

PLEASE NOTE:

.(BUSINESS INTERPHONE)

FOREMAN 02... 6
FOREMAN 03... 6 (BUSINESS INT
FOREMAN 04...
FOREMAN 05... 6
1. GENERAL
FOREMAN 06... 6
FOREMAN 07... 6
1.01 FOREMAN section provides the connection and
FOREMAN 08... maintenance information for the 2A
FOREMAN 09... communication systems and information on connecting
FOREMAN 10... the 3A and 4A type speakerphone to the 2A
FOREMAN 11... communication system.

- Information on connecting the 4-type speakerphone to the 2A communication system
- Add new Fig. 2
- Add comcode numbers.

2.01 All connections are made on the four dual connecting blocks designated A-B, C-D, F-G, and H-J. Refer to Section 461-604-101 for numbering information on the 66-type connecting blocks. Refer to Section 512-620-100 for identification and connection of 3-type speakerphone and Section 512-700-100 for 4-type speakerphone.

Table F—Modification of 253-Type KTU When Audible Signaling or DSS is Provided

Fig. 14—D-180006 Kit of Parts, Schematic

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Bell System except under written agreement

SECTION 512-534-400

3. MAINTENANCE

3.01 Refer to the following as an aid in locating and clearing trouble:

- CD- and SD-69480-01 (311A15 (MD) and 311A16D KSU)
- CD- and SD-69447-01)
 - 247A (MD) KTU
- Section 518-114-116)
- CD- and SD-69529-01)
 - 247B KTU
- Section 518-114-116)
- CD- and SD-69532-01 (57B Control Unit)

3.02 *Replaceable Apparatus* (refer to ordering guide in Section 512-534-100 for ordering nomenclature and color).

- 694-type subscriber set
- 66B3-50 connecting blocks
- 117A cover
- 57A control unit includes (see note):
 - ◆812459212 or◆ P-24E921 printed wiring board
 - ◆812459246 or◆ P-24E924 printed wiring board
 - ◆812459279 or◆ P-24E927 printed wiring board
- 57B control unit includes (see note):
 - ◆812853224 or◆ P-28E322 printed wiring board
 - ◆812853232 or◆ P-28E323 printed wiring board
 - ◆812853240 or◆ P-28E324 printed wiring board

◆**Note:** Printed wiring boards may be ordered on an individual basis by comcode or P-number.◆

- 207C KTU
- 252-type KTU
- 253-type KTU
- 216B KTU

- KS-16846L1 loudspeaker
- 227-type KTU
- 228A KTU
- 237B KTU
- 247A (MD) KTU includes:
 - ◆814864393 or◆ P-48F439 printed wiring board
 - ◆814864427 or◆ P-48F442 printed wiring board
 - ◆814864450 or◆ P-48F445 printed wiring board
- ◆**Note:** Printed wiring boards may be ordered on an individual basis by comcode or P-number.◆

- 228A KTU
- 247B KTU includes:

Y1 through Y5 circuit packs

3.03 *311A15 (MD) or 311A16D KSU:*

(a) Limit activity involving KSU to:

- Tracing wiring trouble
- Replacement of defective component KTUs

(b) Connecting block H-J provides:

- Option strapping points
- Test points for checking circuit continuity

(c) 57-type control unit:

- Operating battery is under control of the 253-type KTU over the **BA1** lead.
- Verify trouble within one of the three plug-in circuit boards by interchanging suspected board with good one.
- Replace defective board and return it for repairs.

3.04 *Station Components:*

(a) Replace defective station sets.

- (b) Check to ensure that wiring of 694-type subscriber set is properly terminated.



Reversal of M1 and M2 leads will cause low microphone output. Any deviation from proper installation rules outlined in Section 512-534-100 Part 3 (a)(1) should be reported to the immediate supervisor.

3.05 Optional KTUs Associated With KSU:

- (a) Ensure that the various optional KTUs (227-type, 228A, 237B, and 247-type) are properly positioned and terminated.
- (b) Refer to separate sections for detailed maintenance information on these units.

3.06 3-Type Speakerphone: When a station is equipped for 3-type speakerphone, modification of the 55-type control unit using D-180006 Kit of Parts is required (Fig. 10 and 14). See Section 512-620-100 for 3-type speakerphone information.

3.07 4-Type Speakerphone: D-180006 Kit of Parts is not required for 4-type speakerphone. See Section 512-700-100 for 4-type speakerphone information.

3.08 Radio Interference:

- (a) Interference from commercial AM (.55 to 1.6 MHz) or FM (88 to 109 MHz) broadcast stations may be experienced when the system is installed in vicinity of a transmitting station.

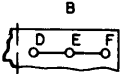
- (1) Interference most frequently encountered is audible program material from station loudspeaker or handset receiver.
- (2) Extreme interference may cause paralysis of system voice switching characteristics and will result in low volume of transmission or reception.

- (b) When radio interference is encountered:

(1) Replace 694A and 694B subscriber sets with a modified subscriber set designated with an asterisk after the code. Specify "Modified for Radio Suppression" when ordering a subscriber set, and the distributing house will include capacitors properly positioned in the circuitry on the printed wiring board to suppress radio interference. Subscriber set will then be coded 694A* or 694B*.

(2) Replace telephone sets equipped with 425B, E, or G networks with sets equipped with 425J networks. This is a distributing house modification. Refer to Section 500-150-100.

TABLE A
POWER CONNECTIONS TO KSU
(NOTE)

LEAD DESIGNATION	CONNECTING BLOCK
	
TERMINAL	
*A1	33E
Ground A	38D
Battery A	39D
Ground B	41D
Battery B	42D
Ground C	47D
10v ac or Battery C	50D

* Connect from associated 1A1 or 1A2 KTS

Note: Power is supplied from associated key equipment, 19- or 20-type power unit, or a 101G or equivalent power supply.

TABLE B
STATION CONNECTIONS FOR SYSTEM WITH
2-6 STATIONS

STATION CODE AND TELEPHONE NUMBER		LEAD DESIG	CONNECTING BLOCK	
			BLOCK	TERMINAL
Sta 4	Tel Set -	T	A	1C
		R		2C
		A		3C
		A1		4C
		LG		5C
		L		6C
	694- Type Subset	M2		7C
		M1		8C
		S2		9C
		S1		10C
Sta 5	Tel Set	*	A	11C-16C
	Subset			17C-20C
Sta 6	Tel Set	*	A	21C-26C
	Subset			27C-30C
Sta 7	Tel Set	*	A	31C-36C
	Subset			37C-40C
Sta 8	Tel Set	*	A	41C-46C
	Subset			47C-50C
Sta 9	Tel Set	*	B	1D-6D
	Subset			7D-10D

* 10 leads, same as Station 4

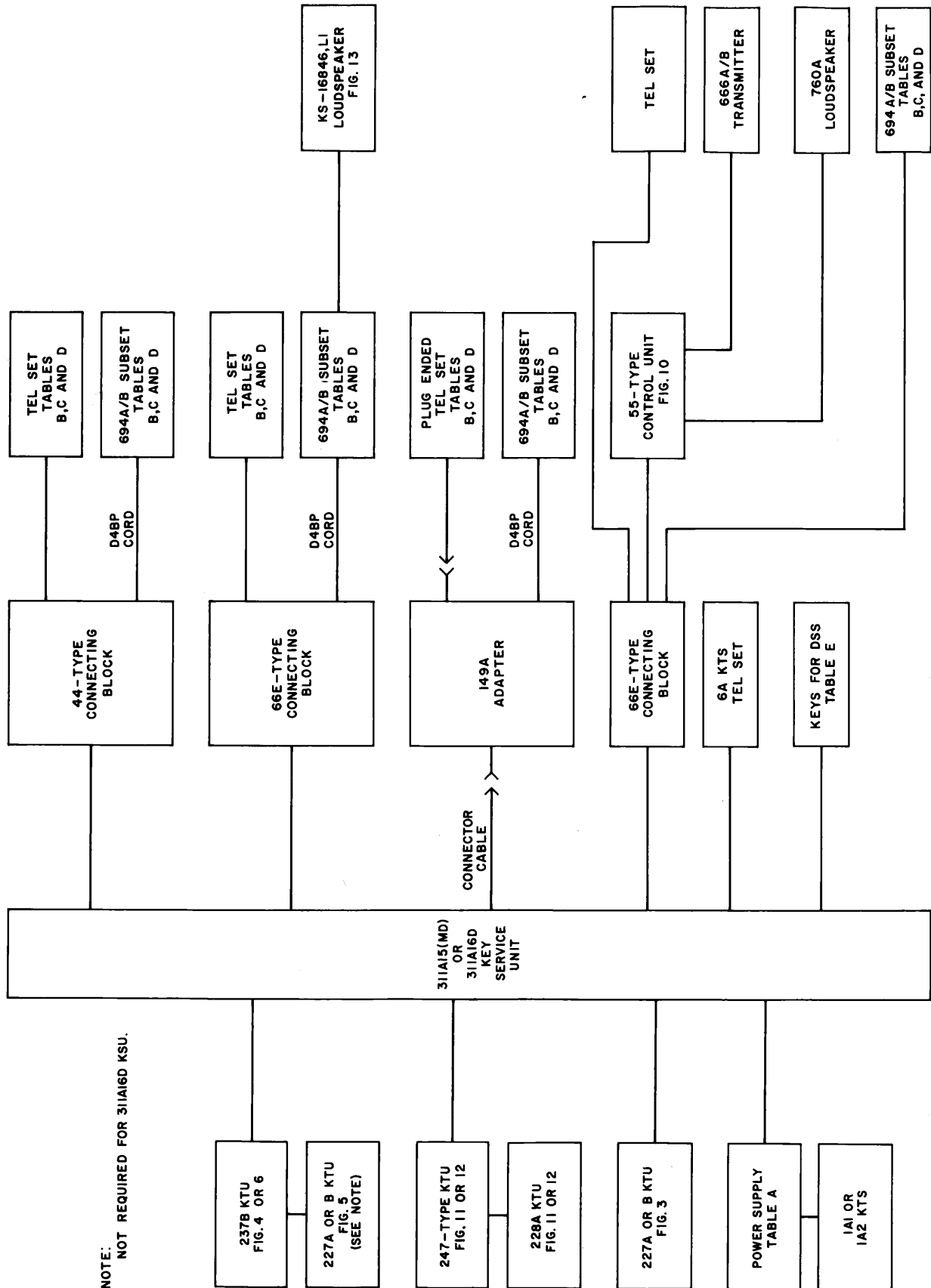


Fig. 1—Block Diagram of 2A Communication System Equipped With 3-Type Speakerphone

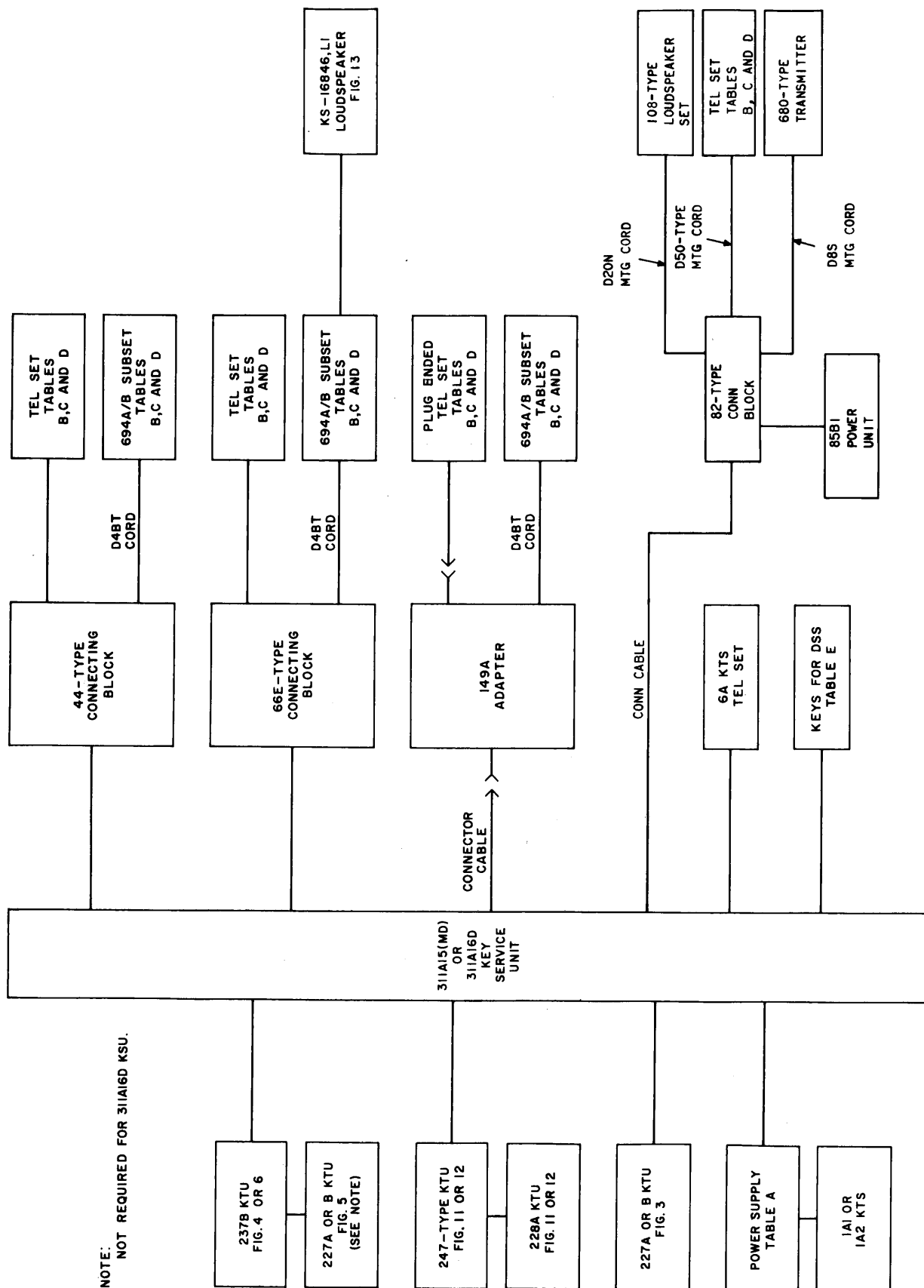


Fig. 2—Block Diagram of 2A Communication System Equipped With 4-Type Speakerphone

TABLE C
STATION CONNECTIONS FOR SYSTEM WITH 7-12 STATIONS

STATION CONNECTIONS IN ADDITION TO TABLE B					REMOVE STRAPS				
STATION CODE AND TELEPHONE NUMBER		LEAD DESIG	CONNECTING BLOCK		CONNECTING BLOCK				
			<div>C D</div> <div><div>A B C</div><div>O — O</div></div> <div><div>D E F</div><div>O — O</div></div>		<div>H J</div> <div><div>A B C</div><div>O — O</div></div> <div><div>D E F</div><div>O — O</div></div>				
			BLOCK	TERMINAL	BETWEEN		AND		
BLOCK	TERMINAL	BLOCK	TERMINAL	BLOCK	TERMINAL	BLOCK	TERMINAL		
Sta 21	Tel Set	*	C	1C-6C	H	1C	J	1D	
	Subset			7C-10C		2C		2D	
	Sta 22	Tel Set	*	C		11C-16C		3C	3D
		Subset				17C-20C		4C	4D
	Sta 23	Tel Set	*	C		21C-26C		5C	5D
		Subset				27C-30C		6C	6D
	Sta 24	Tel Set	*	C		31C-36C		7C	7D
		Subset				37C-40C		8C	8D
	Sta 25	Tel Set	*	C		41C-46C		9C	9D
		Subset				47C-50C		10C	10D
Sta 26	Tel Set	*	D	1D-6D	J	25B	H	26B	
	Subset			7D-10D		41C		42C	
				J	33D	J	34D		
					37D		38D		

* 10 leads same as Station 4 on Table B

* 10 leads, same as Station 4 on Table B

TABLE D
STATION CONNECTIONS FOR SYSTEM WITH 13-18 STATIONS

STATION CONNECTIONS IN ADDITION TO TABLES B AND C					STRAPS TO BE REMOVED IN ADDITION TO TABLE C			
STATION CODE AND TELEPHONE NUMBER		LEAD DESIG	CONNECTING BLOCK		CONNECTING BLOCK			
			<div><div>F</div><div>G</div><div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div><div>F</div></div></div>		<div><div>H</div><div>J</div><div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div><div>F</div></div></div>			
			BLOCK	TERMINAL	BETWEEN		AND	
BLOCK	TERMINAL	BLOCK	TERMINAL					
Sta 27	Tel Set	*	F	1C-6C	H	42C	H	43C
	Subset			7C-10C				
Sta 28	Tel Set	*	F	11C-16C	J	4F	J	11F
	Subset			17C-20C		5F		12F
Sta 29	Tel Set	*	F	21C-26C		6F		13F
	Subset			27C-30C		7F		14F
Sta 31	Tel Set	*	F	31C-36C		8F		15F
	Subset			37C-40C		9F		16F
Sta 32	Tel Set	*	F	41C-46C		10F		17F
	Subset			47C-50C		23E		24E
Sta 33	Tel Set	*	G	1D-6D		25E		26E
	Subset			7D-10D		34D		35D
					J	38D	J	39D

* 10 leads same as Station 4 on Table B

* 10 leads, same as Station 4 on Table B

NOTES:

NOTES:

3. IN EARLIER 2A SYSTEMS, THE START LEAD IS DESIGNATED TO CONNECT THE TO LEAD AS A START LEAD AND NOT TO A TIME-OUT CIRCUIT.
- 227A(MD)
OR 227B
KTU
- TO RINGER
OR BUZZER
CIRCUIT
- TO AUDIBLE
SIGNALING
POWER SUPPLY
- TO VISUAL
AND AUDIBLE
SIGNALING
CIRCUIT
- CONNECTING BLOCK
- H B, D, OR G
- A B C D E F
- CODING STATION
- 227A(MD)
OR 227B
KTU
- 11
14
5
17
20
8
23
26
2
12
15
18
21
24
27
10
40
1
- B, BI
R, RI
B, BI
R, RI
B, BI
R, RI
GRD OR RINGING GRD
±, BAT., OR 105V ±
ST OR TO (NOTE 3)
LF
- S
S
S
B
STRAP
STRAP
STRAP
STRAP (NOTE 2)
- (NOTE 1)
- BLOCK
- TERMINAL
- 4
5
6
7
8
9
O, BC
21
22
23
24
25
26
20, BC
27
28
29
31
32
33
30, BC
44 A
31D
43D

Fig. 3—Connections for Audible and Visual Signaling

237B
KTU

CONNECTING BLOCK

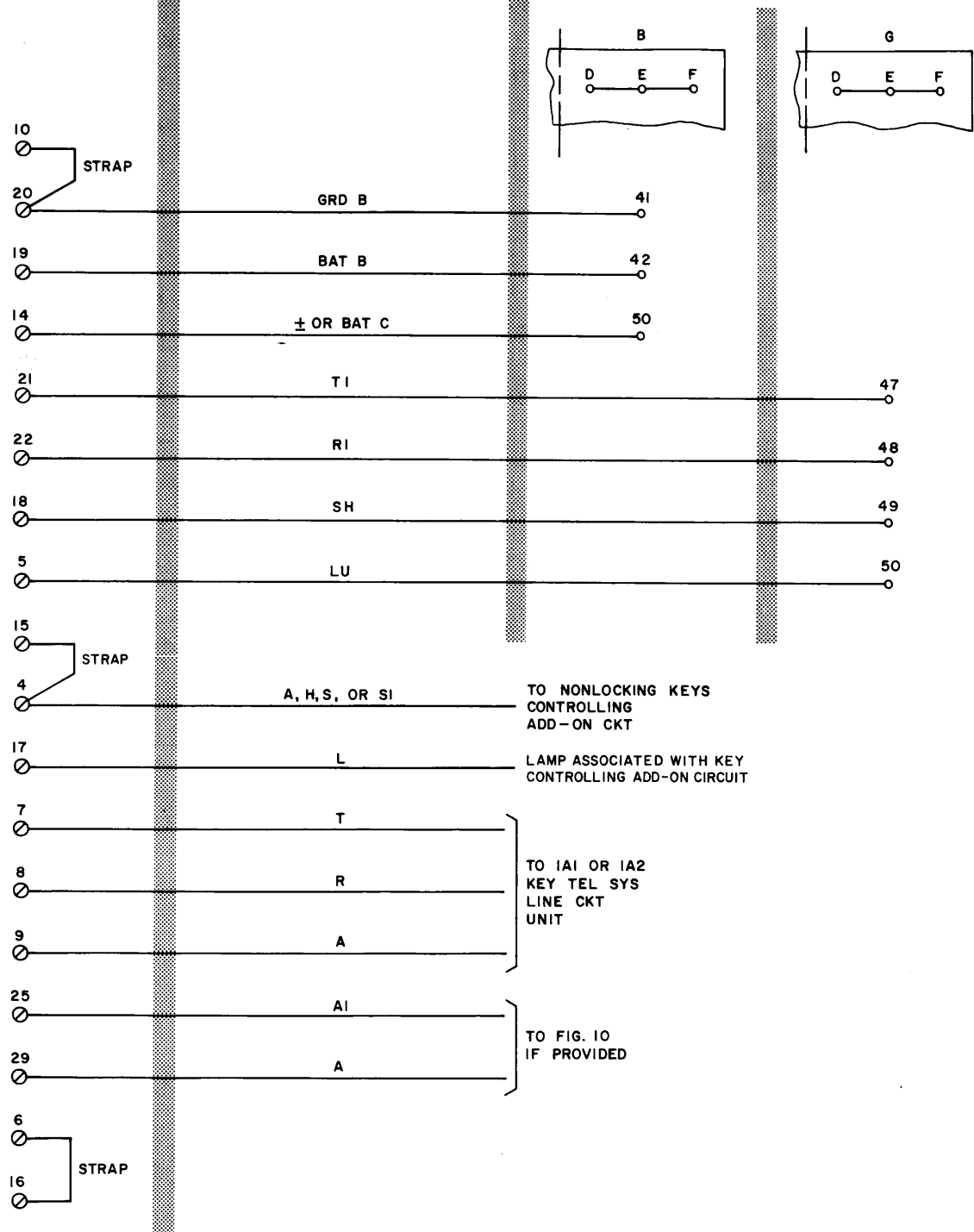


Fig. 4—Connecting 237B KTU Add-On Circuit to 311A16D KSU

TABLE E

CONNECTIONS FOR DIRECT STATION SELECTION (DSS)
USING NONLOCKING KEYS (NOTE 1)

STATION OR CONFERENCE GROUP NONLOCKING KEY NUMBER		LEAD DESIG. (NOTE 2)	CONNECTING BLOCK B, D, OR G	
			BLOCK	TERMINAL
1st Group	4	C	B	11D
	5			13D
	6			15D
	7			17D
	8			19D
	9			21D
	0BC	C (0)		23D
	SG	SG		30D
2nd Group	21	C	D	11D
	22			13D
	23			15D
	24			17D
	25			19D
	26			21D
	20 BC	C (20)		23D
	SG	SG		30D
3rd Group	27	C	G	11D
	28			13D
	29			15D
	31			17D
	32			19D
	33			21D
	30 BC	C (30)		23D
	SG	SG		30D

Notes: 1. Modify each 253-type KTU per Table F when DSS is provided.

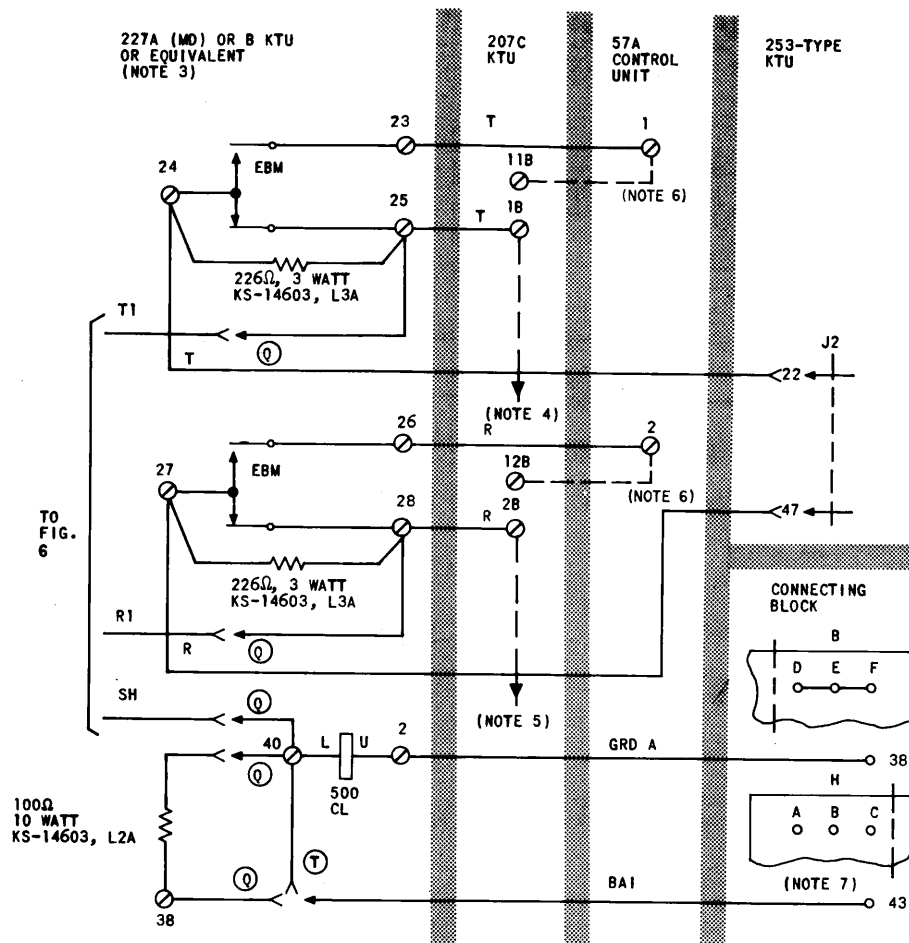
2. Connect C lead to associated non-locking key at station using SG as common ground.

TABLE F

MODIFICATION OF 253-TYPE KTU WHEN
AUDIBLE SIGNALING OR DSS IS PROVIDED

FOR CODED STATION			TERMINALS (NOTE)
ON 1ST 253-	ON 2ND 253-	ON 3RD 253-	
4	21	27	1Ø — Ø 2
5	22	28	3Ø — — Ø 4
6	23	29	5Ø — — Ø 6
7	24	31	7Ø — Ø 8
8	25	32	9Ø — — Ø 10
9	26	33	11Ø — — Ø 12

♦ **Note:** When audible signaling or DSS is provided, remove straps and place 400J diodes between terminals on all stations. ♦



NOTES:

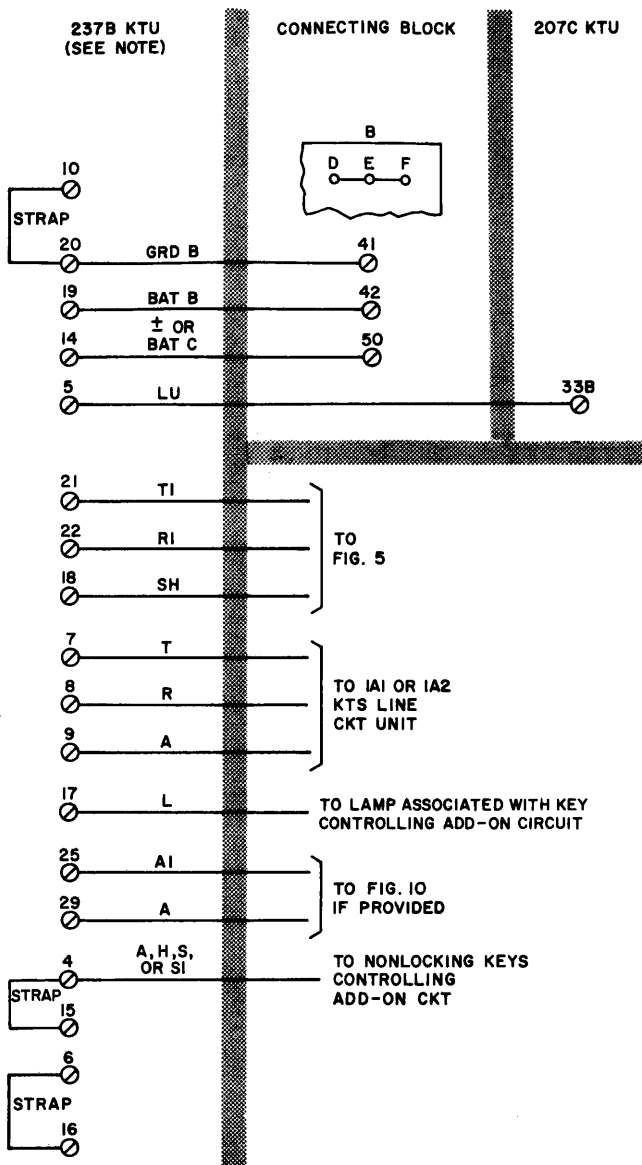
1. THIS MODIFICATION MAKES A 311A15 KSU (MD) ELECTRICALLY THE SAME AS A 311A16D. THIS WILL PERMIT USE OF 253B KTU'S FOR STATION EXPANSION AND 237B KTU'S (FIG. 6) FOR PROVIDING PBX ADD-ON CIRCUIT.
2. EXISTING 253A KTU'S MUST BE MODIFIED PER FIG. 7 WHEN A 253B OR 237B KTU IS ADDED TO THE SYSTEM.
3. USE THE MS RELAY OF THE 227-TYPE RELAY AS THE CL RELAY IN THIS CIRCUIT. THE REMAINING RELAYS MAY BE USED FOR OTHER FUNCTIONS SUCH AS AUDIBLE RINGING CONTROL (FIG. 3) IF REQUIRED.
4. REMOVE ALL THREE T LEADS FROM TERMINAL 1B OF 207C SELECTOR, SPLICE OUT TO LENGTHEN AND CONNECT TO CL RELAY AS SHOWN. OTHER END OF LEADS ARE TERMINATED ONE PER 253-TYPE KTU ON J2, PIN 22.
5. SIMILARLY, REMOVE R LEADS FROM 2B OF THE 207C SELECTOR, SPLICE AND CONNECT TO CL RELAY. OTHER END OF LEADS ARE TERMINATED ONE PER 253-TYPE KTU ON J2, PIN 47.
6. REMOVE, INSULATE AND STORE EXISTING LEADS FROM TERMINALS 1 AND 2 AND CONNECT TO CL RELAY AS SHOWN.
7. IF THIS TERMINAL IS USED, CONNECT LEAD TO ANY SPARE DI TERMINAL ON CONNECTING BLOCK H. EQUIVALENT TO A BAI TERMINAL.

⓪ WITH ADD-ON CIRCUIT (FIG. 6)

Ⓣ WITHOUT ADD-ON CIRCUIT

--- WIRING TO BE REMOVED

Fig. 5—Modification Required When Using 253B KTUs in 311A15 KSU (MD) or Adding 237B KTU Add-On Circuit



NOTE:

WHEN 237B KTU IS PROVIDED FOR 311A15(MD)KSU,
MODIFY THE KSU PER FIG. 5 AND EXISTING 253A
KTU'S PER FIG. 7.

Fig. 6—Connecting 237B KTU Add-On Circuit to
311A15 (MD) KSU

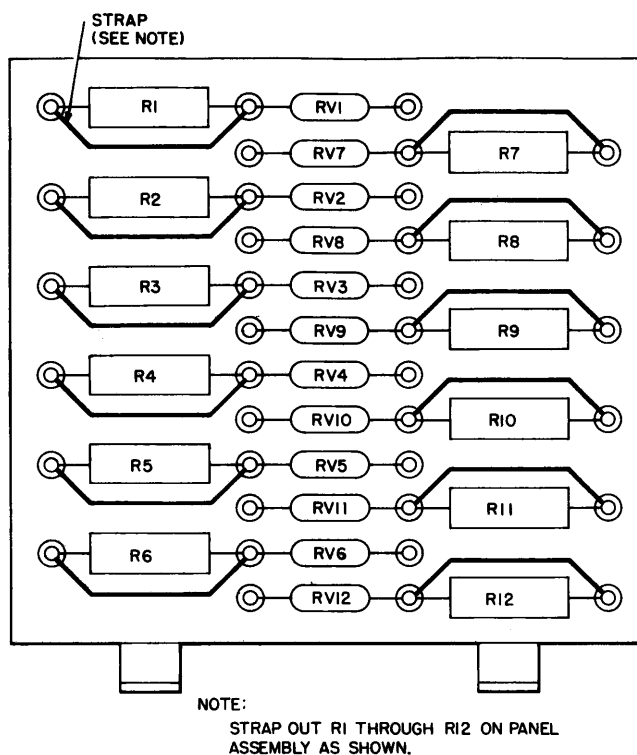


Fig. 7—Modification of Existing 253A KTUs When
Adding a 253B or 237B KTU to The System

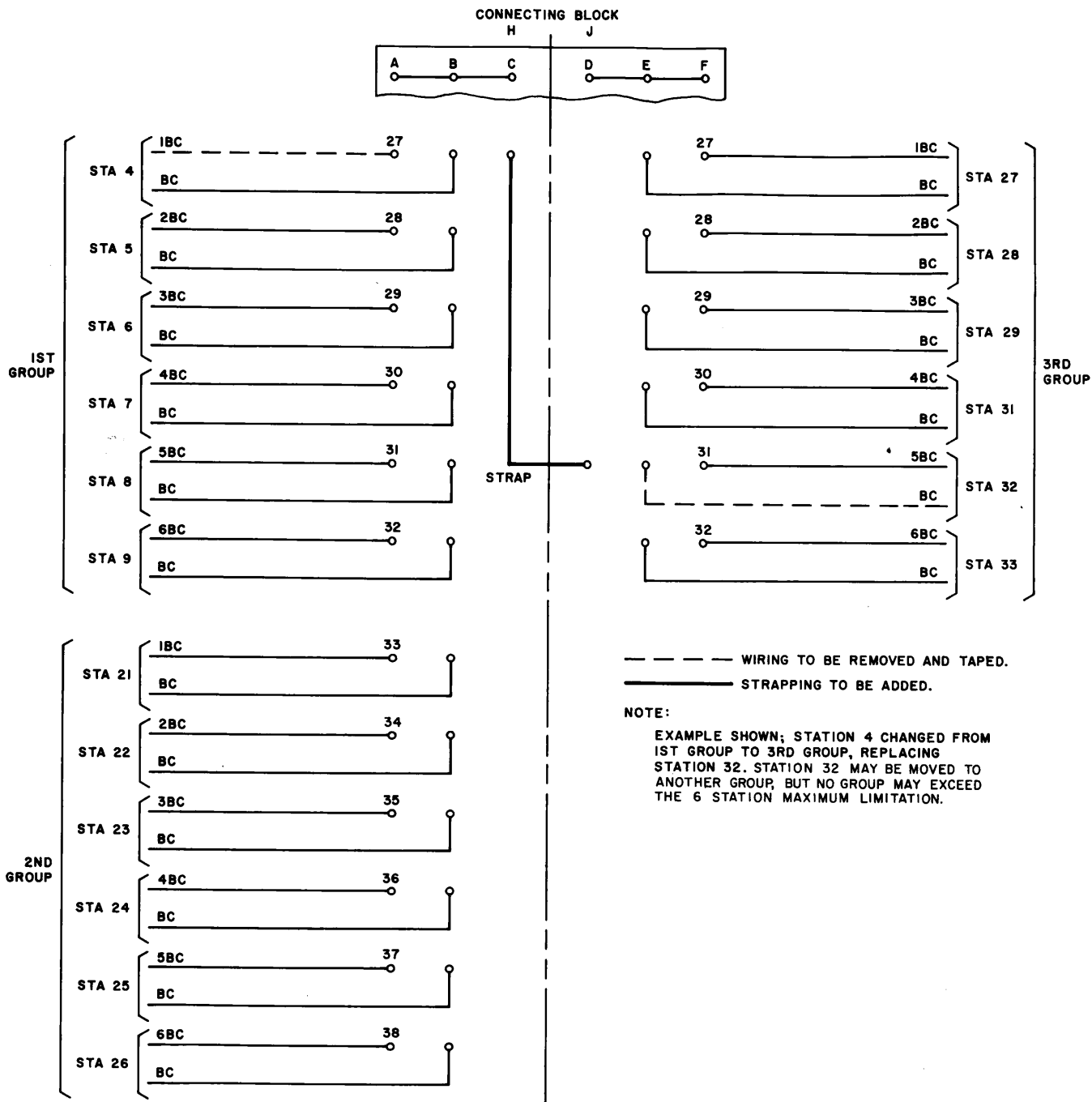


Fig. 8—Changing an Assigned Station From One Group to Another

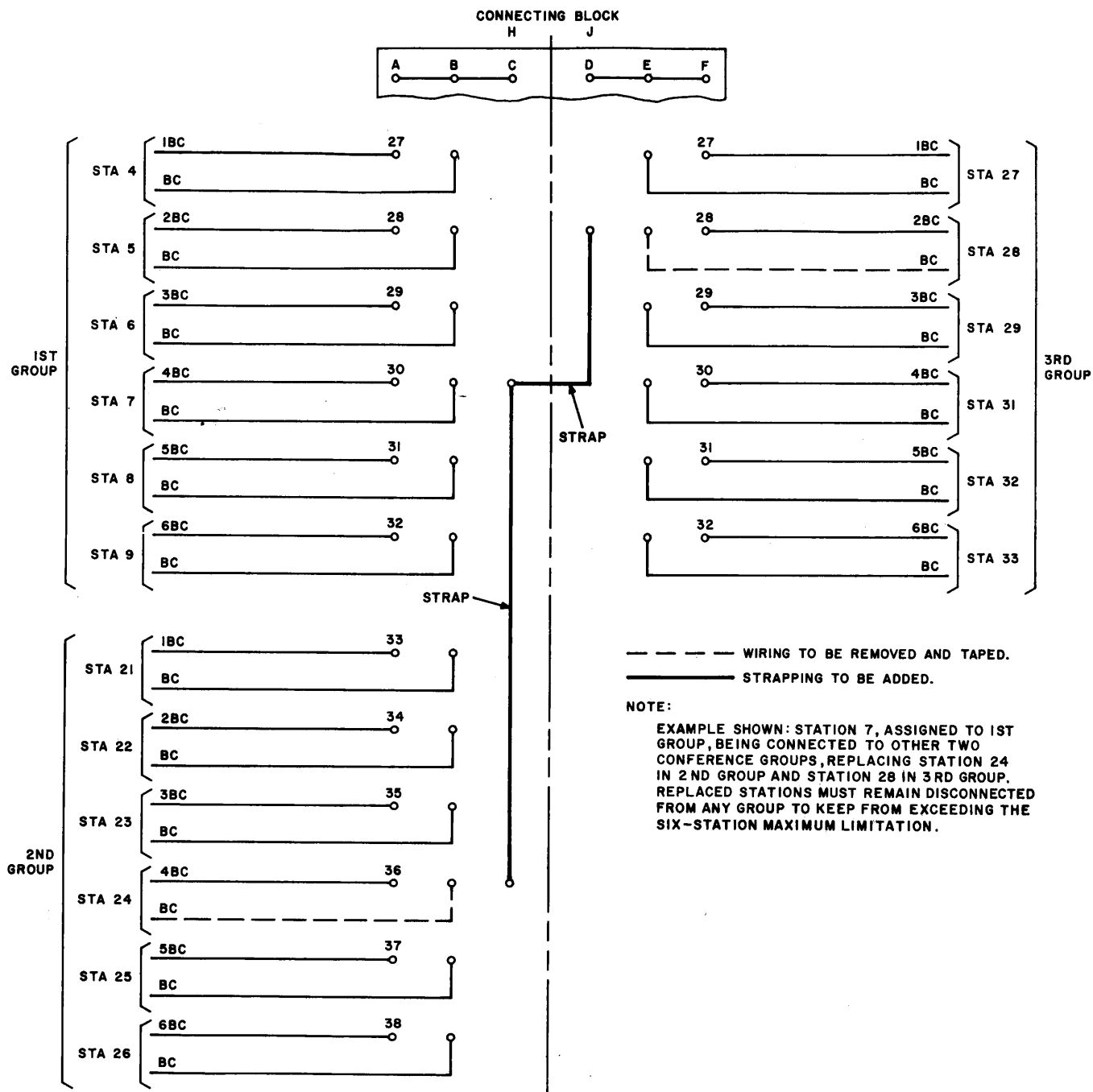
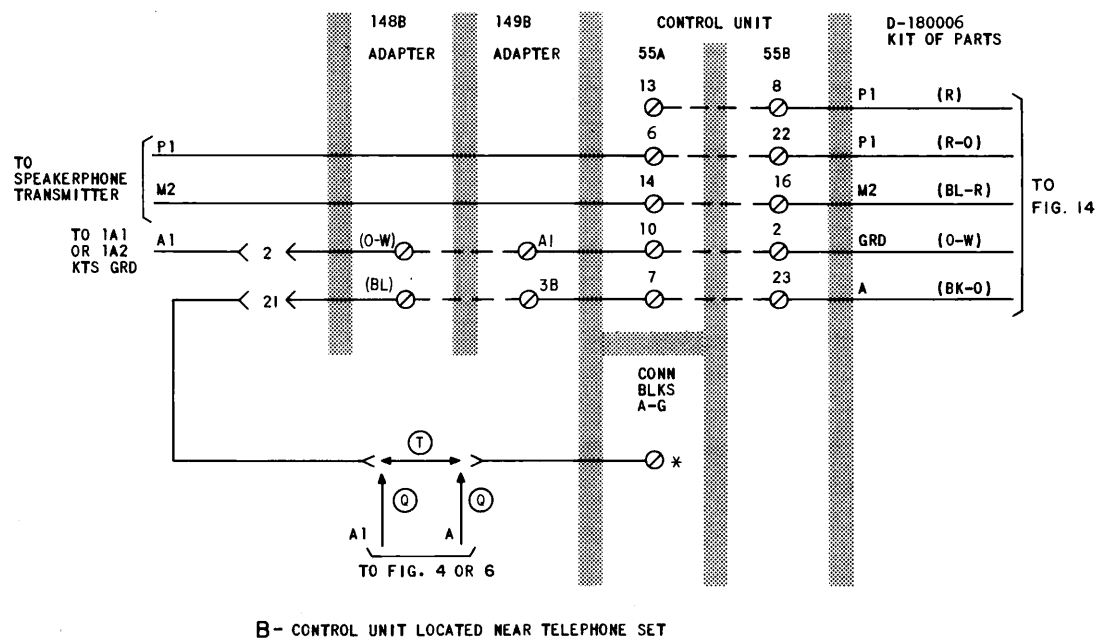
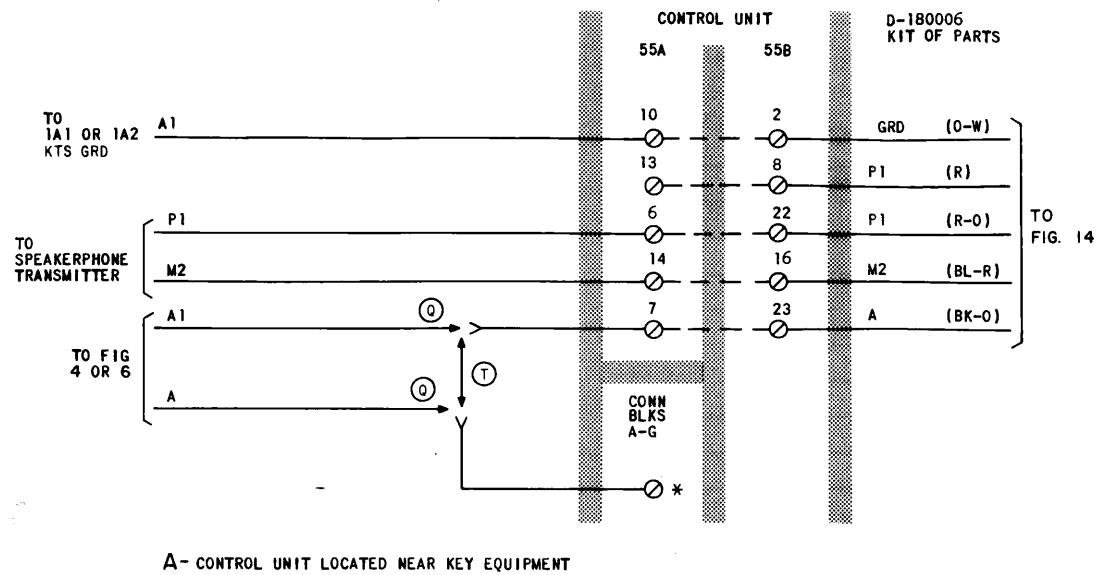


Fig. 9—Connecting a Station to All Conference Groups



* CONNECT TO A LEAD TERMINAL OF
STATION EQUIPPED WITH SPEAKERPHONE

- Q WITH ADD-ON
T WITHOUT ADD-ON

Fig. 10—Modification of 55-Type Control Unit When a Station is Equipped For 3-Type Speakerphone

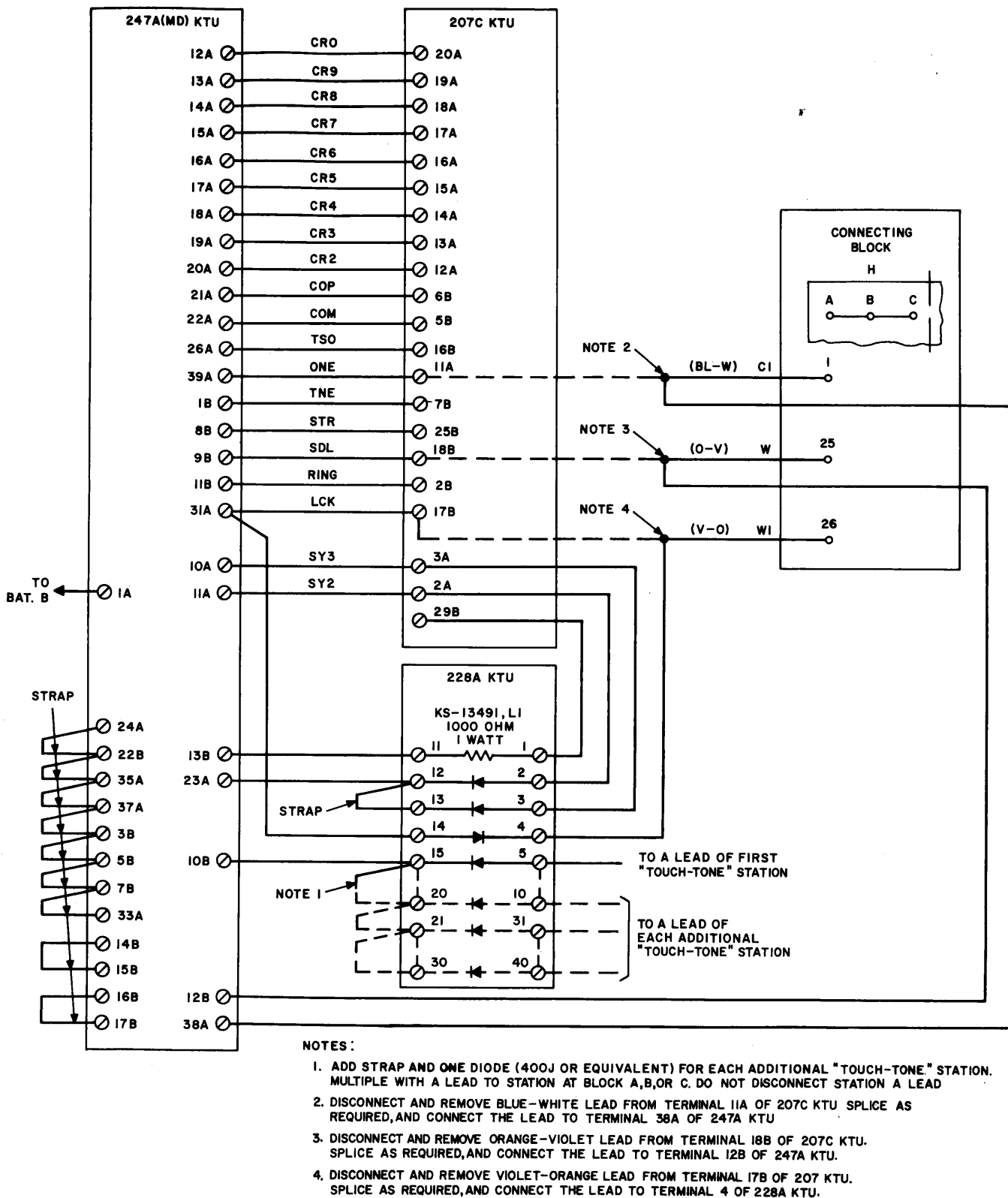
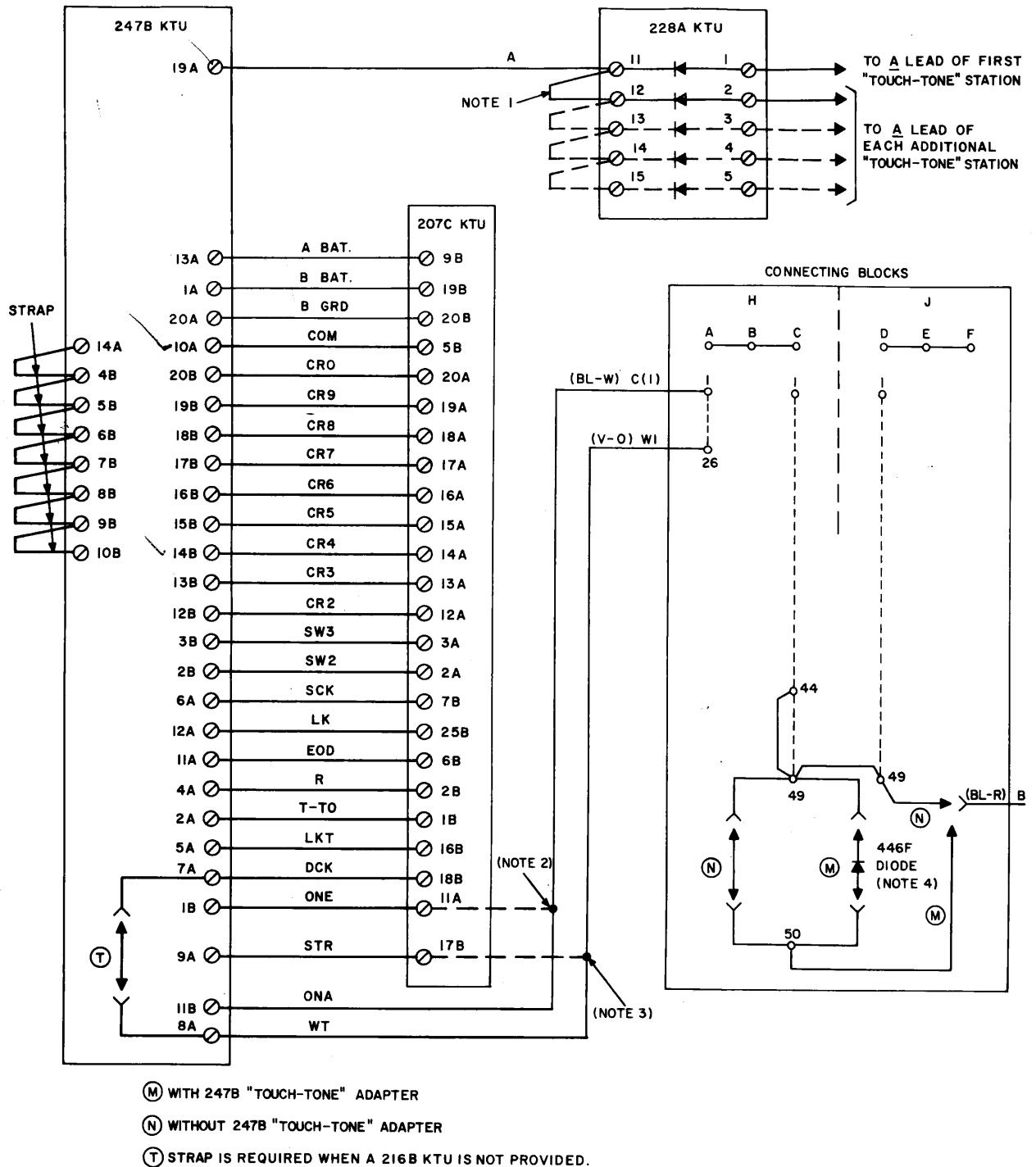


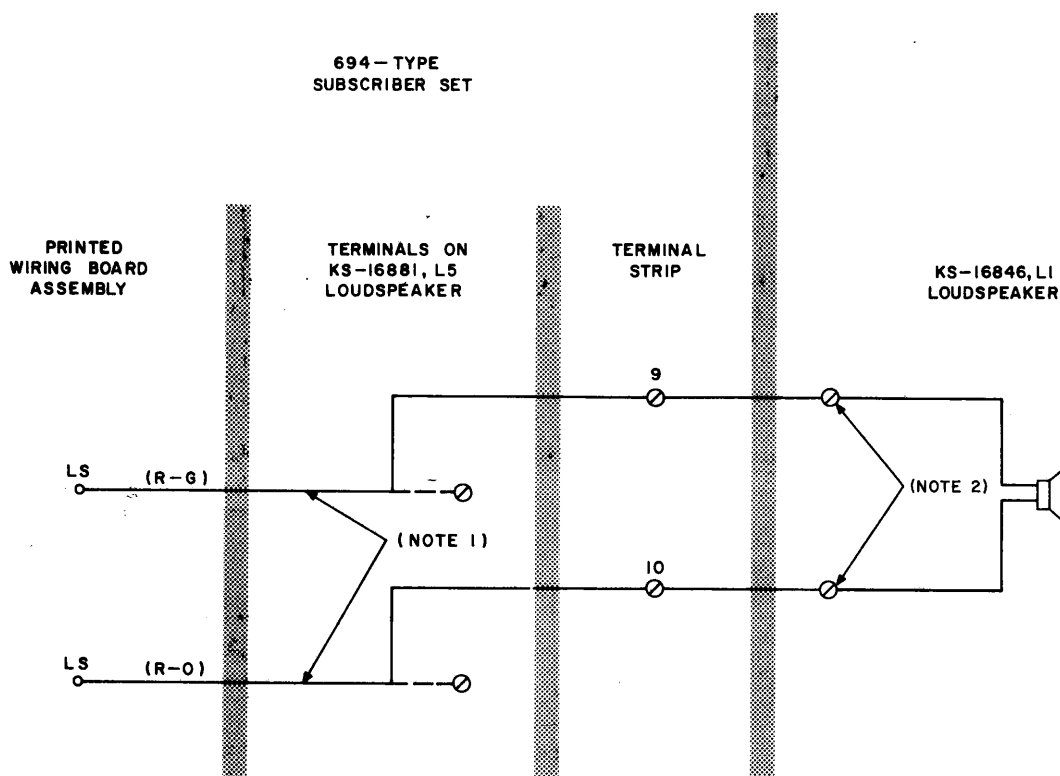
Fig. 11—Modification of KSU to Provide TOUCH-TONE Dialing Using 247A (MD) KTU



NOTES:

1. ADD STRAP AND ONE DIODE (400J OR EQUIVALENT) FOR EACH ADDITIONAL "TOUCH-TONE" STATION. MULTIPLE WITH A LEAD TO STATION AT BLOCK A, B, OR C. DO NOT DISCONNECT STATION A LEAD.
2. DISCONNECT AND REMOVE BLUE-WHITE LEAD FROM TERMINAL 11A OF 207C KTU. SPLICE AS REQUIRED, AND CONNECT THE LEAD TO TERMINAL 11B OF 247B KTU.
3. DISCONNECT AND REMOVE VIOLET-ORANGE LEAD FROM TERMINAL 17B OF 207C KTU. SPLICE AS REQUIRED, AND CONNECT THE LEAD TO TERMINAL 8A OF 247B KTU.
4. WHEN OPTION (M) IS REQUIRED, INSTALL DIODE USING 183A2 ADAPTERS, ORDERED SEPARATELY.

Fig. 12—Modification of KSU to Provide TOUCH-TONE Dialing Using 247B KTU



NOTES:

1. REMOVE LEADS FROM TERMINALS ON KS-16881, L5 LOUDSPEAKER AND CONNECT LEADS TO TERMINALS 9 AND 10.
2. ADD APPROVED WIRING, BY SPLICING OR USING D-TYPE CONNECTORS, TO LEADS PROVIDED BY KS-16846, L1 LOUDSPEAKER, TAPE, AND CONNECT TO TERMINALS 9 AND 10.

Fig. 13—Connections For KS-16846, List 1 External Loudspeaker

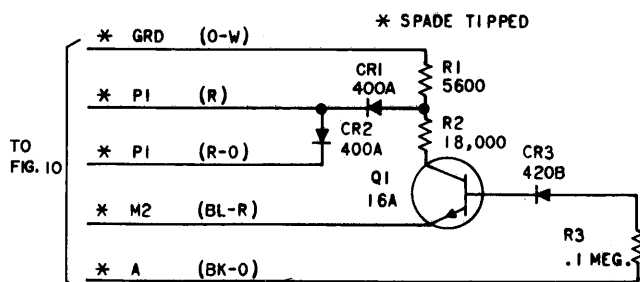


Fig. 14—D-180006 Kit of Parts, Schematic