43B AND 53B STATION DIALS

IDENTIFICATION, INSTALLATION, OPERATION, CONNECTIONS, AND MAINTENANCE

1. GENERAL

1.01 This section contains information on the 43B (MD) and 53B (MD) dials. These dials (Fig. 1 and 2) are capable of automatically dialing multiple telephone numbers. They consist primarily of a dialing mechanism and a number programming terminal board. This information should be retained for existing installations only.
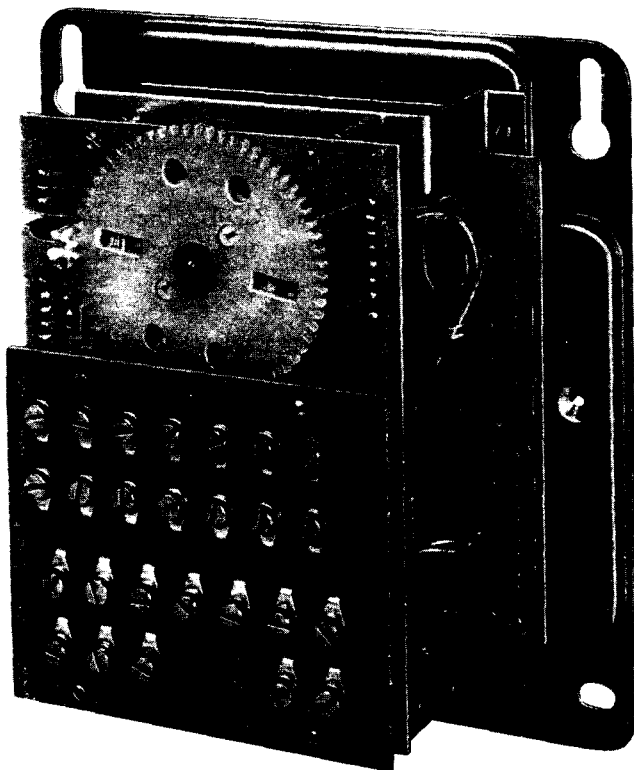

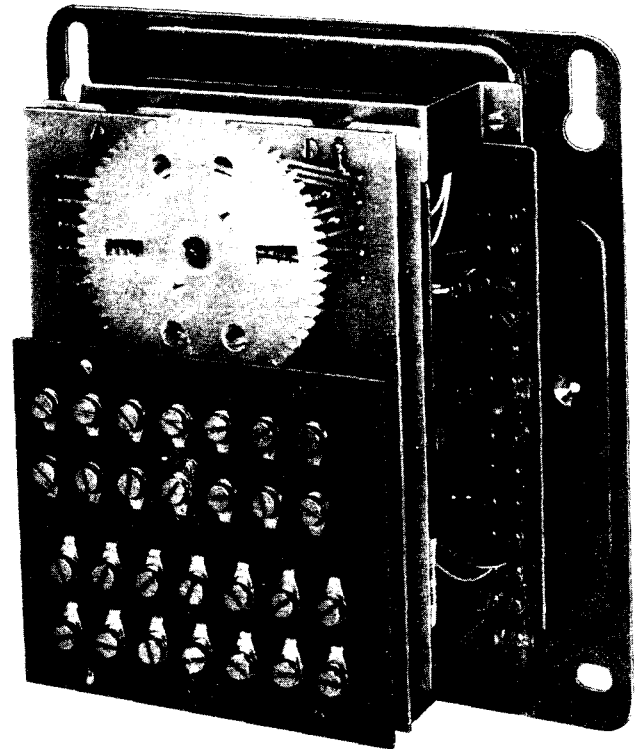Fig. 1—43B (MD) Dial, Without 814775573 (P-47G557) Cover

Fig. 2—53B (MD) Dial, Without 814775573 (P-47G557) Cover

1.02 This section is reissued to:

- Show the 43B dial and 53B dial (MD)

- Add paragraph 4.05

- Add comcode numbers.

1.03 These dials may be used with most standard telephone sets. However, one isolated set of normally open line switch contacts must be used to provide a lock-up path between the dial and

NOTICE
Not for use or disclosure outside the
Bell System except under written agreement

Printed in U.S.A.

the 229B KTU's (used to program the various numbers to be dialed). If this set of line switch contacts must be used for *A* lead control, then the isolated contacts of an auxiliary relay operated by *A* lead control must be provided.

1.04 A separate single make contact switch (call button) and 229B KTU into which the telephone number is programmed is required for each telephone number to be dialed. A typical installation is shown in Fig. 3.

2. IDENTIFICATION

A. Ordering Guide

2.01 *Basic Dial:*

● Dial, 43B (Rotary service)

● Dial, 53B (TOUCH-TONE® service).

2.02 *Replaceable Components:*

● 814775573 (P-47G557 Cover).

2.03 *Associated Apparatus or Equipment (ordered separately):*

● Diode, 533B or equivalent (3 for each 229B KTU installed)

● Set, Telephone

● Transformer, KS-16886L2 or equivalent

● Unit, Telephone, Key, 229B (1 for each number to be programmed of eleven digits or less)

● Capacitor, KS-19658L16 (see note 9, Fig. 4 or note 8, Fig. 5).

2.04 *Optional Associated Apparatus or Equipment (ordered separately):*

● Backboard (see Table A)

● Unit, Telephone, Key, 229B (for customer control of restricted or nonrestricted mode, per station basis)
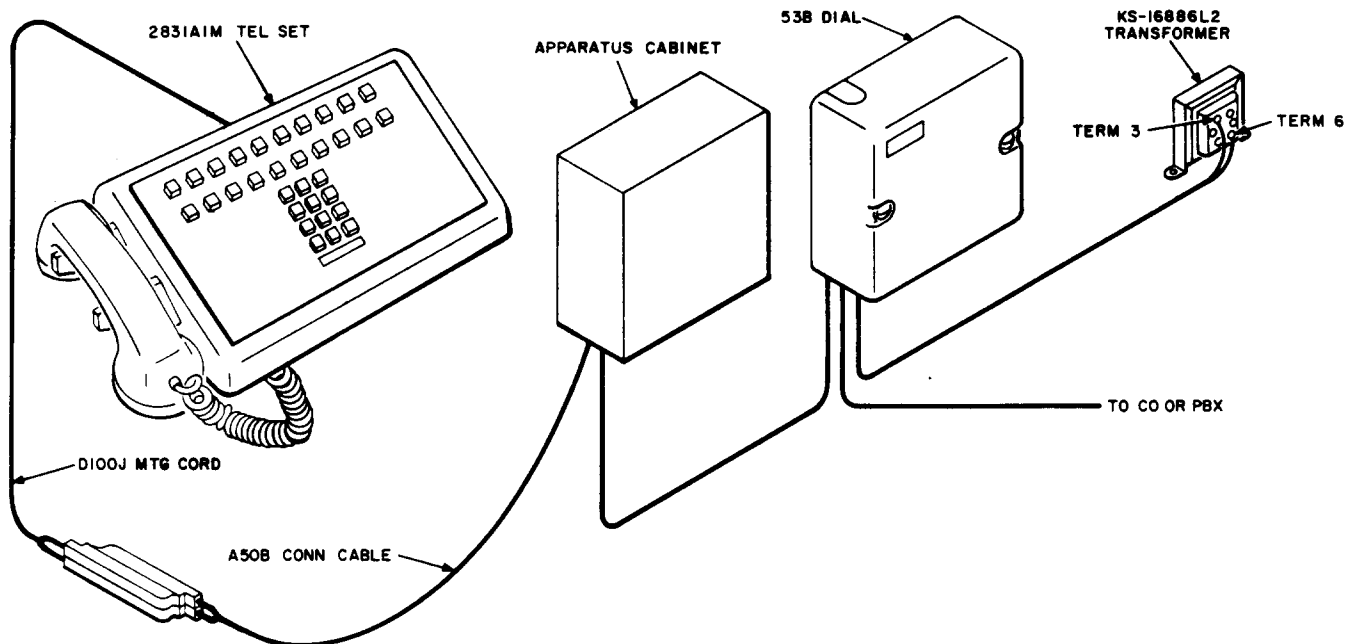
● Unit, Telephone, Key, 227B (See note)

Fig. 3—Typical Installation Layout, 53B Dial

- Diode 533B or equivalent (two for each 227B KTU installed)

- Unit, Telephone, Key, 265A (see note 9, Fig. 4 or note 8, Fig. 5).

Note: When **A** lead control must be used and spare line switch contacts are not available, per station basis, or when more than eleven digits are to be programmed on each 229B KTU, a 227B KTU slave relay may be used to gain additional contacts (Fig. 6).

TABLE A

BACKBOARDS FOR MOUNTING DIAL ON WALL

BACKBOARD	COLOR	NO. OF DIALS MOUNTED
KS-5796L1	Black	1
KS-5796L2		2
KS-5796L3		3
KS-5796L7	Olive Gray	1
KS-5796L8		2
KS-5796L9		3

B. Design Features

2.05   The following are design features.

- Multinumber capacity.

- Facility to program stops after first, second, or third digit.

- Closure of a single make contact switch (call button) causes a preset number to be selected and automatically dialed.

- Restricted Mode—Permits outgoing calls to preset numbers; prevents receiving incoming calls, manual dialing, switchhook dialing, or tone signaling through transmitter of associated telephone set.

- Unrestricted Mode—Permits normal use of associated telephone set in addition to automatic dialing of precoded numbers.

- Compatible with single line or key telephone set.

- Can be operated from any line in a given key set or any set having access to a given line.

2.06   Each dial requires the momentary closure of a single make contact (call button) to start the dialing operation. This can be furnished from the associated telephone set if so equipped or from an external key. Operation of a call button causes the telephone number programmed into the key telephone unit(s) (Fig. 4 or 5) to be automatically dialed.

2.07   Custom installations are also possible with either dial, such as at airport or bus terminals to automatically dial motels, taxicabs, etc.

3. **INSTALLATION**

A. 43B (MD) or 53B (MD) Dial and Associated KTU's

3.01   The dial and KTU's can be mounted in standard equipment cabinets or racks. Mounting arrangements will vary depending on the number of telephone numbers to be dialed.

3.02   The dial mounting holes are spaced 5-7/8 inches horizontally and 6-5/8 inches vertically.

3.03   Three 533B diodes or equivalent must be wired to each 229B KTU installed in the system as shown in Fig. 4 or 5.

3.04   The number programming terminal board of these dials is arranged so that the top two rows of terminals (numerical order) are for the sequence of digits to be programmed. These leads are designated S leads (Fig. 4 and 5). The bottom two rows occupy the digits that can be programmed into each digit position. These leads are designated D leads.

3.05   Extend in numerical order all S leads from the number programming terminal board to the first KTU(s) as shown in (Fig. 7) and strap to succeeding KTU's, (Fig. 4 and 5). In addition to the S leads to be placed, certain control strapping is required. See (Fig. 4 and 5) for additional strapping between KTU's. Programming of telephone numbers is covered in paragraph 3.11.

B. Power Supply

3.06 Installations require between 22 and 28 volts ac, 60 Hz power for proper operation. A KS-16886L2 transformer or equivalent power source is required for each dial installed. The loop length between the power source and dial must be within the limitations of Table B which is based on a maximum loop resistance of 50 ohms.

Ensure that the power source is connected to an ac outlet not under control of a switch.

TABLE B

MAXIMUM LOOP LENGTHS BETWEEN EITHER DIAL AND POWER SOURCE

D-STATION WIRE 22 GAUGE	DIW CABLE 24 GAUGE
1500 ft.	950 ft.

C. Call Button

3.07 The maximum loop resistance between the call button and dial is 150 ohms.

D. Associated Telephone Set

3.08 These dials are compatible with single line or key telephone sets. They can be operated from any line in a given key telephone set or any set having access to a given line.

3.09 When either dial is associated with a line of 1A1 or 1A2 key telephone system, all telephone sets having access to that line must provide *A* lead control to the associated line circuit. To be used with 1A1 or 1A2 KTS, the associated telephone set line switch must furnish enough contacts for *A* lead control, line connections, and lock paths for the KTU's (busy lamp circuit, see paragraph 1.03).

3.10 Only those sets equipped with a varistor across the receiver (G-type handset or equivalent) should be used.

3.11 If converted key set pickup buttons are to be used as call buttons, set should have enough spare pickups to cover numbers to be called in addition to pickup for preset dial line, otherwise external keys must be utilized as call buttons.

At unattended public locations, the station number card on the associated telephone set should use number assignments in accordance with Section 682-000-012, entitled Numbering and Identifying Special Services and Channels unless otherwise specified by local instructions.

E. Programming a Telephone Number

3.12 Programming is accomplished by connecting the D leads from the dialer to the KTU in the numerical order in which they are to be dialed, see (Fig. 4, 5, or 6).

3.13 Connect leads as follows.

(1) Determine the 1st digit of the telephone number (ie, the digit 6 on the 1st KTU in Fig. 4) and extend D6 lead from the dialer number programming terminal board to terminal 11 of 1st KTU.

(2) Extend 2nd digit lead D3 to terminal 12 of 1st KTU.

(3) Code rest of numbers in same manner using appropriate terminals of KTU(s), see (Fig. 7).

(4) Connect all unused digits to the *U* terminal of dial.

Note: If a digit appears more than once in a telephone number, only one D lead is required from the dialer and the proper terminals are strapped on the KTU, ie, the digit one on 1st KTU (Fig. 4 or 5).

3.14 When programming numbers, apply the following.

● If stops after the first, second, or third digit are to be included, refer to Table C for dial wiring changes to be made.

Note: In order for the 43B dial to cycle to the *Talk* position before the switching

equipment completes the connections and rings the called party, the last digit of a small number should be programmed later in the call cycle, ie, the 10th position.

3.15 To check installation of dial in the restricted mode. (No manual dialing permitted.)

(1) Remove handset from the associated telephone set. Dial tone should be present.

(2) Actuate call buttons, telephone numbers programmed on associated relays should automatically be dialed.

(3) Replace telephone handset on hook.

(4) Verify that dial tone cannot be broken when the handset is off-hook and the line switch is manipulated.

3.16 To check installation of dial in the unrestricted mode.

(1) Repeat paragraph 3.15 (1) through (3).

(2) Verify that dial tone can be broken when the handset is off-hook and the line switch or manual dial button is operated.

4. OPERATION

A. Restricted Mode

4.01 The dial responds to an off-hook condition of the associated telephone set, steps off *Home* position, seizes the preset line, and isolates the telephone set transmitter from the line. This prohibits manual dialing and voice transmission from the telephone set.

4.02 Operating the call button operates and locks the KTU(s). The programmed telephone number is dialed and the dial steps to the *Talk* position reconnecting the transmitter to the line.

4.03 After completion of a call, going on-hook causes the dial to step to the *Home* position and releases the KTU(s) terminating the call.

In the restricted mode it is not possible to receive calls at the associated telephone set; therefore the telephone set ringer should be silenced.

4.04 When the telephone set ringer is connected for some reason (such as testing), refer to Table C for wiring connections required to prevent relay K8 from operating on ringing current.

4.05 ▶If a call is abandoned by placing the handset on-hook after the dialing sequence has been started, but has not been completed, the dialer will continue to:

(a) Dial the programmed number.

(b) Proceed through all unused positions.

(c) Step to the talk position and wait.

(d) After a delay of 600 to 700 milliseconds, the dialer will step to the home position. In the event that a stop is wired into the dialer and the call is abandoned before the stop is reached, the internal timer will restart the dial and the preceding events will occur.◀

B. Unrestricted Mode

4.06 This mode permits both automatic (preset) and normal dialing from the associated telephone set. Even if the preset dial is disabled, ie, loss of ac power, the station can still manually dial. See Table C for required wiring connections.

4.07 If the dial is started by a switch contact closure (call button) it will seize the line, dial the preset number, and return the line to the associated telephone set.

5. CONNECTION INDEX

Table C—43B and 53B Dial Options

Fig. 4—Examples of Programming Three Numbers on 43B Dial, Single Line and Single Station Use, Restricted Mode, Connections

Fig. 5—Examples of Programming Three Numbers on 53B Dial, Single Line and Single Station Use, Restricted Mode, Connections

Fig. 6—Typical Connections for 229B KTU's Using 227B KTU as Slave Relay

Fig. 7—229B Key Telephone Unit

6. MAINTENANCE

6.01 Maintenance is limited to checking wiring for secure and correct connections and replacement of dialer.

6.02 Defective components listed in the ordering guide which are available through supply channels may be replaced. *Do not attempt any maintenance to the dial mechanism.*

Fig. 4—Examples of Programming Three Numbers on 43B (MD) Dial, Single Line, and Single Station Use, Restricted Mode, Connections

NOTES:

1. EXTEND TO OTHER KTU'S AS REQUIRED.

2. CONNECT TO TERMINAL 20 OF ALL KTU'S.

3. CONNECT TO TERMINAL 39 OF ALL KTU'S.

4. CONNECT TO TERMINAL 38 OF LAST KTU INSTALLED.

5. CONNECT TO TERMINAL 3 AND 6 ON TRANSFORMER.

6. THREE 533B DIODES OR EQUIVALENT (ORDERED SEPARATELY) ARE REQUIRED FOR EACH 229B KTU, INSTALL AS SHOWN.

7. CALL BUTTONS MAY BE CONVERTED PICKUP KEYS OR SEPARATELY MOUNTED KEYS.

8. THIS CAPACITOR CAN BE MOUNTED ON A 265A KTU IF FACILITIES ARE NOT AVAILABLE THIS CAPACITOR ASSURES ADEQUATE POWER SUPPLY FILTERING FOR THE PROGRAM RELAYS. 60 CYCLE HUM MAY BE INDUCED ON TIP AND RING OF THE TELEPHONE LINE IF THE CAPACITOR IS NOT INSTALLED.
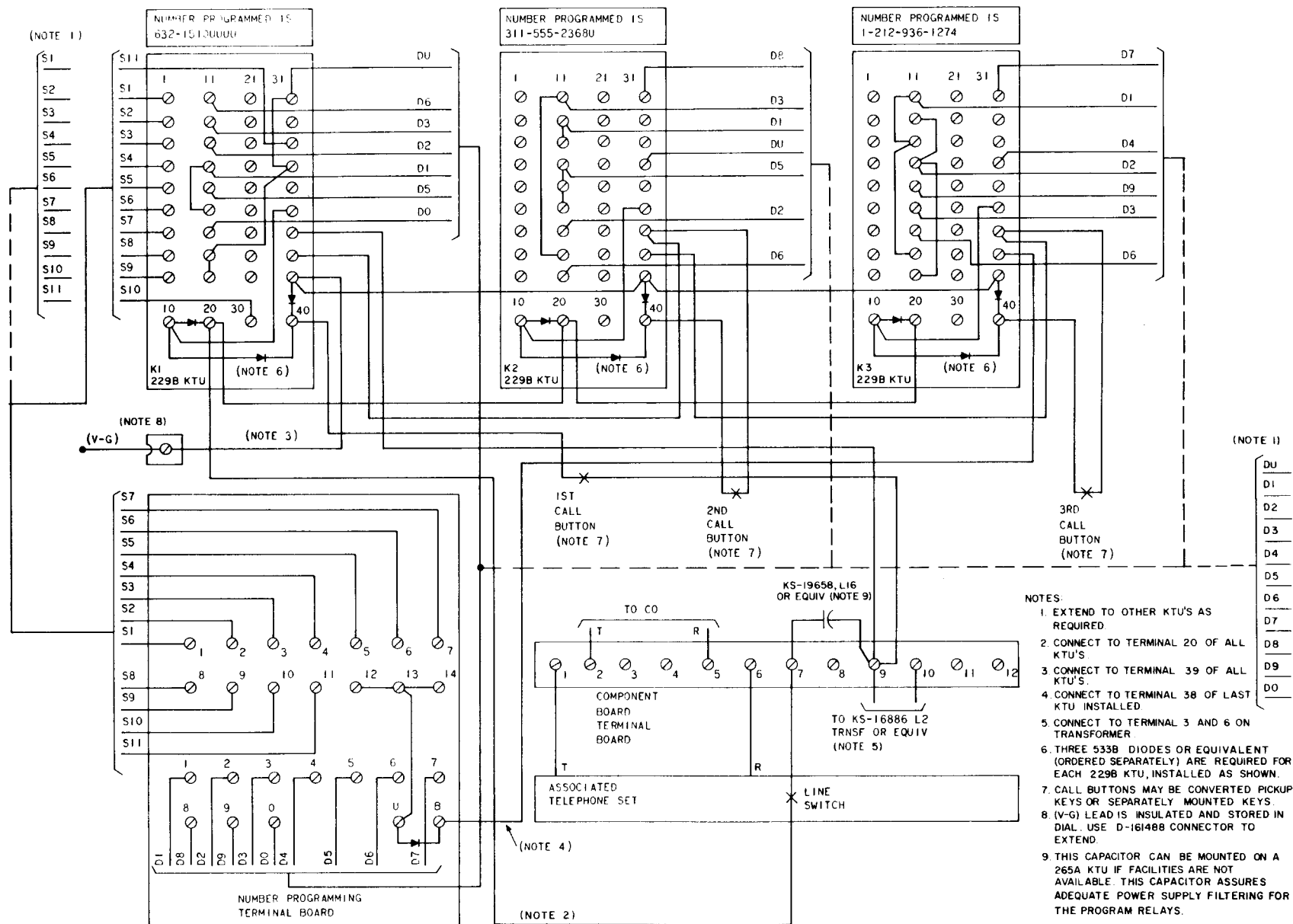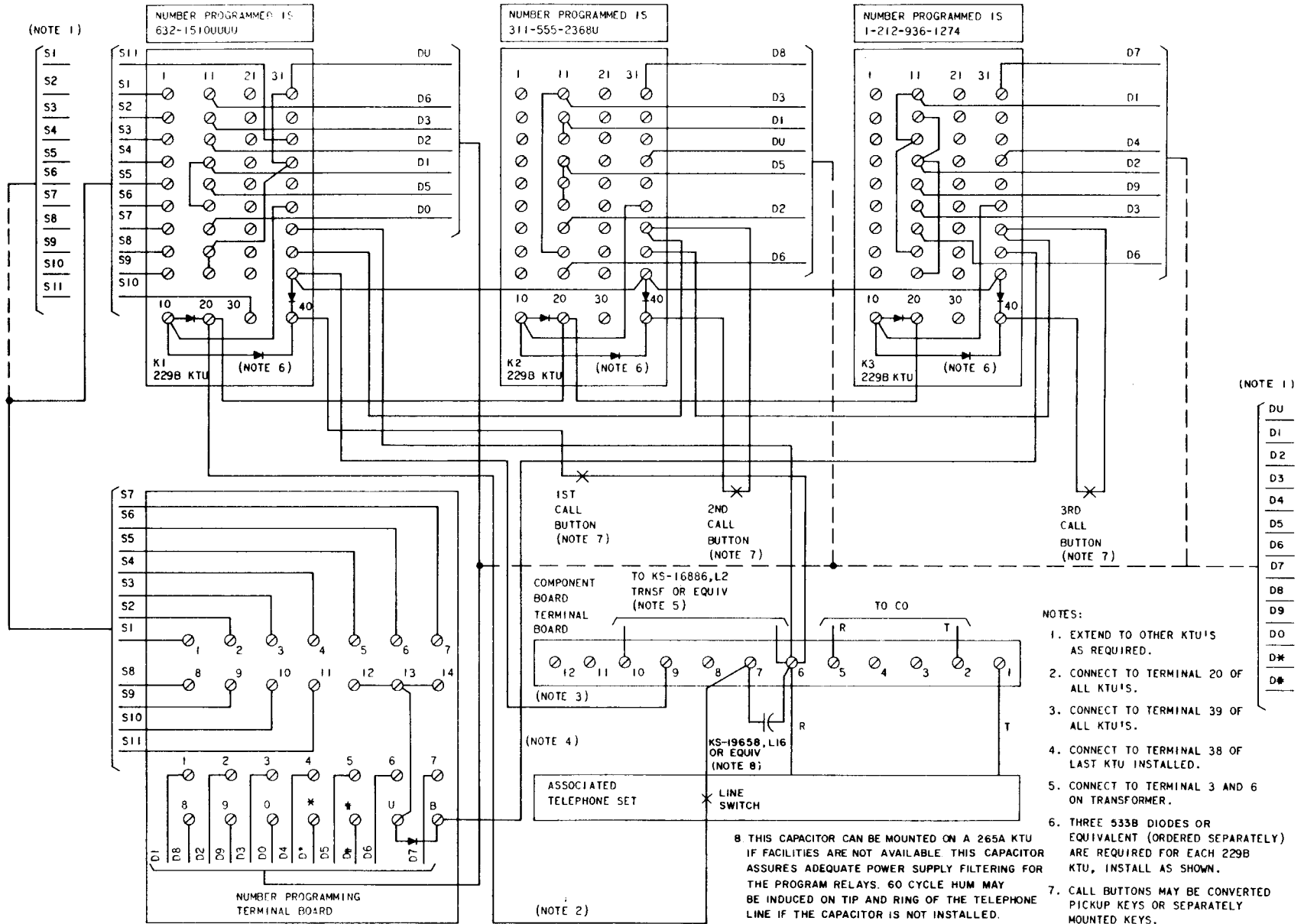
Fig. 5—Examples of Programming Three Numbers on 53B (MD) Dial, Single Line, and Single Station Use, Restricted Mode, Connections
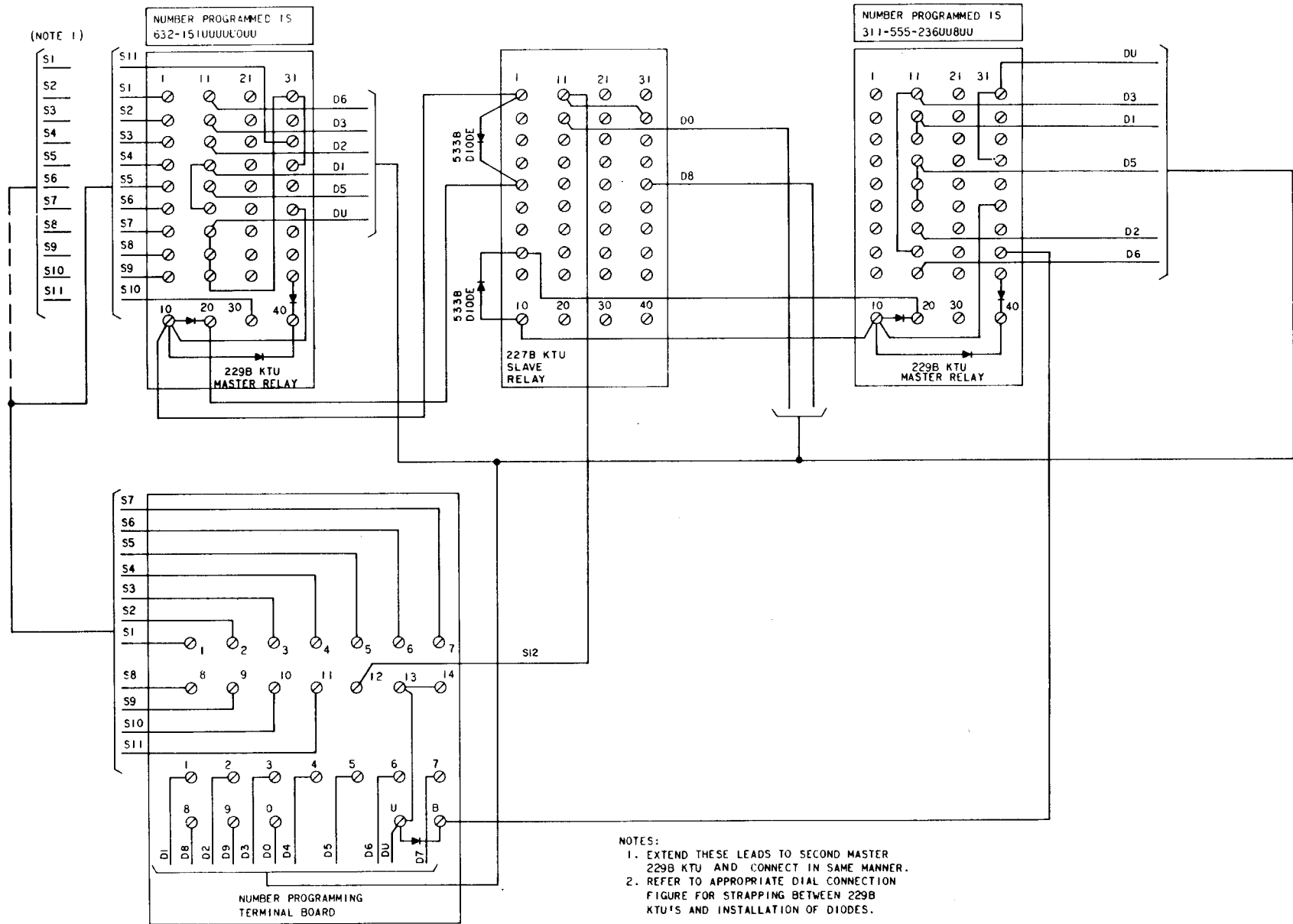
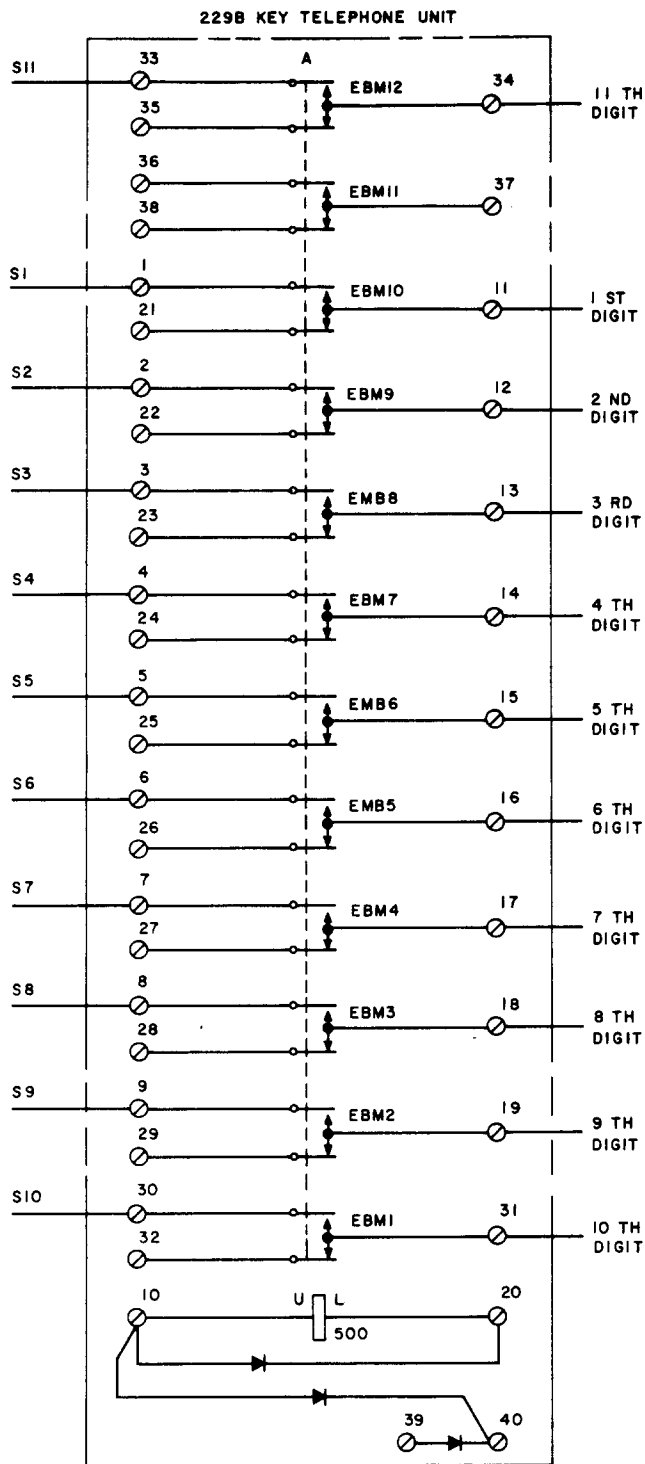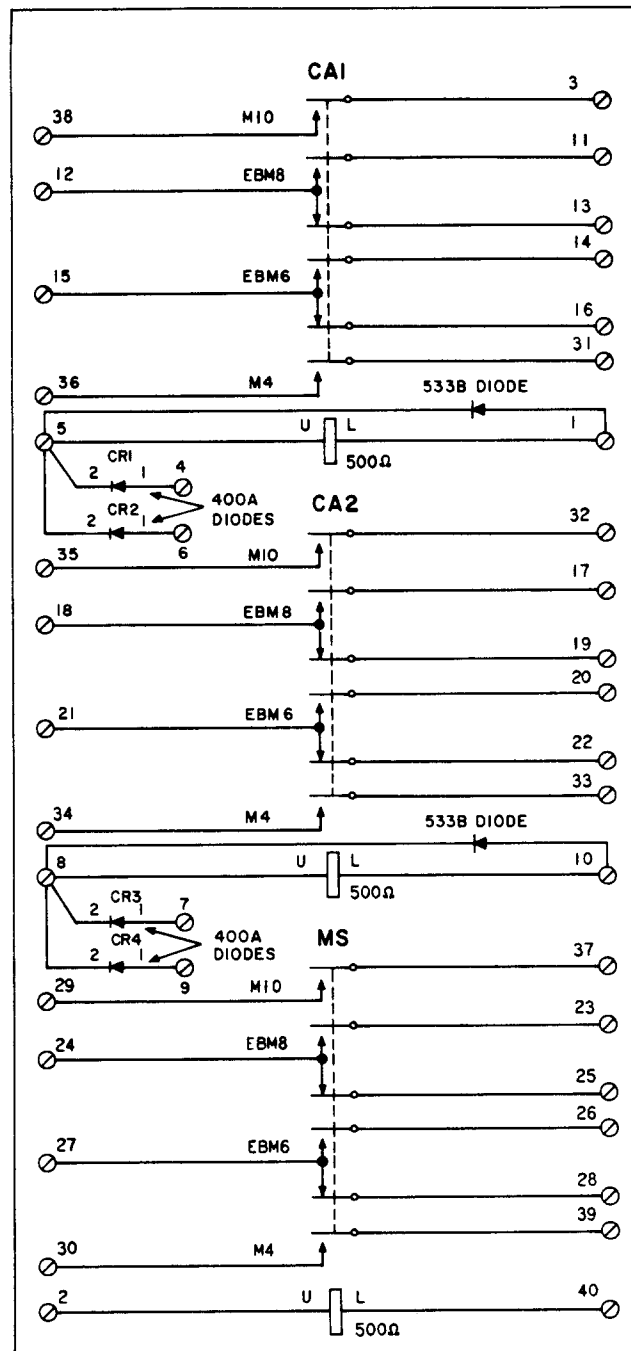Fig. 6—Typical Connections for 229B KTU's Using 227B KTU as Slave Relay

NOTES:
1. EXTEND THESE LEADS TO SECOND MASTER 229B KTU AND CONNECT IN SAME MANNER.
2. REFER TO APPROPRIATE DIAL CONNECTION FIGURE FOR STRAPPING BETWEEN 229B KTU'S AND INSTALLATION OF DIODES.

229B KEY TELEPHONE UNIT

|			
S11	33	A	
	35	EBM12	34 — 11 TH DIGIT
	36		
	38	EBM11	37
S1	1	EBM10	11 — 1 ST DIGIT
	21		
S2	2	EBM9	12 — 2 ND DIGIT
	22		
S3	3	EMB8	13 — 3 RD DIGIT
	23		
S4	4	EBM7	14 — 4 TH DIGIT
	24		
S5	5	EMB6	15 — 5 TH DIGIT
	25		
S6	6	EMB5	16 — 6 TH DIGIT
	26		
S7	7	EBM4	17 — 7 TH DIGIT
	27		
S8	8	EBM3	18 — 8 TH DIGIT
	28		
S9	9	EBM2	19 — 9 TH DIGIT
	29		
S10	30	EBM1	31 — 10 TH DIGIT
	32		

10 — U L 500 — 20

39 40

NOTE:
THE THREE DIODES SHOWN ARE NOT PART OF THE 229B KTU. EQUIP
WITH 533B OR EQUIVALENT DIODES (ORDERED SEPARATELY)

Fig. 7—229B Key Telephone Unit

CA1

38	M10		3
12	EBM8		11
			13
			14
15	EBM6		16
			31
36	M4	533B DIODE	
5	U L 500Ω		1

CR1 2 1 4
CR2 2 6 — 400A DIODES

CA2

35	M10		32
18	EBM8		17
			19
			20
21	EBM6		22
			33
34	M4	533B DIODE	
8	U L 500Ω		10

CR3 2 1 7
CR4 2 1 9 — 400A DIODES

MS

29	M10		37
24	EBM8		23
			25
			26
27	EBM6		28
			39
30	M4		
2	U L 500Ω		40

NOTE:
THE TWO 533B DIODES ARE NOT PART THE 227B KTU, THEY
MUST BE (ORDERED SEPARATELY) AND INSTALLED AS SHOWN.

Fig. 8—227B Key Telephone Unit
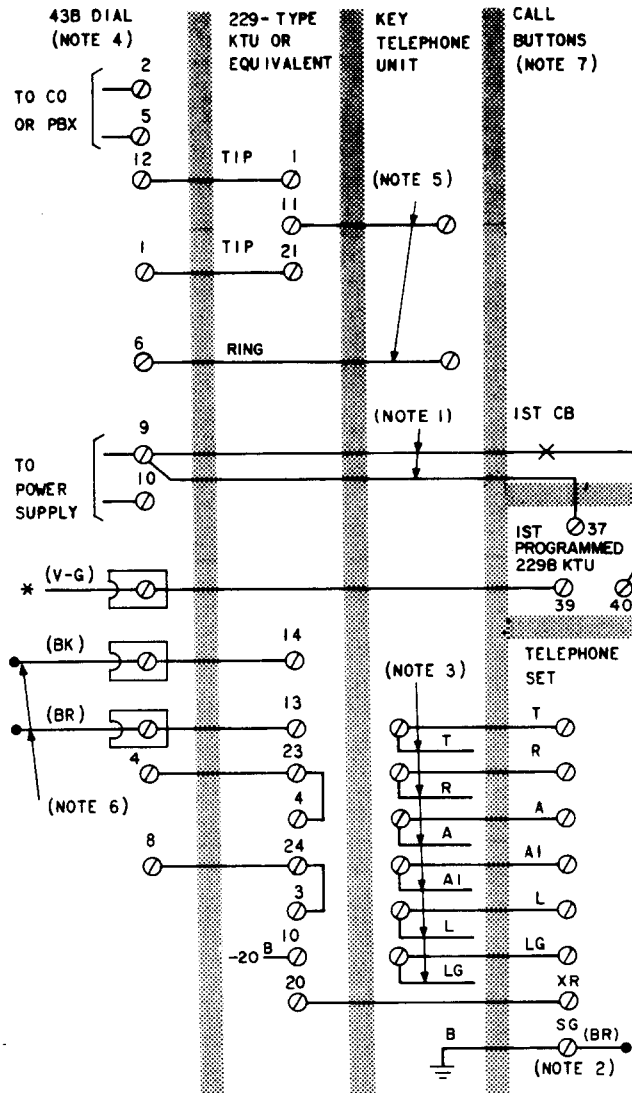
* INSULATED AND STORED, EXTEND LEAD TO 229B KTU
  USING D-161488 CONNECTOR OR CONNECT TO SPARE TERMINAL.

NOTES:
1. TO CONVERTED PICKUP BUTTON USED AS CALL BUTTON.
2. MOVE (BR) TURNBUTTON LEAD FROM 2R TO SG AT TERMINAL
   STRIP. CONNECT SG GRD AT EQUIPMENT.
3. TO EXTENSION STATION USED FOR RESTRICTED MODE.
   SET MUST BE WIRED FOR A LEAD CONTROL. USE BUSY
   LAMP CIRCUIT FOR ALL SETS PER FIG. 10.
4. WIRE 43B DIAL FOR FOLLOWING OPTIONS PER TABLE C:
   ● RINGING START PROTECTION
   ● OTHER OPTIONS AS REQUIRED
5. LINE CIRCUIT OF CO OR PBX LINE ASSIGNED TO
   PRESET LINE, STATION SIDE.
6. (BK) LEAD IS CONNECTED TO TERMINAL 8
   AND (BR) LEAD TO TERMINAL 4 OF DIAL,
   PROVIDE D-161488 CONNECTORS TO EXTEND LEADS TO KTU.
7. SEE FIG. 4 FOR CONNECTIONS OF ADDITIONAL PROGRAMMED
   229B KTU'S.

**Fig. 9—43B (MD) Dial, Key Telephone System Line
and Multistation Use With Transfer from
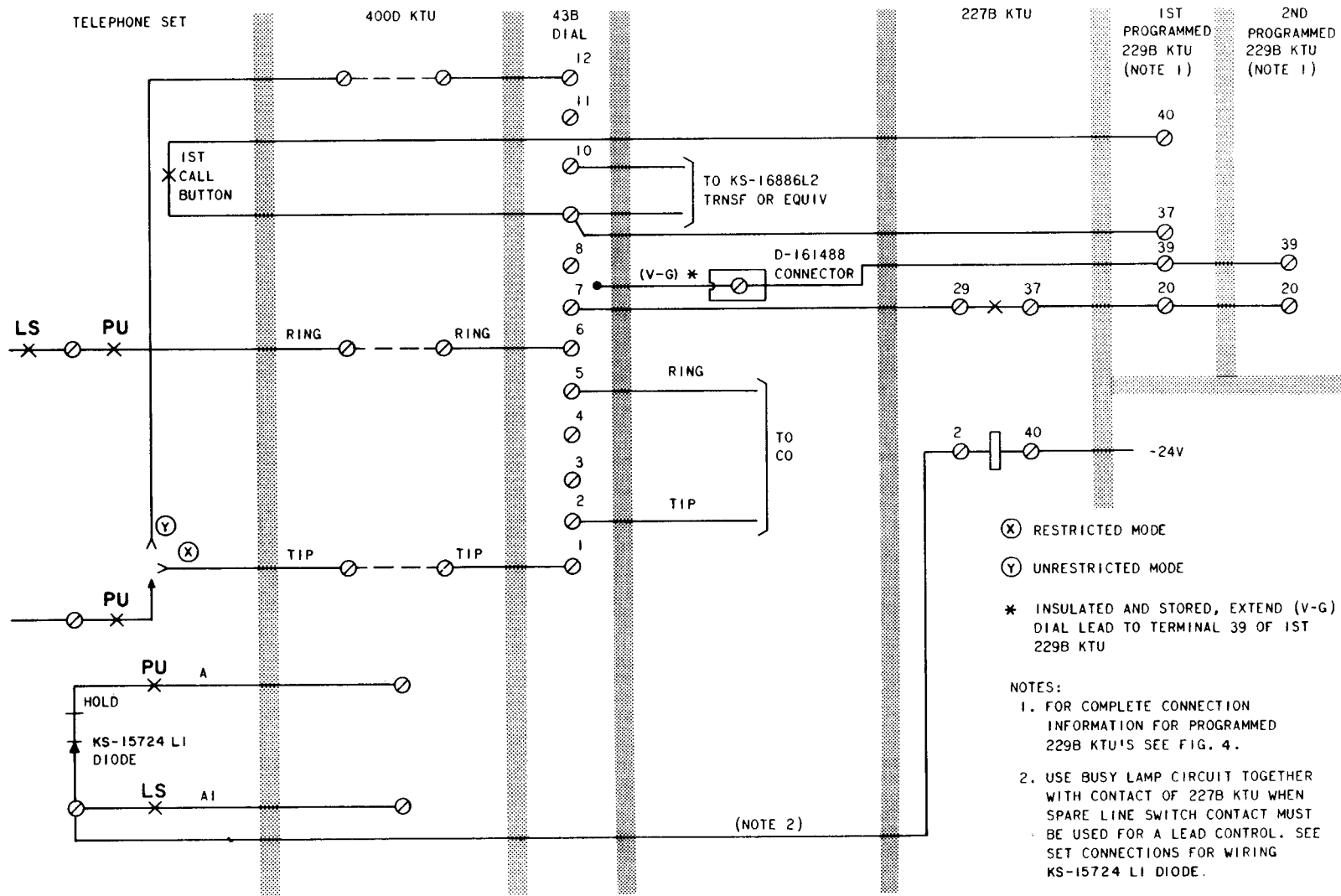Restricted to Unrestricted Mode, Connections**

Fig. 10—43B (MD) Dial, Key Telephone System Line and Single Station Use With Optional Mode, Connections

NOTES:
1. HEAVY CIRCUIT LINES ARE ON THE SCANNER SIDE OF THE LOGIC BOARD. DASHED CIRCUIT LINES ARE ON THE PULSER SIDE OF THE LOGIC BOARD.
2. PULSING AND SCANNING FUNCTIONS ARE ACCOMPLISHED BY MEANS OF CIRCULAR PATHS ON THE LOGIC BOARD AND MOVING CONTACT BRUSHES.
3. LARGE ALPHABETICAL DESIGNATIONS REFER TO INTERFACE CONNECTIONS BETWEEN LOGIC BOARD AND COMPONENT BOARD.
4. TO STOP DIAL FOR SECOND DIAL TONE AFTER 1ST DIGIT MOVE (BL) LEAD FROM TERMINAL 3 TO TERMINAL 8.
5. TO STOP DIAL FOR ADDITIONAL DIAL TONE AFTER 2ND OR 3RD DIGITS MOVE (V) LEAD FROM TERMINAL 3 TO TERMINAL 8. FOR STOP AFTER 2ND DIGIT, 3RD DIGIT MUST BE PROGRAMMED FOR A "U".
6. WHEN THE RINGER IS CONNECTED IN THE EXTERNAL SET, CONNECT (S-R) LEAD TO TERMINAL 2 TO PREVENT K4 RELAY FROM OPERATING ON RINGING CURRENT.
7. TO INCREASE LOOP CURRENT THROUGH DIAL ON LONG LOOPS (OVER 400 OHMS), CONNECT (S) LEAD TO TERMINAL 2.
8. TO CHANGE FROM RESTRICTED MODE TO UNRESTRICTED MODE:
   (A) MOVE (BR) LEAD FROM TERMINAL 4 TO 8
   (B) MOVE (BK) LEAD FROM TERMINAL 8 TO 4
   (C) MOVE EXTERNAL TELEPHONE SET LEAD (TIP) FROM TERMINAL 1 TO 12.
9. (V-G) LEAD IS INSULATED AND STORED IN DIAL. USE D-161488 CONNECTOR TO EXTEND LEAD.
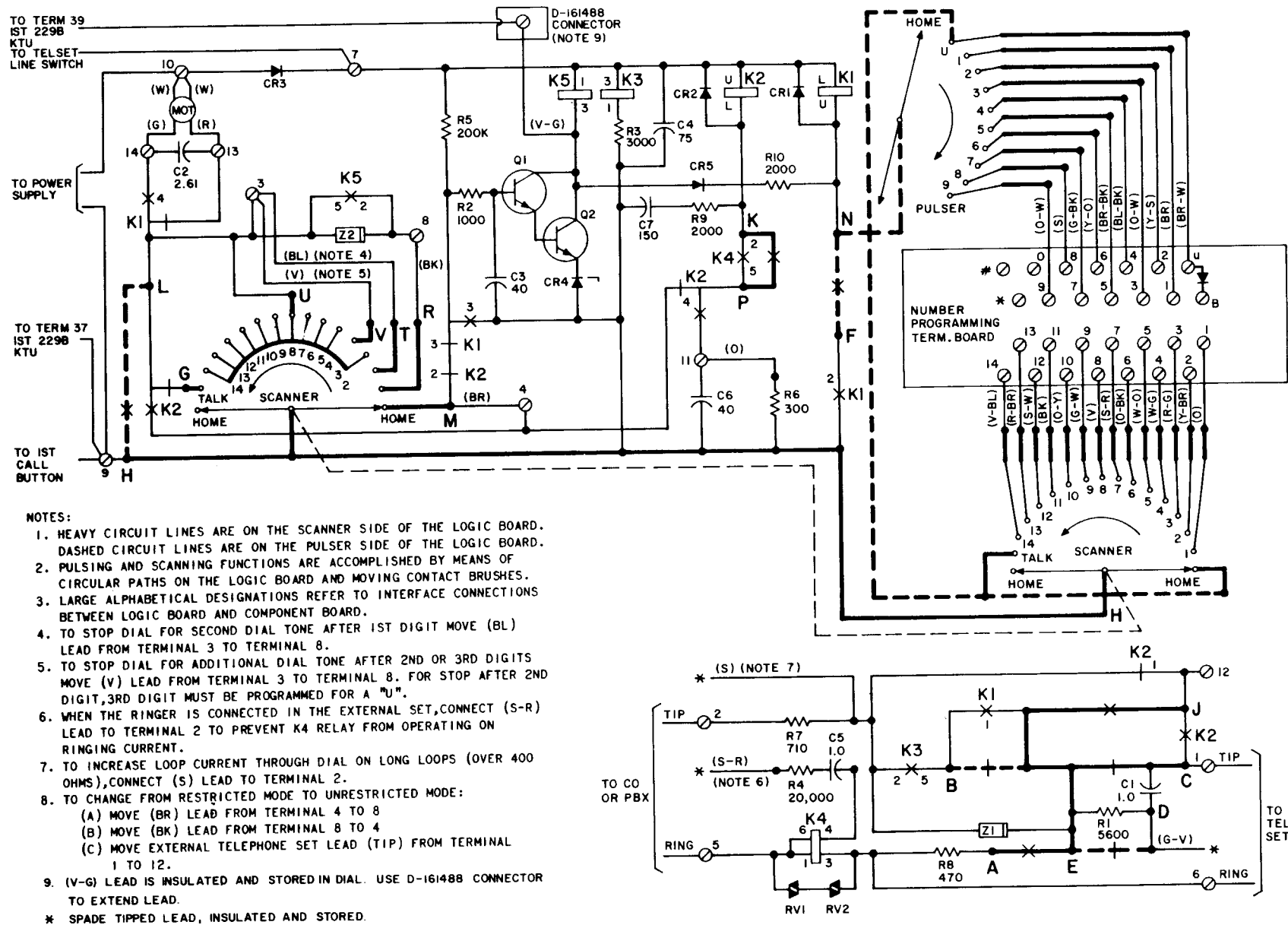* SPADE TIPPED LEAD, INSULATED AND STORED.

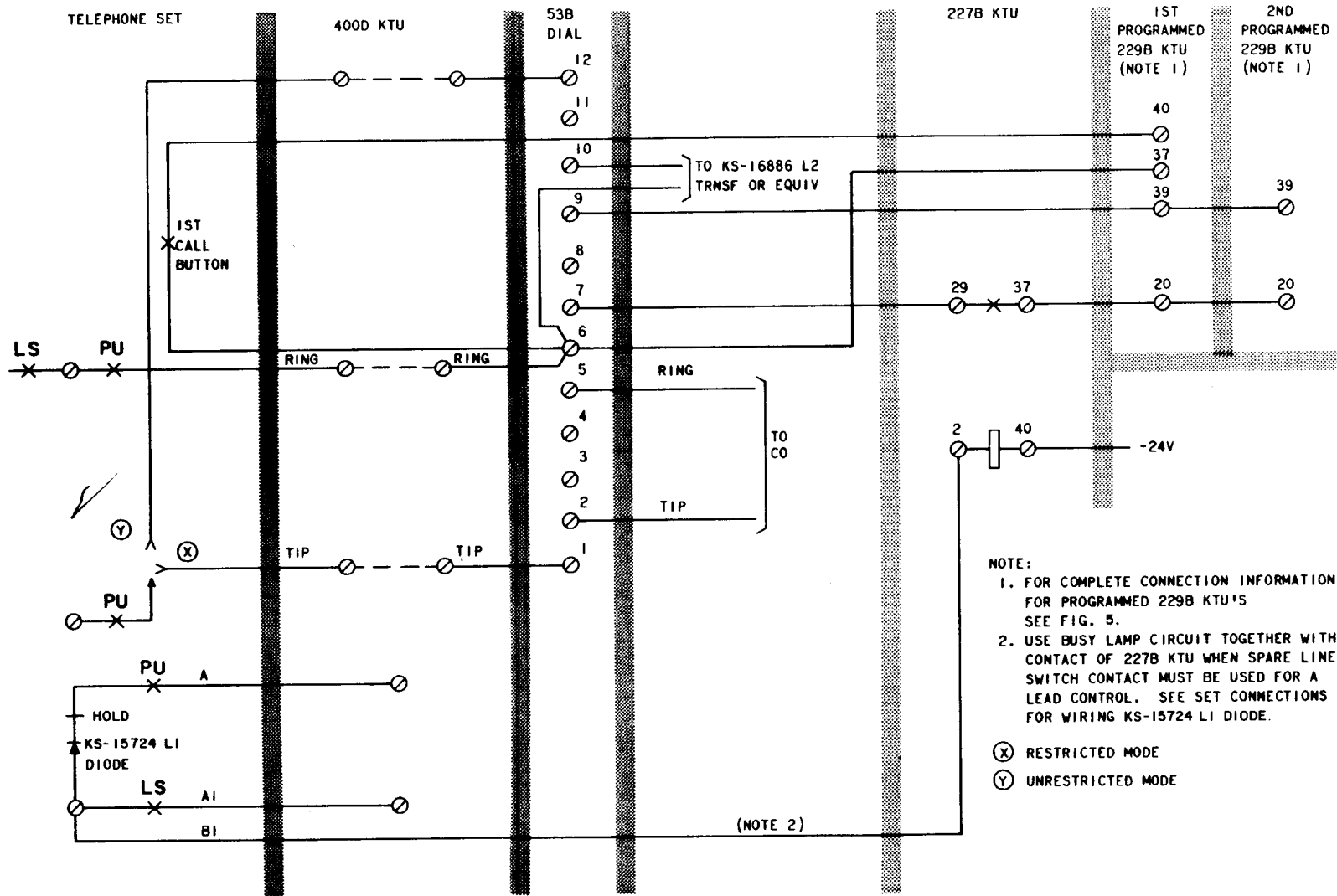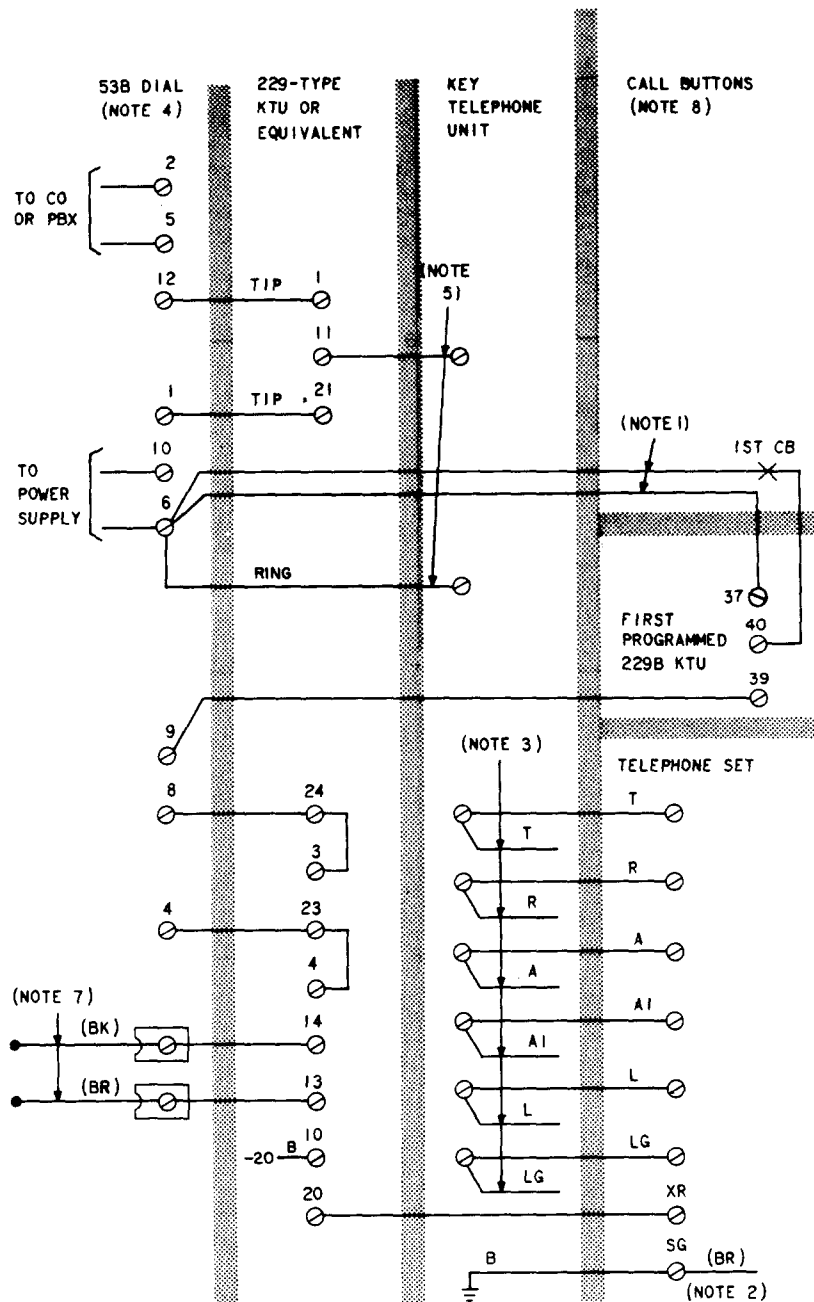Fig. 11—43B (MD) Dial Connections, Factory Wiring, Restricted Mode

Fig. 12—53B (MD) Dial, Key Telephone System Line and Single Station Use With Optional Mode, Connections

NOTES:

1. TO CONVERTED PICKUP BUTTON USED AS CALL BUTTON.
2. MOVE (BR) TURNBUTTON LEAD FROM 2R TO SG AT TERMINAL STRIP. CONNECT SG GRD AT EQUIPMENT.
3. TO EXTENSION STATION USED FOR RESTRICTED MODE. SET MUST BE WIRED FOR A LEAD CONTROL. USE BUSY LAMP CIRCUIT FOR ALL SETS PER FIG. 10.
4. WIRE 53B DIAL FOR FOLLOWING OPTIONS PER TABLE C:
   (A) RINGING START PROTECTION
   (B) OTHER OPTIONS AS REQUIRED
5. LINE CIRCUIT OF CO OR PBX ASSIGNED TO PRESET LINE.
6. CONNECT INSULATED AND STORED (G-V) 53B DIAL LEAD TO TERMINAL 1 OF DIAL.
7. (BK) LEAD WAS CONNECTED TO TERMINAL 8 AND (BR) LEAD TO TERMINAL 4 OF DIAL, PROVIDE D-161488 CONNECTORS TO EXTEND LEADS TO KTU.
8. SEE FIG.5 FOR CONNECTIONS OF ADDITIONAL PROGRAMMED 229B KTU'S.

Fig. 13—53B (MD) Dial, Key Telephone System Line and Multistation Use With Transfer from Restricted to Unrestricted Mode, Connections

Fig. 14—53B (MD) Dial Connections, Factory Wiring, Restricted Mode (Sheet 1 of 2)
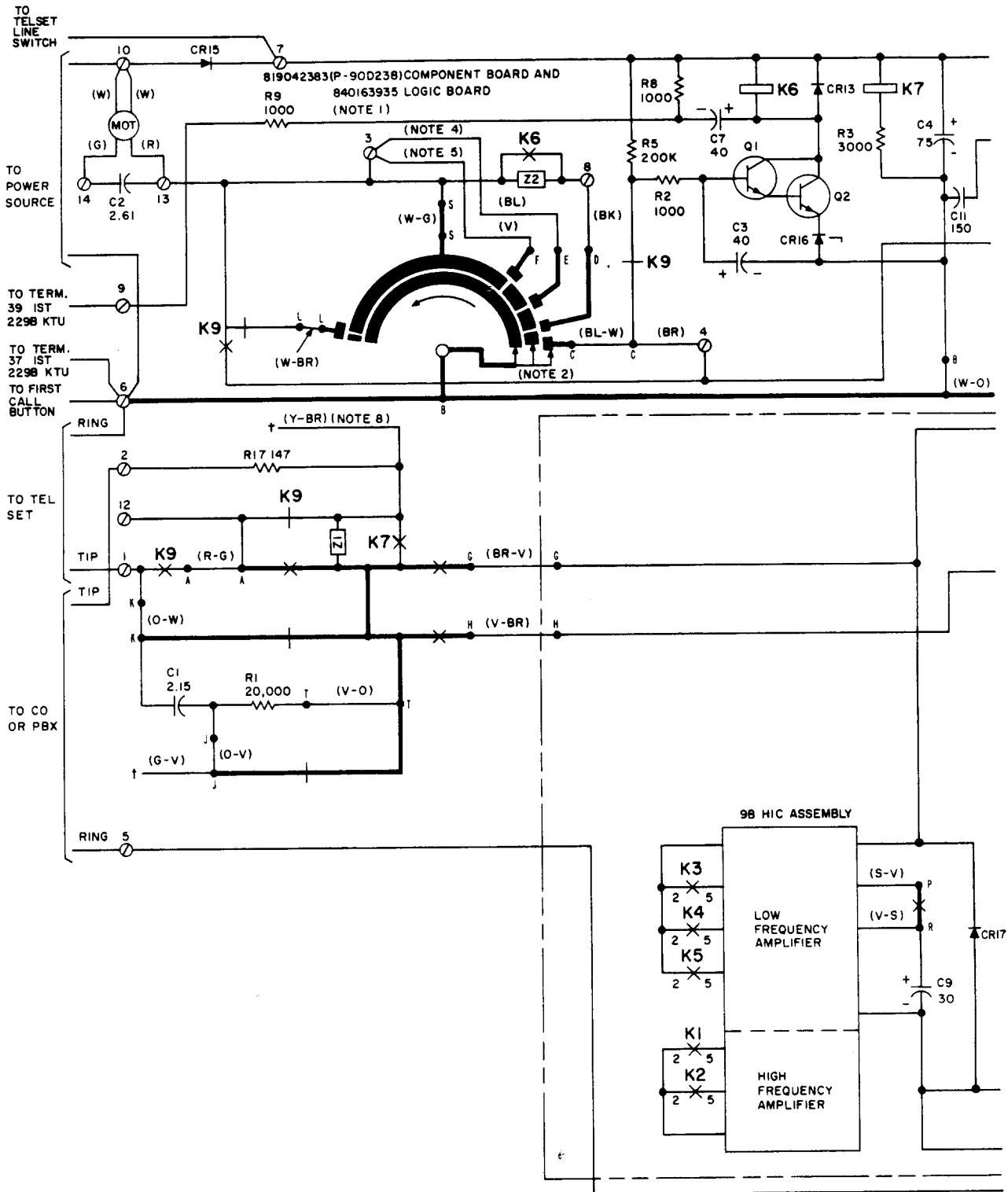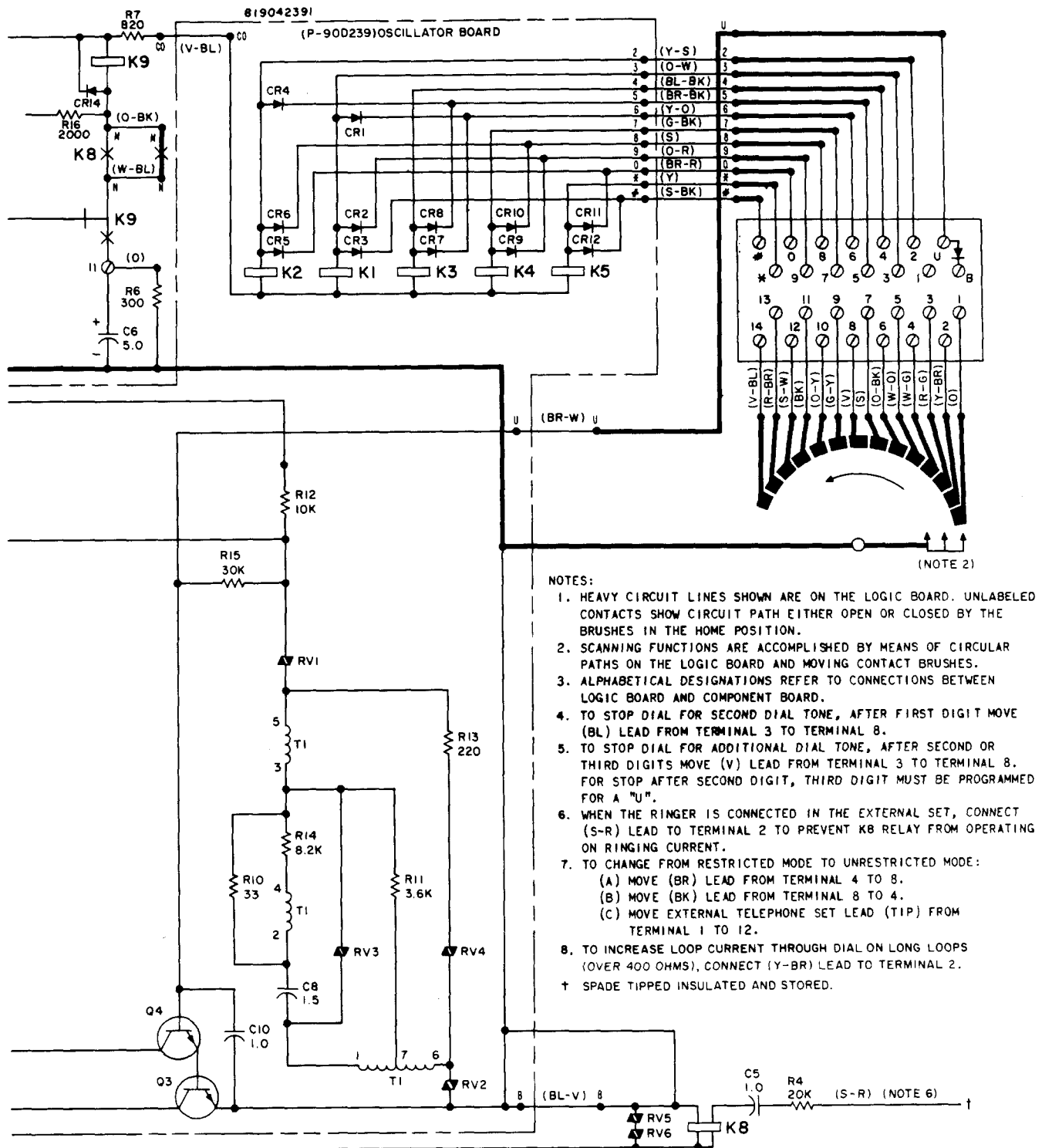
Fig. 14—53B (MD) Dial Connections, Factory Wiring, Restricted Mode (Sheet 2 of 2)

NOTES:

1. HEAVY CIRCUIT LINES SHOWN ARE ON THE LOGIC BOARD. UNLABELED CONTACTS SHOW CIRCUIT PATH EITHER OPEN OR CLOSED BY THE BRUSHES IN THE HOME POSITION.

2. SCANNING FUNCTIONS ARE ACCOMPLISHED BY MEANS OF CIRCULAR PATHS ON THE LOGIC BOARD AND MOVING CONTACT BRUSHES.

3. ALPHABETICAL DESIGNATIONS REFER TO CONNECTIONS BETWEEN LOGIC BOARD AND COMPONENT BOARD.

4. TO STOP DIAL FOR SECOND DIAL TONE, AFTER FIRST DIGIT MOVE (BL) LEAD FROM TERMINAL 3 TO TERMINAL 8.

5. TO STOP DIAL FOR ADDITIONAL DIAL TONE, AFTER SECOND OR THIRD DIGITS MOVE (V) LEAD FROM TERMINAL 3 TO TERMINAL 8. FOR STOP AFTER SECOND DIGIT, THIRD DIGIT MUST BE PROGRAMMED FOR A "U".

6. WHEN THE RINGER IS CONNECTED IN THE EXTERNAL SET, CONNECT (S-R) LEAD TO TERMINAL 2 TO PREVENT K8 RELAY FROM OPERATING ON RINGING CURRENT.

7. TO CHANGE FROM RESTRICTED MODE TO UNRESTRICTED MODE:
   (A) MOVE (BR) LEAD FROM TERMINAL 4 TO 8.
   (B) MOVE (BK) LEAD FROM TERMINAL 8 TO 4.
   (C) MOVE EXTERNAL TELEPHONE SET LEAD (TIP) FROM TERMINAL 1 TO 12.

8. TO INCREASE LOOP CURRENT THROUGH DIAL ON LONG LOOPS (OVER 400 OHMS), CONNECT (Y-BR) LEAD TO TERMINAL 2.

† SPADE TIPPED INSULATED AND STORED.

TABLE C

43B AND 53B DIAL OPTIONS

OPTION		DIAL SPADE-TIPPED LEADS							
		BR	BK	BL	V	S‡	Y-BR§	S-R	G-V
Restricted Dialing		4	8						
Unrestricted Dialing		8	4						
No Dialing Stops				3	3				
Stop After 1st Digit				8	3				
Stop After 2nd Digit†				3	8				
Stop After 1st and 2nd Digit†				8	8				
Stop After 1st and 3rd Digit				8	8				
Short Loop (under 400 ohms total)‡						*	*		
Long Loop (over 400 ohms total)‡						2	2		
Ringing Start Protection								2	
Associated Tel Set	TOUCH-TONE Dial								1¶

* Insulated and stored.

† Program 3rd digit for a "U" for stops after 2nd digit.

‡ 43B dial only.

§ 53B dial only.

¶ Applies only for TOUCH-TONE sets with the 53B dial in the unrestricted mode. In all other cases, insulate and store.