either type is required. When 66M1-50 blocks are used, B bridging clips are used as straps for common leads. Where a second wire must be connected to a terminal, 183B2 adapters are used.

4.93 In any installation requiring a DSS console, the factory-provided D0-D1 strap (26E to 27E) and the CG0-CG1 strap (40E to 41E) on block 1 of the KSU must be removed. If all DSS consoles are removed, the straps must be replaced. When more than one DSS console is required, the CG0-CG1 leads from the consoles must be wired in a series loop as shown in Fig. 40, 41, and 42.

4.94 ◗The 580A KSUs having a serial number of 14425 or higher and all 580B KSUs have been modified to permit mounting the 215C1 power unit on the bracket for the internal electrical outlet in the lower left corner of the KSU. The KSUs numbered between 8296 and 14424 can be modified by the addition of a D-180759 kit of parts. Installation instructions are included with the kit of parts. Where desired, or for KSUs numbered below 8296, a 215B1 power unit can be used for multiple consoles, but the unit must be mounted external to the KSU.◖

O. Station Restriction

4.95 Station restriction prevents a station from dialing on CO/PBX lines. Station restriction does not prevent dialing on intercom lines and has no effect on incoming calls.

4.96 To restrict a station equipped with a rotary dial telephone set:

(1) Install a 446F diode (or equivalent) between terminals RR and F on the telephone set network. Terminate the negative (cathode) lead of the diode on terminal F with the positive (anode) lead on terminal RR (arrow pointing toward terminal F).

(2) Move ***two red leads*** from terminal 4 to terminal 22 on the telephone set terminal board.

(3) Move ***two green leads*** from terminal 22 to terminal 4 on the telephone set terminal board.

Caution: Make sure bare leads of the diode do not come into contact with the case of the network, other network terminals, or other parts of the telephone set. Use insulating sleeving where required.

4.97 To restrict a station equipped with a TOUCH-TONE dial telephone set:

(1) Move ***two red leads*** from terminal 4 to terminal 22 on the telephone set terminal board.

(2) Move ***two green leads*** from terminal 22 to terminal 4 on the telephone set terminal board.

4.98 To test a restricted station:

(1) Lift telephone handset.

(2) Depress line button on an idle CO/PBX line—dial tone should be heard.

(3) Dial the telephone number assigned to the CO/PBX line—dial tone should still be heard.

(4) Operate switchhook—CO/PBX line button restores.

(5) Depress line button on an idle intercom line—dial tone should be heard.

(6) Dial an intercom station code—tone burst signals the called station.

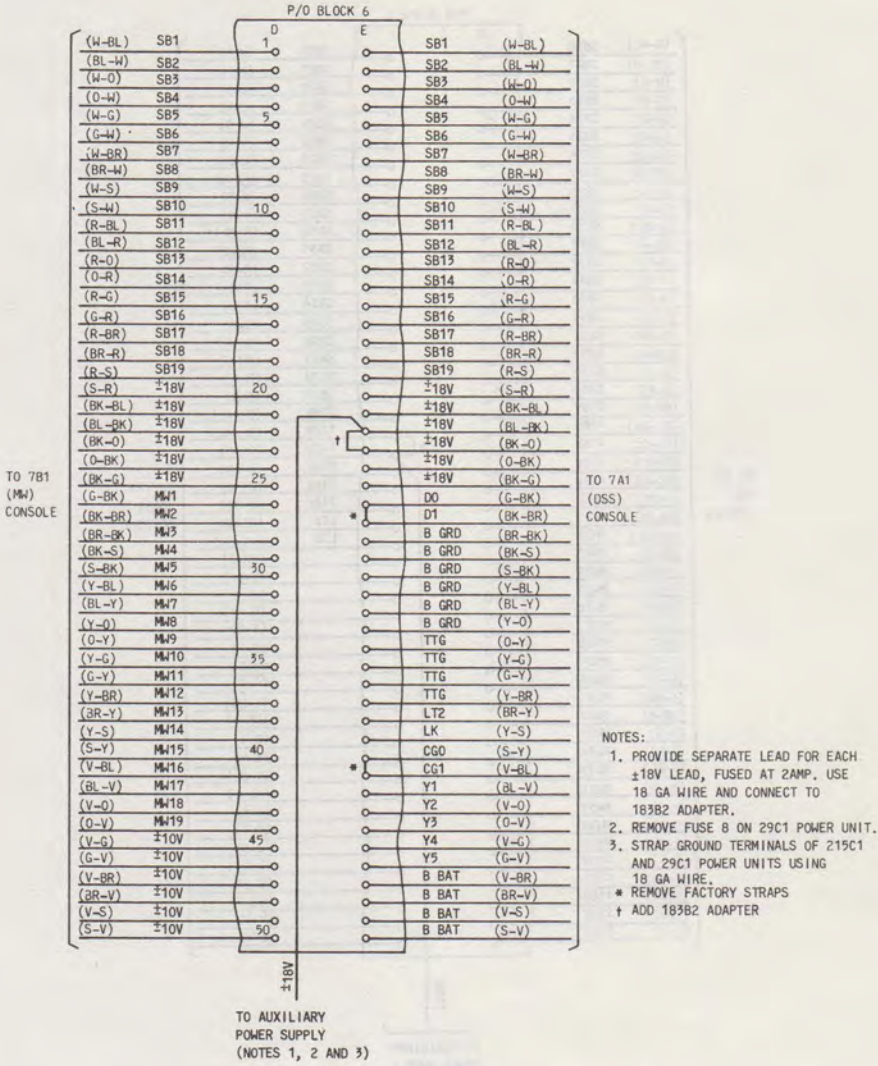


Fig. 38—Connections for One MW and One DSS Console (Sheet 1 of 2)

(7) Place handset on-hook—intercom line button restores.

P. TOUCH-TONE Adapter

4.99 Where TOUCH-TONE dial telephone sets are used with the 14A System, a 440A or 478B KTU (TOUCH-TONE adapter) is required. The 440A and 478B KTUs are the only TOUCH-TONE adapters usable in this system and are installed in connectors J21 and J22. See Fig. 3 for KTU location. The adapter is used to convert the multifrequency signals from the TOUCH-TONE telephone set dial to contact closures which supply

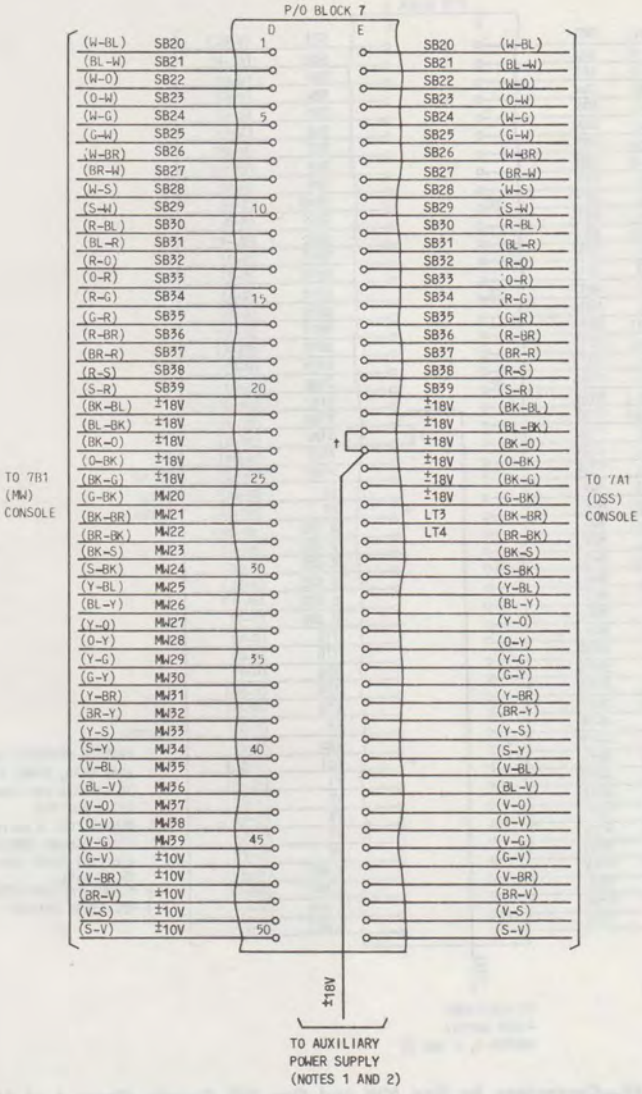


Fig. 38—Connections for One MW and One DSS Console (Sheet 2 of 2)

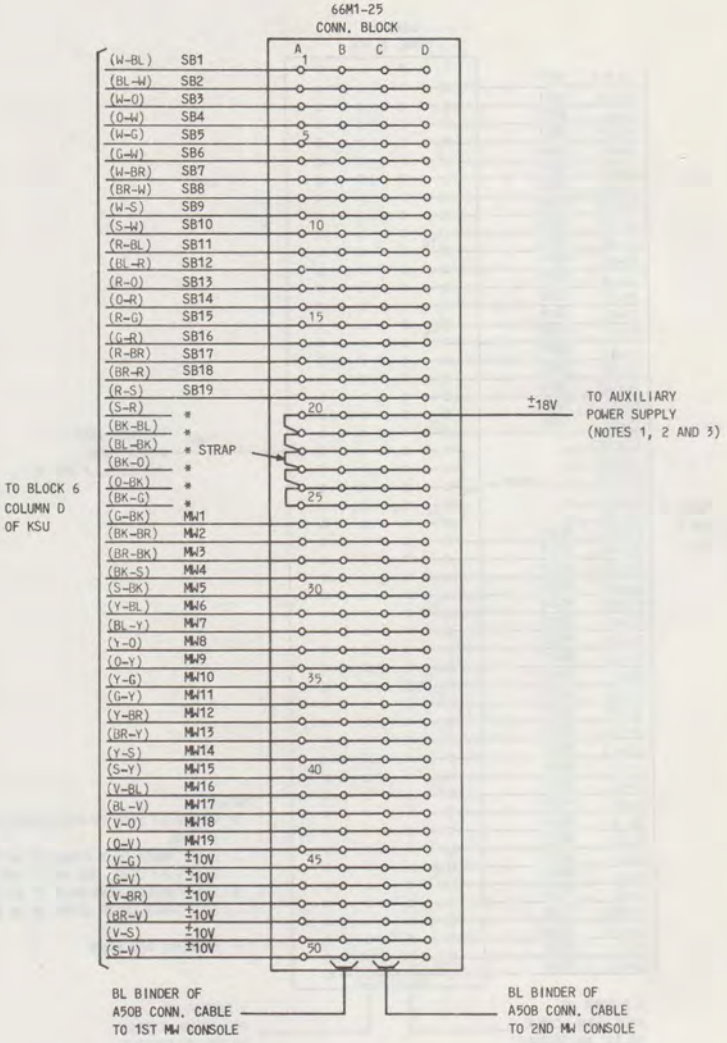


Fig. 39—Connections for Two MW Consoles (Sheet 1 of 2)

ground to the proper leads in the code selector circuit, 424C KTU. If the 580-type KSU has not been modified to provide A and B grounds for using the 478B KTU (serial number 6184 or higher), the kit of parts supplied with the 478B KTU must be installed. Instructions are packed with the KTU. ▶If the KTU is equipped with the plug-type option block, make sure the plug is inserted between B and C (Y option). If the KTU is equipped with a screw-type option, make sure the screw is in the option position.◀

4.100 ***The factory-provided strap, RS1 to CG (terminal H23 to terminal H24),***

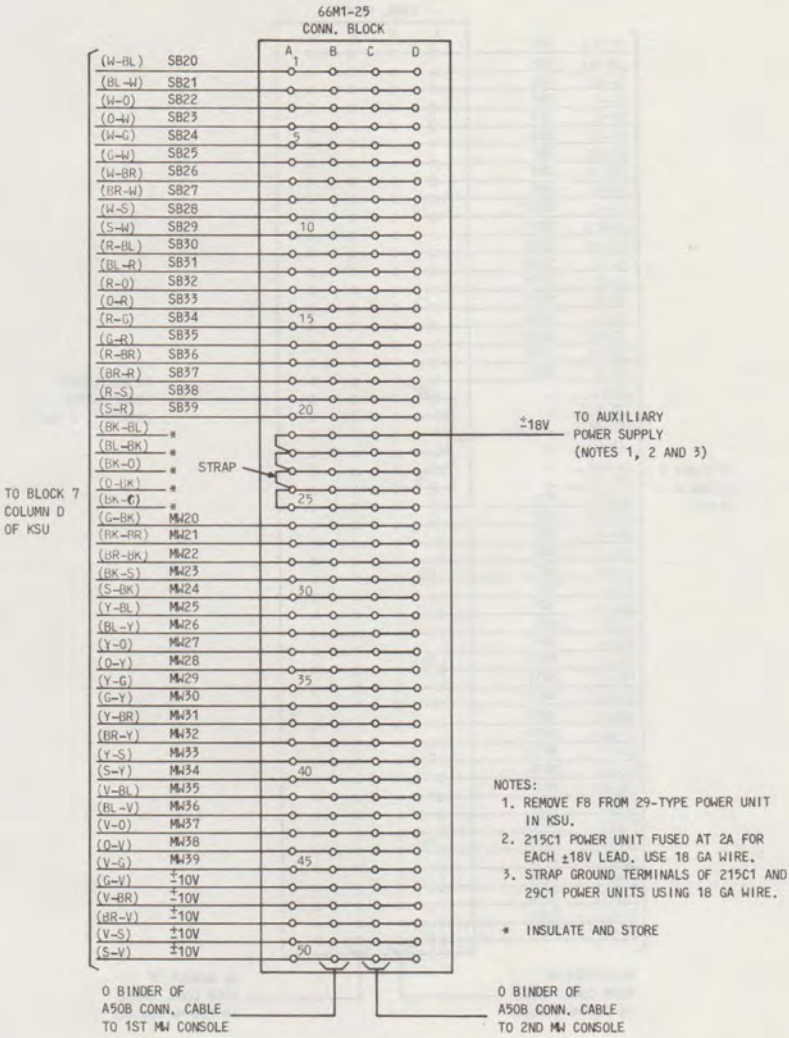


Fig. 39—Connections for Two MW Consoles (Sheet 2 of 2)

on connecting block 1, must be removed when TOUCH-TONE service is provided.

Q. ▶Automatic, DC Signaling, Private Line Circuit

4.101 ***Private line service can be supplied in the 580B KSU only, and then only if music-on-hold is not also being furnished.*** A circuit incompatibility exists between the private line circuit and the music-on-hold circuit. A 415A KTU is required for each private line circuit and is plugged into the KSU in place of one of the CO/PBX line circuits. Each private line installed will reduce the number of CO/PBX

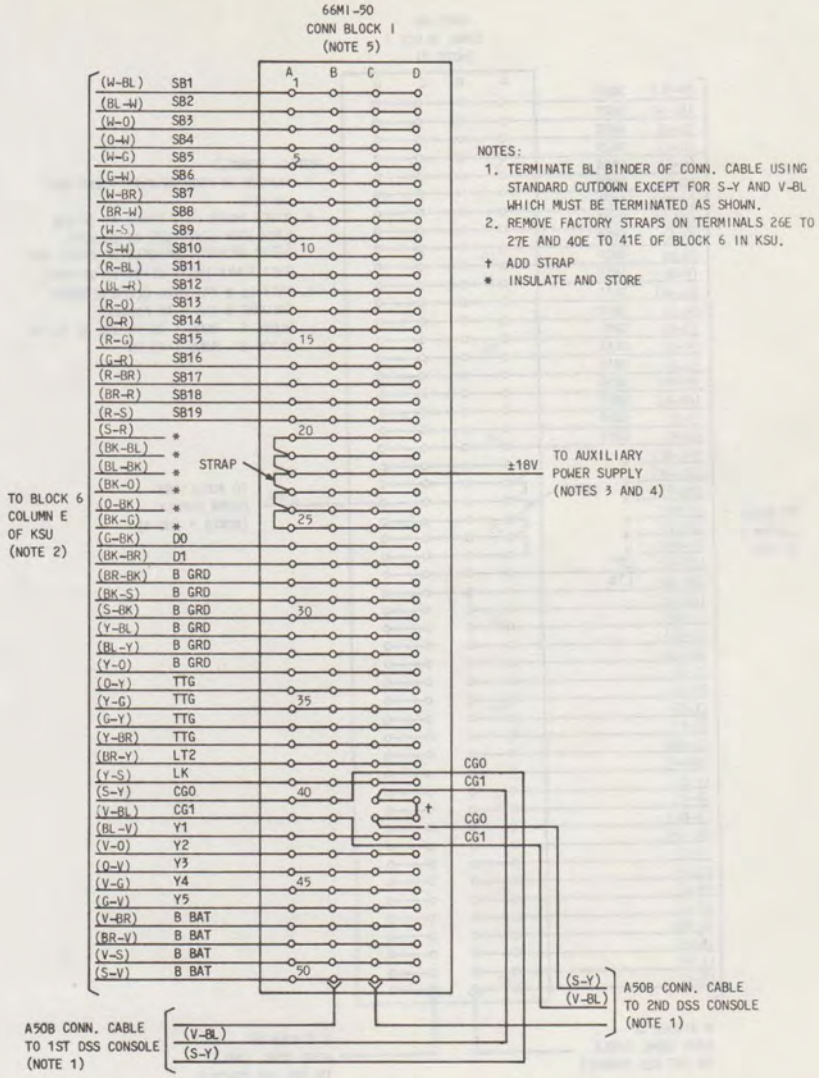


Fig. 40—Connections for Two DSS Consoles (Sheet 1 of 2)

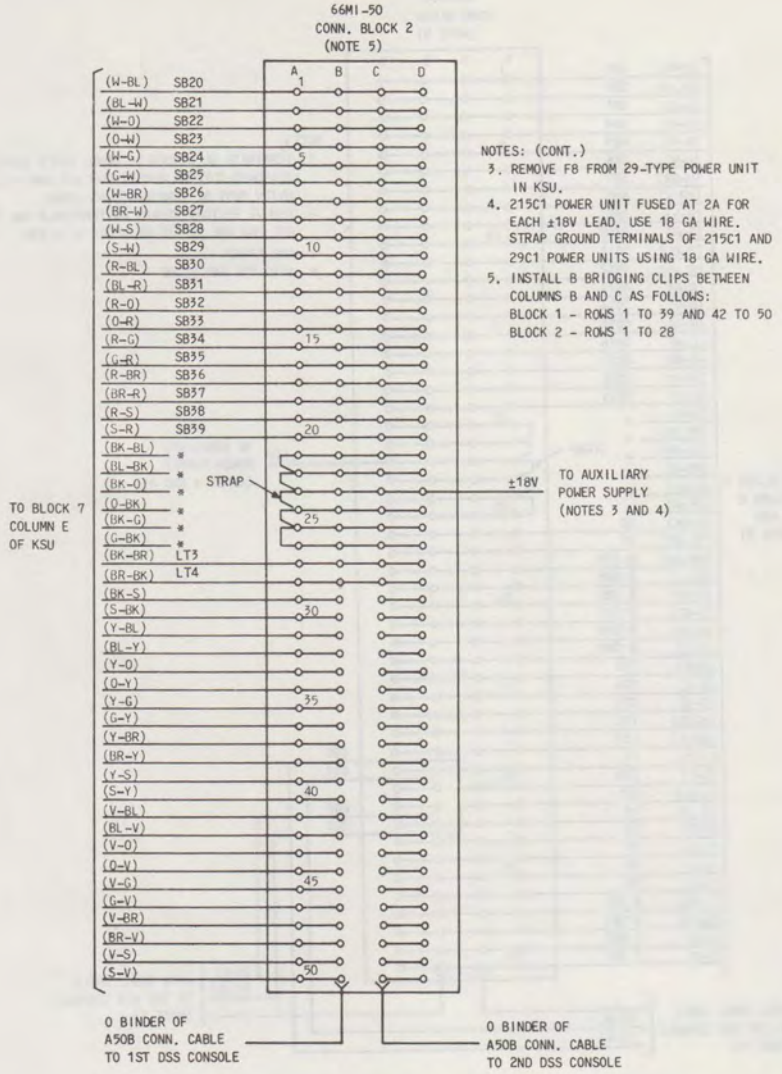


Fig. 40—Connections for Two DSS Consoles (Sheet 2 of 2)

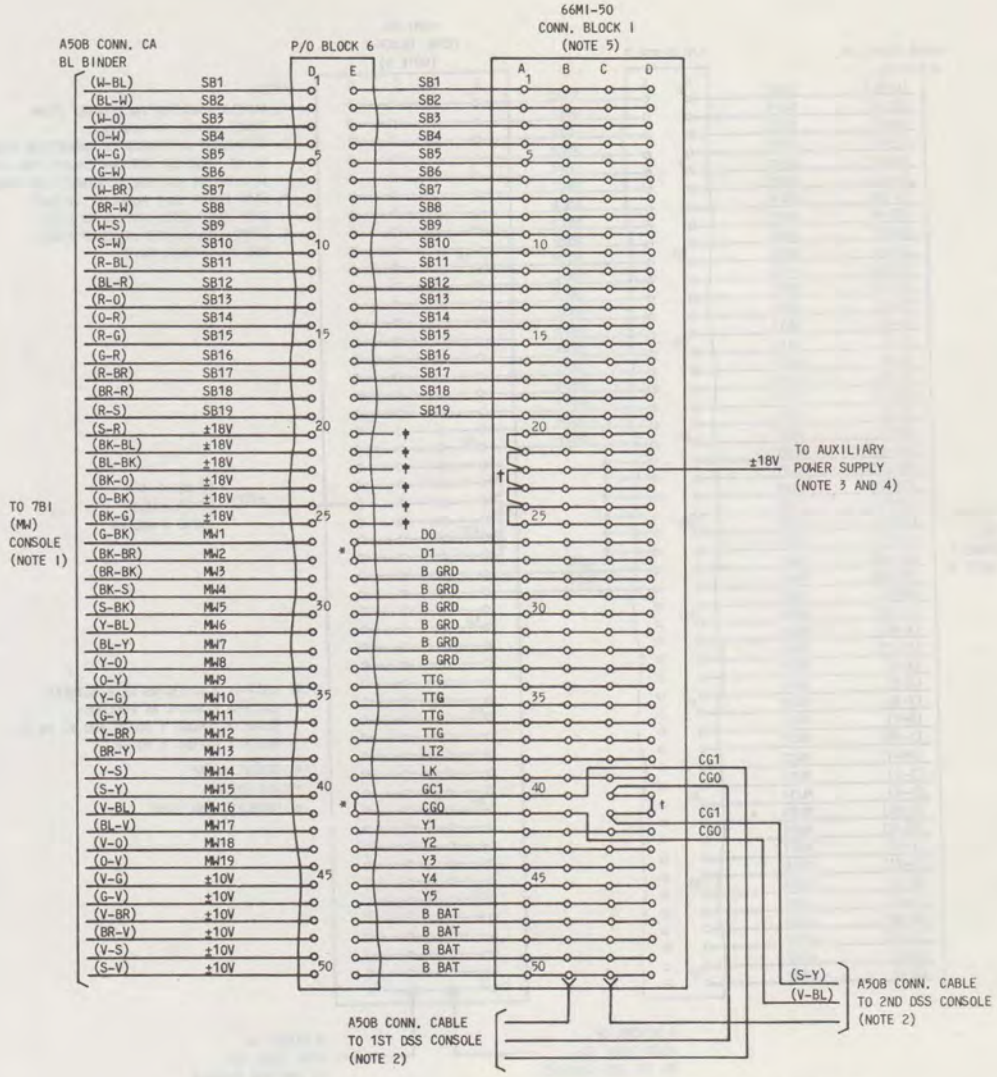


Fig. 41—Connections for One MW and Two DSS Consoles (Sheet 1 of 2)

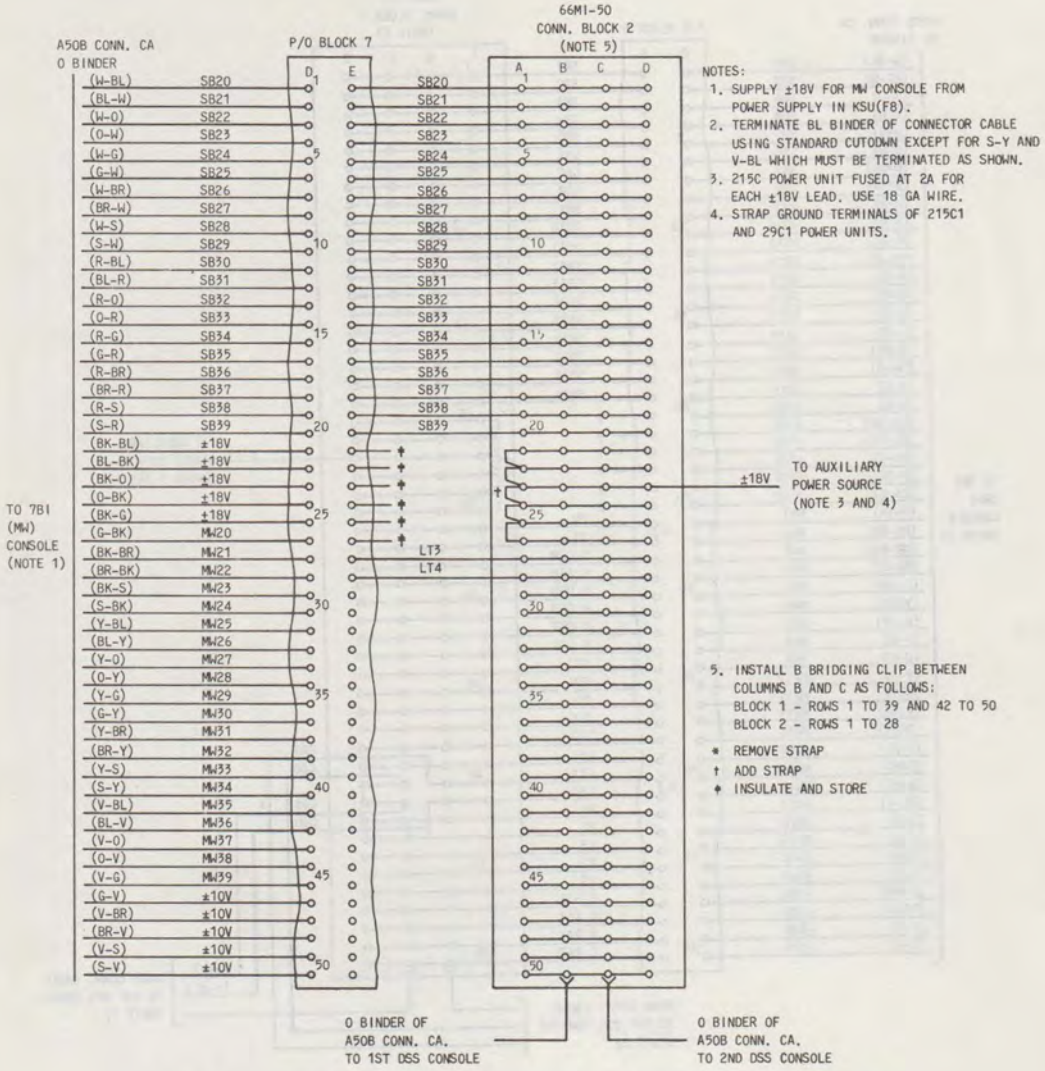


Fig. 41—Connections for One MW and Two DSS Consoles (Sheet 2 of 2)

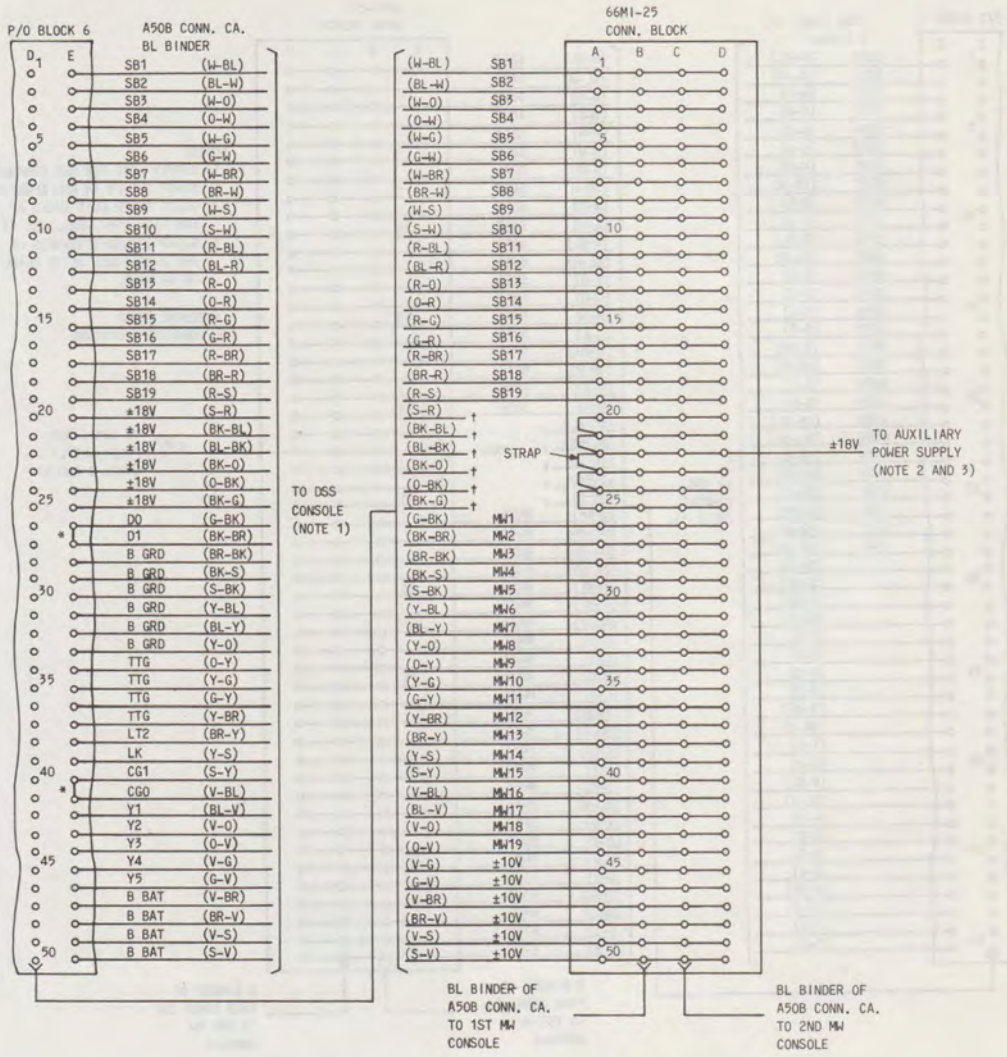


Fig. 42—Connections for One DSS and Two MW Consoles (Sheet 1 of 2)

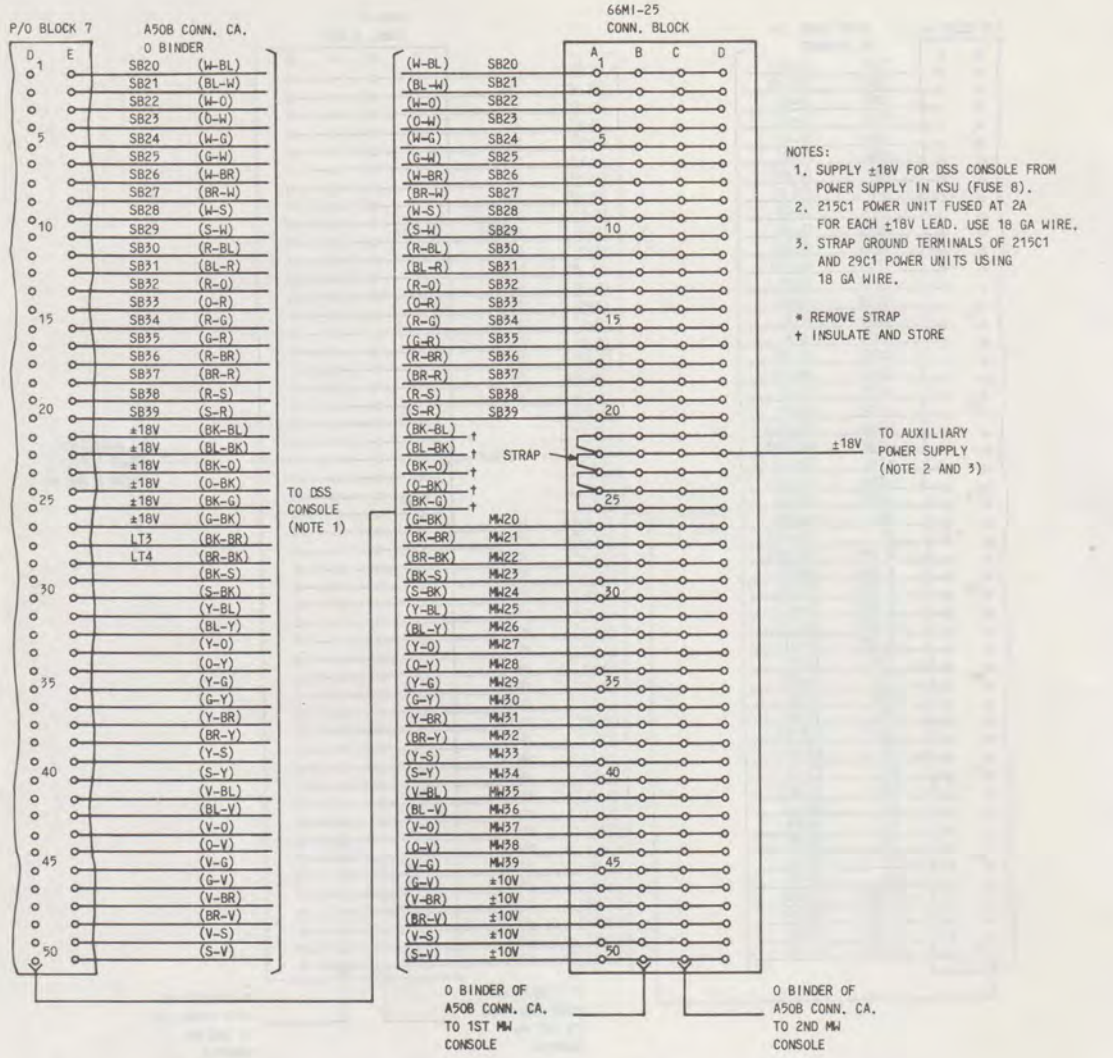


Fig. 42—Connections for One DSS and Two MW Consoles (Sheet 2 of 2)

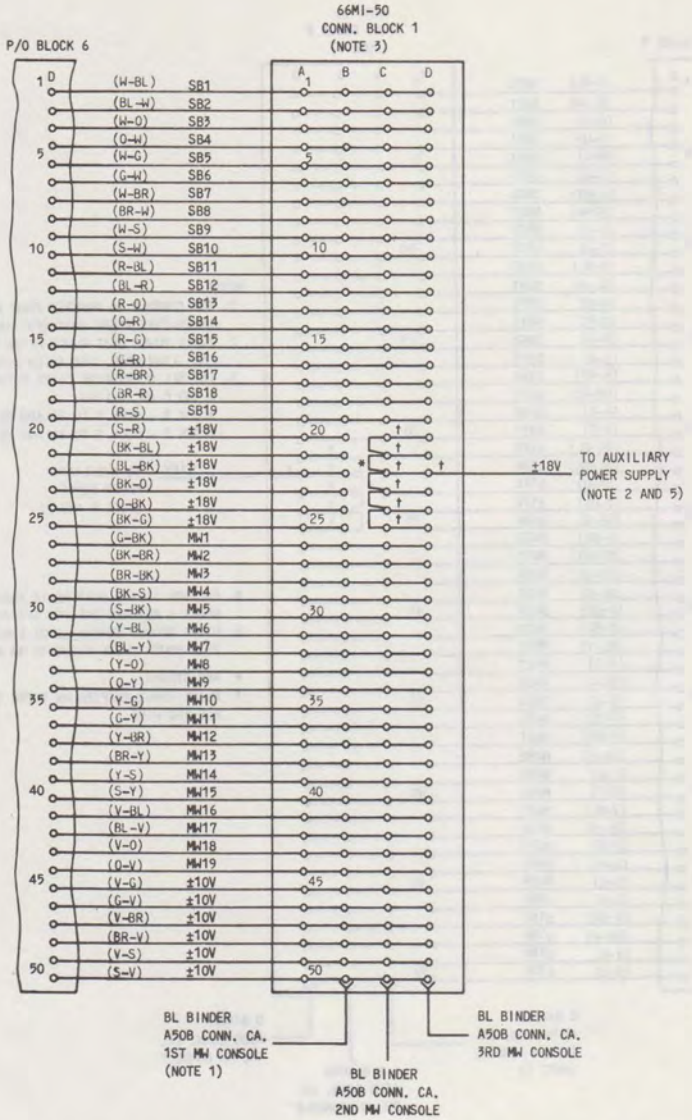


Fig. 43—Connections for Three MW Consoles (Sheet 1 of 2)

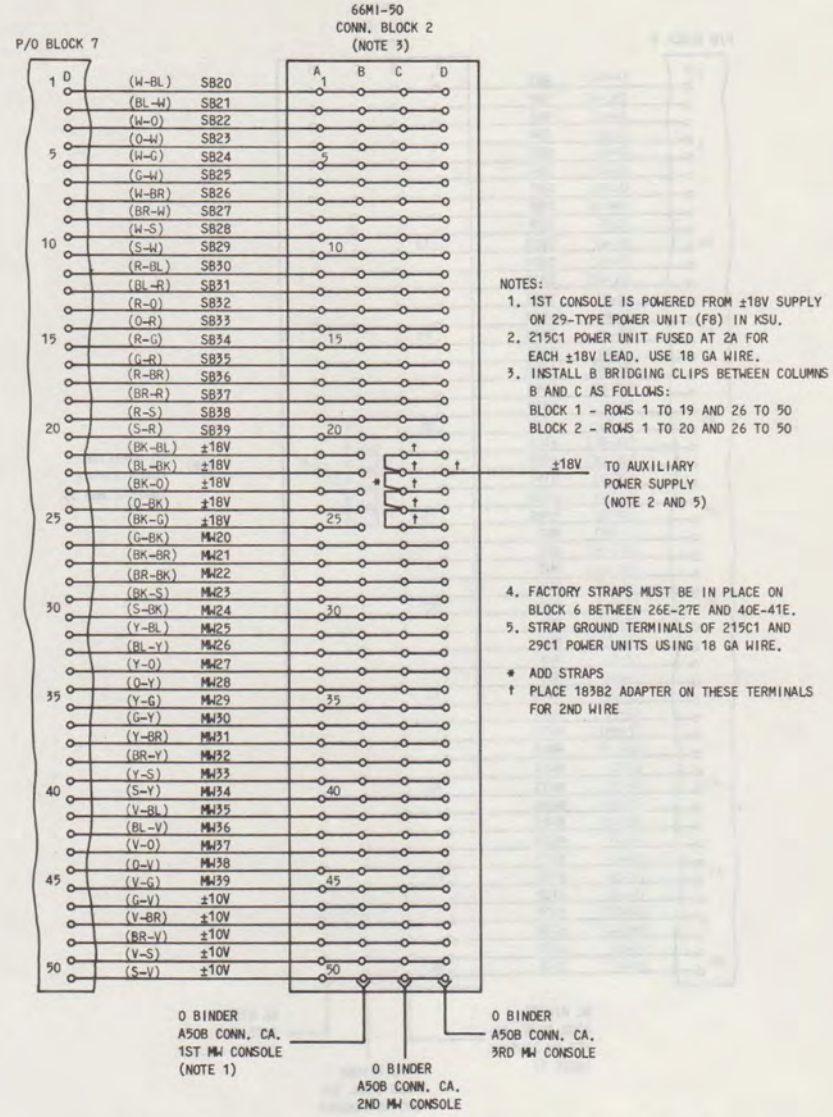


Fig. 43—Connections for Three MW Consoles (Sheet 2 of 2)

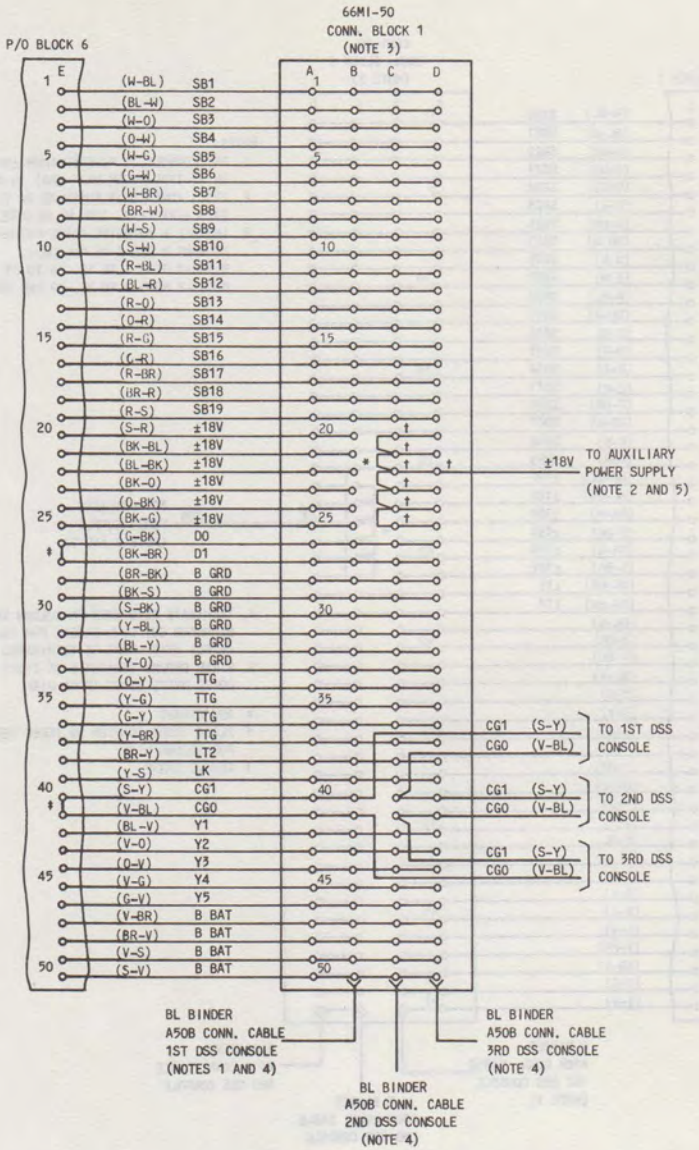


Fig. 44—Connections for Three DSS Consoles (Sheet 1 of 2)

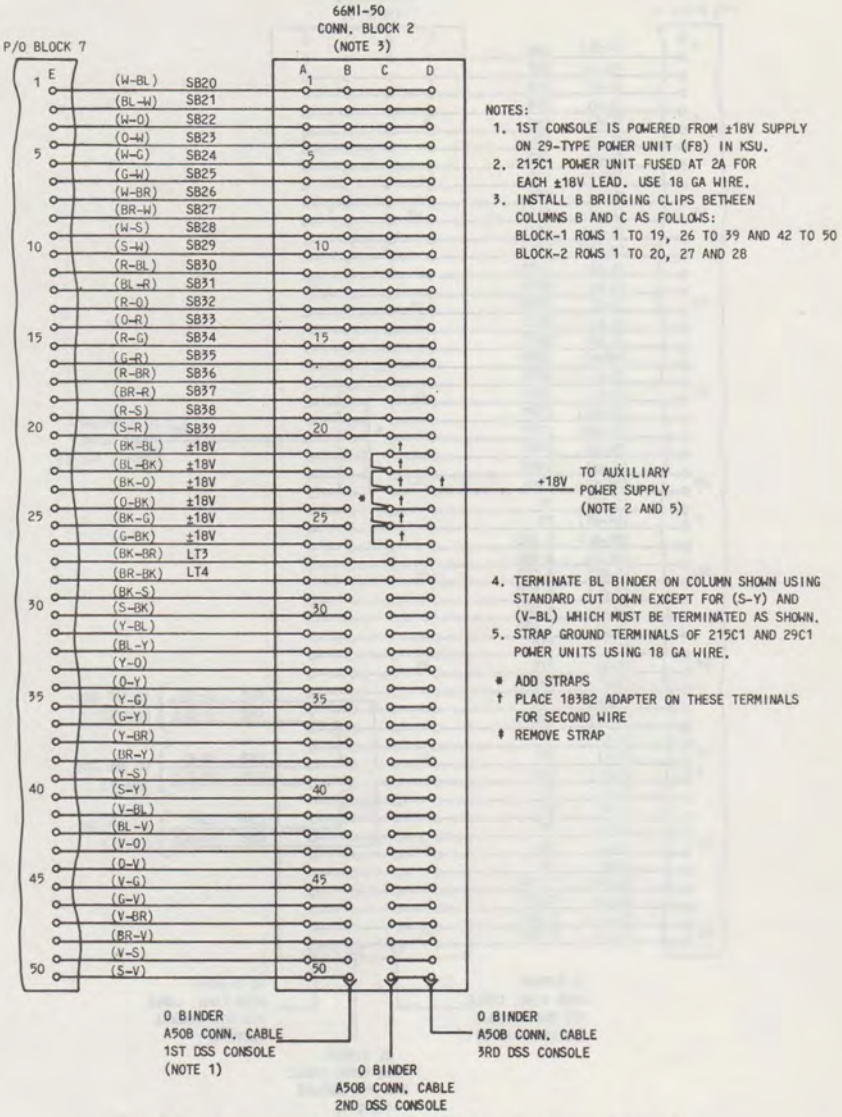


Fig. 44—Connections for Three DSS Consoles (Sheet 2 of 2)

lines by one. In addition, a 415A KTU or equivalent is required at the distant end.

4.102 Install the 415A KTU in jacks 1 through 14 and connect tip and ring to the distant end to block 7 with the incoming CO/PBX lines (Fig. 14).

R. TOUCH-A-MATIC® Adjunct Dials

4.103 Connections for adding the 870A1 or 2870A1 adjunct dials to 833- or 2833-type telephone sets can be found in Section 501-164-201.

5. MECHANICAL MAINTENANCE

5.01 Maintenance of the 14A Communication System is limited to normal station repairs (including cable and inside wire), wiring checks of the KSU, and replacement of defective components. Where a customer-owned and maintained (COAM) music source or a customer's paging system is connected to the 14A System, maintenance does not extend beyond the interface units (33A voice coupler and/or 20A-49 apparatus unit).

5.02 Refer to Part 6 of this section for electrical maintenance information.

5.03 When trouble is encountered, analyze the trouble to determine if the trouble can be localized to a particular area. For example, the trouble may be narrowed down to involve a circuit, CO/PBX line, console, feature, or telephone set.

580-TYPE KSU

5.04 Before considering the replacement of the 580-type KSU, the key telephone units, and the power units, perform the following:

- Fuses in place or not blown (Table K).
- Lamps properly seated and not burnt out.
- KTUs securely mounted in proper connectors with retainers and/or guide assemblies in place.
- Wiring on connecting blocks not loose, broken, or shorted.
- Frame ground is connected.
- Power cord is connected to a 3-wire grounded receptacle.

A. Key Telephone Units

- Securely placed in proper connector (Fig. 3).
- Proper option straps, if required, in place.
- Replace a suspected KTU with one known to be in good working order to determine whether trouble is in KTU or external to it.
- Should a replacement KTU not clear a trouble, the trouble is external and ***the original KTU should be returned to service.***
- No field maintenance is to be performed on KTUs.

B. Power Units

- Fuses in place and not blown
- Power cords connected properly and appropriate power taps connected
- Power present at the ac receptacle
- Circuit and frame grounds properly connected
- Proper auxiliary power supplied if multiple consoles are installed.

CONSOLES

5.05 Perform the following check before making a replacement on consoles:

- Mounting cord plugged into connector cable securely
- Lamps not burnt out
- Buttons operate freely
- Buttons on message waiting console (7B1) lock down and release properly.

TABLE K

580-TYPE KSU FUSE ARRANGEMENT

LOCATION	DESIG	FUSE AMP	TYPE	POTENTIAL	CIRCUIT	CODE
KSU Fuse Panel	F1	1-1/3	70A	10V ac	1st CO/PBX Line Lamps	0, 7-15
	F2					16-39
	F3				2nd CO/PBX Line Lamps	0, 7-15
	F4					16-39
	F5				3rd CO/PBX Line Lamps	0, 7-15
	F6					16-39
	F7				4th CO/PBX Line Lamps	0, 7-15
	F8					16-39
	F9				5th CO/PBX Line Lamps	0, 7-15
	F10					16-39
	F11				6th CO/PBX Line Lamps	0, 7-15
	F12					16-39
	F13				7th CO/PBX Line Lamps	0, 7-15
	F14					16-39
	F15				8th CO/PBX Line Lamps	0, 7-15
	F16					16-39
	F17				9th CO/PBX Line Lamps	0, 7-15
	F18					16-39
	F19				10th CO/PBX Line Lamps	0, 7-15
	F20					16-39
	F21				11th CO/PBX Line Lamps	0, 7-15
	F22					16-39
	F23				12th CO/PBX Line Lamps	0, 7-15
	F24					16-39
	F25				13th CO/PBX Line Lamps	0, 7-15
	F26					16-39

TABLE K (Contd)

580-TYPE KSU FUSE ARRANGEMENT

LOCATION	DESIG	FUSE AMP	TYPE	POTENTIAL	CIRCUIT	CODE
KSU Fuse Panel	F27	1-1/3	70A	10V ac	14th CO/PBX Line Lamps	0, 7-15
	F28					16-39
KSU Power Panel	F29	1-1/3	70A	10V ac	1st Intercom Path Lamps	0, 7-23
	F30					24-39
	F31				2nd Intercom Path Lamps	0, 7-23
	F32					24-39
	F33				3rd Intercom Path Lamps	0, 7-23
	F34					24-39
	F35	See Note	See Note	−24V C BAT.	Telephone Set Amplifiers and Connector J26	0, 7
	F36					8-15
	F37					16-23
	F38					24-31
	F39					32-39
	F40	Blank				
	F41	1/2	70G	−24V B BAT. (SIG)	Privacy and DSS	0, 7
	F42				Privacy	8-15
	F43					16-23
	F44					24-31
	F45					32-39
	F46			−24V B BAT. (SIG)	Paging Zone 1	(4)
	F47				Paging Zone 2	(5)
	F48				Paging Zone 3	(6)
	F49 F50	Blank				
	F51 F52					

TABLE K (Contd)

580-TYPE KSU FUSE ARRANGEMENT

LOCATION	DESIG	FUSE AMP	TYPE	POTENTIAL	CIRCUIT	CODE
KSU Power Panel	F53 F54	Blank				
	F55 F56					
67-Type Power Unit	F1	3	24B	10V ac	CO Lamps Lines 9, 13	16-39
	F2				CO Lamps Lines 8, 11	16-39
	F3				CO Lamps Lines 10, 12	16-39
	F4				CO Lamps Lines 6, 14	16-39
	F5	5	24F		1st 7 CO Line Lamps	0, 7-15
	F6	2	24C		Sta MW & Attendant RT Lamp	
29-Type Power Unit	F1	3	24B	10V ac	Lamp Steady, IC Path 1, 2	
	F2				Lamp Steady, IC Path 3, IC Flash	
	F3				CO Lamps Lines 2, 4	16-39
	F4				CO Lamps Lines 3, 7	16-39
	F5				CO Lamps Lines 1, 5	16-39
	F6	5	24F		2nd 7 CO Line Lamps	0, 7-15
	F7	2	24C	10V ac	Interrupter Motor	
	F8			18V ac	Console Sta Busy Lamps	
	F9			−24V B BAT.	1st 7 CO/PBX Line Circuits	
	F10				2nd 7 CO/PBX Line Circuits	
	F11				Intercom B Battery	
	F12				Power Failure Transfer	
	F13				Privacy Circuits	
	F14				Paging	
	F15			−24V A	A Battery	

Battery Symbol	Voltage Range
−24A	18-26
−24B	20-26
−24C	18-26

Note: On 580-type KSUs manufactured before June 25, 1975, fuses 35 to 39 were 1/2A (70G). Since that date, fuse 35 is 1-1/3A (70A) and fuses 36 to 39 are blank.

EXTERNALLY MOUNTED UNITS

5.06 Do not replace any of the externally mounted units until a check has been made on the following:

A. 33A Voice Coupler

- Fuses not blown and properly positioned
- Connecting leads not part of a voice cable
- Connections not loose or broken.

B. 20A-49 Apparatus Unit

- Volume control not turned off
- Connecting leads not part of a voice cable
- Connections tight and leads not crossed
- Customer's connections made with shielded wire and grounded at customer's equipment only.

C. 22A-49 Apparatus Unit

- Unit fastened securely and mounted in a vertical position
- Battery and ground leads not reversed
- Connections tight and not shorted
- Associated external power supply properly connected and fuses not blown.

D. Loudspeakers

- Connections tight and both pairs of quad wire connected
- Volume control properly adjusted
- Speakers not located too far from KSU
- Speaker leads not part of a voice cable
- Speakers not positioned or located close enough to telephone sets to cause feedback.

Note: Other than fuse replacement, no field maintenance is to be performed on the externally mounted units.

TELEPHONE SETS

5.07 Telephone sets should not be replaced until the following observations have been completed:

- Sets plugged in securely
- Volume control not turned off
- Lamps not burnt out
- Switchhook operates freely
- Line buttons operate freely and automatically restore when handset is placed on-hook (intercom-only telephone sets do not have ABR)
- Cords are not tangled or damaged.

6. ELECTRICAL MAINTENANCE

6.01 Maintenance information is included as an aid in locating and clearing trouble in the 14A Communication System at the time of installation or on subsequent repair visits. Analysis of a trouble reported may be helpful in narrowing the search for the source of trouble. For instance, if a lamp does not light at a particular station or group of stations, the trouble is more likely in a telephone set or its wiring—if the lamp does not light at any station, the trouble is more likely in the KSU or the associated KTU.

6.02 Maintenance information for the following circuits is provided:

- CO/PBX line circuits—400-type KTUs
- Station line ringing arrangements
- Intercom circuits—424C, 440A, 444A, 454B, 456B, and 478B KTUs
- Lamp driver circuit—453B KTU
- Lamp flash circuit
- Lamp wink circuit

- Message waiting circuit
- Music-On-Hold circuit—451-type KTU
- Loudspeaker paging and background music circuits
- Power distribution circuits:

  29-type power supply power distribution

  29-type power supply ground

  67-type power supply power distribution

  67-type power supply ground
- Power failure ringing circuit—452A KTU
- Preset conference on intercom circuit
- Station busy circuit—optional station busy consoles
- Tone ringing circuit.

6.03 If analysis and/or testing indicates trouble in the KSU, the source can be further identified using the supplied information in the following sequence:

(1) The description of each circuit and the purpose of the KTUs can be used to determine what units may be involved.

(2) Once the involved circuit has been determined, use the sequence table which gives an operational procedure for testing the circuit and, where a failure is encountered, the most likely causes or KTUs that could cause the condition.

(3) If the trouble is suspected in or isolated to a particular KTU, further aids are given in the form of a lead table and an input and output table. The lead table defines each lead, its function in the circuit, and its termination on the KTU and mating connector(s). The input and output table can be used to ensure that proper potentials are available at, or being supplied by, the KTU under any circuit conditions shown required in the Remarks column. ▶These potentials should be found on the KTU contacts and the connector terminals.◀ Only tests that can be made with a 1013A hand test set or equivalent have been included. Further tests are possible but may require more sophisticated test equipment. If a KTU tests defective, replace it.

> ***Note:*** No attempt should be made to repair or modify KTUs in the field. Replace defective KTUs with one known to be in working order. If replacing a KTU does not clear the trouble, ***the original unit should be put back in service.***

(4) If trouble is indicated in the factory wiring of the KSU, a point-to-point wiring schematic is furnished for each circuit. The distribution of all power in the KSU is also separately supplied in case it is found a particular potential is missing. Wiring color is not shown; however, connecting block, connector and power supply terminals are identified in detail. All factory wiring is shown as solid lines; dashed lines indicate wiring external to the KSU, installer placed leads, or leads shown in detail in other figures.

CO/PBX LINE CIRCUITS—400-TYPE KTU

6.04 The 400-type KTU provides the control functions between one CO/PBX line and the telephone sets, including line pickup, hold, lamp and tone ringing control. The KTU also assures outgoing service during power failure. Option straps should be placed on the 400A, B, C, D, or G KTU when used with the 14A Communication System to provide short timeout (Z), lamp wink on hold (Y), and interrupted audible signal (W). ▶Options on the 400H should be CO/PBX line (T), interrupted line signal (W), and (S) or (R), depending on serving CO or PBX (see Fig. 93).◀

6.05 ▶To aid in the maintenance of the CO/PBX line circuits in the 580-type KSU, refer to Tables L, M, and N for the 580A/B, Fig. 45 through 58 for the 580A, and Fig. 59 through 72 for the 580B.◀

STATION LINE RINGING ARRANGEMENTS

6.06 Provision is made to program several arrangements involving ringing on the CO/PBX lines. These include:

- Common audible—as factory-wired, station 0 will receive all incoming CO/PBX calls (option K).

TABLE L

400-TYPE KTU LINE CIRCUIT

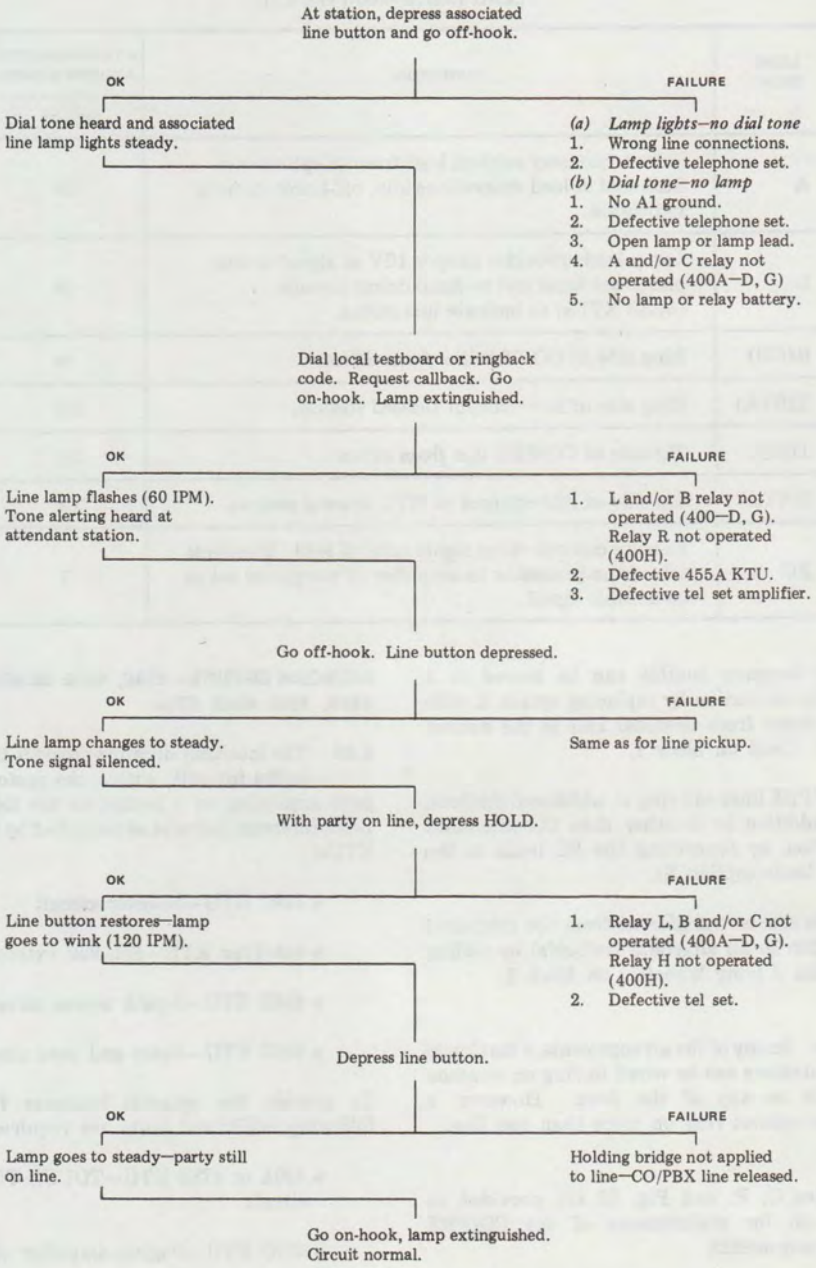


TABLE M

LEAD TABLE—400-TYPE KTU

LEAD DESIG	FUNCTION	KTU/CONNECTOR AND PIN NUMBER
		J1–J14
A	A lead—primary control lead from telephone set. Status of A lead determines idle, off-hook, or hold indication.	16
L	Lamp lead—provides proper 10V ac signal to telephone set lamp and to lamp driver circuits (453B KTUs) to indicate line status.	8
R(CO)	Ring side of CO/PBX line *from* office.	9
R(STA)	Ring side of line—output *toward* station.	13
T(CO)	Tip side of CO/PBX line *from* office.	14
T(STA)	Tip side of line—output of KTU *toward* station.	12
RC	Ringing control—tone signal control lead. Connects tone from generator to amplifier of telephone set as an audible signal.	1

- The common audible can be moved to a different station by replacing option K with a jumper from terminal 19H to the desired CO( ) lead on block 1.

- CO/PBX lines can ring at additional stations, in addition to or other than the attendant station, by connecting the RC leads to the CO leads (option S).

- Calls can be transferred from the attendant station to an alternate station(s) by adding option J (ring transfer) on block 1.

Note: In any of the arrangements, a maximum of 10 stations can be wired to ring on common audible on any of the lines. However, a station cannot ring on more than one line.

6.07 Tables O, P, and Fig. 73 are provided as an aid for maintenance of the CO/PBX ringing arrangements.

INTERCOM CIRCUITS—424C, 440A OR 478B, 444-TYPE, 454B, AND 456B KTUs

6.08 The intercom circuitry provides three separate paths for calls within the system with each path appearing on a button on the telephone sets. Basic intercom features are supplied by the following KTUs:

- 424C KTU—Selector circuit

- 444-Type KTU—Selector extender circuit

- 454B KTU—3-path access circuit

- 456B KTU—Voice and tone alerting circuit.

To provide the optional intercom features, the following additional units are required:

- 440A or 478B KTU—TOUCH-TONE adapter circuit

- 457C KTU—Paging amplifier circuit.

TABLE N

INPUTS AND OUTPUTS – 400-TYPE KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
14	9	TALK	CO/PBX dial tone	
B BAT.	15		B Ground	
	6		MG — interrupter ground	
GROUND or 15	2	MON	LW — 10V± at 120 IPM	With interrupter running
	7		LF — 10V± at 60 IPM	
	4		10V steady	
	11		RN — interrupted tone ringer signal	
	17	TALK	B Battery	Interrupter running
OUTPUTS				
12	13	TALK	CO/PBX dial tone	
GROUND	8	MON	10V± steady	Ground pin 16
	1		Tone ringing signal	CO/PBX ringing on line

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

An additional optional feature, intercom preset conference, can be supplied by making wiring changes on connecting block 1.

> ***Note:*** Condensed functional schematics of the KTUs are located at the end of this section.

A. Selector Circuit—424C KTU

6.09 This circuit is the basic, selector-only 19-code rotary dial intercom circuit. Of the available codes, 0 is used as the attendant code; 1, 2, and 3 are the first digits of the 2-digit codes; 4, 5 and 6 are the paging codes; and 7 through 39 are assigned as station codes. The 424C KTU selects and alerts intercom station codes 0, 7, 8, and 9, or operates an associated 444-type KTU to select and alert intercom stations, codes 1X, 2X, and 3X. Station selection can be by rotary dial, TOUCH-TONE or DSS console, if provided.

B. TOUCH-TONE Adapter Circuit—440A or 478B KTU

6.10 The adapter circuit is used to convert the multifrequency signals from the station to contact closures which supply ground on the proper Y1-Y5 leads to the 424C selector. Operation of the proper counting relays in the selector alerts the designated station in the same manner as for a rotary dial call. The adapter also grounds the LK lead after the first digit of a 2-digit is dialed to remove dial tone. When the adapter is not in use, a path is completed through the H and L

relays for the CG0-CG1 lead, which operates the selector counting relays on rotary-dialed calls.

C. Selector Extender Circuit—444-Type KTU

6.11 The extender circuit, in conjunction with the 19-code selector circuit (424C KTU), provides dial selection of up to 37 codes. This is accomplished by providing two more transfer digits with the selector extender circuit, in addition to the transfer digit in the selector circuit. The selector is designed so that any one of the three transfer digits (1, 2, or 3) will operate the transfer relays in the 424C KTU via the TD lead. The transferred output leads (RXX) of the 424C KTU become the input leads of the 444-type KTU. Depending on whether the 1, 2, or 3 transfer digit is dialed, the voice and tone signaling will appear on either the R1X leads, the R2X leads, or the R3X leads of the 444-type KTU. Single digit codes appear on the 424C KTU RX leads. Leads from the 444-type KTU also extend to the (optional) DSS console in order to operate the transfer relays when a station is selected from the console.

D. 3-Path Access Circuit—454B KTU

6.12 The 454B KTU performs the following:

- Provides talking battery for the three intercom paths
- Controls all intercom lamp functions
- Provides the common control circuitry to connect the selector to one path at a time
- Provides a detect circuit to free the selector at the proper time if a second intercom call is waiting and connects the tone alert and TOUCH-TONE adapter (if provided) to the selected path
- Connects dial tone to the tip of the intercom path selected.

E. Voice and Tone Alerting Circuit—456B KTU

6.13 The 456B KTU consists primarily of an oscillator circuit and a preamplifier circuit. The oscillator is designed to give a 1-second burst of tone as the alerting tone on intercom calls. The preamplifier is used for the voice signaling. A voice input from the (optional) paging circuit is also furnished from this circuit.

6.14 Tables Q, R, S, T, U, V, W, and Fig. 74 are provided as an aid for maintenance of the intercom circuits.

LAMP DRIVER CIRCUIT—453B KTU

6.15 The 453B KTUs are used to switch lamp current to the lamps of stations 16 through 39. Because of the number of lamp multiples (up to 34), the relay contacts of the 400-type line circuits alone are not adequate to switch all the lamp current. Each 453B KTU contains seven slave circuits that repeat lamp information, through high current capacity thyristors, to the telephone sets. Two 453B KTUs are used in the 14A System.

6.16 Tables X, Y, and Z are provided as an aid for maintenance of the lamp driver circuit. Refer to Fig. 45 through 72 (connector pin 8 of connectors 1 through 14) for further illustration of lamp circuitry.

LAMP FLASH CIRCUIT

6.17 Fig. 75 is provided as an aid for maintenance of the lamp flash circuit.

LAMP WINK CIRCUIT

6.18 Fig. 76 is provided as an aid for maintenance of the lamp wink circuit.

MESSAGE WAITING CIRCUIT

6.19 Fig. 77 is provided to illustrate connections and KSU wiring for message waiting.

MUSIC-ON-HOLD CIRCUIT—451-TYPE OR 498A KTU

6.20 The 451-type KTU contains seven identical circuits. Each circuit provides music-on-hold to one CO/PBX line circuit. Incoming music, provided by the customer, is connected to the 451-type KTU via a 33A voice coupler. The incoming music signal is impressed on all seven music-on-hold circuits in parallel as shown by the dashed lines (connectors J27 and J29) in Fig. 78. When the CO/PBX lines are in a talk condition, the outputs of the 451-type KTU are shorted by contacts in the associated line circuits. When the CO/PBX line is placed on hold, the output of the 451-type KTU

is impressed on the ring side of the CO/PBX line and can be heard by the held party. Two 451-type KTUs are used in the 14A System.

> ▶*Note:* The 400H KTU should not be used in a 580A KSU if music-on-hold is furnished. Any 400-type KTU can be used as the line circuit with or without music-on-hold in a 580B KSU.◀

6.21 ▶On the 498A KTU, music is supplied to four CO lines. When the KTU is equipped with a 116A1 CM, this number is increased to seven. With the CO line in the talk condition, a normally open relay contact prevents the music from being heard. When the line is placed on hold, the 498A KTU or 116A1 CM recognizes the change on the A and L leads operating the relay associated with the line. Music is then applied to the T(Sta) and R(Sta) leads, through the line circuit to the held party.◀

6.22 Tables AA, AB, AC, AD, AE, and Fig. 78, 79, 98, and 99 are provided as an aid for maintenance of the music-on-hold circuit.

LOUDSPEAKER PAGING AND BACKGROUND MUSIC CIRCUIT—457C KTU

6.23 The paging circuit is enabled by dialing a paging code (digit 4, 5, or 6) on any of the idle intercom paths. This completes a circuit, via the SS lead, from the 456B KTU through the 424C KTU to the PC() lead of the 457C KTU(s). This applies the input on the PA lead from the 456B KTU to the amplifier(s) and opens the input of the COAM music source, if provided. Voice and tone inputs on the PA lead are then heard in the loudspeakers. Paging codes must be strapped on connecting block 3; see Table D for connections.

6.24 Background music can be supplied over the paging speakers, when paging is not taking place, using the amplifier circuitry in the 457C KTU. The COAM music source is fed through a 33A voice coupler which acts as a combination interface and protective device. The level of the sound at the speakers involves interaction of the volume control settings at the music source, voice coupler, and the individual speakers.

6.25 Tables AF, AG, AH, and Fig. 80 are provided as an aid for maintenance of the paging and background music circuit.

▶AUTOMATIC, DC SIGNALING, PRIVATE LINE CIRCUIT

6.26 ***The 415A KTU can be used in the 580B KSU only.*** The KTU provides a direct connection to a distant end station. Going off-hook (either end) automatically signals the distant end. At the 14A station, the signal will be the tone alerting signal. Calls are answered or originated by depressing the line pickup button associated with the private line. Lamp signals are the same as for a CO/PBX line.

6.27 Tables AI, AJ, AK and Fig. 94 are provided as an aid for maintenance of the 415A KTU private line circuit.◀

POWER DISTRIBUTION CIRCUITS

6.28 Power for the 14A System is supplied by two power supplies, a 29-type and a 67-type. Fig. 81 through 84 are provided as an aid for maintenance of the power system.

- Refer to Fig. 81 for the power distribution circuit for the 29-type power supply.
- Refer to Fig. 82 for the power ground circuit for the 29-type power supply.
- Refer to Fig. 83 for the power distribution circuit for the 67-type power supply.
- Refer to Fig. 84 for the power ground circuit for the 67-type power supply.

POWER FAILURE RINGING CIRCUIT—452A KTU

6.29 The power failure ringing circuit provides for incoming audible signals on an optional basis in the event of loss of commercial power to the 580-type KSU. The tip and ring of each CO/PBX line is brought through normally closed contacts on the 452A KTU relays. These relays are operated (by battery from fuse 12 of the 29-type power supply) as long as commercial power is supplied to the KSU. If the commercial power is lost (or fuse 12 operates), the relays release, extending the lines to connecting block 1 where a cross-connect must be placed (Fig. 34). The cross-connection in turn extends the tip and ring to the (V-S) (S-V) pair of the desired station. An external (E1C) ringer must be connected to these leads at the telephone set or some other accessible point.

6.30 Tables AL, AM, AN, and Fig. 85 are provided as an aid for maintenance of the power failure ringing circuit.

PRESET CONFERENCE ON-INTERCOM CIRCUIT

6.31 Fig. 86 illustrates the diode arrangement, on connecting block 2, that makes up the preset conference circuit. Cross-connections to connect the stations selected for conferencing, option (T), are made on connecting block 1 (Fig. 27). The factory-placed strap, option (V), between 17H and 24E on connecting block 1 must be removed when preset conferencing is provided.

STATION BUSY CIRCUIT (Optional Station Busy Console)

6.32 Fig. 87 is provided to illustrate connections and KSU wiring for station busy. When a station goes off-hook (with or without a CO/PBX or intercom line button depressed), A1 ground is extended through the operated switchhook contacts of the telephone set and through the wiring of the KSU to light an associated lamp on the optional 7A1 or 7B1 console.

TONE RINGING CIRCUIT—455A KTU

6.33 The tone ringing on CO/PBX lines is furnished by the tone ringing signal generator, 455A KTU, located in connector J25. Inputs to the 455A KTU are A battery, pin 18, and A ground, pin 3. The 455A KTU has one output on pin 9 (RO lead) which consists of an alternate 900 Hz and 1107 Hz ac-dc signal. The dc output turns on the telephone set amplifier and the ac output is the audio signal.

6.34 Fig. 88 is furnished as an aid in the maintenance of the tone ringing circuit.

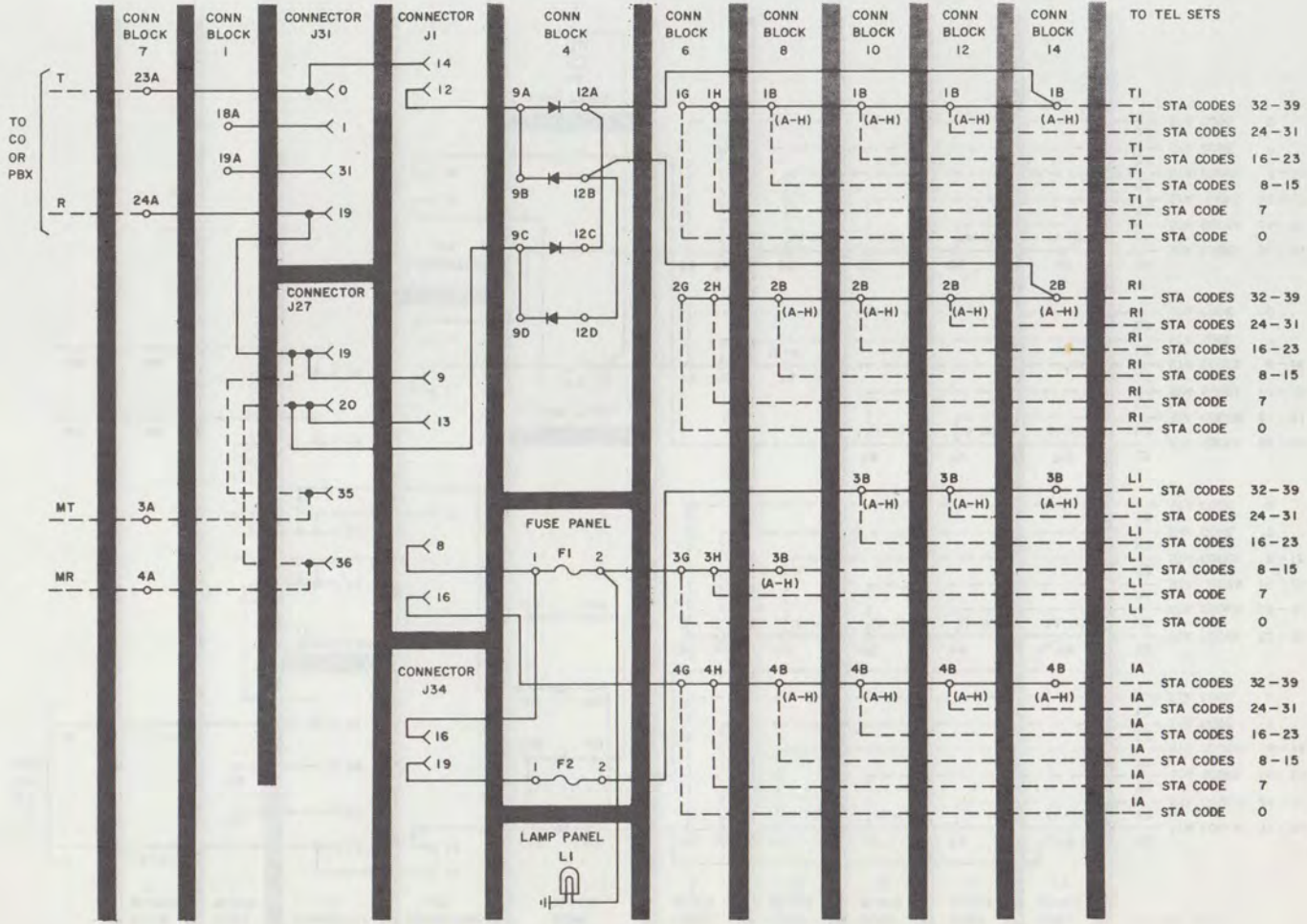


Fig. 45—CO/PBX Line Circuit 1—580A KSU

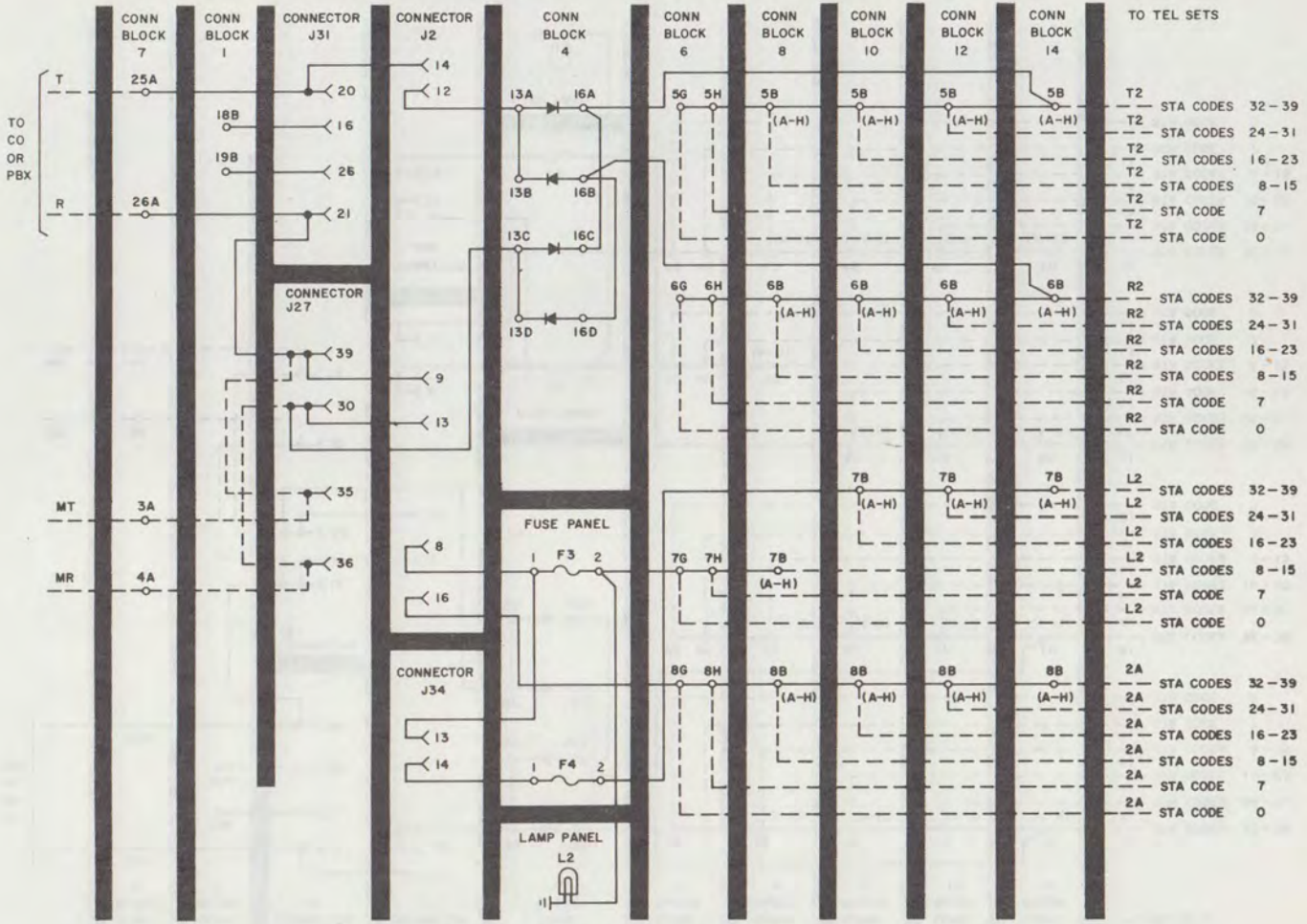


Fig. 46—CO/PBX Line Circuit 2—580A KSU

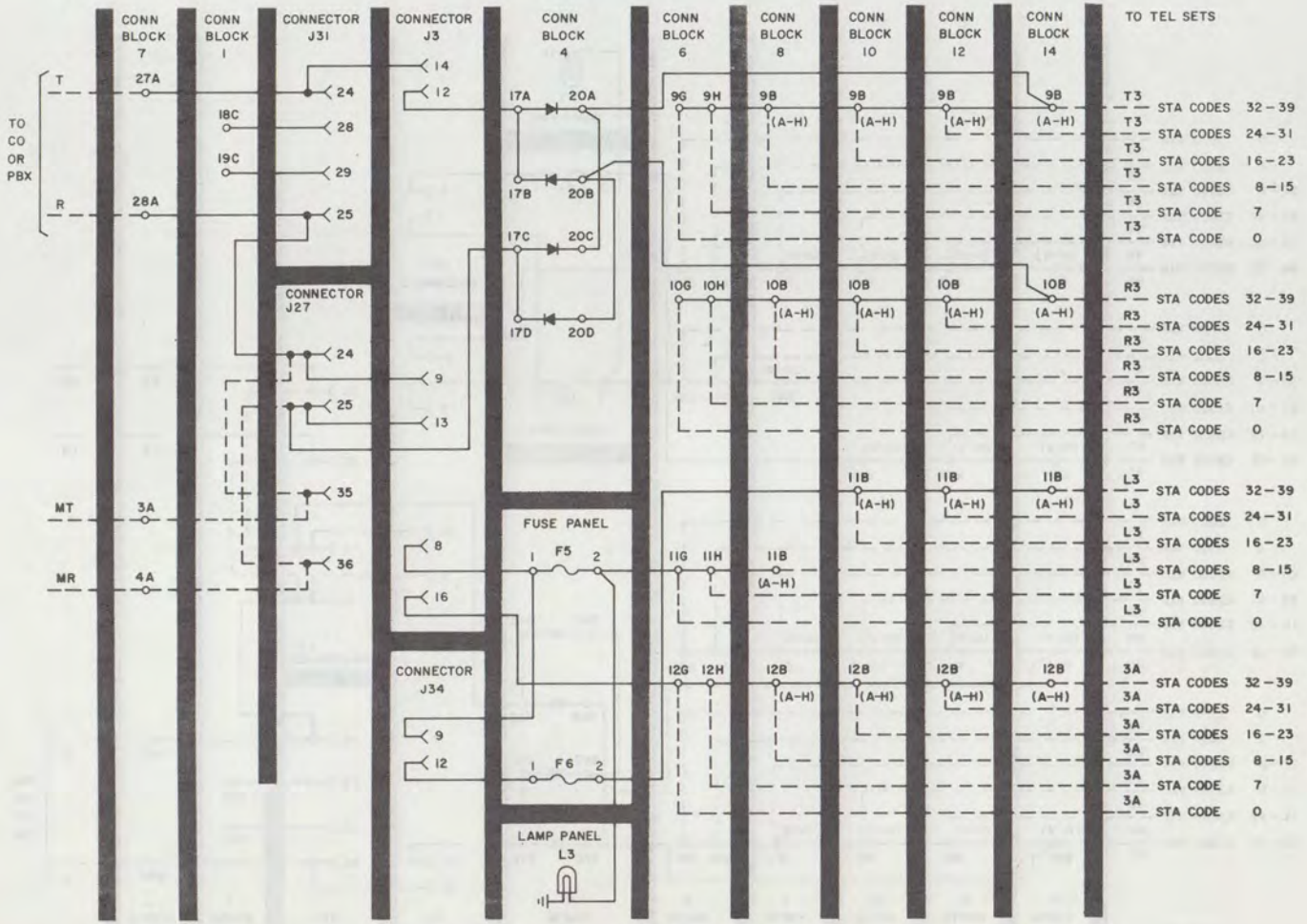


Fig. 47—CO/PBX Line Circuit 3—580A KSU

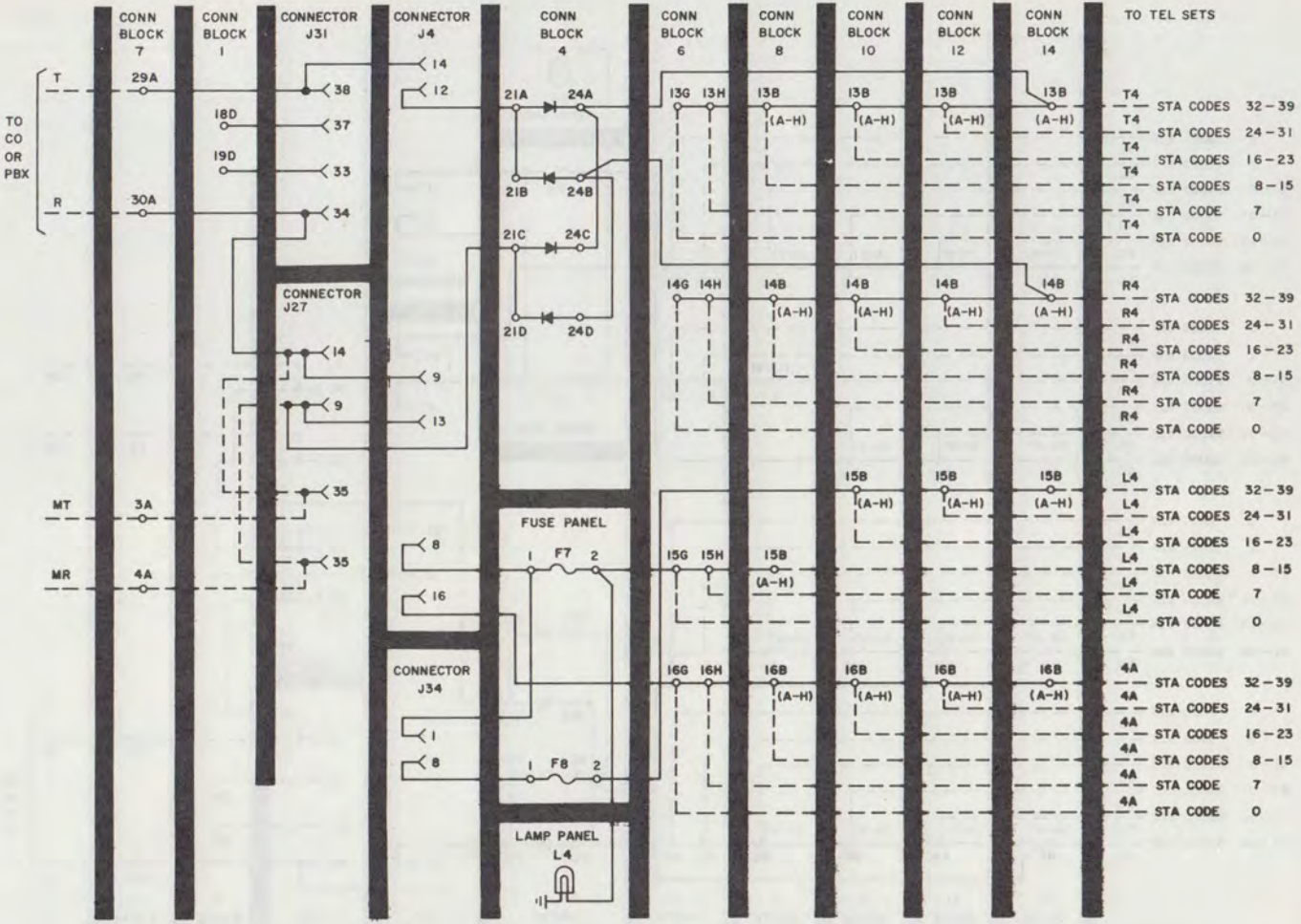


Fig. 48—CO/PBX Line Circuit 4—580A KSU

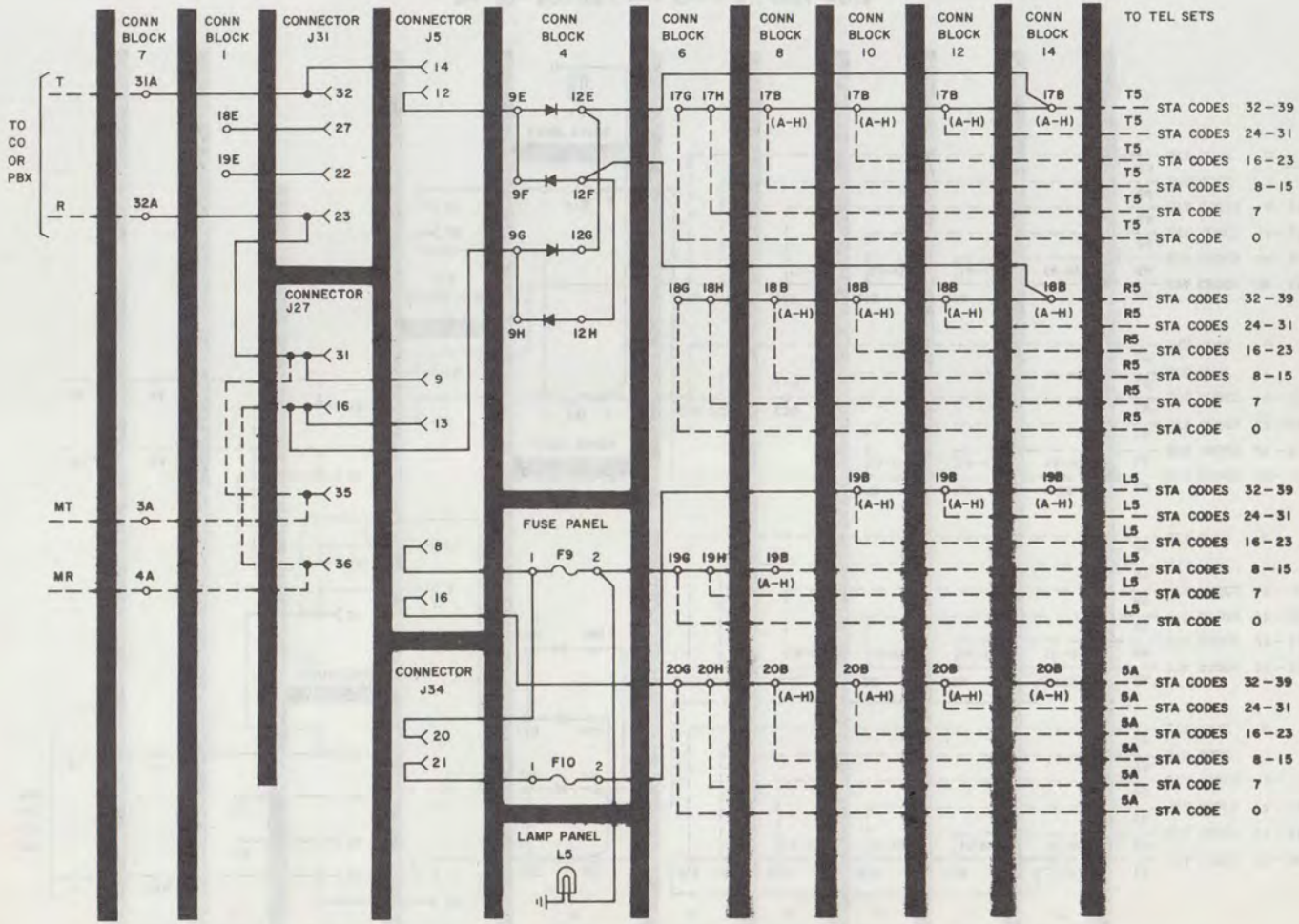


Fig. 49—CO/PBX Line Circuit 5—580A KSU

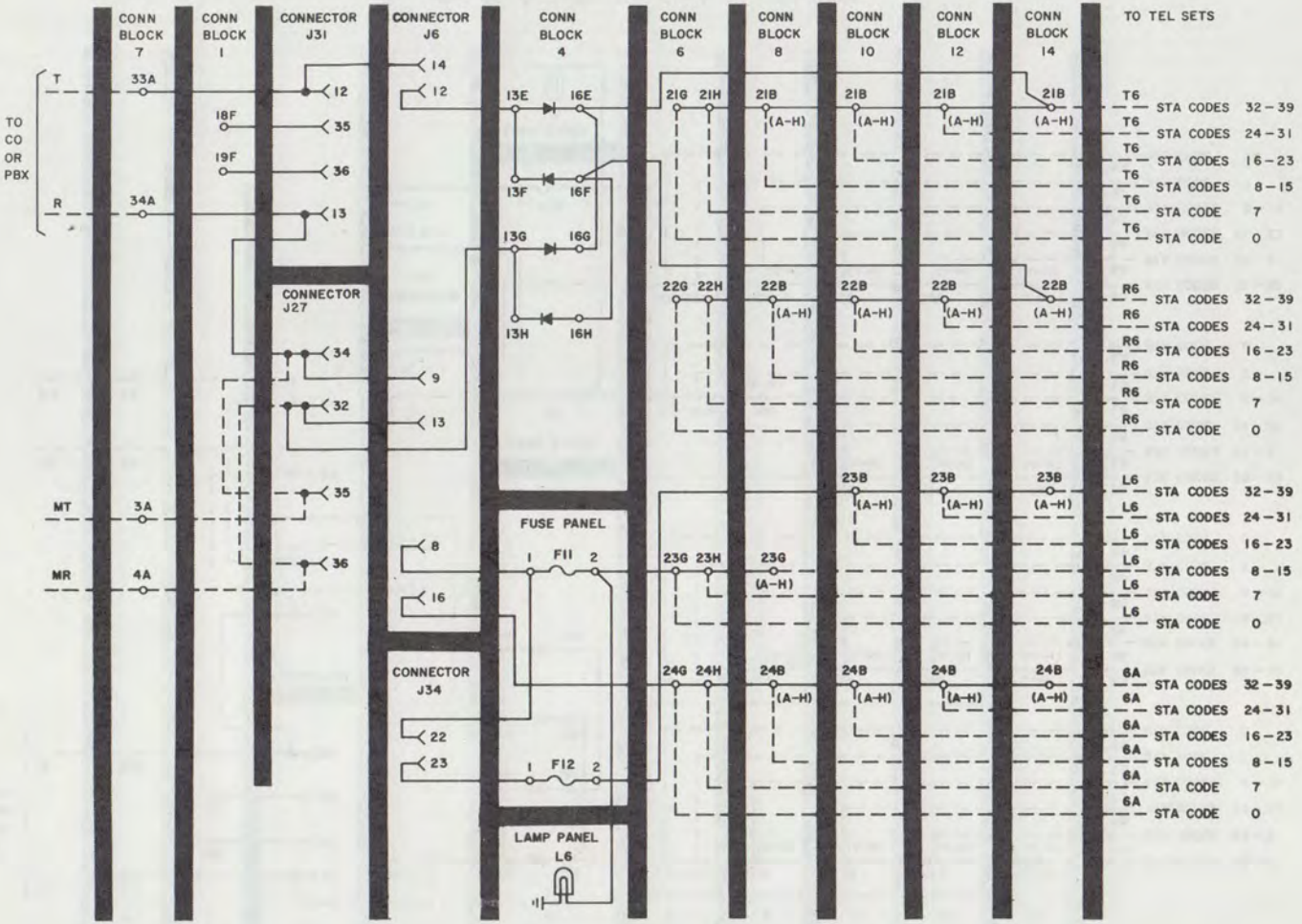


Fig. 50—CO/PBX Line Circuit 6—580A KSU

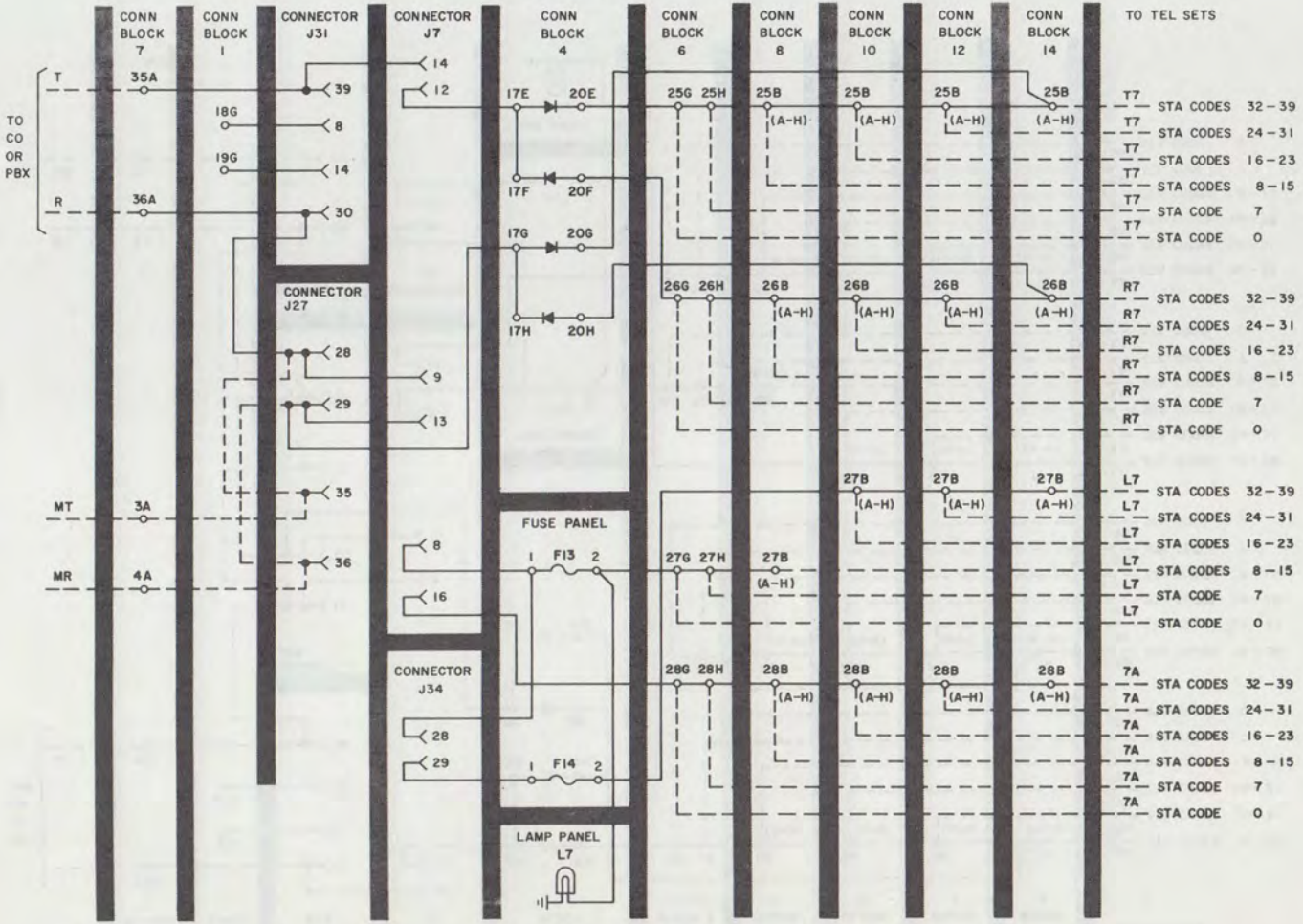


Fig. 51—CO/PBX Line Circuit 7—580A KSU

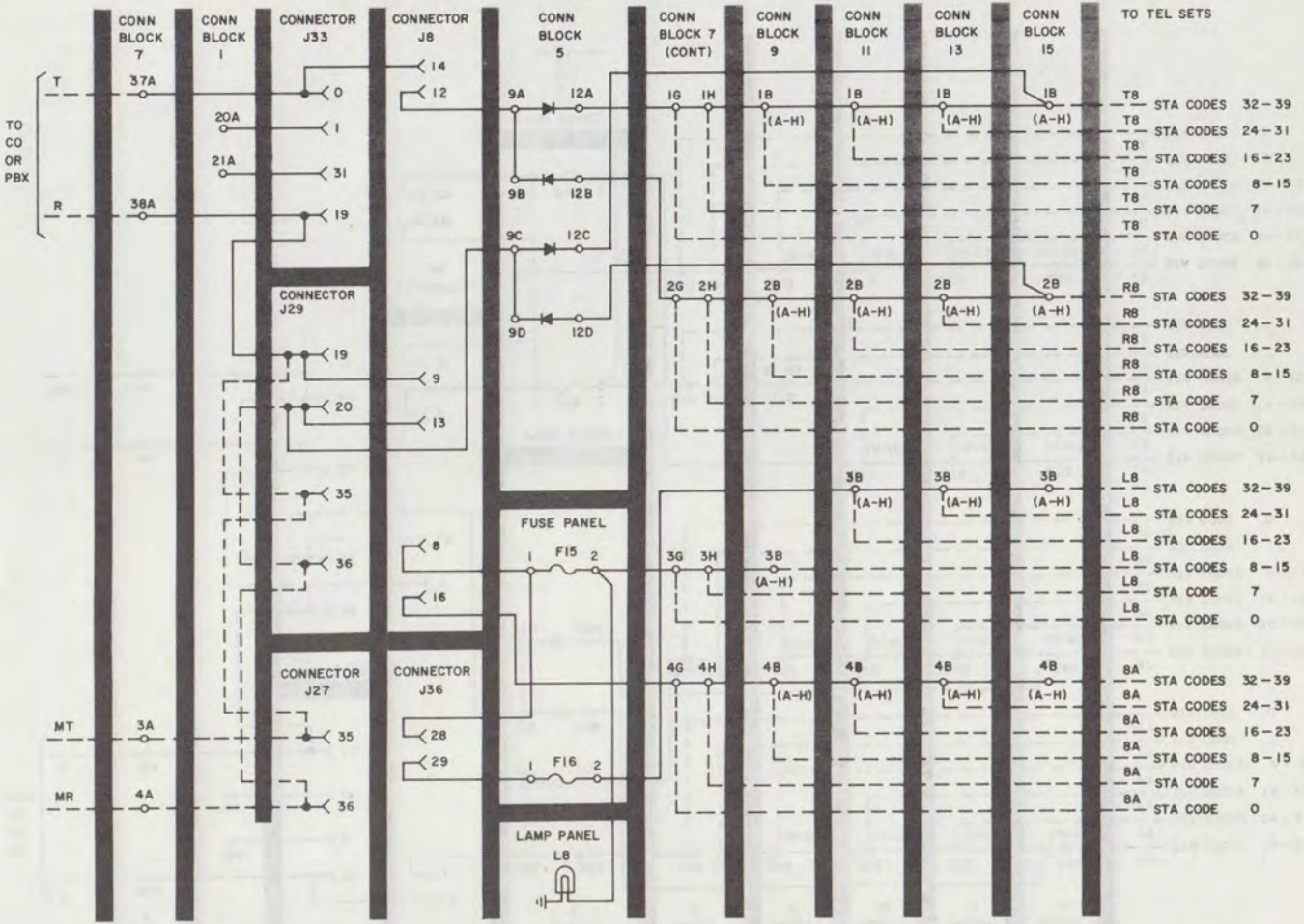


Fig. 52—CO/PBX Line Circuit 8—580A KSU

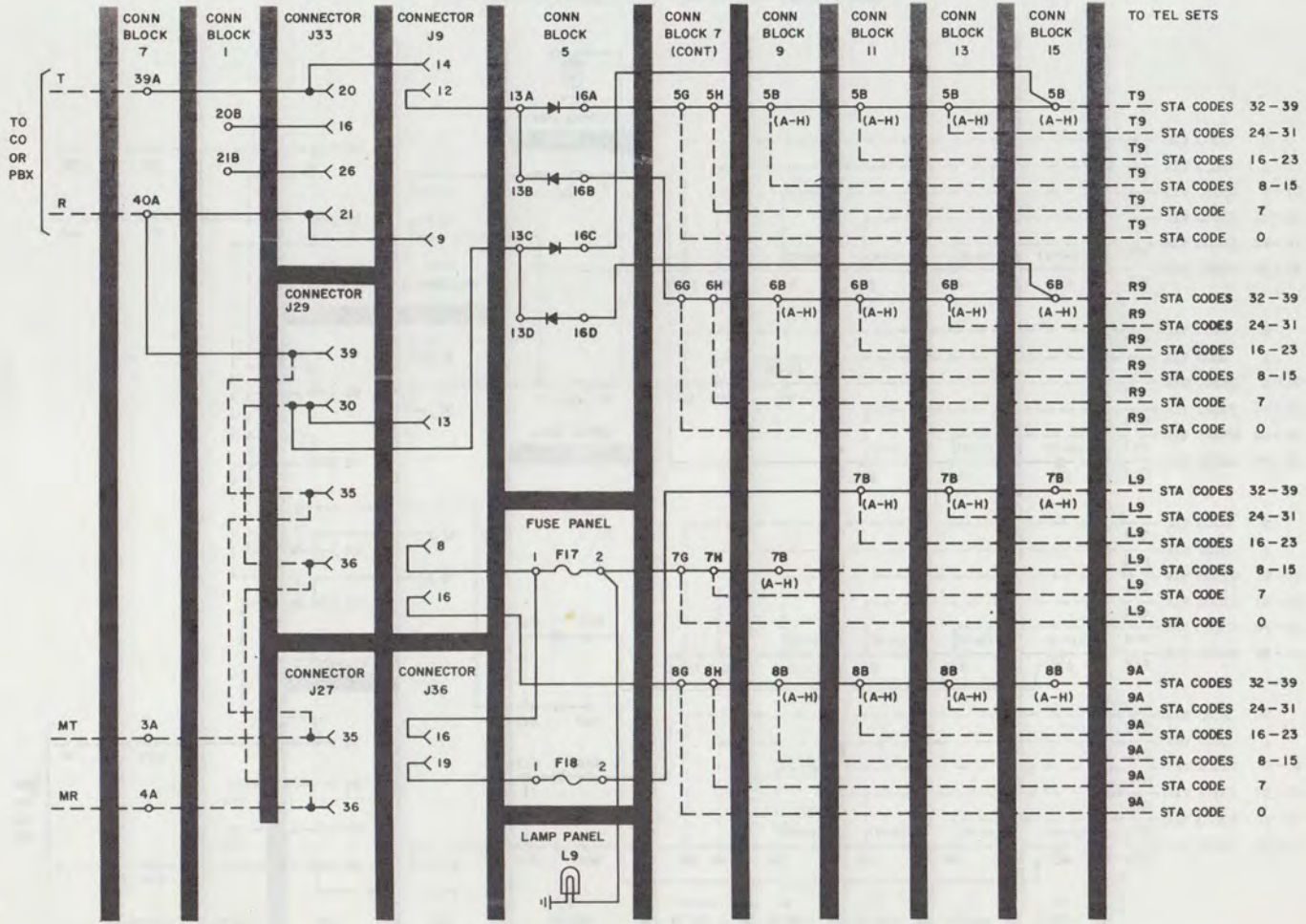


Fig. 53—◊CO/PBX Line Circuit 9—580A KSU◊

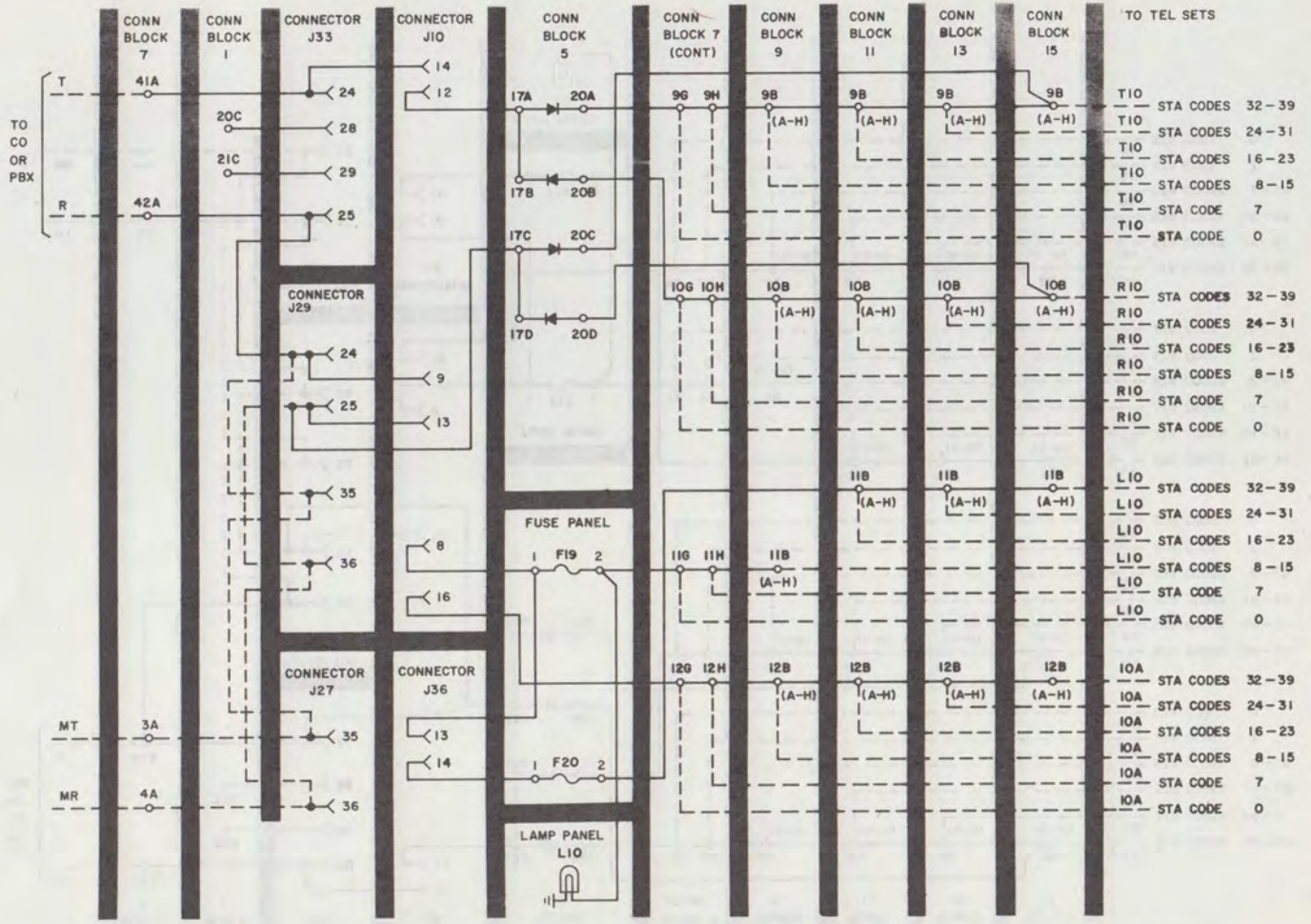


Fig. 54—CO/PBX Line Circuit 10—580A KSU

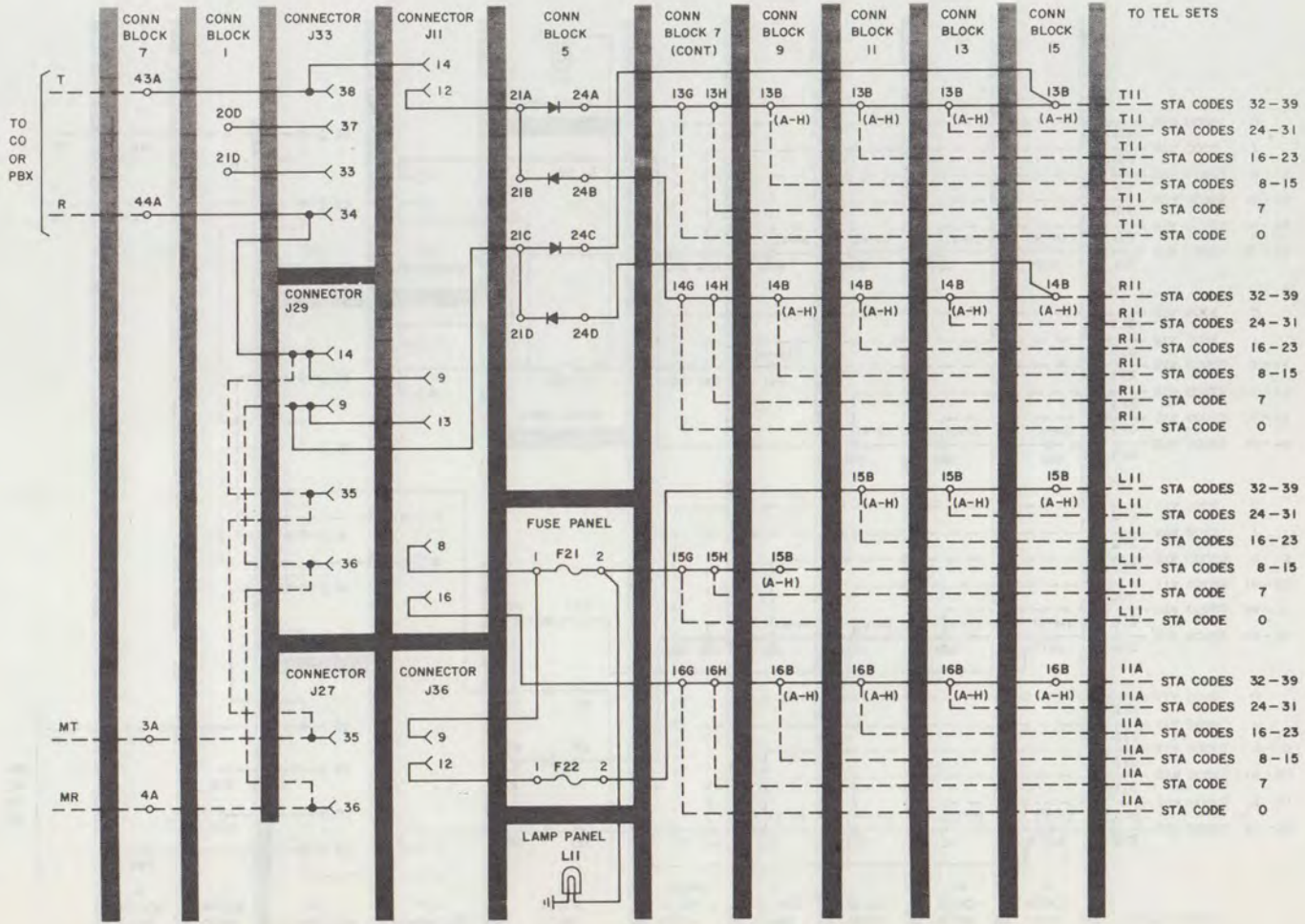


Fig. 55—CO/PBX Line Circuit 11—580A KSU

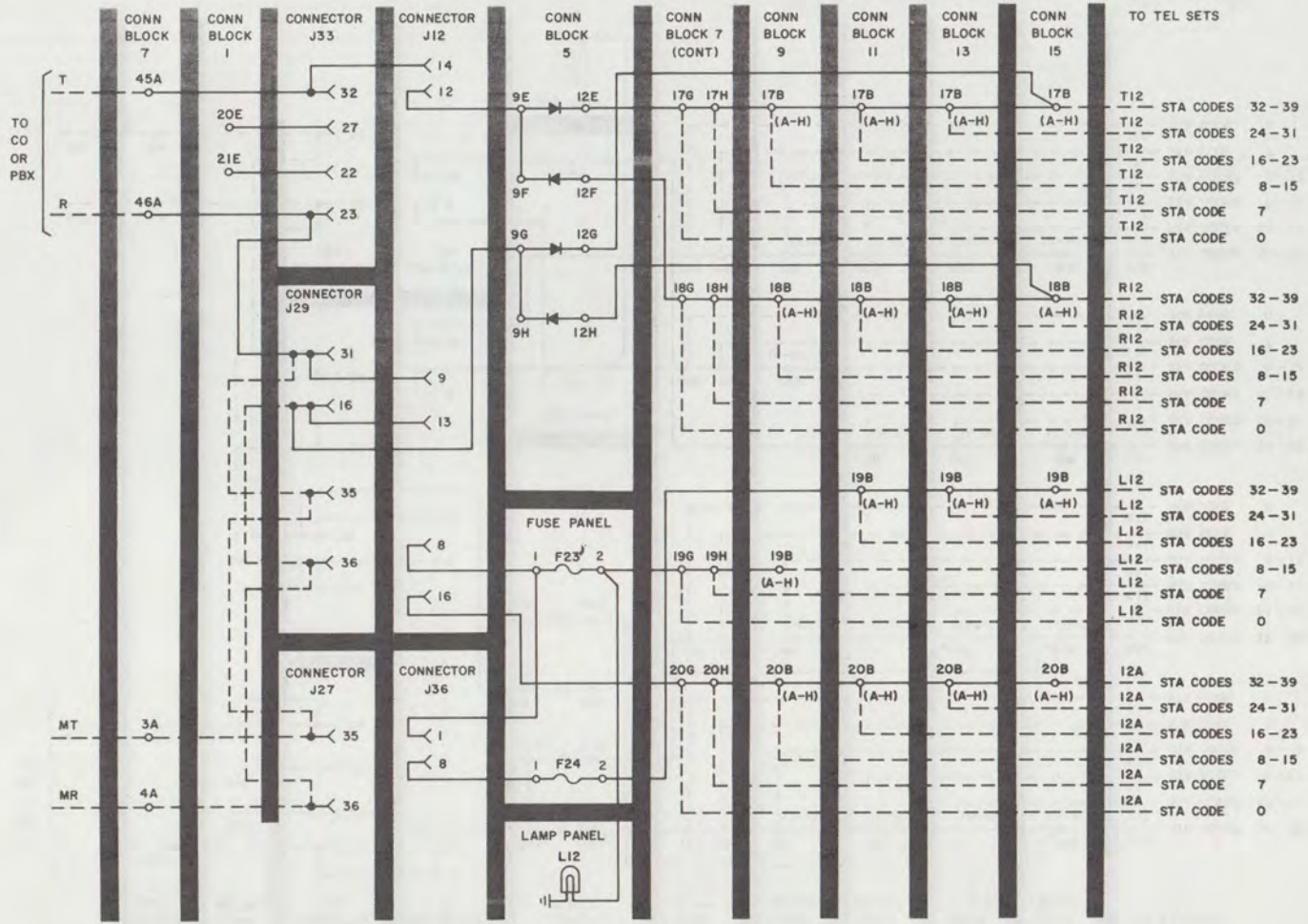


Fig. 56—CO/PBX Line Circuit 12—580A KSU

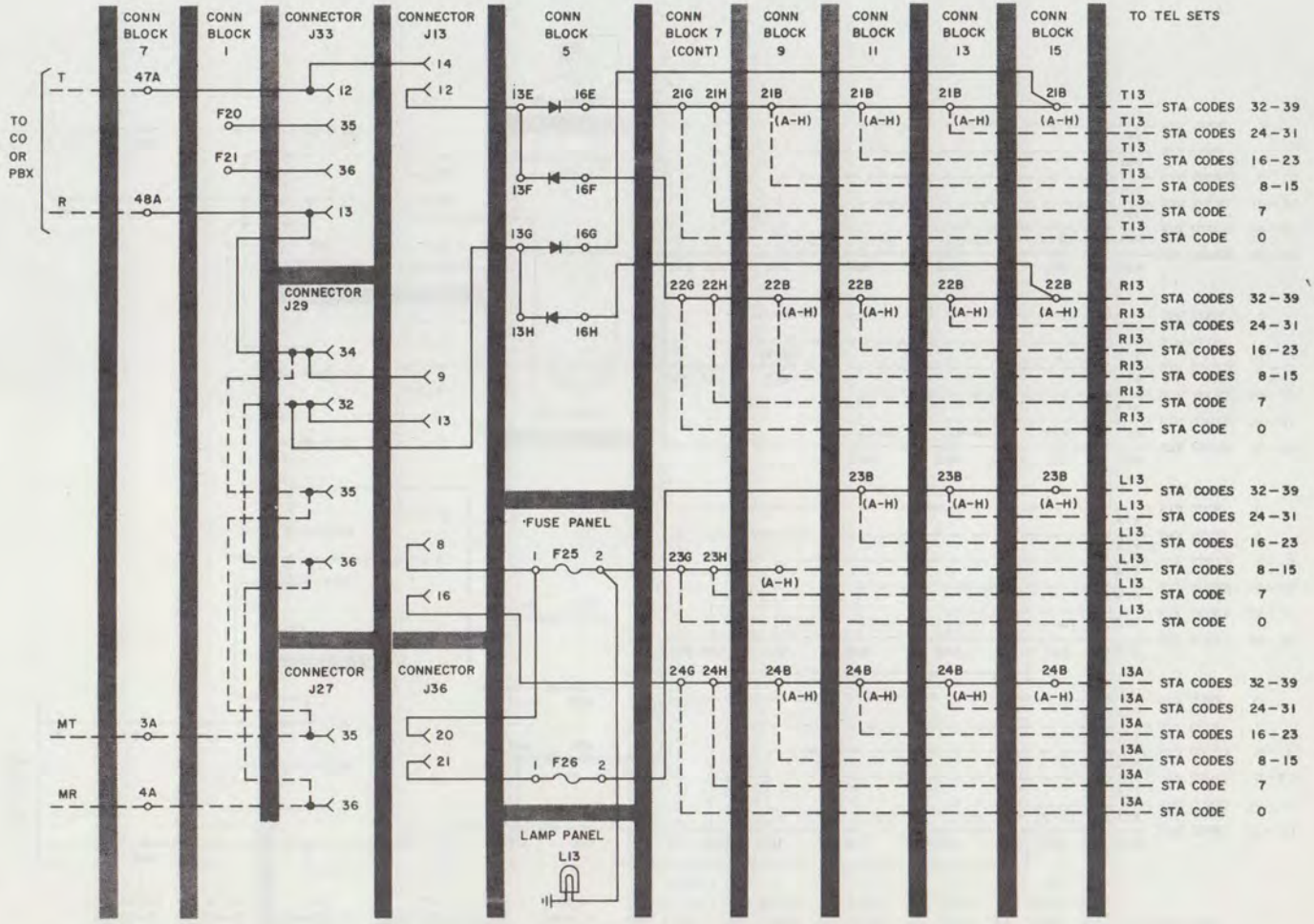


Fig. 57—CO/PBX Line Circuit 13—580A KSU

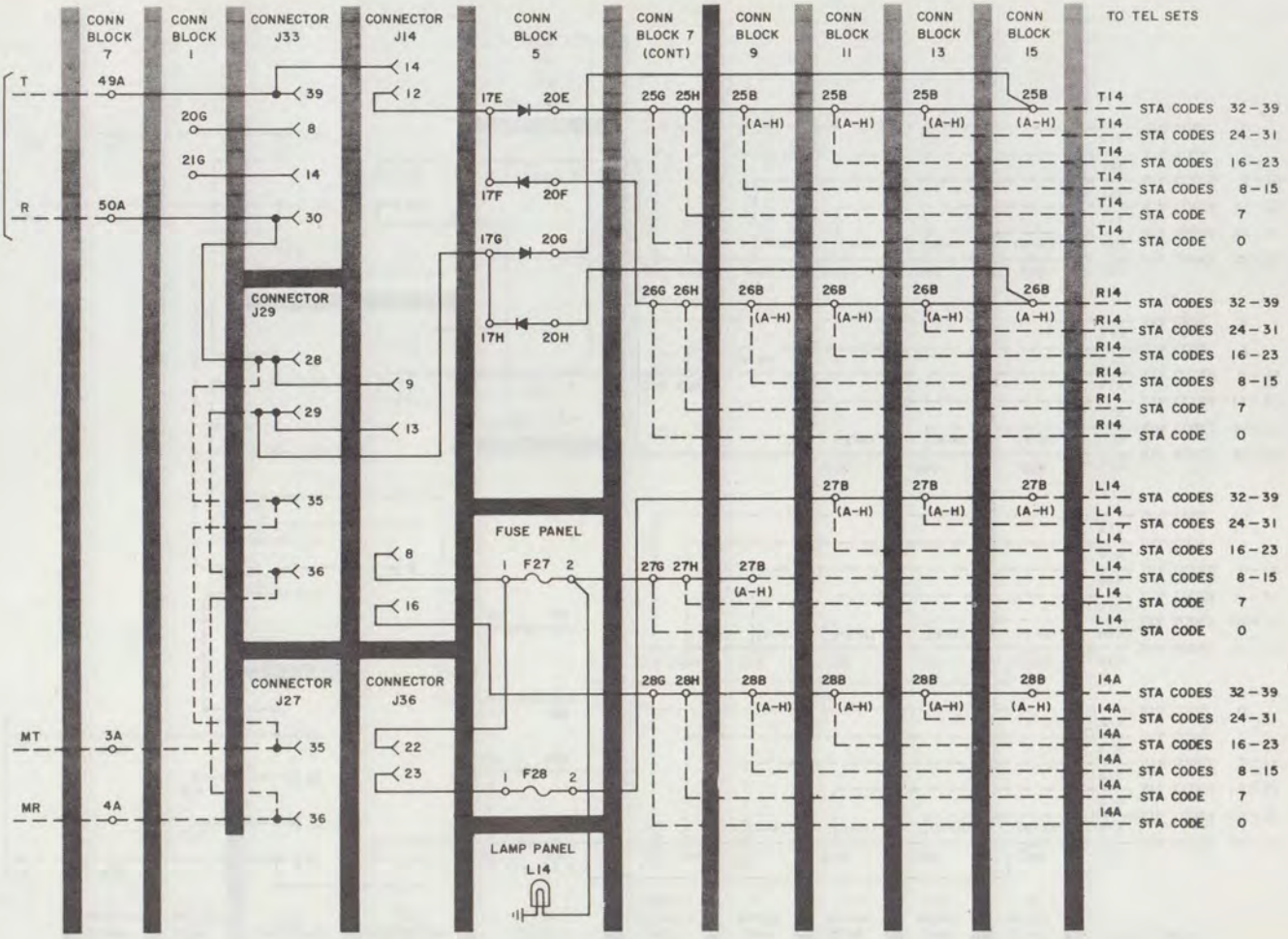


Fig. 58—CO/PBX Line Circuit 14—580A KSU

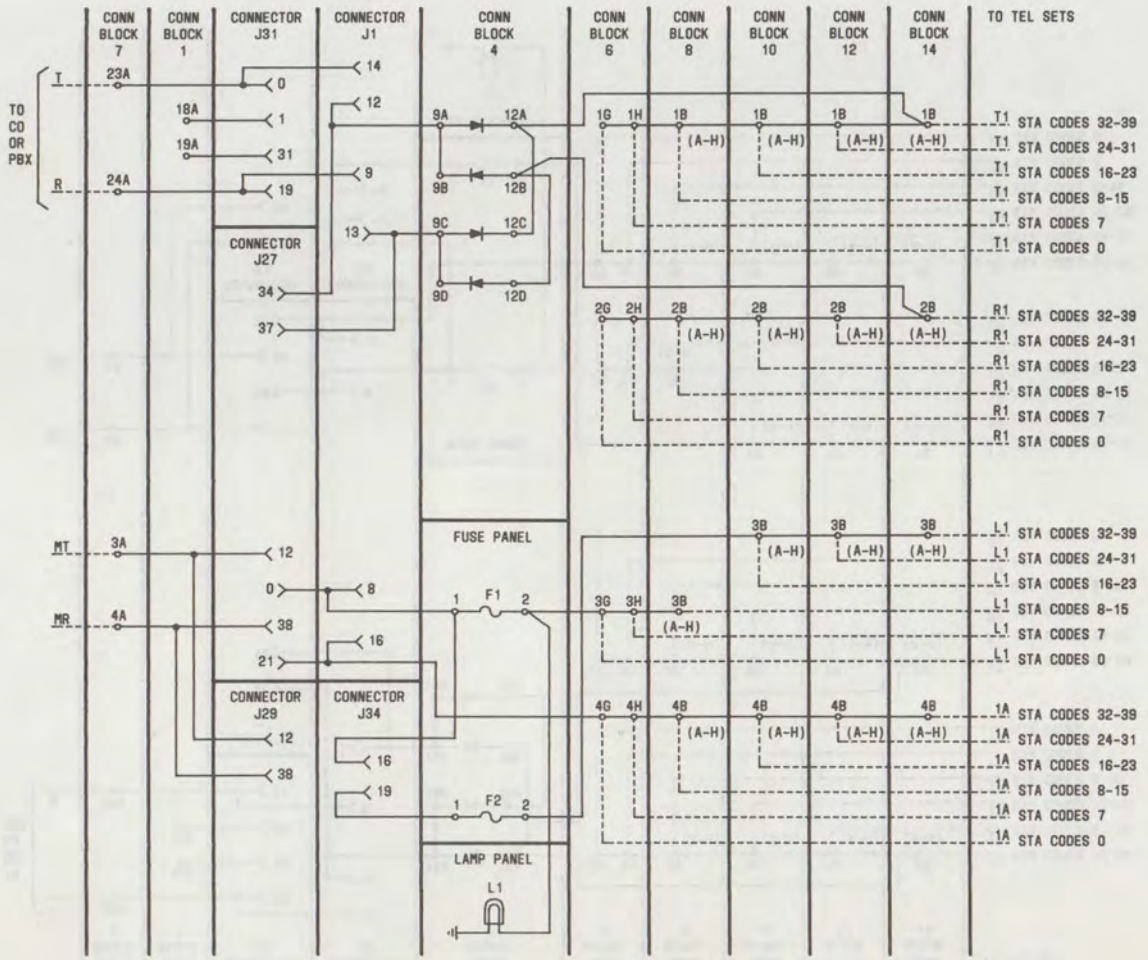


Fig. 59—CO/PBX Line Circuit 1—580B KSU

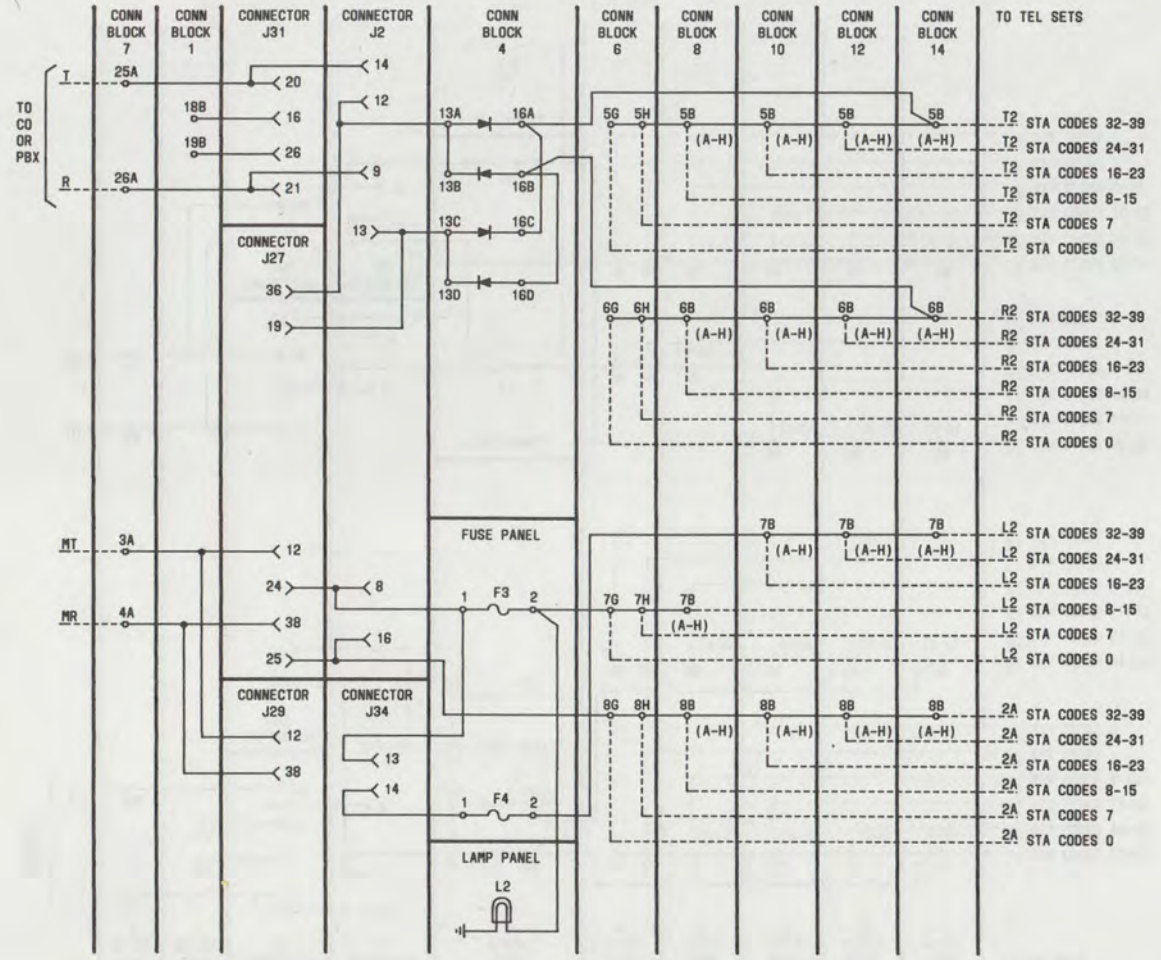


Fig. 60—CO/PBX Line Circuit 2—580B KSU

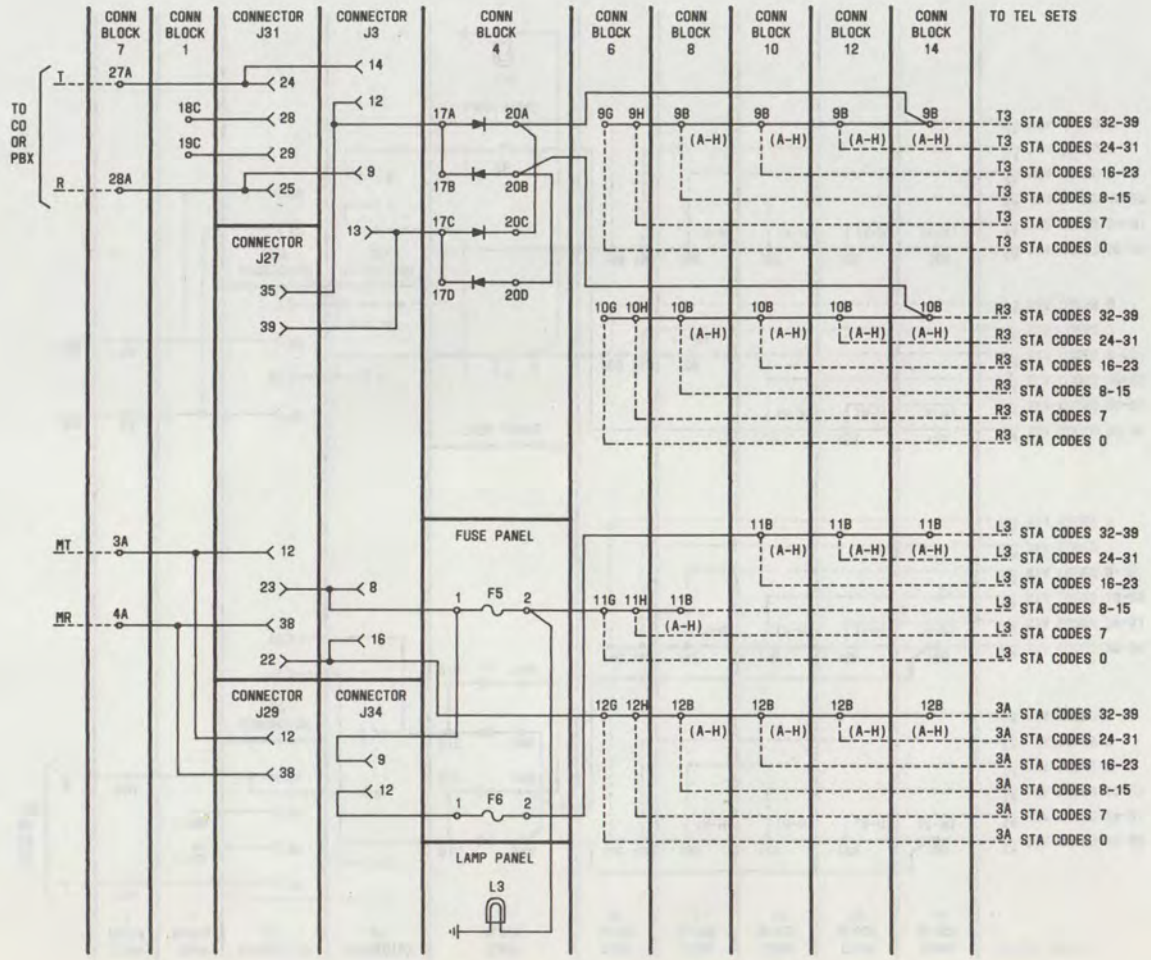


Fig. 61—CO/PBX Line Circuit 3—580B KSU

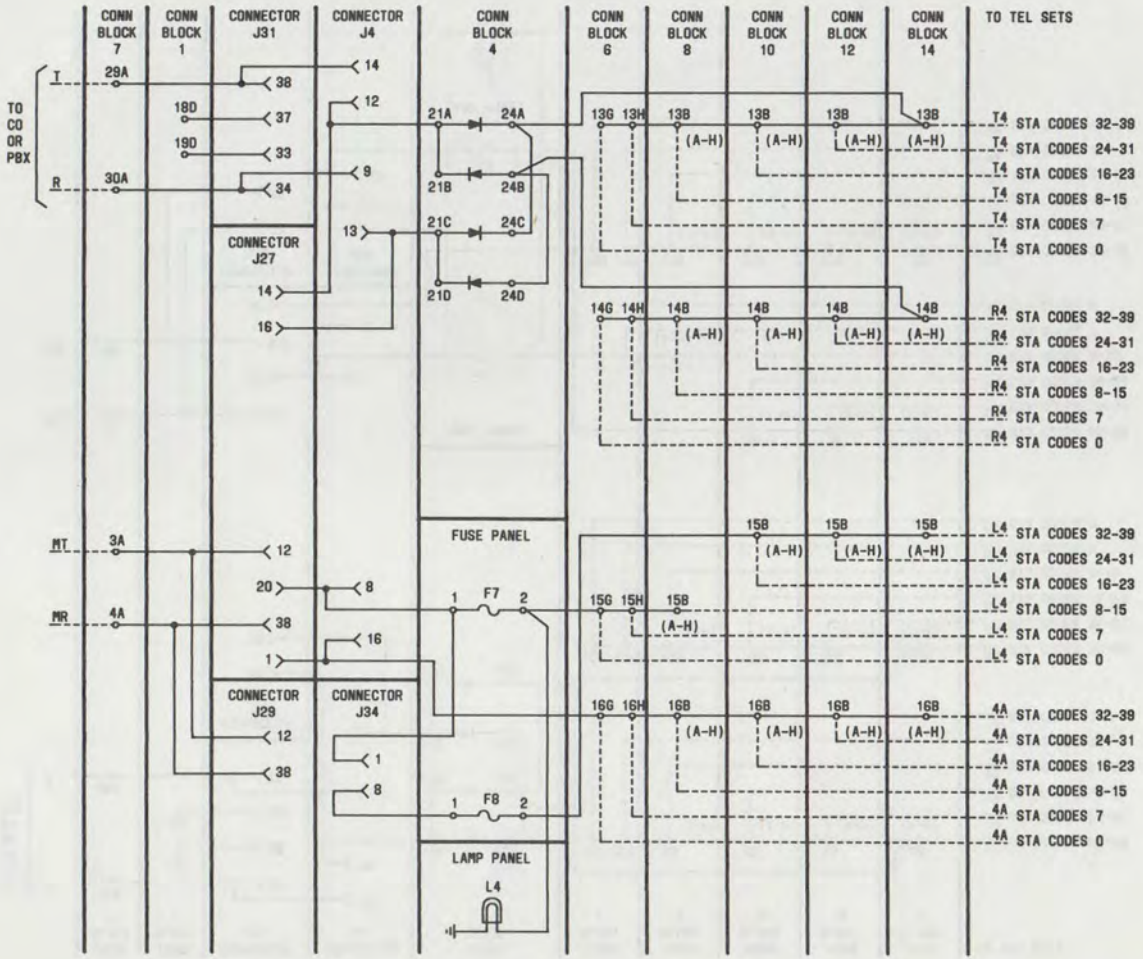


Fig. 62—CO/PBX Line Circuit 4—580B KSU

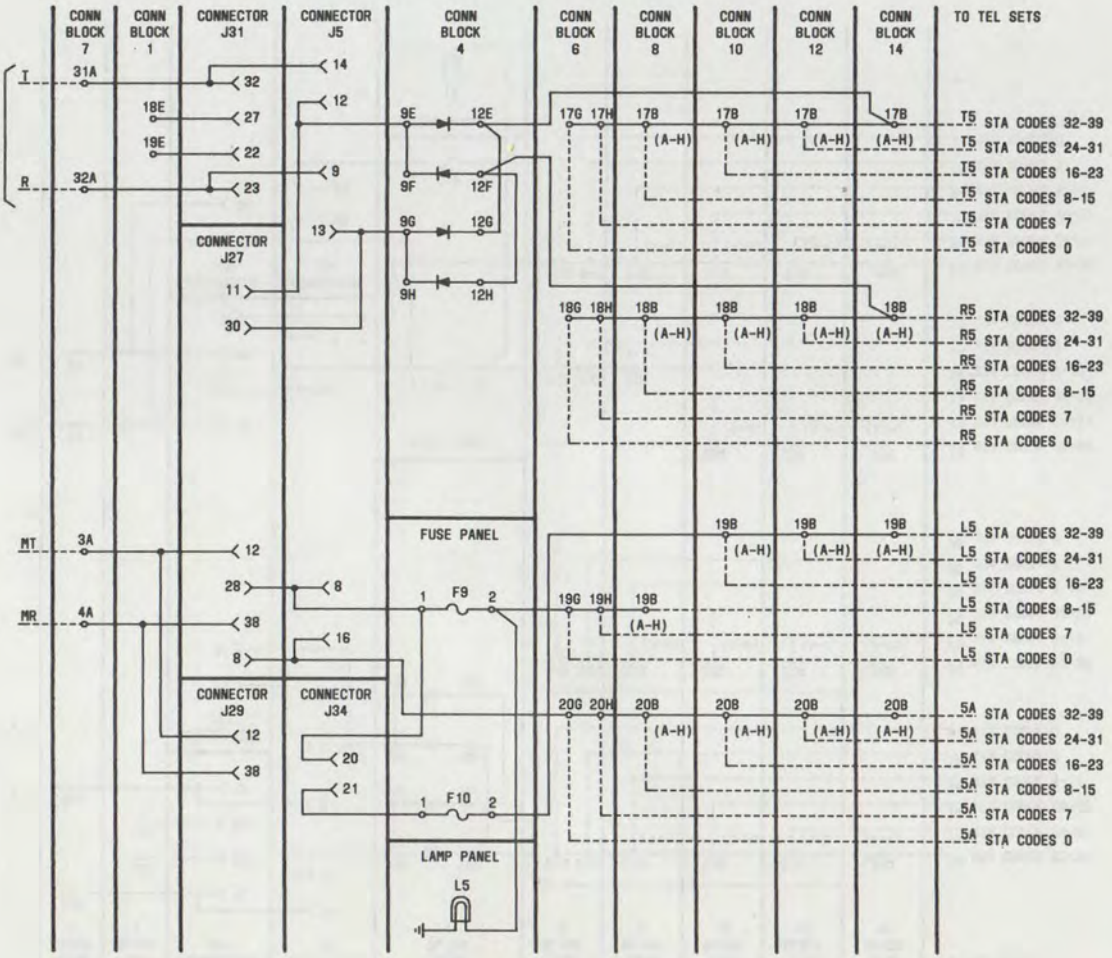


Fig. 63—CO/PBX Line Circuit 5—580B KSU

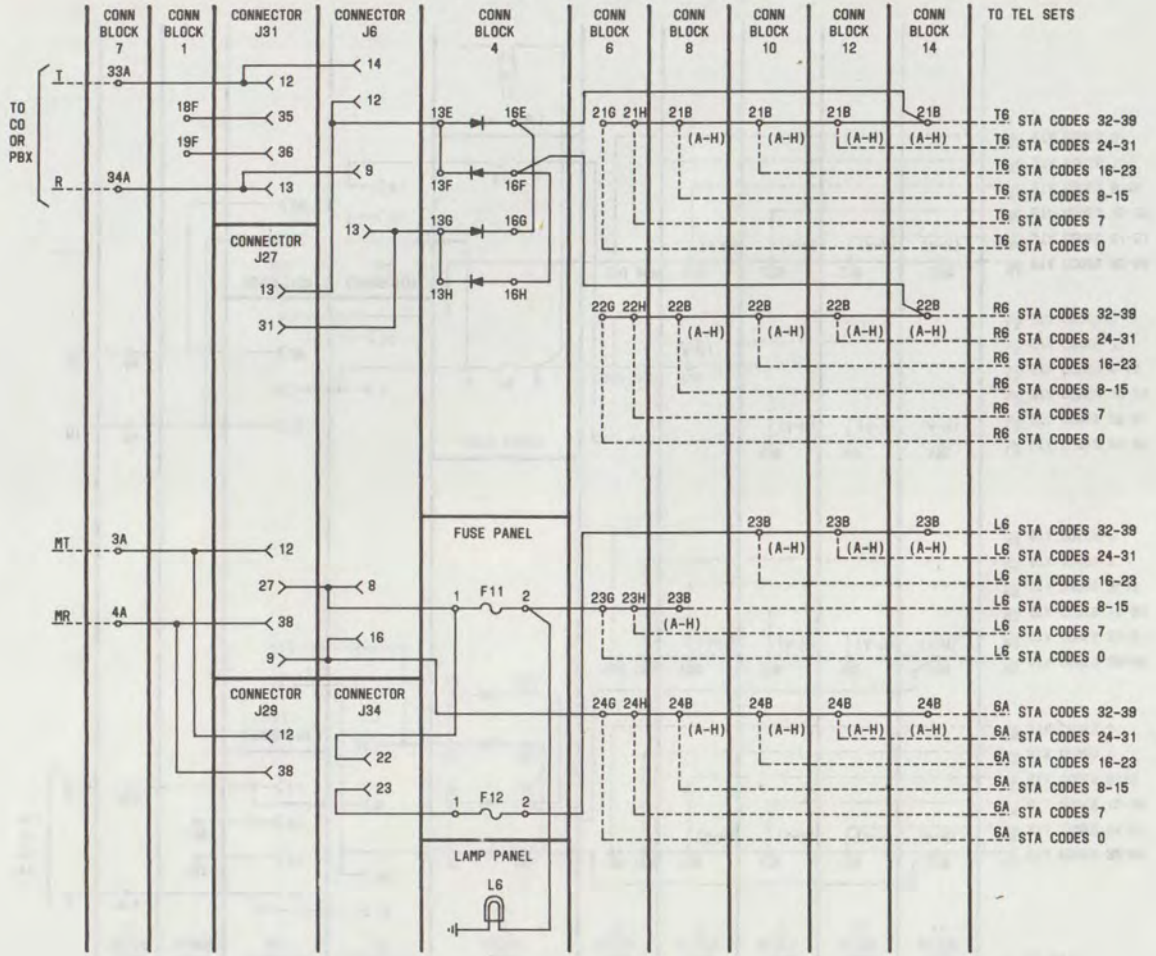


Fig. 64—CO/PBX Line Circuit 6—580B KSU

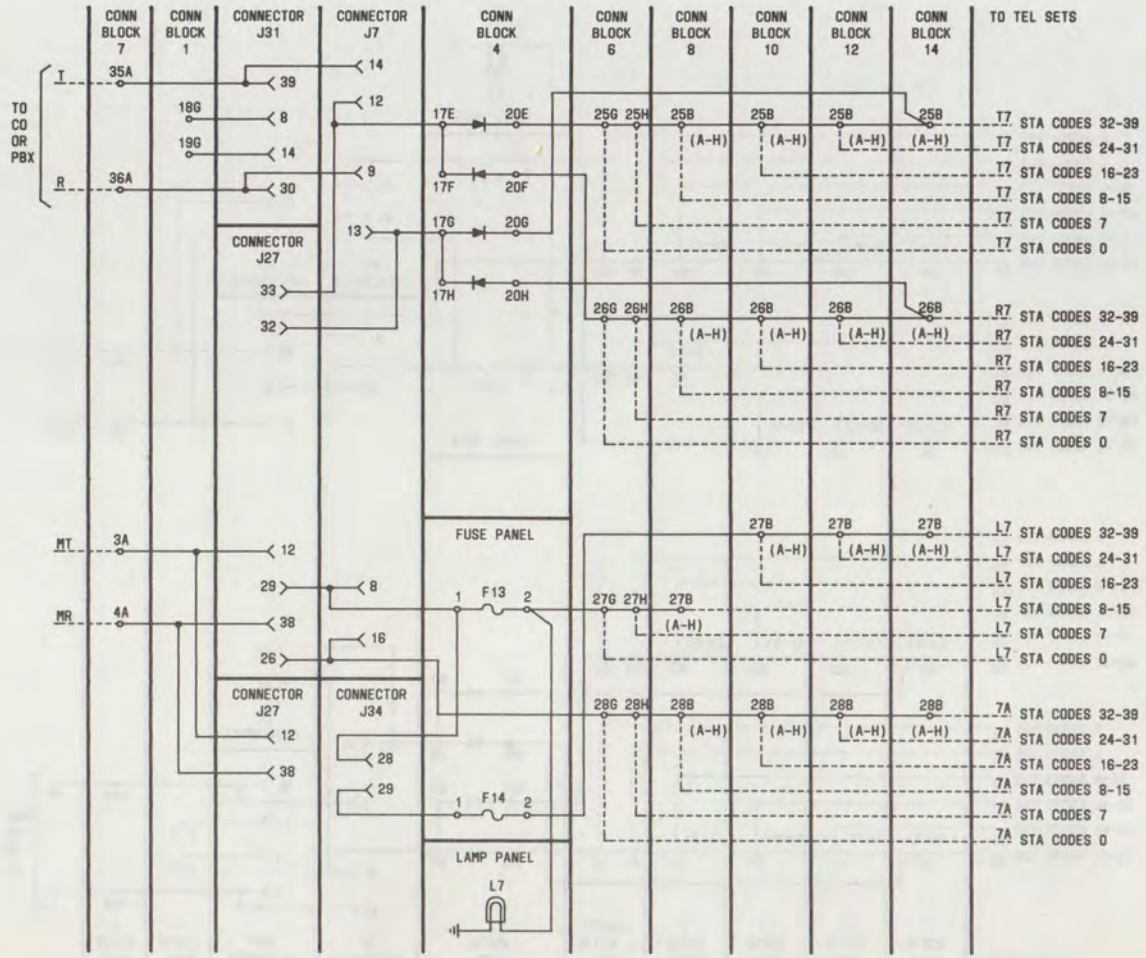


Fig. 65—CO/PBX Line Circuit 7—580B KSU

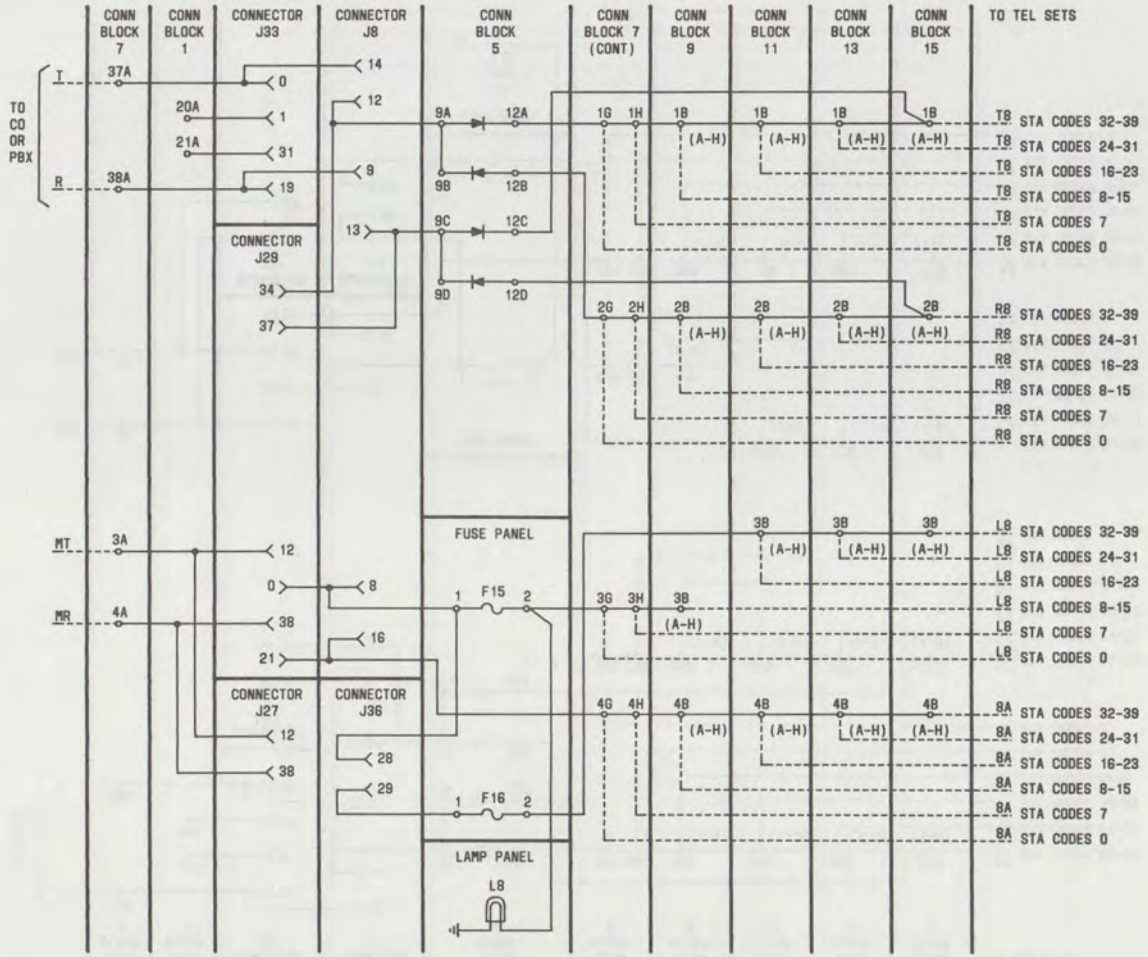


Fig. 66—CO/PBX Line Circuit 8—580B KSU

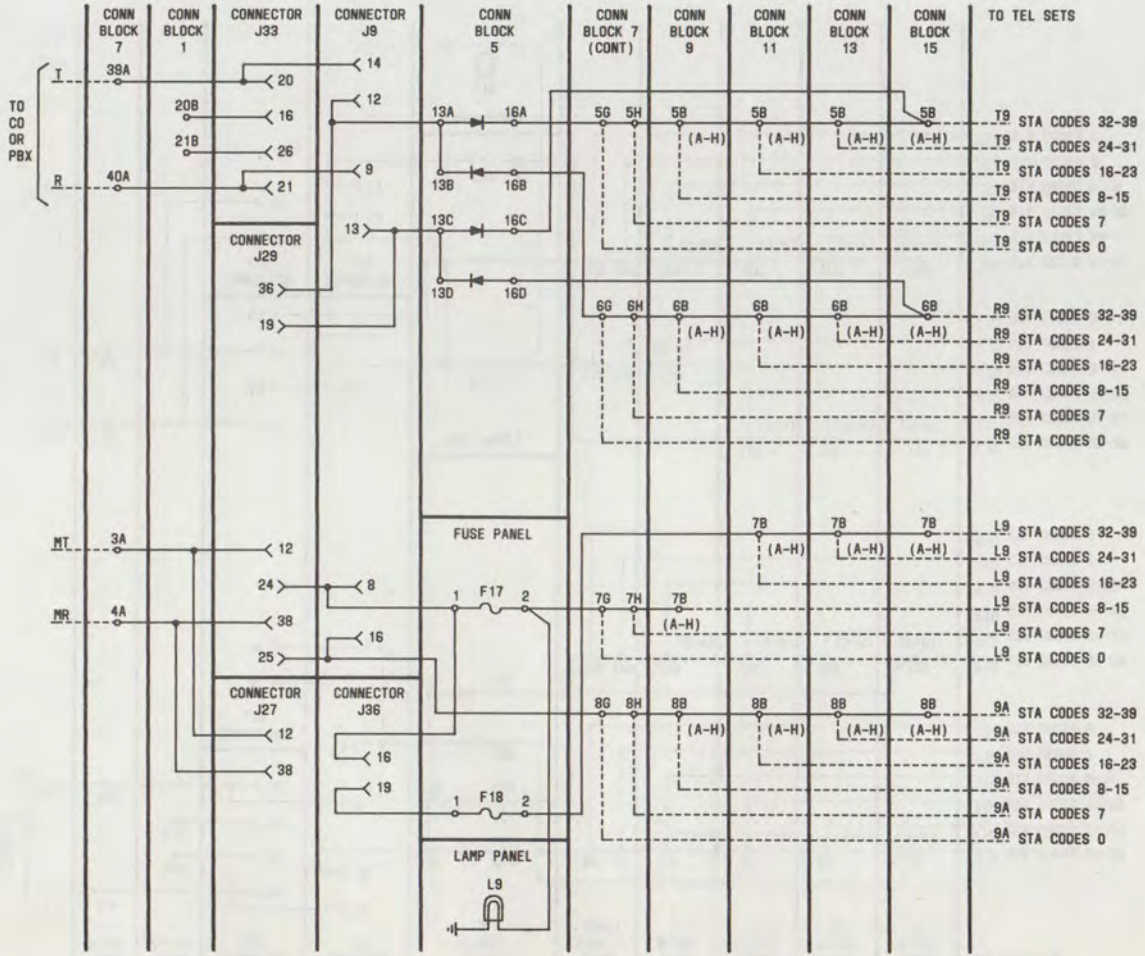


Fig. 67—CO/PBX Line Circuit 9—580B KSU

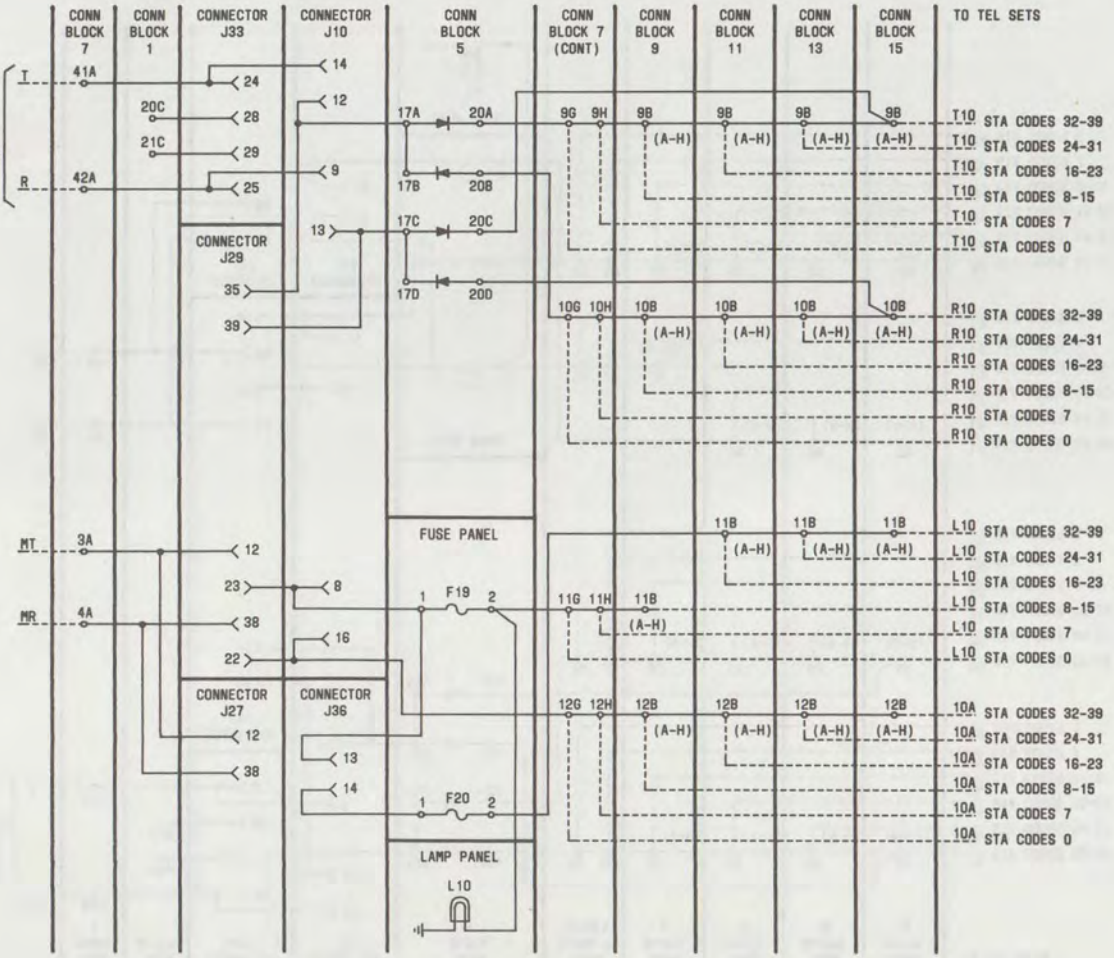


Fig. 68—CO/PBX Line Circuit 10—580B KSU

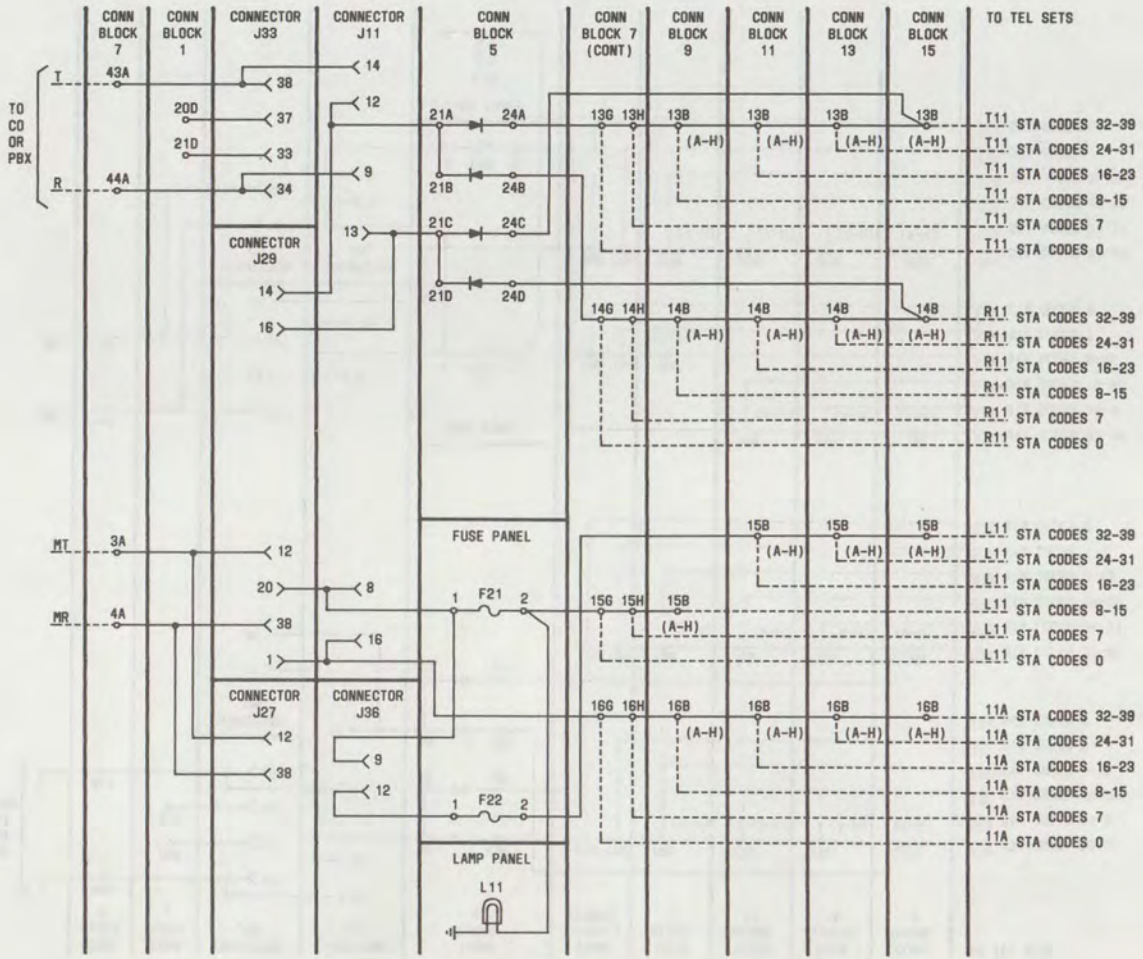


Fig. 69—CO/PBX Line Circuit 11—580B KSU

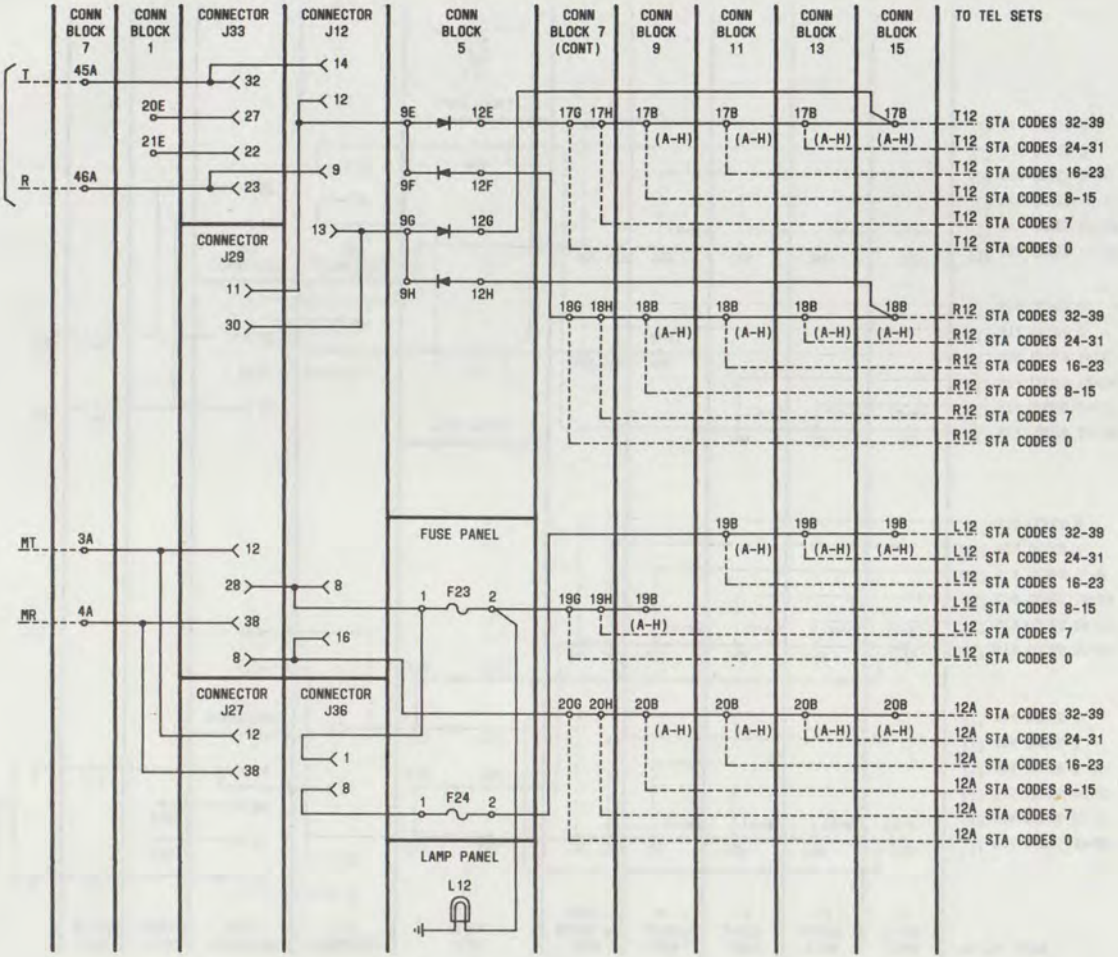


Fig. 70—CO/PBX Line Circuit 12—580B KSU

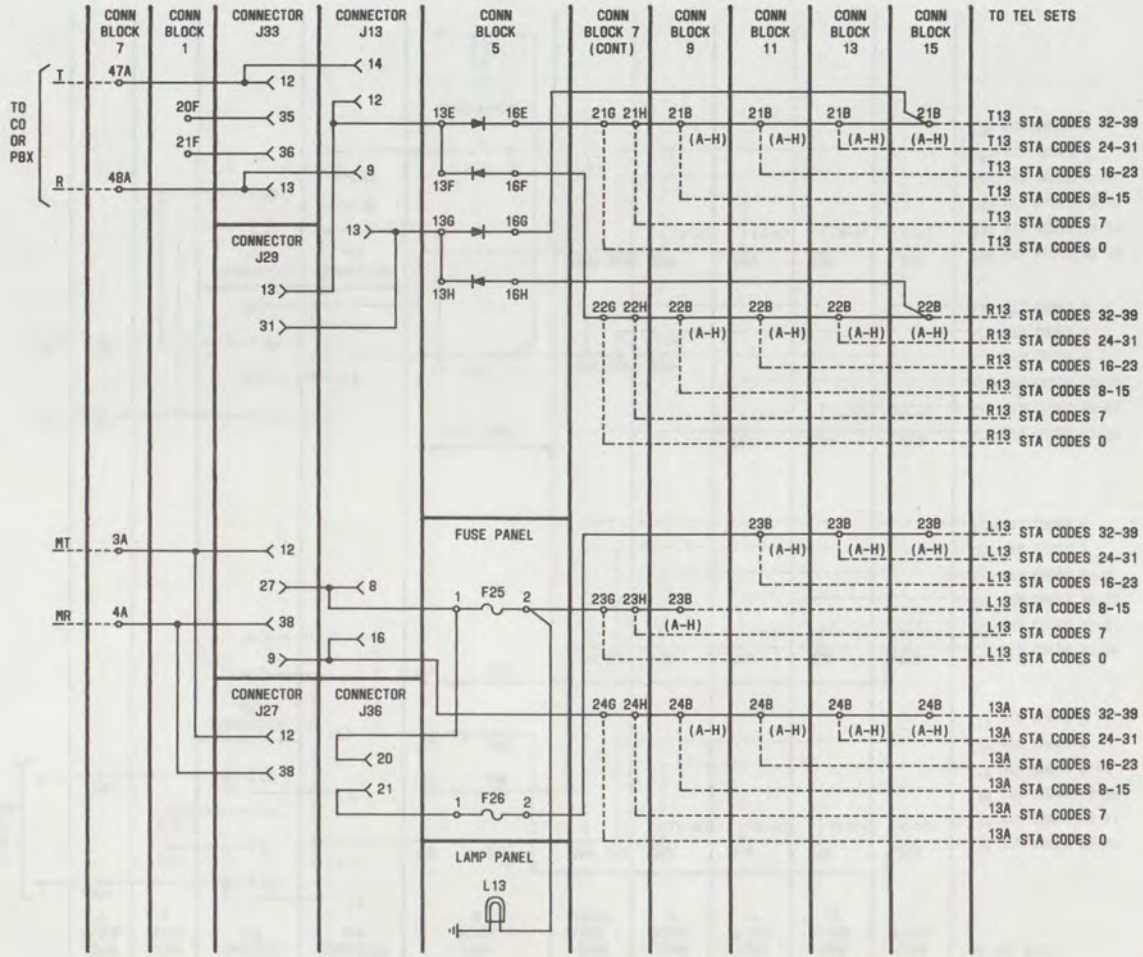


Fig. 71—CO/PBX Line Circuit 13—580B KSU

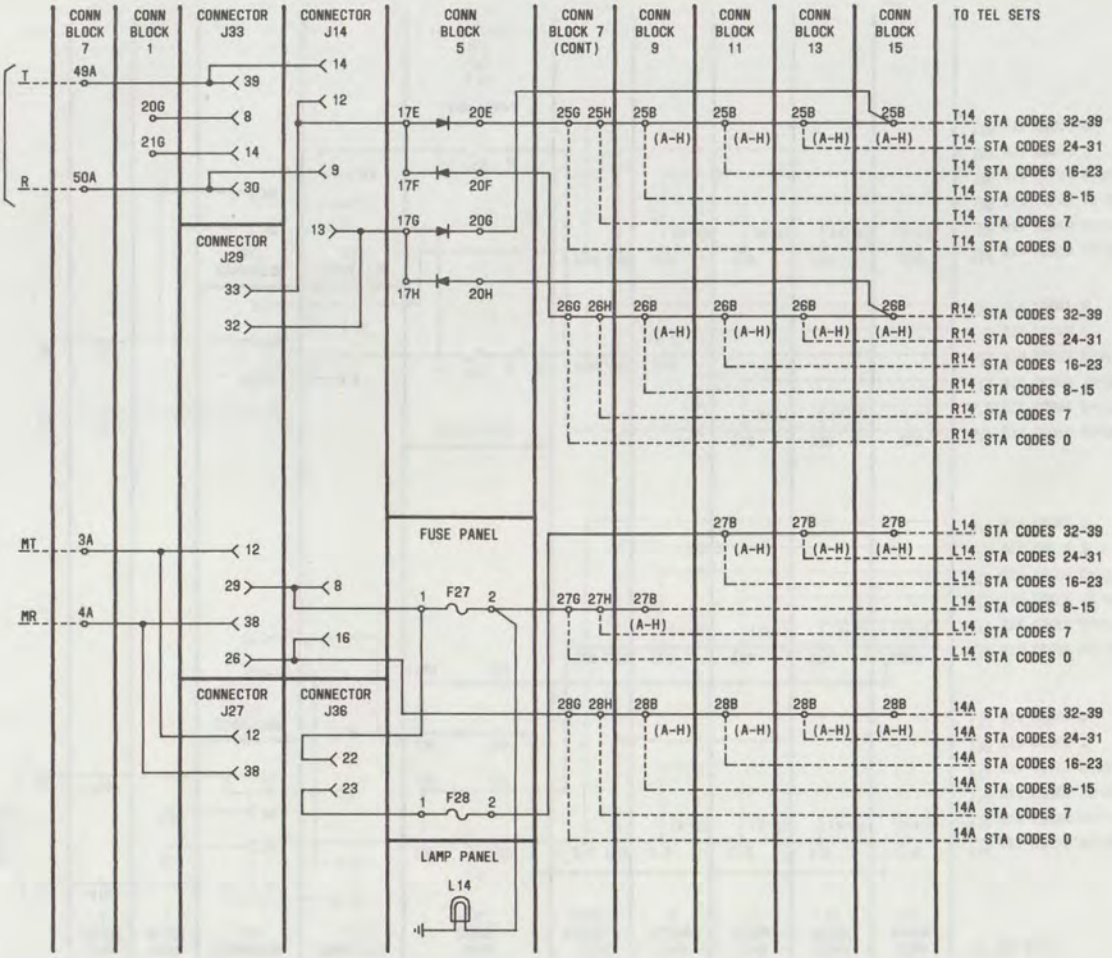


Fig. 72—CO/PBX Line Circuit 14—580B KSU

♦TABLE O♦

CO/PBX LINE RINGING ARRANGEMENTS

CO/PBX ringing on any line

OK

Tone ringing heard at attendant station (0) and alternate station (if option S is provided).

FAILURE

(a) No tone ringing at attendant — any lines

1. Option K strap missing on block 1—1C to 19H.
2. Open CO (0) lead.
3. Defective tel set amplifier and/or loudspeaker.

(b) No tone ringing at attendant — some lines

1. Defective or missing common audible diodes—block 2.
2. Open RC lead—line involved.

(c) No tone ringing—alternate station

1. Option S straps missing on block 1—row 22 or 23 to column C or G.
2. Open CO ( ) lead.
3. Defective tel set amplifier and/or loudspeaker.

Ring transfer button depressed at attendant station (0)

OK

CO/PBX ringing heard at transfer station—removed from attendant station.

FAILURE

1. Strap missing on block 1 from RT terminal (21H) to column C.
2. RING TR key at attendant station not connected properly.
3. Open CO ( ) lead at alternate station.
4. RING TR key at attendant station defective.

Ring transfer button reoperated

OK

CO/PBX ringing returned to attendant station.

FAILURE

1. Defective RING TR key.
2. Defective attendant tel set amplifier and/or loudspeaker.

TABLE P

LEAD TABLE – CO/PBX RINGING ARRANGEMENTS

LEAD DESIG	FUNCTION
CO( )	Central Office ringing lead — tone ringing is applied to this lead from RO lead of 455A KTU, interrupter, RN lead, 400-type KTU, RC( ) lead, common audible diodes, and cross-connect on block 1.
RT	Ring transfer — this lead transfers common audible ringing from CO (0) lead to designated station under control of RING TR button at attendant set and jumper at block 1 (option J).
RC( )	Ringing control — tone ringing output from 400-type KTU to common audible diodes on block 2.

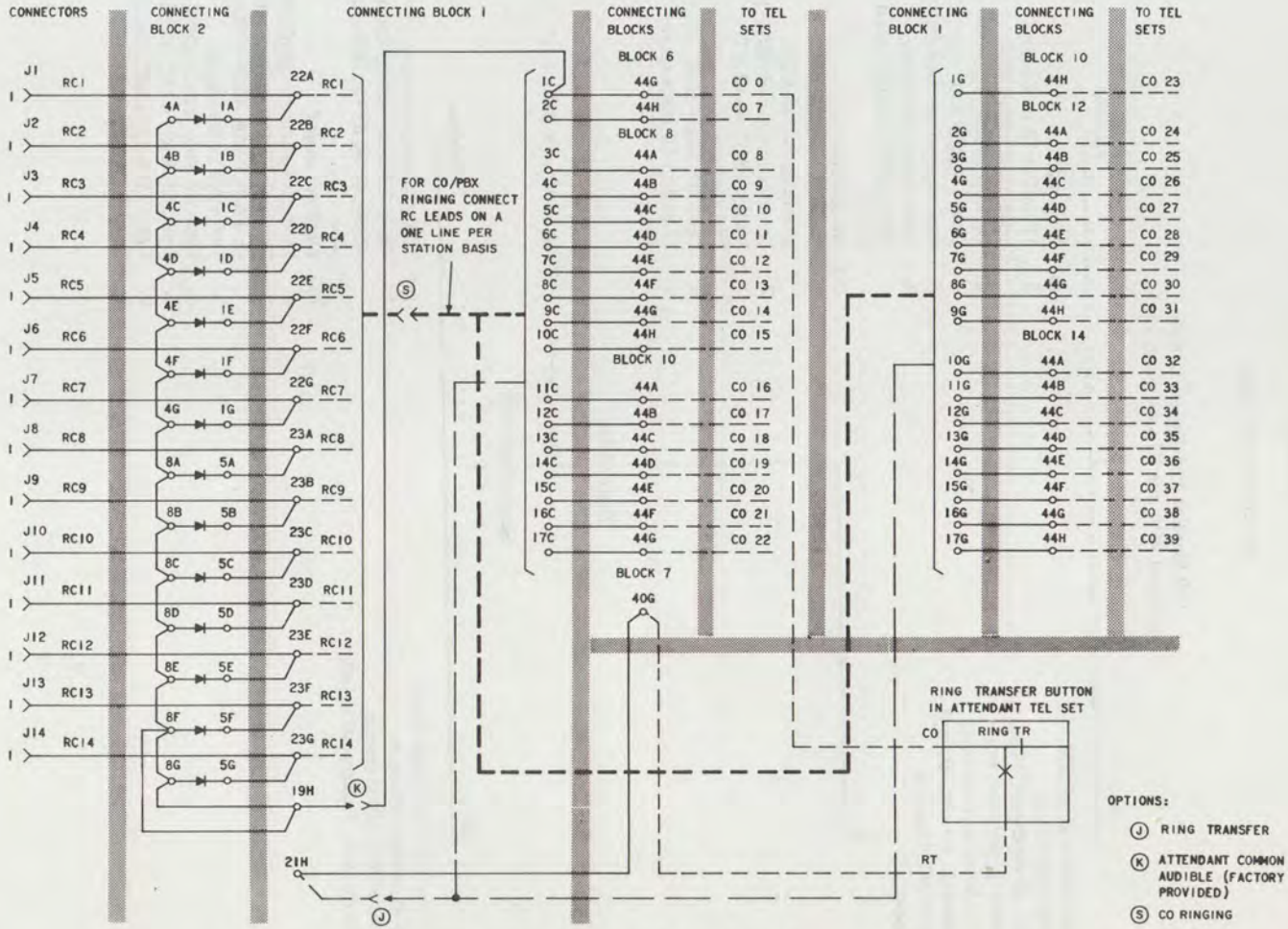


Fig. 73—CO/PBX Ringing Circuit

TABLE Q

INTERCOM (IC) CALL

Lift handset and depress button associated with idle IC path (lamp dark).

OK

Lamp flashes at 60 IPM.
IC dial tone heard.
Note: If another IC lamp is flashing, dial tone will not be heard until selector is released. Do not attempt 2nd IC call if lamp is flashing

FAILURE

(a) No lamp
1. IT and/or IR of selected path open—454B KTU.
2. Open A battery fuse—29-type power supply fuse, fuse 15.
3. Open lamp fuse, fuse 29-34.
4. Interrupter not running—(MS and MG leads)—454B KTU.

(b) No dial tone
1. Defective dial tone generator—454B KTU.
2. Selector not seized (D0-D1 leads); 424C, 454B KTUs, DSS console.
3. Open BR lead—424C, 454B.
4. IT and/or IR leads open—454B.

Digit dialed.

If 2-digit code, see 2-digit call.

Single-digit code.

OK

Dial tone removed. Tone burst. heard at calling station in handset and at called station in loudspeaker. Lamp goes steady.

FAILURE

(a) Dial tone not removed
1. Open LK lead—424C, 440A or 478B, 454B KTUs, DSS console.

(b) Digit not dialed
1. Defective selector—424C KTU.
2. TC and/or RC lead open—440A or 478B, 454B, 456B KTUs.
3. Defective DSS console.
4. Open SS lead—424C, 456B.
5. Open LK lead—424C, 454B.
6. Open TD lead—424C, 444A/B.
7. Open R(X)/VS lead.

TABLE Q (Contd)

INTERCOM (IC) CALL

(c) No tone burst

1. Open BY1 lead—424B/424C, 456A, 454B.
2. Defective voice and tone-alerting circuit—456B.
3. Open SS lead—456B, 424B/424C.
4. Open VS lead—424B/424C.
5. Defective tel set amplifier (called station).

(d) Lamp continues to flash

1. Open BY1 lead—424B/424C, 454B.
2. Defective 2nd station detect circuit—454B.
3. Selector not released.

Calling station makes announcement. Called station depresses same IC button.

OK

Voice conversation possible on IC path.

FAILURE

(a) No voice conversation

1. IT and/or IR lead open (called station)—454B.
2. Defective tel set.

Both stations go on-hook.

OK

Button restores. Lamp extinguishes.

FAILURE

1. Defective access circuit—454B.
2. Defective tel set.

TABLE Q (Contd)

INTERCOM (IC) CALL

2-digit IC call.

1st digit dialed.

OK

Dial tone removed.
Selector reset for 2nd digit.

2nd digit dialed.

OK

Tone burst heard at calling station in handset and at called station in loudspeaker. Lamp goes steady.

Balance of call same as for single digit.

FAILURE

(a) Dial tone not removed
1. Open LK lead–424C, 440A or 478B, 454B KTUs, DSS console.

(b) Selector not reset
1. Defective selector–424C KTU.

FAILURE

(a) Wrong station alerted
1. TR, TR1 relays not operated–424C KTU.
2. K1, K2, K3, or K4 relay not operated in 444A/B KTU.

(b) No tone burst
1. Open BY1 lead–424C, 454B, 456B KTUs.
2. Defective 456B.
3. Open SS lead–456B.
4. Open TD, TDX, TDY, TDZ, BR, or RXX leads–424C, 444A/B KTU.
5. Open R( )/VS lead–424C, 444A/B KTU.
6. Defective tel set–called station.

(c) Lamp continues to flash
1. Open BY1 lead–424C, 454B.
2. Defective detect circuit–454B.
3. Selector not released–424C.

TABLE R

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
BR	Switched B Battery — when 424C is seized, this lead applies —24V B to 454B (to start intercom dial tone) and to 444-type (for the operation of the transfer digit relays).	J18-35 J20-35 J24-35
BY1	Busy Ground — applies ground after completion of dialing to enable the 2nd station detect circuit in the 454B and start intercom ringing in the 456B.	J18-19 J20-19 J26-19
CGO	Counter Ground — provides ground to counting relays (Y1-Y5) of 424C from RS1 lead (M option) or from 440A or 478B (N option) or from DSS console (Q option).	J18-21
CG1	Counter Ground — provides ground to counting relays of 424C, either by option strap or via DSS console (Q option) on non-TOUCH-TONE calls.	J22-21
DO	Dialing Output — seizure input for 424C by way of D1 lead (M option) or by way of DSS console (Q option).	J20-16
D1	Off-hook Detection — selector seizure output from 454B (M option) or to DO output of 454B via DSS console (Q option). If call is rotary dialed, D1 is also the dial pulse input from the 454B.	J18-16
ICF	Intercom Flash — interrupted 10V ac signal for intercom link lamps to indicate that an intercom link has seized the 424C (selector).	J16-7 J20-7
IL11	Intercom Lamp 1 — lamp lead for first intercom path; 10V ac is supplied from fuse 29 to station codes 0, 7-23, and to lamp 15 in lamp panel.	J20-8
IL12	Intercom Lamp 1 — lamp lead for first intercom path; 10V ac is supplied from fuse 30 to station codes 24-39.	J20-9
IL21	Intercom Lamp 2 — lamp lead for second intercom path; 10V ac is supplied from fuse 31 to station codes 0, 7-23, and to lamp 16 in lamp panel.	J19-16
IL22	Intercom Lamp 2 — lamp lead for second intercom path; 10V ac is supplied from fuse 32 to station codes 24-39.	J19-19
IL31	Intercom Lamp 3 — lamp lead for third intercom path; 10V ac is supplied from fuse 33 to station codes 0, 7-23, and to lamp 17 in lamp panel.	J19-8
IL32	Intercom Lamp 3 — lamp lead for third intercom path; 10V ac is supplied from fuse 34 to station codes 24-39.	J19-9

TABLE R (Contd)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
IR1	Intercom Ring 1 — ring side of first intercom path.	J20-14
IR2	Intercom Ring 2 — ring side of second intercom path.	J20-0
IR3	Intercom Ring 3 — ring side of third intercom path.	J19-13
IT1	Intercom Tip 1 — tip side of first intercom path.	J20-34
IT2	Intercom Tip 2 — tip side of second intercom path.	J20-1
IT3	Intercom Tip 3 — tip side of third intercom path.	J19-14
LK	Dial Tone Disconnect — ground applied to this lead stops dial tone in the 454B after the first digit of an intercom code has been dialed.	J18-30 J20-30 J22-26
LTY	Transfer Lead Y — when 20s intercom code is selected from DSS console, DSS ground is applied to 444-type (TRY and TRY1 relays); then ground from the 444-type, via LT2 lead, is applied to the TR and TR1 relays of the 424C.	J23-39
LTZ	Transfer Lead Z — when 30s intercom code is selected from DSS console, DSS ground is applied to 444-type (TR Z and TR Z1 relays); then ground from 444-type, via LT2 lead, is applied to the TR and TR1 relays of the 424C.	J24-39
LT2	Transfer Lead 2 — when 10s intercom code is selected from DSS console, DSS ground is applied to the transfer relays, TR and TR1, of the 424C.	J17-39 J24-12
MG	Motor Ground — starts interrupter when this lead is shorted to MS lead through a contact closure of LB( ) relay in the 454B.	J16-3 J19-6
MS	Motor Start — starts interrupter when this lead is shorted to MG lead through A contact closure of LB( ) relay in the 454B.	J16-2 J19-5
PA	Paging Signal — output to paging amplifiers (457C KTUs).	J26-0 J28-16 J30-16 J32-16
PC1	Paging Code 1 — when the intercom code for zone one paging is dialed, —24V is applied to PC input of zone one paging amplifier (457C) enabling amplifier for paging.	J17-26
PC2	Paging Code 2 — when the intercom code for zone two paging is dialed, —24V is applied to PC input of zone two paging amplifier (457C) enabling amplifier for paging.	J17-20

TABLE R (Contd)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
PC3	Paging Code 3 — when the intercom code for zone three paging is dialed, —24V is applied to PC input of zone three paging amplifier (457C) enabling amplifier for paging.	J17-21
RC	Calling Ring — common ring of intercom circuits to voice and tone-alerting circuit (456B), to access circuit (454B), and to TOUCH-TONE adapter circuit (440A/478B).	J20-13 J22-13 J26-9
RH	R Relay Hold — disables intercom ringing in 424C until dialing is complete by applying ground after intercom dialing starts.	J18-26 J20-26
RS1	Reset — provides ground for 424C selector timer; when TOUCH-TONE (N option) is provided, supplies ground via 440A/478B for counting relays in 424C.	J17-19 J18-38 J22-38
RX0	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 10, 20, or 30.	J17-14 J23-14
RX1	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 11, 21, or 31.	J17-8 J23-8
RX2	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 12, 22, or 32.	J17-22 J23-22
RX3	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 13, 23, or 33.	J17-24 J23-24
RX4	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 14, 24, or 34.	J17-27 J23-27
RX5	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 15, 25, or 35	J17-0 J23-0
RX6	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 16, 26, or 36.	J17-1 J23-1
RX7	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 17, 27, or 37.	J17-33 J23-33
RX8	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 18, 28, or 38.	J17-31 J23-31
RX9	Station Ringing Lead — voice signal lead from 424C to 444-type for intercom codes 19, 29, or 39.	J17-9 J23-9

TABLE R (Contd)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
R0	Station Ringing Lead — voice signal lead — code 0; VS0 lead to tel set.	J17-34
R7	Station Ringing Lead — voice signal lead — code 7; VS7 lead to tel set.	J17-32
R8	Station Ringing Lead — voice signal lead — code 8; VS8 lead to tel set.	J17-30
R9	Station Ringing Lead — voice signal lead — code 9; VS9 lead to tel set.	J17-29
R10	Station Ringing Lead — voice signal lead — code 10; VS10 lead to tel set.	J24-14
R11	Station Ringing Lead — voice signal lead — code 11; VS11 lead to tel set.	J24-8
R12	Station Ringing Lead — voice signal lead — code 12; VS12 lead to tel set.	J24-22
R13	Station Ringing Lead — voice signal lead — code 13; VS13 lead to tel set.	J24-24
R14	Station Ringing Lead — voice signal lead — code 14; VS14 lead to tel set.	J24-27
R15	Station Ringing Lead — voice signal lead — code 15; VS15 lead to tel set.	J24-0
R16	Station Ringing Lead — voice signal lead — code 16; VS16 lead to tel set.	J24-1
R17	Station Ringing Lead — voice signal lead — code 17; VS17 lead to tel set.	J24-33
R18	Station Ringing Lead — voice signal lead — code 18; VS18 lead to tel set.	J24-31
R19	Station Ringing Lead — voice signal lead — code 19; VS19 lead to tel set.	J24-9
R20	Station Ringing Lead — voice signal lead — code 20; VS20 lead to tel set.	J23-34
R21	Station Ringing Lead — voice signal lead — code 21; VS21 lead to tel set.	J23-28
R22	Station Ringing Lead — voice signal lead — code 22; VS22 lead to tel set.	J23-23
R23	Station Ringing Lead — voice signal lead — code 23; VS23 lead to tel set.	J23-25
R24	Station Ringing Lead — voice signal lead — code 24; VS24 lead to tel set.	J23-26
R25	Station Ringing Lead — voice signal lead — code 25; VS25 lead to tel set.	J23-20
R26	Station Ringing Lead — voice signal lead — code 26; VS26 lead to tel set.	J23-21
R27	Station Ringing Lead — voice signal lead — code 27; VS27 lead to tel set.	J23-32
R28	Station Ringing Lead — voice signal lead — code 28; VS28 lead to tel set.	J23-30
R29	Station Ringing Lead — voice signal lead — code 29; VS29 lead to tel set.	J23-29
R30	Station Ringing Lead — voice signal lead — code 30; VS30 lead to tel set.	J24-34

TABLE R (Contd)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
R31	Station Ringing Lead — voice signal lead — code 31; VS31 lead to tel set.	J24-38
R32	Station Ringing Lead — voice signal lead — code 32; VS32 lead to tel set.	J24-23
R33	Station Ringing Lead — voice signal lead — code 33; VS33 lead to tel set.	J24-25
R34	Station Ringing Lead — voice signal lead — code 34; VS34 lead to tel set.	J24-26
R35	Station Ringing Lead — voice signal lead — code 35; VS35 lead to tel set.	J24-20
R36	Station Ringing Lead — voice signal lead — code 36; VS36 lead to tel set.	J24-21
R37	Station Ringing Lead — voice signal lead — code 37; VS37 lead to tel set.	J24-32
R38	Station Ringing Lead — voice signal lead — code 38; VS38 lead to tel set.	J24-30
R39	Station Ringing Lead — voice signal lead — code 39; VS39 lead to tel set (V option) or preset conference code (T option).	J24-29
SS	Station Signaling Input — when dialing is complete, this lead carries the tone burst from the 456B to the selector (424C) where it is applied to the R( )/VS( ) lead of stations 7, 8, 9, and 0, or is extended to the selector extender circuit (444-type) via a RX( ) lead where it is applied to R( )/VS( ) lead station 10 through station 39.	J18-14 J26-1
TC	Calling Tip — common tip of intercom paths to voice and tone-alerting circuit and TOUCH-TONE adapter.	J20-12 J22-12 J26-8
TD	Transfer Digit — resets selector (424C) when a transfer digit of a 2-digit intercom code is dialed.	J17-16 J23-16
TDX	Transfer Digit X — resets selector (424C) when a 1 transfer digit is dialed (codes 10 through 19).	J17-28 J24-36
TDY	Transfer Digit Y — resets selector (424C) when a 2 transfer digit is dialed (codes 20 through 29).	J17-23 J23-36
TDZ	Transfer Digit Z — resets selector (424C) when a 3 transfer digit is dialed (codes 30 through 39).	J17-25 J24-16
TTG	TOUCH-TONE Ground — supplies ground to control adapter (440A/478B) when selector is seized (N option) or provides ground to DSS console selector relays (Q option).	J18-39 J22-36
VS( )	Station Ringing — same as R( ) leads, see R0 and R7 through R39.	

TABLE R (Contd)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
Y1	Selector Counter Relay No. 1 Ground — permits 440A/478B to apply ground to Y1 (counting relay No. 1) in 424C on TOUCH-TONE dialed intercom calls (N option) or permits DSS console to apply ground to Y1 relay in 424C on DSS calls.	J18-25 J22-14
Y2	Selector Counter Relay No. 2 Ground — same as above except for Y2 relay.	J18-24 J22-30
Y3	Selector Counter Relay No. 3 Ground — same as above except for Y3 relay.	J18-22 J22-29
Y4	Selector Counter Relay No. 4 Ground — same as above except for Y4 relay.	J17-36 J22-32
Y5	Selector Counter Relay No. 5 Ground — same as above except for Y5 relay.	J17-37 J22-23

TABLE S

INPUTS AND OUTPUTS – 424C KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J18-17	TALK	B Battery	
B BAT.	J17-15	TALK	B Ground	
OUTPUTS				
GROUND	VS leads	MON	1 sec. tone burst on VS lead of station tested. See Fig. 97 for VS lead assignment.	Tone burst heard after dialing proper digit(s)
B BAT.	J18-19	TALK	Ground — BY1 lead	Dialing complete — 1- or 2-digit code
	J18-30		Ground — LK lead	After dialing 1st digit, dial tone should be removed
	J18-39		Ground — TTG lead	Selector seized
GROUND	J18-35		B BAT. — BR lead	Selector seized

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

TABLE T

INPUTS AND OUTPUTS—440A/478B KTUs

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J22-18	TALK	A Battery	
B BAT.	J21-3 J22-3	TALK	A Ground	Required for 478B KTU only
	J21-15 J22-15	TALK	B Ground	Required for 478B KTU only
J22-12	J22-13	MON	Multifrequency signals	Either IC path seized — any dial button depressed
OUTPUTS				
B BAT.	J22-26	TALK	B Ground—LK lead	1st digit of 2-digit code dialed
	J22-36		B Ground—TTG	Selector seized

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

TABLE U

INPUTS AND OUTPUTS—444-TYPE KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
B BAT.	J23-15	TALK	B Ground	
GROUND	J23-39		K1 and K2 relays operate	Any intercom path seized
GROUND	J24-39		K3 and K4 relays operate	
OUTPUTS				
B BAT.	J23-16	TALK	B Ground	Dial a 10s digit
B BAT.	J24-12		Ground	Apply ground to J23-39

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

TABLE V

INPUTS AND OUTPUTS—454B KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J19-18	TALK	A BAT. — intercom talk battery	
	J19-17		B BAT. — intercom relay battery	
	J20-4	MON	10V± steady lamp voltage — paths 1 and 2	
	J19-4		10V± steady lamp voltage — path 3	
	J20-35	TALK	B Battery	Selector seized
	J20-7	MON	10V± at 60 IPM — lamp flash	Interrupter running
J19-17	J19-3	TALK	A Ground	
	J19-15		B Ground	
	J19-6		Ground — MG lead	
OUTPUTS				
J20-14	J20-34	TALK	Talk Battery — path 1	Selector seized
J20-0	J20-1		Talk Battery — path 2	
J19-13	J19-14		Talk Battery — path 3	
GROUND	J20-8	MON	10V± at 60 IPM	Intercom path 1 seized
	J20-9			
	J19-16			Intercom path 2 seized
	J19-19			
	J19-8			Intercom path 3 seized
	J19-9			
J20-12	J20-13	TALK	Talk BAT. — TC and RC leads	Any path seized

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

TABLE W

INPUTS AND OUTPUTS—456B KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J26-18	TALK	A Battery	
J26-18	J26-3		A Ground	
J26-8	J26-9		Talk Battery from 454B KTU — TC and RC leads	Any intercom path seized
J26-18	J26-19		Ground — from 424C KTU (BY1 lead) after dialing is completed on any path	
OUTPUTS				
J26-8	J26-9	MON	Tone burst after dialing	Any code dialed — any path
GROUND	J26-1		Tone burst after dialing	Any code dialed — any path
	J26-0		Voice conversation on intercom paging calls	Dial paging code — tone burst and voice should be heard

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

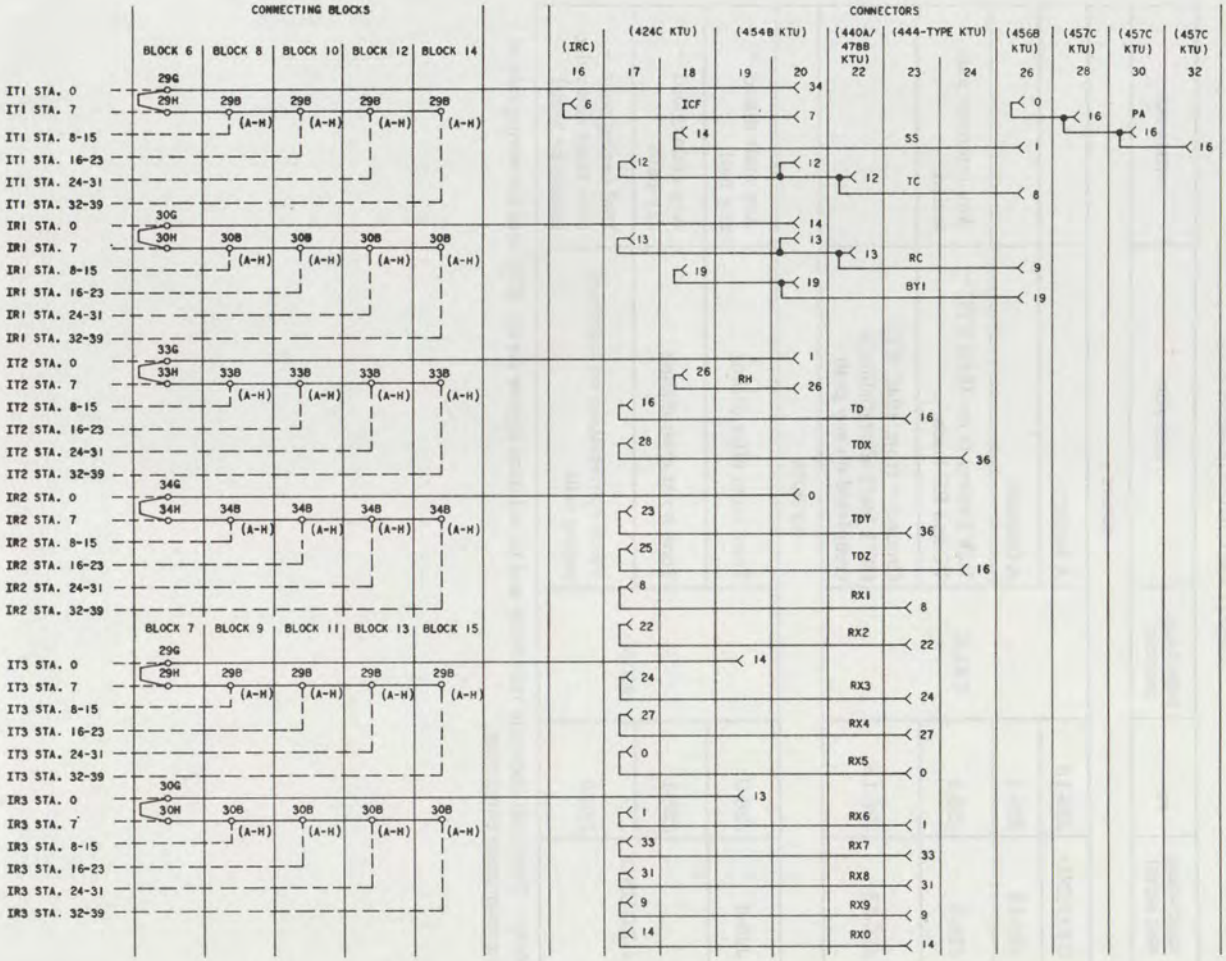


Fig. 74—Intercom Circuit (Sheet 1 of 4)

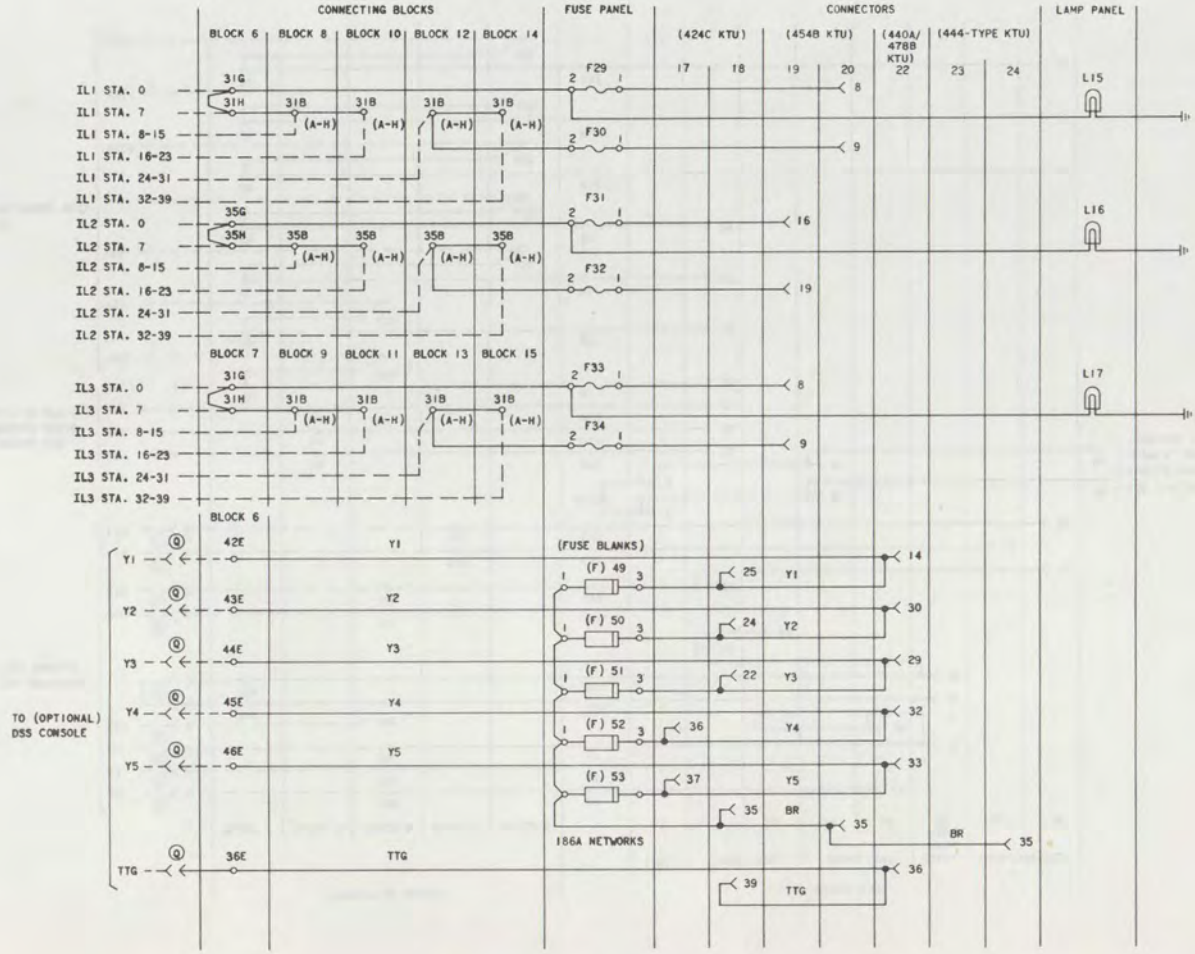


Fig. 74—Intercom Circuit (Sheet 2 of 4)

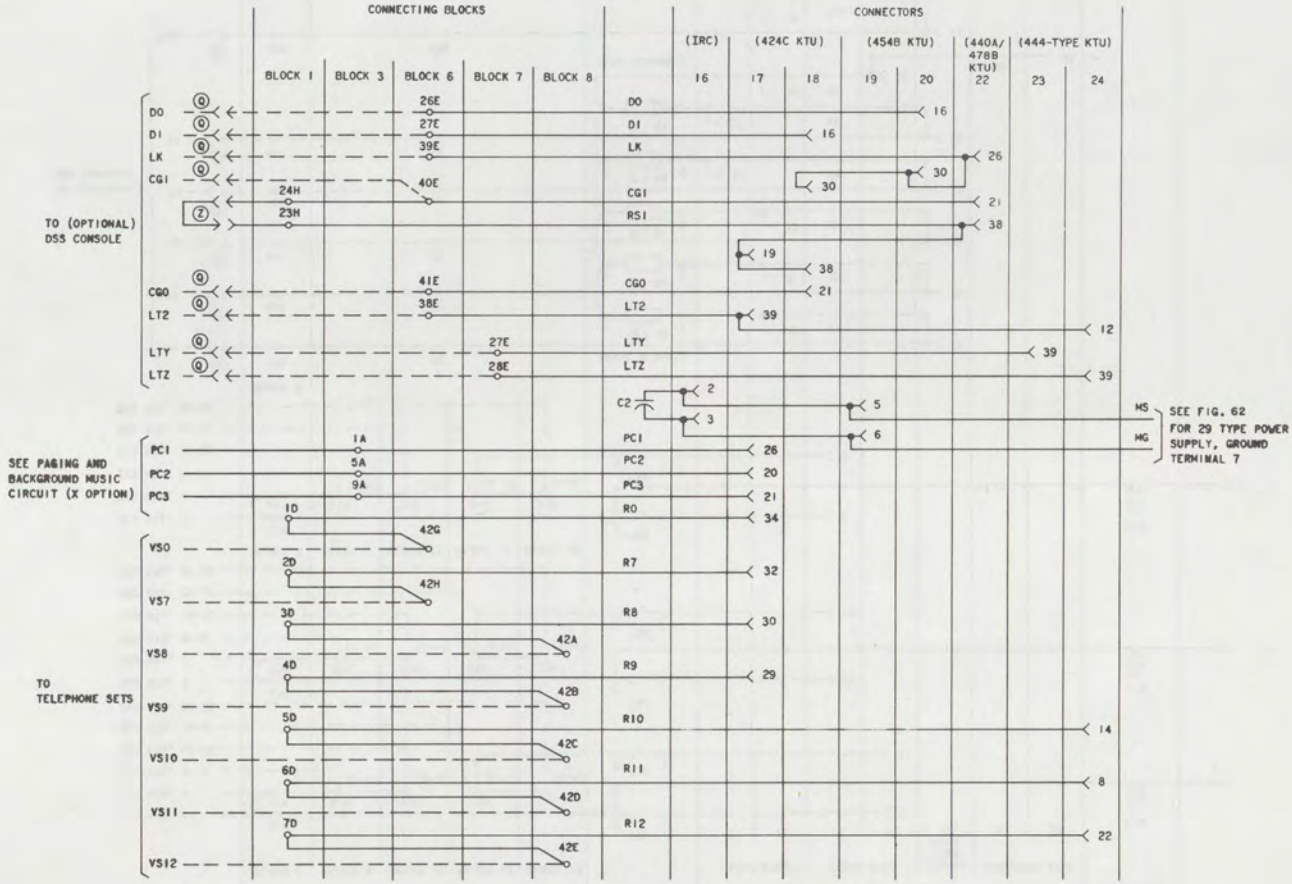


Fig. 74—Intercom Circuit (Sheet 3 of 4)

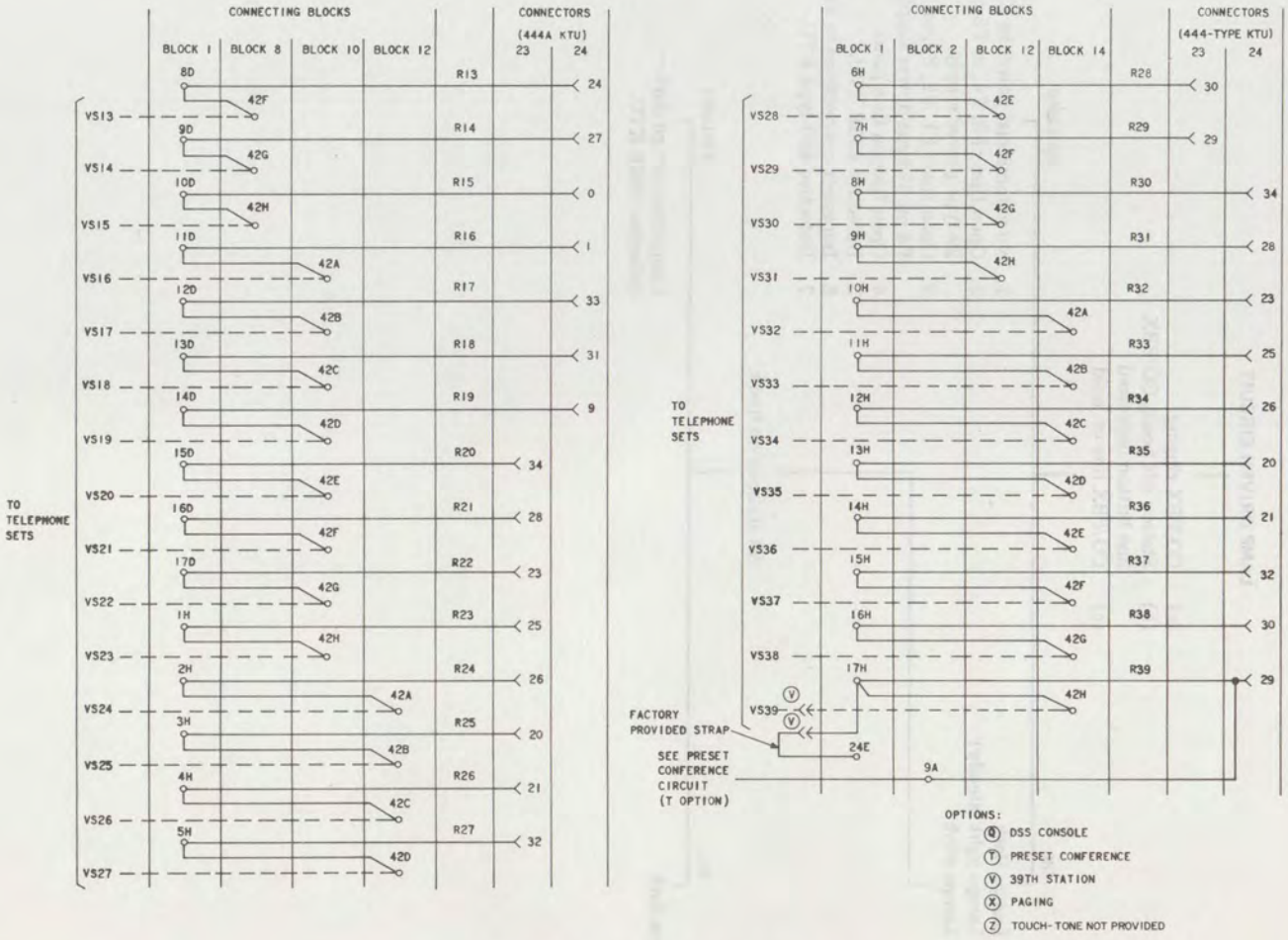


Fig. 74—Intercom Circuit (Sheet 4 of 4)

TABLE X

LAMP DRIVER CIRCUIT

(a) CO/PBX ringing
(b) Station off hook, CO/PBX line button depressed
(c) CO/PBX line on hold

OK

(a) Lamps flash
(b) Lamps light (steady)
(c) Lamps wink

FAILURE

1. No commercial power to KSU.
2. Open fuse—F3, F4, or F5 on 29-type power supply.
3. Open fuse—F1, F2, F3, or F4 on 67-type power supply.
4. Open fuse on fuse panel.
5. Defective 453B KTU.
6. Improper connections in KSU.
7. Defective 400-type KTU.

All stations on hook.

OK

Lamps dark

FAILURE

Lamp does not go dark — defective 453B KTU.

TABLE Y

LEAD TABLE–453B KTU

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
DL1	Lamp lead, driver side — CO/PBX line 1	J34-19
DL2	Lamp lead, driver side — CO/PBX line 2	J34-14
DL3	Lamp lead, driver side — CO/PBX line 3	J34-12
DL4	Lamp lead, driver side — CO/PBX line 4	J34-8
DL5	Lamp lead, driver side — CO/PBX line 5	J34-21
DL6	Lamp lead, driver side — CO/PBX line 6	J34-23
DL7	Lamp lead, driver side — CO/PBX line 7	J34-29
DL8	Lamp lead, driver side — CO/PBX line 8	J36-29
DL9	Lamp lead, driver side — CO/PBX line 9	J36-19
DL10	Lamp lead, driver side — CO/PBX line 10	J36-14
DL11	Lamp lead, driver side — CO/PBX line 11	J36-12
DL12	Lamp lead, driver side — CO/PBX line 12	J36-8
DL13	Lamp lead, driver side — CO/PBX line 13	J36-21
DL14	Lamp lead, driver side — CO/PBX line 14	J36-23
L1	Lamp lead, line side — CO/PBX line 1	J1-8 J34-16
L2	Lamp lead, line side — CO/PBX line 2	J2-8 J34-13
L3	Lamp lead, line side — CO/PBX line 3	J3-8 J34-9
L4	Lamp lead, line side — CO/PBX line 4	J4-8 J34-1
L5	Lamp lead, line side — CO/PBX line 5	J5-8 J34-20
L6	Lamp lead, line side — CO/PBX line 6	J6-8 J34-22
L7	Lamp lead, line side — CO/PBX line 7	J7-8 J34-28

TABLE Y (Contd)

LEAD TABLE—453B KTU

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
L8	Lamp lead, line side — CO/PBX line 8	J8-8 J36-28
L9	Lamp lead, line side — CO/PBX line 9	J9-8 J36-16
L10	Lamp lead, line side — CO/PBX line 10	J10-8 J36-13
L11	Lamp lead, line side — CO/PBX line 11	J11-8 J36-9
L12	Lamp lead, line side — CO/PBX line 12	J12-8 J36-1
L13	Lamp lead, line side — CO/PBX line 13	J13-8 J36-20
L14	Lamp lead, line side — CO/PBX line 14	J14-8 J36-22

TABLE Z

INPUTS AND OUTPUTS — 453B KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND		MON		Handset off-hook and CO/PBX line button depressed on:
	J34-16		10V± steady lamp voltage	Line 1
	J34-13			Line 2
	J34-9			Line 3
	J34-1			Line 4
	J34-20			Line 5
	J34-22			Line 6
	J34-28			Line 7
	J36-28			Line 8
	J36-16			Line 9
	J36-13			Line 10
	J36-9			Line 11
	J36-1			Line 12
	J36-20			Line 13
	J36-22			Line 14
	J34-4		10V± interrupted lamp voltage	interrupter running
	J34-30			
	J34-31			
	J34-32			
	J36-4			
	J36-30			
	J36-31			
	J36-32			

Note: (See end of table.)

TABLE Z (Contd)

INPUTS AND OUTPUTS — 453B KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
OUTPUTS				
GROUND		MON	10V± steady lamp voltage	Handset off-hook and CO/PBX line button depressed on:
	J34-19			Line 1
	J34-14			Line 2
	J34-12			Line 3
	J34-8			Line 4
	J34-21			Line 5
	J34-23			Line 6
	J34-29			Line 7
	J36-29			Line 8
	J36-19			Line 9
	J36-14			Line 10
	J36-12			Line 11
	J36-8			Line 12
	J36-21			Line 13
	J36-23			Line 14

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

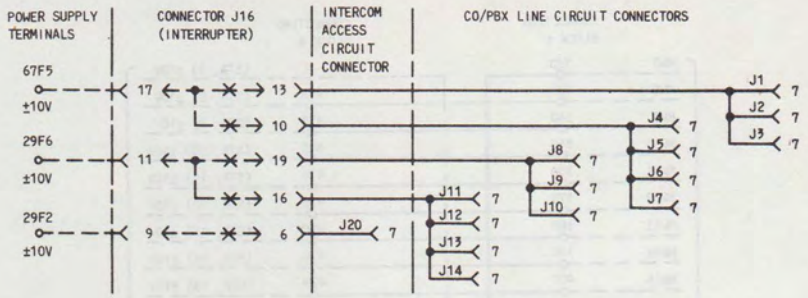


Fig. 75—Lamp Flash Circuit

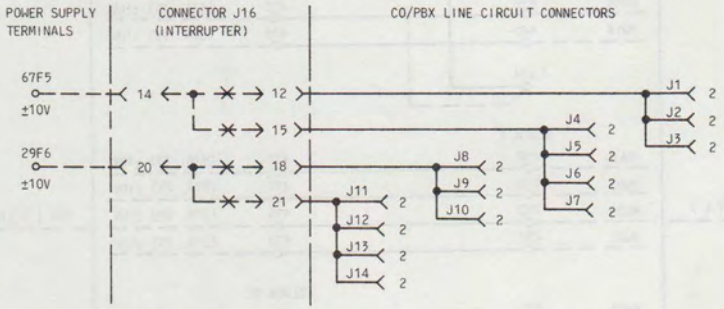


Fig. 76—Lamp Wink Circuit

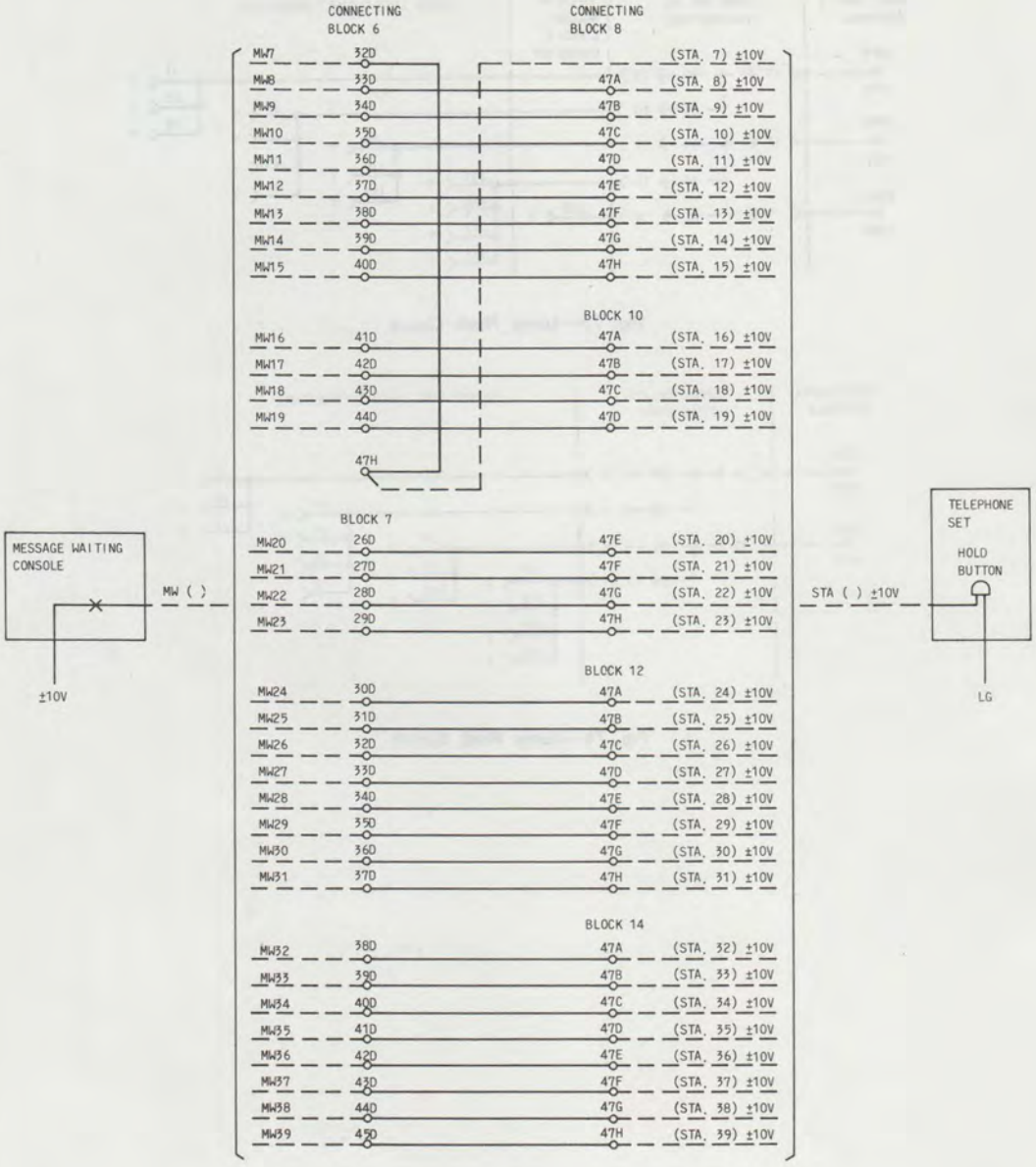


Fig. 77—Message Waiting Circuit

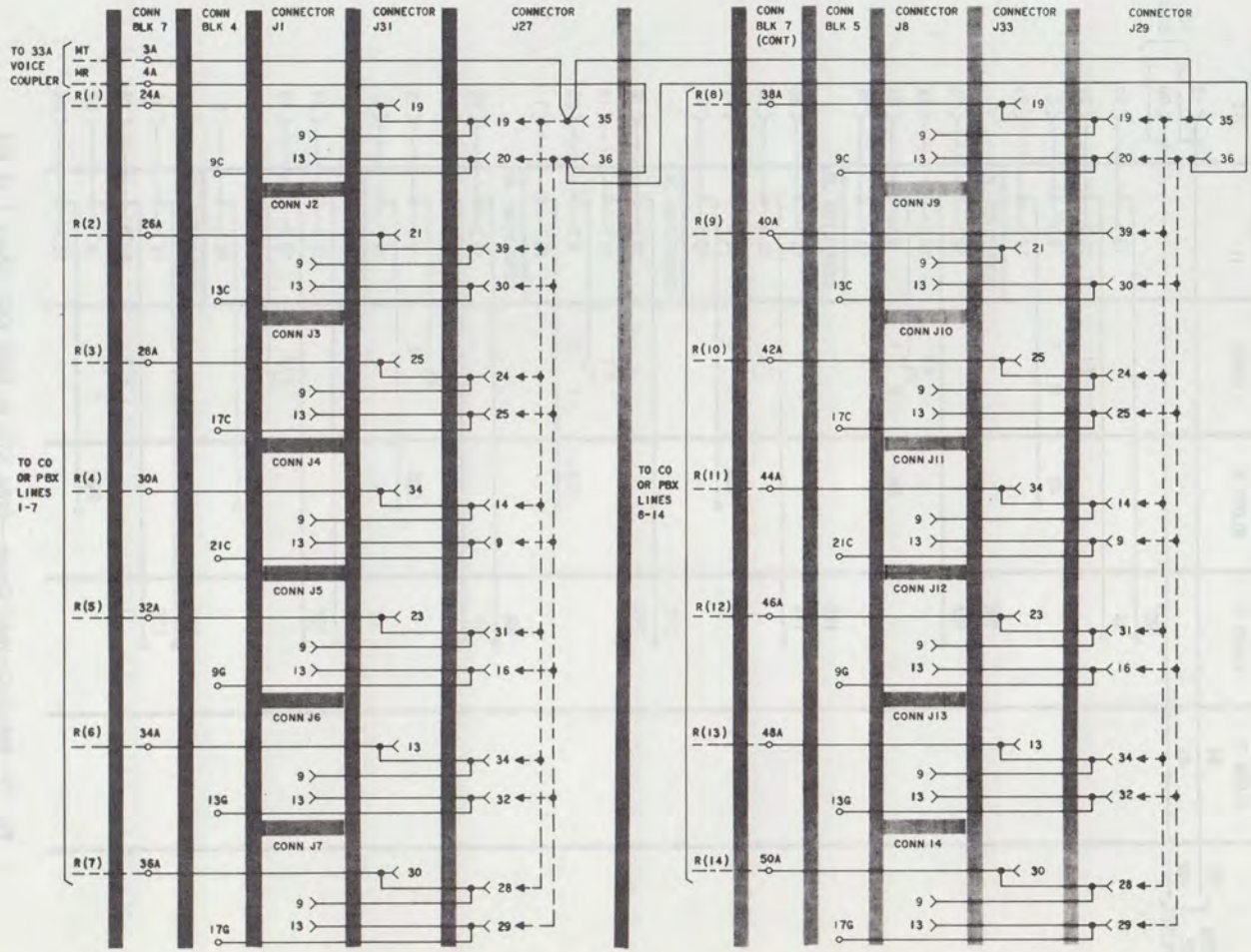


Fig. 78—Music-On-Hold Circuit—451-Type KTU in 580A KSU

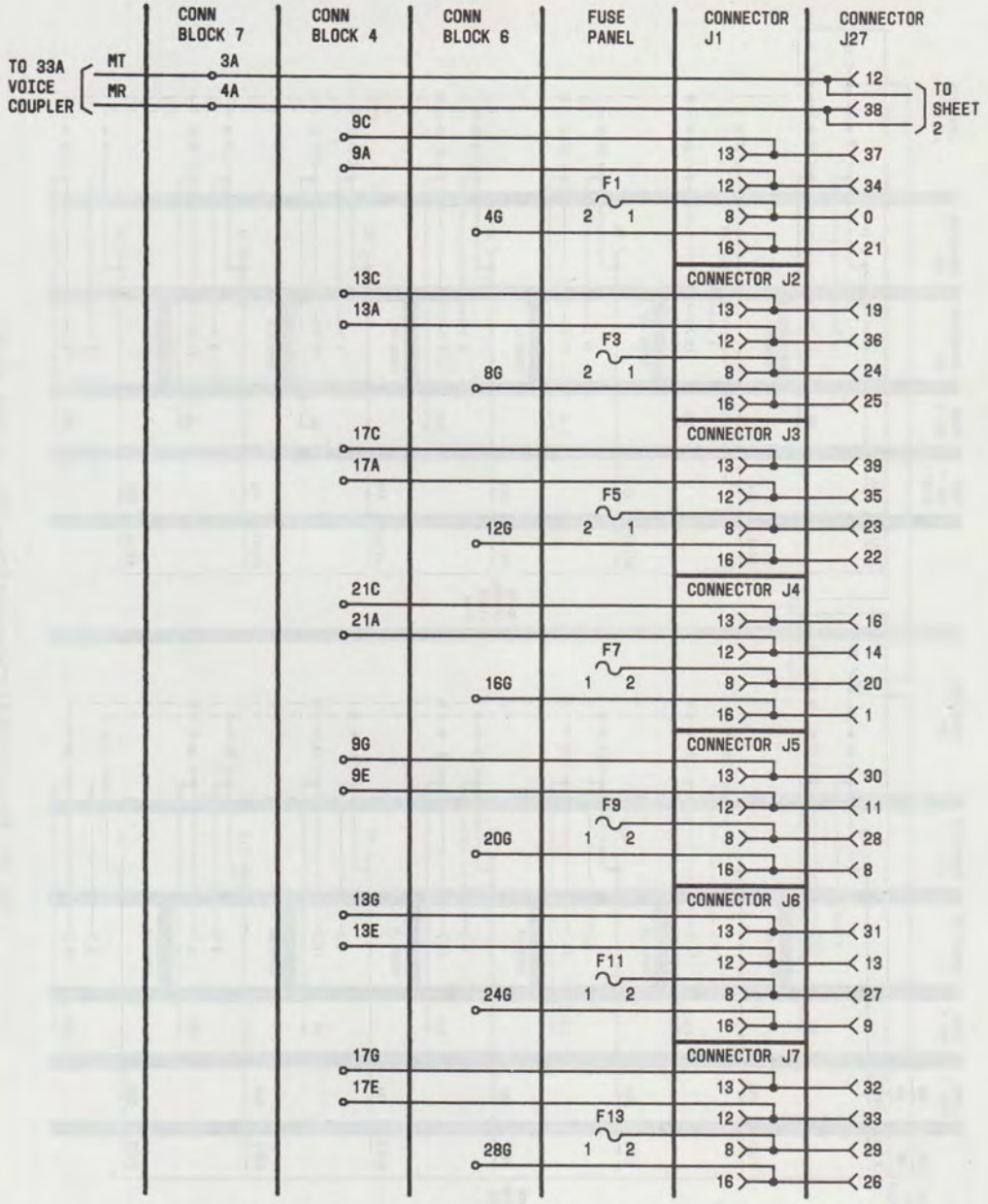


Fig. 79—Music-On-Hold Circuit—498A KTU in 580B KSU (Sheet 1 of 2)

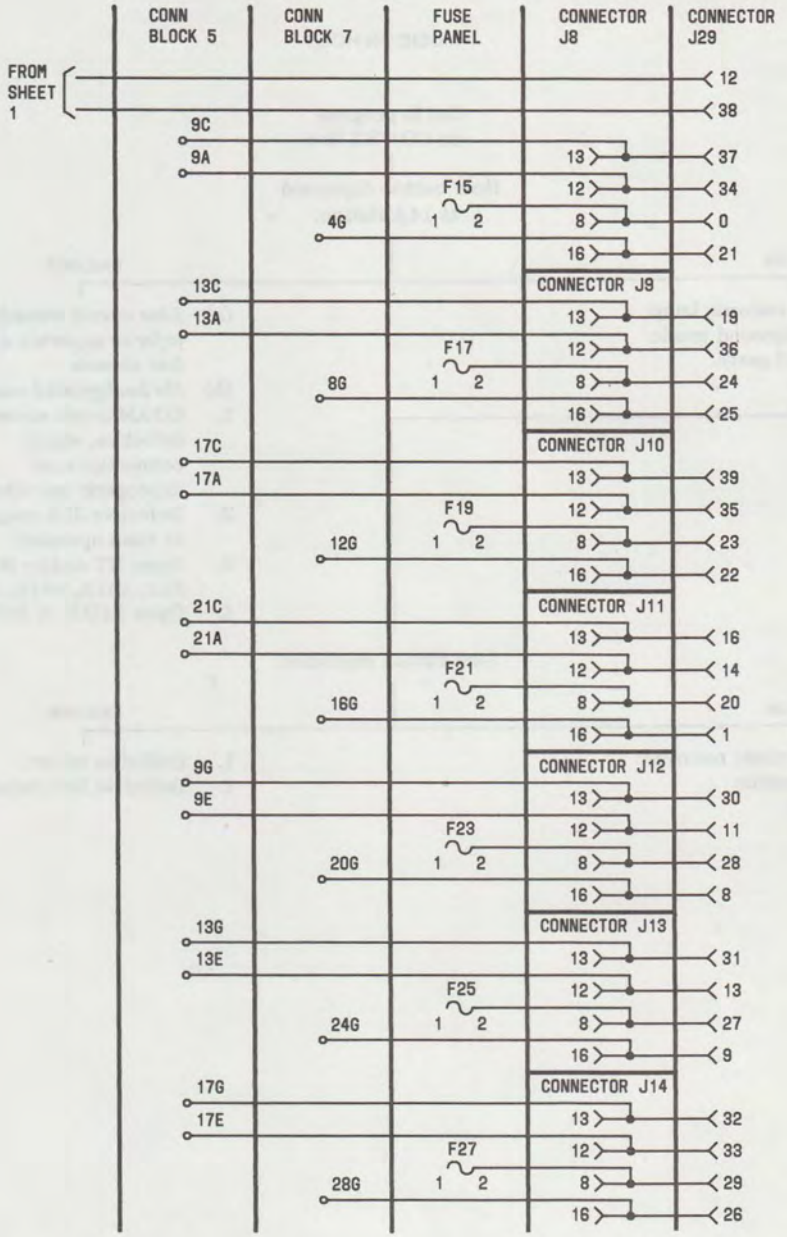


Fig. 79—Music-On-Hold Circuit—498A KTU in 580B KSU (Sheet 2 of 2)

◗TABLE AA◖

MUSIC ON HOLD

Call in progress on CO/PBX line.

Hold button depressed at 14A station.

OK

Line button restores; lamp winks. Background music heard by held party.

Line button depressed.

OK

Background music removed; voice conversation reestablished.

FAILURE

Line button depressed.

- *(a) Line circuit troubles—refer to sequence on line circuits*
- *(b) No background music*
  1. COAM music source defective, wrong connections, or improperly set volume.
  2. Defective 33A coupler or fuses operated.
  3. Open MT and/or MR lead—33A, 451A, 451B, or 498A.
  4. Open R(CO) or R(STA).

FAILURE

Line button depressed.

1. Defective tel set.
2. Defective line circuit.

TABLE AB

LEAD TABLE—451-TYPE KTUs

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
	FIRST 451-TYPE KTU	
MT	Music tip — tip side of music source input— through 33A voice coupler	J27-35
MR	Music ring — ring side of music source input— through 33A voice coupler	J27-36
R (CO)	Ring (Central Office) — multiple of ring side of CO/PBX circuit	J27-19, 39, 24, 14, 31, 34, 28
R (STA)	Ring (Station) — multiple of ring side of line toward station	J27-20, 30, 25, 9, 16, 32, 29
	SECOND 451-TYPE KTU	
MT	Music tip — tip side of music source input — through 33A voice coupler	J29-35
MR	Music ring — ring side of music source input — through 33A voice coupler	J29-36
R (CO)	Ring (Central Office) — multiple of ring side of CO/PBX circuit	J29-19, 39, 24, 14, 31, 34, 28
R (STA)	Ring (Station) — multiple of ring side of line toward station	J29-20, 30, 25, 9, 16, 32, 29

◗TABLE AC◖

LEAD TABLE – 498A KTUs

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
	FIRST 498A KTU	
MT	Music tip — tip side of music source input — through 33A voice coupler	J27-12
MR	Music ring — ring side of music source input — through 33A voice coupler	J27-38
R	Ring (station) — multiple of ring side of line toward station	J27-37, 19, 39, 16, 30, 31, 32
T	Tip (station) — multiple of tip side of line toward station	J27-34, 36, 35, 14, 11, 13, 33
A	A lead — multiple of A lead toward station	J27-21, 25, 22, 1, 8, 9, 26
L	Lamp lead — multiple of lamp lead toward station	J27-0, 24, 23, 20, 28, 27, 29,
	SECOND 498A KTU	
M1	Music tip — tip side of music source input — multipled from J27 through 33A voice coupler	J29-12
M2	Music ring — ring side of music source input — multipled from J27 through 33A voice coupler	J29-38
R	Ring (station) — multiple of ring side of line toward station	J29-37, 19, 39, 16, 30, 31, 32
T	Tip (station) — multiple of tip side of line toward station	J29-34, 36, 35, 14, 11, 13, 33
A	A lead — multiple of A lead toward station	J29-21, 25, 22, 1, 8, 9, 26
L	Lamp lead — multiple of lamp lead toward station	J29-0, 24, 23, 20, 28, 27, 29

TABLE AD

INPUTS AND OUTPUTS – 451-TYPE KTUs

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS – FIRST 451-TYPE KTU				
J27-35	J27-36	MON	Music input	Music source connected
OUTPUTS – FIRST 451-TYPE KTU				
J27-19	J27-20	MON	Music output	CO/PBX line 1 on hold
J27-39	J27-30			CO/PBX line 2 on hold
J27-24	J27-25			CO/PBX line 3 on hold
J27-14	J27-9			CO/PBX line 4 on hold
J27-31	J27-16			CO/PBX line 5 on hold
J27-34	J27-32			CO/PBX line 6 on hold
J27-28	J27-29			CO/PBX line 7 on hold
INPUTS – SECOND 451-TYPE KTU				
J29-35	J29-36	MON	Music input	Music source connected
OUTPUTS – SECOND 451-TYPE KTU				
J29-19	J29-20	MON	Music output	CO/PBX line 8 on hold
J29-39	J29-30			CO/PBX line 9 on hold
J29-24	J29-25			CO/PBX line 10 on hold
J29-14	J29-9			CO/PBX line 11 on hold
J29-31	J29-16			CO/PBX line 12 on hold
J29-34	J29-32			CO/PBX line 13 on hold
J29-28	J29-29			CO/PBX line 14 on hold

Note: Terminals shown in TEST FROM and TO columns appear on KTU and the wiring side of the associated connector.

TABLE AE

INPUTS AND OUTPUTS – 498A KTUs

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS – FIRST 498A KTU				
J27-12	J27-33	MON	Music input	Music source connected
Ground	J27-17	TALK	B battery	
J27-17	J27-15		B ground	
J27-17	J27-6		MG ground	
OUTPUTS – FIRST 498A KTU				
J27-34	J27-37	MON	Music output	CO/PBX line 1 on hold
J27-36	J27-19			CO/PBX line 2 on hold
J27-35	J27-39			CO/PBX line 3 on hold
J27-14	J27-16			CO/PBX line 4 on hold
J27-11	J27-30			CO/PBX line 5 on hold*
J27-13	J27-31			CO/PBX line 6 on hold*
J27-33	J27-32			CO/PBX line 7 on hold*
INPUTS – SECOND 498A KTU				
J29-12	J29-38	MON	Music input	Music source connected
Ground	J29-17	TALK	B battery	
J29-17	J29-15		B ground	
J29-17	J29-6		MG ground	
OUTPUTS – SECOND 498A KTU				
J29-34	J29-37	MON	Music output	CO/PBX line 8 on hold
J29-36	J29-19			CO/PBX line 9 on hold
J29-35	J29-39			CO/PBX line 10 on hold
J29-14	J29-16			CO/PBX line 11 on hold
J29-11	J29-30			CO/PBX line 12 on hold*
J29-13	J29-31			CO/PBX line 13 on hold*
J29-33	J29-32			CO/PBX line 14 on hold*

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

* These circuits are on the 116A1 CM.

TABLE AF

LOUDSPEAKER PAGING

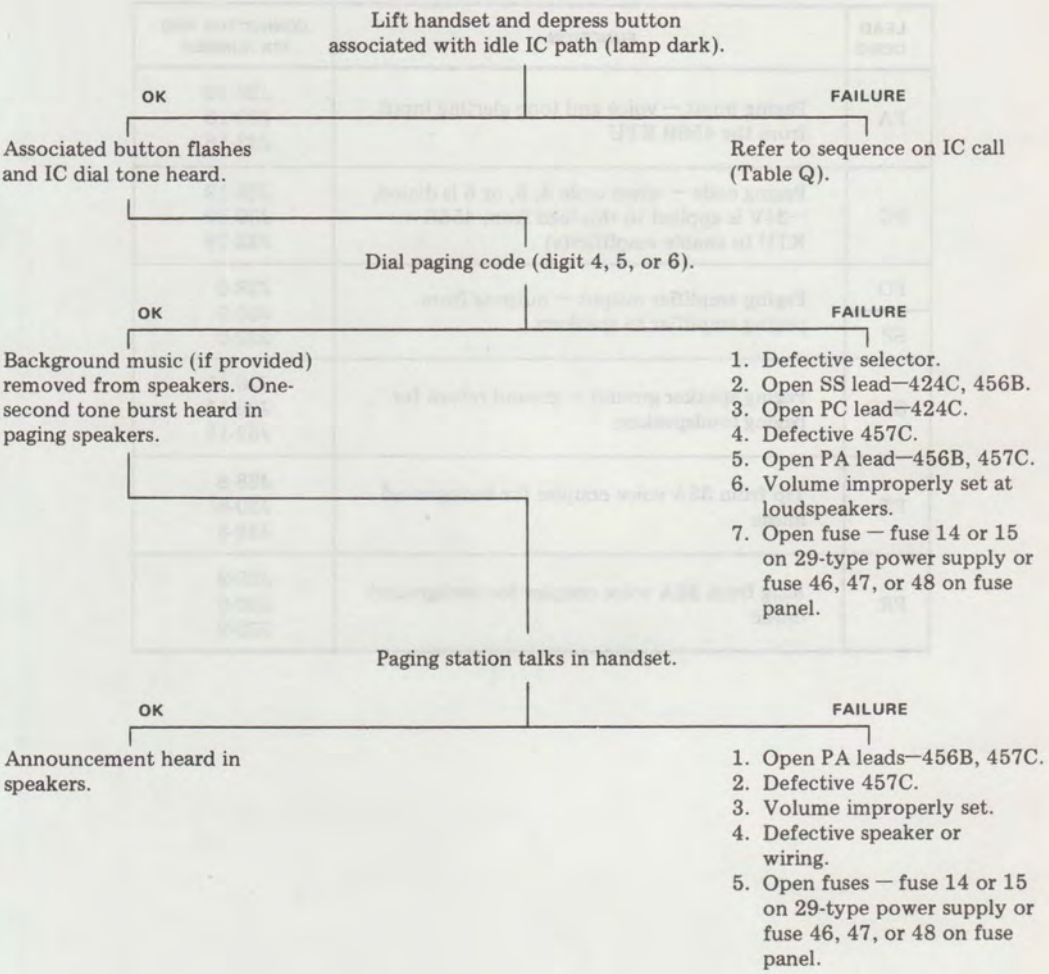


TABLE AG

LEAD TABLE – 457C KTUs

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
PA	Paging input — voice and tone alerting input from the 456B KTU	J28-16 J30-16 J32-16
PC	Paging code — when code 4, 5, or 6 is dialed, —24V is applied to this lead from 456B KTU to enable amplifier(s)	J28-19 J30-19 J32-19
PO SP	Paging amplifier output — outputs from paging amplifier to speakers	J28-0 J30-0 J32-0
SPG	Paging speaker ground — ground return for paging loudspeakers	J28-15 J30-15 J32-15
PT	Tip from 33A voice coupler for background music	J28-8 J30-8 J32-8
PR	Ring from 33A voice coupler for background music	J28-9 J30-9 J32-9

TABLE AH

INPUTS AND OUTPUTS – 457C KTUs

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS – FIRST 457C KTU				
GROUND	J28-18	TALK	A Battery	
	J28-17		B Battery	
J28-17	J28-15		B Ground	
GROUND	J28-19		A Battery (PC lead)	Code 4 dialed
J28-8	J28-9	MON	Background music	If provided
OUTPUTS – FIRST 457C KTU				
GROUND	J28-0	MON	Voice and tone alerting	Code 4 dialed; voice input at calling station
INPUTS – SECOND 457C KTU				
GROUND	J30-18	TALK	A Battery	
	J30-17		B Battery	
J30-17	J30-15		B Ground	
GROUND	J30-19		A Battery (PC lead)	Code 5 dialed
J30-8	J30-9	MON	Background music	If provided
OUTPUTS – SECOND 457C KTU				
GROUND	J30-0	MON	Voice and tone alerting	Code 5 dialed; voice input at calling station
INPUTS – THIRD 457C KTU				
GROUND	J32-18	TALK	A Battery	
	J32-17		B Battery	
J32-17	J32-15		B Ground	
GROUND	J32-19		A Battery (PC lead)	Code 6 dialed
J32-8	J32-9	MON	Background music	If provided
OUTPUTS – THIRD 457C KTU				
GROUND	J32-0	MON	Voice and tone alerting	Code 6 dialed; voice input at calling station

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

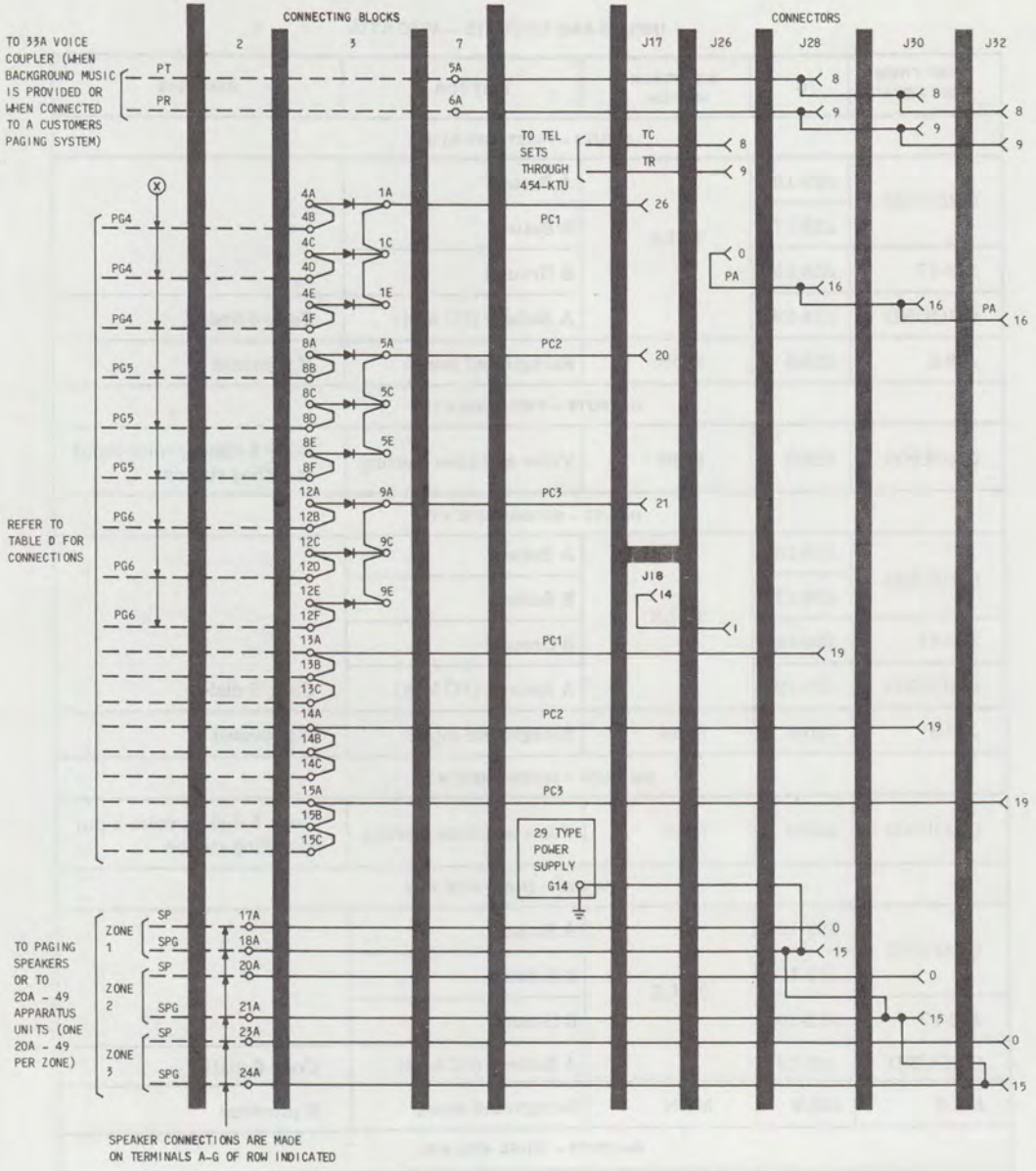


Fig. 80—Loudspeaker Paging and Background Music Circuit

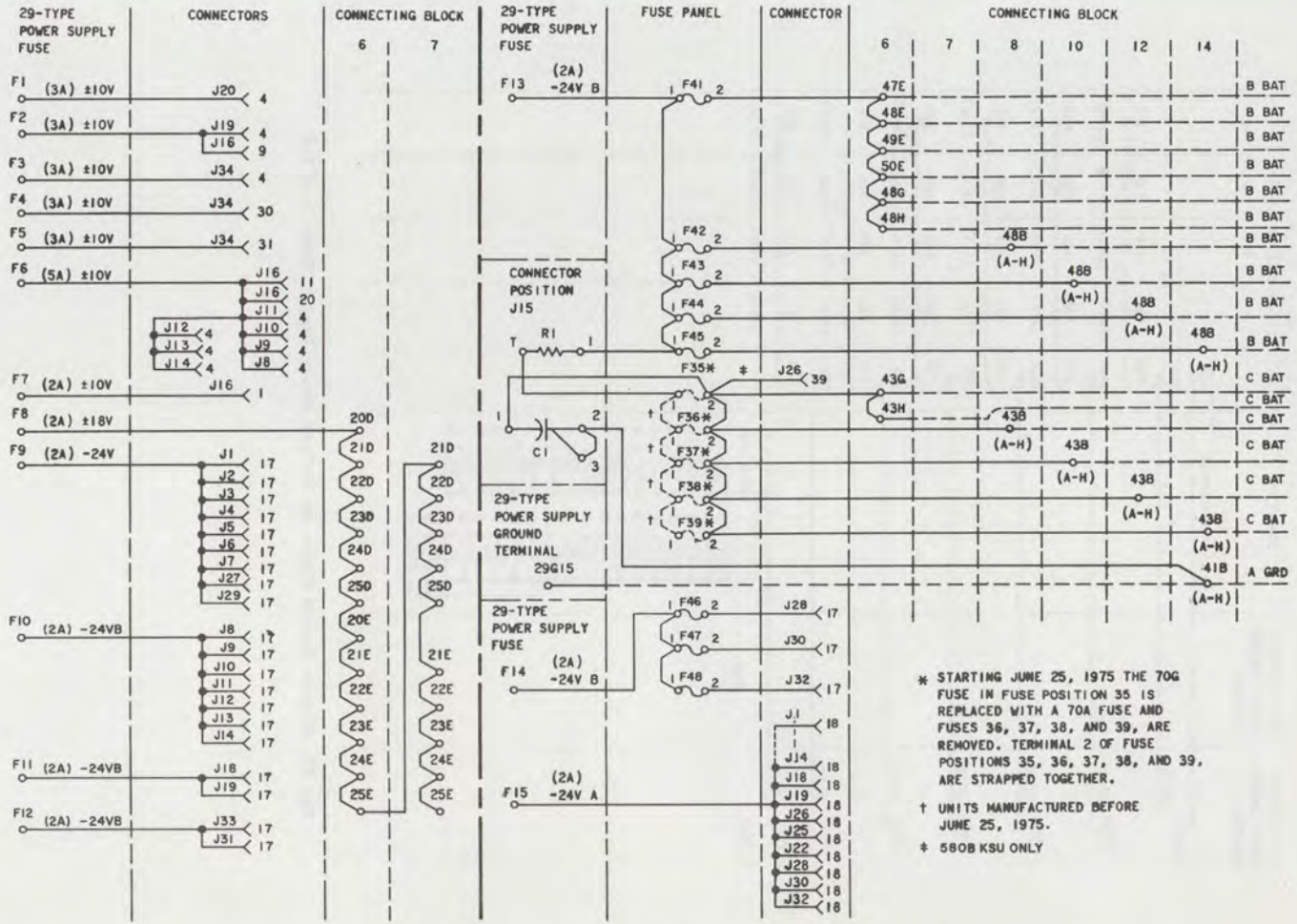


Fig. 81—Power Distribution Circuit for 29-Type Power Supply

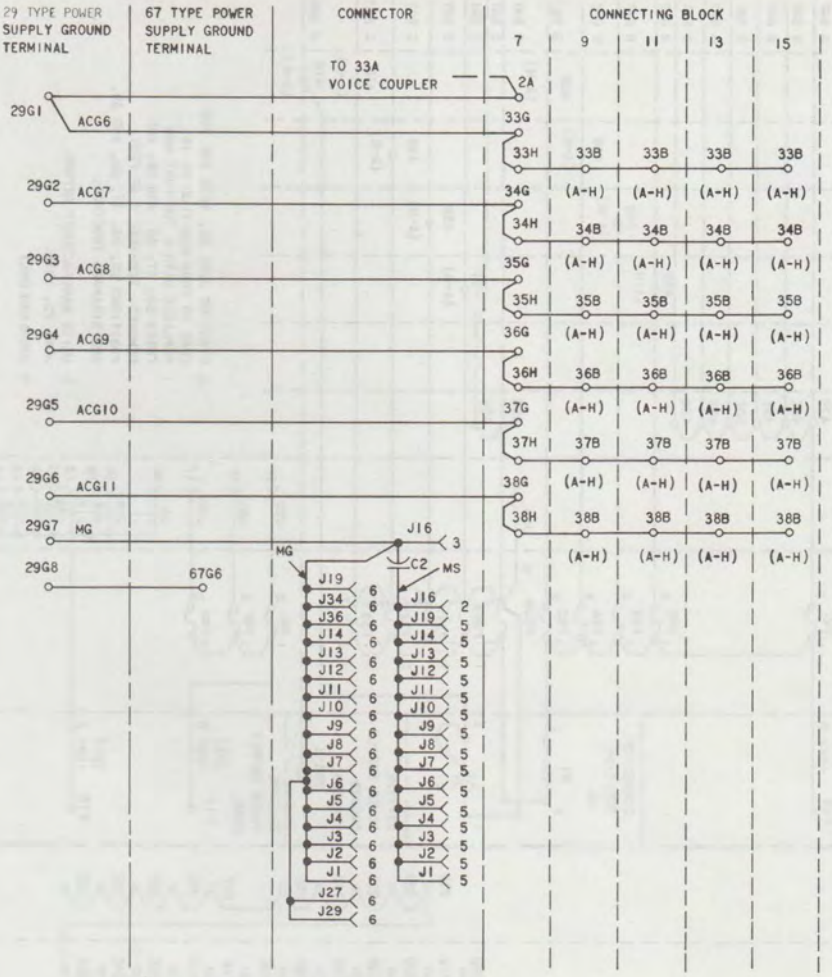


Fig. 82—Power Ground Circuit for 29-Type Power Supply (Sheet 1 of 2)

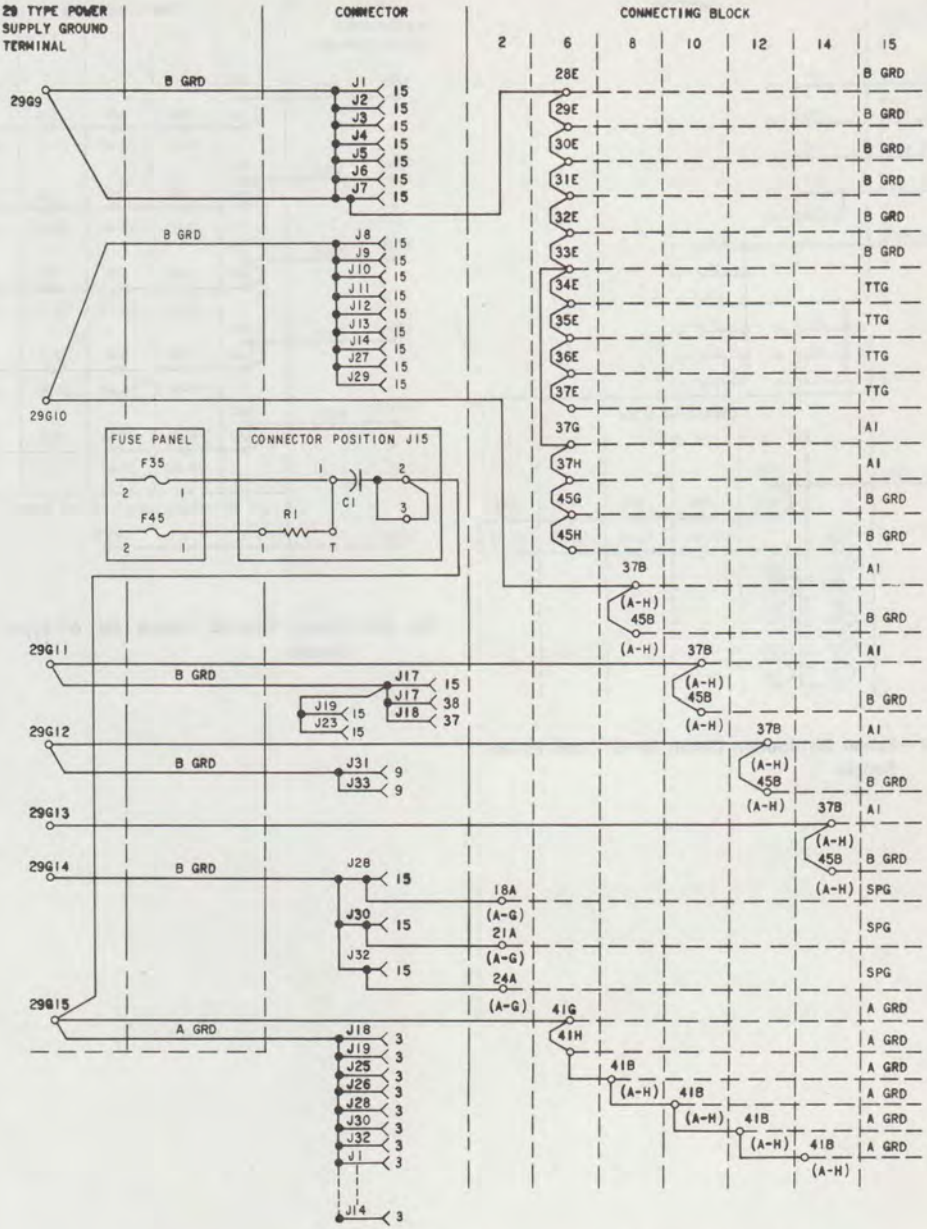


Fig. 82—Power Ground Circuit for 29-Type Power Supply (Sheet 2 of 2)

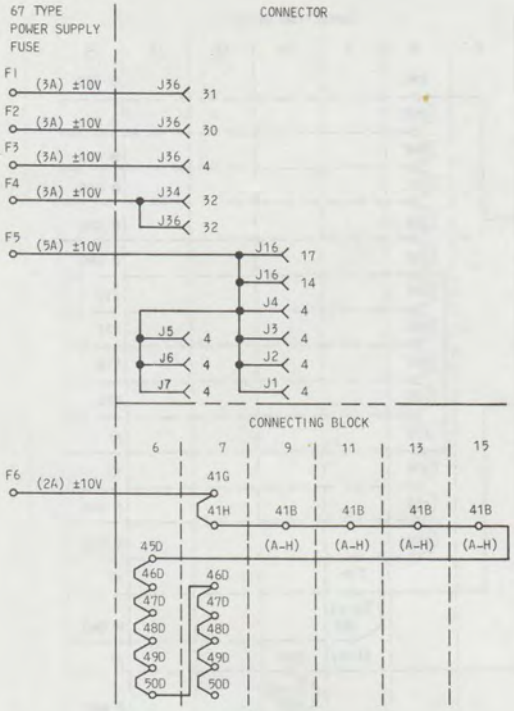


Fig. 83—Power Distribution Circuit for 67-Type Power Supply

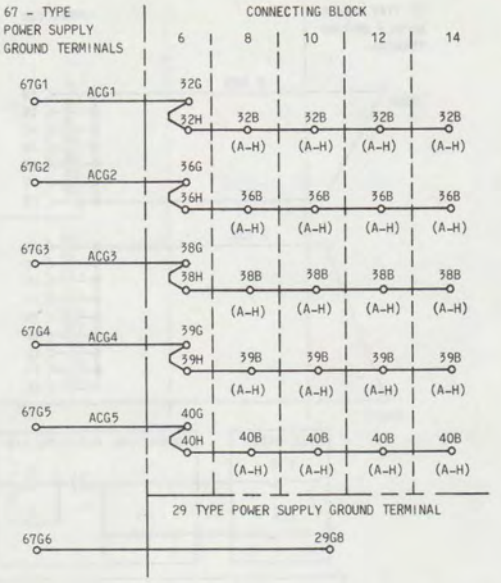


Fig. 84—Power Ground Circuit for 67-Type Power Supply

TABLE AI

PRIVATE LINE CIRCUIT

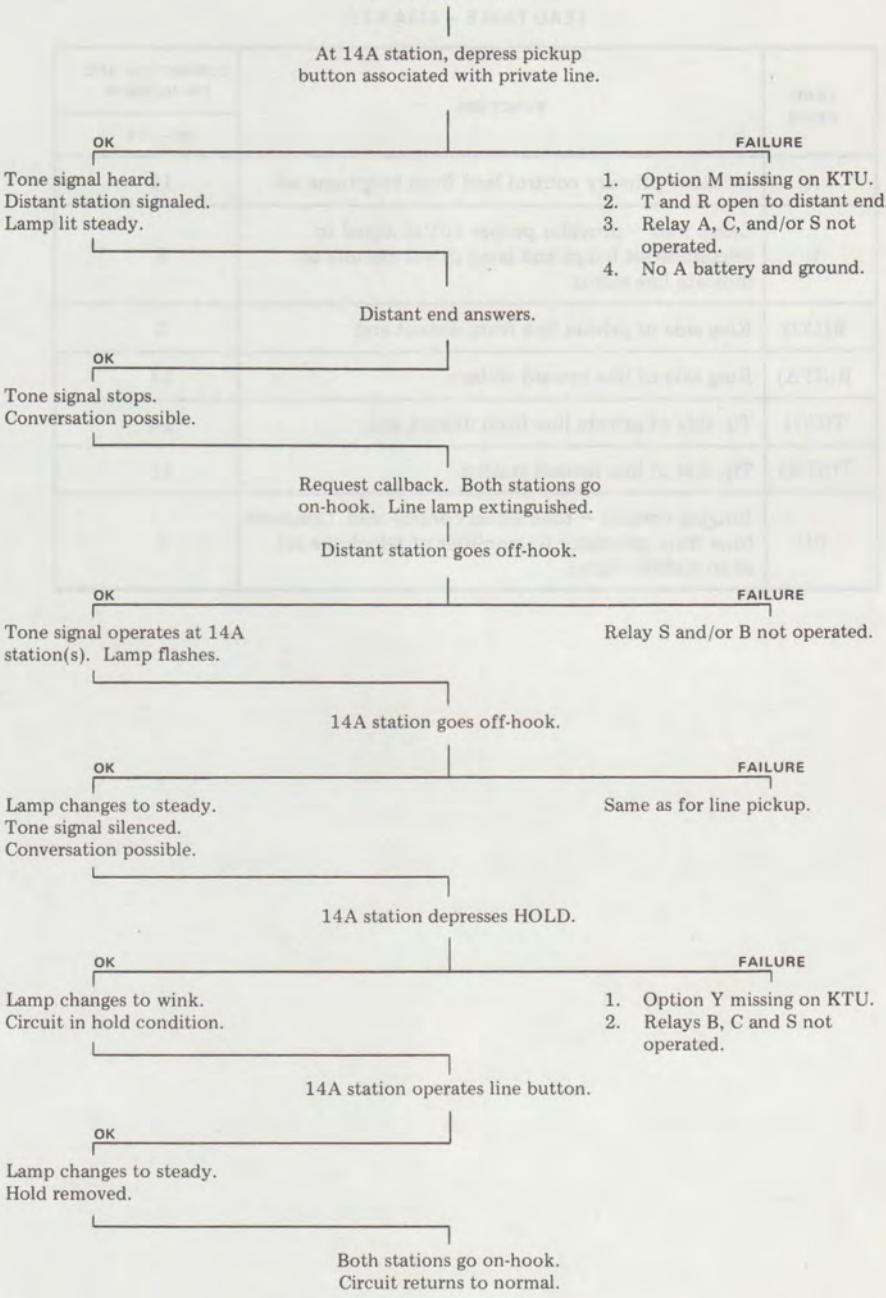


TABLE AJ

LEAD TABLE – 415A KTU

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
		J1 – J14
A	A lead — primary control lead from telephone set	16
L	Lamp lead — provides proper 10Vac signal to telephone set lamps and lamp driver circuits to indicate line status	8
R(CO)	Ring side of private line from distant end	9
R(STA)	Ring side of line toward station	13
T(CO)	Tip side of private line from distant end	14
T(STA)	Tip side of line toward station	12
RC	Ringing control — tone signal control lead. Connects tone from generator to amplifier of telephone set as an audible signal.	1

TABLE AK

INPUTS AND OUTPUTS — 415A KTU

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
14	9	TALK	Talk battery	Ground pin 16
17	15	TALK	B Ground	
	6	TALK	MG — interrupter ground	
GROUND or 15	2	MON	LW — 10V± at 120 IPM	With interrupter running
	7	MON	LF — 10V± at 60 IPM	With interrupter running
	4	MON	10V steady	
	11	MON	RN — interrupted tone ringer signal	
	17	TALK	B Battery	
3	18	TALK	A Battery	
OUTPUTS				
12	13	TALK	Talk battery	
GROUND	8	MON	10V± steady	Ground pin 16
	1	MON	Tone ringing signal	Distant station off-hook

Note: Terminals shown in TEST FROM and TO columns appear on the KTU and the wiring side of the associated connector.

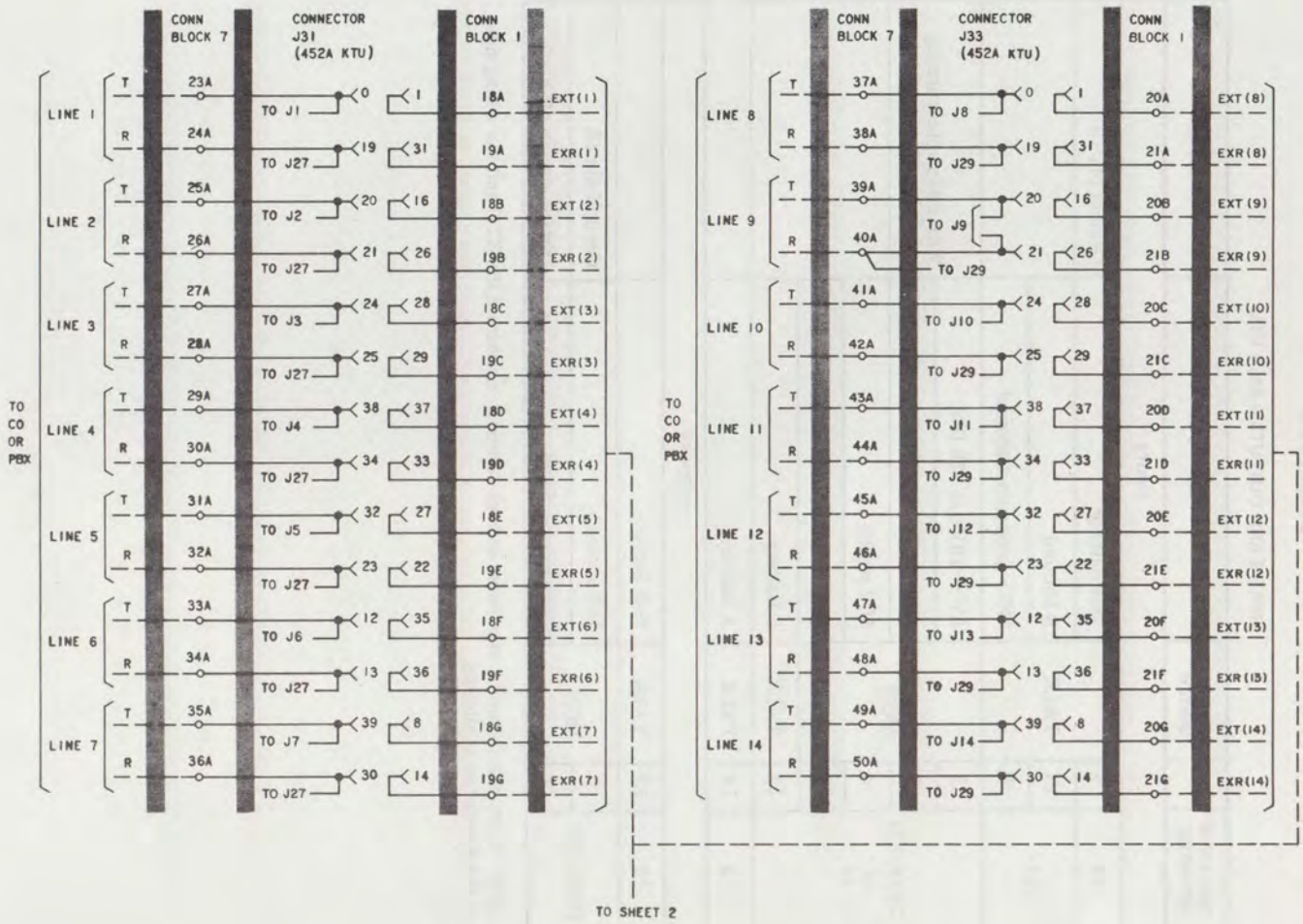


Fig. 85—Power Failure Ringing Circuit (Sheet 1 of 2)

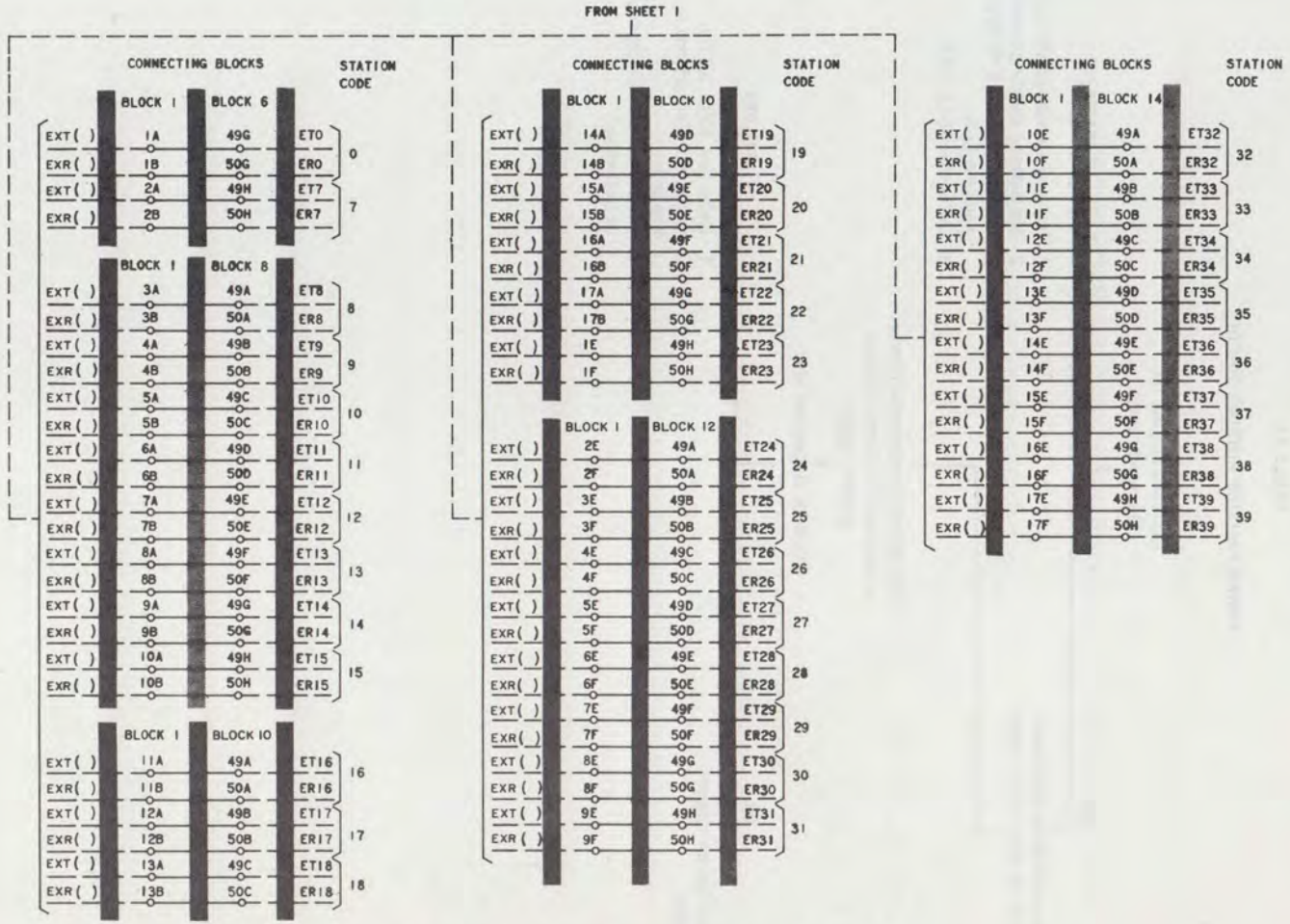


Fig. 85—Power Failure Ringing Circuit (Sheet 2 of 2)

TABLE AL

POWER FAILURE RINGING CIRCUIT

CO/PBX ringing on line under test.

OK

Calls received at attendant station or alternate location.

FAILURE

1. No commercial power to KSU.
2. No battery and/or ground to 452A KTUs—F12 29-type power supply.
3. Defective 452A KTU.

Disconnect commercial power or remove F12 from 29-type power supply.

CO/PBX ringing on line.

OK

Power failure ringers operate.

FAILURE

1. Defective 452A KTUs.
2. Improper connections at block 1.
3. Ringer connected improperly or defective.

TABLE AM

LEAD TABLE—452A KTUs

LEAD DESIG	FUNCTION	CONNECTOR AND PIN NUMBER
ET( )	Tip of extension ringer circuit from station (V-S)	
ER( )	Ring of extension ringer circuit from station (S-V)	
EXT( )	Tip side of audible circuit from first 452A KTU	J31-1, 16, 28, 37, 27, 35, 8
EXT( )	Tip side of audible circuit from second 452A KTU	J33-1, 16, 28, 37, 27, 35, 8
EXR( )	Ring side of audible circuit from first 452A KTU	J31-31, 26, 29, 33, 22, 36, 14
EXR( )	Ring side of audible circuit from second 452A KTU	J33-31, 26, 29, 33, 22, 36, 14
T(CO)	Tip side of CO/PBX line from CO — first 452A KTU	J31-0, 20, 24, 38, 32, 12, 39
T(CO)	Tip side of CO/PBX line from CO — second 452A KTU	J33-0, 20, 24, 38, 32, 12, 39
R(CO)	Ring side of CO/PBX line from CO — first 452A KTU	J31-19, 21, 25, 34, 23, 13, 30
R(CO)	Ring side of CO/PBX line from CO — second 452A KTU	J33-19, 21, 25, 34, 23, 13, 30

TABLE AN

INPUTS AND OUTPUTS—452A KTUs

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J31-17	TALK	B Battery	
	J33-17			
B BAT.	J31-9		B Ground	
	J33-9			
J31-0	J31-19	MON	CO/PBX ringing — line 1	CO/PBX ringing on lines from CO or PBX
J31-20	J31-21		CO/PBX ringing — line 2	
J31-24	J31-25		CO/PBX ringing — line 3	
J31-38	J31-34		CO/PBX ringing — line 4	
J31-32	J31-23		CO/PBX ringing — line 5	
J31-12	J31-13		CO/PBX ringing — line 6	
J31-39	J31-30		CO/PBX ringing — line 7	
J33-0	J33-19		CO/PBX ringing — line 8	
J33-20	J33-21		CO/PBX ringing — line 9	
J33-24	J33-25		CO/PBX ringing — line 10	
J33-38	J33-34		CO/PBX ringing — line 11	
J33-32	J33-23		CO/PBX ringing — line 12	
J33-12	J33-13		CO/PBX ringing — line 13	
J33-39	J33-30		CO/PBX ringing — line 14	
OUTPUTS				
J31-1	J31-31	MON	CO/PBX ringing — line 1	CO/PBX ringing on lines and power disconnected from KSU
J31-16	J31-26		CO/PBX ringing — line 2	
J31-28	J31-29		CO/PBX ringing — line 3	
J31-37	J31-33		CO/PBX ringing — line 4	

TABLE AN (Contd)

INPUTS AND OUTPUTS—452A KTUs

TEST FROM (SEE NOTE)	TO	MON/TALK SWITCH	TEST FOR	REMARKS
OUTPUTS				
J31-27	J31-22	MON	CO/PBX ringing — line 5	CO/PBX ringing on line and power disconnected from KSU or fuse 12 removed from 29-type power supply
J31-35	J31-36		CO/PBX ringing — line 6	
J31-8	J31-14		CO/PBX ringing — line 7	
J33-1	J33-31		CO/PBX ringing — line 8	
J33-16	J33-26		CO/PBX ringing — line 9	
J33-28	J33-29		CO/PBX ringing — line 10	
J33-37	J33-33		CO/PBX ringing — line 11	
J33-27	J33-22		CO/PBX ringing — line 12	
J33-35	J33-36		CO/PBX ringing — line 13	
J33-8	J33-14		CO/PBX ringing — line 14	

Note: Terminals shown in **TEST FROM** and **TO** columns appear on the KTU and the wiring side of the associated connector.

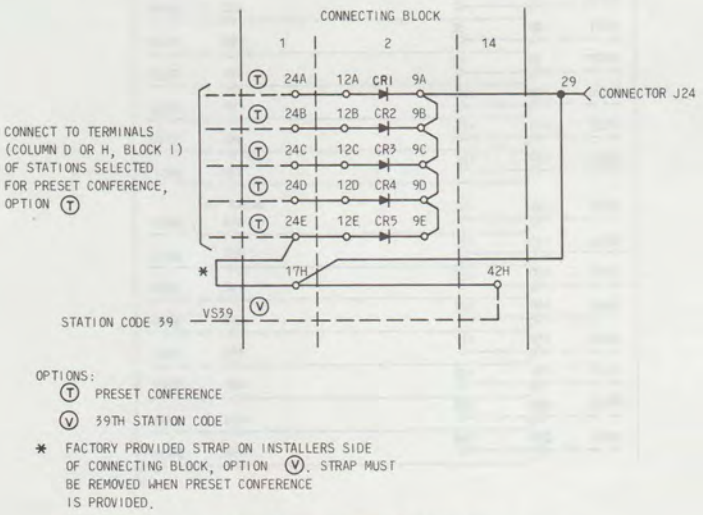


Fig. 86—Preset Conference on Intercom Circuit

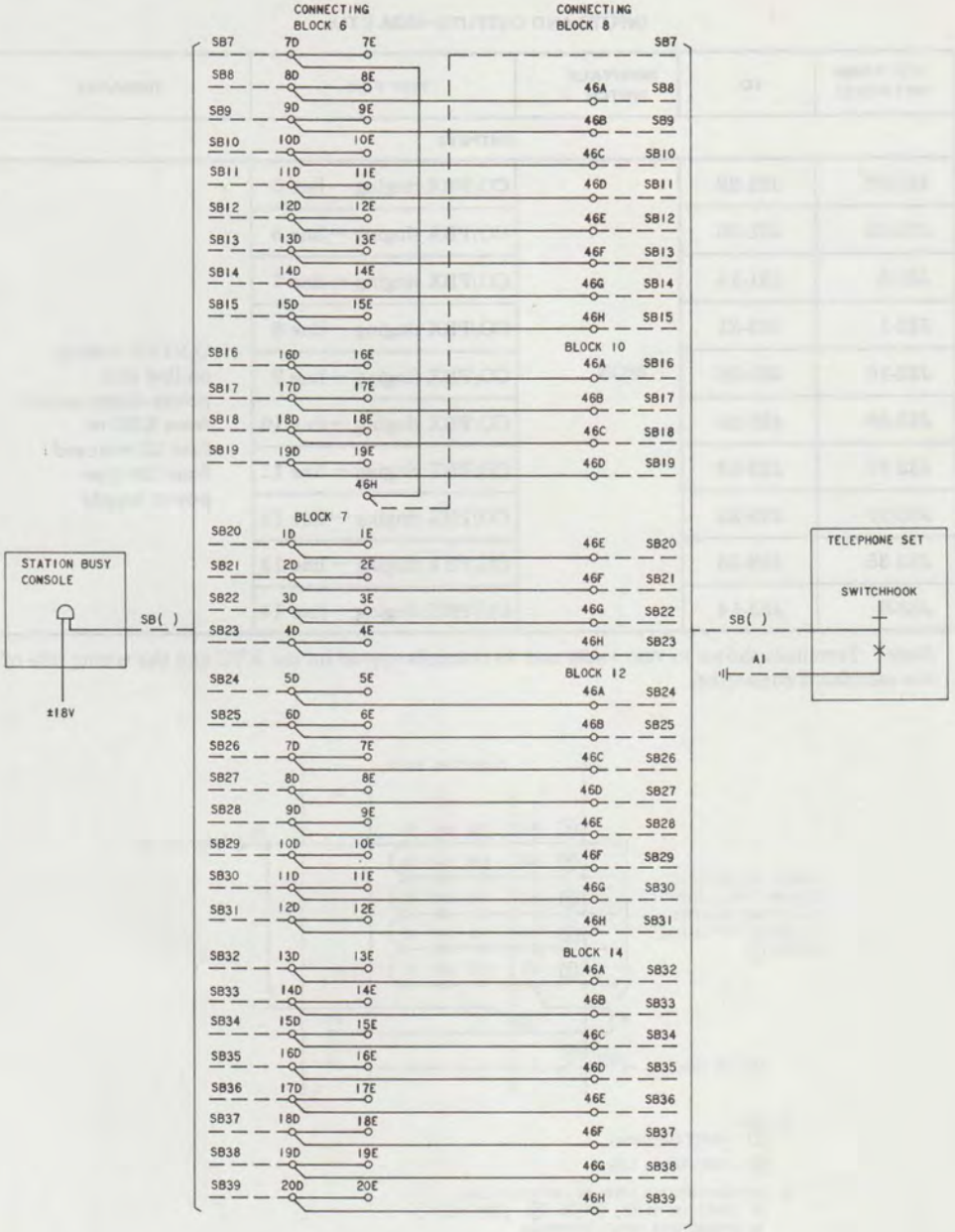


Fig. 87—Station Busy Circuit

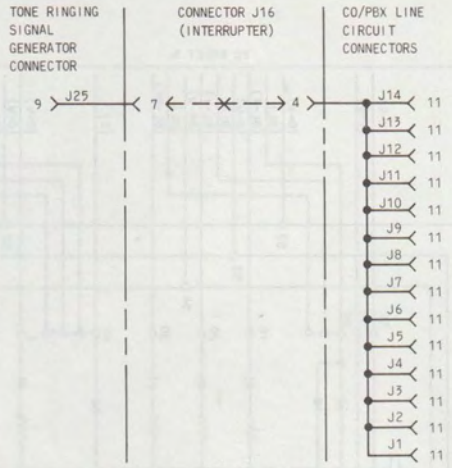


Fig. 88—Tone Ringing Circuit for CO/PBX Lines

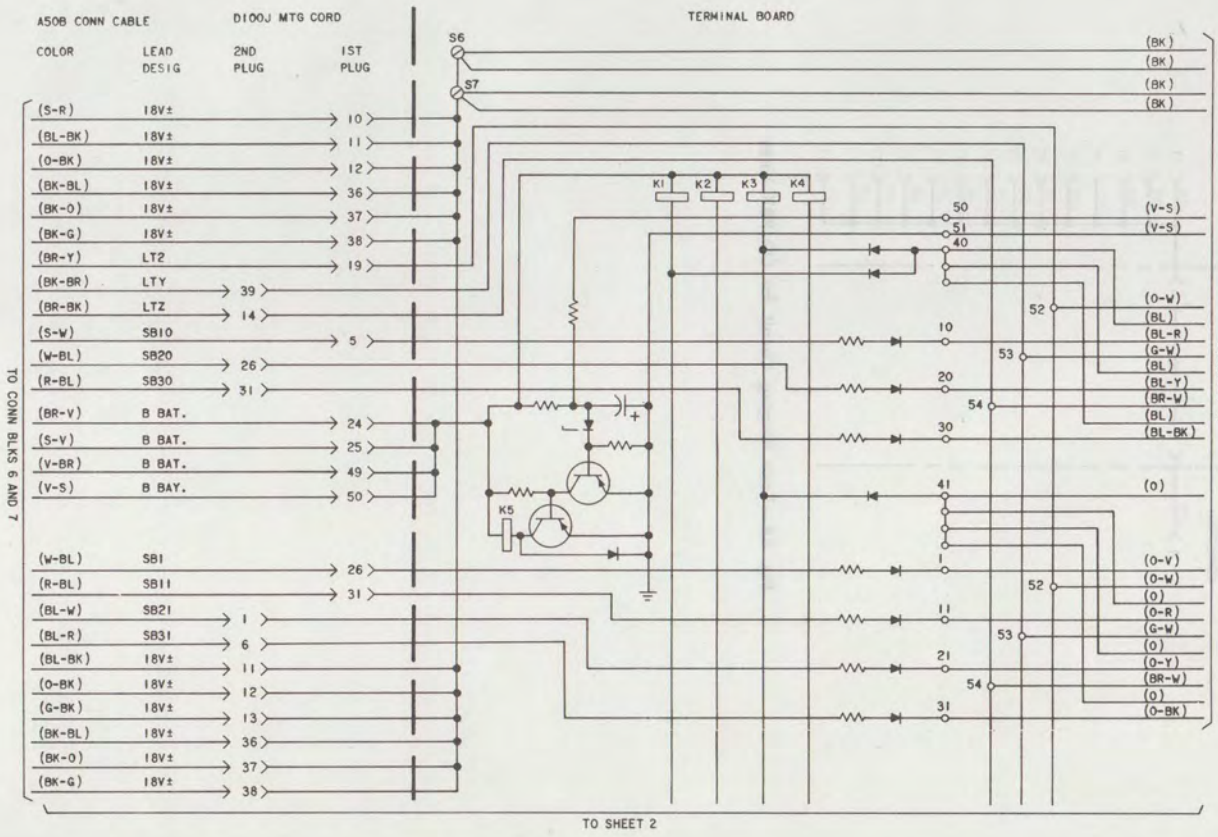


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 1 of 8)

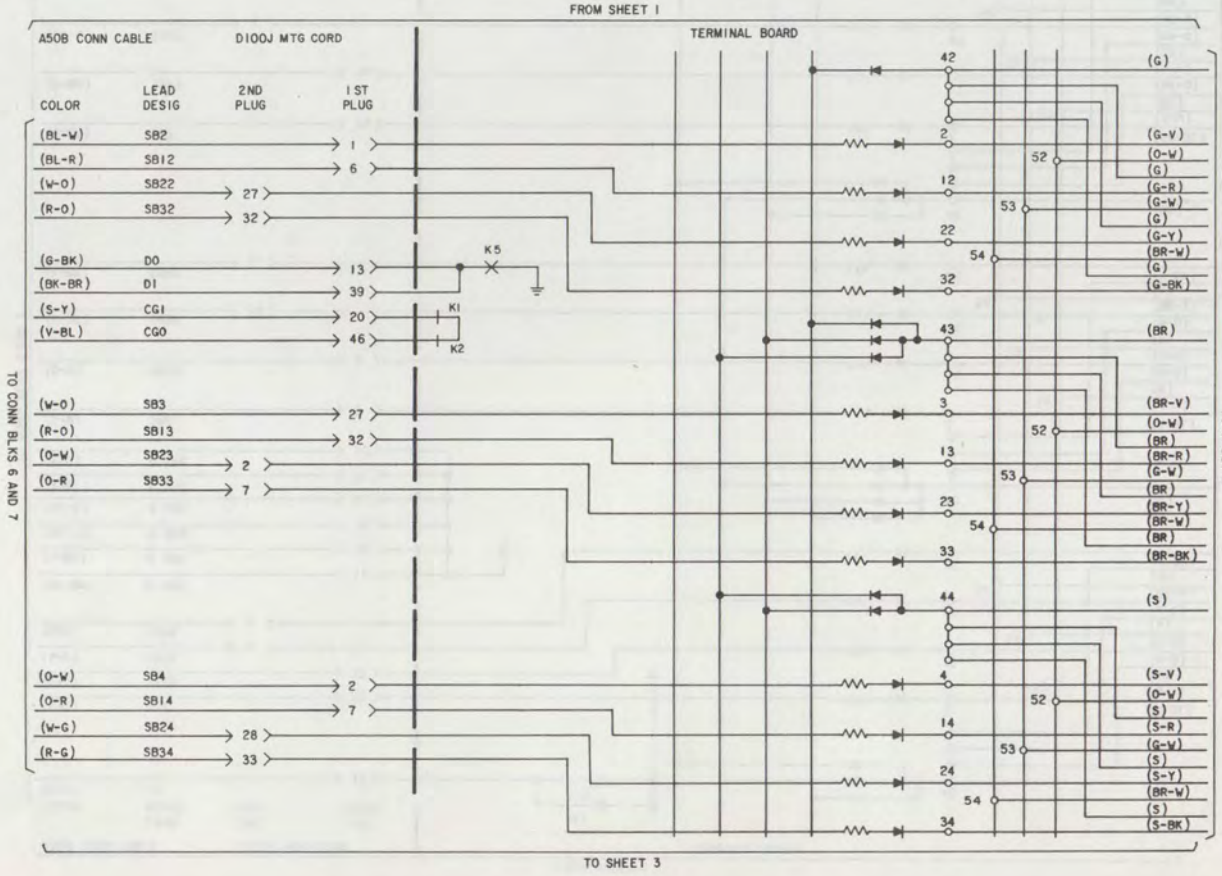


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 2 of 8)

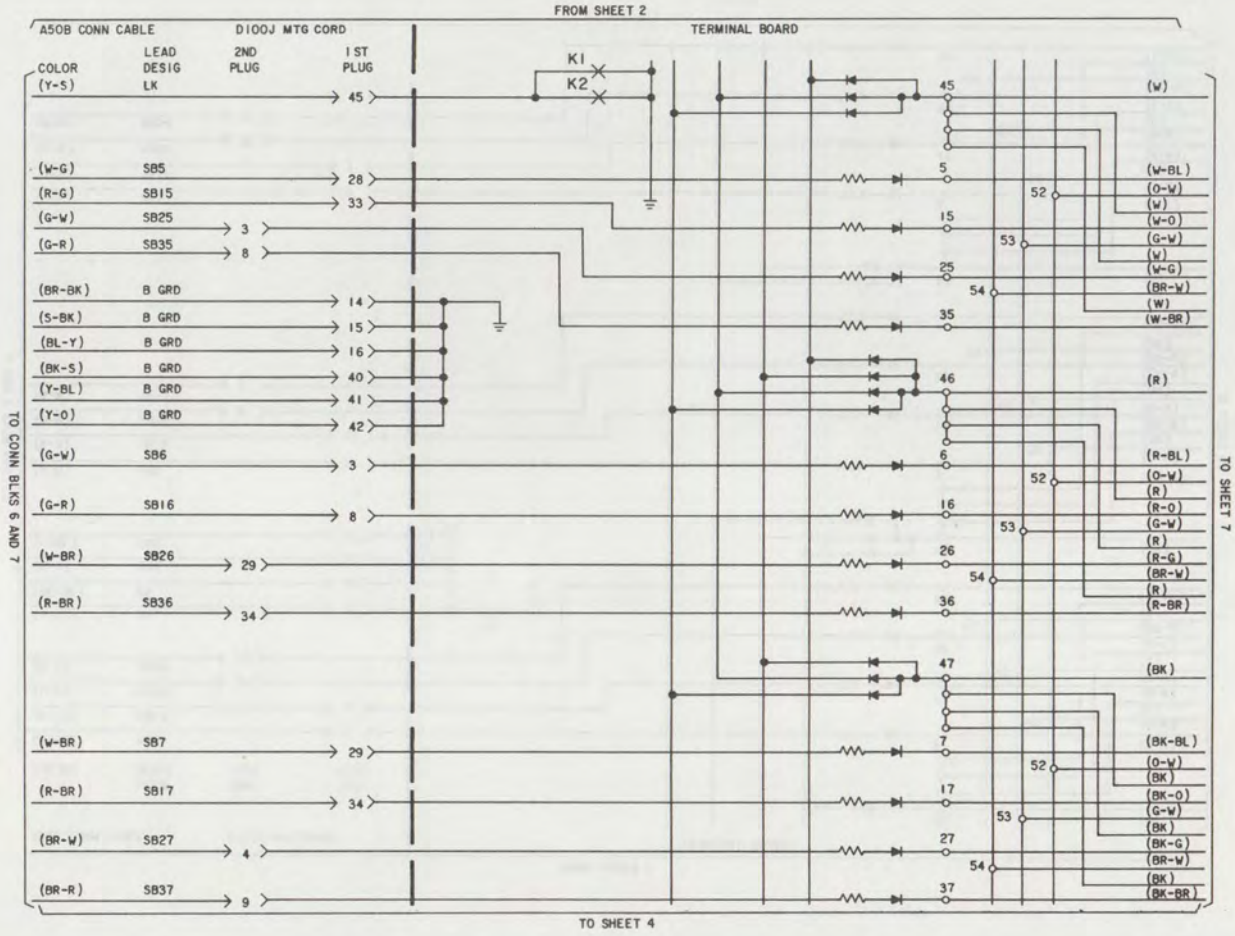


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 3 of 8)

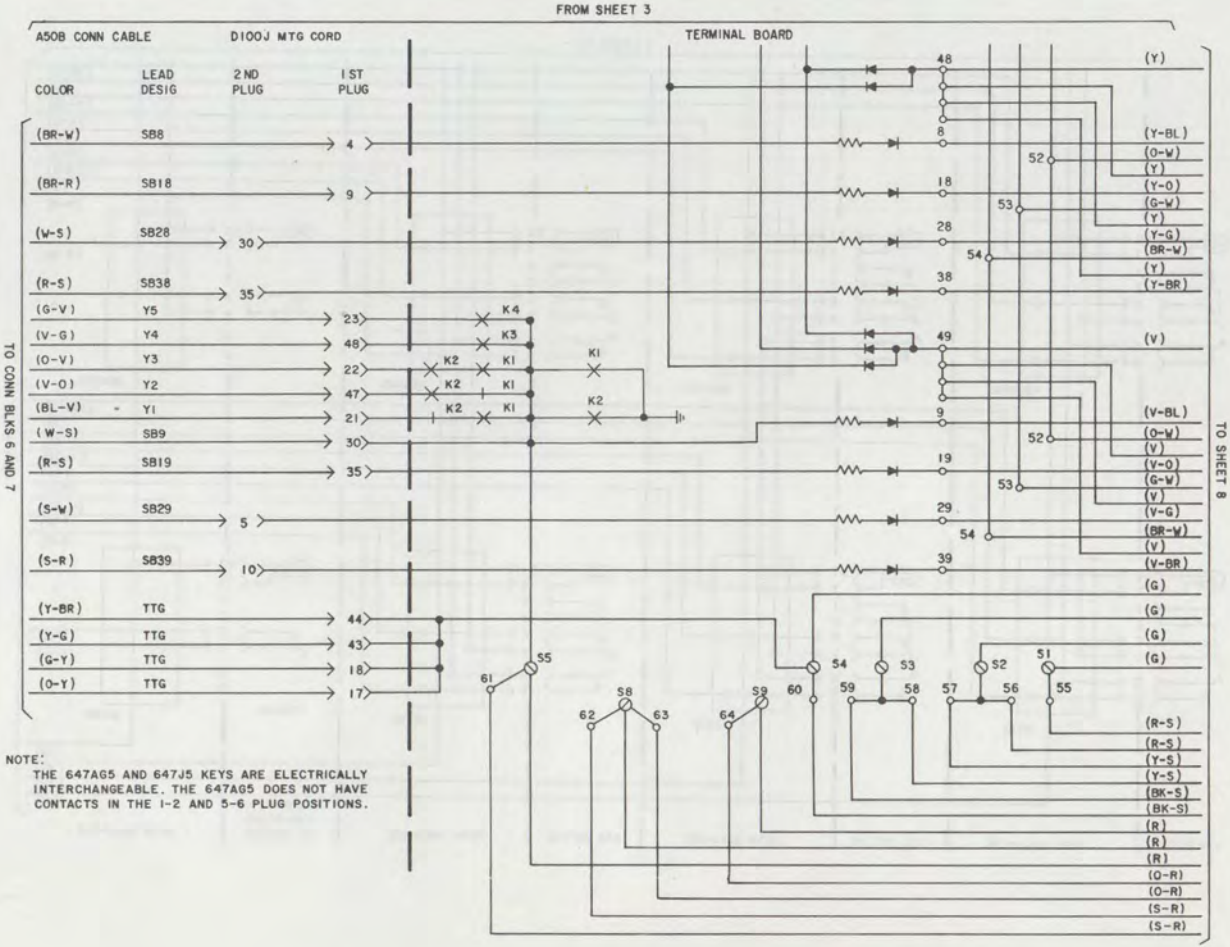


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 4 of 8)

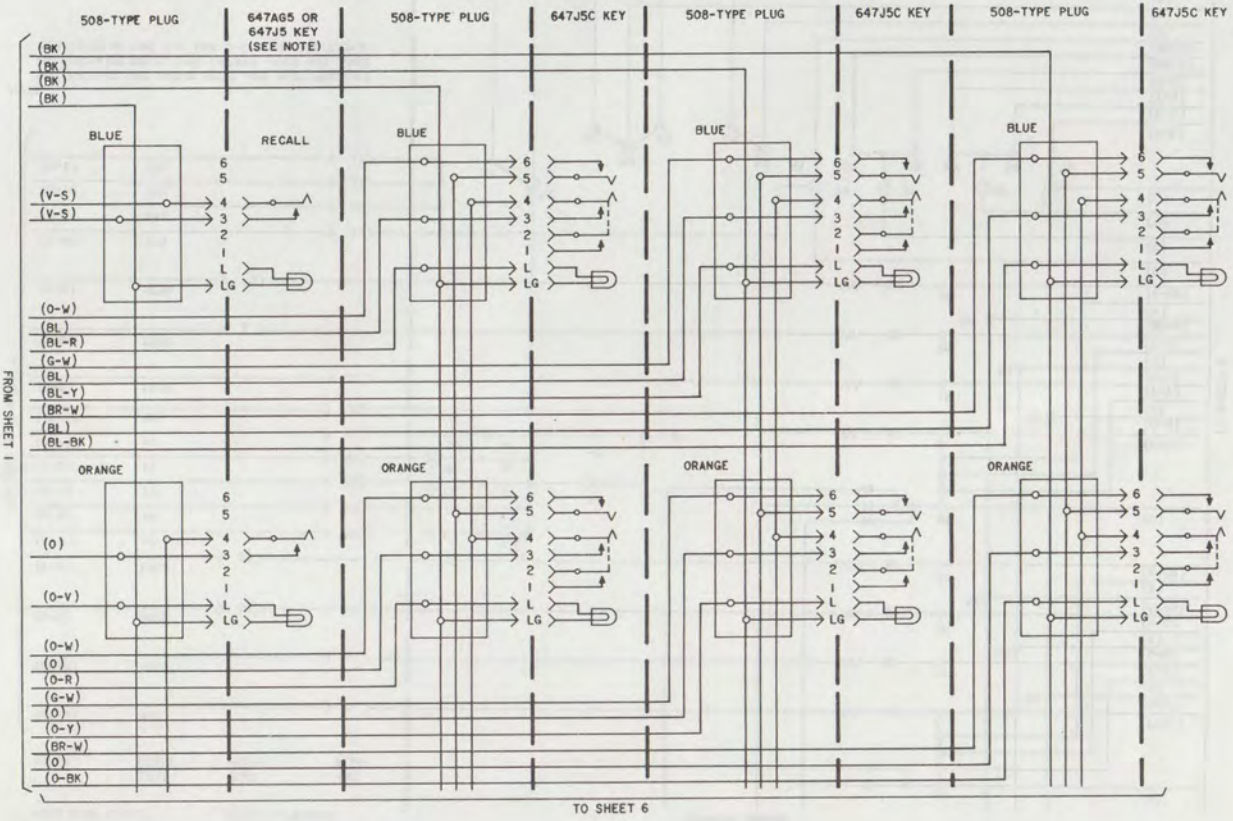


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 5 of 8)

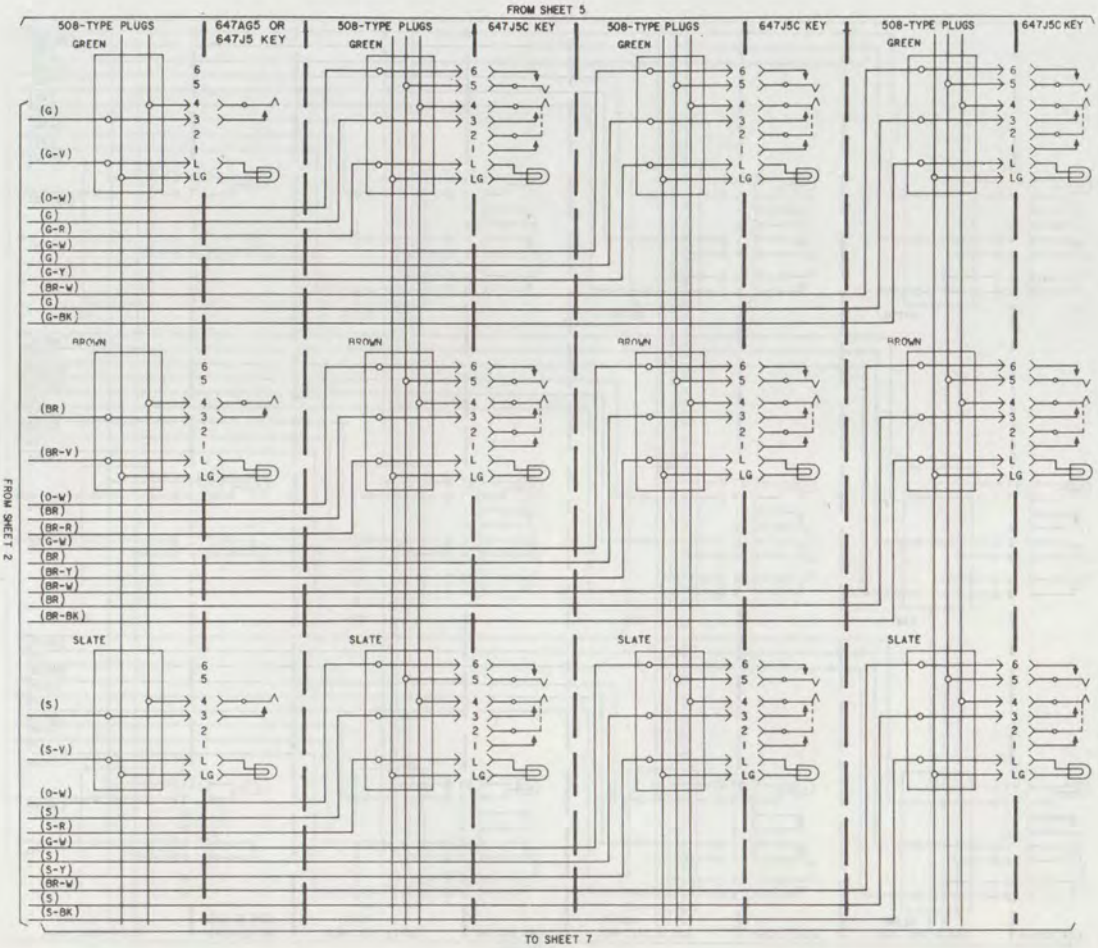


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 6 of 8)

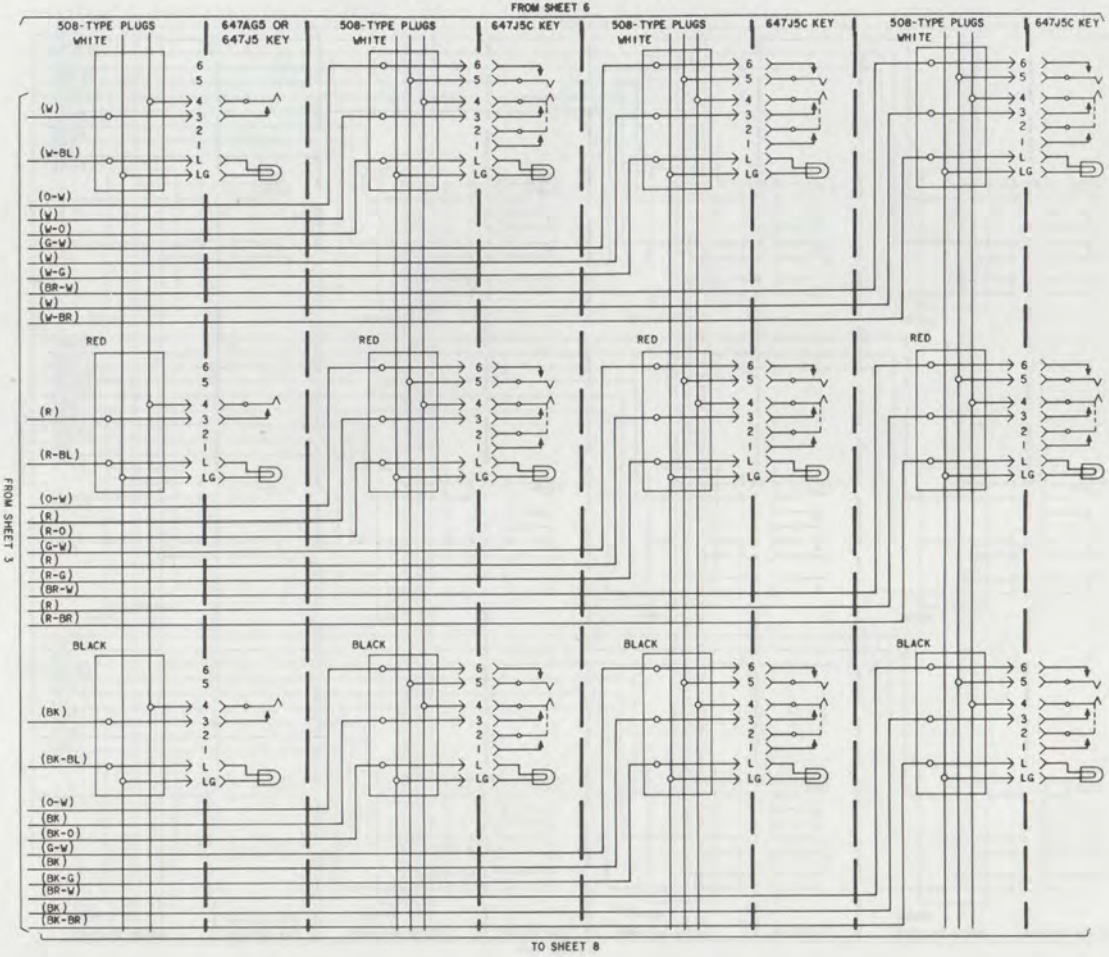


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 7 of 8)

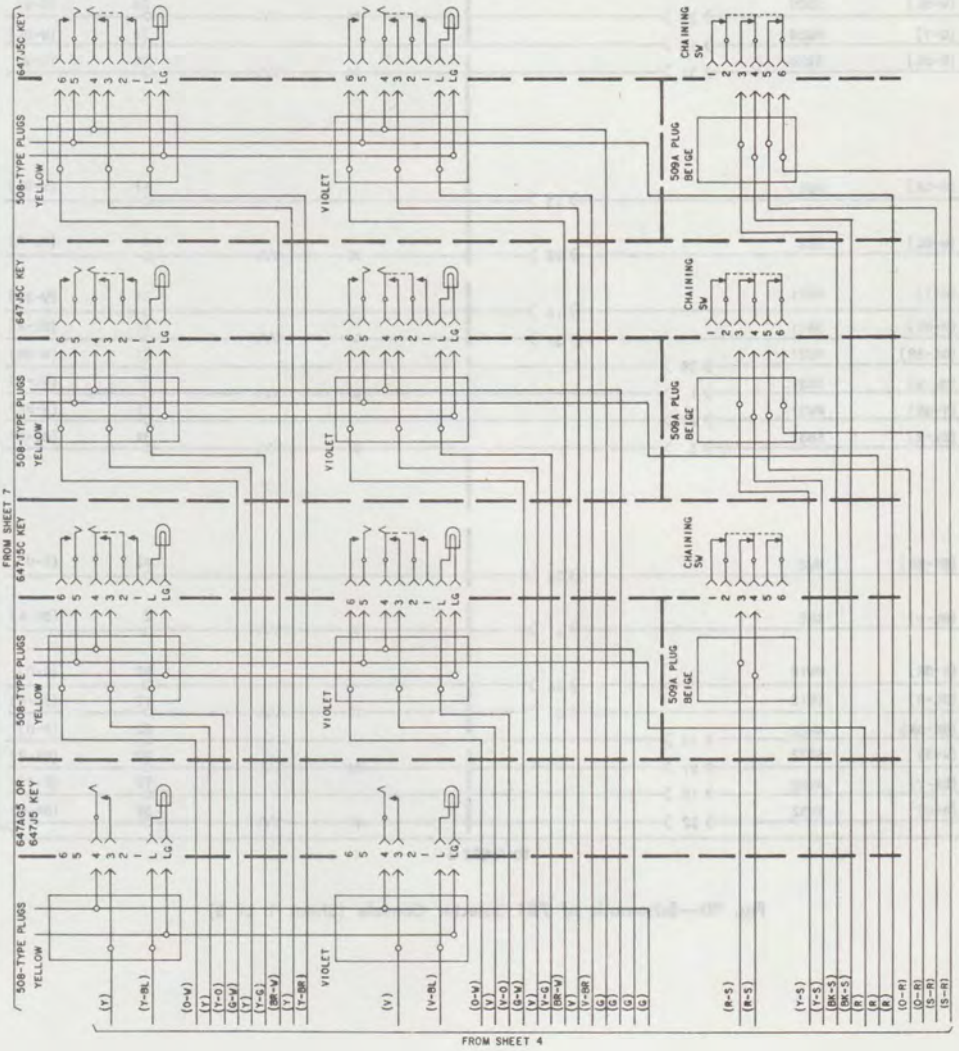


Fig. 89—Schematic of 7A1 Selector Console (DSS) (Sheet 8 of 8)

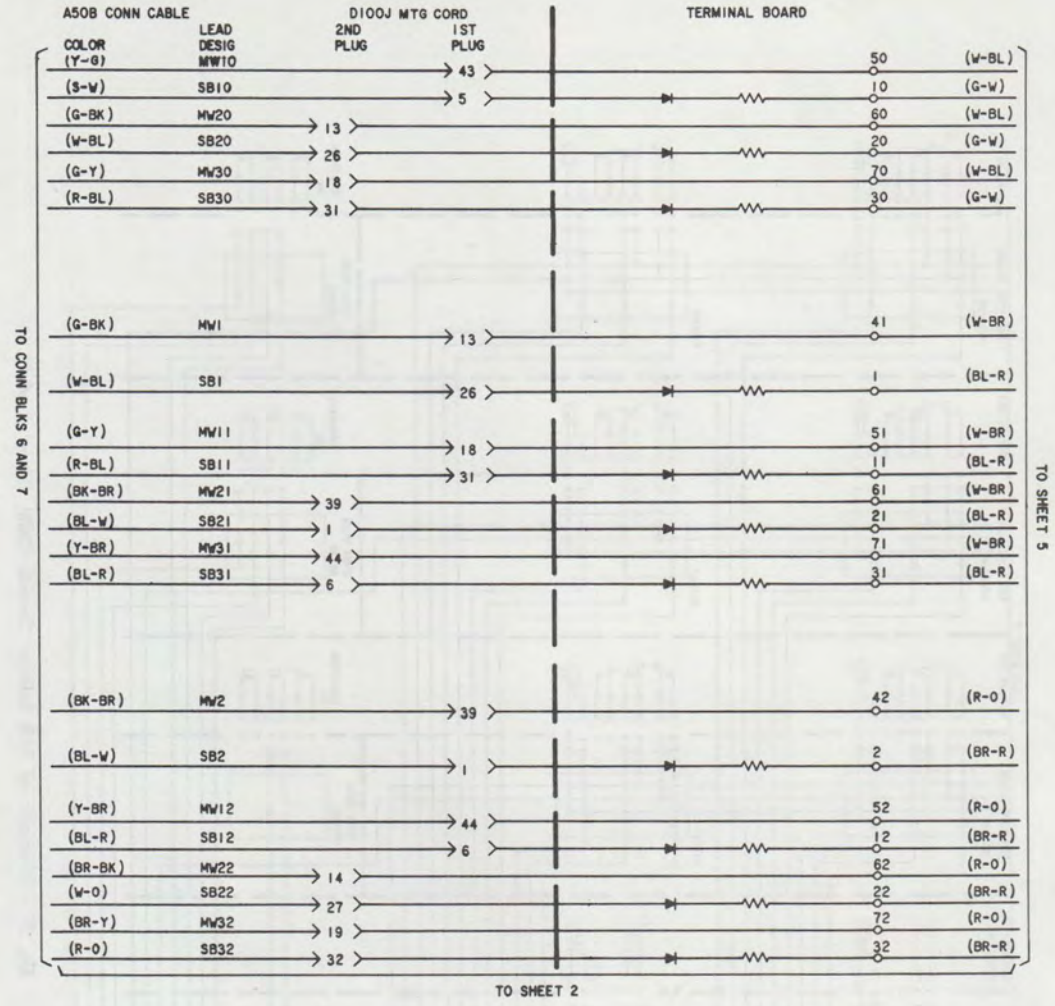


Fig. 90—Schematic of 7B1 Selector Console (Sheet 1 of 8)

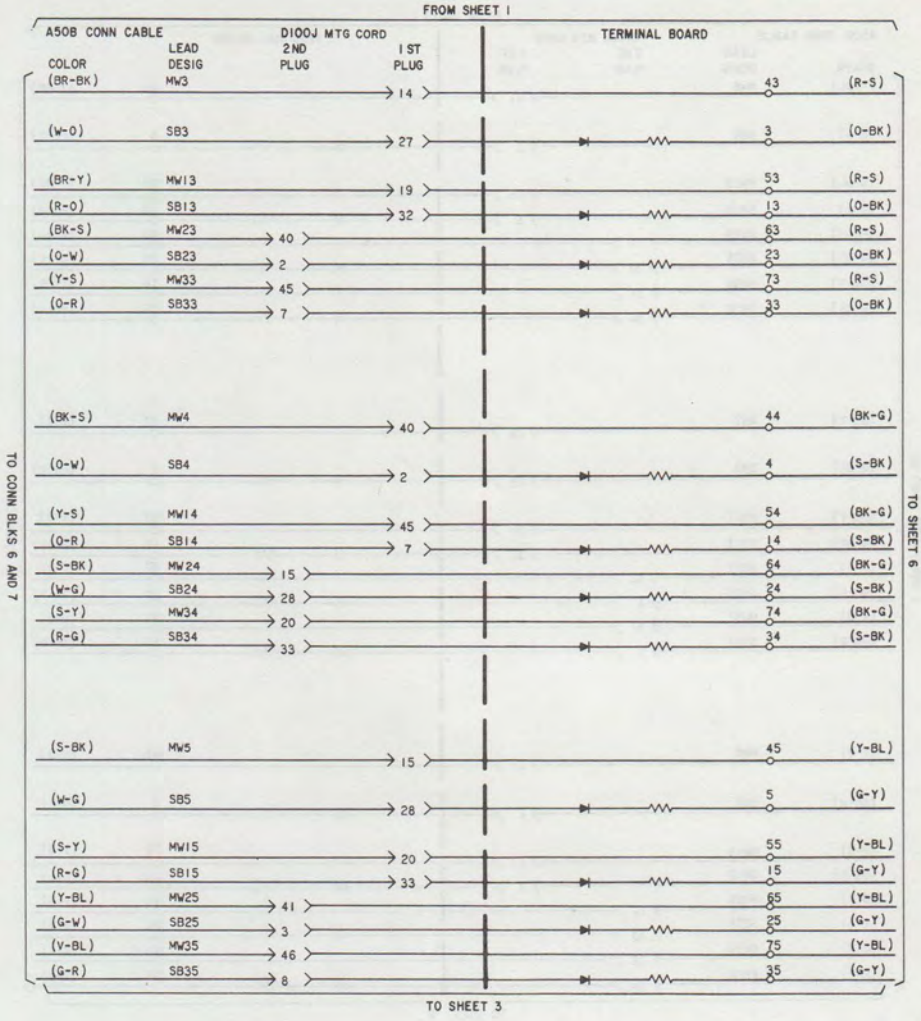


Fig. 90—Schematic of 7B1 Selector Console (Sheet 2 of 8)

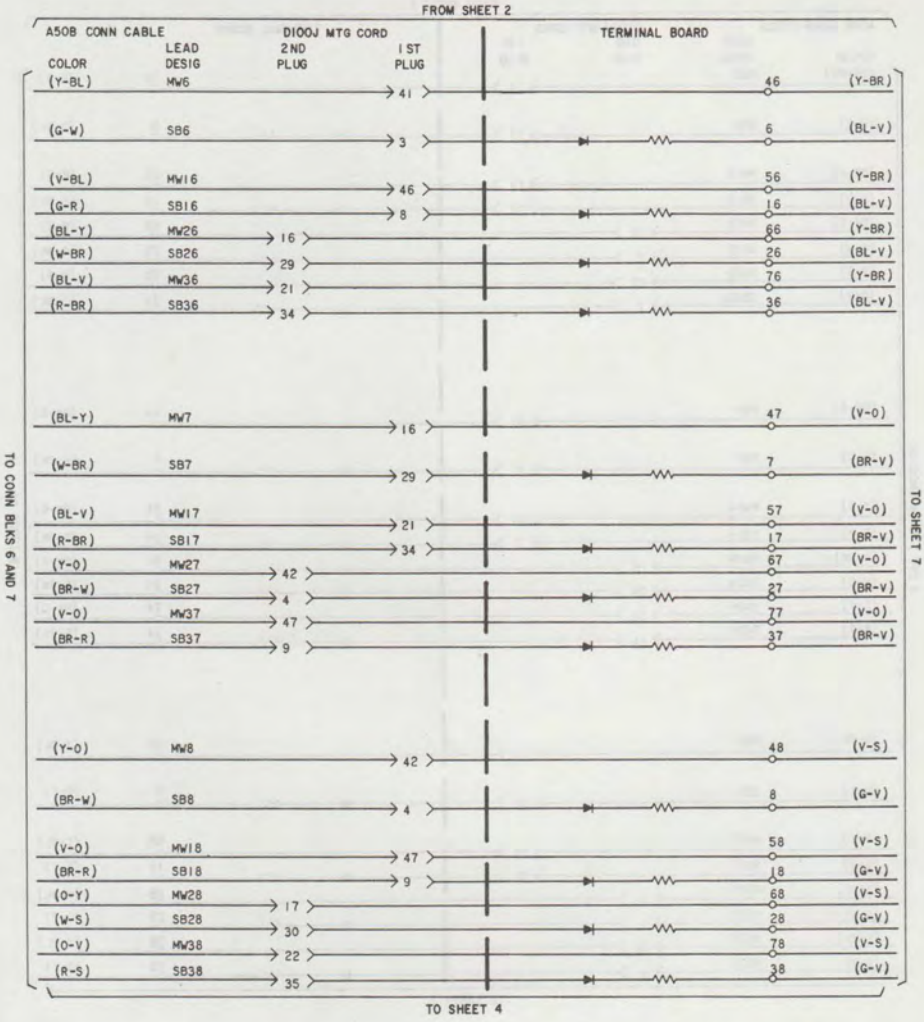


Fig. 90—Schematic of 7B1 Selector Console (Sheet 3 of 8)

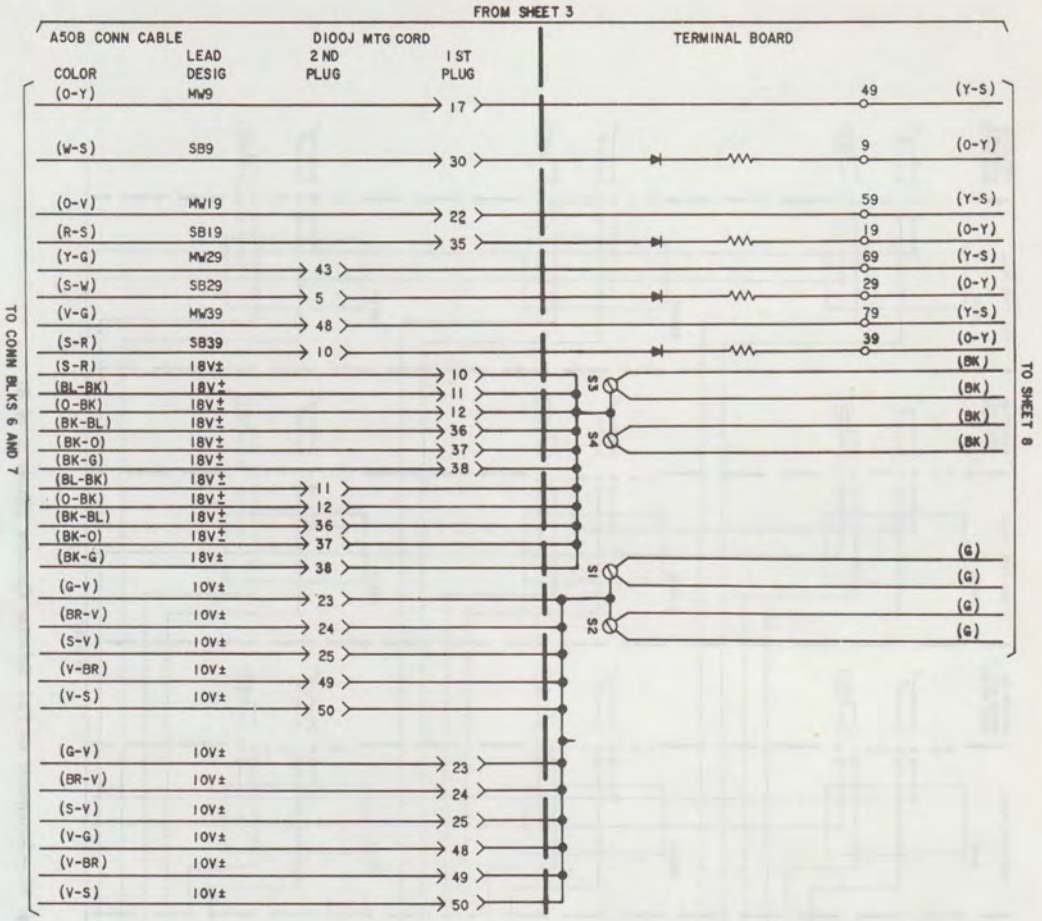


Fig. 90—Schematic of 7B1 Selector Console (Sheet 4 of 8)

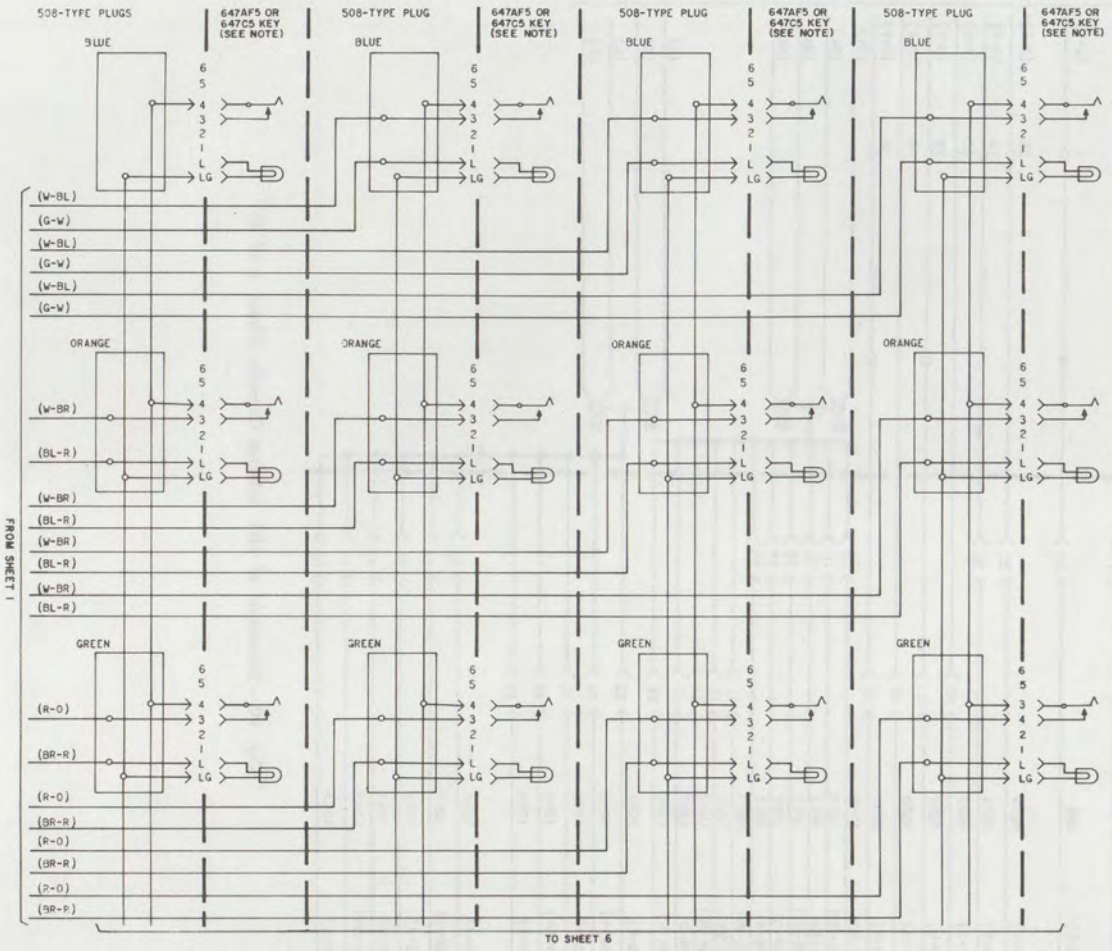


Fig. 90—Schematic of 7B1 Selector Console (Sheet 5 of 8)

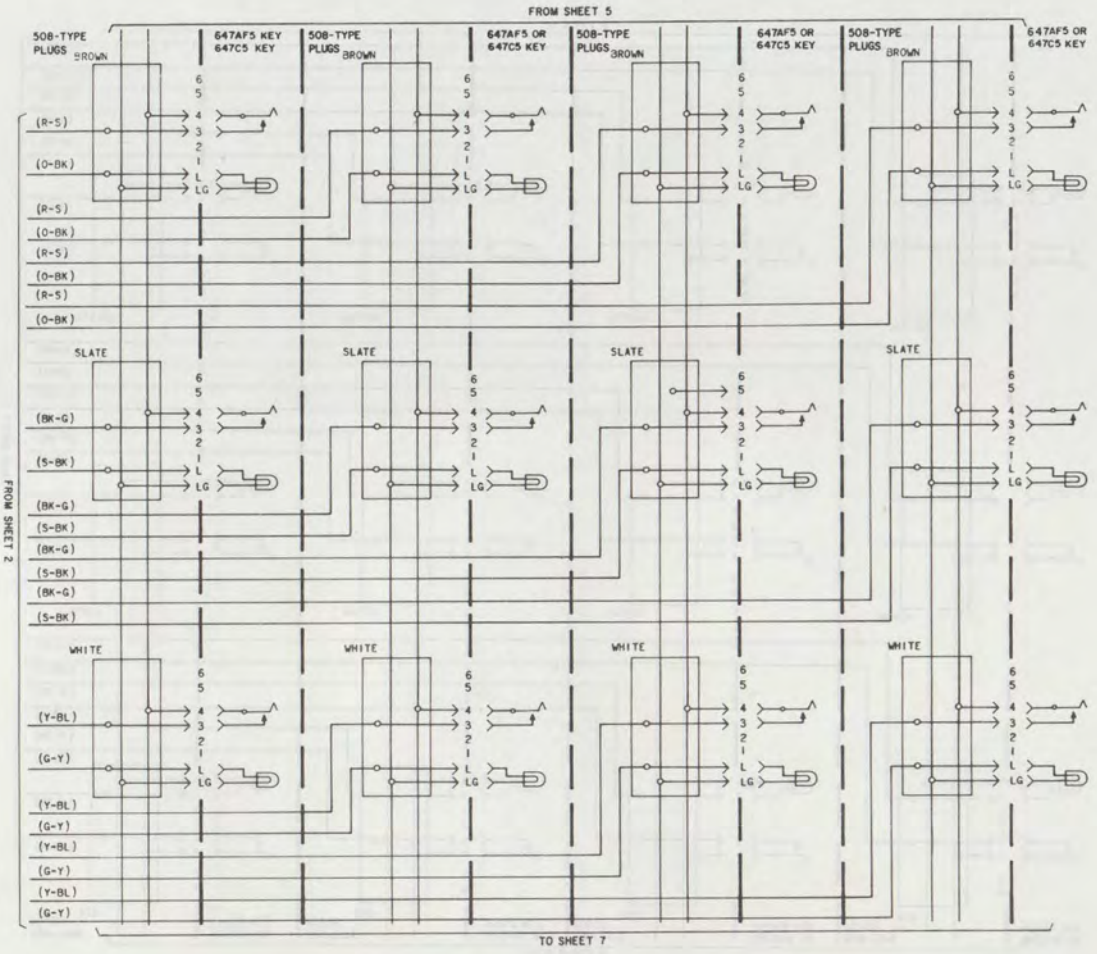


Fig. 90—Schematic of 7B1 Selector Console (Sheet 6 of 8)

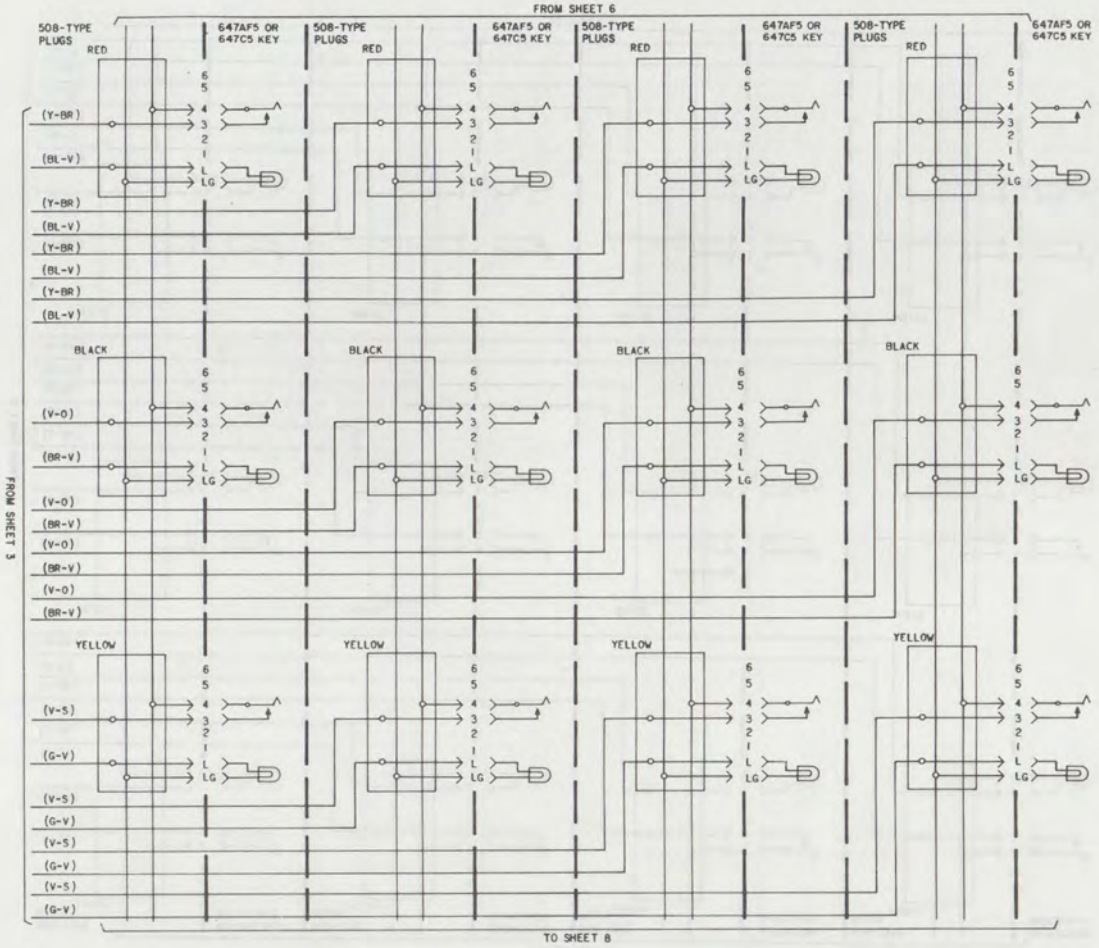
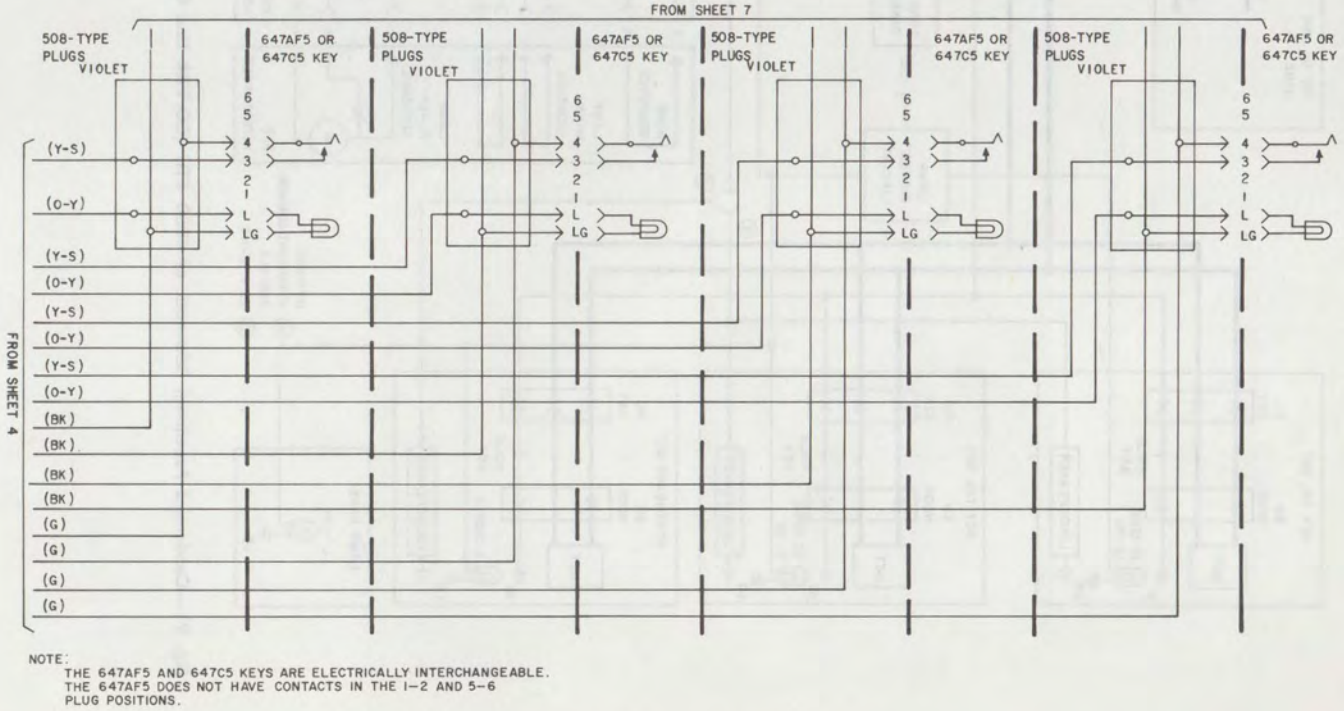


Fig. 90—Schematic of 7B1 Selector Console (Sheet 7 of 8)



NOTE:
THE 647AF5 AND 647C5 KEYS ARE ELECTRICALLY INTERCHANGEABLE.
THE 647AF5 DOES NOT HAVE CONTACTS IN THE 1–2 AND 5–6
PLUG POSITIONS.

Fig. 90—Schematic of 7B1 Selector Console (Sheet 8 of 8)

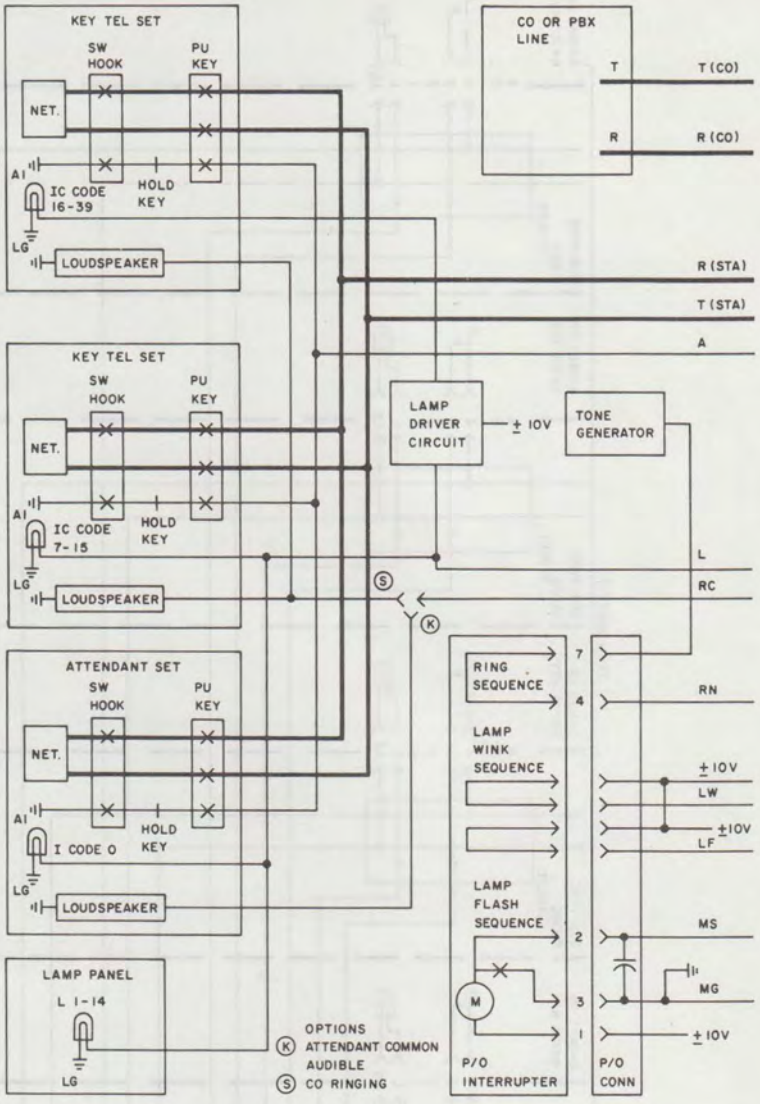


Fig. 91—Condensed Functional Schematic of 400D KTU (CO/PBX Line Circuit) (Sheet 1 of 2)

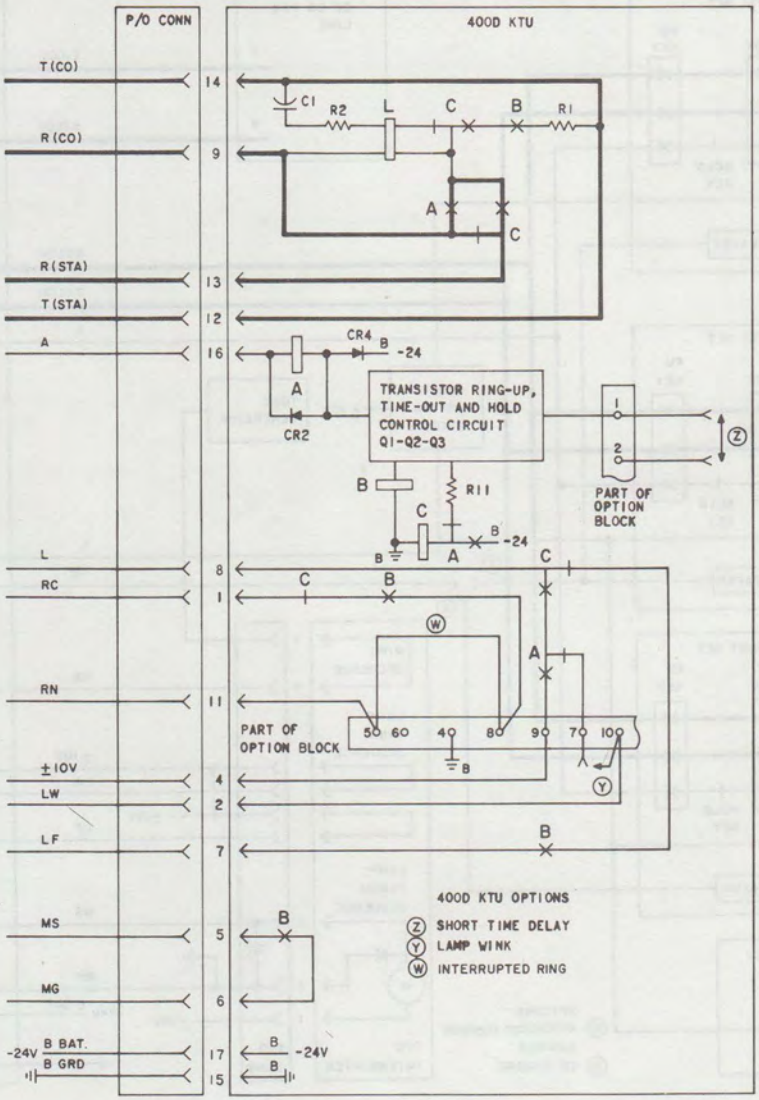


Fig. 91—Condensed Functional Schematic of 400D KTU (CO/PBX Line Circuit) (Sheet 2 of 2)

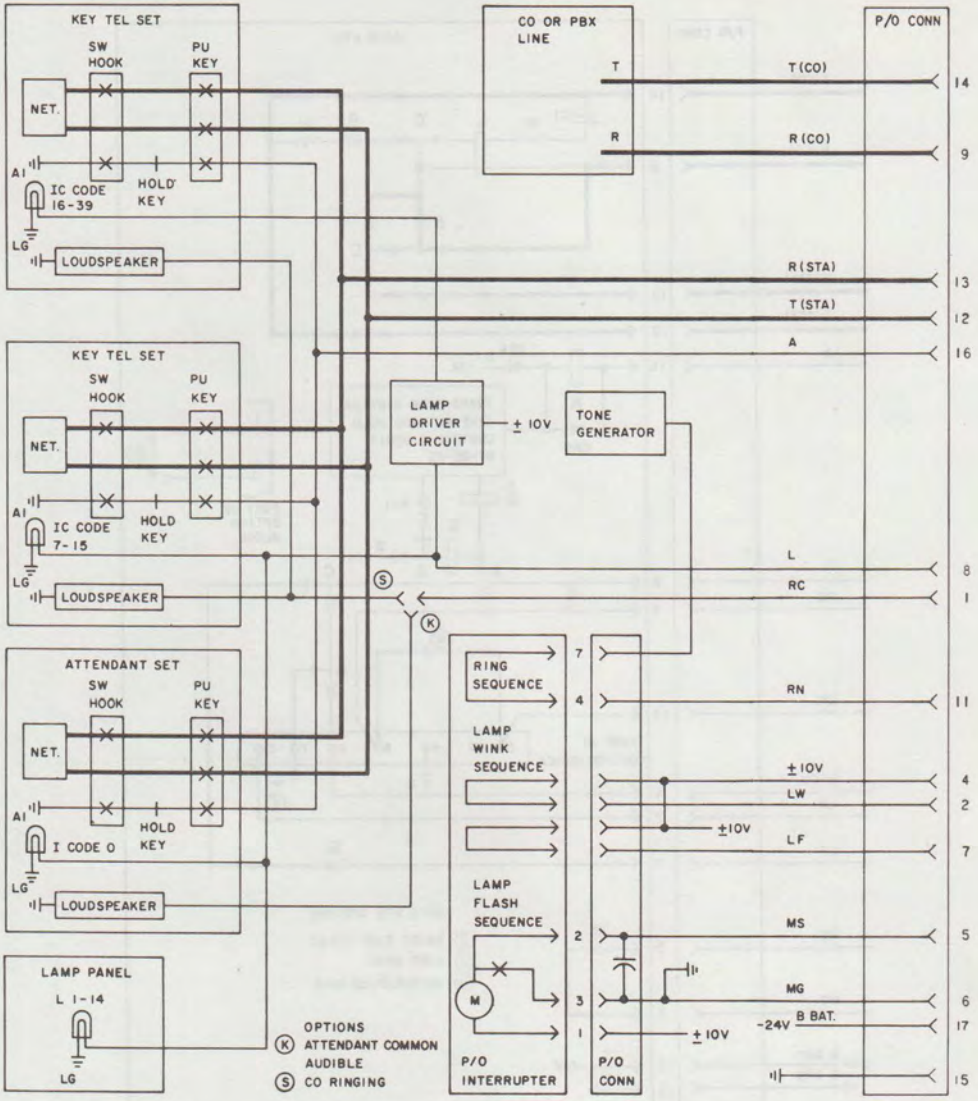


Fig. 92—Condensed Functional Schematic of 400G KTU (CO/PBX Line Circuit) (Sheet 1 of 2)

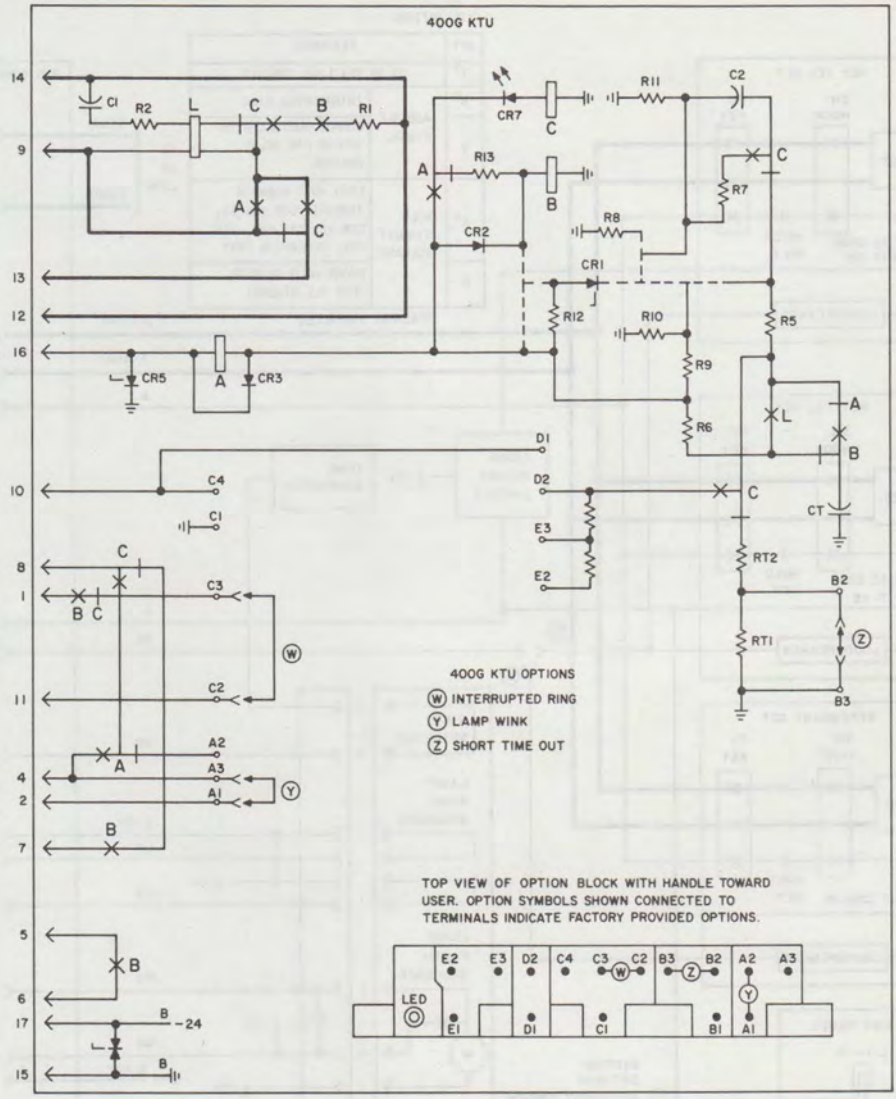


Fig. 92—Condensed Functional Schematic of 400G KTU (CO/PBX Line Circuit) (Sheet 2 of 2)

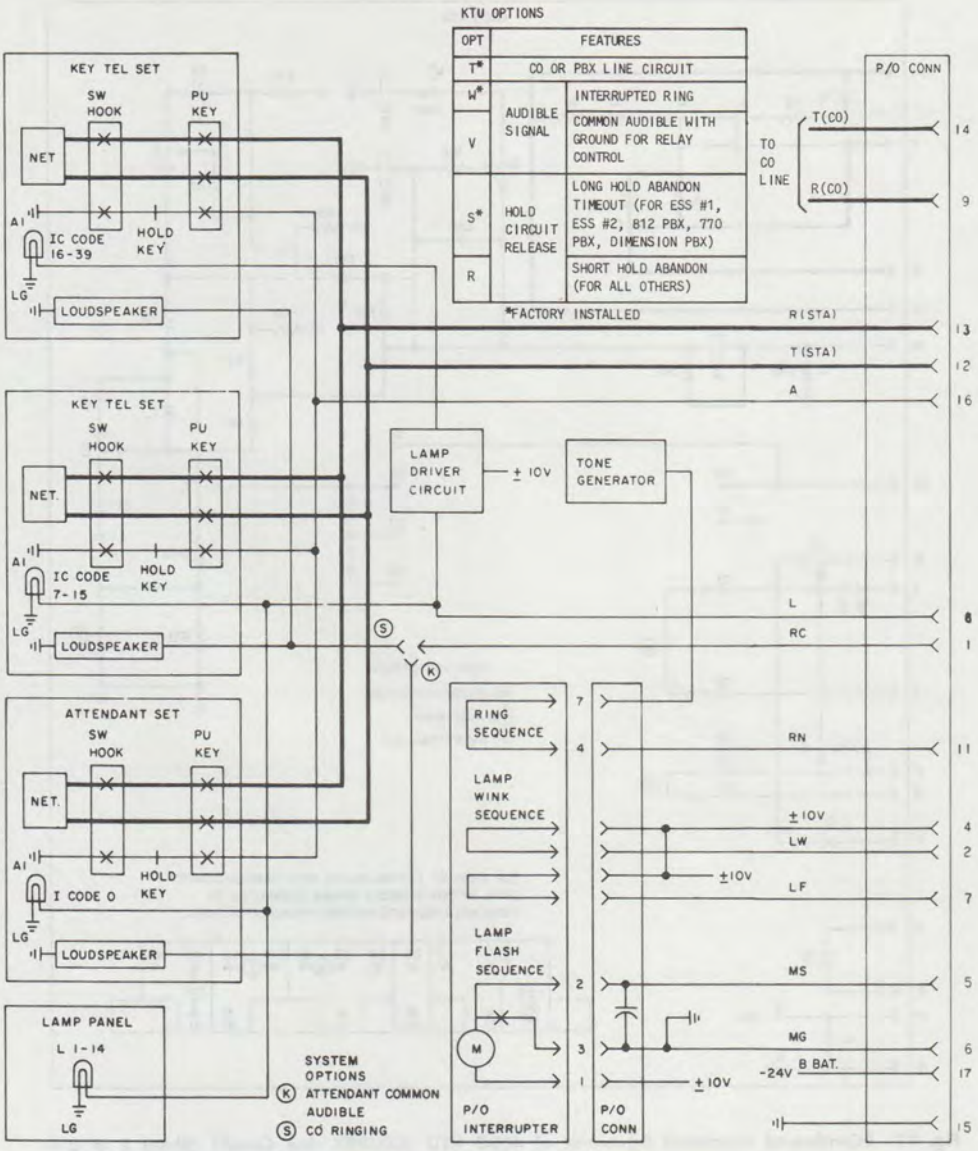


Fig. 93—Condensed Functional Schematic of 400H KTU (CO/PBX Line Circuit) (Sheet 1 of 2)

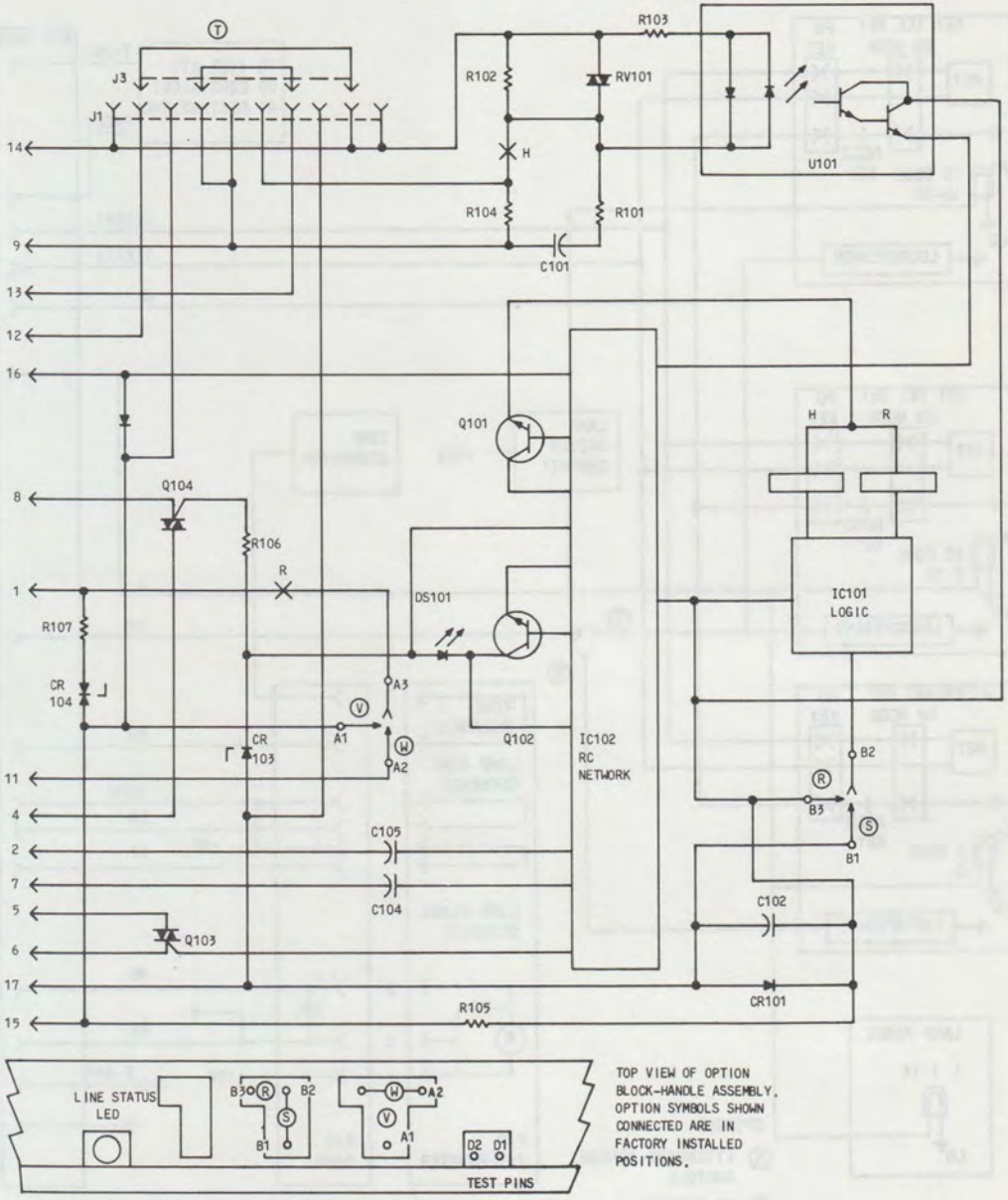


Fig. 93—Condensed Functional Schematic of 400H KTU (CO/PBX Line Circuit) (Sheet 2 of 2)

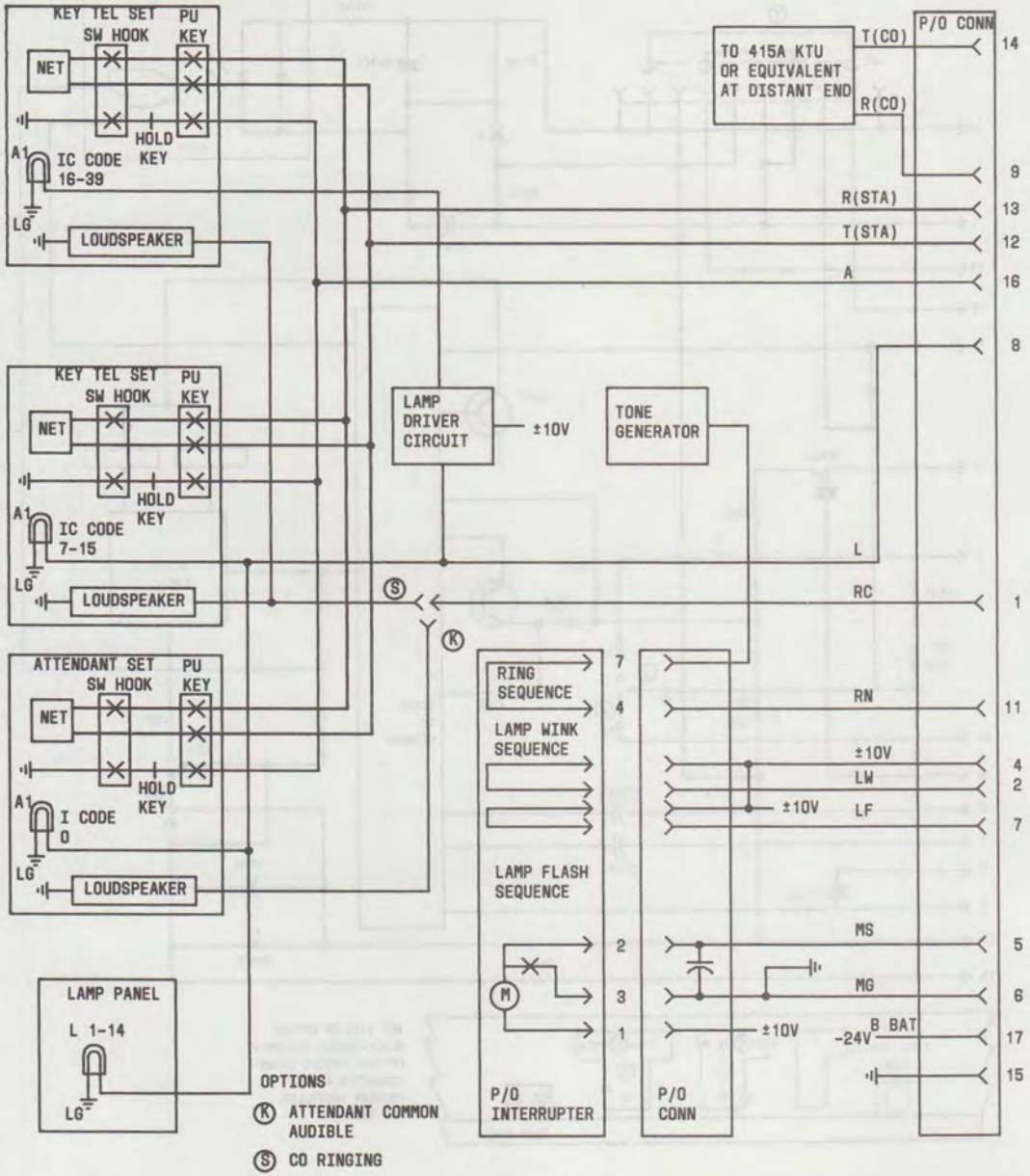
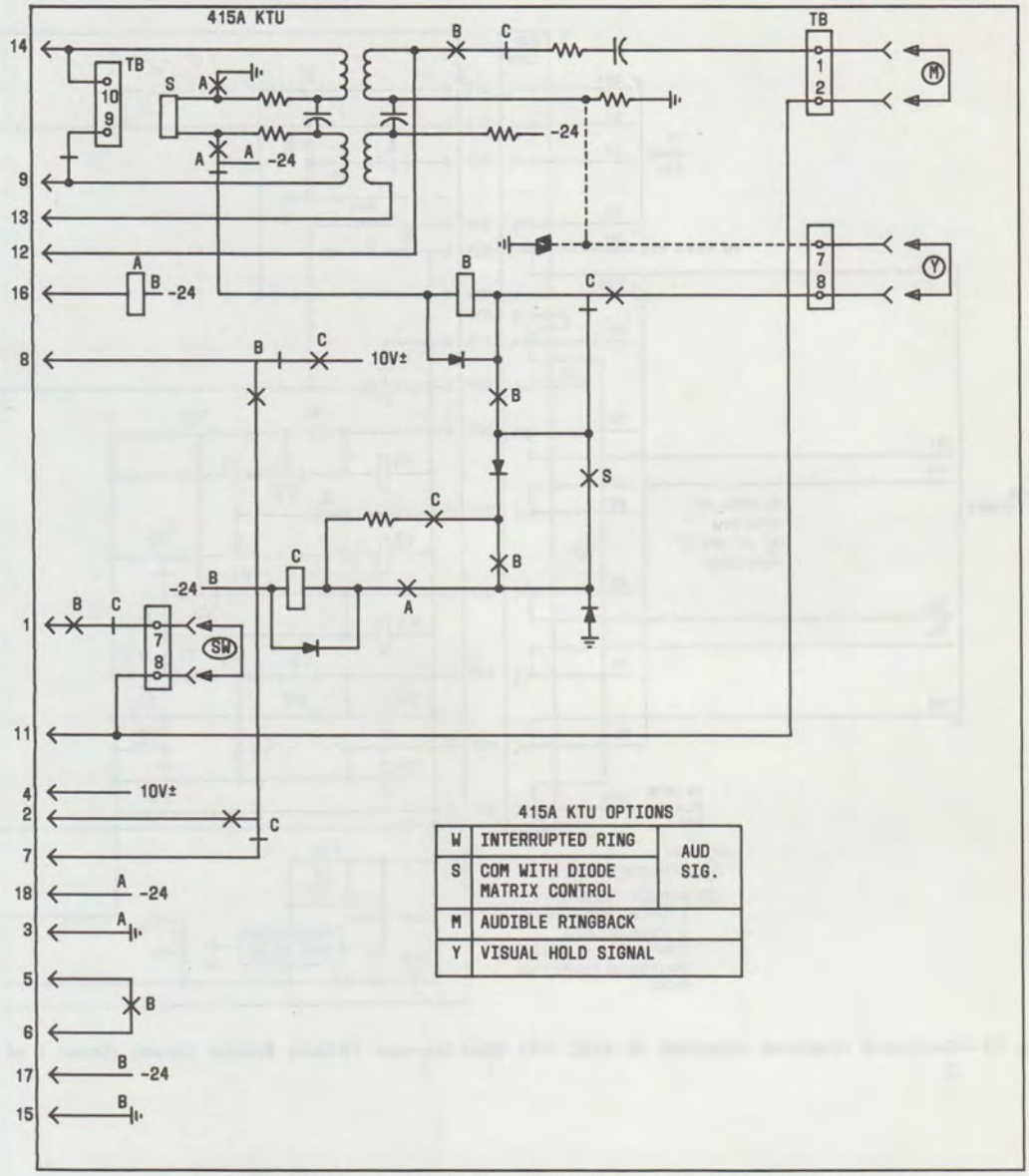


Fig. 94—Condensed Functional Schematic of 415A KTU (Automatic, DC Signaling, Private Line Circuit) (Sheet 1 of 2)



415A KTU OPTIONS

W	INTERRUPTED RING	AUD SIG.
S	COM WITH DIODE MATRIX CONTROL	
M	AUDIBLE RINGBACK	
Y	VISUAL HOLD SIGNAL	

Fig. 94—Condensed Functional Schematic of 415A KTU (Automatic, DC Signaling, Private Line Circuit) (Sheet 2 of 2)

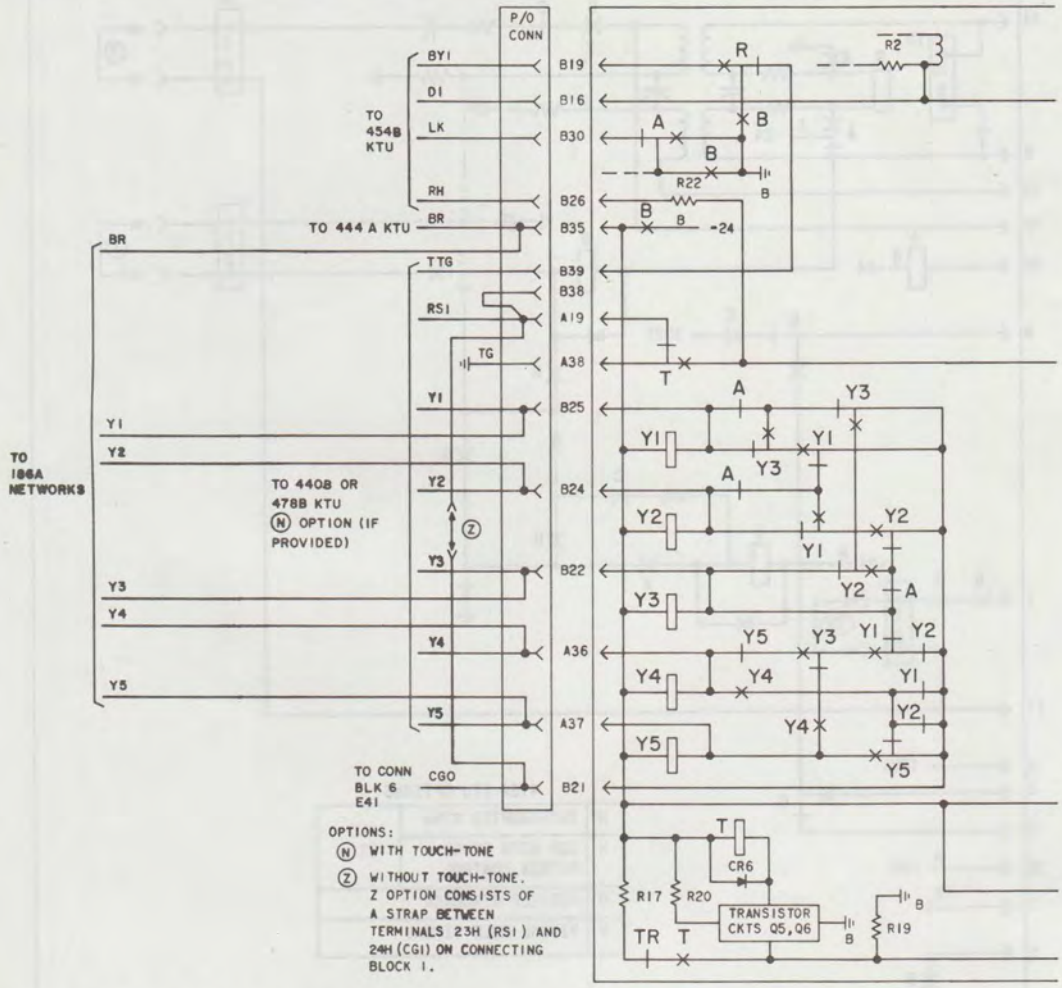


Fig. 95—Condensed Functional Schematic of 424C KTU (Dial Intercom 19-Code Selector Circuit) (Sheet 1 of 2)

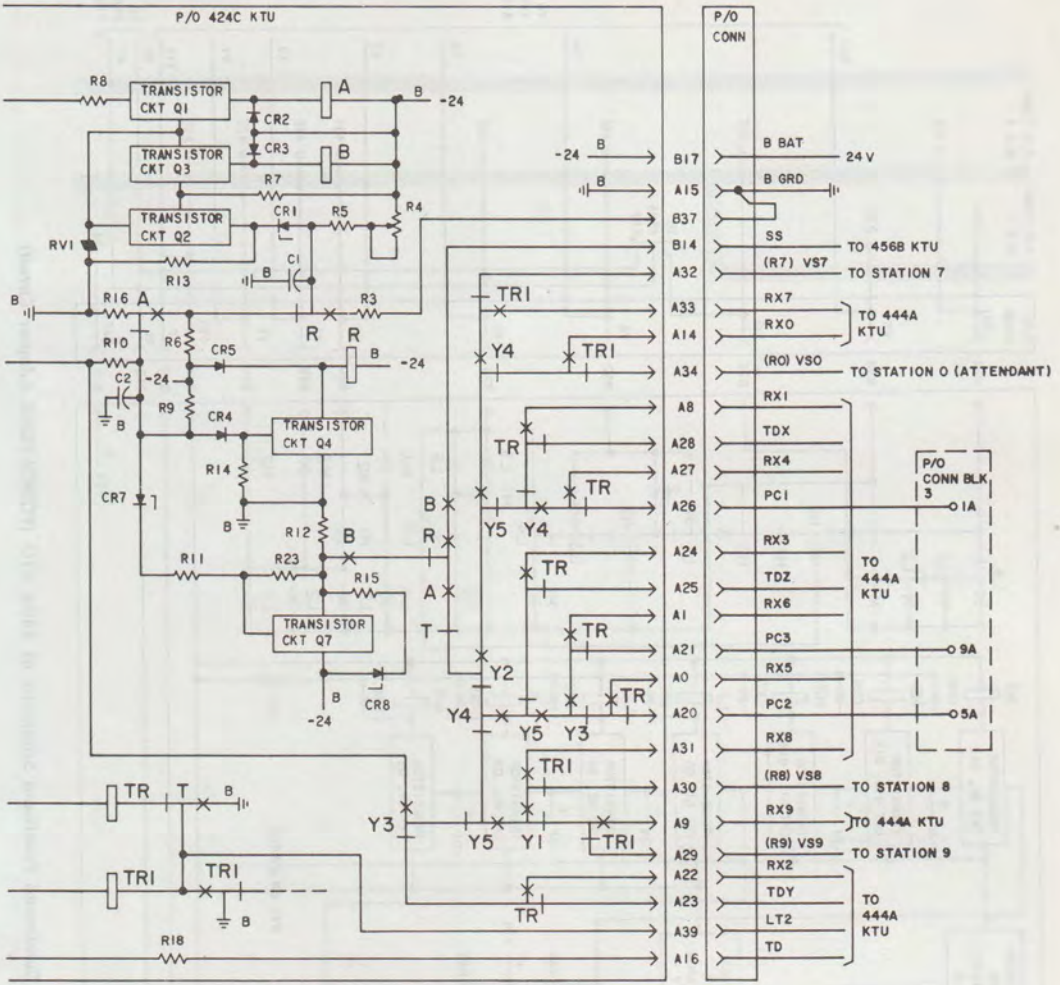


Fig. 95—Condensed Functional Schematic of 424C KTU (Dial Intercom 19-Code Selector Circuit) (Sheet 2 of 2)

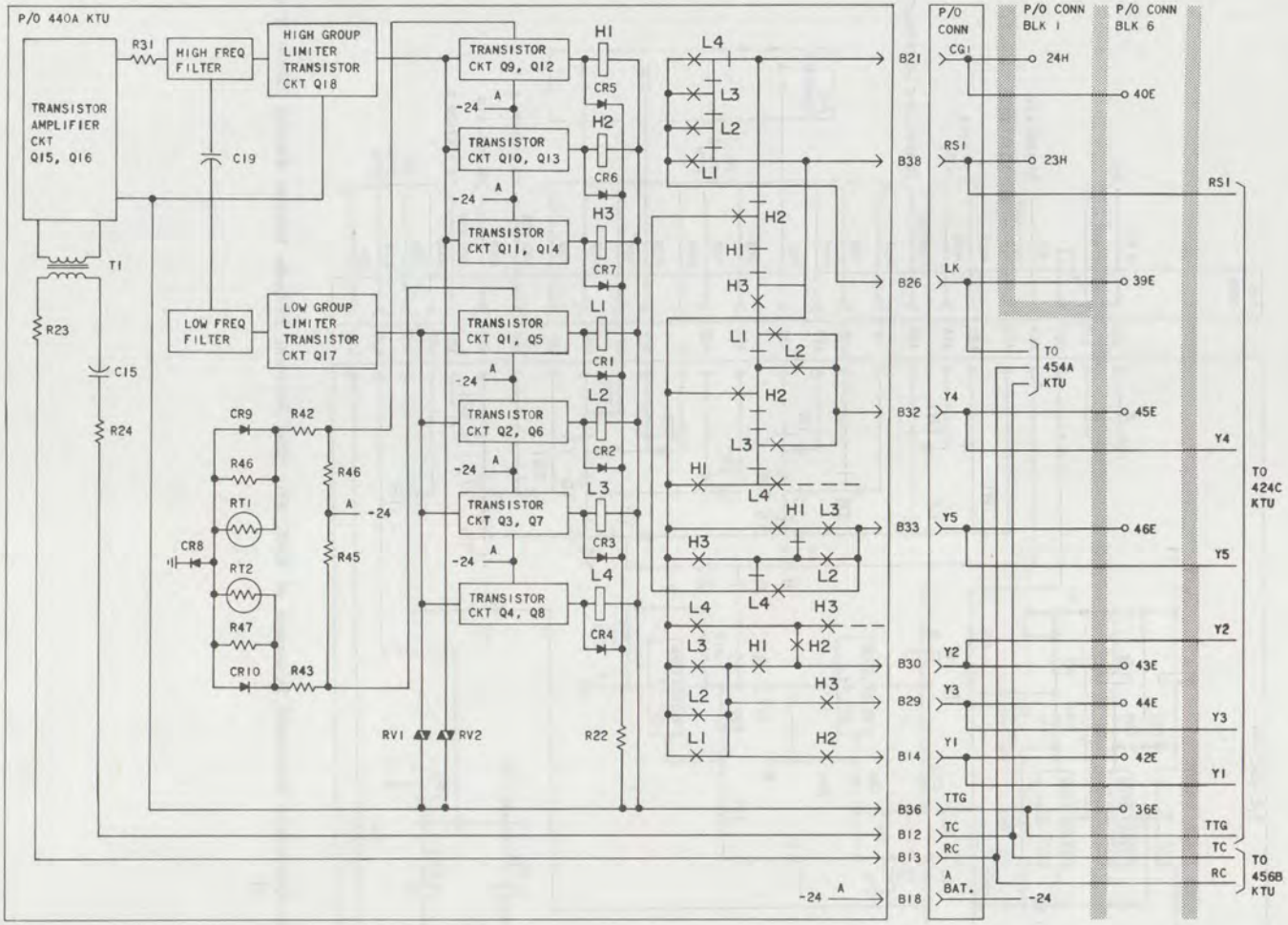


Fig. 96—Condensed Functional Schematic of 440A KTU (TOUCH-TONE Adapter Circuit)

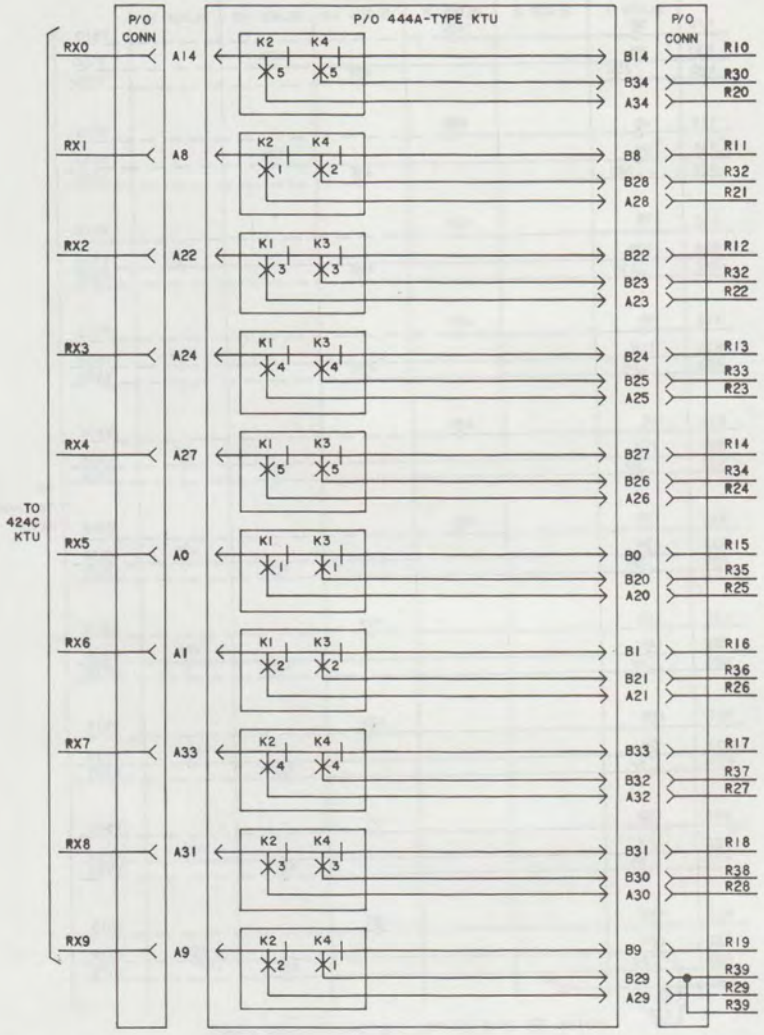


Fig. 97—Condensed Functional Schematic of 444-Type KTU (Selector Extender Circuit) (Sheet 1 of 3)

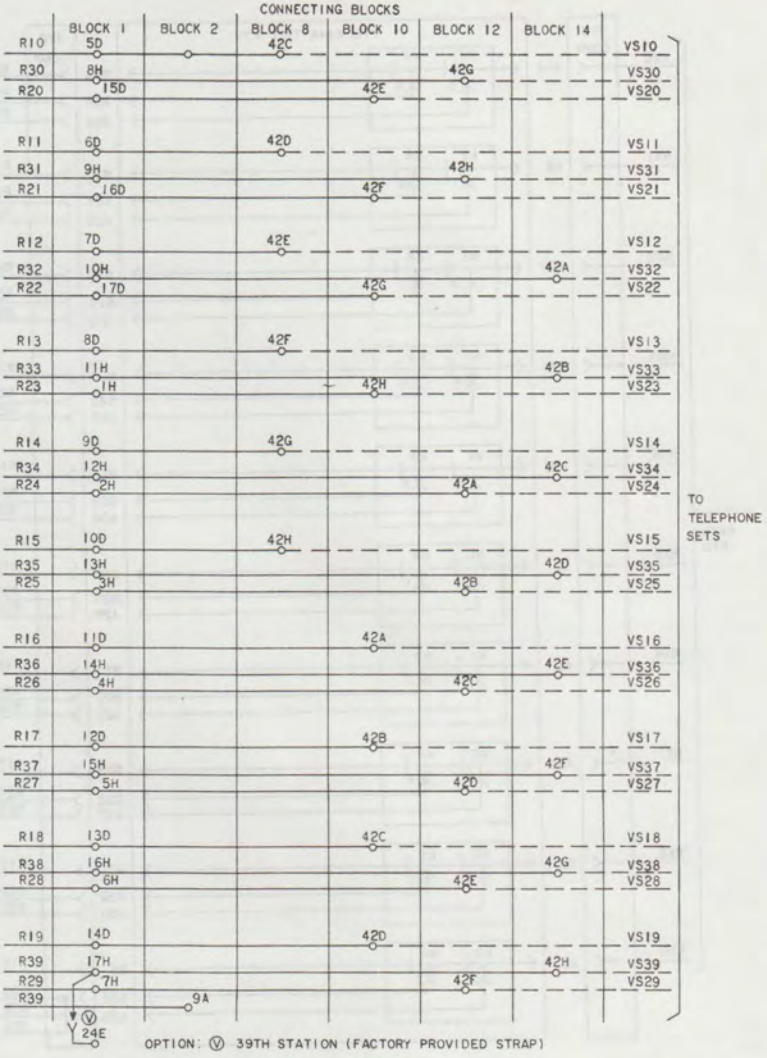


Fig. 97—Condensed Functional Schematic of 444-Type KTU (Selector Extender Circuit) (Sheet 2 of 3)

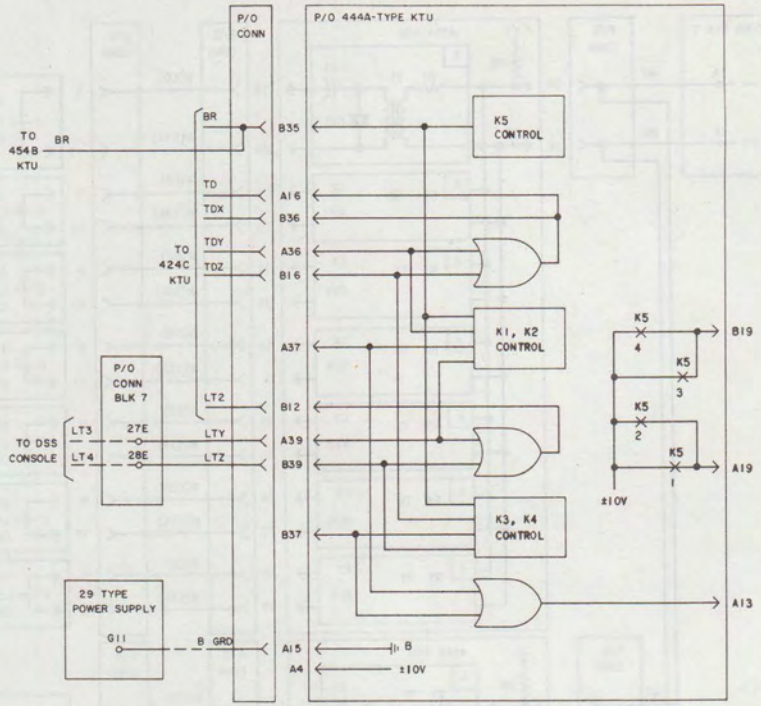


Fig. 97—Condensed Functional Schematic of 444-Type KTU (Selector Extender Circuit) (Sheet 3 of 3)

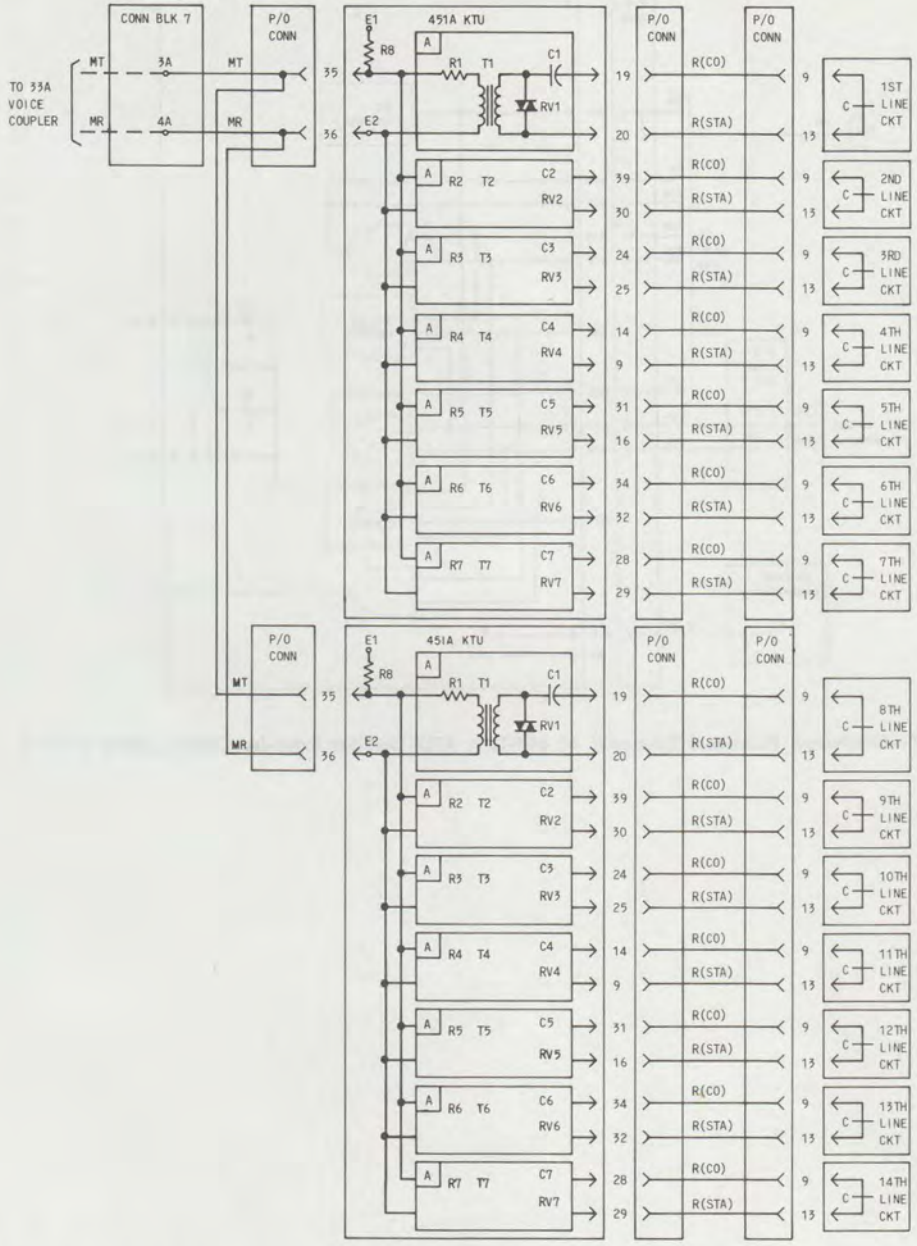


Fig. 98—Condensed Functional Schematic of 451A KTU (Music-On-Hold Circuit) as Used With 580A KSU

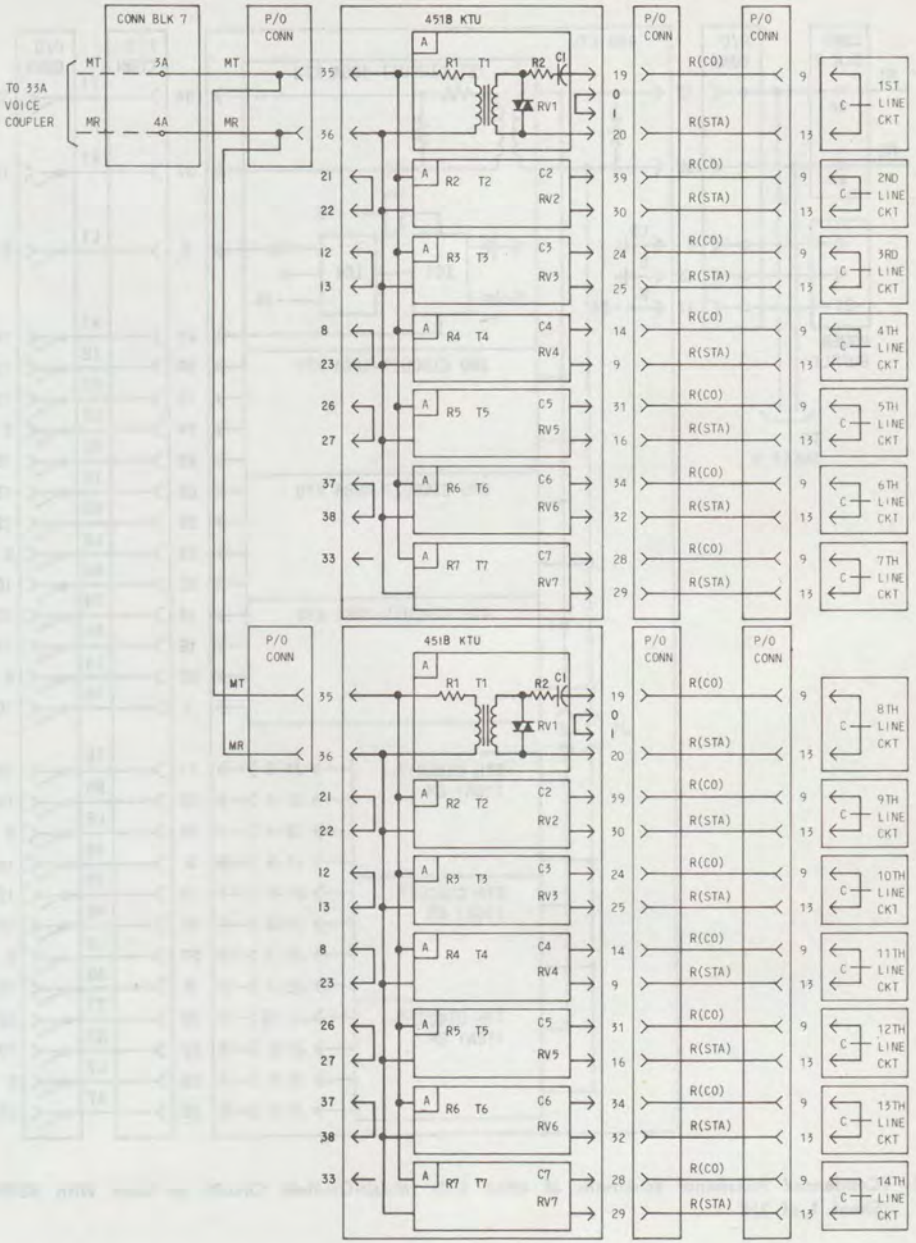


Fig. 99—Condensed Functional Schematic of 451B KTU (Music-On-Hold Circuit) as Used With 580A KSU

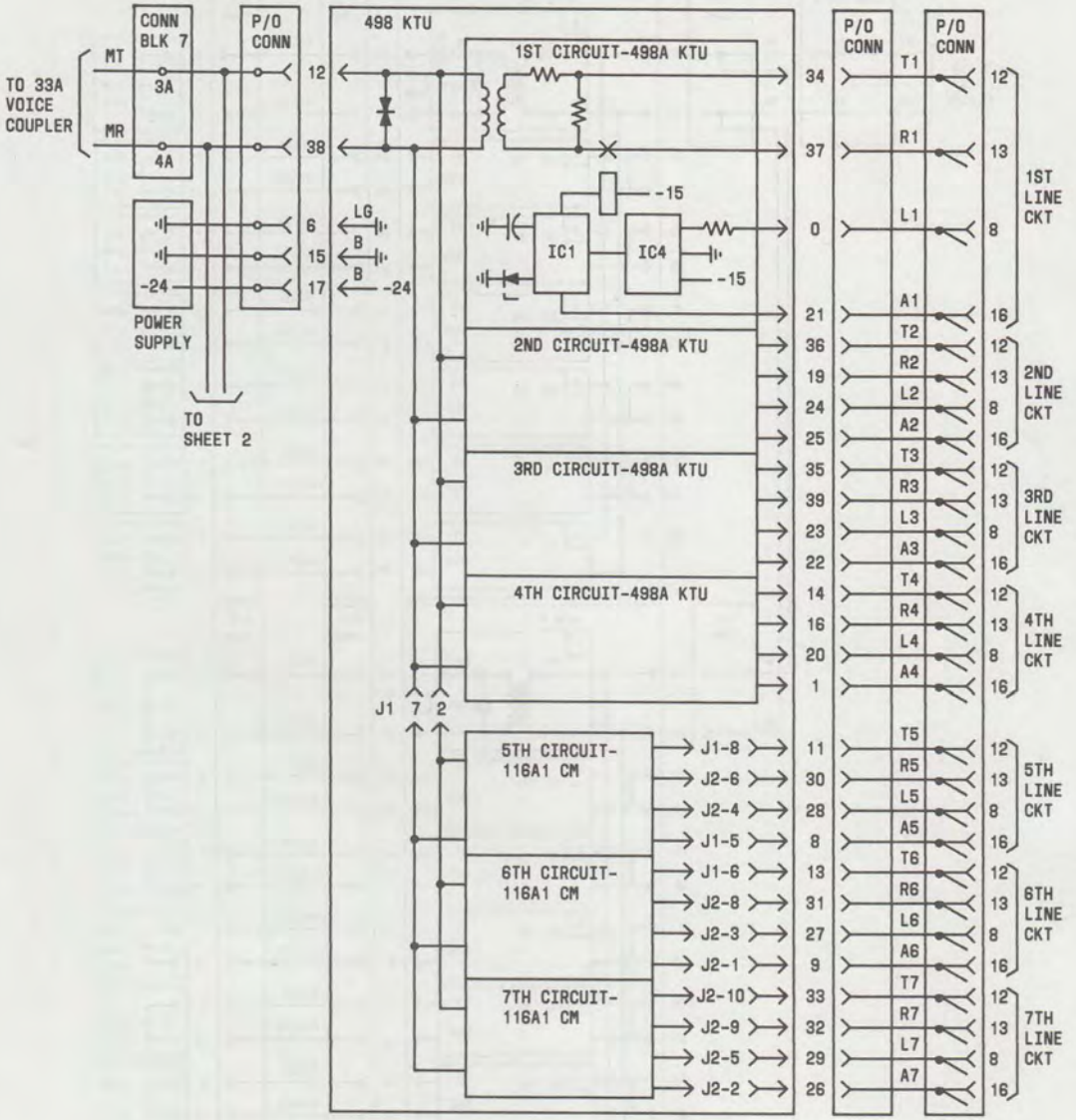


Fig. 100—Condensed Functional Schematic of 498A KTU (Music-On-Hold Circuit) as Used With 580B KSU (Sheet 1 of 2)

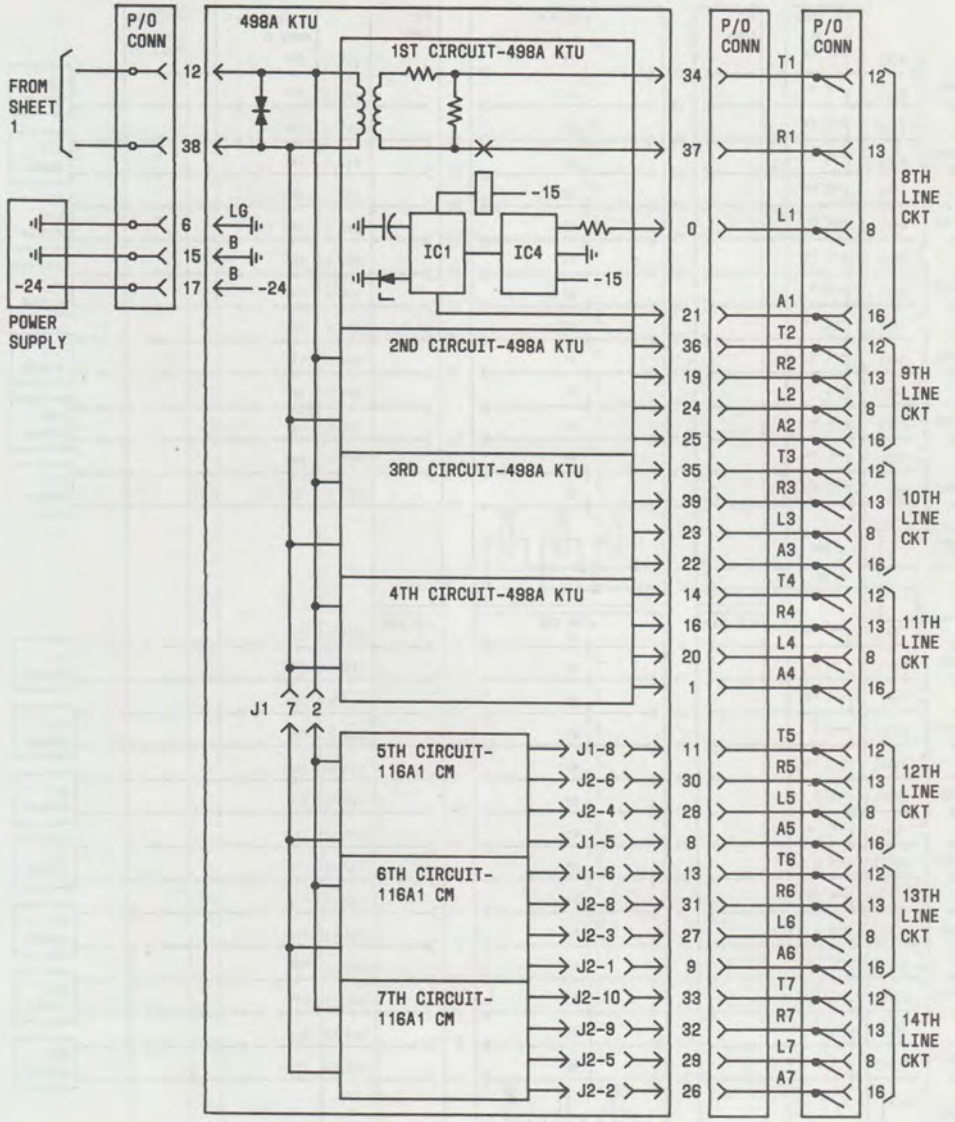
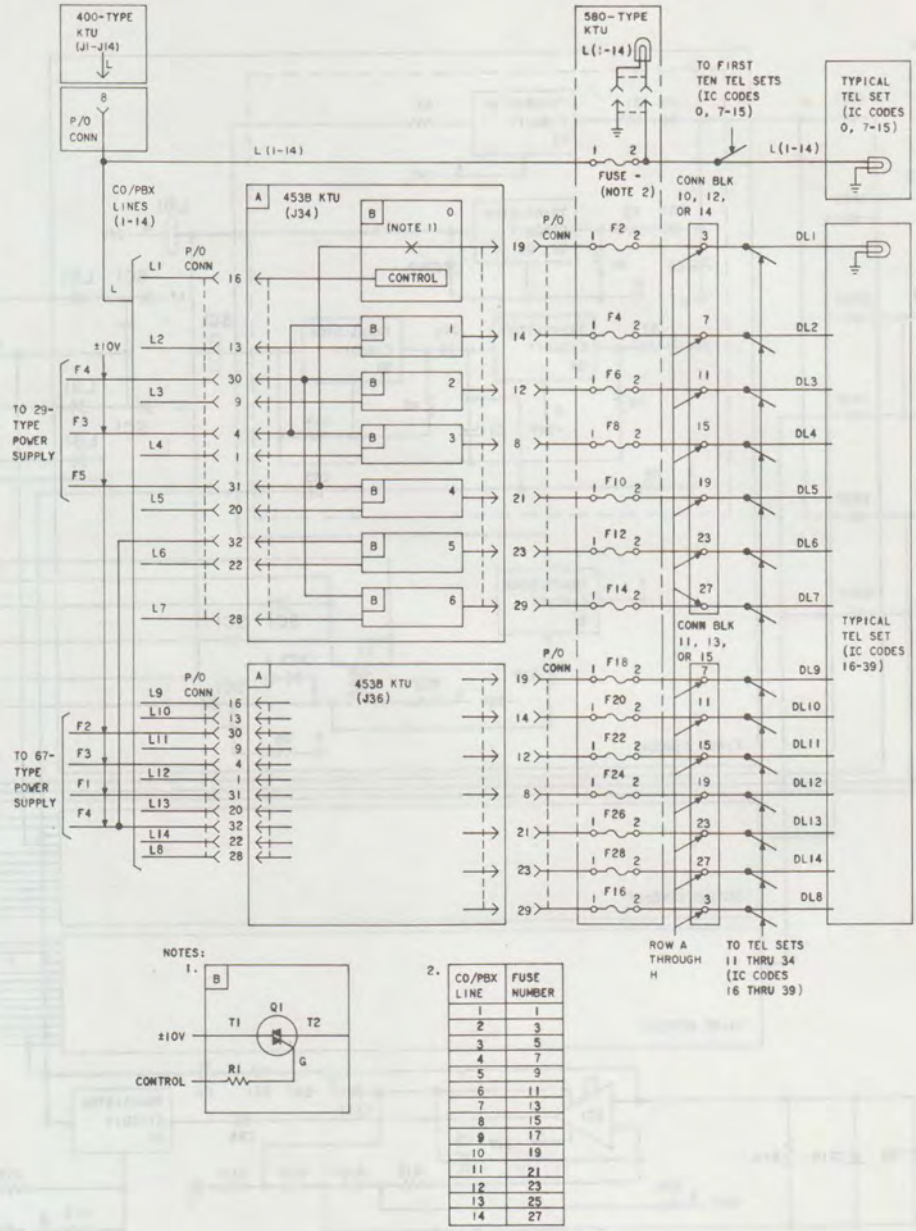


Fig. 100—Condensed Functional Schematic of 498A KTU (Music-On-Hold Circuit) as Used With 580B KSU (Sheet 2 of 2)

NOTES:
1. INSTALLER PROVIDED STRAPS, SEE FIG.34 FOR CONNECTIONS.
2. CONNECTING BLOCK 6, 8, 10, 12 OR 14.

Fig. 101—Condensed Functional Schematic of 452A KTU (Power Failure Ringing Circuit)



CO/PBX LINE	FUSE NUMBER
1	1
2	3
3	5
4	7
5	9
6	11
7	13
8	15
9	17
10	19
11	21
12	23
13	25
14	27

Fig. 102—Condensed Functional Schematic of 453B KTU (Lamp Driver Circuit)

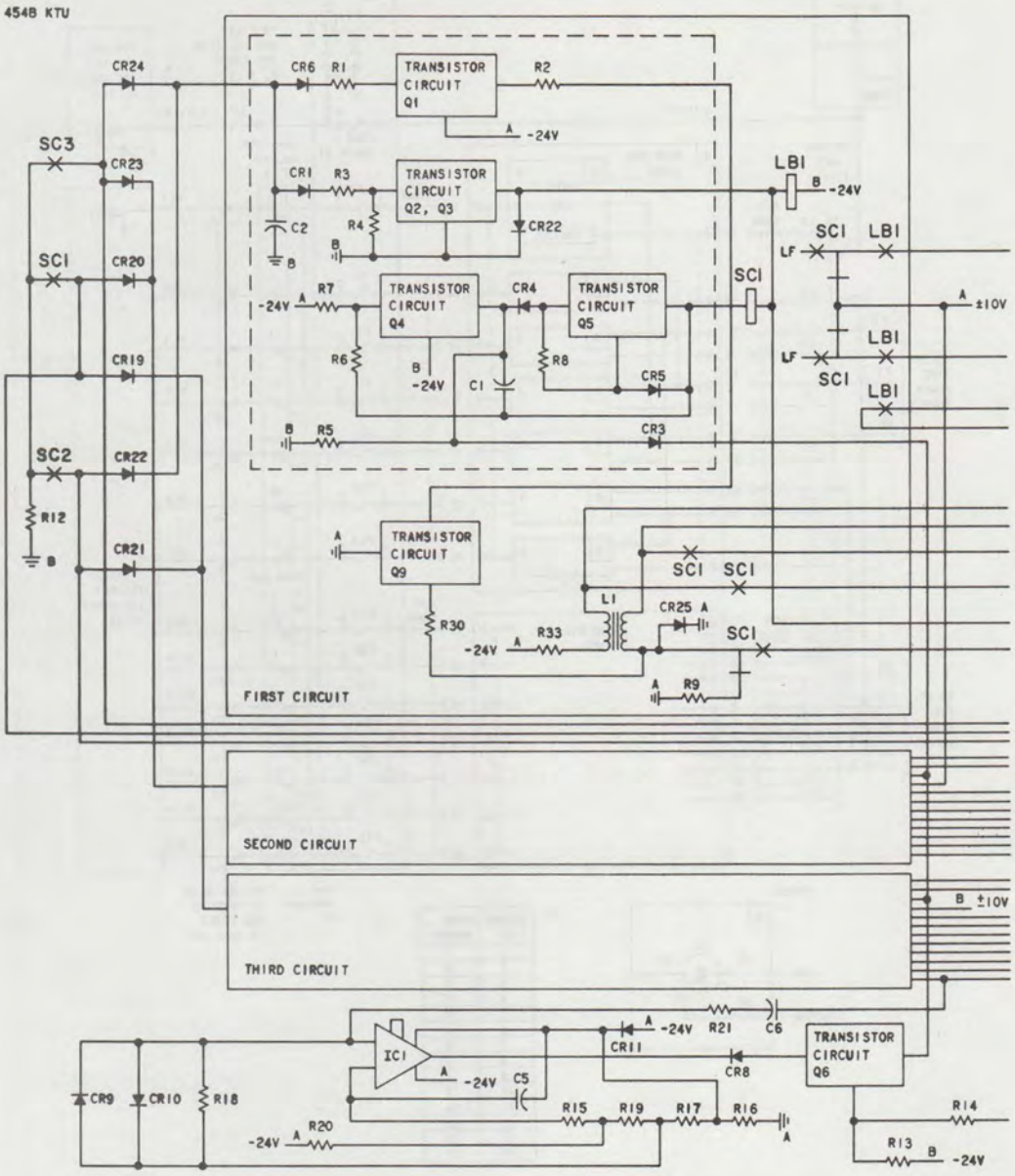


Fig. 103—Condensed Functional Schematic of 454B KTU (3-Path Access Circuit) (Sheet 1 of 2)

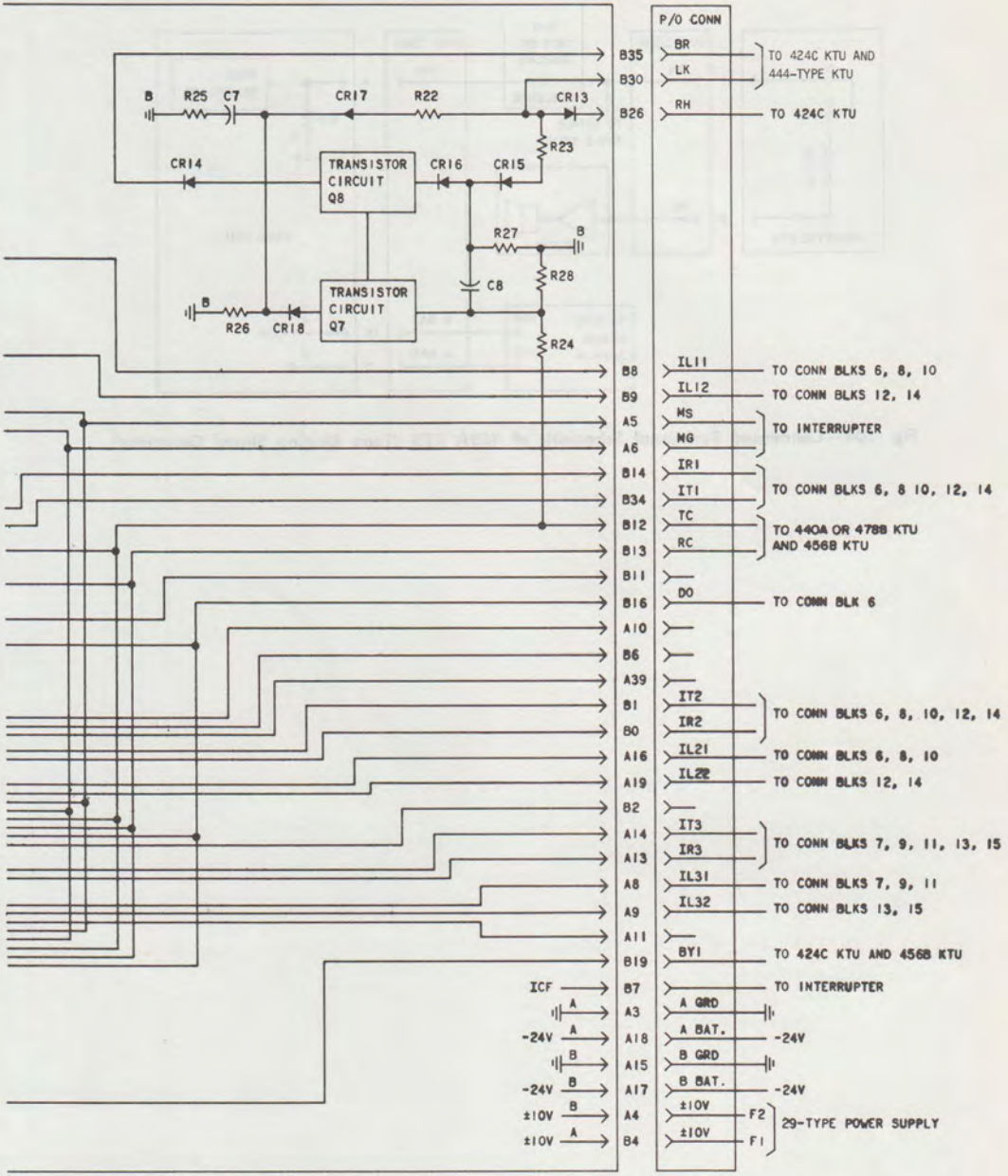


Fig. 103—Condensed Functional Schematic of 454B KTU (3-Path Access Circuit) (Sheet 2 of 2)

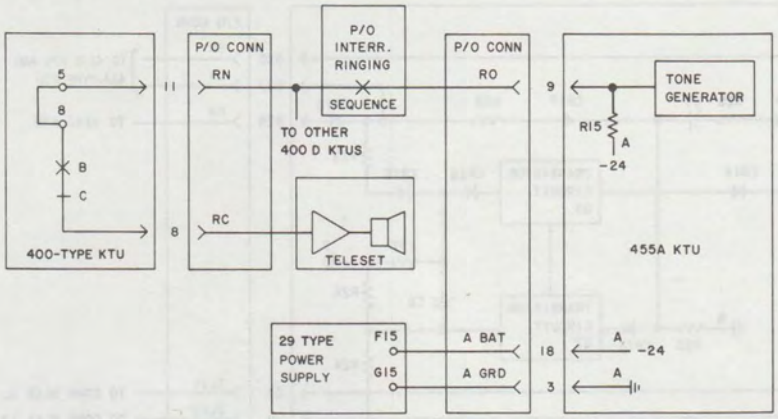


Fig. 104—Condensed Functional Schematic of 455A KTU (Tone Ringing Signal Generator)

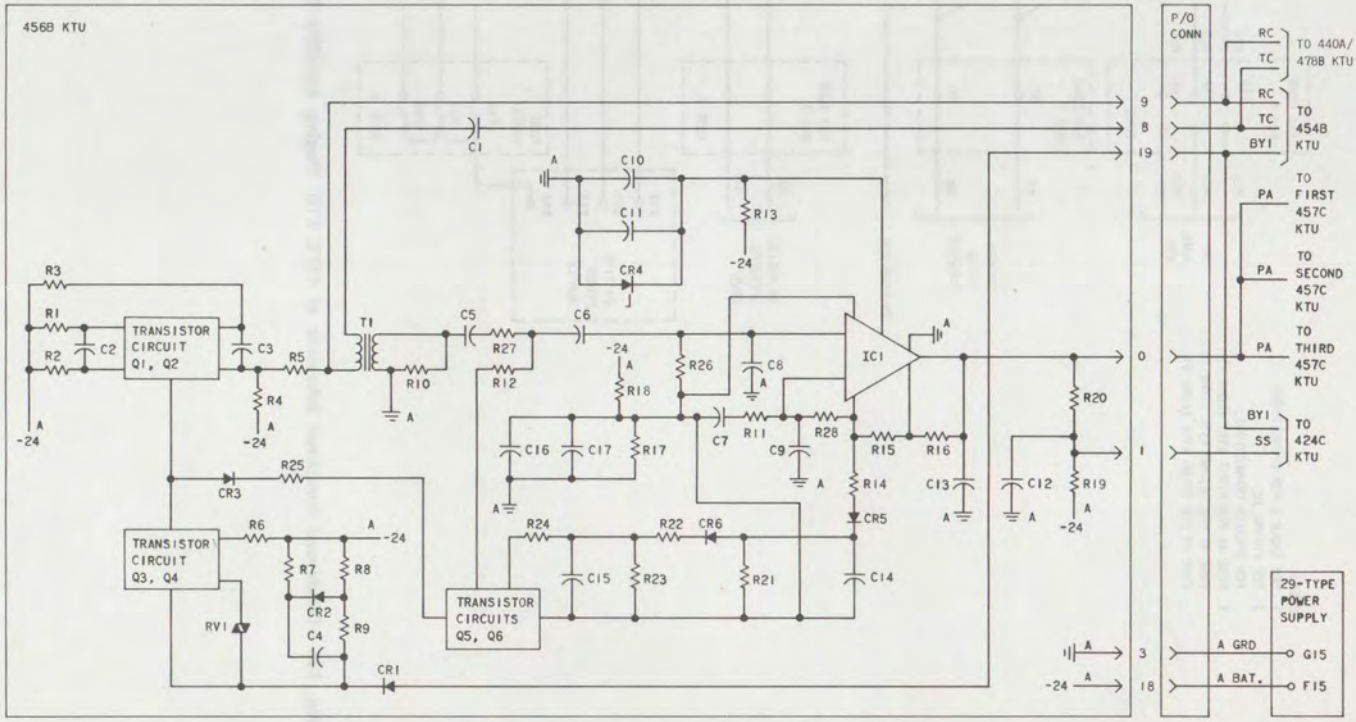


Fig. 105—Condensed Functional Schematic of 456B KTU (Voice and Tone Alerting Circuit)

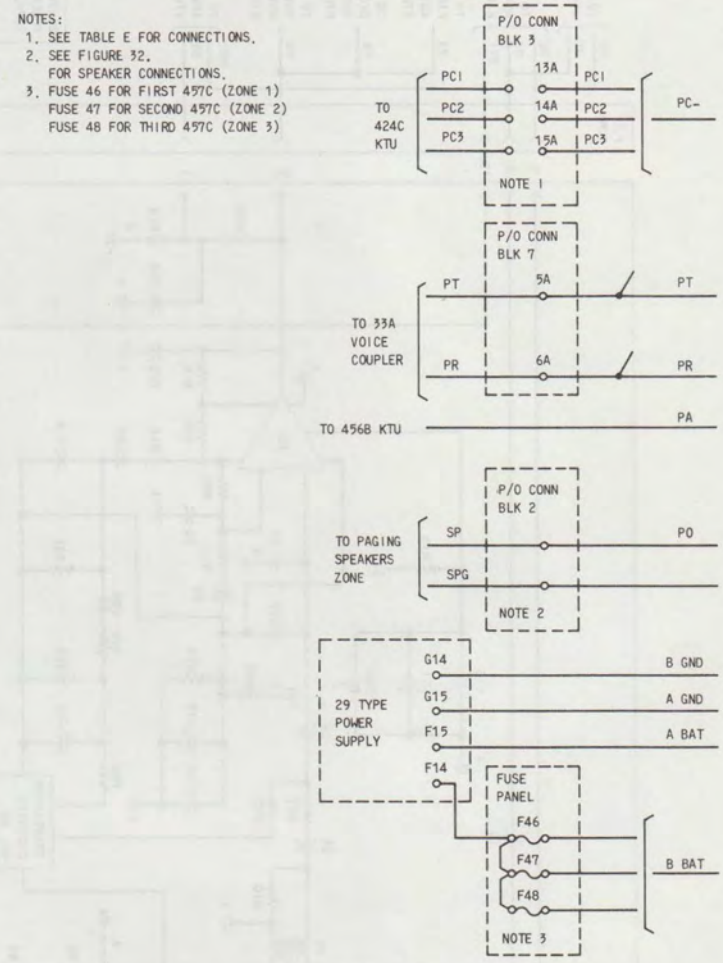


Fig. 106—Condensed Functional Schematic of 457C KTU (Paging Amplifier Circuit) (Sheet 1 of 2)

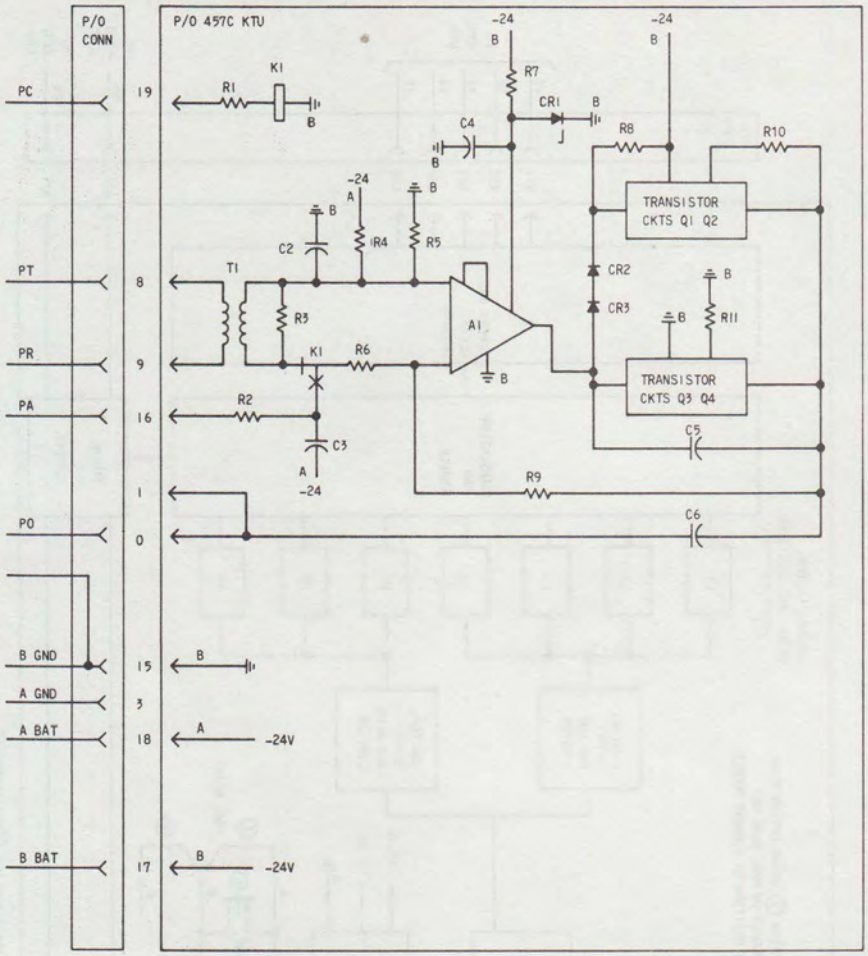


Fig. 106—Condensed Functional Schematic of 457C KTU (Paging Amplifier Circuit) (Sheet 2 of 2)

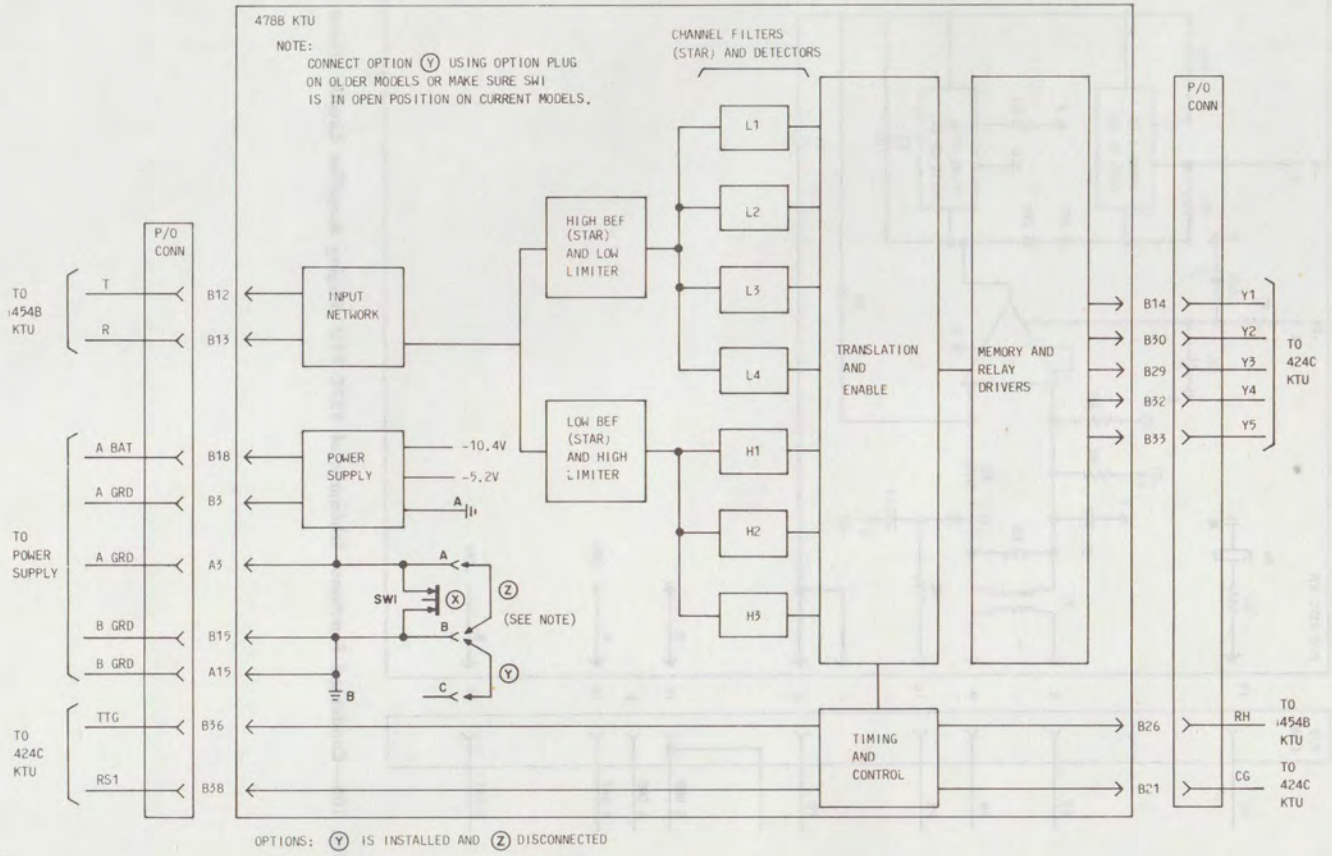


Fig. 107—Condensed Functional Schematic of 478B KTU (TOUCH-TONE Adapter Circuit)