

851- AND 2851-TYPE TELEPHONE SETS

IDENTIFICATION, INSTALLATION, CONNECTIONS, AND MAINTENANCE

1. GENERAL

1.01 This section contains information on the 851- and 2851-type telephone sets.

1.02 This section is reissued to:

- Add additional ordering information
- Update dial wiring diagram information, Fig. 27 and 29
- Add cable routing in current 851CM and 2851CM telephone sets, Fig. 30 and 31.

2. IDENTIFICATION

2.01 The 851BM (MD) or 851CM (rotary dial) and 2851BM (MD) or 2851CM (TOUCH-TONE® dial) are modular telephone sets with a G15A handset and H4DU handset cord.

2.02 The 851CM (rotary dial) and 2851CM (TOUCH-TONE dial) codes are available as a completely assembled telephone set or a basic modular telephone set base.

2.03 **Purpose:** Provides features of a 6-button key station (5-line pickup and hold) at wall installations.

2.04 **Application:** Used with central office or PBX line circuits in 1A, 1A1, 1A2, or 6A key telephone systems. Both the 851- and 2851-type sets are wired for 1A1, 1A2, and 6A systems. For 1A KTS, internal wiring changes must be made.

2.05 **Ordering Guide:**

(a) **Telephone Sets (Complete):**

- Set, Telephone, 851CM-* (Fig. 1)
- Set, Telephone, 2851CM-* (Fig. 2)



Fig. 1—851-Type Telephone Set

(b) **Telephone Set Bases:**

- Base, Telephone Set, 851CM
- Base, Telephone Set, 2851CM♦

(c) **Modular Items:**

- Faceplate, 852A-*
- Faceplate, 2852A-*

NOTICE

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



Fig. 2—2851-Type Telephone Set

- Housing, 851A-*
- Handset, G15A-*
- Cord, Handset, H4DU-*

*Add color suffix from Table A.

(d) **Options:**

- Exclusion
- Buzzer
- Station Busy
- Polarity Guard
- 4A Speakerphone
- Amplifier type handsets

- Multiline Conferencing.

(e) **Replaceable Components:**

- Dial, 8RA (rotary service)
- Dial, 35AF3A (TOUCH-TONE service)
- Ringer, P1B
- Key, 635A5
- Buzzer, KS-20419L1
- 812365039 (P-23F503) Key Collar
- Lamp, 51A (10V) for all key positions
- All items listed as modular.

TABLE A

COLOR ORDERING GUIDE

HOUSING, CORDS AND HANDSET		COORDINATED FACEPLATE	
COLOR	SUFFIX	COLOR	SUFFIX
Black	-03	Charcoal	-70
Ivory	-50	Muted Ivory	-80
Green	-51	Light Green	-71
Red	-53	Muted Red	-69
Yellow	-56	Light Yellow	-72
White	-58	Light Gray	-73
Light Beige	-60	Muted Beige	-75
Aqua Blue	-62	Muted Blue	-76

2.06 **Design Features:**

- Sets are surface mounted on wall or vertical surface using holes for standard outlet box or keyhole slots.
- Handset is cradled on top, permitting on-hook dialing when speakerphone is provided.
- All key buttons including hold can be illuminated (lamps are furnished except in Hold position).
- All pickup buttons convertible to signaling.

- An access hole is provided in the P1-type ringer for ringer bias spring adjustment. Refer to Section 501-259-101.

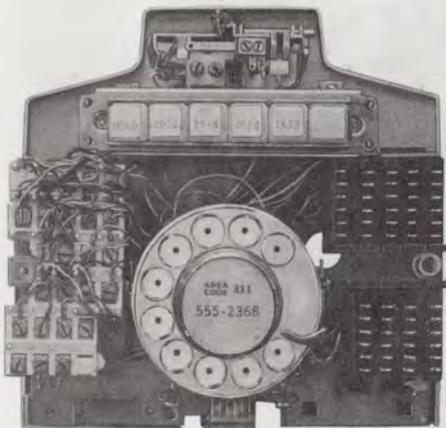


Fig. 3—Early Version 851-Type Telephone Set Base
(Housing Removed)

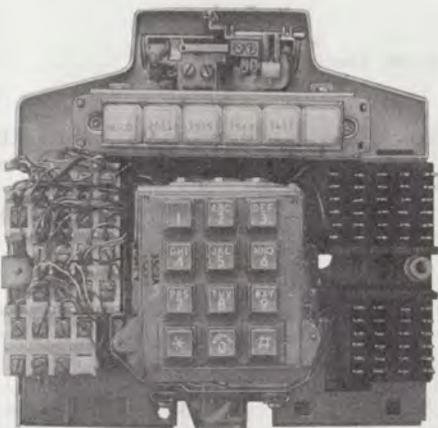


Fig. 4—Early Version 2851-Type Telephone Set Base
(Housing Removed)

3. INSTALLATION

3.01 When mounting the 851- or 2851-type telephone set, select a location which provides at least 6 inches of clearance on all sides to permit removal of the handset, and for maintenance.

3.02 The telephone set should be mounted before installing the modular items. To expose the mounting holes, the hinged chassis assembly must be lowered by loosening the captive screws (Fig. 10) holding the top of the chassis. For ease of installation the chassis assembly can be removed from the base pan by springing the hinged brackets sufficiently to clear the pins. The base pan can then be mounted directly to the wall using the keyhole slots, or holes provided for mounting over an electrical outlet box.

Caution: Avoid damage to wall or telephone set whenever chassis is in lowered position.

3.03 All sets except the CM codes can be wired using either inside wiring cable or connector cable. When mounted over an outlet box, bring wiring through opening in base pan before mounting. When exposed, bring wiring up from bottom (right side of handset cord jack). Allow 20-22 inches of cable inside set for routing and terminating.

3.04 With wiring brought into set and base pan mounted, replace chassis assembly if previously removed, but leave in lowered position.

3.05 Where IW cable is used, prepare and route as follows.

- (1) Remove sheath to surface of outlet box or bottom of hole in base pan, depending on method of wiring.
- (2) Remove cable clamps. Pinch legs of clamp from front of chassis (Fig. 13).
- (3) Slip one of the clamps provided with set around conductors approximately 9 inches from end of sheath. Add second clamp 2 inches above first.
- (4) Form slack loop as shown in Fig. 7 or 8 and install first clamp in hole to left of cord jack.

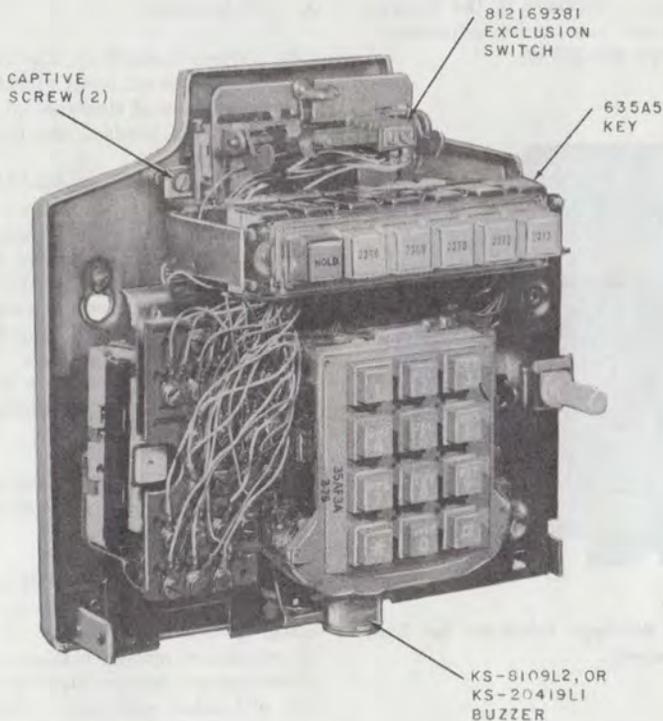


Fig. 5—2851CM Telephone Set With Exclusion (Housing Removed)

- (5) Route cable below jack and install second clamp in hole to left of ringer.
- (6) Twist ends of conductors together and feed through opening between dial, ringer, and connecting blocks.

3.06 On all sets except CM codes, if the set is served by the connector equipped end of an A25B connector cable, a D-180375 Kit of Parts must be used to obtain raw-ended conductors for termination. The mated connector and plug should be located as shown in Fig. 9. Check that connector and plug do not interfere with operation of line switch. Cable is routed and fastened in same manner as IW cable (Fig. 7 and 8).

3.07 Check before terminating that sufficient slack is provided to permit hinging action of chassis assembly.



Cable slack must be in area behind dial and not touching ringer. Chassis cannot be secured if slack lies between base pan and network or base pan and cord jack.

3.08 Since individual terminals are not designated on the quick-connect blocks, terminal identification is provided on the inside of the housing as a wiring guide (Fig. 16). Terminals 1-30 are on the upper block and 31-54 are on the lower block. Terminals 51-54 are spare. Use a 714B tool to terminate conductors.

3.09 The 851CM and 2851CM telephone sets are equipped with a KS-16671L1 connector (Fig. 6). An A25B connector cable is required to connect set to key equipment (Fig. 30 and 31).

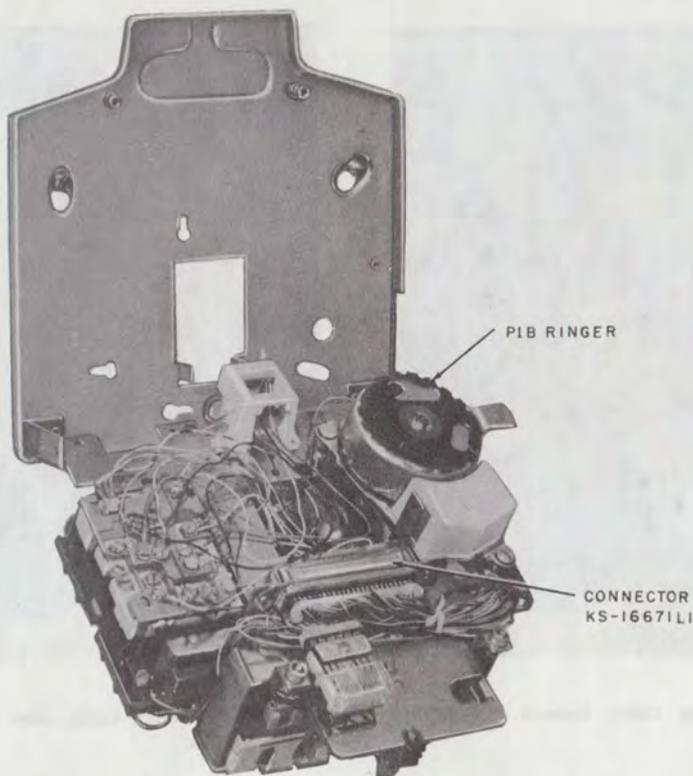


Fig. 6—851CM or 2851CM Telephone Set Showing KS-16671L1 Mounting Cord Connector

Note: Care must be exercised in securing the connector cable to eliminate the possibility of undue strain on the conductors and to prevent damage to the insulation of the conductors which could cause shorts. Plastic tie-wraps should be used to bundle the conductors in order to protect the leads from being damaged when closing the hinged chassis.

3.10 Exclusion Switch: To provide exclusion, install the exclusion switch assembly as follows.

- (1) With chassis in lowered position, fasten switch assembly to line switch bracket using screw provided in kit. Screw must be inserted in hole from rear of bracket.

- (2) Position switch assembly horizontally (Fig. 5 or 10) and fasten securely.

3.11 Polarity Guard: When required with the 2851-type telephone set, install the adhesive backed 819041971 (P-90D197) guard assembly to the left-hand bracket in the position shown in Fig. 11.

3.12 3-Type (MD) Speakerphone: These sets are factory-wired for 3-type speakerphone except that the 851-type telephone set requires the replacement of the 8RA dial with an 8CA dial to provide a second set of off-normal contacts (P3 and P4 leads). When replacing the dial, the adapter brackets must be removed from the 8RA dial and added to the 8CA dial (Fig. 12). With both the

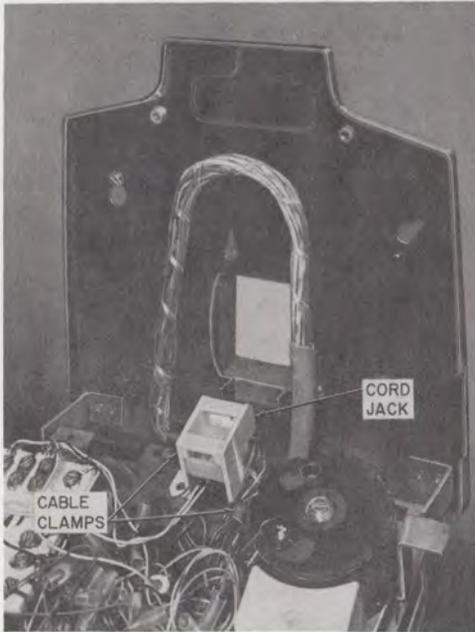


Fig. 7—Inside Wiring Cable, Exposed Wiring (Early Version)

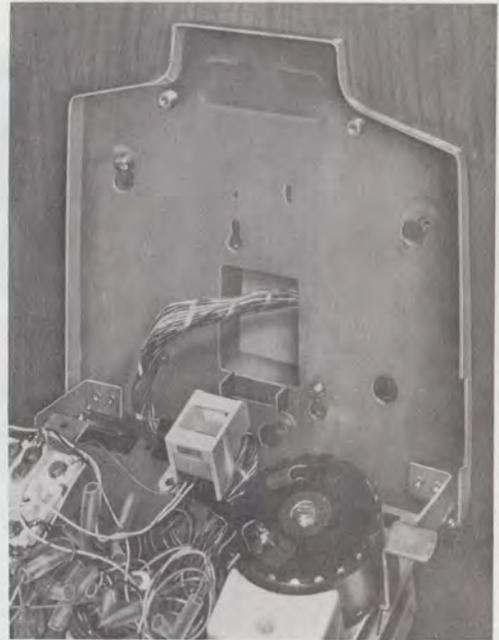


Fig. 8—Inside Wiring Cable, from Outlet Box (Early Version)

rotary and TOUCH-TONE sets, a loudspeaker and transmitter must be installed external to the set and wired to the 55-type control unit. The control unit can be located near the telephone set (Fig. 21) or at the KTS equipment.

3.13 4A Speakerphone: If 4A speakerphone is provided, the 223D adapter is recommended, however, the 82-type adapter also may be used to interconnect the 4A speakerphone components [680-type transmitter, 108-type loudspeaker set, and the 85B1 power unit, (Fig. 22 and 23)].

3.14 For connections to the 3-type (MD) or 4A speakerphone system, refer to the appropriate section in Division 512.

3.15 When an 851- or 2851-type set is multiplexed with sets furnishing speakerphone features, certain leads must be disconnected, insulated, and stored to avoid interference with working circuits. The designation of leads to be removed are as

follows: T1 (V-G), R1 (G-V), P3 or IT (V-BR), P4 or IR (BR-V), AG (V-S), and LK (S-V).

3.16 Buzzer: The KS-20419L1 buzzer is mounted on an insulated bracket below the dial (Fig. 13). If required, an additional KS-20419L1 may be added or the existing KS-20419L1 may be replaced by the KS-8109L2 buzzer (14-30 volt ac or dc) which would be mounted using both screws.

3.17 Station Busy Lamp: A 533K diode is used to provide a station busy lamp feature for multibutton wall telephone sets used in 1A1 and 1A2 key telephone systems.

For connection information, refer to Table B.

3.18 Key Features.

- All pickup positions of the 635A5 key are convertible to signaling by the removal of the 812857738 (P-28E773) locking pins from



Fig. 9—Connector Cable and D-180375 Kit of Parts (Early Version)

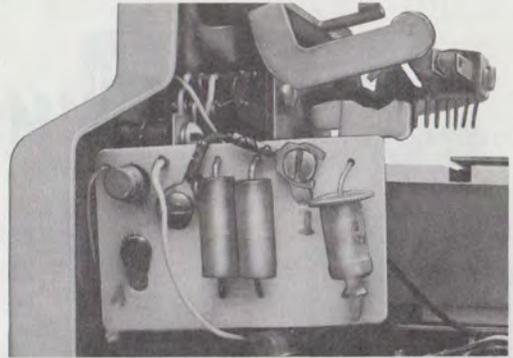


Fig. 11—Polarity Guard Position

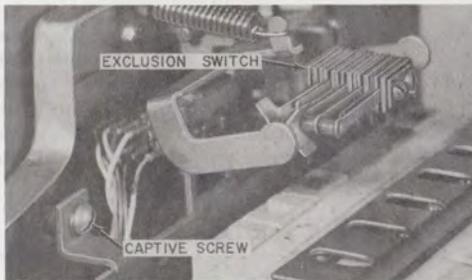


Fig. 10—Exclusion Switch Installed and Hinged Chassis Mounting Screws (Early Version)

the positions involved and making the necessary wiring change (Table C).

- Lamp and set wiring are provided for illuminating all key positions, except in the

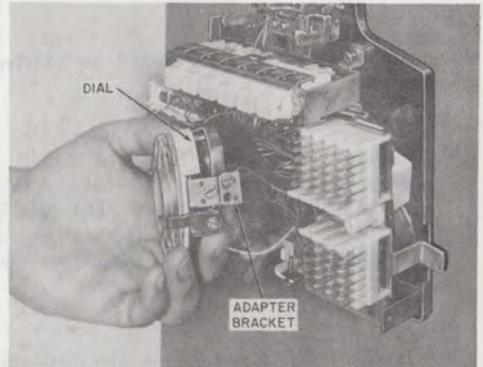


Fig. 12—Dial Adapter Bracket

hold position (lamp must be furnished separately) where the associated lamp leads are insulated and stored.

- Line appearances on the key can be rearranged by switching the color coded plugs on the rear of the key or rearrangement of the cross connections at the key equipment.
- If multiline conferencing option is provided the 635A5 key must be replaced with 635CF5 key, and a 2A1 matrix block shall be added to the equipment (Table E), in place of polarity guard described in paragraph 3.11. This unit provides eight polarity guard

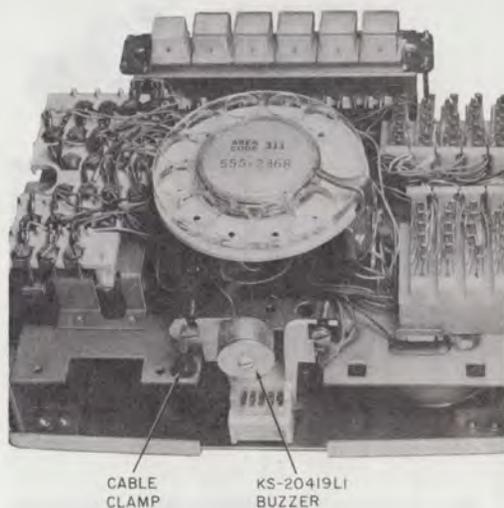


Fig. 13—KS-20419LI Buzzer Mounted on 851-Type Telephone Set

circuits. One polarity guard circuit is required for each line which is conferenceable by multibutton depression. The polarity guard is located between the station side of the line circuit and the station cut-down field.

3.19 Install H4DB handset cord in later production models of 851- and 2851-type telephone sets by inserting the end of the cord having the tapered plug into the handset and the square end into jack on bottom of set. Spring locking tab should face away from wall at bottom of set (Fig. 19).

Warning: Cord must be removed from jack in bottom of set anytime chassis assembly must be put in lowered position.

3.20 When installing H4DU handset cord in 851BM, 851CM, 2851BM, or 2851CM telephone sets, either end of cord will fit in telephone set base or handset. The cord should be inserted in the jack until cord retaining clip locks in place.

3.21 Where conditions warrant, the G3A6, G12A, or G15A handset supplied with these sets can be replaced with other types as follows:

- For impaired hearing—G6-type
- For weak speech—G7-type
- For noisy location—G8-type or D-180413.

Note: Refer to Section 501-211-102 for connections of these handsets. An H4CJ or equivalent handset cord must be used on nonmodular type handsets.

3.22 Installation of Spade-Tipped Handset Cords in Early Production Sets Equipped With G12A Handset (Fig. 14):

To install spade-tipped handset cord (H4CJ or equivalent) remove J hook stayband from the cord. Cut back and remove cord sheath to stayband marks. Thread spade-tipped conductors through plug, ordered separately, (spade tips must be bent to clear cord entrance). Pull cord until about 1/4-inch of cord sheath is in the central cavity of the plug. Separate the conductors into two groups and tie an overhand knot, pulling the knot to the cord sheath. Pull cord from plug until strain relief position is attained by knot entering sheath and resting against plug. Feed spade-tipped conductors straight through jack and connect to proper terminals. Insert plug in jack.

3.23 Installation of Spade-Tipped Handset Cords in 851BM, 851CM, 2851BM, and 2851CM Telephone Sets: To install spade-tipped handset cord (H4CJ or equivalent) insert J hook stayband of cord in slot provided in base of telephone set and terminate on appropriate network terminals (Fig. 26, 27, 28, or 29).

3.24 To install housing.

- (1) Refer to paragraph 5.05.
- (2) If chassis assembly is in lowered position, raise and fasten in place with two captive screws.
- (3) Install collar on key.
- (4) Withdraw the two mounting screws until they are held in the housing by their threads.

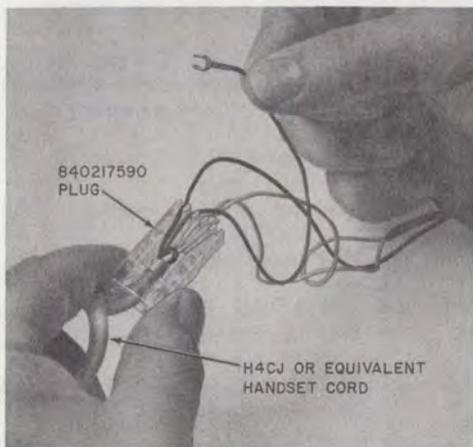


Fig. 14—Installing Spade-Tipped Handset Cords in Early Production 851- and 2851-Type Telephone Sets with G12A Handset

With both line switch plungers fully lifted, move the housing directly into position around the telephone set (if an exclusion switch is installed, the left plunger will touch the exclusion switch when the housing is about 3/8-inch from the base). Depress both plungers to their on-hook position. Continue working the housing into position against the base. Release plungers.

- (5) Fasten housing in place with two captive screws.
- (6) Check complete operation of line switch and exclusion feature.

3.25 Use Form E-5002-A or E-5002-B as a station number card for a TOUCH-TONE station and Form E-4203-G for rotary sets.

3.26 To Install Faceplate.

- (1) Insert tabs on faceplate into slots of housing.
Use a KS-21107 type reloser or equivalent to depress the tab of the faceplate retainer clip while seating the faceplate. To insure proper positioning of the retainer clip, raise the handle

of the reloser well above horizontal, as shown in Fig. 15 before withdrawing the tool.

- (2) If installing 2851A faceplate (2851-type telephone set) place station number card in front of faceplate in standard manner.
- (3) If installing 2852A faceplate, an 840693253 adapter (furnished) is used to retain the station number card. Install adapter in faceplate with the two retaining tabs toward the top of the faceplate. Check for proper seating of adapter.
- (4) If the latching characteristics of the 802695247 (P-269524) retainer clip is inadequate, replace

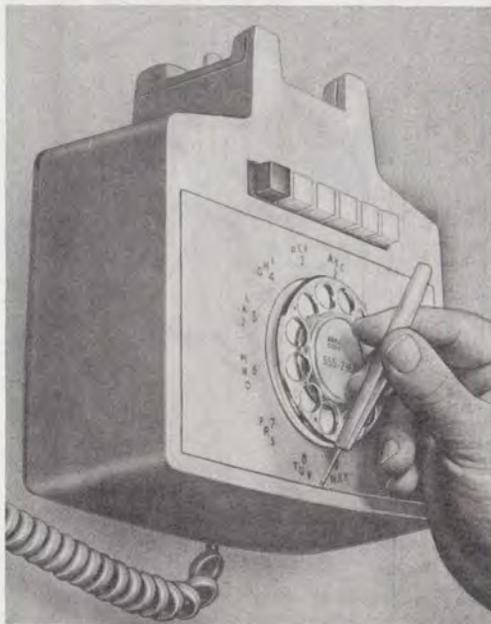


Fig. 15—Installing 851A(MD) or 852A Faceplate

- (2) The 635A5 key uses an E-5837 form (key button designation tabs). To install, squeeze sides of cap to remove from key button and insert designation tab. When replacing cap or key button

make sure assembly snaps into place. If cap does not snap in place properly, rotate 90 degrees.

4. CONNECTIONS

4.01 For sets equipped with a 66S1-type connecting block, terminate IW cable as shown in Fig. 26 and 27 using the terminal identification information inside the housing as a guide in locating terminal numbers (Fig. 16).

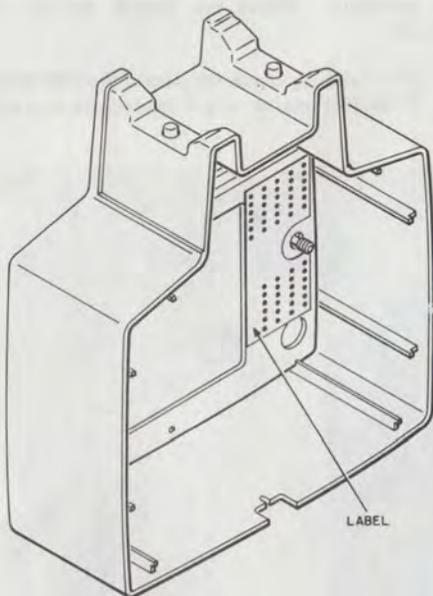


Fig. 16—Connecting Block Terminal Information

4.02 All leads or straps involved in service or option changes are equipped with spade tips. If not factory terminated, leads are insulated and stored.

4.03 For sets equipped with the KS-16671L1 connector, (Fig. 6) an A25B connector cable is required.

4.04 Connection Index:

Table B—Connections for KTS and/or Station Busy Lamp

Table C—Pickup-Signal Key Conversions

Table D—Polarity Guard Connections for 2851-Type Telephone Set [819041971 (P-90D197) Guard Assembly]

Table E—2A1 Matrix Block Connections

Fig. 24—Exclusion Switch Connections

Fig. 25—Hold Lamp Connections

Fig. 26—851BT, 851B, or 851BM Telephone Set, Connections

Fig. 27—2851BT, 2851B, or 2851BM Telephone Set, Connections

Fig. 28—851CM Telephone Set, Connections

Fig. 29—2851CM Telephone Set, Connections

5. MAINTENANCE

5.01 Maintenance replacement should be limited to the following:

- Complete telephone sets
- Modular items
- Optional items
- Replaceable components.

5.02 When dial replacement is necessary in the 851-type telephone set, use an 8RA dial for nonspeakerphone sets and an 8CA dial for sets with speakerphone. Remove dial by loosening adapter mounting screws and springing dial brackets sufficiently to release dial from locating pins. Transfer adapter brackets from dial being replaced to new dial (Fig. 12).

5.03 Maintenance of the 35-type TOUCH-TONE dial is not recommended and the dial should be replaced. Adapter brackets are not involved when replacing the TOUCH-TONE dial.

5.04 When necessary to remove housing, the faceplate must first be removed by using a KS-21107 type releaser or equivalent in catch in bottom of faceplate. Housing can then be removed

by loosening two captive screws under faceplate area.

5.05 For field replacement of 851A housing—early version of housing (Fig. 17) can be used with sets equipped with either the early, later, or current baseplate (Fig. 18, 19, and 20). The current housing (Fig. 18 and 19) can not be used with the early version baseplate.

5.06 Access to the ringer is obtained by lowering the hinged chassis assembly. The ringer

can be removed by loosening the two shouldered mounting screws.

5.07 The current production 635-type keys have been modified for easy lamp replacement by merely removing the lamp cap and inserting a 553-type tool through the hole in the top of the button. In early production keys it was necessary to remove faceplate, housing, key collar, and button for lamp replacement.

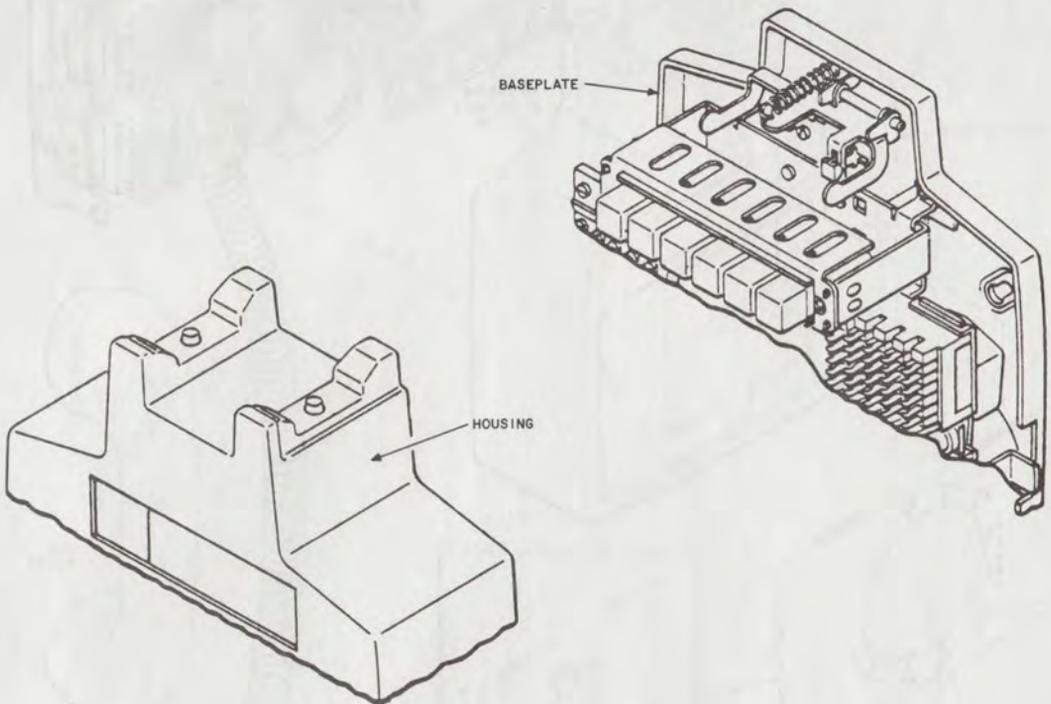


Fig. 17—Early Version Baseplate and Housing

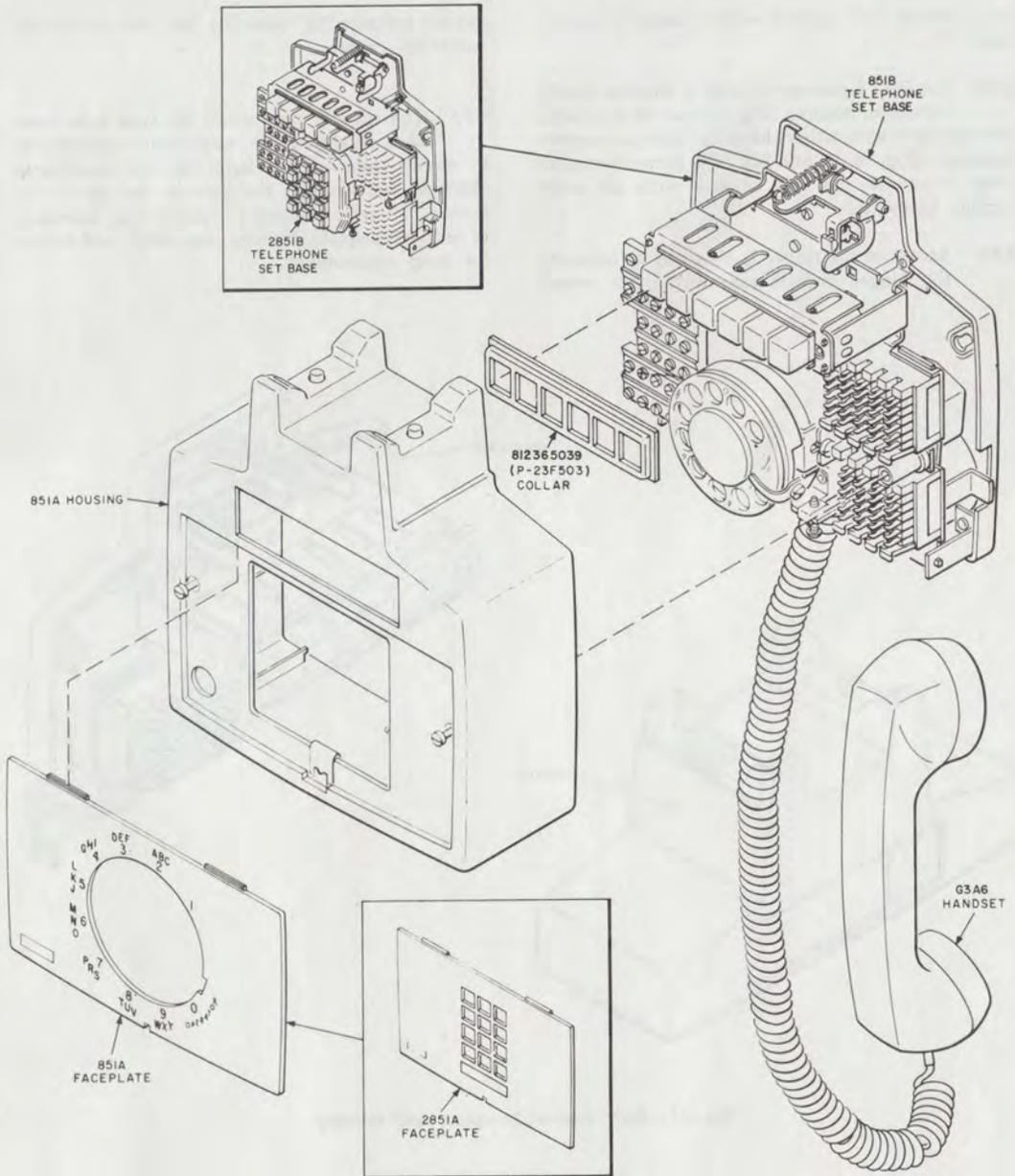


Fig. 18—851B and 2851B Telephone Set, Early Version, Showing 851A Housing and Base Plate

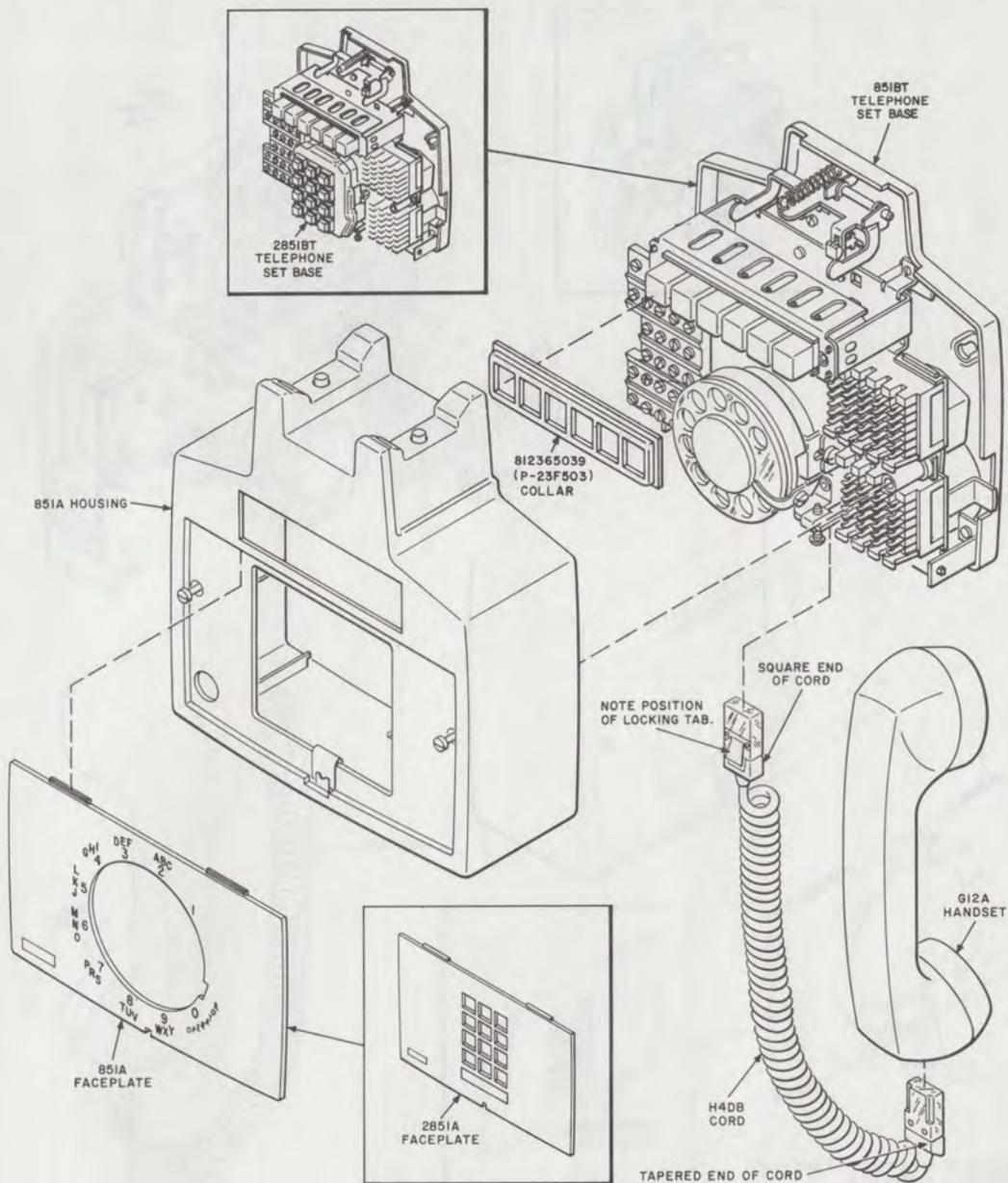


Fig. 19—Station Modular Arrangement, 851BT and 2851BT Telephone Set Showing Later 851A Housing and Base Plate

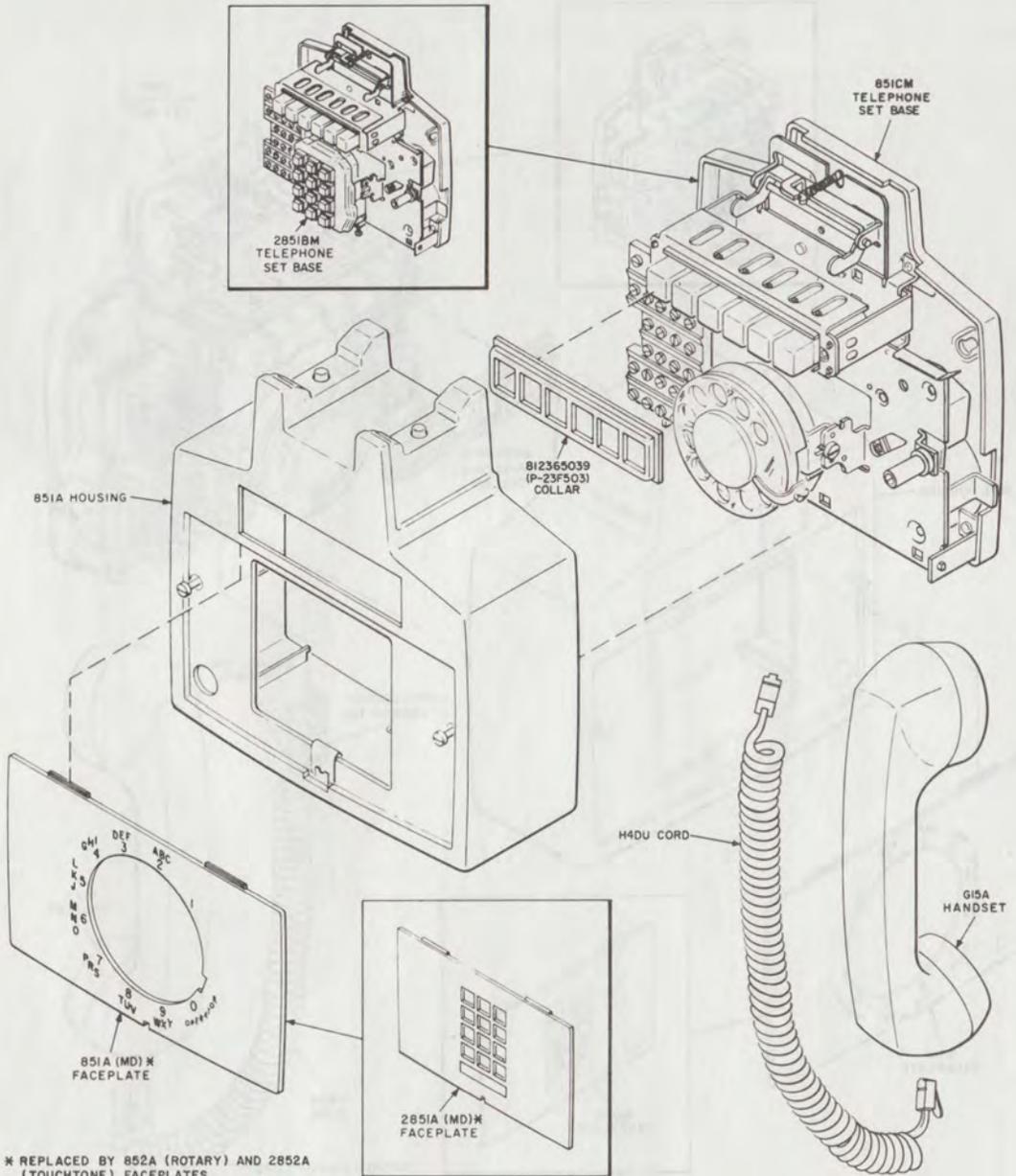


Fig. 20—Station Modular Arrangement 851CM and 2851CM Current Telephone Set

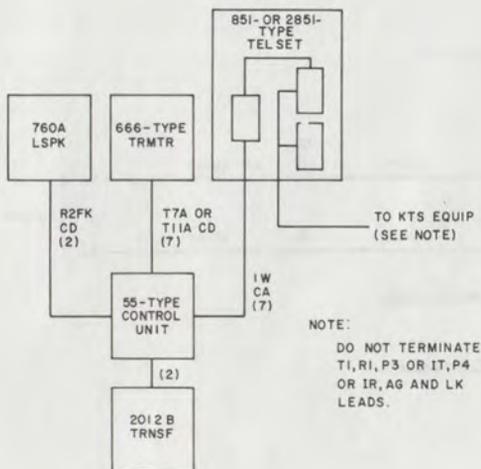


Fig. 21—Block Diagram of 3-Type (MD) Speakerphone Control Unit Located Near Station

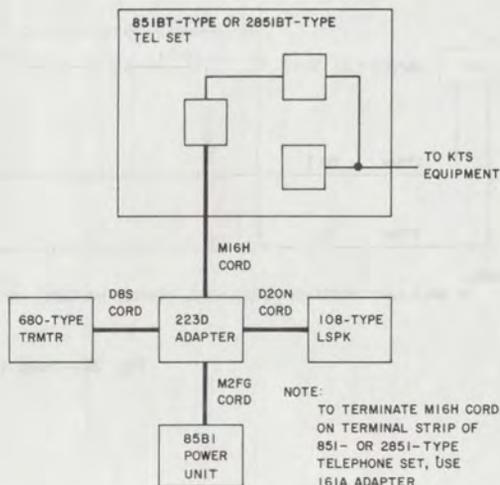


Fig. 23—Block Diagram of 4A Speakerphone Located at Station Using 223D Adapter

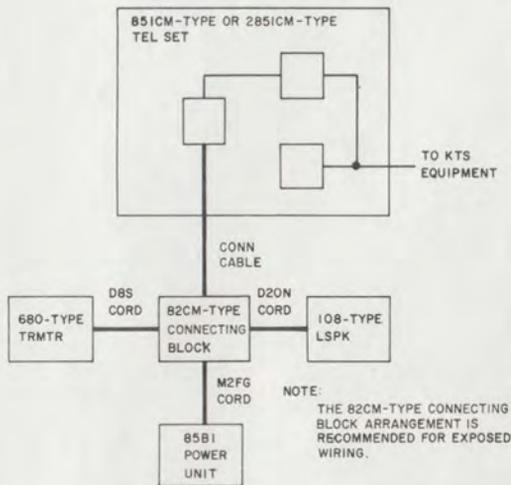
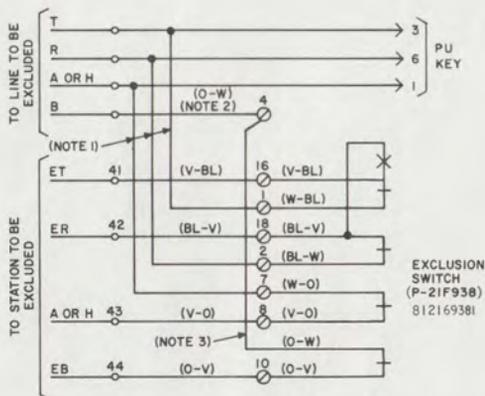


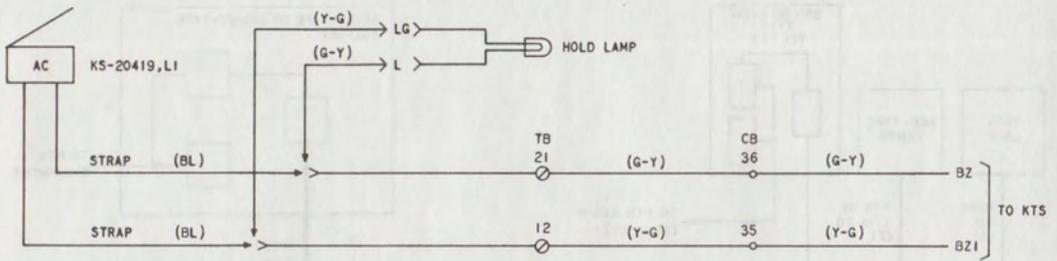
Fig. 22—Block Diagram of 4A Speakerphone Located at Station Using 82-Type Adapter



NOTES:

1. STORED SPADE-TIPPED LEADS OF LINE TO BE EXCLUDED.
2. WHEN OTHER THAN LINE 1 IS EXCLUDED ON IA KTS, DISCONNECT, INSULATE AND STORE (O-W) LEAD FROM TERMINAL 4. CONNECT BALANCE LEAD OF LINE INVOLVED TO TERMINAL 4.
3. FOR IA1 OR IA2 KTS, CONNECT (O-W) EXCLUSION LEAD TO TERMINAL 10. A1 GROUND MUST BE SUPPLIED DIRECTLY TO EXCLUDED STATION.

Fig. 24—Exclusion Switch Connections



NOTE:
IF HOLD LAMP OPERATION IS REQUIRED; REMOVE, INSULATE, AND STORE BUZZER LEADS.

Fig. 25—Hold Lamp Connections

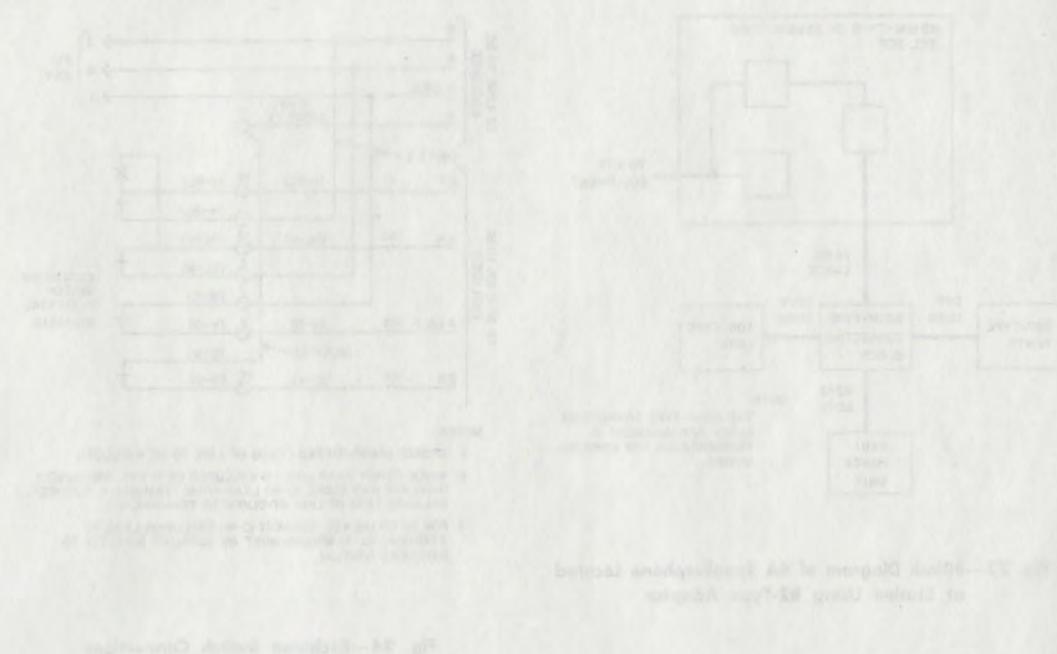


TABLE B

CONNECTIONS FOR KTS AND/OR STATION BUSY LAMP (See Note)

STATION BUSY LAMP		WIRE OR LEAD								533K BUSY LAMP DIODE
		LINE SWITCH			HOLD KEY		STRAP OR MTG CD CONDR			
		Y	BR	G	O-BK	BK-BL	V-S	G-V	Y-BR	
With- out	1A	11	*	3	9	13	*	3	L2†	
	1A1-1A2	4	3	13	3	9	3	13	L2†	
With	1A	11	L2†	3	9	13	L2†	3	L2†	L2† —  — 3
	1A1-1A2	4	L2†	13	3	9	L2†	13	L2†	

Note: Use B battery supply from KTS if available. Do not use 10 volt ac lamp battery.

* Insulate and store.

† Network terminal, undesignated terminals are on terminal board.

TABLE C

PICKUP-SIGNAL KEY CONVERSIONS

TEL SET	KEY OPTION	KEY LEAD				
		O-W	S-W	G-R	BL-BK	BR-BK
851-or 2851-Type	HPPPPP	9	9	9	9	9
	HPPPPS	9	9	9	9	11
	HPPSSS	9	9	9	11	11
	HPPSSS	9	9	11	11	11
	HPSSSS	9	11	11	11	11
	HPPP*P*S*	9	9	6	6	3
	HPP*P*P*S*	9	6	6	6	3

* For common signaling with intercommunicating or private lines with signaling under line switch control. For 1A KTS, move (Y) line switch lead from terminal 4 to 11.

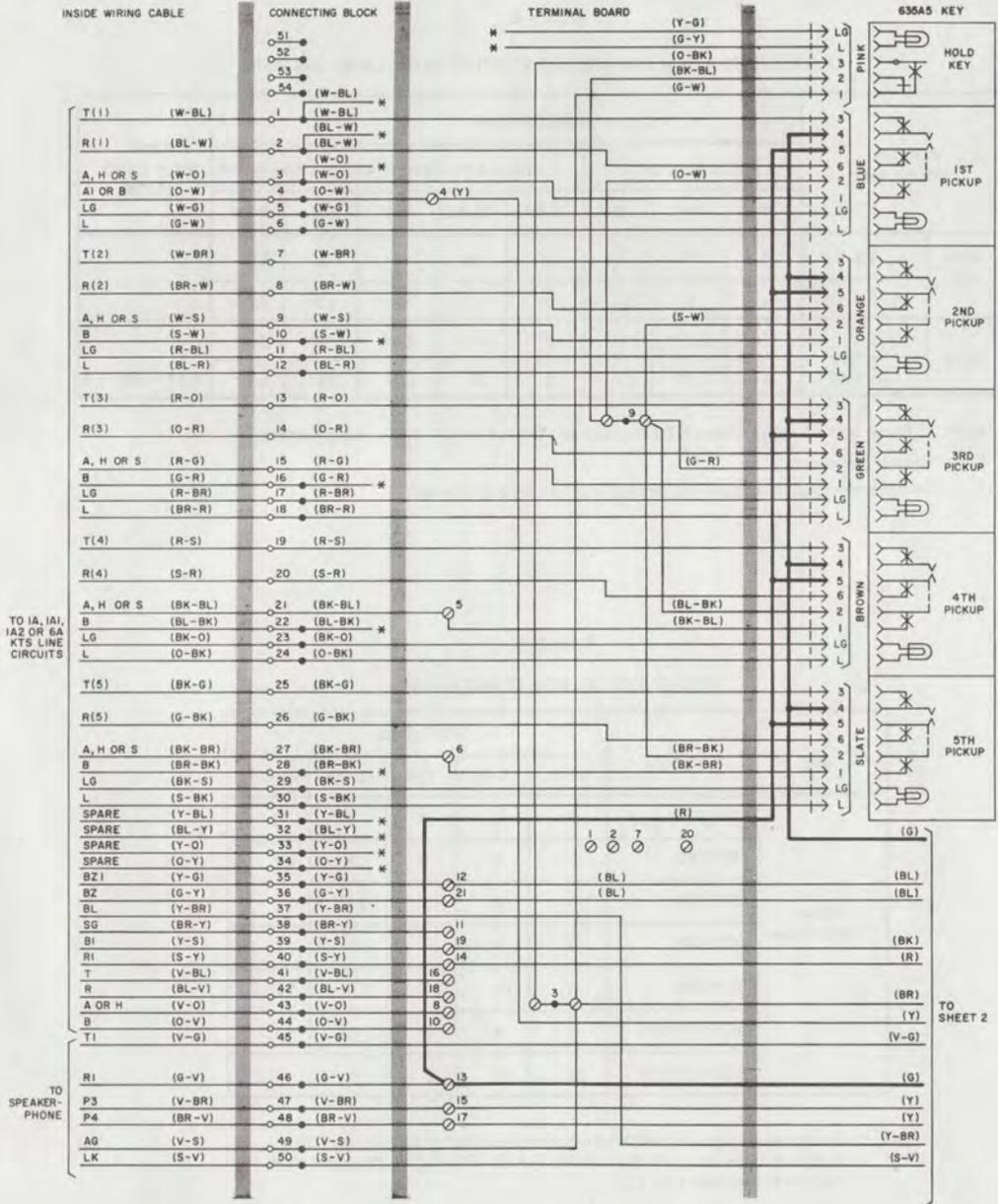


Fig. 26—851BT, 851B, and 851BM Telephone Set Connections (Sheet 1 of 2)

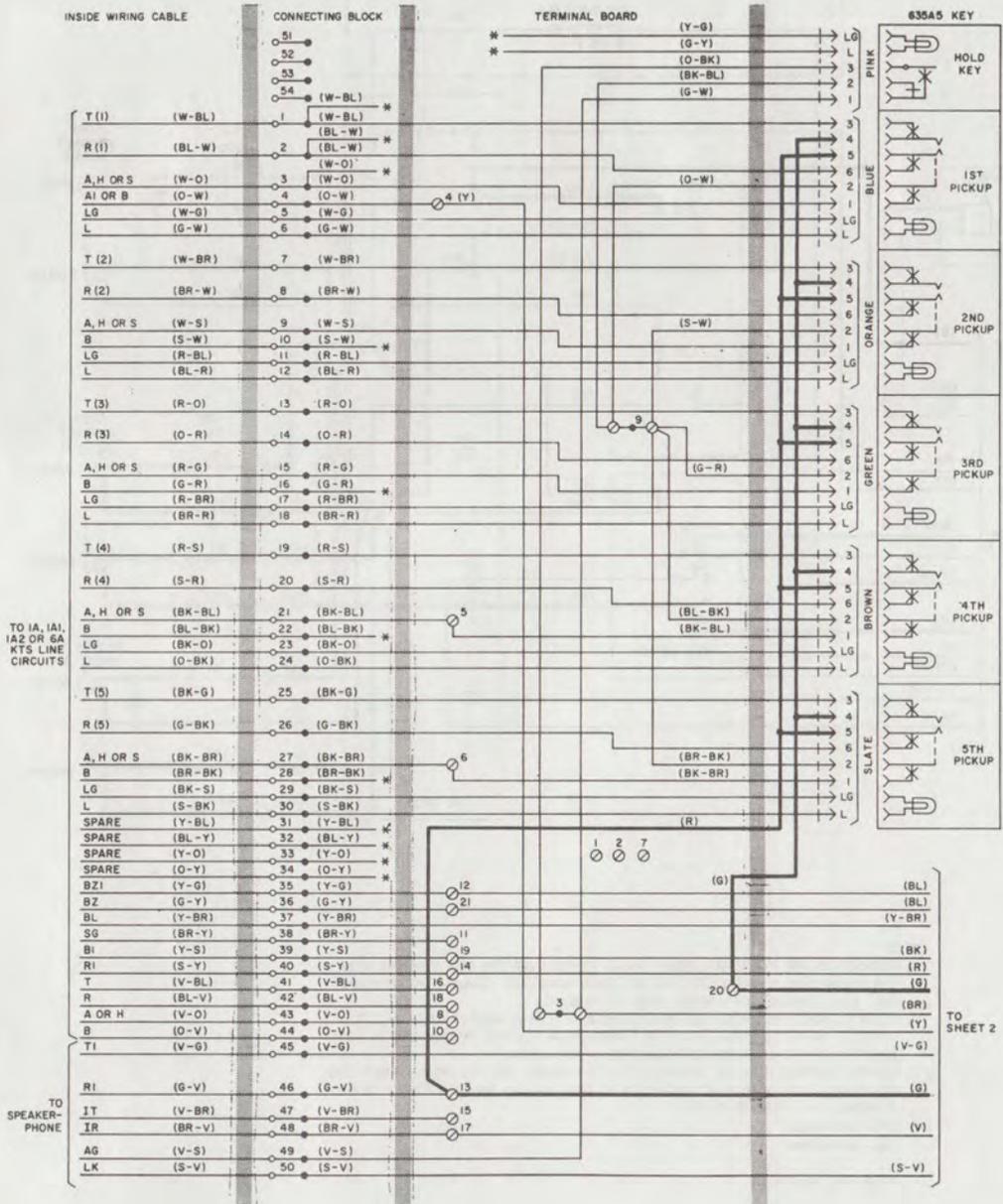


Fig. 27—2851BT, 2851B, and 2851BM Telephone Set, Connections (Sheet 1 of 2)

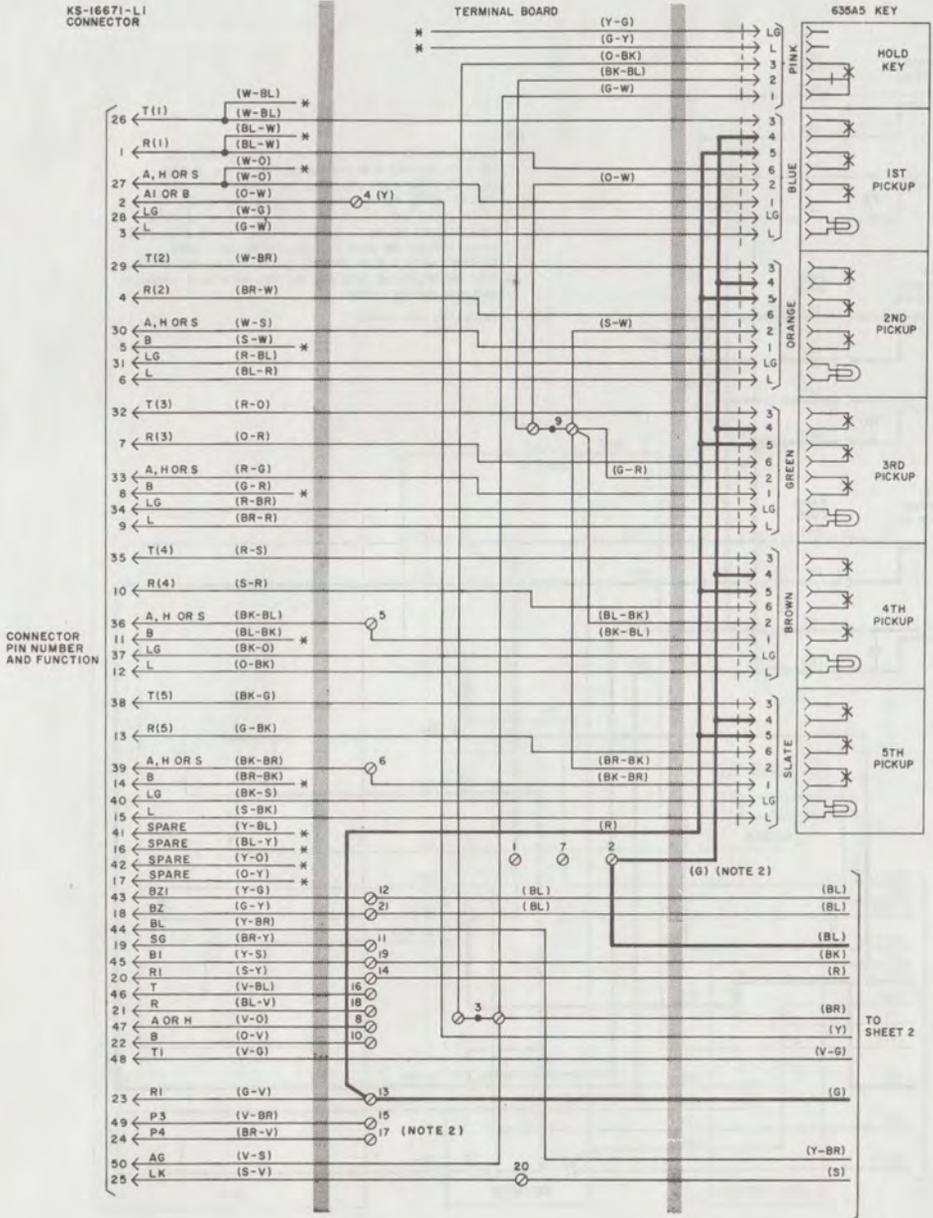


Fig. 28—851CM Telephone Set, Connections (Sheet 1 of 2)

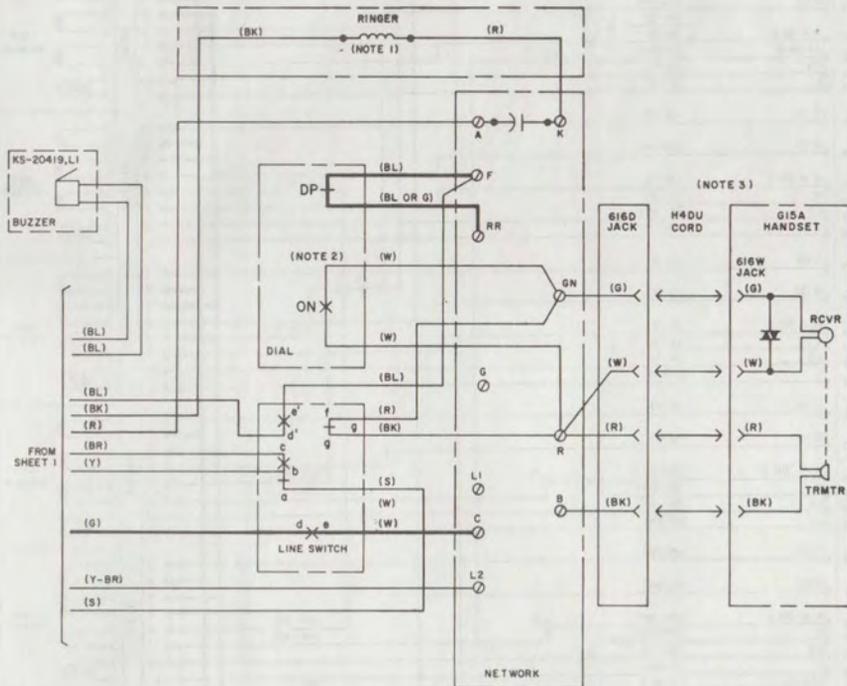


Fig. 28—851CM Telephone Set, Connections (Sheet 2 of 2)

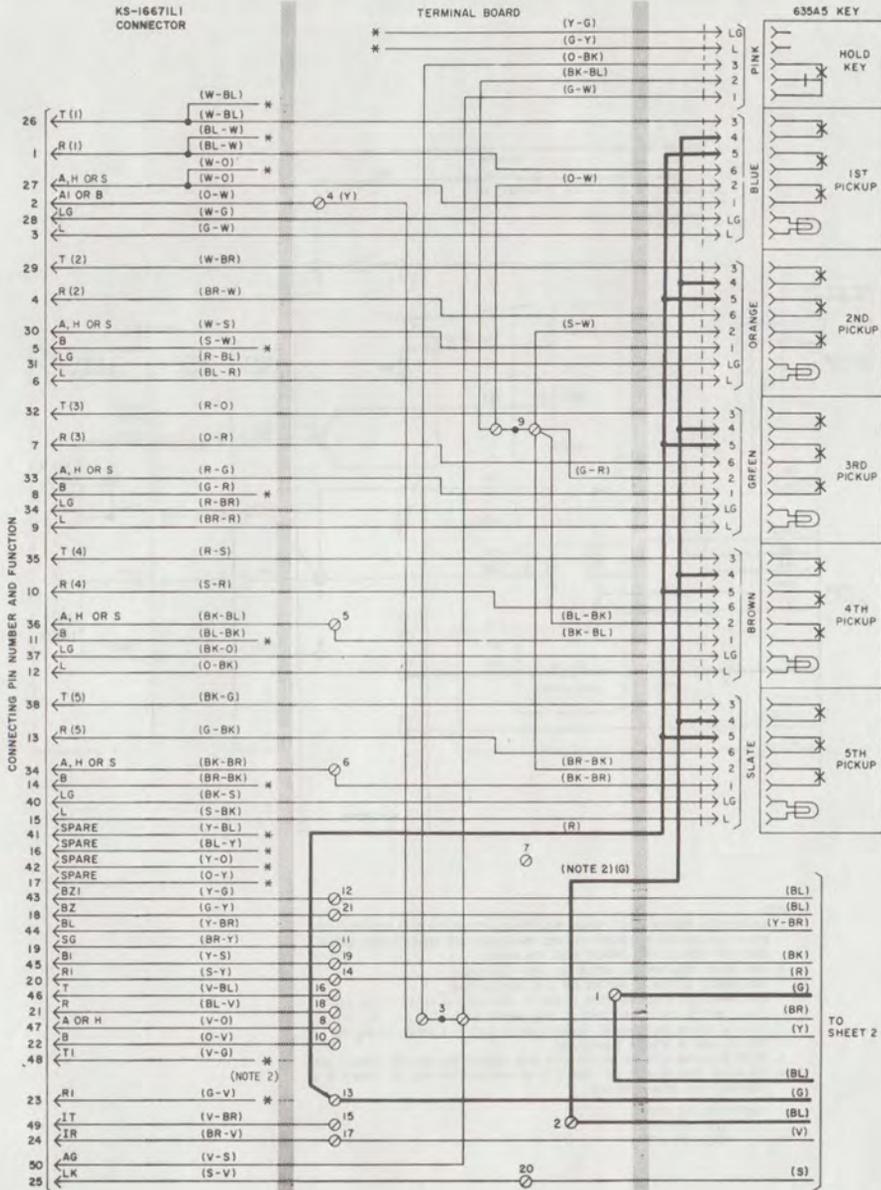


Fig. 29—2851CM Telephone Set, Connections (Sheet 1 of 2)

NOTES:

1. CONNECTIONS FOR P1B RINGER SHOWN. RINGER CONNECTIONS FOR SETS EQUIPPED WITH P1A RINGER SAME AS P1B EXCEPT (BL), (S), AND (S-R) LEADS ARE INSULATED AND STORED. (CURRENT MODEL P1A RINGERS DO NOT HAVE (BL) LEAD).
2. WHEN USING SPEAKERPHONE, REMOVE (G) LEAD FROM TERM 2 AND CONNECT TO TERM 1. REMOVE (BL) LEADS FROM TERMS 1 AND 2, INSULATE AND STORE. SPEAKERPHONE LEADS RT (G-V) AND T1 (V-G), ARE INSULATED AND STORED IN SETS MANUFACTURED AFTER JULY 20, 1979. WHEN INSTALLING SPEAKERPHONE CONNECT THE RT (G-V) LEAD TO TERMINAL 13 AND THE T1 (V-G) LEAD TO NETWORK TERMINAL G.
3. 2851 OF TELEPHONE SETS ARE SHIPPED WITH G15A HANDSETS AND H4DU HANDSET CORD.
4. ON SETS MANUFACTURED PRIOR TO 4-1-78, THE GREEN AND WHITE HANDSET CORD JACK LEADS IN TELEPHONE SET WERE CONNECTED TO NETWORK TERMINALS R AND S, RESPECTIVELY.

* INSULATED AND STORED

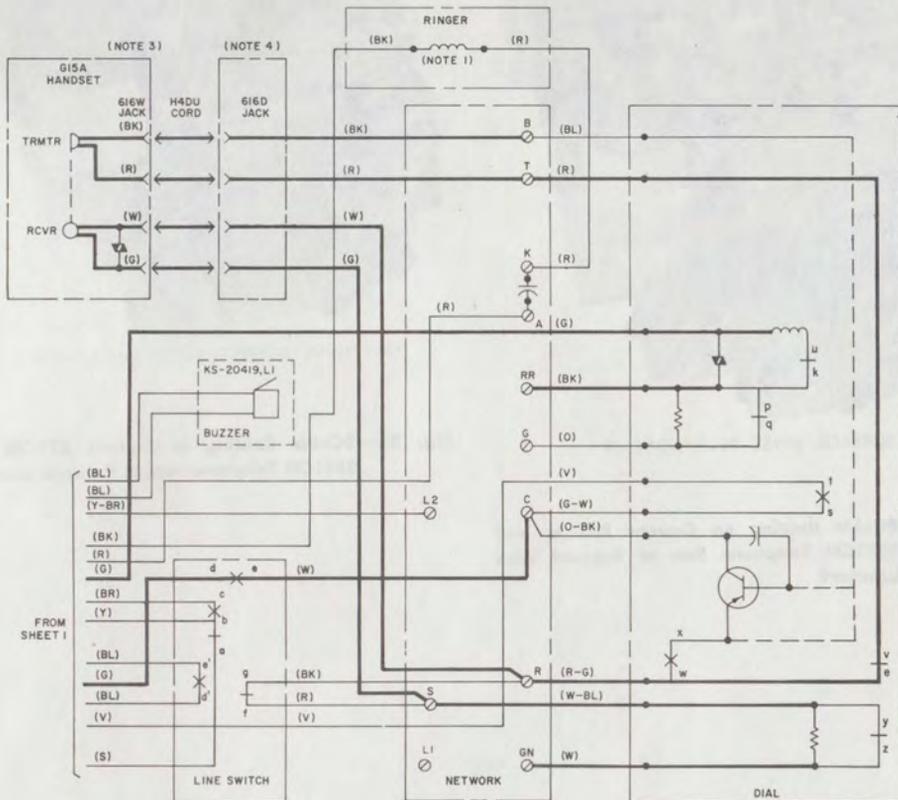
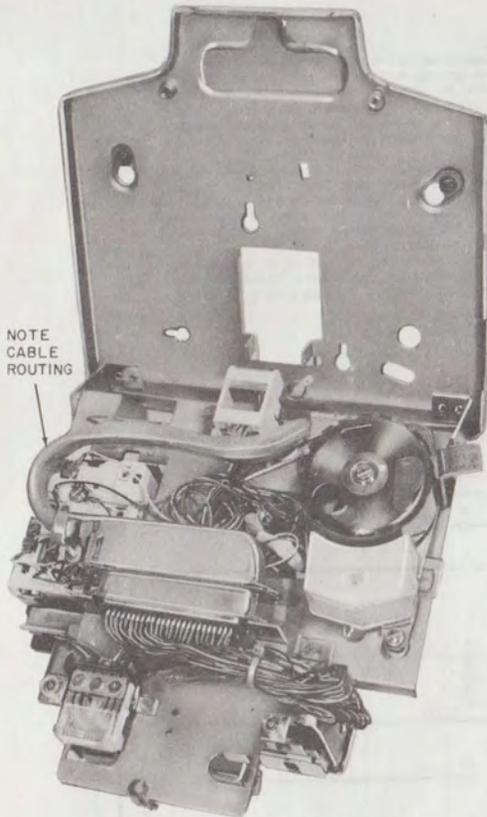
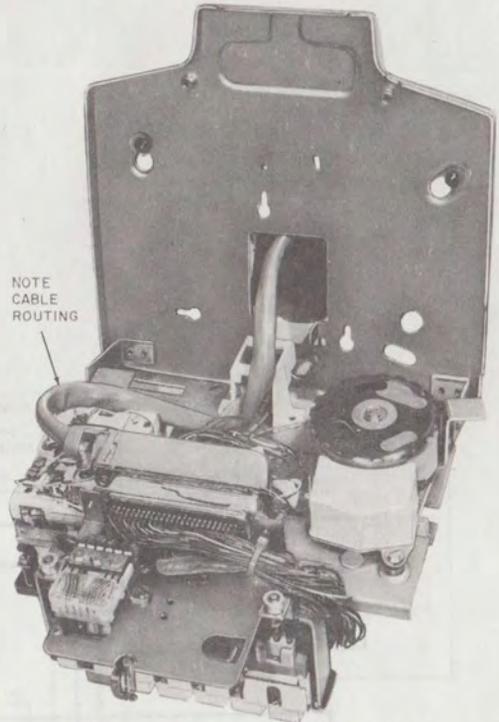


Fig. 29—2851CM Telephone Set, Connections (Sheet 2 of 2)



SURFACE WIRED TELEPHONE SET

Fig. 30—Cable Routing on Current 851CM and 2851CM Telephone Sets at Exposed Wire Location



TELEPHONE WIRED THROUGH OUTLET BOX

Fig. 31—Cable Routing in Current 851CM and 2851CM Telephone Sets at Prewired Location

TABLE D

POLARITY GUARD CONNECTIONS FOR 2851-TYPE
TELEPHONE SET [819041971 (P-90D197) GUARD
ASSEMBLY]

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	GUARD ASSY	NET.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C

Note: For use when specified by local instructions for end-to-end signaling installations.

TABLE E

2A1 MATRIX BLOCK

LINE		LINE TERM. (LEFT)	STATION TERM. (RIGHT)
1	T	1	1
	R	5	5
2	T	7	7
	R	11	11
3	T	13	13
	R	17	17
4	T	19	19
	R	23	23
5	T	25	25
	R	29	29
6	T	31	31
	R	35	35
7	T	37	37
	R	41	41
8*	T	43	43
	R	47	47

* If more than 8 lines are provided, additional 2A1 matrix blocks are required.