7A COMMUNICATION SYSTEM
(COM KEY* 718)

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1. GENERAL

1.01 This section contains identification, installation, connection, operation, and maintenance information for the 7A Communication System.

1.02 This section is reissued to:

- Rate the 832B, 2832B, 832C, and 2832C telephone sets MD
- Add information on the 832BM/2832BM, 832CM/2832CM, 832DM/2832DM, and 832EM/2832EM telephone sets
- Add information on the 575AM and 2575AM telephone sets
- Add information on the 400G, 451B, 456B, 460B, and 478B KTUs
- Show the 440A KTU rated MD
- Add information on the D-180656 kit of parts for wall mounting of 832/2832 desk type telephone sets
- Change night transfer to ring transfer
- Add information on connection of multiple station-busy consoles
- Clarify limitations on loudspeaker placement
- Show new codes for keys in station-busy consoles
- Make corrections and additions to the Ordering Guide
- Revise and correct various tables and figures
- Add new tables and figures
- Revise text.

Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 This issue is based on:

- 463-341-102—Voice Connecting Arrangement FTP (33A Voice Coupler)
- 503-701-110—832- and 2832-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—KTS, Grounding and Special Protection Requirements
- CD- and SD-69652-01, Issue 1—7A Communication System Circuit
- CD- and SD-69654-01, Issue 1—832A and 2832A Telephone Circuit for Use With 7A Communication System
- CD- and SD-69656-01, Issue 1—6A1 and 6B1 Selector Console Circuit to Use With 7A Communication System.

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.

2. DESCRIPTION OF APPARATUS

2.01 The 7A Communication System will accommodate a maximum of 7 CO/PBX lines and 18 stations. It is equipped with a 2-path intercom. A 570A KSU houses a power supply and KTU mountings. Telephone sets (832- and 2832-type) are special 10-button, 11-button, and 13-button sets providing basic services such as pickup, hold and illumination, voice and tone signaling, multiline conferencing, and automatic button restoration (ABR). Optional features are privacy (lockout), privacy release, station restriction, paging (with or without customer-provided [CP] background music), power failure transfer, ring transfer, music-on-hold (utilizing CP music source), intercom preset conference, station busy console with direct station selection (DSS), station busy console with message waiting (MW), intercom-only telephone sets, TOUCH-TONE dialing, speakerphone, external signaling circuit, and connection to customer paging.

2.02 In the 7A Communication System each station has access to all CO/PBX lines and both intercom paths. One station, selected as the attendant station (station code 0), is the only station factory-wired in the KSU for CO/PBX ringing. Incoming calls are answered at the attendant station. The attendant ascertains the station or party being called and places the incoming call on hold. The attendant may then page the called party or dial the called station or party over an intercom path and inform them of the incoming call. The attendant may reenter the call by depressing the associated line button. The attendant station (station code 0) is the only station that can divert its common audible ringing via the optional ring transfer feature. Any station may be optionally wired for CO/PBX ringing on a single line or for common audible ringing. Stations cannot be wired for both common audible and CO/PBX ringing. In the 7A Communication System as many as 10 stations may be wired for common audible ringing. Intercom station codes are: 0 (attendant station code) and 3 through 19. Code 1 is a transfer digit for 2-digit codes and code 2 is for paging.

570A KSU

2.03 The 570A KSU (Fig. 1) has the following mechanical design features:

- Contains internally mounted 19C3 and 215C1 power units and a KS-19175, L1 interrupter. (Older models may be equipped with 19C2 power units.)
- Contains five internally mounted 66-type connecting blocks for option, console, and station connections.
- Has fuse panel (Table A) which provides power distribution to connectors and station blocks for lamp and fusing functions.
- Has status lamps to indicate status of CO/PBX and intercom lines (Table B).

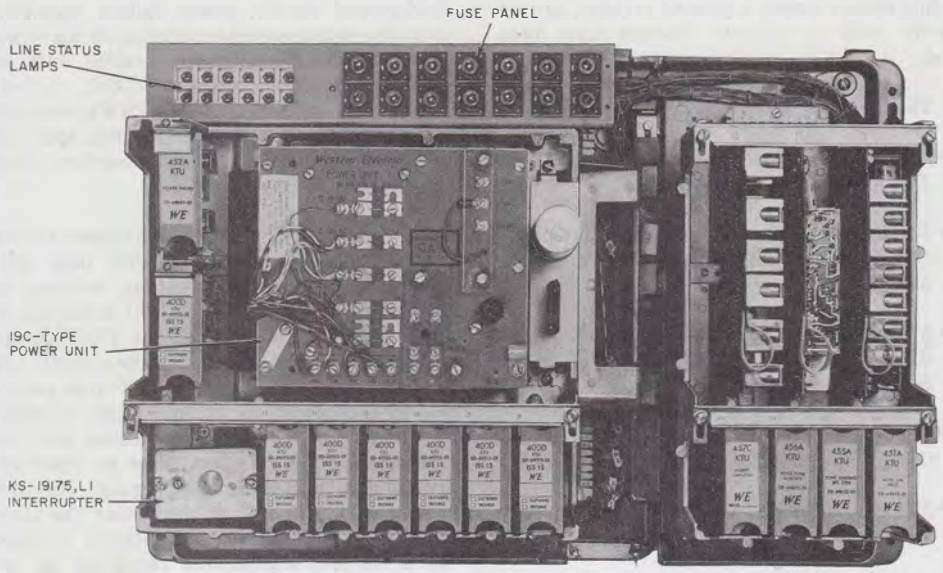


Fig. 1—570A KSU (Cover Removed)

- Has designation strip holder and tab assembly serving as a retainer to lock KTUs in the connectors.
- Mounts twelve 4-inch and three 8-inch KTUs.
- Has 424C, 455A, 456B, and 460B KTUs shipped with KSU.
- Is 25-1/2 inches wide, 17 inches high, 11 inches deep, and requires 9-1/2 inches of wall space on either side of the backboard to permit full opening of the carrier assemblies.
- Is arranged for wall mounting or may be floor-mounted (using the 77B apparatus mounting).
- Has a removable fiberglass cover.

2.04 All wiring connections are made on connecting blocks located in the KSU (Fig. 2). Since all stations pick up all lines on the same button at each telephone set, 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. This eliminates the need for an external cross-connection field except when using satellite wiring plan.

2.05 The block and column on which a station is cut down determines the intercom code assigned to that station. Intercom codes available are codes 0 and 3 through 19.

(a) Connecting block 1 (Fig. 3) contains the diode arrangement for preset conference and common audible signaling. Terminals are provided for strapping the power failure transfer, CO ringing, preset conference, paging, and ring transfer.

(b) Connecting block 2 (Fig. 4) contains the polarity guard diodes for the CO/PBX lines.

(c) Connecting block 3 (Fig. 5) provides terminals for connecting station code 0 (attendant station), station code 3, the incoming CO/PBX

TABLE A

FUSE ARRANGEMENT–570A KSU

FUSE PANEL (SEE FIG. 6)			
FUSE DESIG	**FUSE AMP (TYPE)**	**POTENTIAL**	**FUNCTION**
F1	1-1/3(70A)	10V ac	First CO/PBX Line Lamps
F2			Second CO/PBX Line Lamps
F3			Third CO/PBX Line Lamps
F4			Fourth CO/PBX Line Lamps
F5			Fifth CO/PBX Line Lamps
F6			Sixth CO/PBX Line Lamps
F7			Seventh CO/PBX Line Lamps
F8	1/2(70G)		Interrupter Motor
F9	1-1/3(70A)	–24V dc(SIG)	System Privacy and DSS Console
F10		10V ac	Night Transfer and MW Console
F11	1/2(70G)	–24V dc(SIG)	Paging Amplifier
F12	3/4(70H)		C Battery
F13	1-1/3(70A)	10V ac	First Intercom Path Lamp
F14			Second Intercom Path Lamp

POWER UNITS–19C2/19C2A/19C3		
FUSE DESIG	**FUSE AMP (TYPE)**	**FUNCTION**
Line F1	2(MDL-2)	AC Input Power
±18V ac (19C2 and 19C2A only)	2(24C)	Console Lamp Supply
±10V ac	5(24F)	Lamp and Lamp Flash
±10V ac		Lamp Wink
24V dc B SIG	3(24B)	B (Signal) Battery
24V dc A TLK	2(24C)	A (Talk) Battery
215C1 (USED WITH 19C3 PU)		
18V ac (3)	2(24C)	Console Lamp Supply

VOLTAGE RANGES	
–24A	18-26 (19C2, 19C2A) 18-27 (19C3)
–24B	20-26 (19C2, 19C2A) 20-27 (19C3)

Note: Early production models of the 570A KSUs were equipped with 16 fuses. Fuses 15 and 16 were used for music-on-hold.

TABLE B

LINE STATUS LAMPS—570A KSU

LAMP DESIG	LAMP CODE	FUNCTION
L1	51A	FIRST CO/PBX LINE LAMP
L2	51A	SECOND CO/PBX LINE LAMP
L3	51A	THIRD CO/PBX LINE LAMP
L4	51A	FOURTH CO/PBX LINE LAMP
L5	51A	FIFTH CO/PBX LINE LAMP
L6	51A	SIXTH CO/PBX LINE LAMP
L7	51A	SEVENTH CO/PBX LINE LAMP
L11	51A	FIRST INTERCOM PATH LAMP
L12	51A	SECOND INTERCOM PATH LAMP

lines, the optional message waiting or DSS consoles, and the 33A voice coupler.

(d) Connecting blocks 4 and 5 (Fig. 5) provide terminals for connecting station codes 4 through 19.

2.06 The fuse panel in the 570A KSU utilizes 70-type indicator fuses to give a visual indication of fuse status. The 19-type and 215C1 power units are equipped with 24-type fuses which do not provide a fuse status indication. See Fig. 6 and Table A.

2.07 The lamp panel in the 570A 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 in the telephone sets. See Fig. 6 and Table B.

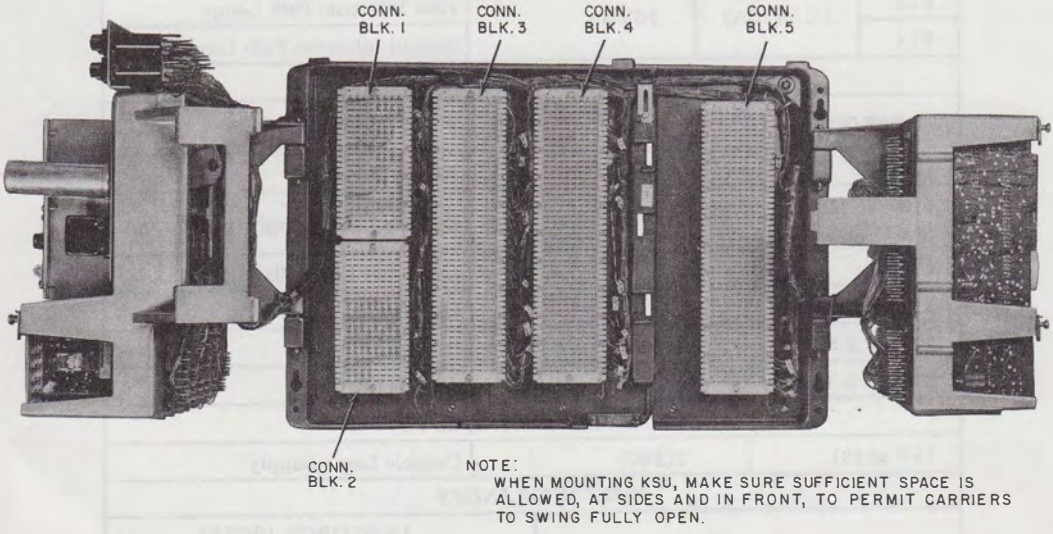


Fig. 2—570A KSU (Carriers Open)

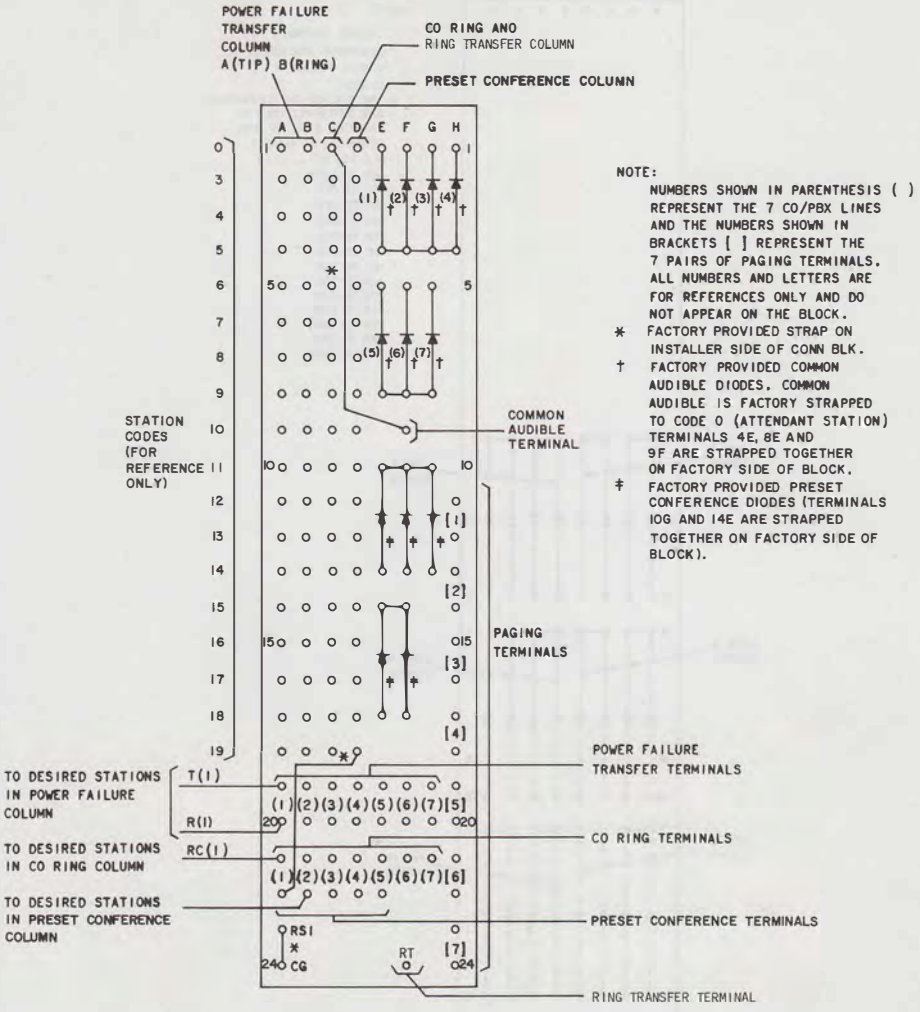


Fig. 3—Terminal Arrangement for Connecting Block 1

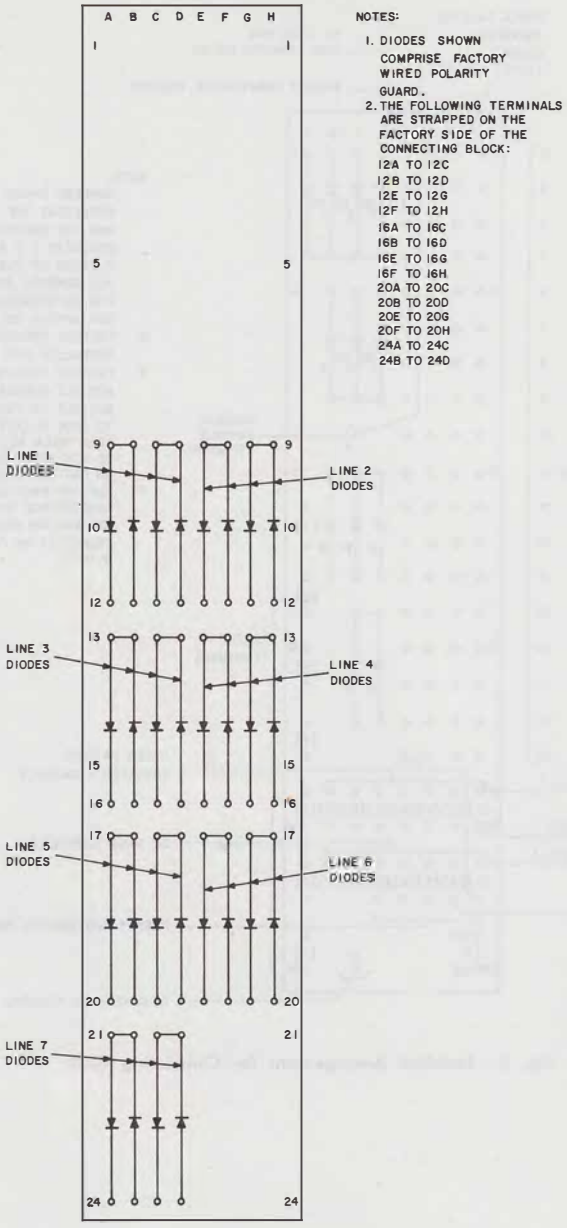


Fig. 4—Terminal Arrangement for Connecting Block 2

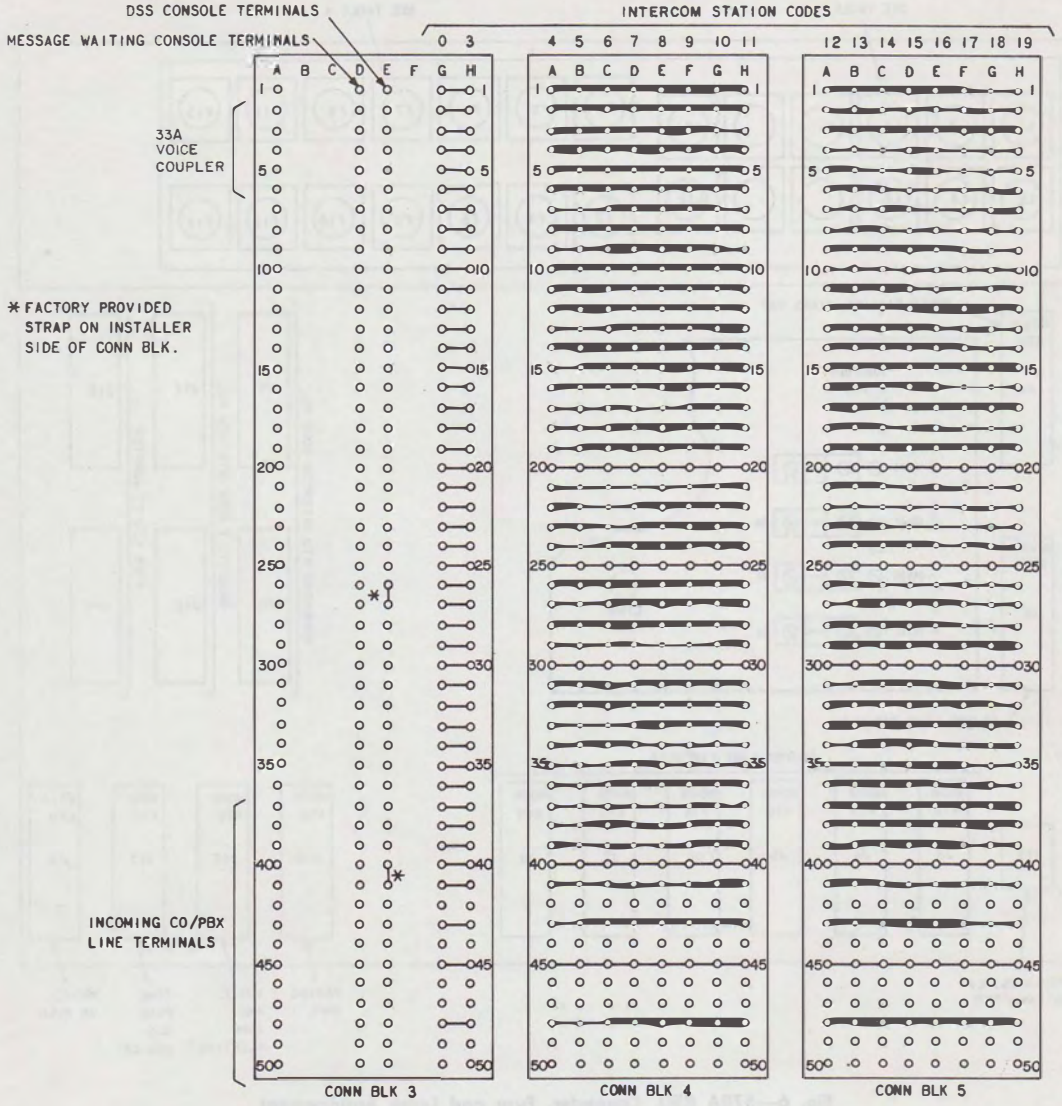


Fig. 5—Terminal Arrangement for Connecting Blocks 3, 4, and 5

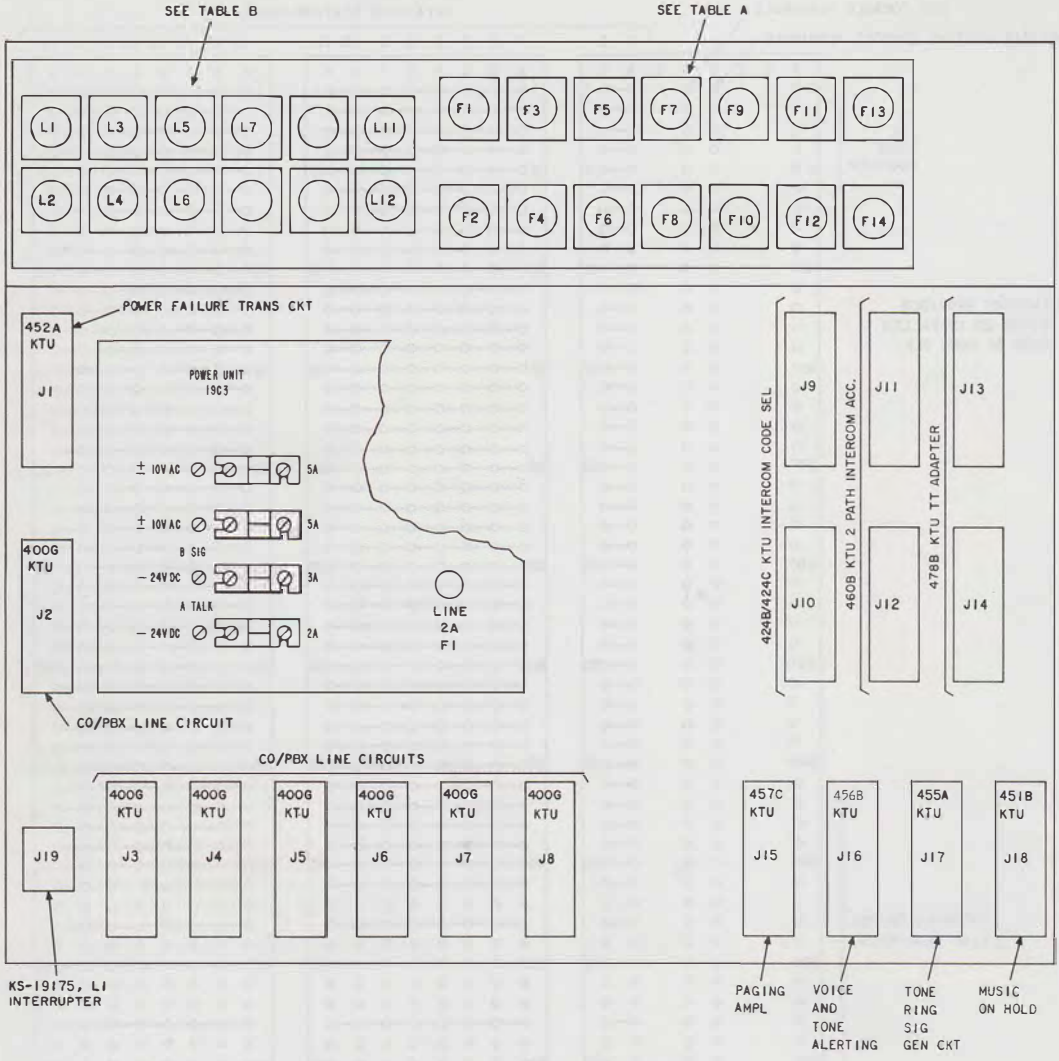


Fig. 6—570A KSU, Connector, Fuse and Lamp Arrangement

CONSOLES

A. 6A1 Selector Console (Station Busy Console With DSS)

2.08 The 6A1 selector console (Fig. 7) is a 20-button console providing a 17-button DSS field with station busy lamps. Of the three remaining buttons, one is used as a paging button, one is used as an intercom recall button, and one button is spare. Ivory (-50) is the standard console color, and a 6A2—* faceplate must be ordered with each console. The 6A1 selector console is normally used in addition to the attendant's telephone set to provide DSS on the intercom.

B. 6B1 Selector Console (Station Busy Console With MW)

2.09 The 6B1 selector console (Fig. 8) is a 20-button console providing a 17-button message waiting field. Three buttons are not used. Ivory (-50) is the standard console color, and a 6A2—* faceplate must be ordered with each console. The 6B1 selector console is normally used in addition to the attendant's telephone set to provide the message waiting feature.

Note: Up to three selector consoles in any combination can be used in a 7A Communication System.

*Refer to Table C for color suffix.

2.10 ***Console Power Requirements***—If more than one console is to be used, lamp power (±18V, 2A) must be provided by a 215C1 power unit installed in the KSU or an equivalent external unit. The 215C1 has three ±18V outputs. When it is installed in an earlier model KSU which has a 19C2 for the principal power unit, the ±18V output of the 19C2 is disabled. On later model KSUs, the principal power unit is a 19C3, which has no ±18V output and all lamp power is supplied by a factory-installed 215C1.

EXTERNALLY MOUNTED APPARATUS

A. 33A Voice Coupler

2.11 The 33A voice coupler (Fig. 9) is an interconnecting unit which provides a point of connection for a customer-provided music source used with music-on-hold and background music. It is wall-mounted externally from the KSU. A

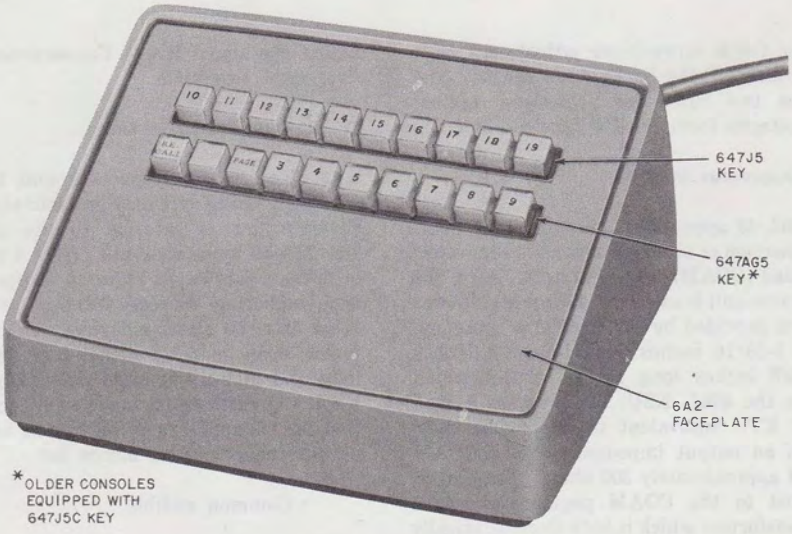


Fig. 7—6A1 Selector Console (DSS)

TABLE C

COLOR ORDERING GUIDE

832-, 2832-TYPE TELEPHONE SETS AND 6A1, 6B1 SELECTOR CONSOLES		FACEPLATES		SPEAKERPHONE, LOUDSPEAKER, AND TRANSMITTER	
SUFFIX	COLOR	SUFFIX	COLOR	SUFFIX	COLOR
		—100	Avocado	--03	Black
		—108	Teak (Woodgrain)	—51	Green
		—109	Walnut (Woodgrain)	--58	White
		—111	Gold	—60	Light Beige
—50	Ivory	—112	Orange	Kit of Parts D-180508*	Ivory
		—113	Brown		
		—114	Red		
		—115	Blue		
		—118	Black		

* Order separately.

potentiometer (with screwdriver adjustment slot) controls the level of the background music. The unit contains two fuses for protection against hazardous voltages from the CP music source.

B. 20A-49 Apparatus Unit

2.12 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 long and is wall-mounted externally to the 570A 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 which 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.

C. 22A-49 Apparatus Unit

2.13 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 offers a contact closure or opens a contact, as required, to operate KS-16301 type signaling devices (Section 463-110-100), or other external alerting devices. The unit is 1-13/16 inches deep by 2-3/4 inches high by 4-3/8 inches long and is wall-mounted externally to the 570A 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
- CO/PBX ringing

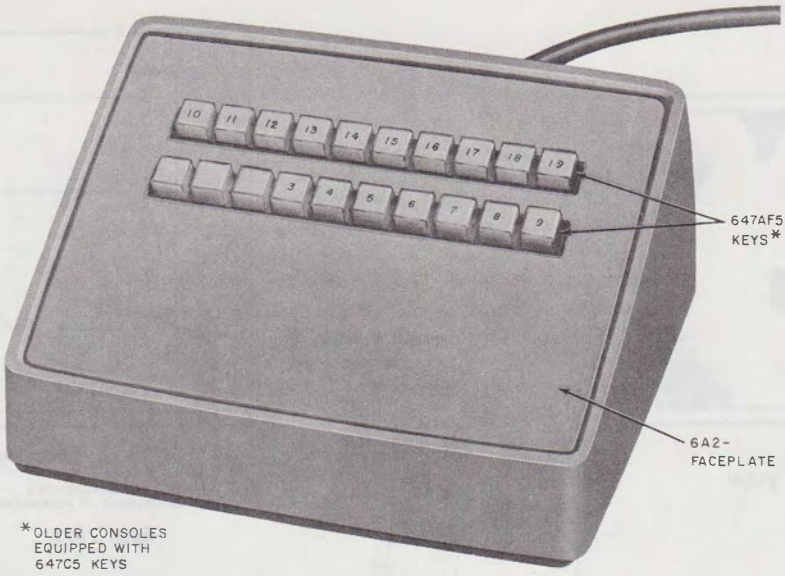


Fig. 8—6B1 Selector Console (MW)

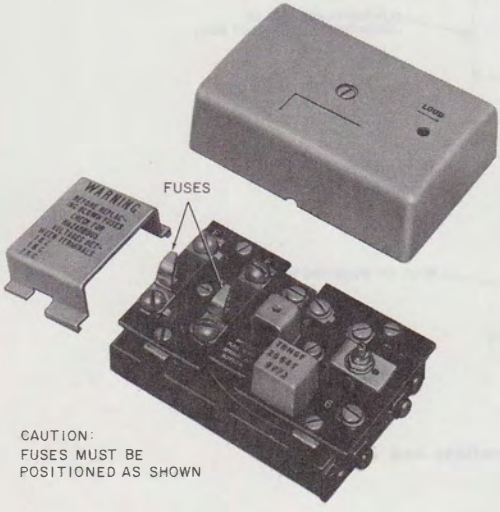


Fig. 9—33A Voice Coupler

- Ring transfer.

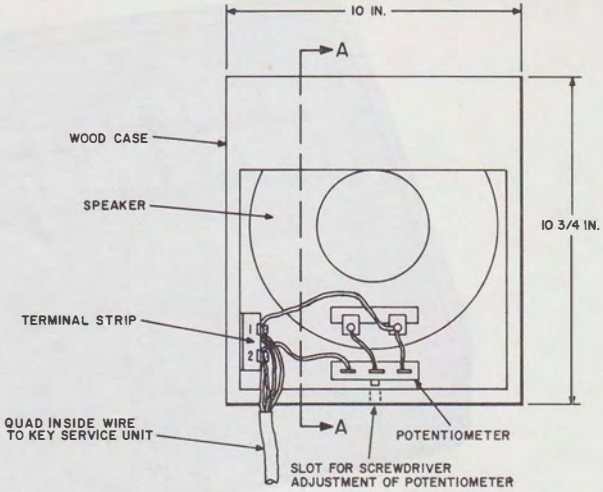
D. K8 Loudspeaker

2.14 The K8 loudspeaker (Fig. 10) is an indoor speaker used for paging. It is 11 inches high, 10 inches wide, and 6-1/2 inches deep. It has a potentiometer (with screwdriver adjustment slot) for volume control. The K8 loudspeaker is furnished with a walnut (woodgrain) finish.

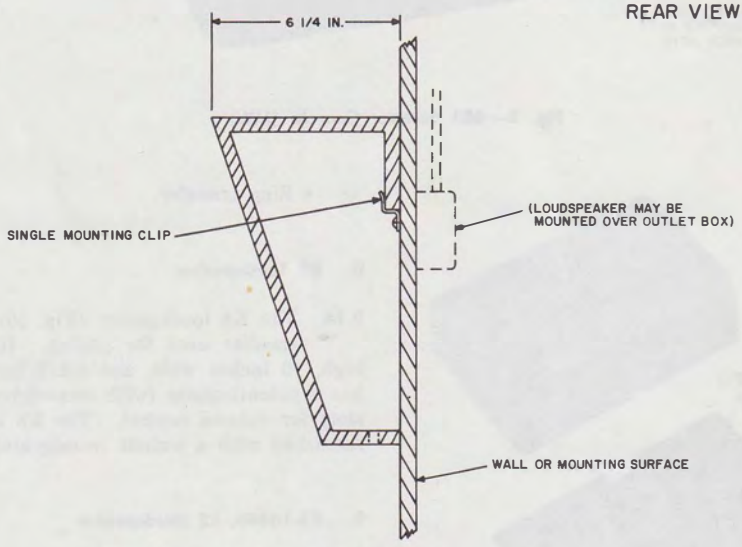
E. KS-16846, L2 Loudspeaker

2.15 The KS-16846, L2 loudspeaker (Fig. 11) is an outdoor speaker used for paging. It is 7-1/2 inches in diameter, 7 inches deep, and weighs 3-1/4 pounds. The loudspeaker is equipped with a swivel mounting bracket having three holes in the outer rim for mounting on a flat surface. The loudspeaker will also fasten to a 1/2-inch pipe. Pigtail leads are provided for connections. Nominal frequency response of the loudspeaker is 400 to 13,000 Hz. The KS-16846, L2 loudspeaker is ***not*** arranged for volume control.

FRONT VIEW



REAR VIEW



VIEW A–A

Fig. 10—K8 Loudspeaker, Connections and Mounting

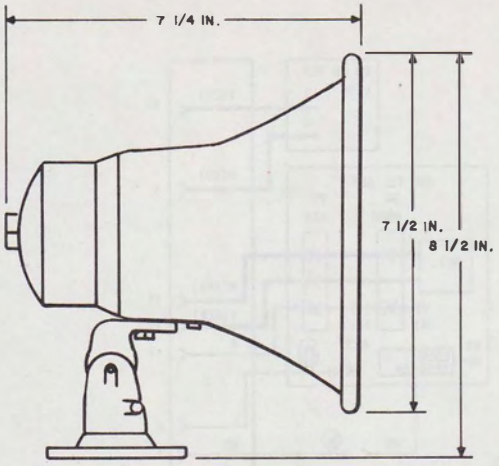


Fig. 11—KS-16846, List 2 Loudspeaker

2.16 The K8 loudspeaker and the KS-16846, L2 loudspeaker are 45-ohm speakers. Do not substitute other speakers for the K8 or KS-16846, L2 loudspeakers in the 7A System.

KEY TELEPHONE UNITS

2.17 The circuitry for the 7A Communication System is provided by 400-series KTUs.

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

2.18 The 400-type KTU (Fig. 12) is a 4-inch unit which provides a key telephone set with CO or PBX line service. Additional information on the 400-type KTU may be found in Section 518-215-400 and CD- and SD-69513-01.

> ***Note:*** The latest version of the line circuit KTU is the 400G. All earlier line circuits are rated MD but can be used when available.

B. 424A or B and 424C KTU (Dial Intercom, 19-Code Selector Circuit)

2.19 The 424A or B KTU is an 8-inch dial selective intercom unit. Additional information may be found in CD- and SD-69567-01. The 424C (Fig. 13) is the preferred KTU for replacements and new installations. In the 7A System, the 424B/424C KTUs provide the following:

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

> ***Note:*** In the 7A System, the first digit of the 2-digit code is 1; therefore, 1 is not available as a station code. Code 2 is dedicated to paging which leaves codes 0 (attendant station) and 3 through 19 available for station codes.

Do not use a 424A KTU in the 7A System.

C. 440A (MD) KTU (TOUCH-TONE Adapter Circuit)

2.20 The 440A KTU (Fig. 14) is an 8-inch unit that provides TOUCH-TONE dialing when used in conjunction with the 424B/424C KTU. Additional information on the 440A KTU may be found in CD- and SD-69906-01.

> ***Note:*** The 440A KTU is superseded by an improved TOUCH-TONE adapter, the 478B KTU, which should be used for replacement and for new installations (see 2.27).

D. 451A or 451B KTU (Music-On-Hold Circuit)

2.21 The 451-type KTU (Fig. 15) is a 4-inch unit that is used with an externally mounted 33A voice coupler to connect a customer-provided source of music to a maximum of seven CO/PBX lines placed on hold.

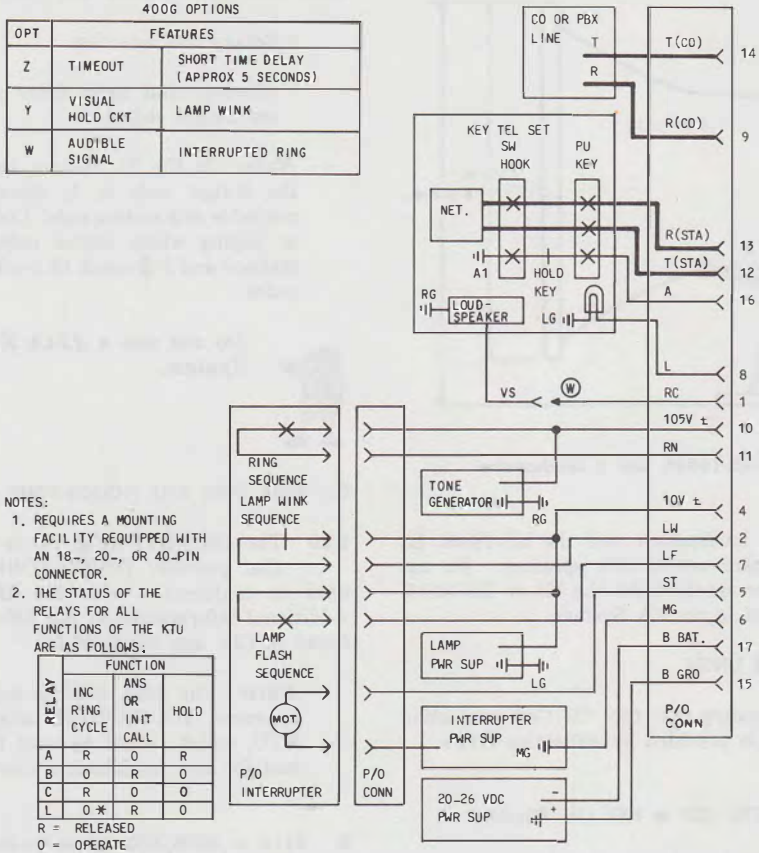
> ***Note:*** The 451A KTU was formerly identified as a 123A IU.

E. 452A KTU (Power Failure Transfer Circuit)

2.22 The 452A KTU (Fig. 16) is a 4-inch unit that automatically "cuts through" up to seven CO/PBX lines to external line ringers in the event of power failure.

400G OPTIONS

OPT	FEATURES	
Z	TIMEOUT	SHORT TIME DELAY (APPROX 5 SECONDS)
Y	VISUAL HOLD CKT	LAMP WINK
W	AUDIBLE SIGNAL	INTERRUPTED RING

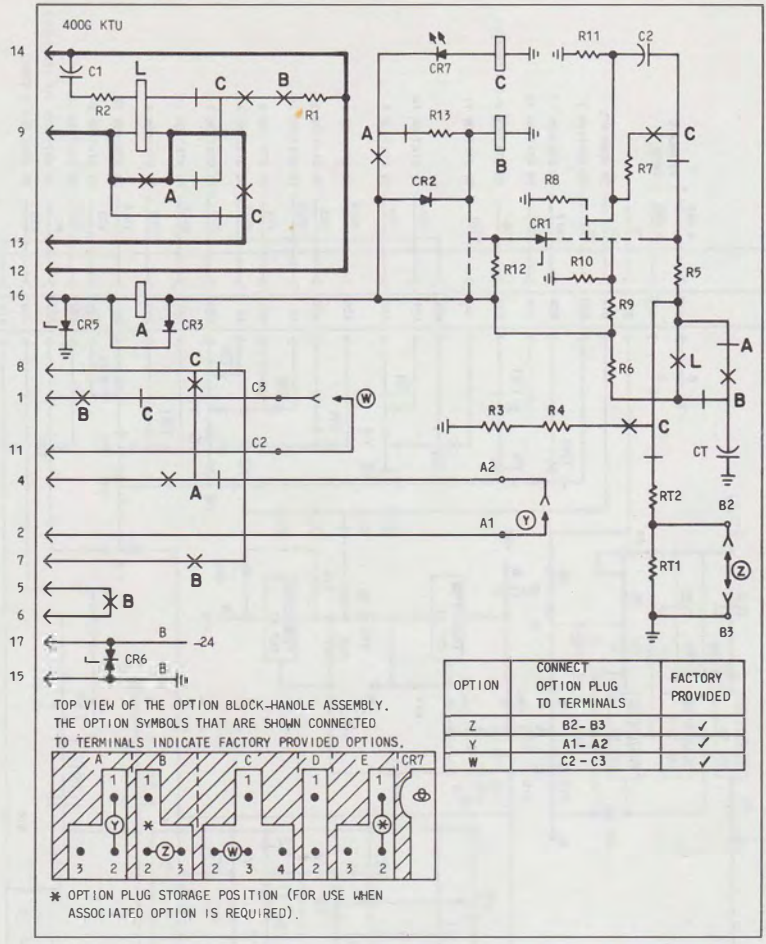


NOTES:
1. REQUIRES A MOUNTING FACILITY REQUIPPED WITH AN 18-, 20-, OR 40-PIN CONNECTOR.
2. THE STATUS OF THE RELAYS FOR ALL FUNCTIONS OF THE KTU ARE AS FOLLOWS:

RELAY	FUNCTION		
	INC RING CYCLE	ANS OR INIT CALL	HOLD
A	R	O	R
B	O	R	O
C	R	O	O
L	O *	R	O

R = RELEASED
O = OPERATE
* = FOLLOWS RINGING

Fig. 12—Condensed Functional Schematic of 400-Type KTU (CO/PBX Line Circuits) (Sheet 1 of 2)



OPTION	CONNECT OPTION PLUG TO TERMINALS	FACTORY PROVIDED
Z	B2 - B3	✓
Y	A1 - A2	✓
W	C2 - C3	✓

Fig. 12—Condensed Functional Schematic of 400-Type KTU (CO/PBX Line Circuits) (Sheet 2 of 2)

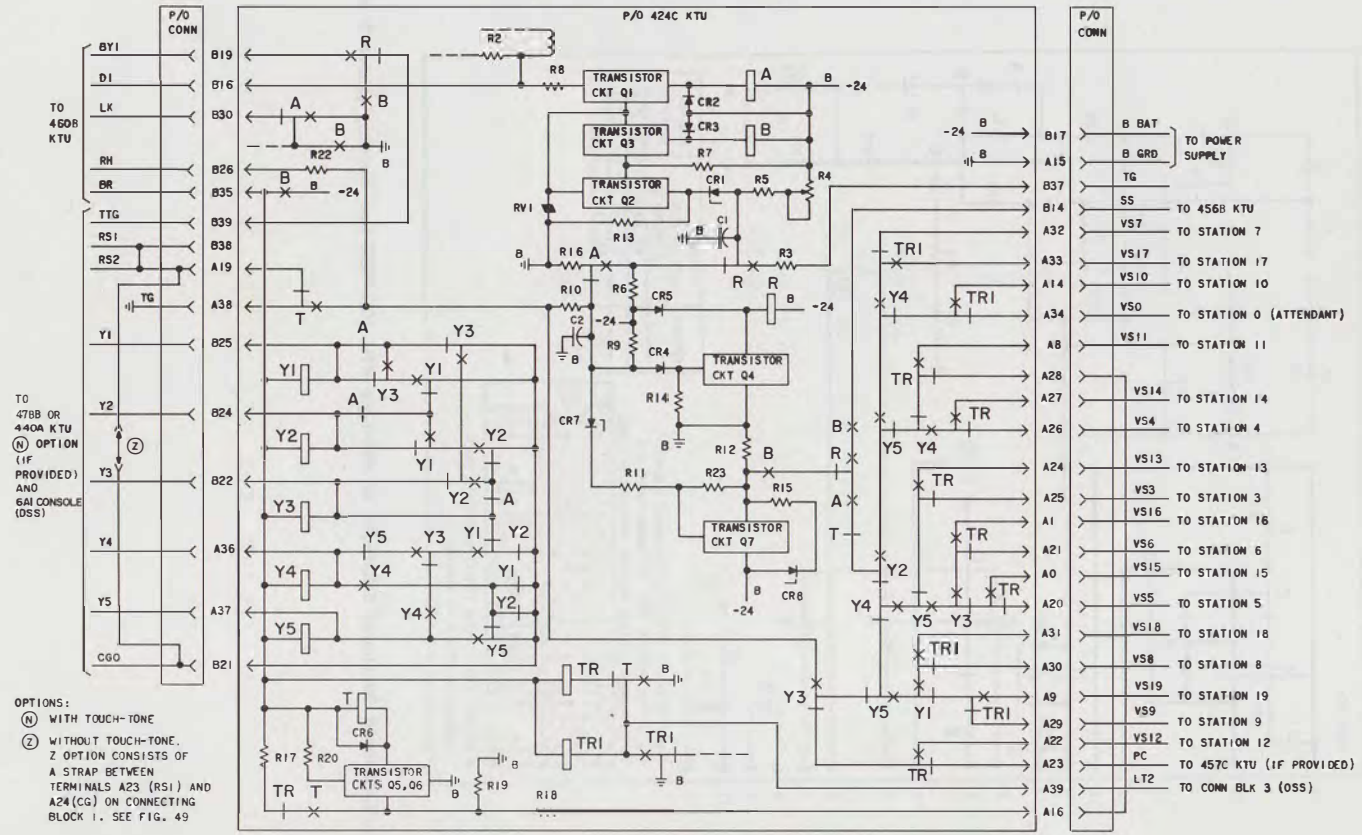


Fig. 13—Condensed Functional Schematic of 424C KTU (Dial Intercom 19-Code Selector Circuit)

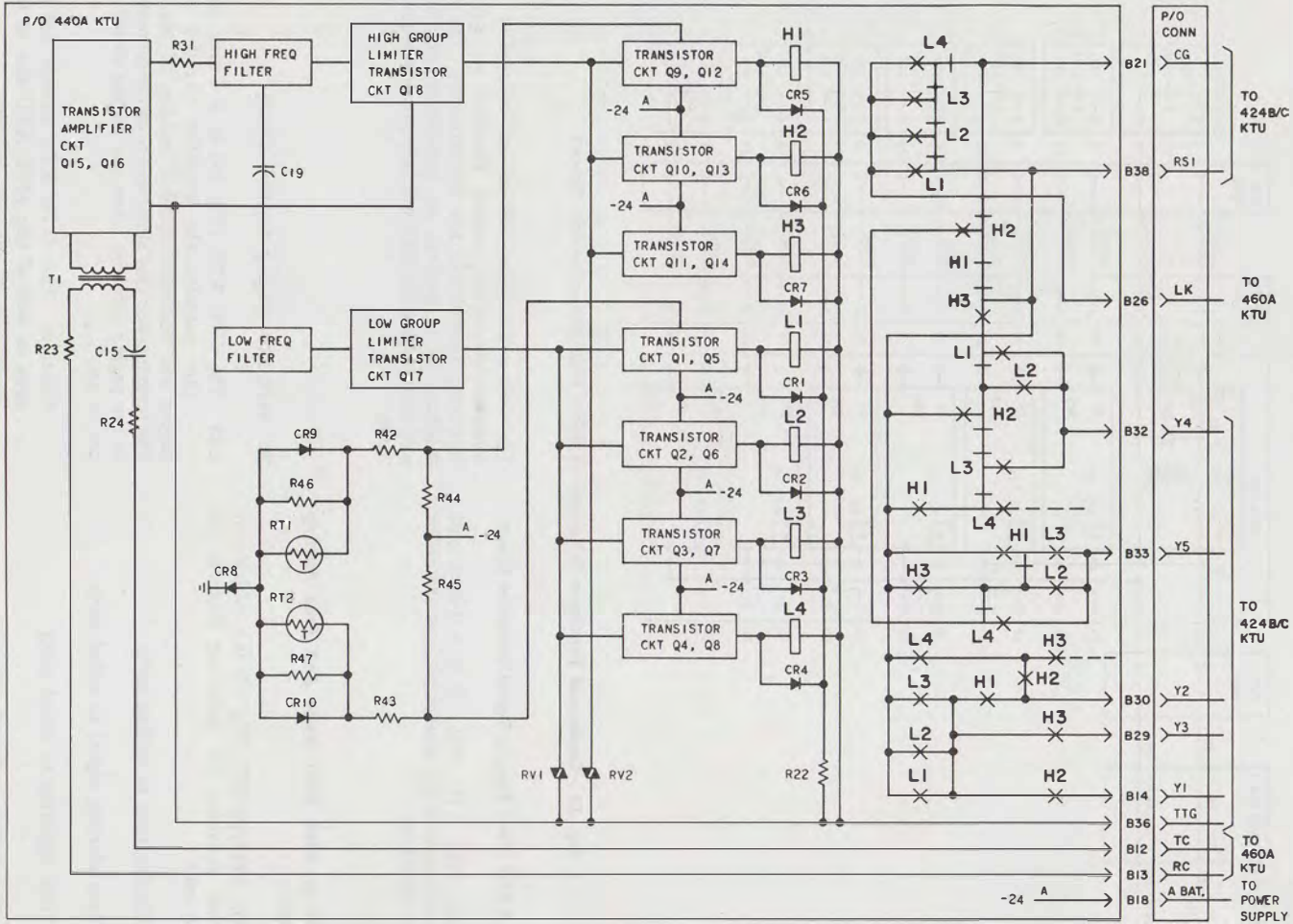


Fig. 14—Condensed Functional Schematic of 440A (MD) KTU (TOUCH-TONE Adapter Circuit)

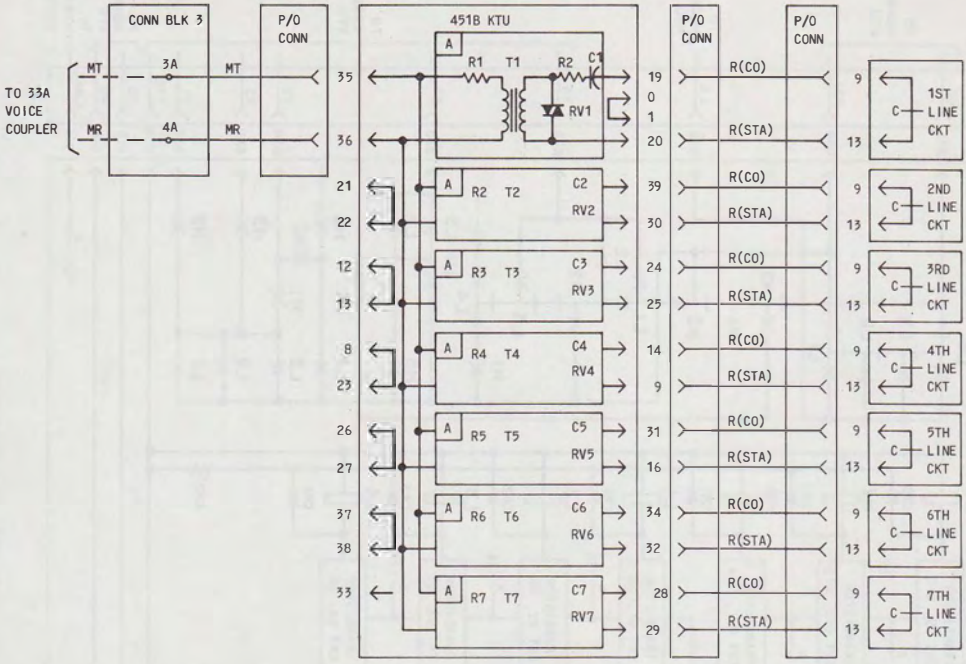


Fig. 15—Condensed Functional Schematic of 451B KTU (Music-On-Hold Circuit)

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

2.23 The 455A KTU (Fig. 17) is a 4-inch unit that contains the tone ringing generator for CO/PBX signaling.

G. 456A or 456B KTU (Voice And Tone Alerting Circuit)

2.24 The 456-type KTU (Fig. 18) is a 4-inch unit that provides the following features on intercom calls:

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

The 456A will be rated MD but can be used in all installations where paging feedback or radio frequency interference are not problems. Paging feedback is, in general, an installation problem, and changeout to the 456B will help only in marginal cases.

H. 457C KTU (Paging Amplifier Circuit)

2.25 The 457C KTU (Fig. 19) is a 4-inch unit that contains the amplifier circuitry for paging and customer-provided background music. The customer-provided music source can be connected to the paging speakers when the paging circuit is not in use.

Caution: The 457B KTU should not be used in lieu of the 457C KTU due to the likelihood of circuit failures.

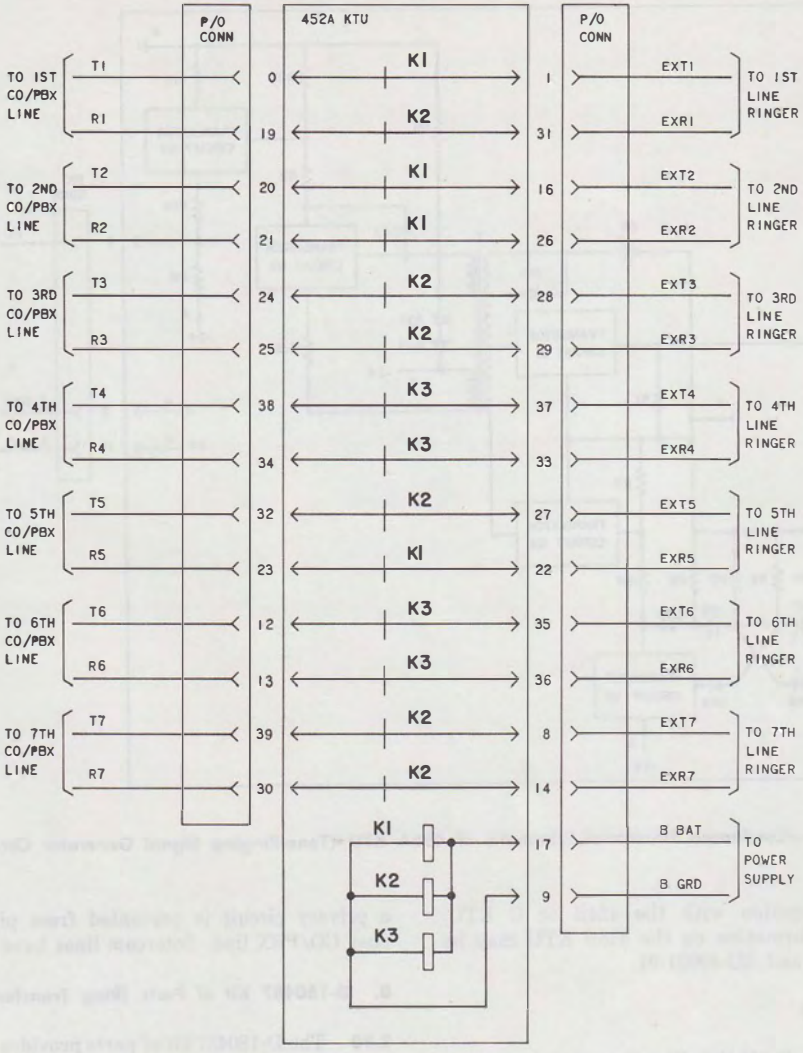


Fig. 16—Condensed Functional Schematic of 452A KTU (Power Failure Transfer Circuit)

I. 460B KTU (2-Path Intercom Access Circuit)

2.26 The 460B KTU (Fig. 20) is an 8-inch unit that contains two separate intercom paths. Path selection is based on operation of the associated intercom button on the key telephone sets. The unit also provides dial tone, seizes the selector, and provides a flashing lamp signal during selection and a steady lamp during the busy mode. Control circuitry permits only one intercom path to seize the selector at a time.

J. 478B KTU (TOUCH-TONE Adapter Circuit)

2.27 The 478B KTU (Fig. 21) is an 8-inch unit that provides TOUCH-TONE dialing when

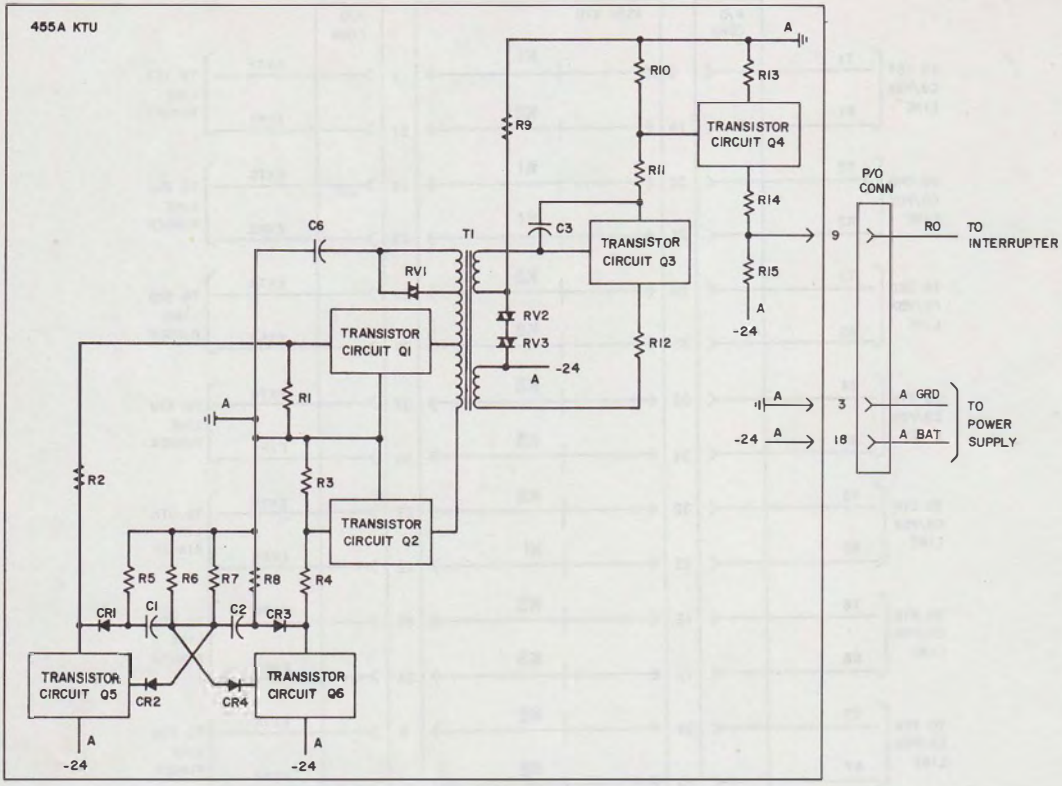


Fig. 17—Condensed Functional Schematic of 455A KTU (Tone-Ringing Signal Generator Circuit)

used in conjunction with the 424B or C KTU. Additional information on the 478B KTU may be found in CD- and SD-69931-01.

KITS OF PARTS

2.28 Privacy (D-180486), Ring Transfer (D-180487), Privacy Release (D-180488), and Recall (D-180591) kits of parts can be added to certain type 832 and 2832 telephone sets in the field. Refer to Table D for a summary of the features provided by these kits, and their applications. Later model telephone sets have these features built in at the factory.

A. D-180486 Kit of Parts (Privacy)

2.29 The D-180486 kit of parts provides a privacy or lockout feature. A station equipped with a privacy circuit is prevented from picking up a busy CO/PBX line. Intercom lines have no privacy.

B. D-180487 Kit of Parts (Ring Transfer)

2.30 The D-180487 kit of parts provides the feature for transferring incoming CO/PBX ringing from an attendant station to a designated secondary station. The D-180487 kit of parts adds an eleventh button (651C key) to the 832A (A&M only) or 2832A (A&M only) telephone sets.

C. D-180488 Kit of Parts (Privacy Release)

2.31 The D-180488 kit of parts provides the feature of permitting an excluded or locked-out station to enter a conversation on a busy CO/PBX line. The D-180488 kit of parts adds an eleventh

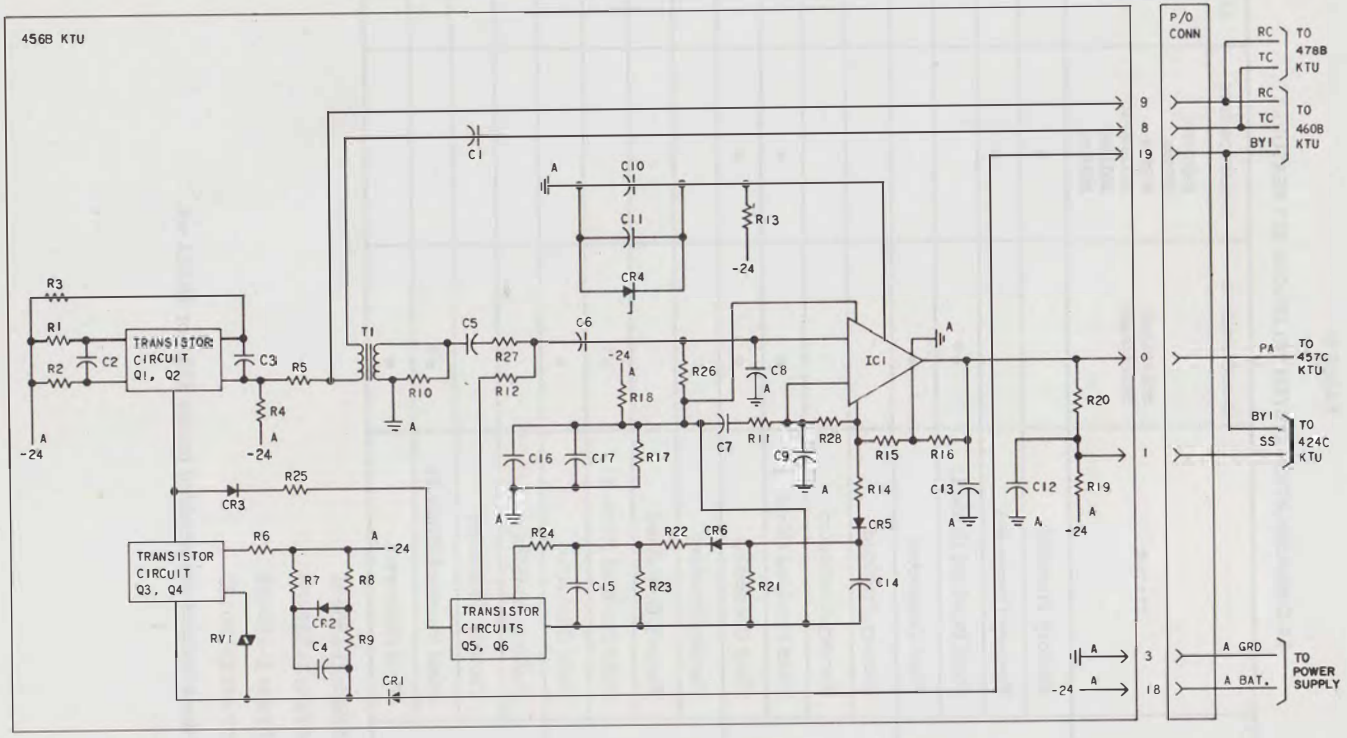


Fig. 18—Condensed Functional Schematic of 456B KTU (Voice and Tone-Alerting Circuit)

TABLE D

7A COMMUNICATION SYSTEM TELEPHONE SET FEATURES

FEATURE	STATUS	10-BUTTON SETS	11-BUTTON SETS	13-BUTTON SETS
		832A(A&M) 2832A(A&M)	832B(MD) 832BM 832DM 2832B(MD) 2832BM 2832DM	832C(MD) 832CM 832EM 2832C(MD) 2832CM 2832EM
RECALL	Factory Provided		•	•
	Factory Connected		•	•
	Field Provided (Note 1)	•*		
	Field Connected	•		
PRIVACY CIRCUIT	Factory Provided			•
	Factory Connected			•
	Field Provided (Note 2)	•	•	
	Field Connected	•	•	
PRIVACY RELEASE	Factory Provided			•
	Factory Connected			•
	Field Provided (Note 3)	•*		
	Field Connected	•		
RING TRANSFER	Factory Provided			•
	Factory Connected			
	Field Provided (Note 4)	•*		
	Field Connected	•		•

Note 1: Kit of Parts D-180591

Note 2: Kit of Parts D-180486

Note 3: Kit of Parts D-180488

Note 4: Kit of Parts D-180487

* Only one of these features can be added to one 832A or 2832A set.

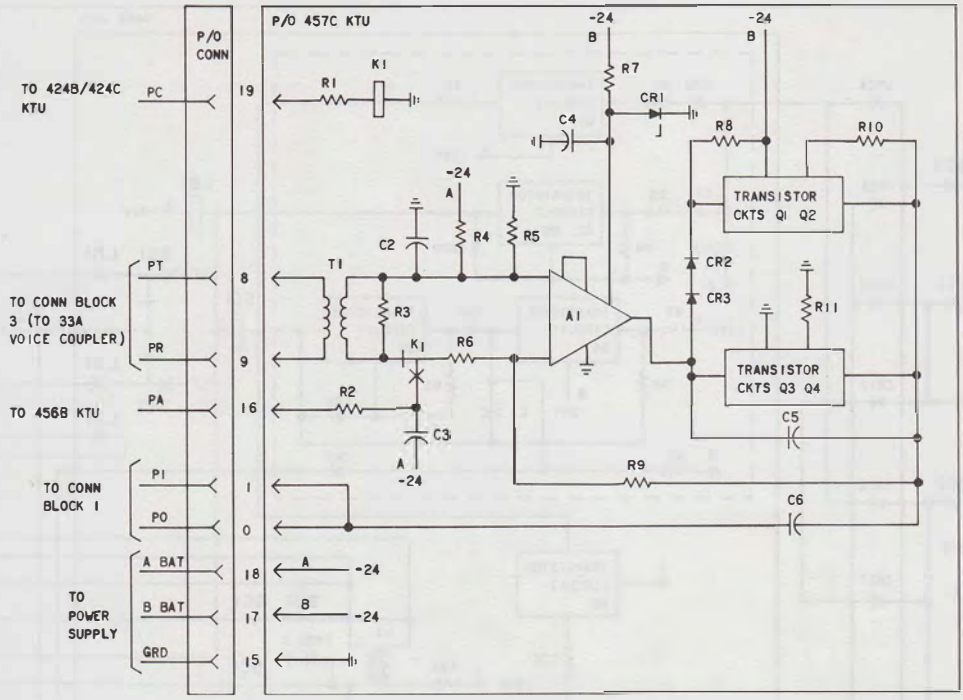


Fig. 19—Condensed Functional Schematic of 457C KTU (Paging Amplifier Circuit)

button (651D key) to the 832A (A&M only) or 2832A (A&M only) telephone set.

D. D-180591 Kit of Parts (Recall)

2.32 The D-180591 kit of parts provides a station the feature of simulating a switchhook flash or recall. The D-180591 kit of parts adds an eleventh button to the 832A (A&M only) or 2832A (A&M only) telephone set. An 832A or 2832A telephone set equipped with the D-180591 kit of parts (recall) is electrically equivalent to the 832B(MD) or 2832B(MD) telephone set.

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

2.33 The D-180656 kit of parts provides a method for wall mounting COM KEY telephone sets. The D-180656 kit of parts 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. This kit can be used with any of the 832- or 2832-type telephone sets not already designed for wall mounting.

TELEPHONE SETS

A. Full Service Telephone Sets (Table D)

2.34 The 832- and 2832-type telephone sets are 10-, 11-, or 13-button key telephone sets designed for use with the 7A 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. CO/PBX lines cannot be conferenced with intercom lines. Automatic button restoration (ABR) restores all depressed buttons when the handset is replaced. The lamp

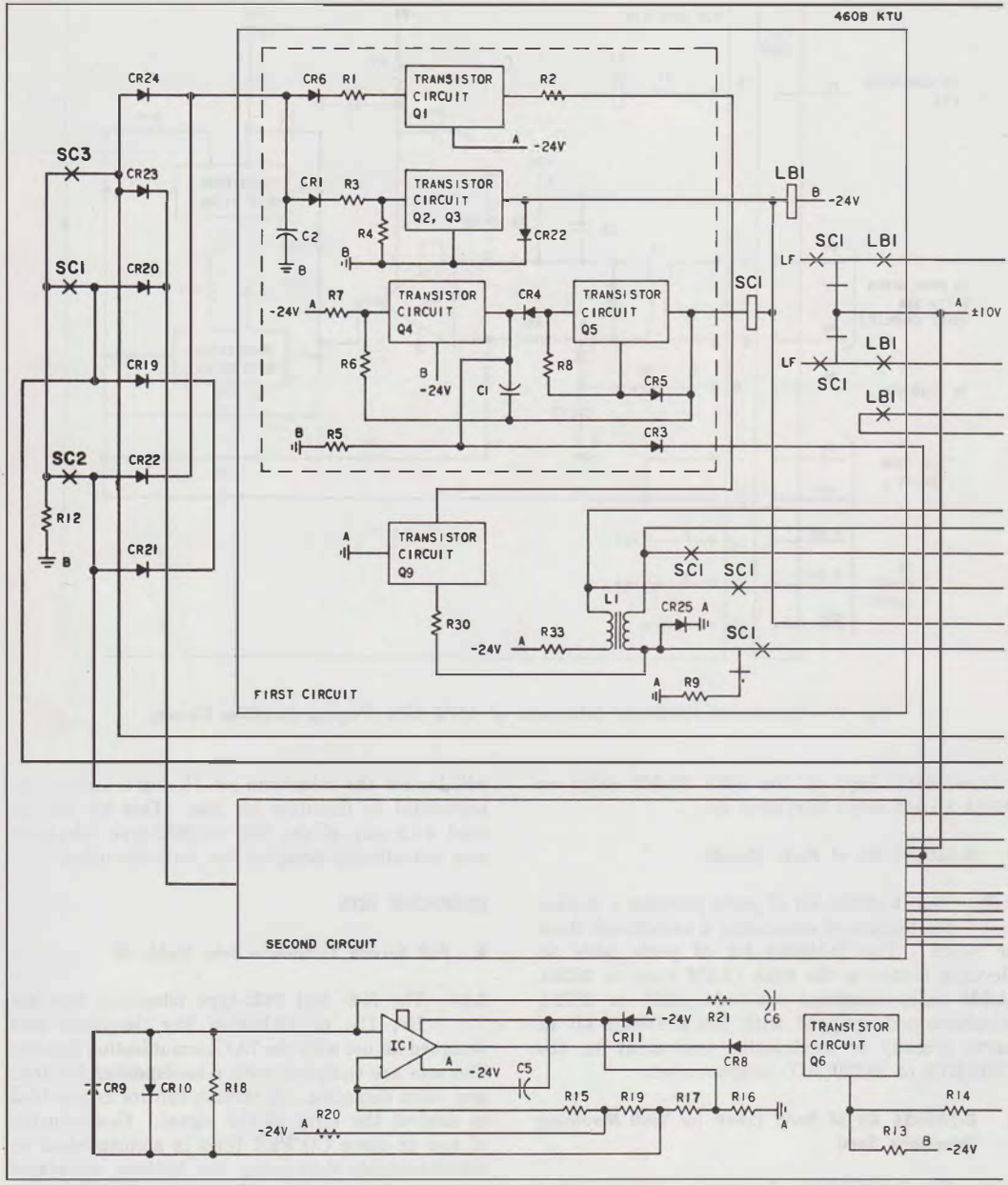


Fig. 20—Condensed Functional Schematic of 460B KTU (2-Path Intercom Access Circuit) (Sheet 1)

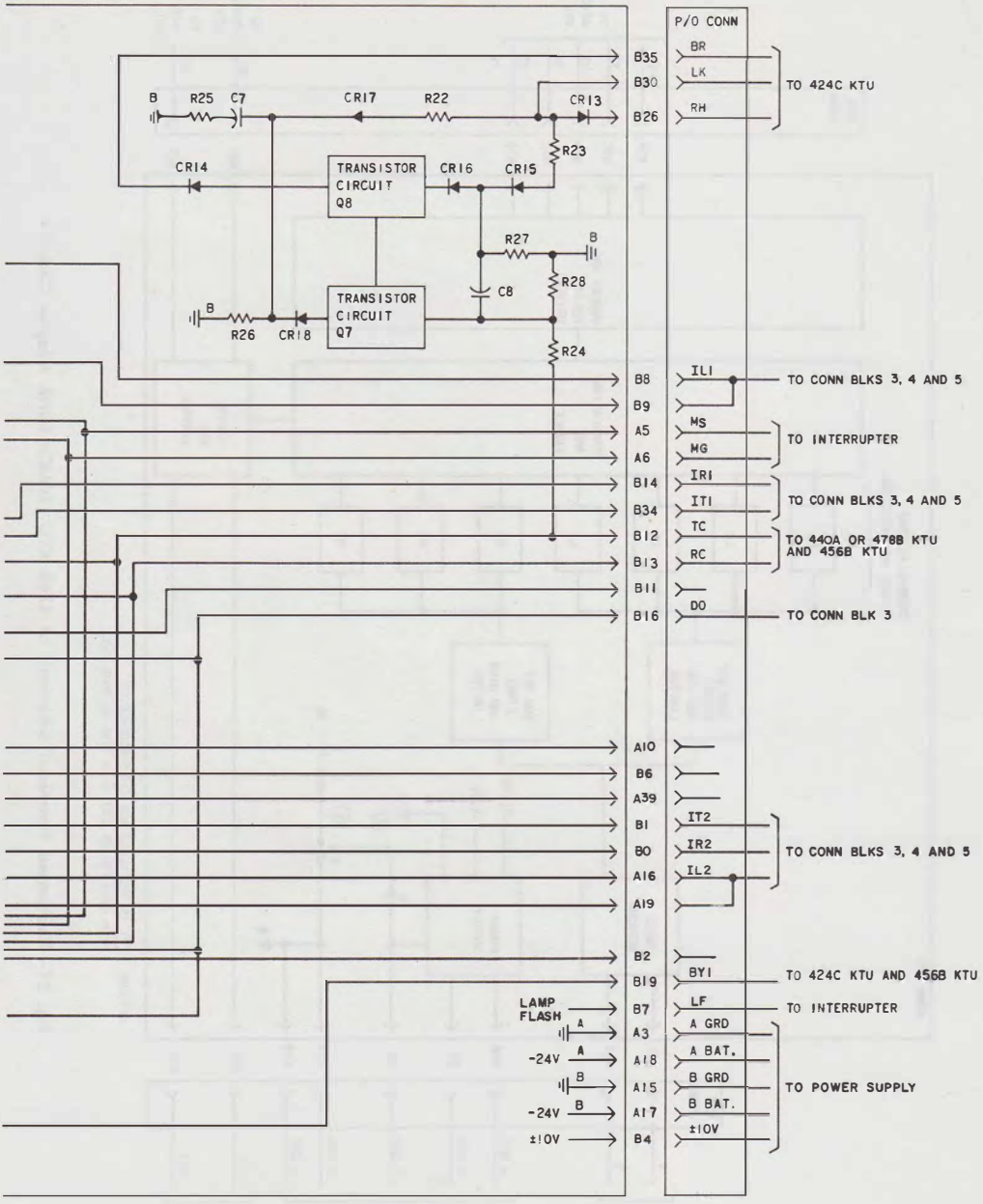


Fig. 20—Condensed Functional Schematic of 460B KTU (2-Path Intercom Access Circuit) (Sheet 2)

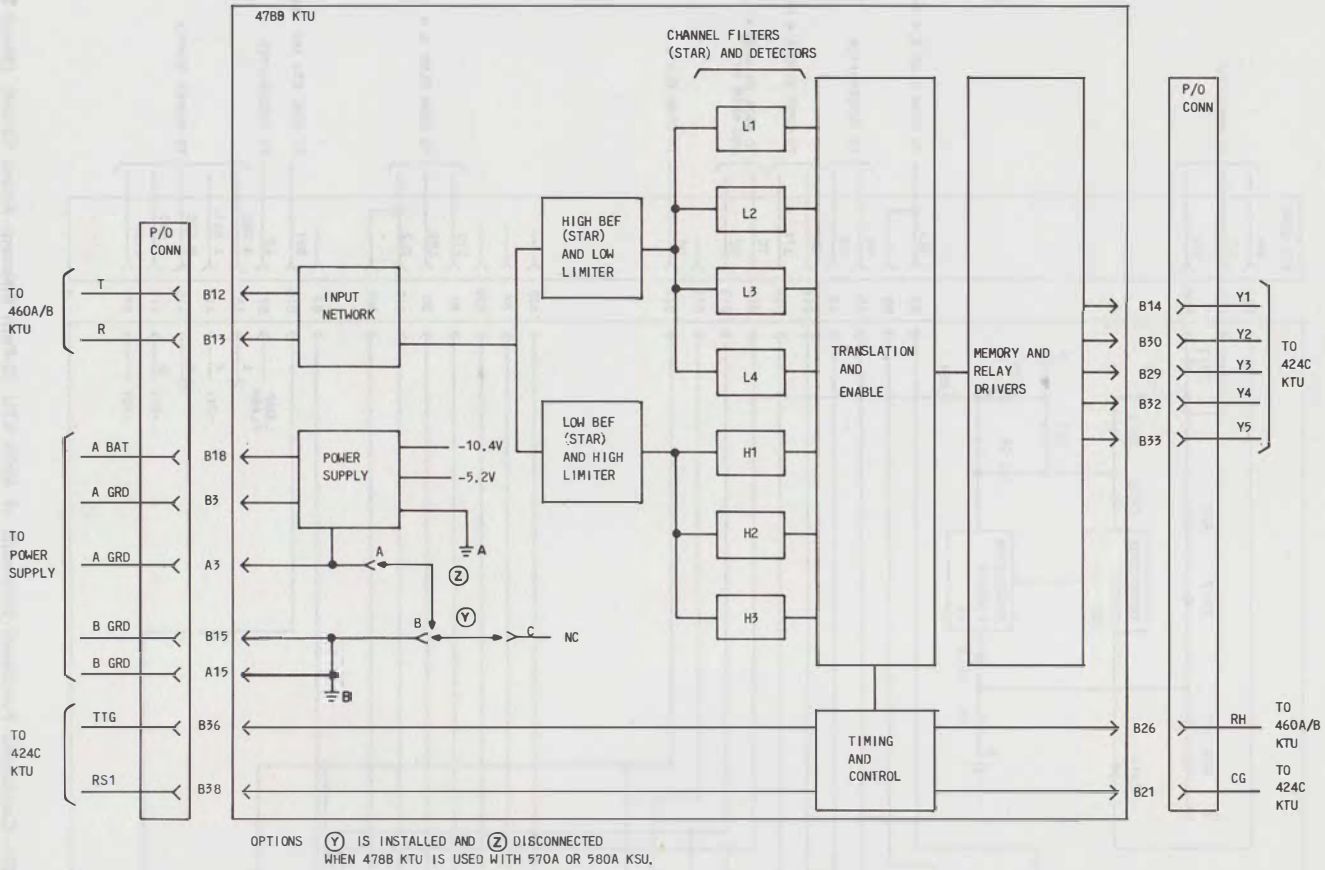


Fig. 21—Condensed Functional Schematic of 478B KTU (TOUCH-TONE Adapter Circuit)

under the HOLD button is provided for use as a message waiting indicator.

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

2.35 Full service telephone sets for the 7A Communication System are available in ivory (-50) only and are shipped from the factory with throwaway, 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 C).

832A/2832A (A & M Only) Telephone Sets

2.36 The 832A telephone set is a rotary dial 10-button key set. The set has 7 CO/PBX line pickup buttons, 2 intercom pickup buttons, and a HOLD button. The 832A telephone set may be modified in the field to provide a privacy circuit and either a PRIV RLS, RING TR, or RECALL button.

Note: Only one button (for privacy release, ring transfer, or recall) can be added to the 832A telephone set.

2.37 The 2832A set is the same as the 832A except it has a TOUCH-TONE dial.

832B/2832B (MD) Telephone Sets

2.38 The 832B telephone set is a rotary dial 11-button key set. The set has 7 CO/PBX line pickup buttons, 2 intercom buttons, a HOLD button, and a RECALL button. The eleventh button, to the right and below the key assembly, is factory-wired for recall and is designated with an amber cap. A momentary operation of the RECALL button opens the line simulating a switchhook flash. The set may be modified in the field for privacy.

2.39 The 2832B set is the same as the 832B except it has a TOUCH-TONE dial.

832BM/2832BM Telephone Sets (Fig. 22)

2.40 The 832BM/2832BM telephone sets are the same as the 832B/2832B (MD) sets except that modular handset components are added.

832C/2832C (MD) Telephone Sets

2.41 The 832C telephone set is a rotary dial 13-button key telephone set. The set has a lower row of ten buttons for 7 CO/PBX line pickups, 2 intercom line pickups, and for hold. The upper row contains 3 buttons on the left providing recall, privacy release, and (optional) ring transfer. A brushed aluminum finished collar assembly, with the words "COM KEY" in black letters, is positioned to the right of these buttons. The 832C telephone set is factory-wired with a privacy circuit and with the PRIV RLS button operational. The RING TR button is not factory-connected. An amber button cap is provided for the RECALL button, and an E-6406 designation strip is provided for labeling the RECALL, PRIV RLS and RING TR buttons.

2.42 The 2832C set is the same as the 832C except it has a TOUCH-TONE dial.

832CM/2832CM Telephone Sets (Fig. 23)

2.43 The 832CM/2832CM telephone sets are the same as the 832C/2832C (MD) sets except that modular handset components are added.

832DM/2832DM Telephone Sets

2.44 The 832DM/2832DM telephone sets are the same as the 832BM/2832BM except that they are arranged for wall mounting. The switchhook allows the handset to hang vertically to the left of the housing.

832EM/2832EM Telephone Sets (Fig. 24)

2.45 The 832EM/2832EM telephone sets are the same as the 832CM/2832CM except that they are arranged for wall mounting.

B. Intercom Only Telephone Sets

575AM Telephone Set

2.46 The 575AM telephone set is a rotary dial, ivory color, 6-button key set ***arranged for intercom service only.*** It is similar to the 565-type set in physical appearance. 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

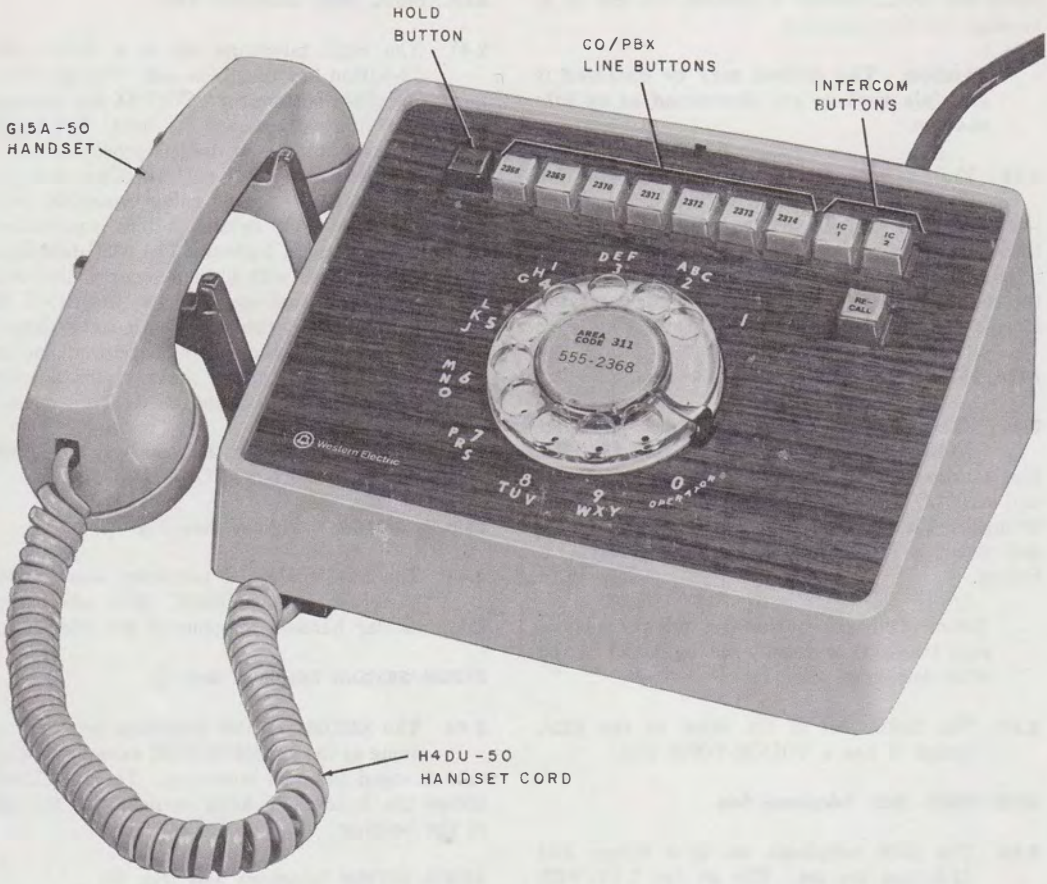


Fig. 22—832BM-50 Telephone Set

waiting indicator. The second, third, and fourth (not used with 7A System) buttons are illuminated pickup buttons. The fifth and sixth are not illuminated and are blocked nonoperative.

2.47 As shipped from the factory, only two intercom buttons (buttons two and three) are wired operational as required for use with the 7A System.

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

2575AM Telephone Set

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

Fig. 23—2832CM-50 Telephone Set

3. INSTALLATION

PLANNING

3.01 Survey the area to be served by the 7A Communication System. Select a location for the 570A KSU that:

- Provides a safe working location
- Has customer's approval and is in his best interest
- Has adequate light and is always accessible
- Has a wall providing adequate support and stability, or floor space away from foot traffic and protected from vehicular traffic
- Has sufficient clearance above floor level to avoid damage from water 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

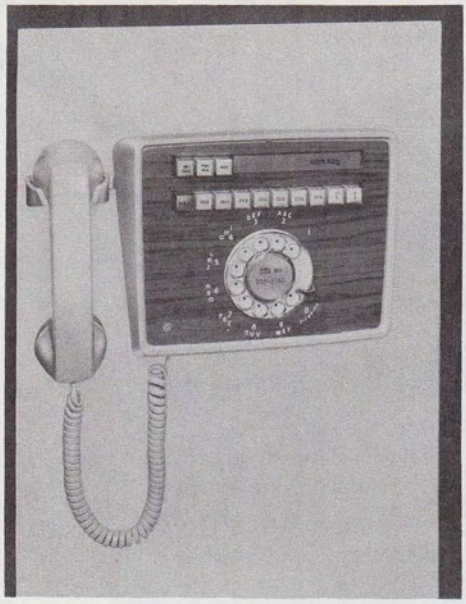


Fig. 24—832EM-50 Telephone Set

- Is near a commercial ac power receptacle not controlled by a switch.

Allow at least 9 inches of space in front of and on each side of KSU to permit gates to swing open.

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 feature of the 7A System can be inadequate for paging in noisy locations. A preinstallation survey should be made of noisy areas where paging is to be provided. The results of the survey may indicate:

- ***Additional speakers 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

(a) ***Apparatus for Basic Service:***

- Cable, Connector, A25B (order one single-ended cable per telephone set and console used; length must be specified)
- Mounting, Apparatus, 77B (floor stand for 570A KSU; order one per installation when KSU is to be floor-mounted)

11-Button Sets:

- Set, Telephone (desk), 832BM-50 (rotary dial) or 2832BM-50 (TOUCH-TONE dial)
- Set, Telephone (wall), 832DM-50 (rotary dial) or 2832DM-50 (TOUCH-TONE dial)
- Plate, Face, 832B—* (order one for each 832BM or 832DM telephone set)
- Plate, Face, 2832B—* (order one for each 2832BM or 2832DM telephone set)

13-Button Sets:

- Set, Telephone (desk), 832CM-50 (rotary dial) or 2832CM-50 (TOUCH-TONE dial)
- Set, Telephone (wall), 832EM-50 (rotary dial) or 2832EM-50 (TOUCH-TONE dial)
- Plate, Face, 833A—* (order one for each 832CM or 832EM telephone set)
- Plate, Face, 2833A—* (order one for each 2832CM or 2832EM telephone set)

Intercom-Only Sets:

- Set, Telephone, 575AM (rotary dial)
- Set, Telephone, 2575AM (TOUCH-TONE dial)
- Unit, Service Key, 570A (The 424C, 455A, 456B, and 460B KTUs are furnished with the KSU.)

Cord, Power (order required length)

824013288 (P-40J328) (4 feet)

824013296 (P-40J329) (6 feet)

824010995 (P-40J099) (12 feet)

- Unit, Telephone Key, 400G (CO/PBX line circuit) (order one per line as required).

*Refer to Table C for color suffix.

(b) ***Optional Apparatus (Order as Required)***

- Console, Selector, 6A1-50 (Station Busy Console with DSS)
- Console, Selector, 6B1-50 (Station Busy Console with MW)
- Coupler, Voice, 33A (order when background music or music-on-hold is provided)
- Diode, 446F, or equivalent (order one for each rotary dial station to be restricted)
- Kit of Parts, D-180486 (Privacy Circuit) (order one for each 832/2832A, B, BM, or DM type telephone set to be locked out)
- Kit of Parts, D-180487 (Ring Transfer) (order one for each 832A or 2832A telephone set used as attendant station)
- Kit of Parts, D-180488 (Privacy Release) (order one for each 832A or 2832A telephone set used for a station equipped with the privacy release feature)
- Kit of Parts, D-180591 (Recall) (order one for each 832A or 2832A telephone set used as a station equipped with the recall feature)
- Kit of Parts, D-180656 (Shelf Assembly) (order one for each 832/2832A, B, C, BM, or CM type telephone set to be wall-mounted)
- Loudspeaker, Horn, KS-16846, L2 (order as required for outside paging)
- Loudspeaker, Indoor, K8 (order as required for indoor paging)

Note: A maximum of seven paging loudspeakers can be connected to the 7A Communication System.

- Ringer, E1C (order one for each line to be wired for power failure ringing)
- Speakerphone, 3B (order one each for each station to be equipped)

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

Loudspeaker, 760A—*

Transformer, 2012B

Transmitter, 666B—*

Unit, Control, 55B

- Speakerphone, 4A (order one each for each station to be equipped)

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

Loudspeaker, 108—*

Transmitter, 680A—*

Unit, Power, 85B1-49

*Refer to Table C for color suffix.

- Unit, Apparatus, 20A-49 (order when 7A System is connected to a customer's paging system or connected 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,

gongs, etc, and an external power supply must be ordered as required.)

- Unit, Telephone Key, 440A or 478B (TOUCH-TONE Adapter Circuit)

Note: J13/J14 connector on KSU must have A and B ground connected when 478B KTU is used. Do not use 478B KTU in conjunction with any dial intercom selector circuit except 424C.

- Unit, Telephone Key, 451A or 451B (Music-On-Hold Circuit)
- Unit, Telephone Key, 452A (Power Failure Transfer Circuit)
- Unit, Telephone Key, 457C (Paging Amplifier Circuit).

(c) ***Replaceable Components***

570A KSU:

- Fuse, 24B (3A)
- Fuse, 24C (2A)
- Fuse, 24F (5A)
- Fuse, 70A (1-1/3A)
- Fuse, 70G (1/2A)
- Fuse, 70H (3/4A)
- Interrupter, KS-19175, L1
- Lamp, 51A
- Unit, Telephone Key, 424C (Dial Intercom, 19-Code Selector Circuit)
- Unit, Telephone Key, 455A (Tone Ringing Signal Generator Circuit)
- Unit, Telephone Key, 456A or 456B (Voice and Tone Alerting Circuit)
- Unit, Telephone Key, 460B (2-Path Intercom Access Circuit)
- Unit, Power, 19C3
- Unit, Power, 215C1
- Unit, Power, 19C2 (on earlier models of KSU)

33A Voice Coupler:

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

832- and 2832-Type Telephone Sets:

- Refer to Section 503-701-110.

575AM and 2575AM Telephone Sets:

- Cord, D20P-87 (mounting cord)
- Cord, H4DU-50 (handset cord)
- Dial, 9CA (rotary dial)
- Dial, 35Y3A (TOUCH-TONE dial)
- Housing, 840996268 (rotary set) or 840997258 (TOUCH-TONE set)
- Key, 636A
- Lamp, 51A
- Plate, Face, 840845502 (required only for TOUCH-TONE set)
- Set, Hand, G15A-50.

6A1 and 6B1 Selector Consoles:

- Base, 6A1 (for 6A1 Selector Console)
- Base, 6B1 (for 6B1 Selector Console)
- Cord, Mounting, D50AD-87
- Housing, 6A1-50
- Key, 647J5 (for 6A1 Selector Console)
- Key, 647AG5 or 647J5C (for 6A1 Selector Console)
- Key, 647AF5 or 647C5 (for 6B1 Selector Console)
- Lamp, 51A

- Plate, Face, 6A2—*

*Refer to Table C for color suffix.

INSTALLING

3.04 Be careful when unpacking to prevent damage to components.

3.05 Install the 7A Communication System as follows:

A. 570A KSU

(1) Remove cover from KSU.

(2) Use the template provided to locate the fastener holes at the selected location.

(3) Install appropriate fasteners.

(4) Hang KSU on fasteners.

(5) Connect the circuit ground to an approved ground. For circuit ground a No. 14 gauge wire should be attached from the LOC GRD terminal of the power unit to an approved local ground. If a 3-wire grounded receptacle is not available, ***a frame ground*** (No. 14 gauge wire) must be connected from the case or frame of the power unit to an approved local ground.

Caution: Do not strap the circuit ground to the frame or case of the power unit. 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. Refer to Section 518-010-105 for detailed information on grounding key systems.

(6) Unlatch and open carrier assemblies.

(7) Terminate the incoming CO/PBX lines on connecting block 3 as shown in Fig. 25.

(8) Terminate the station cables. Cut down the A25B connector cables on connecting blocks 3, 4, and 5 as shown in Fig. 26. Intercom station code 0 (attendant station) is terminated on column G of connecting block 3. Intercom station code 3 is terminated on column H of connecting block 3, and station codes 4 through 19 are terminated on columns A through H on connecting blocks 4 and 5 as shown in Fig. 26. ***A direct cable run to any station may not exceed 667 feet of 24-gauge cable.***

(9) Place or remove option straps.

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

(11) Close and latch carrier assembly.

(12) Install KTUs necessary to provide required services. See Fig. 6 for KTU connector arrangement.

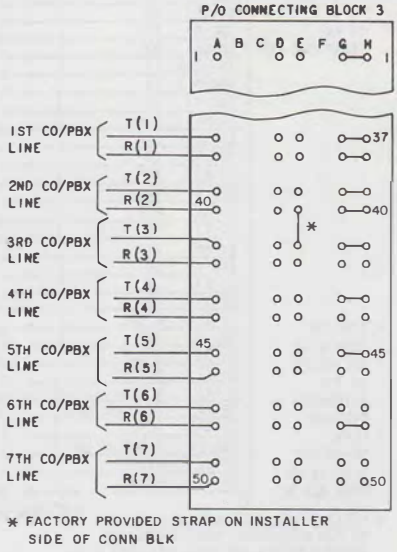


Fig. 25—Connections for Incoming CO/PBX Lines

B. Satellite Wiring Plan

3.06 The 7A System is designed for "Home Run" cabling (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

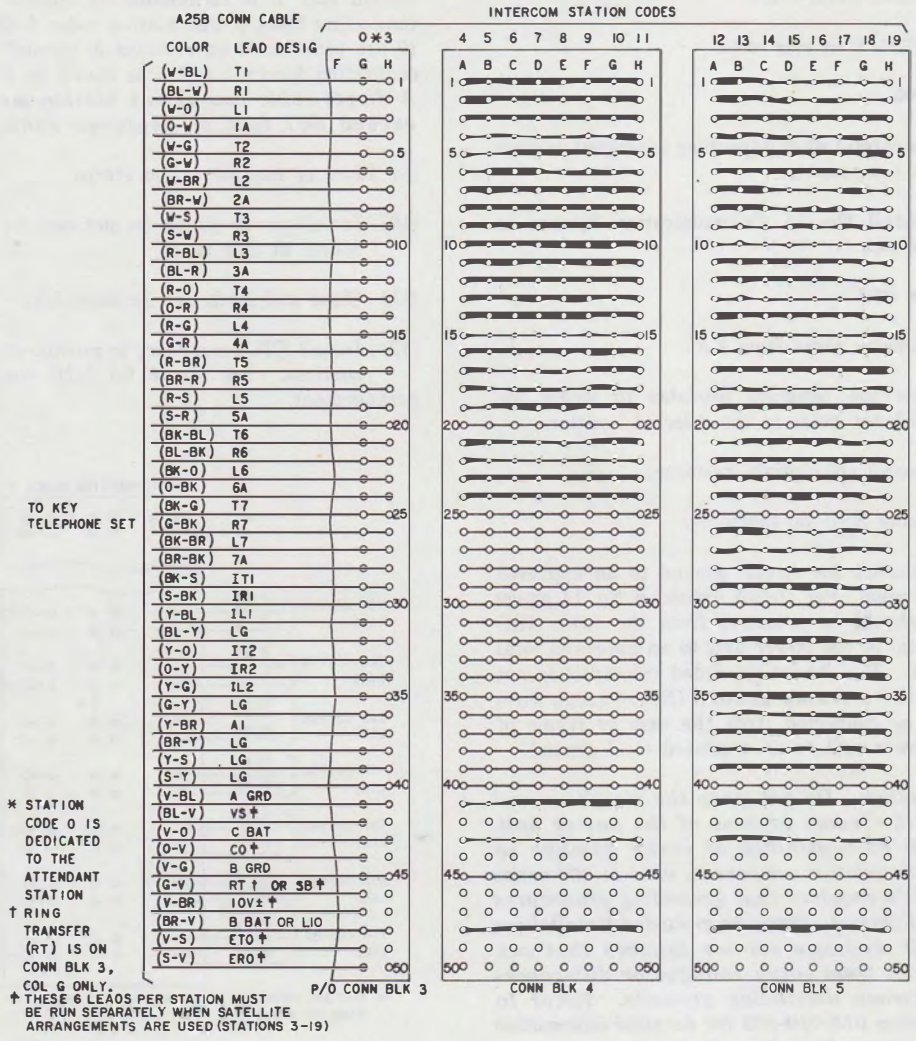


Fig. 26—Station Connections

station terminations. It is served by a connecting cable or cables from the KSU.

3.07 Cabling is required between the satellite location and the KSU as follows:

- One 25-pair cable to provide the 44 leads common to all stations (Fig. 26).

- Additional cable or cables to:

  Provide six additional leads per satellite station (Fig. 26)

  Provide additional leads that may be required to cover A lead and lamp restrictions.

3.08 The limiting factors of a satellite-type wiring plan are keeping the voltage drop in the lamp loop to less than 2 volts and maintaining a low resistance A lead.

3.09 To keep the voltage drop in the lamp loop to less than 2 volts, calculate the number of additional 24-gauge cable conductors required for lamp (L) leads as follows:

(1) Maximum allowable distance for one telephone from the KSU (24-gauge cable) = 667 ft.

(2) Distance between satellite location and telephone set most distant from satellite = ___ft.

(3) Subtract (2) from (1) = ___ft.

(4) Maximum number of telephone sets to work from satellite = ___.

(5) Divide (3) by (4) = ___ft.

(6) Distance between KSU and satellite = ___ft. Where the distance in (5) is more than the distance in (6), additional cable conductors are not required. Where the distance in (5) is less than the distance in (6), proceed to next step.

(7) Divide (6) by (5) = ___.

(8) Subtract one from (7) = ___.

(9) Round off (8) to the next whole number = ___. This number is the number of additional 24-gauge cable conductors to be used in parallel with each lamp (L) (IL) lead. This number is also the number of additional 24-gauge cable conductors to be used in parallel with each lamp ground (LG) lead.

> ***Note:*** There are 5 lamp ground leads in a station cable. Therefore, for each ***additional*** cable conductor used in parallel with a lamp lead, there must be 5 additional lamp ground leads.

3.10 For purposes of illustration, assume a satellite location is 350 feet from the KSU, the most distant telephone set from the satellite is 175 feet, and there will be four telephone sets working from the satellite. The number of additional cable conductors for lamp leads is calculated as follows:

(1) Maximum allowable distance for one telephone from the KSU = 667 ft.

(2) Distance between satellite location and telephone set farthest from satellite = 175 ft.

(3) Subtract (2) from (1), 667 minus 175 = 492 ft.

(4) Maximum number of telephone sets to work from satellite = 4.

(5) Divide (3) by (4), 492 divided by 4 = 123 ft.

(6) Distance between KSU and satellite = 350 ft. As the distance in (5), 123 ft., is less than the distance in (6), 350 ft., it is necessary to proceed to the next step.

(7) Divide (6) by (5), 350 divided by 123 = 2.8.

(8) Subtract one from (7), 2.8 minus 1 = 1.8.

(9) Round off (8) to the next whole number 1.8 = 2.

Therefore, ***two additional*** cable conductors must be used in parallel with each lamp and lamp ground lead between the KSU and the satellite location. A total of 18 additional lamp leads and 10 additional lamp ground leads are required in this example.

3.11 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 in parallel (five total conductors) for the A1 lead. Additional cable conductors are not required for satellites located less than 200 feet from the KSU.

3.12 No more than 17 stations can be associated with a given satellite location.

C. Telephone Sets

3.13 Install telephone sets at desired locations. Install any telephone set options at this time. Refer to Section 503-701-110 for schematics and additional information on the 832- and 2832-type telephone sets. For information on the 575AM

and 2575AM telephone sets, refer to Section 503-603-120.

The telephone which is to be used as the attendant station (code 0), without ring transfer, must be modified. Disconnect the V-BR lead from terminal 28 on the set terminal board; insulate and store.

3.14 Where a wall-mounted telephone is desired, install either a wall-type set (832/2832DM or EM) or a D-180656 kit of parts for converting desk sets to wall sets. The method of mounting wall-type sets is illustrated in Fig. 27. The D-180656 kit of parts (Fig. 28) 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.

3.15 ***Consoles:*** Up to three DSS or MW consoles, in any combination, can be used with a 7A System. Consoles are usually associated with stations which are designated as attendant positions. Some systems will have only one attendant position; in such cases, either an MW or a DSS console or both can be located at the attendant position. If another station is designated as an alternate attendant position, a second or third console might be located there.

> ***Note:*** Terminations and power are provided in the 7A System for either a DSS or MW selector console. If a second or third console are required, additional power and external terminations must be supplied (Fig. 50 to 58).

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

BASIC FEATURES

A. Automatic Button Restoration (ABR)

4.01 Automatic button restoration is a feature of the 832- and 2832-type telephone sets used with the 7A System. When the handset is replaced, all depressed buttons return to the unoperated position. This prevents inadvertent intrusion on calls in progress and insures that multiple buttons will not be left depressed on a set causing an undesired conference from the idle set.

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

4.03 On 832- and 2832-type telephone sets equipped with a RECALL button, this feature should be used for flashing, instead of the switchhook. Otherwise, the ABR will release the line button when the switchhook is operated. On 832/2832A sets without recall, hold down the line button while flashing with the switchhook.

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 The 7A System is factory-wired for the attendant station (intercom code 0) to receive ***tone ringing*** whenever there is an incoming call on any of the CO/PBX lines. (The lamp under the associated CO/PBX line button flashes for visual identification of the calling line.) See Fig. 29 for connections.

4.06 The attendant answers all incoming calls and either takes a message or forwards the call to the desired party using the intercom. To forward a call, the attendant puts the incoming call on hold (CO/PBX line lamp goes from steady to wink), then picks up an idle intercom path, dials the desired station, and voice signals that there is a call on a particular CO/PBX line. By observing the CO/PBX line lamp (going from wink to steady) the attendant is able to determine when the call is picked up. If after a suitable period of time the call is not picked up, the attendant may again pick up the line and proceed per local instructions.

4.07 Common audible is derived through diodes located on connecting block 1. As factory-wired, there is one diode per CO/PBX line connected to a common audible terminal. A factory-provided strap (on the installer's side of block 1) connects the common audible terminal to station code 0.

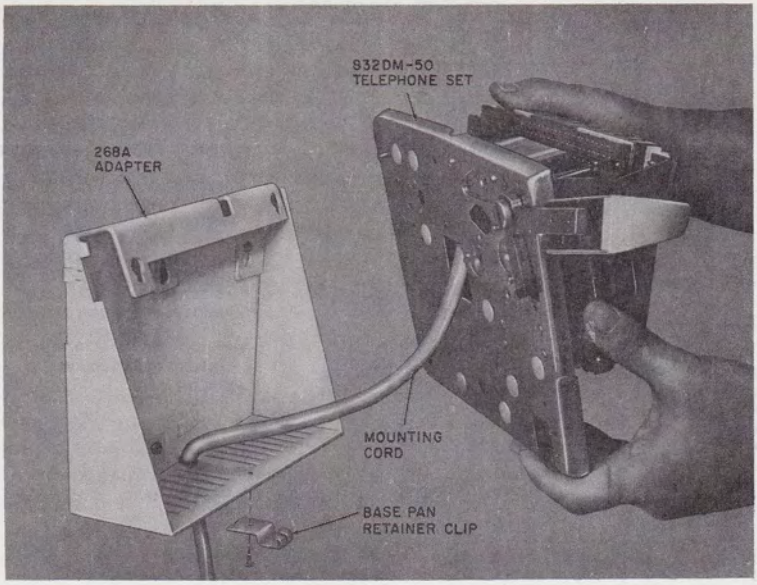


Fig. 27—Installation of 832DM-50 Wall Telephone Set

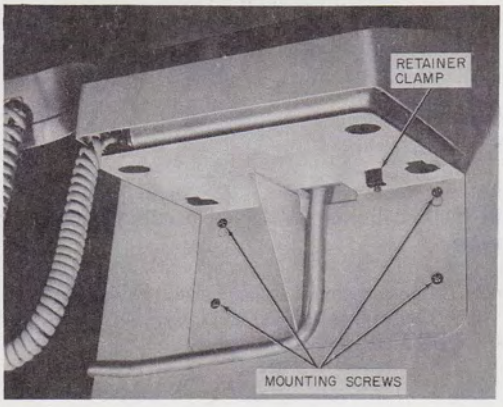


Fig. 28—Shelf for Wall Mounting COM KEY Telephone Set (D-180656 Kit of Parts)

4.08 To move the common audible signal to a station or stations other than, or in addition to, the attendant station (code 0), make the following changes on connecting block 1:

(1) Remove the factory-provided strap between terminals F9 and C1.

Up to ten stations, including the attendant, can be wired for common audible only if capacitor C1 is connected to fuse F12 as shown in Part E of Fig. 73. If it is not, only one station can have common audible.

(2) Run a strap from the common audible terminal F9 to the CO/PBX ring terminal (or terminals) in row C of the desired station (or stations) code. Use a continuous strap if more than one station code is connected to the common audible ring terminal.

4.09 To remove a particular CO/PBX line from the common audible group, remove the

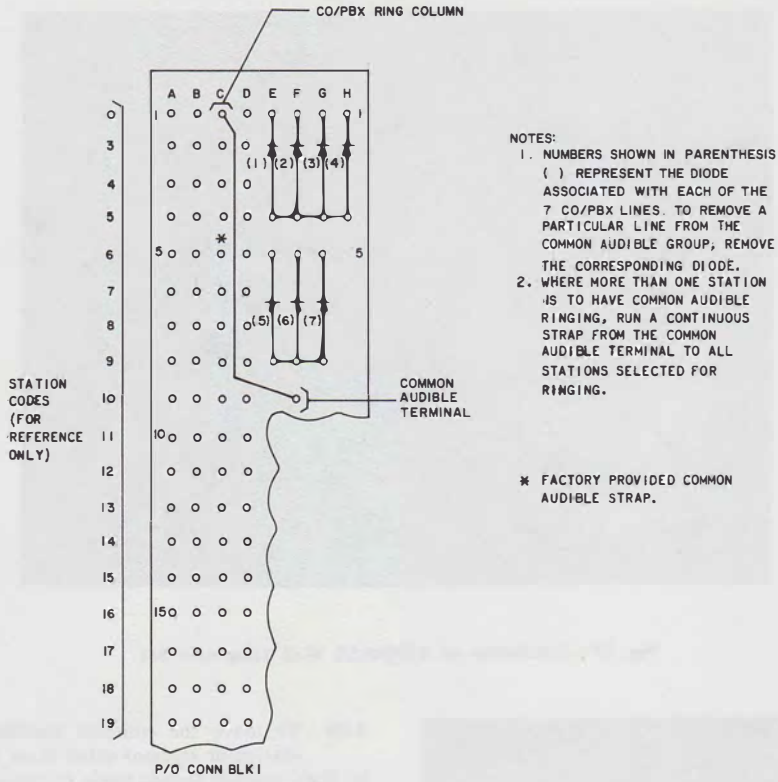


Fig. 29—Connections for Common Audible

corresponding common audible diode from connecting block 1 (Fig. 29). When a CO/PBX 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 as described in 4.26.
- The ringing cannot be transferred through the ring transfer arrangement.

C. Multiline Conferencing

4.10 Multiline conferencing is a feature of the telephone sets used in the system. Since there is no amplification involved, this type of conferencing is limited. When the number of conferenced lines exceeds three, satisfactory results are not to be expected. The main problem will be the inability of the distant parties to hear each other.

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

Intercom and CO/PBX lines cannot be conferenced together.

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

4.13 To make a call during a conference:

(1) Depress HOLD button—all buttons restore.

(2) Select an idle line.

(3) Dial call.

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

(5) To reenter conference again after call is completed, simultaneously depress conferenced buttons again.

4.14 If it is desired to add another call to the conference, while holding the conferenced CO/PBX line buttons down, depress button of CO/PBX line to be added.

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

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

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

D. Pickup, Hold, and Illumination

4.17 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 hold.

4.18 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.

E. Tone and Voice Signaling

4.19 All stations are alerted to an incoming call by a distinctive tone signal. CO/PBX ringing is a frequency-shifting tone. Intercom ringing is a single tone followed by voice signaling. Voice signaling is used in conjunction with tone signaling when calling a station on the intercom. When a station receives incoming CO/PBX tone signals and is simultaneously signaled on the intercom, the intercom signal is given preference.

F. 2-Path Intercom

4.20 The intercom has two separate talking paths. A path is selected by depressing one of the two intercom buttons on the telephone set. There is no privacy on either path and any station may break into an existing conversation.

4.21 When it is desirable for a station to pick up only the two intercom lines and not have access to the CO/PBX lines, a 575AM or a 2575AM telephone set can be used. The 575AM and 2575AM telephone sets are connected to the 570A KSU by A25B connector cables (Fig. 30).

4.22 The selector, used to select and alert the called stations, is shared between the two paths. The alerting signal at the called station is a tone burst followed by a voice signal from the calling station. The lamp signals on the intercom are as follows: When the selector has seized a path, the lamp associated with that path will flash on all telephone sets. This shows the called party which path to answer. When the called party answers, the flashing intercom lamp lights steadily. When an intercom path is idle, the associated lamp is off.

4.23 To place an intercom call:

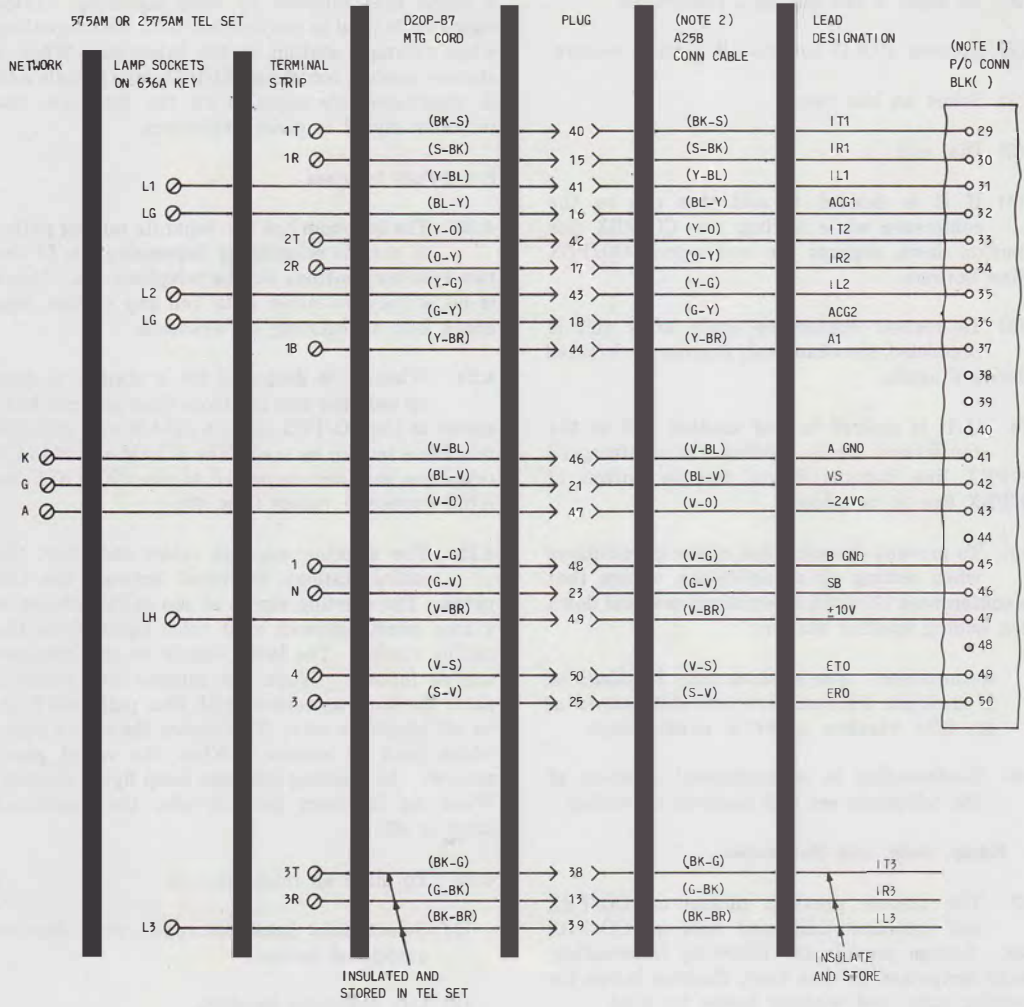
(1) Select idle intercom path and depress associated button.

(2) Lift telephone handset.

Note: If lamp is flashing on other intercom path, dialing cannot take place until the selector is released. While the selector is seized by another station, no dial tone or other indication is available.

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

(4) Calling station makes announcement or waits for called party to answer. When called party picks up, intercom lamp will go steady.



NOTES:
1. TERMINATE CONNECTOR CABLE FOR INTERCOM ONLY STATION ON SAME BLOCK(S) AS ASSIGNED FOR FULL SERVICE STATION.
2. ONLY LEADS SHOWN ARE REQUIRED. CUT OOWN BALANCE OF CONN CABLE ON SAME COLUMN OF CONN BLOCK EXCEPT FOR 3RD IC PATH.

Fig. 30—Connections for Intercom-Only Telephone

4.24 Intercom is factory-wired, requiring the 424C (Fig. 13), 456B (Fig. 18), and 460B (Fig. 20) KTUs furnished with the 570A KSU. See Fig. 31 for KTU locations in the KSU. The intercom code of a station is determined by the column on connecting blocks 3, 4, or 5 on which the station cable is terminated. See 3.05(8) and Fig. 26.

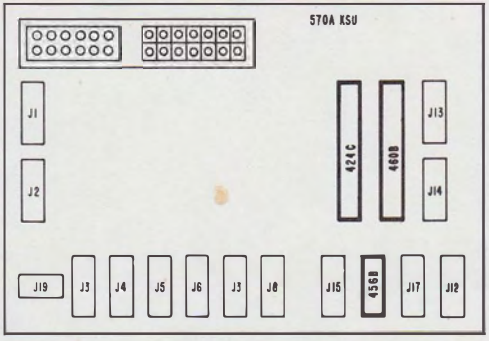


Fig. 31—Location of 424C, 456B, and 460B KTUs, 2-Path Intercom

OPTIONAL FEATURES

A. CO Ringing

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

Remember: The CO ringing is tone ringing.

4.26 A terminal representing each CO/PBX line is brought out on connecting block 1, row 21 (see Fig. 32). To connect CO ringing, on connecting block 1, column C, select the terminal associated with station to ring on a particular CO/PBX line. Then run a strap (RC-) from the station terminal in column C to the particular CO ring terminal in row 21. See Fig. 32. Fig. 32 illustrates station 3 strapped (RC-1) to the CO ring terminal (in row 21) of CO/PBX line 1 and station 16 strapped (RC-2) to the CO ring terminal of CO/PBX line 2. In this instance, CO/PBX line 1 will ring at station 3 and the second CO/PBX will ring at station 16.

B. External Signaling Circuit

4.27 Where external signaling devices (such as bells, gongs, chimes, lights or buzzers) are to be connected to the 7A System, a 22A-49 apparatus unit must be provided. The 22A-49 apparatus unit is externally mounted and connections are made to the KSU with inside wire. Also, an external power supply must be provided to operate the signaling devices. The 22A-49 apparatus unit may be used to activate external 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, sealed contact relay and must be mounted in a vertical upright position.

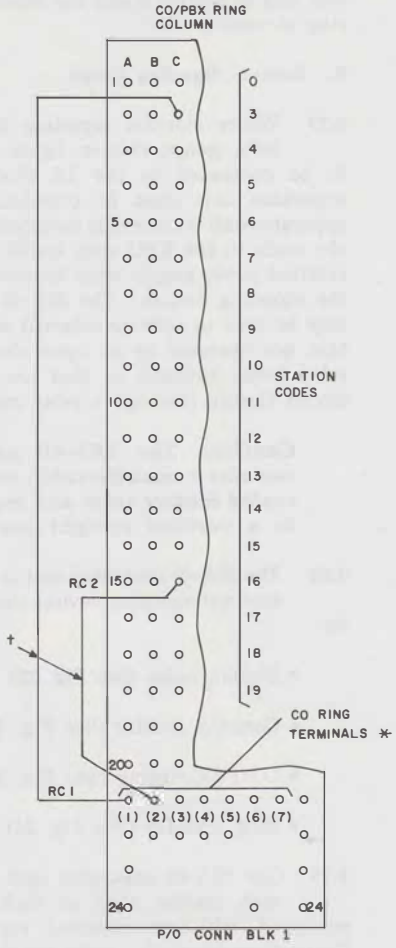
4.28 The 22A-49 apparatus unit is used to activate external signaling devices that are connected for:

- Station codes (See Fig. 33)
- Common audible (See Fig. 34)
- CO/PBX ringing (See Fig. 34)
- Ring transfer (See Fig. 34).

4.29 One 22A-49 apparatus unit is required for each station code or each CO/PBX line equipped with an external signaling device. Connections for station codes are shown in Fig. 33. Connections for common audible, CO ringing and ring transfer are shown in Fig. 34. The maximum resistance of each lead between the KSU and the 22A-49 apparatus unit is 25 ohms.

4.30 The KS-16301 type auxiliary signals are recommended as external signaling devices for use with the 7A System. See Fig. 35 for connections. Refer to Section 463-110-100 for identification, installation, operation, maintenance, and ordering information on the KS-16301 type signals.

4.31 The external power supply used to operate the signaling devices must be properly fused



* NUMBERS SHOWN IN PARENTHESIS ( ) REPRESENT THE 7 INCOMING CO/PBX LINES. NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON THE BLOCK.

† CONNECTIONS AS SHOWN CAUSE STATION 3 TO RING ON LINE 1 AND STATION 16 TO RING ON LINE 2.

Fig. 32—Connections for CO/PBX Ringing

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.

C. Intercom Preset Conference

4.32 Intercom preset conference allows up to five preselected stations to be alerted simultaneously by dialing code 19.

4.33 When preset conference is used, station code 19 is forfeited. Signaling via preset conference

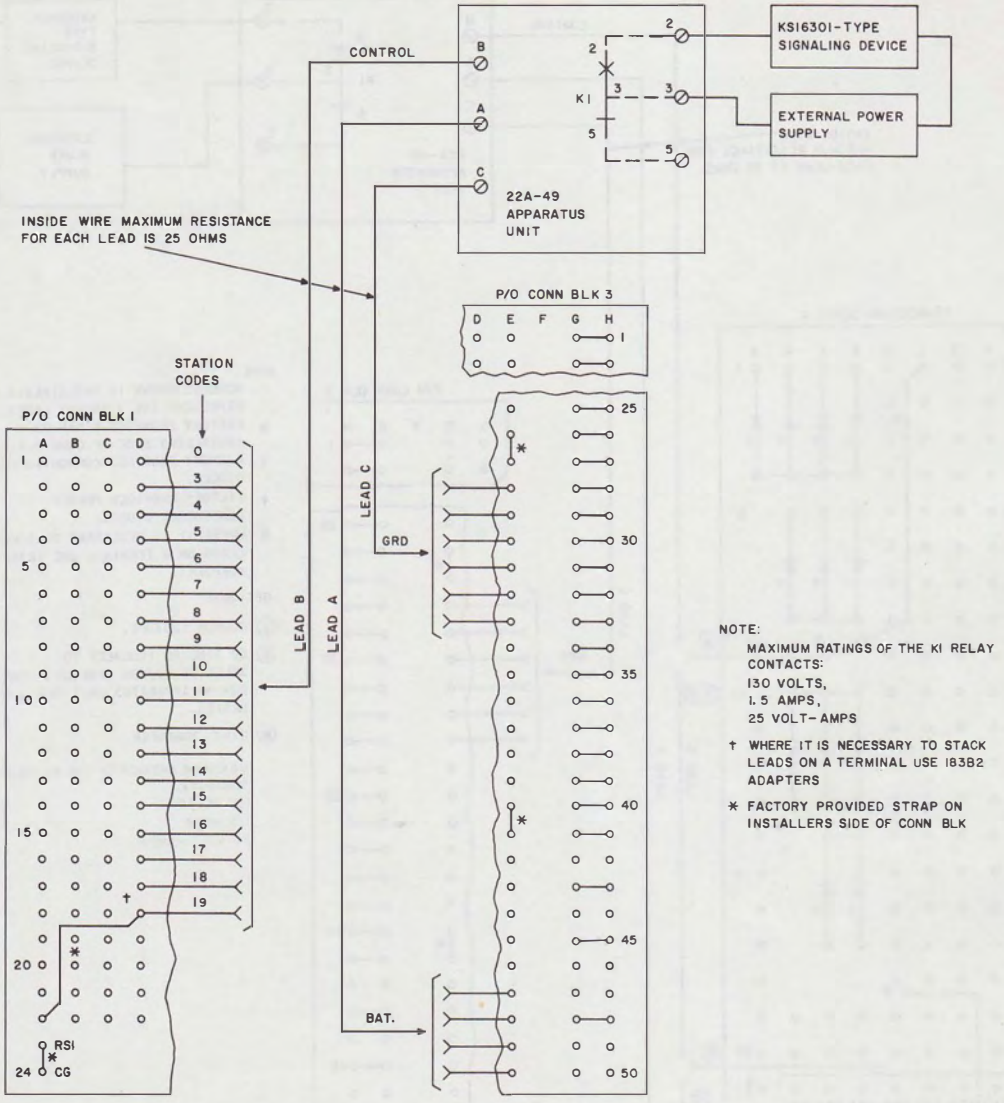
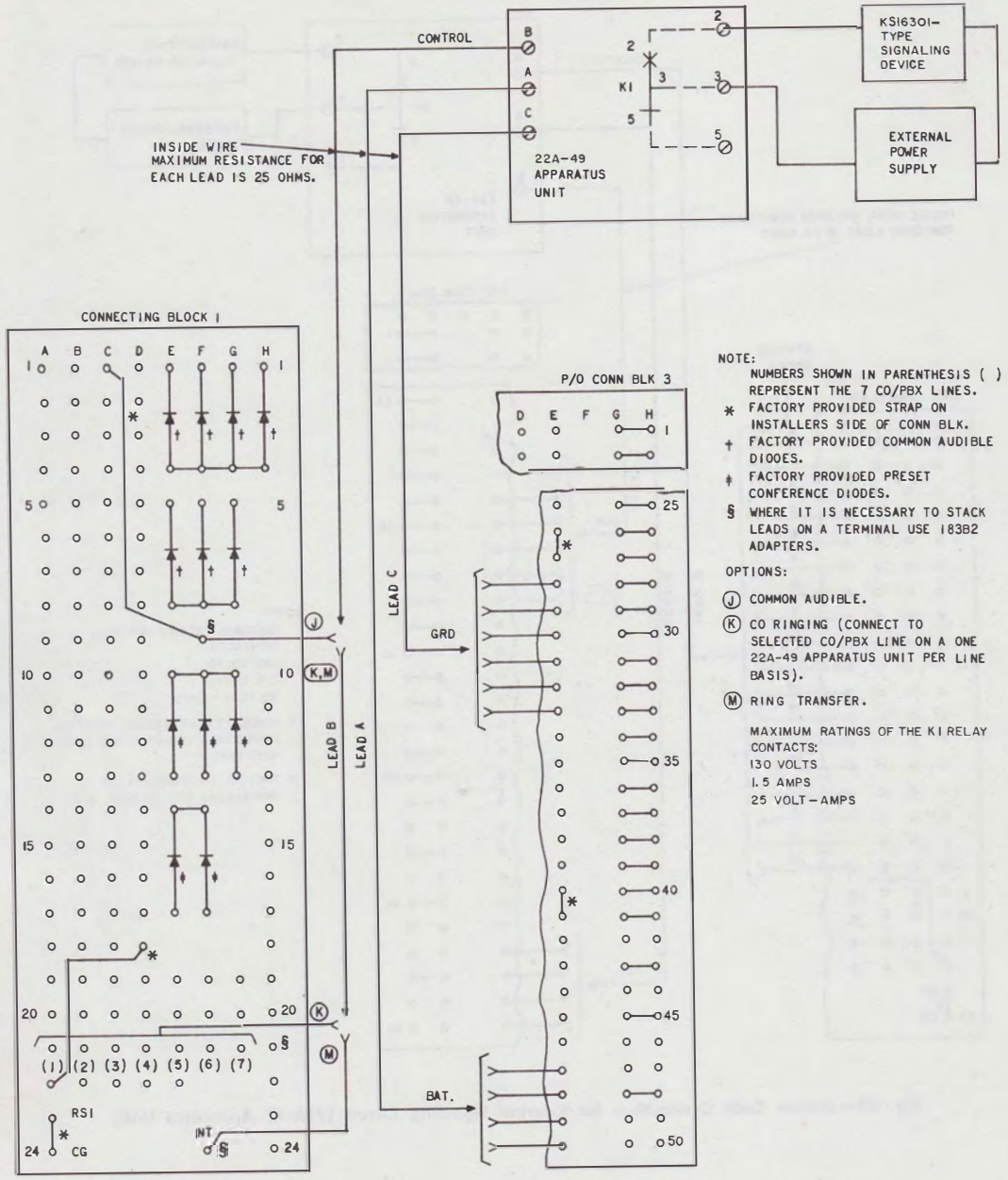


Fig. 33—Station Code Connections for External Signaling Circuit (22A-49 Apparatus Unit)



NOTE:
NUMBERS SHOWN IN PARENTHESIS ( ) REPRESENT THE 7 CO/PBX LINES.

* FACTORY PROVIDED STRAP ON INSTALLERS SIDE OF CONN BLK.

† FACTORY PROVIDED COMMON AUDIBLE DIODES.

‡ FACTORY PROVIDED PRESET CONFERENCE DIODES.

§ WHERE IT IS NECESSARY TO STACK LEADS ON A TERMINAL USE 183B2 ADAPTERS.

OPTIONS:

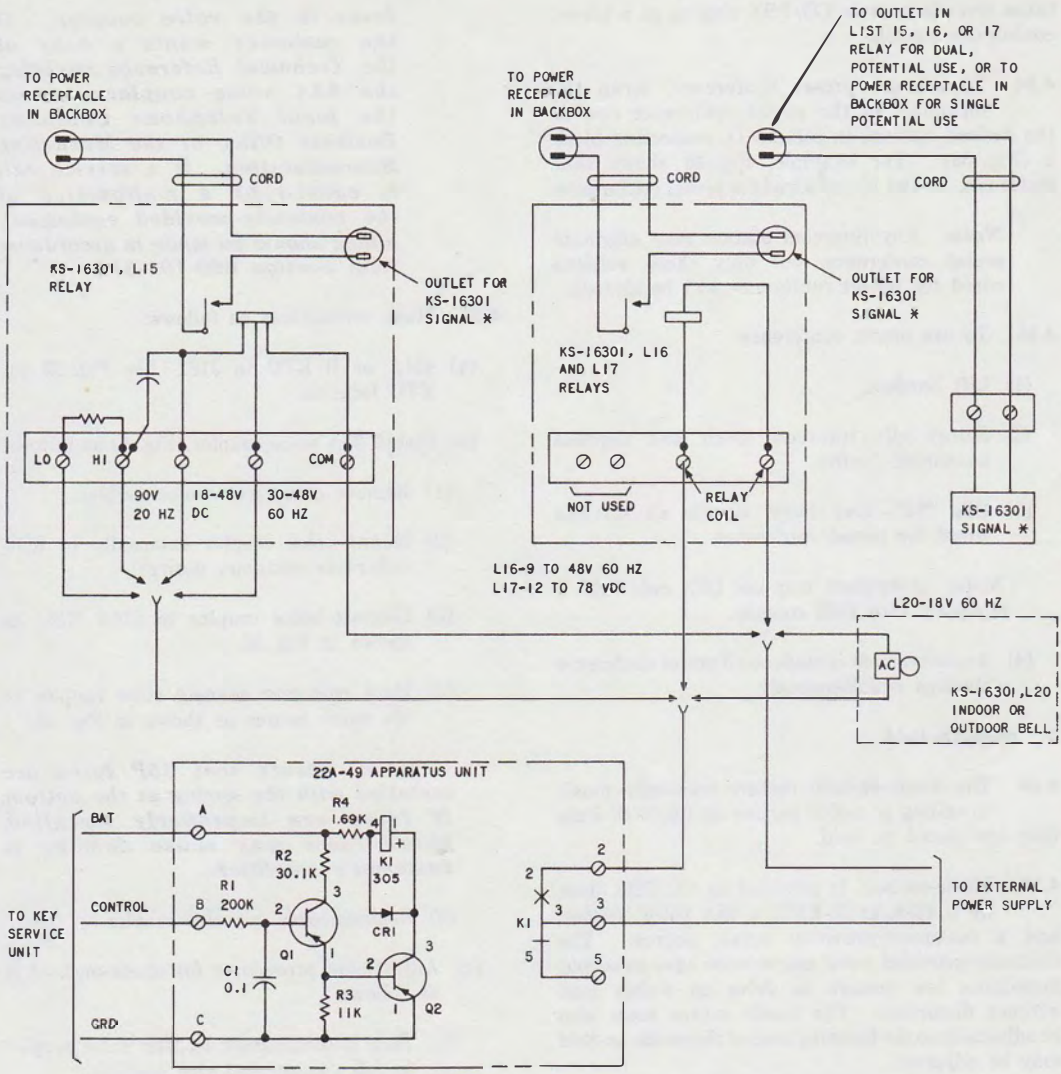
(J) COMMON AUDIBLE.

(K) CO RINGING (CONNECT TO SELECTED CO/PBX LINE ON A ONE 22A-49 APPARATUS UNIT PER LINE BASIS).

(M) RING TRANSFER.

MAXIMUM RATINGS OF THE KI RELAY CONTACTS:
130 VOLTS
1.5 AMPS
25 VOLT-AMPS

Fig. 34—Common Audible, CO/PBX Ringing or Night 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. 35—Connections for 22A-49 Apparatus Unit and KS-16301 Type Signals

takes precedence over CO/PBX ringing at a preset conference station.

4.34 To connect preset conference, strap the terminals in the preset conference row to the desired stations in column D, connecting block 1 (Fig. 36). For example, Fig. 36 shows that stations 5, 10, and 15 are wired for preset conference.

Note: Any intercom station may originate preset conference, but only those stations wired for preset conference will be alerted.

4.35 To use preset conference:

(1) Lift handset.

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

(3) Dial "19"—tone burst signals all stations wired for preset conference.

Note: Attendant may use DSS code "19" if equipped with DSS console.

(4) Announcement is made to all preset conference stations simultaneously.

D. Music-On-Hold

4.36 The music-on-hold feature transmits music to calling or called parties on CO/PBX lines that are placed on hold.

4.37 Music-on-hold is provided on CO/PBX lines by a 451A or B KTU, a 33A voice coupler, and a customer-provided music 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.

Caution: The output of the CP music source must furnish ac coupling only—thus blocking all direct current to the input terminals of the 33A voice coupler.

The CP 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 blow the fuses in the voice coupler. If the customer wants a copy of the Technical Reference covering the 33A voice coupler, contact the local Telephone Company Business Office or the Marketing Representative. 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.

4.38 Make connections as follows:

(a) 451A or B KTU in J18. See Fig. 37 for KTU location.

(b) Install 33A voice coupler (Fig. 9) as follows:

(1) Remove cover from voice coupler.

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

(3) Connect voice coupler to 570A KSU as shown in Fig. 38.

(4) Have customer connect voice coupler to his music source as shown in Fig. 38.

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

(5) Replace cover on voice coupler.

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

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

(2) Place call to a 7A station.

(3) Answer call and place it on hold.

(4) Have customer adjust his music source for a comfortable listening level at the held station.

(5) Disconnect call.

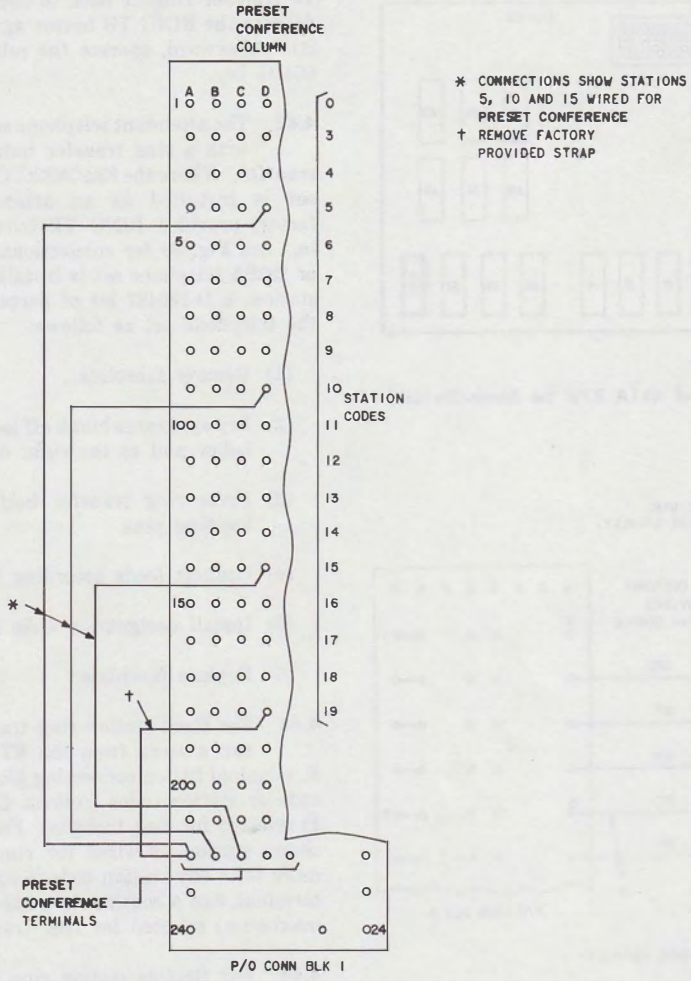


Fig. 36—Connections for Intercom Preset Conference

E. Ring Transfer

4.39 Ring transfer switches the incoming CO/PBX ringing from the attendant station (code 0) to an alternate telephone or telephones in the 7A System. Ring transfer can be wired for fixed station or as a flexible station arrangement. With fixed station ring transfer, incoming CO/PBX calls are transferred to a specific station or group of stations as fixed by an option strap in the KSU. The flexible station 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.

4.40 To operate ring transfer wired for fixed station transfer, depress RING TR button on attendant telephone set (locking it down). To transfer ringing back to the attendant station, depress RING TR button again (which releases it).

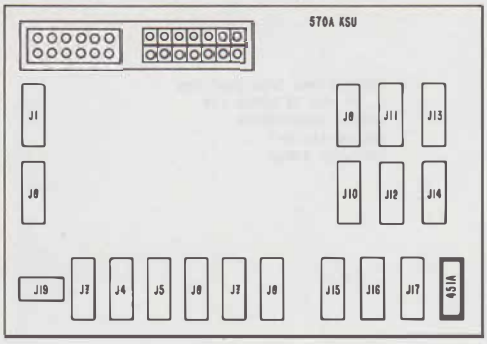


Fig. 37—Location of 451A KTU for Music-On-Hold

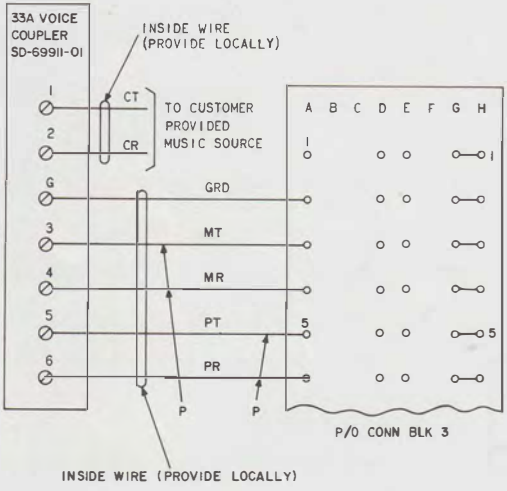


Fig. 38—Connections for 33A Voice Coupler

While the button is depressed, the lamp under it is lit (steady).

4.41 To operate ring transfer arrangement for flexible station transfer, depress button on the 6041G key associated with the station or stations to receive incoming CO/PBX calls. Then depress RING TR button on the attendant telephone set (locking it down). While the button on the attendant set 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). Afterward, operate the release button on the 6041G key.

4.42 The attendant telephone set must be equipped with a ring transfer button to control ring transfer. Where the 832/2832C, CM or EM telephone set is installed as an attendant station, the factory-provided RING TR button must be wired in. See Fig. 39 for connections. Where the 832A or 2832A telephone set is installed as an attendant station, a D-180487 kit of parts must be added to the telephone set as follows:

(1) Remove faceplate.

(2) Pry apparatus blank off locating pins (located below and to the right edge of key strip).

(3) Press ring transfer button (651C key) on locating pins.

(4) Connect leads according to Fig. 39.

(5) Install designation strip in key cap.

(6) Replace faceplate.

4.43 For fixed station ring transfer, in the KSU, run a strap from the RT terminal (column F, terminal 24) on connecting block 1 to the station code or station codes (column C, connecting block 1) selected for ring transfer. For example, Fig. 39 shows station 12 wired for ring transfer. When more than one station code is connected to the RT terminal, run a continuous strap to all stations (10 maximum) selected for ring transfer.

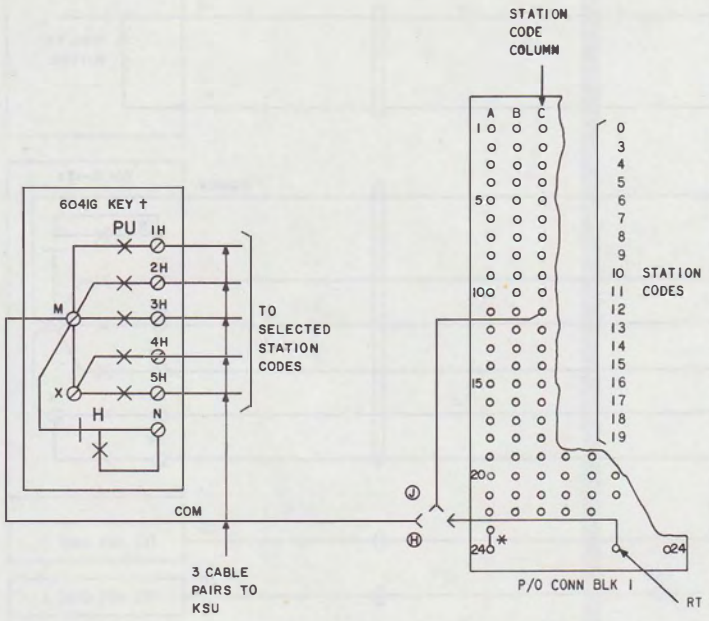
4.44 For flexible station ring transfer.

(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 and strap terminals M and X together (see Fig. 39 or 40).

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



TELEPHONE SET CONNECTIONS FOR RING TRANSFER.
- D-180487 KIT OF PARTS REQUIRED FOR 832A AND 2832A TEL SETS.
- CONNECTIONS ONLY FOR 832C AND 2832C TEL SETS.

RING TRANSFER KEY LEADS	REMOVE LEAD FROM TEL SET		CONNECT LEAD TO TEL SET	
	TERMINAL BOARD			
COLOR	COLOR		TERMINAL	
G				14
V-BR				27
O-BK				16
W-O				1
Y				5
Y-G				26
BR-V				9
G-Y				
	O-V		1	5
	V-BR		28	14
	G-V		8	16
832C OR 2832C TEL SETS, CONNECTIONS ONLY	O-V		1	5
	V-BR		28	14
	G-V		8	16

* FACTORY-PROVIDED STRAP ON INSTALLERS SIDE OF BLOCK

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

OPTIONS:

Ⓙ FIXED STATION RING TRANSFER.
ANY STATION MAY BE SELECTED FOR RING TRANSFER. TRANSFER TO STATION 12 IS SHOWN HERE.

Ⓗ FLEXIBLE STATION RING TRANSFER.
ANY ONE OF UP TO FIVE STATIONS MAY BE SELECTED FOR RING TRANSFER THROUGH 6041G KEY

Fig. 39—Connections for Ring Transfer

(5) At the KSU, terminate one conductor (common lead) on the RT terminal (column F, terminal 24) of connecting block 1.

(6) Terminate the remaining five conductors on the terminals of connecting block 1, column C, corresponding to the codes of the stations selected for ring transfer (see Fig. 39).

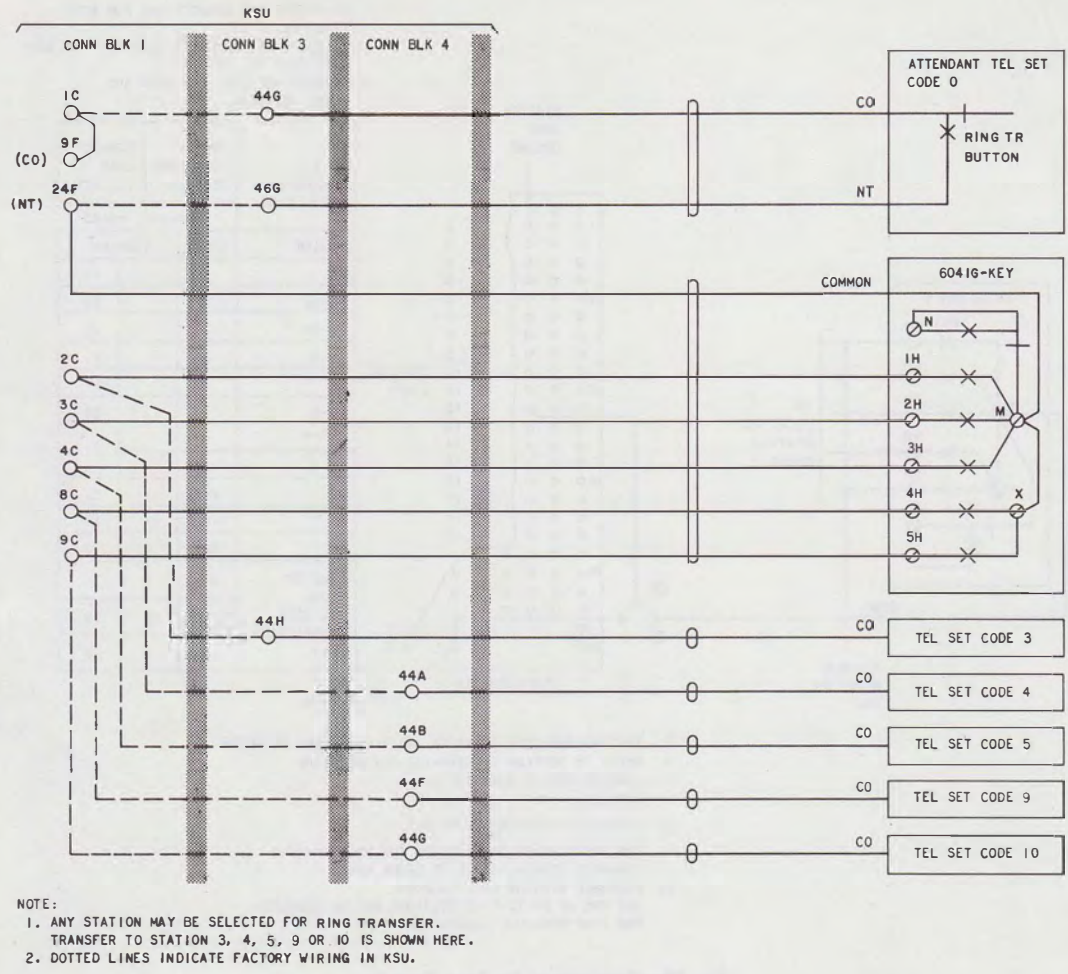
(7) Install designation strip on 6041G key. Designate the first button (position A) as RELEASE and label the remaining buttons according to the stations they connect for ring transfer.

F. Paging and Background Music

4.45 In the 7A System, paging may be:

(a) Provided for up to seven speakers, using indoor or outdoor speakers

(b) Connected to a COAM paging system



NOTE:
1. ANY STATION MAY BE SELECTED FOR RING TRANSFER. TRANSFER TO STATION 3, 4, 5, 9 OR 10 IS SHOWN HERE.
2. DOTTED LINES INDICATE FACTORY WIRING IN KSU.

Fig. 40—Example of Connections for Flexible Station Ring Transfer Arrangement

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

4.46 For background music, a 33A voice coupler must be installed and connected to the KSU and customer-provided music source according to 4.38(b). When the paging system is not being used, the customer-provided music source may be used to provide background music over the paging speakers.

4.47 A paging system should be loud enough to be heard but not loud enough to annoy those who work near the speakers. The number and location of speakers are influenced mainly by the environment in which they will be located. Fig. 41 shows several examples of speaker placement. It may be necessary to experiment with speaker placement on site to achieve the desired results. Noisy locations may require additional speakers or an auxiliary paging system. Refer to Section

981-251-100 for general information on loudspeaker paging system.

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 minimum separation of 60 feet between telephone sets and loudspeakers is recommended. The problem can also be reduced by using a 456B voice and tone alerting circuit KTU instead of a 456A.

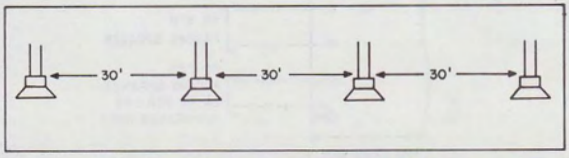
4.48 The system is factory-wired so paging may be activated by dialing code 2.

4.49 Make connections as follows:

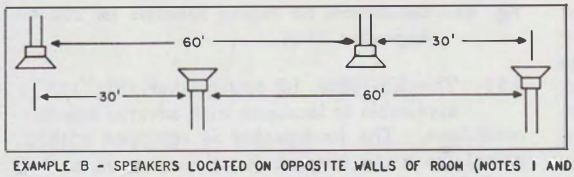
(1) Install 457C KTU in J15. See Fig. 42 for KTU location.

(2) If background music is provided, install the 33A voice coupler according to 4.38(b).

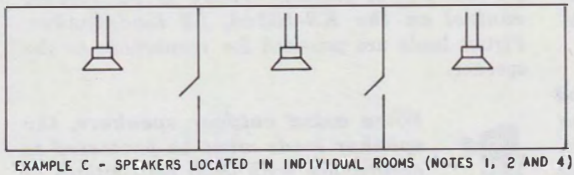
(3) Connect paging speakers as shown in Fig. 43. Speaker wiring should be run separately and not a part of a voice cable. Quad inside wire should be used with both pairs connected. (Where it may become necessary to "stack" wires on the connecting block terminals, use 183B2 adapters.) Speakers connected in this manner can be located a maximum of 320 feet from the



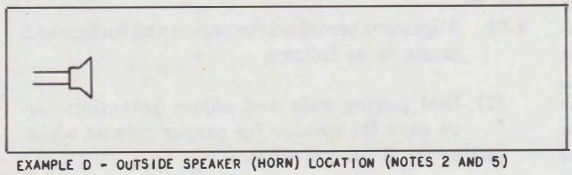
EXAMPLE A - SPEAKERS LOCATED ON ONE WALL OF ROOM (NOTES 1, 2 AND 3)



EXAMPLE B - SPEAKERS LOCATED ON OPPOSITE WALLS OF ROOM (NOTES 1 AND 2)



EXAMPLE C - SPEAKERS LOCATED IN INDIVIDUAL ROOMS (NOTES 1, 2 AND 4)



EXAMPLE D - OUTSIDE SPEAKER (HORN) LOCATION (NOTES 2 AND 5)

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. 41—Example of Paging Speaker Location

KSU. Indoor speakers should be hung as close to the ceiling as possible.

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

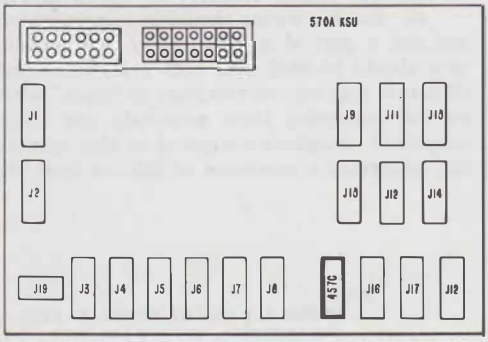


Fig. 42—Location of 457C KTU, Paging Amplifier

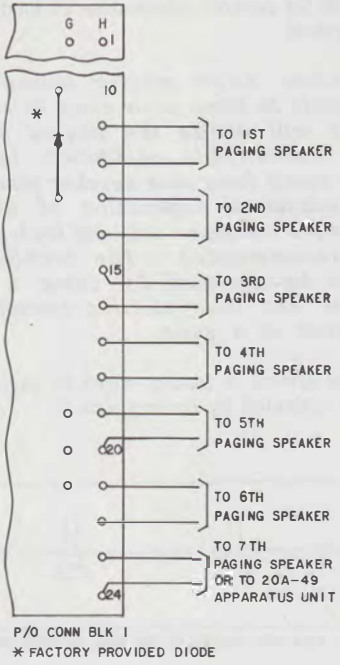


Fig. 43—Connections for Paging Speakers (or 20A-49 Apparatus Unit)

4.50 The K8 loudspeaker (Fig. 10) is an indoor speaker. It is wall-mounted or may be mounted over an outlet box. A mounting clip is furnished with the speaker. To mount speaker (see Fig. 10), 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 level will be affected by changes in room content. The addition of furniture, fixtures, draperies, carpeting or wall covering may necessitate increasing speaker volume, which, however, may increase the tendency of the system to "squeal" because of feedback between loudspeakers and telephones. If this occurs, try to change the relative positions of loudspeakers and telephones, if possible. If a 456A voice and tone alerting circuit is used, replace it with a 456B.

4.51 The KS-16846, L2 loudspeaker (Fig. 11) is applicable to locations with adverse weather conditions. The loudspeaker is equipped with a swivel mounting bracket for mounting on a flat surface. Also the speaker can be fastened to a 1/2-inch pipe or conduit. ***There is no volume control on the KS-16846, L2 loudspeaker.*** Pigtail leads are provided for connections to the speaker.

When using outdoor speakers, the speaker leads must be protected in accordance with local instructions or Section 460-100-400.

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

(1) Dial paging code and adjust potentiometer on each K8 speaker for proper volume while paging in a normal voice.

(2) Disconnect.

(3) Have customer adjust potentiometer on voice coupler for desired level of background music over paging system.

(4) Inform customer after alignment is complete that, if he readjusts 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.

4.53 A COAM paging system or a separate telephone company-provided paging system is connected to the 7A System through a 20A-49 apparatus unit (see Fig. 44). The 20A-49 apparatus unit is mounted externally to the KSU.

(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 KSU (wherever customer desires).

(3) Connect the apparatus unit to the KSU as shown in Fig. 44. Wiring should be run separately and not be a part of the voice cable.

(4) Have customer connect his paging system to the apparatus unit, using shielded wire, as shown in Fig. 44.

(5) Replace cover on apparatus unit.

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

(1) Turn potentiometer to full counterclockwise position.

(2) Select an idle intercom path and dial 2 (paging code).

(3) Using normal voice level, make test announcement while turning potentiometer clockwise until suitable voice level for COAM equipment is reached.

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

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.

(4) Disconnect call.

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.

G. Power Failure Ringer

4.54 For each location to be equipped with power failure transfer, a power failure ringer (E1C) must be installed. Install the E1C ringer near telephone set location. See Fig. 45 for connections.

H. Power Failure Transfer

4.55 Utilizing a 452A KTU and externally mounted E1C ringers, this feature provides an audible indication of incoming CO/PBX calls during a power failure condition.

4.56 The tip and ring of all CO/PBX lines are wired to line ringers through normally made contacts of relays in the 452A KTU. The 452A KTU is held operated while local power is available. When power is lost to the KSU, the 452A KTU releases and the tip and ring of the CO/PBX lines are cut through to the line ringers.

4.57 The tip and ring from each CO/PBX line is brought out on connecting block 1 (Fig. 45). The tip and ring of the desired CO/PBX line may be strapped to the V-S and S-V pair of the desired station by connections as shown in Fig. 45. In this instance, the tip and ring of the first CO/PBX line is strapped to the V-S and S-V pair of station 3. This puts line ringing at station 3 if power failure should occur. The tip and ring may also be connected between the KSU and the external ringer by an auxiliary cable.

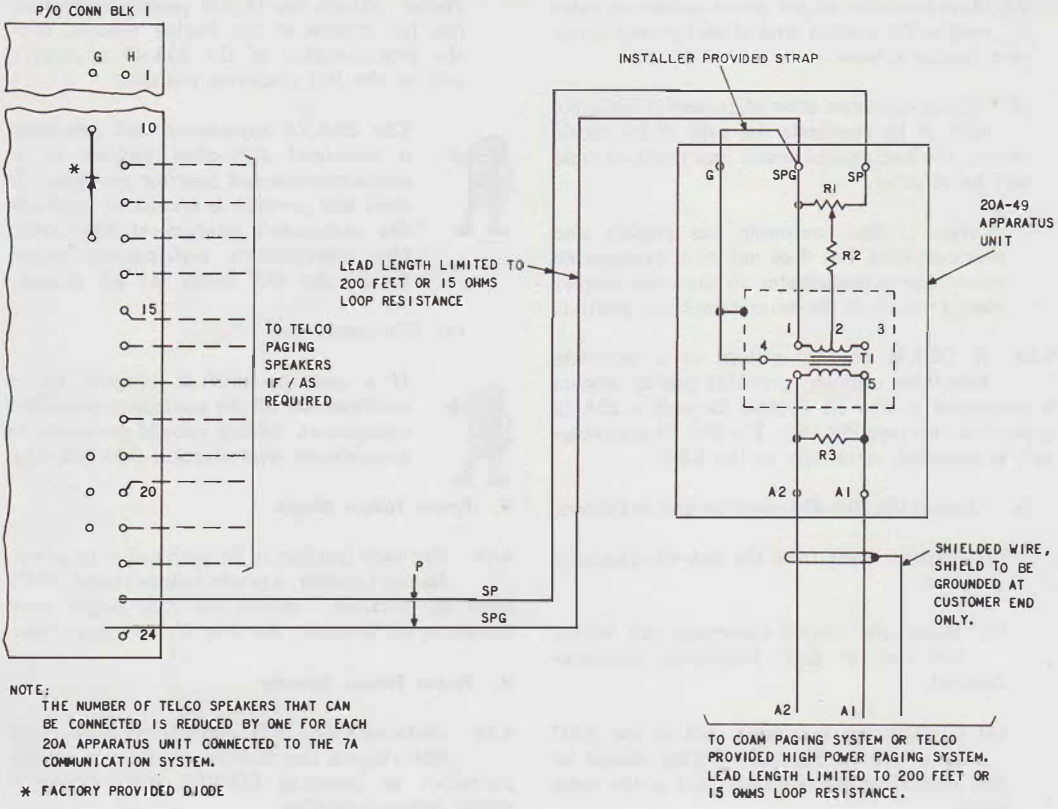


Fig. 44—20A-49 Apparatus Unit, Connections

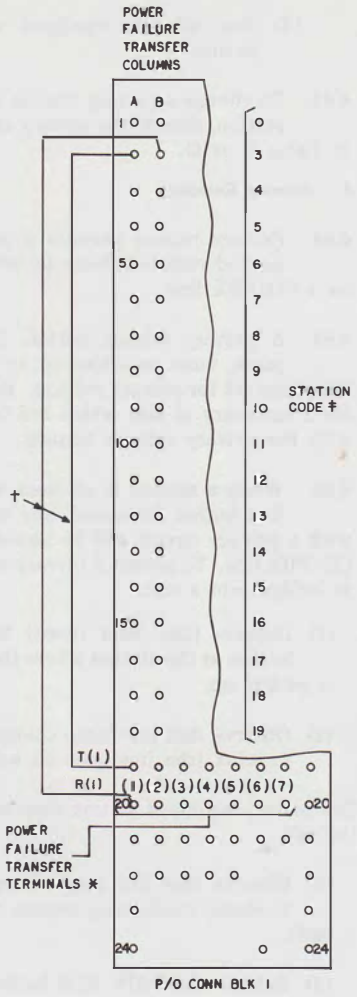
4.58 Install 452A KTU in J1. See Fig. 46 for KTU location.

I. Privacy

4.59 Privacy prevents a station from bridging into a CO/PBX call in progress. Privacy is a station feature, and each station that is to be excluded (locked out) must be equipped with a privacy circuit board.

4.60 A privacy circuit, D-180486 kit of parts, must be added to an 832/2832A, B, BM, or DM telephone set used as a privacy station. The 832/2832C, CM and EM telephone sets are wired at the factory with the privacy circuit operational.

4.61 The privacy circuit operates only when the telephone set is off-hook. The circuit monitors the "A" lead to determine the status of the line. A ground (or positive potential) on the "A" lead indicates the line is busy, operates the privacy circuit, and the station attempting to bridge is excluded. A negative potential on the "A" lead does not cause the privacy circuit to operate and the set is not excluded. There is no privacy on the intercom paths.



* NUMBERS SHOWN IN PARENTHESIS( ) REPRESENT THE 7 INCOMING CO/PBX LINE NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON THE BLOCK.

† CONNECTIONS AS SHOWN PUTS POWER FAILURE IN THE STATION CABLE FOR STATION 3

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

§ USE INSIDE WIRE FOR RINGER CONNECTIONS.

CONNECT POWER FAILURE RINGER (E1C) BY ONE OF THE FOLLOWING METHODS:

	FROM TEL SET TERMINAL	TO RINGER TERMINAL	LEAD DESIGNATION
1 §	20	5	ER
	21	6	ET
2 §	FROM A25B CABLE CONNECTOR (USING ADAPTER)	TO RINGER TERMINAL	LEAD DESIGNATION
	PIN 25	5	ER
	PIN 50	6	ET
3 §	FROM CONN BLK 3, 4 OR 5 IN KSU	TO RINGER TERMINAL	LEAD DESIGNATION
	TERM 50	5	ER-
	TERM 49	6	ET-

Fig. 45—Connections for Power Failure Transfer

4.62 Mount the D-180486 kit of parts (privacy circuit) as follows:

(1) Remove faceplate.

(2) Mount privacy circuit board on the two standoffs located at the left front of the telephone set base (Fig. 47).

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

(4) Connect leads according to Table E.

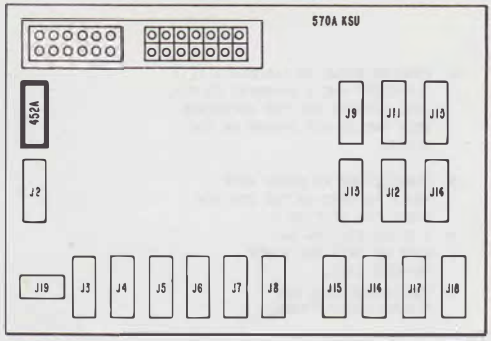


Fig. 46—Location of 452A KTU, Power Failure Transfer Relays

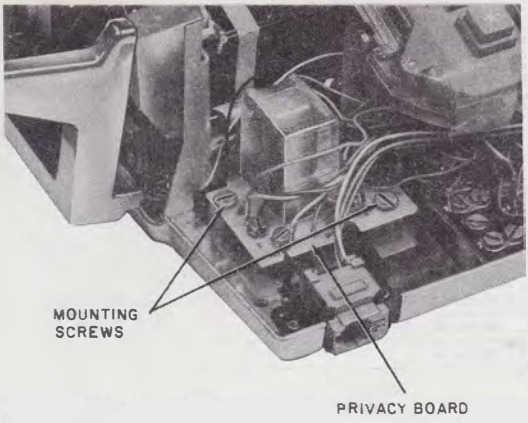


Fig. 47—Privacy Circuit Mounted in Telephone Set

(5) To test privacy circuit:

(a) At a station other than the one being tested, lift handset and depress a CO/PBX line button.

(b) At station being tested, lift handset and depress CO/PBX line button on same line; no side tone should be heard.

(c) Repeat test on all CO/PBX lines.

(d) Test all sets equipped with a privacy circuit.

4.63 To change a privacy station to a nonprivacy station, disable the privacy circuit according to Table F or G.

J. Privacy Release

4.64 Privacy release permits a privacy-equipped (locked out) telephone to bridge into a call on a CO/PBX line.

4.65 A privacy release button, D-180488 kit of parts, must be added to an 832A or 2832A telephone set for privacy release. Refer to Table D for a summary of sets which are factory-equipped with the privacy release feature.

4.66 When a station is off-hook with a CO/PBX line button depressed, any station equipped with a privacy circuit will be locked out from that CO/PBX line. To permit a privacy-equipped station to bridge into a call:

(1) Depress (and hold down) the PRIV RLS button at the station where the CO/PBX line is picked up.

(2) Observe that line lamp changes from steady to wink (the line goes on hold).

The privacy-equipped station may now bridge into the call.

(3) Observe that line lamp changes from wink to steady (indicating station has entered the call).

(4) Release the PRIV RLS button.

4.67 To allow an additional privacy-equipped station to bridge into the call, both stations must depress their PRIV RLS buttons simultaneously. 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.

4.68 The D-180488 kit of parts (privacy release button) is mounted in the 832A or 2832A telephone set and connected as follows:

(1) Remove faceplate.

(2) Pry apparatus blank off locating pins (located below and to the right edge of key strip).

(3) Press privacy release button (651D key) on locating pins.

(4) Connect leads according to Table H.

(5) Install designation strip in key cap.

4.69 Where privacy release is no longer required, the privacy release button may be disabled. See Table I or J for connections.

K. Recall

4.70 Recall provides the same functions as switchhook flash without restoring the line buttons. Recall is accomplished by depressing the RECALL button on the telephone set. The RECALL button is designated with an amber cap.

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

4.71 A recall button, D-180591 kit of parts, must be added to an 832A or 2832A telephone set if this feature is required. All other 832- and 2832-type telephone sets are factory-equipped with a RECALL button.

4.72 The D-180591 kit of parts (recall button) is mounted in the 832A or 2832A telephone set and connected as follows:

(1) Remove faceplate.

(2) Pry apparatus blank off locating pins (located below and to the right edge of key strip).

(3) Press recall button (651F key) on locating pins.

(4) Connect leads according to Table K.

(5) Install designation strip in key cap and install amber key cap on RECALL button.

4.73 The 832A and 2832A telephone sets equipped with RECALL buttons are electrically equivalent to the 832/2832B, BM, and DM telephone sets.

L. Speakerphone

4.74 Normal speakerphone service may be provided at all stations in the system. Connect speakerphone as follows:

When installing a 3B or 4A speakerphone in conjunction with a modular 832- or 2832-type telephone set, determine if there is an orange (O) lead on terminal 27 of the telephone set terminal board. If there is, move it to terminal 22. Failure to move this lead will cause the telephone set dial to be inoperative when the speakerphone is in use.

3B Speakerphone

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

4A Speakerphone

4.76 Install 223A adapter within cord length (7 feet) of telephone set. Connect M16C cord to telephone set as shown in Table M. 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 additional information on 4A speakerphone connections.)

Note: Speakerphone does not prevent normal use of the telephone set for originating, receiving, or transferring calls.

4.77 To originate a call using speakerphone:

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

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

(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.

4.78 To answer an incoming call using speakerphone:

(1) When audible tone signals an incoming call, depress CO/PBX button associated with flashing lamp.

(2) Momentarily depress transmitter ON button. Audible signal is silenced and the speakerphone is connected to the line.

(3) Answer call using transmitter and loudspeaker to carry on conversation.

4.79 To disable transmitter when it is desired not 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 transmitter ON button and system is restored to hands-free operation.

4.80 To transfer from handset to speakerphone operation:

(1) Put line on hold.

(2) Hang up handset.

(3) Turn speakerphone on.

(4) Depress line button.

TABLE E

832/2832A, B, BM, AND DM TELEPHONE SET CONNECTIONS FOR PRIVACY CIRCUIT (D-180486 KIT OF PARTS)

COLOR	CONNECT LEAD TO TEL SET TERMINAL	MOVE LEAD	
		FROM TEL SET TERMINAL	TO PRIV BOARD TERMINAL
0*	8		
BR*	F on Network		
S*	15‡		
BK*	12		
BL*	6		
R†		13	P2
G-W†		13	P1
Y†		6	R1
0†		F on Network	T

* Privacy board leads.

† Tel set leads.

‡ Store slate lead under screw terminal S2 when privacy release is provided.

TABLE F

832/2832A, B, BM, AND DM TELEPHONE SET CONNECTIONS TO REMOVE PRIVACY CIRCUIT

COLOR	DISCONNECT LEAD FROM TEL SET TERMINAL	MOVE LEAD	
		FROM PRIVACY BOARD TERMINAL	TO TEL SET TERMINAL
0*	8		
BR*	F on Network		
S*	15‡		
BK*	12		
BL*	6		
R†		P2	13
G-W†		P1	13
Y†		R1	6
0†		T	F on Network

* Privacy board leads.

† Tel set leads.

‡ Remove slate lead from under screw terminal S2 when privacy release is provided.

TABLE G

ALL 832/2832-TYPE TELEPHONE SET CONNECTIONS TO DISABLE PRIVACY CIRCUIT

COLOR	MOVE LEAD IN TEL SET	
	FROM TERM.	TO TERM.
O	8	*

* Insulate and store.

4.81 To transfer from speakerphone to handset operation, lift handset during speakerphone operation to automatically transfer to handset operation. When it is necessary to transfer back to speakerphone, refer to 4.80 to prevent disconnect.

4.82 To terminate a call on speakerphone, momentarily depress transmitter OFF button.

Note: Restore depressed line buttons after a conference call.

TABLE H

832A AND 2832A TELEPHONE SET CONNECTIONS FOR PRIVACY RELEASE BUTTON (D-180488 KIT OF PARTS)

TEL SET LEAD	PRIVACY BOARD LEAD	PRIVACY RELEASE KEY LEADS	MOVE LEADS FROM TEL SET TERM.	CONNECT TO TEL SET TERM.	MOVE LEADS TO PRIVACY BOARD TERM.
		O-BK		10	
		BK-BL		15	
		G-Y		27	
		Y-G		27	
		G-W		2*	S2†
BK			15	2*	S2†
	S†		15		S2

* If telephone set does not have privacy circuit.

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

TABLE I

832A AND 2832A TELEPHONE SET CONNECTIONS TO REMOVE PRIVACY RELEASE BUTTON

TEL SET LEAD	PRIVACY BOARD LEAD	PRIVACY RELEASE BUTTON LEADS	REMOVE FROM TEL SET TERM.	MOVE LEADS	
				FROM PRIVACY BOARD TERM.	TO TEL SET TERM.
		O-BK	10		
		BK-BL	15		
		G-Y	27		
		Y-G	27		
		G-W	2*	S2	
BK			2*	S2	15
	S†			S2	15

* If telephone set does not have privacy circuit.

† If telephone set has privacy circuit and privacy release is being removed.

TABLE J

ALL 832/2832-TYPE TELEPHONE SET CONNECTIONS TO DISABLE PRIVACY RELEASE BUTTON

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

TABLE K

832A AND 2832A TELEPHONE SET CONNECTIONS FOR RECALL BUTTON (D-180591 KIT OF PARTS)

651F KEY	CONNECT TO	
LEAD COLOR	TERMINAL BOARD	NETWORK
W		GN
W		R
Y	4	
Y	6	

Note: Remove Y strap from 4 and 6 on telephone set terminal board.

M. Station Busy Consoles (Fig. 48 and 49)

4.83 If only one console is to be used with a 7A System, cut down its A25B connector cable on column E (DSS console) or column D (MW console) of block 3 in the KSU (Fig. 50 and 51). However, if more than one console is to be installed, auxiliary connection blocks may be required and additional power connections must be made. Fig. 52 through 58 provide connecting information for all permissible multiconsole installations. Refer to Table N for an index to these diagrams.

If one or more DSS consoles are to be installed, be sure that the D0 to D1 and CG0 to CG1 straps on connecting block 3 are removed (see connection diagrams). If no DSS console is installed, be sure that the straps are in place.

Station Busy Console (6A1) With DSS

4.84 By depressing the appropriate button on the 6A1 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. Seventeen buttons on the console correspond to the station codes (codes 3 through 19); one button is associated with paging, one button is arranged for recall, and one button is spare. See Fig. 48 for schematic of 6A1 selector console.

4.85 Any station having the handset off-hook lights a lamp under the associated button on the 6A1/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 6A1 console, thus lighting the lamp under the associated button in the DSS field.

4.86 To DSS from the 6A1 console:

(1) Lift handset on the associated telephone set.

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

(3) On the 6A1 console, momentarily depress button on DSS field corresponding to desired station—tone burst signals called station.

(4) Announcement may now be made to called party.

4.87 If called party may be reached at 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 party.

(3) Announcement may now be made to called party.

TABLE L

3B SPEAKERPHONE CONNECTIONS

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

Note: On modular sets, move orange lead from terminal 27 on tel set terminal board to terminal 22.

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

TABLE M

4A SPEAKERPHONE CONNECTIONS

M16C CORD		TELEPHONE SET TERMINAL	
LEAD COLOR	LEAD DESIG	832-TYPE	2832-TYPE
W-BR	A1	10	10
W-O	AG	8	8
BL-W	R1	6	6
W-BL	T1	RR (Network)	25
G-W	P4	24	
	IR		24
W-G	P3	30	
	IT		30
O-W	LK	29	29

Note: To reduce the volume of voice signaling or ringing while on speakerphone, make the following changes:

(1) Remove W-S from terminal 1 of telephone set amplifier and connect to S-W of M16C cord using spare terminal or D-161488 connector.

(2) Connect BL-R of M16C cord to amplifier terminal 1.

(3) On modular sets, move orange lead from terminal 27 on tel set terminal board to terminal 22.

Note: The selector may be repeatedly recalled (without losing the seized intercom path) by repeatedly depressing the RECALL button and the DSS button. If intercom call is answered at any point, you must hang up and start over.

4.88 To page from the 6A1/DSS console:

(1) Lift handset on the associated telephone set.

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

(3) Momentarily depress PAGE button on DSS console—tone burst will be heard over paging system loudspeakers.

(4) Speak into handset transmitter to make announcement.

(5) Replace handset.

Station Busy Console (6B1) With MW

4.89 By depressing the appropriate button on the 6B1 console, an attendant may signal any station that there is a message waiting by lighting the lamp under the station HOLD button. The console also provides the attendant with a visual indication of a busy station. Seventeen buttons on the console correspond to the station codes (3 through 19); three buttons are not used. See Fig. 49 for schematic of 6B1 console.

4.90 To signal an intercom station that there is a message waiting at the attendant, the attendant depresses the MW button associated with the desired station. The button will lock down in a partially depressed state causing the lamp under the HOLD button of the called station to light (steady). This steady lamp alerts the station user that he has a message waiting and to call the attendant. When the station calls the attendant, the attendant then depresses the associated MW button to release it.

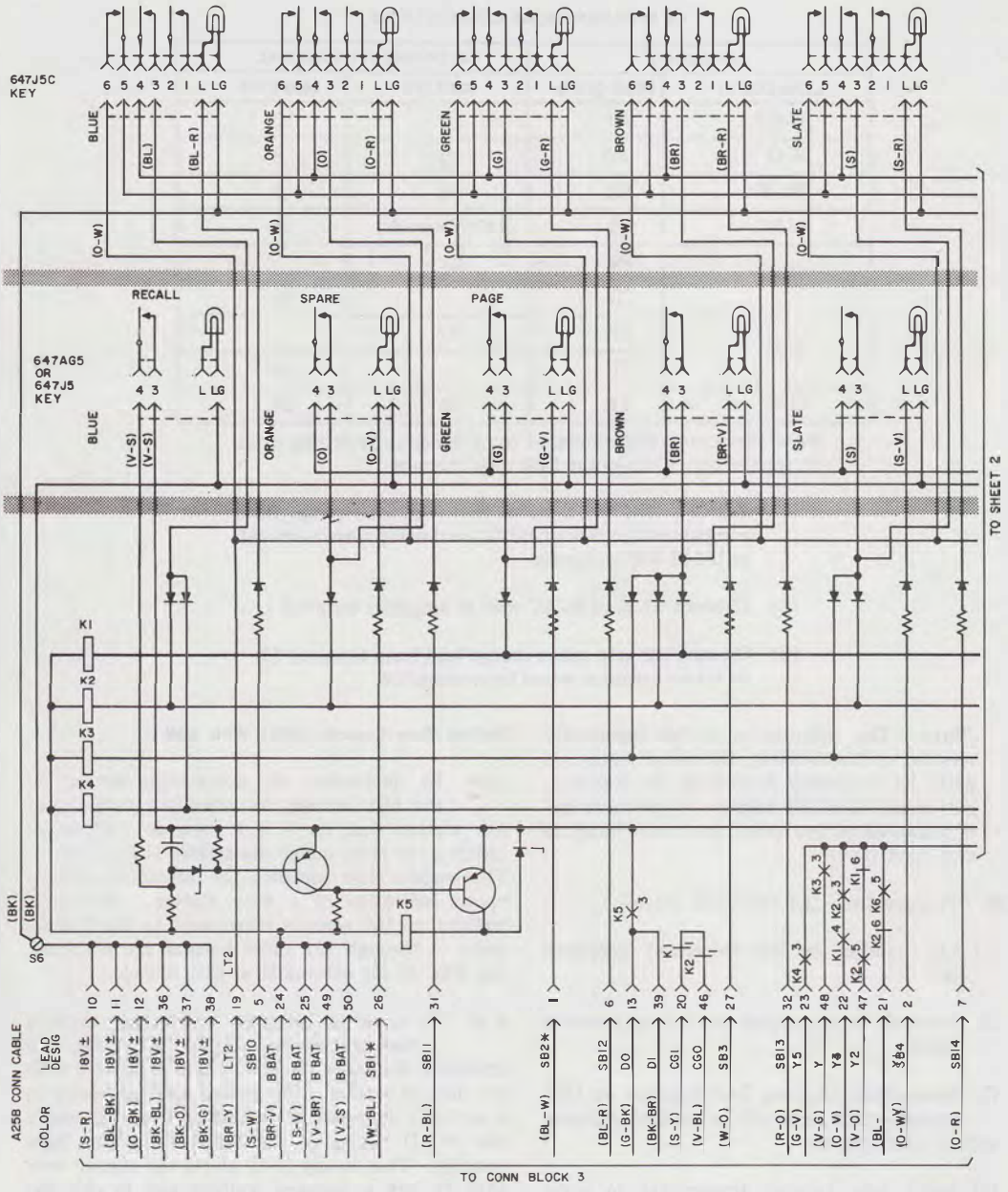


Fig. 48—6A1 Station Busy Console With DSS, Schematic (Sheet 1 of 2)

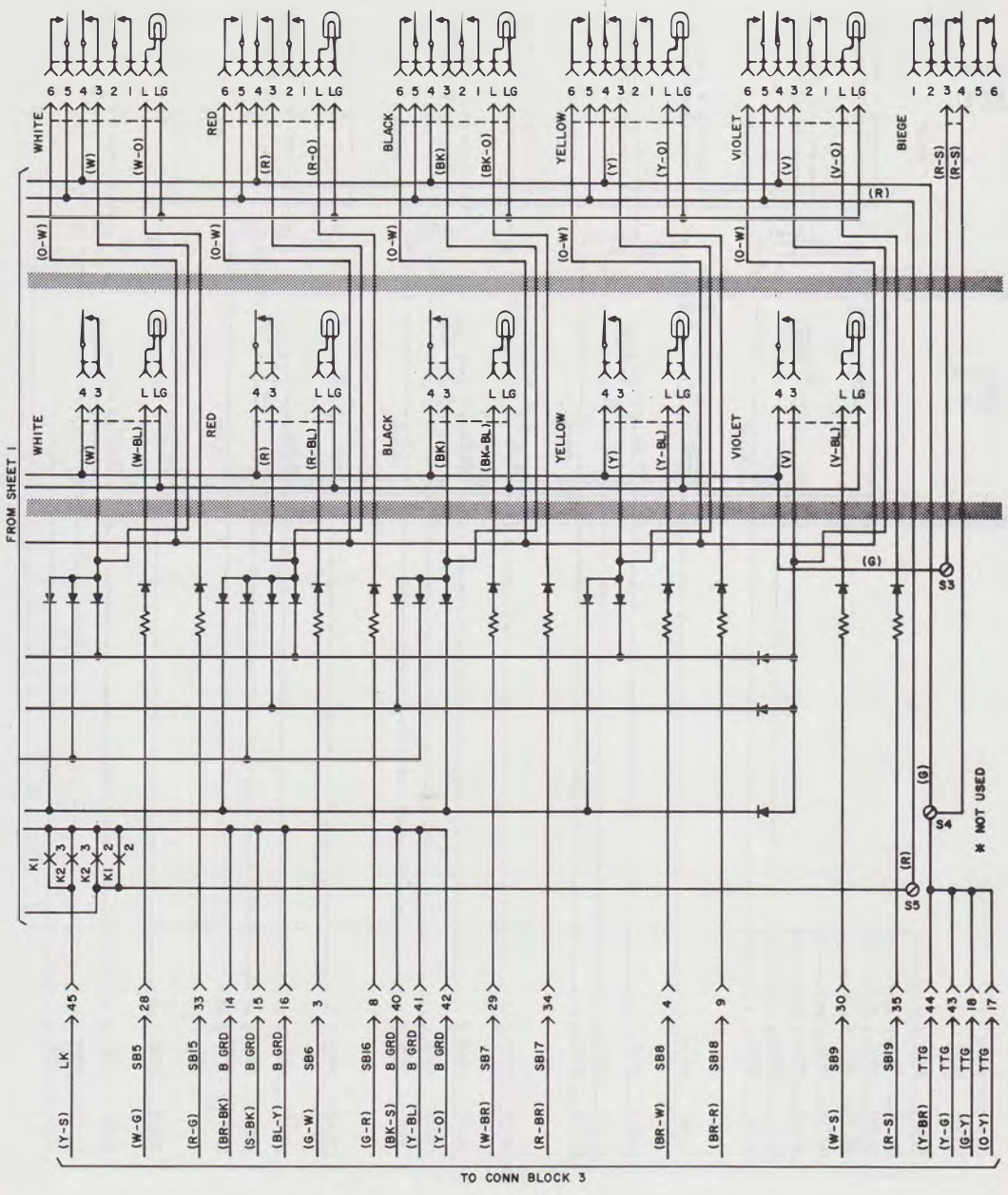


Fig. 48—6A1 Station Busy Console With DSS, Schematic (Sheet 2 of 2)

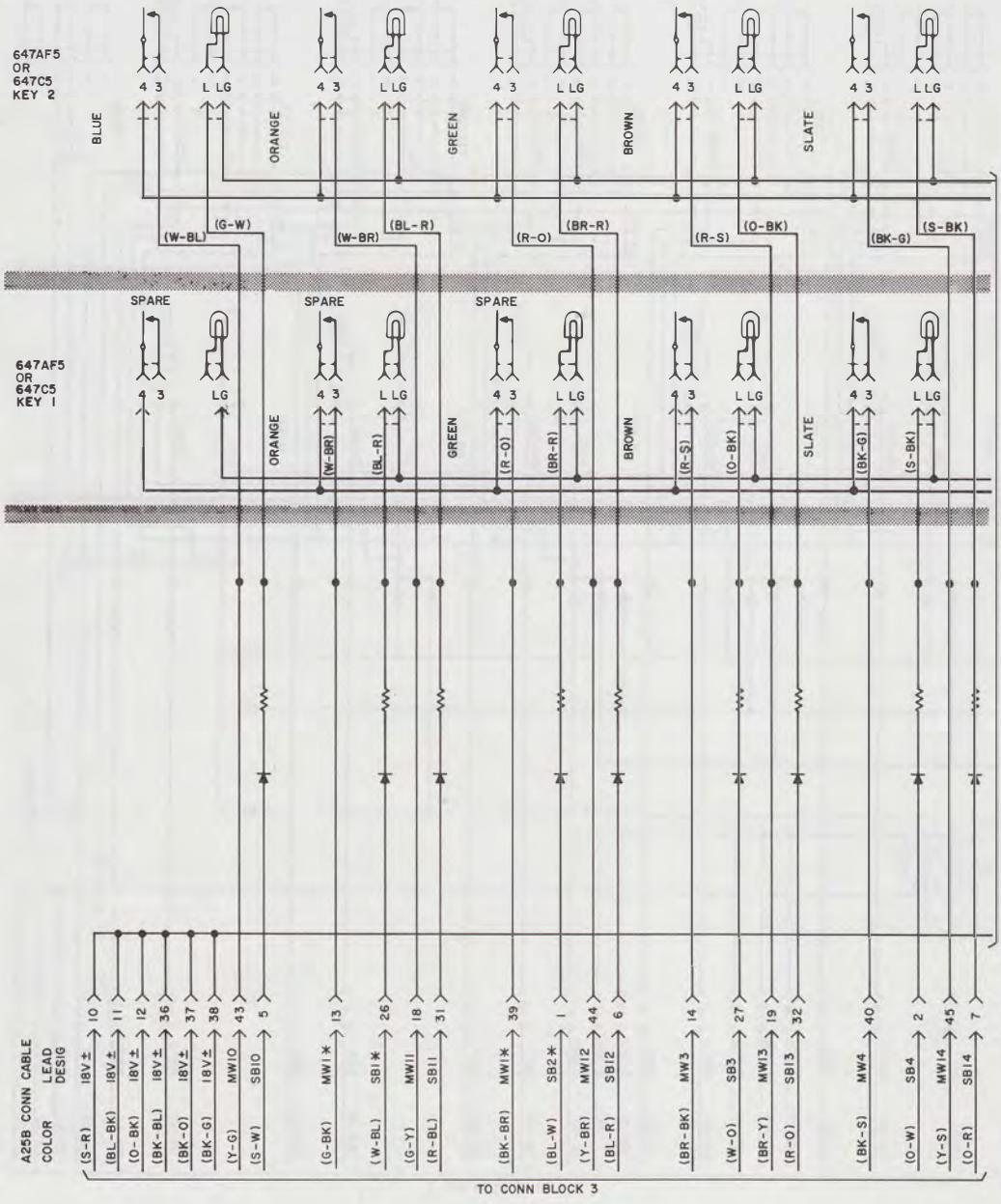


Fig. 49—6B1 Station Busy Console With MW, Schematic (Sheet 1 of 2)

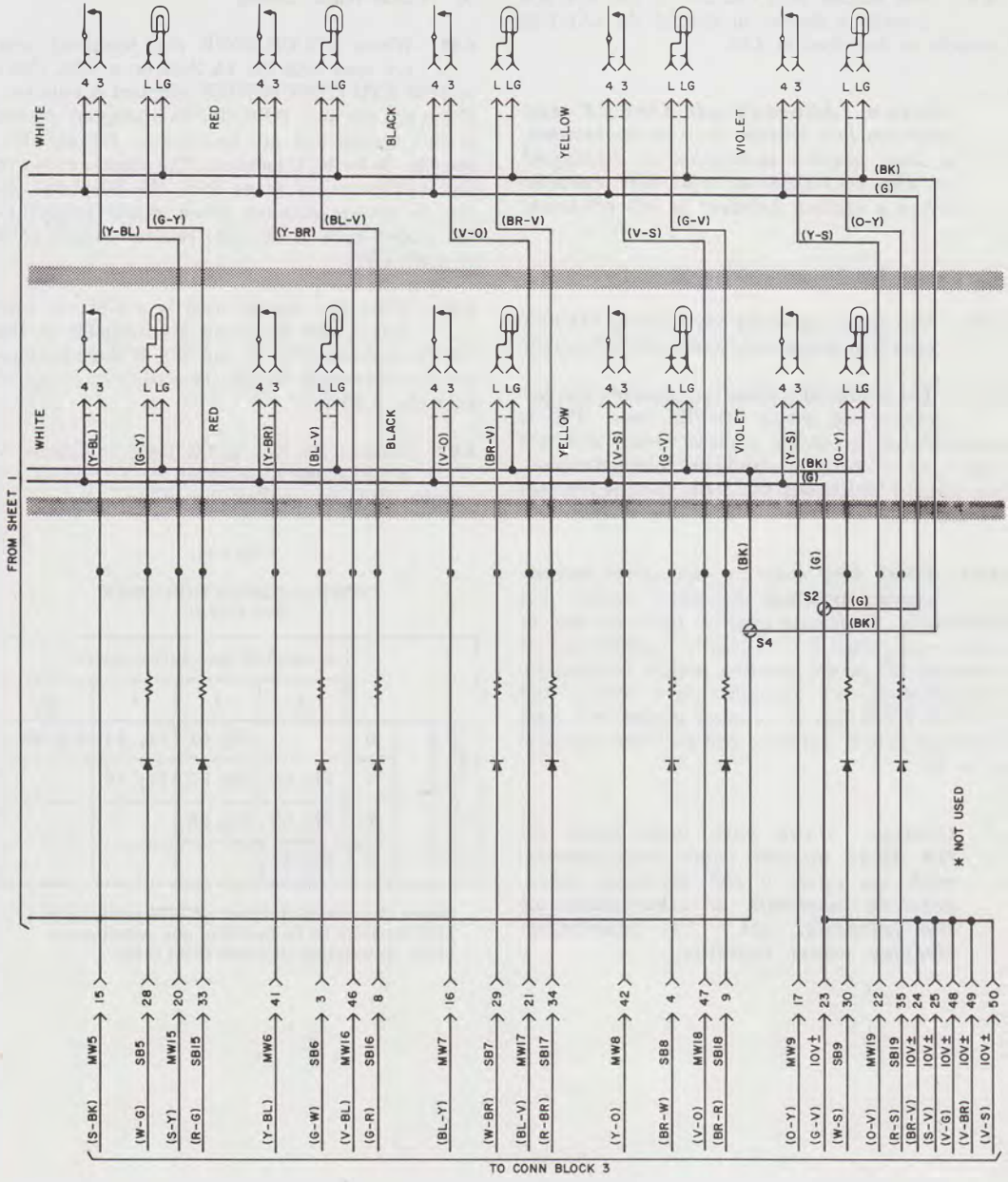


Fig. 49—6B1 Station Busy Console With MW, Schematic (Sheet 2 of 2)

4.91 The station busy feature of the 6B1/MW console is similar to that of the 6A1/DSS console as described in 4.85.

Caution: Although all CO/PBX and intercom line buttons may be unoperated, a busy station indication is displayed at the 6A1/DSS or 6B1/MW console when a station handset is left off-hook.

N. Station Restriction

4.92 This feature prevents any outgoing CO/PBX calls from being made at a restricted station.

4.93 The restricted station may receive calls, but cannot call out on CO/PBX lines. This is accomplished by adding a diode (rotary dial sets only) and reversing two leads in the telephone set. On TOUCH-TONE sets, two leads must be reversed in the telephone sets.

4.94 Install 446F diode (or equivalent) between network terminals RR and F (rotary dial sets only). Terminate negative (cathode) lead of diode on terminal F with positive (anode) lead on terminal RR (arrow pointing toward terminal F). On telephone set terminal board (rotary and TOUCH-TONE dial sets), move ***green*** lead from terminal 22 to 4, and move ***red*** lead from terminal 4 to 22.

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.

O. TOUCH TONE® Dialing

4.95 Where TOUCH-TONE dial telephone sets are used with the 7A System; a 440A (MD) or 487B KTU (TOUCH-TONE adapter) is required. These are the only TOUCH-TONE adapters usable in this system and are installed in J13 and J14. See Fig. 59 for KTU location. The adapter converts the multifrequency tones from the telephone set dial to contact closures which supply ground to the proper leads in the code selector circuit, 424B or 424C KTU.

4.96 When the adapter used is a 478B, be sure that A and B ground are available at the J13/14 connector (Fig. 21 and 73). If these grounds are not connected, install the wiring kit supplied with the 478B KTU.

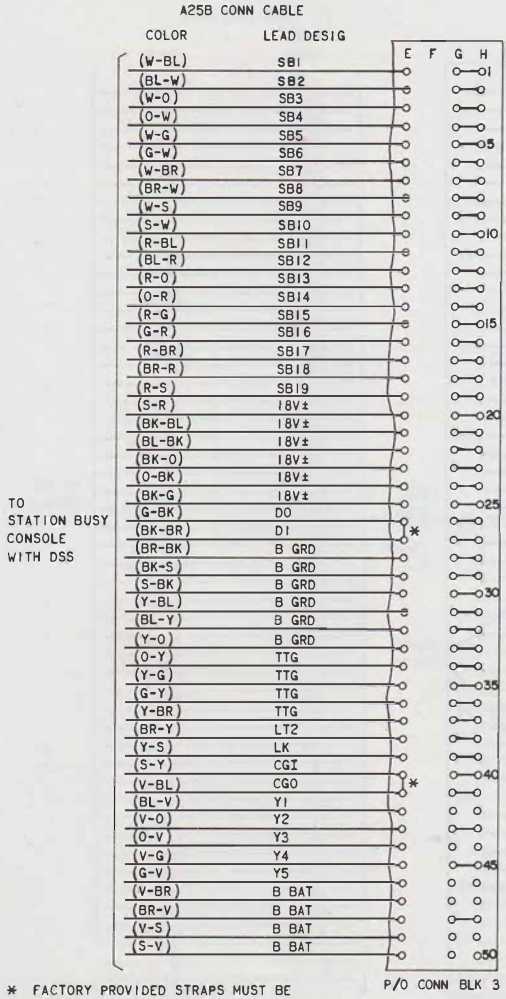
4.97 Remove the RS1 to CG strap in column A of connecting block 1 when any TOUCH-TONE adapter KTU is installed (Fig. 60).

TABLE N

CONSOLE CONNECTION INDEX (SEE NOTE)

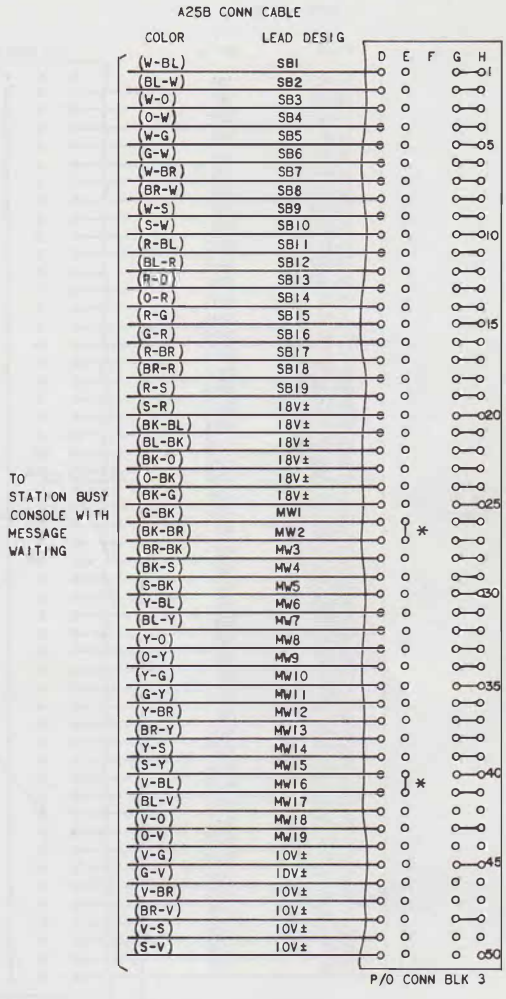
		NUMBER OF MW (6B1) CONSOLES			
		0	1	2	3
Number of DSS (6A1) Consoles	0		Fig. 51	Fig. 54	Fig. 58
	1	Fig. 50	Fig. 52	Fig. 56	
	2	Fig. 53	Fig. 55		
	3	Fig. 57			

Note: Determine number of DSS consoles and MW consoles to be installed and select applicable connection diagram from table.



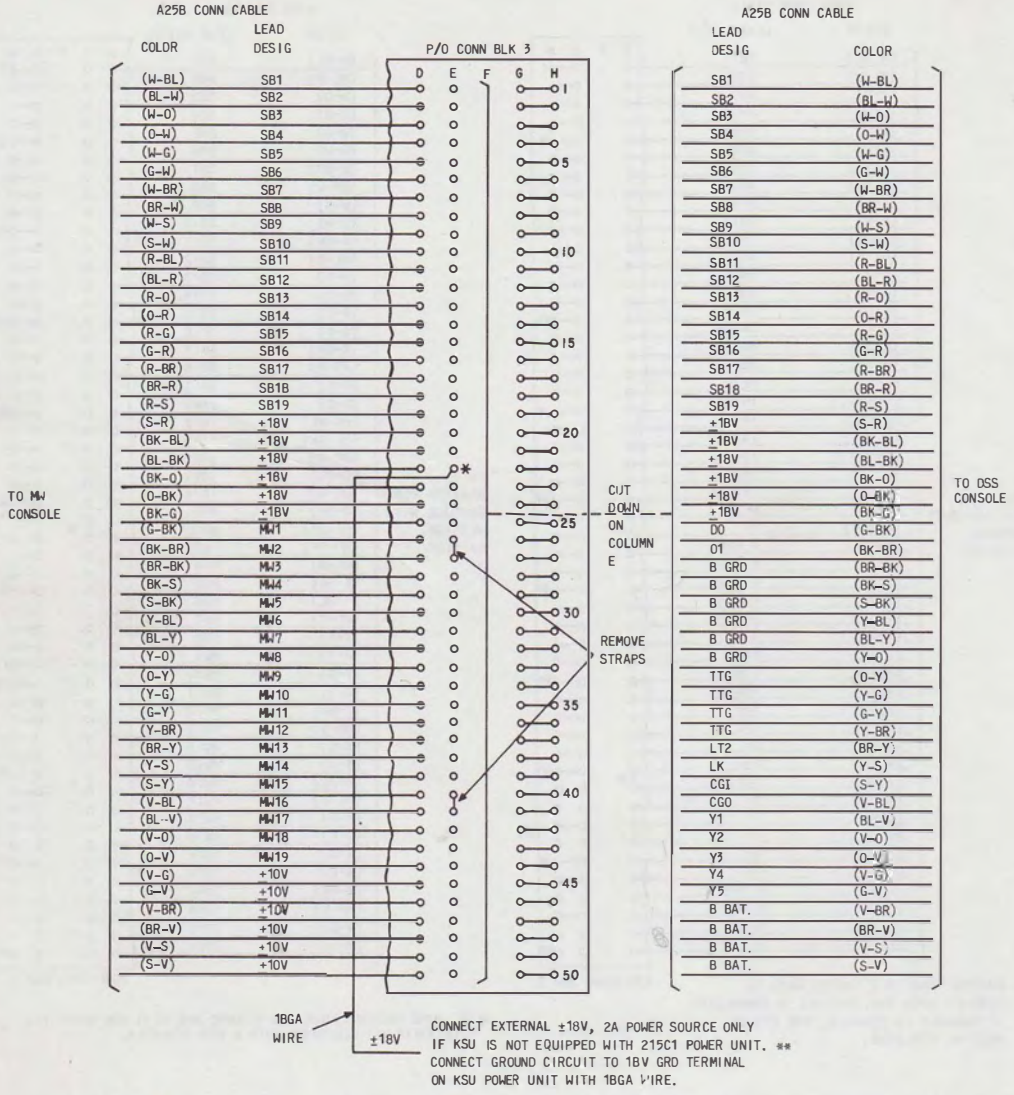
* FACTORY PROVIDED STRAPS MUST BE REMOVED WHEN DSS CONSOLE IS CONNECTED. IF CONSOLE IS REMOVED, THE STRAPS MUST BE REPLACED.

Fig. 50—Connections for One DSS Console



* BE SURE FACTORY PROVIDED STRAPS ARE IN PLACE WHEN THE SYSTEM IS NOT EQUIPPED WITH A DSS CONSOLE.

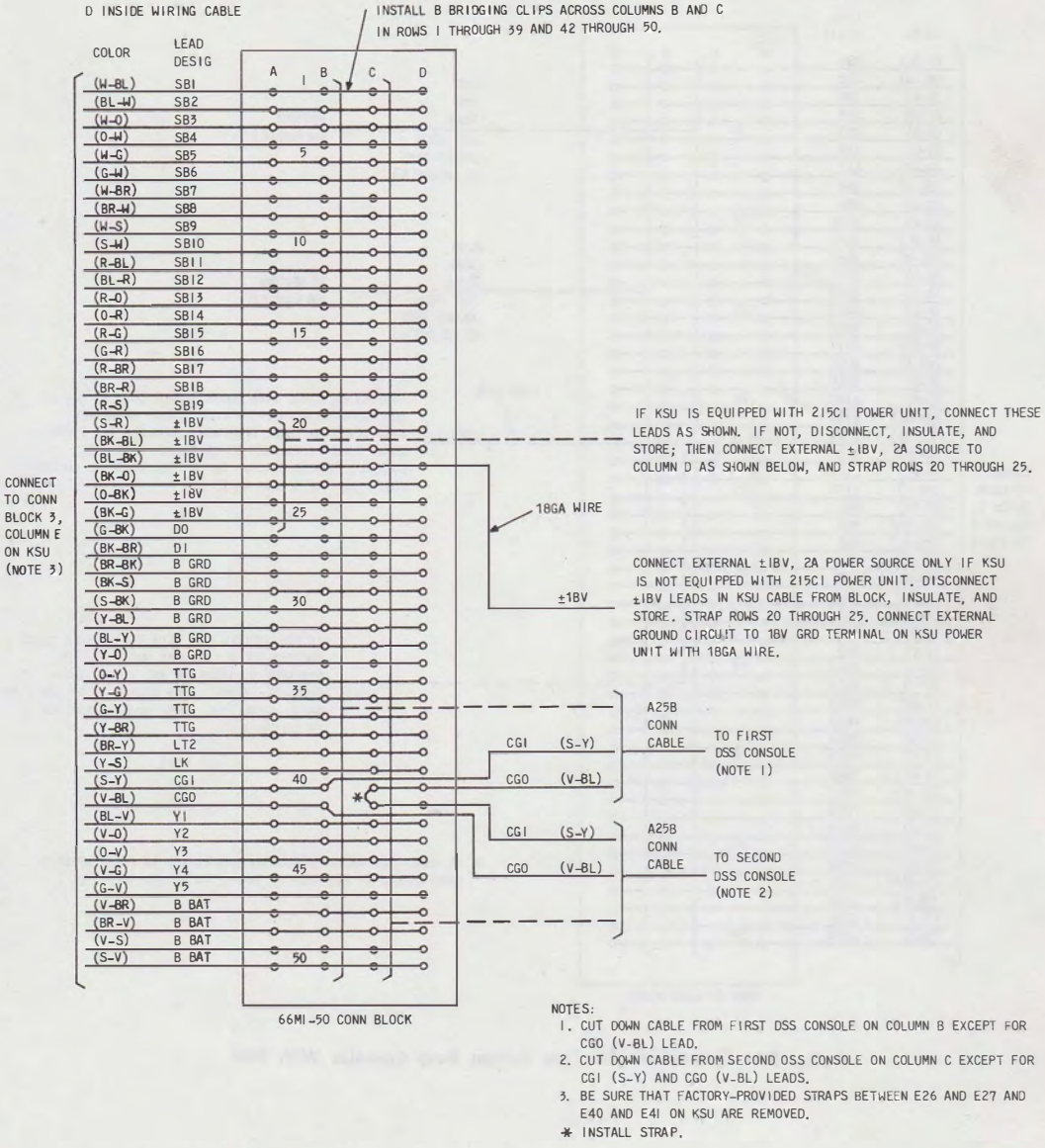
Fig. 51—Connections for One MW Console



* INSTALL 183B2 BRIDGING ADAPTER ON COLUMN E, ROWS 22-23 TO ENABLE CONNECTION OF EXTERNAL ±18V POWER SOURCE.

** IF EXTERNAL ±18V POWER SOURCE IS USED, DISABLE ±18V SUPPLY ON 19C2 OR 19C2A POWER UNIT BY REMOVING FUSE.

Fig. 52—Connections for One MW Console and One DSS Console



NOTES:
1. CUT DOWN CABLE FROM FIRST DSS CONSOLE ON COLUMN B EXCEPT FOR CGO (V-BL) LEAD.
2. CUT DOWN CABLE FROM SECOND DSS CONSOLE ON COLUMN C EXCEPT FOR CG1 (S-Y) AND CGO (V-BL) LEADS.
3. BE SURE THAT FACTORY-PROVIDED STRAPS BETWEEN E26 AND E27 AND E40 AND E41 ON KSU ARE REMOVED.

* INSTALL STRAP.

Fig. 53—Connections for Two DSS Consoles

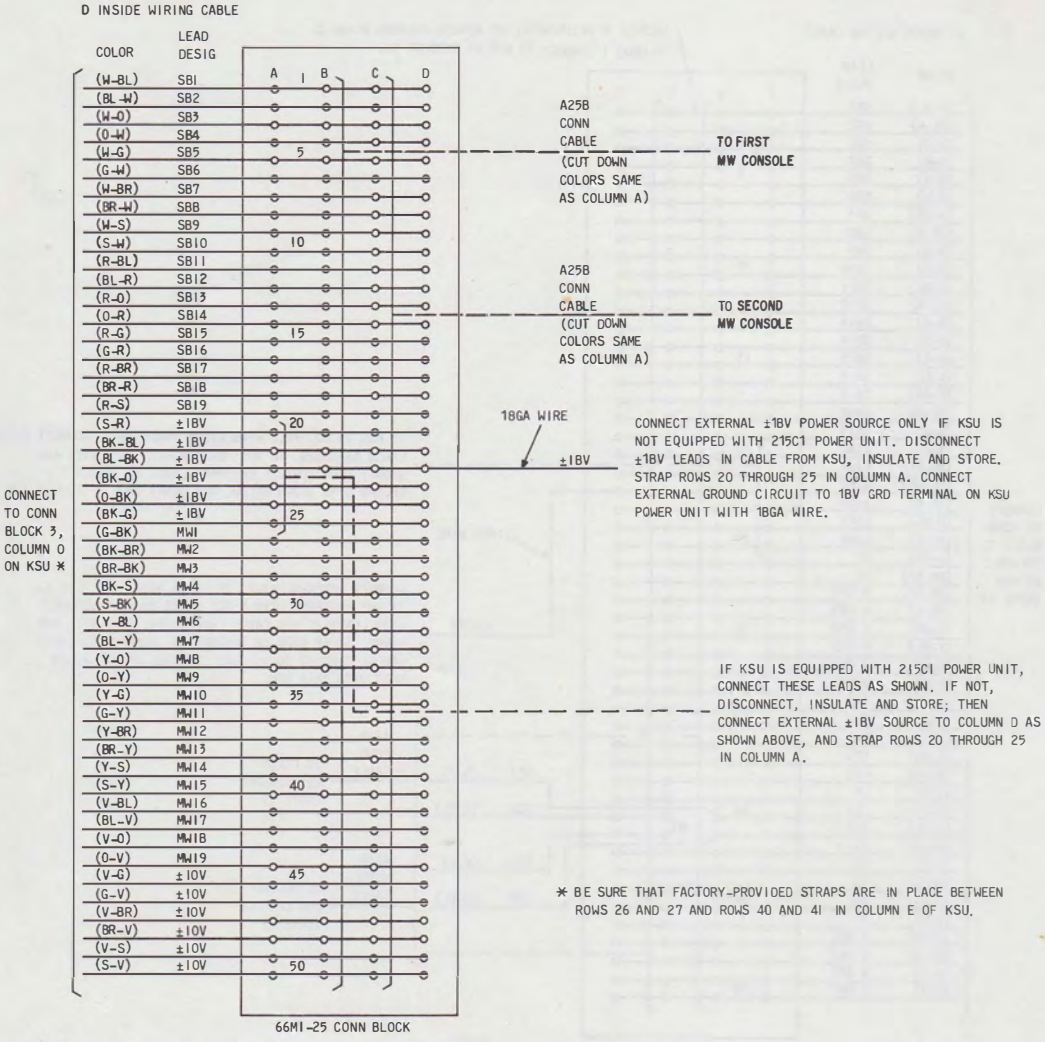
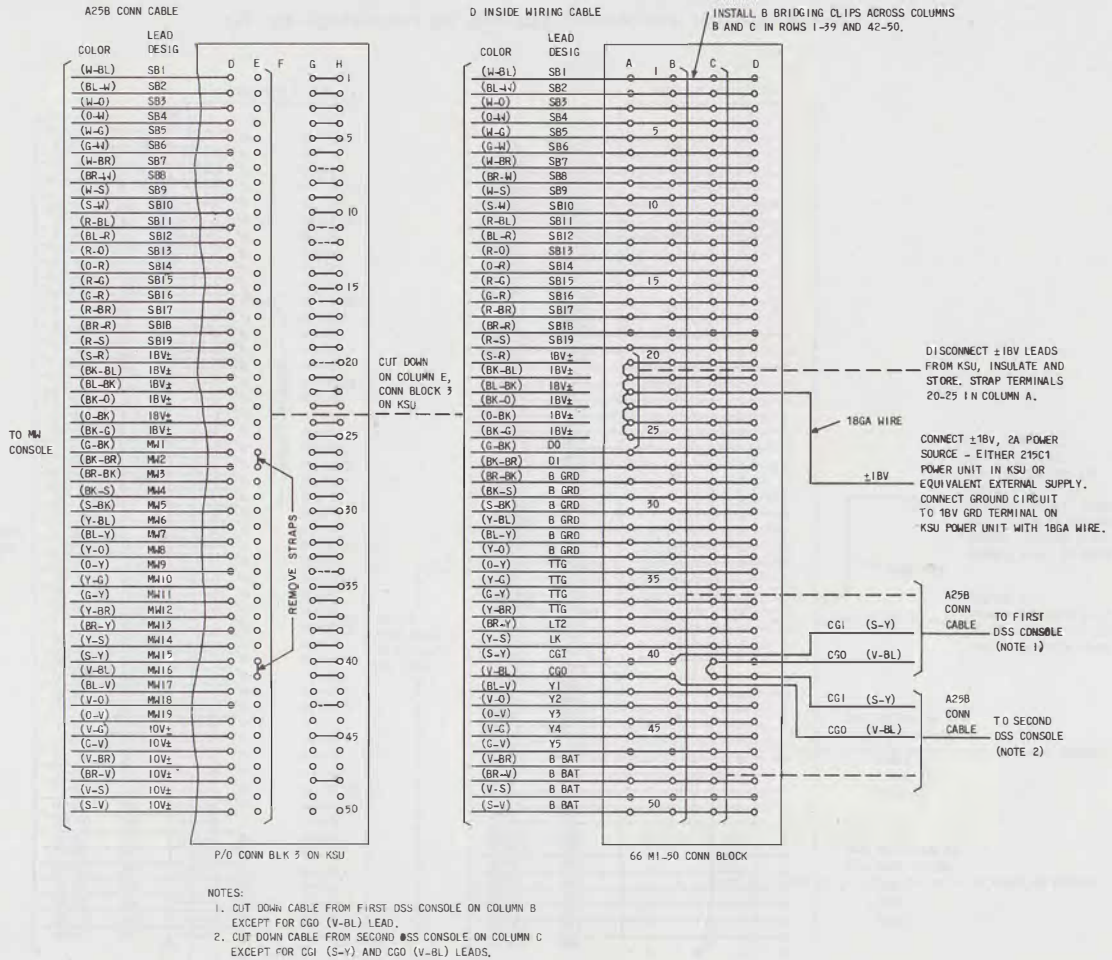


Fig. 54—Connections for Two Station Busy Consoles With MW



NOTES:
1. CUT DOWN CABLE FROM FIRST DSS CONSOLE ON COLUMN B EXCEPT FOR CGO (V-BL) LEAD.
2. CUT DOWN CABLE FROM SECOND DSS CONSOLE ON COLUMN C EXCEPT FOR CGI (S-Y) AND CGO (V-BL) LEADS.

Fig. 55—Connections for One MW Console and Two DSS Consoles

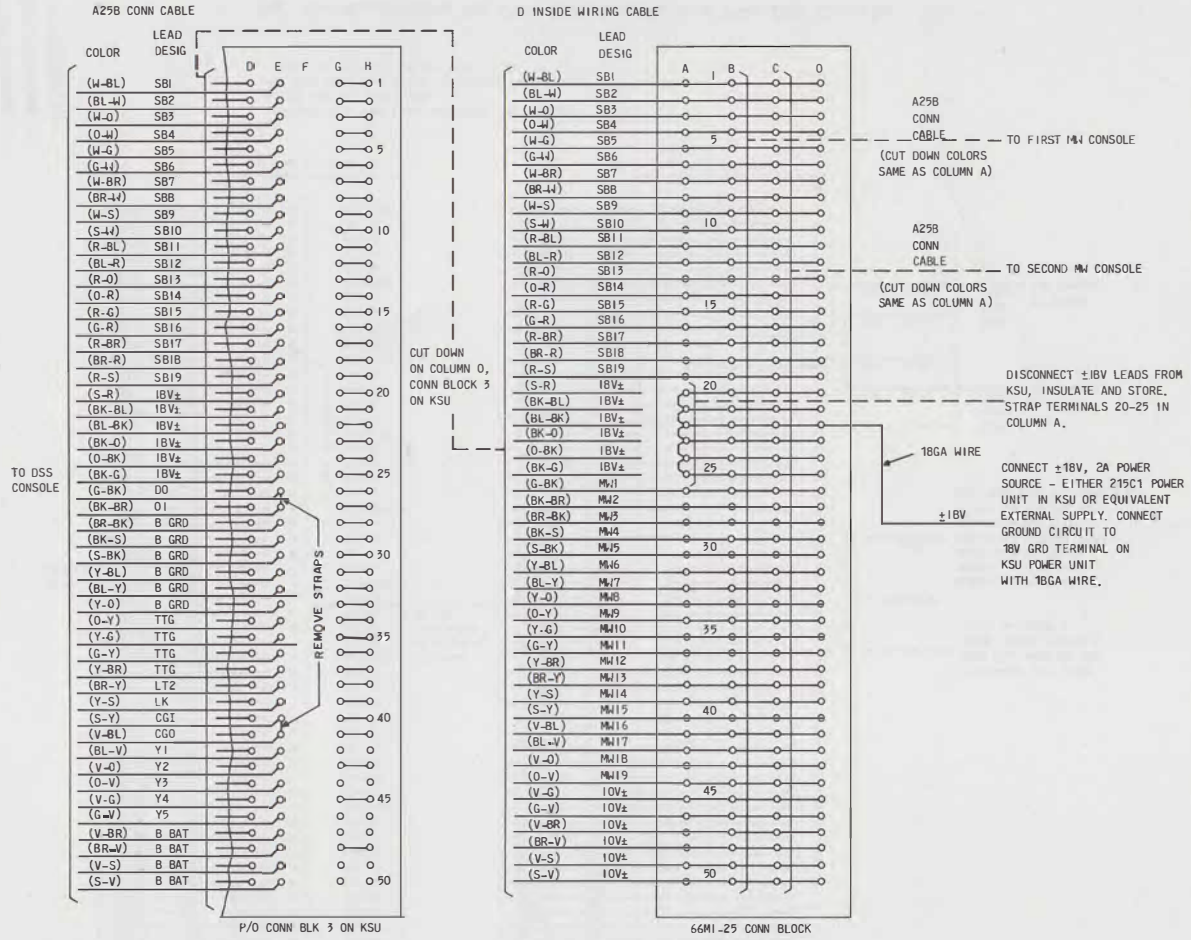


Fig. 56—Connections for One DSS Console and Two MW Consoles

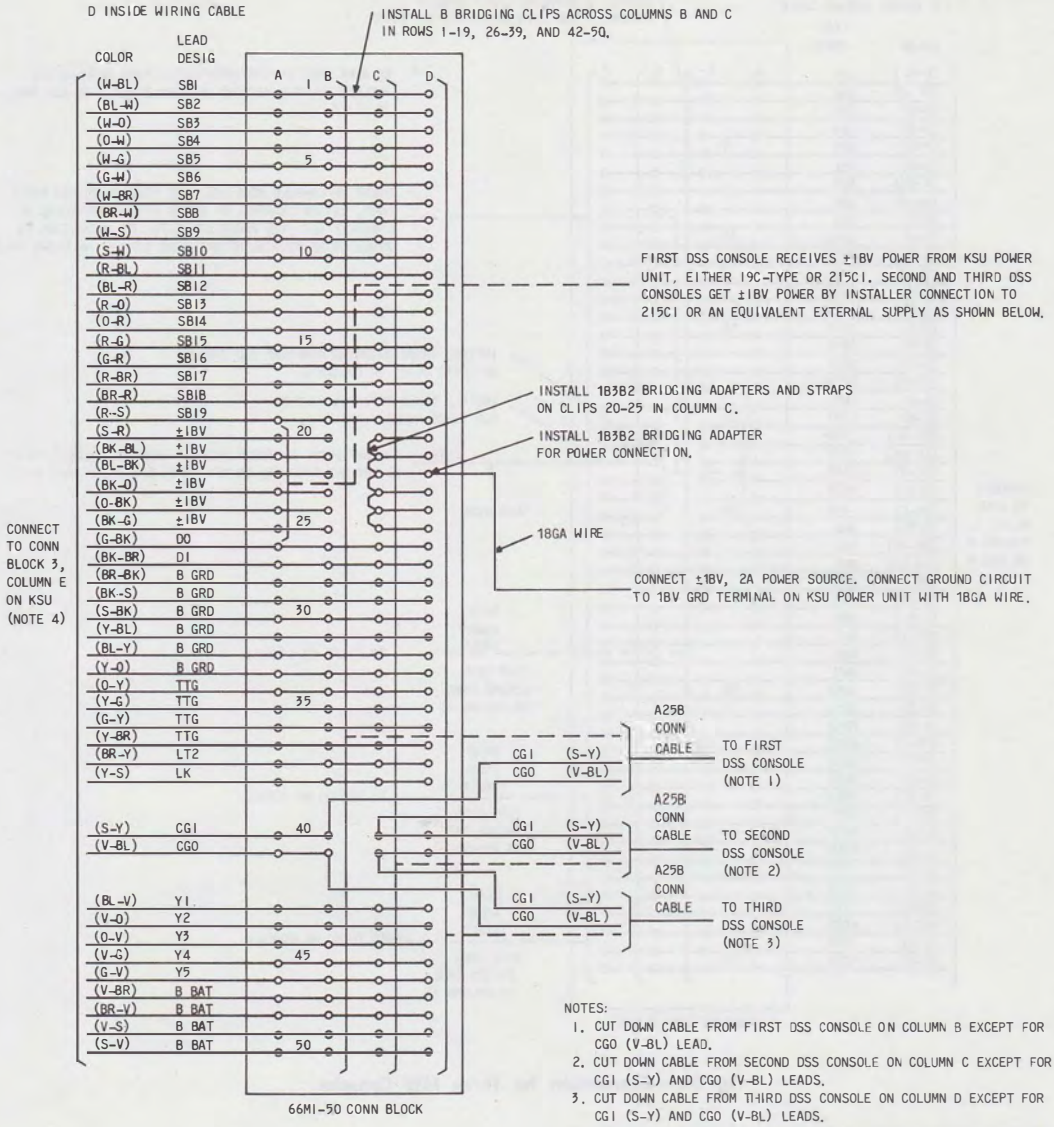


Fig. 57—Connections for Three DSS Consoles

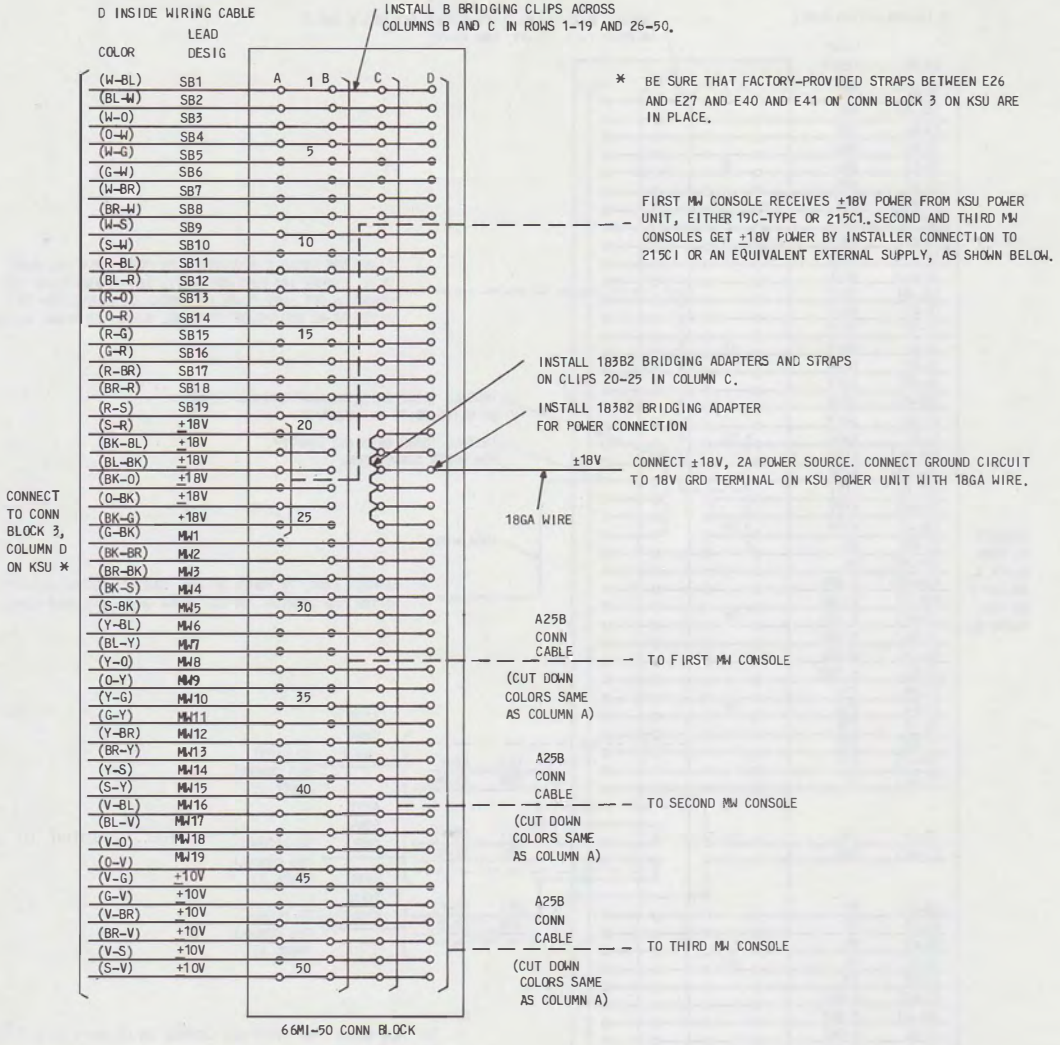


Fig. 58—Connections for Three MW Consoles

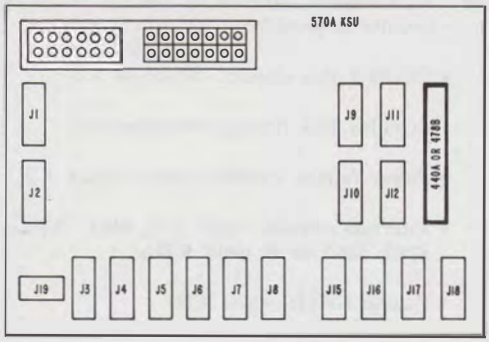


Fig. 59—Location of 440A (MD) or 478B KTU, TOUCH-TONE Adapter

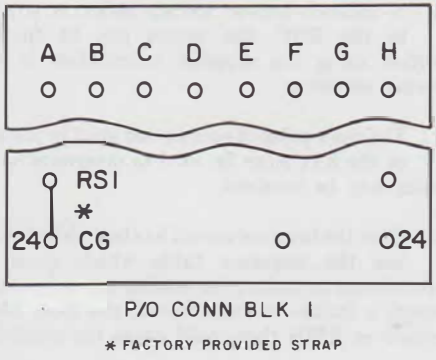


Fig. 60—Removal of RS1 to CG Strap for TOUCH-TONE Intercom

5. GENERAL MAINTENANCE

5.01 Maintenance of the 7A Communication System is limited to normal station repairs and wiring checks of the KSU and replacement of defective components.

5.02 For more detailed maintenance information, refer to Part 6 of this practice.

5.03 When trouble is encountered, ***first make a thorough check of all connections,*** then make the following checks before replacement of KTUs, power unit, or KSU is considered.

5.04 Check as follows:

570A KSU

- Fuses in place and not blown.
- Lamps not burnt out.
- KTUs securely mounted in proper connectors with retainers and/or guide asemblies in place.
- Check wiring on connecting blocks.

EXTERNALLY MOUNTED UNITS

A. 33A Voice Coupler

- Fuses not blown and positioned properly.
- COAM music source operative and meets requirements in 4.37.

B. 20A-49 Apparatus Unit

- Volume control (potentiometer) not turned off on unit.
- Volume control (potentiometer) not turned off on K8 loudspeakers.

C. 22A-49 Apparatus Unit

- Unit fastened securely and mounted in a vertical position.

D. Loudspeakers

- Check wiring and connections.

No field maintenance is to be performed on the externally mounted units.

KTUs

- Securely placed in proper connectors.
- 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 the replacement KTU not clear the trouble, the trouble is external and ***the original KTU should be returned to service.***

- No field maintenance is to be performed on KTUs.

POWER UNIT

- Fuses in place and not blown.

- AC power cord properly secured in both the ac receptacle and the power unit connector.

- Power present at the ac receptacle.

- Circuit and frame grounds properly connected.

TELEPHONE SETS

- Set plugged in securely.

- Volume control not turned off.

- Lamps not burnt out.

TROUBLE ANALYSIS

5.05 Table O is to be used as an aid to diagnose and correct troubles in the system. The troubles should be identified before using the table; then the cause may be recognized and a solution effected.

6. DETAILED MAINTENANCE

6.01 Maintenance information is included as an aid in locating and clearing trouble in the 7A Communication System at the time of installation or on subsequent repair visits. Analysis of the 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.

6.02 Maintenance information for the following circuits is provided:

- CO/PBX line circuits—400-Type KTU

- CO/PBX line ringing arrangements

- Power failure transfer circuit—452A KTU

- Intercom circuits—424B or C, 440A (MD) or 478B, 456A or B, 460B KTUs

- Paging circuit—457C KTU

- Background Music

- Music-On-Hold—451A or B KTU

- Power distribution.

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. 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 the 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. Any wiring that is not designated by color will consist of standard strapping. All factory wiring is shown as solid lines—dashed lines indicate wiring external to the KSU or installer placed.

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 KTU when used with the 7A Communication System to provide short timeout (Z), lamp wink on hold (Y), and interrupted audible signal (W).

6.05 Tables P, Q, R, and Fig. 61 through 67 are provided as an aid for maintenance of the CO line circuits.

CO/PBX 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).
- The common audible can be moved to a different station by replacing option K with a jumper from terminal 9F to the desired CO( ) lead.
- CO/PBX lines can ring at additional stations other than the attendant by connecting the RC leads to the CO leads (option S).
- Calls can be transferred to one alternate station other than the attendant by adding option J on block 1.

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

6.07 Tables S, T, and Fig. 68 are provided as an aid for maintenance of the CO/PBX ringing arrangements.

POWER FAILURE TRANSFER CIRCUIT—452A KTU

6.08 This circuit provides for incoming audible signals on an optional basis in the event of loss of commercial power or operation of the -24V relay battery fuse (B battery) in the 570 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 as long as B battery is supplied to the KSU. If the battery is lost, the relays release, extending the lines to connecting block 1 where a cross-connect must be placed (Fig. 45). The cross-connect in turn extends the tip and ring to the (V-S) (S-V) pair of the desired extension. An external ringer must be connected to these leads at the telephone set or some other accessible point.

6.09 Tables U, V, W, and Fig. 69 are provided as an aid for maintenance of the power failure transfer circuit.

INTERCOM CIRCUITS—424B OR C, 440A (MD) OR 478B, 456A OR B, AND 460B KTUS

6.10 The intercom circuitry provides two 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:

- 424B or C KTU—Selector circuit
- 456A or B KTU—Voice and tone alerting circuit
- 460B KTU—2-path access 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.

An additional optional feature, intercom preset conferencing, can be supplied by making wiring changes on the connecting block field.

A. Selector Circuit—424B or C KTU

6.11 This circuit is the basic, selector-only, 19-code rotary intercom circuit. Of the available codes, 0 is used as the attendant code, 1 is the first digit of the 2-digit codes, 2 is the paging code, and 3 through 19 are assigned as station codes. The 424B or C KTU selects and alerts the desired intercom station. Station selection can be by rotary dial, TOUCH-TONE, or DSS console, if provided.

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

6.12 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 424B or C 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 code 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. Voice and Tone Alerting Circuit—456A or B KTU

6.13 The 456A or B 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 to the paging circuit (optional) is also furnished from this circuit.

D. 2-Path Access Circuit—460B KTU

6.14 The 460B KTU performs the following functions:

- Provides talk battery for the two intercom paths
- Controls all intercom lamp functions
- Provides the common control circuitry to connect the selector to one path at a time and 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.

6.15 Tables X, Y, Z, AA, AB, AC, and Fig. 70 are provided as an aid for maintenance of the intercommunications circuits.

PAGING CIRCUIT—457C KTU

6.16 The paging circuit is enabled by dialing a digit 2 on either of the intercom paths. This completes a circuit between the SS lead from the 456B KTU through the selector to the PC lead in the 457C KTU. This applies the input on the PA lead from the 456B KTU to the amplifier, and short-circuits the input from the CP music source on leads MT and MR, if provided. Voice and tone inputs on the PA lead are then heard in the speakers.

6.17 Tables AD, AE, AF, and Fig. 71 are provided as an aid for maintenance of the paging circuit.

BACKGROUND MUSIC

6.18 Background music can be supplied over the paging speaker when paging is not taking place, using the amplifier circuitry in the 457C KTU. The CP 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.

MUSIC-ON-HOLD—451A OR B KTU

6.19 The same music source used for background music can be multipled at the 33A voice coupler to furnish music-on-hold. The 451A or B KTU is required to furnish an output to the seven CO/PBX lines. When the lines are in a talk condition, the output of the 451A or B KTU is shorted by contacts in the associated line circuit. When placed on hold, the output is impressed on the ring side of the CO/PBX line and can be heard by the held party.

6.20 Tables AG, AH, AI, AJ, and Fig. 72 are provided as an aid in the maintenance of background music and music-on-hold circuits.

POWER DISTRIBUTION

6.21 Refer to Fig. 73 for power distribution circuit information.

TABLE O

TROUBLE ANALYSIS TABLE

TROUBLE	POSSIBLE CAUSE	POSSIBLE SOLUTION
No side tone on CO/PBX line.	a. Incoming CO/PBX line is dead.	Check incoming tip and ring with test set.
	b. Incoming tip and ring terminated on the wrong terminals.	Check connections.
	c. Line circuit (400-type KTU) not plugged in correctly.	Check that KTU is properly seated in connector and is located in the right connector. See Fig. 6.
	d. Diode(s) in polarity guard may be defective.	Replace diodes with ones known to be good.
	e. Switchhook pileup on telephone set is defective.	Change out telephone set.
	f. Privacy circuit in the telephone set may be operating (if the set is equipped with a privacy circuit).	Check to see if privacy relay is falsely operating when going off-hook.
	g. If dial restriction diode is installed in the set, tip and ring may be reversed.	Check station cutdown and polarity of dial restriction diode.
Line busied out (lamp steady).	a. Lamp and A leads reversed.	Check station cutdown for that line.
	b. Lamp and A leads shorted.	Check station cutdown for that line.
Dial tone over an answered call or two lines seized together.	a. Two lines conferenced from an idle station set.	Check stations to ensure that no idle sets have more than one line button depressed.
Intercom oscillates (repeatedly comes up; then drops) when seized.	a. Selector (424B/424C KTU) not plugged in correctly.	Check that KTU is properly seated in connector and is located in the right connector. See Fig. 6 and 31.
	b. D0-D1 strap is missing (if no DSS console is provided).	Check option strap. See Fig. 50.
	c. DSS console unplugged or not connected (if DSS console is provided).	Check DSS console cutdown. Check that DSS console is properly plugged in.
Incorrect intercom codes are dialed (TOUCH-TONE dial set).	a. Y3 relay in selector (424B/424C KTU) is not dropping.	Check that RS1-CG strap is removed. See 4.97 and Fig. 60.

TABLE O (Cont)

TROUBLE ANALYSIS TABLE

TROUBLE	POSSIBLE CAUSE	POSSIBLE SOLUTION
Incorrect intercom codes are dialed when using DSS console.	a. Y3 relay in selector (424B/424C KTU) is not dropping.	Check that CG0-CG1 strap is removed. See Fig. 50.
Cannot dial on intercom. On going off-hook, calling station hears tone burst.	a. 478B or 440A KTU is not plugged in correctly.	Check that KTU is properly seated in connector and is located in the right connector. See Fig. 6 and 59.
	b. Rotary dial system with CG-RS1 strap missing.	Check CG-RS1 strap. See Fig. 3 or 60.
	c. If DSS console is provided, connections may be bad.	Check DSS console cutdown. Check that console is properly plugged in.
Hold lamp on attendant's set is always lit.	a. Attendant set is not modified or is improperly modified.	Disable hold lamp at attendant's set (3.13).
No music-on-hold or distorted music-on-hold.	a. 451A/451B KTU is not plugged in properly.	Check that KTU is properly seated in connector and is located in the right connector. See Fig. 6 and 37.
	b. Music source volume too low.	Gradually increase volume while listening. See 4.37.
	c. Music source unable to drive the 451A KTU.	Source must be approx. 8 ohms or less.
	d. Blown fuse or improperly wired 33A voice coupler.	Check fuses in 33A and verify wiring.
Low or no volume on ringing or voice signaling.	a. Volume control turned off or set too low.	Turn on or adjust volume control.
	b. Defective volume control.	Replace telephone set.
	c. Defective speaker.	Replace speaker.
False hold condition when changing lines or lightly touching line buttons.	a. Incorrect sequence of BD contact on line key.	Replace key or replace telephone set.
Low output from paging speaker.	a. 20A-49 potentiometer set too low.	Adjust potentiometer on 20A-49 apparatus unit.
	b. Wrong speakers used.	Use only 45-ohm speakers.

TABLE O (Cont)

TROUBLE ANALYSIS TABLE

TROUBLE	POSSIBLE CAUSE	POSSIBLE SOLUTION
Cannot transmit over paging speakers.	a. 457C KTU is not plugged in correctly.	Check that KTU is properly seated and is in right connector. See Fig. 42.
	b. Speakers wired wrong.	Check connections. See Fig. 43.
	c. Defective speaker.	Replace speaker.
	d. Wrong speaker used.	Use only 45-ohm speakers.
	e. Speaker located too far from KSU.	Use quad wire. Speaker should be within 320 feet of KSU.
	f. Potentiometer in K8 speaker turned too low.	Adjust potentiometer.
Cannot transmit over COAM paging system.	a. 457C KTU is not plugged in correctly.	Check that KTU is properly seated and is in right connector. See Fig. 6 and 42.
	b. Potentiometer in 20A—49 apparatus unit turned too low.	Adjust potentiometer.
	c. Customer's paging system turned off or Trouble in COAM paging equipment.	Proceed as follows: 1. Test for hazardous voltages at terminals A1 and A2 of 20A-49 apparatus unit. 2. Remove customer's connections from terminals A1 and A2. 3. Have attendant dial paging code. 4. Monitor across terminals A1 and A2 with 1013A test set. 5. If attendant can be heard with 1013A test set, advise customer of results of test. *Do not* attempt any tests or repairs on customer's equipment.

TABLE P

400-TYPE KTU LINE CIRCUIT

At station, depress associated line button and go off-hook.

OK

Dial tone heard and associated line lamp lights steady.

FAILURE

(a) Lamp lights—no dial tone
1. Wrong line connections.
2. Defective telephone set.

(b) Dial tone—no lamp
1. No A1 ground.
2. Defective telephone set.
3. Open lamp or lamp lead.
4. A and/or C relay not operated.
5. No lamp or relay battery.

Dial local testboard or ringback code. Request callback. Go on-hook. Lamp extinguished.

OK

Line lamp flashes (60 IPM). Tone alerting heard at attendant station.

FAILURE

1. L and/or B relay not operated.
2. Defective 455A KTU.
3. Defective tel set amplifier.

Go off-hook. Line button depressed.

OK

Line lamp changes to steady. Tone signal silenced.

FAILURE

Same as for line pickup.

TABLE P (Cont)

400-TYPE KTU LINE CIRCUIT

With party on line, depress HOLD.

OK

Line button restores—lamp goes to wink (120 IPM).

FAILURE

1. Relay L, B and/or C not operated.
2. Defective tel set.

Depress line button.

OK

Lamp goes to steady—party still on line.

FAILURE

Holding bridge not applied to line—CO/PBX line released.

Go on-hook, lamp extinguished. Circuit normal.

TABLE Q

LEAD TABLE—400-TYPE KTU

LEAD DESIG.	FUNCTION	KTU/CONNECTOR PIN NUMBER J2 - J8
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 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

TABLE R

INPUTS AND OUTPUTS—400-TYPE KTU

TEST FROM	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

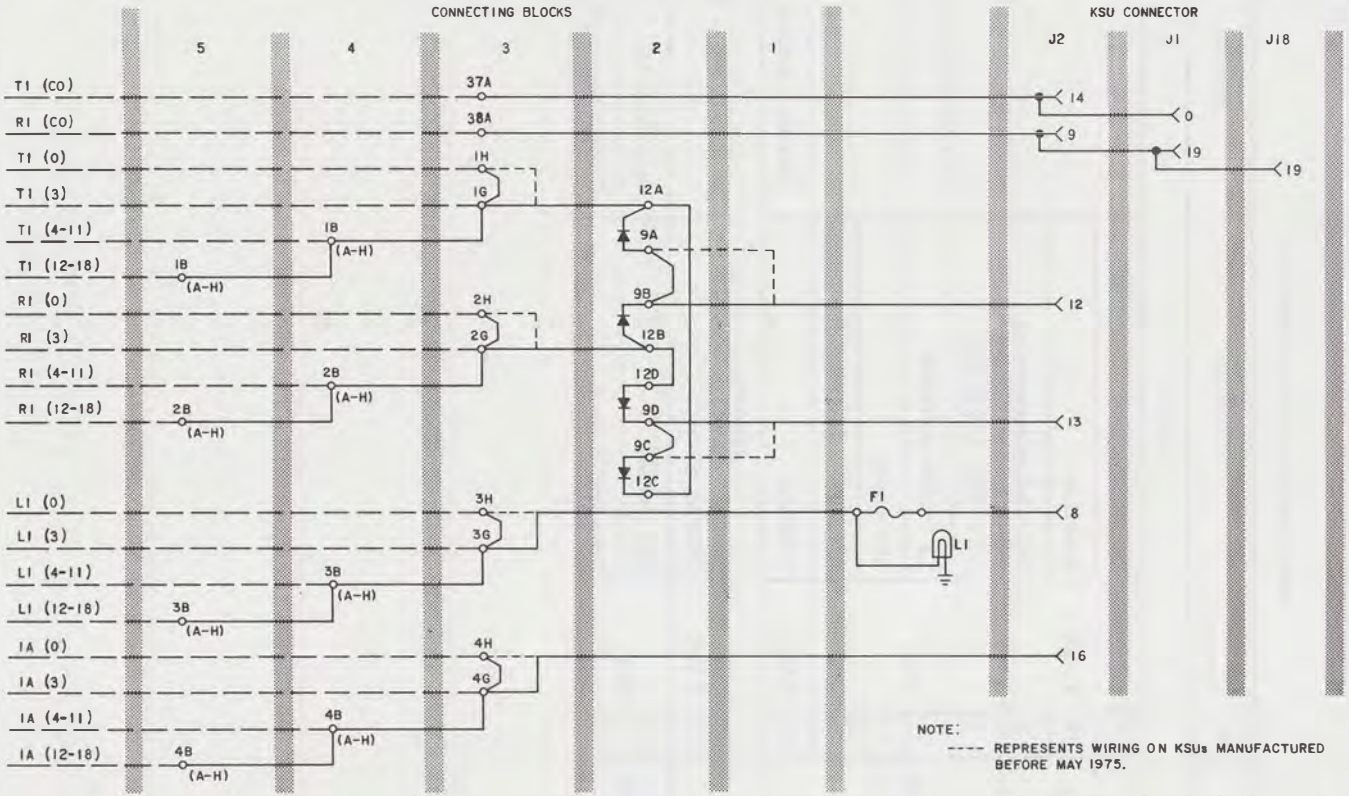


Fig. 61—First Line Circuit

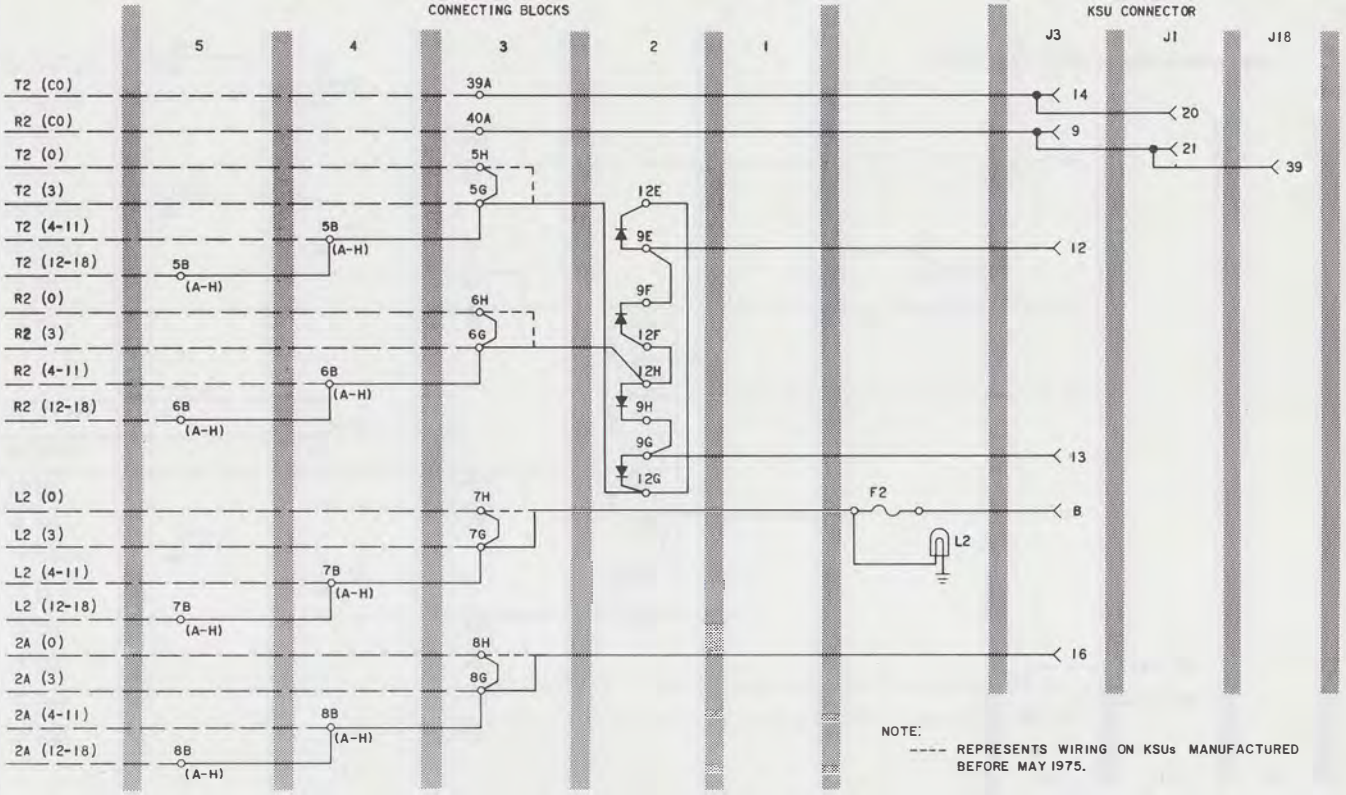


Fig. 62—Second Line Circuit

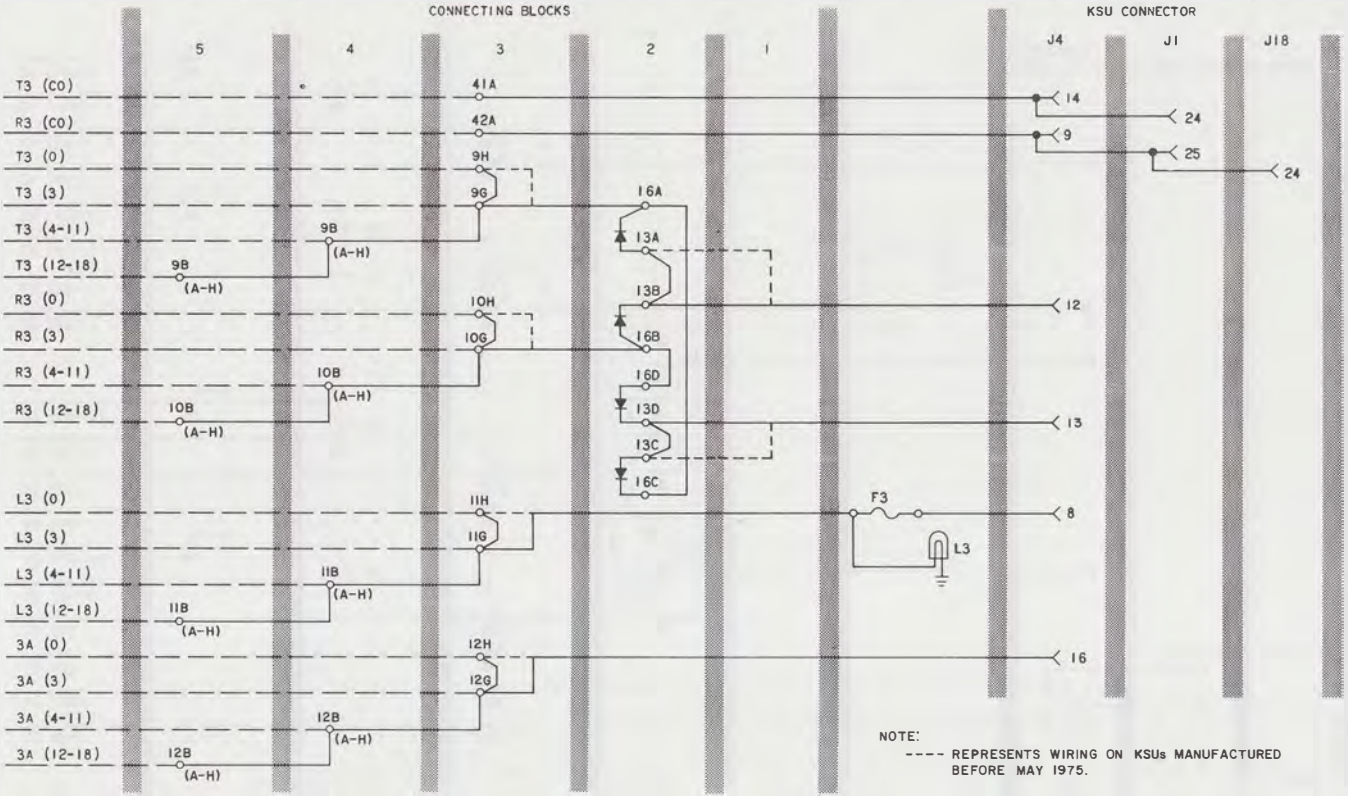


Fig. 63—Third Line Circuit

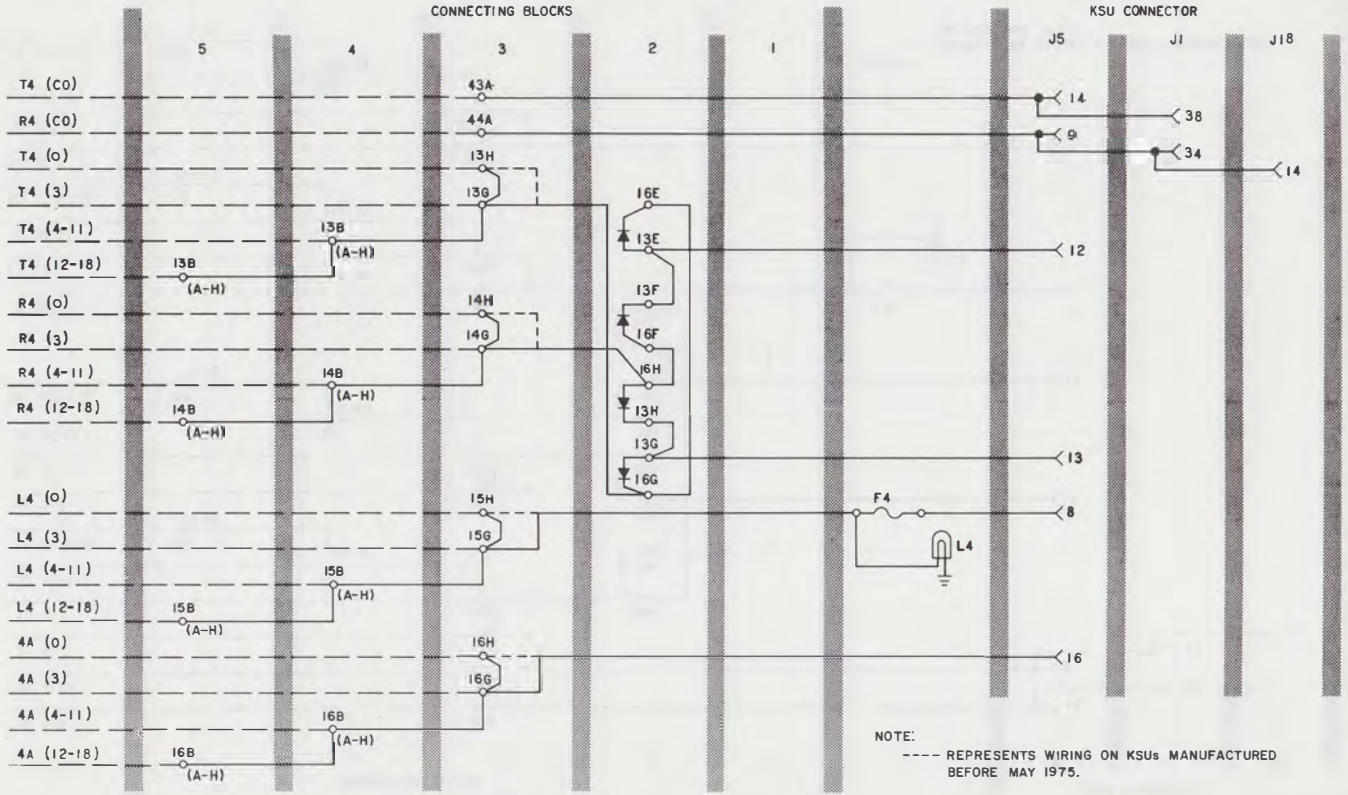


Fig. 64—Fourth Line Circuit

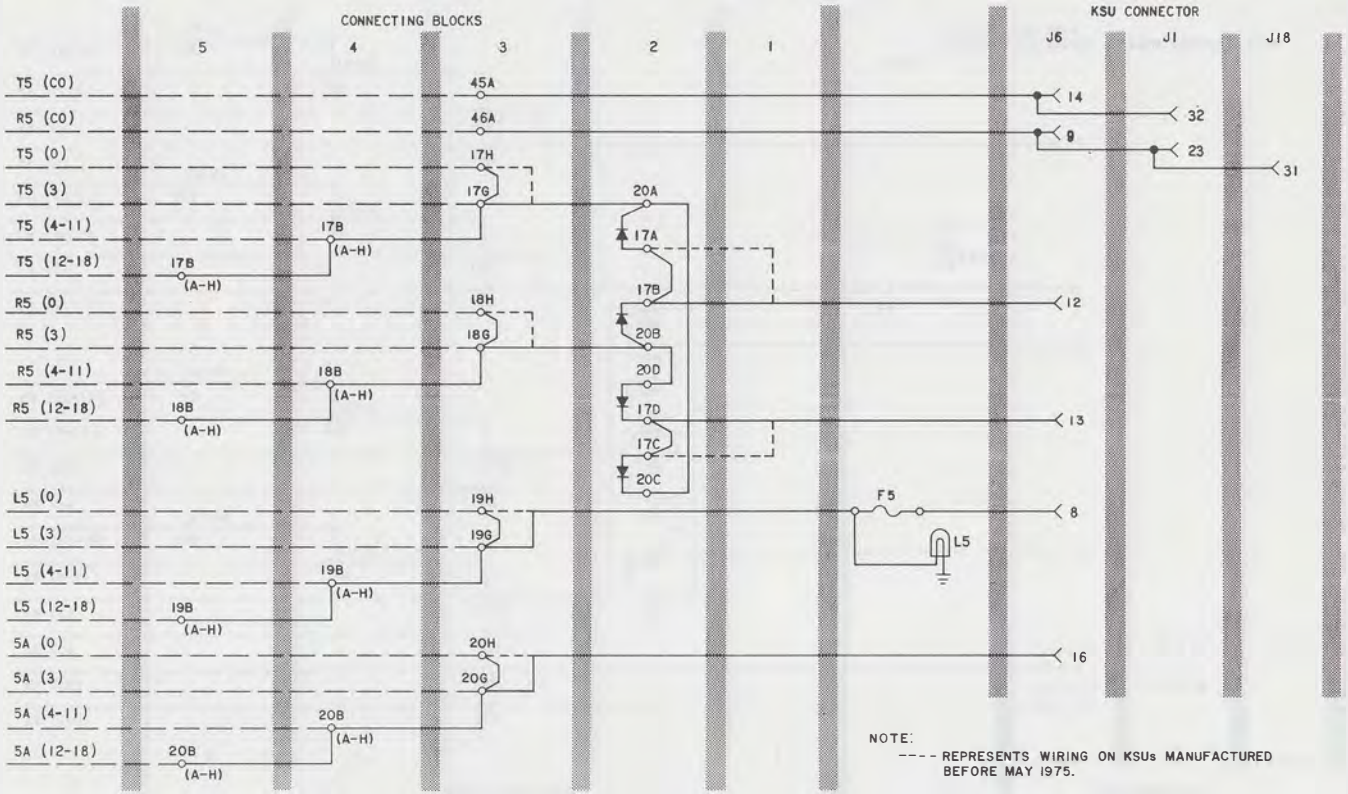


Fig. 65—Fifth Line Circuit

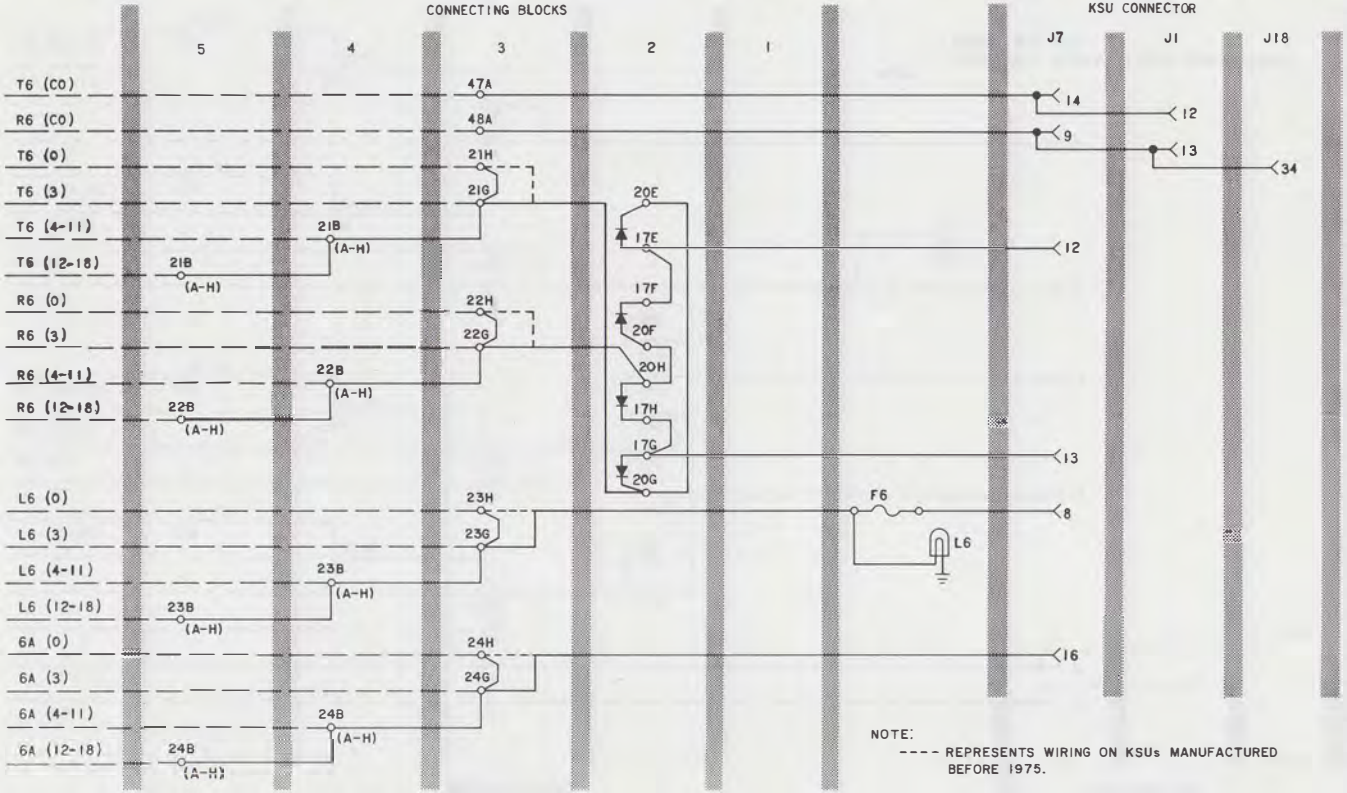


Fig. 66—Sixth Line Circuit

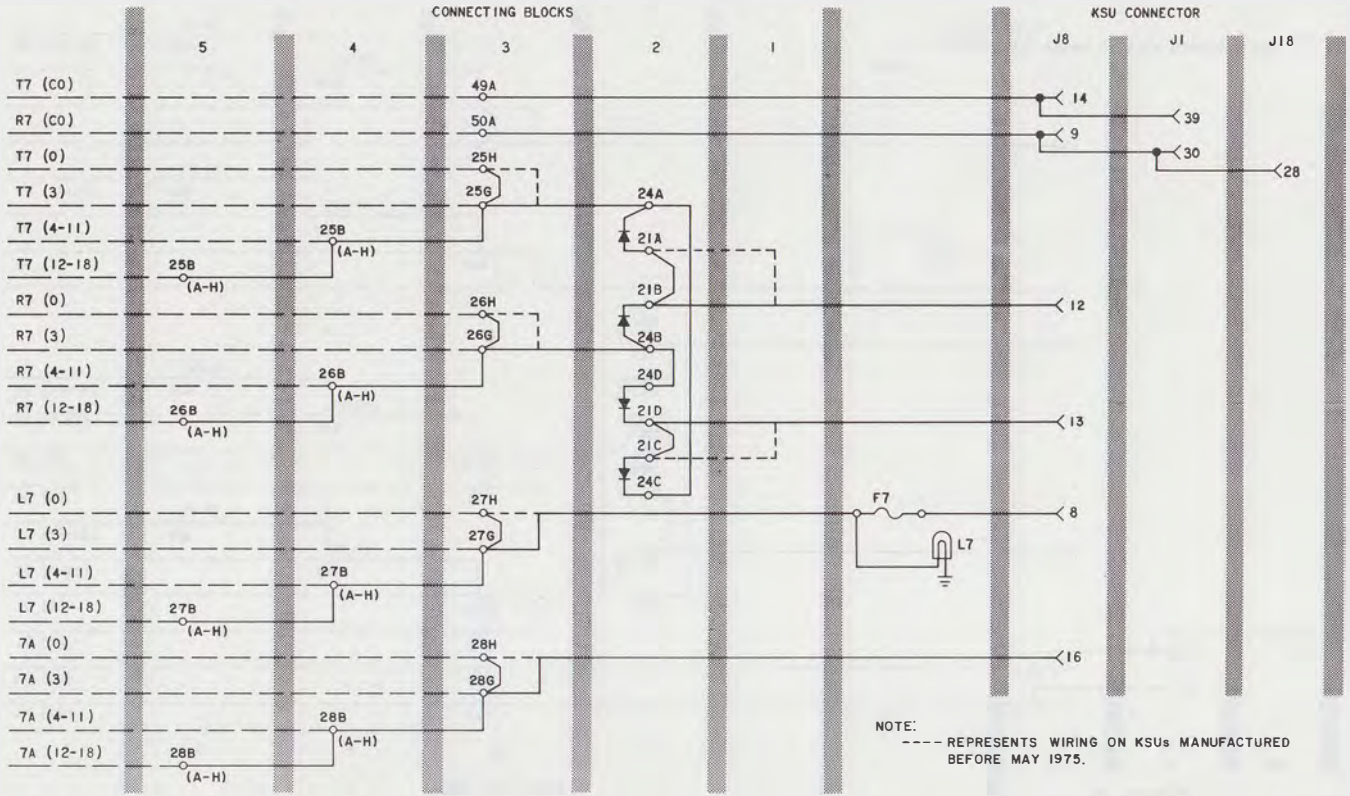


Fig. 67—Seventh Line Circuit

TABLE S

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 9F.
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 1.
2. Open RC lead—line involved.

(c) No tone ringing—alternate station

1. Option S straps missing on block 1—row 24 to column C.
2. Open CO ( ) lead.
3. Defective tel set amplifier and/or loudspeaker.

Ring transfer button depressed at attendant station (0). (Flexible ring transfer only: button operated on 6041G key for selected alternate station.)

OK

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

FAILURE

1. Strap missing on block 1 from RT terminal (24F) to column C. See Fig. 39
2. D180487 kit of parts not installed, connected improperly, or defective at attendant station.
3. Open CO ( ) lead at alternate station.
4. RING TR key at attendant station defective.
5. If flexible ring transfer installed, defective or improperly connected 6041G key.

Ring transfer button reoperated.

OK

CO/PBX ringing returned to attendant station.

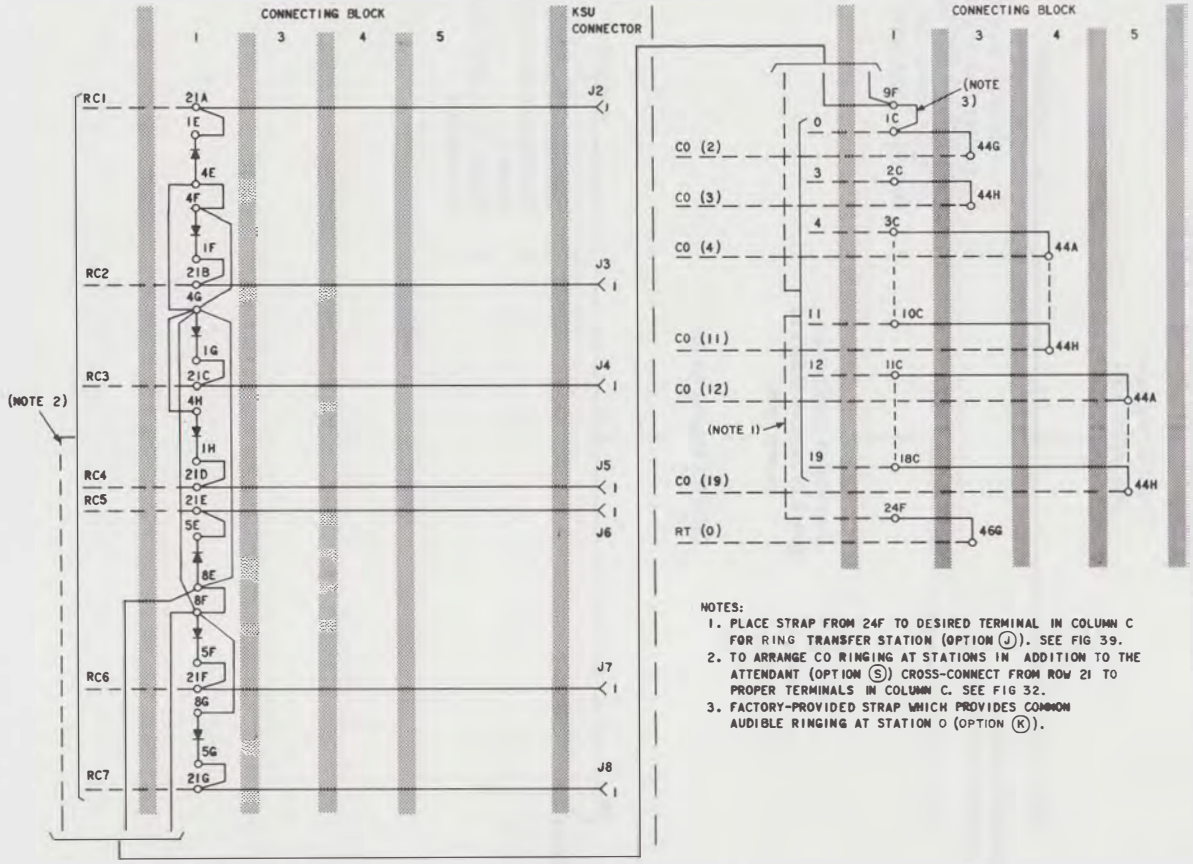
FAILURE

1. Defective RING TR key.
2. Defective D180487 kit of parts.

TABLE T

LEAD TABLE—CO/PBX LINE 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 alternate 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 1.



NOTES:

1. PLACE STRAP FROM 24F TO DESIRED TERMINAL IN COLUMN C FOR RING TRANSFER STATION (OPTION (J)). SEE FIG 39.
2. TO ARRANGE CO RINGING AT STATIONS IN ADDITION TO THE ATTENDANT (OPTION (S)) CROSS-CONNECT FROM ROW 21 TO PROPER TERMINALS IN COLUMN C. SEE FIG 32.
3. FACTORY-PROVIDED STRAP WHICH PROVIDES COMMON AUDIBLE RINGING AT STATION 0 (OPTION (K)).

Fig. 68—CO Ringing Arrangement

TABLE U

POWER FAILURE TRANSFER CIRCUIT – 452A KTU

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 KTU—B SIG fuse on 19C-type power unit.
3. Defective 452A KTU.

Disconnect commercial power or remove B SIG at power unit.

CO/PBX ringing on line.

OK

Power failure ringers operate.

FAILURE

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

TABLE V

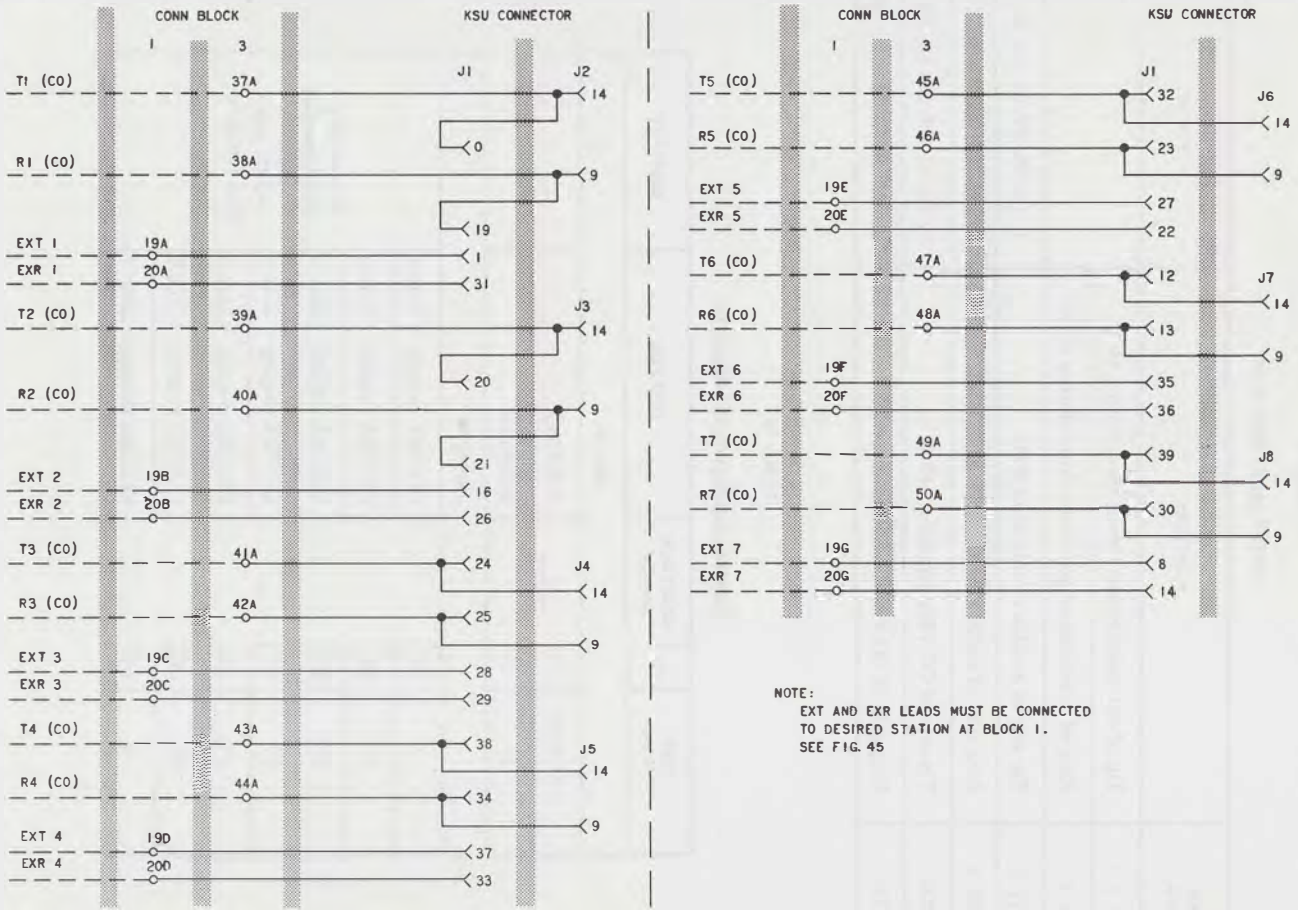
LEAD TABLE—452A KTU

LEAD DESIG.	FUNCTION	KTU/CONNECTOR PIN NO. J1
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 KTU	1, 16, 28, 37, 27, 35, 8
EXR( )	Ring side of audible circuit from KTU	31, 26, 29, 33, 22, 36, 14
T(CO)	Tip side of CO/PBX line from office	0, 20, 24, 38, 32, 12, 39
R(CO)	Ring side of CO/PBX line from office	19, 21, 25, 34, 23, 13, 30

TABLE W

INPUTS AND OUTPUTS—452A KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	17	TALK	B Battery	
17	9		B Ground	
OUTPUTS				
1	31	MON	CO/PBX ringing — Line 1	Power plug disconnected or —24V relay fuse removed.
16	26		CO/PBX ringing — Line 2	
28	29		CO/PBX ringing — Line 3	
37	33		CO/PBX ringing — Line 4	
27	22		CO/PBX ringing — Line 5	
35	36		CO/PBX ringing — Line 6	
8	14		CO/PBX ringing — Line 7	



NOTE:
EXT AND EXR LEADS MUST BE CONNECTED TO DESIRED STATION AT BLOCK 1. SEE FIG. 45

Fig. 69—Power Failure Transfer Circuit

TABLE X

INTERCOM (IC) CALL

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

OK

Button flashes at 60 IPM. IC dial tone heard.
Note: If other IC button is flashing, dial tone will not be heard until selector is released.

Digit dialed.

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

Single-digit code.

OK

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

FAILURE

(a) No lamp
1. IT and/or IR of selected path open—460B KTU.
2. Open A battery fuse—power unit.
3. Open lamp fuse—F13 or F14.
4. Interrupter not running—(MS and MG leads—460B.

(b) No dial tone
1. Defective dial tone generator—460B.
2. Selector not seized (D0-D1 leads); 424B/424C, 460B, DSS console.
3. Open BR lead—424B/424C, 460B.
4. IT and/or IR open—460B.

FAILURE

(a) Dial tone not removed
1. Open LK lead—460B, 440A or 478B, DSS console, 424B/424C.

(b) Digit not dialed
1. Defective selector—424B/424C.
2. TC and/or RC lead open—460B, 440A or 478B.
3. Defective DSS console.

TABLE X (Cont)

INTERCOM (IC) CALL

(c) No tone burst

1. Open BY1 lead—424B/424C, 456B, 460B.
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, 460B.
2. Defective 2nd station detect circuit—460B.
3. Selector not released.

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

OK

Voice conversation possible on IC path.
IC button lamp goes steady.

FAILURE

(a) No voice conversation

1. IT and/or IR lead open (called station)—460B.
2. Defective tel set.

Both stations go on-hook.

OK

Button restores. Lamp extinguishes.

FAILURE

1. Defective access circuit—460B.
2. Defective tel set.

TABLE X (Cont)

INTERCOM (IC) CALL

2-digit IC call.

Selector seized
(same as single digit).

Digit 1 dialed.

OK

Dial tone removed.
Selector reset for 2nd digit.

FAILURE

(a) Dial tone not removed
1. Open LK lead—424B/424C, 440A or 478B, 460B, DSS console.

(b) Selector not reset
1. Open TD lead 424B/424C.
2. Defective selector—424B/424C.

(c) Tone burst heard
1. Open RH lead—424B/424C, 460B.

2nd digit dialed.

OK

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

FAILURE

(a) Wrong station alerted
1. TR, TR1 relays not operated—424B/424C.

(b) No tone burst
1. Open BY1 lead—424B/424C, 456B, 460B.
2. Defective 456B.
3. Open SS lead—456B.
4. Open VS lead—424B/424C.
5. Defective tel set—called station.

(c) Lamp continues to flash
1. Open BY1 lead—424B/424C, 460B.
2. Defective detect circuit—460B.
3. Selector not released.

Balance of call same as for single digit.

TABLE Y

LEAD TABLE–INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	KTU/CONNECTOR PIN NUMBER
BR	Switched B battery — when 424B/424C KTU is seized, this lead applies —24V B to 460B KTU to start intercom dial tone.	J10-35 J12-35
BY1	Busy ground — applies ground after completion of dialing to enable the 2nd station detect circuit in the 460B KTU and start intercom ringing in the 456B KTU.	J10-19 J12-19 J16-19
CG1	Counter ground — applies ground to counting relays in 424B/424C either by M option strap or via DSS console Q option on non-TOUCH TONE calls.	J14-26
CG0	Counter ground — provides ground to counting relays (Y1-Y5) from RS2 lead (M option) or via 440A or 478B (N option) or via CG0 and CG1 leads of DSS console (Q option).	J10-21
D1	Off-hook detection — selector seizure output from 460B KTU (M option) or to D0 output of 460B via DSS console (Q option). If call is rotary dialed, D1 is also the dial pulse input from the 460B.	J10-16
D0	Dialing output — ground supply for talk battery when a path is seized; also, the seizure input for the 424B/424C selector by way of lead D1 if DSS is not provided (M option) or if provided (Q option) by way of the DSS console.	J12-16
IL1	Intercom lamp 1 — lamp circuit for path 1 to station 0 and 3-19.	J12-8
IL2	Intercom lamp 2 — lamp circuit for path 2 to station 0 and 3-19.	J11-16
IR1	Intercom ring 1 — ring side of path 1.	J12-14
IT1	Intercom tip 1 — tip side of path 1.	J12-34
IR2	Intercom ring 2 — ring side of path 2.	J12-0
IT2	Intercom tip 2 — tip side of path 2.	J12-1
LF2	Intercom flash — 60 IPM signal from the interrupter applied to all tel sets during the period an intercom path is seized until call is answered and selector is released.	J12-7

TABLE Y (Cont)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	KTU/CONNECTOR PIN NUMBER
LK	Dial tone disconnect — ground is applied to this lead by the selector after first digit of an intercom code is dialed to stop dial tone.	J10-30 J12-30 J14-26
LT2	Transfer digit 2 — provides ground from DSS console to operate TR, TR1 relays (codes 10-19).	J9-39
MG	Motor ground — ground to start interrupter motor when any intercom path is seized.	J11-6
MS	Motor start — from interrupter motor circuit, starts interrupter from MG when any path is seized.	J11-5
PA	Paging signal — output to the paging amplifier (457C KTU). Paging (optional) speakers must be connected as shown in Fig. 43.	J16-0
RC	Calling ring — common ring of intercom circuits to voice and tone-alerting circuit and to TOUCH-TONE adapter.	J12-13 J14-13 J16-9
RH	R relay hold — ground from LK lead is applied on this lead to 424B/424C KTU to prevent ringing until all dialing is completed.	J10-26 J12-26
RS1	Reset — provides ground for 424B/424C KTU selector timer over RS2 lead. If TOUCH-TONE is provided, N option furnishes ground to the counting relays via the adapter.	J10-38 J14-38
RS2	Reset — connected to RS1 (see above).	J9-19
SS	Station signaling input — when dialing is complete, this lead carries the tone burst to the selector where it is applied to the VS lead of the station selected.	J10-14 J16-1
TC	Calling tip — common tip of intercom paths to voice and tone-alerting circuit and TOUCH-TONE adapter.	J12-12 J14-12 J16-8
TD	Transfer digit — resets 424B/424C selector after 1st digit of a 2-digit code is dialed.	J9-16 J9-28

TABLE Y (Cont)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	KTU/CONNECTOR PIN NUMBER
TG	To ground — provides ground to selector timer via the RS1 lead.	J9-38
TTG	TOUCH-TONE ground — supplies ground to control adapter when selector is seized (N option) or provides ground to DSS console selector relays (Q option).	J10-39 J14-36
VS0	Station ringing — voice signaling lead — code 0.	J9-34
VS3	Station ringing — voice signaling lead — code 3.	J9-25
VS4	Station ringing — voice signaling lead — code 4.	J9-26
VS5	Station ringing — voice signaling lead — code 5.	J9-20
VS6	Station ringing — voice signaling lead — code 6.	J9-21
VS7	Station ringing — voice signaling lead — code 7.	J9-32
VS8	Station ringing — voice signaling lead — code 8.	J9-30
VS9	Station ringing — voice signaling lead — code 9.	J9-29
VS10	Station ringing — voice signaling lead — code 10.	J9-14
VS11	Station ringing — voice signaling lead — code 11.	J9-8
VS12	Station ringing — voice signaling lead — code 12.	J9-22
VS13	Station ringing — voice signaling lead — code 13.	J9-24
VS14	Station ringing — voice signaling lead — code 14.	J9-27
VS15	Station ringing — voice signaling lead — code 15.	J9-0
VS16	Station ringing — voice signaling lead — code 16.	J9-1
VS17	Station ringing — voice signaling lead — code 17.	J9-33

TABLE Y (Cont)

LEAD TABLE—INTERCOM CIRCUIT

LEAD DESIG	FUNCTION	KTU/CONNECTOR PIN NUMBER
VS18	Station ringing — voice signaling lead — code 18.	J9-31
VS-19	Station ringing — voice signaling lead — code 19.	J9-9
Y1	Selector counter relay No. 1 ground — provides ground to operate Y1 counting relay from TOUCH-TONE adapter of DSS console.	J10-25 J14-14
Y2	Same as above except for Y2 relay.	J10-24 J14-30
Y3	Same as above except for Y3 relay.	J10-22 J14-29
Y4	Same as above except for Y4 relay.	J9-36 J14-32
Y5	Same as above except for Y5 relay.	J9-37 J14-33

TABLE Z

INPUTS AND OUTPUTS—424B/424C KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J10-18	TALK	A Battery	
	J10-17		B Battery	
J18-17	J9-15	TALK	B Ground	
J18-18	J10-3		A Ground	
OUTPUTS				
GROUND	VS lead	MON	1 sec. tone burst on VS lead of station tested. See Fig. 70 for VS lead assignment.	Tone burst heard after dialing proper digit(s)
B BAT	J10-19	TALK	Ground — BY1 lead	Dialing complete— 1- or 2-digit code
	J10-30		Ground — LK lead	After dialing 1st digit, dial tone should be removed
	J10-39		Ground — TTG lead	Selector seized
GROUND	J10-35		B BAT. — BR lead	Selector seized

TABLE AA

INPUTS AND OUTPUTS—440A OR 478B KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J14-8	TALK	A Battery	
A BAT.	J13-3 J14-3	TALK	A Ground	Required for 478B KTU only
J14-12	J14-13	MON	Multifrequency signals	Either IC path seized — any dial button depressed
OUTPUTS				
B BAT.	J14-26	TALK	B Ground — LK lead	1st digit of 2-digit code dialed
	J14-36		B Ground — TTG lead	Selector seized

TABLE AB

INPUTS AND OUTPUTS—456B KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J16-18	TALK	A Battery	
J16-18	J16-3		A Ground	
J16-8	J16-9		Talk Battery from 460B KTU — TC and RC leads	Any intercom path seized
J16-18	J16-19		Ground — from 424B/424C KTU (BY1 lead) after dialing is completed on any path	
OUTPUTS				
J16-8	J16-9	MON	Tone burst after dialing	Any code dialed — any path
GROUND	J16-1		Tone burst after dialing	Any code dialed — any path
	J16-0		Voice conversation on intercom paging calls.	Dial 2 if paging is furnished — tone burst and voice should be heard

TABLE AA

INPUTS AND OUTPUTS—440A OR 478B KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J14-8	TALK	A Battery	
A BAT.	J13-3 J14-3	TALK	A Ground	Required for 478B KTU only
J14-12	J14-13	MON	Multifrequency signals	Either IC path seized — any dial button depressed
OUTPUTS				
B BAT.	J14-26	TALK	B Ground — LK lead	1st digit of 2-digit code dialed
	J14-36		B Ground — TTG lead	Selector seized

TABLE AB

INPUTS AND OUTPUTS—456B KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J16-18	TALK	A Battery	
J16-18	J16-3		A Ground	
J16-8	J16-9		Talk Battery from 460B KTU — TC and RC leads	Any intercom path seized
J16-18	J16-19		Ground — from 424B/424C KTU (BY1 lead) after dialing is completed on any path	
OUTPUTS				
J16-8	J16-9	MON	Tone burst after dialing	Any code dialed — any path
GROUND	J16-1		Tone burst after dialing	Any code dialed — any path
	J16-0		Voice conversation on intercom paging calls.	Dial 2 if paging is furnished — tone burst and voice should be heard

TABLE AC

INPUTS AND OUTPUTS – 460B KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J11-18	TALK	A BAT. — intercom talk battery	
	J11-17		B BAT. — intercom relay battery	
	J12-4	MON	10V± steady lamp voltage — paths 1 and 2	
	J12-35	TALK	B Battery	Selector seized
	J12-7	MON	10V± at 60 IPM — lamp flash	Interrupter running
J11-17	J11-3	TALK	A Ground	
	J11-15		B Ground	
	J11-6		Ground — MG lead	
OUTPUTS				
J12-14	J12-34	TALK	Talk Battery — path 1	Selector seized
J12-0	J12-1		Talk Battery — path 2	
GROUND	J12-8	MON	10V± at 60 IPM	Intercom path 1 seized
	J12-9			
	J11-16			Intercom path 2 seized
	J11-19			
J12-12	J12-13	TALK	Talk BAT. — TC and RC leads	Any path seized

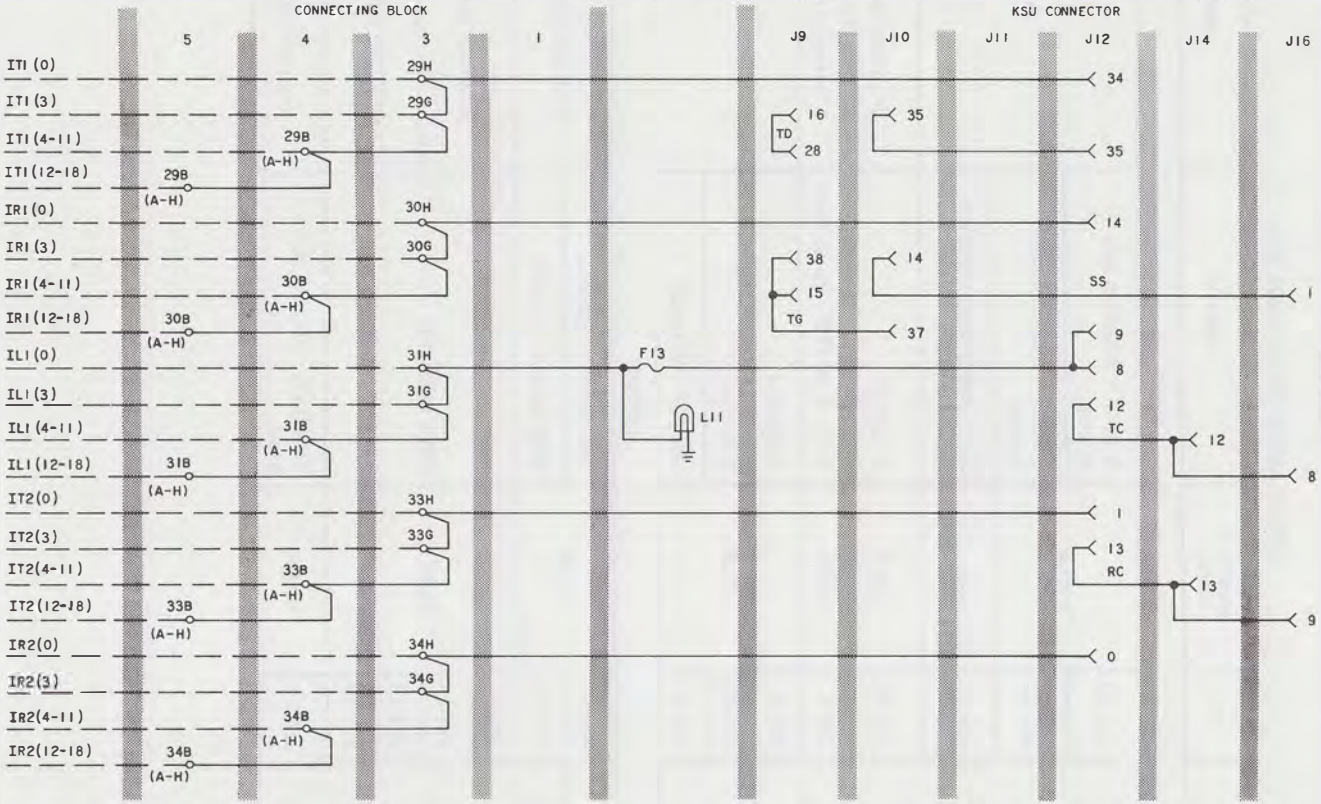


Fig. 70—Intercom Circuit (Sheet 1 of 4)

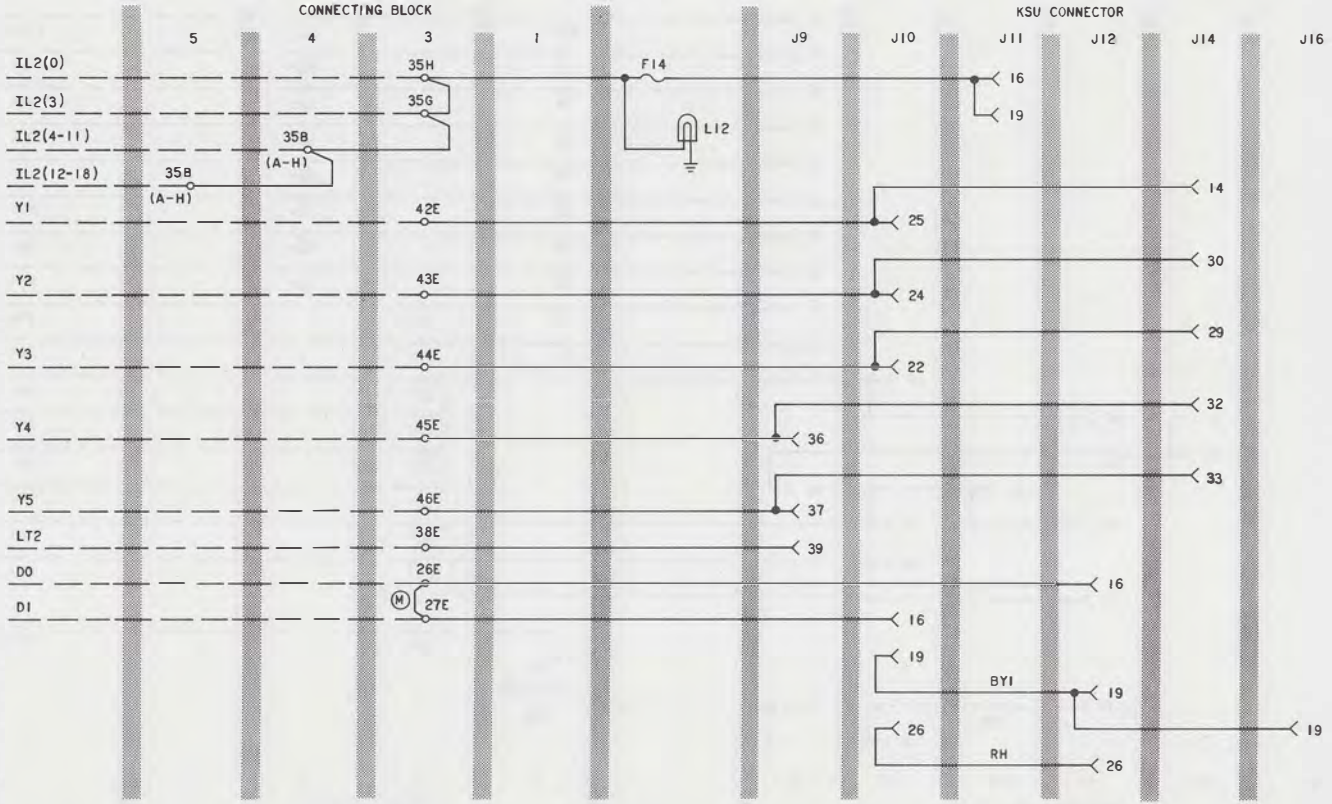


Fig. 70—Intercom Circuit (Sheet 2 of 4)

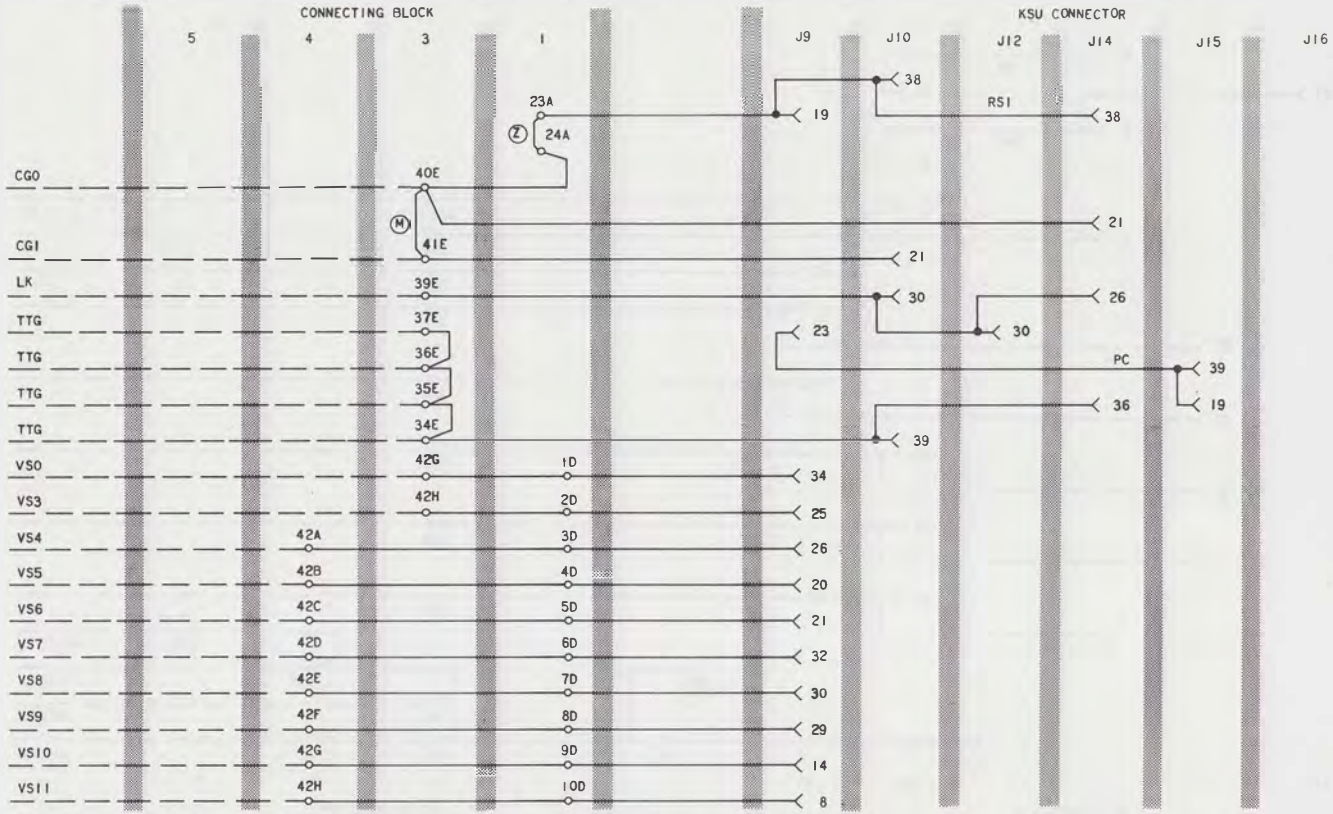


Fig. 70—Intercom Circuit (Sheet 3 of 4)

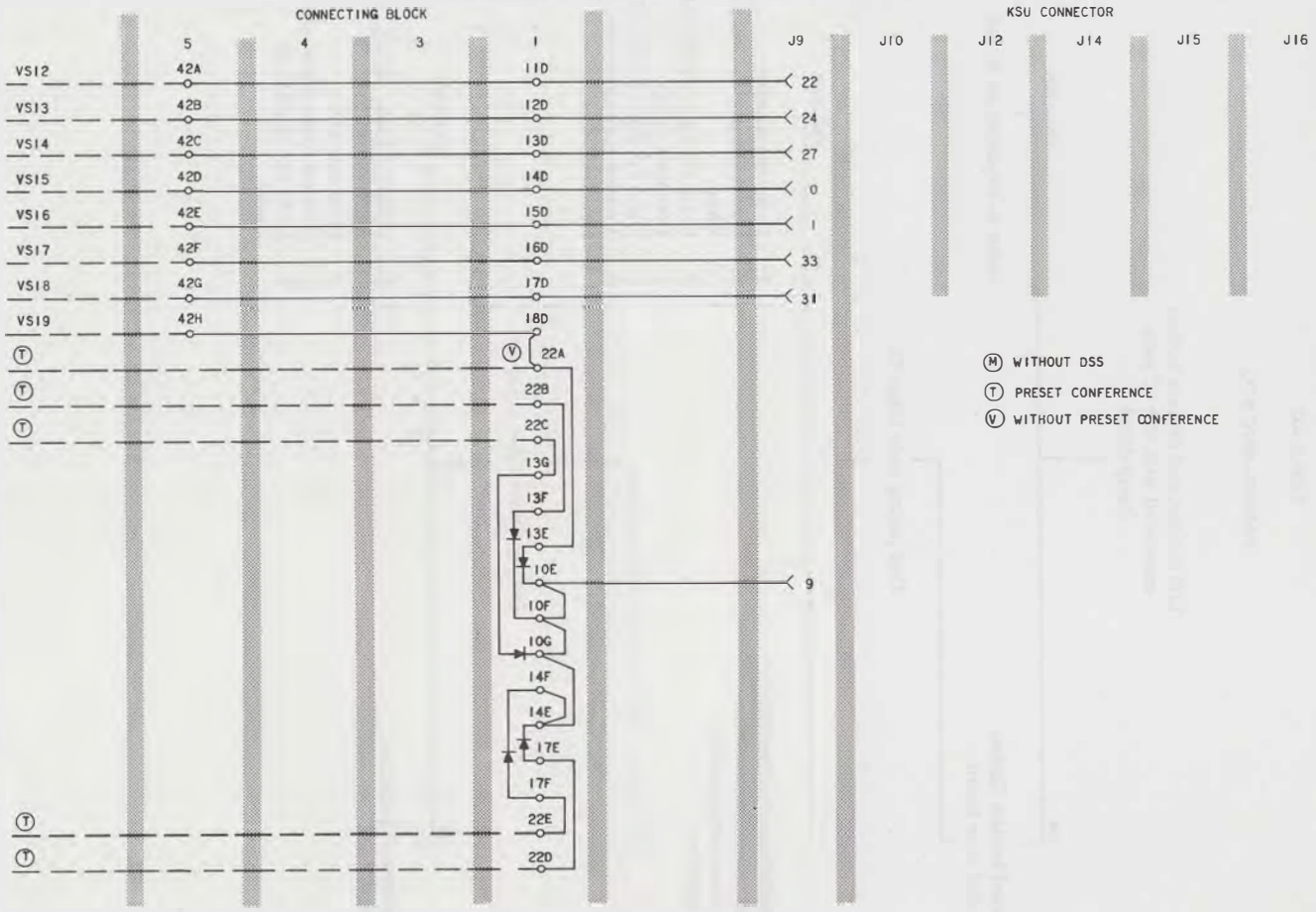


Fig. 70—Intercom Circuit (Sheet 4 of 4)

TABLE AD

PAGING—457C KTU

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

OK

Associated button flashes and IC dial tone heard.

Dial paging code (digit 2).

OK

Background music (if provided) removed from speakers. One-second tone burst heard in paging speakers.

Paging station talks in handset.

OK

Announcement heard in speakers.

FAILURE

Refer to sequence on IC call.

FAILURE

1. Defective selector.
2. Open SS lead—424B/424C, 456B.
3. Open PC lead—424B/424C.
4. Defective 457C.
5. Open PA lead—456B, 457C.
6. Volume improperly set (see 4.50, 4.52).

FAILURE

1. Open PA leads—456B, 457C.
2. Defective 457C.
3. Volume improperly set.
4. Defective speaker or wiring.

TABLE AE

LEAD TABLE – 457C KTU

LEAD DESIG.	FUNCTION	KSU/CONNECTOR PIN NO.
PA	Paging input — voice and tone alerting input from the 456B KTU.	J15-16
PC	Paging code — when code 2 is dialed, —24V is applied to this lead from 456B KTU to enable amplifier.	J15-19
P0-P1	Paging amplifier output — outputs from paging amplifier to speakers.	J15-0 J15-1

TABLE AF

INPUTS AND OUTPUTS – 457C KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
GROUND	J15-18	TALK	A Battery	
	J15-17		B Battery	
J15-17	J15-15		B Ground	
GROUND	J15-19		A Battery (PC lead)	Code 2 dialed
J15-8	J15-9	MON	Background music	If provided
OUTPUTS				
GROUND	J15-0	MON	Voice and tone alerting	Code 2 dialed; voice input at calling station
	J15-1			

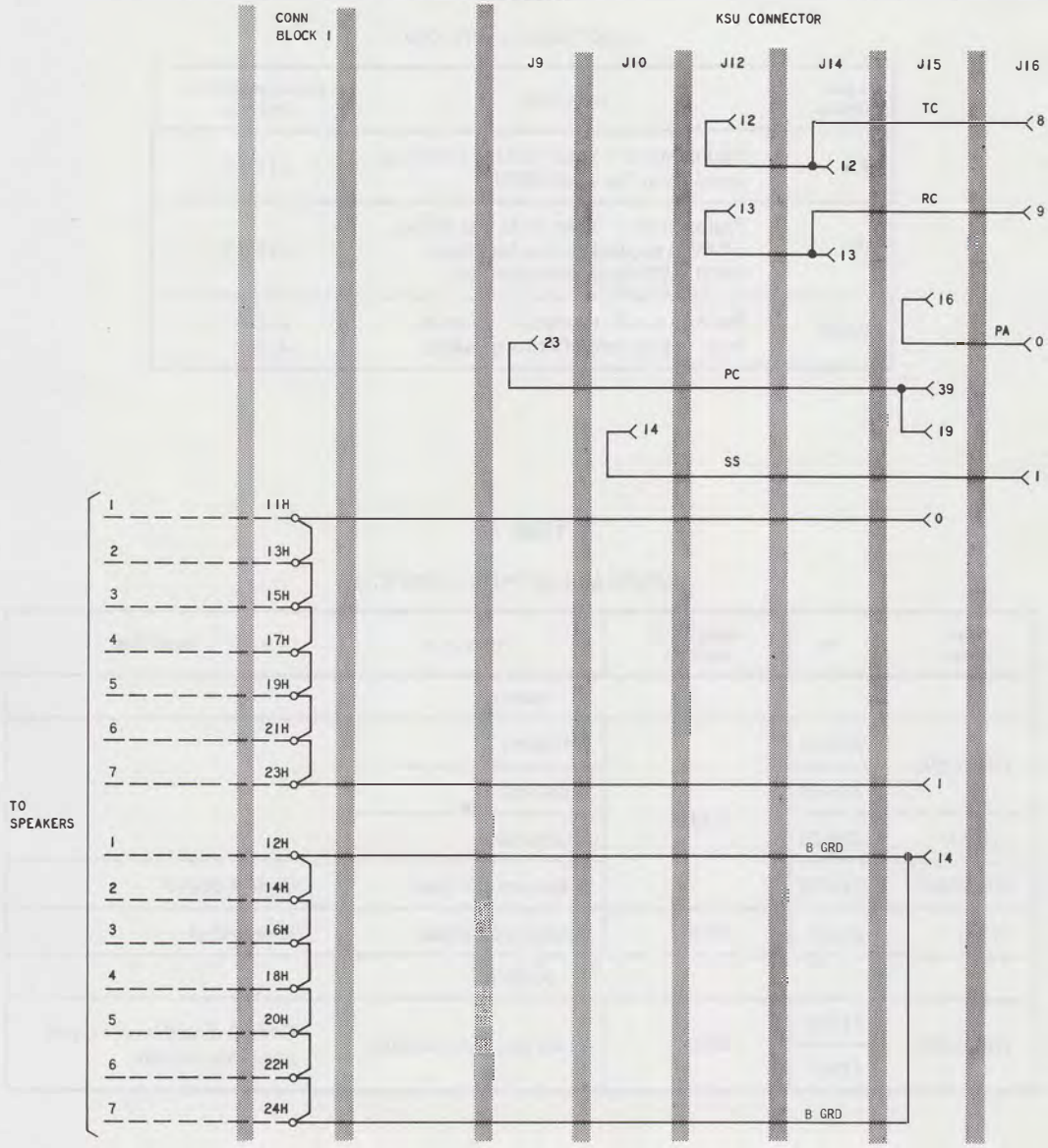


Fig. 71—Paging Connections

TABLE AG

BACKGROUND MUSIC

Paging circuit idle.

OK

Background music heard.

FAILURE

1. COAM music source defective, connected wrong, or volume set improperly.
2. Defective 33A coupler, fuses operated, or volume set improperly.
3. Open PT and/or PR leads—33A, 457C.
4. Defective 457C.

Paging code dialed.

OK

Background music removed.
Paging circuit enabled.

FAILURE

Refer to sequence on paging.

TABLE AH

MUSIC ON HOLD

Call in progress on CO/PBX line.

Hold button depressed at 7A station.

OK

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

Line button depressed.

OK

Background music removed; voice conversation reestablished.

FAILURE

(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, 451B.
4. Open R(CO) or R(STA).

FAILURE

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

TABLE AI

LEAD TABLE – 451A KTU

LEAD DESIG	FUNCTION	KSU/CONNECTOR PIN NO.
MT	Music tip — tip side of music source input — through 33A voice coupler	J18-35
MR	Music ring — ring side of music source input — through 33A voice coupler	J18-36
R (CO)	Ring (Central Office) — multiple of ring side of CO/PBX circuit	J18-19, 39, 24, 14, 31, 34, 28
R (STA)	Ring (Station) — multiple of ring side of line toward station	J18-20, 30, 25, 9, 16, 32, 29

TABLE AJ

INPUTS AND OUTPUTS – 451A KTU

TEST FROM	TO	MON/TALK SWITCH	TEST FOR	REMARKS
INPUTS				
J18-35	J18-36	MON	Background music input	Music source connected
OUTPUTS				
J18-19	J18-20	MON	Background music output	CO/PBX line 1 on hold
J18-39	J18-30		Background music output	CO/PBX line 2 on hold
J18-24	J18-25		Background music output	CO/PBX line 3 on hold
J18-14	J18-9		Background music output	CO/PBX line 4 on hold
J18-31	J18-16		Background music output	CO/PBX line 5 on hold
J18-34	J18-32		Background music output	CO/PBX line 6 on hold
J18-28	J18-29		Background music output	CO/PBX line 7 on hold

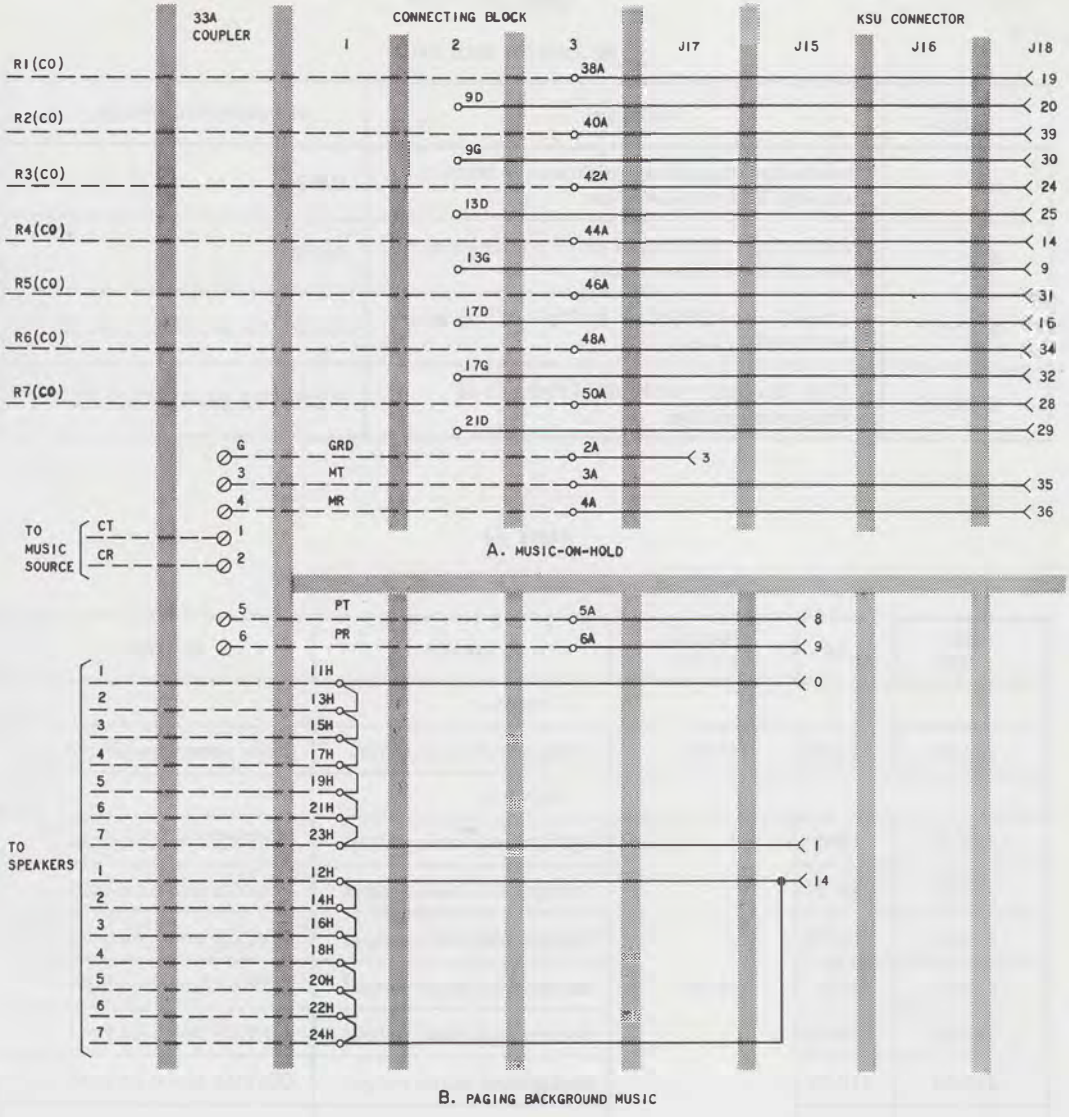


Fig. 72—Music-On-Hold And Background Music

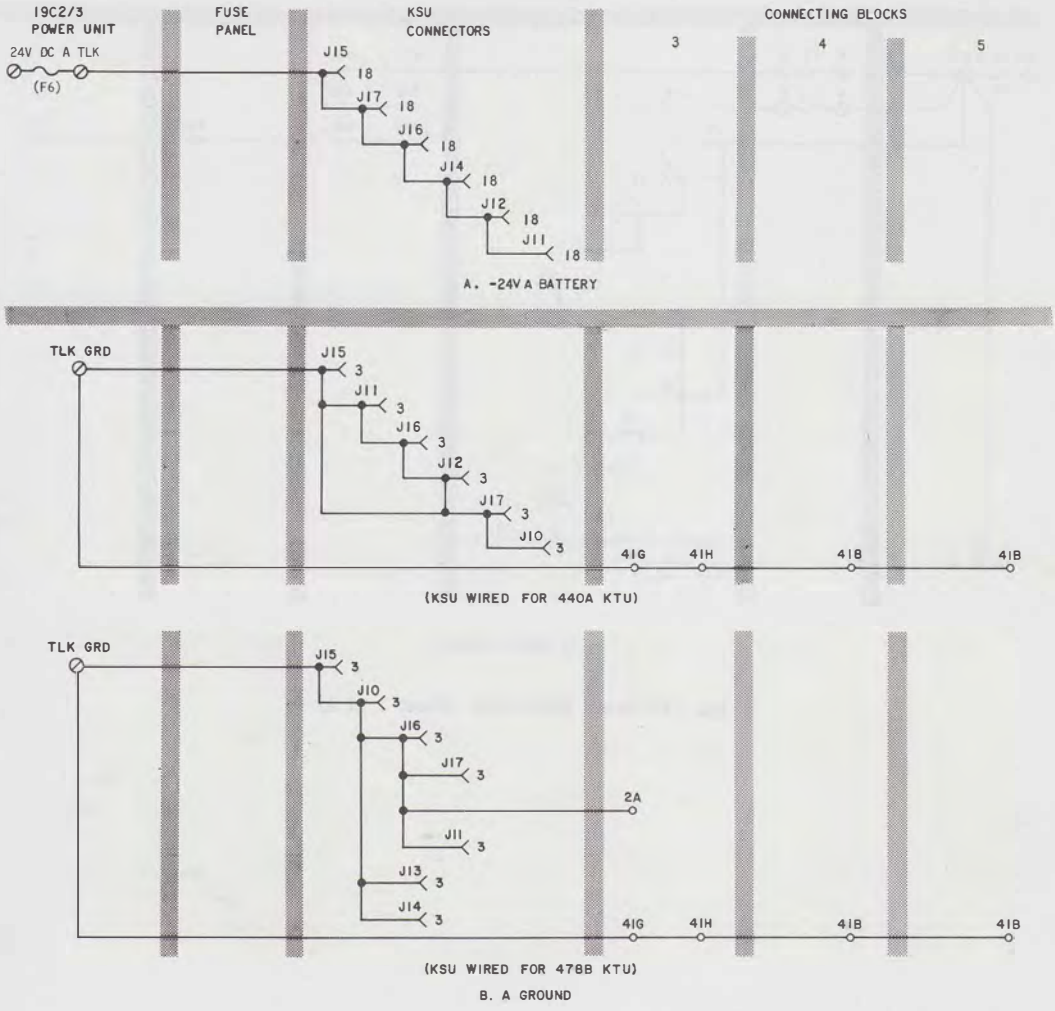


Fig. 73—Power Distribution (Sheet 1 of 6)

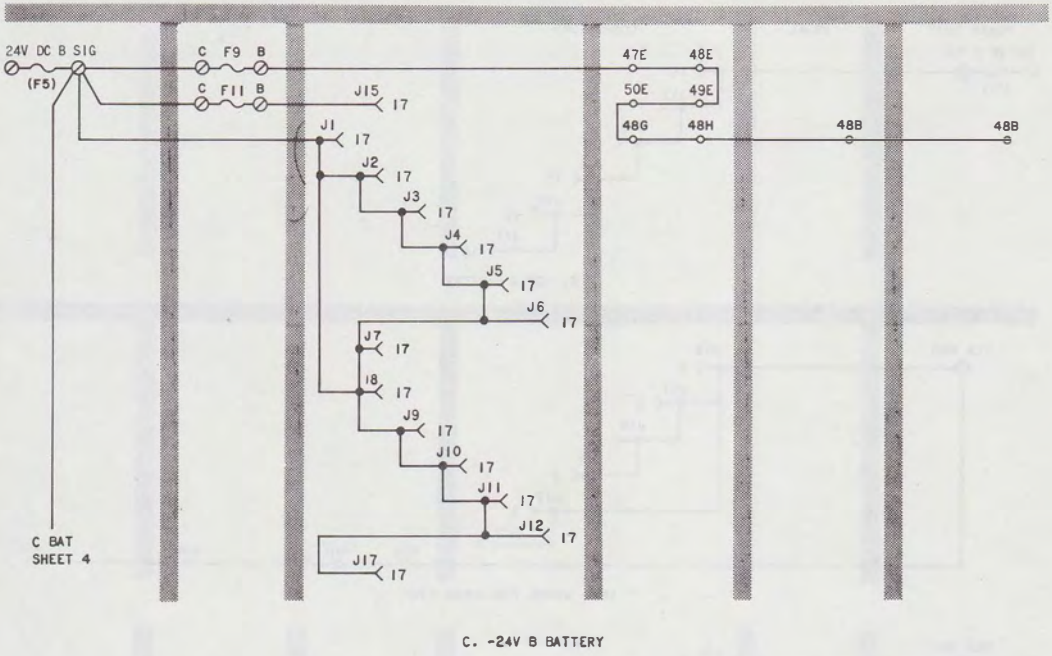


Fig. 73—Power Distribution (Sheet 2 of 6)

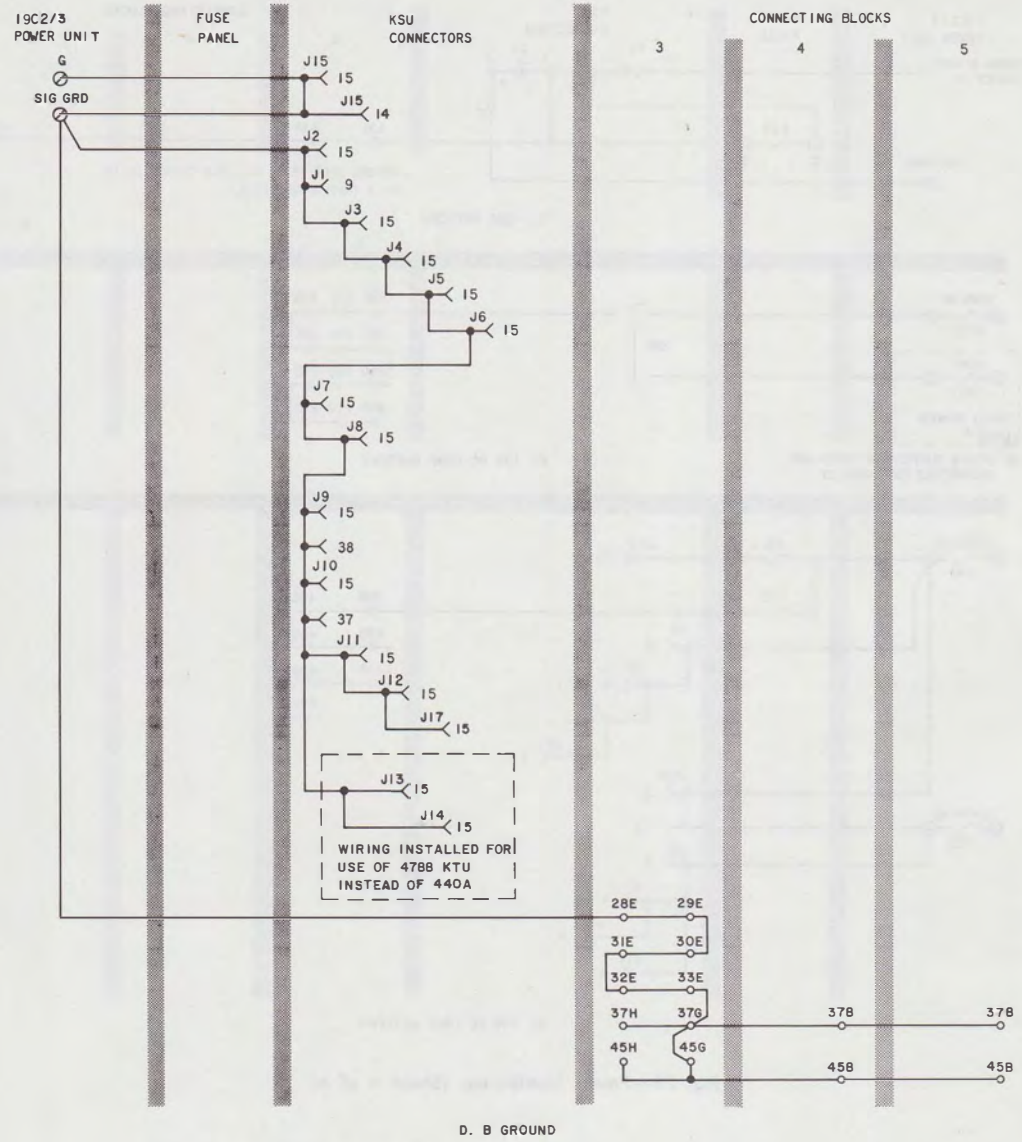


Fig. 73—Power Distribution (Sheet 3 of 6)

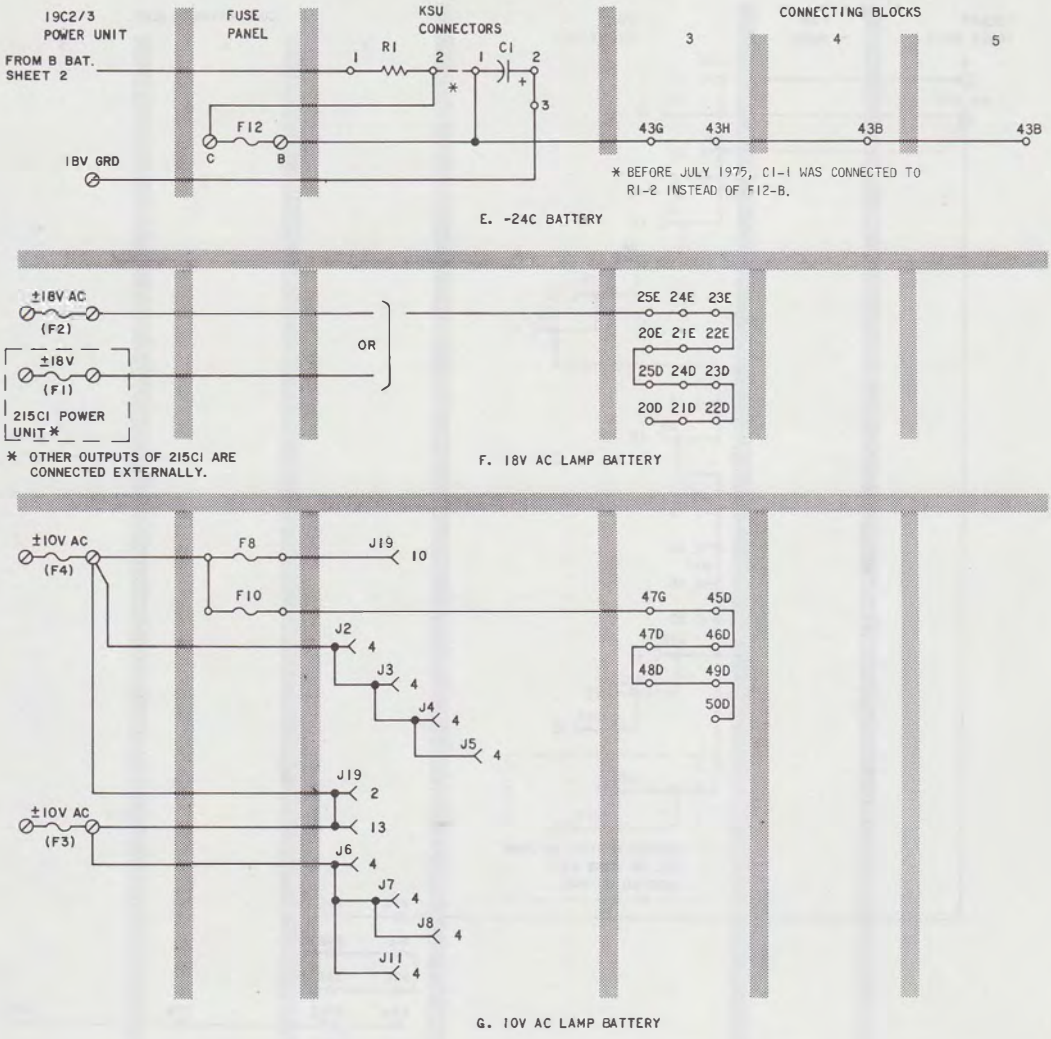


Fig. 73—Power Distribution (Sheet 4 of 6)

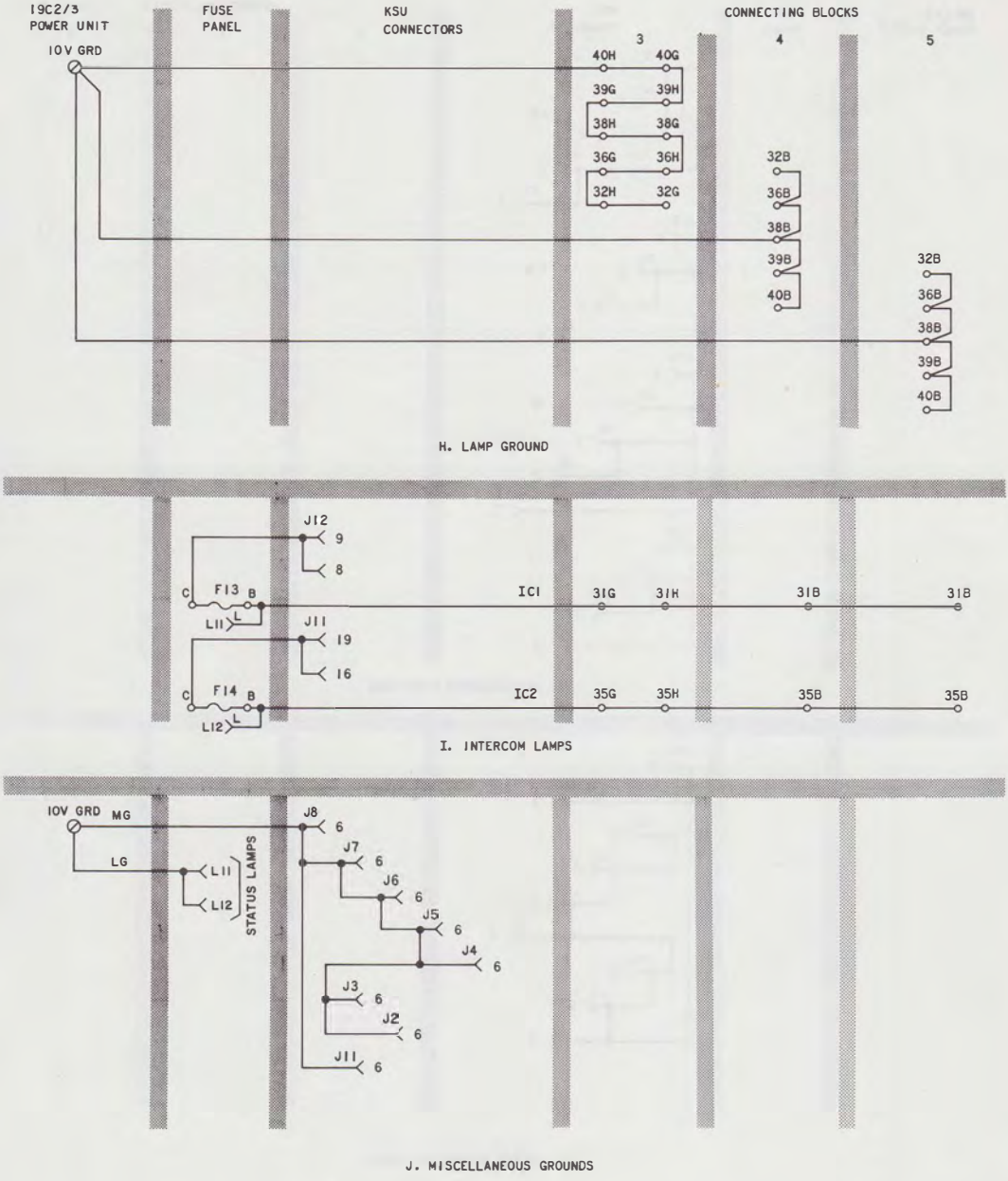


Fig. 73—Power Distribution (Sheet 5 of 6)

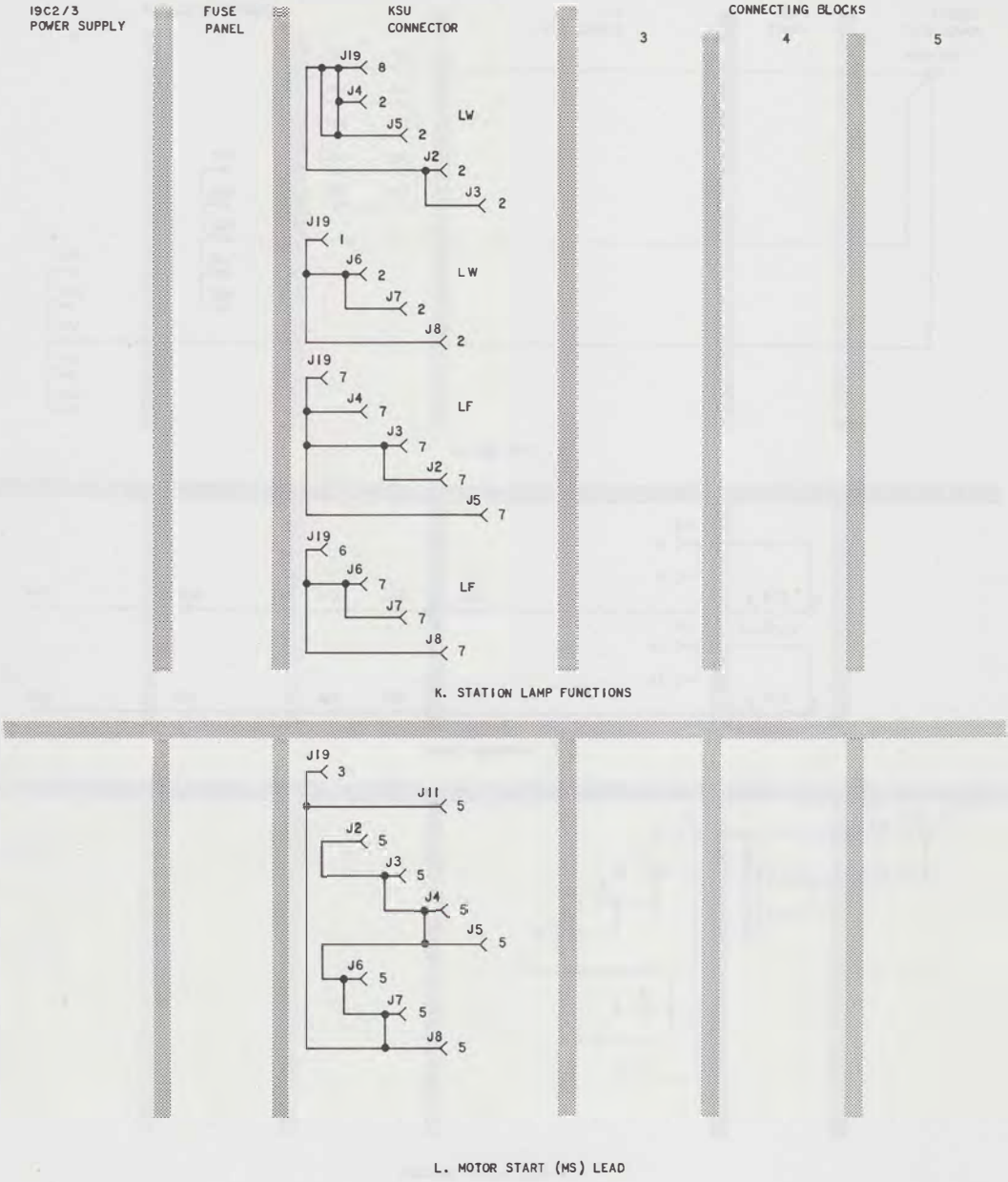


Fig. 73—Power Distribution (Sheet 6 of 6)