

*Beck*

# STATION SPECIALTIES SERVICE MANUAL

VOLUME I



325-016

OCTOBER 1982

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**STATION  
SPECIALTIES  
SERVICE  
MANUAL  
VOL I**



## Introduction

The practices in this manual provide installation and maintenance information for special apparatus which complements the use of both the Station and Key Telephone Service Manuals. For information not included in this manual, refer to the standard BSP files.

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*\*Trademark of AT&T Co.*



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**870A1 AND 2870A1 "TOUCH-A-MATIC\*" 32 AUTOMATIC DIALER  
IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION  
AND MAINTENANCE**

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†Registered Service Mark of American Telephone and Telegraph Company.

**NOTICE**

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

⚠**Warning:** This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.⚠

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- (a) Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy and may radiate that energy, paragraph 1.01
- (b) Remove information on D-180837 Kit of Parts (never manufactured)
- (c) Change all references to 95B-type power unit to 95B1 power unit
- (d) Add 870B2-108, -109 and 2870B2-108, -109 faceplates.

1.03 These dials are factory-wired as an adjunct dialer to provide manual and automatic rotary



NOTE:  
THE 870A1 DIAL APPEARS THE  
SAME AS THE 2870A1 DIAL EXCEPT  
THAT IT IS EQUIPPED WITH AN  
8-TYPE ROTARY DIAL

Fig. 1—2870A1 Dial

(870A1) or TOUCH-TONE (2870A1) dialing service when interfaced with a multiline or nonmodular telephone set or console. For modular single line application, the 870B1M or 2870B1M dials should be provided.

1.04 These dials are shipped from the factory in the Ivory (-50) housing only. However, housings are available in additional colors per paragraph 2.09.

2. IDENTIFICATION

2.01 These dials provide manual dialing plus automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED scratch pad memory.

A. Design Features

2.02 The following are design features:

- Integrated circuit memory.
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing.
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each.
- Last number manually dialed memory.

- Plug-in battery.
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input).

B. Optional Features

2.03 The following are optional features.

- (a) Decorative Faceplate.
- (b) Speakerphone: These dials interface with telephone sets using either 3B (MD) or 4A speakerphone systems.
- (c) Dial Tone Detector: Automatically starts dialer when precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) is present.
- (d) One-Touch Calling: Depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number.

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) if the call is to be completed automatically.

- (e) D-180818 Kit of Parts provides the following features.
  - (1) Record Disable Only: Turns off recording feature to prevent accidental erasures of

♦TABLE A♦

OPTIONS

OPTION	ADDITIONAL ITEMS REQUIRED	CONNECT 870A1 PER		CONNECT 2870A1 PER	
		FIG.	TABLE	FIG.	TABLE
One-Touch Calling *	D-180493 Kit of Parts	9B, D, E	B	11B, D, E	B
Dial Tone Detector		9B, D		11B, D	
Record Disable Only	D-180818 Kit of Parts †	5	C	5	C
Record Disable and Dial Intermix					

\* Associated telephone set must be equipped with 3B (MD) or 4A speakerphone system.

† Adjunct dial must be equipped with an 870B or 2870B Memory when this kit is provided.

previously stored numbers. No recording possible except for LAST NUMBER DIALED memory which will store digits dialed manually from adjunct dial.

(2) Record Disable and Dial Intermix: Same as record disable feature plus.

(a) Allows digits dialed with manual dial and from memory to be intermixed without having to depress the RECORD OFF button.

(b) Disables the LAST NUMBER DIALED feature.

**2.04** All options are implemented by the following.

- Wiring changes in the applicable dial.
- Wiring changes in the telephone set or console to which the dial is an adjunct.
- Installation of appropriate additional items.

### C. Ordering Guide

**2.05** Either of these dials may be ordered complete and ready to install as:

- Dial, 870A1-50 (rotary service)
- Dial, 2870A1-50 (TOUCH-TONE service).

**2.06** The following must be ordered separately:

- Unit, Power, 95B1 (required for operation of the automatic dialing feature)

**Note:** One power unit is required for each adjunct dial.

- Decorative Faceplate, see paragraph 2.09.

**2.07** The 870A1-50 dial may be ordered in its component parts as follows:

- (a) Housing, Lower, 870ADJ1-50
- (b) Housing, Upper, 870A1U-50
- (c) Faceplate, 870B1-122 (Matte Aluminum)
- (d) 841382575 Dial Base (includes the following):

- Dial, 8EA-119
- 841382880 Line Sensing Printed Wiring Board Assembly
- Cord, Mounting, D10U-87
- Cord, Power, M2SL-87
- Battery, KS-20390L4
- Memory, 870B
- 841382617 Power Supply Printed Wiring Board (PSB) Assembly
- 840393672 Directory Sheet Set
- Booklet, Instruction, Subscriber, SIB-2481B

**2.08** The 2870A1-50 dial may also be ordered in its component parts as follows:

- (a) Housing, Lower, 870ADJ1-50
- (b) Housing, Upper, 870A1U-50
- (c) Faceplate, 2870B1-122 (Matte Aluminum)
- (d) 841381965 Dial Base (includes the following):

- Dial, 35AG3A
- 841382880 Line Sensing Printed Wiring Board Assembly
- Cord, Mounting, D10U-87
- Cord, Power, M2SL-87
- Battery, KS-20390L4
- Memory, 2870B
- 841382385 Power Supply Printed Wiring Board (PSB) Assembly
- 840393672 Directory Sheet Set
- Booklet, Instruction, Subscriber, SIB-2481B.

**2.09** Optional apparatus (order as required) is as follows:

- Housing, Lower, 870ADJ1-(see Note 1)

- Housing, Upper, 870A1U-(see Note 1)
- Faceplate, Decorative, 870B1-(see Note 2), 2870B1-(see Note 2) or 870B2-(see Note 2), 2870B2-(see Note 2)
- Cord, Mounting, D10Y-50 (required when adjunct dial connected to some MET sets and some COM-KEY\* key telephone systems)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling Switch)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix) (see Note 3)

**Note 1:** Color suffix as follows: Black (-03), Green (-51), White (-58), and Light Beige (-60).

**Note 2:** Color suffix as follows: Teak Woodgrain (-108) or Walnut Woodgrain (-109). ♦B2-type is the same as B1-type faceplate except woodgrain runs in the opposite direction. B2-type faceplates are compatible with MET sets and COM KEY 416 key telephone system.♦

**Note 3:** The D-180818 Kit of Parts can only be used on dials equipped with an 870B or 2870B Memory.

#### D. Operating Features

##### 2.10 Operating features (Fig. 1) are as follows.

- Dial.
- 32-button array of low force, low travel nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed from the adjunct dial.
- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp

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and enables the memory circuits to store telephone numbers.

- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) required].

### 3. INSTALLATION

#### STANDARD INSTALLATION

**Warning:** *Do not plug in either battery or power unit until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.*

**3.01** Connect the adjunct dial to the telephone set using the D10U-87 or D10Y-50 mounting cord. Refer to Fig. 6 and 7 for basic interface connections and to Tables D through G for specific connections.

**3.02** The dials are shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery by tilting the adjunct dial up and inserting the battery plug into the mating jack.

**Note:** Write date of battery installation on label provided.

**Danger 1:** *For safety, securely attach retaining clamp, if used, to ac outlet using outlet cover screw BEFORE attempting to install ♦95B1♦ power unit. The power unit and any other cord plugged into the ac outlet should always be unplugged completely from the outlet BEFORE attempting attach or remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use retaining clamp on outlets where the cover*

*mounting screw holds the duplex outlet in the box.*

**Danger 2:** Care should be taken to trim and dress leads connecting to low voltage output terminals of #95B1 power unit to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.

**3.03** Connect the M2SL-87 power cord to the power unit and plug the power unit into an ac outlet not controlled by a switch (continuous ac power is required).

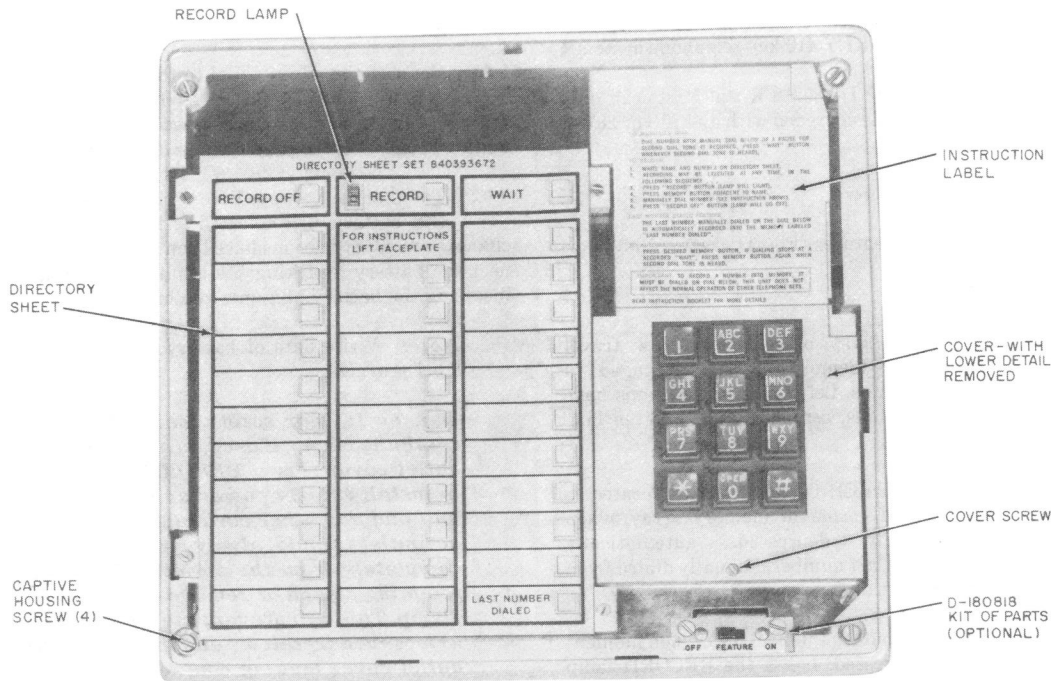
**Note:** The power unit must be located no closer than 1-1/2 feet from the dial in order to prevent a potential noise condition.

**3.04** Directory sheets (Fig. 2) are held in place under the faceplate. Additional sheets are available in directory sheet set.

**Installation Check Procedure**

**870A1 Dial**

**3.05** Check the 870A1 (rotary service) dial as follows.



**Fig. 2—2870A1 Dial, Faceplate Removed**

(1) Check operation of line sensing circuit per the following tests. (Refer to Part 5 for operation.) In case of failure, refer to Table H (Trouble Analysis).

- (a) With telephone handset on-hook, momentarily depress RECORD button. RECORD lamp should light.
  - (b) Lift telephone handset off-hook. RECORD lamp should be extinguished.
- (2) Using the telephone set dial, manually dial a known number to check that the telephone set operates correctly.
- (3) For the adjunct dial, perform dial speed test as follows.
- (a) Obtain dial tone.
  - (b) Dial code number for dial speed test.
  - (c) After dial tone is heard again, manually dial digit 0. One of the following audible signals will indicate how the dial meets the requirements of the test.
    - (1) Audible ringback: dial speed satisfactory.
    - (2) Rapidly interrupted dial tone: dial speed fast.
    - (3) Slowly interrupted dial tone: dial speed slow.
- (4) With the telephone handset on-hook, use the dial on the adjunct to record known telephone numbers, storing consecutive digits of the numbers in sequential memory locations. Fill all memory locations except LAST NUMBER DIALED and the location immediately above it [paragraph 5.01 (4) through (7)].
- (5) Automatically dial the telephone numbers stored in Step (4) by momentarily depressing the memory buttons in the same sequence in which the digits were recorded. Verify that the digits thus dialed produce the expected telephone numbers.
- (6) Go off-hook and use the dial on the adjunct to record a known telephone number into mem-

ory location immediately above LAST NUMBER DIALED location [paragraph 5.01 (4) through (7)].

- (7) Momentarily hang up handset and then automatically dial the number recorded in Step (6).
- (8) Go off-hook and from the adjunct, manually dial a known telephone number.

**Note:** If a pause for second dial tone is required, dial the access digit(s). After the RECORD lamp relights, depress the WAIT button then dial the telephone number.

- (9) Momentarily hang up handset and then automatically redial the number [dialed in Step (8)] by depressing the LAST NUMBER DIALED button.

**Note:** The dial should stop dialing if it reaches a stored WAIT input. Depress the LAST NUMBER DIALED button again and the remaining digits should be dialed.



**The battery and power unit must be connected a minimum of five minutes before doing Step (10).**

- (10) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, momentarily depress memory buttons in same sequence in which digits were recorded in Step (4). Verify that the correct telephone number is dialed.
- (11) Dial the appropriate code for ring-back to test the telephone set ringer.
- (12) If equipped with one-touch calling option, (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (6). The speakerphone should turn on, dial tone should automatically be detected, and the stored number should be automatically dialed.

### **2870A1 Dial**

**3.06** Check the 2870A1 (TOUCH-TONE service) dial as follows.

- (1) Check operation of the line sensing circuit per the following tests. (Refer to Part 5 for opera-



tion.) In case of failure, refer to Table I (Trouble Analysis).

- (a) With the telephone handset on-hook, momentarily depress the RECORD button. RECORD lamp should light.
  - (b) Lift telephone handset. RECORD lamp should be extinguished.
- (2) Using the telephone set dial, manually dial a known number to check that telephone set operates correctly.
  - (3) With the telephone handset on-hook, use the dial on the adjunct to record digits 1 through 0 in consecutive memory locations, storing one digit per memory. Fill all memory locations except LAST NUMBER DIALED and the memory location immediately above it [paragraph 5.01 (4) through (7)].
  - (4) Lift handset off-hook and record CO dial test and ringer circuit number into memory location immediately above LAST NUMBER DIALED location [paragraph 5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.
  - (5) Momentarily hang up handset and then automatically redial the test circuit number recorded in Step (4) by depressing button immediately above LAST NUMBER DIALED button and proceed as follows:
    - (a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into test circuit. Verify that correct signal is returned from test circuit.
    - (b) Momentarily depress the memory buttons used in Step (3) in the same sequence in which the digits were recorded. Verify that the correct signal is returned from the test circuit.



**The battery and power unit must be connected a minimum of five minutes before doing Step (c).**

- (c) Disconnect the power unit from the ac outlet. With the handset off-hook and using the

telephone set dial, manually dial a known number to check that the telephone set operates correctly.

**Note:** With ac power removed, the adjunct dial is inoperative.

- (6) Reconnect the power unit, momentarily depress the LAST NUMBER DIALED button. Verify that the number dialed is the same as that recorded in Step (4).
- (7) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with the telephone set in on-hook condition, depress the memory button previously used in Step (4). The speakerphone should turn on, dial tone should automatically be detected, and the stored number should be automatically dialed.

#### OPTIONAL APPARATUS INSTALLATION

##### A. D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)

##### 3.07 Install as follows.

- (1) Remove the housing (paragraph 3.11) and access PSB terminal board (paragraph 3.09).
- (2) Insert the dial tone detector board assembly from the back of the dial, such that the two tabs on the board assembly fit into the slots in the chassis (Fig. 3).
- (3) Insert the self-threading screw through the side of the chassis to secure the board in position.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If the switch for D-180818 Kit of Parts is already present, the one-touch calling switch cannot be installed. The terminals on the PSB to which the one-touch switch should have been connected (Table B) shall be strapped together. (The one-touch calling option can no longer be disabled by the subscriber.)

- (5) Connect per Table B.
- (6) Break off the detail at the bottom of the cover (Fig. 4) and trim edge as required.

(7) Verify correct operation of option.

(8) Reassemble.

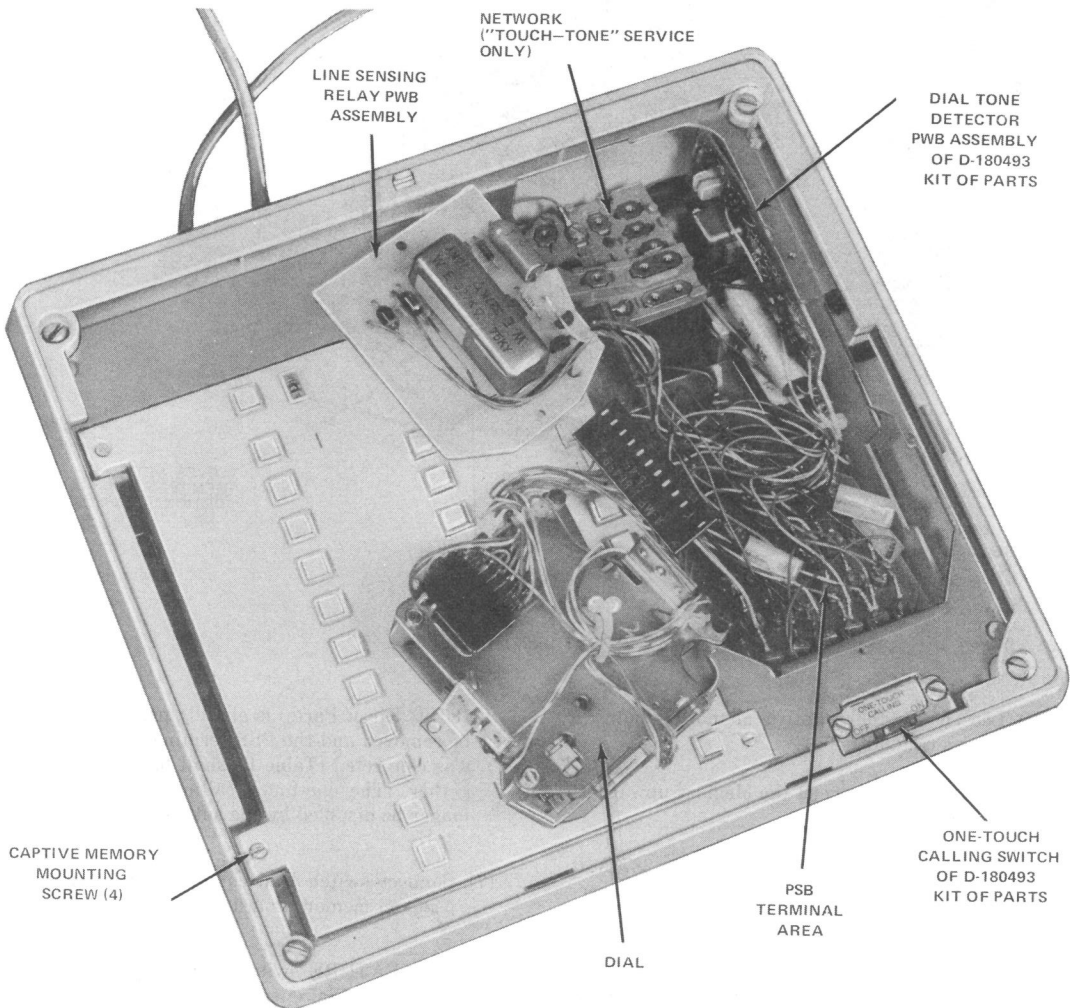
**B. D-180818 Kit of Parts (Record Disable and Dial Inter-mix Feature)**

**3.08** Install as follows.

(1) Remove faceplate (paragraph 3.10).

(2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover (Fig. 2).

(3) Disengage dial from chassis (paragraph 6.05 or 6.06).



**Fig. 3—2870A1 Dial, Dial and Memory Removed to Show Terminal Area**

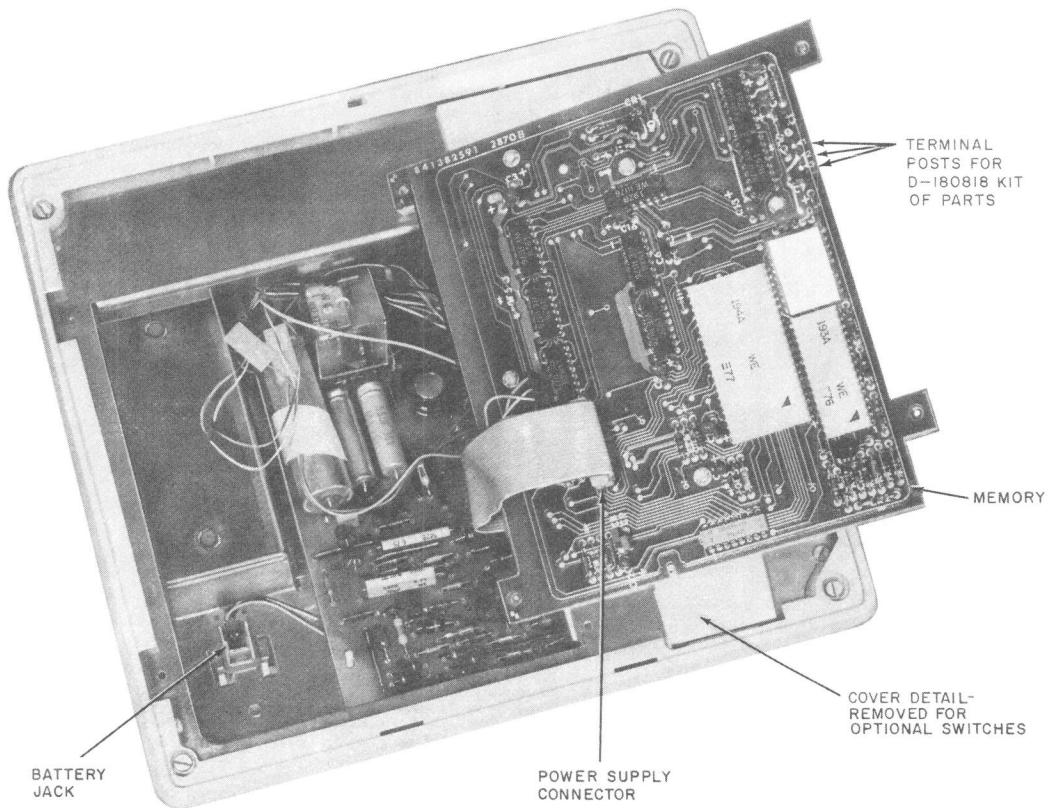


Fig. 4—2870A1 Dial, Internal View

- (4) Loosen the four captive Memory mounting screws (Fig. 3).
- (5) Rotate the left edge of the Memory upward as shown in Fig. 4.

**Note:** If existing memory is 870A or 2870A, it must be replaced with 870B or 2870B, respectively. Carefully repack existing memory to ensure recovery.

- (6) Mount switch below dial with the two screws provided.

**Note:** If the one-touch calling switch (D-

180493 Kit of Parts) is already present it shall be removed and the PSB terminals to which it was connected (Table B) shall be strapped together. (The one-touch calling option can no longer be disabled by the subscriber.)

- (7) Connect switch lead connectors to terminal posts on memory board per Table C.
- (8) Set FEATURE switch to OFF position and verify that dial operates in normal manner.

- Numbers can be recorded into memory

TABLE B

## CONNECTIONS FOR DIAL TONE DETECTOR ONLY AND ONE-TOUCH CALLING (NOTE)

APPARATUS		LEAD		ON 870A1 DIAL			ON 2870A1 DIAL		
				REMOVE FROM PSB	CONNECT TO PSB TERM. FOR		REMOVE FROM PSB	CONNECT TO PSB TERM. FOR	
		DESIG	COLOR		DIAL TONE DETECTOR ONLY†	ONE-TOUCH CALLING		DIAL TONE DETECTOR ONLY†	ONE-TOUCH CALLING
870A1 or 2870A1 Dial Adjunct		Strap	BK	11	*	*	19	*	*
		Strap	BK	20§	—	*	26	*	*
		Strap	BK	23	*	*	29§	—	*
D-180493 Kit of Parts	Dial Tone Detector	Input	G-R		2	2		16	16
		PB	O-BK		7	7		9	9
		Input	G-R		16	16		17	17
		DT	O-Y		11	11		19	19
		LK	Y-G		*	13		*	33
		VDD	R-O		17	17		21	21
		SPR	Y-BL		*	18		*	27
		DR	Y-O		19	19		24	24
		COM	BK-O		20	20		29	29
		SPO	G-Y		*	21		*	34
		PL	O-R		22	22		25	25
		DTT	BL-Y		23	23		26	26
	Switch ‡	S1	S	*	15	*	28		
		S2	S	*	20	*	29		

Note: For connection of D10U-87 or D10Y-50 cord at telephone set end, refer to Tables D through G.

\* Insulate and store.

† When dial tone detector only is provided, first dial tone may or may not be precise (350 Hz and 440 Hz) but all subsequent dial tones must be precise.

‡ Switch is required for one-touch calling option only (dial tone detector and speakerphone) and all dial tones must be precise (350 Hz and 440 Hz).

§ Do not remove from PSB when dial tone detector only is provided.

- Numbers can be deleted or changed in memory
  - Numbers can be automatically dialed.
- (9) Set FEATURE switch to ON position and verify feature provided.
- (a) For record disable only feature.
- (1) Record lamp will not light when RECORD button is depressed.
- (2) No telephone numbers can be recorded, deleted, or changed in memory.
- (3) LAST NUMBER DIALED feature still operative.
- (b) For record disable and dial intermix features.
- (1) Record lamp will not light when RECORD button is depressed.

- (2) No telephone numbers can be recorded, deleted, or changed in memory.
  - (3) Manually and automatically dialed digits may be intermixed. (Depression of RECORD OFF button not required.)
  - (4) LAST NUMBER DIALED feature disabled.
- (10) Reassemble adjunct dial.

#### COMPONENT LOCATION AND ACCESS INFORMATION

**Danger:** When it is necessary to access component parts of terminal areas, ac power must be disconnected.

#### A. Power Supply Board (PSB) Terminals

**3.09** To access the terminal field on the power supply board, proceed as follows.

- (1) Disconnect power unit from ac outlet.
- (2) Remove the faceplate (paragraph 3.10).
- (3) Loosen the captive cover screw at the bottom of the cover around the dial (Fig. 2).
- (4) Remove the cover.
- (5) Loosen the two captive dial mounting screws.

**Note:** On units with metal dial brackets, the screws will have to be removed.

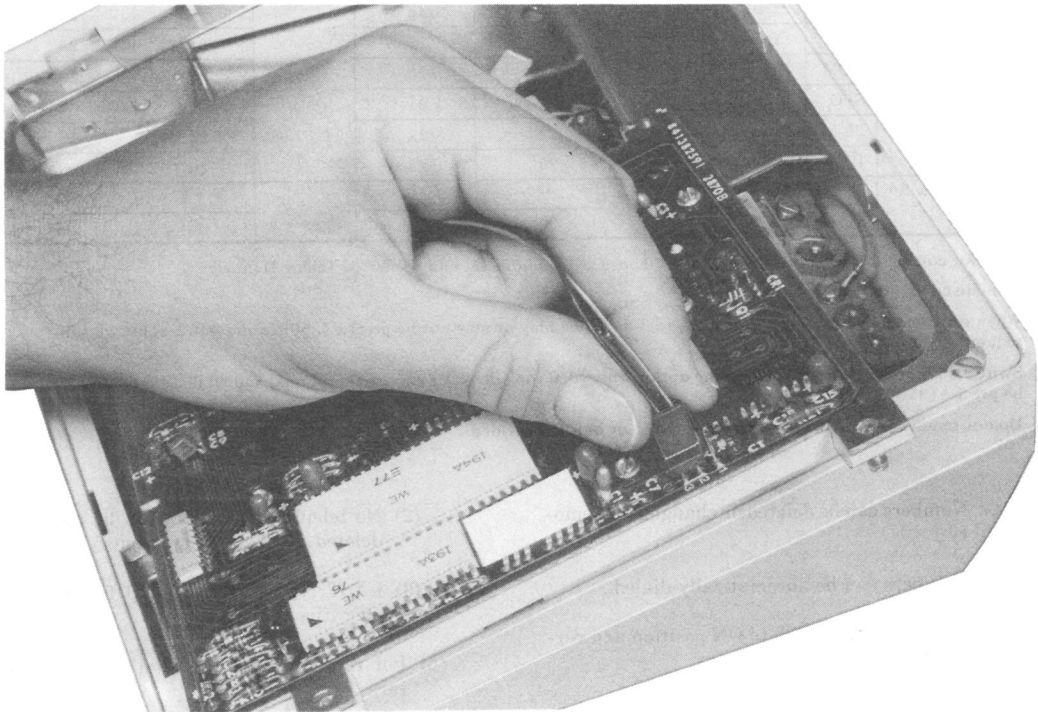


Fig. 5—2870A1 Dial, Connection of D-180818 Kit of Parts, Record Disable Feature Only

TABLE C

## CONNECTIONS FOR D-180818 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX (NOTE 2)
WDC	BK†	*	1
VDD	R	2	2
RCD	BK	3	3

*Notes:*

1. There are connectors attached to the switch leads, a single pin connector with a (BK) lead and a double pin connector with a (R) and (BK) lead.
2. When this option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

\* Insulate and store.

† Single pin connector.

(6) On the 870A1 dial, place the 8-type dial aside to gain access to some of the PSB terminals. On the 2870A1 dial, carefully disengage the connector of the 35-type dial and rotate the dial onto the memory button field (Fig. 3).

(7) Remove the two mounting screws for the Line Sensing Relay Board and place the board assembly aside to access the remaining terminals on the PSB.

(8) To reassemble, reverse this procedure.

#### B. Faceplate Removal

3.10 To remove, proceed as follows.

(a) Remove 870B1, 870B2, 2870B1, or 2870B2 faceplate as follows.

(1) The B1 or B2 faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

(b) Remove 870A2 (MD) or 2870A2 (MD) faceplate as follows.

(1) For those adjunct dials equipped with a 870A2-87 or 2870A2-87 faceplate, it is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edge and lift off.

**Note:** The B1 or B2 faceplate is not a direct replacement for the A2 faceplate described since an 870A1U upper housing is also required (paragraph 6.08).

#### C. Housing Removal

3.11 To remove, proceed as follows.

(a) Remove lower housing as follows.

(1) Remove the faceplate (paragraph 3.10).

(2) Disengage the captive housing screws (Fig. 2). One is located in each of the four corners of the chassis.

(3) Separate the housing from the adjunct dial base while feeding the two cords through hole in bottom of housing.

(4) Before replacing the housing, lift the adjunct to check that the shoulders of the battery jack are against the two chassis tabs. Misalignment may cause the bottom of the housing to bow.

(b) Remove upper housing as follows.

(1) Remove the faceplate (paragraph 3.10).

(2) Disengage the captive housing screws. One is located in each of the four corners of the upper housing (Fig. 2).

(3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.

**Note:** If the upper housing is being replaced, it will be necessary to remove the housing screws.

(4) To reassemble, reverse procedure.

#### 4. CONNECTIONS

**4.01** Typical interface connections for the basic 870A1 and 2870A1 dials are shown in Fig. 6.

**4.02** Typical interface connections for the 870A1 and 2870A1 dials to provide the one-touch calling feature are shown in Fig. 7.

**4.03** Connections for the adjunct dial to a selected variety of telephone sets and consoles may be found in the following tables:

- Table D—870A1 Dial Connections to Telephones
- Table E—2870A1 Dial Connections to Telephones
- Table F—870A1 Dial Connections to Consoles
- Table G—2870A1 Dial Connections to Consoles.

**4.04** Refer to Table A for connection references for all options.

**4.05** Adjunct dial connections are shown in Fig. 9 for the 870A1 dial and in Fig. 11 for the 2870A1 dial.

**4.06** Partial functional schematics are shown in Fig. 10 for the 870A1 dial and in Fig. 12 for the 2870A1 dial.

#### 5. OPERATION

##### A. Record a Number Into Memory

**Note:** If equipped with the D-180818 Kit of Parts, switch must be in the OFF position.

**5.01** To record, only the dial of the adjunct may be used. Digits manually dialed on the associated telephone set will not be recorded into memory.

(1) Remove the faceplate (paragraph 3.10).

(2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.

(3) Replace the directory sheet and faceplate.

(4) Depress the RECORD button. The RECORD lamp will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

(5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.

(6) Using the adjunct dial, manually dial the desired telephone number.

**Note:** If an access code and pause for second dial tone is required, perform Steps (a) through (c).

(a) Dial the access digit(s).

(b) After the RECORD lamp lights, push the WAIT button. (The WAIT entry counts as one digit.)

(c) Using the adjunct dial, manually dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out

momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer will also be reset by a switchhook or speakerphone operation.

#### B. Change a Number In Memory

**Note:** If equipped with the D-180818 Kit of Parts, switch must be in the OFF position.

- 5.02 Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

#### C. Delete a Number From Memory

**Note:** If equipped with the D-180818 Kit of Parts, switch must be in the OFF position.

- 5.03 To delete a number, proceed as follows.

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

#### D. Automatically Dial a Number From Memory

- 5.04 To automatically dial a number, proceed as follows.

- (1) Go off-hook on the telephone set, listen for dial tone, and depress the desired memory button. If WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress memory button again to complete automatic dialing.
- (2) If the adjunct dial is equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the memory button.
- (3) If the adjunct dial is wired to provide the one-touch calling feature (telephone set is

equipped with speakerphone, and adjunct dial equipped with dial tone detector), simply depress the memory button.

#### E. LAST NUMBER DIALED Feature

**Note:** If equipped with the D-180818 Kit of Parts, and dial intermix feature is provided, switch must be in the OFF position.

- 5.05 The adjunct dial automatically records into the LAST NUMBER DIALED position (Fig. 1) any number called using the dial of the adjunct. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

- 5.06 Operation of LAST NUMBER DIALED feature is as follows.

- (a) If no access digit(s) are required, proceed as follows:
  - (1) Go off-hook on the telephone set
  - (2) Listen for dial tone
  - (3) Manually dial telephone number using the adjunct dial
  - (4) To redial same number automatically, go off-hook on telephone set, listen for dial tone, and depress LAST NUMBER DIALED button.
- (b) If an access code and pause for second dial tone is required, proceed as follows:
  - (1) Go off-hook on the telephone set
  - (2) Listen for dial tone
  - (3) Dial access digit(s) using adjunct dial
  - (4) After second dial tone is heard depress WAIT button
  - (5) Manually dial telephone number using adjunct dial
  - (6) To redial same number automatically, go off-hook, listen for dial tone, and depress



LAST NUMBER DIALED button. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.

#### F. End-to-End Signaling (2870A1 Only)

**5.07** For end-to-end signaling (such as data transmission), the 2870A1 dial has the capability to intermix manual and automatic dialing.

**5.08** If the one-touch calling option is provided, the initial number must be dialed automatically (even if the one-touch switch is in the OFF position). This allows the dial tone detector to complete its function. Additional numbers may then be dialed automatically or manually if desired.

(a) **Standard Operation:** If at any time, digit(s) are keyed manually using the 2870A1 dial, the RECORD OFF button must be depressed before additional digits can be dialed automatically from memory. (The RECORD lamp will not light at any time but depressing the RECORD OFF button will remove the dial from the LAST NUMBER DIALED mode to allow additional automatic dialing.)

(b) **Dial Intermix Mode (with D-180818 Kit of Parts):** Manually and automatically dialed digits may be intermixed as desired when the FEATURE switch is in the ON position.

**Note:** In this mode, the RECORD button and the LAST NUMBER DIALED feature are inoperative.

## 6. MAINTENANCE

**6.01** In case of power failure, the adjunct dial is inoperative. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

### A. Trouble Analysis

**6.02** When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm improper operation either as a basic dial or as an automatic dialer (Part 5).
- (2) Check connections.

(3) Refer to Trouble Analysis Table H (870A1) or Table I (2870A1).

(4) If removal of adjunct dial is required, proceed as follows.

- (a) Disconnect power unit from ac outlet and unplug battery.
- (b) Disconnect adjunct dial.

**Warning: Failure to restrain plug can result in plug damage requiring battery replacement.**

(c) Place battery plug sideways into housing slot below battery pack and tape into place.

### B. Battery

**6.03** The battery has an expected life of about 4 years. It can be replaced without loss of stored numbers provided that commercial ac power to the dial is continuously maintained. To replace the battery, proceed as follows:

- (1) Tilt the front of the dial adjunct up
- (2) Unplug the battery
- (3) Loosen captive screw on the battery support
- (4) Remove battery support
- (5) Remove battery
- (6) Install and check new battery (paragraph 3.05 or 3.06).

### C. Memory

**6.04** The memory may be replaced in the following manner.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of the memory or ac and battery power results in loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.10).
- (3) Loosen the four captive memory mounting screws (Fig. 3).

- (4) Rotate the left edge of the memory upward as shown in Fig. 4.
- (5) Disengage the connector(s) by pulling them perpendicular to the printed wiring board.
- (6) Replace the memory by engaging the dial connector (2870A1 only) first. The connector(s) are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply cable should not be twisted.
- (7) Reassemble dial.
- (8) Reconnect battery and power unit.
- (9) Test per paragraph 3.05 or 3.06 as required.
- (10) Reprogram memory (see Part 5).

#### D. Dial

##### 6.05 Replace rotary dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove faceplate (paragraph 3.10).
- (3) Loosen the captive screw at bottom of the cover around the dial and remove the cover.
- (4) Remove the two dial mounting screws and set dial aside.
- (5) Remove dial leads from terminals on PSB.
- (6) Remove dial.
- (7) Reverse procedure to replace dial.
- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

##### 6.06 Replace TOUCH-TONE\* telephone dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

\*Trademark of American Telephone and Telegraph Company.

- (2) Remove faceplate (paragraph 3.10).
- (3) Loosen the captive screw at bottom of the cover around the dial and remove the cover.
- (4) Disengage the two dial mounting screws.

**Note:** On early units, with metal dial brackets, the screws will have to be removed.

- (5) Disengage the four captive memory mounting screws (Fig. 3).
- (6) Gently raise the memory to a position that permits access to the dial connector.
- (7) Disengage the dial connector by carefully pulling on it perpendicular to the printed wiring board.
- (8) Disengage the second dial connector from the power supply printed wiring board.
- (9) Lift the dial out.
- (10) To replace with a new dial, reverse the previous steps. The connectors are keyed to orient them relative to the pins. Observe the correct orientation and do not force the connection.
- (11) Reconnect battery and power unit.
- (12) Reprogram memory, see Part 5.

#### E. Line Sensing Relay Printed Wiring Board Assembly

##### 6.07 Replace as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in the loss of stored numbers.

- (2) Remove faceplate (paragraph 3.10).
- (3) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (4) Remove the two dial mounting screws (870A1) or disengage (2870A1).
- (5) Place the dial aside to gain access to the PSB terminals.

- (6) Remove the two mounting screws for the Line Sensing Relay Board and move the board assembly to one side.
- (7) Disconnect the leads of the Line Sensing Relay Board from associated terminals on the PSB, and remove the board assembly.
- (8) Connect the leads of the replacement Line Sensing Relay Board to the appropriate terminals on the PSB (Fig. 9B and 9C for the 870A1 dial or Fig. 11B and 11C for the 2870A1 dial).
- (9) Reassemble adjunct dial.
- (10) Reconnect battery and power unit.
- (11) Reprogram memory, see Part 5.

**F. Faceplate (conversion from 870A2 or 2870A2 to 870B1 or 2870B1)**

**6.08** Replace an 870A2-87 or 2870A2-87 faceplate with an 870B1-87 or 2870B1-87 faceplate as follows.

- (1) Remove the A2 faceplate by lifting up on any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U upper housing to the chassis and 870ADJ housing. The three parts should be held tightly together as the screws are driven.
- (4) Place the two tabs located along the lower edge of the B1 faceplate in the notches in the lower side of the 870A1U upper housing.
- (5) Lower the faceplate to rest on the memory. The spring clip located in the center of the upper side of the upper housing should retain the faceplate.

**TABLE D**  
**CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET**

TEL SET	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO§§	LEAD COLOR	REMOVE FROM	CONNECT TO¶¶
565HK, HKM	G	Net. F	Spare 1	G, G-V	9	Spare 2
564HL, HLM	G	Net. F	Spare 1	G	9	Spare 2
630DA, DAM	(2) G	Net. F	Spare 1	G§§§	13	Spare 2
631DA, 631DAM	(2) G	Net. F	Spare 1	G§§§	13	Spare 2
634DA, DAM	W-BL	Net. F	Spare 1	BL-W§§§	13	Spare 2
635DA, DAM	W-BL	Net. F	Spare 1	BL-W§§§	13	Spare 2
636CA, CAM	(2) G	Net. F	Spare 1	W-BL	13	Spare 2
637DA, DAM	(2) G	Net. F	Spare 1	W-BL	13	Spare 2
830CM†	G††	8	Spare 1	R	6	Spare 2
830CM‡	G	16	Spare 1	R	6	Spare 2
830CM§	G	Net. F	Spare 1	R	6	Spare 2
830DM†,‡	G††	8	Spare 1	R	3	Spare 2
830DM§	G	Net. F	Spare 1	R	3	Spare 2
831CM†	(2) G††	8	Spare 1	(2) R	6	Spare 2
831CM‡	(2) G	16	Spare 1	(2) R	6	Spare 2
831CM§	(2) G	Net. F	Spare 1	(2) R	6	Spare 2
831DM†,‡,¶	(2) G††	8	Spare 1	G	6	Spare 2
831DM§,¶	(2) G	Net. F	Spare 1	G	6	Spare 2
832-Type¶	G	22	Spare 1	R	4	Spare 2
833-Type¶	(2) G	22	Spare 1	(2) R	4	Spare 2
851B 851BT 851BM	G	Net. F	Spare 1	R	13	Spare 2
851CM	G	2***	Spare 1	R	13	Spare 2
852A 852AM	G	4†††	Spare 1	R	1	Spare 2
870A1M	W-BL	TB1 8	TB1 15	BL-W	TB1 4	TB1 16
870A2M	G	TB1 8	TB1 15	R	TB1 4	TB1 16
870A1 Dial‡‡	W-O	26	27	O-W	9	Spare 1
872A1M	G	TB1 8	TB1 15	R	PSB 9	Net. G

TABLE D (Contd)

## CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	T1	LR	R1	M1	M2	LK	SPO	P3	P4
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S
Spare 1	Net. F	9	Spare 2	Net. R	Net. GN	Net. L1	See Fig. 8	8	7
Spare 1	Net. F	9	Spare 2	Net. R	Net. GN	*		*	*
Spare 1	Net. F	13	Spare 2	Net. R	Net. GN	4		9	14
Spare 1	Net. F	13	Spare 2	Net. R	Net. GN	4		9	14
Spare 1	Net. F	Spare 2	13	Net. R	Net. GN	4		14	9
Spare 1	Net. F	Spare 2	13	Net. R	Net. GN	4		14	9
Spare 1	Net. F	Spare 2	13	Net. R	Net. GN	*		*	*
Spare 1	Net. F	Spare 2	13	Net. R	Net. GN	*		*	*
Spare 1	8	Spare 2	6	Net. R	Net. GN	29		30	24
Spare 1	16	Spare 2	6	Net. R	Net. GN	29		30	24
Spare 1	Net. F	Spare 2	6	Net. R	Net. GN	29		30	24
Spare 1	8	Spare 2	3	Net. R	Net. GN	29		30	24
Spare 1	Net. F	Spare 2	3	Net. R	Net. GN	29		30	24
Spare 1	8	Spare 2	6	Net. R	Net. GN	29		30	24
Spare 1	16	Spare 2	6	Net. R	Net. GN	29		30	24
Spare 1	Net. F	Spare 2	6	Net. R	Net. GN	29		30	24
Spare 1	8	6	Spare 2	Net. R	Net. GN	29		30	24
Spare 1	Net. F	6	Spare 2	Net. R	Net. GN	29		30	24
Spare 1	22	Spare 2	4	Net. R	Net. GN	29		30	24
Spare 1	22	Spare 2	4	Net. R	Net. GN	29		30	24
Spare 1	Net. F	Spare 2	13	Net. R	Net. GN	Net. L1	15	17	
Spare 1	2***	Spare 2	13	Net. R	Net. GN	20	15	17	
Spare 1	4†††	Spare 2	1	Net. R	Net. GN	10	†††	†††	
TB1 15	TB1 8	TB1 16	TB1 4	Net. R	Net. GN	PSB 27	PSB 21	PSB 3	PSB 6
TB1 15	TB1 8	TB1 16	TB1 4	Net. R	Net. GN	PSB 27	PSB 21	PSB 3	PSB 6
PSB 26	PSB 27	PSB 9	Spare 1	PSB 1	PSB 8	PSB 13	PSB 21	PSB 3	PSB 6
TB1 15	TB1 8	Net. G	PSB 9	Net. R	Net. GN	PSB 13	PSB 21	PSB 3	PSB 6

TABLE D (Contd)

## CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

TEL SET	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO§§	LEAD COLOR	REMOVE FROM	CONNECT TO§§§
960A01M	G	PSB-7	PSB-14	R	PSB-6	PSB-19
981-Type**	Remove Shorting Bars					
983-Type**						

TABLE D (Contd)

## CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	T1	LR	R1	M1	M2	LK	SPO	P3	P4
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S
PSB-14	PSB-7	PSB-19	PSB-6	PSB-8	PSB-20	*	*	*	*
Plug D10Y cord into set									

\* Insulate and store.

† Manufactured after 2-77 with new line switch (new line switch is identified by two additional blue leads).

‡ Manufactured prior to 2-77 with new line switch.

§ Manufactured prior to 2-77 with old line switch (old line switch has no blue leads).

¶ Only CO lines can be dialed from adjunct dial (no intercom lines).

\*\* Replace the D10U-87 cord in the 870A1 dial with a D10Y-50 cord, observing same color code.

†† From line key.

‡‡ Each adjunct dial adds 1 db loss to the loop. 20 ma loop current is required for proper operation of unit.

§§ Spare "1s" use same spare terminal or D-161488 connector in telephone set.

¶¶ Spare "2s" use same spare terminal or D-161488 connector in telephone set.

\*\*\* Network F when using 4A speakerphone.

††† Common tip lead from line key. Located on terminal 2 in 852AM sets manufactured before 3-4-77

‡‡‡ Connect to same terminals as P3 and P4 leads from 4A speakerphone.

§§§ If speakerphone is provided, speakerphone lead designated R1 must also be moved from 13 to spare 2.

TABLE E

## CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

TEL SET	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO**	LEAD COLOR	REMOVE FROM	CONNECT TO***
2565HK, 2565HKM	G††	Net. L2	Spare 1	G, G-V	9	Spare 2
2630DA 2630DAM	G‡‡	12	Spare 1	G§§§	13	Spare 2
2631DA, 2631DAM	G‡‡	12	Spare 1	G§§§	13	Spare 2
2634DA 2634DAM	W-BL	Net. L2	Spare 1	BL-W§§§§	13	Spare 2
2635DA 2635DAM	W-BL	Net. L2	Spare 1	BL-W§§§§	13	Spare 2
2636CA, CAM	G‡‡	12	Spare 1	BL-W	9	Spare 2
2637DA, DAM	G‡‡	12	Spare 1	BL-W	9	Spare 2
2830CM†	G††	8	Spare 1	R	6	Spare 2
2830CM‡	G††	16	Spare 1	R	6	Spare 2
2830CM§	G††	8	Spare 1	R	6	Spare 2
2830DM†,‡	G††	8	Spare 1	R	3	Spare 2
2830DM§	G††	8	Spare 1	R	3	Spare 2
2831CM†	(2) G††	8	Spare 1	(2) R	6	Spare 2
2831CM‡	(2) G††	16	Spare 1	(2) R	6	Spare 2
2831CM§	(2) G††	8	Spare 1	(2) R	6	Spare 2
2831DM†,‡,§	(2) G††	8	Spare 1	(2) R	3	Spare 2
2831DM§,§	(2) G††	8	Spare 1	(2) R	3	Spare 2
2833-Type¶	G	22	Spare 1	R	4	Spare 2
2833-Type¶	(2) G	22	Spare 1	(2) R	4	Spare 2
2851B, 2851BT, 2851BM	G	20†††	Spare 1	R	13	Spare 2
2851CM	G	2‡‡‡	Spare 1	R	13	Spare 2
2852A, 2852AM	G	4§§§	Spare 1	R	1	Spare 2
2870A1M	W-BL	TB1 8	TB1 11	BL-W	TB1 4	TB1 12
2870A2M	G	TB1 8	TB1 11	R	TB1 4	TB1 12
2870A1 Dial§§	W-O	PSB-2	Net. G	O-W	PSB-11	Net. L1
2872A1M, 2872A2M	G	TB1 8	TB1-15	R	PSB-12	Net. G
2960A01M	G	PSB-7	PSB-14	R	PSB-6	PSB-19
2981-Type**	Remove Shorting Bars					
2983-Type**						



TABLE E (Contd)

## CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

D10Y-87 CORD (FROM ADJUNCT DIAL)												
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH						
LT	T1	LR	R1	A1	AG	LK	SPO	SPARE				
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S			
Spare 1	Net. L2	9	Spare 2	1B	N	Net. L1	See Fig. 8					
12	Spare 1	13	Spare 2	8	7	4						
12	Spare 1	13	Spare 2	8	7	4						
Spare 1	Net. L2	Spare 2	13	10	56	4						
Spare 1	Net. L2	Spare 2	13	10	56	4						
12	Spare 1	9	Spare 2	8	7	*						
12	Spare 1	9	Spare 2	8	7	*						
Spare 1	8	Spare 2	6	10	22	29						
Spare 1	16	Spare 2	6	10	22	*						
Spare 1	8	Spare 2	6	10	22	29						
Spare 1	8	Spare 2	3	10	22	29						
Spare 1	8	Spare 2	3	10	22	29						
Spare 1	8	Spare 2	6	10	22	29						
Spare 1	16	Spare 2	6	10	22	29						
Spare 1	8	Spare 2	6	10	22	29						
Spare 1	8	Spare 2	3	10	22	29						
Spare 1	8	Spare 2	3	10	22	29						
Spare 1	22	Spare 2	4	10	8	29						
Spare 1	22	Spare 2	4	10	8	29						
Spare 1	20	Spare 2	13	4	3	Net. L1						
Spare 1	2###	Spare 2	13	4	3	20						
Spare 1	4\$\$\$	Spare 2	1	3	11	10						
TB1 11	TB1 8	TB1 12	TB1 4	TB1 2	TB1 1	PSB-17				PSB-34		
TB1 11	TB1 8	TB1 12	TB1 4	TB1 2	TB1 1	PSB-17				PSB-34		
PSB-2	Net. G	PSB-11	Net. L1	PSB-1	PSB-32	PSB-33				PSB-34		
TB1 15	TB1 8	Net. G	PSB-12	TB1 12	Net. L2****	PSB-17				PSB-34		
PSB-14	PSB-7	PSB-19	PSB-6	PSB-5	PSB-9	*				*		

Plug D10Y cord into set

TABLE E (Contd)

## CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

TEL SET	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO**	LEAD COLOR	REMOVE FROM	CONNECT TO***
2991A**	0	54	*	G-Y	7	6
2991C**		Remove Shorting Bars				
2992A	0	54	*	G-Y	7	6
2992C**		Remove Shorting Bars				
2993A	0	54	*	G-Y	7	6
2993C**		Remove Shorting Bars				
2994C**						

TABLE E (Contd)

CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	T1	LR	R1	A1	AG	LK	SPO	SPARE	
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S
54	38	7	6	*	*	27	Fig. 8	*	*
Plug D10Y cord into set									
54	38	7	6	*	*	27	Fig. 8	*	*
Plug D10Y cord into set									
54	38	7	6	*	*	27	Fig. 8	*	*
Plug D10Y cord into set									

- \* Insulate and store.
- † Manufactured after 2-77 with new line switch (new line switch is identified by two additional blue leads).
- ‡ Manufactured prior to 2-77 with new line switch.
- § Manufactured prior to 2-77 with old line switch (old line switch has no blue leads).
- ¶ Only CO lines can be dialed from adjunct dial (no intercom lines).
- \*\* Replace the D10U-87 cord in the 2870A1 dial with a D10Y-50 cord, observing same color code.
- †† From line key.
- ‡‡ From dial.
- §§ Each adjunct dial adds 1 db loss to the loop. 20 ma loop current is required for proper operation of unit.
- ¶¶ Spare "1s" use same spare terminal or D-161488 connector in telephone set.
- \*\*\* Spare "2s" use same spare terminal or D-161488 connector in telephone set.
- ††† Common tip lead from line key.
- ‡‡‡ Common tip lead from line key. Terminal 1 when using 4A speakerphone.
- §§§ Common tip lead from line key. On terminal 2 in 2852AM sets manufactured before 3-4-77.
- ¶¶¶ If speakerphone is provided, speakerphone lead designated R1 must also be moved from 13 to spare 2.
- \*\*\*\* Network terminal F in early telephone sets.

**TABLE F**  
**CONNECTIONS FOR 870A1 DIAL TO TELEPHONE CONSOLE (NOTE 1)**

TEL CONSOLE (NOTE 7)	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO †	LEAD COLOR	REMOVE FROM	CONNECT TO ‡
3, 4-Type	O-BK	Net. F	Spare 1	G-R	Net. C	Spare 2
10, 11-Type	BL	2	Spare 1	BK-BL	4	Spare 2
14A1, 14A3	BK	Net. RR	Spare 1	W	Net. C	Spare 2
15A1, 15A3	BK	Net. RR	Spare 1	W	Net. C	Spare 2
22A3R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
23A2R, 23A9R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
24A8R, 24B8R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
29A2R, 29B2R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
32A3R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
34A5R, 34B5R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
43A5R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
53A5R, 53A9R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
53B5R, 53B9R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
53C5R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
54A8R, 54B8R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
63B5R, 63B9R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
83B5R, 83B9R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
83C5R	BK	Net. RR	Spare 1	S	Net. C	Spare 2
128A3R, 128A4R	G	42 §	Spare 1	R	4	Spare 2
138A4R	G	42 §	Spare 1	R	4	Spare 2
21-Type	Not Compatible					
41-Type						
45-Type						
51-Type						
DIMENSION® PBX						

**Notes:**

1. The following changes shall be made in the 870A1 dial in addition to connections shown in table.
  - (a) Remove (BL-R) lead from PSB-28 and (BL-W) lead from PSB-2 and connect together using spare term. or D-161488 connector.
  - (b) Move the (G-W) lead from PSB-13 to PSB-2.
  - (c) Move the (W-G) lead from PSB-21 to PSB-28.
2. Remove (G) or (BL) dial lead from term. 19 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.
3. Remove (G) or (BL) dial lead from term. 42 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.
4. Remove (G) or (BL) dial lead from term. 11 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.

**TABLE F (Cont)**  
**CONNECTIONS FOR 870A1 DIAL TO TELEPHONE CONSOLE (NOTE 1)**

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS									
LT	T1	LR	R1	M1	M2	G-W	W-G	S-W	W-S
W-BL	W-O	BL-W	O-W	BR-W	W-BR				
Spare 1	Net. F	Spare 2	Net. C	TB2 3	TB2 4	*	*	*	*
2	Spare 1	4	Spare 2	Net. R	Net. GN	*	*	*	*
Spare 1	Net. RR	Spare 2	Net. C	*	*	7	Note 6	6	8
Spare 1	Net. RR	Spare 2	Net. C	*	*	7	Note 6	6	8
Spare 1	Net. RR	Spare 2	Net. C	*	*	19	Note 2	28	29
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	11	Note 4	11	14
Spare 1	Net. RR	Spare 2	Net. C	*	*	28	Note 5	33	34
Spare 1	Net. RR	Spare 2	Net. C	*	*	19	Note 2	28	29
Spare 1	Net. RR	Spare 2	Net. C	*	*	11	Note 4	11	14
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	11	Note 4	11	14
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	Net. RR	Spare 2	Net. C	*	*	42	Note 3	39	38
Spare 1	42 §	Spare 2	4	Net. R	Net. GN	*	*	37	38
Spare 1	42 §	Spare 2	4	*	*	*	*	*	*
Not Compatible									

5. Remove (G) or (BL) dial lead from term. 28 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.
6. Remove (G) dial lead from term. 7 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.
7. To allow proper placement of adjunct the D10U-87 cord may have to be replaced by a D10R-87 cord, observing same color code.

\* Insulate and store.

† Spare "1s" use same spare term. or D-161488 connector in console.

‡ Spare "2s" use same spare term. or D-161488 connector in console.

§ If neither Privacy nor DSS option is provided, this will be terminal 22.

**TABLE G**  
**CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE CONSOLE**

TEL CONSOLE (NOTE 1 AND 2)	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO †	LEAD COLOR	REMOVE FROM	CONNECT TO ¶
1, 2-Type ‡	Strap	TB1 9-14		Strap	TB1 3-8	
10, 11-Type	R-S	5	Spare 1	BK-O	4	Spare 2
14A2, 14A4	BK	Net. RR	Spare 1	W	Net. C	Spare 2
14A5, 14A6	BK	Net. RR	Spare 1	W	Net. C	Spare 2
15A2, 15A4	BK	Net. RR	Spare 1	W	Net. C	Spare 2
15A5, 15A6	BK	Net. RR	Spare 1	W	Net. C	Spare 2
22A3T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
23A2T, 23A9T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
24A8T, 24B8T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
26A9T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
27-Type	BK	TB1 8 §	TB1 3	W-O	TB1 45	TB1 5
28-Type	G	TB1 6	TB1 7	S, O-BK	TB1 1	TB1 2
29A2T, 29B2T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
32A3T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
34A5T, 34B5T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
43A5T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
46A9T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
47-Type	BK	TB1 8 §	TB1 3	W-O	TB1 45	TB1 5
48-Type	G	TB1 6	TB1 7	S, O-BK	TB1 1	TB1 2
53A5T, 53B5T	BK	Net. RR	Spare 1	S	Net. C	Spare
53A9T, 53B9T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
53C5T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
54A8T, 54B8T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
56A9T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
63B5T, 63B9T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
83B5T, 83B9T, 83C5T	BK	Net. RR	Spare 1	S	Net. C	Spare 2
121-Type	BK	TB1 41 §	TB1 3	G	TB1 22	TB1 5
128A3T, 128A4T	G	42 **	Spare 1	R	4	Spare 2
131-Type	BK	TB1 41 §	TB1 3	Y-O	TB1 22	TB1 5
138A4T	G	42 **	Spare 1	R	4	Spare 2
151-Type	BK	TB1 41 §	TB1 3	Y-O	TB1 22	TB1 5

*Notes:*

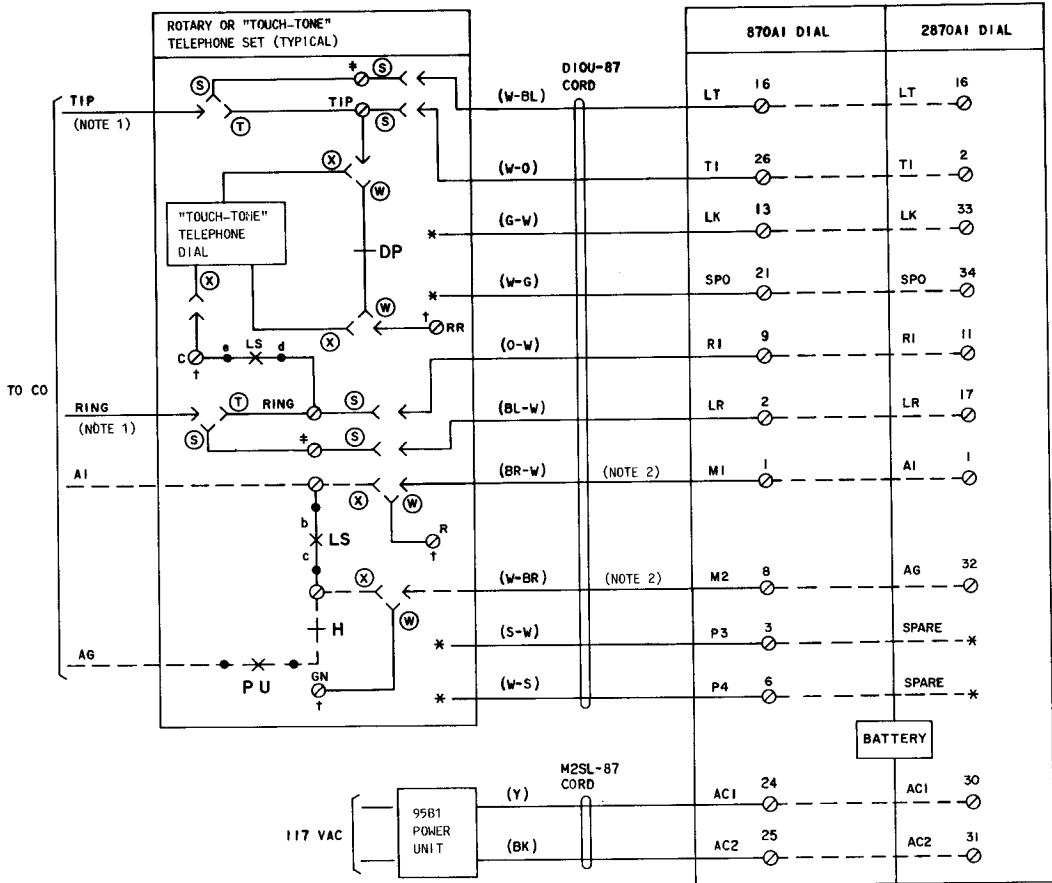
- To allow proper placement of adjunct, the D10U-87 may have to be replaced by a D10R-87 mounting cord, observing same color code.
- 2870A1 dial not compatible with 21, 41-, 45-, 51-Type or AGD-, A G H-Type (DIMENSION PBX) consoles.

\* Insulate and store.

**TABLE G (Contd)**  
**CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE CONSOLE**

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS				SPEAKERPHONE/ONE-TOUCH					
LT	T1	LR	R1	A1	AG	LK	SPO	SPARE	
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	WS
TB1 14	TB1 9	TB1 8	TB1 3						
5	Spare 1	4	Spare 2						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
TB1 8	TB1 3	TB1 5	TB1 45						
TB1 6	TB1 7	TB1 1	TB1 2						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C	*	*	*	*	*	*
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
TB1 8	TB1 3	TB1 5	TB1 45						
TB1 6	TB1 7	TB1 1	TB1 2						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
TB1 41	TB1 3	TB1 5	TB1 22						
Spare 1	42 **	Spare 2	4						
TB1 41	TB1 3	TB1 5	TB1 22						
Spare 1	42 **	Spare 2	4						
TB1 41	TB1 3	TB1 5	TB1 22						

† Spare "1s" use same spare terminal or D-161488 connector in console.  
 Consoles equipped with TOUCH-TONE dialing only.  
 ‡ Lead from network terminal RR.  
 § Spare "2s" use same spare terminal or D-161488 connector in console.  
 \*\* If neither Privacy nor DSS option is provided, this will be terminal 22.



NOTES:

1. LT AND LR LEADS OF THE ADJUNCT DIAL MUST CONNECT TO THE INCOMING TIP AND RING LEADS IN THE TELEPHONE SET AT THE FIRST ACCESSIBLE POINT. IN THE CASE OF KEY TELEPHONE SETS, IT MUST BE BEHIND THE LINE PICKUP KEYS. THE LT, TI, AND LR, R1, LEADS MUST BE CONNECTED INTO THE TELEPHONE SET IN SERIES WITH THE TIP AND RING PATH.
2. THE (BR-W) AND (W-BR) ARE HANDSET MUTING LEADS ONLY IN CASE OF THE 870A1 DIAL ONLY.

\* SPARE TERMINAL OR D-161488 CONNECTOR  
DP DIAL PULSE

- (S) CONNECTION WITH ADJUNCT DIAL
- (T) NORMAL TELEPHONE SET CONNECTION
- (W) ROTARY TEL SET
- (X) "TOUCH-TONE" TEL SET
- \* INSULATE AND STORE
- † TERMINAL ON NETWORK

Fig. 6—Basic Interface Connections for 870A1 and 2870A1 Dials



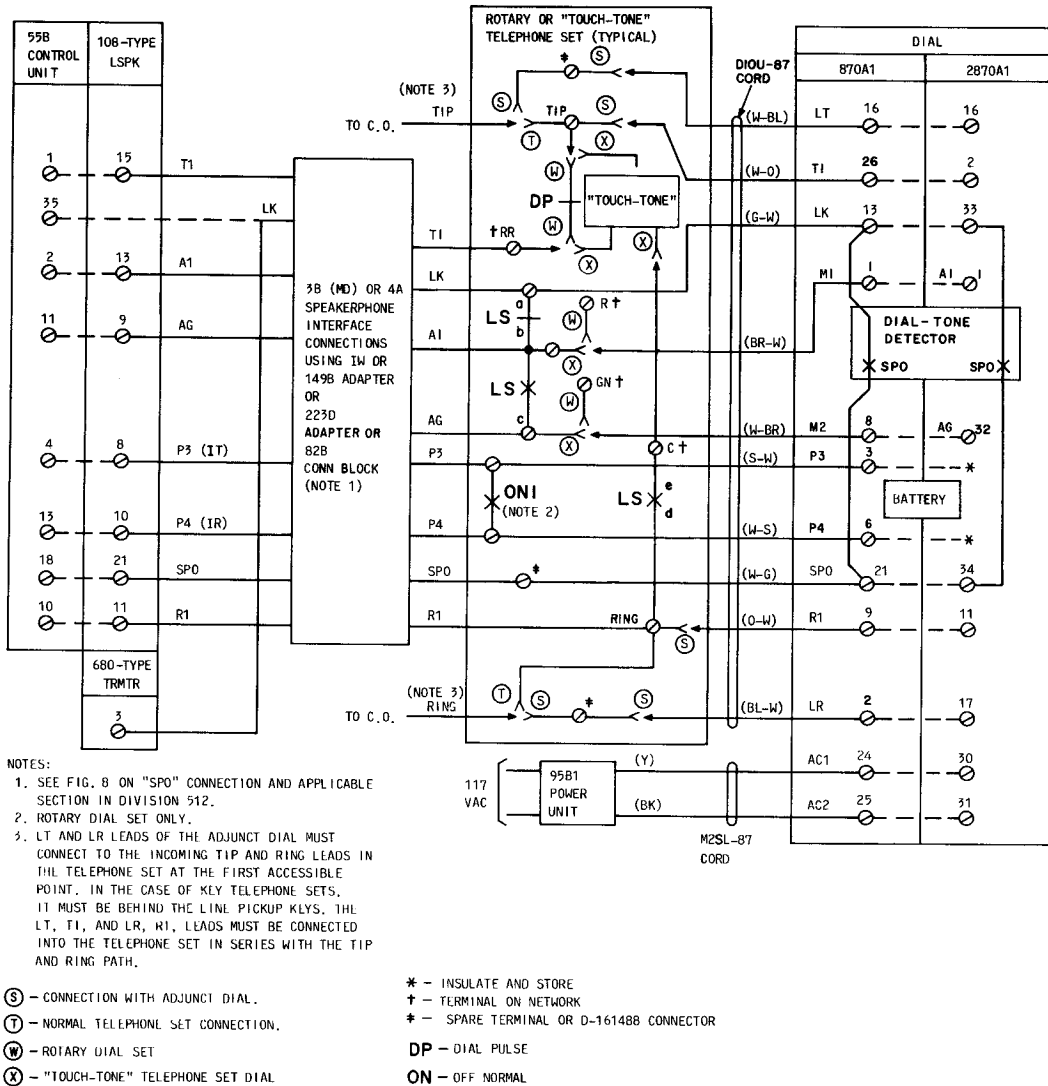
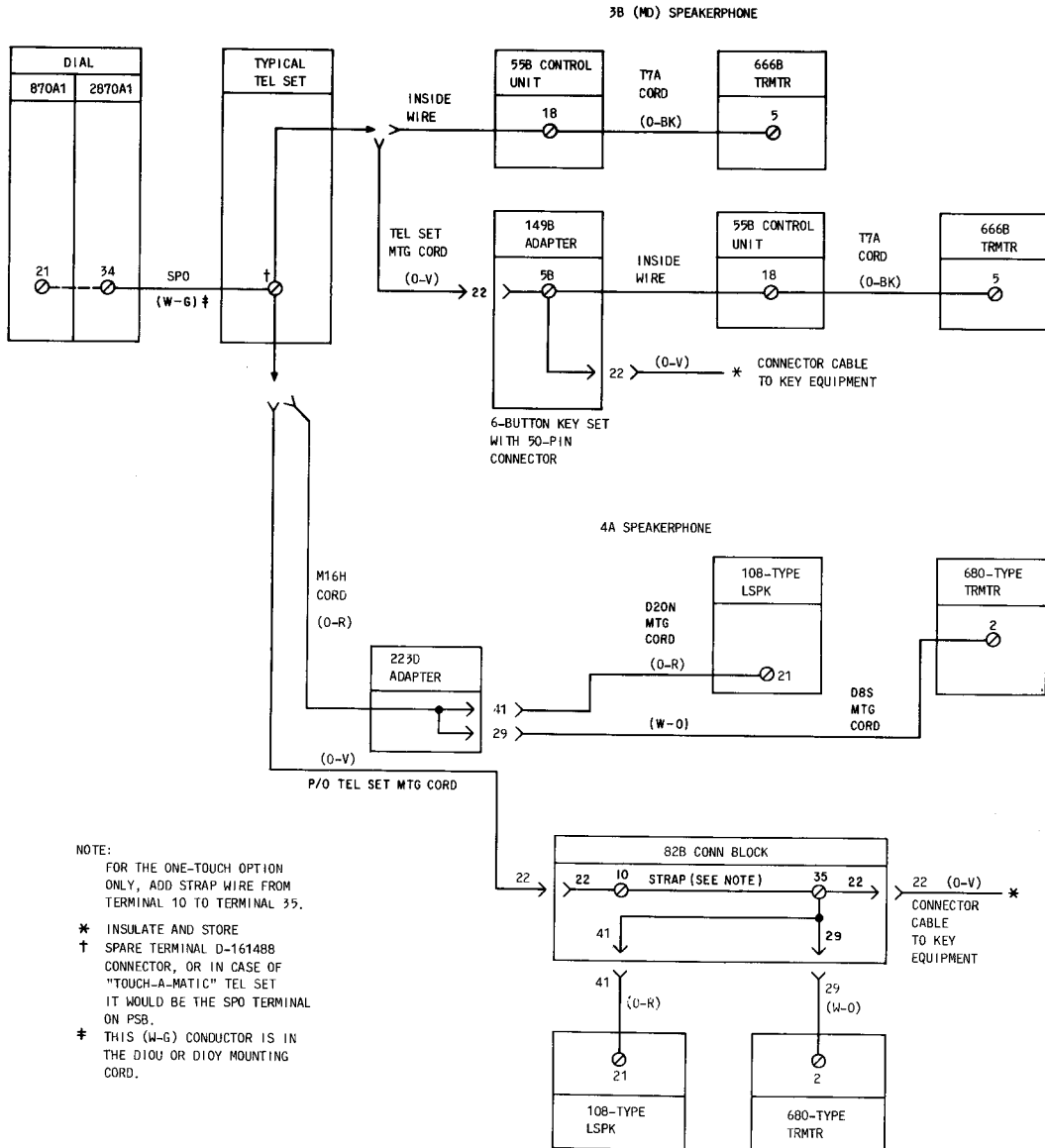


Fig. 7—870A1 and 2870A1 Dials, Basic Interface Connections for One-Touch Calling Option



**Fig. 8—870A1 and 2870A1 Dials, "SPO" Interface Connections for One-Touch Calling**

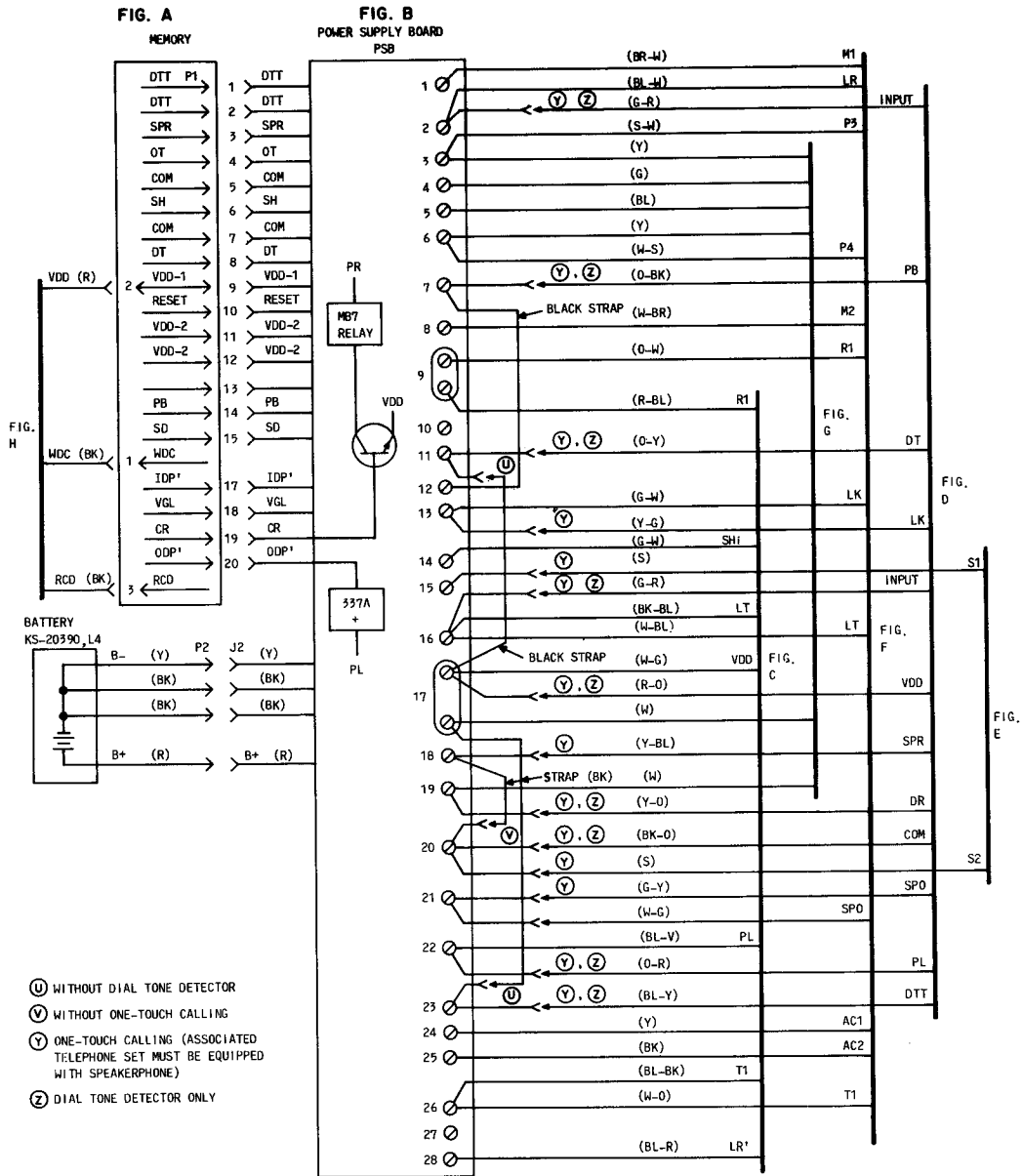
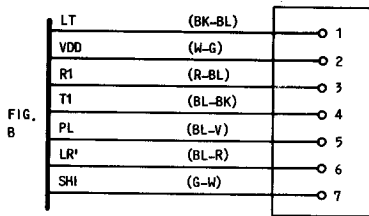
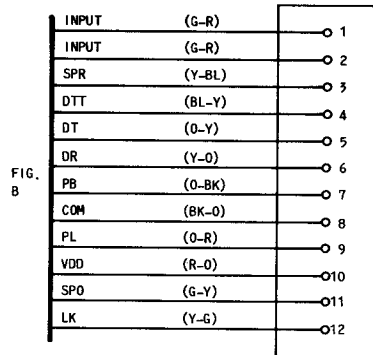


Fig. 9—870A1 Dial, Connections (Sheet 1 of 2)

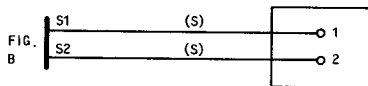
**FIG. C**  
LINE SENSING RELAY PMB  
841382880



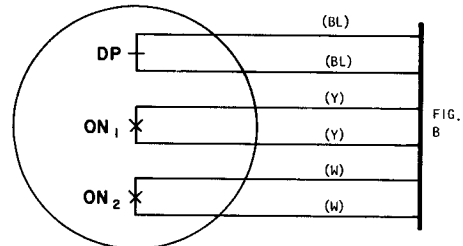
**FIG. D**  
DIAL TONE DETECTOR  
(P/O D-180493)



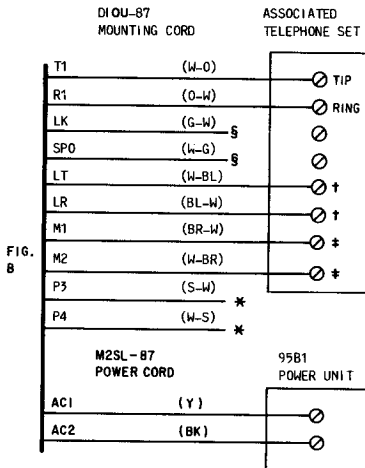
**FIG. E**  
ONE-TOUCH CALLING SWITCH  
(P/O D-180493)



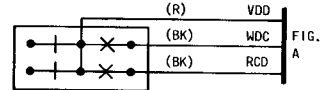
**FIG. G**  
BEA -119 DIAL



**FIG. F**



**FIG. H**  
RECORD DISABLE/DIAL INTERMIX SWITCH (D-180818)



DP - DIAL PULSE

ON - OFF NORMAL

\* INSULATE AND STORE UNLESS SPEAKERPHONE IS PROVIDED

† SPARE TERMINAL OR D-161488 CONNECTOR

‡ APPROPRIATE TERMINAL TO PROVIDE MUTING OF RECEIVER

§ INSULATE AND STORE UNLESS ONE TOUCH CALLING IS PROVIDED

**Fig. 9—870A1 Dial, Connections (Sheet 2 of 2)**

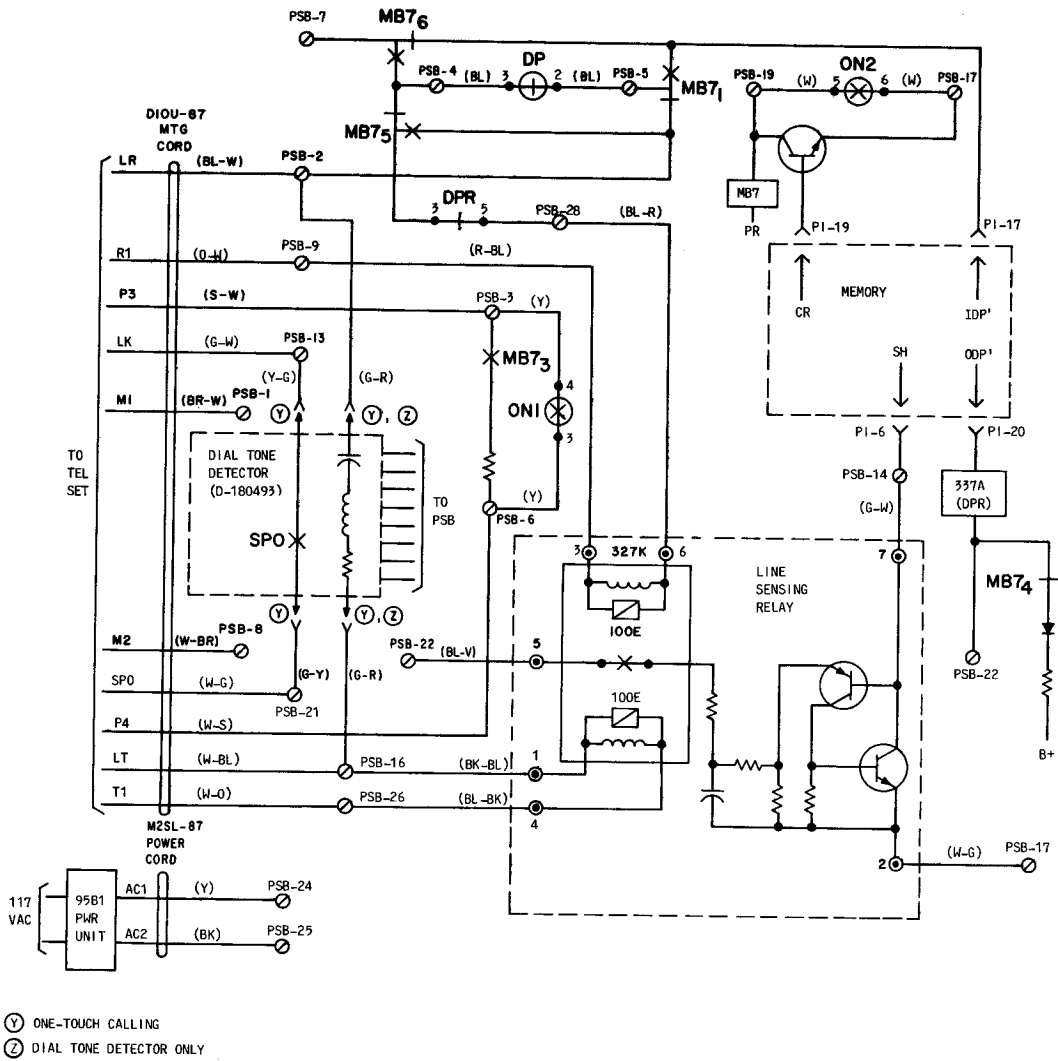


Fig. 10—870A1 Dial, Partial Functional Schematic

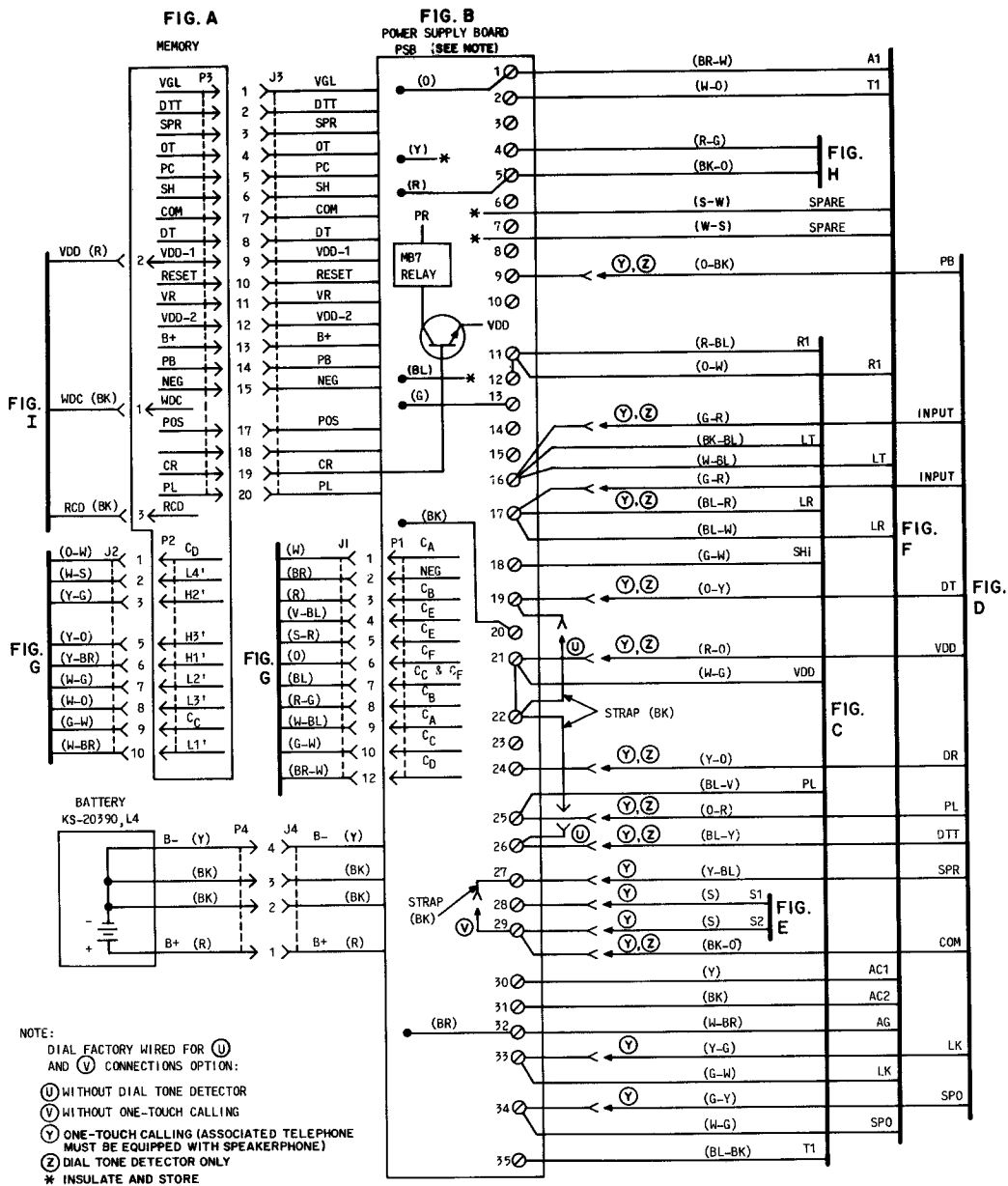
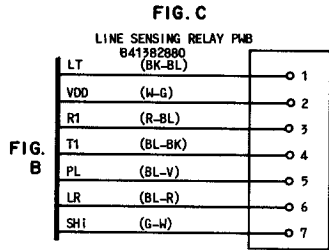


Fig. 11—2870A1 Dial, Connections (Sheet 1 of 2)†



NOTE:  
ASSOCIATED TELEPHONE SET  
MUST BE EQUIPPED WITH  
SPEAKERPHONE  
\* INSULATE AND STORE  
+ SPARE TERMINAL OR  
D-161488 CONNECTOR  
+ INSULATE AND STORE UNLESS  
ONE TOUCH CALLING IS PROVIDED  
(ASSOCIATED TELEPHONE  
SET EQUIPPED WITH  
SPEAKERPHONE)

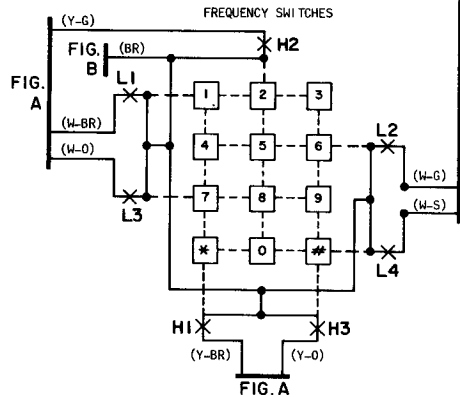
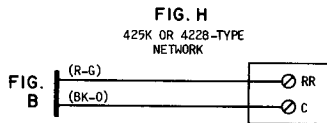
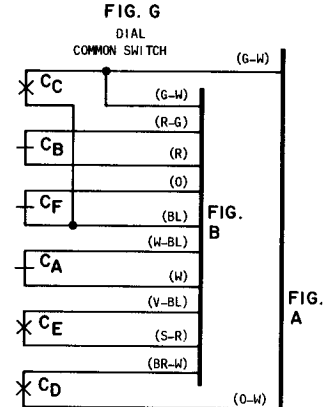
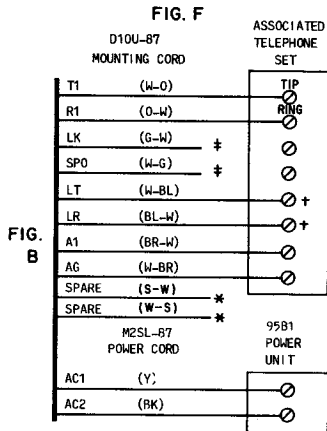
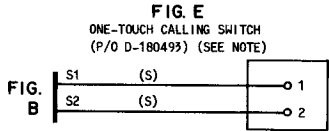
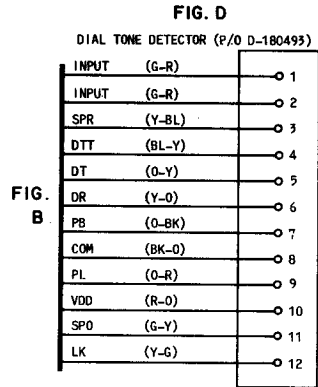


Fig. 11—D2870A1 Dial, Connections (Sheet 2 of 2)

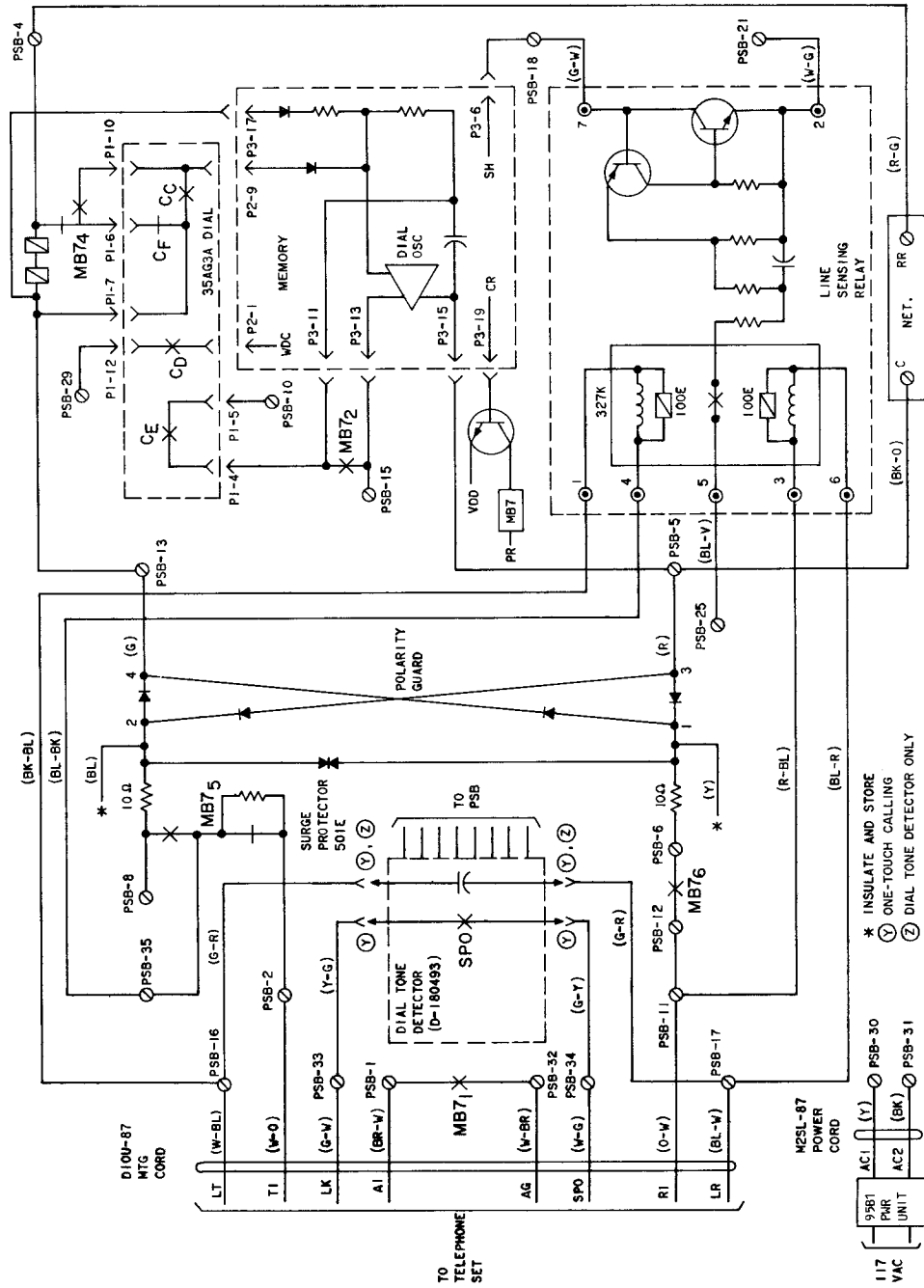


Fig. 12—2870A1 Dial, Partial Functional Schematic



♦ TABLE H ♦

## TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
1	Dead set when off-hook	No dial tone. Cannot transmit or receive when off-hook using handset	Mounting cord improperly connected to telephone set	Check cord connections from line to telephone set or console and to adjunct dial. See Fig. 6, 7 or Tables D, F	
			Open cord conductor or defective Line Sensing Relay PWB	Check continuity between W-BL and W-O conductors and between BL-W and O-W conductors. (Nominal resistance is 8 ohms.) If open, replace mounting cord or Line Sensing Relay board	
			Unknown	Replace adjunct dial*	
2	Cannot manually dial when off-hook using either telephone set dial or 870A1 adjunct dial	Cannot break dial tone or cannot hang-up set	Extension station off-hook	Place extension station on-hook	
3	Cannot manually dial when off-hook using adjunct dial	Cannot dial using set dial but can manually dial using 870A1 dial only when ac power is disconnected	Improperly installed or defective memory	1. Check connector cable 2. Replace memory	
			Defective PSB	Replace adjunct dial*	
		No dialing clicks heard when dial is returning. Condition remains unchanged when 95B1 power unit is disconnected	Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial	
			Unknown	Replace adjunct dial*	
4	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not plugged in or defective	Connect or replace battery	
			RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			95B1 power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 Vac across screw terminals 24 and 25 on PSB)	
			Switch of D-180818 Kit of Parts in ON position.	Change switch position to OFF	
			Bad connections or defective M2SL-87 cord	1. Check connections and cord 2. Replace cord	

\*Refer to paragraph 6.02(4).

◆ TABLE H (Contd) ◆

## TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4 (Contd)			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace memory
			Unknown	Replace adjunct dial*
		Lamp turns off when any memory button is depressed	Defective logic	Replace memory
			Unknown	Replace adjunct dial*
		Lamp does not turn off as dial is returning. No MB7 relay click heard at beginning of dial wind-up or at end of dial return	Improperly connected or defective rotary dial (off-normal contact)	1. Check rotary dial connections 2. Replace rotary dial
			Unknown	Replace adjunct dial*
		Lamp does not turn off as dial is returning, but MB7 relay click is heard at beginning of dial wind-up and at end of dial return. Can manually dial off-hook	Improperly connected or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace adjunct dial*
		Lamp turns off as dial is returning and stays off	Memory button was not depressed prior to the operation of the dial	Record per paragraph 5.01.
			Defective memory	Replace memory
			Unknown	Replace adjunct dial*
5	Cannot record properly into the 31 memory positions or into LAST NUMBER DIALED position	RECORD lamp functions properly and can manually dial using adjunct dial	Defective Memory	Replace memory
			Unknown	Replace adjunct dial*
		Party is reached when number is recorded as it is manually dialed; however, when number is subsequently dialed from memory, party is not reached – wrong number is dialed from memory	Check recording procedure	Record per paragraph 5.01.
			Defective memory	Replace memory
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF
			Unknown	Replace adjunct dial*
6	Cannot dial properly from memory	MB7 relay clicks heard when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light	Battery not plugged in	Plug in battery

\*Refer to paragraph 6.02(4).

◆ TABLE H (Contd) ◆

## TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FEATURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		MB7 relay does not operate (no click heard) when memory button is depressed	Memory not securely mounted	Tighten memory mounting screws
			Improper and/or defective strap from PSB terminal 18 to PSB terminal 20	Check and/or replace strap lead. See Fig. 9B
			Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Can dial from memory by adding temporary strap lead between PSB terminals 14 and 17	Improperly installed or defective Line Sensing Relay PWB	1. Check connections 2. Replace Line Sensing Relay PWB
			Unknown	Replace adjunct dial*
		MB7 relay operates (click heard) when memory button is depressed but no dialing clicks are heard. In addition, transmit and receive levels are very low	WAIT button is stuck down or defective	Free stuck WAIT button or replace memory
			Unknown	Replace adjunct dial*
		No digits, random digits or all the same digits in memory location(s). Note: memory may or may not have functioned properly at some previous time	AC power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory
			Disconnected or defective battery	1. Plug in the battery 2. Allow the battery to be charged for a minimum of 5 minutes. Then remove the power unit from the ac power outlet for 10 seconds and reinsert 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure
				Defective memory
		Automatically dials through a WAIT	Unknown	Replace adjunct dial*
			Memory not securely mounted	Tighten memory mounting screws
			Improper connection to PSB terminal 23	Check connection to and/or replace strap to PSB terminal 23
			Defective memory	Replace memory
		Unknown	Replace adjunct dial*	

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		Number appears to be dialed out correctly but results in "high and dry" condition or connection to invalid number recording	Switching transients causing line break greater than 300 milliseconds due to incompatibility with switching	Consult your Telco engineer
7	Cannot dial properly from memory when off-hook and using adjunct dial (wired for dial tone detector only)	MB7 relay clicks when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light	Battery not plugged in	Plug in battery
		MB7 relay does not operate (no click heard) when memory button is depressed	Precise dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten memory mounting screws
			Improper installation of dial tone detector	Check connections for D-180493 installation. See Table B.
		Same as above -- Addition of temporary strap lead between PSB terminals 11 and 20 does not correct problem	Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Addition of temporary strap lead between PSB terminals 11 and 20 corrects problem	Defective dial tone detector	Replace D-180493 dial tone detector
Unknown	Replace adjunct dial*			
8	Speakerphone does not turn on when a memory button is momentarily depressed (wired for ONE-TOUCH option)		SPO path not completed via proper lead in telephone set mounting cord	Check for correct lead assignment per Fig. 8.
			With 4A speakerphone 82B connecting block not modified per Fig. 8	Add strap lead between terminals 10 and 35 on 82B connecting block
			ONE-TOUCH calling switch in OFF position	Turn ONE-TOUCH calling switch on
		With addition of a temporary strap between PSB terminals 15 and 20, speakerphone turns on when a memory button is depressed	Defective ONE-TOUCH calling switch	Replace switch assembly of D-180493 Kit of Parts
		With addition of a temporary strap between PSB terminals 13 and 21, speakerphone turns on	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 13 and 21
			Defective Line Sensing Relay PWB	Replace Line Sensing Relay PWB
Defective dial tone detector	Replace dial tone detector of D-180493 Kit of Parts			

\*Refer to paragraph 6.02(4).

♦ TABLE H (Contd) ♦

## TROUBLE ANALYSIS — 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSIBLE CAUSE	REMEDIAL ACTION
9	Speakerphone turns on but adjunct dial does not automatically dial when memory button is depressed (wired for ONE-TOUCH option)		(BK) strap leads from screw terminals 11 and 23 on PSB were not disconnected when option was wired	Disconnect, insulate and store strap leads
		Set automatically dials when screw terminals 11 and 20 on PSB are temporarily shorted	Precise dial tone not present or a defective dial tone detector	1. Check CO line for presence of precise dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D-180493 Kit of Parts
10	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (wired for ONE-TOUCH option)		Defective timing circuit	1. Replace memory 2. Replace dial tone detector PWB assembly of D-180439 Kit of Parts
11	Cannot turn speakerphone off (wired for ONE-TOUCH option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Memory button depressed when TIP and RING not connected to telephone set	Depress RECORD OFF button and then depress speakerphone OFF button
			(BK) strap lead from terminal 18 on PSB was not disconnected when option was wired	Disconnect, insulate and store strap lead
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 18 on PSB and OFF button is depressed	Defective logic from memory	Replace memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook	Defective circuit on D-180493 Kit of Parts	Replace dial tone detector board assembly of D-180493 Kit of Parts
12	Automatic dialing commences for no apparent reason (wired for ONE-TOUCH option)		Static discharge damage	1. Replace memory 2. Consult Telco engineer for proper grounding procedures
13	Adjunct dials automatically but does not wait for dial tone (wired for ONE-TOUCH option)		Noise on line	1. Add .05 $\mu$ f capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10k $\Omega$ — 50k $\Omega$ ) in series with a G-R dial tone detector input lead

♦ TABLE I ♦

## TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set when off-hook	No dial tone Cannot transmit or receive when off-hook using handset	Mounting cord improperly connected to telephone set	Check cord connections from line to telephone set or console and to adjunct dial. See Fig. 6, 7 or Tables E, G
			Open cord conductor or defective Line Sensing Relay PWB	Check continuity between W-B and W-O conductors and between BL-W and O-W conductors. (Nominal resistance is 8 OHMS.) If open, replace mounting cord or Line Sensing Relay Board
			Unknown	Replace adjunct dial*
2	Cannot manually dial when off-hook using telephone set dial or adjunct dial	Clicking sounds or damped TOUCH-TONE dialing signals heard when dial buttons are depressed. Cannot hang up set	Extension station off-hook	Place extension station on-hook
3	Cannot manually dial when off-hook and using adjunct dial	No audible TOUCH-TONE dialing signal present	Power supply cable connector not properly inserted on memory	Check connector insertion
			Dial connectors not properly inserted	1. Check connector 2. Replace 35-type dial
			Defective memory	Replace memory
		Unknown	Replace adjunct dial*	
		Some TOUCH-TONE dialing frequencies incorrect	Static discharge damage	1. Replace memory 2. Consult Telco engineer for proper grounding procedures
4	Cannot manually dial some digits when off-hook using adjunct dial		Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on 35-type dial	Replace 35-type dial
			Defective memory	Replace memory
			Unknown	Replace adjunct dial*
5	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not plugged in or defective	Connect or replace battery
		RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power

\*Refer to paragraph 6.02(4).

♦ TABLE I (Contd) ♦

## TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5 (Contd)			Power unit not plugged in or defective	Check or replace power unit. Should read 13.9 to 18 Vac across screw terminals 30 and 31 on PSB
			Bad connections or defective M2SL cord	1. Check connections and cord 2. Replace cord
			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF
			Defective lamp or lamp driver circuit	Replace memory
			Static discharge damage	1. Replace memory 2. Consult Telco engineer for proper grounding procedures
			Unknown	Replace adjunct dial*
Lamp turns off, flashes or lights erratically when any memory button is depressed or lamp does not momentarily turn off when dial button on adjunct is depressed	Defective logic	Replace memory		
	Unknown	Replace adjunct dial*		
6	Cannot read into memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
			WAIT contacts closed even when WAIT button is not depressed or stuck WAIT button	Replace memory
			Defective Line Sensing Relay PWB	Replace Line Sensing Relay PWB
		Digits appear to be accepted correctly but cannot automatically dial from memory	Dialing problem	See Trouble No. 8
7	Cannot record properly into the 31 memory positions or into the LAST NUMBER DIALED position	Warble tones heard when automatically dialing. Get intercept for automatic or manual dialing	WAIT contacts closed even when WAIT button is not depressed or stuck WAIT button	Replace memory
		RECORD lamp does not light	Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF

\*Refer to paragraph 6.02(4).

♦ TABLE I (Contd) ♦

## TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (Contd)		Party is reached when number is recorded as it is manually dialed. However, when number is subsequently dialed from memory, party is not reached – wrong number is dialed from memory	Incorrect dial contact sequence	Replace adjunct dial*
			Defective logic	Replace memory
			Open circuit on PSB	Replace adjunct dial*
			Unknown	
8	Cannot dial properly from memory		Did not record properly	1. Record per paragraph 5.01 2. See Trouble No. 6
			Battery not plugged in	Connect battery
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE dialing signal present	Open circuit in power path	Check for proper strap lead connections on PSB See Fig. 11(B)
			Defective logic	Replace memory
		MB7 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number	Incorrect dial sequence	Replace 35-type dial
		Audible gap in train of digits being dialed		
		No digits or random digits in memory	AC power outage for 24 hours or longer	Reestablish ac power rerecord numbers into memory
			Disconnected or defective battery	1. Plug in the battery 2. Allow the battery to be charged for a minimum of 5 minutes. Then remove the power unit from the ac power outlet for 10 seconds and reinsert 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure
			Defective power supply circuit	Replace adjunct dial*
Number appears to be dialed out correctly but results in "high and dry" conditions or connection to invalid number recording	Switching transients causing line break greater than 300 milliseconds due to incompatibility with switching	Consult your Telco engineer		

\*Refer to paragraph 6.02(4).



♦ TABLE I (Contd) ♦

## TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
8 (Contd)		No digits or all the same in random memory locations	Defective memory	Replace memory
		Two or more memory locations have same digits which are usually different from originally recorded digits	Static discharge damage	1. Replace memory 2. Consult Telco engineer for proper grounding procedures
		Automatically dials through a WAIT	Memory not securely mounted	Tighten memory mounting screws
			Improper connection to PSB terminal 26	Check connection to and/or replace strap to PSB terminal 26
			Defective memory	Replace memory
Unknown	Replace adjunct dial*			
9	Cannot dial properly from memory when off-hook and using adjunct dial (wired for dial tone detector only)	MB7 relay clicks when manual dial is operated but no automatic dialing possible. RECORD lamp does not light.	Battery not plugged in	Plug in battery
		MB7 relay does not operate (no click heard) when memory button is depressed	Precise dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten memory mounting screws
			Improper installation of dial tone detector	Check connections of D-180493 installation. See Fig. 11D and Table B
		Same as above — Addition of temporary strap lead between PSB terminals 19 and 29 does not correct problem	Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Addition of temporary strap lead between PSB terminals 19 and 29 corrects problem	Defective dial tone detector	Replace D-180493 dial tone detector
Unknown	Replace adjunct dial*			
10	Speakerphone does not turn on when a memory button is momentarily depressed (wired for ONE-TOUCH option)		SPO path not completed via proper lead in telephone set mounting cord	Check for correct lead assignment in Fig. 8.
			With 4A speakerphone 82B connecting block not modified per Fig. 8	Add strap lead between terminals 10 and 35 on 82B
		With addition of a temporary strap between PSB screw terminals 28 and 29 speakerphone turns on when a memory button is depressed	ONE-TOUCH calling switch turned off or defective	1. Turn ONE-TOUCH calling switch on 2. Replace ONE-TOUCH calling switch assembly of D-180493 Kit of Parts

\*Refer to paragraph 6.02(4).

◆ TABLE I (Contd) ◆

## TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (Contd)		With addition of a temporary strap between PSB screw terminals 33 and 35, speakerphone turns on when a memory button is depressed	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 33 and 34, respectively.
			Defective Line Sensing Relay PWB	Replace Line Sensing Relay PWB
			Defective dial tone detector	Replace D-180493 dial tone detector
11	Speakerphone turns on but adjunct dial does not automatically dial when memory button is depressed (wired for ONE-TOUCH option)	Dial automatically dials when screw terminals 19 and 29 on PSB are temporarily shorted	Strap leads from screw terminals 19 and 26 on PSB were not disconnected when option was wired	Disconnect, insulate and store strap leads
			Precise TOUCH-TONE service dial tone not present or a defective dial tone detector	1. Check CO line for presence of precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace D-180493 dial tone detector
12	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (wired for ONE-TOUCH option)		Defective timing circuit	1. Replace memory 2. Replace D-180493 dial tone detector
13	Cannot turn speakerphone off (wired for ONE-TOUCH option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Memory button depressed when TIP & RING disconnected from set	Depress RECORD OFF button
			(BK) strap lead from terminal 27 on PSB was not disconnected when option was wired	Disconnect, insulate and store strap lead.
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 27 on PSB and OFF button is depressed	Defective logic	Replace memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook	Defective circuit on D-180493 Kit of Parts	Replace D-180493 dial tone detector

◆ TABLE I (Contd) ◆

## TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
14	Automatic dialing commences for no apparent reason (wired for ONE-TOUCH option)		Static discharge damage	<ol style="list-style-type: none"> <li>1. Replace memory</li> <li>2. Consult Telco engineer for proper grounding procedures</li> </ol>
15	Adjunct dials automatically but does not wait for dial tone (wired for ONE-TOUCH option)		Noise on line	<ol style="list-style-type: none"> <li>1. Add .05 <math>\mu</math>f capacitor between PSB-21 and PSB-26</li> <li>2. Remove above capacitor and add resistor (10k<math>\Omega</math> - 50k<math>\Omega</math>) in series with a G-R dial tone detector input lead</li> </ol>

## 870B1M AND 2870B1M "TOUCH-A-MATIC®" 32 AUTOMATIC DIALER IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

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**NOTICE**

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

## 1. GENERAL

1.01 This section contains information on the 870B1M (rotary service) and the 2870B1M (TOUCH-TONE service) dials, Fig. 1.

**Warning:** This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is

**likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.**

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and use radio frequency energy and may radiate that energy
- Remove information on D-180837 Kit of Parts (never manufactured)
- Change all references to 95B-type power unit to 95B1 power unit



NOTE:  
THE 870B1M DIAL APPEARS THE SAME AS THE 2870B1M DIAL EXCEPT THAT IT IS EQUIPPED WITH AN 8-TYPE ROTARY DIAL

Fig. 1—2870B1M Dial (See Note)

- Add 870B2-108, -109 and 2870B2-108, -109 faceplates.

**1.03** These dials are factory-wired to provide manual or automatic rotary (870B1M) or TOUCH-TONE (2870B1M) service when interfaced with miniature plug and jack equipped single line telephone sets and connecting blocks. All other applications should use the 870A1 and 2870A1 dials. Single line installation with speakerphone service and the one touch calling option should also use the 870A1 and 2870A1 dials.

**1.04** These dials are available in Ivory (-50) color only, except as indicated in paragraph 2.08(e).

## 2. IDENTIFICATION

**2.01** These dials provide manual dialing, plus automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED scratch pad memory.

### A. Design Features

**2.02** The following are design features:

- Modular unit
- Integrated circuit memory
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Capability to detect when associated telephone set is off-hook
- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input).

### B. Optional Features

**2.03** The following are optional features:

- (a) Decorative Faceplate
- (b) Dial Tone Detector: automatically starts dialer when precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) is present

(c) D-180818 Kit of Parts provides the following features.

(1) Record Disable: turns off recording feature to prevent accidental erasures of previously stored numbers. No recording possible except for LAST NUMBER DIALED memory which will store digits manually dialed from adjunct dial.

(2) Record Disable and Dial Intermix Feature: digits dialed manually from adjunct dial and digits dialed automatically from memory may be intermixed without depressing RECORD OFF button. Memories cannot be altered and LAST NUMBER DIALED feature is inoperative.

**2.04** All options are implemented by the following:

- Wiring changes in the applicable dial
- Wiring changes in the telephone set to which the dial is an adjunct
- Installation of appropriate additional items.

### C. Ordering Guide

**2.05** Either of these dials may be ordered as complete units:

- (a) Dial, 870B1M-50 (rotary service)
- (b) Dial, 2870B1M-50 (TOUCH-TONE service).

**2.06** D4BU-29 mounting cords (2) must be ordered separately.

**2.07** The 870B1M-50 dial is comprised of the following component parts:

- (a) 841365505 Housing, lower, (Ivory)
- (b) Housing, upper, 870A1U-50
- (c) Faceplate, 870B1-122 (Matte Aluminum)
- (d) 841387574 Base, Dial, (includes the following):
  - Unit, Power, 95B1
  - Dial, 8EA-119
  - 841382880 Line Sensing Printed Wiring Board Assembly

- Jack, 623P4 (2)
- Cord, Power, M2SL-87
- Battery, KS-20390L4
- Memory, 870B
- 841382617 Power Supply Printed Wiring Board (PSB) Assembly
- 840393672 Directory Sheet Set
- Booklet, Instruction, Subscriber, SIB-2481B.

**2.08** The 2870B1M-50 dial is comprised of the following component parts:

- (a) 841365505 Housing (Ivory)
- (b) Housing, Upper, 870A1U-50
- (c) Faceplate, 2870B1-122 (Matte Aluminum)
- (d) 841387566, Base, Dial, (includes the following):
  - Unit, Power, 95B1
  - Dial, 35AG3A
  - Line Sensing Printed Wiring Board Assembly, 841382880
  - Jack, 623P4 (2)
  - Cord, Power, M2SL-87
  - + • Battery, KS-20390L4
  - Memory, 2870B
  - 841382385 Power Supply Printed Wiring Board (PSB) Assembly
  - 840393672 Directory Sheet Set
  - Booklet, Instruction, Subscriber, SIB-2481B.
- (e) Optional apparatus (order as required) is as follows:
  - Kit of Parts, D-180818 (Record Disable and Dial Intermix Feature)
  - Kit of Parts, D-180493 (Dial Tone Detector)

- Housing, 870ADJ1-(see Notes 1 and 2)
- Housing, 870A1U-(see Note 2)
- Faceplate, 870B1-(see Note 3) or 2870B1-(see Note 3) or 870B2-(see Note 3) 2870B2-(see Note 3).

**Note 1:** Nonmodular 870ADJ1-type housing must be modified with 798A tool (Fig. 8).

**Note 2:** Color suffix as follows: Black (-03), Green (-51), White (-58), and Light Beige (-60).

**Note 3:** Color suffix as follows: Teak Woodgrain (108) and Walnut Woodgrain (109). B2-type same as B1-type faceplate except Woodgrain runs in the opposite direction.♦

**D. Operating Features**

**2.09** Operating features (Fig. 2) are as follows.

- Dial.
- 32-button array of low force, low travel nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed on the adjunct dial.
- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.
- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) required].
- Additional dial pulse muting (optional) paragraph 6.10.

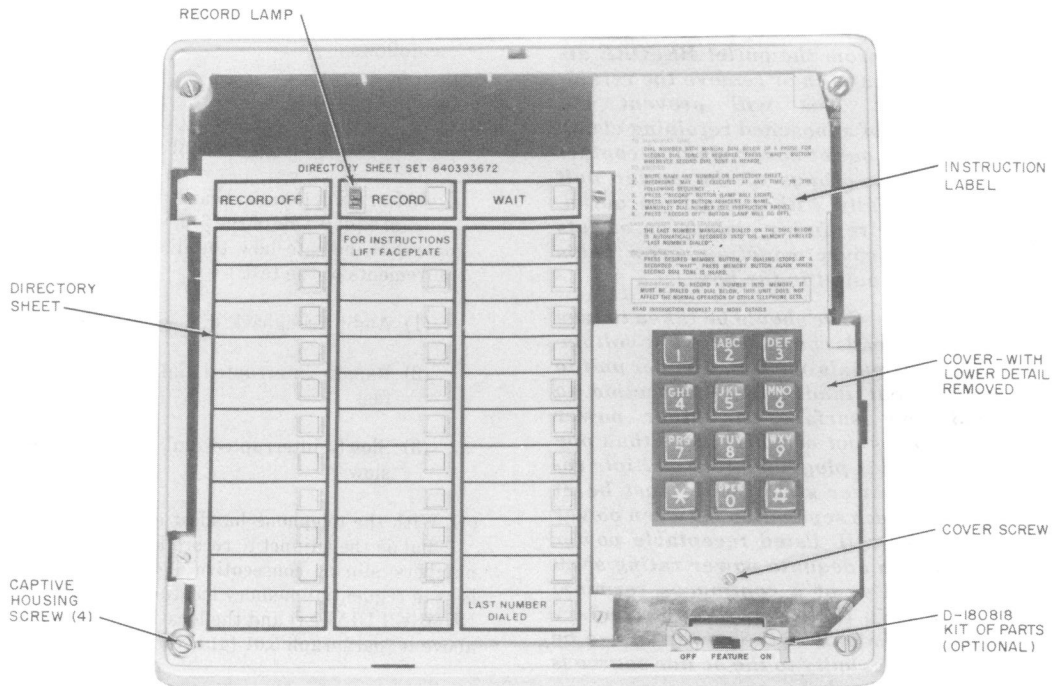


Fig. 2—2870B1M Dial, Faceplate Removed

### 3. INSTALLATION

#### STANDARD INSTALLATION

**Warning:** Do not plug in either battery or power unit until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuit, etc, when the adjunct dial is opened.

**3.01** Connect a D4BU-29 mounting cord between the connecting block and the jack in the adjunct dial identified LINE. Connect a second D4BU-29 mounting cord between the jack in the adjunct dial identified SET and the telephone set. Refer to Fig. 9 for basic interface connections.

**3.02** The dials are shipped from the factory with the battery disconnected. After all wiring

changes and modifications have been completed, connect the battery by tilting the adjunct dial up and inserting the battery plug into the mating jack.

**Note:** Write date of battery installation on label provided (Fig. 6).

**3.03** Plug the power unit into an ac outlet not controlled by a switch (continuous ac power is required).

**Note:** The power unit must be located no closer than 1-1/2 feet from the dial in order to prevent a potential noise condition.

**Danger 1:** For safety, securely attach retaining clamp, if used, to ac outlet using outlet cover screw BEFORE attempting to install #95B1# power unit. The power unit and any other cord plugged into the



**ac outlet should always be unplugged completely from the outlet BEFORE attempting to attach or remove the retaining clamp. This will prevent the possibility of a loosened retaining clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use retaining clamps on outlets where the cover mounting screw holds the duplex outlet in the box.**

**Danger 2: Care should be taken to trim and dress leads connecting to low voltage output terminals of #95B1# power unit to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.**

**3.04** Station number card may be placed in the location provided on the dial (870B1M) or below the dial (2870B1M).

**3.05** Directory sheets (Fig. 2) are held in place by the faceplate. Additional sheets are available in directory sheet set, 840393672.

#### **Installation Check Procedure**

##### **870B1M Dial**

**3.06** Check the 870B1M (rotary service) dial as follows.

- (1) Check operation of the line sensing circuit as follows.
  - (a) With handset on-hook, momentarily depress RECORD button. RECORD lamp should light.
  - (b) Go off-hook with handset. RECORD lamp should extinguish.
- (2) Using the dial on the telephone set, manually dial a known number to check that the telephone set operates correctly.

(3) For the adjunct dial, perform dial speed test as follows.

- (a) Obtain dial tone.
- (b) Dial code number for dial speed test.
- (c) After dial tone is heard again, manually dial digit 0. One of the following audible signals will indicate how the dial meets the requirements of the test:
  - (1) Audible ringback: dial speed satisfactory
  - (2) Rapidly interrupted dial tone: dial speed fast
  - (3) Slowly interrupted dial tone: dial speed slow.

(4) With the telephone handset on-hook, use the dial on the adjunct to record known telephone numbers, storing consecutive digits of the numbers in sequential memory locations except LAST NUMBER DIALED and the location immediately above it [paragraph 5.01 (4) through (7)]

(5) Automatically dial the telephone numbers stored in Step (4) by momentarily depressing the memory buttons in the same sequence in which the digits were recorded. Verify that the digits thus dialed produce the expected telephone numbers.

(6) Go off-hook and use the dial on the adjunct to record a known telephone number into memory location immediately above LAST NUMBER DIALED location [paragraph 5.01 (4) through (7)]

(7) Momentarily hang up handset and then automatically dial the number recorded in Step (6).

(8) Go off-hook and from the adjunct, manually dial a known telephone number.

**Note:** If a pause for second dial tone is required, dial the access digits. After the RECORD lamp relights, depress the WAIT button then dial the telephone number.

(9) Momentarily hang up handset and then automatically redial the number [dialed in Step

(8) by depressing the LAST NUMBER DIALED button.

**Note:** The dial should stop dialing if it reaches a stored WAIT input. Depress the LAST NUMBER DIALED button again and the remaining digits should be dialed.



**The battery and power unit must be connected a minimum of five minutes before doing Step 10.**

- (10) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, momentarily depress memory buttons in same sequence in which digits were recorded in Step (4). Verify that the correct telephone numbers are dialed out.
- (11) Dial the appropriate code for ring-back to test the telephone set ringer.

### 2870B1M Dial

**3.07** Check the 2870B1M (TOUCH-TONE service) dial as follows.

- (1) Check operation of the line sensing circuit as follows.
  - (a) With the telephone handset on-hook momentarily depress the RECORD button. RECORD lamp should light.
  - (b) Go off-hook with handset. RECORD lamp should extinguish.
- (2) Using the dial on the telephone set, manually dial a known number to check that the telephone set operates correctly.
- (3) With the telephone handset on-hook, use the dial on the adjunct to record digits 1 through 0 in consecutive memory locations, storing one digit per memory. Fill all memory locations except LAST NUMBER DIALED and the memory location immediately above it [paragraph 5.01 (4) through (7)].
- (4) Lift handset off-hook and record CO dial test and ringer circuit number into memory location immediately above LAST NUMBER DIALED

location [paragraph 5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.

(5) Momentarily hang up handset and then automatically redial the test circuit number recorded in Step (4) by depressing button immediately above LAST NUMBER DIALED button and proceed as follows:

- (a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into test circuit. Verify that correct signal is returned from test circuit.
- (b) Momentarily depress the memory buttons used in Step (3) in the same sequence in which the digits were recorded. Verify that the correct signal is returned from the test circuit.



**The battery and power unit must be connected a minimum of five minutes before doing Step (c).**

- (c) Disconnect the power unit from the ac outlet. With the handset off-hook and using the telephone set dial, manually dial a known number to check that the telephone set operates correctly.

**Note:** With ac power removed, the adjunct dial is inoperative.

- (6) Reconnect the power unit. Momentarily depress the LAST NUMBER DIALED button. Verify that the number dialed out is the same as that recorded in Step (4).

### OPTIONAL APPARATUS INSTALLATION

#### A. D-180493 Kit of Parts (Dial Tone Detector)

**3.08** Install as follows.

- (1) Remove the housing (paragraph 3.13), and access PSB terminal field (paragraph 3.10).
- (2) Insert the dial tone detector board assembly from the back of the dial, so that the two tabs on the board assembly fit into the slots in the chassis (Fig. 3).
- (3) Insert the self-threading screw through the side of the chassis to secure the board in position.

- (4) Connect the dial tone detector as shown in Table B.

**B. D-180818 Kit of Parts (Record Disable and Dial Inter-mix Feature)**

**3.09** Install as follows.

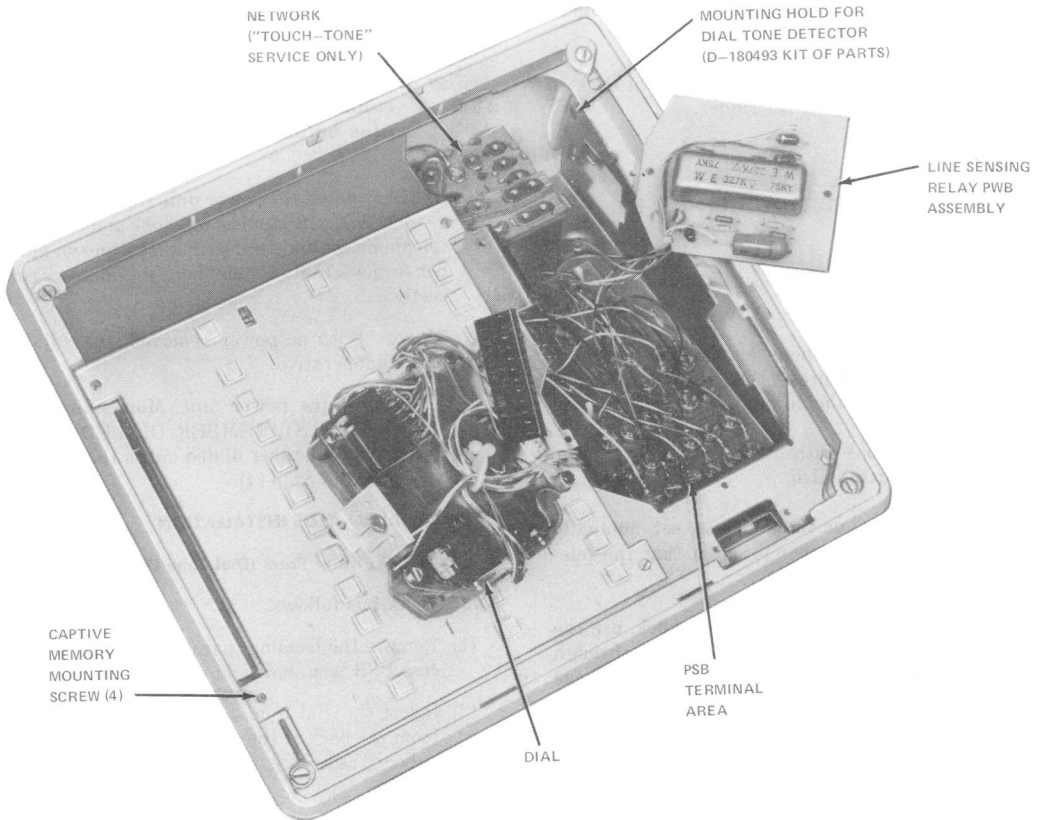
- (1) Remove faceplate (paragraph 3.11 or 3.12).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (3) Disengage dial from chassis (paragraph 6.05 or 6.06).

- (4) Loosen the four captive memory mounting screws (Fig. 3).

- (5) Rotate the left edge of the memory upward as shown in (Fig. 4).

**Note:** If existing memory is 870A or 2870A, it must be replaced with 870B or 2870B, respectively. Carefully pack and return old memory according to local procedures.

- (6) Mount switch below dial with the two screws provided.



**Fig. 3—2870B1M Dial, View to Show Terminal Area**

◆ TABLE A ◆

## OPTIONS

OPTION	ADDITIONAL ITEMS REQUIRED	CONNECT 870BIM PER		CONNECT 2870BIM PER	
		FIG.	TABLE	FIG.	TABLE
Dial Tone Detector	D-180493 Kit of Parts	10B, F	B	12 B, H	B
Record Disable Only	D-180818 Kit of Parts*	5	C	5	C
Record Disable and Dial Intermix					

\* Adjunct dial must be equipped with an 870B or 2870B memory when these kits are used.

- (7) Connect switch lead connectors to post terminals on memory board per Table C.
- (8) Set FEATURE switch to OFF position and verify that numbers can be recorded into memory and numbers can be automatically dialed.
- (9) Set FEATURE switch to ON position and verify feature provided.
  - (a) For record disable feature only:
    - (1) RECORD lamp will not light when button is depressed.
    - (2) No telephone numbers can be recorded in memory.
    - (3) LAST NUMBER DIALED feature is still operative.
  - (b) For record disable and dial intermix feature:
    - (1) RECORD lamp will not light when RECORD button is depressed.
    - (2) No telephone numbers can be recorded in memory.
    - (3) Manually and automatically dialed digits may be intermixed (depression of RECORD OFF button not required).
    - (4) LAST NUMBER DIALED feature is disabled and the LAST NUMBER DIALED position can be utilized just like the other memory positions to store frequently dialed numbers.

- (10) Reassemble adjunct dial.

## COMPONENT LOCATION AND ACCESS INFORMATION

**Danger:** When it is necessary to access component parts of terminal areas, ac power must be disconnected.

## A. Power Supply Board (PSB), Terminals

**3.10** To access the terminal field on the power supply board, proceed as follows.

- (1) Disconnect power unit from ac outlet.
- (2) Remove the faceplate (paragraph 3.11 or 3.12).
- (3) Loosen the captive cover screw at the bottom of the cover around the dial (Fig. 2).
- (4) Remove the cover.
- (5) Loosen the two captive dial mounting screws.

**Note:** On units with metal dial brackets, the screws will have to be removed.

- (6) To gain access to some of the PSB terminals, either place the 8-type dial aside (870B1M) or carefully disengage the connector of the 35-type dial and rotate the dial onto the memory button field (2870B1M).
- (7) Remove the two mounting screws for the Line Sensing Relay Board and place the board assembly aside to access the remaining terminals on the PSB.
- (8) To reassemble, reverse this procedure.

TABLE B

## CONNECTIONS FOR DIAL TONE DETECTOR (SEE NOTE)

APPARATUS		LEAD		870B1M DIAL		2870B1M DIAL	
		DESIG	COLOR	REMOVE FROM PSB	CONNECT TO PSB TERM.	REMOVE FROM PSB	CONNECT TO PSB TERM.
870B1M or 2870B1M Dial Adjunct		Strap	BK	11	*	19	*
		Strap	BK	23	*	26	*
D-180493 Kit of Parts	Dial Tone Dectector	Input	G-R		16		16
		PB	O-BK		7		9
		Input	G-R		2		L2†
		DT	O-Y		11		19
		LK	Y-G		*		*
		VDD	R-O		17		21
		SPR	Y-BL		*		*
		DR	Y-O		19		24
		COM	BK-O		20		29
		SPO	G-Y		*		*
		PL	O-R		22		25
	DTT	BL-Y		23		26	
	Switch	NOT REQUIRED, DO NOT INSTALL					

**Note:** First dial tone may or may not be precise (350 Hz and 440 Hz) but all subsequent dial tones must be precise.

\* Insulate and store.

† Terminal on network.

## B. Faceplate Removal

**3.11** The B1- and B2-type faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The B1- and B2-type faceplate is not a direct replacement for the A2-type faceplate

described below. An 870A1U upper housing is also required (paragraph 6.08).

**3.12** The 870A2-87 and 2870A2-87 faceplates are MD. For those adjunct dials equipped with either faceplate, it is held in place by two snaps bonded to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edge and lift off.

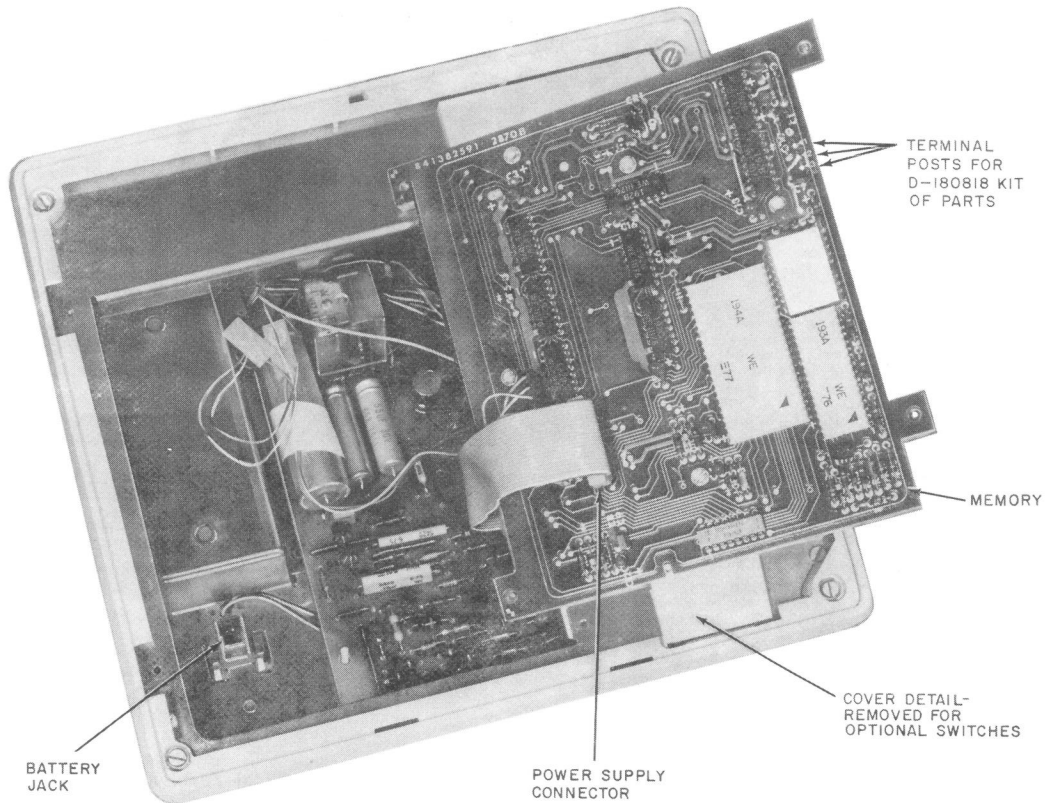


Fig. 4—2870B1M Dial, Internal View

### C. Housing Removal

3.13 To remove, proceed as follows.

(a) Remove lower housing as follows.

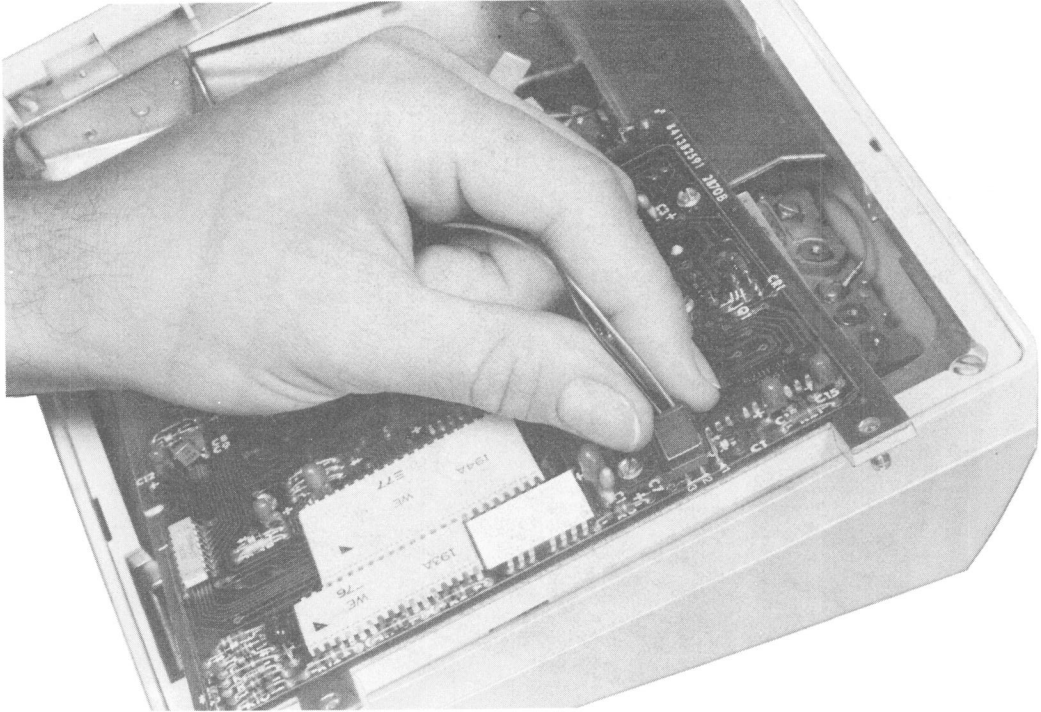
- (1) Disconnect the power unit from ac outlet.
- (2) Remove the faceplate (paragraph 3.11 or 3.12).
- (3) Disengage the captive housing screws (Fig. 2), one located in each of the four corners of the chassis.

(4) Separate the housing from the adjunct dial base while feeding the two cords through holes in bottom of housing.

(5) Before replacing the housing, lift the adjunct dial to check that the shoulders of the battery jack are against the two tabs of the chassis. Misalignment may cause the bottom of the housing to bow.

(b) Remove upper housing as follows.

- (1) Disconnect the power unit from ac outlet.



**Fig. 5—2870B1M Dial, Connection of D-180818 Kit of Parts (Record Disable Feature Only)**

- (2) Remove the faceplate (paragraph 3.11 or 3.12).
- (3) Disengage the captive housing screws, one located in each of the four corners of the upper housing. This will release the lower housing.
- (4) Pull the lower housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.

**Note:** If the upper housing is being replaced, it will be necessary to remove housing screws.

- (5) To reassemble, reverse procedure.

#### 4. CONNECTIONS

- 4.01 Basic interface connections are shown in Fig. 9 for the 870B1M dial and the 2870B1M dial.
- 4.02 Adjunct dial connections are shown in Fig. 10 for the 870B1M dial and in Fig. 12 for the 2870B1M dial.
- 4.03 Partial functional schematics are shown in Fig. 11 for the 870B1M dial and in Fig. 13 for the 2870B1M dial.

#### 5. OPERATION

##### A. Record a Number Into Memory

**5.01** To record, only the dial of the adjunct may be used. Digits manually dialed on the associated telephone set will not be recorded into memory.

- (1) Remove the faceplate (paragraph 3.11 or 3.12).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the directory sheet and faceplate.
- (4) Depress the RECORD button. The RECORD lamp will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

**Note:** ♦If equipped with the D-180818 Kit of Parts, switch should be placed in the OFF position.♦

- (5) Depress memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Using adjunct dial, manually dial the desired telephone number.

**Note:** If an access code and pause for second dial tone is required, perform Steps (a) through (c).

- (a) Dial the access digit(s).
- (b) Push the WAIT button after RECORD lamp relights. (The WAIT entry counts as one digit.)
- (c) Using the adjunct dial, manually dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will

go out. The dialer will be reset. The number is now stored in the selected memory. The dialer will also be reset by a switchhook operation longer than 300 milliseconds in duration.

#### **B. Change a Number in Memory**

**Note:** ♦If equipped with the D-180818 Kit of Parts, switch should be placed in the OFF position.♦

**5.02** Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

#### **C. Delete a Number From Memory**

**Note:** ♦If equipped with the D-180818 Kit of Parts, switch should be placed in the OFF position.♦

**5.03** To delete a number, proceed as follows.

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

#### **D. Automatically Dial a Number From Memory**

**5.04** To automatically dial a number, proceed as follows.

- (1) Go off-hook on the telephone set, listen for dial tone, and depress the desired memory button. If wait input has been recorded, automatic dialing will stop. When second dial tone is heard, depress memory button again to complete automatic dialing.
- (2) If the adjunct dial is equipped with the dial tone detector, go off-hook, listen for dial tone, and depress the memory button.

#### **E. LAST NUMBER DIALED Feature**

**Note:** ♦If equipped with the D-180818 Kit of Parts, and dial intermix feature is provided, switch must be in the OFF position.♦

**5.05** The adjunct dial automatically records into the LAST NUMBER DIALED position (Fig. 1)



any number called using the dial of the adjunct. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed from the adjunct dial. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

**5.06** Operation of LAST NUMBER DIALED feature is as follows.

- (a) If no access digit(s) are required:
  - (1) Go off-hook on the telephone set
  - (2) Listen for dial tone
  - (3) Manually dial telephone number using the adjunct dial
  - (4) To redial same number automatically, go off-hook on telephone set, listen for dial tone, and depress LAST NUMBER DIALED button.
- (b) If an access code and pause for second dial tone is required.
  - (1) Go off-hook on the telephone set.
  - (2) Listen for dial tone.
  - (3) Dial access digit(s) using adjunct dial.
  - (4) After second dial tone is heard depress WAIT button.
  - (5) Manually dial telephone number using adjunct dial.
  - (6) To redial same number automatically, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.

**F. End-to-End Signaling (2870B1M Only)**

**5.07** For end-to-end signaling (such as data transmission) this set has the capability to intermix manual and automatic dialing.

(a) **Standard Operation:** If at any time digit(s) are keyed manually using the 2870B1M dial, the RECORD OFF button must be depressed before additional digits can be dialed automatically from memory. (The RECORD lamp will not light at any time but depressing the RECORD OFF button will remove the dial from the LAST NUMBER DIALED mode to allow additional automatic dialing.)

(b) **Dial Intermix Mode (with D-180818 Kit of Parts):** Manually and automatically dialed digits may be intermixed as desired when the feature switch is in the ON position.

**Note:** In this mode, the RECORD button and the LAST NUMBER DIALED feature are inoperative.

**6. MAINTENANCE**

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

**A. Trouble Analysis**

**6.02** When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm improper operation either as a basic dial or as an automatic dialer (Part 5).
- (2) Check connections.
- (3) Refer to Trouble Analysis Table D for 870B1M dial and Table E for 2870B1M dial.
- (4) If removal of adjunct dial is required proceed as follows.
  - (a) Disconnect power unit from ac outlet and unplug battery.
  - (b) Disconnect adjunct dial.

**Warning: Failure to restrain plug can result in plug damage requiring battery replacement.**

- (c) Place battery plug sideways into housing slot below battery jack and tape into place.

## B. Battery

**6.03** The battery has an expected operational life of about 4 years. It can be replaced without loss of stored numbers provided that commercial ac power to dial is continuously maintained. To replace the battery proceed as follows.

- (1) Tilt the front of the adjunct dial up.
- (2) Unplug the battery.
- (3) Loosen captive screw on the battery support.
- (4) Remove battery support.
- (5) Remove battery.
- (6) Install and check new battery (paragraph 3.06 or 3.07). Write date of installation on battery (Fig. 6).

## C. Memory

**6.04** The memory may be replaced in the following manner.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of the memory or ac and battery power results in loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.11 or 3.12).
- (3) Loosen the four captive memory mounting screws (Fig. 3).
- (4) Rotate the left edge of the memory upward and over dial area as shown in Fig. 4.
- (5) Disengage the connector(s) by pulling on them perpendicular to the printed wiring board.
- (6) Replace the memory by engaging the dial connector (2870B1M only) first. The connector(s) are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply cable should not be twisted.
- (7) Reassemble adjunct dial.
- (8) Reconnect battery and power unit.
- (9) Test per paragraph 3.06 or 3.07 as required.



**Fig. 6—870B1M or 2870B1M Dial, Partial Bottom View**

- (10) Reprogram memory, see Part 5.

## D. Rotary Dial

**6.05** Replace rotary dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove faceplate (paragraph 3.11 or 3.12).
- (3) Loosen captive screw at bottom of the cover around the dial and remove cover.
- (4) Remove the two dial mounting screws and lay dial aside.
- (5) Disconnect dial leads from terminals on PSB.

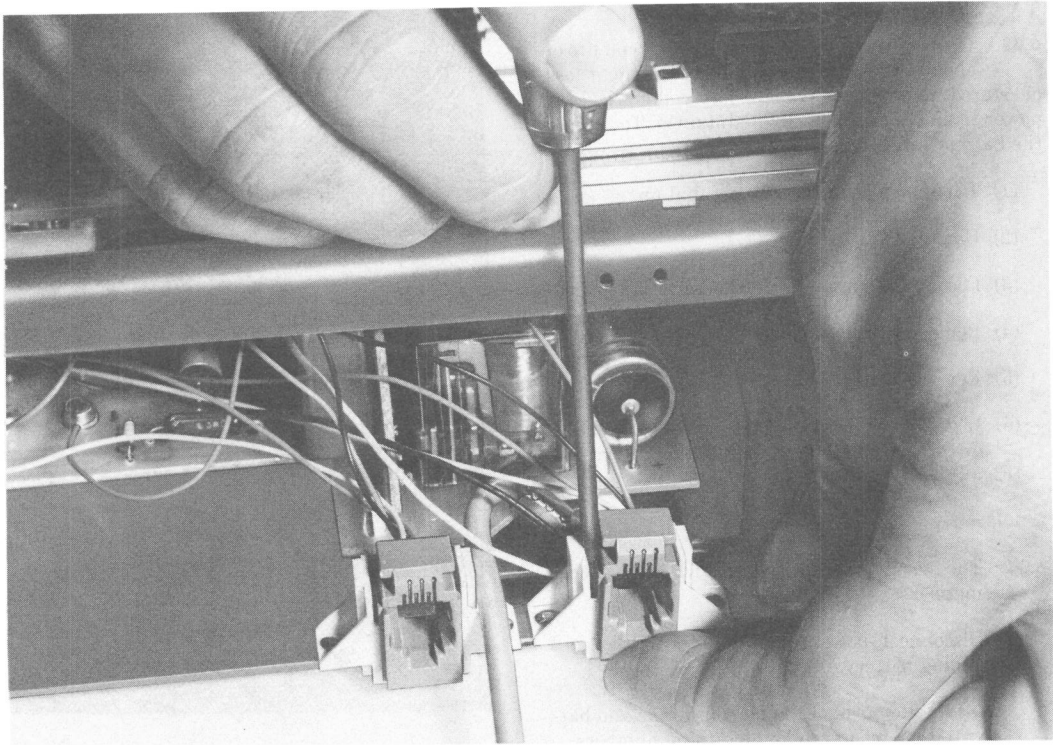


Fig. 7—Removing Mounting Cord Jack or Interface Cord Jack From Dial Base

- (6) Remove dial.
- (7) Reverse procedure to reassemble.
- (8) Reconnect battery and power unit.
- (9) Reprogram memory, see Part 5.

#### E. TOUCH-TONE Service Dial

6.06 Replace TOUCH-TONE service dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results on loss of stored numbers.

- (2) Remove faceplate (paragraph 3.11 or 3.12).

- (3) Loosen captive screw at bottom of the cover around dial and remove cover.
- (4) Disengage the two dial mounting screws and lift the dial.

**Note:** On early model units equipped with metal brackets, the mounting screws should be removed.

- (5) Disengage the four captive memory mounting screws (Fig. 3).
- (6) Gently raise the memory to a position that permits access to the dial connector.
- (7) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.

- (8) Disengage the second dial connector from the power supply printed wiring board.
- (9) Lift the dial out.
- (10) To replace with a new dial, reverse the previous steps. The connectors are keyed to orient them relative to the pins. Observe the correct orientation and do not force the connection.
- (11) Reconnect battery and power unit.
- (12) Reprogram memory, see Part 5.

#### F. Line Sensing Relay Printed Wiring Board Assembly

**6.07** Replace as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Remove faceplate (paragraph 3.11 or 3.12).
- (3) Loosen captive screw at bottom of the cover around dial and remove cover.
- (4) Remove the two dial mounting screws.
- (5) On the 870B1M dial, place the rotary dial aside to gain access to the PSB terminals. On the 2870B1M dial, disengage the dial connector and carefully rotate the dial onto the memory button field.
- (6) Remove the two mounting screws of the Line Sensing Relay Board.
- (7) Disconnect the Line Sensing Relay Board leads from associated terminals on the PSB and remove the board assembly.
- (8) Connect the leads of the replacement Line Sensing Relay Board to the appropriate terminals on the PSB (Fig. 10B and 10C for the 870B1M dial or Fig. 12B and 12C for the 2870B1M dial).
- (9) Reassemble adjunct dial.
- (10) Reconnect battery and power unit.
- (11) Reprogram memory, see Part 5.

#### G. Faceplate (Conversion From A2- to B1-Type)

**6.08** Replace an 870A2 or 2870A2 faceplate with an 870B1 or 2870B1 faceplate as follows.

- (1) Remove A2-type faceplate by lifting up on any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount a 870A1U upper housing to the chassis and 841365505 (lower) housing. The three parts should be held tightly together as the screws are tightened.
- (4) Place the two tabs located along the lower edge of the B1-type faceplate in the notches in the lower side of the 870A1U upper housing.
- (5) Lower the faceplate to rest on the memory. The spring clip located in the center of the top side of the upper housing should retain the faceplate.

#### H. Jack (Mounting and/or Interface Cord)

**6.09** Replace as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Disconnect mounting cord and interface cord from mating jacks in adjunct dial.
- (3) Remove faceplate (paragraph 3.11 or 3.12).
- (4) Loosen captive screw at bottom of the cover around the dial and remove cover.
- (5) Remove housings (paragraph 3.13).
- (6) Remove 4 screws (located adjacent to housing screws) which hold upper chassis to lower chassis.
- (7) Move upper chassis toward front of unit to expose jack, which is mounted to back of lower chassis.
- (8) To release snap of the retainer, carefully slide blade of a thin-bladed screwdriver (KS-6854 or

smaller) down between right side of jack and retainer (as viewed from front of set), while pushing up on bottom of jack, and remove jack (Fig. 7).

- (9) Disconnect leads from appropriate PSB terminals.
- (10) To install new jack, slip it into retainer until snap engages and connect leads to appropriate terminals.
- (11) Reassemble unit.
- (12) Reconnect battery and power unit.
- (13) Reprogram memory, see Part 5.

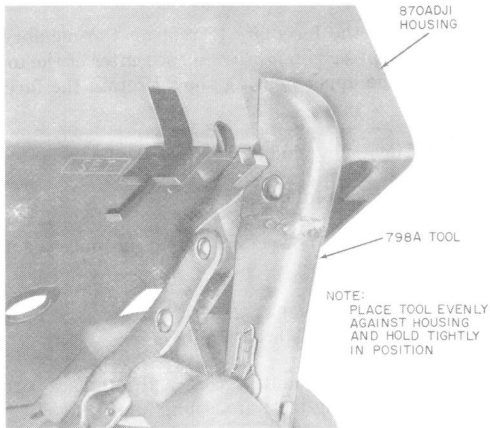


Fig. 8—Notched 870ADJ1 Housing (See Note)

#### I. Dial Pulse Muting

**6.10** Additional dial pulse muting of the handset receiver is available in the 870B1M dial, if the (Y) and (BK) leads in the mounting cord are unused. Proceed as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Access PSB terminal area (paragraph 3.10).
- (3) Move (Y) interface cord jack lead on 870B1M dial from PSB-3 to PSB-1.
- (4) Move (BK) interface cord jack lead on 870B1M dial from PSB-13 to PSB-8.
- (5) Reassemble adjunct dial.
- (6) Reconnect battery and power unit.
- (7) Reprogram memory, see Part 5.
- (8) Connect (Y) and (BK) mounting cord jack leads on the associated telephone set across the f-g line switch contacts.

**Note:** If the (Y) and (BK) leads are not available in mounting cord the 870A1 dial should be used to provide the desired muting.

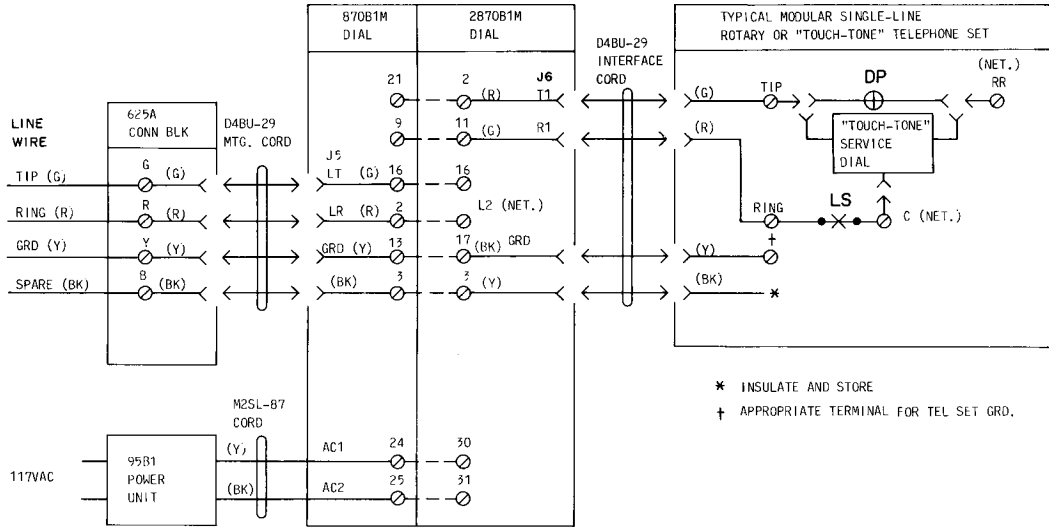


Fig. 9—Basic Interface Connections for 870B1M and 2870B1M Dials

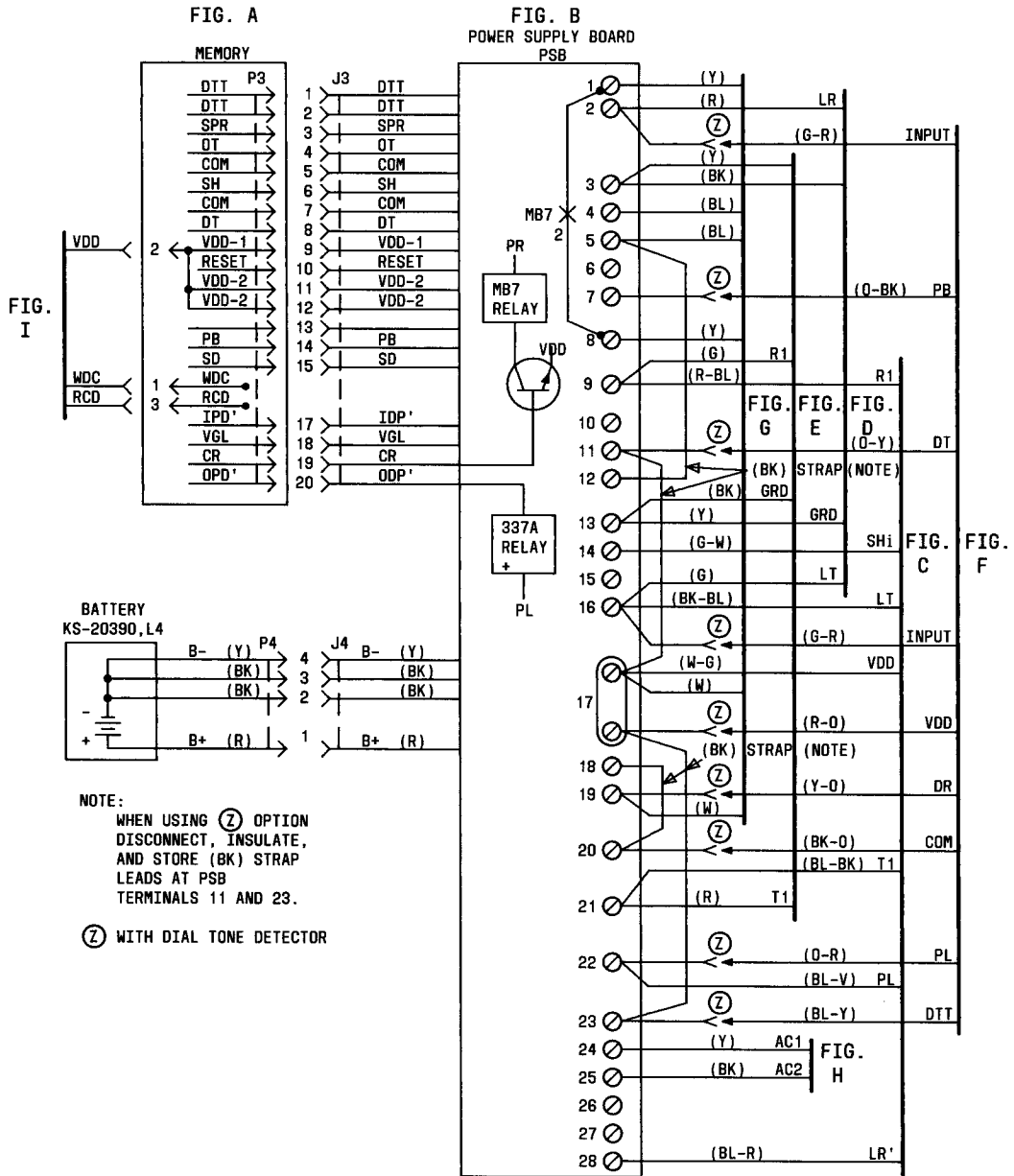


Fig. 10—#870B1M Dial, Connections (Sheet 1 of 2)◆

FIG. C  
LINE SENSING RELAY  
PWB ASSY 841382880

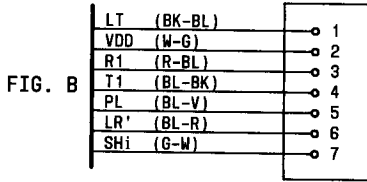


FIG. D

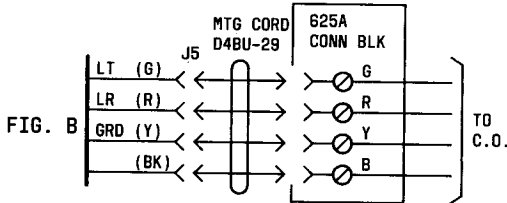
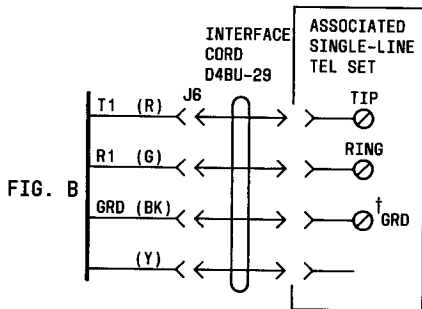


FIG. E



\* INSULATE AND STORE  
† APPROPRIATE TERMINAL

FIG. F  
DIAL TONE DETECTOR  
(P/O D-180493)

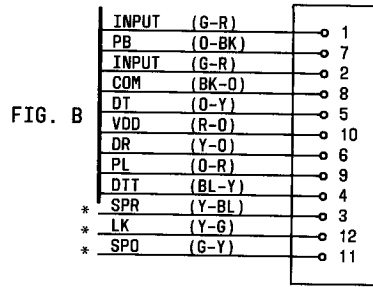


FIG. G  
8EA-119 DIAL

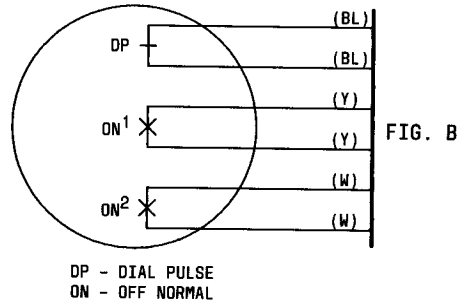


FIG. H  
95B1 POWER UNIT

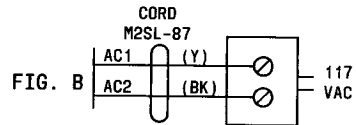


FIG. I  
RECORD DISABLE AND DIAL  
INTERMIX FEATURE SWITCH (D-180818)

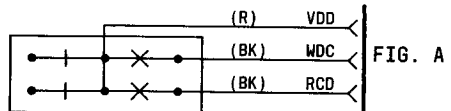


Fig. 10—870B1M Dial, Connections (Sheet 2 of 2)◆



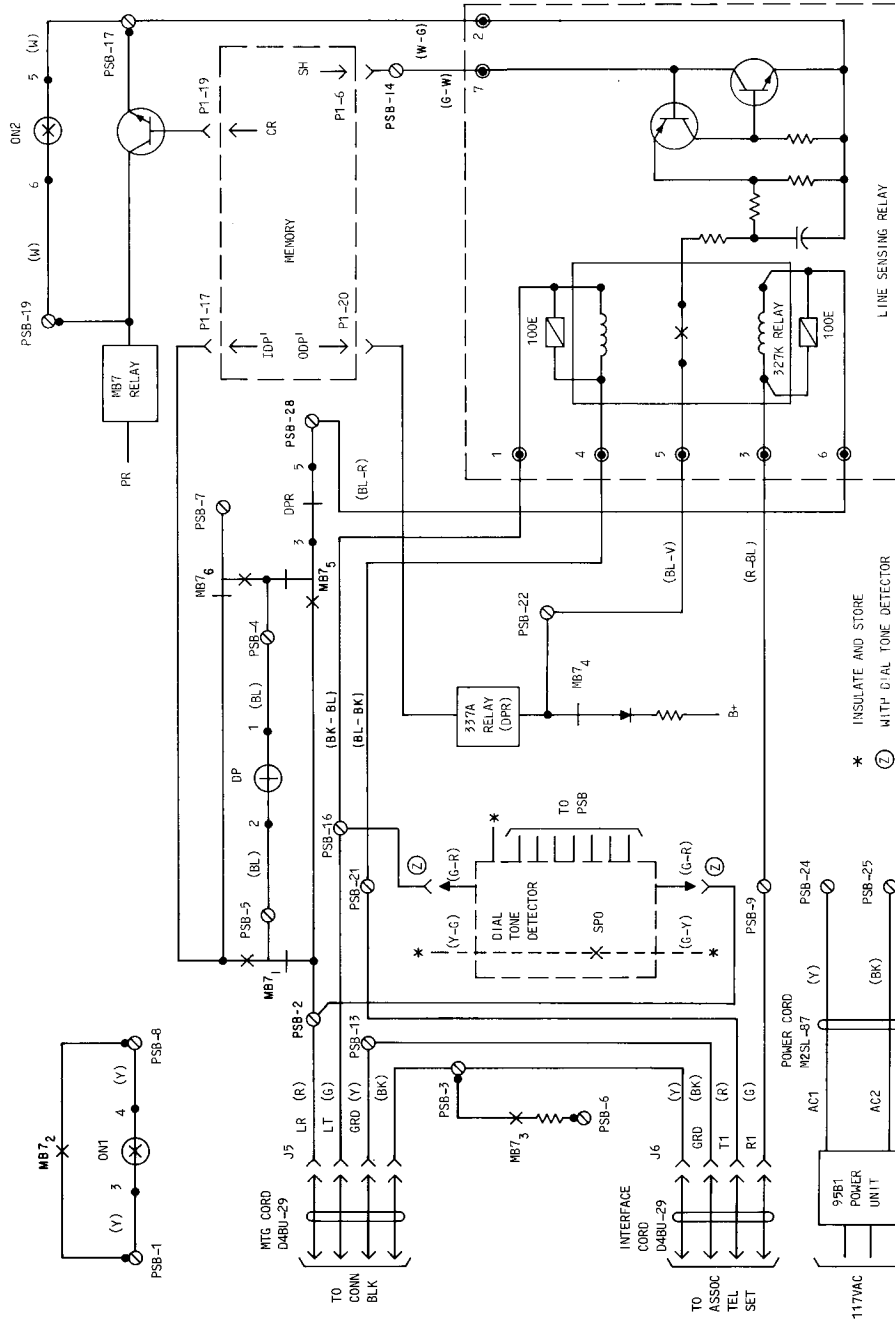


Fig. 11 — 870B1M Dial, Partial Functional Schematic

TABLE C

## CONNECTIONS FOR D-180818 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX FEATURE (NOTE 2)
WDC	BK *	†	1
VDD	R	2	2
RCD	BK	3	3

**Note 1:** There are connectors attached to the switch leads, a single pin connector with a (BK) lead and a double pin connector with a (R) and (BK) lead.

**Note 2:** When this option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

\* Single pin connector.

† Insulate and store.

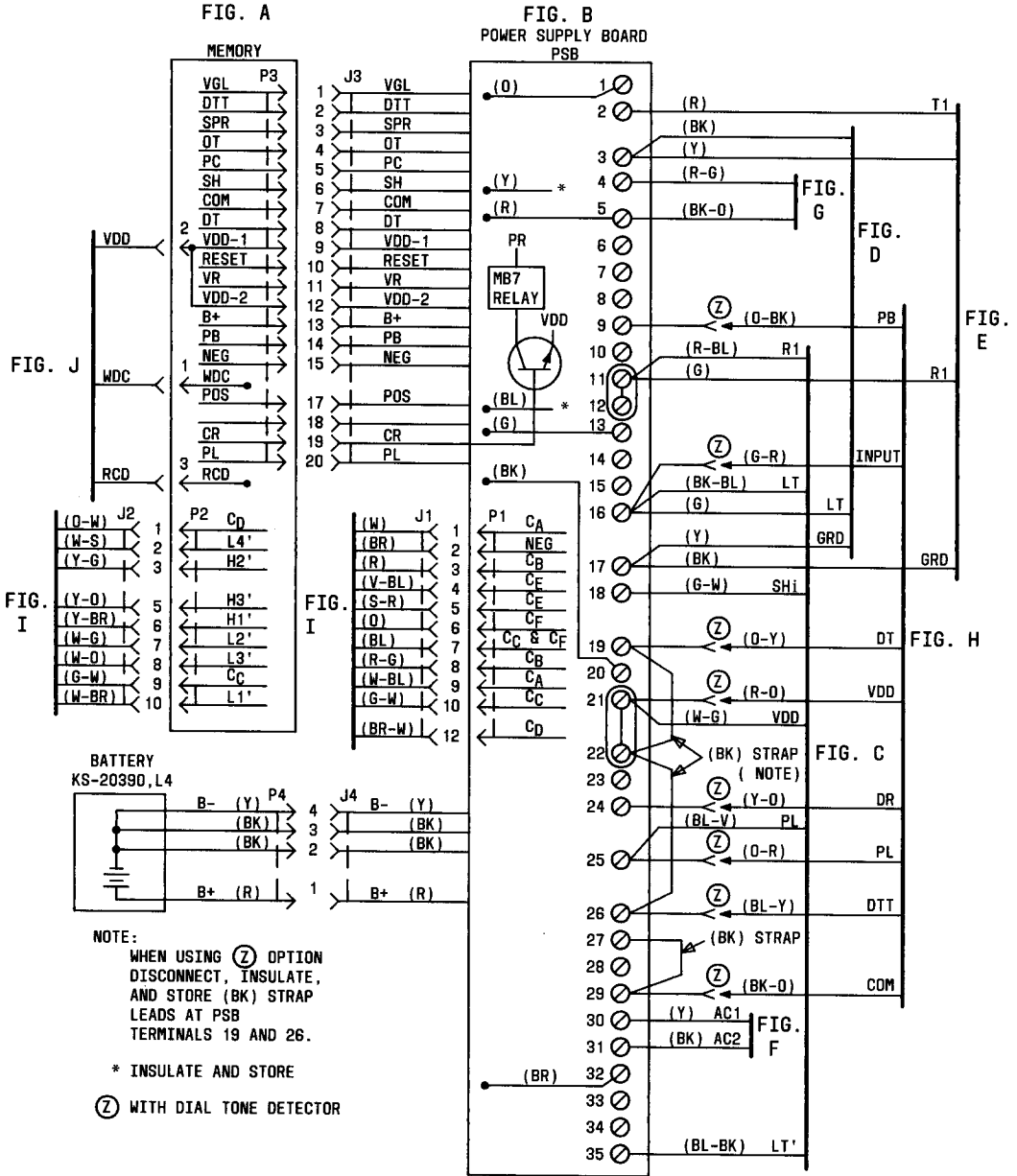


Fig. 12—2870B1M Dial, Connections (Sheet 1 of 2)

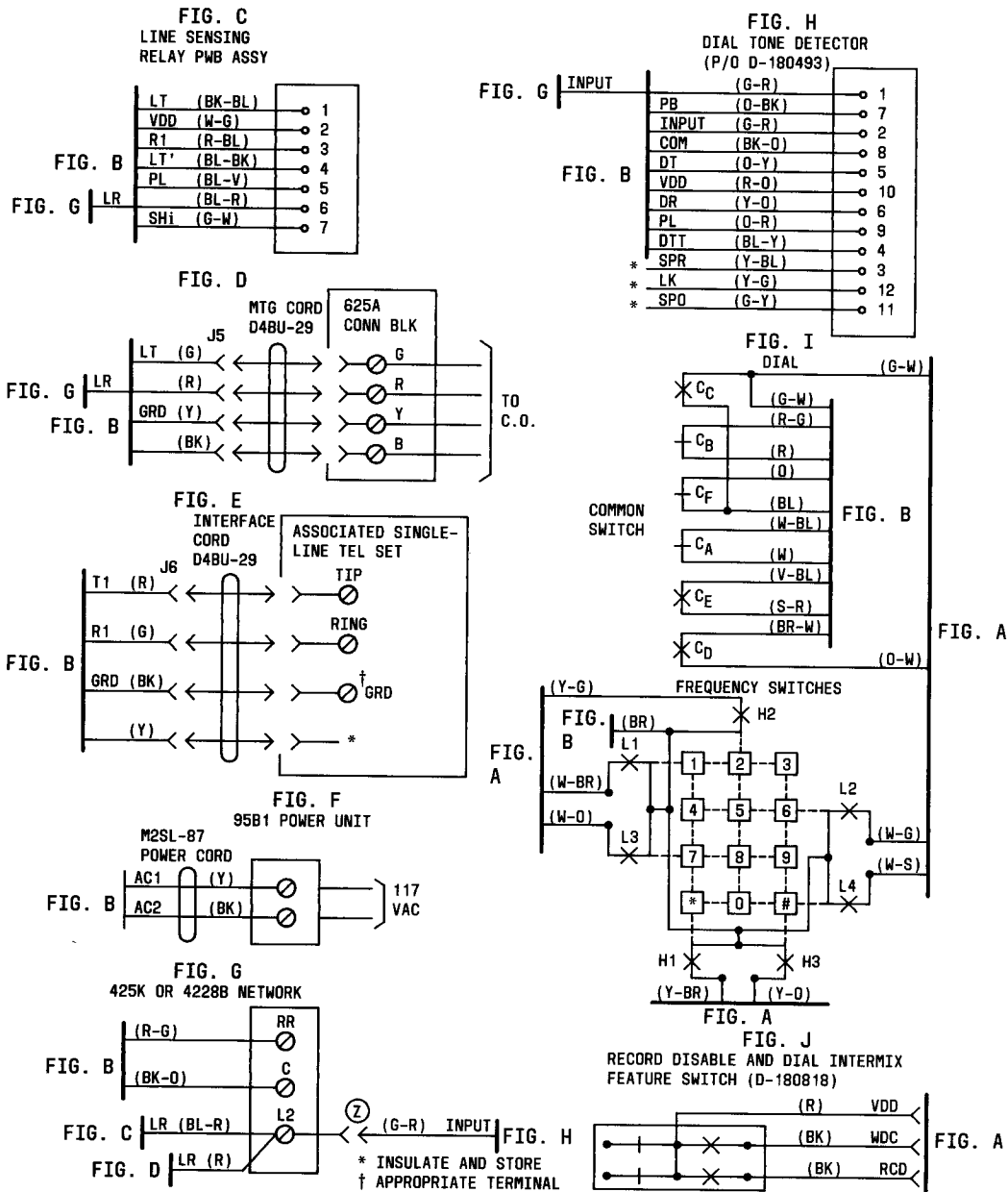


Fig. 12—2870B1M Dial, Connections (Sheet 2 of 2)

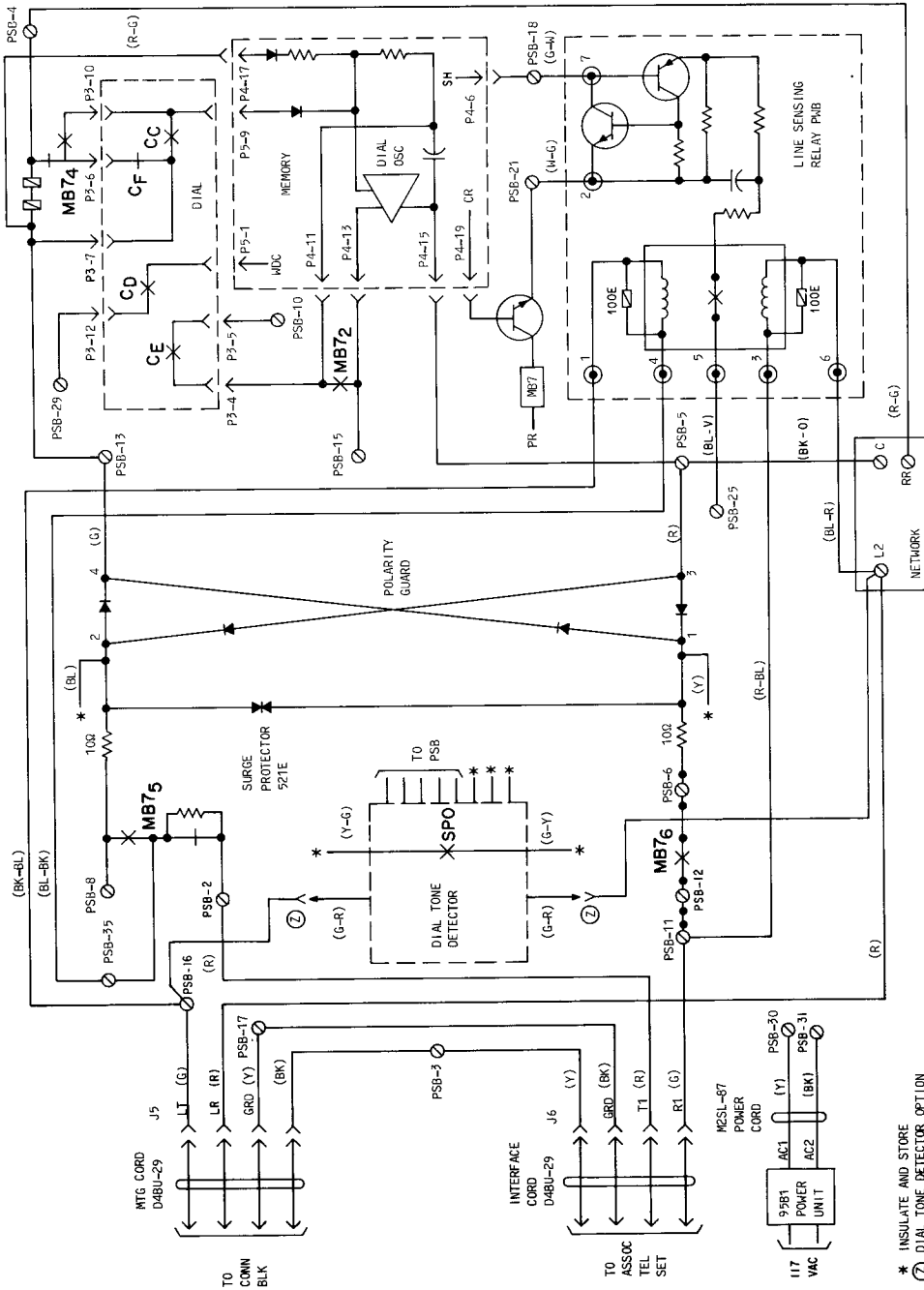


Fig. 13—#2870B1M Dial, Partial Functional Schematic

**TABLE D**  
**TROUBLE ANALYSIS – 870B1M DIAL**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set when off-hook	No dial tone. Cannot transmit or receive when off-hook using handset	Mounting cord or interface cord improperly connected	Check cord insertions to connecting block, adjunct dial and telephone set
			Defective lead connections from Line Sensing Relay to terminals on PSB. See Fig. 11	Check continuity between PSB terminals 9 and 28 and between 16 and 21. (Nominal resistance is 8 ohms.) If open, replace Line Sensing Relay board
2	Cannot manually dial when off-hook using either telephone set dial or adjunct dial	Cannot break dial tone or cannot hang-up set	Unknown	Replace adjunct dial*
			Bridged set off-hook	Place bridged set on-hook
3	Cannot manually dial when off-hook using adjunct dial	When ac power is disconnected cannot dial using set dial but can manually dial using adjunct dial only	Improperly installed or defective Memory	1. Check connector cable 2. Replace Memory
			Defective PSB	Replace adjunct dial*
			Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial
4	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed	Defective PSB	Replace adjunct dial*
			AC power not present	Check for commercial power
			Battery not connected	Connect battery
			Power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 across screw terminals 24 and 25 on PSB)
			Defective M2SL-87 cord or improper connections	1. Check connections and cord 2. Replace cord

\*Refer to paragraph 6.02(4).

TABLE D (Contd)  
TROUBLE ANALYSIS -- 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4 (Contd)			RECORD OFF, WAIT, or memory button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace Memory
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF
			Unknown	Replace adjunct dial*
			Defective logic	Replace Memory
			Unknown	Replace adjunct dial*
			Improperly connected or defective rotary dial (off-normal contact)	1. Check rotary dial connections 2. Replace rotary dial
			Unknown	Replace adjunct dial*
			Improperly connected or defective Memory	1. Check connector cable 2. Replace Memory
			Unknown	Replace adjunct dial*
5	Cannot record properly into the 31 memory positions or into LAST NUMBER DIALED position	Lamp turns off as dial is returning and stays off	Memory button was not depressed prior to the operation of the dial	Record per paragraph 5.01
			Defective Memory	Replace Memory
			Unknown	Replace adjunct dial*
			Defective Memory	Replace Memory
			Unknown	Replace adjunct dial*
			Unknown	Replace adjunct dial*

\*Refer to paragraph 6.02(4).

TABLE D (Contd)  
TROUBLE ANALYSIS – 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5 (Contd)		Party is reached when number is recorded as it is manually dialed; however, when number is subsequently dialed from memory, party is not reached—wrong number is dialed from memory	Check recording procedure Switch of D-180818 Kit of Parts in ON position Defective Memory Unknown	Record per paragraph 5.01 Change switch position to OFF Replace Memory Replace adjunct dial*
6	Cannot dial properly from memory	MB7 relay clicks when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light. MB7 relay does not operate (no click heard) when memory button is depressed	Battery not connected Memory not securely mounted. Improper and/or defective strap from PSB terminal 18 to PSB terminal 20 Improper connection to or defective Memory Improperly installed or defective Line Sensing Relay Unknown	Connect battery Tighten Memory mounting screws Check and/or replace strap lead. See Fig. 10B 1. Check connector cable 2. Replace Memory 1. Check connections 2. Replace Line Sensing Relay Replace adjunct dial*
		Can dial from memory with temporary strap lead between PSB terminals 14 and 17 MB7 relay operates (click heard) when memory button is depressed but no dialing clicks are heard. In addition, transmit and receive levels are very low No digits, random digits or all the same digits in memory location(s). Note: memory may or may not have functioned properly at some	WAIT button is stuck down or defective Unknown	Free stuck WAIT button or replace Memory Replace adjunct dial*
			AC power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory

\*Refer to paragraph 6.02(4).



TABLE D (Contd)  
TROUBLE ANALYSIS – 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		previous time	Disconnected or defective battery	<ol style="list-style-type: none"> <li>1. Plug in the battery</li> <li>2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the power unit from the ac power outlet for 10 seconds and reinsert</li> <li>3. If previously stored numbers are not dialed from memory, replace the battery</li> <li>4. Repeat procedure</li> </ol>
			Defective Memory	Replace Memory
			Unknown	Replace adjunct dial*
		Automatically dials through a WAIT after pausing momentarily at the WAIT space on a train of recorded digits	Memory not securely mounted	Tighten Memory mounting screws
			Improper connection to PSB terminal 23	Check connection to and/or replace strap to PSB terminal 23
			Defective Memory	Replace Memory
			Unknown	Replace adjunct dial*
7	Cannot dial properly from memory when off-hook (wired for dial tone detector option)	MB7 relay clicks when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light	Battery not connected	Connect battery
		MB7 relay does not operate (no click heard) when memory button is depressed	Precise (350 Hz and 440 Hz) dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten Memory mounting screws

\*Refer to paragraph 6.02(4).

**TABLE D (Contd)**  
**TROUBLE ANALYSIS – 870B1M DIAL**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (Contd)		Same as above — Addition of strap lead between PSB terminals 11 and 20 does not correct problem  Addition of strap lead between PSB terminals 11 and 20 corrects problem.	Improper installation of dial tone detector D-180493	Check connections for D-180493 installation See Fig. 10B and F and Table B
			Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
			Defective Memory	Replace Memory
			Defective dial tone detector	Replace D-180493 dial tone detector
			Unknown	Replace adjunct dial*

\*Refer to paragraph 6.02(4).

**TABLE E**  
**TROUBLE ANALYSIS - 2870B1M DIAL**

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set when off-hook	No dial tone Cannot transmit or receive when off-hook using handset	Mounting cord or interface cord improperly connected	Check cord insertions to connecting block, adjunct dial, and telephone set
			Defective lead connections from Line Sensing Relay to terminals on PSB. See Fig. 13	Check continuity between PSB terminals 16 and 35 and between 11 and network terminal L2 (Nominal resistance is 8 ohms ) If open, replace Line Sensing Relay Board
2	Cannot manually dial when off-hook using telephone set dial or adjunct dial	Clicking sounds or damped TOUCH-TONE dialing signals heard when dial buttons are depressed. Cannot hang up set	Unknown	Replace adjunct dial*
			Bridged set off-hook	Place bridged set on-hook
3	Cannot manually dial when off-hook and using adjunct dial	No audible TOUCH-TONE dialing signal present	20-pin power supply connector not properly inserted on Memory	Check connector insertion.
			Dial connectors not properly inserted	1. Check connector insertion 2. Replace 35-type dial
			Defective Memory	Replace Memory
4	Cannot manually dial some digits when off-hook using adjunct dial		Unknown	Replace adjunct dial*
			Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on 35-type dial	Replace 35-type dial
			Defective Memory	Replace Memory
			Unknown	Replace adjunct dial*

\*Refer to paragraph 6.02(4).

TABLE E (Contd)  
TROUBLE ANALYSIS - 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not connected, or defective	Connect or replace battery
		RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			Power unit not plugged in or defective	Check or replace power unit. Should read 13.4 to 18 V ac across screw terminals 30 and 31 on PSB
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF
			Defective M2SL-87 cord or improper connections	1. Check connections and cord 2. Replace cord
			RECORD OFF, WAIT, or Memory button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace Memory
			Unknown	Replace adjunct dial*
			Defective logic	Replace Memory
			Unknown	Replace adjunct dial*
6	Cannot record into memory	Lamp turns off when any memory button is depressed or Lamp does not momentarily turn off when adjunct dial button is depressed	Unknown	Replace adjunct dial*
		See Trouble No. 5		
		RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button WAIT contacts closed even when WAIT button is not depressed	Check RECORD OFF button 1. Check WAIT button 2. Replace Memory

\*Refer to paragraph 6.02(4).

TABLE E (Contd)  
TROUBLE ANALYSIS — 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		Digits appear to be accepted correctly but cannot dial from memory	Defective Line Sensing Relay PWB	Replace Line Sensing PWB
			Dialing problem	See trouble No. 8
7	Cannot record properly into the 31 memory positions or into the LAST NUMBER DIALED position	Warble tones heard when automatically dialing. Get "cannot complete" intercept for automatic or manual dialing	WAIT contacts closed even when WAIT button is not depressed	Replace Memory
			Incorrect dial contact sequence	Replace dial
			Defective logic	Replace Memory
			Open circuit on PSB	Replace adjunct dial*
8	Cannot dial properly from memory		Unknown	
			Did not record properly	1. Record per paragraph 5.01. 2. See trouble No. 6
			Battery not connected or defective	Connect or replace battery
			Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 12B.
			Defective logic	Replace Memory
			Incorrect dial sequence	Replace 35-type dial
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE dialing signal present		
		MB7 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number		
		No audible TOUCH-TONE dialing signal present		

\*Refer to paragraph 6.02(4).

TABLE E (Contd)  
TROUBLE ANALYSIS - 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
8 (Contd)		Audible gap in train of digits being dialed		
		No digits or random digits in memory	AC power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory.
			Disconnected or defective battery	<ol style="list-style-type: none"> <li>1. Plug in the battery.</li> <li>2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the power unit from the ac power outlet for 10 seconds and reinsert.</li> <li>3. If previously stored numbers are not dialed from memory, replace the battery.</li> <li>4. Repeat procedure.</li> </ol>
			Defective power supply circuit	Replace adjunct dial*
9	Cannot dial properly from memory when off hook (Wired with dial tone detector option )	No digits or all the same in random memory locations	Defective Memory	Replace Memory.
		Two or more memory locations have same digits which are usually different from originally recorded digits.	Static discharge damage	<ol style="list-style-type: none"> <li>1. Consult telephone company for proper grounding procedure.</li> <li>2. Replace memory.</li> </ol>
		Automatically dials through a "wait" after pausing momentarily at the "wait" space on a train of recorded digits	Defective WAIT contacts or defective circuit components	<ol style="list-style-type: none"> <li>1. Replace Memory.</li> <li>2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts (if option is provided).</li> </ol>
		MB7 relay does not operate (no click heard) when button is depressed	Precise (350 Hz and 440 Hz) dial tone may not be present. Battery not connected	<p>Make sure precise dial tone (350 Hz and 440 Hz) is present.</p> <p>Connect battery</p>

\*Refer to paragraph 6.02(4).

TABLE E (Contd)  
TROUBLE ANALYSIS - 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Contd)			Memory not securely mounted	Tighten Memory mounting screws
			Improper installation of dial tone detector D-180493	Check connections for D-180493 installation. See Table B
		Same as above - Addition of strap lead between PSB terminals 19 and 29 does not correct problem	Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
			Defective Memory	Replace Memory
		Addition of strap lead between PSB terminals 19 and 29 corrects problem	Defective dial tone detector	Replace D-180493 dial tone detector
	Unknown	Replace adjunct dial*		

\*Refer to paragraph 6.02(4).

# 1200AR1 AND 1200AT1 "TOUCH-A-MATIC" 12 AUTOMATIC DIALER IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

## 1. GENERAL

1.01 This section contains information on the TOUCH-A-MATIC 12 automatic dialer (Fig. 1 and 2), coded 1200AR1 and 1200AT1 dials. Information on the 1200AR1 dial was formerly found in Section 501-164-204.

**Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits specified for Class B computing devices pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at their own expense will be required to take whatever measures may be required to correct the interference.*

1.02 The reasons for reissuing this section are listed below. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

- Add warning notice in compliance with FCC ruling, paragraph 1.01
- Include information on 1200AR1 dial.

1.03 These dialers are factory-wired to interface with a modular single line or two line (first line only) telephone set. The 1200AR1 dial is used for rotary or TOUCH-TONE® service, and the 1200AT1 dial is used only with TOUCH-TONE service. These

dialers cannot be used where A lead control is required, but can be used on party-line service.

1.04 These dialers are available in the colors shown in Table A. The faceplate provided with each dialer is silver.



Fig. 1—1200AR1 Automatic Dialer and Associated Rotary Service Telephone Set

## 2. IDENTIFICATION

2.01 Each dialer provides automatic dialing of up to 12 numbers. A number up to 16 digits in length can be stored.

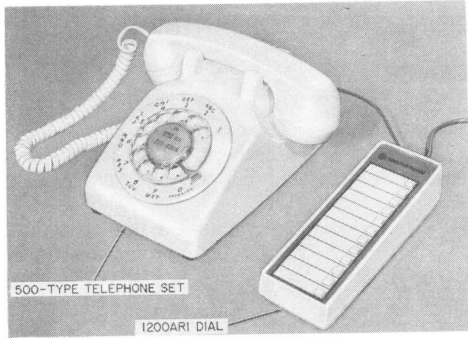
2.02 Design features are as follows:

- Modular unit.
- Solid-state circuit memory.
- Will automatically dial 12 stored numbers.

### NOTICE

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





**Fig. 2—1200AT1 Automatic Dialer and Associated TOUCH-TONE Service Telephone Set**

- Will store up to 16 digits per number.
- Capability to record, change, or delete numbers in memory.
- Single button dialing and directory space for each number.
- Has an internal S1 sounder unit which provides tones for dialing, indicating proper recording procedures, and for checking the battery.
- Battery powered (customer replaceable).
- Recording can be done with handset on- or off-hook. Off-hook recording does not interfere with conversation.
- Record button protected during normal use by faceplate to prevent inadvertent erasure of stored numbers.
- Can be used as a data input device for end-to-end signaling (1200AT1 only).

**2.03** Operating features are as follows:

- (a) 12-button memory field with low force, short travel, nonlocking buttons
- (b) RECORD ON/OFF button (top button when faceplate is removed), when momentarily de-

pressed places dialer in the record mode, subsequent operation terminates the recording mode.

**2.04** Ordering guide is as follows:

- (a) The 1200AR1 dial is a modular type dialer and may be ordered as follows:

- (1) Dial, 1200AR1- (refer to Table A for color suffix) which includes the following:

- (a) Faceplate, 1200A1-122 (silver)
- (b) Customer Instruction Booklet, CIB-2502
- (c) Battery, KS-21618L2 (9-volt)
- (d) Cord, Mounting, D4BU-29 (2-foot)
- (e) 841386352 Directory Marker (color dots and emergency symbols)
- (f) 841397938 Directory Sheet (double-sided).

- (b) The 1200AT1 dial is a modular type dialer and may be ordered as follows:

- (1) Dial, 1200AT1- (refer to Table A for color suffix) which includes the following:

- (a) Faceplate, 1200A1-122 (silver)
- (b) Customer Instruction Booklet, CIB-2502
- (c) Battery, KS-21618L2 (9-volt)
- (d) Cord, Mounting, D4BU-29 (2-foot)
- (e) 841386352 Directory Marker (color dots and emergency symbols)
- (f) 841396559 Directory Sheet (double-sided).

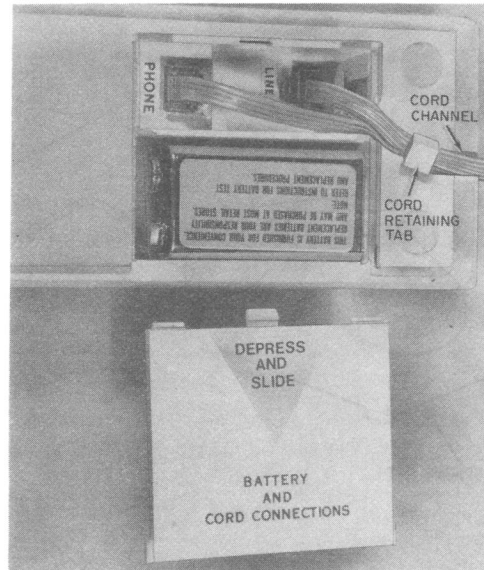
- (c) Replaceable components are as follows:

- Alkaline Battery, 9-volt (subscriber replacement only)
- Cord, Mounting, D4BU-29 (2-foot)
- Faceplate, 1200A1-122 (silver)
- 841397938 Directory Sheet (double-sided), 1200AT1

- 841397559 Directory Sheet (double-sided), 1200AR1
- Cover, Battery (Table A).

**TABLE A**  
**COLOR ORDERING GUIDE**

COLOR	SUFFIX	BATTERY COVER
Black	-03	841399264
Ivory	-50	841399272
Green	-51	841399280
Red	-53	841399298
Yellow	-56	841399306
White	-58	841399256
Beige	-60	841399314
Blue	-62	841399322
Brown	-104	841399330
Rust	-124	841399348



**Fig. 3—Location of Battery and Cords**

### 3. INSTALLATION AND CONNECTIONS

**3.01** There are two types of installations: standard and special.

#### A. Standard Installation

**3.02** Assure that the CO line is terminated into a connecting block which will accept a standard modular D4BU mounting cord.

**3.03** These dialers are shipped with a 9-volt alkaline battery which is to be connected at the time of installation. Remove the battery cover located on bottom side of dial and make the necessary connection (Fig. 3). The battery should last a year under normal telephone usage.

**Note:** All subsequent batteries will be provided and installed by the subscriber. If service is discontinued, disconnect and discard the battery.

**Caution:** *If the mounting cords are reversed at the dialer, you cannot break dial tone from the dialer.*

**3.04** Plug one end of the standard D4BU mounting cord into LINE jack located under battery

cover of the dialer and other end into connecting block from central office (CO). Plug one end of the 2-foot D4BU telephone set mounting cord (furnished with the dial) into the PHONE jack on dialer and plug other end of the cord into the telephone set mounting cord jack (Fig. 4 or 5).

**3.05** Dress the two (2) cords flatwise in the cord channel under the cord retaining tab and replace the battery cover (Fig. 3).

**3.06** For proper illumination of incandescent dial lamp in associated telephone set, the total length of modular mounting cords may be limited. Refer to Section 502-303-101 for TRIMLINE® telephone sets and Section 502-703-101 for PRINCESS® telephone sets.

#### B. Special Installation

**3.07** If an RJ32X USOC arrangement using a 635A manufacture discontinued (MD) or 635B connecting block is available, the dialer can be directly connected using a D8AA mounting cord from the con-

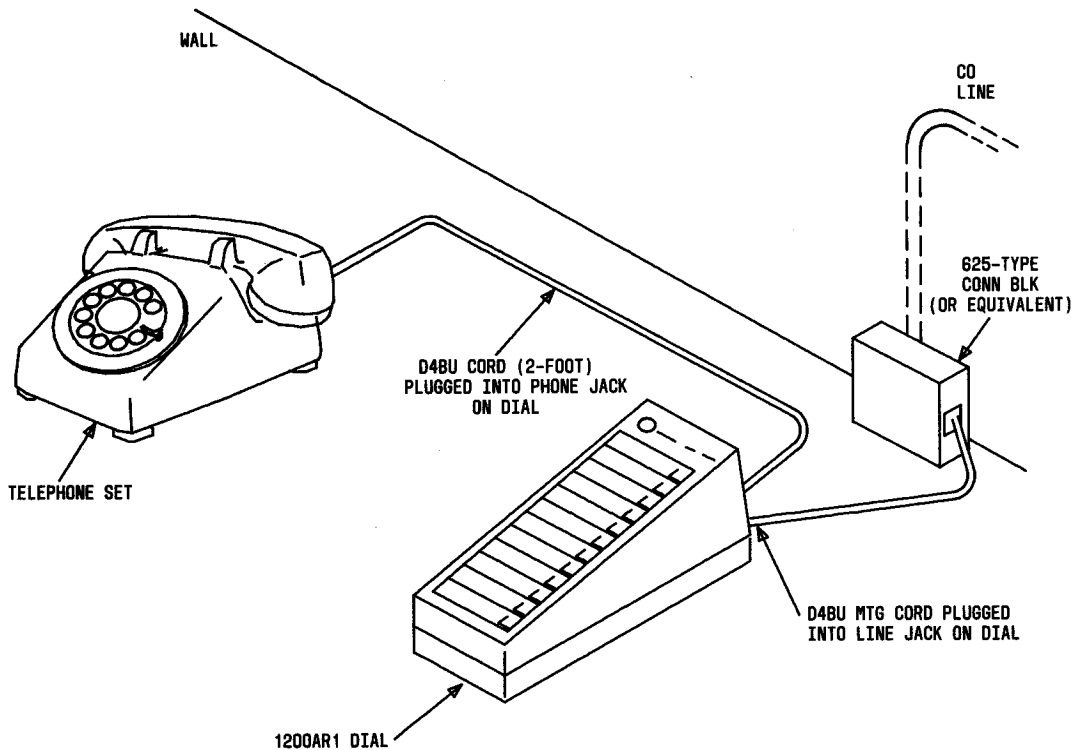


Fig. 4—Recommended Installation Using 1200AR1 Dial

necting block to the line jack on the dial. This arrangement provides a series tip and ring connection through the connecting block. Refer to Section 463-400-130 for additional information.

#### C. Installation Test

##### Associated Telephone Set

**3.08** Manually dial the appropriate code for ringback to test the telephone set ringer and to check that the telephone operates properly.

##### Automatic Dialer (1200AR1)

**3.09** To test the 1200AR1 dialer, proceed as follows.

- (1) Record a known telephone number into each of the 12 memory locations (see paragraph 4.02).

- (2) Dial a prerecorded number from memory by lifting the handset and listening for dial tone; then depress the desired memory button on the dialer. The dialer does not mute the handset receiver and the signals outpulsed should be heard in the receiver.

##### Automatic Dialer (1200AT1)

**3.10** To test the 1200AT1 dialer, proceed as follows.

- (1) Record digits 1 through 9, \*, 0, and # into first memory location (see paragraph 4.02).
- (2) From the subscribers telephone set, manually dial CO dial test and ringer circuit.

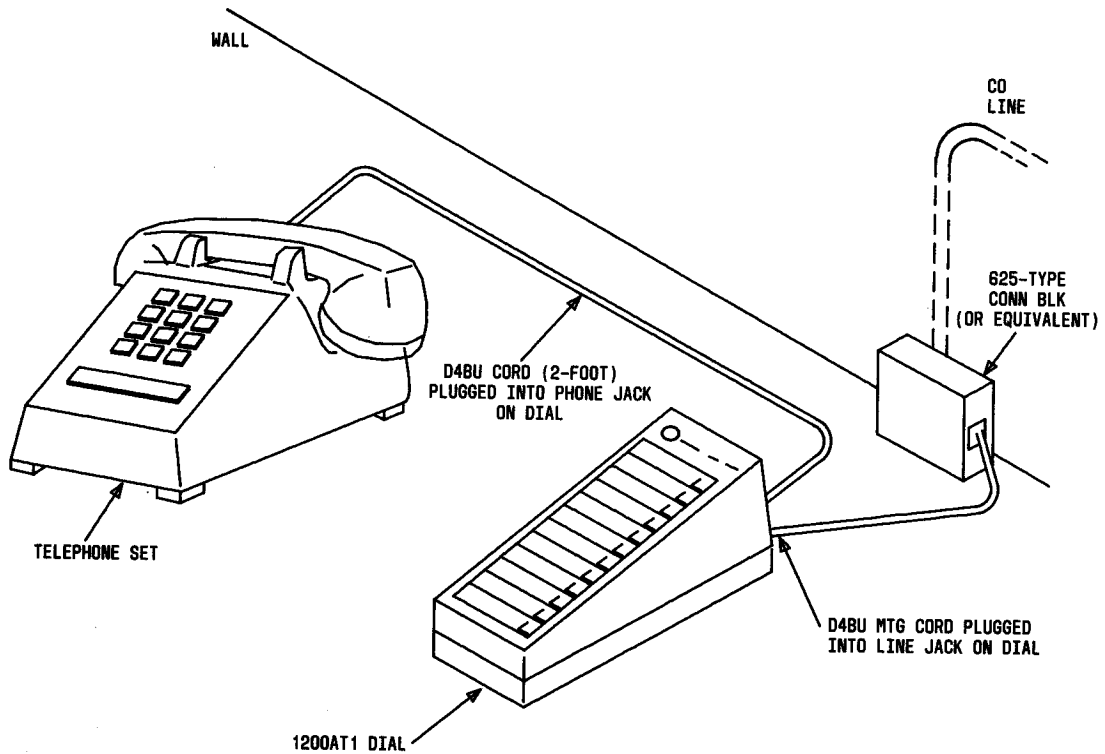


Fig. 5—Recommended Installation Using 1200AT1 Dial

(3) Depress the first memory button (where test information was recorded); verify that correct signal is returned from CO.

#### 4. OPERATION

4.01 The buttons on the dialer serve a dual purpose as follows:

- (1) To select memory locations
- (2) To be used as specific digits when recording a telephone number.

##### A. To Record a Number Into Memory

4.02 Perform the following operations in sequence.

(1) Remove the dialer faceplate (Fig. 6 or 7) using fingernail in slot at top.

(2) Remove the directory sheet and write or type the desired name(s) and number(s). Replace the directory sheet on the dialer.

**Note:** The self-adhesive color dots and emergency symbols are furnished with the dialer so that the customer can place them on the directory sheet to emphasize or highlight important telephone numbers.

(3) Momentarily depress the RECORD ON/OFF button (Fig. 8 or 9). A constant tone will be heard.

(4) Momentarily depress the memory button adjacent to the desired name listed on the direc-

tory sheet. (A double interrupt of the tone will be heard.)

(5) Manually dial the desired number using the digit designations to the right of the memory buttons on dialer, **not** the dial of the associated telephone set. (The tone will interrupt momentarily as each digit is recorded.) A total of 16 digits can be recorded. If 16 digits are recorded, the dialer will beep three (3) times and automatically end the recording procedure.



***If the dialer is inadvertently left in the record mode it will time out after about 1 minute, give three (3) beeps, and automatically reset.***

(6) Momentarily depress the RECORD ON/OFF button. (The tone will cease and the dialer will

be ready either for automatic dialing or to record another number into memory.)

(7) Replace the faceplate after all numbers have been recorded.

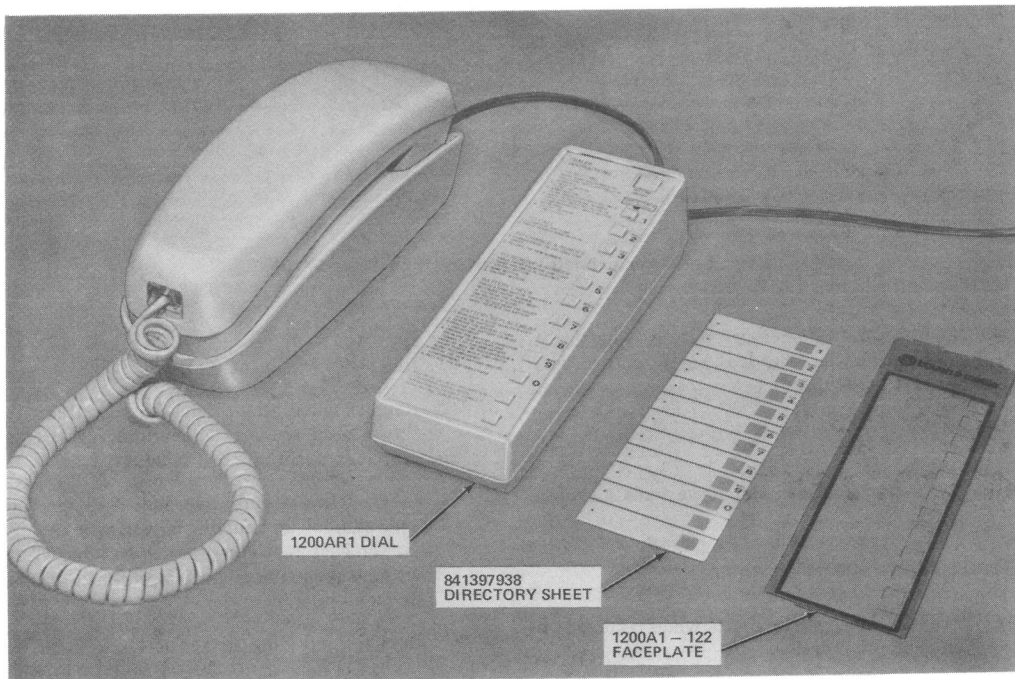
**B. To Change a Number in Memory**

**4.03** When a new number is recorded in a previously used memory position it will automatically replace the previously stored number.

**C. To Delete a Number From Memory**

**4.04** Perform the following operations in sequence.

- (1) Remove the dialer faceplate.
- (2) Momentarily depress the RECORD ON/OFF button.



**Fig. 6—1200AR1 Dial With Faceplate and Directory Sheet Removed**

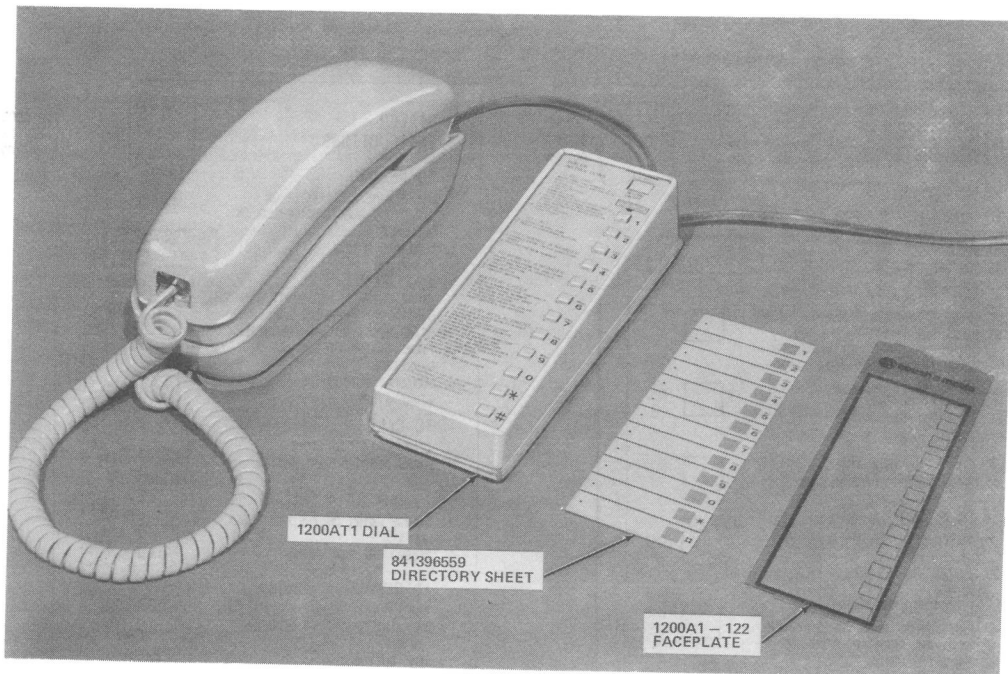


Fig. 7—1200AT1 Dial With Faceplate and Directory Sheet Removed

- (3) Depress the memory button corresponding to the name and number to be deleted.
- (4) Momentarily depress the RECORD ON/OFF button.
- (5) Remove the name and number previously written or typed on the directory sheet.
- (6) Replace the faceplate.

#### D. To Automatically Dial a Number From Memory

4.05 To automatically dial a number, perform the following.

- (1) Lift the handset off-hook and listen for dial tone.
- (2) Depress the desired memory button on the dialer.

#### 5. MAINTENANCE

5.01 Maintenance is limited to replacement of mounting cord, faceplate, directory sheet, and battery cover.

**Caution: Numbers stored in memory may be erased if battery is disconnected for longer than 1 minute during replacement.**

5.02 The battery is to be replaced by the customer. Refer to instruction label (Fig. 8 or 9) or Customer Instruction Booklet (CIB) for detailed battery testing and replacement procedures.

5.03 If a dead battery is suspected, replace with a known good battery. If the new battery clears trouble, retrieve the test battery and inform the customer a new battery is required.

**DIALER INSTRUCTIONS**

RECORD ON/OFF

**TO RECORD**  
WRITE NAME AND NUMBER ON DIRECTORY SHEET AND PRESS IN SEQUENCE

- "ON/OFF" BUTTON (TONE ON)
- NAME BUTTON (TONE BRIEFLY INTERRUPTED TWICE)
- DIGITS OF TELEPHONE NUMBER USING DIGIT BUTTONS ON DIALER (TONE INTERRUPTED WHILE BUTTON DEPRESSED)
- "ON/OFF" BUTTON (TONE STOPS)

**TO CALL**

- LISTEN FOR DIAL TONE
- PRESS DESIRED NAME BUTTON

**TO CHANGE A NUMBER**

- CHANGE ENTRY ON THE DIRECTORY SHEET
- RECORD THE NEW NUMBER

**TO REMOVE A NUMBER**  
ERASE ENTRY FROM THE DIRECTORY SHEET AND PRESS IN SEQUENCE

- "ON/OFF" BUTTON
- NAME BUTTON
- "ON/OFF" BUTTON

**BATTERY CHECK**  
PRESS A NAME BUTTON THAT HAS A RECORDED PHONE NUMBER. IF YOU HEAR THE DIALER "BEEP" THE BATTERY IS GOOD. IF YOU DO NOT HEAR THE DIALER "BEEP", REPLACE THE BATTERY

**BATTERY REPLACEMENT**

- PURCHASE A GOOD QUALITY 9-VOLT ALKALINE BATTERY
- REMOVE THE BATTERY COVER
- REMOVE THE BATTERY FROM ITS COMPARTMENT
- UNSNAP THE BATTERY CONNECTOR FROM THE OLD BATTERY AND CONNECT TO THE NEW BATTERY (MEMORY WILL BE PRESERVED FOR A SHORT PERIOD WHILE THIS STEP IS BEING ACCOMPLISHED)
- INSERT THE NEW BATTERY INTO ITS COMPARTMENT
- REPLACE THE BATTERY COVER

FOR MORE DETAILED INFORMATION CONCERNING INSTALLATION, OPERATION OR TROUBLE CONSULT YOUR INSTRUCTION BOOKLET

NAME BUTTONS & DIGIT BUTTONS

1  
ABC 2  
DEF 3  
GHI 4  
JKL 5  
MNO 6  
PRS 7  
TUV 8  
WXY 9  
0

NAME AND DIGIT BUTTONS

Fig. 8—Instruction Label (1200AR1 Dial)

**DIALER INSTRUCTIONS**

RECORD ON/OFF

**TO RECORD**  
WRITE NAME AND NUMBER ON DIRECTORY SHEET AND PRESS IN SEQUENCE

- "ON/OFF" BUTTON (TONE ON)
- NAME BUTTON (TONE BRIEFLY INTERRUPTED TWICE)
- DIGITS OF TELEPHONE NUMBER USING DIGIT BUTTONS ON DIALER (TONE INTERRUPTED WHILE BUTTON DEPRESSED)
- "ON/OFF" BUTTON (TONE STOPS)

**TO CALL**

- LISTEN FOR DIAL TONE
- PRESS DESIRED NAME BUTTON

**TO CHANGE A NUMBER**

- CHANGE ENTRY ON THE DIRECTORY SHEET
- RECORD THE NEW NUMBER

**TO REMOVE A NUMBER**  
ERASE ENTRY FROM THE DIRECTORY SHEET AND PRESS IN SEQUENCE

- "ON/OFF" BUTTON
- NAME BUTTON
- "ON/OFF" BUTTON

**BATTERY CHECK**  
PRESS A NAME BUTTON THAT HAS A RECORDED PHONE NUMBER. IF YOU HEAR THE DIALER "BEEP" THE BATTERY IS GOOD. IF YOU DO NOT HEAR THE DIALER "BEEP", REPLACE THE BATTERY

**BATTERY REPLACEMENT**  
DESK SETS AND ADJUNCT SETS BEGIN WITH STEP 2

- WALL SETS MUST FIRST BE REMOVED FROM WALL BY PUSHING UP THEN PULLING SET AWAY FROM WALL. TO REPLACE: ALIGN SET WITH WALL MOUNT THEN PUSH DOWN TO SECURE
- USE A 9-VOLT ALKALINE BATTERY
- TURN SET OVER AND REMOVE BATTERY FROM COVERED WELL
- UNSNAP OLD BATTERY (MEMORY WILL BE PRESERVED FOR A SHORT PERIOD OF TIME WHEN BATTERY IS DISCONNECTED)
- INSERT NEW BATTERY INTO WELL REPLACE COVER OVER BATTERY WELL

FOR MORE DETAILED INFORMATION CONCERNING INSTALLATION, OPERATION OR TROUBLE CONSULT YOUR INSTRUCTION BOOKLET

NAME BUTTONS & DIGIT BUTTONS

1  
ABC 2  
DEF 3  
GHI 4  
JKL 5  
MNO 6  
PRS 7  
TUV 8  
WXY 9  
0  
\*  
#

NAME AND DIGIT BUTTONS

Fig. 9—Instruction Label (1200AT1 Dial)

## SERVICE

### 660-TYPE TELEPHONE SETS

#### 1. GENERAL

**1.01** These sets are supplied factory wired as a 660A1 only. Modification kits are available for field conversion of the basic set to provide exclusion.

**1.02** Reissued to add:

- G3A6 handset
- Key systems lead designation A and A1.

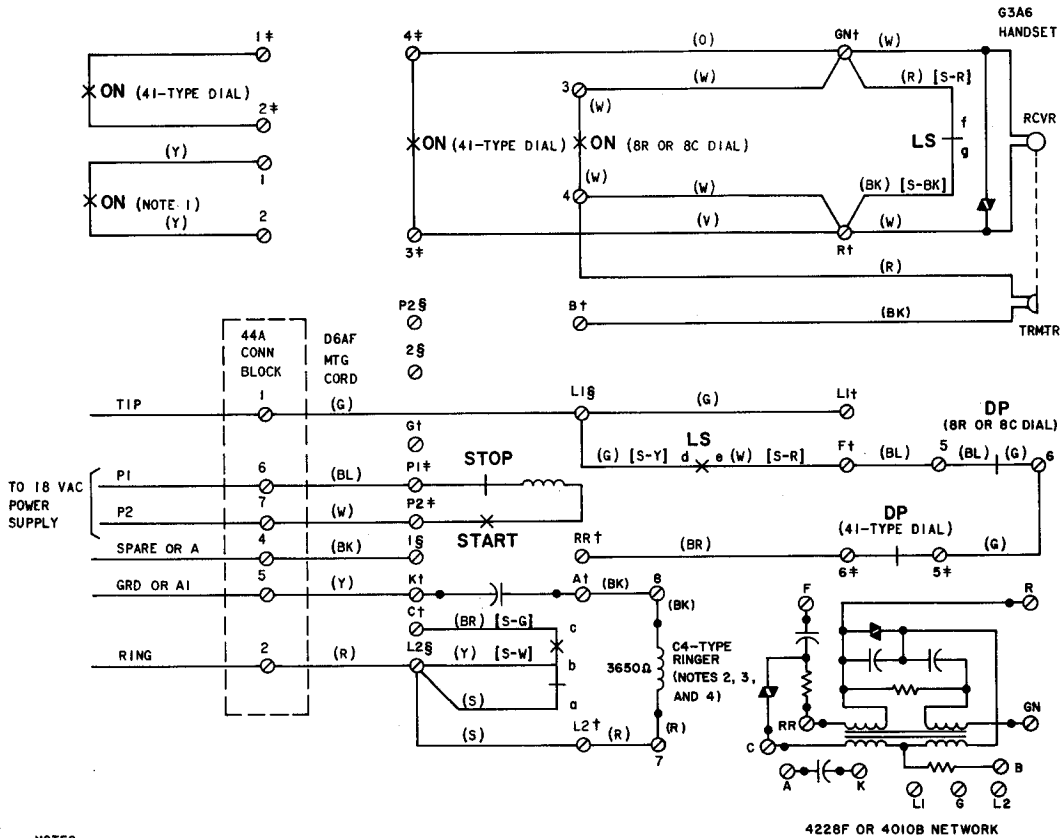
**1.03** ♦Refer to Section 502-617-405 for connection information for the 660A1M (modular) telephone set.♦

**1.04** ♦For identification and ordering information refer to Reference Section 502-601-120.♦

**1.05** For speakerphone connections refer to Division 512.

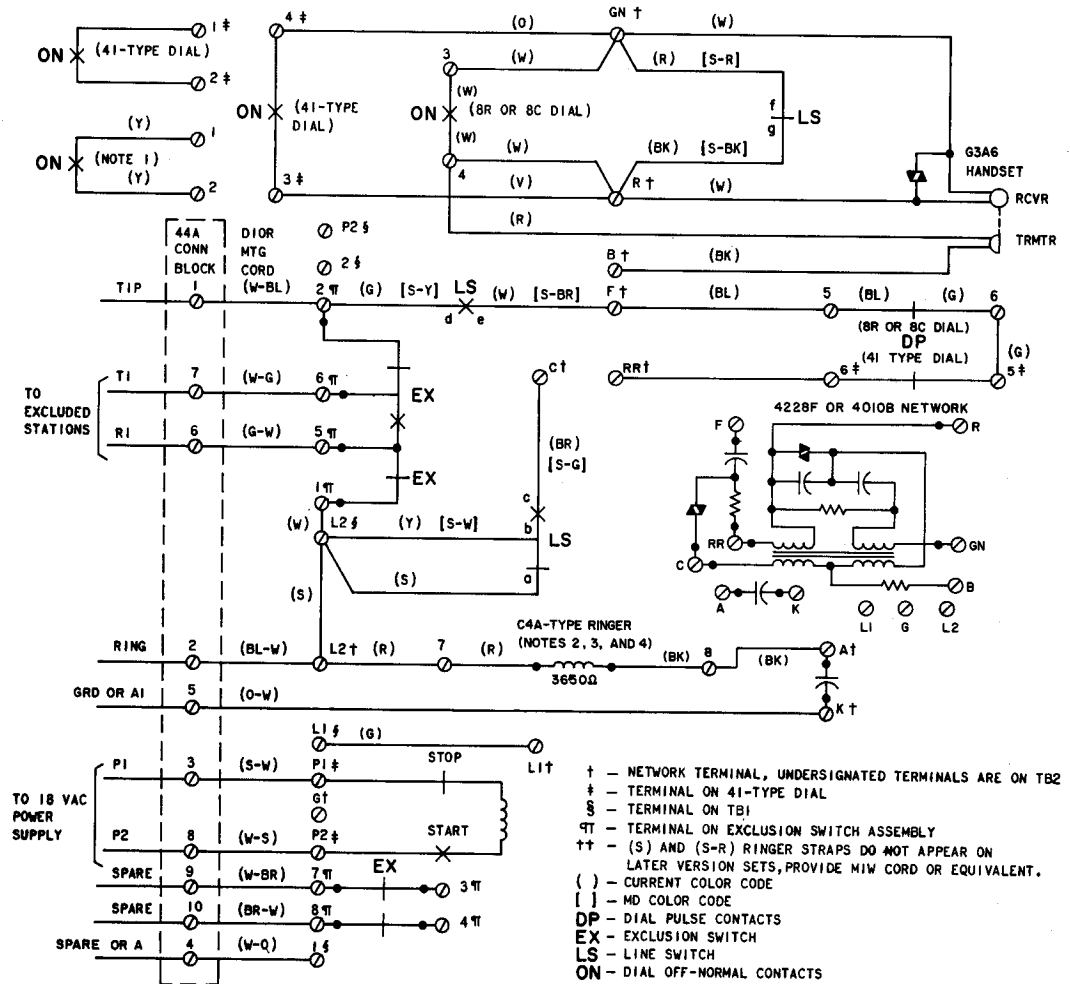
**1.06** ♦To install exclusion switch or for common installation and maintenance information, refer to Section 502-600-102.♦





- NOTES:**
- OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
  - IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT MOVE (BK) RINGER LEAD TO TERMINAL K ON NETWORK. FOR LINE AND RINGER CONNECTIONS REFER TO TABLE A.
  - TO SILENCE RINGER PERMANENTLY, REMOVE (BK) RINGER STRAP FROM A OF NETWORK AND CONNECT TO TERMINAL 8 OF TB2.
  - CONNECTIONS FOR C4B RINGER SHOWN. FOR LINE AND RINGER CONNECTIONS REFER TO TABLE A. WHEN C4A RINGER IS PROVIDED CONNECT AS FOLLOWS:
    - (R) RINGER LEAD TO 7 OF TB2.
    - (BK) RINGER LEAD TO 8 OF TB2.
    - (S) RINGER LEAD TO 9 OF TB2.
    - (S-R) RINGER LEAD TO 10 OF TB2.
    - (R) RINGER STRAP BETWEEN 7 OF TB2 AND L2 OF NETWORK.
    - (BK) RINGER STRAP BETWEEN 8 OF TB2 AND G OF NETWORK.
    - RT (S) RINGER STRAP BETWEEN 9 OF TB2 AND K OF NETWORK.
    - RT (S-R) RINGER STRAP BETWEEN 10 OF TB2 AND A OF NETWORK.
- C4A RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION. FOR LINE AND RINGER CONNECTIONS REFER TO TABLE B.
5. LINE SWITCH SEQUENCE, HANDSET REMOVED:
- |            |             |
|------------|-------------|
| bc - MAKES | ab - BREAKS |
| de - MAKES | fg - BREAKS |
- ( ) - CURRENT COLOR CODE  
 [ ] - MD COLOR CODE  
 † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2  
 ‡ - TERMINAL ON 41-TYPE DIAL
- § - TERMINAL ON TB1  
 RT - (S) AND (S-R) RINGER STRAPS DO NOT APPEAR ON LATER VERSION SETS, PROVIDE MIW CORD OR EQUIVALENT.
- DP - DIAL PULSE CONTACTS  
 LS - LINE SWITCH  
 ON - DIAL OFF-NORMAL CONTACTS

Fig. 1—660A1 Telephone Set, Connections



NOTES:

1. OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
2. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT MOVE (BK) RINGER STRAP TO K OF NETWORK.
3. TO SILENCE RINGER PERMANENTLY, REMOVE (BK) RINGER STRAP FROM TERMINAL 8 OF TB2 AND CONNECT TO A OF NETWORK.
4. CONNECTIONS FOR C4B RINGER SHOWN. FOR LINE AND RINGER CONNECTIONS REFER TO TABLE C. WHEN C4A RINGER IS PROVIDED CONNECT AS FOLLOWS:
 

(R) RINGER LEAD TO 7 OF TB2	(R) RINGER STRAP BETWEEN 7 OF TB2 AND L2 OF NETWORK
(BK) RINGER LEAD TO 8 OF TB2	(BK) RINGER STRAP BETWEEN 8 OF TB2 AND G OF NETWORK
(S) RINGER LEAD TO 9 OF TB2	†† (S) RINGER STRAP BETWEEN 9 OF TB2 AND K OF NETWORK
(S-R) RINGER LEAD TO 10 OF TB2	†† (S-R) RINGER STRAP BETWEEN 10 OF TB2 AND A OF NETWORK
5. LINE SWITCH SEQUENCE, HANDSET REMOVED:
 

bc - MAKES	ab - BREAKS
de - MAKES	fg - BREAKS

◆ Fig. 2—660A2 Telephone Set, Connections ◆

TABLE A

## LINE AND C4B RINGER CONNECTIONS — 660A1 TELEPHONE SET

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY	1A1 OR 1A2 KEY TEL SYSTEM (NOTE)
					NO IDENT GROUND	
Line Wire	Tip Ring Grd A1 A	Connecting Block	1	1	1	1
			2	2	2	2
Mounting Cord	(G) (R) (Y) (BK)	Connecting Block	5*	5	5	5
			1	1	2	1
Mounting Cord in Set	(G) (R) (Y) (BK)	TB1	2	2	1	2
			1	5	5	5
Ringer Leads	(R) (BK)	TB2	4	4	4	4
			L1	L1	L1	L1
Ringer Straps	(R) (BK)	Net.	L2	L2	L2	L2
			A	A	A	A
Line Switch	(S) [S-W] (Y) [S-G] (BR) [S-Y] (G)	TB1	K†	K†	K†	2
			1	1	1	1
Line Switch	(S) [S-W] (Y) [S-G] (BR) [S-Y] (G)	TB1	L2	L2	L2	2
			L2	L2	L2	2
Line Switch	(S) [S-W] (Y) [S-G] (BR) [S-Y] (G)	TB1	C†	C†	C†	1
			L1	L1	L1	L2

\* Ground may be omitted if not required for service. Not required for protection of 41-type dial power supply.

† Terminal on network.

( ) Current color code.

[ ] MD color code.

Note: Move (G) strap from L1 to C of network and provide M1W strap between C and K of network.

♦ TABLE B ♦

## LINE AND C4A RINGER CONNECTIONS — 660A1 TELEPHONE SET

WIRE OR LEAD		INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2 KEY TEL SYSTEM (NOTE)	
				NO IDENT GROUND	IDENTIFYING GROUND			
					1000Ω	2650Ω		
Line Wire	Tip Ring Grd A1 A	Connecting Block	1 2 5*	1 2 5	1 2 5	1 2 5	1 2 5 4	
Mounting Cord	(G) (R) (Y) (BK)		1 2 1 4	1 2 5 4	2 1 5 4	2 1 5 4	2 1 5 4	1 2 5 4
Mounting Cord in Set	(G) (R) (Y) (BK)	TB1	L1 L2 G† 1	L1 L2 G† 1	L1 L2 G† 1	L1 L2 G† 1	L1 L2 2 1	
Ringer Leads	(R) (BK) (S) (S-R)	TB2	7 8 9 10	7 8 9 10	7 8 9 10	7 8 9 10	7 8 9 10	
Ringer Straps ‡	(R) (BK) (S) (S-R)	Net.	L2 G K A	L2 G K A	L2 G K A	K G B B	B B K G	L2 C K A
Line Switch	(S) {S-W} (Y) {S-G} (BR) {S-Y} (G)	TB1	L2 L2 C† L1	L2 L2 C† L1	L2 L2 C† L1	A† L2 C† L1	A† L2 C† L1	2 2 1 L2

\* Ground may be omitted if not required for service. Not required for protection of 41-type dial power supply.

† Terminals on network.

‡ (S) and (S-R) ringer straps do not appear on later version sets, provide M1W cord or equivalent.

( ) Current color code.

{ } MD color code.

Note: Move (G) strap from L1 of network to C of network.

TABLE C

## LINE AND C4B RINGER CONNECTIONS — 660A2 TELEPHONE SET

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY	1A1 OR 1A2 KEY TEL SYSTEM
					NO IDENT GROUND	
Line Wire	Tip Ring Grd A1 A	Connecting Block	1	1	1	1
			2 5*	2 5	2 5	2 5 4
Mounting Cord	(W-BL) (BL-W) (O-W) (W-O)	Connecting Block	1	1	2	1
			2 1 4	2 5 4	1 5 4	2 5 4
Mounting Cord in Set	(W-BL) (BL-W) (O-W) (W-O)		2† L2‡ K‡ 1§	2† L2‡ K‡ 1§	2† L2‡ K‡ 1§	2† L2‡ L2§ 1§
Ringer Leads	(R) (BK)	TB2	7 8	7 8	7 8	7 8
Ringer Straps	(R) (BK)	Net.	L2 A	L2 A	L2 A	L2 A
Line Switch	(S) (S-W) (Y) (S-G) (BR) (S-Y) (G)	TB1	L2 L2 C‡ 2†	L2 L2 C‡ 2†	L2 L2 C‡ 2†	L2 L2 1 L2‡
Straps	(S)	L2§ to L2‡	L2§ to L2‡	L2§ to L2‡	L2§ to L2‡	1† to L2‡
	(W)	L2§ to 1†	L2§ to 1†	L2§ to 1†	L2§ to 1†	2† to C‡

\* Ground may be omitted if not required for service. Not required for protection of 41-type dial power supply.

† Terminal on exclusion switch terminal board.

‡ Terminals on network.

§ TB1.

( ) Current color code.

[ ] MD color code.

◆ TABLE D ◆

LINE AND C4A RINGER CONNECTIONS — 660A2 TELEPHONE SET

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2 KEY TEL SYSTEM
					NO IDENT GROUND	IDENTIFYING GROUND		
						1000Ω	2650Ω	
Line Wire	Tip Ring Grd A1 A	Connecting Block	1 2 5*	1 2 5	1 2 5	1 2 5	1 2 5 4	
Mounting Cord	(W-BL) (BL-W) (O-W) (W-O)		1 2 1 4	1 2 5 4	2 1 5 4	2 1 5 4	2 1 5 4	1 2 5 4
Mounting Cord in Set	(W-BL) (BL-W) (O-W) (W-O)		2† L2† G† 1§	2† L2† G† 1§	2† L2† G† 1§	2† L2† G† 1§	2† L2† L2§ 1§	
Ringer Leads	(R) (BK) (S) (S-R)	TB2	7 8 9 10	7 8 9 10	7 8 9 10	7 8 9 10	7 8 9 10	
Ringer Straps††	(R) (BK) (S) (S-R)	Net.	L2 G K A	L2 G K A	L2 G K A	K G B B	B B K G	L2 C K A
Line Switch	(S) [S-W] (Y) [S-G] (BR) [S-Y] (G)	TB1	L2 L2 C† 2†	L2 L2 C† 2†	L2 L2 C† 2†	A† L2 C† 2†	A† L2 C† 2†	L2 L2 1 L2†
Straps	(S)	L2§ to L2†	L2§ to L2†	L2§ to L2†	L2§ to L2†	L2§ to L2†	L2§ to L2†	1† to L2†
	(W)	L2§ to 1†	L2§ to 1†	L2§ to 1†	L2§ to 1†	L2§ to 1†	L2§ to 1†	2† to C†

\* Ground may be omitted if not required for service. Not required for protection of 41-type dial power supply.

† Terminal on exclusion switch terminal board.

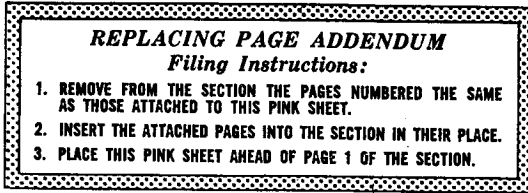
‡ Terminal on network.

§ TB1.

†† (S) and (S-R) ringer straps do not appear on later version sets, provide M1W cord or equivalent.

( ) Current color code.

[ ] MD color code.



**SERVICE**  
**662-TYPE TELEPHONE SETS**

**1. GENERAL**

**1.001** This addendum supplements Section 502-617-402, Issue 2. The attached pages must be inserted in accordance with the filing instructions above.

**1.002** This addendum is issued to reference Section 502-601-130 for ordering and installation information and Section 501-163-101 for power supply connections to 41-type dial.

**Attached:**

**Page 1 dated March 1974, Revised**  
**Page 2 dated March 1974, Reissued**

**1. GENERAL**

The following change applies to Part 1 of this section:

(a) 1.02—revised

## SERVICE

### 662-TYPE TELEPHONE SETS

#### 1. GENERAL

**1.01** This section is reissued to include the KS-20419L1 buzzer.

**1.02** These sets are supplied factory-wired as 662A1 only. For conversion to 662A2 or 662A3 the appropriate key must be ordered and installed separately. Modification kits are available for field conversion to provide exclusion (662A4, 662A5, or 662A6 codes). For ordering and installation information, refer to Section 502-601-130. For power supply connections to the 41-type dial, refer to Section 501-163-101. Speakerphone connections are shown in Division 512.

**1.03** When a 662-type telephone set is not used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, speakerphone leads must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common connection between the circuits of the multiplied telephone sets.

**1.04** ♦Current sets are factory-equipped with a KS-20419L1 (10 volt AC only) buzzer wired to the (BL-V) (V-BL) cord conductors. These conductors should be used when adding buzzer in the field.♦

**TABLE A**  
**PICKUP-SIGNAL KEY CONVERSION — 662A1 OR 662A4 TELEPHONE SET**

CONVERSION OPTIONS	657A OR 599A KEY LEADS					
	(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(BR-W)
HPPPPP (Note)	A2	A2	A2	A2	A2	5
HPPPPS	A2	A2	A2	A2	SG	5
HPPSSS	A2	A2	A2	SG	SG	5
HPPSSS	A2	A2	SG	SG	SG	5
HPPPP*S*	A2	A2	A2	S1	A2†	S1
HPPPP*S*	A2	A2	S1	S1	A2†	S1
HPPPP*S*	A2	S1	S1	S1	A2†	S1

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 or 3 shows line switch lead terminations.

† For 1A KTS connect (BR-BK) key lead to BL terminal.

**Note:** 657A or 599A key as furnished in 662A1 telephone set. To convert from pickup (locking) to signal (nonlocking) remove the P-10E837 screw from the plunger at the key position being converted.



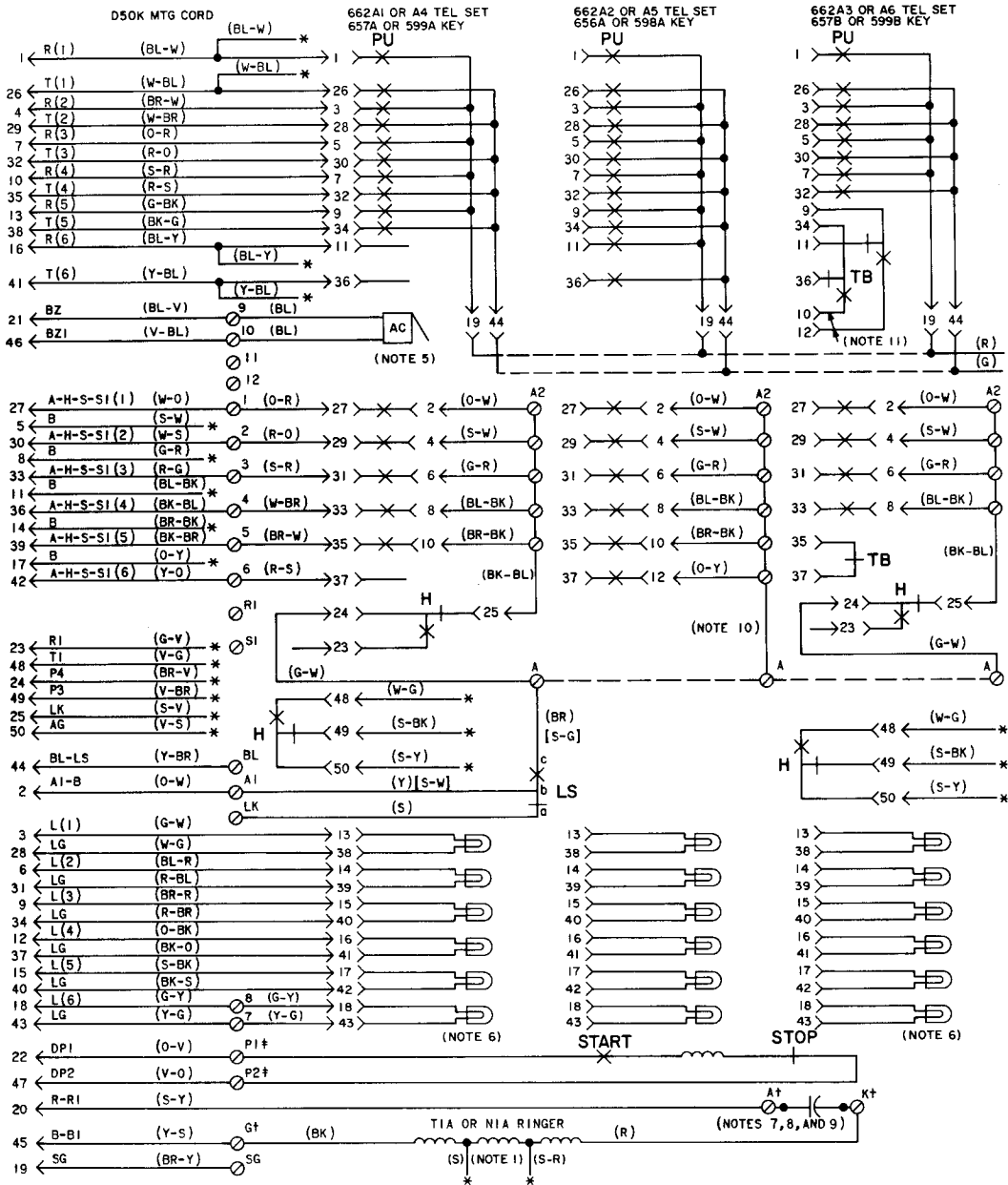


Fig. 1—662-Type Telephone Set, Connections (Sheet 1 of 2)†

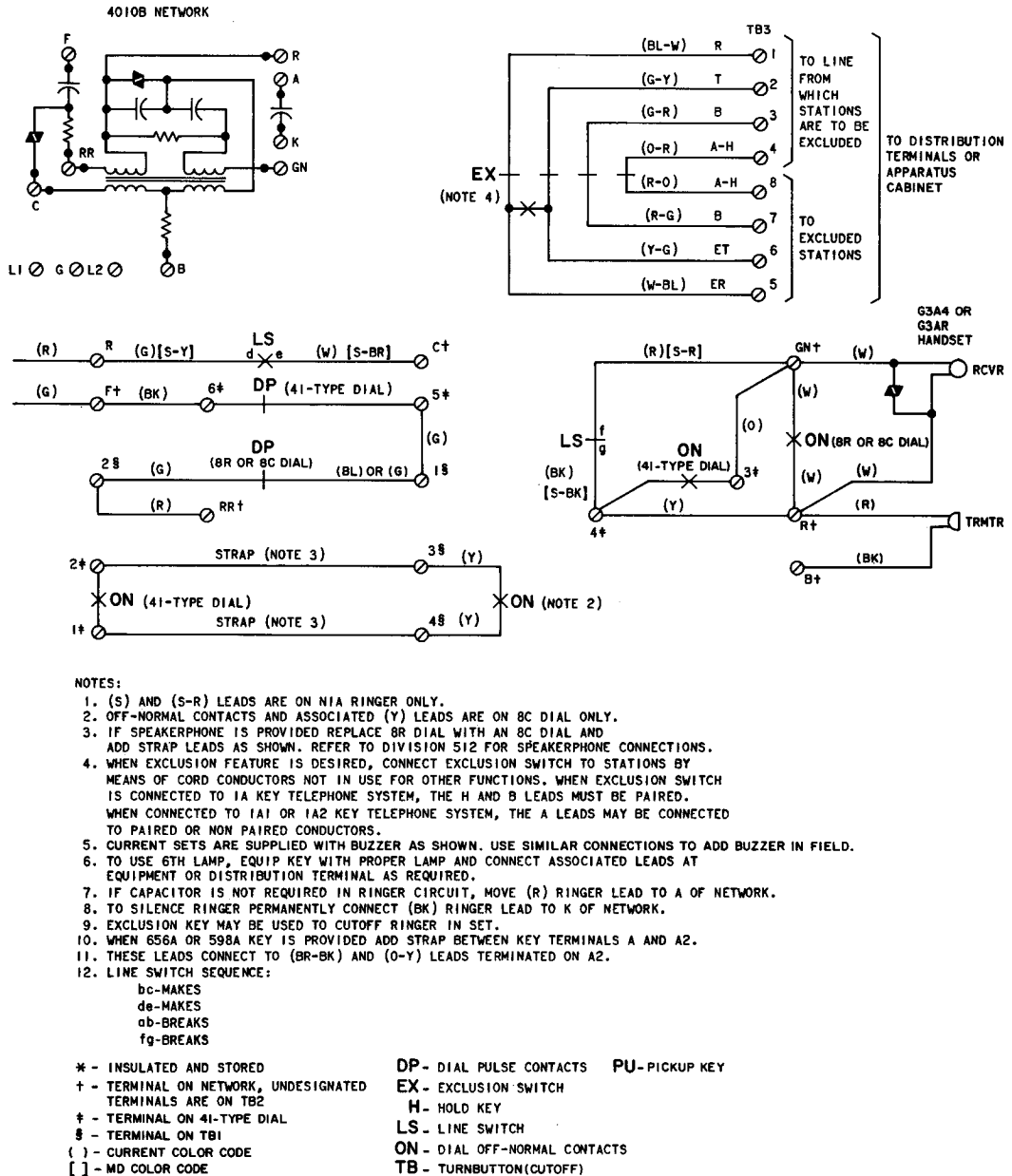
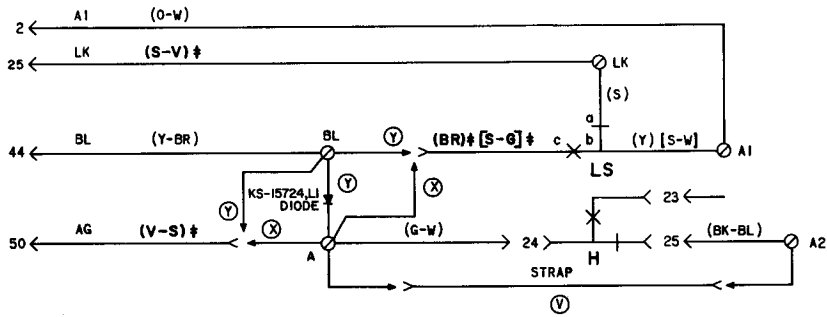
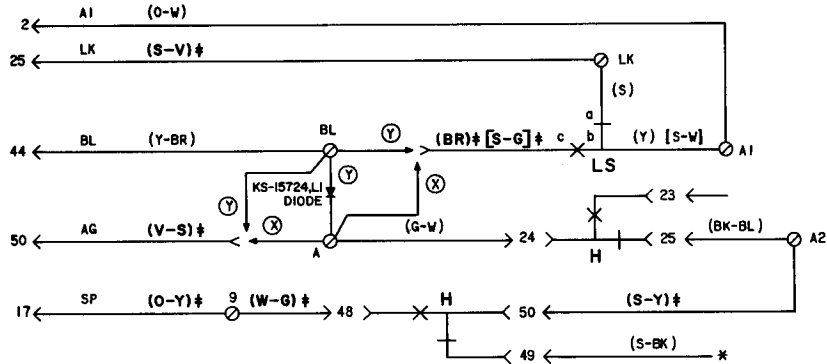


Fig. 1—662-Type Telephone Set, Connections (Sheet 2 of 2)†



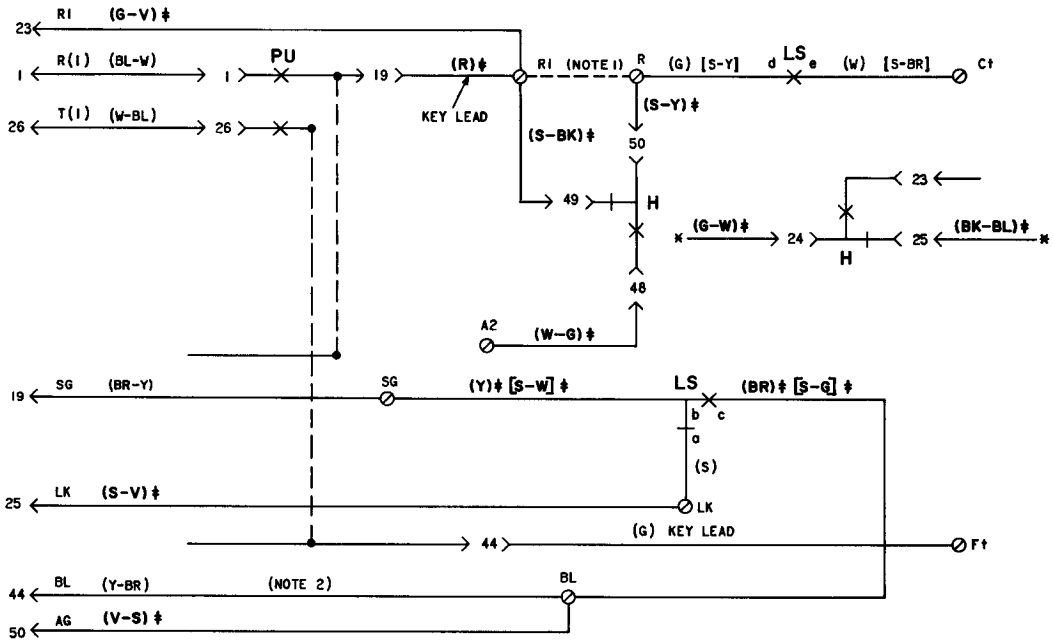
(A) WITHOUT I HOLD



(B) WITH I HOLD

- LS - LINESWITCH
- H - HOLD KEY
- (X) - WITHOUT BUSY LAMP
- (Y) - WITH BUSY LAMP
- (V) - ADD STRAP WHEN 656A OR 598A KEY IS FURNISHED
- ( ) - CURRENT COLOR CODE
- [ ] - MD COLOR CODE
- x - INSULATED AND STORED
- ‡ - LEADS INVOLVED IN MODIFICATION

Fig. 2—1A1 or 1A2 KTS—I Hold and/or Station Busy Lamp Modification



NOTES:

1. WHEN 656A OR 598A KEY IS USED PLACE STRAP BETWEEN R AND R1.
2. IF STATION BUSY LAMP IS NOT PROVIDED, REMOVE (Y-BR) MOUNTING CORD LEAD FROM BL TERMINAL, INSULATE AND STORE.

- ( ) - CURRENT COLOR CODE
- [ ] - MD COLOR CODE
- H - HOLD KEY
- LS - LINE SWITCH
- PU - PICKUP KEY
- \* - INSULATE AND STORE
- † - TERMINAL ON NETWORK, UNDESIGNATED TERMINALS ARE ON TB2.
- ‡ - LEADS INVOLVED IN MODIFICATION

Fig. 3—662-Type Telephone Set Converted For 1A KTS—With or Without Busy Lamp or Speakerphone

TABLE B

## PICKUP-SIGNAL KEY CONVERSION — 662A2 OR 662A5 TELEPHONE SET

CONVERSION OPTIONS	656A OR 598A KEY LEADS						
	(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(O-Y)	(R-S)
PPPPPP (Note)	A2	A2	A2	A2	A2	A2	6
PPPPPS	A2	A2	A2	A2	A2	SG	6
PPPPSS	A2	A2	A2	A2	SG	SG	6
PPSSSS	A2	A2	A2	SG	SG	SG	6
PPSSSS	A2	A2	SG	SG	SG	SG	6
PPPPPS*	A2	A2	A2	A2	S1	A2†	S1
PPPPPS*	A2	A2	A2	S1	S1	A2†	S1
PPPPPS*	A2	A2	S1	S1	S1	A2†	S1
PPPPPS*	A2	S1	S1	S1	S1	A2†	S1

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 or 3 shows line switch lead terminations.

† For 1A KTS connect (O-Y) key lead to BL terminal.

**Note:** When field installed, connect 656A or 598A key as shown unless converted. To convert from pickup (locking) to signal (nonlocking) remove the P-10E837 screw from the plunger at the key position being converted.

◆ TABLE C ◆

## PICKUP-SIGNAL KEY CONVERSION — 662A3 OR 662A6 TELEPHONE SET

CONVERSION OPTIONS	657B OR 599B KEY LEADS								
	(O-W)	(S-W)	(G-R)	(BL-BK)	(W-BR)	(Y-BL)	(BL-Y)	(BR-BK)	(O-Y)
HPPPPC (Note)	A2	A2	A2	A2	4	†	†	A2	A2
HPPPPC	A2	A2	A2	SG	4	†	†	A2	A2
HPPSSC	A2	A2	SG	SG	4	†	†	A2	A2
HPPPS*	A2	A2	S1	A2§	S1	†	†	A2	A2
HPPPS*	A2	S1	S1	A2§	S1	†	†	A2	A2
HPPPPC(1)	A2	A2	A2	A2	4	†	†	A2	A2
HPPPPC(2)	A2	A2	A2	A2	4	TB1-7†	A of Net†	†	†
HPPPPC(3)	A2	A2	A2	A2	4	TB2-9	TB2-10	†	†
HPPPPC(4)	A2	A2	A2	A2	4	†	†	†	†

\* These arrangements use line switch controlled ground for common signal key with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 or 3 shows line switch lead terminations.

† Insulated and stored.

‡ Remove mounting cord (S-Y) (Y-S) leads, insulate and store.

§ For 1A KTS connect (BL-BK) key lead to BL terminal.

Turnbutton may be used to

- (1) Operate auxiliary relay [through 5th R and T (G-BK) (BK-G) pair].
- (2) Cutoff ringer in set
- (3) Cutoff buzzer in set
- (4) Cutoff external audible signal [connect 5th R and T (G-BK) (BK-G) pair to ringer or signal circuit; connect 6th R and T (BL-Y) (Y-BL) pair to external signal].

**Note:** When field installed, connect 657B or 599B key as shown unless converted. To convert from pickup (locking) to signal (nonlocking) remove the P-10E837 screw from the plunger at key position being converted.

♦ TABLE D ♦

## CONDUCTOR ASSIGNMENTS USING 66E-TYPE CONNECTOR BLOCK OR A25B CONNECTOR CABLE

LEAD DESIG	TEL SET TERM.*	MTG CORD OR A25B CONN CABLE		PLUG OR CONN	66E-TYPE CONN BLOCK
		PAIR NO.	CONDUCTOR COLOR	PIN NO.	CLIP TERM. NO.
T	26	1	W-BL	26	1
R	1		BL-W	1	2
A, H, S, or S1	TB2-1	2	W-O	27	3
A1 or B†	TB2-A1		O-W	2	4
LG	38	3	W-G	28	5
L1	13		G-W	3	6
T	28	4	W-BR	29	7
R	3		BR-W	4	8
A, H, S, or S1	TB2-2	5	W-S	30	9
Spare or B†	‡		S-W	5	10
LG	39	6	R-BL	31	11
L2	14		BL-R	6	12
T	30	7	R-O	32	13
R	5		O-R	7	14
A, H, S, or S1	TB2-3	8	R-G	33	15
Spare or B†	‡		G-R	8	16
LG	40	9	R-BR	34	17
L3	15		BR-R	9	18
T	32	10	R-S	35	19
R	7		S-R	10	20
A, H, S, or S1	TB2-4	11	BK-BL	36	21
Spare or B†	‡		BL-BK	11	22
LG	41	12	BK-O	37	23
L4	16		O-BK	12	24
T	34	13	BK-G	38	25
R	9		G-BK	13	26
A, H, S, or S1	TB2-5	14	BK-BR	39	27
Spare or B†	‡		BR-BK	14	28
LG	42	15	BK-S	40	29
L5	17		S-BK	15	30
T	36	16	Y-BL	41	31
R	11		BL-Y	16	32
A, H, S, or S1	TB2-6	17	Y-O	42	33
Spare or B†	‡		O-Y	17	34
LG	TB2-7	18	Y-G	43	35
L6	TB2-8		G-Y	18	36
BL or LS	TB2-BL	19	Y-BR	44	37
SG	TB2-SG		BR-Y	19	38
B or B1	G of net	20	Y-S	45	39
R or R1	A of net		S-Y	20	40
BZ1	TB2-10	21	V-BL	46	41
BZ	TB2-9		BL-V	21	42
Spare or DP2	P2 of 41 dial	22	V-O	47	43
Spare or DP1	P1 of 41 dial		O-V	22	44
Spare T1	‡	23	V-G	48	45
Spare R1	‡		G-V	23	46
Spare P3	‡	24	V-BR	49	47
Spare P4	‡		BR-V	24	48
Spare AG	‡	25	V-S	50	49
Spare LK	‡		S-V	25	50

\* Contacts of key plug unless otherwise noted.

† When set is used in 1A key telephone system, these balance leads must not be used for other purposes.

‡ Insulate and store.

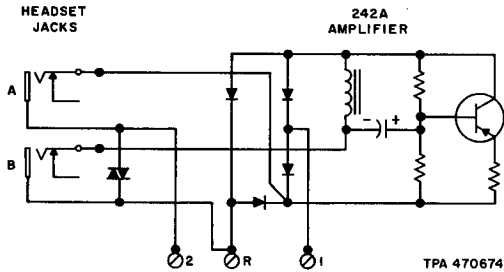
## SERVICE

### 663-TYPE TELEPHONE SETS

#### 1. GENERAL

**1.01** These sets are supplied factory wired with a 242-type amplifier to provide for headset operation. A head telephone set must be ordered separately. For ordering and installation information refer to the appropriate Reference section in Division 502.

**1.02** Reissued to add C4B ringer furnished in current production 663-type telephone sets.



**Fig. 1—242A Amplifier connections—663A1 Telephone Set**

**TABLE A**

**AMPLIFIER CONNECTIONS — 663A1 TELEPHONE SET**

LEAD	242A AMPLIFIER	242B AMPLIFIER*
V-G	R	2
G-V	2	T
O-V	1	1
R	2	2
S	R	T
BK	2	2

\* Place P-29E318 strap or equivalent between R and T terminals of amplifier.

TABLE B

## LINE AND RINGER CONNECTIONS — 663A1 TELEPHONE SET

WIRE OR LEAD		INDIV OR BRIDGED	RING PARTY	TIP PARTY				
				NO IDENT GROUND	IDENT GROUND ¶			
					1000Ω	2650Ω		
Line Wire	Tip	Connecting Block	1	1	1	1	1	
	Ring		2	2	2	2	2	
	Grd A1		5*	5	5	5	5	
	A		4	4	4	4	4	
Mounting Cord	G		1	1	1	1	1	
	R		2	2	2	2	2	
	Y		4	4	4	4	4	
	BK		5	5	5	5	5	
Mounting Cord in Set	G		TB1	2	2	2	2	2
	R			C†	C†	C†	F†	F†
	Y	1		1	1	1	1	
	BK	3		3	3	3	3	
Ringer Leads	R	TB2	7 ¶ or 9	7 ¶ or 9	7 ¶ or 9	7	7	
	BK		8	8	8	8	8	
	S ¶		9	9	9	9	9	
	S-R ¶		10	10	10	9	9	
Ringer Straps	R	Net.	C	C	2‡	K	3‡	
	BK		2‡	3‡	3‡	3‡	K	
	S		K	K	K	B	B	
	S-R ¶		A	A	A	B§	B§	
Key Assembly Leads	S-V		F	F	F	C	C	

\* Ground may be omitted if not required for service. Not required for protection of 41-type dial power supply.

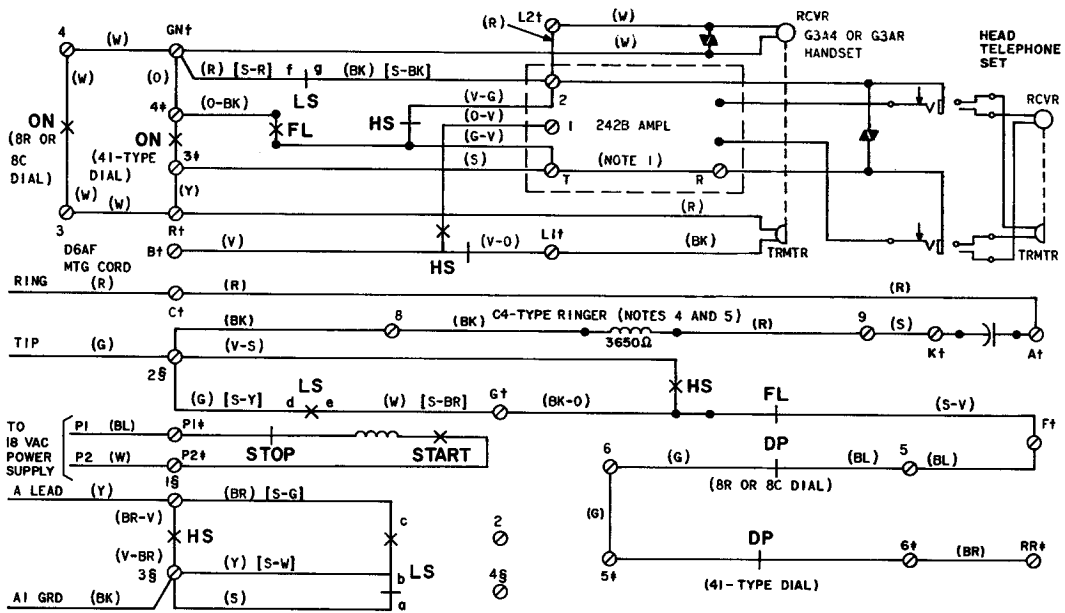
† Network terminal.

‡ TB1.

§ Place M1W cord or equivalent from A of network to 2 of TB1.

¶ C4A ringer only





- NOTES:
- P-29E318 STRAP.
  - ON EARLIER MANUFACTURED SETS, AT TB2:
    - (A) TERMINALS 2, 5, AND 6 WERE DESIGNATED 6, 2 AND 5 RESPECTIVELY
    - (B) (S-V) FROM KEY ASSEMBLY WAS TERMINATED WITH (BL) DIAL LEAD AND (BL) STRAP AT TB2
  - OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
  - CONNECTIONS FOR C4B RINGER SHOWN. REFER TO TABLE B FOR LINE AND RINGER CONNECTIONS. IF C4A RINGER IS USED WIRE AS FOLLOWS:
    - (BK) RINGER LEAD TO 8 OF TB2
    - (R) RINGER LEAD TO 7 OF TB2
    - (S) RINGER LEAD TO 9 OF TB2
    - (S-R) RINGER LEAD TO 10 OF TB2
    - (S) STRAP BETWEEN 9 OF TB2 AND K OF NETWORK
    - (S-R) STRAP BETWEEN 10 OF TB2 AND A OF NETWORK
 C4A RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION. REFER TO TABLE B.
  - TO SILENCE RINGER PERMANENTLY MOVE (BK) RINGER LEAD TO TERMINAL 9 OF TB2.
  - LINE SWITCH SEQUENCE:
    - bc - MAKES    ab - BREAKS
    - de - MAKES    fg - BREAKS

- † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2
- ‡ - TERMINAL ON 41 - TYPE DIAL
- § - TERMINAL ON TB1
- ( ) - CURRENT COLOR CODE
- [ ] - MD COLOR CODE
- DP - DIAL PULSE CONTACTS
- FL - FLASH KEY
- HS - HEADSET ON-OFF KEY
- LS - LINE SWITCH
- ON - DIAL OFF-NORMAL CONTACTS

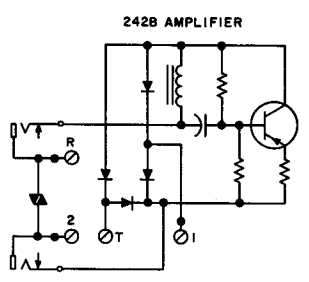
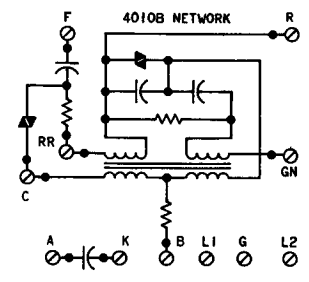
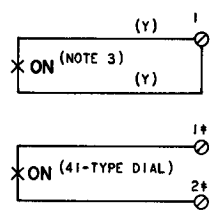


Fig. 2—663A1 Telephone Set, Connections

## SERVICE

### 660A1M TELEPHONE SETS

#### 1. GENERAL

**1.01** Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

**1.02** For identification and ordering information, refer to reference Section 502-601-121.

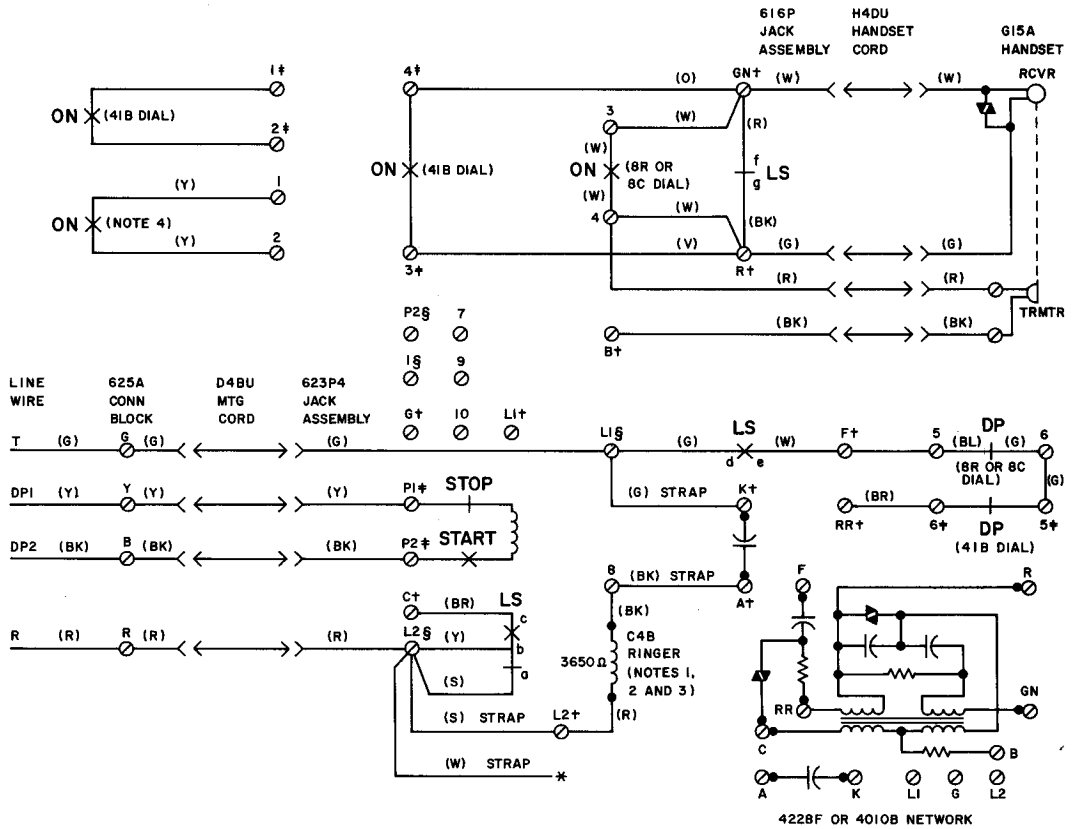
**1.03** The 660A1M (modular) telephone set is factory wired for bridged ringing only (Fig. 1). For all other services the D4BU-29 mounting cord and 623P4 jack assembly must be removed and replaced with a D6AF-87 mounting cord, refer to Fig. 2, Tables A and B.

**1.04** When exclusion is provided the appropriate D-kit of parts must be installed and the D4BU-29 mounting cord and 623P4 jack assembly must be removed and replaced with a D10R-87 mounting cord, refer to Fig. 3, Tables C and D.

**1.05** To install exclusion switch, or for common installation and maintenance information, refer to Section 502-600-102. Speakerphone connections are found in Division 512.

**1.06** When a 660A1M telephone set is used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, speakerphone leads (T1, R1, P3, P4, AG, and LK) at sets not having speakerphone must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common connection between the circuits of the multiplied telephone sets.

**1.07** For additional information on the modular concept, refer to Section 503-100-100.



NOTES:

1. TELEPHONE SET IS FACTORY-WIRED FOR BRIDGED RINGING ONLY.
2. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT MOVE (BK) RINGER STRAP FROM A TO TERMINAL K ON NETWORK.
3. TO SILENCE RINGER PERMANENTLY, REMOVE (BK) RINGER STRAP FROM A OF NETWORK AND CONNECT TO TERMINAL 8 OF TB2.
4. OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
5. LINE SWITCH OFF-HOOK SEQUENCE:  
bc - MAKES    ab - BREAKS  
de - MAKES    fg - BREAKS

\* - INSULATED AND STORED

+ - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2

‡ - TERMINAL ON 41B DIAL

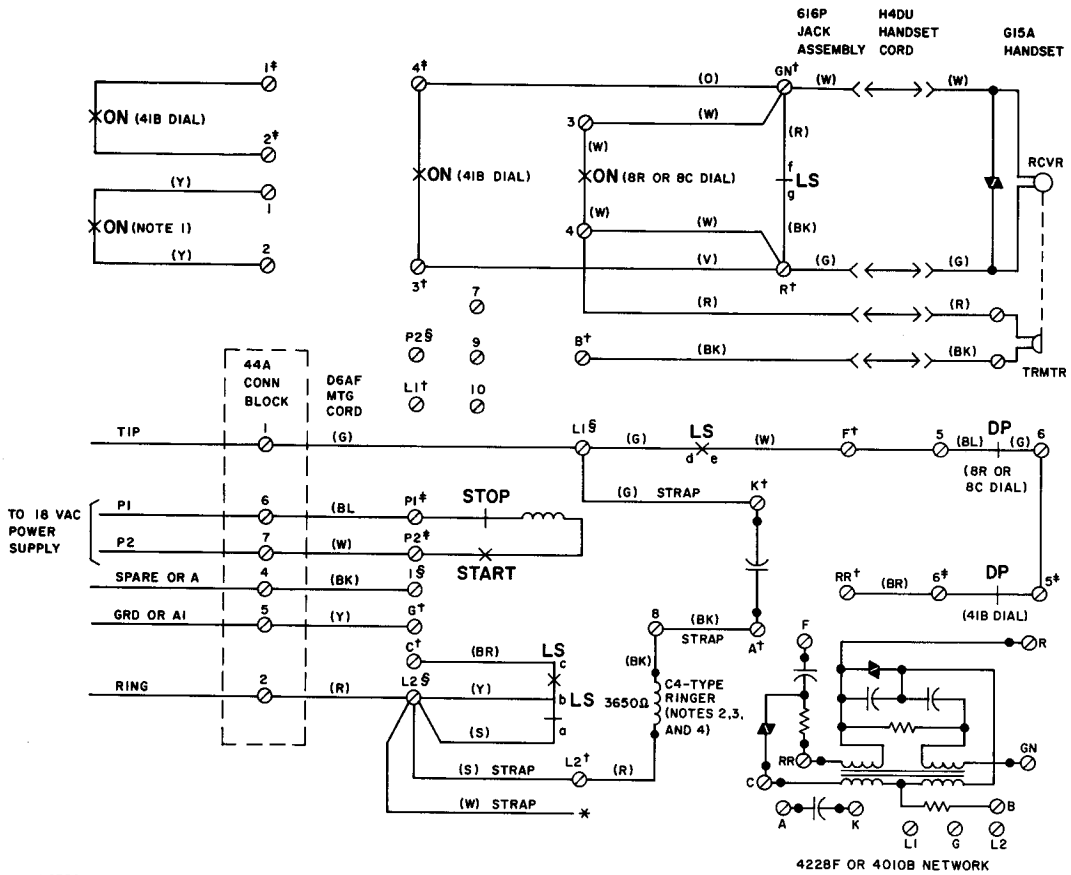
§ - TERMINAL ON TB1

DP - DIAL PULSE CONTACTS

LS - LINE SWITCH

ON - DIAL OFF-NORMAL CONTACTS

Fig. 1—660A1M Telephone Set, Connections



NOTES:

1. OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEAD ARE ON 8C DIAL ONLY.
2. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT MOVE (BK) RINGER STRAP FROM A TO TERMINAL K ON NETWORK. FOR LINE AND RINGER CONNECTIONS REFER TO TABLE A.
3. TO SILENCE RINGER PERMANENTLY, REMOVE (BK) RINGER STRAP FROM A OF NETWORK AND CONNECT TO TERMINAL 8 OF TB2.
4. SET IS FACTORY-WIRED FOR BRIDGED RINGING. CONNECTIONS FOR C4B RINGER SHOWN, FOR LINE AND RINGER CONNECTIONS REFER TO TABLE A. C4A RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION, FOR LINE AND RINGER CONNECTIONS REFER TO TABLE B.
5. LINE SWITCH SEQUENCE, OFF-HOOK SEQUENCE:
 

bc - MAKES	ab - BREAKS
de - MAKES	fg - BREAKS

\* - INSULATED AND STORED

† - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2

‡ - TERMINAL ON 41B DIAL

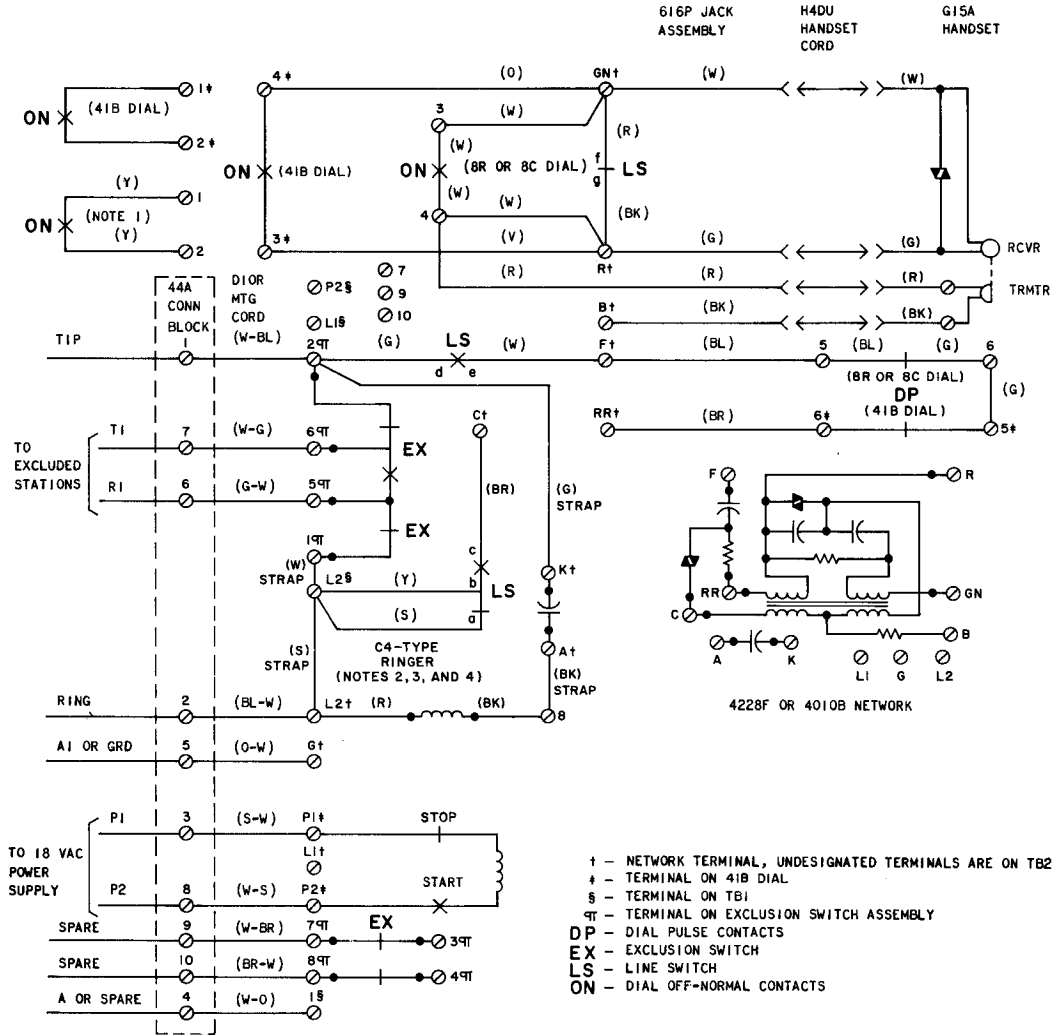
§ - TERMINAL ON TB1

DP - DIAL PULSE CONTACTS

LS - LINE SWITCH

ON - DIAL OFF-NORMAL CONTACTS

Fig. 2—660A1M Telephone Set (Equipped with D6AF Mounting Cord), Connections



- NOTES:
- OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
  - IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT MOVE (BK) RINGER STRAP FROM A TO K NETWORK.
  - TO SILENCE RINGER PERMANENTLY, REMOVE (BK) RINGER STRAP FROM TERMINAL 8 OF TB2 AND CONNECT TO A OF NETWORK.
  - SET IS FACTORY-WIRED FOR BRIDGED RINGING. CONNECTIONS FOR C4B RINGER SHOWN, FOR LINE AND RINGER CONNECTIONS REFER TO TABLE C. C4A RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION, FOR LINE AND RINGER CONNECTIONS REFER TO TABLE D.
  - LINE SWITCH OFF-HOOK SEQUENCE:  
bc - MAKES      ab - BREAKS  
de - MAKES      fg - BREAKS

Fig. 3—660A1M Telephone Set (Equipped with DIOR Mounting Cord), Connections

TABLE A

**LINE AND C4B RINGER CONNECTIONS  
(680A1M TELEPHONE SET EQUIPPED WITH D6AF MOUNTING CORD)**

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY	1A1 OR 1A2 KEY TEL SYSTEM (NOTE)
					TO IDENT GROUND	
Line Wire	Tip Ring Grd A1 A P1 P2	Connecting Block	1	1	1	1
			2	2	2	2
			5*	5	5	5
			—	—	—	4
			6	6	6	6
			7	7	7	7
Mtg Cord	G R Y BK BL W	Connecting Block	1	1	2	1
			2	2	1	2
			5	5	5	5
			4	4	4	4
			6	6	6	6
			7	7	7	7
Mtg Cord in Set	G R Y BK	TB1	L1 L2 G† 1	L1 L2 G† 1	L1 L2 G† 1	L1 L2 G† 1
		41B Dial	P1 P2	P1 P2	P1 P2	P1 P2
Line Switch	S Y BR G	TB1	L2 L2 C† L1	L2 L2 C† L1	L2 L2 C† L1	G† G† 1 L2
Strap	G		K† to L1 of TB1	K† to G†	K† to G†	K† to L1 of TB1

\* Ground may be omitted if not required for service. Not required for protection of 41B dial power supply.

† Terminal on network.

*Note:* Provide M1W strap between C and K of network

TABLE B

**LINE AND C4A RINGER CONNECTIONS  
(660A1M TELEPHONE SET EQUIPPED WITH D6AF MOUNTING CORD)**

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2 KEY TEL SYSTEM
					NO IDENT GROUND	IDENTIFYING GROUND		
						1000Ω	2650Ω	
Line Wire	Tip Ring Grd A1 A P1 P2	Connecting Block	1	1	1	1	1	1
			2	2	2	2	2	2
			5*	5	5	5	5	5
			—	—	—	—	—	—
			6	6	6	6	6	6
			7	7	7	7	7	7
			7	7	7	7	7	7
Mtg Cord	G R Y BK BL W	Connecting Block	1	1	2	2	2	1
			2	2	1	1	1	2
			5	5	5	5	5	5
			4	4	4	4	4	4
			6	6	6	6	6	6
			7	7	7	7	7	7
			7	7	7	7	7	7
Mtg Cord in Set	G R Y BK	TB1	L1	L1	L1	L1	L1	L1
			L2	L2	L2	L2	L2	L2
	BK	TB1	G†	G†	G†	G†	G†	G†
			1	1	1	1	1	1
	BL W	41B Dial	P1	P1	P1	P1	P1	P1
			P2	P2	P2	P2	P2	P2
Ringer Leads	R BK S S-R	TB2	L2†	L2†	L2†	K†	B†	L2†
			8	8	8	8	8	8
			9	9	9	9	9	9
			10	10	10	10	10	10
Ringer Straps	BK	TB2	8 to L1†	8 to G†	8 to G†	8 to B†	8 to B†	8 to C†
			†	9 to K†	9 to K†	9 to B†	9 to K†	9 to K†
			†	10 to A†	10 to A†	10 to B†	10 to G†	10 to A†
Strap	G	TB1	L1 to L1†	L1 to L1†	L1 to L1†	L1 to L1†	L1 to L2†	L1 to C†
Line Switch	S Y BR G	TB1	L2	L2	L2	A†	A†	G†
			L2	L2	L2	L2	L2	G†
			C†	C†	C†	C†	C†	1
			L1	L1	L1	L1	L1	L2

\* Ground may be omitted if not required for service. Not required for protection of 41B dial power supply.

† Terminals on network.

‡ Straps must be provided, use M1W cord or equivalent.

**TABLE C**  
**LINE AND C4B RINGER CONNECTIONS**  
**(660A1M TELEPHONE SET EQUIPPED WITH D10R MOUNTING CORD)**

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY	1A1 OR 1A2 KEY TEL SYSTEM			
					NO IDENT GROUND				
Line Wire	Tip Ring Grd A1 A T1 R1 P1 P2	Connecting Block	1	1	1	1			
			2	2	2	2			
			5*	5	5	5			
			—	—	—	4			
			7	7	7	7			
			6	6	6	6			
			3	3	3	3			
			8	8	8	8			
Mtg Cord	W-BL BL-W O-W W-O	Connecting Block	1	1	2	1			
			2	2	1	2			
			5	5	5	5			
			4	4	4	4			
	W-G G-W W-BR BR-W W-S S-W		Connecting Block	7	7	7	7		
				6	6	6	6		
				9	9	9	9		
				10	10	10	10		
8	8	8		8					
3	3	3		3					
Mtg Cord in Set	W-BL BL-W O-W W-O W-G G-W W-BR BR-W W-S S-W			2†	2†	2†	2†		
				L2†	L2†	L2†	L2†		
			G†	G†	G†	L2§			
			1§	1§	1§	1§			
			6‡	6‡	6‡	6‡			
			5‡	5‡	5‡	5‡			
			7‡	7‡	7‡	7‡			
			8‡	8‡	8‡	8‡			
			P2¶	P2¶	P2¶	P2¶			
			P1¶	P1¶	P1¶	P1¶			
			Ringer Leads	R BK	TB2	L2† 8	L2† 8	L2† 8	L2† 8
			Ringer Strap	BK	TB2	8 to A†	8 to A†	8 to A†	8 to A†
Line Switch	S Y BR G	TB1	L2 L2 C† 2‡	L2 L2 C† 2‡	L2 L2 C† 2‡	L2 L2 1 2†			
Straps	G	NET.	K to 2‡	K to G	K to G	K to 2‡			
	S		L2 to L2§	L2 to L2§	L2 to L2§	L2 to 1‡			
	W	Excn Switch	1 to L2§	1 to L2§	1 to L2§	2 to C†			

\* Ground may be omitted if not required for service. Not required for protection of 41B dial power supply.

† Terminals on network.

‡ Terminal on exclusion switch terminal board.

§ TB1.

¶ Terminal on 41B dial.



**TABLE D**  
**LINE AND C4A RINGER CONNECTIONS**  
**(660A1M TELEPHONE SET EQUIPPED WITH D10R MOUNTING CORD)**

WIRE OR LEAD		INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2 KEY TEL SYSTEM	
				NO IDENT GROUND	IDENTIFYING GROUND			
					1000Ω	2650Ω		
Line Wire	Tip	Connecting Block	1	1	1	1	1	
	Ring		2	2	2	2	2	
	Grd A1		5¶	5	5	5	5	
	A		—	—	—	—	4	
	T1		7	7	7	7	7	
	R1		6	6	6	6	6	
	P1		3	3	3	3	3	
	P2		8	8	8	8	8	
Mtg Cord	W-BL	Connecting Block	1	1	2	2	1	
	BL-W		2	2	1	1	2	
	O-W		5	5	5	5	5	
	W-O		4	4	4	4	4	
	W-G		7	7	7	7	7	
	G-W		6	6	6	6	6	
	W-BR		9	9	9	9	9	
	BR-W		10	10	10	10	10	
	W-S		8	8	8	8	8	
	S-W		3	3	3	3	3	
Mtg Cord in Set	W-BL	Connecting Block	2‡	2‡	2‡	2‡	2‡	
	BL-W		L2‡	L2‡	L2‡	L2‡	L2‡	
	O-W		G‡	G‡	G‡	G‡	L2§	
	W-O		1§	1§	1§	1§	1§	
	W-G		6‡	6‡	6‡	6‡	6‡	
	G-W		5‡	5‡	5‡	5‡	5‡	
	W-BR		7‡	7‡	7‡	7‡	7‡	
	BR-W		8‡	8‡	8‡	8‡	8‡	
	W-S		P2¶	P2¶	P2¶	P2¶	P2¶	
	S-W		P1¶	P1¶	P1¶	P1¶	P1¶	
Ringer Leads	R	TB2	L2‡	L2‡	L2‡	K‡	B‡	L2‡
	BK		8	8	8	8	8	8
	S		9	9	9	9	9	9
	S-R		10	10	10	10	10	10
Ringer Straps	BK	TB2	8 to G‡	8 to G‡	8 to G‡	8 to G‡	8 to B‡	8 to C‡
	**		9 to K‡	9 to K‡	9 to K‡	9 to B‡	9 to K‡	9 to K‡
Line Switch	S	TB1	L2	L2	L2	A‡	A‡	L2
	Y		L2	L2	L2	L2	L2	L2
	BR		C‡	C‡	C‡	C‡	C‡	1
	G		2‡	2‡	2‡	2‡	2‡	L2‡
Straps	G	NET.	L1 to 2‡	L1 to G	L1 to G	L1 to G	L1 to G	C to 2‡
	S		L2 to L2§	L2 to L2§	L2 to L2§	L2 to L2§	L2 to L2§	L2 to 1‡
	W	Excn Switch	1 to L2§	1 to L2§	1 to L2§	1 to L2§	1 to L2§	1‡ to *

\* Insulate and store.

‡ Terminal on network.

‡ Terminal on exclusion switch terminal board.

§ TB1.

¶ Ground may be omitted if not required for service. Not required for protection of 41B dial.

\*\* Provide M1W cord or equivalent.

## SERVICE

### 662A1M TELEPHONE SETS

#### 1. GENERAL

- 1.01 Whenever this section is reissued the reason for reissue will be listed in this paragraph.
- 1.02 The 662A1M (modular) telephone set is equipped with a 635A5 key. A modification kit is available for field conversion to provide exclusion.
- 1.03 For identification and ordering information, refer to reference Section 502-601-131.
- 1.04 To install exclusion switch, or for common installation and maintenance information,

refer to Section 502-600-102. Speakerphone connections are found in Division 512.

1.05 When a 662A1M telephone set is used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature the speakerphone leads (T1, R1, P3, P4, AG, and LK) at all sets not having speakerphone must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common connection between the circuits of the multiplied telephone sets.

1.06 For additional information on the modular concept, refer to Section 503-100-100.

TABLE A

PICKUP-SIGNAL KEY CONVERSION – 662A1M TELEPHONE SET

CONVERSION OPTIONS	635A5, KEY LEADS					
	(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(BR-W)
HPPPPP (Note)	A2	A2	A2	A2	A2	5
HPPPPS	A2	A2	A2	A2	SG	5
HPPSSS	A2	A2	A2	SG	SG	5
HPPSSS	A2	A2	SG	SG	SG	5
HPPPP*S*	A2	A2	A2	S1	A2†	S1
HPPP*P*S*	A2	A2	S1	S1	A2†	S1
HPP*P*P*S*	A2	S1	S1	S1	A2†	S1

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 or 3 shows line switch lead terminations.

† For 1A KTS connect (BR-BK) key lead to BL terminal.

Note: 635A5 key is furnished in 662A1M telephone set. To convert from pickup (locking) to signal (nonlocking) remove 812857738 or P-28E773 screw from the plunger at the key position being converted.

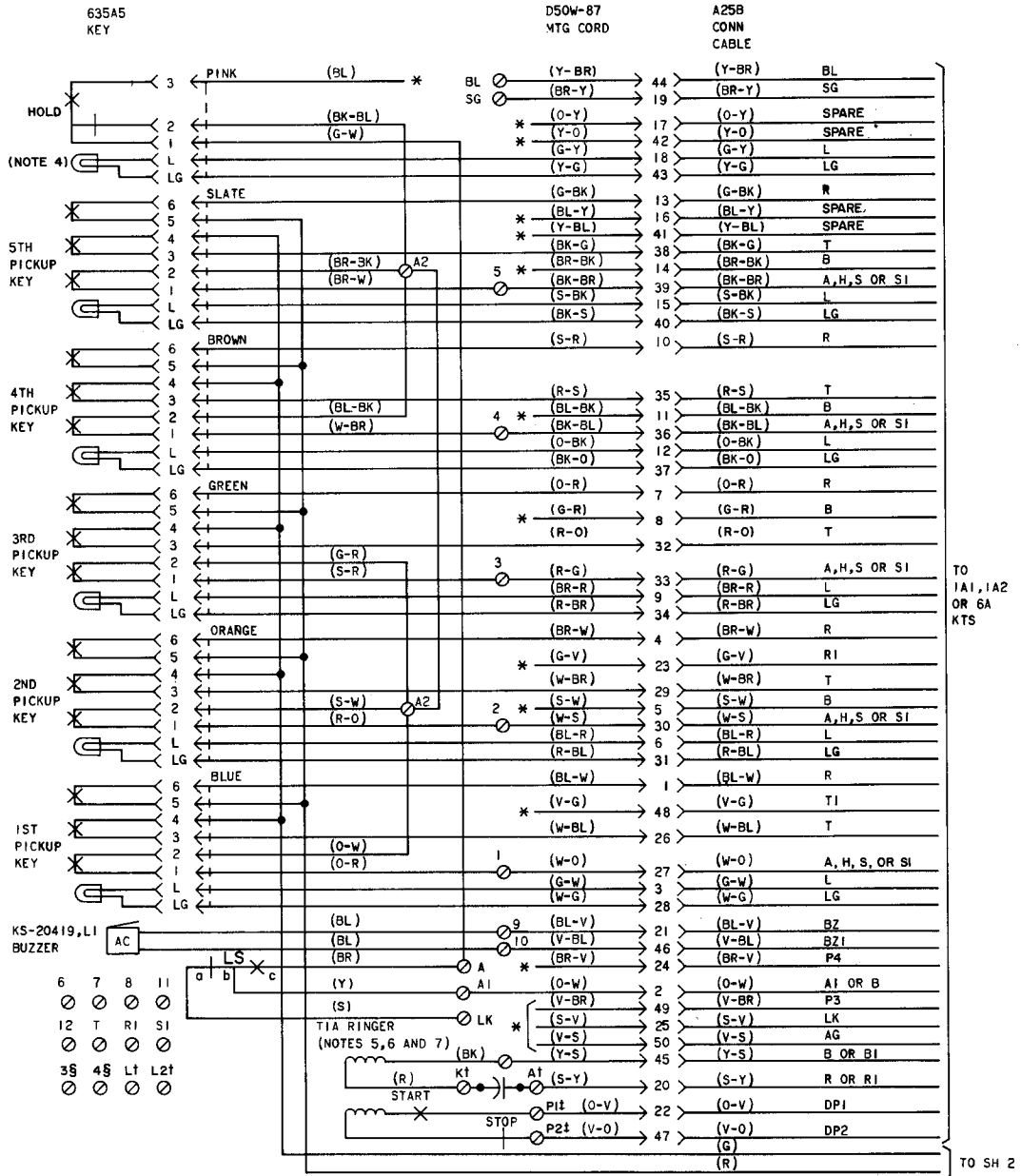


Fig. 1—662A1M Telephone Set Connections (Sheet 1 of 2)

NOTES:

1. OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
2. IF SPEAKERPHONE IS PROVIDED REPLACE 8R DIAL WITH AN 8C DIAL AND ADD STRAP LEADS AS SHOWN. REFER TO DIVISION 512 FOR SPEAKERPHONE CONNECTIONS.
3. WHEN EXCLUSION FEATURE IS DESIRED, CONNECT EXCLUSION SWITCH TO STATIONS BY MEANS OF CORD CONDUCTORS NOT IN USE FOR OTHER FUNCTIONS, WHEN EXCLUSION SWITCH IS CONNECTED TO 1A KEY TELEPHONE SYSTEM, THE H AND B LEADS MUST BE PAIRED. WHEN CONNECTED TO 1A1 OR 1A2 KEY TELEPHONE SYSTEM, THE A LEADS MAY BE CONNECTED TO PAIRED OR NON PAIRED CONDUCTORS.
4. TO USE 6TH LAMP, EQUIP KEY WITH PROPER LAMP AND CONNECT ASSOCIATED LEADS AT EQUIPMENT OR DISTRIBUTION TERMINAL AS REQUIRED.
5. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (R) RINGER LEAD TO A OF NETWORK.
6. TO SILENCE RINGER PERMANENTLY CONNECT (BK) RINGER LEAD TO K OF NETWORK.
7. EXCLUSION KEY MAY BE USED TO CUTOFF RINGER IN SET.
8. LINE SWITCH OFF-HOOK SEQUENCE
  - bc - MAKES
  - de - MAKES
  - ab - BREAKS
  - fg - BREAKS

- \* - INSULATED AND STORED
  - † - TERMINAL ON NETWORK, UNDESIGNATED
  - ‡ - TERMINALS ARE ON TB2
  - § - TERMINAL ON 41-TYPE DIAL
  - ⊥ - TERMINAL ON TB1
- DP - DIAL PULSE CONTACTS
  - EX - EXCLUSION SWITCH
  - H - HOLD KEY
  - LS - LINE SWITCH
  - ON - DIAL OFF-NORMAL CONTACTS
  - TB - TURNBUTTON(CUTOFF)

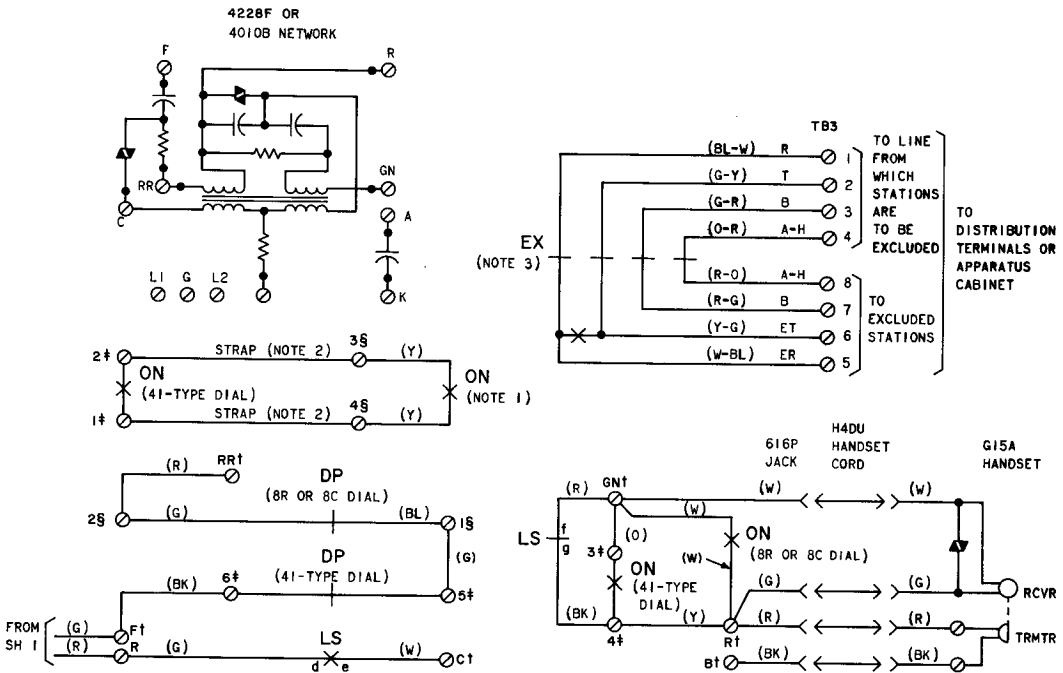
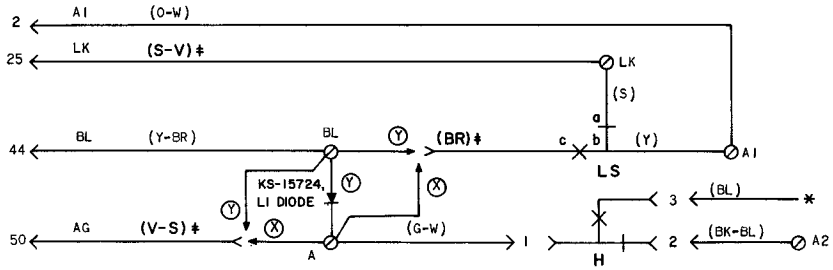
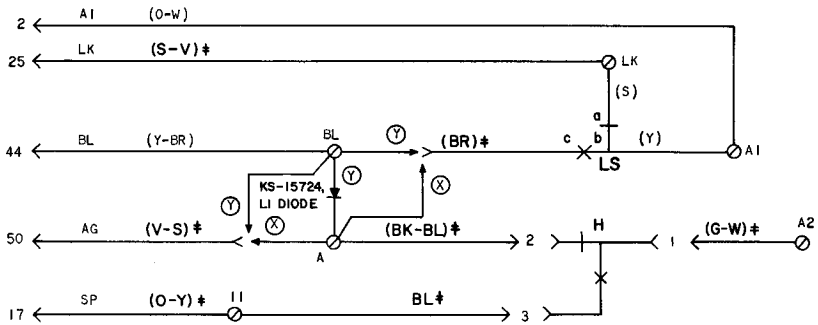


Fig. 1—662AIM Telephone Set Connections (Sheet 2 of 2)



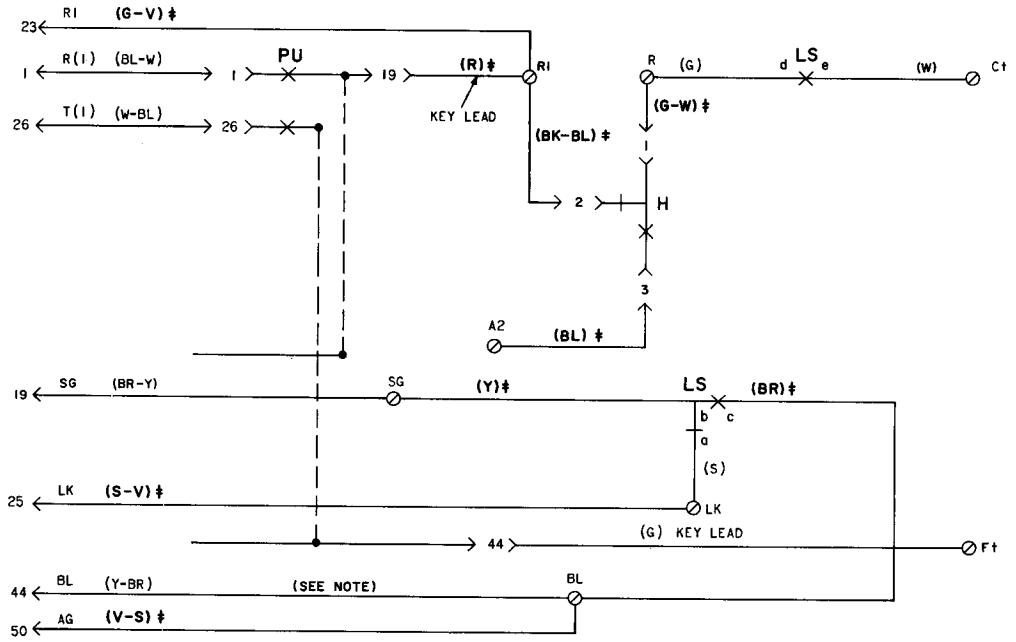
(A) WITHOUT I HOLD



(B) WITH I HOLD

- LS - LINESWITCH
- H - HOLD KEY
- (X) - WITHOUT BUSY LAMP
- (Y) - WITH BUSY LAMP
- \* - INSULATED AND STORE
- † - LEADS INVOLVED IN MODIFICATION

Fig. 2—1A1 or 1A2 KTS - I Hold and/or Station Busy Lamp Modification (662A1M) Telephone Set



NOTE:  
 IF STATION BUSY LAMP IS NOT PROVIDED, REMOVE (Y-BR)  
 MOUNTING CORD LEAD FROM BL TERMINAL, INSULATE AND STORE.

H - HOLD KEY  
 LS - LINE SWITCH  
 PU - PICKUP KEY

† - TERMINAL ON NETWORK, UNDESIGNATED TERMINALS ARE ON TB2.  
 ‡ - LEADS INVOLVED IN MODIFICATION

Fig. 3—662A1M Telephone Set Converted for 1A KTS - With or Without Busy Lamp or Speakerphone

**TABLE B**  
**CONDUCTOR ASSIGNMENTS USING 66E-TYPE CONNECTOR BLOCK OR A25B CONNECTOR CABLE**

LEAD DESIG	662A1M TEL SET TERM.†	MTG CORD OR A25B CONN CABLE		PLUG OR CONN	66E-TYPE CONN BLOCK
		PAIR NO.	COND COLOR	PIN NO.	CLIP TERM. NO.
T R	3 6	1	W-BL BL-W	26 1	1 2
A, H, S, or S1 A1 or B†	TB2-1 TB2-A1	2	W-O O-W	27 2	3 4
LG L1	LG L	3	W-G G-W	28 3	5 6
T R	3 6	4	W-BR BR-W	29 4	7 8
A, H, S, or S1 Spare or B†	TB2-2 *	5	W-S S-W	30 5	9 10
LG L2	LG L	6	R-BL BL-R	31 6	11 12
T R	3 6	7	R-O O-R	32 7	13 14
A, H, S, or S1 Spare or B†	TB2-3 *	8	R-G G-R	33 8	15 16
LG L3	LG L	9	R-BR BR-R	34 9	17 18
T R	3 6	10	R-S S-R	35 10	19 20
A, H, S, or S1 Spare or B†	TB2-4 *	11	BK-BL BL-BK	36 11	21 22
LG L4	LG L	12	BK-O O-BK	37 12	23 24
T R	3 6	13	BK-G G-BK	38 13	25 26
A, H, S, or S1 Spare or B†	TB2-5 *	14	BK-BR BR-BK	39 14	27 28
LG L5	LG L	15	BK-S S-BK	40 15	29 30
Spare Spare	* *	16	Y-BL BL-Y	41 16	31 32
Spare Spare	* *	17	Y-O O-Y	42 17	33 34
LG L6	LG L	18	Y-G G-Y	43 18	35 36
BL SG	TB2-BL TB2-SG	19	Y-BR BY-Y	44 19	37 38
B or B1 R or R1	G of net A of net	20	Y-S S-Y	45 20	39 40
BZ1 BZ	TB2-10 TB2-9	21	V-BL BL-V	46 21	41 42
Spare or DP2 Spare or DP1	P2 of 41 dial P1 of 41 dial	22	V-O O-V	47 22	43 44
Spare or T1 Spare or R1	* *	23	V-G G-V	48 23	45 46
Spare or P3 Spare or P4	* *	24	V-BR BR-V	49 24	47 48
Spare or AG Spare or LK	* *	25	V-S S-V	50 25	49 50

\* Insulate and store.

† When set is used in 1A key telephone system, these balance leads must not be used for other purposes.

‡ Contacts of key plug unless otherwise noted.

**SERVICE**  
**2660-TYPE TELEPHONE SETS**

**1. GENERAL**

**1.01** Reissued to add:

- M1B ringer
- D4BT-87 mounting cord
- 4228B network
- G3A6 handset

**1.02** The 2660-type telephone set is furnished in the A1 code only. Modification kits are available for field conversion to provide exclusion, signaling, and/or 2-line pickup.

**1.03** When any of these features are required the appropriate mounting cord and D-kit of parts must be installed.

**1.04** Refer to Section 502-603-120 for identification and ordering information.

**1.05** To install kit of parts or for common installation and maintenance information, refer to Section 502-600-102.

**1.06** Speakerphone connections are covered in Division 512.

**1.07** When a 2660-type telephone set is used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, the speakerphone leads (T1, R1, IT, IR, AG, and LK) at sets not having speakerphone must be disconnected, insulated and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common connection between the circuit of the multiplied telephone sets.

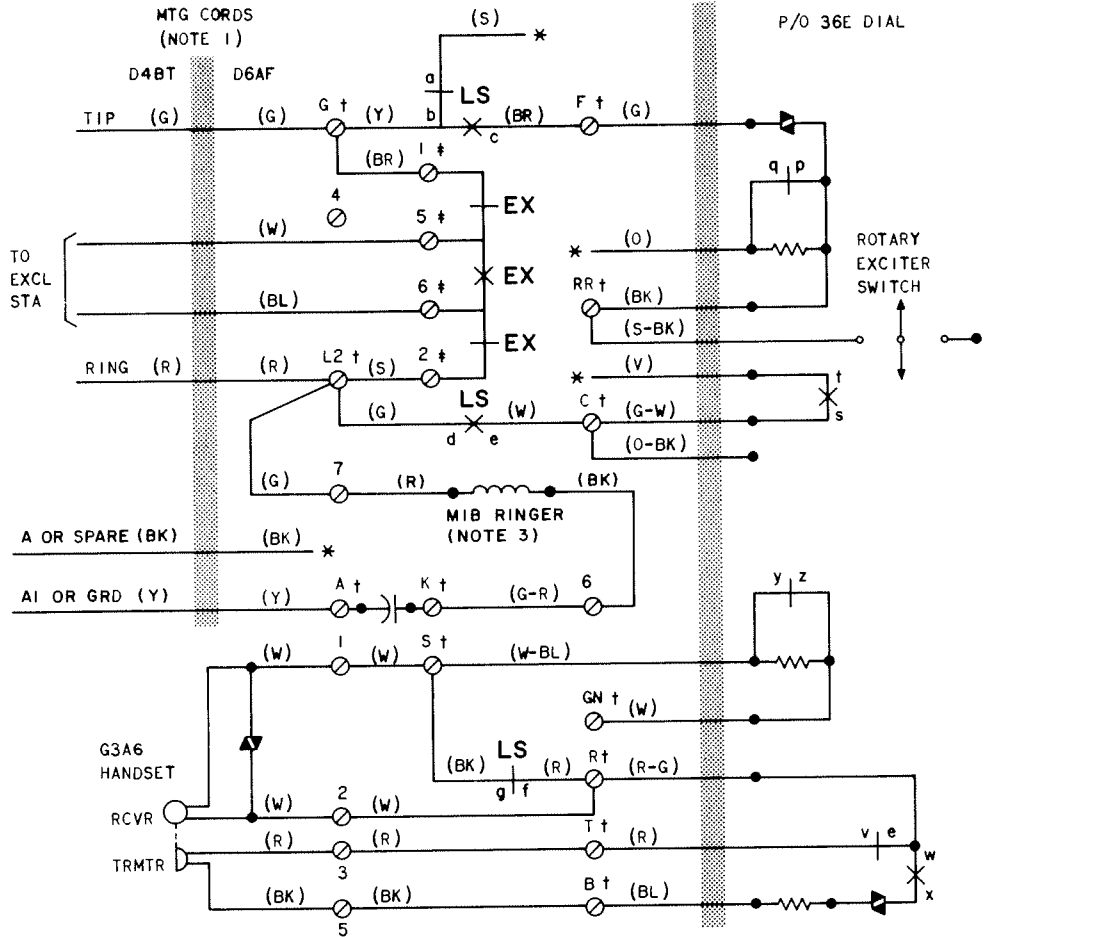
**1.08** Current production 2660-type telephone sets are equipped with a D4BT-87 mounting cord. Early sets were equipped with a D3BN mounting cord.

PLEASE NOTE:

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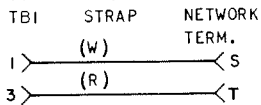




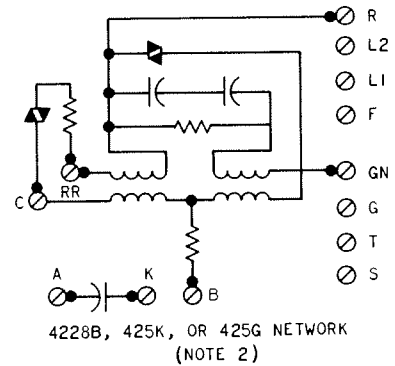
NOTES:

1. D4BT MTG CORD FURNISHED WITH 2660A1 CODE ONLY. D6AF MTG CORD (ORDERED SEPARATELY) REPLACES D4BT MTG CORD TO ADD EXCLUSION FEATURE, 2660A2 CODE.
2. THE 425G NETWORK IS ELECTRICALLY THE SAME AS THE 425K OR 4228B NETWORK. THE 425K OR 4228B PROVIDES TWO ADDITIONAL TIE POINT TERMINALS, S AND T.
3. CONNECTIONS FOR MIB RINGER SHOWN. CONNECTIONS FOR MIA SAME AS MIB EXCEPT (S) AND (S-R) RINGER LEADS ARE INSULATED AND STORED. MIA RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION.

- \* - INSULATED AND STORED.
- + - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TBI.
- \* - EXCLUSION SWITCH TERMINAL BOARD.
- § - STRAPS REQUIRED:



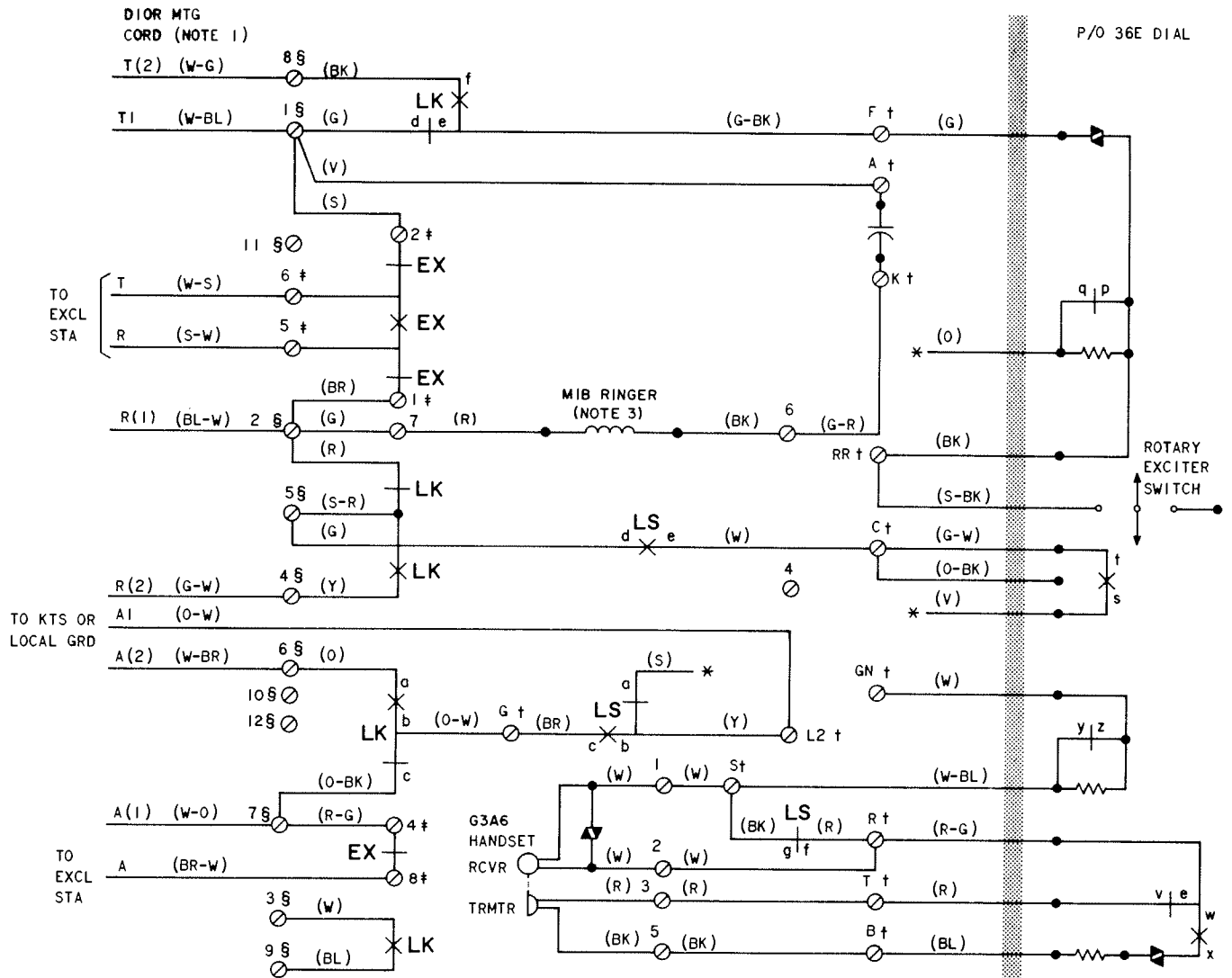
LS - LINE SWITCH  
EX - EXCLUSION SWITCH



NETWORK CONNECTIONS

LEADS	COLOR	425G	4228B § OR 425K §
LINE SWITCH	BK	1 ON TBI	S ON NETWORK
DIAL	W-BL	3 ON TBI	T ON NETWORK
	R		

Fig. 1—2660A1 and 2660A2 Telephone Set Connections

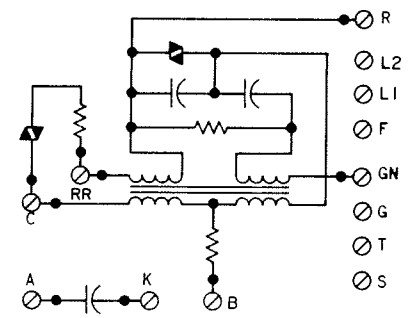
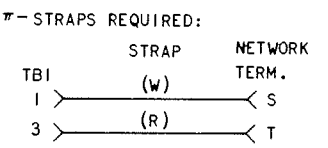


- NOTES:
1. THE 2660A3 CODE PROVIDES FOR 2-LINE PICKUP AND SIGNALING. 2660A4 CODE ADDS EXCLUSION FEATURE. INSULATE AND STORE UNUSED MTG CORD CONDUCTORS.
  2. THE 425G NETWORK IS ELECTRICALLY THE SAME AS THE 425K OR 4228B NETWORK. THE 425K OR 4228B PROVIDES TWO ADDITIONAL TIE POINT TERMINALS, S AND T.
  3. CONNECTIONS FOR MIB RINGER SHOWN. CONNECTIONS FOR MIA RINGER SAME AS MIB EXCEPT (S) AND (S-R) RINGER LEADS ARE INSULATED AND STORED. MIA RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION.

- \* - INSULATED AND STORED
- † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TBI
- ‡ - EXCLUSION SWITCH TERMINAL BOARD
- § - TERMINAL BOARD 2
- LS - LINE SWITCH
- LK - LINE KEY
- EX - EXCLUSION SWITCH

**NETWORK CONNECTIONS**

LEADS	COLOR	425G	4228B* OR 425K*
LINE SWITCH	BK	1 ON TBI	S ON NETWORK
	W-BL		
DIAL	R	3 ON TBI	T ON NETWORK



4228B, 425K, OR 425G NETWORK (NOTE 2)

Fig. 2—2660A3 and 2660A4 Telephone Set, Connections

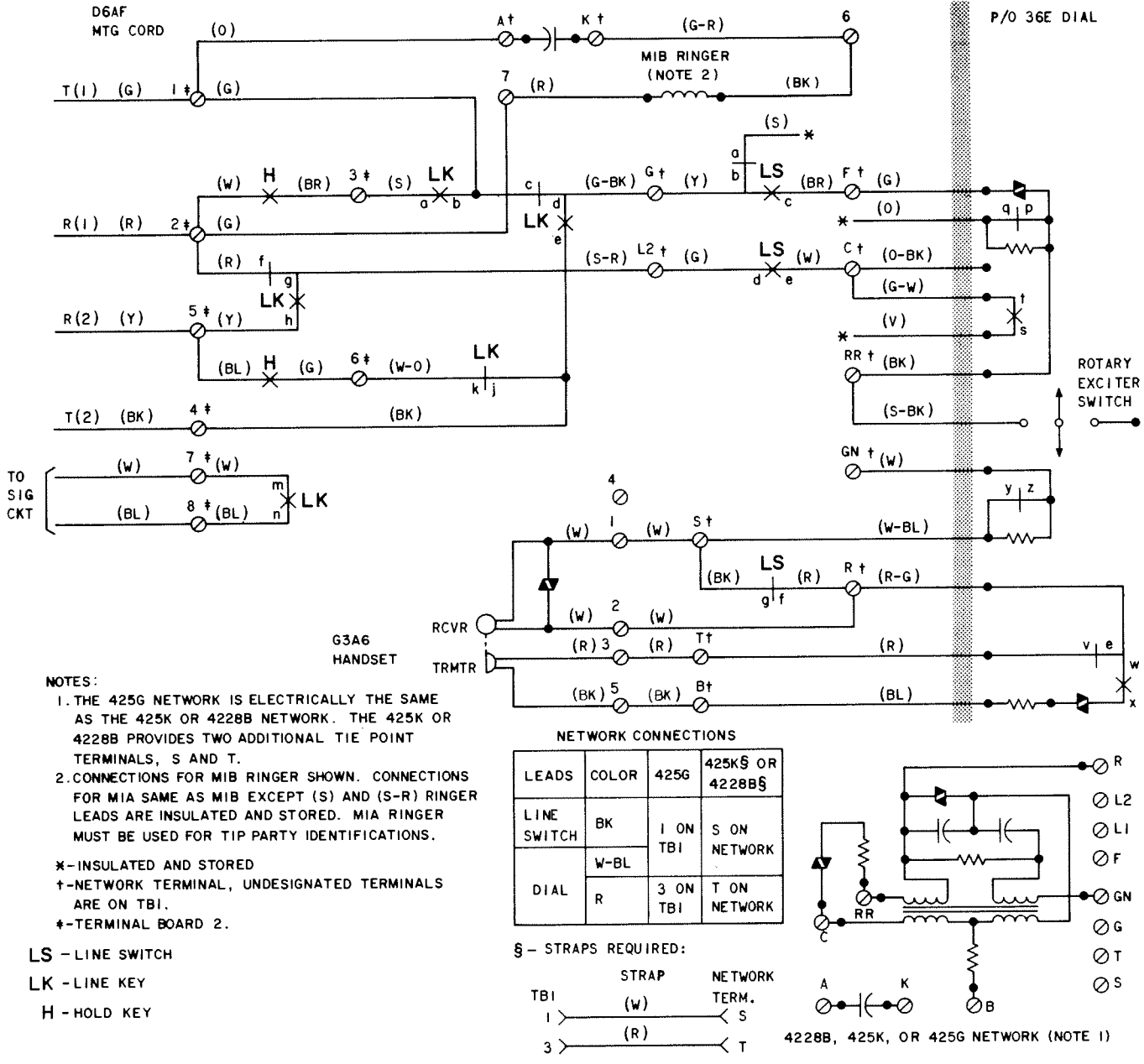


Fig. 3—2660A1 Telephone Set Modified for 2-Line Pickup and Hold (Nonkey Telephone Systems)

◆ TABLE A ◆

## LINE AND RINGER CONNECTIONS — 2660A1 AND 2660A2 TELEPHONE SETS

WIRE OR LEAD		INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2* KEY TEL SYSTEM	EXCLUSION† (2660A2 ONLY)	
				NO IDENT GROUND	IDENT GROUND				
					1000 Ω	2650 Ω			
Mounting Cord at Connecting Block	Tip	(G)	G	G	G	G	G	2	
	Ring	(R)	R	R	R	R	R	1	
	Grd A1	(Y)	G	Y	Y	Y	Y	4	
	A	(BK)					B	5	
	ET	(BL)						7	
	ER	(W)						6	
Mounting Cord in Set	Tip	(G)	G	G	G	G	A	G	
	Ring	(R)	L2	L2	L2	L2	L2	L2	
	Grd A1	(Y)	A	A	A	L1	L1	G	
	A	(BK)	*	*	*	*	*	F	*
	ET	(BL)							6‡
	ER	(W)							5‡
Ringer Leads	(R)	7	7	7	7	7	7	7	
	(BK)	6	6	6	6	6	6	6	
	(S)§	*	*	*	5	*	*	*	
	(S-R)§	*	*	*	*	5	*	*	
Line Switch	(BR)	F	F	F	F	F	F	F	
	(W)	C	C	C	C	C	C	C	
	(S)	*	*	*	K	K	*	*	
Dial	(G)	F	F	F	F	F	A	F	
Ringer Straps	(G)	7 to L2	7 to L2	7 to G	7 to A	7 to A	7 to L2	7 to L2	
	(G-R)	6 to K	6 to K	6 to K	6 to L1	6 to L1	6 to K	6 to K	
Exclusion Straps (2660A2 only)	(BR)							G to 1‡	
	(S)							L2 to 2‡	

\* Insulate and store.

† Replace D4BT with D6AF mounting cord.

‡ Terminals on exclusion terminal board.

§ Leads on M1A ringer only. M1A ringer must be used for tip party identification.

TABLE B — CONVERSION OF 2660A1 TO 2660A3 TELEPHONE SETS

LEADS	REMOVE FROM	FOR 2-LINE PICKUP AND SIGNALING		FOR 1-LINE, SIGNALING AND SET RINGER USED AS LINE RINGER		
		SET RINGER USED AS LINE RINGER ON LINE 1 CONNECT TO	SET RINGER USED AS COM. OR PVT. LINE RINGER CONNECT TO	EXT. STA. OR RINGER CUTOFF BY TURN KEY CONNECT TO	EXT. STA. OR RINGER AND SET RINGER CUTOFF BY TURN KEY CONNECT TO	
Line Switch	(Y)		L2 of network			
	(BR)	G of network				
	(G)	F of network				
	(G)	L2 of network	TB2-5			
Ringer Strap	(G)	L2 of network	TB2-2†	*	TB2-5	
	(W-BL)		TB2-1		TB2-2	
	(BL-W)		TB2-2		A of network	
	(W-O)		TB2-7		TB2-5	
	(O-W)		L2 of network		G of network	
	(W-G)		TB2-8		L2 of network	
	(G-W)		TB2-4		TB2-1	
	(W-BR)		TB2-6		TB2-2	
	(BR-W)		*	TB2-3	*	TB2-7
	(W-S)		TB2-3	TB1-6†		*
	(S-W)		TB2-9	TB1-7		TB2-3
	D10R Mig. Cord (added)	(O-W)				TB2-9
(G-BK)				G of network		
(G)				F of network		
(R)				TB2-1		
(W)				TB2-2		
(Y)				TB2-3		
(S-R)				TB2-4		
(O)				TB2-5		
(O-BK)				TB2-6		
(BK)				TB2-7		
(BL)				TB2-8		
Strap(added)		(V)				
			TB2-1 and A of net.†	Store in set	F of net. and A of net.	

\* Insulate and store.

† For ringer on line 2 move strap (G) from TB2-2 to TB2-4 and strap (V) from TB2-1 to TB2-8.

‡ Ringer connected without capacitor for common or private line ringing. If common audible signal power failure feature is provided, connect capacitor in circuit by moving mounting cord (W-S) lead from TB1-6 to A of network.

**TABLE C**  
**2660A3 TELEPHONE SET**  
**CONDUCTOR ASSIGNMENT**  
**USING 44A CONNECTING BLOCK**

D10R MTG CORD	44A CONN. BLOCK TERMINAL	LINE 1	LINE 2 OR CUTOFF CIRCUIT	SIGNAL* OR COM. RINGER CIRCUIT
(W-BL)	2	T		
(BL-W)	1	R		
(W-O)	5	A		
(O-W)	4	A1 or GRD		
(W-G)	7		T	
(G-W)	6		R	
(W-BR)	10		A	
(BR-W)	9			SPARE or S*
(W-S)	8			S or R
(S-W)	3			G or B

\*When both signaling and common ringer are required, connect mtg. cord (BR-W) set end to TB2-3 and place strap between TB2-9 and L2 of network.

**TABLE D**  
**2660A4 TELEPHONE SET**  
**CONDUCTOR ASSIGNMENT**  
**USING 44A CONNECTING BLOCK**

D10R MTG CORD	44A CONN. BLOCK TERMINAL	LINE 1	LINE 2, CUTOFF, OR SIGNAL CIRCUIT	EXCLUSION OR SIGNAL CIRCUIT
(W-BL)	2	T		
(BL-W)	1	R		
(W-O)	5	A		
(O-W)	4	A1 or GRD		
(W-G)	7		T or S*	
(G-W)	6		R or G*	
(W-BR)	10		A or SPARE	
(BR-W)	9			A or SPARE
(W-S)	8			T or S
(S-W)	3			R or G

\*Used when both signaling and exclusion are required.

TABLE E

**MODIFICATION FOR 2-LINE PICKUP AND HOLD  
(NONKEY TELEPHONE SYSTEM)**

WIRE OR LEAD	COLOR	CONNECT TO*
2-Line Pickup Key Assembly	S	3
	G	1
	G-BK	G of network
	BK	4
	R	2
	S-R	L2 of network
	Y	5
	W-O	6
	W	7
BL	8	
Hold Key Assembly	G	6
	BL	5
	W	2
	BR	3
D6AF Mounting Cord†	G	1
	R	2
	Y	5
	BK	4
	W	7
	BL	8
Strap (added)	O	TB2-1 and A of network
Ringer Strap‡	G	2

\*Terminals on TB2 except where noted otherwise.

†D6AF mounting cord replaces original D4BT mounting cord.

‡Move existing ringer strap (G) from L2 of network to TB2-2.

TABLE F

**P-90D012 OR 819040122 POLARITY GUARD CONNECTIONS**

	TEL SET LEADS			POLARITY GUARD LEADS	
	(W) LINE SWITCH	(G-W) DIAL	(BK) DIAL	(W)	(G)
Remove From	C of network		RR of network	—	—
Connect To	S of polarity guard		T of polarity guard	C of network	RR of network

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

**TABLE G**  
**CONVERSION OF 2660A1 TO 2660A4 TELEPHONE SETS**

LEADS		REMOVE FROM	FOR 2-LINE PICKUP — RINGER ON LINE 1	
			WITH EXT EXCL CONNECT TO	WITH SIG AND SET RINGER CUTOFF BY EXCL SWITCH CONNECT TO
Line Switch	(Y)	G of net.	L2 of net.	L2 of net.
	(BR)	F of net.	G of net.	G of net.
	(G)	L2 of net.	TB2-5	TB2-5
Ringer Strap	(G)	L2 of net.	TB2-2‡	Excl TB-6
D10R Mtg. Cord (added)	(W-BL)		TB2-1	TB2-1
	(BL-W)		TB2-2	TB2-2
	(W-O)		TB2-7	TB2-7
	(O-W)		L2 of net.	L2 of net.
	(W-G)		TB2-8	TB2-8
	(G-W)		TB2-4	TB2-4
	(W-BR)		TB2-6	TB2-6
	(BR-W)		Excl TB-8	*
	(W-S)		Excl TB-6	TB2-3
(S-W)		Excl TB-5	TB2-9	
Key Assy (added)	(O-W)		G of net.	
	(G-BK)		F of net.	
	(G)		TB2-1	
	(R)		TB2-2	
	(W)		TB2-3	
	(Y)		TB2-4	
	(S-R)		TB2-5	
	(O)		TB2-6	
	(O-BK)		TB2-7	
	(BK)		TB2-8	
(BL)		TB2-9		
Straps (added)	(V)		TB2-1 and A of net.‡	A of net and Excl TB-5
	(S)		TB2-1 and Excl TB-2†	TB2-1 and Excl TB-2
	(BR)		TB2-2 and Excl TB-1†	TB2-2 and Excl TB-1
	(R-G)		TB2-7 and Excl TB-4†	*

\* Insulate and store.

† For exclusion on line 2, move strap (S) from TB2-1 to TB2-8, strap (BR) from TB2-2 to TB2-4, and strap (R-G) from TB2-7 to TB2-6.

‡ For ringer on line 2, move strap (G) from TB2-2 to TB2-4 and strap (V) from TB2-1 to TB2-8.



**TABLE G (Cont)**  
**CONVERSION OF 2660A1 TO 2660A4 TELEPHONE SETS**

LEADS		REMOVE FROM	FOR 1-LINE PICKUP — SET RINGER USED AS LINE RINGER		
			WITH EXT EXCL AND EXT STA OR RINGER CUTOFF BY TURN KEY CONNECT TO	WITH SIG, EXT STA OR RINGER CUTOFF BY TURN KEY AND SET RINGER CUTOFF BY EXCL SWITCH CONNECT TO	WITH SIG, SET RINGER CUTOFF BY TURN KEY, AND EXT EXCL CONNECT TO
Line Switch	(Y)	G of net.	L2 of net.	L2 of net.	L2 of net.
	(BR)	F of net.	G of net.	G of net.	G of net.
	(G)	L2 of net.	TB2-5	TB2-5	TB2-5
Ringer Strap	(G)	L2 of net.	Excl TB-2	Excl TB-6	TB2-2
D10R Mtg. Cord (added)	(W-BL)		F of net.	F of net.	F of net.
	(BL-W)		TB2-5	TB2-5	TB2-5
	(W-O)		G of net.	G of net.	G of net.
	(O-W)		L2 of net.	L2 of net.	L2 of net.
	(W-G)		TB2-1	TB2-1	TB2-3
	(G-W)		TB2-2	TB2-2	TB2-9
	(W-BR)		TB2-7	TB2-7	*
	(BR-W)		Excl TB-8	*	Excl TB-8
	(W-S)		Excl TB-6	TB2-3	Excl TB-6
	(S-W)		Excl TB-5	TB2-9	Excl TB-5
Key assy (added)	(O-W)		G of net.		
	(G-BK)		F of net.		
	(G)		TB2-1		
	(R)		TB2-2		
	(W)		TB2-3		
	(Y)		TB2-4		
	(S-R)		TB2-5		
	(O)		TB2-6		
	(O-BK)		TB2-7		
	(BK)		TB2-8		
	(BL)		TB2-9		
Straps (added)	(V)		A of net. and Excl TB-1	A of net. and Excl TB-5	TB2-1 and A of net.
	(S)		F of net. and Excl TB-2	F of net. and Excl TB-2	F of net. and Excl TB-2
	(BR)		TB2-5 and Excl TB-1	TB2-5 and Excl TB-1	TB2-5 and Excl TB-1
	(R-G)		G of net. and Excl TB-4	*	G of net. and Excl TB-4

\* Insulate and store.

† For exclusion on line 2, move strap (S) from TB2-1 to TB2-8, strap (BR) from TB2-2 to TB2-4, and strap (R-G) from TB2-7 to TB2-6.

‡ For ringer on line 2, move strap (G) from TB2-2 to TB2-4 and strap (V) from TB2-1 to TB2-8.

## SERVICE

### 2662-TYPE TELEPHONE SETS

#### 1. GENERAL

##### 1.01 Reissued to:

- Add KS-20419L1 buzzer
- Add M1B ringer
- Add 4228B network.

**1.02** These sets are supplied factory-wired as 2662A1 only. For conversion to 2662A2 or 2662A3 the appropriate key must be ordered and installed separately. Modification kits are available for field conversion to provide exclusion (2662A4, 2662A5, or 2662A6 codes). For ordering and installation information, refer to the appropriate Reference section in Division 502. Speakerphone connections are shown in Division 512.

**1.03** When a 2662-type telephone set is not used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, speakerphone leads must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected,

the speakerphone leads will provide a common connection between the circuits of the multiplied telephone sets.

**TABLE A**  
**P-90D012 POLARITY GUARD CONNECTIONS**

LEAD		REMOVE FROM	CONNECT TO	
		NET	NET	POLARITY GUARD
Dial	BK	RR		T
Line Switch	W	C		S
Polarity Guard	G		RR	
	W		C	

*Note:*

Polarity guard used when specified by local instruction for end-to-end signaling installation when battery and ground reversals may be encountered.

**TABLE B**  
**PICKUP-SIGNAL KEY CONVERSION, 2662A1 OR 2662A4 TELEPHONE SET**

CONVERSION OPTIONS	657A OR 599A KEY LEADS					
	(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(BR-W)
HPPPPP (Note)	A2	A2	A2	A2	A2	5
HPPPPS	A2	A2	A2	A2	SG	5
HPPSSS	A2	A2	A2	SG	SG	5
HPPSSS	A2	A2	SG	SG	SG	5
HPPPP*S*	A2	A2	A2	S1	A2†	S1
HPPP*P*S*	A2	A2	S1	S1	A2†	S1
HPP*P*P*S*	A2	S1	S1	S1	A2†	S1

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 and 3 show line switch lead terminations.

† For 1A KTS connect (BR-BK) key lead to BL terminal.

**Note:** 657A or 599A key as furnished in 2662A1 telephone set. To convert from pickup (locking) to signal (nonlocking) remove the P-10E837 screw from the plunger at the key position being converted.

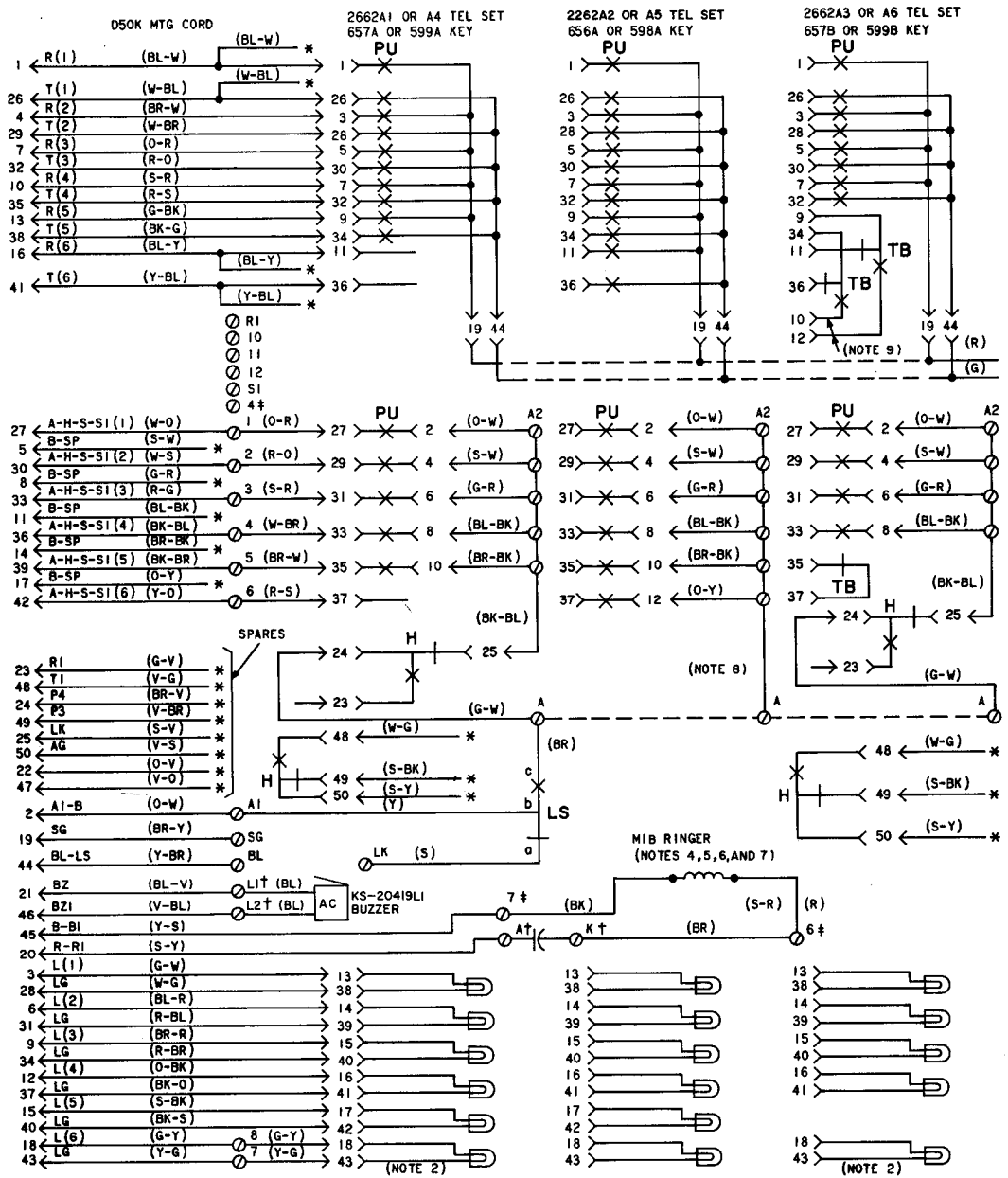
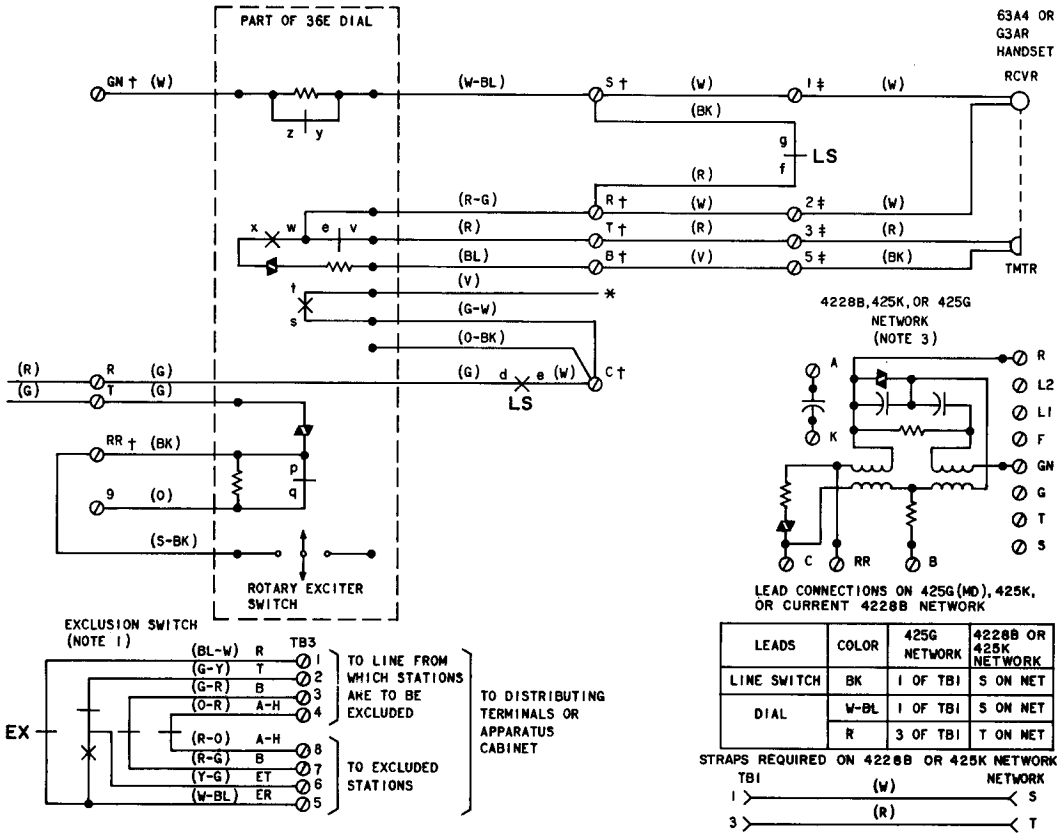


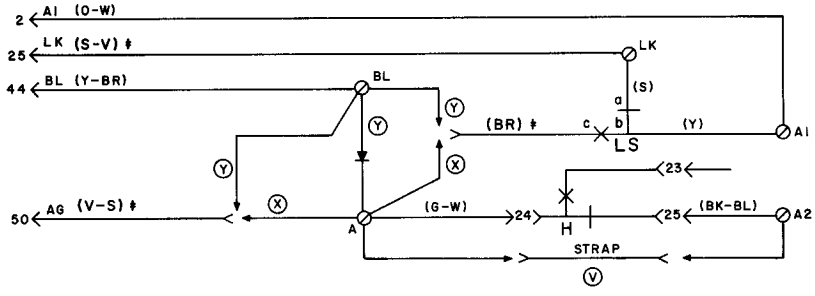
Fig. 1—2662-Type Telephone Set, Connections (Sheet 1 of 2)†



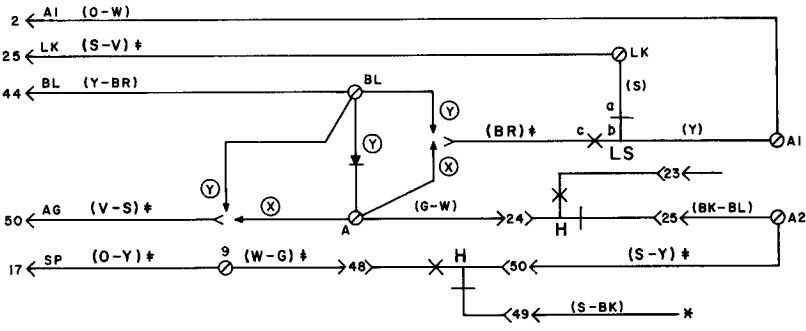
- NOTES:**
- WHEN EXCLUSION FEATURE IS DESIRED, CONNECT EXCLUSION SWITCH TO STATIONS BY MEANS OF CORD CONDUCTORS NOT IN USE FOR OTHER FUNCTIONS. WHEN EXCLUSION SWITCH IS CONNECTED TO 1A KEY TELEPHONE SYSTEM, THE H AND B LEADS MUST BE PAIRED. WHEN CONNECTED TO 1A1 OR 1A2 KEY TELEPHONE SYSTEM, THE A LEADS MAY BE CONNECTED TO PAIRED OR NONPAIRED CONDUCTORS.
  - TO USE 6TH LAMP, EQUIP KEY WITH THE PROPER LAMP AND CONNECT ASSOCIATED LEADS AT EQUIPMENT OR DISTRIBUTION TERMINAL AS REQUIRED.
  - THE 4228B NETWORK IS ELECTRICALLY THE SAME AS THE 425K OR 425G (MD) NETWORK. THE 4228B OR 425K NETWORK PROVIDES S AND T TIE POINT TERMINALS.
  - CONNECTIONS FOR MIB RINGER SHOWN. CONNECTIONS FOR MIA SAME AS MIB EXCEPT UNUSED RINGER LEADS ARE INSULATED AND STORED.
  - IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (BR) STRAP FROM K TO A OF NETWORK.
  - TO SILENCE RINGER PERMANENTLY, MOVE (BK) RINGER LEAD FROM TERMINAL 7 TO TERMINAL 6 OF TBI.
  - EXCLUSION KEY MAY BE USED TO CUTOFF RINGER IN SET.
  - WHEN 656A OR 598A KEY IS PROVIDED ADD STRAP BETWEEN KEY TERMINALS A AND A2.

- THESE LEADS CONNECT TO (BR-BK) AND (O-Y) LEADS TERMINATED ON A2.
  - LINE SWITCH SEQUENCE:
    - bc - MAKES
    - de - MAKES
    - ab - BREAKS
    - fg - BREAKS
- \* - INSULATED AND STORED  
 † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2  
 ‡ - TERMINAL ON TBI  
 EX - EXCLUSION SWITCH  
 H - HOLD KEY  
 LS - LINE SWITCH  
 TB - TURNBUTTON (CUTOFF)  
 PU - PICKUP KEY

Fig. 1—2662-Type Telephone Set, Connections (Sheet 2 of 2)



A. WITHOUT I HOLD



B. WITH I HOLD

- \* - INSULATED AND STORED
- ‡ - LEADS INVOLVED IN MODIFICATION
- H - HOLD KEY
- LS - LINE SWITCH
- (X) - WITHOUT BUSY LAMP
- (Y) - WITH BUSY LAMP, USE KS-15724, LI DIODE
- (V) - ADD STRAP WHEN 656A OR 598A KEY IS FURNISHED

Fig. 2—1A1 or 1A2 KTS—I Hold and/or Station Busy Lamp Modification

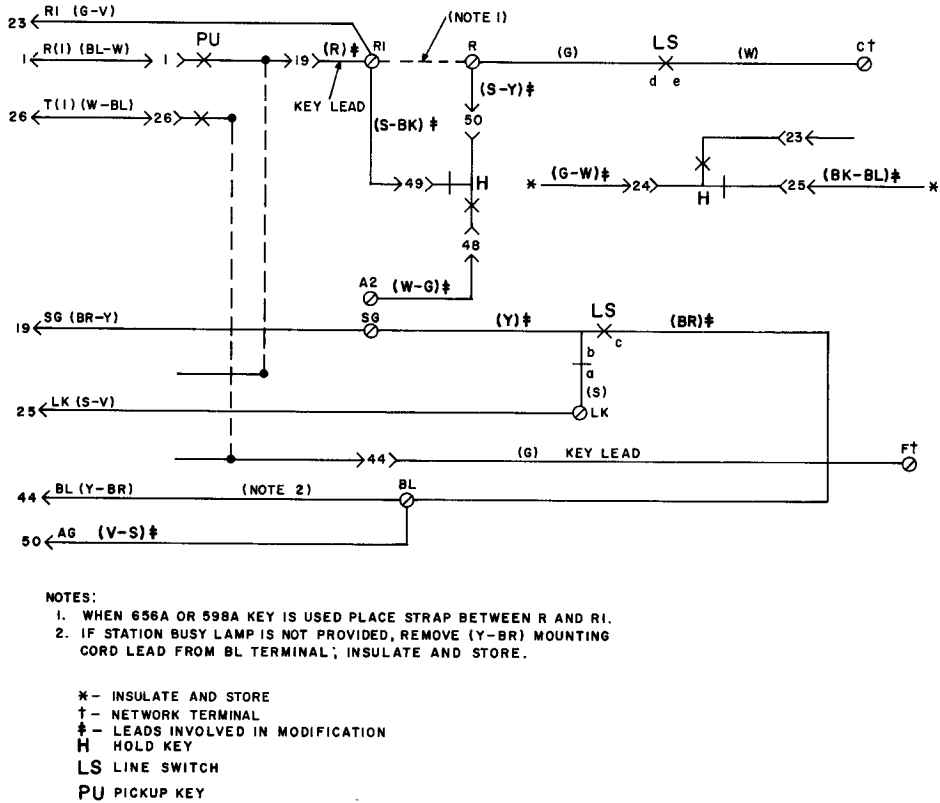


Fig. 3—2662-Type Telephone Set Converted for 1A KTS—With or Without Busy Lamp or Speakerphone

**TABLE C**  
**PICKUP-SIGNAL KEY CONVERSION, 2662A2 OR 2662A5 TELEPHONE SET**

CONVERSION OPTIONS	656A OR 598A KEY LEADS						
	(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(O-Y)	(R-S)
PPPPPP (Note)	A2	A2	A2	A2	A2	A2	6
PPPPPS	A2	A2	A2	A2	A2	SG	6
PPPPSS	A2	A2	A2	A2	SG	SG	6
PPSSSS	A2	A2	A2	SG	SG	SG	6
PPSSSS	A2	A2	SG	SG	SG	SG	6
PPPP*S*	A2	A2	A2	A2	S1	A2†	S1
PPPP*P*S*	A2	A2	A2	S1	S1	A2†	S1
PP*P*P*S*	A2	A2	S1	S1	S1	A2†	S1
PP*P*P*S*	A2	S1	S1	S1	S1	A2†	S1

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 and 3 show line switch lead terminations.

† For 1A KTS connect (O-Y) key lead to BL terminal.

Note: 656A or 598A key as furnished in 2662A2 telephone set. To convert from pickup (locking) to signal (nonlocking) remove the P-10E837 screw from the plunger at the key position being converted.

◆ TABLE D ◆

**PICKUP-SIGNAL KEY CONVERSION, 2662A3 OR 2662A6 TELEPHONE SET**

CONVERSION OPTIONS	657B OR 599B KEY LEADS								
	(O-W)	(S-W)	(G-R)	(BL-BK)	(W-BR)	(Y-BL)	(BL-Y)	(BR-BK)	(O-Y)
HPPPPC (Note)	A2	A2	A2	A2	4	†	†	A2	A2
HPPPSC	A2	A2	A2	SG	4	†	†	A2	A2
HPPSSC	A2	A2	SG	SG	4	†	†	A2	A2
HPPP*S*C	A2	A2	S1	A2§	S1	†	†	A2	A2
HPP*P*S*C	A2	S1	S1	A2§	S1	†	†	A2	A2
HPPPPC(1)	A2	A2	A2	A2	4	†	†	A2	A2
HPPPPC(2)	A2	A2	A2	A2	4	TB1-7†	A of Net.†	†	†
HPPPPC(3)	A2	A2	A2	A2	4	L1 of Net.¶	L2 of Net.¶	†	†
HPPPPC(4)	A2	A2	A2	A2	4	†	†	†	†

\* These arrangements used line switch controlled ground for common signal key with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer. Fig. 2 and 3 show line switch lead terminations.

† Insulated and stored.

‡ Remove mounting cord (S-Y) (Y-S) leads, insulate and store.

§ For 1A KTS connect (BL-BK) key lead to BL terminal.

¶ Remove mounting cord (BL-V) (V-BL) leads; insulate and store.

Turn button may be used to

- (1) Operate auxiliary relay [through 5th R and T (G-BK) (BK-G) pair].
- (2) Cutoff ringer in set } connect 5th R and T (G-BK) (BK-G) pair to ringer or signal circuit.
- (3) Cutoff buzzer in set }
- (4) Cutoff external audible signal [connect 5th R and T (G-BK) (BK-G) pair to signal circuit; connect 6th R and T (BL-Y) (Y-BL) pair to external signal].

Note: 657B or 599B key wired as furnished in 2662A3 telephone set. To convert from pickup (locking) to signal (nonlocking) remove the P-10E837 screw from the plunger at key position being converted.

♦ TABLE E ♦

**CONDUCTOR ASSIGNMENTS USING  
66E-TYPE CONNECTOR BLOCK OR A25B CONNECTOR CABLE**

LEAD DESIG	TEL SET TERM.*	MTG CORD OR A25B CONN CABLE		PLUG OR CONN	66E-TYPE CONN BLOCK
		PAIR NO.	CONDUCTOR COLOR	PIN NO.	CLIP TERM. NO.
T	26	1	W-BL	26	1
R	1		BL-W	1	2
A,H,S, or S1	TB2-1	2	W-O	27	3
A1 or B†	TB2-A1		O-W	2	4
LG	38	3	W-G	28	5
L1	13		G-W	3	6
T	28	4	W-BR	29	7
R	3		BR-W	4	8
A,H,S, or S1	TB2-2	5	W-S	30	9
Spare or B†	‡		S-W	5	10
LG	39	6	R-BL	31	11
L2	14		BL-R	6	12
T	30	7	R-O	32	13
R	5		O-R	7	14
A,H,S, or S1	TB2-3	8	R-G	33	15
Spare or B†	‡		G-R	8	16
LG	40	9	R-BR	34	17
L3	15		BR-R	9	18
T	32	10	R-S	35	19
R	7		S-R	10	20
A, H, S, or S1	TB2-4	11	BK-BL	36	21
Spare or B†	‡		BL-BK	11	22
LG	41	12	BK-O	37	23
L4	16		O-BK	12	24
T	34	13	BK-G	38	25
R	9		G-BK	13	26
A,H,S, or S1	TB2-5	14	BK-BR	39	27
Spare or B†	‡		BR-BK	14	28
LG	42	15	BK-S	40	29
L5	17		S-BK	15	30
T	36	16	Y-BL	41	31
R	11		BL-Y	16	32
A,H,S, or S1	TB2-6	17	Y-O	42	33
Spare or B†	‡		O-Y	17	34
LG	TB2-7	18	Y-G	43	35
L6	TB2-8		G-Y	18	36
BL or LS	TB2-BL	19	Y-BR	44	37
SG	TB2-SG		BR-Y	19	38
B or B1	TB1-7	20	Y-S	45	39
R or R1	A of net.		S-Y	20	40
BZ1	L2 of Net.	21	V-BL	46	41
BZ	L1 of Net.		BL-V	21	42
Spare	‡	22	V-O	47	43
Spare	‡		O-V	22	44
Spare or T1	‡	23	V-G	48	45
Spare or R1	‡		G-V	23	46
Spare or IT	‡	24	V-BR	49	47
Spare or IR	‡		BR-V	24	48
Spare or AG	‡	25	V-S	50	49
Spare or LK	‡		S-V	25	50

\* Contacts of key plug unless otherwise noted.

† When set is used in 1A key telephone system, these balance leads must not be used for other purposes.

‡ Insulate and store.



## SERVICE

### 2663A1 TELEPHONE SETS

#### 1. GENERAL

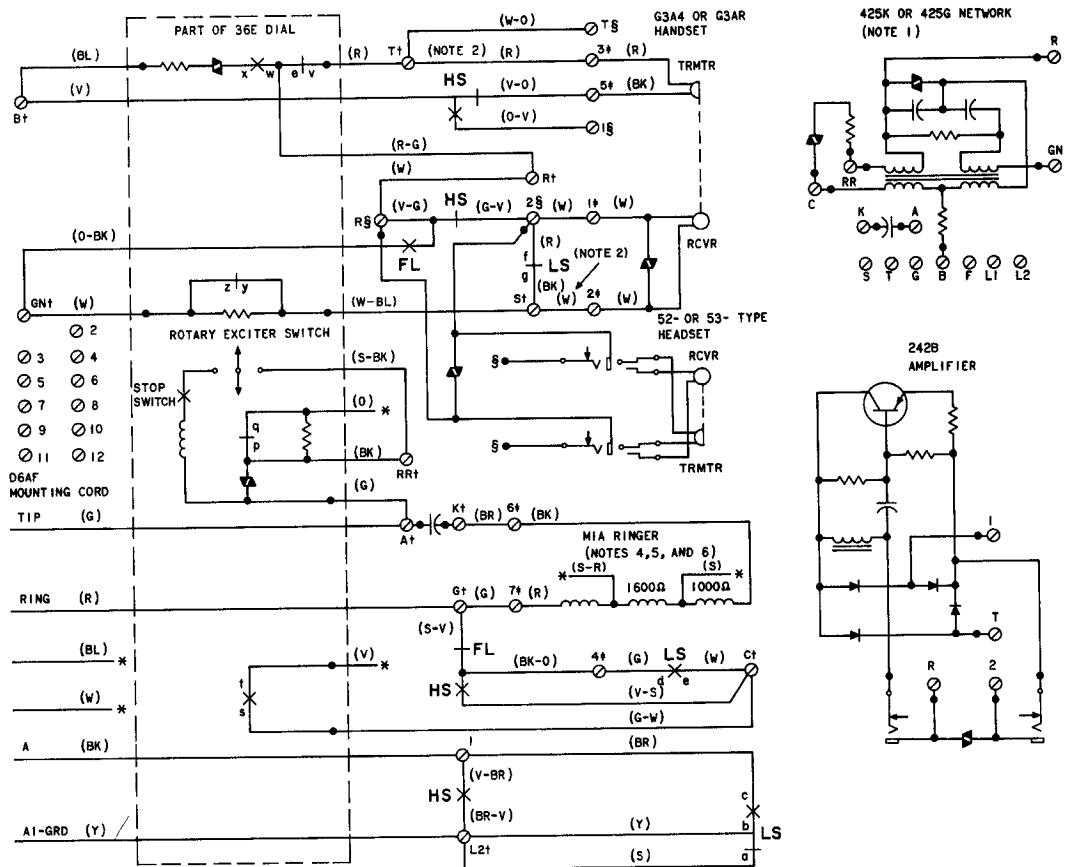
**1.01** These sets are supplied factory wired with a 242B amplifier to provide for headset operation and are used with 1A1, 1A2, or 6A KTS. A 52- or 53-type headset must be ordered separately. For ordering and installation information refer to the appropriate Reference section in Division 502.

**1.02** Connection information was formerly found in Section 502-660-423 which will be canceled.

TABLE A  
P-90D012 POLARITY GUARD CONECTIONS

LEAD	COLOR	REMOVE FROM	CONNECT TO	
		NET.	NET.	POLARITY GUARD
Line Switch	W	C		S
Headset Key	V-S			
Dial	BK	RR		T
Polarity Guard	W		C	
	G		RR	

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



- NOTES:
1. 425G NETWORK ELECTRICALLY THE SAME AS 425K NETWORK. THE 425K NETWORK PROVIDES S AND T TIE POINT TERMINALS.
  2. STRAPS REQUIRED ON 425K NETWORK.
  3. A KS-8109L2 OR KS-20419L1 BUZZER CAN BE MOUNTED IN THESE SETS FOR USE AS AN AUXILIARY SIGNAL. USE SPARE CONDUCTORS TO CONNECT TO EQUIPMENT.
  4. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (BR) LEAD FROM K TO A OF NETWORK.
  5. TO SILENCE RINGER PERMANENTLY MOVE (R) RINGER LEAD FROM TERMINAL 7 TO TERMINAL 6 OF TBI.
  6. FOR LINE AND RINGER CONNECTIONS REFER TO TABLE B.
  7. LINE SWITCH SEQUENCE:  
bc - MAKES  
de - MAKES  
ab - BREAKS  
fg - BREAKS

- LEGEND
- \* - INSULATE AND STORE
  - † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2
  - ‡ - TERMINAL ON TBI
  - § - TERMINAL OR CONNECTION ON 242B AMPLIFIER
- FL - FLASH KEY  
HS - HEADSET ON-OFF KEY  
LS - LINE SWITCH

CONNECTIONS ON 425G OR CURRENT 425K NETWORKS

LEADS	COLOR	425G	425K
LINE SWITCH	BK	2 OF TBI	S OF NETWORK
DIAL	W-BL	3 OF TBI	T OF NETWORK
	R		
242B AMPLIFIER	W-0		

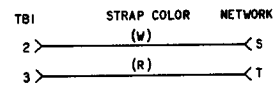


Fig. 1—2663A1 Telephone Set Connections

TABLE B

LINE AND RINGER CONNECTIONS – 2663A1 TELEPHONE SET

WIRE OR LEAD		COLOR	INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2 KEY TEL SYSTEM
					NO IDENT GROUND	IDENT GROUND		
						1000 Ω	2650 Ω	
Line Wire at Connecting Block	Tip Ring Grd A1 A		1	1	1	1	1	1
			2	2	2	2	2	2
			4	4	4	4	4	4
Mounting Cord at Connecting Block		G	1	1	1	1	1	1
		R	2	2	2	2	2	2
		Y	4	4	4	4	4	4
		BK	5	5	5	5	5	5
		BL	6	6	6	6	6	6
		W	7	7	7	7	7	7
Mounting Cord in Set		G	A	G	A	A	A	A
		R	G	A	G	G	G	G
		Y	L2	L2	L2	L2	L2	L2
		BK	TB2-1	TB2-1	TB2-1	TB2-1	TB2-1	TB2-1
		BL	*	*	*	*	*	*
		W	*	*	*	*	*	*
Ringer Leads		R	TB1-7	TB1-7	TB1-7	TB1-6	TB1-6	TB1-7
		BK	TB1-6	TB1-6	TB1-6	TB1-7	TB1-7	TB1-6
		S	*	*	*	B	*	*
		S-R	*	*	*	*	B	*
Ringer Straps		BR	K	K	K	K	K	K
		G	G	L2	L2	L2	L2	G
Dial Leads		G	A	G	A	A	A	A
		O-BK	C	C	C	C	C	C
Headset Key Lead		S-V	G	A	G	G	G	G

\* Insulate and store

## SERVICE

### 2660A1M TELEPHONE SETS

#### 1. GENERAL

**1.01** This section contains connection information for the 2660A1M (modular) telephone set (Fig. 1). For additional information refer to Sections 502-600-102 and 502-603-121. For 4A speakerphone connections refer to Section 512-730-450.

**1.02** Reissued to:

- Delete connection information for 2-line pickup and exclusion options

- Revise Table A.

**1.03** The 2660A1M telephone set is factory-wired for bridged ringing. For all other services, refer to Table A.

**1.04** For polarity guard connections, refer to Table B.

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Page 1

♦ TABLE A ♦

## LINE AND RINGER CONNECTIONS – 2660A1M TELEPHONE SETS

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY			1A1 OR 1A2 KEY TEL SYSTEM
					NO IDENT GROUND	IDENT GROUND		
						1000Ω	2650Ω	
Mtg Cord at Conn. Block	Tip	G	G	G	G	G	G	
	Ring	R	R	R	R	R	R	
	Grd A1	Y	Y	Y	Y	Y	Y	
	A	BK	*	*	*	*	B	
623P4 Jack Assy or Mtg Cord at Net.	Tip	G	G	G	G	G	A	
	Ring	R	L2	L2	L2	L2	L2	
	Grd A1	Y	L1	L1	L1	L1	G	
	A	BK	*	*	*	*	F	
Ringer Leads at TB1	R	7	7	7	7	7	7	
	BK	6	6	6	6	6	6	
	S†	*	*	*	5	*	*	
	S-R†	*	*	*	*	5	*	
Line Switch Leads at Net.	BR	F	F	F	F	F	F	
	W	C	C	C	C	C	C	
	S	*	*	*	K	K	*	
Dial Leads at Net.	G	F	F	F	F	F	A	
Ringer Straps between TB2 and Net.	G	7 to L2	7 to L2	7 to G	7 to A	7 to A	7 to L2	
	G-R	6 to K	6 to K	6 to K	6 to L1	6 to L1	6 to K	
Strap between Net. Term.	G	A to G	A to L1	A to L1	A to *	A to *	A to *	

\*Insulated and stored.

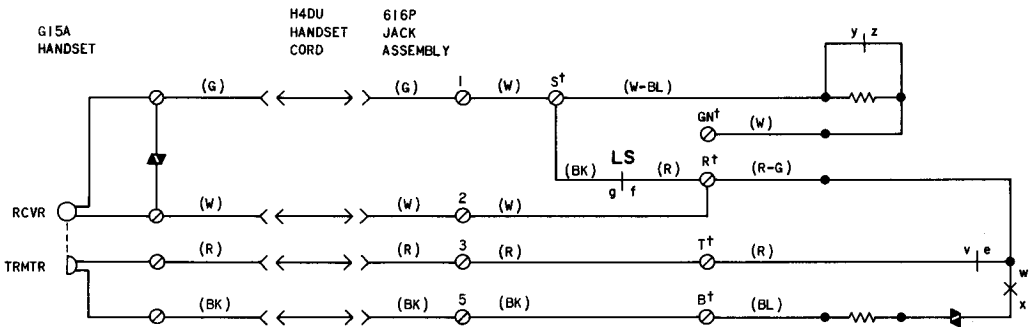
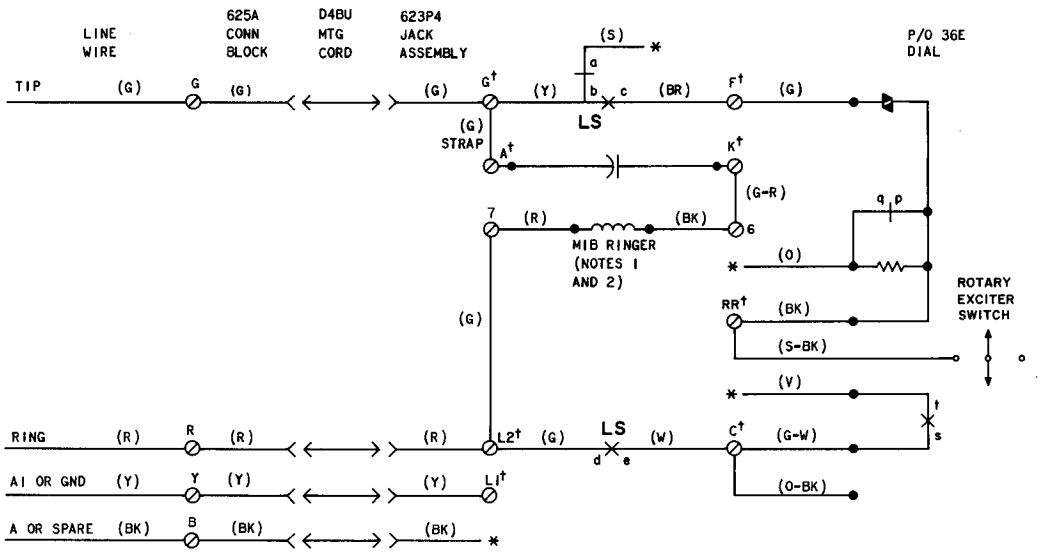
†Leads on M1A ringer only.

TABLE B

## 819040122 (P-90D012) POLARITY GUARD CONNECTIONS

	TEL SET LEADS			POLARITY GUARD LEADS	
	(W) LINE SWITCH	(G-W) DIAL	(BK) DIAL	(W)	(G)
Remove From	C of network		RR of network	—	—
Connect To	S of polarity guard		T of polarity guard	C of network	RR of network

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



- NOTES:
1. 2660A1M TELEPHONE SET IS FACTORY-WIRED FOR BRIDGED RINGING. FOR ALL OTHER SERVICES REFER TO TABLE A.
  2. CONNECTIONS FOR MIB RINGER SHOWN. CONNECTIONS FOR MIA RINGER SAME AS MIB EXCEPT (S) AND (S-R) RINGER LEADS ARE INSULATED AND STORED. MIA RINGER MUST BE USED FOR TIP PARTY IDENTIFICATION.

\* - INSULATED AND STORED  
 † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TBI.

LS-LINE SWITCH

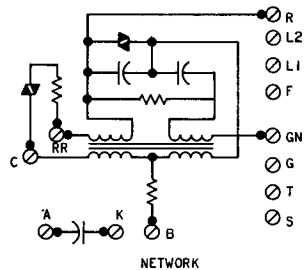


Fig. 1—2660A1M Telephone Set, Connections

## SERVICE

### 2662A1M TELEPHONE SET

#### 1. GENERAL

**1.01** This section contains connection information for the 2662A1M telephone set (Fig. 1). For additional information refer to Sections 502-600-102 and 502-603-131. For 4A speakerphone connections, refer to Section 512-730-455.

**1.02** Reissued to:

- Revise Table A
- Delete exclusion connection information
- Add speakerphone lead color information

**1.03** When a 2662A1M telephone set is not used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, speakerphone leads must be disconnected, insulated, and stored either at the telephone set or at the multiplying point. If not disconnected, the speakerphone leads will provide a common path between the circuits of the multiplied telephone sets. The leads to be disconnected are as follows: T1 (V-G), R1 (G-V), IT (V-BR), IR (BR-V), AG (V-S), and LK (S-V).

**1.04** To install polarity guard, refer to Table A.

**1.05** For key conversion from pickup to signaling, refer to Table B.

**1.06** For conductor assignments on 66-type connecting block or A25B connector cable, refer to Table C.

**1.07** The 1A1 or 1A2 KTS can be modified for I hold and station busy lamp options as shown in Fig. 2.

**1.08** The 1A KTS can be modified for station busy lamp option as shown in Fig. 3.

◆ TABLE A ◆

**819040122 (P-90D012) POLARITY  
GUARD CONNECTIONS**

LEAD		REMOVE FROM	CONNECT TO	
		NET	NET	POLARITY GUARD
Dial	BK	RR		T
	G-W	C		S
Line Switch	W	C		S
Polarity Guard	G		RR	
	W		C	

*Note:* Polarity guard used when specified by local instruction for end-to-end signaling installation when battery and ground reversals may be encountered.

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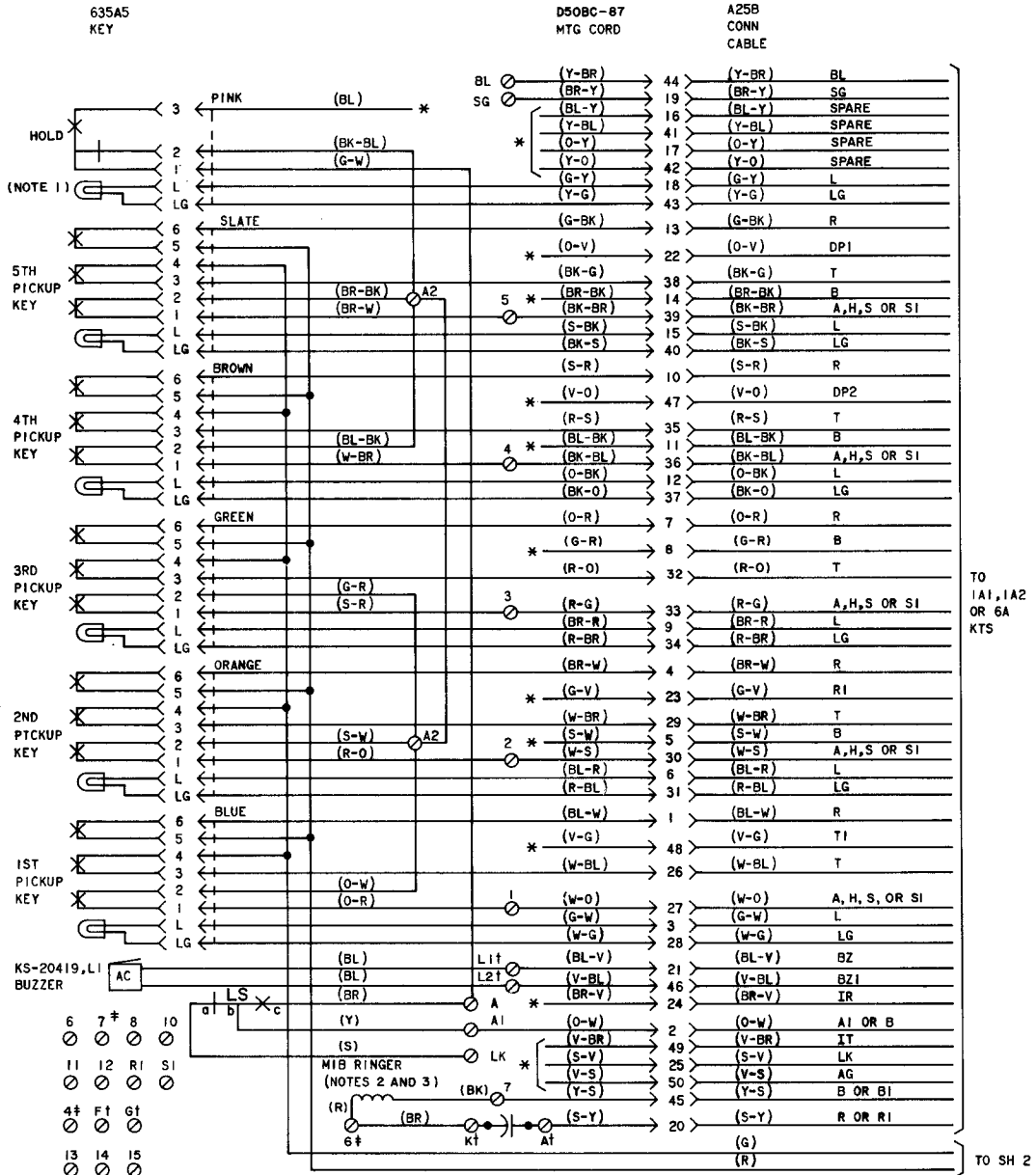


Fig. 1—2662A1M Telephone Set, Connections (Sheet 1 of 2)



NOTES:

1. TO USE 6TH LAMP, EQUIP KEY WITH THE PROPER LAMP AND CONNECT ASSOCIATED LEADS AT EQUIPMENT OR DISTRIBUTION TERMINAL AS REQUIRED.
2. IF CAPACITOR IS NOT REQUIRED IN RINGER CIRCUIT, MOVE (BR) STRAP FROM K TO A OF NETWORK.
3. TO SILENCE RINGER FOR ALL CLASSES OF SERVICE, REFER TO APPROPRIATE RINGER SECTION IN DIVISION 501.
4. TO PREVENT A FALSE HOLD CONDITION WHEN GOING ON-HOOK, THE TIP AND RING LINE SWITCH CONTACTS MUST BREAK BEFORE THE "A" LEAD CONTACTS BREAK. FIELD ADJUSTMENT OF LINE SWITCH IS NOT RECOMMENDED.

- \* - INSULATED AND STORED
- † - NETWORK TERMINAL, UNDESIGNATED
- ‡ - TERMINAL ON TB1
- § - TERMINAL ON TB2
- H - HOLD KEY
- LS - LINE SWITCH

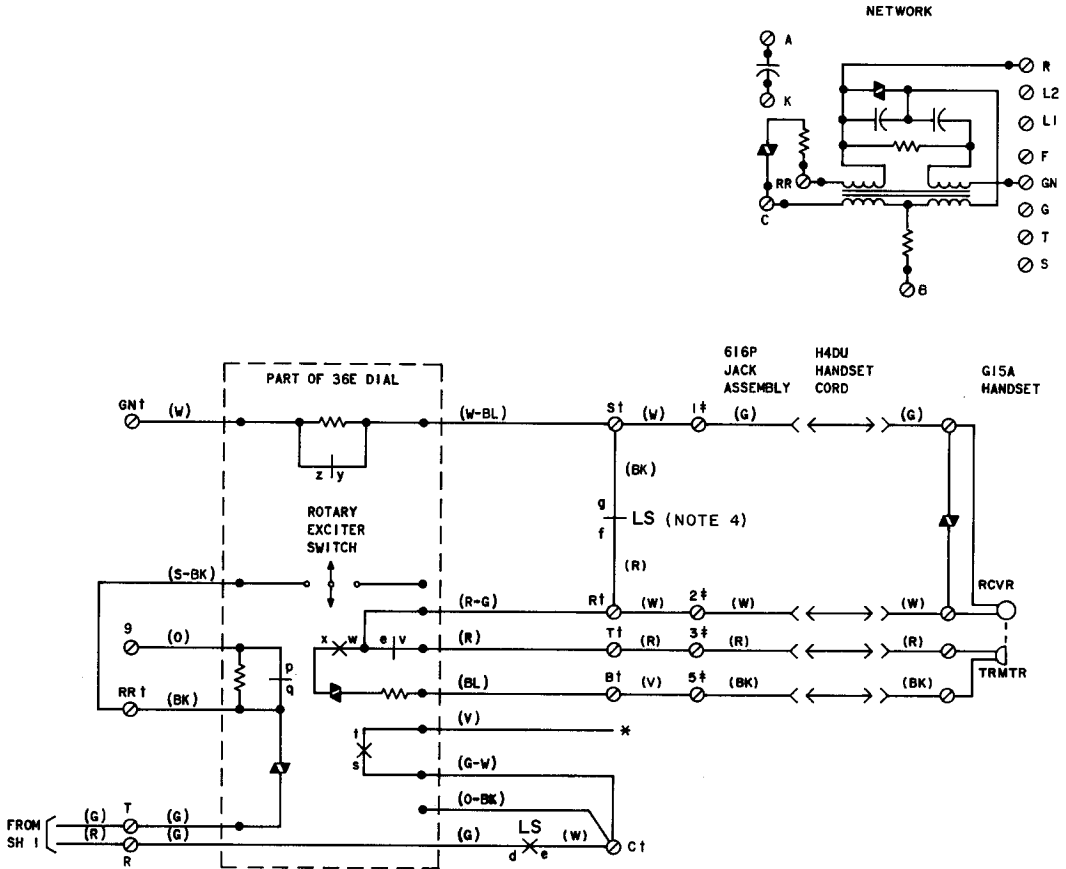
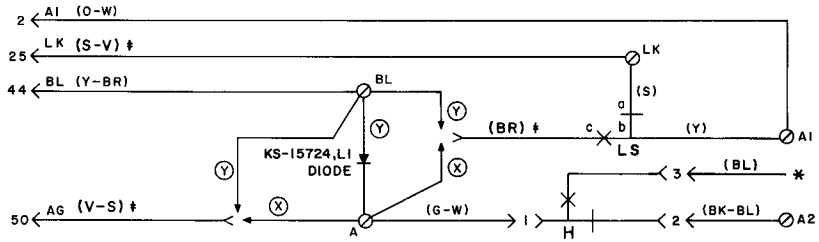
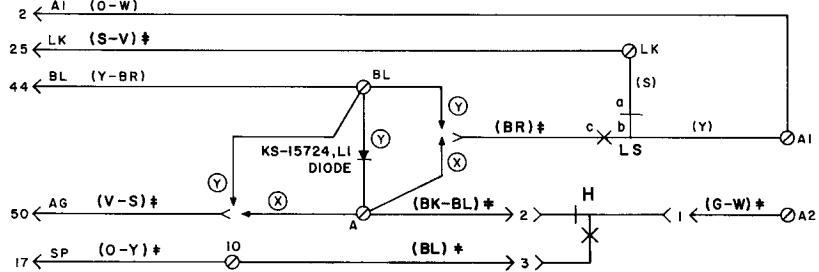


Fig. 1—2662A1M Telephone Set, Connections (Sheet 2 of 2)



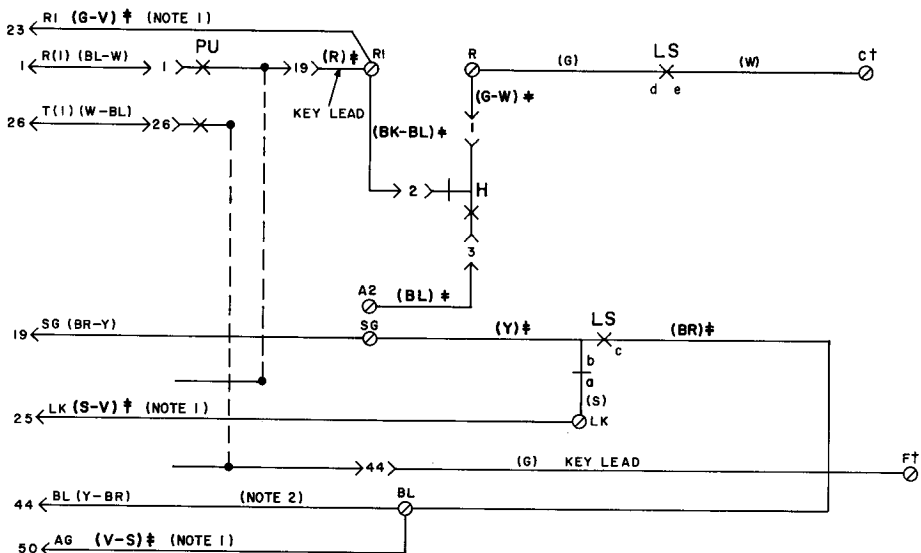
A. WITHOUT I HOLD



B. WITH I HOLD

- LEGEND:
- \* - INSULATED AND STORED
  - ‡ - LEADS INVOLVED IN MODIFICATION
  - H - HOLD KEY
  - LS - LINE SWITCH
  - (X) - WITHOUT BUSY LAMP
  - (Y) - WITH BUSY LAMP, USE KS-15724, LI DIODE

Fig. 2—1A1 or 1A2 KTS—I Hold and/or Station Busy Lamp Modification (2662A1M Telephone Set)



NOTES:

1. IF SPEAKERPHONE IS NOT PROVIDED THESE LEADS ARE INSULATED AND STORED.
2. IF STATION BUSY LAMP IS NOT PROVIDED, REMOVE (Y-BR) MOUNTING CORD LEAD FROM BL TERMINAL; INSULATE AND STORE.

LEGEND:

- \* - INSULATE AND STORE
- † - NETWORK TERMINAL
- ‡ - LEADS INVOLVED IN MODIFICATION
- H - HOLD KEY
- LS - LINE SWITCH
- PU - PICKUP KEY

Fig. 3—2662A1M Telephone Set Converted for 1A KTS—With or Without Busy Lamp or Speakerphone

TABLE B

## PICKUP-SIGNAL KEY CONVERSION, 2662A1M TELEPHONE SET

CONVERSION OPTIONS	635A5 KEY LEADS					
	(O-W)	(S-W)	(G-R)	(BL-BK)	(BR-BK)	(BR-W)
HPPPPP (Note)	A2	A2	A2	A2	A2	5
HPPPPS	A2	A2	A2	A2	SG	5
HPPSSS	A2	A2	A2	SG	SG	5
HPPSSS	A2	A2	SG	SG	SG	5
HPPPP*S*	A2	A2	A2	S1	A2†	S1
HPPPP*P*S*	A2	A2	S1	S1	A2†	S1
HPP*P*P*S*	A2	S1	S1	S1	A2†	S1

\* These arrangements use line switch controlled ground for common signal key used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

† For 1A KTS connect (BR-BK) key lead to BL terminal.

*Note:* 635A5 key is furnished in 2662A1M telephone set. To convert from pickup (locking) to signal (nonlocking) remove 812857738 or P-28E773 screw from plunger at the key position being converted.

**TABLE C**  
**CONDUCTOR ASSIGNMENTS USING 66E-TYPE CONNECTOR BLOCK OR A25B CONNECTOR CABLE**

LEAD DESIG	2662A1M TEL SET TERM.†	MTG CORD OR A25B CONN CABLE		PLUG OR CONN	66E-TYPE CONN BLOCK
		PAIR NO.	COND COLOR	PIN NO.	CLIP TERM. NO.
T R	3 6	1	W-BL BL-W	26 1	1 2
A, H, S, or S1 A1 or B†	TB2-1 TB2-A1	2	W-O O-W	27 2	3 4
LG L1	LG L	3	W-G G-W	28 3	5 6
T R	3 6	4	W-BR BR-W	29 4	7 8
A, H, S, or S1 Spare or B†	TB2-2 *	5	W-S S-W	30 5	9 10
LG L2	LG L	6	R-BL BL-R	31 6	11 12
T R	3 6	7	R-O O-R	32 7	13 14
A, H, S, or S1 Spare or B†	TB2-3 *	8	R-G G-R	33 8	15 16
LG L3	LG L	9	R-BR BR-R	34 9	17 18
T R	3 6	10	R-S S-R	35 10	19 20
A, H, S, or S1 Spare or B†	TB2-4 *	11	BK-BL BL-BK	36 11	21 22
LG L4	LG L	12	BK-O O-BK	37 12	23 24
T R	3 6	13	BK-G G-BK	38 13	25 26
A, H, S, or S1 Spare or B†	TB2-5 *	14	BK-BR BR-BK	39 14	27 28
LG L5	LG L	15	BK-S S-BK	40 15	29 30
Spare Spare	* *	16	Y-BL BL-Y	41 16	31 32
Spare Spare	* *	17	Y-O O-Y	42 17	33 34
LG L6	LG L	18	Y-G G-Y	43 18	35 36
BL SG	TB2-BL TB2-SG	19	Y-BR BR-Y	44 19	37 38
B or B1 R or R1	TB1-7 A of net	20	Y-S S-Y	45 20	39 40
BZ1 BZ	L2 of net L1 of net	21	V-BL BL-V	46 21	41 42
Spare or DP2 Spare or DP1	* *	22	V-O O-V	47 22	43 44
Spare or T1 Spare or R1	* *	23	V-G G-V	48 23	45 46
Spare or IT Spare or IR	* *	24	V-BR BR-V	49 24	47 48
Spare or AG Spare or LK	* *	25	V-S S-V	50 25	49 50

\* Insulate and store.

† When set is used in 1A key telephone system, these balance leads must not be used for other purposes.

‡ Contracts of key plug unless otherwise noted.

**870A1M AND 870A2M "TOUCH-A-MATIC®" 32 TELEPHONE SET  
IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION,  
AND MAINTENANCE**

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**NOTICE**

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

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## 1. GENERAL

1.01 This section contains information for the 870A1M (MD) and 870A2M TOUCH-A-MATIC telephone set (Fig. 1).

**⚡Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.*

1.02 The reason for reissuing this section are listed below: Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy, paragraph 1.01.
- Show both 2012-type transformer and 95B1 power unit must be connected for 3B (MD)

speakerphone system operation (Tables B and C)

- Show both 85B1 and 95B1 power units must be connected for 4A speakerphone operation (Tables D and E).

**Warning:** *Telephone sets are factory-wired for A-lead control. If set is installed in a location where dial-light service is provided the A and A1 leads must be disconnected, insulated, and stored at the connecting block to prevent shorting out dial light transformer.*

1.03 The 870A1M (MD) telephone set equipped with D6AD mounting cord and 870A2M telephone set equipped with 623P6 jack assembly are factory-wired for bridged or individual ringing. Mounting cord conductors provide for tip, ring, ac power (870A1M), and A-lead control for 1A1, 1A2, or 6A key telephone systems (KTS).

1.04 The 870A2M telephone set is shipped with a modular 623P6 mounting cord jack assembly, M2SL-87 power cord, and 95B1 power unit installed.

1.05 The 870A1M telephone set is field convertible to modular.

1.06 The telephone sets are available in the following colors:

- Black (-03)
- Green (-51)
- White (-58)
- Light Beige (-60).

1.07 The 870B1-type faceplates are available in the following colors:

- Teak Woodgrain (-108)
- Walnut Woodgrain (-109)
- Matte Aluminum (-122).

1.08 The 870A2 (MD) faceplate is available in satin-silver (-87) only.

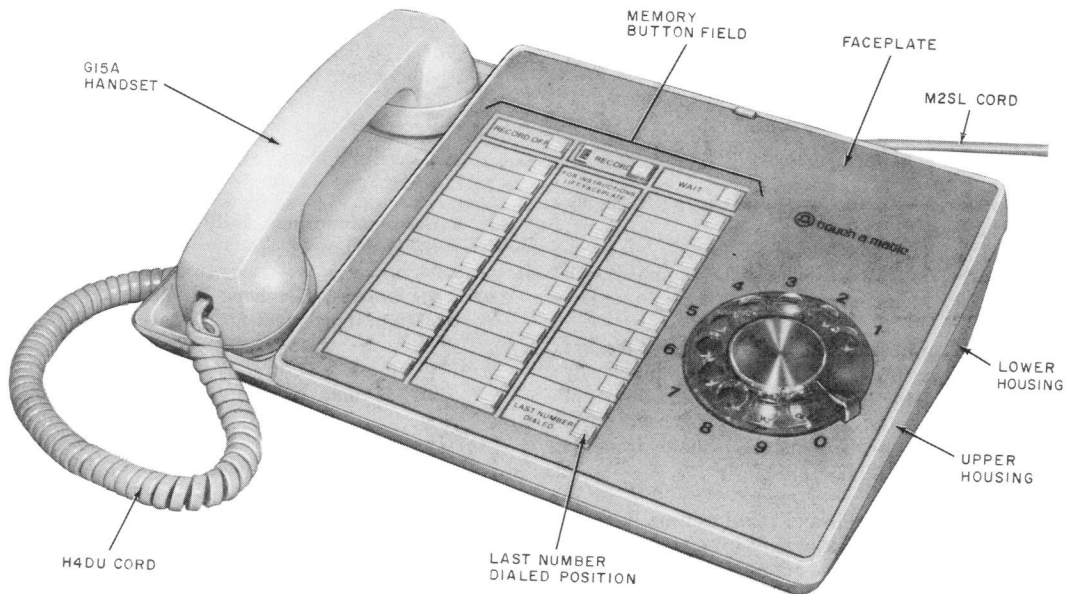


Fig. 1—870A2M Telephone Set

## 2. IDENTIFICATION

2.01 The 870A1M and 870A2M telephone sets provide all standard features of a normal single line telephone set plus automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

### A. Design Features

2.02 Design features are as follows:

- Modular telephone set, 870A2M (870A1M is convertible to modular)
- Integrated circuit memory
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
- Last number manually dialed memory

- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input).

### B. Optional Features

2.03 Optional features (refer to Table A) are as follows:

- (a) Decorative Faceplate
- (b) Speakerphone. Either 3-type (MD) or 4A speakerphone system may be added to stations
- (c) Dial Tone Detector. Automatically starts dialer when precise TOUCH-TONE® service dial tone (350 Hz and 440 Hz) is present
- (d) One-Touch Calling, (requires both Dial Tone Detector and speakerphone). Depressing one memory button will automatically turn on speak-



erphone, detect dial tone, and dial complete number

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) if the call is to be completed automatically.

- (e) D-180818 Kit of Part provides the following features:

**Note:** Telephone set must be equipped with an 870B Memory.

(1) Record Disable: Turns off recording feature to prevent accidental erasures of previously stored numbers. No recording possible except for last number dialed memory which will automatically store digits manually dialed from the telephone set dial.

(2) Record Disable and Dial Intermix Feature: Digits dialed manually from telephone set dial and digits dialed automatically from memory may be intermixed without depressing RECORD OFF button. Memories cannot be altered and LAST NUMBER DIALED feature is inoperative.

- (f) KS-20419L1 or KS-20419L2 buzzer
- (g) Amplifying handset
- (h) Head telephone set operation (with jackset)
- (i) End-to-end signaling using 1035C3A (MD) or 1035AF3A dial adjunct (Section 501-164-130).

**2.04** All options are implemented by the following:

- (a) Wiring changes in the telephone set
- (b) Installation of appropriate additional items.

#### C. Ordering Guide

**2.05** The 870A2M (modular) telephone set may be ordered complete and ready to install as:

- Set, Telephone, 870A2M- (refer to paragraph 1.06 or 1.07 for color suffix) equipped with 870B1-122 faceplate.

**2.06** Order the following separately:

- Unit, Power, 95B1

**Note:** A 95B1 power unit is required for each telephone set.

- Decorative Faceplate, 870B1-: Teak Woodgrain (-108) or Walnut Woodgrain (-109)

- Cord, Mounting, D4BU-29 or D6AM-87 (870A2M).

**2.07** The 870A2M telephone set may also be ordered in its component parts as follows:

- (a) Housing, 870A1- (refer to paragraph 1.06 or 1.07 for color suffix)
- (b) Housing, Upper, 870A1U- (refer to paragraph 1.06 or 1.07 for color suffix) (used with 870B1 faceplate)
- (c) Faceplate, 870B1-122 (matte aluminum)
- (d) Handset, G15A- (refer to paragraph 1.06 or 1.07 for color suffix)
- (e) Cord, Handset, H4DU- (refer to paragraph 1.06 or 1.07 for color suffix)
- (f) Base, Telephone Set, 870A2M includes the following:

- Dial, 8EA-119
- Ringer, P1B
- Network (4228-type)
- Battery, KS-20390L2 or KS-20390L4
- Jack, Handset, 616B
- Jack, Mounting Cord, 623P6
- Cord, Power, M2SL-87 (7-foot)
- Unit, Power, 95B1
- Memory, 870B
- 840393672 Directory Sheet Set
- Subscriber Instruction Booklet, SIB-2455B.

TABLE A  
OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIG.	TABLE
Speakerphone	4A	108AA Loudspeaker	10	D, E
		680AE Transmitter	10	D, E
		223D Adapter	10	D, E
		85B1 Power Unit	10	D, E
		D-180568 Kit of Parts	8(C)	D, E
	3B (MD)	760A (MD) Loudspeaker	9	B, C
		666B (MD) Transmitter	9	B, C
		55-type (MD) Control Unit	9	B, C
		2012D Transformer	9	B, C
		D10R-87 Cord	9	B, C
		D-180568 Kit of Parts	8(C)	B, C
One-Touch Calling	D-180493 Kit of Parts	8(D,E)	C or E	
	Speakerphone	8(B)		
Dial Tone Detector	D-180493 Kit of Parts	8(D)	F	
Convert 870A1M to 870A2M (Paragraph 3.11)	623P6 Jack, D4BU Cord, M2SL Cord, 95B1 Power Unit			
Buzzer (Paragraph 3.10)	KS-20419L1			
Amplifying Handsets (Paragraph 6.09)	G6BM, G7BM, or G8BM Handset			
Adjunct Keys *	6040-, 6050-, or 6051-Type Key			
Decorative Faceplate (Paragraph 3.19)	870B1-108 (Teak Woodgrain)			
	870B1-109 (Walnut Woodgrain)			
Record Disable (Paragraph 3.09)	D-180818 Kit of Parts †	8(A)	G	
Dial Intermix (Paragraph 3.09)				
Head Telephone Set Operation (Paragraph 3.13)	Plantronics Jackset Model JS0180-1A or JS0180-2A	Tables Provided With Plantronics Jackset		
	Desired Head Telephone Set ‡			
End-to-End Signaling	1035C3A (MD) or 1035AF3A Dial Adjunct	Section 501-164-130		

\* When 6040-, or 6050-, or 6051-type key is used in conjunction with the 870A1M telephone set, automatic dialing and recording features are not reset when switching lines. To reset the dialer, it will be necessary to go on-hook, flash the line switch, or depress the RECORD OFF button after termination of each call. If 6-button key service is desired it is recommended that the 872A1M telephone set be used because the reset function is automatically provided.

† If set is equipped with 870A Memory, it must be replaced with an 870B Memory.

‡ KS-19796, KS-20778, 52-type, 53-type, and 60-type headsets are registered with the jackset models.

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

- Decorative Faceplate, 870B1-: Teak Woodgrain (-108) or Walnut Woodgrain (-109)

**Note:** If set is equipped with older 870A1 or 870A2 faceplate, then an upper housing of the appropriate color must be ordered.

- Kit of Parts, D-180568 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix features)

**Note:** This kit of parts may be used only with sets equipped with an 870B Memory.

- Cord, Mounting, D4BU-29 or D6AM-87 (870A1M, conversion to modular)
- Jack, Mounting, 623P6 (870A1M, conversion to modular)
- Cord, Power, M2SL-87, 7-foot (separate power cord for 870A1M)
- Buzzer, KS-20419L1 or KS-20419L2
- Handset, Amplifying (G6BM-, G7BM-, or G8BM-; refer to paragraph 1.06 to 1.07 for color suffix)
- Set, Head Telephone [using Plantronics Jackset Model JS0180-1A (1-1/2 foot cord) or JS0180-2A (6-foot cord)]. See Table A.

**D. Operating Features****2.07** Operating features (Fig. 1) are as follows.

- 32-button array of low force, low travel nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button located in lower right corner of memory array, when

momentarily depressed, automatically redials the last number manually dialed.

- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.
- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) are required].

**3. INSTALLATION****STANDARD INSTALLATION**

**3.01** Make all wiring changes and optional modifications (Table A) before external connections are made to the set (Fig. 8).

**Warning:** *Do not plug in either battery or power unit until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.*

**3.02** The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery by tilting the set up, and inserting the battery plug into the mating jack.

**Note:** Write date of battery installation on label provided (Fig. 5).

**A. Power Unit Connections**

**3.03** Power unit connections are as follows.

- (1) For the 870A2M telephone set, the 95B1 power unit is factory-wired to terminals PSB-24 and PSB-25 via the M2SL-87 cord.
- (2) For the 870A1M telephone set, install the 95B1 power unit within 150 feet (24 gauge conduc-

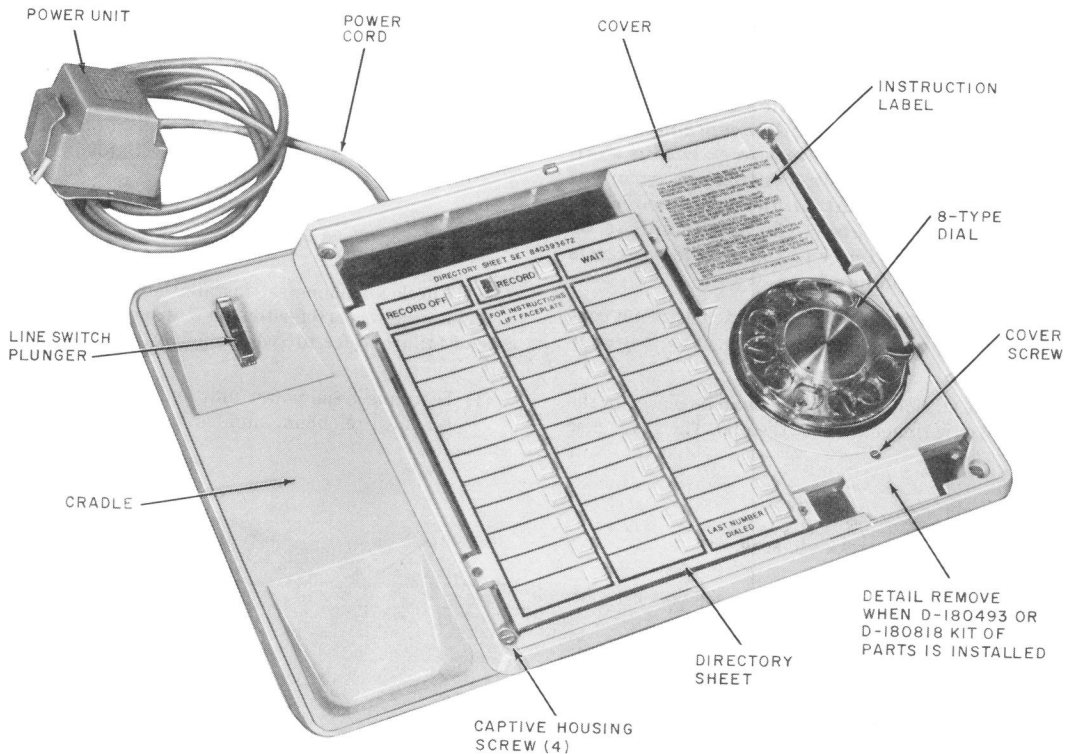


Fig. 2—870A2M Telephone Set—Faceplate and Handset Removed

tors) of the telephone set. The power unit may be located at the equipment end of the cable and connected to the telephone set by the G-W and W-G conductors in the mounting cord. Alternatively it may be connected to terminals PSB-24 and PSB-25 by conductors separate from the mounting cord. When separate power conductors are used, disconnect, insulate and store the (G-W) and (W-G) mounting cord leads on PSB terminals 24 and 25.

**Note:** The 95B1 power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

**Danger 1:** If used, securely attach retaining clamp to ac outlet using outlet cover screw **BEFORE** attempting to install 95B1 power unit. The power unit

**and any other cord plugged into the ac outlet should always be unplugged completely from outlet BEFORE attempting to attach or remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use retaining clamp on outlets where cover mounting screw holds the duplex outlet in the box.**

**Danger 2:** Care should be taken to trim and dress leads connecting to low voltage output terminals of 95B1 power unit to assure that inadvertent connection to conducting surfaces or other power

*source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.*

(3) Plug the power unit into an ac outlet not controlled by a switch (continuous ac power is required).

**3.04** The station number card shall be placed in the plastic fingerwheel of the dial. The silver disc

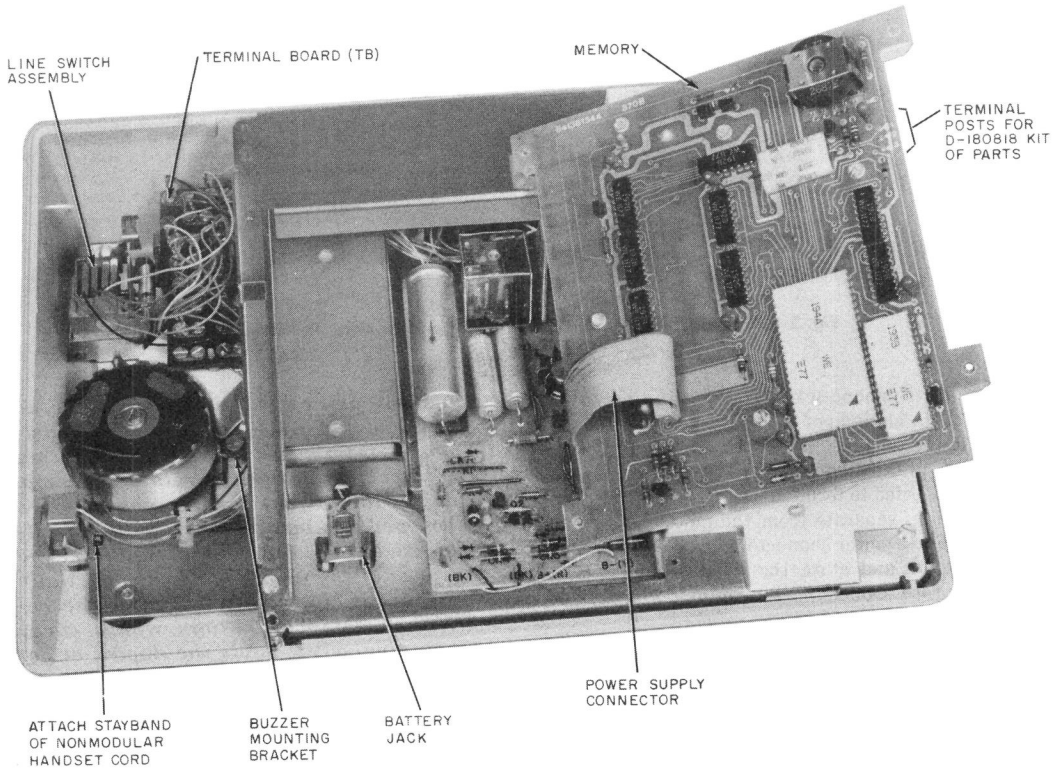
provided with the dial shall be retained under the number card.

**3.05** The directory sheets (Fig. 2) fit over the buttons of the Memory and are held in place by the faceplate. Additional sheets are available in the directory sheet set, 840393672.

**B. Installation Check Procedure**

**3.06** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Trouble Analysis, Table H.

(1) Disconnect the power unit and manually dial a known telephone number to check that the



**Fig. 3—870A2M Telephone Set—Internal View**

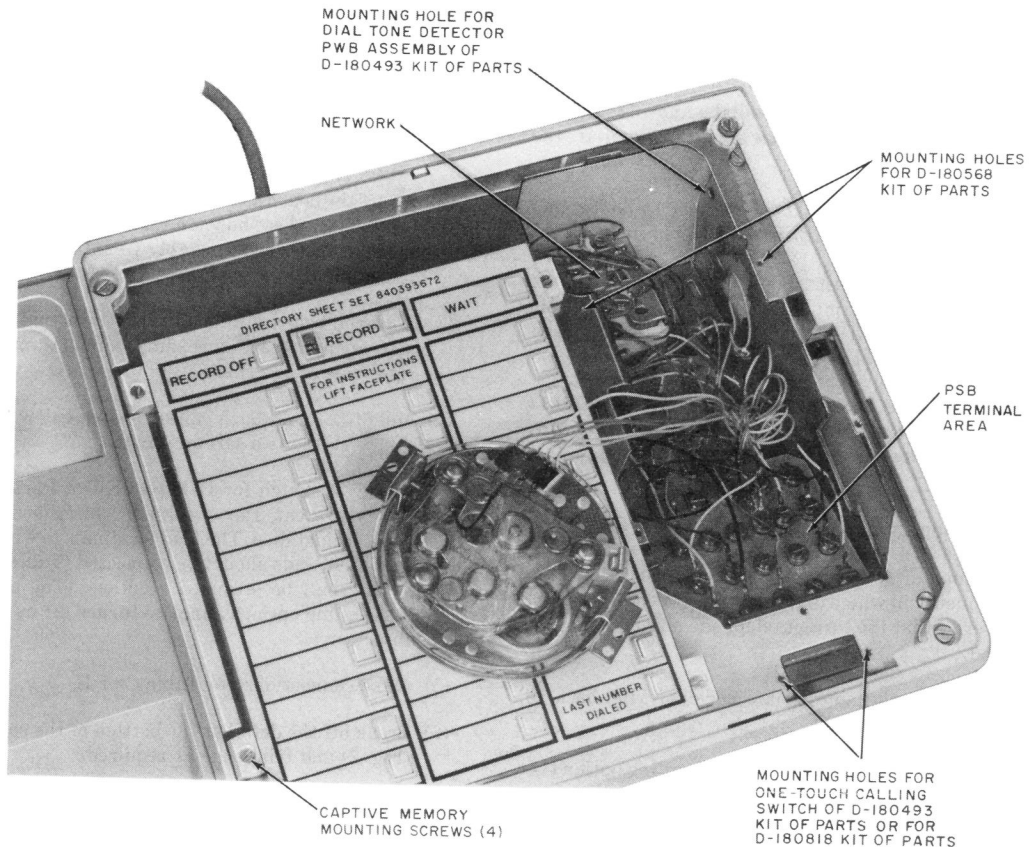


Fig. 4—870A2M Telephone Set—Dial Removed to Show Terminal Area

telephone operates correctly in the absence of commercial power.

- (2) Reconnect the power unit to ac outlet.
- (3) With the handset on-hook, record known telephone numbers, storing consecutive digits of the numbers in sequential memory locations. Fill all memory locations except LAST NUMBER DIALED and the location immediately above it [paragraph 5.01 (4) through (7)].
- (4) Automatically dial the telephone numbers stored in Step (3) by momentarily depressing

the memory buttons in the same sequence in which the digits were recorded. Verify that the digits thus dialed produce the expected telephone numbers.

**Note:** The set should stop dialing if it reaches a stored WAIT input. Depress the memory button again and the remaining digits should be dialed.

- (5) Go off-hook and simultaneously manually dial and record a known telephone number into memory location immediately above LAST NUMBER DIALED [paragraph 5.01 (4) through (7)].

- (6) Momentarily hang up handset and automatically dial the number recorded in Step (5) and verify that it is correct.
- (7) Go off-hook, manually dial a known telephone number with a *wait* input inserted in the number.
- (8) Automatically dial the number by depressing the LAST NUMBER DIALED button.

**Note:** The set should stop dialing at the stored WAIT input. Depress the LAST NUMBER DIALED button again and the remaining digits should be dialed.



**The battery and the power unit must be connected a minimum of five minutes before doing Step (9).**

- (9) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, momentarily depress memory buttons in same sequence in which digits were recorded in Step (3). Verify that the correct telephone number is dialed out.
- (10) Dial the appropriate code for ring-back to test the ringer.
- (11) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (5). The speakerphone should turn on, dial tone should automatically be detected, and the stored number should be automatically dialed.

#### OPTIONAL APPARATUS INSTALLATION

##### A. D-180568 Kit of Parts (Speakerphone)

**3.07** Install as follows.

- (1) Proceed as described in paragraph 3.18.
- (2) Make connections per appropriate Table B, C, D, or E.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of the printed wiring board (PWB) should be at lower right corner.

##### B. D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)

**3.08** Install as follows.

- (1) Remove the housing (paragraph 3.21), and access PSB terminal board (paragraph 3.18).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the chassis.
- (3) Lock the board into position by inserting the accompanying self-threading screw through the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If switch for D-180818 Kit of Parts is already present, the one-touch calling switch cannot be installed. The PSB terminals to which the switch leads should be connected (Tables C and E) shall be strapped together. (The one-touch calling option cannot be turned off by the subscriber.)

- (5) Make connections per Table C or E.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.
- (7) Verify correct operation of option.
- (8) Reassemble set.

##### C. D-180818 Kit of Parts (Record Disable and Dial Inter-mix Features)

**3.09** Install as follows.

- (1) Remove faceplate (paragraph 3.19).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (3) Disengage the four captive memory mounting screws (Fig. 4).
- (4) Remove the two captive dial mounting screws and move dial aside.
- (5) Rotate left edge of the memory upward as shown by Fig. 3.

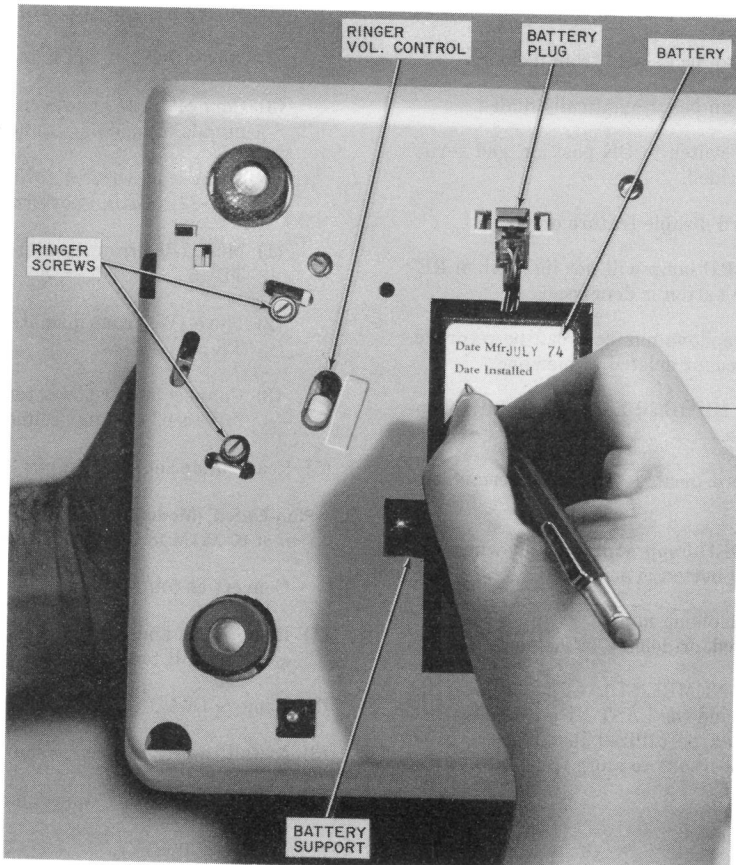


Fig. 5—Telephone Set, Bottom View

**Note:** If the set is equipped with an 870A Memory, replace it with an 870B Memory and carefully pack and return the old Memory according to local procedures.

- (6) Mount switch below dial using the two screws provided.

**Note:** If the one-touch calling switch (D-180493 Kit of Parts) has been provided, it must be removed. The PSB terminals to which the switch leads were connected (Table C or E) must

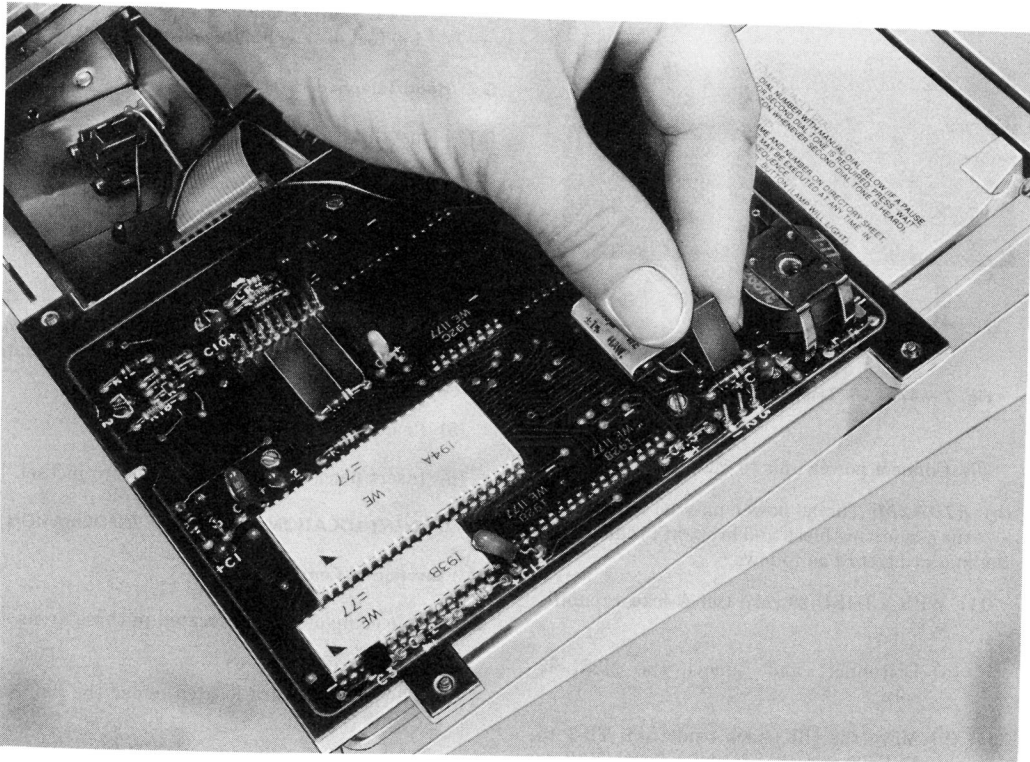
be strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

- (7) Connect switch lead connectors to post terminals on memory board per Table G and Fig. 6.
- (8) With feature switch in OFF position, verify that set operates in normal manner:

- Numbers can be recorded into memory.



- Numbers can be changed.
  - Numbers can be deleted from memory.
  - Numbers can be automatically dialed.
- (9) Set feature switch to ON position and verify feature provided.
- (a) For record disable feature only.
- (1) RECORD lamp will not light when RECORD button is depressed.
  - (2) No telephone numbers can be recorded, changed, or deleted in memory.
  - (3) LAST NUMBER DIALED feature is operative.
- (b) For record disable and dial intermix features:
- (1) RECORD lamp will not light when RECORD button is depressed.
  - (2) No telephone numbers can be recorded, changed, or deleted in memory.
  - (3) LAST NUMBER DIALED feature is disabled and the LAST NUMBER DIALED position can be utilized just like the other memory positions to store frequently dialed numbers.
- (10) Reassemble set.
- D. KS-20419L1 or KS-20419L2 Buzzer**
- 3.10** Install as follows.
- (1) Remove faceplate (paragraph 3.19) and place handset aside.
  - (2) Remove handset cradle (paragraph 3.20).
  - (3) Remove screw from buzzer mounting bracket, and mount buzzer on bracket shown in Fig. 3.
  - (4) Connect two blue buzzer leads to TB-15 and TB-16 (Fig. 8H), and connect to external 10 volt ac circuit by changing the 623P6 jack connections as follows:
    - (a) With no A-lead control perform the following:
      - (1) Move (W-O) or (BK) from TB-1 to TB-15
      - (2) Move (O-W) or (Y) from TB-2 to TB-16
      - (3) Connect buzzer power to appropriate terminals of modular connecting block.
    - (b) With A-lead control (870A2M only), use D6AM-87 cord and perform the following:
      - (1) Move (BL) from insulated and stored to TB-15
      - (2) Move (W) from insulated and stored to TB-16
      - (3) Connect buzzer power to appropriate terminals of modular connecting block.
- (5) Reassemble set (paragraphs 3.20 and 3.19).
- E. Plug-Ended (Modular) Mounting Cord (for conversion of 870A1M to 870A2M telephone set)**
- 3.11** Convert as follows.
- (1) Remove the housing (paragraph 3.21) and access the PSB terminals (paragraph 3.18).
  - (2) Remove D6AD-87 mounting cord.
  - (3) Install the 623P6 jack as shown in Fig. 7.
  - (4) Connect the spade-tipped jack leads as follows:
    - (a) (R) wire to TB-4
    - (b) (G) wire to TB-8
    - (c) (Y) wire to TB-2
    - (d) (BK) wire to TB-1
    - (e) Insulate and store (BL) and (W) conductors.
  - (5) Connect (Y) lead of M2SL-87 cord to PSB-24 and the (BK) lead to PSB-25 and route cord through housing.
  - (6) Connect the cord to the 95B1 power unit.
  - (7) Reassemble the set.
  - (8) Install a 625-type connecting block.



**Fig. 6—870A1M (MD) or 870A2M Telephone Set, Connection of D-180818 Kit of Parts, Record Disable Feature Only**

(9) Install the D4BU mounting cord.

#### **F. Optional Power Connections**

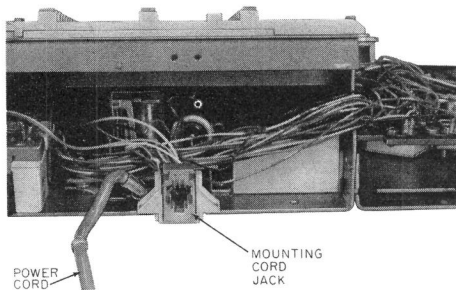
**3.12** In some cases it may be possible and desirable to bring ac power into the set in a nonstandard manner. The following methods are approved alternatives.

(a) **870A1M:** An M2SL-87 cord may be used to connect the 95B1 power unit to the telephone set as follows.

- (1) Remove the housing (paragraph 3.21).
- (2) Disconnect the (G-W) and (W-G) leads of

the mounting cord from PSB-24 and PSB-25, and insulate and store.

- (3) Thread the leads of the M2SL cord to the PSB area from the rear of the telephone set.
- (4) Fasten the M2SL cord to the chassis by placing a No. 10-24 by 1/4-inch screw [804216471 (P-421647)] through the hole in the S-hook and into the tapped hole in the chassis located behind the 623P6 jack.
- (5) Connect the (Y) lead to PSB-24 and the (BK) lead to PSB-25.
- (6) Reassemble housing.



**Fig. 7—870A2M Telephone Set, Partial View**

- (7) Connect power unit to M2SL cord.
- (b) **870A2M:** The ac power may be wired in at the connecting block and brought to the set via the mounting cord as follows:
- (1) With a D4BU-29 cord (no A-lead capability):
    - (a) Disconnect and remove the M2SL-87 cord.
    - (b) Move the (BK) jack lead from TB-1 to PSB-13 and the (Y) lead from TB-2 to PSB-16.
    - (c) Add strap leads from PSB-13 to PSB-24 and from PSB-16 to PSB-25.
    - (d) Connect the power unit to the appropriate terminals of the 625-type connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.
  - (2) With a D6AM-87 cord:
    - (a) Disconnect and remove the M2SL-87 cord.
    - (b) Connect the normally insulated and stored (BL) and (W) jack leads to PSB-13 and PSB-16, respectively.
    - (c) Add strap leads from PSB-13 to PSB-24 and from PSB-16 to PSB-25.
    - (d) Connect the power unit to the appropriate terminals of the 74D connecting

block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.

#### G. Head Telephone Set

##### 3.13 Install as follows:

- (1) Remove housing (paragraph 3.21).
- (2) Access PSB terminal area (paragraph 3.18).
- (3) Remove cradle (paragraph 3.20).
- (4) Thread cord of jackset through hole in rear of housing and make connections per appropriate table provided with Plantronics Jackset.
- (5) Reassemble telephone set.
- (6) Insert head telephone set plug into jackset.

#### COMPONENT LOCATION AND ACCESS INFORMATION

##### A. Location of Components

##### 3.14 The components are located in three areas as follows.

- (a) The following are located under the handset cradle (Fig. 3):
  - Buzzer (optional)
  - Ringer
  - Line Switch Assembly
  - Handset jack
  - Terminal board (TB).
- (b) The following are located under the faceplate, inside the set (Fig. 3 and 4):
  - (1) Battery jack (Fig. 3)
  - (2) Power supply board (PSB) terminal area (Fig. 4)
  - (3) Network (Fig. 4)
  - (4) Options (Fig. 4) are as follows:
    - (a) D-180568 (relay kit for speakerphone)

(b) D-180493 (dial tone detector and one-touch calling switch kit)

(c) D-180818 (record disable and dial intermix features kit).

(c) The battery is located in the bottom of telephone set (Fig. 5).

#### B. Mounting Cord

3.15 The D6AD-87 mounting cord (870A1M) is spade-tip ended at both ends. The conductors provide for tip, ring, ac power, and A-lead control.

3.16 The D4BU-29 plug-ended mounting cord (870A2M) conductors provide for tip, ring, and A-lead control.

**Note:** If two extra leads are required, a D6AM-87 cord may be used.

#### C. Network Terminals

3.17 For access to the network terminals, proceed as follows:

- (1) Remove the faceplate (paragraph 3.19)
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2)
- (3) Remove the cover
- (4) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### D. Power Supply Board (PSB) Terminals

3.18 To access the terminal field on the power supply board, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) Remove the two screws that hold the dial in place.

(5) Gently raise the dial and move it aside.

(6) To reassemble; reverse procedure.

(7) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### E. Faceplate Removal

3.19 Removal will differ depending on faceplate being used. Proceed as follows.

(a) The 870B1-type faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The 870B1 faceplate is not a direct replacement for the 870A2-87 faceplate. An 870A1U upper housing is also required with the 870B1 faceplate (paragraph 6.10).

(b) The 870A2-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edge and lift.

#### F. Handset Cradle Removal

3.20 To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19) and place the handset aside.
- (2) Remove upper housing, if provided [paragraph 3.21(b)].

**Warning:** *The plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the line switch arm.*

- (3) Disengage the captive cradle screws located in the two tabs on the cradle.
- (4) Lift the cradle by pulling up on the plunger, and remove.
- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

- (6) Refasten the captive cradle screws.

### G. Housing Removal

#### 3.21 To remove, proceed as follows.

##### (a) Remove lower housing as follows.

- (1) Unplug the handset cord, at the telephone set end and remove handset.
- (2) Unplug the mounting cord (870A2M).
- (3) Remove the faceplate (paragraph 3.19).

**Warning:** Attempting to remove the housing without removing the handset cradle may damage the line switch arm.

- (4) Remove upper housing if provided [paragraph 3.21(b)].
- (5) Remove the handset cradle (paragraph 3.20).
- (6) Disengage the captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
- (7) Separate the housing from the telephone set base.
- (8) Disconnect the 95B1 power unit from the M2SL-87 cord, if required (870A2M).
- (9) Feed mounting cord through hole in bottom of housing as housing is removed.
- (10) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs on the chassis. Misalignment may cause the bottom of the housing to bow.
- (11) When replacing the housing, keep the handset jack from being trapped between the housing and chassis.

##### (b) Remove upper housing as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Disengage the captive housing screws located in each corner of the upper housing (Fig. 2). This will release the lower housing.

- (3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.

- (4) If necessary, thread screws out of housing.

- (5) To reassemble, reverse procedure.

### 4. CONNECTIONS

- 4.01 Telephone set connections are shown in Fig. 8.

- 4.02 Refer to Table A for connection reference for all options.

**Warning:** Telephone sets are factory-wired for A-lead control. If set is installed in a location where dial-light service is provided, the A and A1 leads must be disconnected, insulated, and stored at the connecting block to prevent shorting out of dial light transformer.

- 4.03 A partial functional schematic is shown in Fig. 11.

### 5. OPERATION

#### A. Record a Number Into Memory

**Note:** If set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

- 5.01 To record a number, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the directory sheet and faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)
- (5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number.

**Note:** If an access code and pause for second dial tone is required, perform Steps (a) through (c).

- (a) Dial the access digit(s) for the outside line.
- (b) Push the WAIT button after RECORD lamp relights. (The WAIT entry counts as one digit.)
- (c) Dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer will also be reset by a line switch or speakerphone operation.

#### B. Change a number in Memory

**Note:** If set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

- 5.02 Whenever a new number is recorded, in a previously used memory position, it will automatically replace the previously stored number.

#### C. Delete a Number From Memory

**Note:** If set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

- 5.03 Complete the following operations in succession.
  - (1) Depress the RECORD button.
  - (2) Depress the memory button corresponding to the name and number to be deleted.
  - (3) Depress the RECORD OFF button.

#### D. Automatically Dial a Number From Memory

- 5.04 To automatically dial a number, proceed as follows.

- (a) For factory-wired sets, go off-hook, listen for dial tone, and depress the desired memory button. If WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress the memory button again to complete automatic dialing.
- (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the memory button.
- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the memory button.

#### E. LAST NUMBER DIALED Feature

- 5.05 The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED position (Fig. 1) any number called using the standard telephone dial. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

**Note:** If set is equipped with D-180818 Kit of Parts, and dial intermix feature is provided, LAST NUMBER DIALED feature is functional only when the feature switch is in the OFF position.

- 5.06 Operation of LAST NUMBER DIALED feature is as follows.

- (a) With no access digit(s) required:
  - (1) Go off-hook
  - (2) Listen for dial tone
  - (3) Manually dial telephone number
  - (4) To redial same number automatically:
    - (a) For factory-wired sets, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.
    - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial

tone, and depress the LAST NUMBER DIALED button.

- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the LAST NUMBER DIALED button.
- (b) When an access code and pause for second dial tone is required:
- (1) Go off-hook
  - (2) Listen for dial tone
  - (3) Dial access digit(s)
  - (4) Depress WAIT button after second dial tone is heard
  - (5) Manually dial telephone number
  - (6) To redial same number automatically:
    - (a) For factory-wired sets, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded *wait*. Input when second dial tone is heard, depress LAST NUMBER DIALED button again to complete dialing.
    - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
    - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the LAST NUMBER DIALED button.

## 6. MAINTENANCE

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

### A. Trouble Analysis

**6.02** When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).
- (2) Check for improper connections.
- (3) Refer to Table H and the following paragraphs.
- (4) If removal of the telephone set is required, do the following.
  - (a) Disconnect power unit from ac outlet and unplug battery.
  - (b) Disconnect telephone set.

**Warning:** *Failure to restrain plug can result in plug damage necessitating battery replacement.*

- (c) Place the plug sideways into the housing slot below the battery jack and tape in place.

### B. Battery

**6.03** The KS-20390L2 or L4 battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 5).

- (1) Tilt the front of the set up
- (2) Unplug the battery
- (3) Loosen captive screw on the battery support
- (4) Remove battery support
- (5) Remove battery
- (6) Install new battery
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a prerecorded telephone number.

### C. Memory

**6.04** The memory may be replaced in the following manner (Fig. 3).

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of the Memory or ac and battery power results in loss of the stored telephone numbers.

- (2) Remove the faceplate (paragraph 3.19).
- (3) Loosen the four captive memory mounting screws.
- (4) Rotate the left edge of the memory upward as shown in Fig. 3.
- (5) Disengage the connector by pulling on it perpendicular to the printed wiring board and disconnect D-kit switch lead after noting connections.
- (6) Replace the memory. The connector is keyed; one position is filled and should fit over the vacant position in the row of pins. The cable from the connector should not be twisted. It should form a loop as shown in Fig. 3 when connected to the board. Reconnect D-kit switch leads.
- (7) Reassemble telephone set.
- (8) Reconnect battery and power unit.
- (9) Test per paragraph 3.06.
- (10) Reprogram memory (see Part 5).

#### D. Dial

##### 6.05 Replace dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in the loss of stored numbers.

- (2) Access PSB terminal area [paragraph 3.18 (1) through (5)].
- (3) Disconnect dial leads and remove dial.
- (4) To install a new dial, reverse the previous steps.
- (5) Reconnect battery and power unit.

- (6) Reprogram memory (see Part 5).

#### E. Ringer

##### 6.06 Replace ringer as follows.

- (1) Disconnect power unit from the ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove the upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect the ringer leads (Fig. 8H).
- (6) Tilt the front of the set up.
- (7) Loosen ringer mounting screws (Fig. 5).
- (8) Remove ringer.
- (9) Install new ringer. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent damping of the ringer output. Dial ringback code to test ringer.
- (10) Reassemble set [paragraphs 3.20, 3.21(b), and 3.19].
- (11) Reconnect battery and power unit.
- (12) Reprogram memory (see Part 5).

#### F. Buzzer (optional)

##### 6.07 Replace buzzer as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove the upper housing, if provided [paragraph 3.21(b)].



- (4) Remove the cradle (paragraph 3.20).
- (5) Loosen buzzer mounting screw and remove buzzer.
- (6) Remove buzzer leads from the TB-15 and TB-16.
- (7) Install new buzzer.
- (8) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (10) Reconnect battery and power unit.
- (11) Reprogram memory (see Part 5).

#### G. Handset Jack (616B)

##### 6.08 Replace handset as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
  
*Note:* Removal of ac and battery power results in loss of stored numbers.
- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove the upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect the handset jack leads and remove jack.
- (6) Install new 616B handset jack.
- (7) Reassemble telephone set [paragraph 3.20, 3.21(b), and 3.19].
- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

#### H. Handsets

**6.09** A defective G15A handset may be replaced or changed to a modular amplifying handset (G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace

the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B) proceed as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
  
*Note:* Removal of ac and battery power results in loss of stored numbers.
- (2) Unplug H4DU handset cord at telephone set end.
- (3) Remove faceplate (paragraph 3.19), and place handset aside.
- (4) Remove the upper housing, if provided [paragraph 3.21(b)].
- (5) Remove handset cradle (paragraph 3.20).
- (6) Disconnect 616B handset jack (paragraph 6.08). (Jack may be removed or stored just to right of ringer.)
- (7) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (8) Attach stayband hook to chassis (Fig. 3).
- (9) Route leads through wire guide as shown in Fig. 3.
- (10) Make connections (Fig. 8H).
- (11) Reassemble set [paragraph 3.20, 3.21(b), and 3.19].
- (12) Reconnect battery and power unit.
- (13) Reprogram memory (see Part 5).

#### I. Faceplate

**6.10** To replace an 870A2-87 faceplate with an 870B1-type faceplate, proceed as follows.

- (1) Remove the 870A2-87 faceplate by lifting up on any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U upper housing to the chassis and

870A1 housing. The three parts should be held together tightly as the screws are driven.

(4) Place the two tabs located along the lower edge of the 870B1 faceplate in the notches in the lower side of the 870A1U upper housing.

(5) Lower the faceplate to rest on the memory. The spring clip located in the center of the upper side of the upper housing should retain the faceplate.

#### J. Speakerphone

6.11 For maintenance information on the 3-type (MD) or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively.

6.12 For speakerphone connections, use applicable Tables B through E.

♦TABLE B♦

## CONNECTIONS – 870A1M (MD) OR 870A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		CONNECT						
				FROM		TO				
		DESIG	COLOR	TEL SET		44-TYPE BLOCK TERM.	TEL SET PSB	CONTROL UNIT (NOTE)		
				PSB	TB			55A	55B	
Tel Set	Mtg Cord D6AD-87 (870A1M)	R	BL-W			1				
		T	W-BL			2				
		A1	O-W			4				
		A	W-O			5				
		AC1	G-W			6				
		AC2	W-G			7				
	623P6 Jack Assy (870A2M) *	Spare	W							
		A	BK							
		R	R							
		T	G							
		A1	Y							
		Spare	BL							
	Speakerphone Interconnection Cord D10R-87	R1	BL-W	9					28	10
		T1	W-BL	2					19	1
		LK	O-W	27					11	35
		A1	W-BR		2				12	2
		SPO	S-W	21					†	†
		AG	W-O		1				5	11
		P3	W-G	3					21	4
		P4	G-W	6					30	13
		Spare	BR-W						†	†
		Spare	W-S						†	†
	D-180568 Kit of Parts		Shi	G-W				14		
			VDD	W-G				17		
			SHa	R-BL				26		
			LK	BL-R				27		
	666B (MD) Trmtr	T7A Cord	M1	S-BK					4	7
			P1	BL-R					13	8
-15V			BK-S					14	16	
S			O-BK					3	18	
A1			Y-O					29	19	
F1			G-Y					2	17	
LK			BK-O					11	35	
760A (MD) LSPK	R2FK Cord	SP1	G					34	20	
		SP2	R					33†	29†	

See note and footnotes at end of table.

♦TABLE B (Contd)♦

## CONNECTIONS – 870A1M (MD) OR 870A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		CONNECT					
				FROM			TO		
		DESIG	COLOR	TEL SET		44-TYPE BLOCK TERM.	TEL SET PSB	CONTROL UNIT (NOTE)	
				PSB	TB			55A	55B
95B1 PWR Unit (870A1M) §	D-Station Wire	AC1				6			
		AC2				7			
95B1 PWR Unit (870A2M) §	M2SL-87 Cord	AC1	Y				24 ¶		
		AC2	BK				25 ¶		
2012B (MD) or 2012D Trnsf §	D-Station Wire	AC1						27	27
		AC2						36	36

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B).

\* Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

† Insulate and store.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

§ Both 95B1 power unit and 2012B (MD) or 2012D transformer must be connected for speakerphone operation.

¶ Connected at factory.

♦TABLE C♦

**CONNECTIONS - 870A1M (MD) OR 870A2M TELEPHONE SET WITH ONE-TOUCH CALLING  
(DIAL TONE DETECTOR AND 3B (MD) SPEAKERPHONE)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT								
					FROM		TO						
		DESIG	COLOR	REMOVE FROM PSB	TEL SET		44-TYPE BLOCK TERM.	TEL SET PSB	CONTROL UNIT (NOTE)				
					PSB	TB			55A	55B			
870-Type Tel Set	Mtg Cord D6AD-87 (870A1M)	R	BL-W					1					
		T	W-BL					2					
		A1	O-W					4					
		A	W-O					5					
		AC1	G-W					6					
		AC2	W-G					7					
	623P6 Jack Assy (870A2M)*	Spare	W										
		A	BK										
		R	R										
		T	G										
		A1	Y										
	Speakerphone Interconnection Cord D10R-87	Spare	BL										
		R1	BL-W			9					28	10	
		T1	W-BL			2					19	1	
		LK	O-W			27					11	35	
		A1	W-BR				2				12	2	
		SPO	S-W			21					3	18	
		AG	W-O				1				5	11	
		P3	W-G			3					21	4	
		P4	G-W			6					30	13	
		Spare	BR-W								†	†	
		Spare	W-S								†	†	
		Strap	BK	11								†	
	BK		18								†		
	BK		23								†		
	D-180493 Kit of Parts	Dial Tone Detector	Input	G-R							2		
			PB	O-BK							7		
			Input	G-R								9	
			DT	O-Y								11	
			VDD	R-O								17	
			SPR	Y-BL								18	
			DR	Y-O								19	

See note and footnotes at end of table.

◆TABLE C (Contd)◆

**CONNECTION - 870A1M (MD) OR 870A2M TELEPHONE SET WITH ONE-TOUCH CALLING  
(DIAL TONE DETECTOR AND 3B (MD) SPEAKERPHONE)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT						
		DESIG	COLOR		FROM		TO				
					TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (NOTE)	
					PSB	TB		PSB	55A	55B	
D-180493 Kit of Parts (Contd)	Dial Tone Detector (Contd)	COM	BK-O					20			
		SPO	G-Y					21			
		PL	O-R					22			
		DTT	BL-Y					23			
		LK	Y-G					27			
	Switch §	S1	S					15			
S2		S					20				
D-180568 Kit of Parts		SHi	G-W					14			
		VDD	W-G					17			
		SHa	R-BL					26			
		LK	BL-R					27			
666B (MD) Trmr	T7A Cord	M1	S-BK						4	7	
		P1	BL-R						13	8	
		-15V	BK-S						14	16	
		S	O-BK						3	18	
		A1	Y-O						29	19	
		F1	G-Y						2	17	
		LK	BK-O						11	35	
760A (MD) LSPK	R2FK Cord	SP1	G						34	20	
		SP2	R						33**	29**	
95B1 Pwr Unit (870A1M) ‡	D-Station Wire	AC1					6				
		AC2					7				
95B1 Pwr Unit (870A2M) ‡	M2SL-87 Cord	AC1	Y					24¶			
		AC2	BK					25¶			
2012B (MD) or 2012D Transf ‡	D-Station Wire	AC1							27	27	
		AC2							36	36	

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B).

\* Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

† Insulate and store.

‡ Both 95B1 power unit and 2012B (MD) or 2012D transformer must be connected for speakerphone operation.

§ One touch calling switch must be set to ON position.

¶ Connected at factory.

\*\* To reduce loudspeaker volume move SP2 lead to terminal 24 (55A) or 30 (55B).

♦ TABLE D ♦

## CONNECTIONS — 870A1M (MD) OR 870A2M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		CONNECT TO				
		DESIG	COLOR	44-TYPE BLK. TERM.	TEL SET		223D ADAPTER	
					PSB	TB		
Tel Set	Mtg Cord D6AD-87 (870A1M)	R	BL-W	1				
		T	W-BL	2				
		A1	O-W	4				
		A	W-O	5				
		AC1	G-W	6				
		AC2	W-G	7				
	623P6 Jack Assy (870A2M)†	Spare	W					
		A	BK					
		R	R					
		T	G					
		A1	Y					
		Spare	BL					
D-180568 Kit of Parts		SHi	G-W		14			
		VDD	W-G		17			
		SHa	R-BL		26			
		LK	BL-R		27			
223D Adapter	M16H Cord ‡	AC	R-G		§			
		AC	G-R		§			
		LK	O-W		27			
		SPO	O-R		21			
		Spare	R-O		§			
		K6M	BR-W		§			
		P3	W-G		3			
		P4	G-W		6			
		T1	W-BL		2			
		R1	BL-W		9			
		K4C	S-W		§			
		K5C	W-S		§			
		K4B	BL-R		§			
		K5B	R-BL		§			
		AG	W-O					1
		A1	W-BR					2
95B1 Pwr Unit (870A1M) *	D-Station Wire	AC1		6				
		AC2		7				
95B1 Pwr Unit (870A2M) *	M2SL-87 Cord	AC1	Y		24 ¶			
		AC2	BK		25 ¶			

See footnotes at end of table.

◆ TABLE D (Contd) ◆

## CONNECTIONS – 870A1M (MD) OR 870A2M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		CONNECT TO			
		DESIG	COLOR	44-TYPE BLK. TERM	TEL SET		223D ADAPTER
					PSB	TB	
680-Type Trmtr	D8S Cord						Plugs into Adapter
108-Type LSPK	D20N Cord						
85B1 Pwr Unit *	M2FG Cord **	AC1	BK				
		AC2	Y				

\* Both 85B1 and 95B1 power units must be connected for speakerphone operation.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ To provide strain relief, the S-hook of the M16H cord shall be retained by the screw in the telephone set already used to retain the D6AD-87 cord (870A1M) or the M2SL-87 cord (870A2M).

§ Insulate and store.

¶ Connected at factory.

\*\* Only (Y) and (BK) leads are terminated in plug of M2FG cord.



◆ TABLE E ◆

**CONNECTIONS – 870A1M (MD) OR 870A2M TELEPHONE SET WITH ONE-TOUCH CALLING  
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO				
		DESIG	COLOR	REMOVE FROM PSB	44-TYPE BLOCK TERM.	TEL SET		223D ADAPTER	
						PSB	TB		
Tel Set	Mtg Cord D6AD-87 (870A1M)	R	BL-W		1				
		T	W-BL		2				
		A1	O-W		4				
		A	W-O		5				
		AC1	G-W		6				
		AC2	W-G		7				
	623P6 Jack Assy (870A2M)†	Spare	W						
		A	BK						
		R	R						
		T	G						
		A1	Y						
		Spare	BL						
		Strap	BK		11		§		
		Strap	BK		18		§		
		Strap	BK		23		§		
	D-180493 Kit of Parts	Dial Tone Detector	Input	G-R			2		
			PB	O-BK			7		
			Input	G-R			9		
DT			O-Y			11			
VDD			R-O			17			
SPR			Y-BL			18			
DR			Y-O			19			
COM			BK-O			20			
SPO			G-Y			21			
PL			O-R			22			
DTT			BL-Y			23			
LK			Y-G			27			
Switch ‡		S1	S				15		
		S2	S				20		
D-180568 Kit of Parts			SHi	G-W			14		
	VDD		W-G			17			
	SHa		R-BL			26			
	LK		BL-R			27			

See footnotes at end of table.

◆ TABLE E (Contd) ◆

**CONNECTIONS — 870A1M (MD) OR 870A2M TELEPHONE SET WITH ONE-TOUCH CALLING  
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO			
		DESIG	COLOR	REMOVE FROM PSB	44-TYPE BLOCK TERM.	TEL SET		223D ADAPTER
						PSB	TB	
223D Adapter	M16H Cord	AC	R-G			§		
		AC	G-R			§		
		LK	O-W			27		
		SPO	O-R			21		
		Spare	R-O			§		
		K5M	BR-W			§		
		P3	W-G			3		
		P4	G-W			6		
		T1	W-BL			2		
		R1	BL-W			9		
		K4C	S-W			§		
		K5C	W-S			§		
		K4B	BL-R			§		
		K5B	R-BL			§		
		AG	W-O				1	
		A1	W-BR				2	
95B1 Pwr Unit (870A1M) *	D-Station Wire	AC1			6			
		AC2			7			
95B1 Pwr Unit (870A2M) *	M2SL-87 Cord	AC1	Y			24**		
		AC2	BK			25**		
680-Type Trmtr	D8S Cord							
108-Type LSPK	D20N Cord							Plugs into Adapter
85B1 Pwr Unit *	M2FG Cord ¶	AC	BK					
		AC	Y					

\* Both 85B1 and 95B1 power units must be connected for speakerphone operation.

† Accepts D4BU or D6AM mounting cord which connects to modular connecting block.

‡ One touch calling switch must be set to ON position.

§ Insulate and store

¶ (Y) and (BK) leads only are terminated in plug of M2FG cord.

\*\* Connected at factory.

TABLE F

**CONNECTIONS – 870A1M (MD) OR 870A2M TELEPHONE SET WITH  
DIAL TONE DETECTOR (NOTE 1)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO		
		DESIG	COLOR	REMOVE FROM PSB	TEL SET PSB	44-TYPE BLK. TERM:	
Tel Set	Mtg Cord D6AD-87 (870A1M)	R	BL-W			1	
		T	W-BL			2	
		A1	O-W			4	
		A	W-O			5	
		AC1	G-W			6	
		AC2	W-G			7	
	623P6 Jack Assy (870A2M)‡	Spare	W				
		A	BK				
		R	R				
		T	G				
		A1	Y				
		Spare	BL				
		Strap	BK		11	*	
		Strap	BK		23	*	
D-180493 Kit of Parts	Dial Tone Detector	Input	G-R			2	
		PB	O-BK			7	
		Input	G-R			9	
		LK	Y-G			*	
		DT	O-Y			11	
		VDD	R-O			17	
		DR	Y-O			19	
		PL	O-R			22	
		DTT	BL-Y			23	
		SPR	Y-BL			*	
		COM	BK-O			20	
	SPO	G-Y			*		
Switch (Note 2)	S1	S				15	
	S2	S				15	
95B1 Power Unit (870A1M)	D-Station Wire	AC1				6	
		AC2				7	
95B1 Power Unit (870A2M)	M2SL-87 Cord	AC1	Y			24†	
		AC2	BK			25†	

\* Insulate and store

† Connected at factory.

‡ Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

Note 1: May be used for installations where first dial tone is not precise (350 Hz and 440 Hz), but all subsequent dial tones are precise.

Note 2: Switch is not required.

TABLE G

## CONNECTIONS FOR D-180818 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS (NOTE 3)	
DESIG.	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX (NOTE 2)
WDC	BK†	*	1
VDD	R	2	2
RCD	BK	3	3

*Note 1:* These are connectors attached to the switch leads. A single pin connector with a (BK) lead and a double pin connector with a (R) and a (BK) lead.

*Note 2:* When this option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

*Note 3:* These terminal posts are found on the 870B Memory PWB (Fig. 3).

\* Insulate and store.

† Single pin connector.

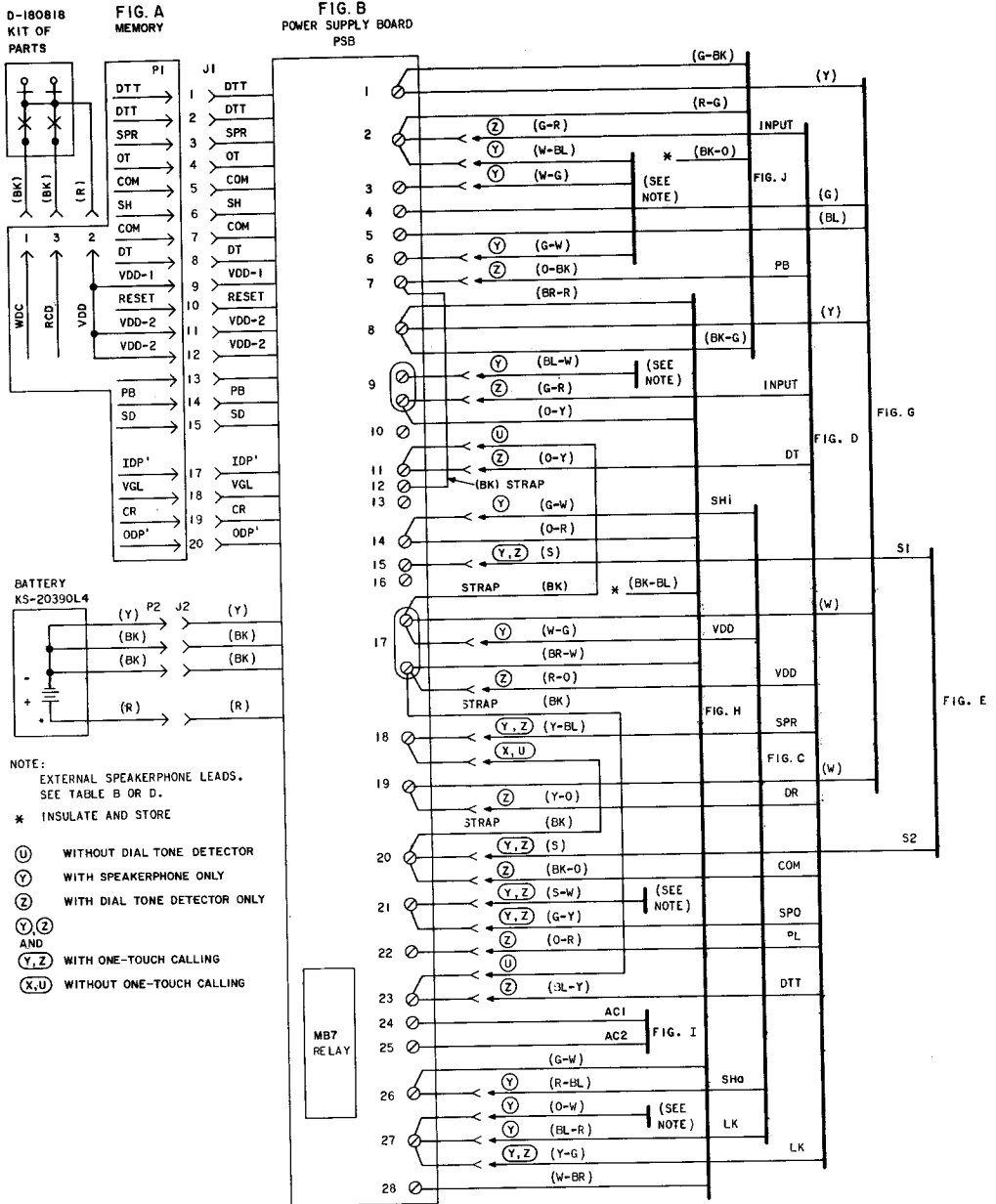


Fig. 8—Telephone Set, Connections (Sheet 1 of 3)

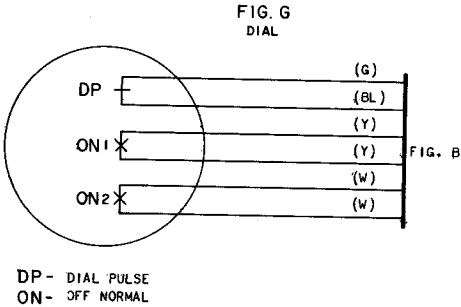
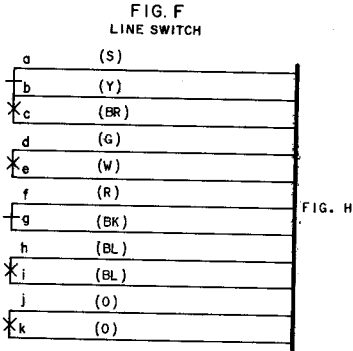
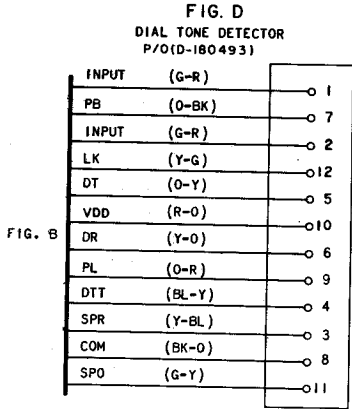
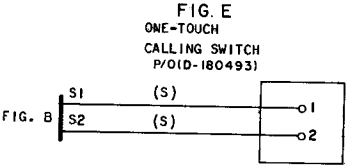
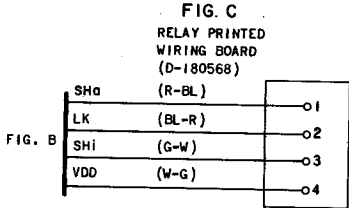
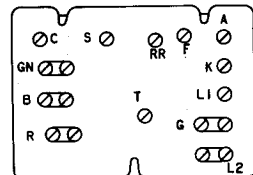
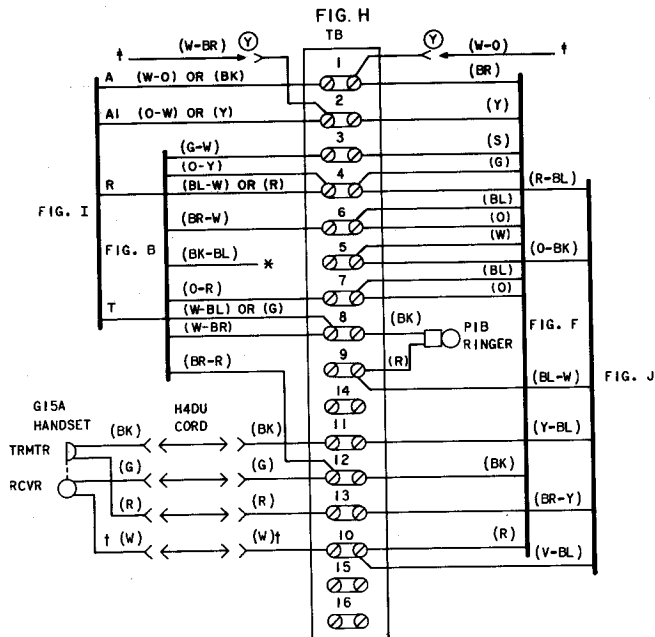
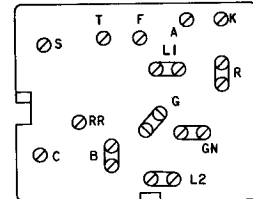


Fig. 8—Telephone Set, Connections (Sheet 2 of 3)

NOTES:  
 1. PHYSICAL TERMINAL LAYOUT OF 425-TYPE NETWORK  
 2. PHYSICAL TERMINAL LAYOUT OF 4228-TYPE NETWORK



2. PHYSICAL TERMINAL LAYOUT OF 4228-TYPE NETWORK



Ⓢ WITH SPEAKERPHONE  
 \* INSULATE AND STORE  
 † IF NONMODULAR AMPLIFYING HANDSET IS USED, YELLOW LEAD MUST BE CONNECTED TO TERMINAL 10.  
 ‡ EXTERNAL SPEAKERPHONE LEAD. SEE TABLE B OR D.

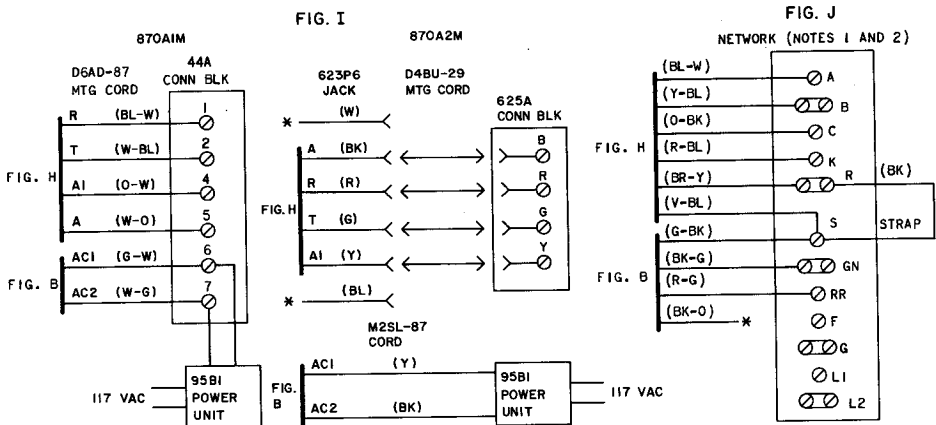


Fig. 8—Telephone Set, Connections (Sheet 3 of 3)

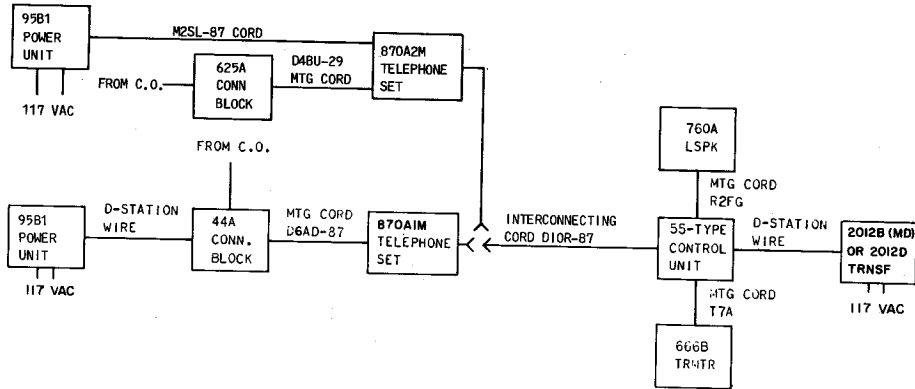


Fig. 9—Block Diagram—Telephone Set With 3-Type (MD) Speakerphone

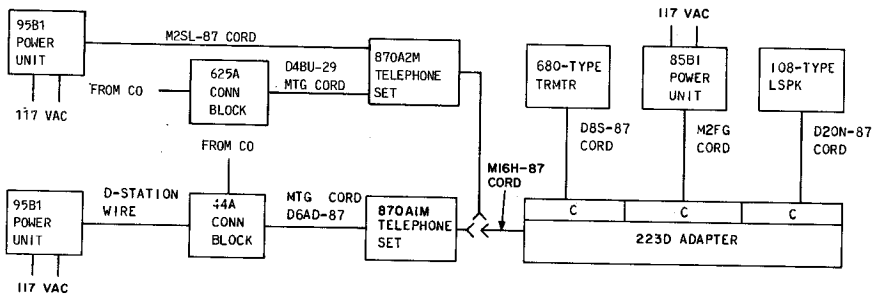


Fig. 10—Block Diagram—Telephone Set With 4A Speakerphone



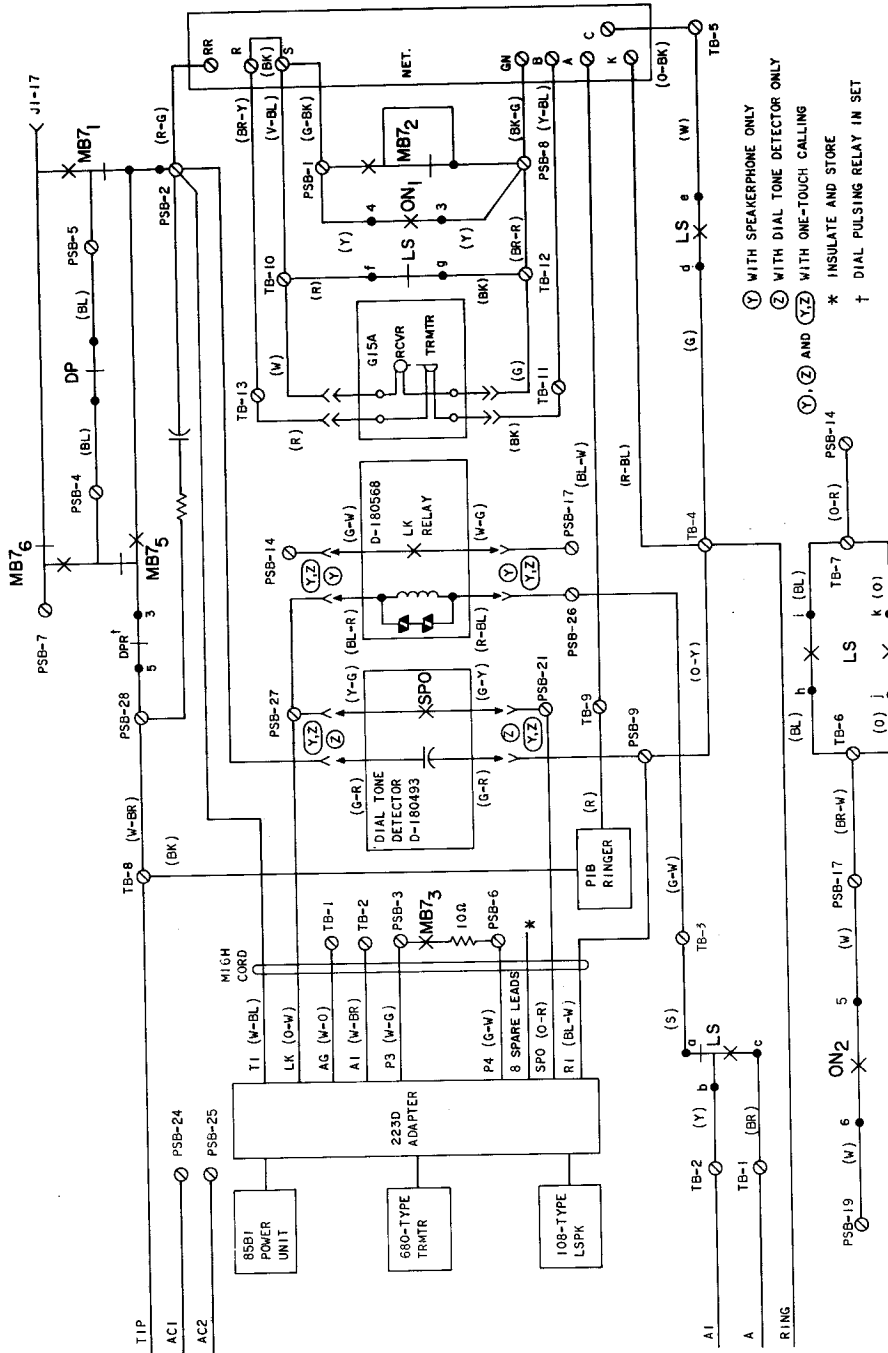


Fig. 11 — Telephone Set, Partial Functional Schematic

TABLE H

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set when off-hook on handset		Mounting cord improperly connected at equipment end	Check cord connections
		Set remains dead when 95B1 power disconnected.	Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
			Defective receiver	Check handset
			Open tip or ring lead	Check leads and connections
			Unknown	Replace telephone set*
		Set becomes active 95B1 power unit is disconnected	Improperly installed or defective Memory	1. Check connector insertion 2. Replace Memory
Defective PSB	Replace telephone set*			
2	Dead set only when speakerphone is on	Set is active when off-hook on handset.	Improperly connected or defective speakerphone	1. Check connections 2. See appropriate speakerphone BSP for trouble analysis
3	Cannot transmit when off-hook on handset.	Dial tone present, but sidetone absent.	Handset cord improperly inserted into either handset or jack in telephone set	Check handset cord and/or handset
			Defective transmitter	Replace transmitter or handset
			Defective 616B jack	Replace 616B jack
			Defective network	Replace telephone set*
4	Cannot manually dial when off-hook on handset (dial tone is present).	Dialing clicks heard (in handset) when dial is returning.	Bridged set off-hook	Place bridged set on-hook
			Speakerphone, improperly installed or defective	Check appropriate speakerphone BSP for analysis
		No dialing clicks heard when dial is returning. Condition remains unchanged when 95B1 power unit is disconnected.	Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial
			Unknown	Replace telephone set*

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
4 (Contd)		No dialing click heard when dial is returning. With 95B1 power unit disconnected, set can manually dial.	Improperly installed or defective Memory	1. Check cable 2. Replace Memory
			Defective PSB	Replace telephone set*
5	Cannot manually dial when speakerphone is on. (Dial tone is present.)	Set does manually dial when off-hook on handset	Improperly installed or defective speakerphone	1. Check connections 2. See appropriate speakerphone BSP for trouble analysis
			Defective line switch contacts	Replace telephone set*
6	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed.	AC power not present	Check for commercial power
			Battery not plugged in	Plug in battery
			Switch of D-180818 Kit of Parts in ON position.	Change switch position to OFF
			95B1 power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 Vac across screw terminals 24 and 25 PSB)
			Open in IW	Check IW and connections
			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
			Improperly installed or defective Memory	1. Check connector cable 2. Replace Memory
			Unknown	Replace telephone set*
		RECORD lamp flashes or lights erratically	Battery plug not connected	Connect battery plug
			Unknown	Replace telephone set*
			Lamp turns off, flashes or lights erratically when any memory button is depressed	Improperly installed or defective Memory
		Unknown	Replace telephone set*	

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		Lamp does not turn off as dial is returning. No relay click heard at beginning of dial wind-up or at end of dial return. Can manually dial off-hook.	Improperly connected or defective rotary dial (off-normal contact).	1. Check rotary dial connections 2. Replace rotary dial
			Unknown	Replace telephone set*
		Lamp does not turn off as dial is returning, but relay click is heard at beginning of dial wind-up and at end of dial return. Can manually dial off-hook.	Improperly connected or defective Memory	1. Check connector cable 2. Replace Memory
			Unknown	Replace telephone set*
		Lamp turns off as dial is returning and stays off.	Memory button was not depressed prior to the operation of the dial.	Record per paragraph 5.01
			Defective Memory	Replace Memory
Unknown	Replace telephone set*			
7	Cannot record properly into the 31 memory positions or into LAST NUMBER DIALED position.	RECORD lamp functions properly and set dials manually.	Defective Memory	Replace Memory
			Unknown	Replace telephone set*
		Party is reached when number is recorded as it is manually dialed however, when number is subsequently dialed from memory, party is not reached — wrong number is dialed from memory.	Check recording procedure.	Record per [paragraph 5.01 (4) thru (7)]
			Defective Memory	Replace Memory
			Unknown	Replace telephone set*
8	Cannot dial properly from Memory using handset.	MB7 relay clicks when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light.	Battery not plugged in	Plug in battery
			Memory not securely mounted.	Tighten Memory mounting screws
		Improper and/or defective strap from PSB terminal 18 to PSB terminal 20.		Check and/or replace strap lead. See Fig. 8B

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
8 (Cont)			Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
			Unknown	Replace telephone set*
		MB7 relay operates (click heard) when memory button is depressed but no dialing clicks are heard. In addition, transmit and receive levels are very low.	WAIT button is stuck down or defective	Free stuck WAIT button or replace Memory
			Unknown	Replace telephone set*
		No digits, random digits or all the same digits in memory location(s). <u>Note:</u> Memory may not have functioned properly at some previous time.	An ac power outage for 24 hours or longer.	Reestablish ac power and record numbers
			Defective battery	1. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B1 power unit from the ac power outlet and reinsert 2. If previously stored numbers are not dialed from memory replace the battery 3. Repeat procedure
			Defective Memory	Replace Memory
			Unknown	Replace telephone set*
		Two or more Memory locations have same digits which are usually different from originally recorded digits.	Static discharge damage	1. Consult TELCO engineer for proper grounding procedure 2. Replace Memory
		Automatically dials through a WAIT.	Memory not securely mounted.	Tighten Memory mounting screws
			Improper connection to PSB terminal 23	Check connection to and/or replace strap to PSB terminal 23
			Defective Memory	Replace Memory
			Unknown	Replace telephone set*

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION	
9	Cannot dial properly from Memory when on the handset (wired for dial tone detector option)	MB7 relay clicks when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light.	Battery not plugged in	Plug in battery	
		MB7 relay does not operate (no click heard) when memory button is depressed	Precise dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present	
			Memory not securely mounted	Tighten Memory mounting screws	
			Improper installation of dial tone detector D-180493	Check connections for D-180493 installation	
		Same as above — Addition of strap lead between PSB terminals 20 and 23 does not correct problem	Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory	
				Defective Memory	Replace Memory
				Defective dial tone detector	Replace D-180493 dial tone detector
		Addition of strap lead between PSB terminals 20 and 23 corrects problem.	Unknown	Replace telephone set*	
			Automatically dials through a <u>wait</u> .	Memory not securely mounted	Tighten Memory mounting screws
				Improper connection to PSB terminals 23 and 11	Check installation of D-180493 Kit of Parts
10	Cannot turn speakerphone on when ON button is depressed (wired for speakerphone option).	Speakerphone indicator lamp does not turn on.	Handset off-hook	Place handset on-hook	
			Improper connections or defective 85B1 power unit [or 2012B (MD) or 2012D transformer]	1. Check for commercial power 2. Check that power unit or transformer is plugged into commercial ac power outlet 3. Check connections per Tables B, C, D, and E	

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
10 (Contd)				4. Check output of power unit or transformer: 85B1: 18-25 Vac open circuit 2012B (MD) or 2012D: 15-18 Vac open circuit
		No dial tone heard, but indicator lamp turns on.	Open T1 or R1 leads	Check leads and connections.
		With temporary strap lead added between PSB screw terminals 26 and 27, speakerphone turns on when ON button is depressed.	Improper connections or defective D-180568 Kit of Parts	Check connections to and/or replace D-180568 Kit of Parts
		With temporary strap lead added between screw terminals 2 and 3 on TB, speakerphone turns on when ON button is depressed.	Defective line switch a-b contacts	Replace telephone set*.
		With temporary strap lead added between screw terminals TB-3 and PSB-26, speakerphone turns on when ON button is depressed.	Defective connecting lead	Replace (G-W) harness lead between screw terminal 3 on TB and PSB terminal 26
			Defective speakerphone	See appropriate speakerphone BSP for trouble analysis
11	RECORD lamp does not turn off when speakerphone ON button is depressed (wired for speakerphone option).	With temporary strap lead added between PSB screw terminals 14 and 17, speakerphone turns on when ON button is depressed and RECORD lamp goes off.	LK relay circuit defective on D-180568 Kit of Parts	Replace D-180568 Kit of Parts
		Operation of RECORD OFF button turns RECORD lamp off.	Defective line switch h-i or j-k contacts	Replace telephone set*
12	Cannot turn speakerphone off when handset is lifted off-hook (wired for speakerphone option).	Speakerphone turns off when OFF button is depressed but turns back on when OFF button is released	Short circuit between screw terminals 2 and 3 on TB	Clear short
			Defective line switch a-b contacts	Replace telephone set*

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
13	Cannot hear dial clicks when dialing with speakerphone on (wired for speakerphone option).	With the speakerphone ON button depressed, dialing clicks can be heard.	Physical spacing between speakerphone, loudspeaker and transmitter units is too close	See appropriate speakerphone BSP for proper placement of units
14	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (wired for one-touch option).	MB7 relay clicks when manual dial is operated, but no automatic dialing possible. RECORD lamp does not light.	Battery not plugged in	Plug in battery
		With temporary strap between PSB screw terminals 15 and 20, speakerphone turns on when a memory button is depressed	Defective 223D adapter	Check continuity from PSB-21 to LSPK-21
			One-touch calling switch turned off or defective	1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts
		With temporary strap between PSB screw terminals 27 and 21 speakerphone turns on.	Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 27 and 21, respectively			
15	Speakerphone turns on but set does not automatically dial when memory button is depressed (wired for one-touch option).	Set automatically dials when screw terminals 20 and 23 on PSB are temporarily shorted.	(BK) Strap leads from screw terminals 11 and 23 on PSB were not disconnected when option was wired	Disconnect, insulate and store strap leads
			Precise dial tone not present or a defective dial tone detector	1. Check CO line for presence of precise dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D-180493 Kit of Parts



TABLE H (Contd)

## TROUBLE ANALYSIS—870A1M (MD) OR 870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
16	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (wired for one-touch option).		Defective timing circuit	1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts
17	Cannot turn speakerphone off (wired for one-touch option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released.	(BK) strap lead from terminal 18 on PSB was not disconnected when option was wired.	Disconnect, insulate and store strap lead
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 18 on PSB and OFF button is depressed.	Defective logic	Replace Memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook.	Defective circuit on D-180493 Kit of Parts	Replace dial tone detector board assembly of D-180493 Kit of Parts
18	Set dials automatically but does not wait for dial tone (wired for one-touch calling).		Noise on line	1. Add 0.05 uf capacitor between PSB-17 and PSB-23 2. Remove above capacitor and add resistor (10K $\Omega$ to 50K $\Omega$ ) in series with (G-R) dial tone detector input lead.
19	Automatic dialing commences for no apparent reason (wired for one-touch calling).		Static discharge damage	1. Consult TELCO engineer for proper grounding procedure 2. Replace Memory
20	Hum or noise caused by electrical apparatus (light dimmer switch, etc.)		Unbalanced telephone line	Check for unintentional connections that might cause an unbalanced telephone line.

## 2870A1M AND 2870A2M "TOUCH-A-MATIC\*" 32 TELEPHONE SET IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

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Bell System except under written agreement

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## 1. GENERAL

1.01 This section contains information for the 2870A1M (MD) and 2870A2M TOUCH-A-MATIC telephone sets (Fig. 1).

**⚠Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.⚠**

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio fre-

quency energy and may radiate that energy, paragraph 1.01.

- Change all references to 95-type power unit to 95B1 power unit
- Show both 2012-type transformer and 95B1 power unit must be connected for 3B (MD) speakerphone system operation (Tables B and C)
- Show both 85B1 and 95B1 power unit must be connected for 4A speakerphone system operation (Tables D and E).

**Warning: Telephone sets are factory-wired for A-lead control. If set is installed in a location where dial-light service is provided the A and A1 leads must be disconnected, insulated, and stored at the connecting block to prevent shorting out dial light transformer.**

1.03 The 2870A1M (MD) telephone set equipped with D6AD mounting cord and 2870A2M telephone set equipped with 623P6 jack assembly are factory-wired for bridged or individual ringing. Mounting cord conductors provide for tip, ring, ac power (2870A1M), and A-lead control for 1A1, 1A2, or 6A key telephone systems (KTS).

1.04 The 2870A2M telephone set is shipped with a modular 623P6 mounting cord jack assembly and an M2SL-87 power cord installed with a 95B1 power unit.

1.05 The 2870A1M telephone set is field convertible to modular.

1.06 These telephone sets are available in the following colors:

- Black (-03)
- Green (-51)
- White (-58)
- Light Beige (-60).

1.07 The 2870B1-type faceplates are available in the following colors:

- Teak Woodgrain (-108)

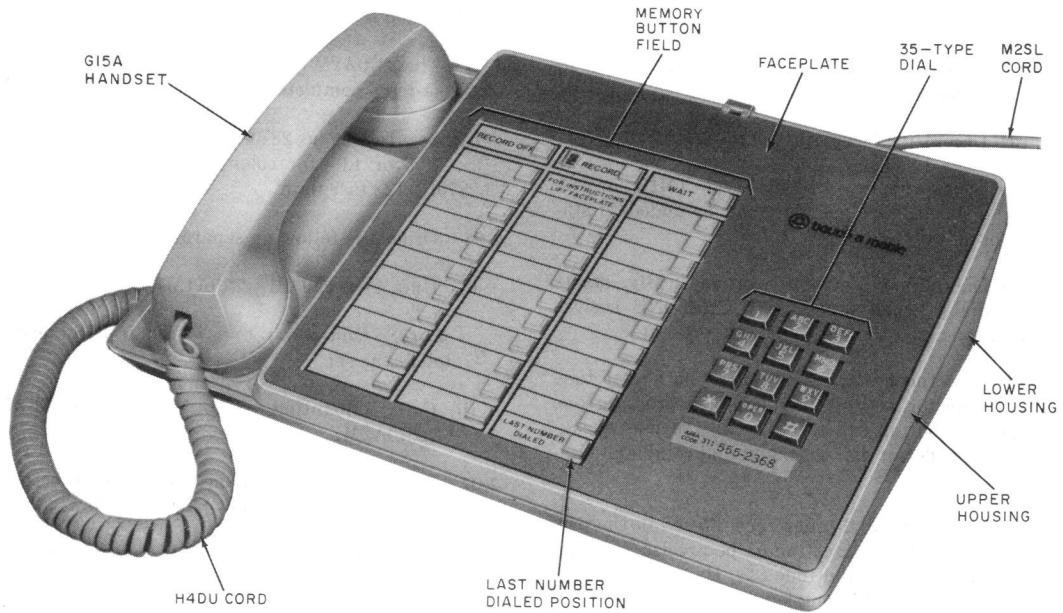


Fig. 1—2870A2M Telephone Set

- Walnut Woodgrain (-109)
  - Matte Aluminum (-122).
- 1.08 The 2870A2 (MD) faceplate is available in satin-silver (-87) only.

## 2. IDENTIFICATION

2.01 The 2870A1M (MD) and 2870A2M telephone sets provide all standard features of a normal single line set plus automatic TOUCH-TONE\* dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

### A. Design Features

2.02 Design features are as follows

- Modular telephone set
- Integrated circuit RC TOUCH-TONE† telephone dial oscillator

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† Trademark of AT&TCo.

- Integrated circuit memory
- Surge protector
- Polarity guard (removable for dry circuit application)
- Memory buttons from which to select pre-programmed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input)
- End-to-end signaling for data application.

**B. Optional Features**

**2.03** Optional features are as follows (refer to Table A).

- (a) Decorative faceplate
- (b) Speakerphone: either 3-type (MD) or 4A speakerphone systems may be added to stations
- (c) Dial Tone Detector: automatically starts dialer when precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) is present
- (d) One-Touch Calling (requires both dial tone detector and speakerphone): depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) if the call is to be completed automatically.

(e) D-180818 Kit of Parts provides the following features:

(1) Record Disable: Turns off recording feature to prevent accidental erasures of previously stored numbers. No recording possible except for last number dialed memory which will automatically store digits manually dialed from the telephone set dial.

(2) Record Disable and Dial Intermix Feature: Digits dialed manually from telephone set dial and digits dialed automatically from memory may be intermixed without depressing RECORD OFF button (paragraph 5.07). Memories cannot be altered and LAST NUMBER DIALED feature is inoperative.

- (f) Amplifying Handset
- (g) KS-20419L1 or KS-20419L2 Buzzer
- (h) Head Telephone Set Operation (with jackset).

**2.04** All options are implemented by as follows:

- (a) Wiring changes in the telephone set
- (b) Installation of appropriate additional items.

**C. Ordering Guide**

**2.05** The 2870A2M (modular) telephone set may be ordered complete and ready to install as:

- (a) Set, Telephone, 2870A2M- (refer to paragraph 1.06 or 1.07 for color suffix) equipped with 2870B1-122 faceplate.

**2.06** Order the following separately:

- (a) Unit, Power, 95B1 (2870A1M)

**Note:** One power unit is required for each telephone set.

- (b) Cord, Mounting, D4BU-29 or D6AM-87 (2870A2M).

**2.07** The 2870A2M telephone set also may be ordered in its component parts as follows:

- (a) Housing, 870A1- (refer to paragraph 1.06 or 1.07 for color suffix)
- (b) Housing, upper, 870A1U- (refer to paragraph 1.06 or 1.07 for color suffix) (used with 2870B1 faceplate)
- (c) Faceplate, 2870B1-122 (matte aluminum)
- (d) Handset, G15A- (refer to paragraph 1.06 to 1.07 for color suffix)
- (e) Cord, Handset, H4DU- (refer to paragraph 1.06 or 1.07 for color suffix)
- (f) Base, Telephone Set, 2870A2M includes the following:
  - Dial, 35AG3A
  - Ringer, P1B
  - Network (4228-type)
  - Battery, KS-20390L4 or KS-20390L2
  - Jack, Handset, 616B
  - Jack Mounting Cord, 623P6 (2870A2M only)
  - Cord, Power, M2SL-87, 7-foot (2870A2M only)

TABLE A

## OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone	4A	108AA Loudspeaker	11	D, E
		680AE Transmitter	11	D, E
		223D Adapter	11	D, E
		85B1 Power Unit	11	D, E
		D-180492 Kit of Parts	9C	D, E
	3B (MD)	760A (MD) Loudspeaker	10	B, C
		666B (MD) Transmitter	10	B, C
		55-type (MD) Control Unit	10	B, C
		2012D Transformer	10	B, C
		D-180492 Kit of Parts	9C	B, C
		D6AD-87 Cord	10	B, C
One-Touch Calling	D-180493 Kit of Parts	9D, E	C, E	
	Speakerphone	9B	C, E	
Dial Tone Detector	D-180493 Kit of Parts	9D, E	F	
Adjunct. Key *	6040-, 6050-, or 6051-Type Key			
Convert 2870A1M to 2870A2M (paragraph 3.11)	623P6 Jack, 95B1 Power Unit D4BU Cord, M2SL Cord			
Buzzer (paragraph 3.10)	KS-20419L1, L2 Buzzer			
Amplifying Handsets (paragraph 6.09)	G6BM, G7BM, or G8BM Handset	9H		
Dry Circuit (without Polarity Guard)		9B		
Decorative Faceplate	2870B1-108 (Teak Woodgrain)			
	2870B1-109 (Walnut Woodgrain)			
Record Disable (paragraph 3.09)	D-180818 Kit of Parts †	9A	G	
Dial Intermix (paragraph 3.09)				
Head Telephone Set Operation (paragraph 3.13)	Plantronics Jackset Model JS0180-1A or JS0180-2A	Tables provided with Plantronics Jackset		
	Desired Head Telephone Set ‡			

\* When a 6040-, 6050-, or 6051-type key is used in conjunction with the 2870A1M or 2870A2M telephone set, automatic dialing and recording features are not reset when switching from one line to another. To reset dialer, it will be necessary to go on-hook, flash the line switch, or depress the RECORD OFF button after termination of each call. If 6-button key service is desired, it is recommended that the 2872A2M telephone set be used because the reset function is automatically provided.

† If set is equipped with 2870A Memory, it must be replaced with a 2870B Memory.

‡ KS-19796, KS-20778, 52-Type, 53-Type, and 60-Type headsets are registered with the jackset models.

- Unit, Power, 95B1
- Memory, 2870B
- 840393672 Directory Sheet Set
- Subscriber Instruction Booklet, SIB-2455B.

**2.08** Optional apparatus is as follows (order as required):

- Faceplate 2870B1: Teak Woodgrain (-108) or Walnut Woodgrain (-109)

**Note:** If set is equipped with older 2870A1 or 2870A2 faceplate, then an upper housing of the appropriate color must be ordered.

- Kit of Parts, D-180492 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix Features)

**Note:** This kit of parts may be used only with sets equipped with a 2870B Memory.

- Cord, Mounting, D4BU-29 or D6AM-87 (2870A1M, conversion to modular)
- Jack, Mounting, 623P6 (2870A1M, conversion to modular)
- Cord, M2SL, 7-foot (separate power cord for 2870A1M)
- Buzzer, KS-20419L1 or KS-20419L2
- Handset, Amplifying (G6BM-, G7BM-, or G8BM-type) (refer to paragraph 1.06 or 1.07 for color suffix)
- Set, Head Telephone [using Plantronics Jackset Model JS0180-1A (2-foot cord) or JS0180-2A (7-foot cord)] see Table A.

**D. Operating Features**

**2.09** Operating features (Fig. 1) are as follows.

- Dial (TOUCH-TONE dialing).

- 32-button array of low force, low travel, nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.

- LAST NUMBER DIALED button located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed.

- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.

- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.

- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) are required].

**3. INSTALLATION**

**STANDARD INSTALLATION**

**Warning:** *Do not plug in either battery or power unit until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.*

- 3.01** Make all wiring changes and optional modifications (Table A) before external connections are made to the set (Fig. 9).

- 3.02** The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery by tilting the set up, and inserting the battery plug into the mating jack.

**Note:** Write date of battery installation on label provided (Fig. 7).

- 3.03** Install power unit as follows.

- (1) For the 2870A2M the 95B1 power unit is factory-wired to PSB terminals 30 and 31 using the M2SL-87 cord.

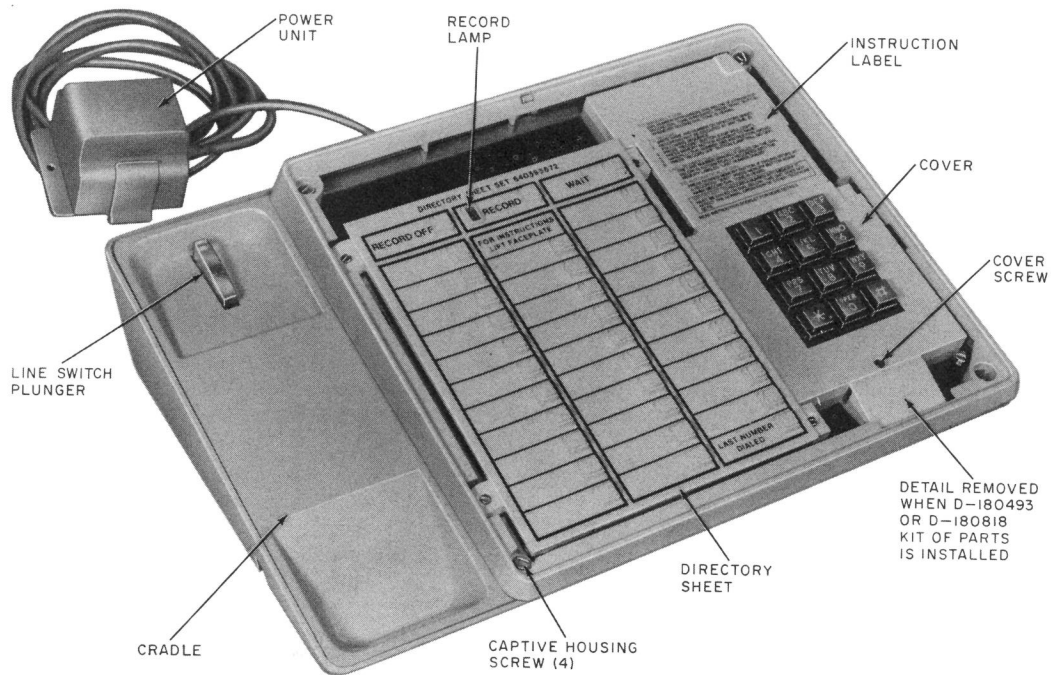


Fig. 2—Telephone Set—Faceplate and Handset Removed

(2) For the 2870AIM, install the 95B1 power unit within 150 feet (24 gauge conductors) of the telephone set. The power unit may be located at the equipment end of the cable and connected to the telephone set by the (G-W) and (W-G) conductors to terminals PSB-30 and PSB-31 by conductors separate from the mounting cord. When separate power conductors are used, disconnect, insulate, and store the (G-W) and (W-G) mounting cord leads on PSB-30 and PSB-31.

**Note:** The 95B1 power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

**Danger 1:** If used, securely attach retaining clamp to ac outlet using outlet cover screw **BEFORE** attempting to install  $\text{\textcircled{95B1}}$  power unit. The power unit

and any other cord plugged into the ac outlet should always be unplugged completely from outlet before attempting to attach or remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use retaining clamps on outlets where center mounting screw holds the duplex outlet in the box.

**Danger 2:** Care should be taken to trim and dress leads connecting to low voltage output terminals of  $\text{\textcircled{95B1}}$  power unit to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at



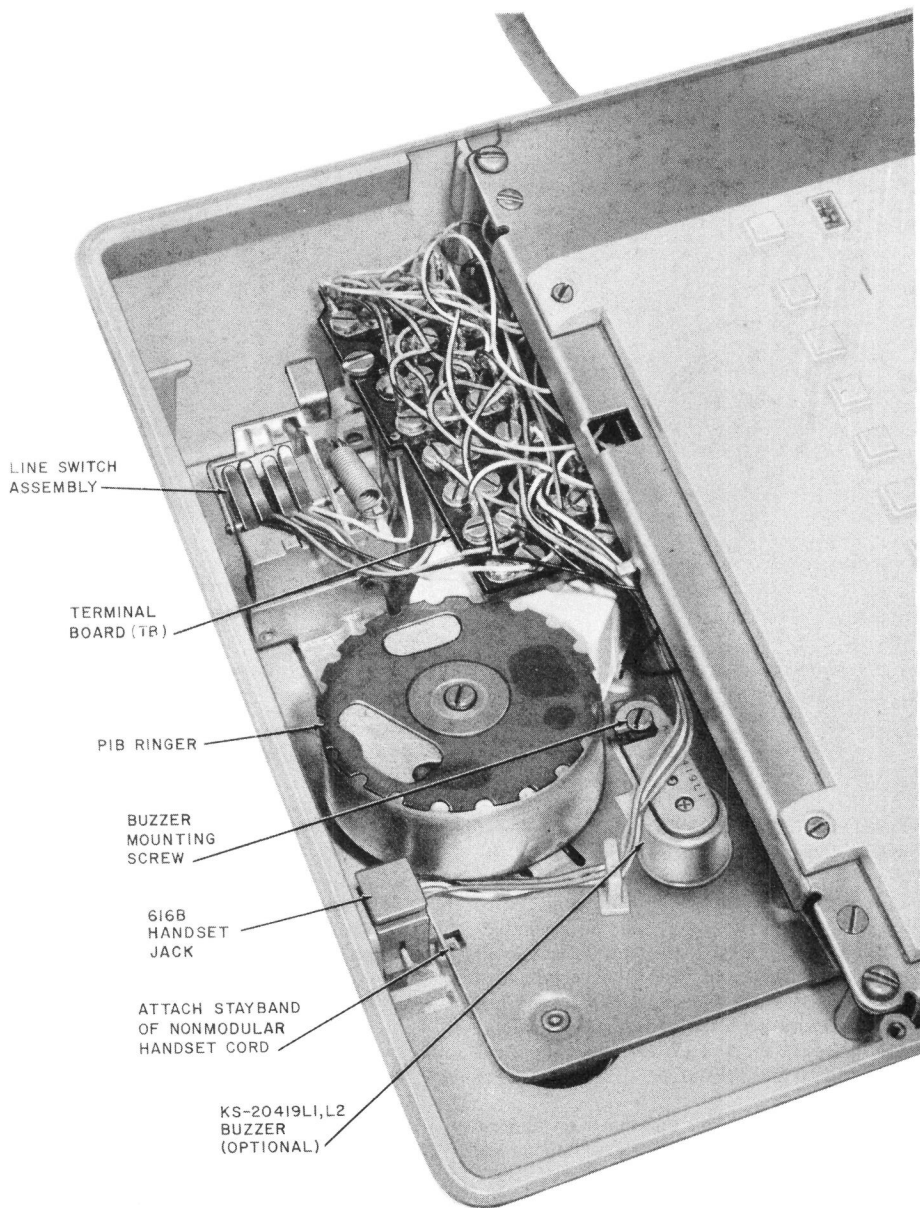


Fig. 3—Telephone Set With Faceplate, Handset, and Handset Cradle Removed

**least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.**

- (3) Plug the power unit into an ac outlet not controlled by a switch (continuous ac power is required).
- 3.04** The station number card retainer 812558039 (P-25E803) snaps into the faceplate below the dial.
- 3.05** The directory sheets (Fig. 2) fit over the buttons of the Memory and are held in place by the faceplate. Additional sheets are available in the directory sheet set (840393672).

#### Installation Check Procedure

- 3.06** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Trouble Analysis, Table H.
- (1) Disconnect power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
- (2) Reconnect power unit to ac outlet.
- (3) With handset on-hook, record digits 1 through 0 into consecutive memory locations, storing one digit per memory. Fill all memory locations except LAST NUMBER DIALED and location immediately above it [paragraph 5.01 (4) through (7)].
- (4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [paragraph 5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.
- (5) Momentarily hang up handset and automatically dial the test circuit number recorded in Step (4) by depressing button immediately above

LAST NUMBER DIALED button and proceed as follows.

**Note:** The set should stop dialing if it reaches a stored *wait* input. Depress the memory button again and the remaining digits should be dialed.

- (a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into test circuit. Verify that correct signal is returned from test circuit.
- (b) Momentarily depress the memory buttons used in Step (3) in the same sequence in which the digits were recorded. Verify that correct signal is returned from test circuit after each series of numbers.



**The battery and the power unit must be connected a minimum of five minutes before doing Step (c).**

- (c) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, depress the button of a memory location used in Step (3), to verify retention of stored numbers.
- (6) Dial the appropriate code for ring-back to test the ringer.
- (7) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (4). The speakerphone should turn on, dial tone should be detected, and the stored number should be automatically dialed.

#### OPTIONAL APPARATUS INSTALLATION

##### A. D-180492 Kit of Parts (With Speakerphone)

**3.07** Install as follows.

- (1) Proceed as described in paragraph 3.18.
- (2) Make connections per appropriate Table B, C, D, or E.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of the

printed wiring board (PWB) should be at lower right corner.

**B. D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)**

**3.08** Install as follows.

- (1) Remove the housing (paragraph 3.21), and access PSB terminal board (paragraph 3.18).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the chassis.
- (3) Lock the board into position by inserting the accompanying self threading screw through the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If switch for D-180818 Kit of Parts is already present, the one-touch calling switch cannot be installed. The PSB terminals to which the switch leads should be connected (Tables C and E) shall be strapped together. (The one-touch calling option can not be turned off by the subscriber.)

- (5) Make connections per Table C or E.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.
- (7) Verify correct operation of option.
- (8) Reassemble set.

**C. D-180818 Kit of Parts (Record Disable and Dial Intermix Features)**

**3.09** Install as follows.

- (1) Remove faceplate (paragraph 3.19).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (3) Disengage the four captive memory mounting screws (Fig. 4).
- (4) Disengage the two captive dial mounting screws and move dial aside.

- (5) Rotate left edge of the memory upward as shown by Fig. 5.

**Note:** If the set is equipped with a 2870A Memory, replace it with a 2870B Memory and carefully pack and return the old memory according to local procedures.

- (6) Mount switch below dial using the two screws provided.

**Note:** If the one-touch calling switch (D-180493 Kit of Parts) has been provided, it must be removed. The PSB terminals to which the switch leads were connected (Table C or E) must be strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

- (7) Connect switch lead connectors to post terminals on memory board per Table G and Fig. 6.
- (8) With feature switch in OFF position, verify that set operates in normal manner:

- Numbers can be recorded into memory.
- Numbers can be changed.
- Numbers can be deleted from memory.
- Numbers can be automatically dialed.

- (9) Set feature switch to ON position and verify feature provided.

- (a) For record disable feature only, proceed as follows.

- (1) RECORD lamp will not light when RECORD button is depressed.

- (2) No telephone numbers can be recorded, changed, or deleted in memory.

- (3) LAST NUMBER DIALED feature is operative.

- (b) For record disable and dial intermix feature, proceed as follows.

- (1) RECORD lamp will not light when RECORD button is depressed.

- (2) No telephone numbers can be recorded, changed, or deleted in memory.

(3) Manually and automatically dialed digits may be intermixed (paragraph 5.07).

(4) LAST NUMBER DIALED feature is disabled and the LAST NUMBER DIALED position can be utilized just like the other memory position to store frequently dialed numbers.

(10) Reassemble set.

#### D. KS-20419L1 or KS-20419L2 Buzzer

3.10 Install as follows.

(1) Remove faceplate (paragraph 3.19) and place handset aside.

(2) Remove handset cradle (paragraph 3.20).

(3) Remove screw from buzzer mounting bracket, and mount buzzer on bracket shown in Fig. 3.

(4) Connect two blue buzzer leads to TB-11 and TB-12 (Fig. 9H) and connect to 10-volt ac external circuit by changing the 623P6 jack connections as follows:

(a) With no A-lead control, proceed as follows.

(1) Move (W-O) or (BK) from TB-1 to TB-11.

(2) Move (O-W) or (Y) from TB-2 to TB-12.

(3) Connect buzzer power to appropriate terminals of modular connecting block.

(b) With A-lead control, (2870A2M) use D6AM-87 cord, proceed as follows.

(1) Move (BL) from insulate and store to TB-11.

(2) Move (W) from insulate and store to TB-12.

(3) Connect buzzer power to appropriate terminals of modular connecting block.

(5) Reassemble set (paragraphs 3.20 and 3.19).

#### E. Plug-Ended Mounting Cord (For Converting 2870A1M to 2870A2M Telephone Set)

3.11 Convert as follows.

(1) Remove the housing (paragraph 3.21) and access the PSB terminals (paragraph 3.18).

(2) Remove D6AD-87 mounting cord.

(3) Install the 623P6 jack as shown in Fig. 8.

(4) Connect the spade-tipped jack leads as follows:

(a) (R) wire to TB-4

(b) (G) wire to TB-8

(c) (Y) wire to TB-2

(d) (BK) wire to TB-1

(e) Insulate and store (W) and (BL) conductors.

(5) Connect (Y) lead of M2SL cord to PSB-30 and the (BK) lead to PSB-31 and route cord through housing.

(6) Connect the cord to the 95B1 power unit.

(7) Reassemble the set.

(8) Install a 625-type connecting block.

(9) Install the D4BU mounting cord.

#### F. Optional Power Connections

3.12 In some cases it may be possible and desirable to bring ac power into the set in a nonstandard manner. The following methods are approved alternatives.

(a) **2870AIM:** An M2SL-87 cord may be used to connect the 95B1 power unit to the telephone set as follows.

(1) Remove the housing (paragraph 3.21).

(2) Disconnect the (G-W) and (W-G) leads of the mounting cord from PSB-30 and PSB-31, and insulate and store.

(3) Thread the leads of the M2SL cord to the PSB area from the rear of the telephone set.

(4) Fasten the M2SL cord to the chassis by placing a No. 10-24 by 1/4-inch screw

[804216471 (P-421647)] through the hole in the S-hook and into the tapped hole in the chassis located behind the 623P6 jack.

- (5) Connect the (Y) lead to PSB-30 and the (BK) lead to PSB-31.
  - (6) Reassemble housing.
  - (7) Connect power unit to M2SL cord.
- (b) **2870A2M:** The ac power may be wired in at the connecting block and brought to the set via the mounting cord as follows.

- (1) With a D4BU-29 cord (no A-lead capability), proceed as follows.
  - (a) Disconnect and remove the M2SL-87 cord.
  - (b) Move the (BK) jack lead from TB-1 to PSB-16 and the (Y) lead from TB-2 to PSB-17.
  - (c) Add strap leads from PSB-16 to PSB-30 and from PSB-17 to PSB-31.
  - (d) Connect the power unit to the appropriate terminals of the 625-type connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.
- (2) With a D6AM-87 cord, proceed as follows.
  - (a) Disconnect and remove the M2SL-87 cord.
  - (b) Connect the normally insulated and stored (BL) and (W) jack leads to PSB-16 and PSB-17, respectively.
  - (c) Add strap leads from PSB-16 to PSB-30 and from PSB-17 to PSB-31.
  - (d) Connect the power unit to the appropriate terminals of the 74D connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.

#### G. Head Telephone Set

##### 3.13 Install as follows.

- (1) Remove housing (paragraph 3.21).

- (2) Access PSB terminal area (paragraph 3.18).
- (3) Remove cradle (paragraph 3.20).
- (4) Thread cord of jackset through hole in rear of housing and make connections per appropriate table provided with Plantronics Jackset.
- (5) Reassemble telephone set.
- (6) Insert head telephone set plug into jackset.

#### COMPONENT LOCATION AND ACCESS INFORMATION

##### A. Location of Components

##### 3.14 The components are located in three areas as follows:

- (a) The following are located under the handset cradle (Fig. 3):

- Buzzer (optional)
- Ringer
- Line switch assembly
- Handset jack
- Terminal board (TB).

- (b) The following are located under the faceplate, inside the set (Fig. 4 and 5):

- (1) Battery jack (Fig. 5)
- (2) Power supply (PSB) terminal area (Fig. 4)
- (3) Network (Fig. 4)
- (4) Options (Fig. 4) are as follows:
  - (a) D-180492 (relay kit for speakerphone)
  - (b) D-180493 (dial tone detector and one-touch calling switch kit)
  - (c) D-180818 (record disable/and dial intermix kits).

- (c) The battery is located in the bottom of the telephone set (Fig. 7).

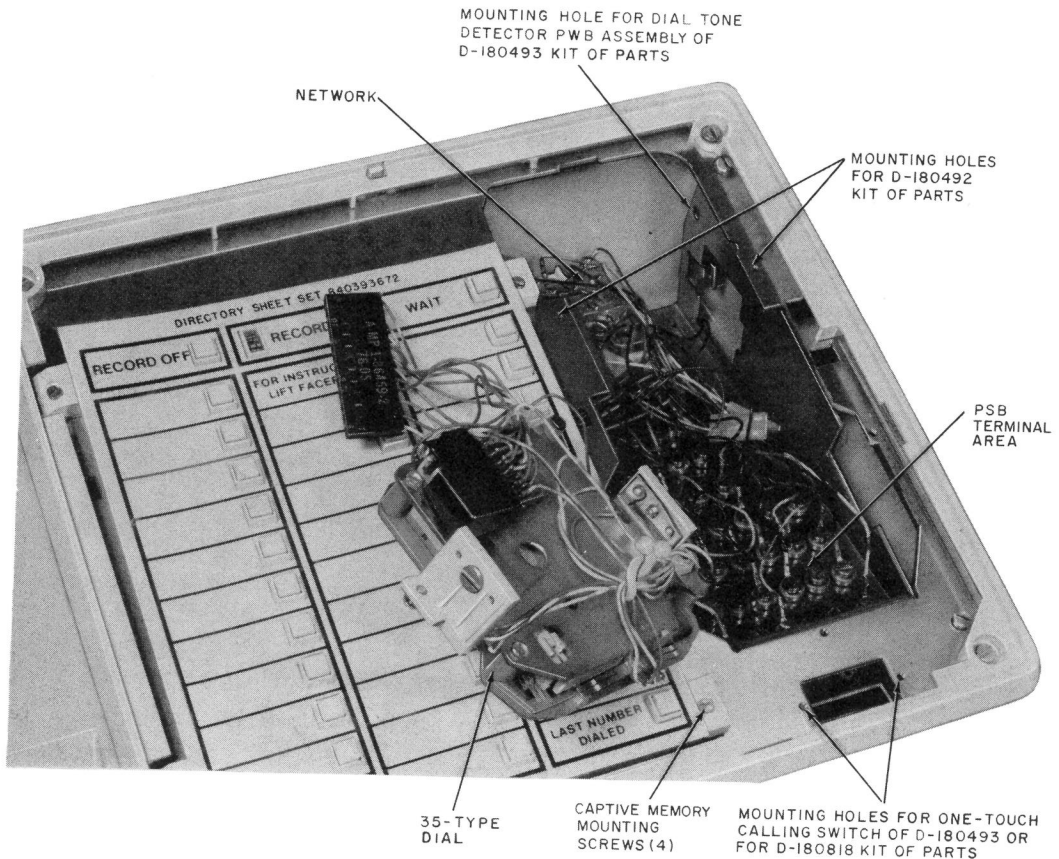


Fig. 4—Telephone Set—Dial Removed to Show Terminal Area

#### B. Mounting Cord

3.15 The D6AD-87 mounting cord (2870A1M) is spade-tip ended at both ends. The conductors provide for tip, ring, ac power, and A-lead control.

3.16 The D4BU (2870A2M) plug-ended mounting cord conductors provide for tip, ring, and A-lead control.

**Note:** If two extra leads are required, a D6AM-87 cord may be used.

#### C. Network Terminals

3.17 For access to the network terminals, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) To replace the cover, the three tabs of the cover (one at the top center and one at each

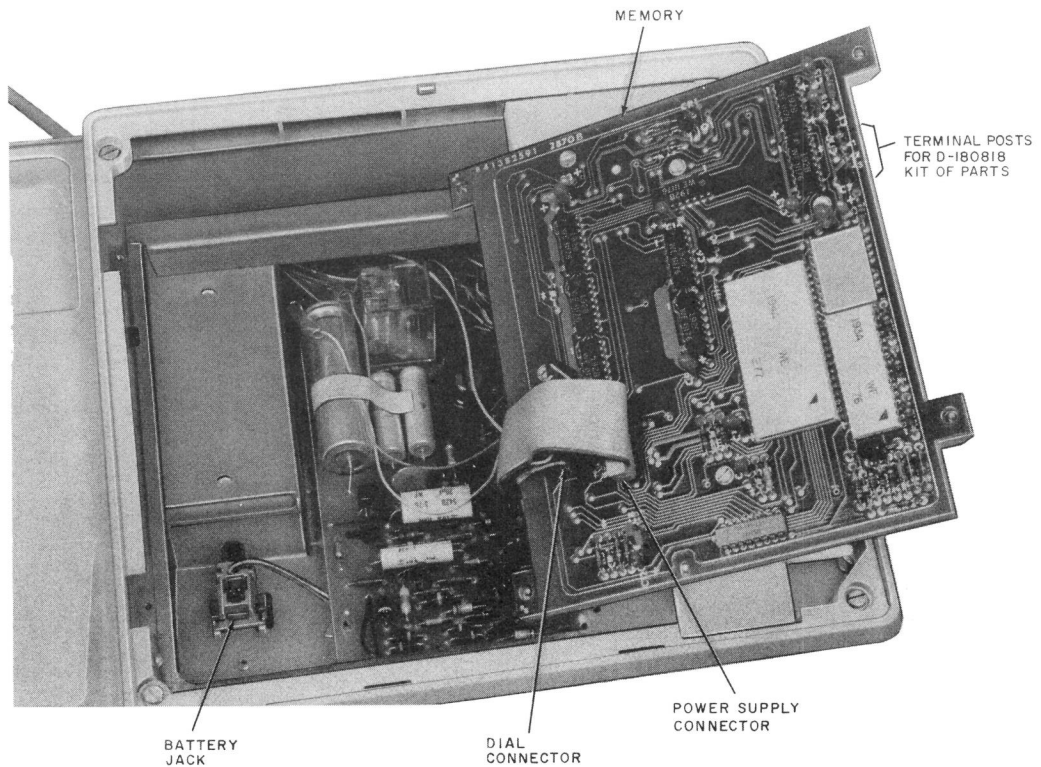


Fig. 5—Telephone Set, Internal View

side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### D. Power Supply Board (PSB) Terminals

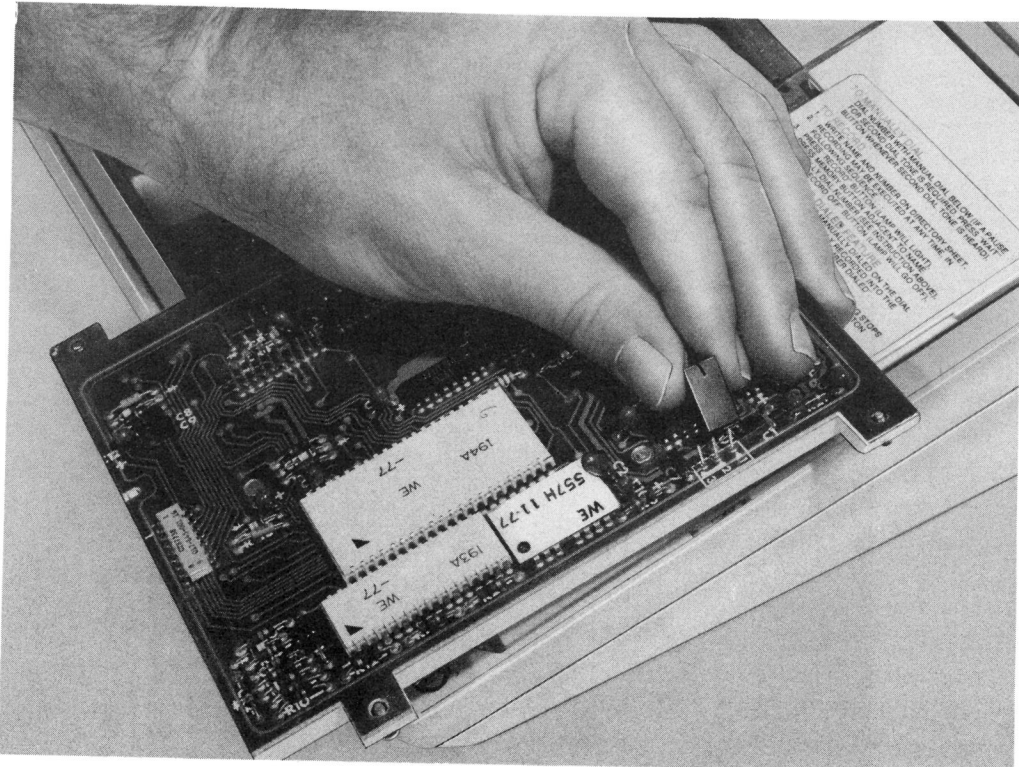
3.18 To access the terminal field on the power supply board, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.

- (4) Loosen the two captive screws that hold the dial in place.

**Note:** On sets with metal dial brackets, the screws will have to be removed.

- (5) Gently raise the dial and disconnect 12 position plug from PSB.
- (6) Rotate dial over onto the memory.
- (7) To reassemble, reverse procedure.
- (8) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Fail-



**Fig. 6—2870A1M (MD) or 2870A2M Telephone Set Connections of D-180818 Kit of Parts, Record Disable Feature Only**

ure to do this will result in improper seating of the faceplate.

#### **E. Faceplate Removal**

**3.19** Removal will differ depending on faceplate being used. Proceed as follows.

- (a) The 2870B1-type faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The 2870B1 faceplate is not a direct replacement for the 2870A2-87 faceplate. An

870A1U upper housing is also required with the 2870B1 faceplate (paragraph 6.10).

- (b) The 2870A2-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edge and lift.

#### **F. Handset Cradle Removal**

**3.20** To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19) and place the handset aside.



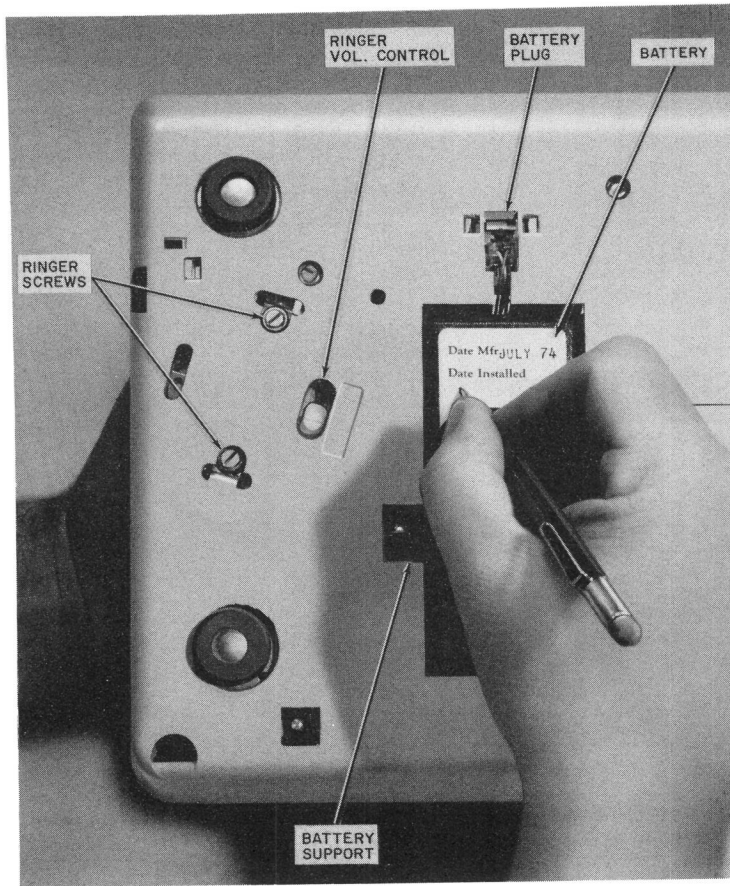


Fig. 7—Telephone Set, Bottom View

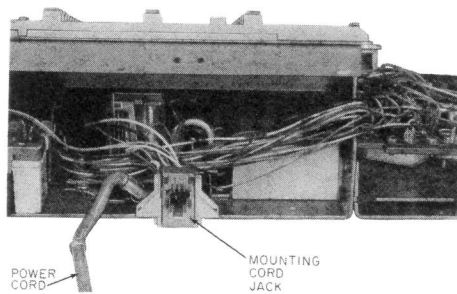
- (2) Remove upper housing, if provided [paragraph 3.21(b)].
- (3) Disengage the captive cradle screws located in the two tabs on the cradle.

**Warning:** *The plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the line switch arm.*

- (4) Lift the cradle, by pulling up on the plunger, and remove.
- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.
- (6) Refasten the captive cradle screws.

#### G. Housing Removal

3.21 To remove, proceed as follows.



**Fig. 8—2870A2M Telephone Set, Partial View**

- (a) Remove lower housing as follows.
  - (1) Unplug the handset cord at the telephone set end and remove handset.
  - (2) Remove the faceplate (paragraph 3.19).
 

**Warning:** Attempting to remove the housing without removing the handset cradle may damage the line switch arm.
  - (3) Remove upper housing, if provided [paragraph 3.21(b)].
  - (4) Remove the handset cradle (paragraph 3.20).
  - (5) Disengage the captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
  - (6) Unplug mounting cord (2870A2M).
  - (7) Separate the housing from the telephone set base.
  - (8) Disconnect the 95B1 power unit from M2SL-87 cord, if required (2870A2M).
  - (9) Feed cord through hole in bottom of housing as housing is removed.
  - (10) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs on the chassis.

Misalignment may cause the bottom of the housing to bow.

- (11) When replacing the housing, keep the handset jack from being trapped between the housing and chassis.
- (b) Removal upper housing as follows.
    - (1) Remove the faceplate (paragraph 3.19).
    - (2) Disengage the captive housing screws located in each corner of the upper housing (Fig. 2). This will release the lower housing.
    - (3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.
    - (4) If necessary, thread screws out of housing.
    - (5) To reassemble, reverse procedures.

#### 4. CONNECTIONS

**Warning:** Telephone sets are factory-wired for A-lead control. If set is installed in a location where dial-light service is provided the A and A1 leads must be disconnected, insulated, and stored at the connecting block to prevent shorting out of dial light transformer.

- 4.01 Telephone set connections are shown in Fig. 9.
- 4.02 Refer to Table A for connection reference for all options.
- 4.03 A partial functional schematic is shown on Fig. 12.

#### 5. OPERATION

##### A. Record a Number Into Memory

**Note:** If set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

- 5.01 To record a number, proceed as follows.
  - (1) Remove the faceplate (paragraph 3.19).
  - (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.

- (3) Replace the directory sheet and faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)
- (5) Depress the memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number.

**Note:** If an access code and pause for second dial tone is required, perform Steps (a) through (c).

- (a) Dial the access digit(s) for the outside line.
- (b) Push the WAIT button. (The WAIT entry counts as one digit.)
- (c) Dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer will also be reset by a line switch, line key, or speakerphone operation.

#### B. Change a Number In Memory

**Note:** If set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

- 5.02** Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

#### C. Delete a Number From Memory

**Note:** If set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

- 5.03** Complete the following operations in succession.

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

#### D. Automatically Dial a Number From Memory

- 5.04** To automatically dial a number, proceed as follows.

- (a) For factory-wired sets, go off-hook, listen for dial tone, and depress the desired memory button. If WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress the memory button again to complete automatic dialing.
- (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the desired memory button.
- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the desired memory button.

#### E. LAST NUMBER DIALED Feature

- 5.05** The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED position (Fig. 1) any number called using the standard telephone dial. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

**Note:** If set is equipped with D-180818 Kit of Parts and dial intermix feature is provided, LAST NUMBER DIALED feature is functional only when the feature switch is in the OFF position.

- 5.06** Operation of LAST NUMBER DIALED feature as follows.

- (a) With no access digit(s) required:
  - (1) Go off-hook
  - (2) Listen for dial tone

- (3) Manually dial telephone number
- (4) To redial same number automatically, proceed as follows.
  - (a) For factory-wired sets, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.
  - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
  - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the LAST NUMBER DIALED button.
- (b) When an access code and pause for second dial tone are required, proceed as follows:
  - (1) Go off-hook
  - (2) Listen for dial tone
  - (3) Dial access digit(s)
  - (4) Depress WAIT button
  - (5) Manually dial telephone number
  - (6) To redial same number automatically, proceed as follows.
    - (a) For factory-wired sets, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded *wait* input. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.
    - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
    - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the LAST NUMBER DIALED button.

## F. End-to-End Signaling

**5.07** For end-to-end signaling (such as data transmission) this set has the capability to intermix manual and automatic dialing. This can be accomplished if the following rules are observed:

**Note:** If the telephone set is to be used for end-to-end signaling, V option (with polarity guard) shall be used (Fig. 9B). Set is factory-wired with V option.

(1) If the telephone set is equipped with the one-touch calling option the initial number must be dialed automatically (even if the one-touch calling switch is in the OFF position). This allows the dial tone detector to complete its function and then additional numbers may be dialed automatically or manually if desired.

(a) **Standard Operation:** If, at any time, information is keyed in manually, the RECORD OFF button must be depressed before another number can be dialed from memory. (The RECORD lamp will not light at any time but depressing the RECORD OFF button will remove the set from the LAST NUMBER DIALED mode and allow additional automatic dialing.)

(b) **Dial Intermix (D-180818 Kit of Parts):** With the feature switch in ON position manually and automatically dialed digits may be intermixed as desired. Operation of the RECORD OFF button is not required.

**Note:** In this mode, the RECORD button and the LAST NUMBER DIALED feature are inoperative.

## 6. MAINTENANCE

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

### A. Trouble Analysis

**6.02** When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).

- (2) Check for improper connections.
- (3) Refer to Table H and the following paragraphs.
- (4) If removal of set is required, proceed as follows.
  - (a) Disconnect power unit from ac outlet and unplug battery.
  - (b) Disconnect telephone set.

**Warning: Failure to restrain plug can result in plug damage necessitating battery replacement.**

- (c) Place plug sideways into housing slot below battery jack and tape in place.

#### B. Battery

**6.03** The KS-20390L2 or KS-20390L4 battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 7):

- (1) Tilt the front of the set up
- (2) Unplug the battery
- (3) Loosen captive screw on the battery support
- (4) Remove battery support
- (5) Remove battery
- (6) Install new battery
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a prerecorded telephone number.

#### C. Memory

**6.04** The memory may be replaced as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of the Memory or ac and battery power results in loss of the stored telephone numbers.

- (2) Remove the faceplate (paragraph 3.19).
- (3) Loosen the four captive memory mounting screws (Fig. 4).
- (4) Rotate the left edge of the memory upward as shown in Fig. 5.
- (5) Disengage the two connectors by pulling on them perpendicular to the printed wiring board and disconnect D-kit switch leads after noting connections.
- (6) Replace the memory by engaging the dial connector first. The dial connectors are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board. Reconnect D-kit switch leads.
- (7) Reassemble telephone set.
- (8) Reconnect battery and power unit.
- (9) Test per paragraph 3.06.
- (10) Reprogram memory (see Part 5).

#### D. Dial

**6.05** Replace dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in the loss of stored numbers.

- (2) Proceed per paragraph 3.18.
- (3) Loosen the four captive Memory mounting screws (Fig. 4).
- (4) Gently raise the left side of the Memory and rotate to position shown in Fig. 5. This will expose 10-position dial connector.
- (5) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (6) Lift the dial out.
- (7) To install a new dial, reverse the previous steps. The connectors are keyed to orient them

relative to the pins. Observe the correct orientation and do not force the connection.

- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

#### E. Ringer

##### 6.06 Replace ringer as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect ringer leads (Fig. 9H).
- (6) Tilt the front of the set up.
- (7) Loosen ringer mounting screws (Fig. 7).
- (8) Remove ringer.
- (9) Install new ringer. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent damping of the ringer output. Dial ringback code to test ringer.
- (10) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (11) Reconnect battery and power unit.
- (12) Reprogram memory (see Part 5).

#### F. Buzzer (Optional)

##### 6.07 Replace buzzer as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results on the loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Loosen buzzer mounting screw, and remove buzzer.
- (6) Remove buzzer leads from the terminal board.
- (7) Install new buzzer.
- (8) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (9) Reconnect battery and power unit.
- (10) Reprogram memory (see Part 5).

#### G. Handset Jack (616B)

##### 6.08 Replace handset jack as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in the loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect the handset jack leads and remove jack.
- (6) Install new 616B handset jack.
- (7) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

#### H. Handsets

- 6.09 A defective G15A handset may be replaced or changed to a modular amplifying handset

(G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B), proceed as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.
 

**Note:** Removal of ac and battery power results in the loss of stored numbers.
- (2) Unplug H4DU handset cord at telephone set end.
- (3) Remove faceplate (paragraph 3.19) and place handset aside.
- (4) Remove upper housing, if provided [paragraph 3.21(b)].
- (5) Remove handset cradle (paragraph 3.20).
- (6) Disconnect 616B handset jack (paragraph 6.08). (Jack may be removed or stored just to right of ringer.)
- (7) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (8) Attach stayband hook to chassis (Fig. 3).
- (9) Route leads through wire guide as shown in Fig. 3.
- (10) Make connections (Fig. 9H).
- (11) Reassemble telephone set [paragraph 3.20, 3.21(b), and 3.19].

(12) Reconnect battery and power unit.

(13) Reprogram memory (see Part 5).

#### I. Faceplates

**6.10** To replace a 2870A2-87 faceplate with a 2870B1-type faceplate, proceed as follows.

- (1) Remove the 2870A2-87 faceplate by lifting up at any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U upper housing to the chassis and 870A1 housing. The three parts should be held tightly together as the screws are driven.
- (4) Place the two tabs located along the lower edge of the 2870B1 faceplate in the notches in the lower side of the 870A1U upper housing.
- (5) Lower the faceplate to rest on the memory. The spring clip located at the top center of the upper housing should retain the faceplate.

#### J. Speakerphone

**6.11** For maintenance information on the 3-type (MD) or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively.

**6.12** For speakerphone connections, use applicable Tables B through E.

♦TABLE B♦

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT						
		DESIG	COLOR		FROM		TO				
					TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
					PSB	TB		PSB	55A	55B	
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1				
		T	W-BL				2				
		A1	O-W				4				
		A	W-O				5				
		AC1	G-W				6				
		AC2	W-G				7				
	623P6 Jack Assy (2870A2M) †	Spare	W								
		A	BK								
		R	R								
		T	G								
		A1	Y								
		Spare	BL								
	Speakerphone Interconnection Cord D6AD-87	R1	BL-W		11					28	10
		T1	W-BL		2					19	1
		LK	G-W		33					11	35
		A1	O-W			2				12	2
		SPO	W-O		34					‡	‡
		AG	W-G			1				5	11
		Strap	BK	10					‡		
		Strap	BK	20					‡		
	D-180492 Kit of Parts		CE	BL-BK					10		
DB+			BK-BL					15			
SHa			R-BL					32			
LK			BL-R					33			
SHi			G-W					18			
PFR			BL-V					20			
VDD			W-G					21			
666B (MD) Trmtr	T7A Cord	M1	S-BK						4	7	
		P1	BL-R						13	8	
		-15V	BK-S						14	16	
		S	O-BK						3	18	
		A1	Y-O						29	19	
		F1	G-Y						2	17	
		LK	BK-O						11	35	

See note and footnotes at end of table.



TABLE B (Contd)

## CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT						
		DESIG	COLOR		FROM		TO				
					TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
					PSB	TB		PSB	55A	55B	
760A (MD) LSPK	R2FK Cord	SP1	G						34	20	
		SP2	R						33¶	29¶	
95B1 Power Unit (2870A1M)	D-Station Wire	AC1					6				
		AC2					7				
95B1 Power Unit (2870A2M)*	M2SL-87 Cord	AC1	Y					30§			
		AC2	BK					31§			
2012B (MD or 2012D) Transf *	D-Station Wire	AC1							27	27	
		AC2							36	36	

**Note:** Strap terminals 20 and 21 (55A) or 4 and 5 (55B). If a 55A control unit is used it must be modified for use with TOUCH-TONE telephone set. Control units having this modification are stamped 55A\* (Modified).

\* Both 2012-type transformer and 95B1 power unit must be connected for speakerphone operation.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ Insulate and store.

§ Connected at factory.

¶ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

TABLE C

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,  
[DIAL TONE DETECTOR AND 3B (MD) SPEAKERPHONE]

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT							
		DESIG	COLOR		REMOVE FROM PSB	FROM		TO				
						TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
						PSB	TB		PSB	55A	55B	
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1					
		T	W-BL				2					
		A1	O-W				4					
		A	W-O				5					
		AC1	G-W				6					
		AC2	W-G				7					
	623P6 Jack Assy (2870A2M)§	Spare	W									
		A	BK									
		R	R									
		T	G									
		A1	Y									
		Spare	BL									
	Speaker- phone Intercon- nection Cord D6AD-87	R1	BL-W		11					28	10	
		T1	W-BL		2					19	1	
		LK	G-W		33					11	35	
		A1	O-W			2				12	2	
		SPO	W-O		34					3	18	
		AG	W-G			1				5	11	
		Strap	BK	10								
		Strap	BK	19								
		Strap	BK	20								
		Strap	BK	26								
		Strap	BK	29								
	D-180493 Kit of Parts	Dial Tone Detector	Input	G-R						2		
			PB	O-BK						9		
			Input	G-R							11	
			LK	Y-G							33	
DT			O-Y							19		
VDD			R-O							21		
DR			Y-O							24		
PL			O-R							25		
DTT			BL-Y							26		
SPR			Y-BL							27		
COM			BK-O							29		
SPO	G-Y							34				

See note and footnotes at end of table.

†TABLE C (Contd)‡

**CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,  
[DIAL TONE DETECTOR AND 3B (MD) SPEAKERPHONE]**

APPARATUS		CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT					
			DESIG	COLOR		FROM		TO			
						TEL SET		44-TYPE BLOCK TERM.	CONTROL UNIT (SEE NOTE)		
						PSB	TB		PSB	55A	55B
D-180493 Kit of Parts (Contd)	Switch*	S1	S					28			
		S2	S					29			
D-180492 Kit of Parts			CE	BL-BK					10		
			DB+	BK-BL					15		
			SHa	R-BL					32		
			LK	BL-R					33		
			SHi	G-W					18		
			PFR	BL-V					20		
			VDD	W-G					21		
666B (MD) Trmtr		T7A Cord	M1	S-BK						4	7
			P1	BL-R						13	8
			-15V	BK-S						14	16
			S	O-BK						3	18
			A1	Y-O						29	19
			F1	G-Y						2	17
			LK	BK-O						11	35
760A (MD) LSPK		R2PK Cord	SP1	G						34	20
			SP2	R						33**	29**
95B1 Power Unit † (2870A1M)		D-Station Wire	AC1					6			
			AC2					7			
95B1 Power Unit † (2870A2M)		M2SL-87 Cord	AC1	Y					30 ‡		
			AC2	BK					31 ‡		
2012B (MD) or 2012D Trnsf †		D-Station Wire	AC1							27	27
			AC2							36	36

**Note:** Strap terminals 20 and 21 (55A) or 4 and 5 (55B). If a 55A control unit is used it must be modified for use with TOUCH-TONE telephone set. Control units having this modification are stamped: 55A\* (Modified).

\* One-touch calling switch must be set to ON position.

† Both 2012-type transformer and 95B1 power unit must be connected for speakerphone operation.

‡ Connected at factory.

§ Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

¶ Insulate and store.

\*\* To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

♦TABLE D♦

## CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO				
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER	
					PSB	TB			
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1		
		T	W-BL				2		
		A1	O-W				4		
		A	W-O				5		
		AC1	G-W				6		
		AC2	W-G				7		
	623P6 Jack Assy (2870A2M)†	Spare	W						
		A	BK						
		R	R						
		T	G						
		A1	Y						
		Spare	BL						
		Strap	BK		10	¶			
		Strap	BK		20	¶			
D-180492 Kit of Parts		CE	BL-BK				10		
		DB+	BK-BL				15		
		SHa	R-BL				32		
		LK	BL-R				33		
		SHi	G-W				18		
		PFR	BL-V				20		
		VDD	W-G				21		
223D Adapter	M16H Cord ‡	AC	R-G				¶		
		AC	G-R				¶		
		LK	O-W				33		
		Spare	O-R				¶		
		Spare	R-O				¶		
		K5M	BR-W				¶		
		IT	W-G				¶		
		IR	G-W				¶		
		T1	W-BL				2		
		R1	BL-W				11		
		K4C	S-W				¶		
		K5C	W-S				¶		
		K4B	BL-R				¶		
		K5B	R-BL				¶		
		AG	W-O					1	
		A1	W-BR					2	

See footnotes at end of table.

♦TABLE D (Contd)♦

## CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO			
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER
					PSB	TB		
95B1 Power Unit (2870A1M)*	D-Station Wire	AC1					6	
		AC2					7	
95B1 Power Unit (2870A2M)*	M2SL-87 Cord	AC1	Y		30**			
		AC2	BK		31**			
680-Type Trmtr	D8S Cord							Plugs into adapter
108-Type LSPK	D20N Cord							
85B1 PWR Unit*	M2FC Cord‡	AC	BK					
		AC	Y					

\* Both 85B1 and 95B1 power unit must be connected for speakerphone operation.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ To provide strain relief, the S-hook of the M16H cord shall be retained by the screw in the telephone set already used to retain the D6AD-87 cord (2870A1M) or the M2SL-87 cord (2870A2M).

§ Only (Y) and (BK) leads are terminated in plug of M2FG cord.

¶ Insulate and store.

\*\* Connected at factory.

TABLE E4

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING  
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO			
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER
					PSB	TB		
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1	
		T	W-BL				2	
		A1	O-W				4	
		A	W-O				5	
		AC1	G-W				6	
		AC2	W-G				7	
		Spare	W					
	623P6 Jack Assy (2870A2M)‡	A	BK					
		R	R					
		T	G					
		A1	Y					
		Spare	BL					
		Strap	BK	10	¶			
		Strap	BK	19	¶			
		Strap	BK	20	¶			
Strap		BK	26	¶				
Strap		BK	29	¶				
D-180493 Kit of Parts	Dial Tone Detector	Input	G-R		2			
		PB	O-BK		9			
		Input	G-R		11			
		LK	Y-G		33			
		DT	O-Y		19			
		VDD	R-O		21			
		DR	Y-O		24			
		P1	O-R		25			
		DTT	BL-Y		26			
		SPR	Y-BL		27			
		COM	BK-O		29			
	SPO	G-Y		34				
Switch*	S1	S			28			
	S2	S			29			
D-180492 Kit of Parts	CE	BL-BK			10			
	DB+	BK-BL			15			
	SHa	R-BL			32			
	LK	BL-R			33			
	SHi	G-W			18			

See footnotes at end of table.

TABLE E (Contd)†

**CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING  
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO			
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER
					PSB	TB		
D-180492 Kit of Parts (Contd)		PFR	Bl-V		20			
		VDD	W-G		21			
223D Adapter	M16H Cord	AC	R-G		¶			
		AC	G-R		¶			
		LK	O-W		33			
		SPO	O-R		34			
		Spare	R-O		¶			
		K5M	BR-W		¶			
		IT	W-G		¶			
		1R	G-W		¶			
		T1	W-BL		2			
		R1	BL-W		11			
		K4C	S-W		¶			
		K5C	W-S		¶			
		K4B	BL-R		¶			
		K5B	R-BL		¶			
		AG	W-O			1		
A1	W-BR			2				
95B1 Power Unit (2870A1M) †	D-Station Wire	AC1					6	
		AC2					7	
95B1 Power Unit (2870A2M) †	M2SL-87 Cord	AC1	Y		30**			
		AC2	BK		31**			
680-Type Trmtr	D8S Cord						Plugs into adapter	
180-Type LSPK	D20N Cord							
85B1 PWR Unit †	M2FG §	AC	BK					
		AC	Y					

\* One-touch calling switch must be set to ON position

† Both 85B1 and 95B1 power unit must be connected for speakerphone operation.

‡ Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

§ Only (Y) and (BK) leads are terminated in plug of M2FG cord.

¶ Insulate and store.

\*\* Connected at factory.

TABLE F4

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH  
DIAL TONE DETECTOR ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO		
		DESIG	COLOR	REMOVE FROM	TEL SET	44-TYPE BLK TERM.	
				PSB	PSB		
Telephone Set	Mtg Cord P6AD-87 (2870A1M)	R	BL-W			1	
		T	W-BL			2	
		A1	O-W			4	
		A	W-O			5	
		AC1	G-W			6	
		AC2	W-G			7	
		623P6 Jack Assy (2870A2M)†	Spare	W			
	A		BK				
	R		R				
	T		G				
	A1		Y				
		Spare	BL				
		Strap	BK	19	‡		
		Strap	BK	26	‡		
D-180493 Kit of Parts	Dial Tone Detector	Input	G-R			2	
		PB	O-BK			9	
		Input	G-R			11	
		LK	Y-G			‡	
		DT	O-Y			19	
		VDD	R-O			21	
		DR	Y-O			24	
		PL	O-R			25	
		DTT	BL-Y			26	
		SPR	Y-BL			‡	
		COM	BK-O			29	
		SPO	G-Y			‡	
		Switch*	S1	S			‡
	S2		S			‡	
95B1 Power Unit (2870A1M)	D-Station Wire	AC1				6	
		AC2				7	
95B1 Power Unit (2870A2M)	M2SL-87 Cord	AC1	Y		30§		
		AC2	BK		31§		

\* Switch not used for this option.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ Insulate and store.

§ Connected at factory.



**TABLE G**  
**CONNECTIONS FOR D-180818 KIT OF PARTS**

D- KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS (NOTE 1)	
DESIG.	COLOR (NOTE 2)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX FEATURE (NOTE 3)
WDC	BK *	†	1
VDD	R	2	2
RCD	BK	3	3

*Note 1:* These posts are on the 2870B Memory PWB (Fig. 5).

*Note 2:* These are connectors attached to the switch leads. A single position connector with a (BK) lead and a double position connector with a (R) and (BK) lead.

*Note 3:* When this option is provided the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just like any other memory.

\* Single position connector.

† Insulate and store.

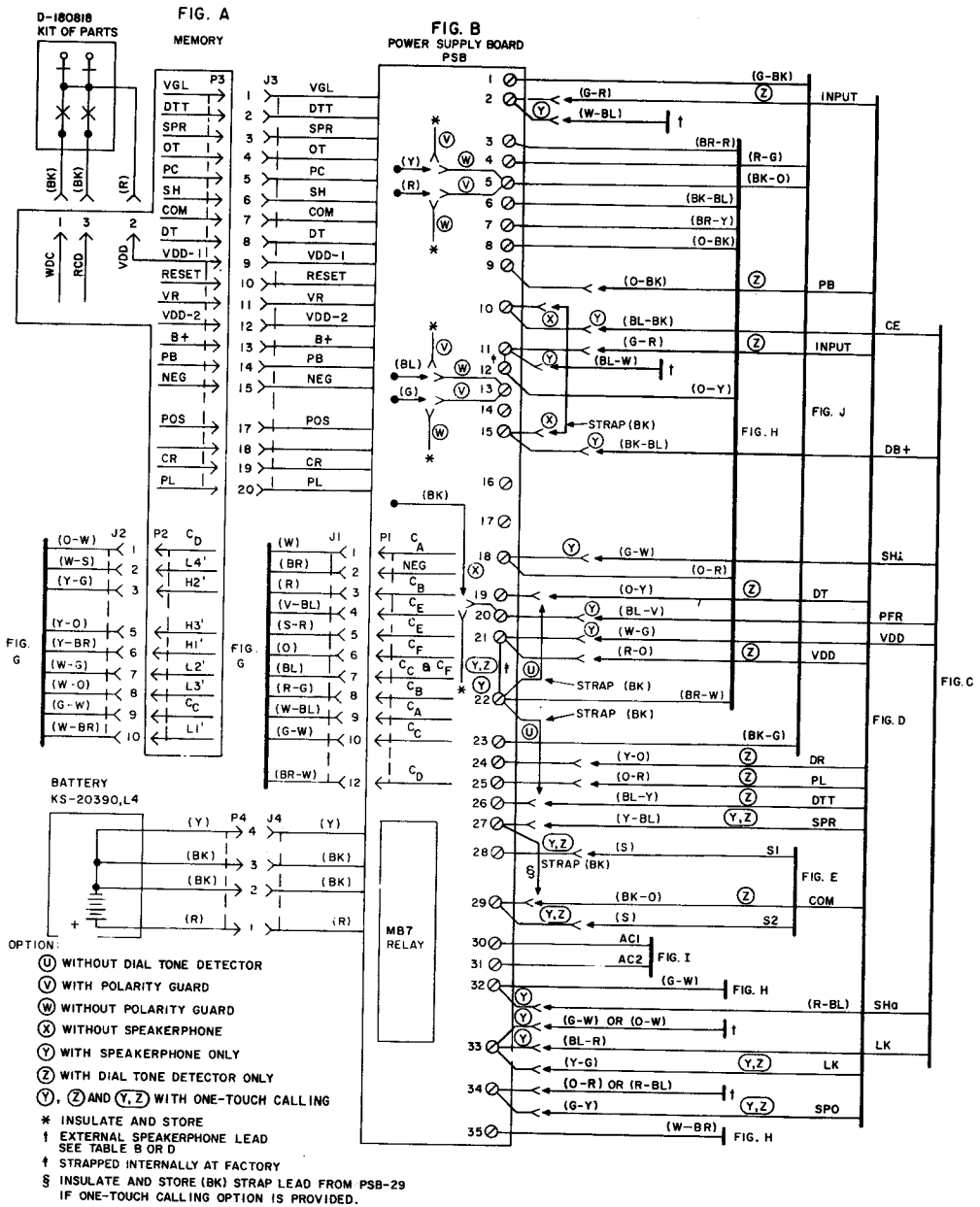


Fig. 9—Telephone Set, Connections (Sheet 1 of 4)

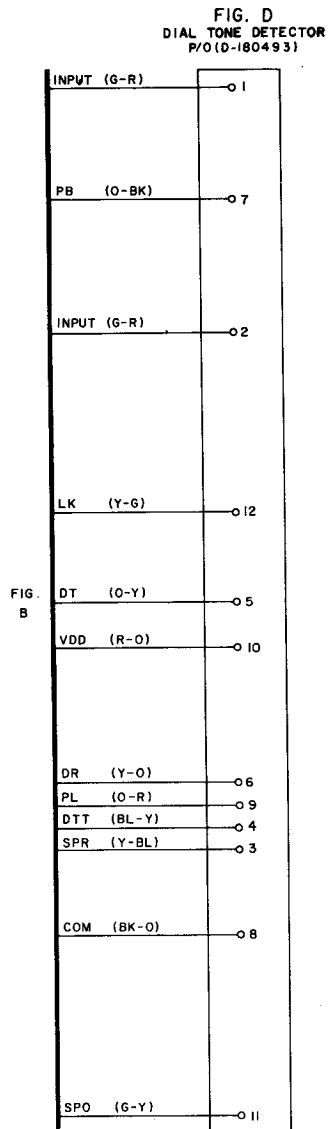
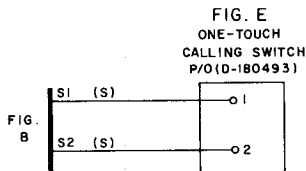
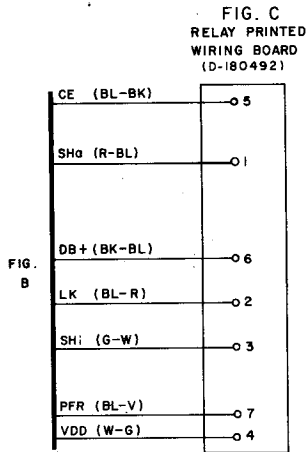


Fig. 9—Telephone Set, Connections (Sheet 2 of 4)

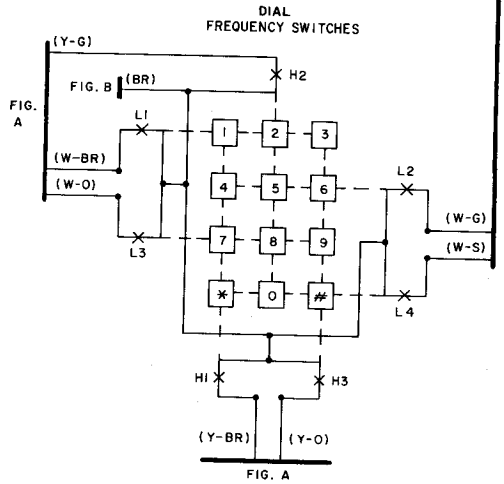
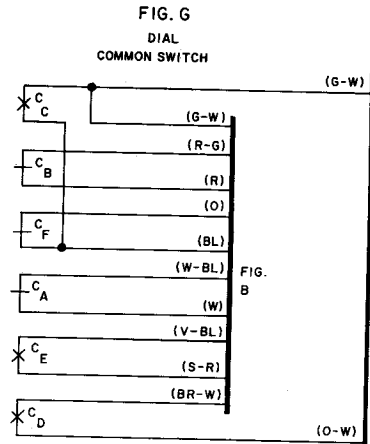
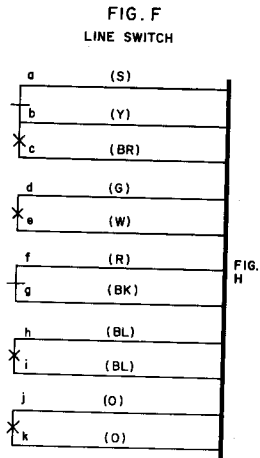


Fig. 9—Telephone Set, Connections (Sheet 3 of 4)

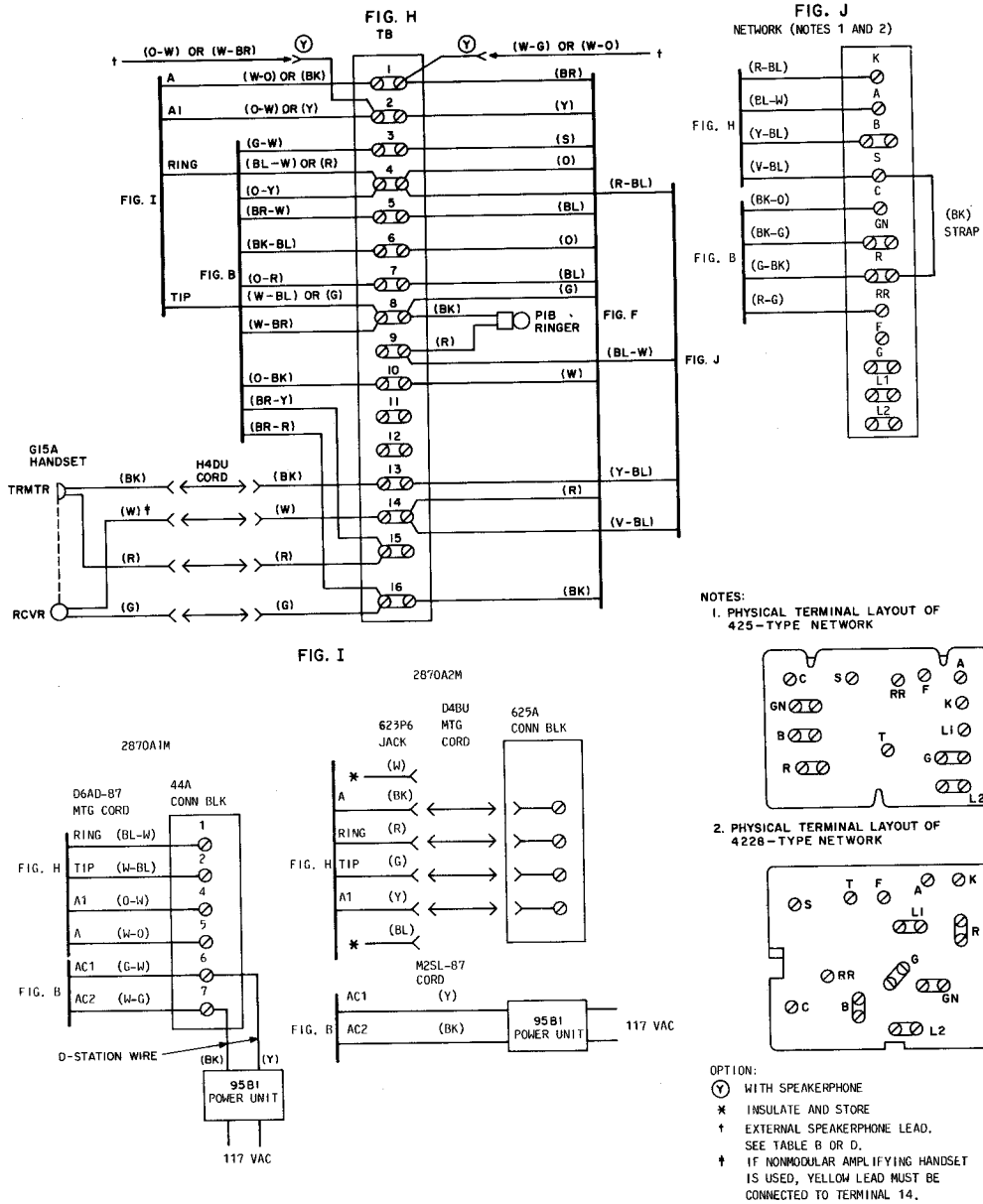


Fig. 9—Telephone Set, Connections (Sheet 4 of 4)

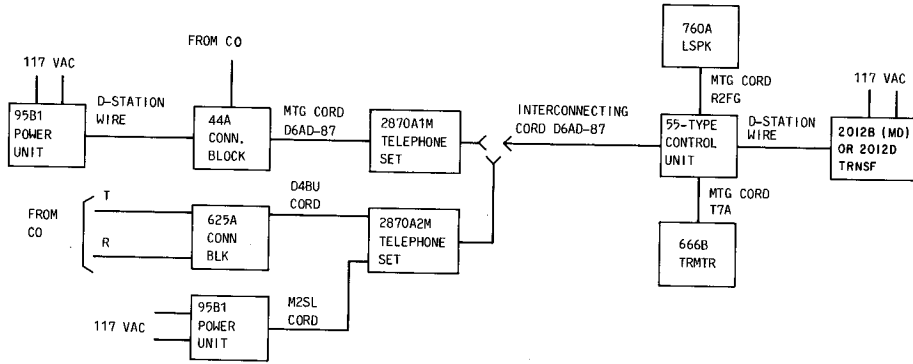


Fig. 10—Block Diagram—Telephone Set With 3-Type (MD) Speakerphone

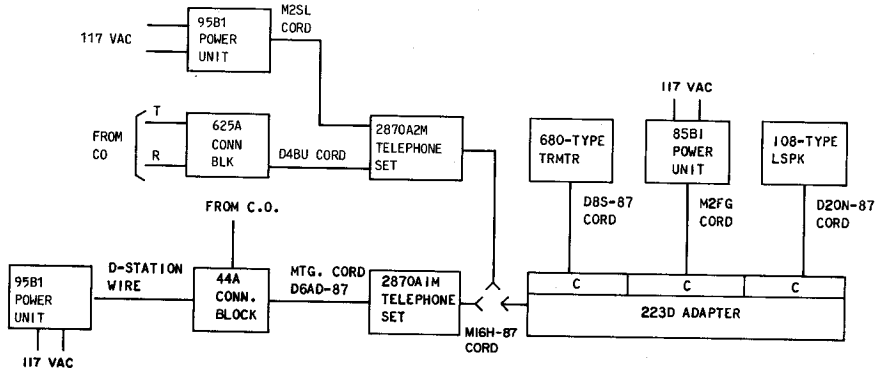


Fig. 11—Block Diagram—Telephone Set With 4A Speakerphone

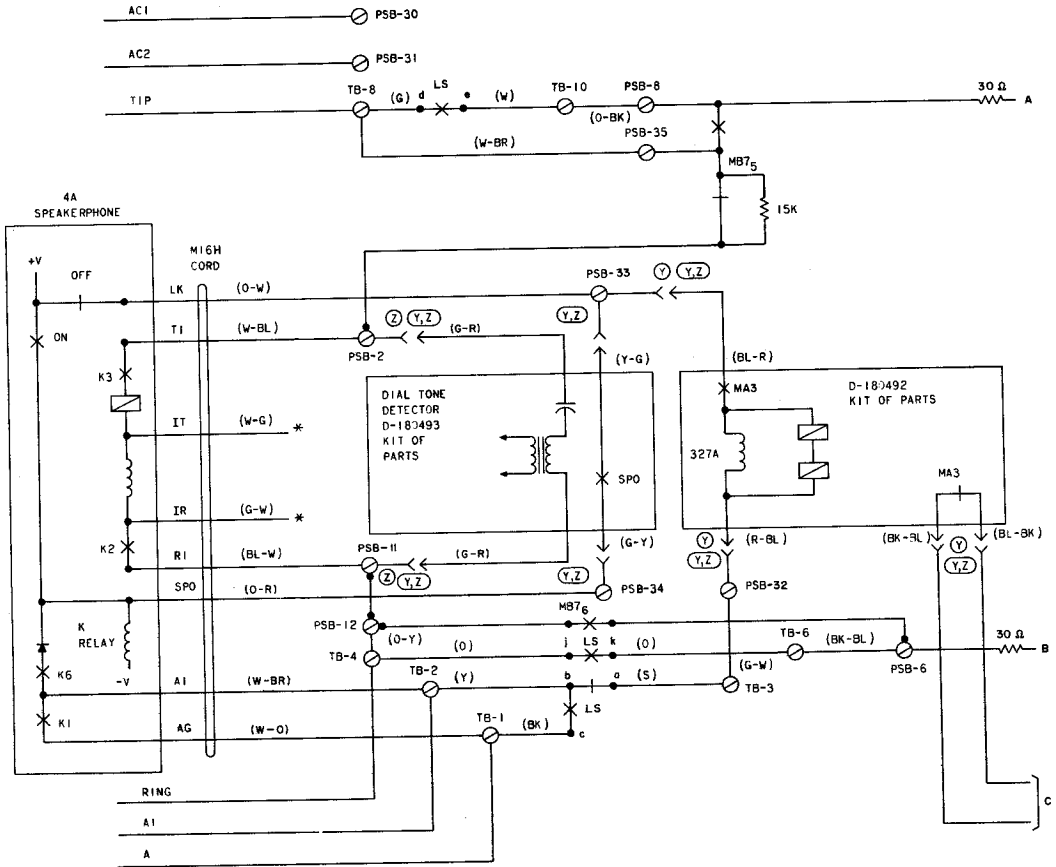


Fig. 12—Telephone Set—Partial Functional Schematic (Sheet 1 of 2)

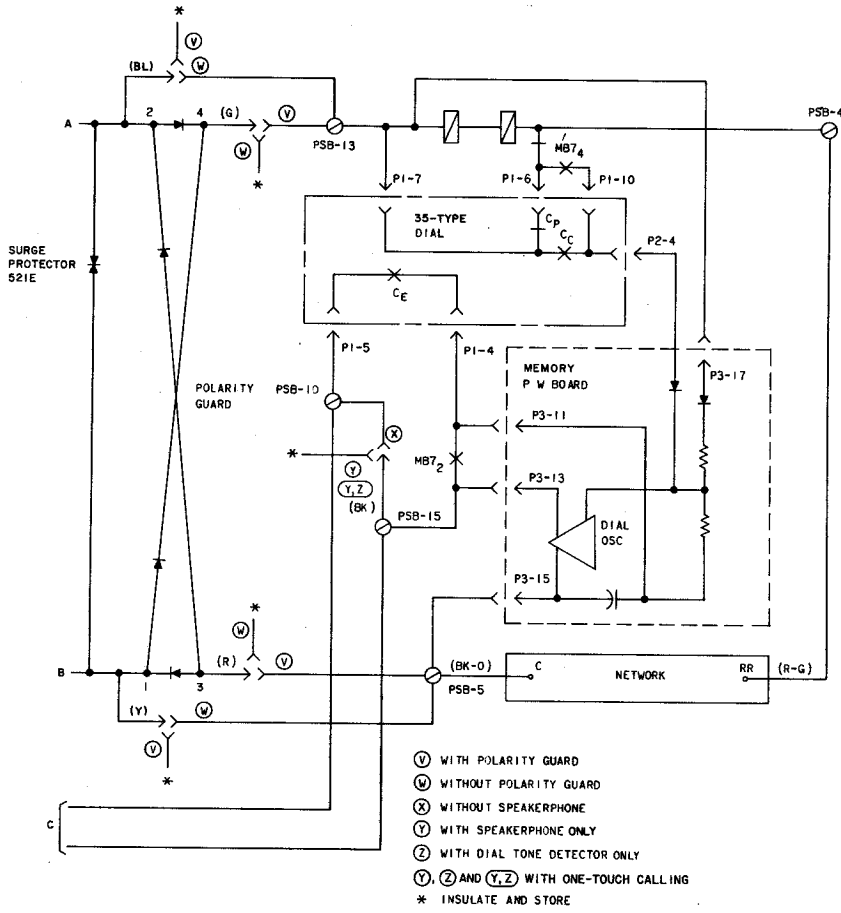


Fig. 12—Telephone Set—Partial Functional Schematic (Sheet 2 of 2)



TABLE H

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
1	Dead Set		Mounting cord improperly connected at equipment end	Check mounting cord connections	
			Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections	
			Defective receiver	Check handset	
			Unknown	Replace telephone set*	
		Dial tone is not present when speakerphone is on	Open tip or ring lead	Check leads	
		Dial tone is present when speakerphone is on	Defective line switch d-e or j-k contacts	Replace telephone set*	
2	Cannot transmit or receive when off-hook using handset		Handset cord improperly inserted into handset or jack in telephone set	Check handset cord and/or handset	
			Dial tone present, sidetone absent. No audible TOUCH-TONE dialing signal	12-pin connector or dial not properly inserted on pins on power supply board	1. Check connector insertion 2. Replace dial
			Defective 616B jack	Replace 616B jack	
			Defective network	Replace telephone set*	
3	Cannot manually dial when off-hook	Clicking sounds or damped TOUCH-TONE dialing signals heard when dial buttons are depressed. Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook	
			No audible TOUCH-TONE dialing signal present	20-pin power supply connector not properly inserted on pins on Memory PWB	Check connector insertion
				Dial connectors not properly inserted	1. Check connector insertion 2. Replace dial
				Defective Memory PWB	Replace Memory
				Unknown	Replace telephone set*
		Some TOUCH-TONE dialing frequencies incorrect	Static discharge damage	1. Contact TELCO Engineer for proper grounding procedure 2. Replace Memory	

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4	Cannot manually dial some digits when off-hook		Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on dial	Replace dial
			Defective Memory PWB	Replace Memory
			Unknown	Replace telephone set*
5	Cannot manually dial off-hook for ac power failure condition	Can manually dial off-hook with ac power on	Open strap lead between screw terminals 10 and 15 on PSB	Repair or replace strap lead
			Open path on PSB	Replace telephone set*
6	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not plugged in or defective	Plug in or replace battery
		RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			Feature switch of D-180818 Kit of Parts in ON position	Change feature switch position to OFF
			AC power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 V ac across screw terminals 30 and 31 on PSB)
			Open in IW	Check IW and connections
			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace Memory
			Static discharge damage	1. Consult TELCO engineer for proper grounding procedure 2. Replace Memory
			Unknown	Replace telephone set*

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		Record lamp flashes or lights erratically	Battery plug not connected	Connect battery plug
			Unknown	Replace telephone set*
		Lamp turns off, flashes, or lights erratically when any memory button is depressed or Lamp does not momentarily turn off when a dial button is depressed	Defective logic	Replace Memory
			Unknown	Replace telephone set*
7	Cannot record into memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
			WAIT contacts closed even when WAIT button is not depressed	1. Check WAIT button 2. Replace Memory
8	Cannot record properly into the 31 memory positions or into the LAST NUMBER DIALED position	Warble tones heard when automatically dialing. Get "cannot complete" intercept for automatic or manual dialing	WAIT contacts closed even when WAIT button is not depressed	Replace Memory
			Party is reached when number is recorded as it is manually dialed. However, when number is subsequently dialed from memory, party is not reached—wrong number is dialed from memory	Feature switch of D-180818 Kit of Parts in ON position
			Incorrect dial contact sequence	Replace dial
			Defective logic	Replace Memory
		Open circuit on PSB	Replace telephone set*	

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
9	Cannot dial properly from memory		Did not record properly	1. Record per paragraph 5.01 2. See trouble No. 7	
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE dialing signal present	Battery plug not connected	Connect battery plug	
			Memory not securely mounted	Tighten Memory mounting screws	
			Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 9(B).	
			Defective logic	Replace Memory	
			Defective line switch h-i contacts	Replace telephone set*	
		MB7 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number	Incorrect dial sequence	Replace dial	
					No audible TOUCH-TONE dialing signal present
					Audible gap in train of digits being dialed
		Digit dialed too rapidly (fast dialer)	Noise on ac power line (2870A1M tel set)	Minimize wire length between 95B1 power unit and telephone set	
Defective power supply PWB assembly (2870A2M)	Replace telephone set*				

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Contd)		No digits or random digits in memory	An ac power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory
			Disconnected or defective battery	1. Plug in the battery 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B-type power unit from the ac power outlet and reinsert 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure
			Defective power supply circuit	Replace telephone set*
		No digits or all the same digits in random memory locations	Defective Memory	Replace Memory
		Two or more memory locations have some digits which are usually different from originally recorded digits	Static discharge damage	1. Consult your TELCO engineer for proper grounding procedures 2. Replace Memory
	Automatically dials through a "wait" after pausing momentarily at the "wait" space on a train of recorded digits	Defective WAIT contacts or defective circuit components	1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts (if option is provided)	
10	Cannot manually dial off-hook for ac power failure condition (Wired for speakerphone option)	With a strap lead between screw terminals 10 and 15 on PSB can manually dial off-hook for ac power failure condition	Defective circuit or connections on D-180492 Kit of Parts	1. Check connections per Table B, C, D, or E 2. Replace D-180492 Kit of Parts
11	Cannot turn speakerphone on when ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on.	Handset off-hook	Place handset on-hook
		No dial tone heard, but indicator lamp turns on	Open T1 or R1 leads	Check connections

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
11 (Cont)		Speakerphone indicator lamp does not turn on	Improper connections or defective speakerphone power unit	<ol style="list-style-type: none"> <li>1. Check connections per Table B, C, D, or E</li> <li>2. Check that speakerphone power unit is plugged into commercial ac power outlet</li> <li>3. Check for commercial power</li> <li>4. Check speakerphone power unit for correct output. (85B1 power unit, 18 to 25 V ac across secondary screw terminals) [2012B (MD) or 2012D transformer, 15 to 18 V ac across secondary screw terminals].</li> </ol>
			Improper connections or defective 95B1 power unit	<ol style="list-style-type: none"> <li>1. Check connections</li> <li>2. Check or replace 95B1 power unit (should read 13.4 to 18 V ac across screw terminals 30 and 31 on PSB)</li> </ol>
		With temporary strap added between power supply screw terminals 32 and 33, speakerphone turns on when ON button is depressed	Defective 327A relay, MA3 relay or connecting leads on D-180492 Kit of Parts	Replace D-180492 Kit of Parts
		With temporary strap added between screw terminals 2 and 3 on TB, speakerphone turns on when ON button is depressed	Defective line switch a-b contacts	Replace telephone set*
		With temporary strap added between screw terminals TB-3 and PSB-32, speakerphone turns on when ON button is depressed	Open lead between TB-3 and PSB-32	Replace (G-W) lead between TB-3 and PSB-32
			Defective speakerphone	See appropriate speakerphone BSP
12	Cannot turn speakerphone off when handset is lifted off-hook (Wired for speakerphone option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Short circuit between screw terminals 2 and 3 on TB	Clear short
			Defective line switch a-b contacts	Replace telephone set*

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
13	RECORD lamp does not turn off when speakerphone ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on	Handset off-hook	Place handset on-hook
		With temporary strap added between screw terminals 32 and 33 on PSB, speakerphone turns on when ON button is depressed	Improper connections or defective LK relay circuit on D-180492 Kit of Parts	1. Check connections 2. Replace D-180492 Kit of Parts
		Operation of RECORD OFF button turns RECORD lamp off	Defective line switch h-i contacts	Replace telephone set*
14	Cannot break dial tone when dialing with speakerphone on (Wired for speakerphone option)	Cannot manually dial when off-hook	Refer to trouble number 3	Refer to trouble number 3
		When dial button is depressed, audible level of TOUCH-TONE dialing signal is high on speakerphone	Defective muting circuit on PSB	Replace telephone set*
15	Cannot hear tones when dialing with speakerphone on (Wired for speakerphone option)	With the speakerphone ON button held depressed, the audible tone level is normal	Physical spacing between speakerphone loudspeaker and transmitter units is too close	See appropriate speakerphone BSP for proper placement of units
		Normal conversational level on speakerphone	Defective muting circuit on PSB	Replace telephone set*
16	Cannot turn speakerphone off (Wired for one-touch option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Strap lead on screw terminal 29 on PSB was not removed when option was wired	Remove the strap lead from terminal 29 on PSB, insulate and store
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 27 on PSB and OFF button is depressed	Defective output logic level from Memory PWB	Replace Memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook	Defective circuit on D-180493 Kit of Parts	Replace dial tone detector board assembly of D-180493 Kit of Parts

\*Refer to paragraph 6.02(4).

TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
17	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (Wired for one-touch option)	MB7 relay does not operate (no click heard) when memory button is depressed	Battery plug not connected	Connect battery plug
		With temporary strap between screw terminals 28 and 29 on PSB, speakerphone turns on when a memory button is depressed	One-touch calling switch turned off or defective	1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
		With temporary strap between screw terminals 33 and 34 on PSB, speakerphone turns on.	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 33 and 34, respectively
Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts			
18	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3-seconds (Wired for one-touch option)		Defective timing circuit	1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts
19	Speakerphone turns on but set does not automatically dial when memory button is depressed (Wired for one-touch option)		Strap leads to screw terminals 19 and 26 on PSB were not removed when option was wired	Remove strap leads from terminals 19 and 26 on PSB, insulate and store
		Set dials when screw terminals 26 and 29 on PSB are temporarily shorted	Precise dial tone not present	1. Check CO line for presence of precise dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D180493 Kit of Parts
		Set does not dial from memory when screw terminals 26 and 29 on PSB are temporarily shorted	Defective logic	Replace Memory



TABLE H (Contd)

## TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
20	Automatic dialing commences for no apparent reason (Wired for one-touch option)		Static discharge damage	1. Consult your TELCO engineer for proper grounding procedures 2. Replace Memory
21	Calls not completed if handset is removed too quickly while automatically dialing on a speakerphone	Automatic dialing is terminated before all digits are dialed	Marginal line switch sequence between a-b and h-i contacts	1. Remove handset more slowly from handset 2. Replace telephone set*
22	Set dials automatically but does not wait for dial tone (Wired for one-touch dialing)		Noise on line	1. Add 0.05 $\mu$ f capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10K-50K) in series with (G-R) dial tone detector input leads
23	Cannot dial properly from memory when on handset (Wired with dial tone detector option)	MB7 relay does not operate (no click heard) when memory button is depressed	Battery plug not connected	Connect battery plug
			Precise dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten Memory mounting screws
			Improper installation of dial tone detector, D-180493	Check connections for D-180493 installation
		Same as above — Addition of strap lead between PSB terminals 26 and 29 does not correct problem	Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
		Addition of strap lead between PSB terminals 26 and 29 corrects problem	Defective Memory	Replace Memory
			Defective dial tone detector	Replace D-180493 dial tone detector
Unknown	Replace telephone set*			
24	Hum or noise caused by electrical apparatus (light dimmer switch, etc)		Unbalanced telephone line	Check for unintentional connections that might cause an unbalanced telephone line

\*Refer to paragraph 6.02(4).

**960A01M "TOUCH-A-MATIC®" 16 TELEPHONE SET**  
**IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION,**  
**AND MAINTENANCE**

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**NOTICE**

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

## 1. GENERAL

1.01 This section contains information on the 960A01M manufacture discontinued (MD) telephone set. This set is shipped from the factory as a desk set (Fig. 1) and can easily be converted to a wall set with no additional parts required.

**⚠Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.*

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Show 960A01M-50 telephone set MD
- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the users documentation for equipment that generates and uses radio frequency energy and may radiate that energy, paragraph 1.01
- Show K1C-50 handset MD
- Add K2C-50 handset
- Add information on K6C-50 handset (Table B)
- Add 10A speakerphone information (Table B).

1.03 The 960A01M telephone set is a single line set and is factory-wired for bridged ringing. It

can be wired to provide A-lead control for 1A1, 1A2, 6A, or 6B key telephone systems (KTS).

1.04 The telephone set is available in Ivory (-50) only. For color selection of available faceplates, see Table A.

## 2. IDENTIFICATION

2.01 The 960A01M telephone set provides the standard features of a single line set plus manual rotary dialing, automatic dialing of 15 frequently called or important numbers, and a LAST NUMBER DIALED scratch pad memory.

### A. Design Features

2.02 The following are design features:

- Modular telephone set
- Integrated circuit memory
- Memory buttons select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 15 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Battery for memory retention in event of ac power outage
- Battery OFF-ON switch
- Supplementary directory
- Directory Privacy (hidden directory)
- Convertibility from a desk set to a wall set.

### B. Optional Features

2.03 The following are optional features (refer to Table B):

- (a) Selective ringing.
- (b) Tip party with identification ground.
- (c) 4-party full selective or 8-party semiselective ringing using an 11-type extender, 813BH diode, or 28A ringer isolator as a coupling device.

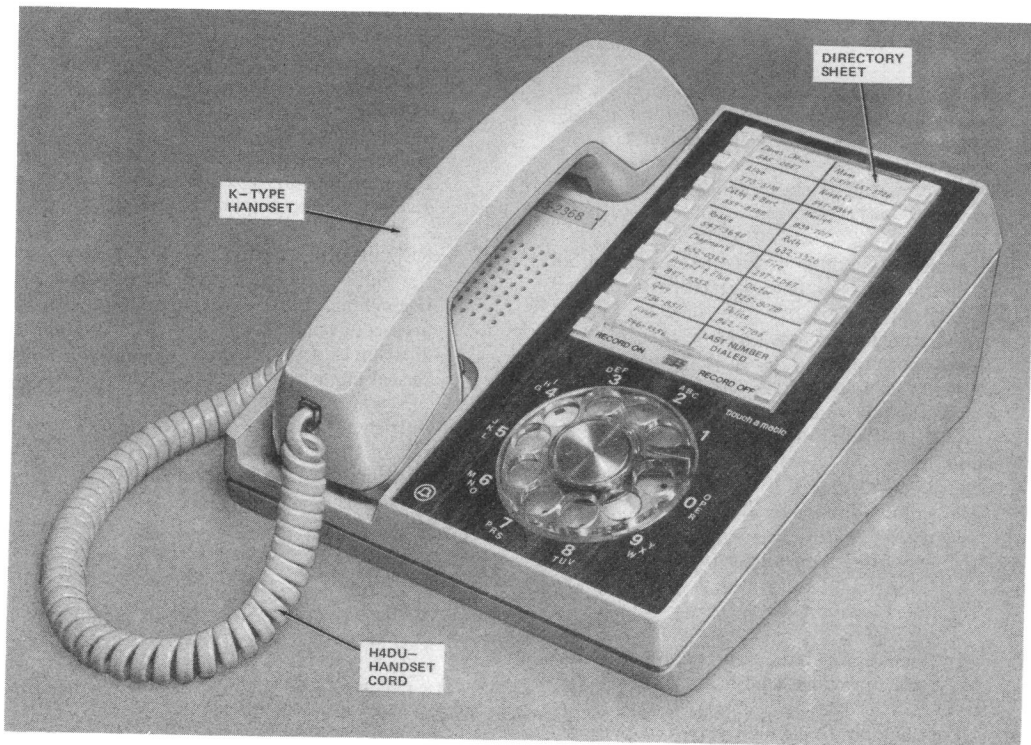


Fig. 1—960A01M (MD) Telephone Set

(d) A-lead control for 1A1, 1A2, 6A, and 6B key telephone systems.

(e) Either 3-type (MD), 4A, or 10A speakerphone may be interfaced with the telephone set.

**Note:** For use with a speakerphone, all dialing must be performed with the handset off-hook (paragraph 5.08). Speakerphone and tip party identification options cannot be provided at the same time.

(f) Multiline service using adjunct key.

**Note:** Replacing the handset each time a line is changed assures proper dialer operation (paragraph 5.09).

(g) 107-type loudspeaker set (SPOKESMAN® loudspeaker unit) may be interfaced with the telephone set (see Section 463-221-100).

(h) D-180812 Kit of Parts provides the following features:

(1) Record Disable Only, turns off the recording feature to prevent accidental erasures of previously stored numbers.

(2) Record Disable and Dial Intermix, same as record disable feature plus:

(a) Allows digits dialed from manual dial and from memory to be intermixed without having to depress the RECORD OFF button.

(b) Disables the LAST NUMBER DIALED feature.

(i) ♦K6C-50 (impaired hearing) handset containing a volume control is available for replacement of K1C-50 (MD) or K2C-50 handset.♦

(j) D-180851 Kit of Parts provides the following features.

(1) Standard modular G-type handsets can be used with desk sets when modified with the D-180851 Kit of Parts. This kit consists of ivory colored transmitter and receiver caps used to replace the standard caps on the G-type handset. Modified G-type handsets can be used to provide the following features when the appropriate K-type handset is not available or is incompatible:

- (a) Amplified receiver (G6BM)
- (b) Amplified transmitter (G7BM)
- (c) Noisy location (G8BM)
- (d) Acoustic or inductive coupling to customer-provided equipment (G15A).

**2.04** All options are implemented by:

- (a) Wiring changes in the telephone set
- (b) Installation of appropriate additional items.

#### C. Operating Features

**2.05** The following are operating features:

- Dial (Rotary), 11E.
- 16-button memory field of low force, low travel nonlocking buttons arranged in two columns; one along the left-hand edge of the memory and the second along the right-hand edge. Each column has eight memory buttons plus a ninth button (bottom button) for the record function.
- LAST NUMBER DIALED button (the next to the bottom button in the right-hand column of nine buttons) when momentarily depressed, with the handset off-hook, initiates

automatic redialing of the last number manually dialed.

- RECORD button (the bottom button in the left-hand column of nine buttons) is nonlocking and when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store manually dialed telephone numbers.

- RECORD OFF button (the bottom button in the right-hand column of nine buttons) is nonlocking and when momentarily depressed, extinguishes the RECORD lamp indicating that the dialer is switched out of the record mode.

- Battery OFF-ON switch (located on the bottom of the set, Fig. 2), should be in the OFF position when set is not in service.

#### D. Ordering Guide

**2.06** Order as follows:

(a) The 960A01M telephone set is a modular type set and may be ordered as follows:

(1) Set, Telephone, 960A01M-50 which includes:

- (a) Adapter, 248B (in sets manufactured prior to August 2, 1979)
- (b) Plug, 523B4, (used when converting from a desk set to a wall set) Fig. 12
- (c) Cord, Handset, H4DU-50
- (d) All components listed in (c) Replaceable Components except faceplate and D4BU-29 cords.

(b) Order the following separately:

**Caution: A 2012A (MD) or 2012C transformer shall not be substituted for a 2012B (MD) or 2012D, as set will not operate properly on the lower voltage.**

- D-180894 Kit of Parts is required to provide ac power for operation of the automatic dialer. The kit contains a 2012D transformer, 248B-49 adapter, D4BU-29 (14 foot) line cord, and instruction sheet (840364194).

**TABLE A**  
**FACEPLATE ORDERING GUIDE (SEE NOTE)**

CODE	COLOR
60A-100	Avocado
60A-108	Teak
60A-109	Walnut
60A-111	Gold
60A-112	Orange
60A-113	Brown
60A-114	Red
60A-115	Blue
60A-118	Black

**Note:** A display package containing all nine color faceplates can be ordered as a D-180667 Kit of Parts. This package is intended for use as an aid to permit selection of color on customers premises. Cardboard insert shipped with set is discarded at time of installation.

- Clamp, 2A (used to secure 2012B (MD) or 2012D transformer to outlet)
  - Faceplate, 60A- (See Table A)
  - Cord, Mounting, D4BU-29
  - Cord, Mounting, D4BU-29 (line cord, maximum 14 feet)
  - Cord Clips B (for dressing cords as needed).
- (c) Replaceable components which may be ordered separately are as follows:
- Lower Housing Assembly, 60AL-50
  - Upper Housing Assembly, 60AU-50
  - Faceplate, 60A- (See Table A)
  - ♦Handset, K2C-50 or K1C-50 (MD)♦

- Cord, Handset, H4DU-50
- Cord, Mounting, D4BU-29
- Cord, Mounting, D4BU-29 (line cord, maximum 14 feet)
- Jack, Handset, 616J
- Battery, KS-20390L5
- Ringer, P1A
- Dial, 11E
- Memory, 960-type (includes button field)
- 841382245 Cover Assembly
- 841382146 Directory Sheet Set (includes four directory sheets and one sheet of color dots)
- 812558039 (P-25E803) Station Number Card Retainer
- 841381098 Handset Hook
- Transformer, 2012D

**Note:** A 2012A (MD) or 2012C transformer shall not be substituted for 2012B (MD) or 2012D, as set will not operate properly on the lower voltage.

- 841417157 Shield and Lead Assembly (Fig. 4)
  - Subscriber Instruction Booklet (SIB-2480C).
- (d) See Table B for apparatus required.

### 3. INSTALLATION

**Danger 1: For safety, securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install 2012B (MD) or 2012D transformer. The transformer and any other cord plugged into the ac outlet should always be unplugged completely from outlet BEFORE attempting to attach or remove the clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the**

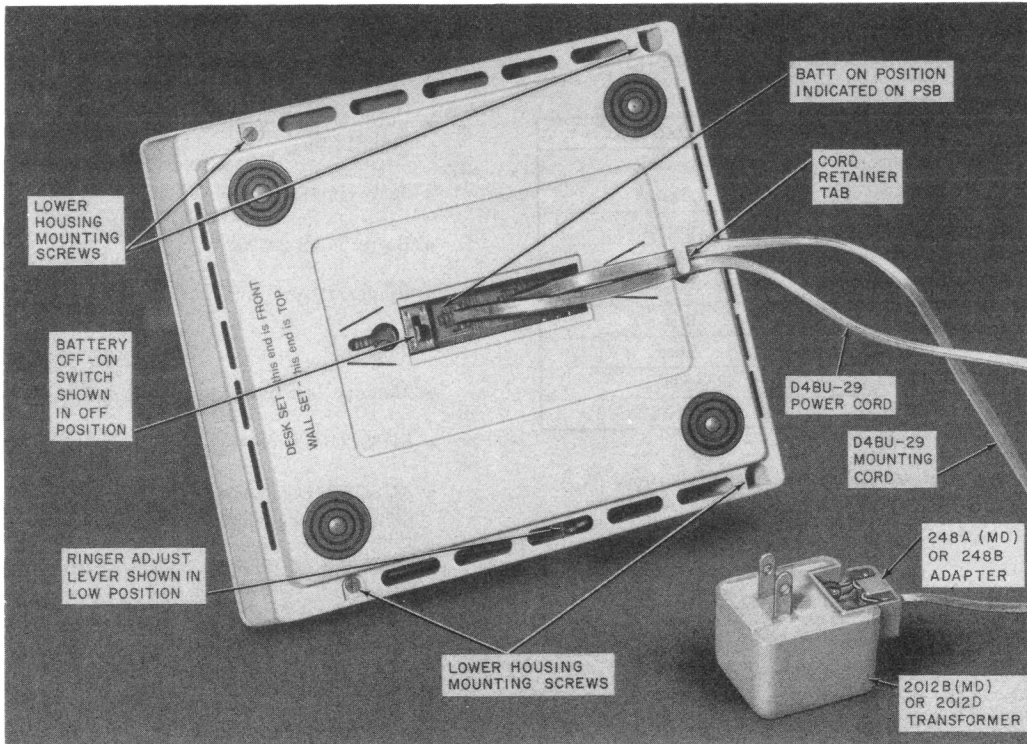


Fig. 2—960A01M (MD) Telephone Set, Bottom View

ac prongs on the transformer when partially withdrawn from outlet. Do not use retaining clamp on outlets where cover mounting screw holds the duplex outlet in the box.

**Danger 2:** Care should be taken to trim and dress leads connecting to low voltage output terminals of 2012B (MD) or 2012D transformer to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one transformer is plugged into a multiple receptacle power strip, there must be at least one inch separation between transformers. Only UL listed receptacle power strips with adequate power rating shall be used. Use of

a continuous terminal power strip that allows the secondary output terminals of the transformer to be in close proximity to the ac line source is not recommended.

**Warning:** Do not turn on the battery switch or plug in the 2012B (MD) or 2012D transformer until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuits, etc. when the set is opened.

- 3.01 Terminate the local loop into a jack or connecting block suitable for the D4BU-29 mounting cord. If this is to be a wall set installation, terminate loop into a 630A4 connecting block and refer to Part 7 of this section for conversion of set.

TABLE B4

## OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED		CONNECTION PER			
				FIG.	TABLE		
Selective Ringing *					C		
Tip Party Identification					C		
A-Lead Control					C		
Conversion to Wall Mounted Telephone Set		523B4 Plug †		12, 15D, & 16B			
		630A4 Connecting Block					
Speakerphone		760A (MD) Loudspeaker		17	E		
		666B (MD) Transmitter		17	E		
		Control Unit (MD)		55A‡	17	E	
				55B	17	E	
		2012B (MD) or 2012D Transformer		17	E		
		D6AD-87 Cord		17	E		
		4A		108AA Loudspeaker		18	F
				680AE Transmitter		18	F
				223D Adapter		18	F
				85B1 Power Unit		18	F
10A		D4BU-29 (2 foot) Cord					
		304A Adapter D8AA-87 (STD) Cord					
		Wall Adapter § D-181062 Kit of Parts					
Multiline Service		6040/6050-Type Key and Interface Cord (min. of 6 conductors)		19			
Record Disable Only		D-180812 Kit of Parts ¶		7, 8, & 13	D		
Record Disable and Dial Intermix							
Impaired Hearing Handset		K6C-50 Handset					
Amplifier-Type Handset		G6BM, G7BM, or G8BM Handset and D-180851 Kit of Parts					
Acoustic or Inductive Coupling to Customer-Provided Equipment		G15A Handset and D-180851 Kit of Parts					

\* For selective ringing with superimposed ringing current, refer to Table C.

† Provided in set taped inside lower housing

‡ Modified by Western Electric Co. to conform to 55B control unit circuitry.

§ For wall installations.

¶ Telephone set must be equipped with a 960B Memory when these kits are used.



For standard desk set installation, terminate loop into 625-type connecting block.

**Note:** For information on modular connecting blocks or adapters, refer to Section 503-100-100.

**Caution 1:** *On sets manufactured or repaired prior to November 1979, to protect the circuit from static discharge, the black (BK) shield lead was factory-wired to the yellow (Y) lead of the mounting cord jack. Upon installation of the set the yellow (Y) lead was connected to earth ground through a 625- or 630-type connecting block. This placed the black (BK) shield lead at earth ground potential.*

**Caution 2:** *During wiring options, care had to be taken that the black (BK) shield lead remained connected to earth ground. Sets manufactured or repaired after October, 1979 will have the black (BK) shield lead connected to terminal 16 on the power supply board which is the dialer common terminal. This wiring change will provide a discharge path for static electricity buildup.*

**Caution 3:** *In severe cases where radio frequency interference or memory scrambling due to static electricity is encountered the black (BK) static shield lead on terminal 16 can be connected to the yellow (Y) ground lead on terminal 1. This yellow (Y) lead should then be connected to an appropriate ground termination.*

**3.02** Lay shield aside and make all wiring changes and telephone set modifications (Table B) before external connections are made to the set (paragraph 4.01). Remove upper housing (paragraph 3.16), if necessary, for set modification.

**3.03** Replace upper housing and install faceplate of subscribers choice (see note, Table A).

**3.04** Attach 248A (MD) or 248B adapter to 2012B (MD) or 2012D transformer (Fig. 2) and plug into 110-117 volt ac outlet not controlled by a switch (continuous ac power is required). Plug one end of the

D4BU-29 cord (maximum 14 feet) into the power jack on the bottom of the set (Fig. 15C) and the other end into the 248A (MD) or 248B adapter attached to the transformer.

**Note:** The 2012B (MD) or 2012D transformer must be located no closer than 1-1/2 feet from the telephone set in order to avoid a potential noise condition.

**Caution 1:** *The ac power to the 960A01M telephone set shall not be provided over the BK and Y conductors of the modules mounting cord used for connecting to the line since these leads may be grounded for some applications and neither ac power lead may be connected to earth ground.*

**Caution 2:** *The transformer should not be used for furnishing power to anything other than this set.*

**3.05** The transformer may also be placed at a remote location with D-station or inside wire as all or part of the connection. (See Fig. 15C for the wiring options and the maximum conductor lengths).

**3.06** The set is shipped from the factory with the battery switch in the OFF position. After all wiring changes and modifications have been completed, tilt the set up and move the battery switch arm (visible in the bottom view of the set, Fig. 2) to the ON position.

**Note:** The switch ON position is indicated on the bottom of the printed wiring board (Fig. 2), and if switch is not placed in ON position, the set will not record or automatically dial.

**Warning:** *Stapling of the D4BU-29 cords can break the conductors. Use a B-cord clip for dressing.*

**3.07** For desk installation, plug mounting cord into phone jack on bottom of set and into 625-type connecting block. (For wall installation, refer to Part 7.)

**Note:** Dress all cords under retainer tab at bottom rear of housing, Fig. 2.

**3.08** The side of a directory card labeled LAST NUMBER DIALED is installed by sliding the

card between the underneath side of the cover (window) and the card retainer strip as shown in Fig. 3A.

**3.09** A second card with the supplementary directory card side up is placed under the retainer tabs and positioned on the top surface of the memory frame as shown in Fig. 3B.

**3.10** When the subscriber does not want the directory prominently displayed, the directory privacy option is used as follows.

(a) A blank directory card, with the side labeled LAST NUMBER DIALED up, is installed per paragraph 3.08 (Fig. 3C).

(b) The actual directory card, with the side labeled LAST NUMBER DIALED up, is placed under the retainer tabs and positioned on the top surface of the memory frame (Fig. 3D).

**3.11** The 812558039 (P-25E803) station number card retainer snaps into the upper housing just below the well for the handset receiver.

#### INSTALLATION CHECK PROCEDURE

**3.12** Check the telephone set installation per the following tests (refer to Part 5 for Operation). In case of failure, refer to Trouble Analysis, Table G.

(1) Disconnect the 2012B (MD) or 2012D transformer from ac power and manually dial the appropriate code for ring-back to test the ringer and to check that the basic telephone operates properly in the absence of commercial power.

(2) Reconnect the 2012B (MD) or 2012D transformer to ac outlet.

(3) With the handset on-hook, record a known telephone number into all memory locations except LAST NUMBER DIALED and the button immediately above [paragraph 5.01 (4) through (7)].

(4) Automatically dial the numbers recorded in Step (3) and verify that they are correct (paragraph 5.04).

(5) Go off-hook and simultaneously manually dial and record a known telephone number into memory location immediately above LAST NUM-

BER DIALED button [paragraph 5.01 (4) through (7)].

(6) Momentarily hang up and then automatically dial from the memory used in Step (5). This verifies that the number was recorded properly.

(7) Go off-hook and manually dial a known telephone number.

(8) Momentarily hang up handset and depress the LAST NUMBER DIALED button. The number automatically dialed should be the same as the number in Step (7).



**The KS-20390L5 battery switch must be in the ON position and the 2012B (MD) or 2012D transformer must be connected a minimum of five minutes before doing Step (9).**

(9) Momentarily disconnect the 2012B (MD) or 2012D transformer (for 5 to 10 seconds). After reconnecting the transformer and securing with a 2A clamp, automatically dial any of the previously recorded numbers. This verifies retention of memory with commercial power disconnected.

#### OPTIONAL APPARATUS INSTALLATION

##### D-180812 Kit of Parts (Record Disable and Dial Intermix Features)

**3.13** Install the D-180812 Kit of Parts (Fig. 7) as follows.

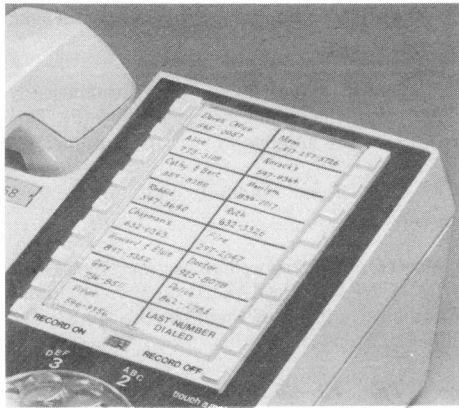
(1) Remove lower housing (paragraph 3.17).

(2) Position the switch assembly as shown in Fig. 13.

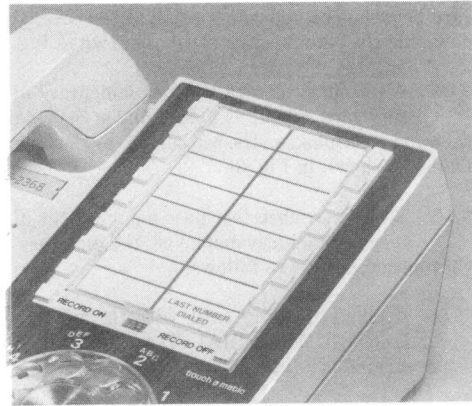
(3) Secure the switch assembly with the locking plate as shown in Fig. 8A and 8B.

(a) For **desk set** installations, the locking plate may be oriented either way according to customer preference. With locking plate flange on the outside (Fig. 8B), it provides a more secure installation in regards to accidental operation of switch.

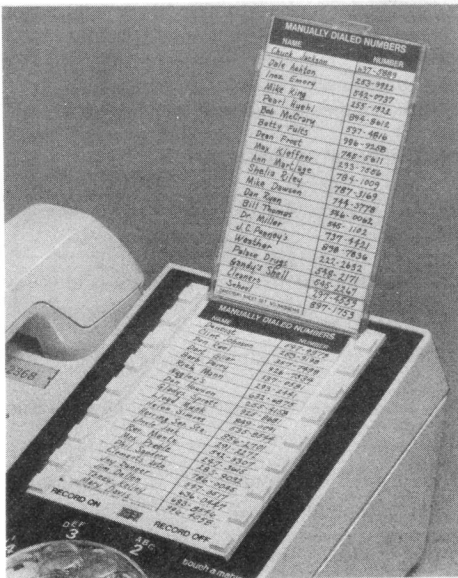
(b) For **wall set** installations, the switch assembly should be located as shown by Fig.



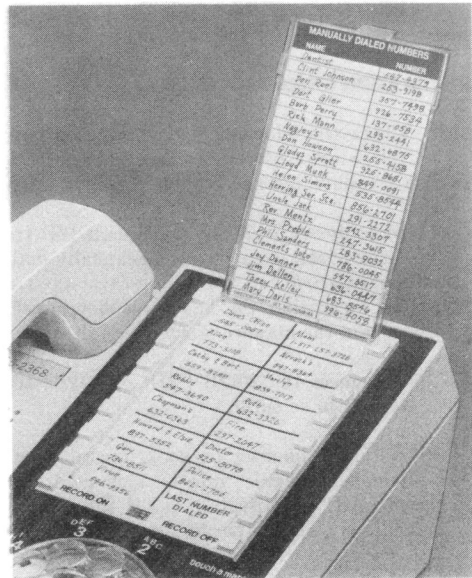
A. DIRECTORY DISPLAYED (WINDOW CLOSED)



C. DIRECTORY PRIVACY (WINDOW CLOSED)



B. DIRECTORY DISPLAYED (WINDOW OPEN)



D. DIRECTORY PRIVACY (WINDOW OPEN)

Fig. 3—Optional Methods of Installing Directory Cards

13. Locate locking plate per Fig. 8A so switch is accessible.
- (4) Insert the three leads from the switch assembly between the circuit board and the chassis under the memory.
- (5) Replace the lower housing and place the set upright.
- (6) Remove faceplate (paragraph 3.15).
- (7) Disengage the four captive memory mounting screws (Fig. 4).
- (8) Rotate the right edge of the memory upward (Fig. 6) and connect the three leads to the terminal posts on the 960B Memory per Table D.

**Note:** If set is equipped with a 960A Memory, replace it with a 960B Memory and carefully pack and return the old memory according to local procedures.

- (9) With feature switch in OFF position, verify that set operates in normal manner:
  - (a) Numbers can be recorded into memory
  - (b) Numbers can be changed in memory
  - (c) Numbers can be deleted from memory
  - (d) Manual dialed numbers are automatically entered into LAST NUMBER DIALED position.
- (10) Set switch to ON position and verify feature provided.
  - (a) For record disable feature, only:
    - (1) RECORD lamp will not light when RECORD button is depressed.
    - (2) No telephone numbers can be recorded, changed, or deleted from memory.
    - (3) LAST NUMBER DIALED feature is operative.
  - (b) For record disable and dial intermix features:
    - (1) RECORD lamp will not light when RECORD button is depressed.

- (2) No telephone numbers can be recorded, changed, or deleted from memory.
- (3) LAST NUMBER DIALED feature is disabled.
- (4) Manually and automatically dialed digits may be intermixed.
- (11) Reassemble set.



**For complete memory security, the switch assembly may be installed through the housing from below, with the switch inside the housing. This type installation would make it necessary to remove the housing to make any changes in memory, or features provided, and is not recommended.**

## COMPONENT LOCATION AND ACCESS INFORMATION

### A. Location of Components

3.14 The components are located as follows.

- **Faceplate** is held in place by three tabs which align with mating slots in the upper housing cutout and is positioned over the dial and memory with appropriate holes that align with the dial and memory assembly (Fig. 1).
- **Shield** is underneath faceplate and is positioned over the dial and Memory (Fig. 4).
- **Battery** snaps into a cavity from the top side in the left front corner of the chassis (Fig. 5).
- **Battery Switch** is soldered to power supply printed wiring board with switch arm accessible at bottom of set through opening near center of lower housing (Fig. 2).
- **Ringer** is fastened by two screws to bosses on the bottom of the chassis (Fig. 9A) and rests in a cavity just to the rear of the battery cavity (Fig. 5).
- **Handset Jack** slides into a cavity on the top left side wall of the chassis adjacent to the ringer and battery (Fig. 5).

- **Switchhook Assembly** is soldered to power supply printed wiring board and located at left-rear corner of power supply board (PSB) (Fig. 5).
- **Rotary Dial** is fastened by two screws and located on the top side at right-front corner of the chassis (Fig. 4).
- **Memory** is fastened by four screws and located just to the rear of the dial on the top right side of the chassis (Fig. 4).
- **Network** electronic components soldered to power supply printed wiring board replace the conventional network.
- **Power Supply Printed Wiring Board Assembly** is fastened by six screws to bosses on the bottom of the chassis (Fig. 9).
- **Power Supply Printed Wiring Board Screw Terminal Areas** (Fig. 5 and 6).
- **Mounting Cord and Power Cord Jacks** slide into adjacent cavities on the bottom side of the center wall of the chassis. Jacks are held in place when power supply board is fastened to bottom of chassis and are accessible through holes in the lower housing and power supply board (Fig. 2 and 9).
- **Lower Housing** is fastened by four screws to the bottom of the chassis (Fig. 2).
- **Upper Housing** is fastened by four screws to the top side of the chassis (Fig. 4).
- **Chassis** is main structural member to which other component assemblies are fastened, including the upper and lower housings (Fig. 5 and 9).

## B. Access of Components

### Faceplate Removal

**3.15** The faceplate has one tab at the top center and two tabs near the bottom corners. To remove, gently bow the upper housing wall away from the top tab and pull up to free the faceplate tab. This can be done by using the thumbnail of one hand on the housing and a fingernail of the other hand on the face-

plate. Then slide the faceplate slightly upward to free the two bottom tabs and remove the faceplate. To reinsert the faceplate, slide the two bottom tabs into mating slots in the upper housing, lower the faceplate on to the top edge of the housing cutout and gently bow the upper housing wall away from the top tab of the faceplate. Push down top of faceplate and release housing.

### Upper Housing Removal

**3.16** To remove the upper housing, proceed as follows.

- (1) Unplug the modular handset cord at the telephone set end and remove handset.

**Warning:** Use extreme care when handling shield. Do not bend shield or break solder connection on attached lead.

- (2) Remove the faceplate (paragraph 3.15) and place the shield aside (Fig. 4).
- (3) Remove the station number card retainer and station number card.
- (4) Disengage the four captive upper housing screws (Fig. 4).
- (5) Remove the upper housing by slipping the shield through the faceplate cutout.
- (6) To replace the upper housing, reverse the procedure.

### Lower Housing Removal

**3.17** To remove the lower housing, proceed as follows.

- (1) Remove the modular mounting and power cords from under the retainer tab and unplug cords from jacks in the bottom of the telephone set (Fig. 2).
- (2) Disengage the four captive screws located at the corners of the lower housing on the bottom of the telephone set (Fig. 2).
- (3) Remove the lower housing.
- (4) To replace the lower housing, reverse the procedure.

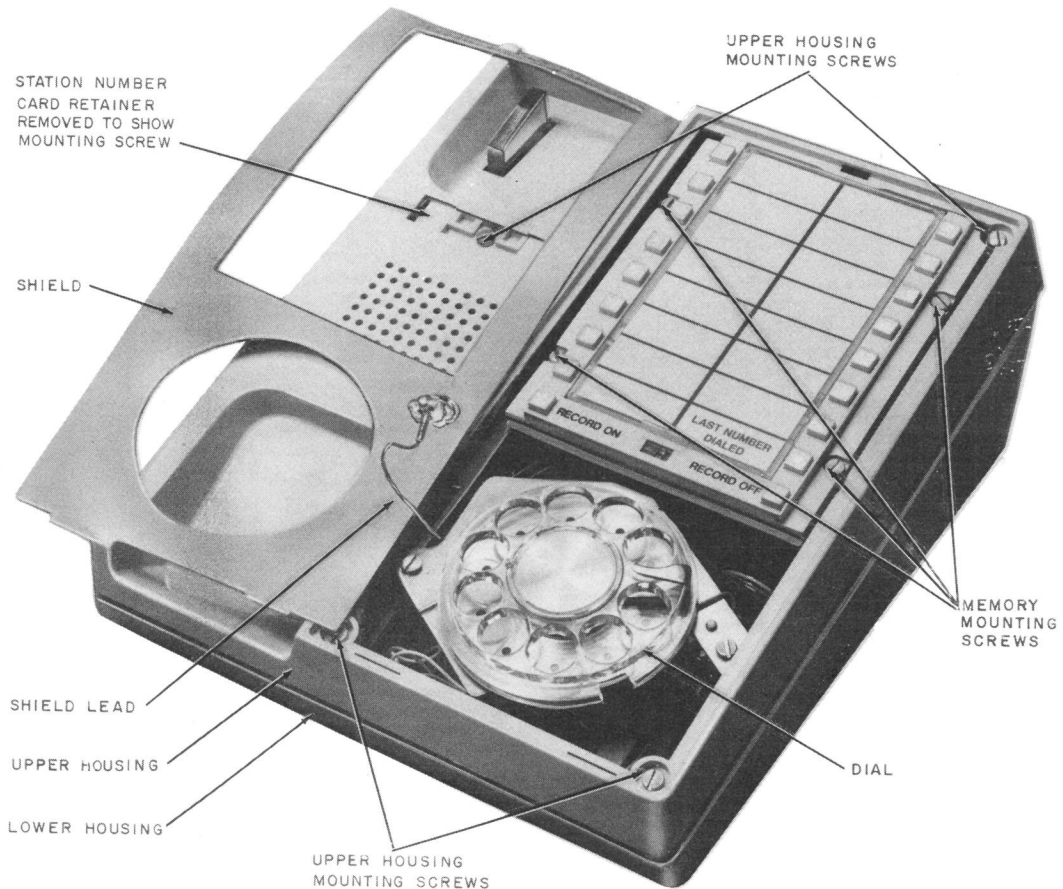


Fig. 4—960A01M (MD) Telephone Set With Handset and Faceplate Removed, and Shield Laid Aside

#### Power Supply Board (PSB) Terminals

3.18 To access the screw terminals 1 through 13 (under the dial) on the power supply board, proceed as follows.

- (1) Remove the faceplate (paragraph 3.15) and place the shield aside.
- (2) Disengage the two captive screws that hold the dial in place.

(3) Remove the dial and place on the Memory as in Fig. 10.

(4) To reassemble, reverse the procedure.

3.19 To access screw terminals 14 through 21 (under the battery) on the power supply board, proceed as follows.

- (1) Remove the upper housing (paragraph 3.16).

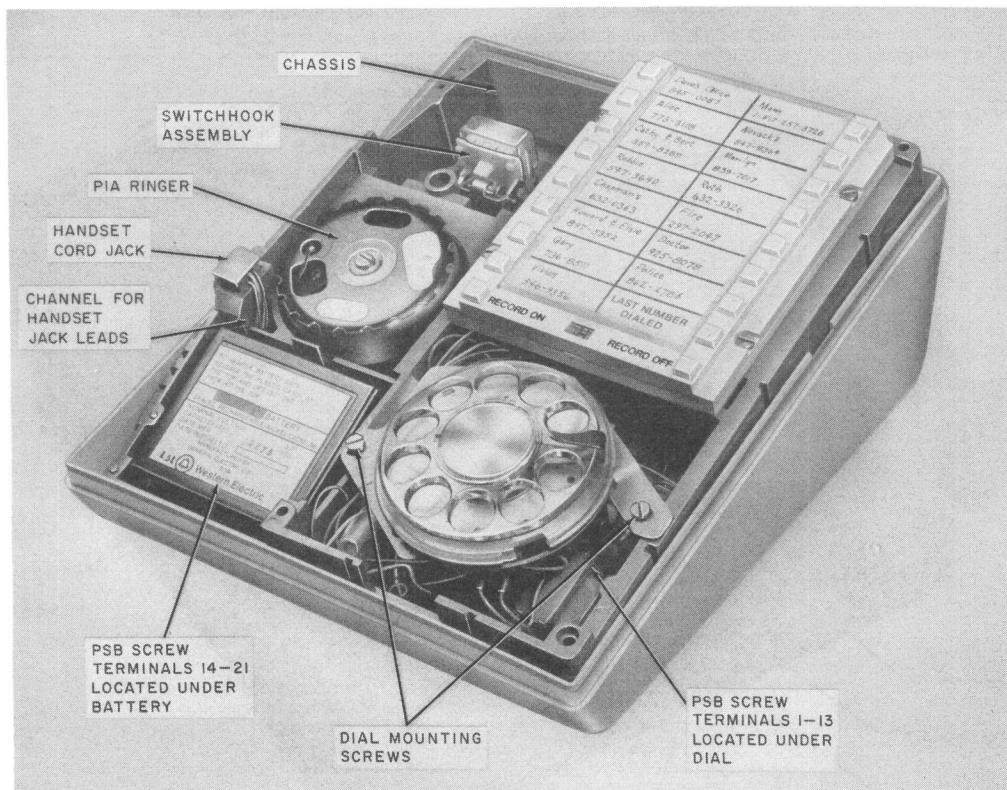


Fig. 5—960A01M (MD) Telephone Set With Handset, Faceplate, Shield, and Upper Housing Removed

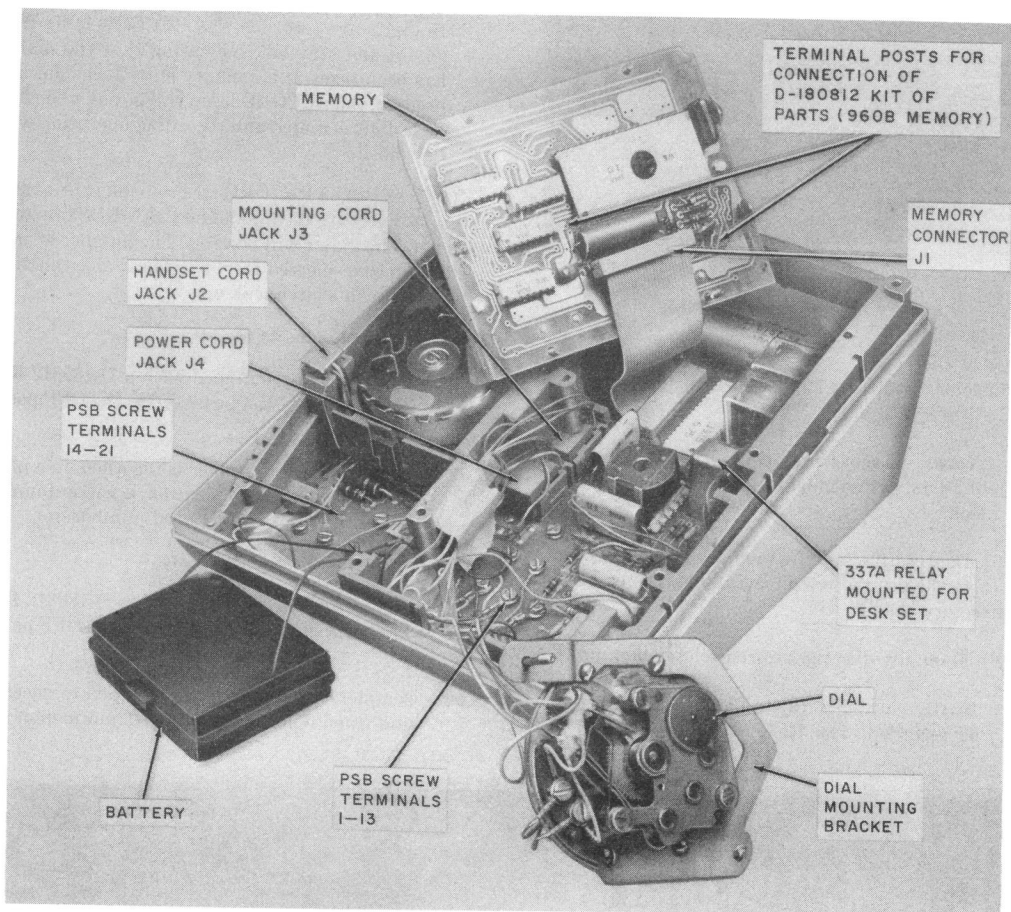
- (2) Gently push back on the battery retainer catch and swing the rear edge of the battery upward to release the battery.
- (3) Carefully lift the battery from its cavity and lay aside.
- (4) To reassemble, reverse the procedure.

**Note:** To reinsert battery, position lower edge first and then push top of battery under retainer catch.

#### 4. CONNECTIONS

- 4.01 Telephone set connections are shown in Fig. 15.
- 4.02 Refer to Table B for connection information for all options.
- 4.03 A partial functional schematic is shown on Fig. 20.

#### 5. OPERATION



**Fig. 6—960A01M Chassis and Lower Housing With Dial, Memory, and Battery Laid Aside, and Shield Removed**

**Note:** If the telephone set is used behind a PBX, etc., where an access code is required, refer to paragraphs 5.06 and 5.07.

**A. Record a Number Into Memory**

**5.01** To record a number into memory, proceed as follows:

(1) Remove the directory sheet (Fig. 1).

(2) Write or type (using light pressure) the desired name and telephone number for a selected memory button on the associated position of the directory sheet.

(3) Replace the directory sheet.

(4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simul-



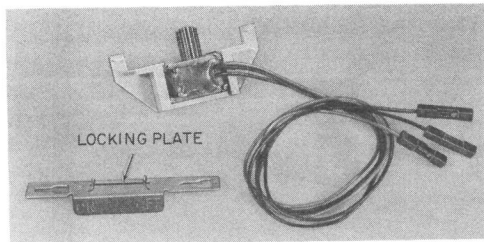


Fig. 7—D-180812 Kit of Parts

taneously by lifting handset before depressing the RECORD button.)

**Note:** If set is equipped with a D-180812 Kit of Parts, switch must be placed in the OFF position.

(5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.

(6) Manually dial the desired telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out

momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button was not depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

(7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer can also be reset by a switchhook operation.

#### B. Change a Number In Memory

**Note:** If set is equipped with a D-180812 Kit of Parts, switch must be placed in the OFF position.

5.02 Whenever a new number is recorded, in a previously used memory position, it will automatically replace the previously stored number.

#### C. Delete a Number From Memory

**Note:** If set is equipped with a D-180812 Kit of Parts, switch must be placed in the OFF position.

5.03 Complete the following operations in succession when deleting a number from memory:

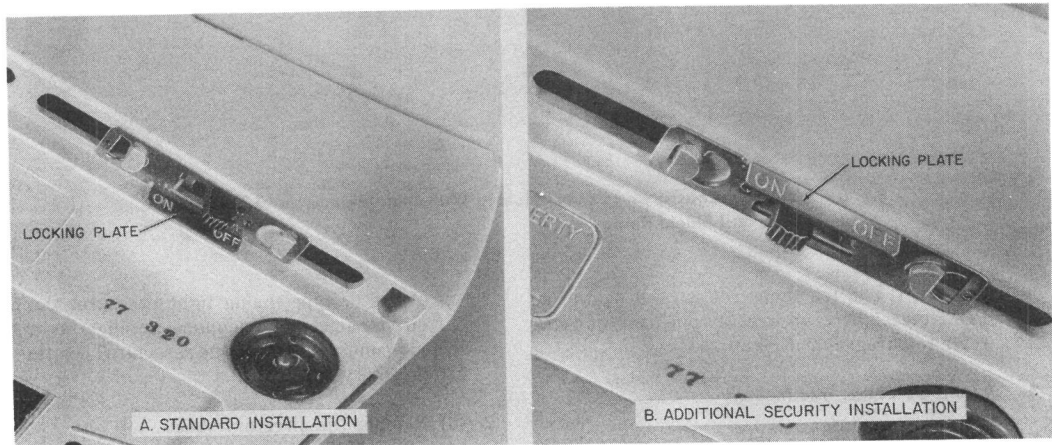
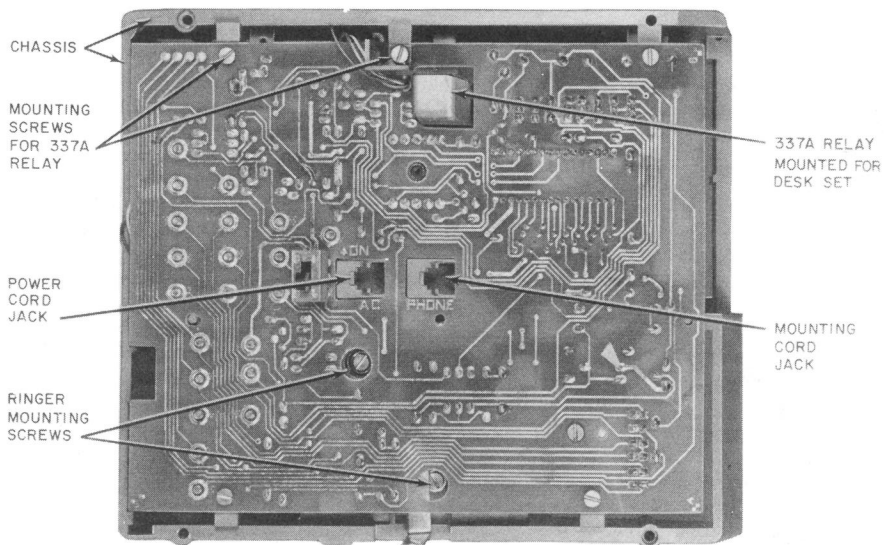
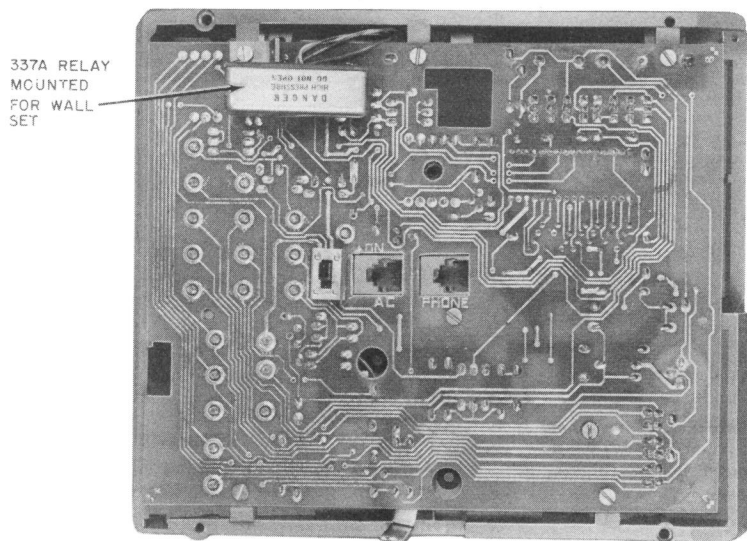


Fig. 8—Optional Methods of Installing Locking Plate of D-180812 Kit of Parts



A. SHOWING 337A RELAY MOUNTED FOR DESK SET SERVICE



B. SHOWING 337A RELAY MOUNTED FOR WALL SET SERVICE

Fig. 9—Bottom View of Power Supply Board (Lower Housing Removed)



**Fig. 10—Ringer Being Installed in 960A01M Chassis With Dial Rotated Onto Memory and Shield Removed**

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

**D. Automatically Dial a Number From Memory**

**5.04** To automatically dial a number from memory, proceed as follows:

- (1) Go off-hook and listen for dial tone.
- (2) Depress the desired memory button.

**E. LAST NUMBER DIALED Feature**

**Note:** If set is equipped with a D-180812 Kit of Parts, and dial intermix feature is provided, switch must be placed in the OFF position.

**5.05** Operation of the LAST NUMBER DIALED feature is as follows:

- (1) Go off-hook.
- (2) Listen for dial tone.
- (3) Manually dial telephone number.
- (4) Hang up to reset dialer for automatic dialing.
- (5) To redial same number automatically, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.

**Note:** Note that the RECORD lamp never comes on during LAST NUMBER DIALED operations.

#### F. Access Code

**5.06** If there is no break in dial tone after the access code, simply record the number prefixed by the access code.

**5.07** When a pause for second dial tone is required following an access code, one of the following procedures is necessary to record and automatically dial from memory.

(a) Use one memory button for access code as follows.

(1) Record the required access code in one memory location.

(2) Record the remaining number in a second memory location.

(3) To automatically dial a number, perform the following.

(a) Go off-hook, listen for dial tone, and depress the memory button for the access code.

(b) Listen for a second dial tone and depress the appropriate memory button or the LAST NUMBER DIALED button for the telephone number.

(b) To save a memory location by not recording the access code, an alternate procedure may be used.

**Note:** LAST NUMBER DIALED feature can not be used with this procedure.

(1) Just record the desired telephone number into memory, do not record the access code.

(2) Go off-hook, listen for dial tone, manually dial the required access code, and depress the RECORD OFF button (not necessary to depress RECORD OFF button with record disable and dial intermix feature). (This will remove set from LAST NUMBER DIALED mode and allow additional automatic dialing.)

(3) Listen for a second dial tone and depress the memory button for the desired telephone number.

#### G. Speakerphone Option

**5.08** Use speakerphone in normal manner except that all dialing must be done with handset off-hook. After dialing, depress the speakerphone ON button and hold it depressed until the handset is placed on-hook.

#### H. Multiline Service (Using 6040/6050-Type Key)

**5.09** Replacing the handset each time a line key is changed assures proper dialer operation. If a number is dialed manually from one line and another line key is depressed to make another outgoing call without hanging up, the RECORD OFF button should be depressed before dialing. This will remove the set from the "last number dialed mode" to allow either automatic dialing or proper recording of a manually dialed number into LAST NUMBER DIALED position.

### 6. MAINTENANCE

**Caution:** *Operation of battery OFF-ON switch to OFF position will result in loss of memory if ac power is not present.*

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 16 hours. If power loss exceeds 16 hours, the numbers may have to be rerecorded.

#### A. Return Procedure

**6.02** Any replaced set (or components) should be returned in the carton of the replacement with a label placed on the outside of the carton stating that contents are defective. When a set is not being replaced by a new one, use a D-180600 Kit of Parts for returning set to repair center.



**Always place battery switch in OFF position when a set is removed from service.**

#### B. Trouble Analysis

**6.03** When trouble is encountered, the subsequent procedure should be followed.

(1) Confirm trouble report either as an automatic dialer (Part 5), or as a basic telephone set.

- (2) Check for improper connections.
- (3) Refer to Table G and paragraphs 6.04 through 6.08.

#### C. Battery

**Warning: Do not short battery terminals.**

**6.04** The KS-20390L5 battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 5 and 6):

- (1) Remove the upper housing (paragraph 3.16).
- (2) Release the battery [paragraph 3.19 (2) and (3)].
- (3) Disconnect the battery leads.
- (4) Remove battery
- (5) Install new battery.
- (6) Reassemble the set



**Before doing Step (7), insure that.**

**(a) The battery switch is in the ON position.**

**(b) The new battery has been connected for a minimum of five minutes.**

**(c) There is a known telephone number recorded in a memory location.**

- (7) Momentarily disconnect the 2012B (MD) or 2012D transformer (for 5 to 10 seconds). After reconnecting the transformer and securing with a 2A clamp, automatically dial a previously recorded known telephone number. This will verify retention of memory by the new battery.

#### D. Memory

**6.05** The memory may be replaced in the following manner.

**Note:** Removal of the memory results in loss of stored telephone numbers.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the faceplate (paragraph 3.15) and place the shield aside.
- (4) Disengage the four captive memory screws (Fig. 4).
- (5) Rotate the right edge of the memory upward.
- (6) Disengage the connector at the memory (Fig. 6) by pulling it perpendicular to the circuit board.
- (7) Replace the memory by engaging the connector. The connector is keyed, one position is filled and should fit over the vacant position in the row of pins. The cable should not be twisted.
- (8) Tighten the four captive screws.
- (9) Replace the shield and faceplate.
- (10) Test per paragraph 3.12.
- (11) Place the old memory in shipping container of the new memory (carton 900314535), affix a defective label and return to the repair location.

#### E. 11E Dial

**6.06** To replace the 11E dial, proceed as follows.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the faceplate (paragraph 3.15) and place the shield aside.
- (4) Remove the upper housing (paragraph 3.16).
- (5) Gently push back on the battery retainer catch and swing the rear edge of the battery upward to release the battery.
- (6) Carefully lift the battery from its cavity and place onto the ringer.
- (7) Disconnect the (W) dial lead from screw terminal 20 on the power supply board.

- (8) Disengage the two captive screws that hold the dial in place.
- (9) Lift the dial out of the way and disconnect the appropriate leads (Fig. 15B).
- (10) Remove dial mounting bracket from the dial (Fig. 6).
- (11) To install a new dial, reverse procedure.
- (12) Test per paragraph 3.12 (7) and (8).

#### F. P1A Ringer

**6.07** To replace the P1A ringer, proceed as follows.

**Note:** A split blade expandable or a magnetic screwdriver will be required to install the new ringer, Steps (13) and (16).

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the lower housing (paragraph 3.17).
- (4) Disengage and remove the two ringer mounting screws which can be accessed through the clearance holes in the power supply board (Fig. 9).
- (5) Temporarily replace the lower housing and place the set on its feet.
- (6) Remove the upper housing (paragraph 3.16).
- (7) Release the dial [paragraph 3.18 (2) and (3)] and place aside (Fig. 10).
- (8) Disconnect the ringer leads (Fig. 15B and Table C) and remove ringer.
- (9) Dress the leads of the new ringer through the ringer adjust arm mounting boss and under the center rail of the chassis. Connect leads to the appropriate terminals.
- (10) As the ringer is lowered into its mounting position, pull any slack in the leads through to the dial side of the center rail (Fig. 10).
- (11) Replace the dial.
- (12) Remove the lower housing. Holding the ringer in position, turn the chassis over to

expose the clearance holes in the power supply board.

- (13) Attach one ringer mounting screw onto the blade of a screwdriver (see preceding note).
- (14) Insert the ringer mounting screw into one location and secure ringer.
- (15) Align the ringer adjust arm over the ringer volume control button (Fig. 10).
- (16) Replace the remaining ringer mounting screw with the **special** screwdriver and tighten ringer into place.
- (17) Replace the housing, shield, faceplate, and handset.
- (18) Dial the appropriate code for ring-back to test the ringer.
- (19) Turn battery switch to ON.
- (20) Reconnect 2012B (MD) or 2012D transformer.

#### G. Handset Jack

**6.08** To replace the 616J handset jack (Fig. 5 and 6), proceed as follows.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the upper housing (paragraph 3.16).
- (4) Release the battery and place aside [paragraph 3.19 (2) and (3)].
- (5) Release the dial [paragraph 3.18 (2) and (3)] and place aside (Fig. 10).
- (6) Disconnect the appropriate leads (Fig. 15B) and remove jack.
- (7) Replace the jack and dress jack leads in channel behind jack (Fig. 5).
- (8) Reassemble set.
- (9) Turn battery switch to ON.
- (10) Reconnect 2012B (MD) or 2012D transformer

- (11) Verify proper handset operation.

## 7. CONVERSION FROM DESK SET TO WALL SET

**7.01** To convert from a desk set to a wall set, proceed as follows.

- (1) Remove the lower housing (paragraph 3.17).
- (2) Remove the screw which holds the 337A relay bracket to the printed wiring board, and also the screw in the printed wiring board located near the upper left hand corner as shown in Fig. 9A.
- (3) Relocate the 337A relay on the printed wiring board (Fig. 9B) and replace the two screws removed in (2).
- (4) Remove the 523B4 plug from its stored position and snap both sides of the plug into rectangular slot in the bottom of the lower housing. Snap plug in from the outside such that the word **TOP** is properly oriented in the housing (Fig. 12). The plug should slide freely in the slot.
- (5) Insert the other end of the 523B4 plug into the jack position designated **PHONE** on the power supply board.
- (6) Insert the power cord up through the cord opening below the plastic retainer tab in the bottom of the lower housing (Fig. 12).
- (7) Connect the power cord to the telephone set per the appropriate option of Fig. 15C.
- (8) Place the lower housing on the chassis according to the instructions on the bottom (Fig. 12), and engage the four captive screws.
- (9) Remove the station number card retainer and station number card from the upper housing.
- (10) Disengage the captive screw from the chassis and lift out the concealed handset hook and screw from the cavity in the upper housing.
- (11) Completely remove the captive screw from one side of the handset hook and insert it into the other side.
- (12) Place the handset hook back into its cavity in the upper housing, engage the screw with the chassis, and fasten the hook down (Fig. 11).

- (13) Replace the station number card and card retainer.

(14) The converted wall set is intended to plug into and secure to a 630A4 connecting block (Fig. 12 and 16B).

**7.02** When connecting set to wall, proceed as follows to prevent damage to 523B4 plug or to receptacle in 630A4 connecting block.

- (1) Begin with slight engagement of plug in receptacle.
- (2) Raise set (with plug slightly engaged) and push toward wall to engage studs in corresponding holes in base of set. (The plug will slide up and down in the base of the set.)
- (3) Pull set downward until firmly seated. (A snap should be felt.)
- (4) Gently tug on the top and then on the bottom of the set. If one of the studs is not engaged, that end of the set will move away from the wall. In that case, push up to remove the set and repeat the procedure.

## 8. CORD DRESSING FOR OPTIONAL SERVICES (ADJUNCTS)

**8.01** Knockouts are provided in the bottom rear of the lower housing (Fig. 13) to accommodate the additional cords associated with the connections of wiring options such as speakerphone, SPOKESMAN loudspeaker service, etc.

- (a) For small cords it is necessary to remove only the vertical portion of the knockouts on the rear of the housing.
- (b) For larger cords and connectors, the remainder of the knockout on the bottom of the housing should be removed.

**8.02** Strain relief for optional cordage may be obtained by using any of the six screws used to fasten the power supply board to the bottom of the chassis (Fig. 14). Proper precautions must be taken so that the stay band and hooks do not short any circuit paths. Insulating tape should be placed around the cord and stay band and also applied to the power supply board under the cord (Fig. 14).

**8.03** A rectangular cutout at the right front edge of the power supply board provides access for



Fig. 11—960A01M (MD) Telephone Set With Handset Hook Reversed for Wall Mounting

dressing individual spade-tipped leads to the appropriate screw terminals on the power supply circuit board (Fig. 14).



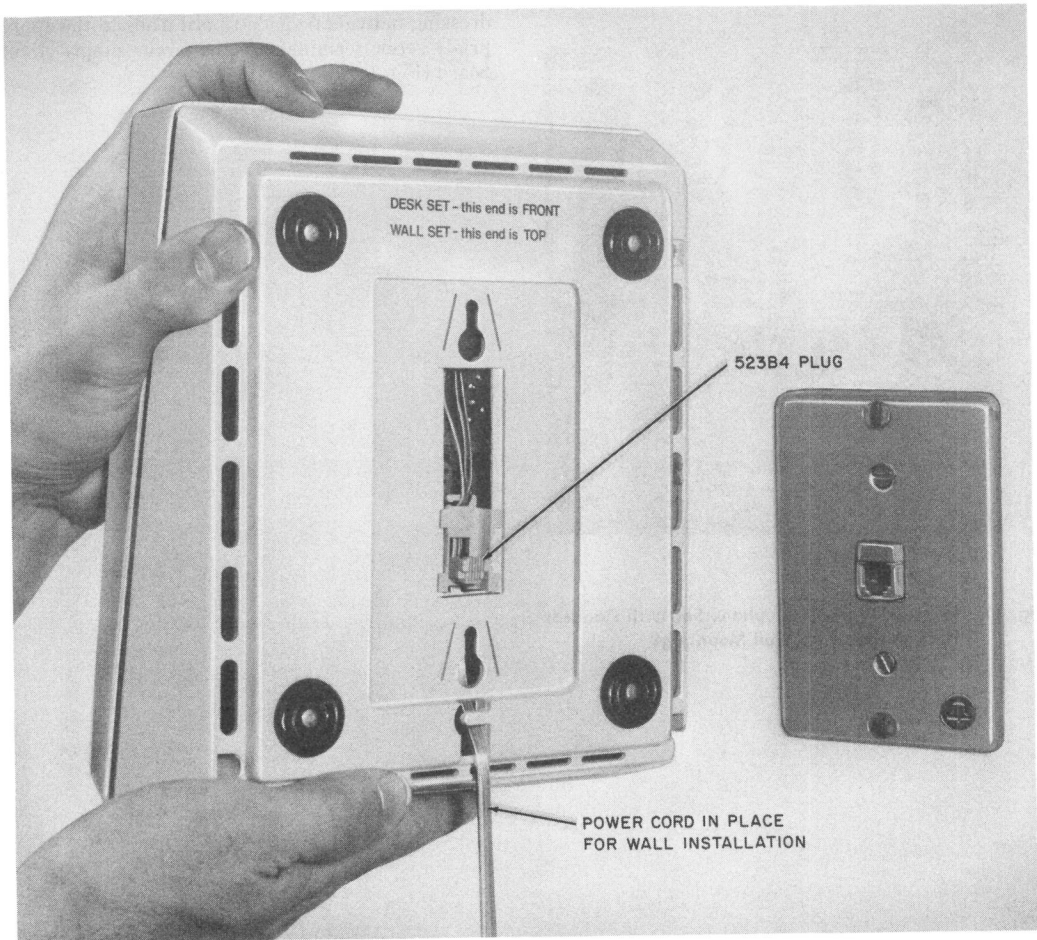
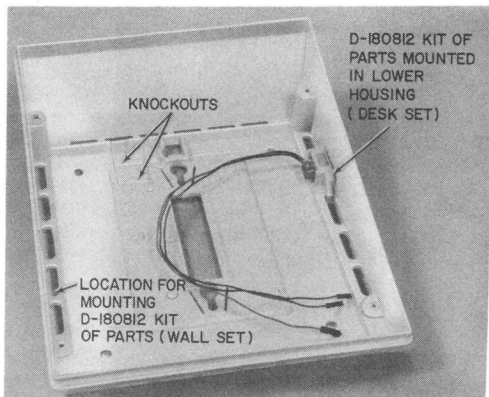


Fig. 12—960A01M (MD) Wall Set and 630A4 Connecting Block



**Fig. 13—Lower Housing Removed Showing Knockouts for Access by Adjunct Cords and Locations for Mounting D-180812 Kit of Parts**

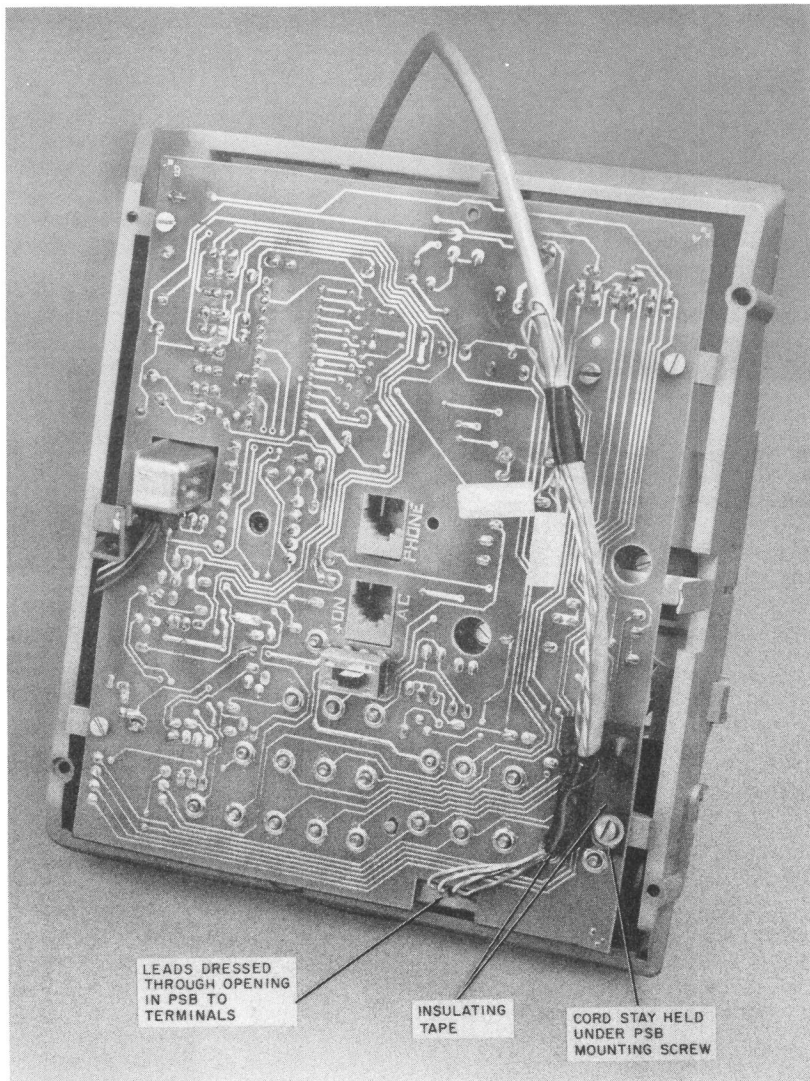


Fig. 14—Bottom of Set With Lower Housing Removed Showing an Adjunct Cord Dressed Across Power Supply Board (PSB)

♦TABLE C♦

CONNECTION — 960A01M (MD) TELEPHONE SET FOR RINGER OR A LEAD CONTROL OPTIONS

OPTION		LEAD		REMOVE FROM PSB TERM.	CONNECT TO PSB TERM.	REMARKS	
		DESIG.	COLOR				
Selective Ringing*	Ring Party	Ringer	BK	7	1	Ringing current from ring to Grd	
	Tip Party	Ringer	BK	7	1	Ringing current from Tip to Grd	
		Spade Tip Lead on PSB	BL	6	7		
Tip Party with Identification Ground	Ringer Leads		BK	7	1	Ringing current from Tip to Grd	
			S§	¶	19		
			S-R	¶	¶		
	Strap		**				
	Spade Tip Leads on PSB		BL	6	10		
		G	¶	19			
A-Lead Control ††	Mtg Cord Jack		Y	1	5	A1	Leads must be dedicated
			BK	¶	9	A	
	Shield		BK	1	5	Sets manufactured prior to Nov. 1979	

\* For 4-party full selective or 8-party semiselective, one of the following must be provided:

- (a) 426N (MD) or 813BH diode. For connections, Refer to Section 501-320-100.
- (b) 11-type extender (MD) or 28A ringer isolator. These may also be used to extend the range of selective ringing and/or provide ringer isolation on all lines using grounded ringers. Refer to Section 501-322-101 for connection information using 11-type extender, or Section 501-375-101 for information on 28A ringer isolator.

† No ringer option available (factory wired bridged ringer only) when A lead control option is used.

‡ Sets manufactured or repaired after October, 1979 have a black (BK) shield lead on terminal 16. Lead should not be removed for A lead control unless severe static electricity is encountered (see **Cautions** preceding paragraph 3.02).

§ Approximately 2600 ohm identification ground only.

¶ Insulated and stored.

\*\* Strap PSB terminal 5 to PSB terminal 7.

**TABLE D  
CONNECTIONS FOR D-180812 KIT OF PARTS**

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG.	COLOR (NOTE1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX (NOTE 2)
LND-LK	BK	*	27-LND-LK
VDD	R	29-VDD	29-VDD
RCD-LK	BK	28-RCD-LK	28-RCD-LK

\*Insulate and store.

- Note 1.* These are single pin connectors attached to the switch leads. There are 2 (BK) leads and 1 (R) lead. The (BK) leads are interchangeable.
- Note 2.* When the option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 16th memory may be used as any other memory.

TABLE E

**CONNECTIONS — 960A01M (MD) TELEPHONE SET WITH  
3B (MD) SPEAKERPHONE SYSTEMS**

APPARATUS	CORD OR WIRE	LEAD		CONNECT		
		DESIG.	COLOR	FROM	TO	
				PSB TERM.	CONTROL UNIT (NOTE 1)	
					55A* (NOTE 2)	55B
960A01M Tel Set	D6AD-87 Cord	R1	BL-W	6	28	10
		T1	W-BL	7	19	1
		LK	G-W	10	11	35
		A1	O-W	5	12	2
		AG	W-G	9	5	11
			W-O	*	*	*
666B Trmtr	T7A Mtg. Cord	M1	S-BK		4	7
		P1	BL-R		13	8
		-15V	BK-S		14	16
		S	O-BK		3	18
		A1	Y-O		29	19
		F1	G-Y		2	17
		LK	BK-O		11	35
760A LSPK	R2FK-87 Mtg. Cord	SP1	R		33†	29†
		SP2	G		34	20
2012B (MD) or 2012D Trnsf	D-Station Wire	AC1			27	27
		AC2			36	36

**Note 1:** Refer to Fig. 17 for block diagram of interface.

**Note 2:** The 55A\* is modified by Western Electric to conform to 55B control unit circuitry.

\* Insulate and store.

† To reduce loudspeaker volume, move SP1 lead to terminal 24 (55A\*) or 30 (55B).

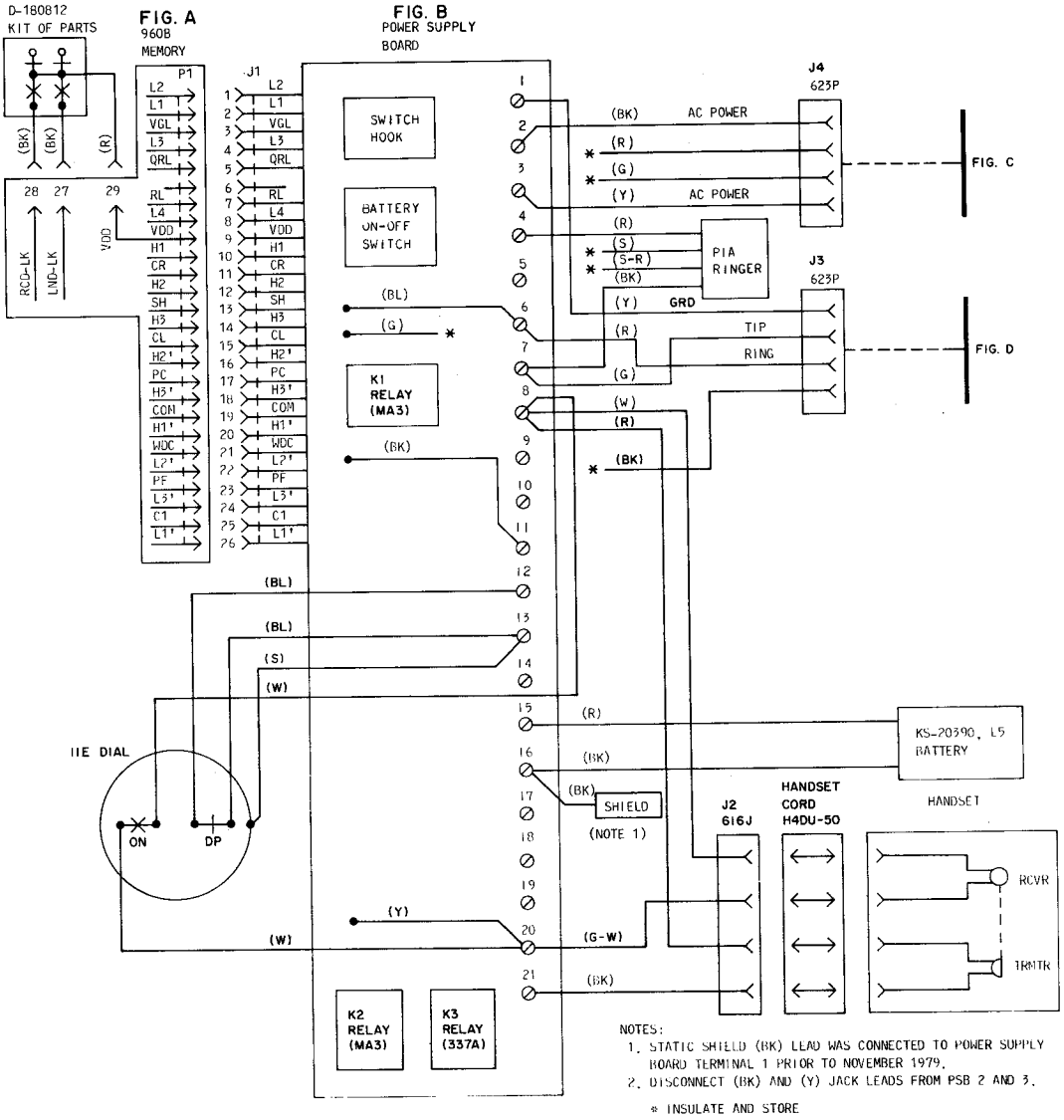
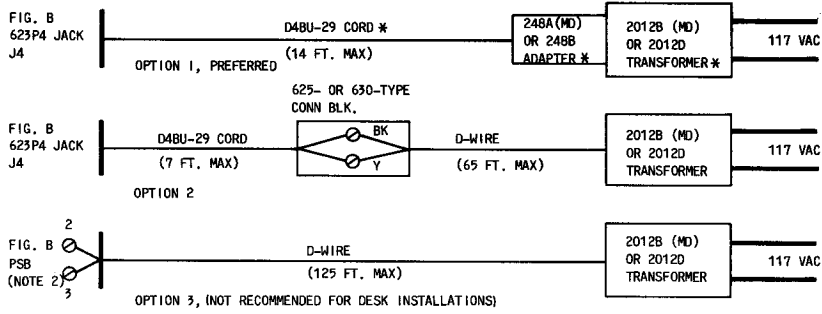


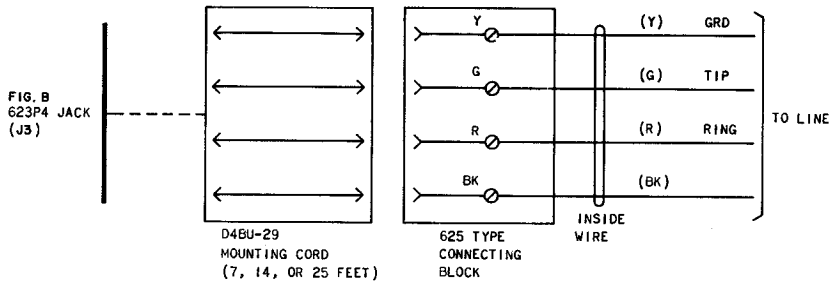
Fig. 15—960A01M (MD) Telephone Set, Connections (Sheet 1 of 2)

**FIG. C**  
POWER CONNECTIONS

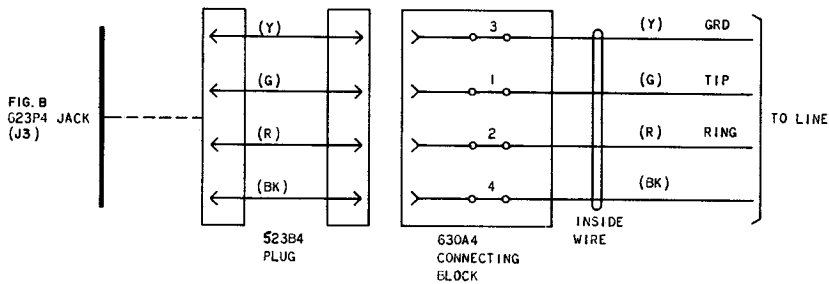


\* - INCLUDED IN D-180894 KIT OF PARTS

**FIG. D**  
LINE CONNECTIONS



FOR DESK SET INSTALLATION



FOR WALL SET INSTALLATION

**Fig. 15—960A01M (MD) Telephone Set, Connections (Sheet 2 of 2)**



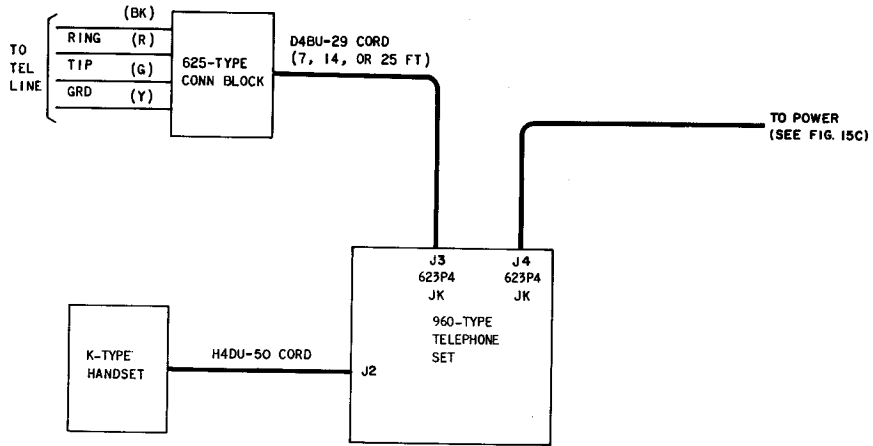
TABLE F

**CONNECTIONS – 960A01M TELEPHONE SET  
WITH 4A SPEAKERPHONE SYSTEM**

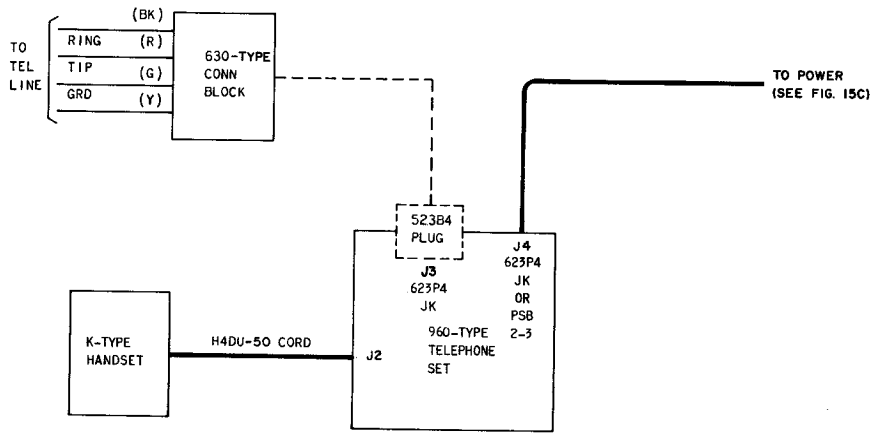
APPARATUS	CORDS (SEE NOTE)	LEAD		CONNECT TO
		DESIG.	COLOR	
960A01M Tel Set	M16H Cord	AC	R-G	*
		AC	G-R	*
		LK	O-W	PSB-10
		Spare	O-R	*
		Spare	R-O	*
		K5M	BR-W	*
		IT	W-G	*
		IR	G-W	*
		T1	W-BL	PSB-7
		R1	BL-W	PSB-6
		K4C	S-W	*
		K5C	W-S	*
		K4B	BL-R	*
		K5B	R-BL	*
		AG	W-O	PSB-9
	A1	W-BR	PSB-5	
680-Type Trmtr	D8S-87 Mtg. Cord			
108-Type LSPK	D20N-87 Mtg. Cord			
85B1 Power Unit	M2FG Cord	AC	BK	3
		AC	Y	4

**Note:** All cords plug into 223D adapter. (See Fig. 18 for block diagram of interface.)

\* Insulate and store



A. DESK SET



B. WALL SET

Fig. 16—Block Diagram—960A01M (MD) Telephone Set, Desk- and Wall-Type

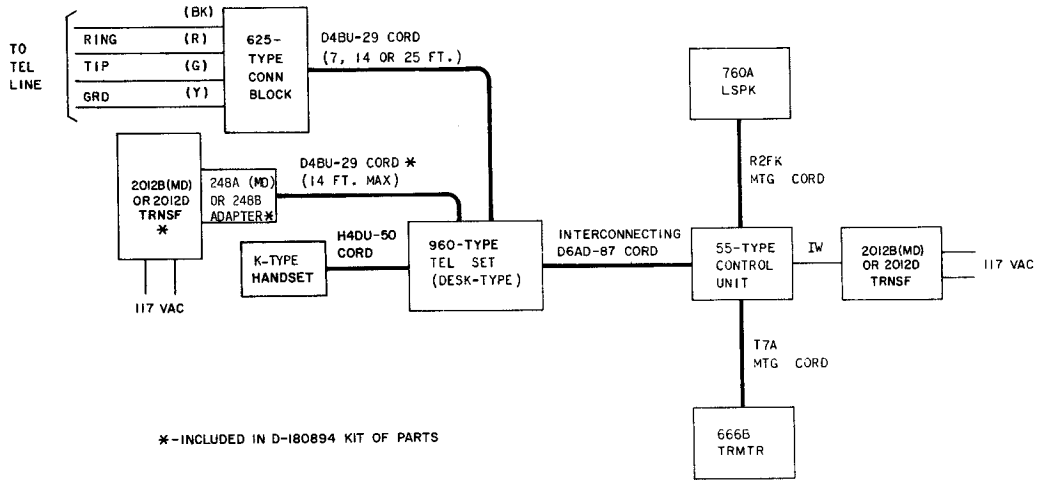


Fig. 17—Block Diagram—960A01M (MD) Telephone Set, With 3B (MD) Speakerphone

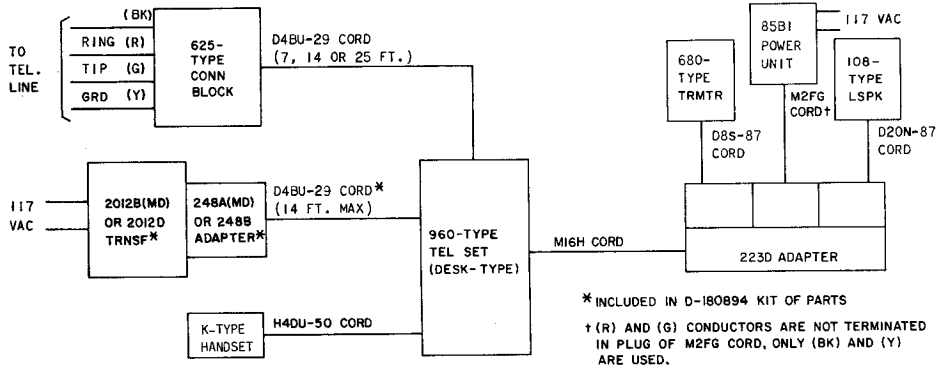


Fig. 18—Block Diagram—960A01M (MD) Telephone Set With 4A Speakerphone

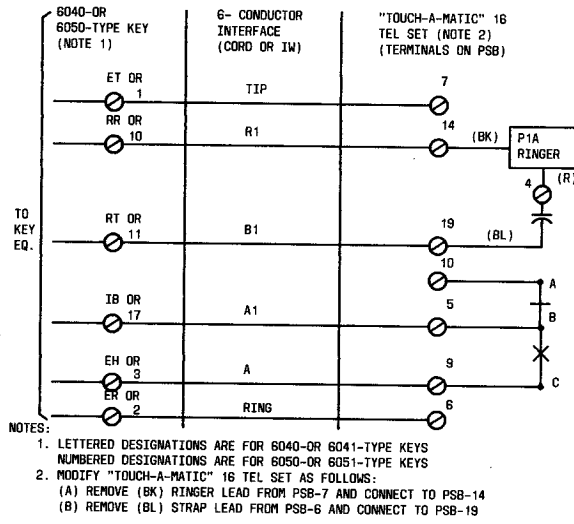


Fig. 19—Connections From Telephone Set to 6040/6050-Type Key

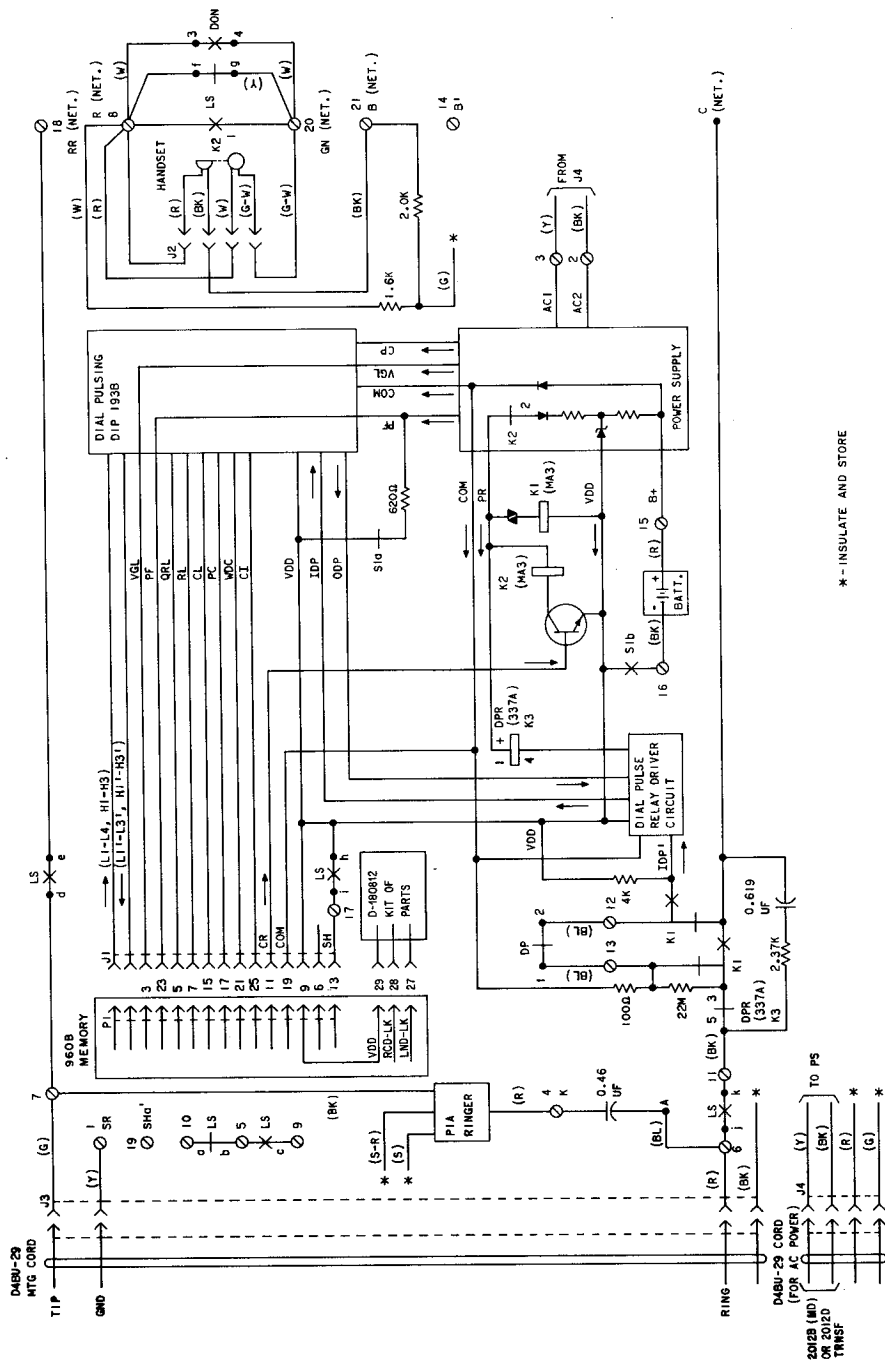


Fig. 20—9960A01M (MD) Telephone Set, Partial Functional Schematic

♦TABLE G♦

## TROUBLE ANALYSIS—960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set	RECORD lamp does not turn on when RECORD button is depressed	Mounting and power cords plugged into wrong jacks	Plug cords into proper jacks
			D4BU-29 mounting cord improperly inserted at set or block	Check cord insertion and jack connections at set and block
			Bad connection between handset and telephone set	1. Check handset cord insertion in handset and telephone set 2. Check handset jack connections in set
			Defective handset	Check and/or replace handset
			Open tip or ring lead	Check leads and connections
			Defective 616J jack	Replace jack
			With strap lead between screw terminals 6 and 11 and/or 7 and 13 on PSB, dial tone is present and set operates	Defective line switch contacts d-e and/or j-k. Unknown
2	Cannot transmit when off-hook		Bad connections	Check handset cord, handset, and handset jack connections
			Defective transmitter	Replace handset
			Unknown	Replace telephone set
3	Cannot receive when off-hook		Bad connections	Check handset cord, handset and handset jack connections
			Defective receiver	Replace handset
			Defective dial off-normal contacts	Repair or replace dial
			Defective line switch f-g contacts	Replace telephone set
			Unknown	Replace telephone set
4	Cannot manually dial when off-hook (dial tone is present)	Dialing clicks heard (in handset) when dial is returning	Bridged set off-hook	Place bridged set on-hook
		No dialing clicks heard when dial is returning. Condition remains unchanged when 2012B or 2012D transformer is disconnected	Improperly installed or defective rotary dial Unknown	1. Check connections 2. Replace rotary dial Replace telephone set
		No dialing clicks heard when dial is returning. With 2012B or 2012D transformer disconnected, set can manually dial	Improperly installed or defective memory	1. Check cable 2. Replace memory
			Defective PSB	Replace telephone set

◆ TABLE G (Contd) ◆

## TROUBLE ANALYSIS—960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			Switch of D-180812 Kit of Parts in On position	Change switch position to OFF
			D4BU-29 power cord improperly inserted	Check cord insertion at set and 248A or 248B adapter
			2012B or 2012D transformer defective or not plugged in	Check or replace 2012B or 2012D transformer. (Should read 13.4 to 18 Vac across screw terminals 2 and 3 on PSB)
			Memory or RECORD OFF button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace memory
		Lamp turns off when any memory button is depressed	Unknown	Replace telephone set
			Improperly installed or defective memory	1. Check connector cable 2. Replace memory
		Lamp does not turn off as dial is returning. Can not manually dial off-hook	Unknown	Replace telephone set
			Improperly connected or defective rotary dial (dial pulsing contacts)	1. Check rotary dial connections 2. Replace rotary dial
		Lamp does not turn off as dial is returning. Can manually dial off-hook	Unknown	Replace telephone set
			Improperly connected or defective Memory	1. Check connector cable 2. Replace Memory
		Lamp turns off as dial is returning and stays off	Unknown	Replace telephone set
			Memory button was not depressed prior to the operation of the dial	Record per paragraph 5.01
			Defective Memory	Replace Memory
6	Cannot record into Memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
			Unknown	Replace telephone set
7	Cannot record properly into the 15 memory positions or into LAST NUMBER DIALED position	RECORD lamp functions properly and set dials manually	Defective Memory	Replace Memory
			Unknown	Replace telephone set
		Party is reached when number is recorded as it is manually dialed; however,	Check recording procedure	Record per paragraph 5.01
			Defective Memory	Replace Memory

♦ TABLE G (Contd) ♦

TROUBLE ANALYSIS—960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (Contd)		when number is subsequently dialed from Memory, party is not reached — wrong number is dialed from Memory	Unknown	Replace telephone set
8	Cannot dial properly from Memory	MA3 relay does not operate (no click heard) when memory button is depressed	Improperly connected or defective Memory	1. Check connector cable 2. Replace Memory
		No digits, random digits or all the same digits in memory location(s).  <i>Note:</i> Memory may or may not have functioned properly at some previous time.	Unknown	Replace telephone set
			AC power outage for 16 hours or longer	Reestablish ac power and rerecord numbers into Memory
			Disconnected or defective battery	1. Check KS-20390L5 battery connections and ON-OFF switch 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 2012B or 2012D transformer from the ac power outlet and reinsert. 3. If previously stored numbers are not dialed from Memory replace the battery 4. Repeat procedure to check new battery
			Defective Memory	Replace Memory
Unknown	Replace telephone set			
9	All memory dialing functions are inoperative	RECORD lamp is on	RECORD ON button stuck down	Clear stuck button
		Can manually dial off-hook with ac power on or off	RECORD OFF button stuck down	Clear stuck button
			Battery switch off	Place switch to ON
			Defective Memory logic	Replace Memory assembly
			Unknown	Replace telephone set
10	Ringer does not operate	Operates with adjust lever in HIGH position	Marginal operation with adjust lever in LOW position	Readjust lever position
			Ringer lower limit stop screw removed	Replace lower limit stop screw in ringer
		Does not operate with lever in HIGH position	Open ringer connections	Check connections and ringer leads
			Defective ringer	Replace ringer



◆ TABLE G (Contd) ◆

## TROUBLE ANALYSIS—960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
11	Noisy line	Hum on line when set is off-hook	Defective power	Replace telephone set
			Unknown	Replace telephone set
12	Reach wrong numbers when dialing from memory locations (Numbers are not the same as were recorded)	Numbers can be rerecorded and dialing from Memory is proper	Improperly connected or defective (BK) lead from shield	Check lead and connection. (Lead must be connected to terminal 16 or GRD) Replace shield
			Improperly connected or defective (Y) lead from mounting cord jack J3	Check lead and connections — (Y) lead must be connected to Grd* Replace jack J3
			Defective D4BU mounting cord	Replace cord
			(Y) lead at connecting block not connected to earth ground	Check connections and insure that (Y) lead is dedicated as earth ground*
13	Electro-Magnetic Interference (EMI) or Radio Frequency Interference (RFI)	Radio station heard in handset	Black shield lead connected to terminal 16	Move black shield lead to terminal 1*
			Inductive coupling in cable	Change cable pair.

\* Yellow (Y) lead does not have to be connected to ground on sets manufactured or repaired after October 1979 except where radio frequency interference or severe static electricity is encountered (**see Cautions** preceding paragraph 3.02).

**2960A01M "TOUCH-A-MATIC" 16 TELEPHONE SET  
IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION,  
AND MAINTENANCE**

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\*Registered Trademark of AT&TCo

**NOTICE**

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

**1. GENERAL**

**1.01** This section contains information on the 2960A01M manufacture discontinued (MD) telephone set. This set is shipped from the factory as a desk set (Fig. 1) and can easily be converted to a wall set with no additional parts required.

**⚡Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communication Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.*

**1.02** The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Show 2960A01M-50 telephone set MD
- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy and may radiate that energy, paragraph 1.01
- Add information on K6C-50 handset
- Add 10A speakerphone information.
- Add 813BH diode (Table C)
- Show 426N diode MD.

**1.03** The 2960A01M ⚡(MD)⚡ telephone set is a single line set and is factory-wired for bridged ringing. It can be wired to provide A lead control for 1A1, 1A2, 6A, or 6B key telephone systems (KTS).

**1.04** The telephone set is available in Ivory (-50) only. For color selection of available faceplate, refer to Table A.

**2. IDENTIFICATION**

**2.01** The 2960A01M ⚡(MD)⚡ telephone set provides the standard features of a single line set plus manual TOUCH-TONE\* dialing, automatic dialing of 15 frequently called or important numbers, and a LAST NUMBER DIALED scratch pad memory.

**A. Design Features**

**2.02** The following are design features:

- Modular telephone set
- Integrated circuit memory and dial
- Surge protector
- Polarity guard
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 15 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Battery for memory retention in event of ac power outage
- Battery OFF-ON switch
- Supplementary directory
- Directory Privacy (hidden directory)
- Convertability from a desk set to a wall set
- End-to-end signaling.

**B. Optional Features**

**2.03** The following are optional features (Table B):

- (a) Selective ringing
- (b) Tip party with identification ground
- (c) 4-party full selective or 8-party semiselective ringing using an 11-type extender, 426N diode, or 28A ringer isolator as a coupling device

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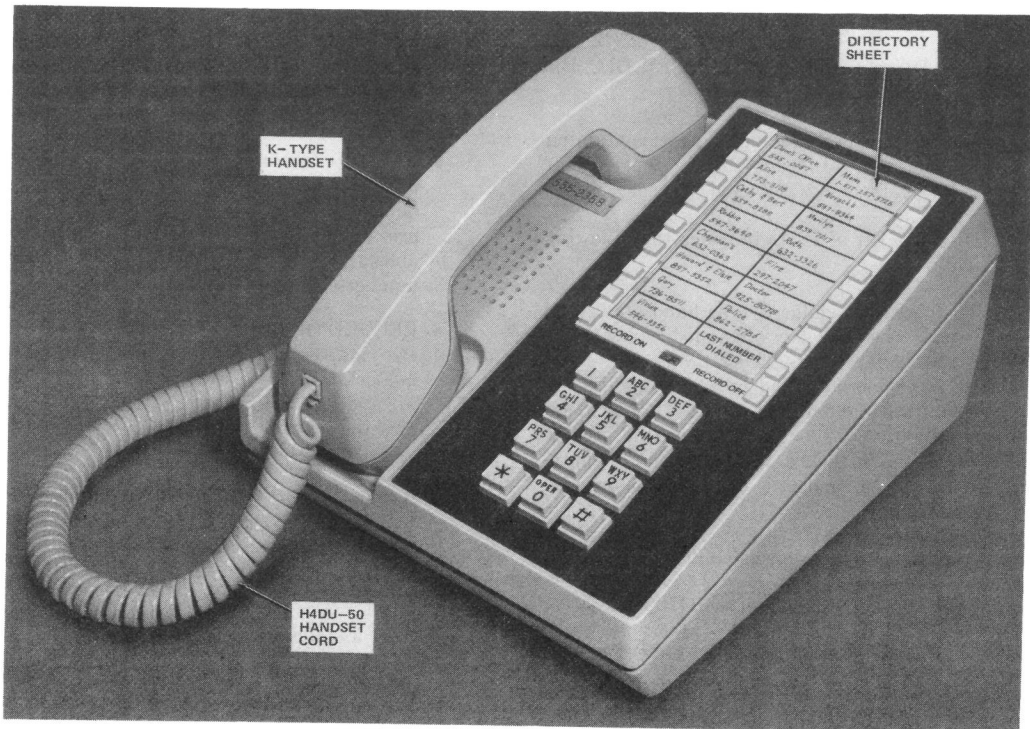


Fig. 1—2960A01M (MD) Telephone Set

- (d) A lead control for 1A1, 1A2, 6A, or 6B key telephone systems
- (e) Either 3-type (MD), 4A, or 10A speakerphone may be interfaced with the telephone set.

**Note:** For use with a speakerphone, all dialing must be performed with the handset off-hook (paragraph 5.09). Speakerphone and tip party identification options cannot be provided at the same time.

- (f) Multiline service using adjunct key

**Note:** Replacing the handset each time a line is changed assures proper dialer operation (paragraph 5.10).

- (g) 107-type loudspeaker set (SPOKESMAN\* loudspeaker unit) may be interfaced with the telephone set (see Section 463-221-100)

- (h) D-180812 Kit of Parts provides the following features:

- (1) Record Disable (only): turns off the recording feature to prevent accidental erasures of previously stored numbers.
- (2) Record Disable and Dial Intermix: same as record disable feature plus the following:

- (a) Allow digits dialed from manual dial and from memory to be intermixed without

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having to depress the RECORD OFF button (see paragraph 5.06).

- (b) Disables the LAST NUMBER DIALED feature.
- (i) K6C-50 (impaired hearing) handset containing a volume control is available for replacement of K1C-50 (MD) or K2C-50 handset
- (j) D-180851 Kit of Parts provides the following features:
  - (l) Standard modular G-type handsets can be used with desk sets when modified with the D-180851 Kit of Parts. This kit consists of ivory colored transmitter and receiver caps used to replace the standard caps in the G-type handset. Modified G-type handsets can be used to provide the following features when the appropriate K-type handset is not available or is incompatible:
    - (a) Amplified receiver (G6BM)
    - (b) Amplified transmitter (G7BM)
    - (c) Noisy location (G8BM)
    - (d) Acoustic or inductive coupling to customer-provided equipment (G15A).

**2.04** All options are implemented by the following:

- (a) Wiring changes in the telephone set
- (b) Installation of appropriate additional items.

#### C. Operating Features

**2.05** The following are operating features:

- Dial (TOUCH-TONE\* telephone dial), 35AT3A
- 16-button memory field of low force, low travel nonlocking buttons arranged in two columns; one along the left-hand edge of the memory and the second along the right-hand edge. Each column has eight memory buttons plus a ninth button (bottom button) for the record function

\*Trademark of AT&TCo.

- LAST NUMBER DIALED button (the next to the bottom button in the right-hand column of nine buttons) when momentarily depressed, with the handset off-hook, initiates automatic redialing of the last number manually dialed
- RECORD button (the bottom button in the left-hand column of nine buttons) is nonlocking and when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers manually dialed
- RECORD OFF button (the bottom button in the right-hand column of nine buttons) is nonlocking and when momentarily depressed, extinguishes the RECORD lamp indicating that the dialer is switched out of the record mode.
- Battery OFF-ON switch (located on the bottom of the set, Fig. 2), should be in the OFF position when set is not in service.

#### D. Ordering Guide

**2.06** Order as follows:

- (a) The 2960A01M telephone set is a modular type set and may be ordered as follows:
  - (1) Set, Telephone, 2960A01M-50 which includes:
    - (a) Adapter, 248B
    - (b) Plug, 523B4, (used when converting from a desk set to a wall set) Fig. 12
    - (c) Cord, Handset, H4DU-50
    - (d) All components listed in (c) Replaceable Components, except faceplates and D4BU-29 cords.
- (b) Order the following separately:
  - D-180894 Kit of Parts is required to provide ac powers for operation of the automatic dialer. The kit contains a 2012D transformer, 248B-49 adapter, D4BU-29 (14-foot) line cord, and instruction sheet (840364194).

**Note:** A 2012A (MD) or 2012C transformer shall not be substituted for a 2012B (MD) or

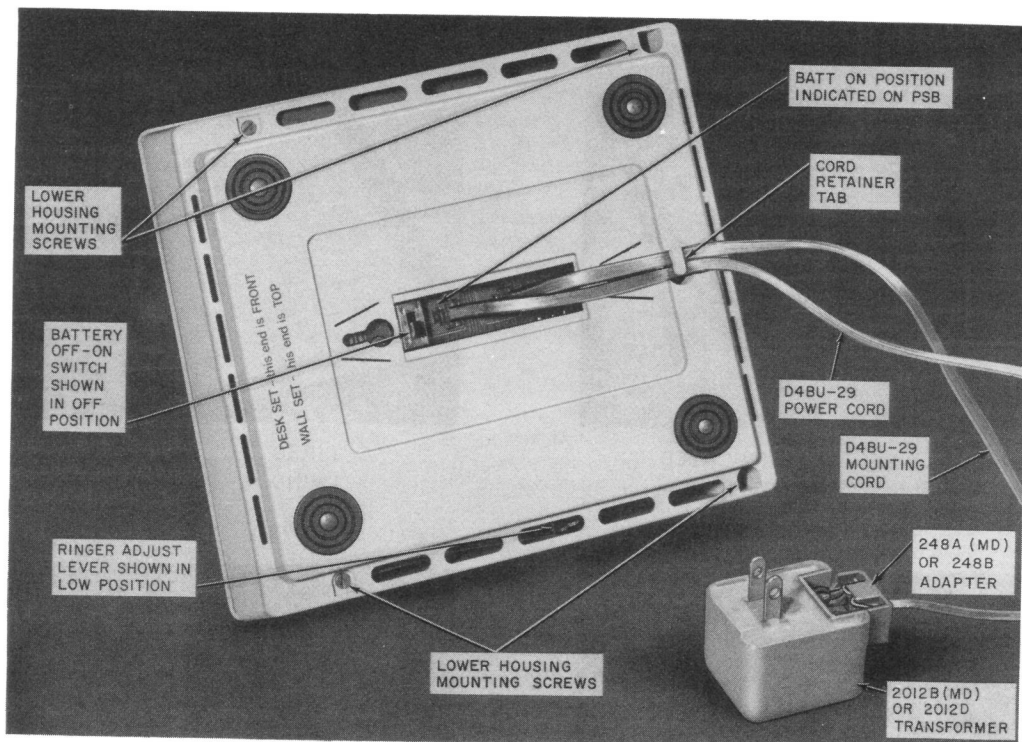
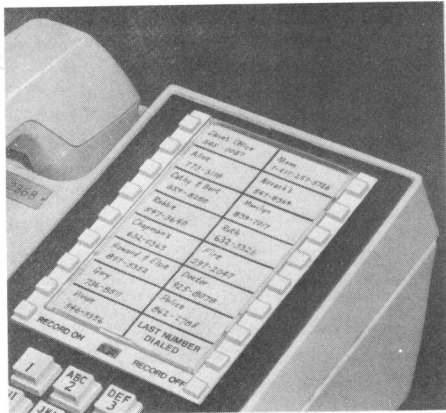


Fig. 2—2960A01M (MD) Telephone Set, Bottom View

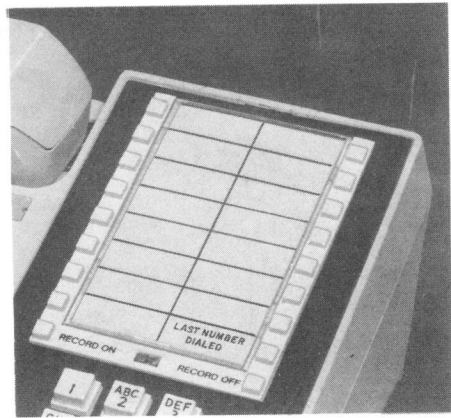
2012D, as set will not operate properly on the lower voltage.

- Clamp, 2A [used to secure 2012B (MD) or 2012D transformer to outlet].
  - Faceplate, 260A- (refer to Table A for color suffix).
  - Cord, Mounting, D4BU-29.
  - Cord, Mounting, D4BU-29 (line cord, maximum 14 feet).
  - Cord Clips, B (for dressing cords as needed).
- (c) Replaceable components may be ordered separately as follows:
- Lower Housing Assembly, 60AL-50

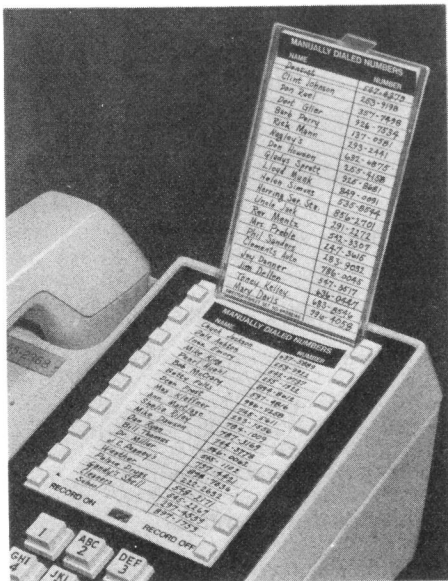
- Upper Housing Assembly, 60AU-50
- Faceplate, 260A- (refer to Table A for color suffix)
- Handset, K2C-50 or K1C-50 (MD)
- Cord, Handset, H4DU-50
- Cord, Mounting, D4BU-29
- Cord, Mounting, D4BU-29 (line cord, maximum 14 feet)
- Jack, Handset, 616J
- Battery, KS-20390L5
- Ringer, P1A



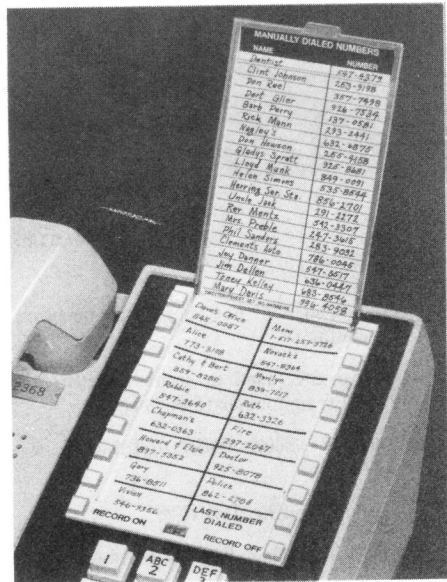
A. DIRECTORY DISPLAYED (WINDOW CLOSED)



C. DIRECTORY PRIVACY (WINDOW CLOSED)



B. DIRECTORY DISPLAYED (WINDOW OPEN)



D. DIRECTORY PRIVACY (WINDOW OPEN)

Fig. 3—Optional Methods of Installing Directory Cards

TABLE A

## FACEPLATE ORDERING GUIDE (See Note)

CODE	COLOR
260A-100	Avocado
260A-108	Teak
260A-109	Walnut
260A-111	Gold
260A-112	Orange
260A-113	Brown
260A-114	Red
260A-115	Blue
260A-118	Black

**Note:** A display package containing all 9 color faceplates can be ordered as a D-180666 Kit of Parts. This package is intended for use as an aid to permit selection of color on customers premises. Cardboard insert shipped with set is discarded at time of installation.

- Dial, 35AT3A
- Memory, 960-type (includes button field)
- 841382245 Cover Assembly
- 841382146 Directory Sheet Set (includes four directory sheets and one sheet of color dots)
- 812558039 (P-25E803) Station Number Card Retainer
- 841381098 Handset Hook

**Caution:** A 2012A (MD) or 2012C transformer shall not be substituted for a 2012B (MD) or 2012D, as set will not operate properly on the lower voltage.

- Transformer, 2012D
- 841417165 Shield and Lead Assembly (Fig. 4)

- Subscriber Instruction Booklet (SIB 2480C).

(d) See Table B for apparatus required.

### 3. INSTALLATION

**Danger 1:** For safety, securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install 2012B (MD) or 2012D transformer. The transformer and any other cord plugged into the ac outlet should always be unplugged completely from outlet BEFORE attempting to attach or remove the clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the transformer when partially withdrawn from outlet. Do not use retaining clamp on outlets where cover mounting screw holds the duplex outlet in the box.

**Danger 2:** Care should be taken to trim and dress leads connecting to low voltage output terminals of 2012B (MD) or 2012D transformer to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one transformer is plugged into a multiple receptacle power strip, there must be at least one inch separation between transformers. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the transformer to be in close proximity to the ac line source is not recommended.

**Warning:** Do not turn on the battery switch or plug in the 2012B (MD) or 2012D transformer until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuits, etc. when the set is opened.

3.01 Terminate the local loop into a jack or connecting block suitable for the D4BU-29 mounting cord. If this is to be a wall set installation, terminate loop into a 630A4 connecting block and refer to Part 7 of this section for conversion of set.



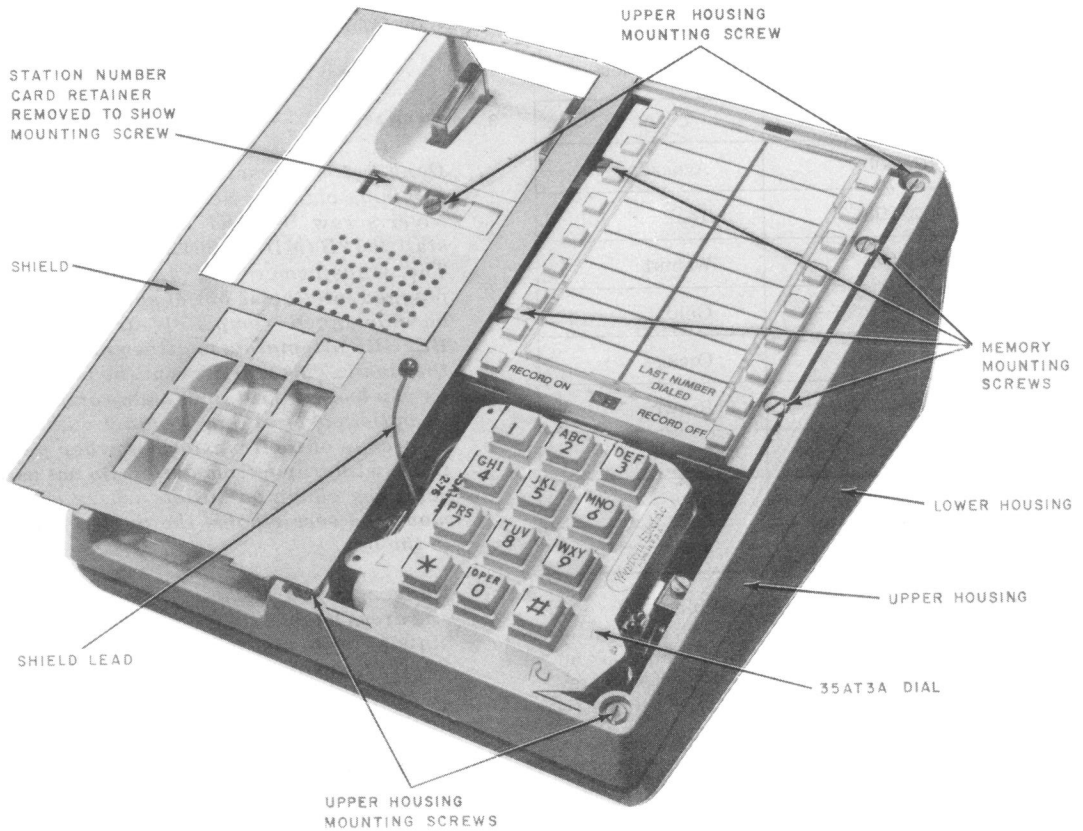


Fig. 4—2960A01M (MD) Telephone Set With Handset and Faceplate Removed and Shield Laid Aside

For standard desk set installation, terminate loop into 625-type connecting block.

**Note:** For information on modular connecting blocks or adapters, refer to Section 503-100-100.

**Caution 1:** On sets manufactured or repaired prior to November 1979, to protect the circuit from static discharge, the black (BK) shield lead was factory wired to the yellow (Y) lead of the mounting cord jack. Upon installation of the set the yellow (Y) lead was connected to earth

ground through a 625 or 630-type connecting block. This placed the black (BK) shield lead at earth ground potential.

**Caution 2:** During wiring options, care had to be taken that the black (BK) shield lead remained connected to earth ground. Sets manufactured or repaired after October 1979 will have the black (BK) shield lead connected to terminal 16 on the power supply board. This is the dialer common terminal. This wiring change will provide a discharge path for static electricity buildup.

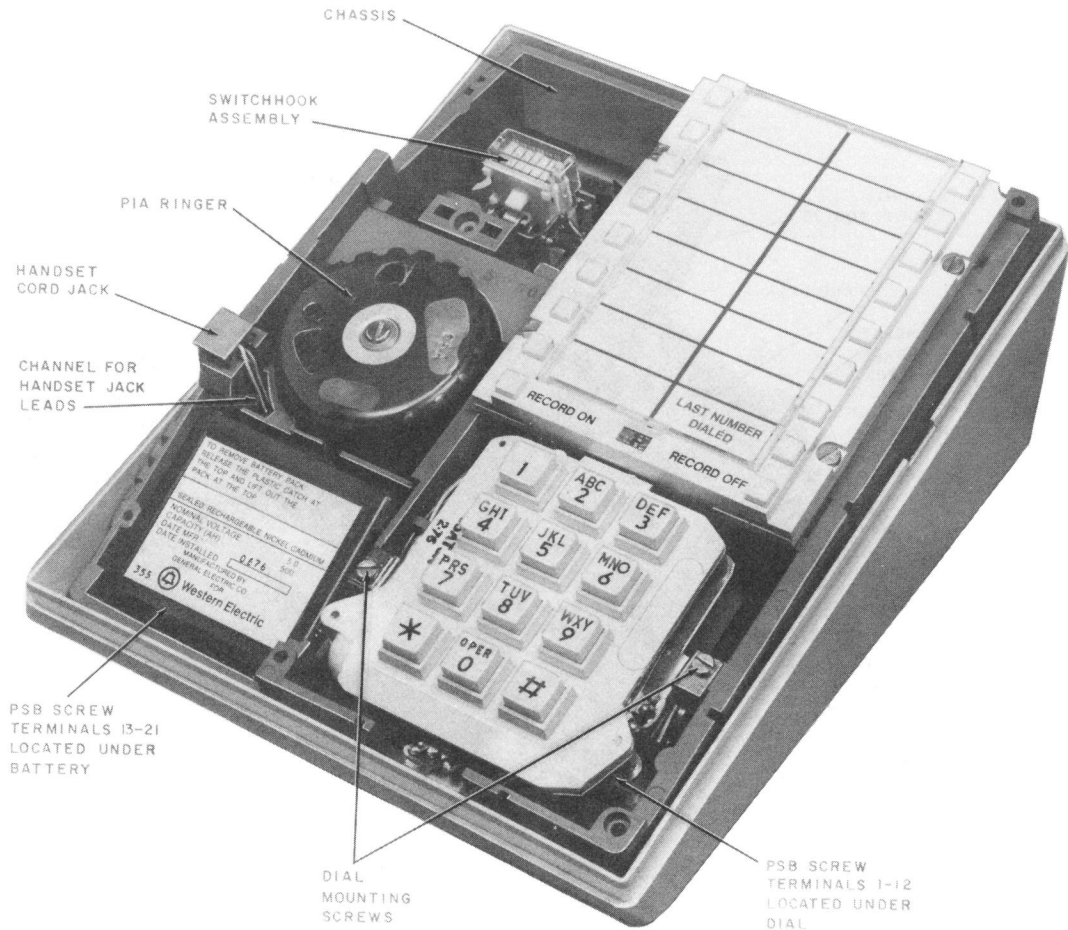
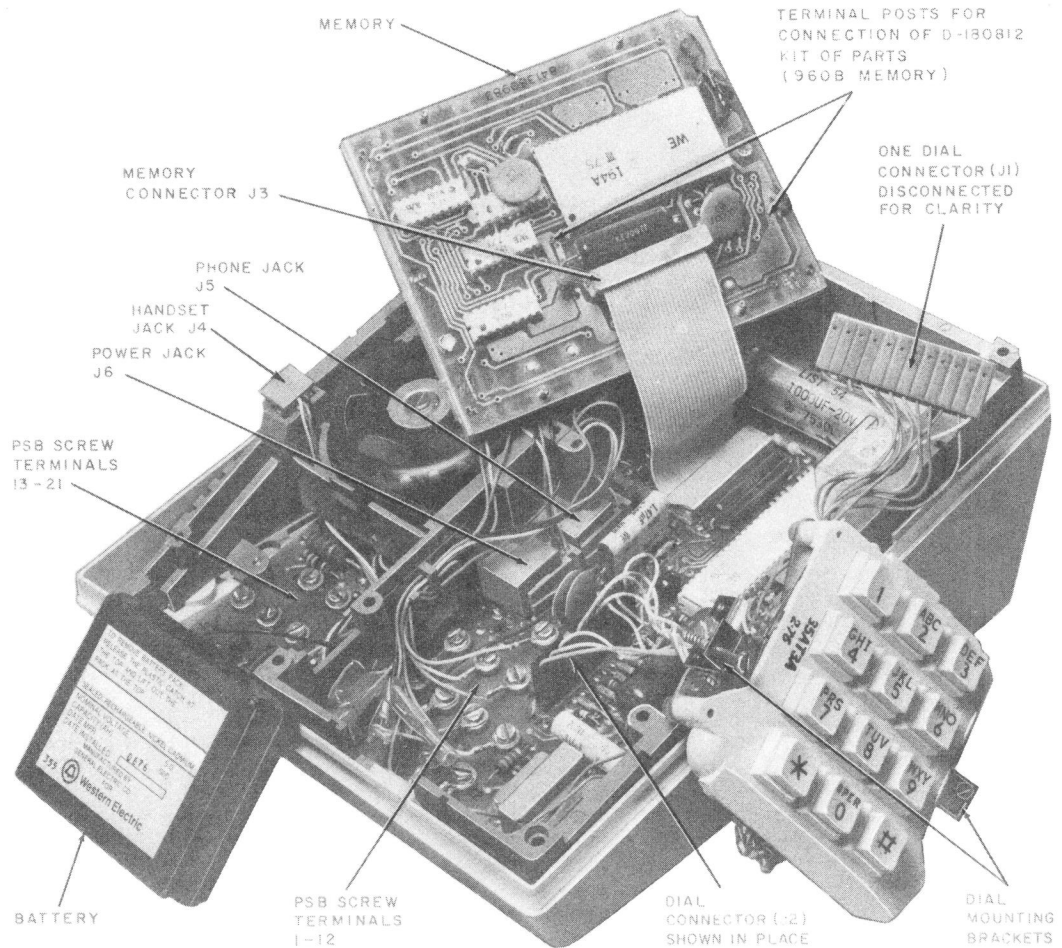


Fig. 5—2960A01M (MD) Telephone Set With Handset, Faceplate, Shield, and Upper Housing Removed

**Caution 3:** In severe cases where radio frequency interference or memory scrambling due to static electricity is encountered the black (BK) static shield lead on terminal 16 can be reconnected to the yellow (Y) ground lead on terminal 1. This yellow (Y) lead should then be connected to an appropriate ground termination.

- 3.02 Lay shield aside and make all wiring changes and telephone set modifications (Table B) before external connections are made to the set (paragraph 4.01). Remove upper housing (paragraph 3.16), if necessary, for set modification.
- 3.03 Replace upper housing and install faceplate of subscriber's choice, (see note, Table A).
- 3.04 Attach 248A (MD) or 248B adapter to 2012B



**Fig. 6—2960A01M Chassis and Lower Housing With Dial, Memory, and Battery Laid Aside and Shield Removed**

(MD) or 2012D transformer (Fig. 2) and plug into 110-117 volt ac outlet not controlled by a switch (continuous ac power is required). Plug one end of the D4BU-29 line cord (maximum 14 feet) into the power jack on the bottom of the set (Fig. 15D) and the other end into the 248A or B adapter attached to the transformer.

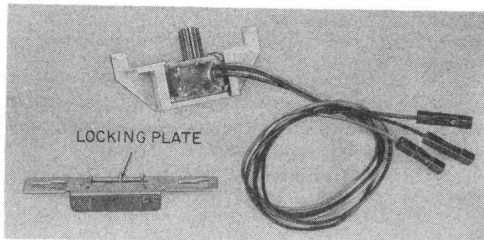
**Note:** The 2012B or 2012D transformer must be located no closer than 1-1/2 feet from the telephone set in order to avoid a potential noise condition.

**Caution 1:** The ac power to the 2960A01M telephone set shall not be provided over the BK and Y conductors

*of the modular mounting cord used for connecting to the line since these leads may be grounded for some applications and neither ac power lead may be connected to earth ground.*

**Caution 2:** *The transformer should not be used for furnishing power to anything other than this set.*

**3.05** The transformer may also be placed at a remote location with D-station or inside wire used for all or part of the connection. (See Fig. 15D for the wiring options and the maximum conductor lengths.)



**Fig. 7—D-180812 Kit of Parts**

**3.06** The set is shipped from the factory with the battery switch in the OFF position. After all wiring changes and modifications have been completed, tilt the set up and move the battery switch arm (visible in the bottom view of the set, Fig. 2) to the ON position.

**Note:** The switch ON position is indicated on the bottom of the printed wiring board, (Fig. 2) and if switch is not placed in ON position the set will not record or automatically dial.

**Warning:** *Stapling of the D4BU-29 cord can break the conductor. Use a B-cord clip for dressing.*

**3.07** For desk installation, connect mounting cord to phone jack on bottom of set and plug into 625-type connecting block. (For wall installation, refer to Part 7.)

**Note:** Dress all cords under retainer tab at bottom rear of housing, Fig. 2.

**3.08** The side of the card labeled LAST NUMBER DIALED is installed by sliding the card between the underneath side of the cover (window) and the card retainer strip as shown in Fig. 3A.

**3.09** A second card with supplementary directory card side up is placed under the retainer tabs and positioned on the top surface of the memory frame as shown in Fig. 3B.

**3.10** When the subscriber does not want the directory prominently displayed, the directory privacy option is used as follows.

(a) A blank directory card with the side labeled LAST NUMBER DIALED up, is installed per paragraph 3.08 (Fig. 3C).

(b) The actual directory card, with the side labeled LAST NUMBER DIALED up, is placed under the retainer tabs and positioned on the top surface of the memory frame (Fig. 3D).

**3.11** The station number card retainer 812558039 (P-25E803) snaps into the upper housing just below the well for the handset receiver.

#### INSTALLATION CHECK PROCEDURE

**3.12** Check the telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Trouble Analysis, Table G.

(1) Disconnect the 2012B (MD) or 2012D transformer from ac power and manually dial the appropriate code for ring-back to test the ringer and to check that the basic telephone operates properly in the absence of commercial power.

(2) Reconnect the 2012B (MD) or 2012D transformer to ac outlet.

(3) With the handset on-hook, record digits 1 through 0 into all memory locations except LAST NUMBER DIALED and the button immediately above it [paragraphs 5.01 (4) through (7)].

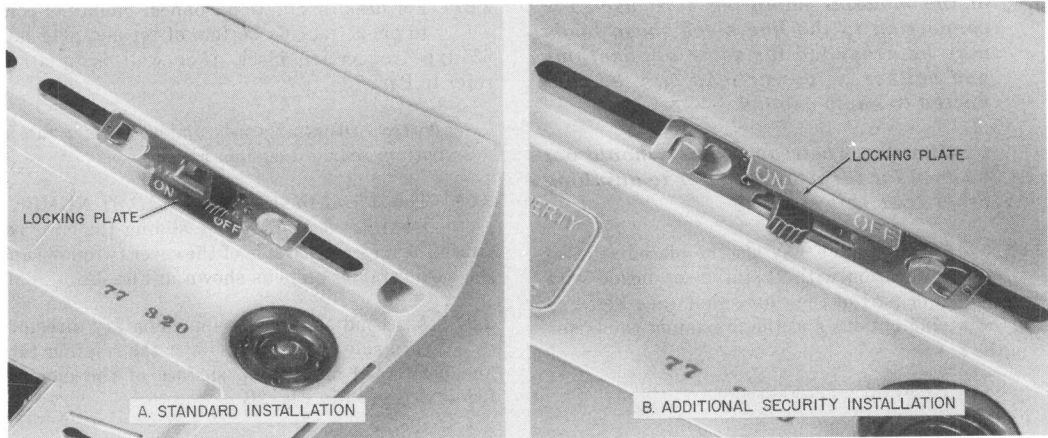


Fig. 8—Optional Methods of Installing Locking Plate of D-180812 Kit of Parts

(4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [paragraphs 5.01 (4) through (7)]. After depressing RECORD OFF button and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.

(5) Momentarily hang up handset and automatically dial the test circuit number recorded in Step (4) by depressing the button immediately above LAST NUMBER DIALED button and proceed as follows.

- (a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into the test circuit. Verify that the correct signal is returned from the test circuit.
- (b) Depress buttons of the memory locations recorded in Step (3) and verify that the correct signal is returned from the test circuit each time.



**The KS-20390L5 battery switch must be in the ON position and the 2012B (MD) or 2012D transformer must be connected a minimum of five minutes before doing Step (c).**

- (c) Momentarily disconnect from the 2012B (MD) or 2012D transformer (for 5 to 10 sec-

onds). After reconnecting transformer and securing with a 2A clamp, depress the memory button immediately above the LAST NUMBER DIALED button which accesses the dial test and ringer circuit. When test circuit is ready, depress any other memory button and verify that correct signal is returned from test circuit. This verifies memory retention with commercial power disconnected.

#### OPTIONAL APPARATUS INSTALLATION

##### D-180812 Kit of Parts (Record Disable and Dial Intermix)

**3.13** Install the D-180812 Kit of Parts (Fig. 7) as follows.

- (1) Remove lower housing (paragraph 3.17).
- (2) Position the switch assembly as shown by Fig. 13.
- (3) Secure the switch assembly with the locking plate as shown by Fig. 8A and 8B.

(a) For *desk set* installations, the locking plate may be oriented either way according to customer preference. With locking plate flange on the outside, (Fig. 8B), it provides a more secure installation in regards to accidental operation of switch.

- (b) For **wall set** installations, the switch assembly should be located as shown by Fig. 13. Locate locking plate per Fig. 8A so switch is accessible.
- (4) Insert the three leads from the switch assembly between the circuit board and the chassis under the memory.
- (5) Replace the lower housing and place the set upright.
- (6) Remove faceplate (paragraph 3.15).
- (7) Disengage the four captive memory mounting screws (Fig. 4).
- (8) Rotate the right edge of the memory upward (Fig. 6) and connect the three leads to the terminal posts on the 960B Memory per Table D.

**Note:** If set is equipped with a 960A Memory, replace it with a 960B Memory and carefully pack and return the old memory according to local procedures.

- (9) With feature switch in OFF position, verify that set operates in normal manner.
- Numbers can be recorded into memory
  - Numbers can be changed in memory
  - Numbers can be deleted from memory
  - Manually dialed numbers are automatically entered into LAST NUMBER DIALED position.
- (10) Set switch to ON position and verify feature provided.
- (a) For record disable feature only, proceed as follows:
- (1) RECORD lamp will not light when RECORD button is depressed.
  - (2) No telephone numbers can be recorded, changed, or deleted from memory.
  - (3) LAST NUMBER DIALED feature is operative.
- (b) For record disable and dial intermix features, proceed as follows:

- (1) RECORD lamp will not light when RECORD button is depressed.
  - (2) No telephone numbers can be recorded, changed, or deleted from memory.
  - (3) LAST NUMBER DIALED feature is disabled.
  - (4) Manually and automatically dialed digits may be intermixed (paragraph 5.06).
- (11) Reassemble set.



**For complete memory security, the switch assembly may be installed through the housing from below, with the switch inside the housing. This type installation would make it necessary to remove the lower housing to make any changes in memory, or features provided, and is not recommended.**

## COMPONENT LOCATION AND ACCESS INFORMATION

### A. Location of Components

3.14 The components are located as follows.

- **Faceplate** is held in place by three tabs which align with mating slots in the upper housing cutout and is positioned over the dial and memory assembly with appropriate holes that align with the dial buttons and memory assembly (Fig. 1).
- **Shield** is underneath faceplate and is positioned over the dial and memory (Fig. 4).
- **Battery** snaps into a cavity on the top side and left front corner of the chassis (Fig. 5).
- **Battery Switch** is soldered to power supply printed wiring board with switch arm accessible at bottom of set through opening near center of lower housing (Fig. 2).
- **Ringer** is fastened by two screws to bosses on the bottom of the chassis (Fig. 9) and rests in a cavity just to the rear of the battery cavity (Fig. 5).
- **Handset Jack** slides into a cavity on the top left side wall of the chassis adjacent to the ringer and battery (Fig. 5).

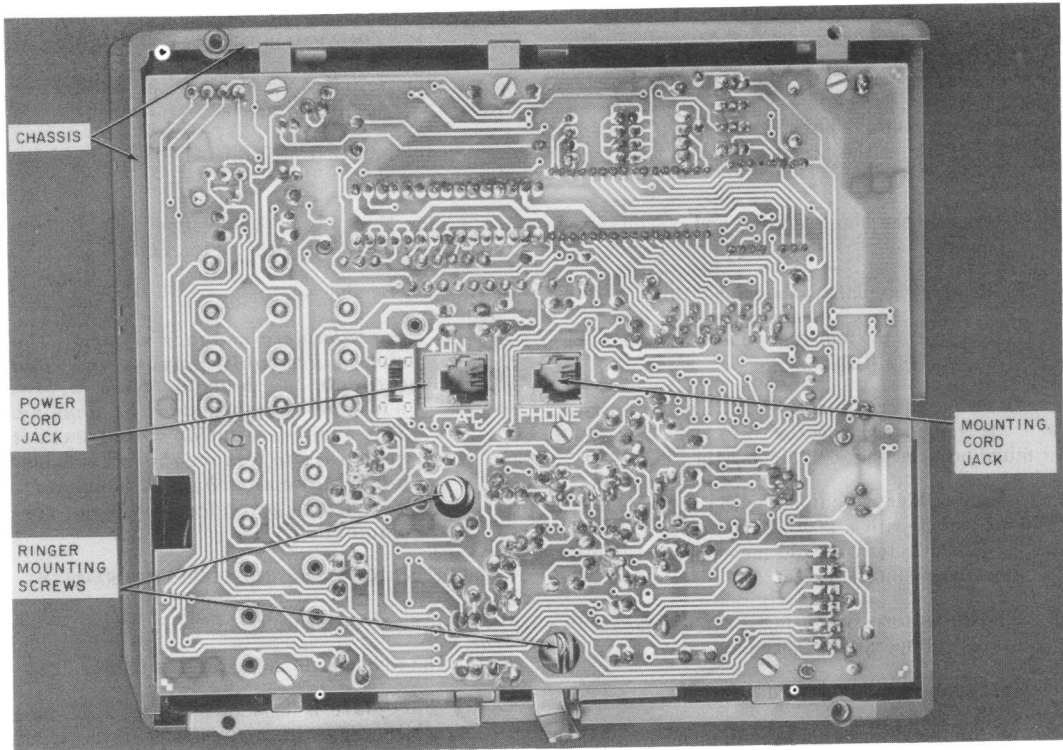


Fig. 9—Bottom View of Power Supply Board (Lower Housing Removed)

- **Switchhook Assembly** is soldered to power supply printed wiring board and located at left-rear corner of power supply board (PSB) (Fig. 5).
- **TOUCH-TONE Telephone Dial** is fastened by two screws and located on the top side at right-front corner of the chassis (Fig. 4).
- **Memory** is fastened by four screws and located just to the rear of the dial on the top right side of the chassis (Fig. 4).
- **Network** is electronic components soldered to power supply printed wiring board which replace the conventional network.
- **Power Supply Printed Wiring Board Assembly** is fastened by six screws to bosses on the bottom of the chassis (Fig. 9).
- **Power Supply Printed Wiring Board Screw Terminal Areas** (Fig. 5 and 6).
- **Mounting Cord and Power Cord Jacks** slide into adjacent cavities on the bottom side of the center wall of the chassis. Jacks are held in place when power supply board is fastened to bottom of chassis and are accessible through holes in the lower housing and power supply board (Fig. 2 and 9).
- **Lower Housing** is fastened by four screws to the bottom side of the chassis (Fig. 2).

- **Upper Housing** is fastened by four screws to the top side of the chassis (Fig. 4).
- **Chassis** is main structural member to which other component assemblies are fastened, including the upper and lower housings (Fig. 5 and 9).

## B. Access of Components

### Faceplate Removal

**3.15** The faceplate has one tab at the top center and two tabs near the bottom corners. To remove, gently bow the upper housing wall away from the top tab and pull up to free the faceplate tab. This can be done by using the thumbnail of one hand on the housing and a fingernail of the other hand on the faceplate. Then slide the faceplate slightly upward to free the two bottom tabs and remove the faceplate. To reinsert the faceplate, slide the two bottom tabs into mating slots in the upper housing, lower the faceplate on to the top edge of the housing cutout and gently bow the upper housing wall away from the top tab of the faceplate. Push down top of faceplate and release housing.

### Upper Housing Removal

**3.16** To remove the upper housing, proceed as follows.

- (1) Unplug the modular handset cord at the telephone set end and remove handset.

**Warning:** Use extreme care when handling shield. Do not bend the shield or break solder connection of attached lead.

- (2) Remove the faceplate (paragraph 3.15) and place the shield aside (Fig. 4).
- (3) Remove the station number card retainer and station number card.
- (4) Disengage the four captive upper housing screws (Fig. 4).
- (5) Remove the upper housing by slipping the shield through the faceplate cutout.
- (6) To replace the upper housing, reverse the procedure.

### Lower Housing Removal

**3.17** To remove the lower housing proceed as follows.

- (1) Remove the modular mounting and power cords from under the retainer tab and unplug cords from jacks in the bottom of the telephone set (Fig. 2).
- (2) Disengage the four captive screws located at the corners of the lower housing on the bottom of the telephone set (Fig. 2).
- (3) Remove the lower housing.
- (4) To replace the lower housing, reverse the procedure.

### Power Supply Board (PSB) Terminals

**3.18** To access the screw terminals 1 through 12 (under the dial) on the power supply board, proceed as follows.

- (1) Remove the faceplate (paragraph 3.15) and place the shield aside.
- (2) Disengage the two captive screws that hold the dial in place.
- (3) Gently lift dial, rotating counterclockwise to enable frequency switches located at lower front edge of dial to clear housing. As dial rotates clear, it may be placed on memory assembly with dial buttons up as in Fig. 10.
- (4) Check that dial connections are properly seated and reassemble by reversing the procedure.

**3.19** To access screw terminals 13 through 21 (under the battery) on the power supply board, proceed as follows.

- (1) Remove the upper housing (paragraph 3.16).
- (2) Gently push back on the battery retainer catch and swing the rear edge of the battery upward to release the battery.
- (3) Carefully lift the battery from its cavity and lay aside.
- (4) To reassemble, reverse the procedure.



**Note:** To reinsert battery, position lower edge first and then push top of battery under retainer catch.

#### 4. CONNECTIONS

- 4.01 Telephone set connections are shown in Fig. 15.
- 4.02 Refer to Table B for connection information for all options.
- 4.03 A partial functional schematic is shown on Fig. 20.

#### 5. OPERATION

**Note:** If the telephone set is used behind a PBX, etc, where an access code is required, see paragraphs 5.07 and 5.08.

##### A. Record a Number Into Memory

- 5.01 To record a number into memory, proceed as follows.

- (1) Remove the directory sheet (Fig. 1).
- (2) Write or type (using light pressure), the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the directory sheet.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

**Note:** If set is equipped with a D-180812 Kit of Parts, switch must be placed in the OFF position.

- (5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out

momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If memory button was not depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer can also be reset by a switchhook operation.

##### B. Change a Number in Memory

**Note:** If set is equipped with a D-180812 Kit of Parts, switch must be placed in the OFF position.

- 5.02 Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

##### C. Delete a Number From Memory

**Note:** If set is equipped with a D-180812 Kit of Parts, switch must be placed in the OFF position.

- 5.03 Complete the following operations in sequence when deleting a number from memory:

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

##### D. Automatically Dial a Number From Memory

- 5.04 To automatically dial a number from memory, proceed as follows:

- (1) Go off-hook and listen for dial tone.
- (2) Depress the desired memory button.

##### E. LAST NUMBER DIALED Feature

**Note:** If set is equipped with a D-180812 Kit of Parts, and dial intermix feature is provided, switch must be placed in the OFF position.

**5.05** Operation of the LAST NUMBER DIALED feature is as follows:

- (1) Go off-hook.
- (2) Listen for dial tone.
- (3) Manually dial telephone number.
- (4) Hang up to reset dialer for automatic dialing.
- (5) To redial same number automatically, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.

**Note:** Note that the RECORD lamp never comes on during LAST NUMBER DIALED operations.

**F. End-to-End Signaling**

**5.06** For end-to-end signaling (such as data transmission) this set has the capability to intermix manual and automatic dialing. This can be accomplished if the following procedure is observed.

- (a) **Standard Operation:** If, at any time, digits are dialed manually, the RECORD OFF button must be depressed before additional digits can be dialed automatically from memory. (The RECORD lamp will not light at any time but depressing the RECORD OFF button will remove the set from the "last number dialed mode" and allow additional automatic dialing.)
- (b) **Record Disable and Dial Intermix (D-180812 Kit of Parts):** With the switch in the ON position manually and automatically dialed digits may be intermixed as desired. Operation of the RECORD OFF button is not required.

**Note:** In this mode, the RECORD button and the LAST NUMBER DIALED feature are inoperative.

**G. Access Code**

- 5.07** If there is no break in dial tone after the access code, simply record the number prefixed by the access code.
- 5.08** When a pause for second dial tone is required following an access code, one of the following

procedures are necessary to record and automatically dial from memory.

- (a) Use one memory button for access code as follows.
  - (1) Record the required access code in one memory location.
  - (2) Record the remaining number in a second memory location.
- (3) To automatically dial a number:
  - (a) Go off-hook, listen for dial tone, and depress the memory button for the access code.
  - (b) Listen for a second dial tone and depress the appropriate memory button or the LAST NUMBER DIALED button for the telephone number.
- (b) To save a memory location by not recording the access code, an alternate procedure may be used.

**Note:** LAST NUMBER DIALED feature can not be used with this procedure.

- (1) Just record the desired telephone number into memory—do not record the access code.
- (2) Go off-hook, listen for dial tone, manually dial the required access code, and depress (not necessary to depress RECORD OFF button with record disable and dial intermix feature) the RECORD OFF button. (This will remove set from LAST NUMBER DIALED mode and allow additional automatic dialing.)
- (3) Listen for a second dial tone and depress the memory button for the desired telephone number.

**H. Speakerphone Option**

**5.09** Use speakerphone in normal manner except that all dialing must be done with handset off hook. After dialing, depress the speakerphone ON button and hold it depressed until the handset is placed on hook.

I. Multiline Service (Using 6040/6050-Type Key)

5.10 Replacing the handset each time a line key is changed assures proper dialer operation. If a number is dialed manually from one line and another line key is depressed to make another outgoing call without hanging up, the RECORD OFF button should be depressed before dialing. This will remove the set from the "last number dialed mode" to allow either automatic dialing or proper recording of a manually dialed number into LAST NUMBER DIALED position.

6. MAINTENANCE

**Caution:** Operation of battery OFF-ON switch to OFF position will result in loss of memory if ac power is not present.

6.01 In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 16 hours. If power loss exceeds 16 hours, the numbers may have to be rerecorded.

A. Return Procedure

6.02 Any replaced set or (component) should be returned in the carton of the replacement with a label placed on the outside of the carton stating that contents are defective. When a set is not being replaced by a new one, use a D-180600 Kit of Parts for returning set to repair center.

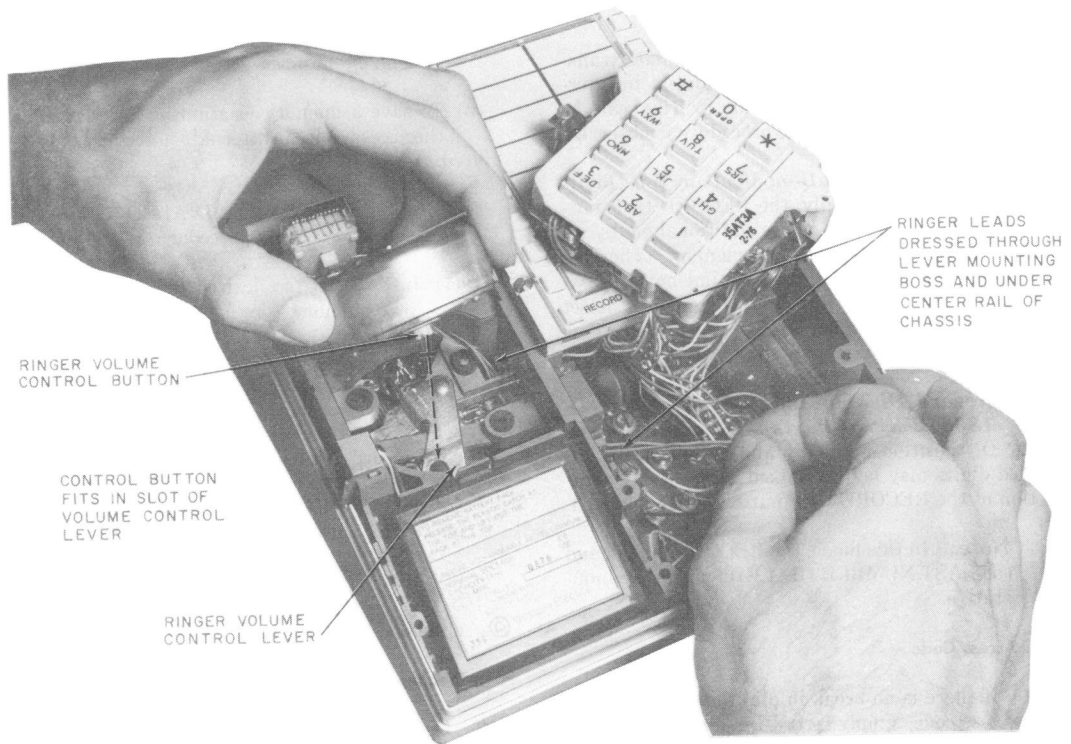


Fig. 10—Ringer Being Installed in 2960A01M Chassis With Dial Rotated Onto Memory and Shield Removed

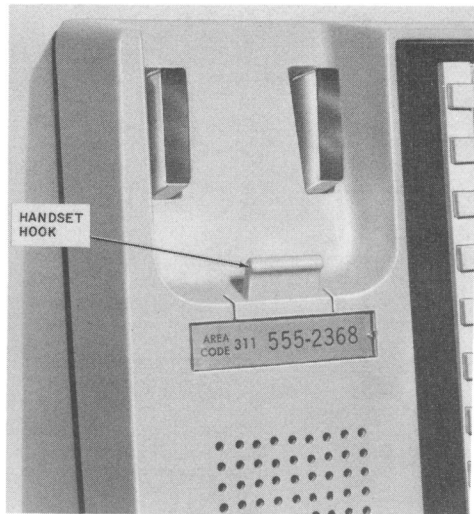


Fig. 11—2960A01M (MD) Telephone Set With Handset Hook Reversed for Wall Mounting



**Always place battery switch in OFF position when set is removed from service.**

#### B. Trouble Analysis

6.03 When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm trouble report either as an automatic dialer (Part 5), or as a basic telephone set.
- (2) Check for improper connections.
- (3) Refer to Table G and paragraphs 6.04 through 6.08.

#### C. Battery

**Warning:** Do not short battery terminals.

6.04 The KS-20390L5 battery has an expected life of about 4 years. It can be replaced without

loss of memory provided that commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 5):

- (1) Remove the upper housing (paragraph 3.16)
- (2) Release the battery [paragraph 3.19 (2) and (3)].
- (3) Disconnect the battery leads.
- (4) Remove battery.
- (5) Install new battery.
- (6) Reassemble the set.



**Before doing Step (7) insure that:**

- (a) The battery switch is in the ON position.
- (b) The new battery has been connected for a minimum of five minutes.
- (c) That there is a known telephone number recorded in a memory location.

(7) Momentarily disconnect the 2012B (MD) or 2012D transformer (for 5 to 10 seconds). After reconnecting the 2012B (MD) or 2012D and securing with a 2A clamp, automatically dial the previously recorded known telephone number. This will verify retention of memory by the new battery.

#### D. Memory

6.05 The memory may be replaced in the following manner.

**Note:** Removal of the memory results in loss of stored telephone number.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the faceplate (paragraph 3.15) and place the shield aside.

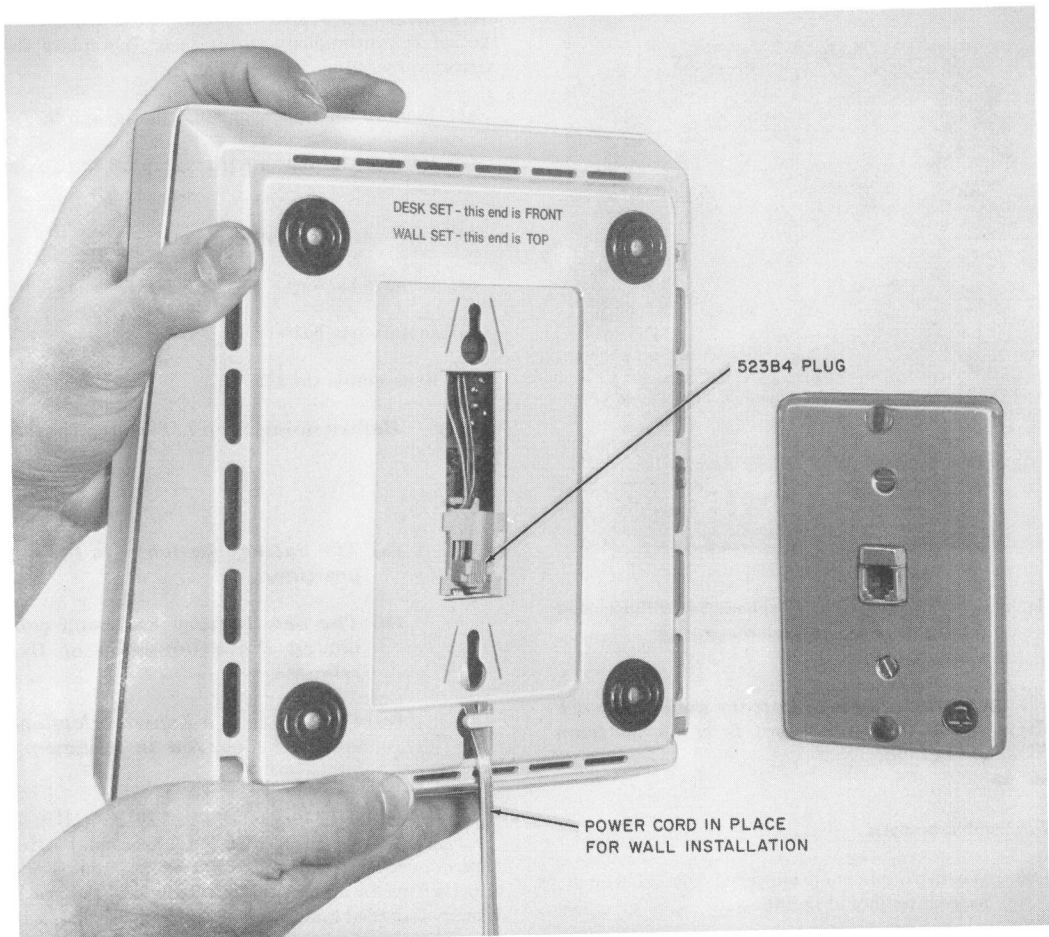


Fig. 12—▶2960A01M (MD) Wall Set and 630A4 Connecting Block◀

- (4) Disengage the four captive memory screws (Fig. 4).
- (5) Rotate the right edge of the memory upward.
- (6) Disengage the connector at the memory (Fig. 6) by pulling it perpendicular to the circuit board.
- (7) Replace the memory by engaging the connector. The connector is keyed, one position is filled and should fit over the vacant position in the row of pins. The cable should not be twisted.
- (8) Tighten the four captive screws.
- (9) Replace the shield and faceplate.
- (10) Test per paragraph 3.12.

(11) Place the old memory in the shipping container of the new memory (carton 900314535), affix a defective label and return to the repair location.

#### E. 35AT3A Dial

6.06 The dial may be replaced in the following manner.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the faceplate (paragraph 3.15) and place the shield aside.
- (4) Disengage the two captive screws that hold the dial in place.
- (5) Disengage the four captive memory screws (Fig. 4), gently lift and rotate memory counterclockwise and rest lightly on top of housing.
- (6) Lift dial out and carefully disengage the dial connectors by pulling up perpendicular to the printed wiring board.
- (7) Remove the two dial mounting brackets from the dial (Fig. 6).
- (8) To install a new dial, reverse the previous steps. The connectors are keyed to orient them relative to the pins. Observe the correct orientation and do not force the connections.
- (9) Test the dial for both manual and automatic operation as follows:
  - (a) Go off-hook and manually dial a known telephone number.
  - (b) Momentarily hang up handset and depress the LAST NUMBER DIALED button. The number automatically dialed should be the same as the number in Step (a).

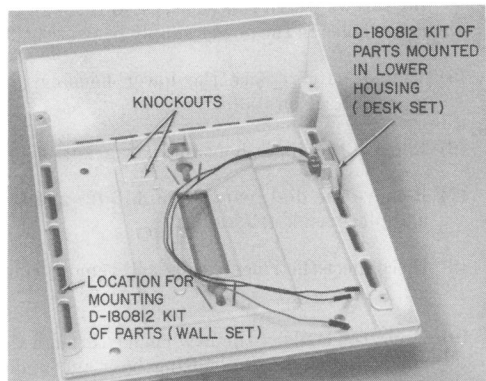
#### F. P1A Ringer

6.07 Replace the P1A ringer as follows.

**Note:** To perform Steps (11) and (14) a split blade expandable or a magnetic screwdriver will be required to install the new ringer.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the lower housing (paragraph 3.17).
- (4) Disengage and remove the two ringer mounting screws which can be accessed through the clearance holes in the power supply board (Fig. 9).
- (5) Temporarily replace the lower housing and place the set on its feet.
- (6) Remove the upper housing (paragraph 3.16).
- (7) Remove the dial [paragraph 3.18 (2) and (3)] and place aside (Fig. 10).
- (8) Disconnect the ringer leads and remove ringer.
- (9) Dress the leads of the new ringer through the ringer adjust arm mounting boss and under the center rail of the chassis, and connect to the appropriate terminals.
- (10) As the ringer is lowered into its mounting position, pull any slack in the leads through to the dial side of the center rail (Fig. 10).
- (11) Replace the dial.
- (12) Remove the lower housing. Holding the ringer in position, turn the chassis over to expose the clearance holes in the power supply board.
- (13) Attach one ringer mounting screw onto the blade of a screwdriver, (see preceding note).
- (14) Insert the ringer mounting screw into one location and secure ringer.
- (15) Align the ringer adjust arm over the ringer volume control button (Fig. 10).
- (16) Replace the remaining ringer mounting screw with the "special" screwdriver and tighten ringer into place.
- (17) Replace the housings, and shield, faceplate, and handset.
- (18) Dial appropriate code for ring-back to test the ringer.

- (19) Turn battery switch to ON.
- (20) Reconnect 2012B (MD) or 2012D transformer.



**Fig. 13—Lower Housing Removed Showing Knockouts for Access by Adjunct Cords and Locations for Mounting D-180812 Kit of Parts**

#### G. Handset Jack

**6.08** Replace the 616J handset jack (Fig. 5 and 6) as follows.

- (1) Disconnect 2012B (MD) or 2012D transformer.
- (2) Turn battery switch to OFF.
- (3) Remove the upper housing (paragraph 3.16).
- (4) Release the battery and place aside [paragraph 3.19 (2) and (3)].
- (5) Release the dial [paragraph 3.18 (2) and (3)] and place aside (Fig. 10).
- (6) Disconnect the appropriate leads (Fig. 15B) and remove jack.
- (7) Replace the jack and dress jack leads in channel behind jack (Fig. 5).
- (8) Reassemble set.
- (9) Turn battery switch to ON.

- (10) Reconnect 2012B (MD) or 2012D transformer.
- (11) Verify proper handset operation.

#### 7. CONVERSION FROM DESK SET TO WALL SET

**7.01** To convert from a desk set to a wall set, proceed as follows.

- (1) Remove the lower housing (paragraph 3.17).
- (2) Remove the 523B4 plug from its stored position and snap both sides of the plug into rectangular slot in the bottom of the lower housing. Snap plug in from the outside so that the word **TOP** is properly oriented in the housing (Fig. 12). The plug should slide freely in the slot.
- (3) Insert the other end of the 523B4 plug into the jack position designated **PHONE** on the power supply board.
- (4) Insert the power cord up through the cord opening below the plastic retainer tab in the bottom of the lower housing (Fig. 12).
- (5) Connect the power cord to the telephone set per the appropriate option of Fig. 15D.
- (6) Place the lower housing on the chassis according to the instructions on the bottom (Fig. 12).
- (7) Engage the four captive screws to fasten the lower housing to the bottom of the chassis.
- (8) Remove the station number card retainer and station number card from the upper housing.
- (9) Disengage the captive screw from the chassis and lift out the concealed handset hook and screw from the cavity in the upper housing.
- (10) Completely remove the captive screw from one side of the handset hook and insert it into the other side.
- (11) Place the handset hook back into its cavity in the upper housing, engage the screw with the chassis, and fasten the hook down (Fig. 11).
- (12) Replace the station number card and card retainer.
- (13) The converted wall set is intended to plug into and secure to a 630A4 connecting block (Fig. 12 and 16B).

**7.02** When connecting set to wall, proceed as follows to prevent damage to 523B4 plug or to receptacle in 630A4 connecting block.

- (1) Begin with slight engagement of plug in receptacle.
- (2) Raise set (with plug slightly engaged) and push toward wall to engage studs in corresponding holes in base of set. (The plug will slide up and down in the base of the set.)
- (3) Pull set downward until firmly seated. (A snap should be felt.)
- (4) Gently tug on the top and then on the bottom of the set. If one of the studs is not engaged, that end of the set will move away from the wall. In that case, remove the set and repeat the procedure.

## **8. CORD DRESSING FOR OPTIONAL SERVICES (ADJUNCTS)**

**8.01** Knockouts are provided in the bottom rear of the lower housing (Fig. 13), to accommodate

the additional cords associated with the connections of wiring options such as speakerphone, SPOKESMAN loudspeaker service, etc.

- (a) For small cords it is necessary to remove only the vertical portion of the knockouts on the rear of the housing.
- (b) For larger cords and connectors, the remainder of the knockout should be removed.

**8.02** Strain relief for optional cordage may be obtained by using any of the six screws used to fasten the power supply board to the bottom of the chassis (Fig. 14). Proper precautions must be taken so that the stay band and hooks do not short any circuit paths. Insulating tape should be placed around the cord and stay band and also applied to the power supply board under the cord (Fig. 14).

**8.03** A rectangular cutout at the right front edge of the power supply board provides access for dressing individual spade-tipped leads to the appropriate screw terminals on the power supply circuit board (Fig. 14).



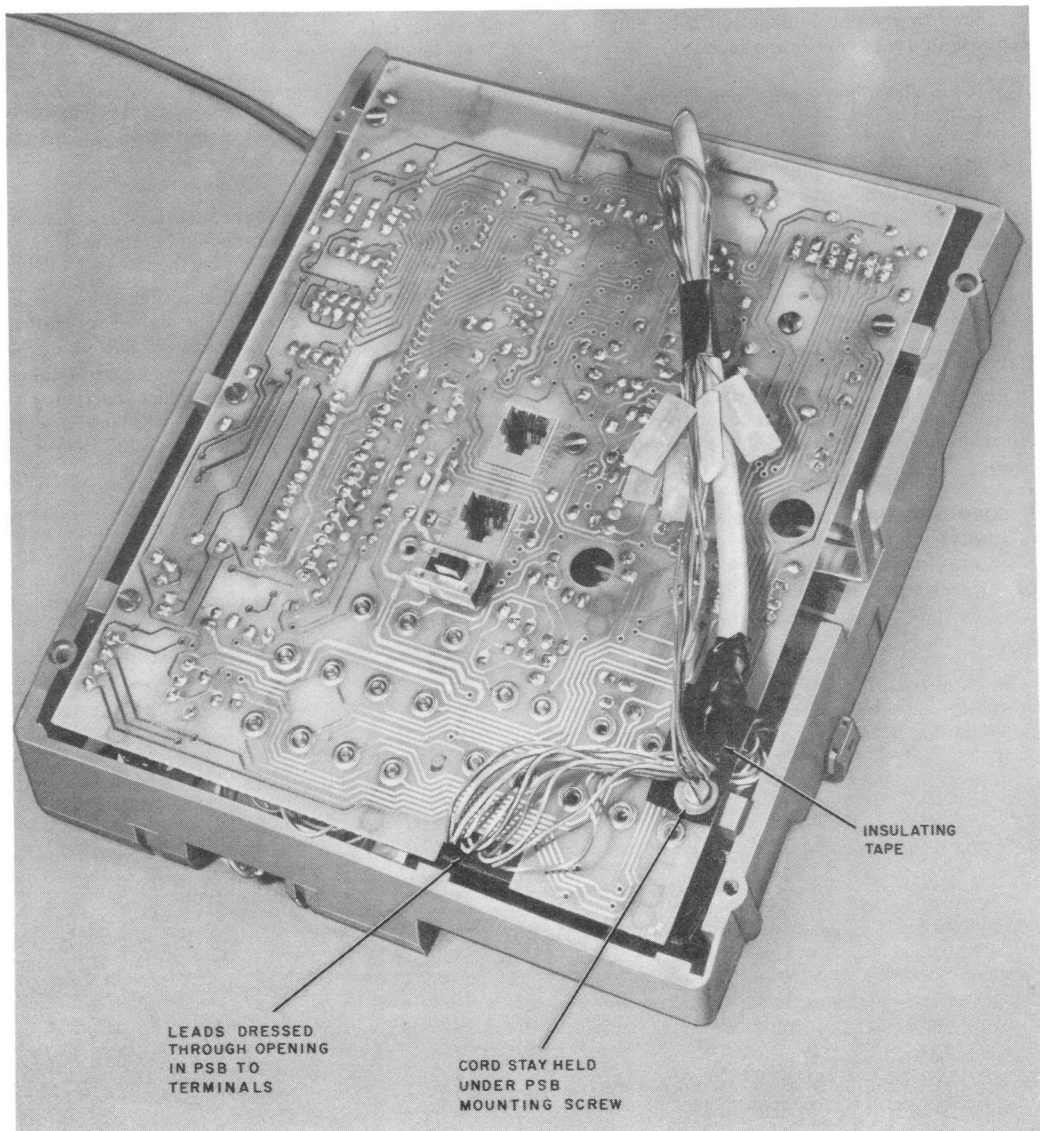


Fig. 14—Bottom of Set With Lower Housing Removed Showing an Adjunct Cord Dressed Across Power Supply Board (PSB)

TABLE B4

## OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED		CONNECTION PER	
				FIG.	TABLE
Selective Ringing*					C
Tip Party Identification					C
A-Lead Control					C
Conversion to Wall Mounted Telephone Set		523B4 Plug†		12, 15 F. & 16 B	
		630A4 Connecting Blk			
Speakerphone	3B	760A Loudspeaker		17	E
		666B Transmitter		17	E
		Control Unit	55A‡	17	E
			55B	17	E
		2012B (MD) or 2012D Transformer		17	E
		D6AD-87 Cord		17	E
	4A	108-Type Loudspeaker		18	F
		680-Type Transmitter		18	F
		223D Adapter		18	F
		85B1 Power Unit		18	F
	10A	D4BU-29 (2 foot) Cord			
		304A Adapter D8AA-87 Cord			
		Wall Mount Adapter§ D-181062			
Multiline Service		6040/6050-Type Key and Interface Cord (Min. of 6 Conductors)		19	
Record Disable Only		D-180812 Kit of Parts¶		7, 8, & 13	D
Record Disable and Dial Intermix					
Impaired Hearing Handset		K6C-50 Handset			
Amplifier-Type Handset		G6BM, G7BM, or G8BM Handset and D-180851 Kit of Parts			
Acoustic or Inductive Coupling to Customer Provided Equipment		G15A Handset and D-180851 Kit of Parts			

\* For selective ringing with superimposed ringing current, refer to [footnote (\*)] of Table C.

† Provided with set and taped inside lower housing.

‡ Modified for TOUCH-TONE service.

§ For wall installations.

¶ Telephone set must be equipped with a 960B Memory when these kits are used.

♦TABLE C♦

**CONNECTIONS — 2960A01M (MD) TELEPHONE SETS FOR  
RINGER OR A-LEAD CONTROL OPTIONS**

OPTION		LEAD		REMOVE FROM PSB TERM.	CONNECT TO PSB TERM.	REMARKS	
		DESIG.	COLOR				
Selective Ringing*	Ring Party	Ringer	BK	7	1	Ringing current from ring to Grd	
	Tip Party	Ringer	BK	7	1	Ringing current from Tip to Grd	
		Mtg Cord Jack	G	7	6		
			R	6	7		
Tip Party with Identification Ground	Ringer Leads		BK	7	1	Ringing current from Tip to Grd	
			S§	¶	6		
			S-R	¶	¶		
	Mtg Cord Jack		G	7	5		
			R	6	7		
	Spade Tip Leads on PSB		BL	6	10		
			BK	11	9		
	G	¶	11				
A-Lead Control†‡	Mtg Cord Jack		Y	1	5	A1	Leads must be dedicated
			BK	¶	9	A	
	Shield		BK	1	5	Sets manufactured prior to Nov. 1979	

- \* For 4-party full selective or 8-party semiselective, one of the following must be provided:  
 (a) 426N (MD) or 813BH diode. For connections, Refer to Section 501-320-100.  
 (b) 11-type extender (MD) or 29A ringer isolator. These may also be used to extend the range of selective ringing and/or provide ringer isolation on all lines using grounded ringers. Refer to Section 501-322-101 for connection information using 11-type extender, or Section 501-375-101 for connection information using 29A isolator.

† No ringer option available (factory wired bridged ringer only) when A lead control option is used.

‡ Sets manufactured or repaired after October, 1979 have a black (BK) shield lead on terminal 16. Lead should not be removed for A lead control unless severe static electricity is encountered (see **Cautions** preceding paragraph 3.02).

§ Approximately 2600 ohm identification ground only.

¶ Isolated and stored.

TABLE D

## CONNECTIONS FOR D-180812 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG.	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX (NOTE 2)
LND-LK	BK	*	27-LNK-LK
VDD	R	29-VDD	29-VDD
RCD-LK	BK	28	28-RCD-LK

*Note 1:* These are single pin connectors attached to the switch leads. There are 2 (BK) leads and 1 (R) lead. The (BK) leads are interchangeable.

*Note 2:* When this option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 16th memory may be used as any other memory.

\* Insulate and store.

TABLE E

**CONNECTIONS—2960A01M (MD) TELEPHONE SET WITH 3B (MD) SPEAKERPHONE SYSTEM**

APPARATUS	CORD OR WIRE	LEAD		CONNECT		
				FROM	TO	
		DESIG.	COLOR	PSB TERM.	CONTROL UNIT (NOTE 1)	
					55A* (NOTE 2)	55B
2960A01M Tel Set	D6AD-87 Cord	R1	BL-W	6	28	10
		T1	W-BL	7	19	1
		LK	G-W	10	11	35
		A1	O-W	5	12	2
		AG	W-G	9	5	11
			W-O	*	*	*
666B Trmtr	T7A Mtg. Cord	M1	S-BK		4	7
		P1	BL-R		13	8
		-15V	BK-S		14	16
		S	O-BK		3	18
		A1	Y-O		29	19
		F1	G-Y		2	17
		LK	BK-O		11	35
760A LSPK	R2FK-87 Mtg. Cord	SP1	R		33†	29†
		SP2	G		34	20
2012B (MD) or 2012D Trnsf	D-Station Wire	AC1			27	27
		AC2			36	36

**Note 1:** Strap terminals 20 and 22 (55A\*) or 4 and 5 (55B). (See Fig. 17 for block diagram of interface.)

**Note 2:** 55A\* control unit modified by Western Electric for use with TOUCH-TONE telephone dial equipped telephone sets.

\* Insulate and store.

† To reduce loudspeaker volume, move SP1 lead to terminal 24 (55A\*) or 30 (55B).

TABLE F

**CONNECTIONS—2960A01M (MD) TELEPHONE SET WITH 4A SPEAKERPHONE SYSTEM**

APPARATUS	CORDS (SEE NOTE)	LEAD		CONNECT TO
		DESIG.	COLOR	
2960A01M Tel Set	M16H Cord	AC	R-G	*
		AC	G-R	*
		LK	O-W	PSB-10
		Spare	O-R	*
		Spare	R-O	*
		K5M	BR-W	*
		IT	W-G	*
		IR	G-W	*
		T1	W-BL	PSB-7
		R1	BL-W	PSB-6
		K4C	S-W	*
		K5C	W-S	*
		K4B	BL-R	*
		K5B	R-BL	*
		AG	W-O	PSB-9
A1	W-BR	PSB-5		
680-Type Trmtr	D8S-87 Mtg. Cord			
108-Type LSPK	D20N-87 Mtg. Cord			
85B1 Power Unit	M2FG Cord	AC	BK	3
		AC	Y	4

**Note:** All cords plug into 223D adapter. (See Fig. 18 for block diagram of interface.)

\* Insulate and store

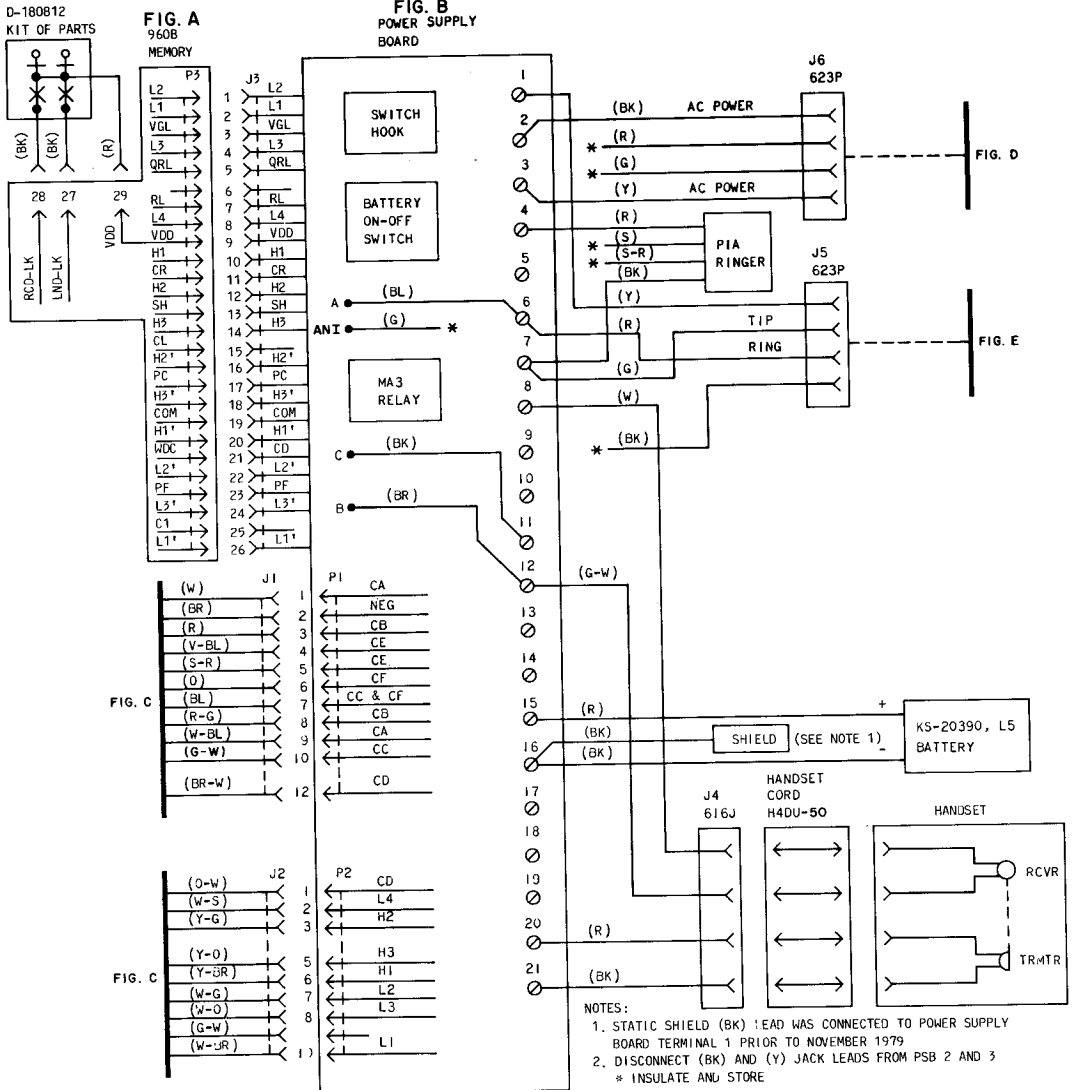


Fig. 15—2960A01M (MD) Telephone Set, Connections (Sheet 1 of 3)

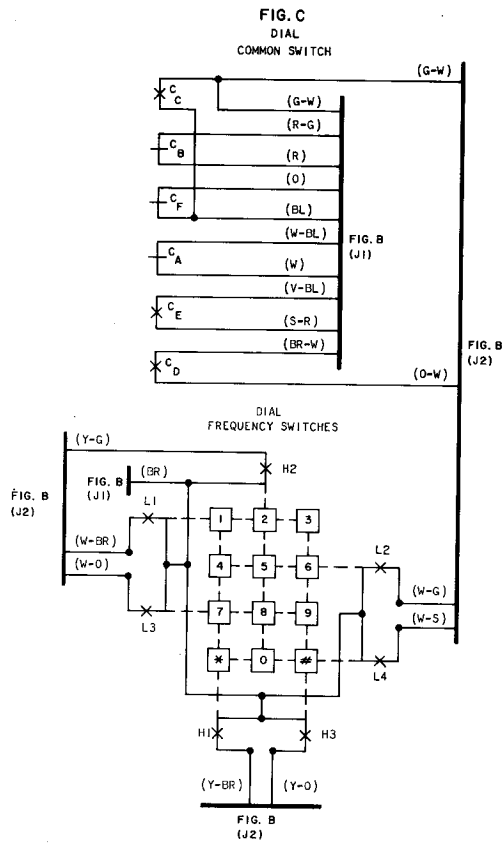


Fig. 15—2960A01M (MD) Telephone Set, Connections (Sheet 2 of 3)



FIG. D  
POWER CONNECTIONS

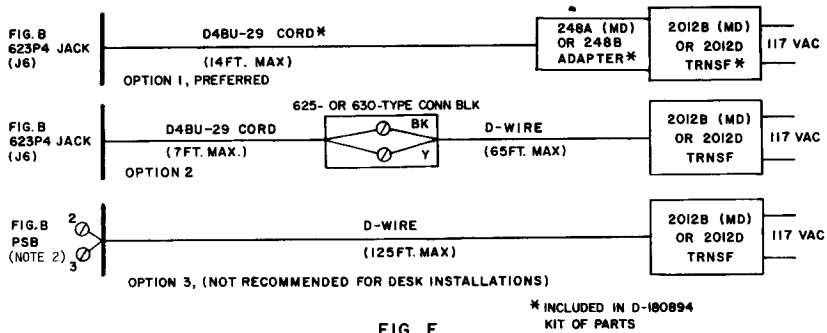


FIG. E  
LINE CONNECTIONS

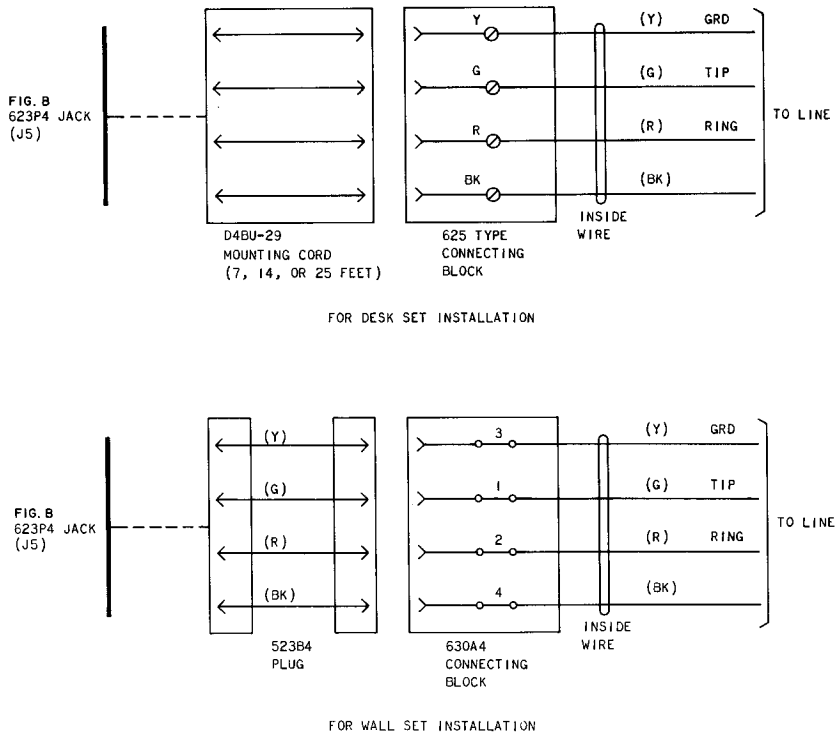


Fig. 15—2960A01M (MD) Telephone Set, Connections (Sheet 3 of 3)

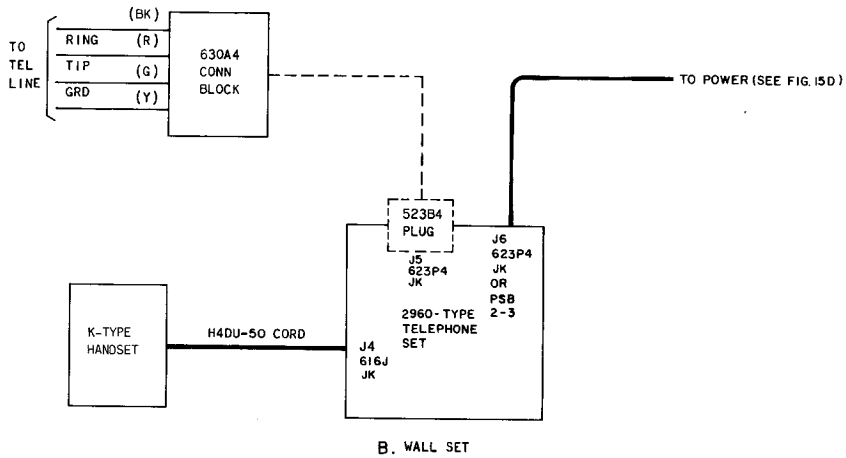
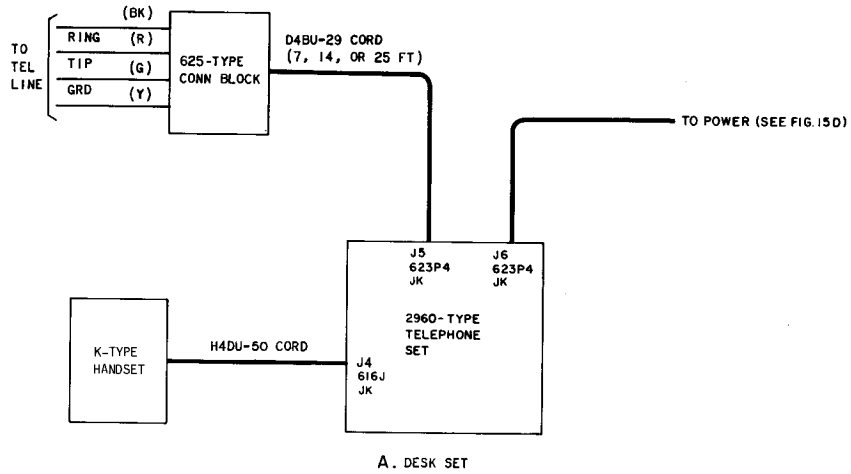


Fig. 16—Block Diagram—2960A01M (MD) Telephone Set, Desk- and Wall-Type

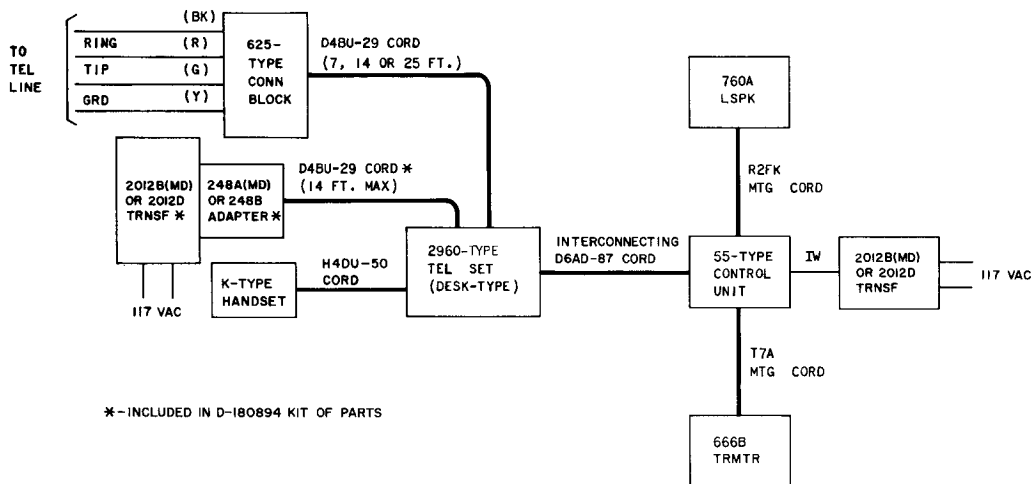


Fig. 17—Block Diagram—2960A01M (MD) Telephone Set With 3B (MD) Speakerphone

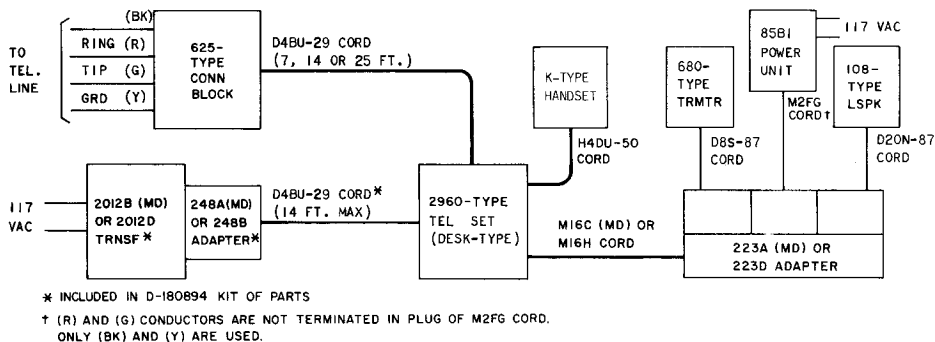


Fig. 18—Block Diagram—2960A01M (MD) Telephone Set With 4A Speakerphone

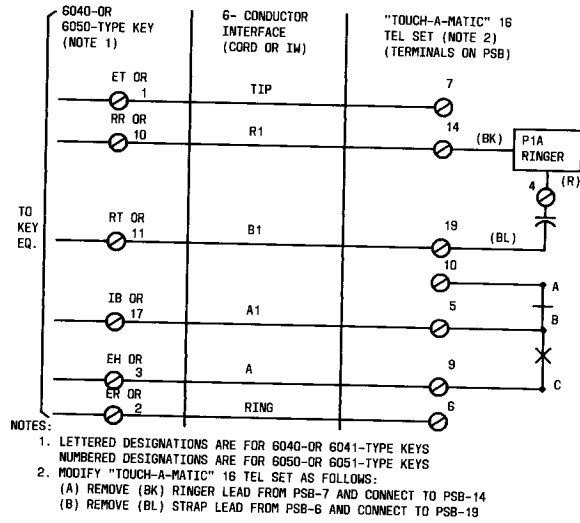


Fig. 19—Connections from Telephone Set to 6040/6050—Type Key

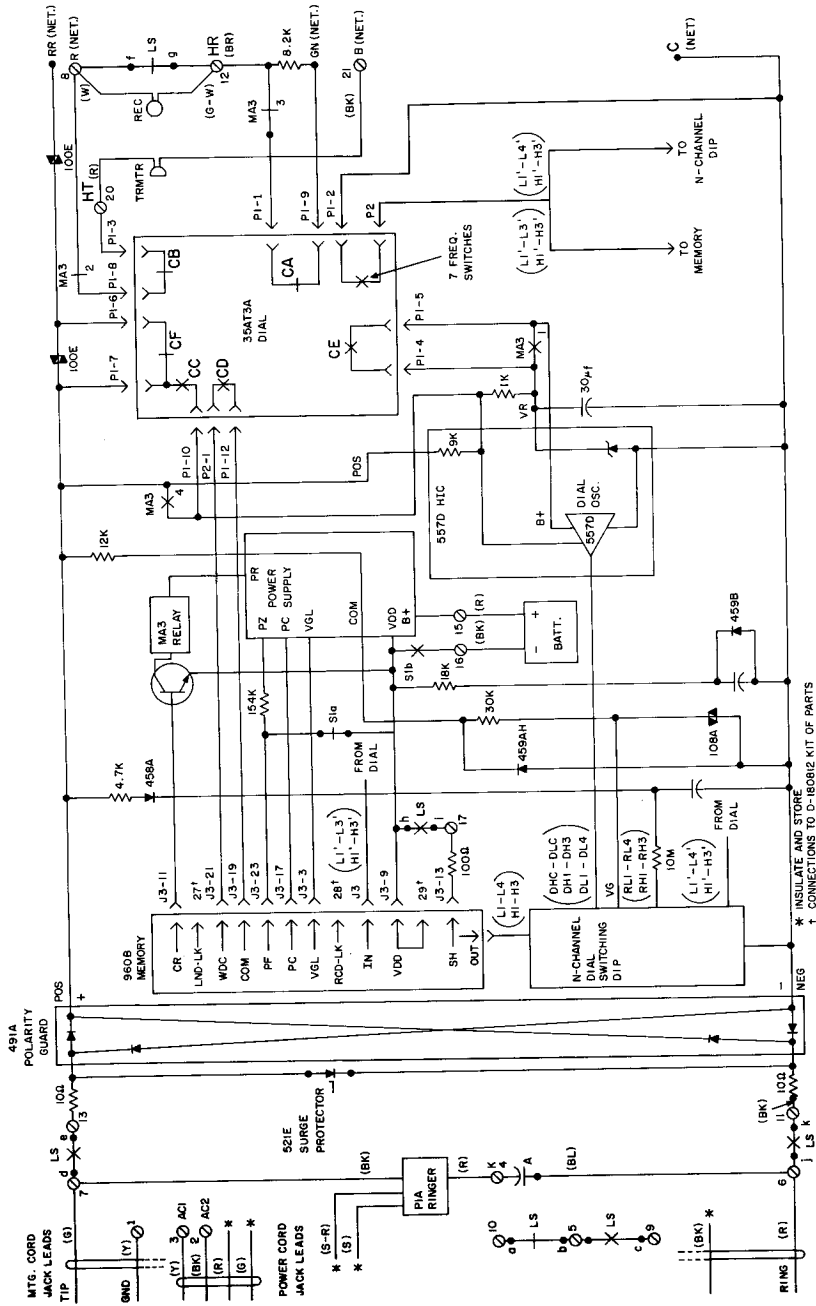


Fig. 20—02960A01M (MD) Telephone Set, Partial Functional Schematic

♦ TABLE G ♦

## TROUBLE ANALYSIS—2960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set	RECORD lamp does not turn on when RECORD button is depressed	Mounting and power cords reversed in jacks	Plug cords into proper jacks
			D4BU-29 mounting cord improperly inserted at set or connecting block.	Check mounting cord insertion at set and connecting block.
			Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
			Defective handset	Replace handset
		With strap lead between screw terminals 7 and 13 and/or 6 and 11 on PSB, dial tone is present	Defective line switch contacts	Replace telephone set
		Unknown	Replace telephone set	
2	Cannot transmit when off-hook		Bad connection	Check handset, handset cord, and handset jack connections
			Defective transmitter	Replace handset
		Can transmit properly with a temporary strap lead between screw terminals 8 and 20 on PSB	Defective contacts on 35AT3A dial	Replace 35AT3A dial
			Unknown	Replace telephone set
3	Cannot receive when off-hook		Bad connection	Check handset, handset cord, and handset jack connections
			Defective receiver	Replace handset
		Can receive properly with temporary strap lead between screw terminals 12 and 21 on PSB	Defective contacts on 35AT3A dial	Replace 35AT3A dial
			Unknown	Replace telephone set
4	Cannot manually dial when off-hook	Clicking sounds or damped TOUCH-TONE dialing signals heard when dial buttons are depressed. Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook
			No audible TOUCH-TONE dialing signal present	Dial connectors not properly inserted
			Defective dialing circuits on PSB	Replace telephone set
			Unknown	Replace telephone set

◆ TABLE G (Contd) ◆

## TROUBLE ANALYSIS—2960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5	Cannot manually dial some digits when off-hook		Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on 35AT3A dial	Replace 35AT3A dial
			Defective dialing circuits on PSB	Replace telephone set
			Unknown	Replace telephone set
6	Cannot manually dial off-hook without ac power	Can manually dial off-hook with ac power on	Open path on PSB	Replace telephone set
7	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed	Switch of D-180812 Kit of Parts in ON position	Change switch position to OFF
			AC power not present	Check for commercial power
			D4BU-29 power cord inserted improperly	Check cord insertion at set and at 248A or 248B adapter
			2012B or 2012D transformer not plugged in or defective	Check or replace 2012B or 2012D transformer. (Should read 13.4 to 18 Vac across screw terminals 2 and 3 on PSB)
			RECORD OFF button stuck down	Clear stuck button
			Battery switch OFF	Place switch to ON
			Defective lamp or lamp driver circuit	Replace memory assembly
			Unknown	Replace telephone set
		Lamp turns off when any memory button is depressed or Lamp does not momentarily turn off when a dial button is depressed	Defective Memory logic	Replace Memory assembly
			Unknown	Replace telephone set
8	Cannot record into Memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
9	Cannot record properly into the 15 memory positions or into the LAST NUMBER DIALED position	Party is reached when number is recorded as it is manually dialed. However, when number is subsequently dialed from memory, party is not reached — wrong number is dialed from Memory	Incorrect dial contact sequence	Replace 35AT3A dial
			Defective Memory logic	Replace Memory assembly
			Open circuit on PSB	Replace telephone set

◆ TABLE G (Contd) ◆

## TROUBLE ANALYSIS—2960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10	Cannot dial properly from Memory		Did not record properly	1. Record per paragraph 5.01. 2. See trouble No. 7
		MA3 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE dialing signal present	Defective Memory logic	Replace Memory assembly
			Open circuit in power path	Replace telephone set
			Defective line switch h-i contacts	
		MA3 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number	Incorrect dial sequence	Replace 35AT3A dial
		No audible TOUCH-TONE dialing signal		
		Audible gap in train of digits being dialed.		
		No digits or random digits in memory	An ac power outage for 16 hours or longer	Reestablish ac power and rerecord numbers into Memory
			Disconnected battery leads or defective battery	1. Check KS-20390L5 battery connections 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 2012B or 2012D transformer from the ac power outlet and reinsert. 3. If previously stored numbers are not dialed from Memory, replace the battery 4. Repeat procedure
			Defective power supply circuit	Replace telephone set
No digits or all the same digits in random memory locations	Defective Memory	Replace Memory assembly		
11	All memory dialing functions are inoperative	RECORD lamp is on	RECORD ON button stuck down	Clear stuck button
		Can manually dial off-hook with ac power on or off	RECORD OFF or Memory button stuck down	Clear stuck button
			Battery switch off	Place switch to ON
			Defective Memory logic	Replace Memory assembly
			Unknown	Replace telephone set



◆ TABLE G (Contd) ◆

## TROUBLE ANALYSIS—2960A01M (MD)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
12	Ringer does not operate	Operates with adjust level in HIGH position	Marginal operation with adjust lever in LOW position	Replace lever position
			Ringer lower limit stop screw removed	Replace lower limit stop screw in ringer
		Does not operate with adjust level in HIGH position	Open ringer leads	Check ringer lead connections
			Defective ringer	Replace ringer
13	Noisy Line	Hum on line when set is off-hook	One side of ac power to set is grounded	1. Check connections to PSB terminals 2 and 3 2. If IW is used to run power from 2012B or 2012D to PSB terminals 2 and 3, check for unwanted ground
			Defective power supply circuit	Replace telephone set
			Unknown	Replace telephone set
14	Reach wrong numbers when dialing from Memory locations (Numbers are not the same as were recorded)	Number can be re-recorded and dialing from Memory is proper	Improperly connected or defective (BK) lead from shield	Check lead and connection. (Lead must be connected to terminal 16 or GRD) Replace shield
			Improperly connected or defective (Y) lead from mounting cord jack J5	Check lead and connections — Must be connected to Grd * Replace jack J5
			Defective D4BU mounting cord	Replace cord
			( Y) lead at connecting block not connected to earth ground	Check connections and insure that (Y) lead is dedicated as earth ground *
15	Electro-magnetic interference (EMI) Radio Frequency Interference (RFI)	Radio station heard in handset	Black shield lead connected to terminal 16	Move black shield lead to terminal 1 *
			Inductive coupling in cable	Change cable pair

\* Yellow (Y) lead does not have to be connected to ground on sets manufactured or repaired after October 1979 except where radio frequency interference or severe static electricity is encountered (see **Cautions** preceding paragraph 3.02).

# 5001T01A "TOUCH-A-MATIC\*" TELEPHONE SET, S SERIES

## IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

### 1. GENERAL

1.01 This section contains information on the TOUCH-A-MATIC telephone S series, 12-button, desk-type set (Fig. 1 and 2).

**⚠ Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at their own expense will be required to take whatever measures may be required to correct the interference.*

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user documentation for equipment that generates and uses radio frequency energy and may radiate that energy, paragraph 1.01
- Add information on M2A handset
- Revise battery replacement information on instruction label (Fig. 4)

\* Registered Trademark of AT&TCo.

- Eliminate Fig. 5
- Show 5001T01A-51 and 5001T01A-58 manufacture discontinued (MD) (Table A)
- Add emergency symbols (Fig. 2).

1.03 This telephone set can only be used for individual or single line TOUCH-TONE† service.

**Note:** This set is not designed for speakerphone, loudspeaker, A lead control, or party-line service.

1.04 This set is available in colors listed in Table A. The only faceplate color available for the automatic dialer is silver (-122).

### 2. IDENTIFICATION

2.01 The 5001T01A desk telephone set has a 12-button automatic dialing feature. The two top name and number buttons are illuminated red and green by light-emitting diodes (LEDs). The set also contains a TOUCH-TONE‡ telephone dial, tone ring-er, and M1A handset.

2.02 Design features are as follows:

- Modular unit.
- Solid-state circuit memory and network.
- Automatic dialing of 12 stored numbers.
- Will store up to 16 digits per number.
- Capability to record, change, or delete numbers in memory.

† Registered Service Mark of AT&TCo.

‡ Trademark of AT&TCo.

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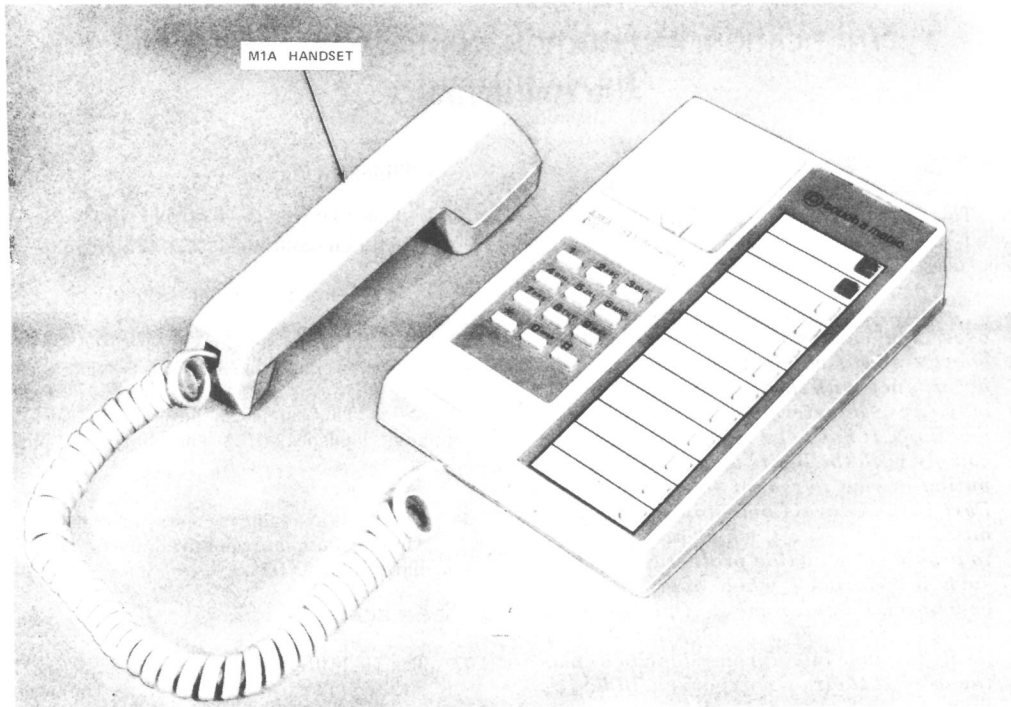


Fig. 1—5001T01A Telephone Set

- Single button dialing and directory space for names and numbers.
- Two illuminated buttons to highlight important numbers.
- M1A handset.
- Electronic tone ringer.
- Internal S1 sounder unit which provides tones for automatic dialing, indicating proper recording procedures, and for checking battery.
- Battery powered repertory dialer.
- Telephone number recording with handset on- or off-hook. Off-hook recording does not interfere with conversation.
- RECORD ON/OFF button protected during normal usage by faceplate to prevent inadvertent erasure of stored numbers.
- Built in polarity guard.

2.03 Operating features are as follows:



***This set is not compatible with all network facilities due to limited available loop current, and may not function properly in all cases. When these sets are connected to these facilities, such as analog subscriber***

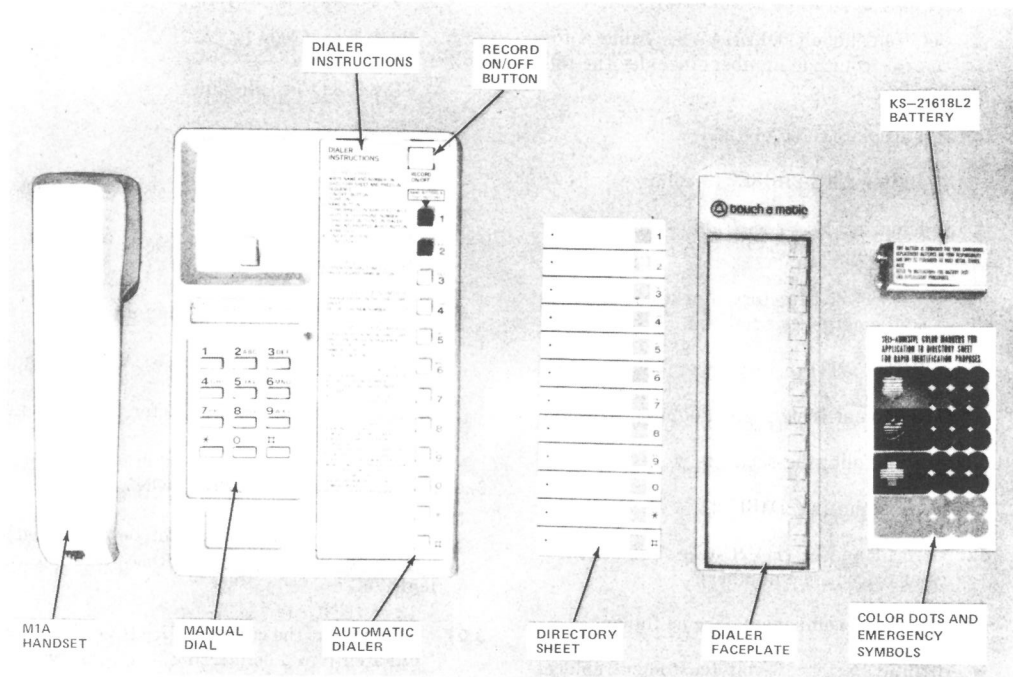


Fig. 2—5001T01A Telephone Set With Handset, Dialer Faceplate, Directory Sheet, and Battery, Removed

*loop carrier systems (SLC-1 and SLC-8 type) and long loops (over 1300 ohms), the sets may not dial from the manual dial key pad. When this incompatibility is encountered, the customer should be directed to exchange the set for another product.*

- 12-button memory field with low force, short travel nonlocking buttons.
- TOUCH-TONE dialing with short travel buttons.
- RECORD ON/OFF button (under faceplate) when momentarily depressed places dialer in

the record mode, subsequent operation terminates the record mode.

- Approximately 1 to 1-1/2 minute automatic time-out if left idle in the record mode.
- Approximately 10 second light time-out on the red and green LED illuminated automatic dial buttons.
- Normal telephone usage with either the automatic dialer or manual TOUCH-TONE telephone dial.
- Tone ringer with slide adjustment for volume control.

2.04 Ordering guide is as follows:

(a) The 5001T01A is a modular type telephone set and may be ordered as follows:

(1) Set, Telephone, 5001T01A-(see Table A for color or comcode number) includes the following:

- (a) Faceplate, 1200A1-122
- (b) Battery, KS-21618L2 (9-volt)
- (c) Handset, M1A-(see Table A for color or comcode number)
- (d) 841386352 Directory Marker (color dots and emergency symbols)
- (e) 841396559 Directory Sheet (double-sided)
- (f) Customer Instruction Booklet, CIB-2506.

(b) Order the following separately:

- (1) Cord, Mounting, D4BU-29
- (2) Cord, Handset, H4DU-(see Table A for color or comcode number).

(c) Replacement components are as follows:

- Alkaline Battery, 9-volt (customer replacement only)
- Handset, M1A-(see Table A for color or comcode number)
- Cord, Mounting, D4BU-29

- Cord, Handset, H4DU-(see Table A for color or comcode number)

- Faceplate, 1200A1-122

- 841408289 Card Retainer

- 841408255 Number Card

- 841396559 Directory Sheet (double-sided)

- Battery cover (see Table A for color or comcode number)

(d) ♦Associated apparatus is as follows:

(1) Handset, M2A-(see Table A for color or comcode number) (for use with inductive pickup hearing aids, refer to Section 501-210-110).♦

**3. INSTALLATION AND CONNECTIONS**

**Note:** Inside wire need not be connected to the ground terminal at the protector or equivalent.

**3.01** Assure that the central office (CO) line is terminated into a connecting block that will accept a modular D4BU mounting cord.

**3.02** The telephone set is shipped with a 9-volt alkaline battery which is to be connected at the time of installation. Remove the battery cover located on the bottom of the telephone set and make

♦ TABLE A ♦

**TELEPHONE SET HOUSING, HANDSET CORD, BATTERY COVER, AND FACEPLATE COLORS**

HOUSING, HANDSET CORD, AND BATTERY COVER COLOR	HOUSING AND HANDSET CORD, SUFFIX	BATTERY COVER NUMBERS	FACEPLATE COLOR	SUFFIX
Ivory	-50	841411507	Silver	-122
Green	-51 (MD)	841411515		
Yellow	-56	841411523		
White	-58 (MD)	841411531		
Brown	-104	841411549		
Rust	-124	841411556		

the necessary connections (Fig. 3). Place the battery in the battery compartment and replace the cover.

**Note:** The battery should last approximately one year under normal telephone usage. All subsequent batteries are to be provided and installed by the customer. If service is disconnected, remove and discard the battery.

**3.03** Plug one end of the mounting cord (D4BU) into the modular jack in the rear of the set and the other end into the 625-type modular connecting block. Connect the handset cord to the set (Fig. 3).

#### INSTALLATION TEST

##### A. Telephone Set

- (1) Dial the appropriate code for ringback to test the telephone set tone ringer. Move the ringer volume control lever (Fig. 3) on the bottom of the set to check variation of volume. There is no provision for ringer cutoff using the volume control.
- (2) Call the CO dial test line, when connected press the dial buttons in sequence 1 through 9, \*, 0, and # verifying that correct signals is returned from the CO.

##### B. Automatic Dialer

- (1) Record digits 1 through 9, \*, 0, and # into first memory location.
- (2) From the telephone set manually dial CO "dial test circuit."
- (3) When test line is connected, depress the first memory button and verify that correct signal is returned from the CO.
- (4) Repeat Steps (1), (2), and (3) for memory buttons two through twelve.

#### 4. OPERATION

**4.01** The memory location buttons are used for the following functions:

- To select memory locations
- To be used as specific digits when recording or changing numbers

- To automatically dial prerecorded numbers.

##### A. To Place a Number Into Memory

**4.02** Perform the following operations in sequence.

- (1) Remove the dialer faceplate by inserting fingernail into slot at top of faceplate, pull down slightly, and lift out.
- (2) Remove the directory sheet and write or type the desired name(s) and telephone number(s).
- (3) Momentarily depress the RECORD ON/OFF button (Fig. 2). (A constant tone will be heard.)
- (4) Momentarily depress the memory button adjacent to the desired name listed on the directory sheet. (A double interrupt of the tone will be heard.)
- (5) Manually dial the desired number using the digit designations to the right of the memory buttons on the dialer. (The tone will interrupt momentarily as each digit is recorded.) The manual dial key pad **cannot** be used to record a number into memory. A total of 16 digits can be recorded. When the sixteenth digit is recorded, the dialer will beep three (3) times and automatically end the recording procedure. If the dialer is inadvertently left in the record mode it will time out after 1-1/2 minutes, give three (3) beeps, and automatically reset.
- (6) Momentarily depress the RECORD ON/OFF BUTTON. [The tone will cease and the dialer will be ready either for automatic dialing or to record another telephone number into memory. Repeat Steps (3) through (6)].
- (7) Replace the faceplate after all numbers have been recorded.

**Note:** The two top name and digit buttons are illuminated by red and greens LEDs. Both buttons are illuminated for approximately 10 seconds when the handset is taken off-hook. This enables the user to identify important numbers such as police, fire, etc, especially in the dark. Other important numbers may be highlighted by use of the adhesive backed color dots furnished with the set.

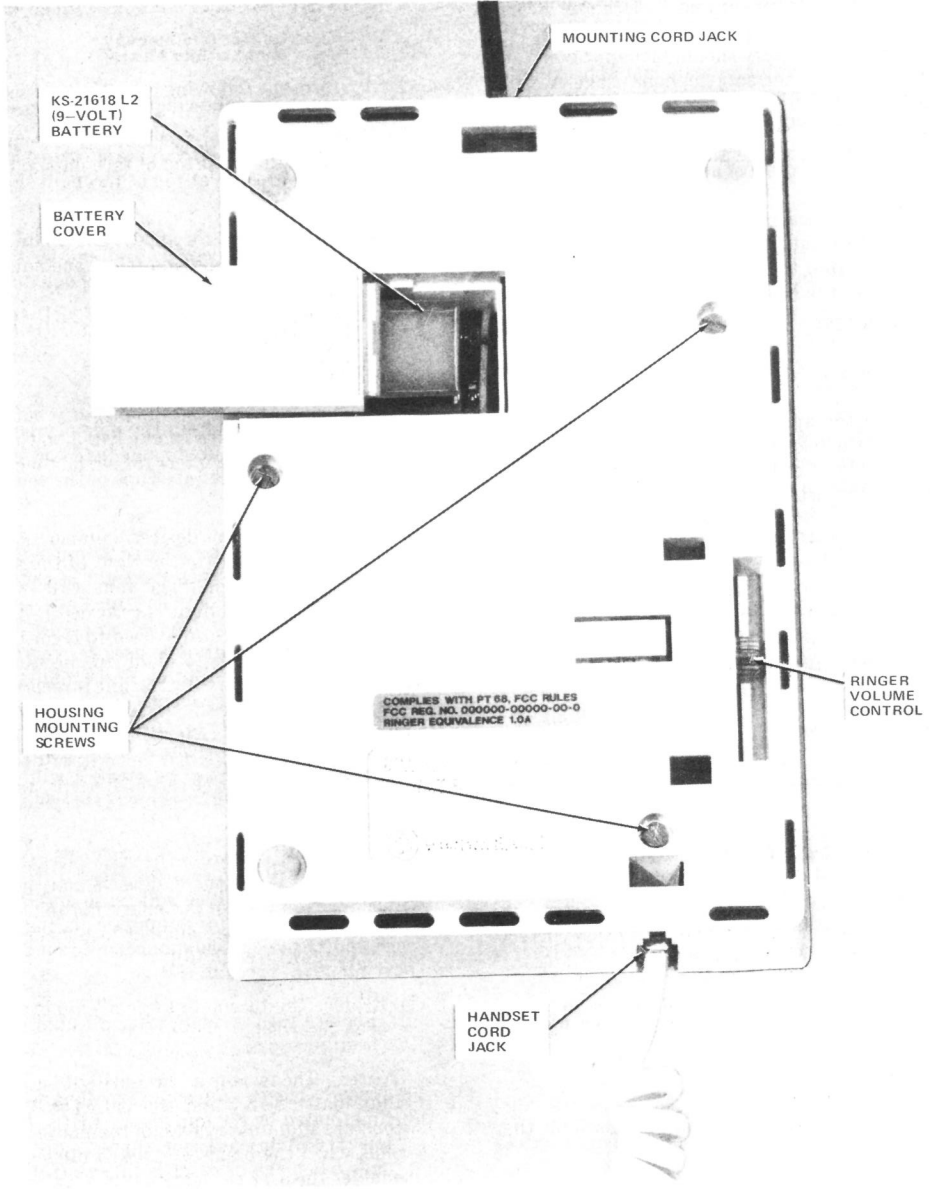


Fig. 3—5001T01A Telephone Set, Bottom View

**B. To Change a Number in Memory**

**4.03** When a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

**C. To Delete a Number From Memory**

**4.04** Perform the following operations in sequence.

- (1) Remove the dialer faceplate by inserting fingernail into slot at top of faceplate, pull down slightly, and lift out.
- (2) Momentarily depress the RECORD ON/OFF button.
- (3) Depress the memory button corresponding to the name and number to be deleted.
- (4) Momentarily depress the RECORD ON/OFF button.
- (5) Remove the persons name and number previously written or typed on the directory sheet.
- (6) Replace the faceplate.

**D. To Automatically Dial a Number From Memory**

**4.05** Perform the following to automatically dial a number.

- (1) Lift the handset and listen for dial tone.
- (2) Depress the desired memory button on the dialer.

**5. MAINTENANCE**

**5.01** Maintenance is limited to replacement of mounting cord, faceplate, directory sheet, battery cover, handset cord, and handset.

**Note:** Only the M1A ♦ or M2A ♦ handset can be used with this telephone set.

**Caution:** *Numbers stored in memory may be erased if battery is disconnected for longer than 1 minute during replacement.*

**5.02** The battery is to be replaced by the customer. Refer to instruction label (Fig. 4) or Customer Instruction Booklet (CIB-2506) for detailed testing and replacement procedures.

**5.03** If a weak or dead battery is suspected, inform the customer a new battery is required.



**DIALER INSTRUCTIONS**

**TO RECORD**  
WRITE NAME AND NUMBER ON DIRECTORY SHEET AND PRESS IN SEQUENCE

1. "ON/OFF" BUTTON (TONE ON)
2. NAME BUTTON (TONE BRIEFLY INTERRUPTED TWICE)
3. DIGITS OF TELEPHONE NUMBER USING DIGIT BUTTONS ON DIALER (TONE INTERRUPTED WHILE BUTTON DEPRESSED)
4. "ON/OFF" BUTTON (TONE STOPS)

**TO CALL**

1. LISTEN FOR DIAL TONE
2. PRESS DESIRED NAME BUTTON

**TO CHANGE A NUMBER**

1. CHANGE ENTRY ON THE DIRECTORY SHEET
2. RECORD THE NEW NUMBER

**TO REMOVE A NUMBER**  
ERASE ENTRY FROM THE DIRECTORY SHEET AND PRESS IN SEQUENCE

1. "ON/OFF" BUTTON
2. NAME BUTTON
3. "ON/OFF" BUTTON

**BATTERY CHECK**  
PRESS A NAME BUTTON THAT HAS A RECORDED PHONE NUMBER.  
IF YOU HEAR THE DIALER "BEEP" THE BATTERY IS GOOD.  
IF YOU DO NOT HEAR THE DIALER "BEEP", REPLACE THE BATTERY

**BATTERY REPLACEMENT**  
DESK SETS AND ADJUNCT SETS BEGIN WITH STEP 2

1. WALL SETS MUST FIRST BE REMOVED FROM WALL BY PUSHING UP THEN PULLING SET AWAY FROM WALL. TO REPLACE: ALIGN SET WITH WALL MOUNT THEN PUSH DOWN TO SECURE
2. USE A 9-VOLT ALKALINE BATTERY
3. TURN SET OVER AND REMOVE BATTERY FROM COVERED WELL
4. UNSNAP OLD BATTERY (MEMORY WILL BE PRESERVED FOR A SHORT PERIOD OF TIME WHEN BATTERY IS DISCONNECTED)
5. INSERT NEW BATTERY INTO WELL REPLACE COVER OVER BATTERY WELL

FOR MORE DETAILED INFORMATION CONCERNING INSTALLATION, OPERATION OR TROUBLE CONSULT YOUR INSTRUCTION BOOKLET

RECORD ON/OFF BUTTON

NAME BUTTONS & DIGIT BUTTONS

1

ABC  
2

DEF  
3

GHI  
4

JKL  
5

MNO  
6

PRS  
7

TUV  
8

WXY  
9

0

\*

#

Fig. 4—Instruction Label

# 5011T01A "TOUCH-A-MATIC\*" TELEPHONE SET, S SERIES

## IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

### 1. GENERAL

1.01 This section contains information on the TOUCH-A-MATIC telephone, S series 12-button, wall type telephone set (Fig. 1 and 2).

**⚠ Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.*

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy and may radiate that energy, paragraph 1.01
- Add information on M2A handset
- Revise battery replacement information on instruction label (Fig. 4)

\* Registered Trademark of American Telephone and Telegraph Company.

- Eliminate Fig. 5

- Show 5011T01A-51 and 5011T01A-58 manufacture discontinued (MD) (Table A)

- Add emergency symbols (Fig. 2).

1.03 This telephone set can only be used for individual or single line TOUCH-TONE† service.

**Note:** This set is not designed for speaker-phone, loudspeaker, A lead control, or party line service.

1.04 The set is available in the colors listed in Table A. The only faceplate color available for the automatic dialer is silver (-122).

### 2. IDENTIFICATION

2.01 The 5011T01A wall telephone set has a 12-button automatic dialing feature. The two top name and number buttons are illuminated by red and green light emitting diodes (LEDs). The set also contains a TOUCH-TONE‡ telephone dial, tone ringer, and a M1A handset.

2.02 Design features are as follows:

- Modular unit.
- Solid state circuit memory and network.
- Automatic dialing of 12 stored numbers.
- Will store up to 16 digits per number.
- Capability to record, change, or delete numbers in memory.

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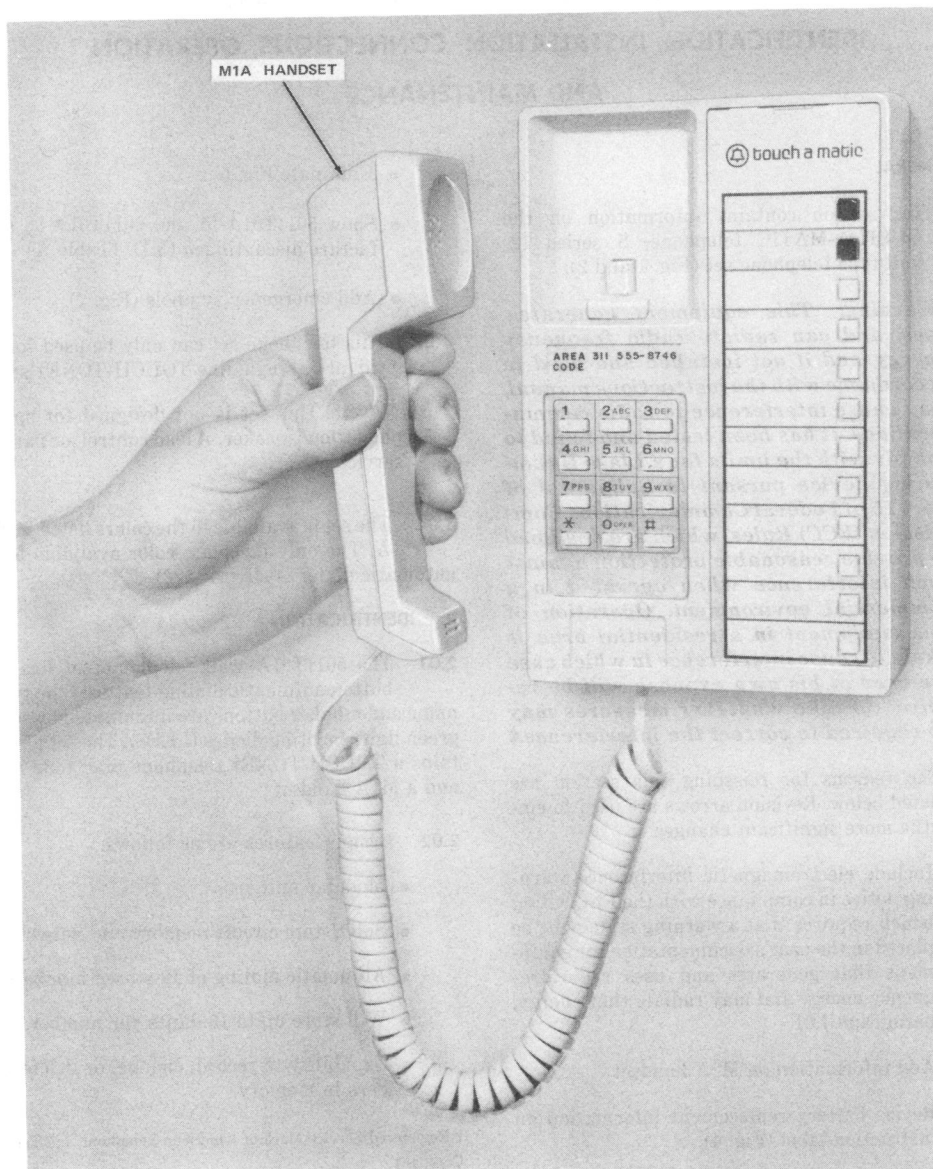


Fig. 1—5011T01A Telephone Set

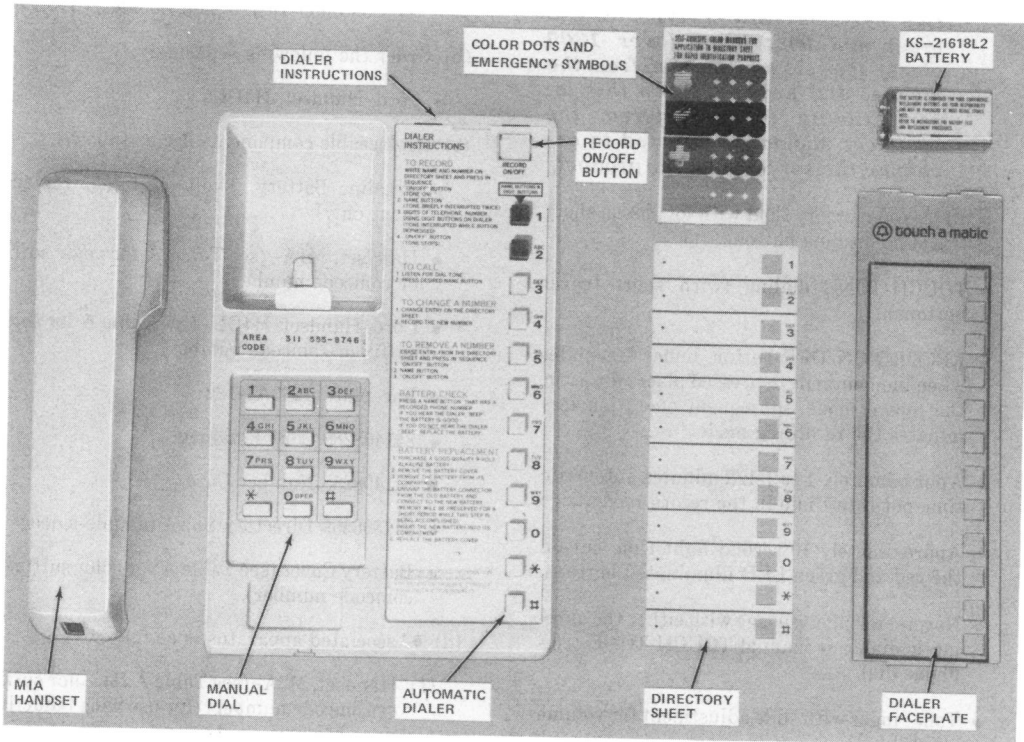


Fig. 2—5011T01A Telephone Set With Handset, Dialer Faceplate, Director Sheet, and Battery Removed

- Single button dialing and directory space for names and numbers.
- Two illuminated buttons to highlight important telephone numbers.
- M1A handset.
- Electronic tone ringer.
- Internal S1 sounder unit which provides tones for automatic dialing, indicating proper recording procedures, and for checking the battery.
- Battery powered repertory dialer.
- Telephone number recording with handset on- or off-hook. Off-hook recording does not interfere with conversation.
- RECORD ON/OFF button protected during normal usage by faceplate to prevent inadvertent erasure of stored numbers.
- Built in polarity guard.

### 2.03 Operating features are as follows.



*This set is not compatible with all facilities due to limited available loop current, and may not function properly in all cases. When these sets are connected to these facilities, such as analog subscriber loop car-*

*rier systems (SLC-1 type, SLC-8 type) and long loops (over 1300 ohms), the sets may not dial from the manual dial keypad. When this incompatibility is encountered, the customer should be directed to exchange the set for another product.*

- 12-button memory field with low force, short travel nonlocking buttons.
- TOUCH-TONE dialing (with short travel buttons).
- RECORD ON/OFF button, under faceplate, when momentarily depressed places dialer in the record mode, subsequent operation terminates the recording mode.
- Approximately 1 to 1-1/2 minutes automatic time-out if left idle in the record mode.
- Approximately 10 second light time out on the red and green LED illuminated buttons.
- Normal telephone usage with either the automatic dialer or manual TOUCH-TONE telephone dial.
- Tone ringer with slide adjustment for volume control.
- No provisions have been made in this set design to provide for ringer cutoff.

#### 2.04 Ordering guide is as follows:

- (a) The 5011T01A is a modular type telephone set and may be ordered as follows:
  - (1) Set, Telephone, 5011T01A- (see Table A for color suffix or comcode number) includes the following:
    - (a) Faceplate, 1200A1-122
    - (b) Battery, KS-21618L2 (9-volt)
    - (c) Handset, M1A- (see Table A for color suffix or comcode number)
    - (d) 841386352 Directory Marker (color dots and emergency symbols)
    - (e) 841396559 Directory Sheet (double-sided)

(f) Customer Instruction Booklet, CIB-2506.

(b) Order the following separately:

- Cord, Handset, H4DU.

(c) Replaceable components are as follows:

- Alkaline Battery, 9-volt (customer replacement only)
- Handset, M1A- (see Table A for color suffix or comcode number)
- Cord, Handset, H4DU- (see Table A for color suffix or comcode number)
- Faceplate, 1200A1-122
- 841408289 Card Retainer
- 841408255 Number Card
- 841396559 Directory Sheet (double-sided)
- Battery Cover (see Table A for color suffix or comcode number).

(d) ♦Associated apparatus is as follow:

- (1) Handset, M2A- (see Table A for color suffix or comcode number) (for use with inductive pickup hearing aids, refer to Section 501-210-110).♦

### 3. INSTALLATION AND CONNECTIONS

**Note:** Inside wire need not be connected to the ground terminal at the protector or equivalent.

**3.01** The telephone set is shipped with a 9-volt alkaline battery, to be connected at the time of installation. Remove the battery cover on the rear of the set and make the necessary connections. Place the battery in the battery compartment and close the cover (Fig. 3).

**Note:** The battery should last approximately one year under normal telephone usage. All subsequent batteries are to be provided and installed by customer. If set is disconnected, remove and discard the battery.

**3.02** A 630-type modular wall connecting block must be used to connect the telephone to the wall.

**TABLE A**  
**TELEPHONE SET HOUSING, HANDSET CORD, BATTERY COVER,**  
**AND FACEPLATE COLORS**

HOUSING, HANDSET CORD, AND BATTERY COVER COLOR	HOUSING AND HANDSET CORD, SUFFIX	BATTERY COVER NUMBERS	FACEPLATE COLOR	SUFFIX
Ivory	-50	841411507	Silver	-122
Green	-51 (MD)	841411515		
Yellow	-56	841411523		
White	-58 (MD)	841411531		
Brown	-104	841411549		
Rust	-124	841411556		

**3.03** The rear of the set is recessed with two keyhole type slots (Fig. 3). Be sure the movable plug is in the down position as shown in Fig. 3. Align the keyhole slots with the mounting studs on the 630-type connecting block. Push the set in and down engaging the set to the connecting block. Connect the handset cord to the set.

#### INSTALLATION TEST

##### A. Telephone Set

- (1) Dial the appropriate code for ring-back to test the telephone set tone ringer. Move the ringer volume control lever (Fig. 3) on the lower edge of the set to check variation of volume. There is no provision for ringer cut off using the volume control.
- (2) Call the central office (CO) dial test line, when connected press the dial buttons in sequence 1 through 9, \*, 0, and # verifying that correct signal is returned from the CO.

##### B. Automatic Dialer

- (1) Record digits 1 through 9, \*, 0, and # into first memory location.
- (2) From the telephone set manually dial CO "dial test circuit."
- (3) When test line is connected, depress the first memory button and verify that correct signal is returned from the CO.
- (4) Repeat Steps (1), (2), and (3) for memory buttons two through twelve.

#### 4. OPERATION

**4.01** The memory location buttons are used for the following functions:

- To select memory locations
- To be used as specific digits when recording or changing numbers
- To automatically dial prerecorded numbers.

##### A. To Place a Number Into Memory

**4.02** Perform the following operations in sequence.

- (1) Remove the dialer faceplate by inserting fingernail into slot at top of faceplate, pull down slightly and lift out.
- (2) Remove the directory sheet and write or type the desired name(s) and telephone number(s).
- (3) Momentarily depress the RECORD ON/OFF button (Fig. 2). (A constant tone will be heard.)
- (4) Momentarily depress the memory button adjacent to the desired name listed on the directory sheet. (A double interrupt of the tone will be heard.)
- (5) Manually dial the desired number using the digit designations to the right of the memory buttons on dialer. (The tone will interrupt momentarily as each digit is recorded.) The manual dial

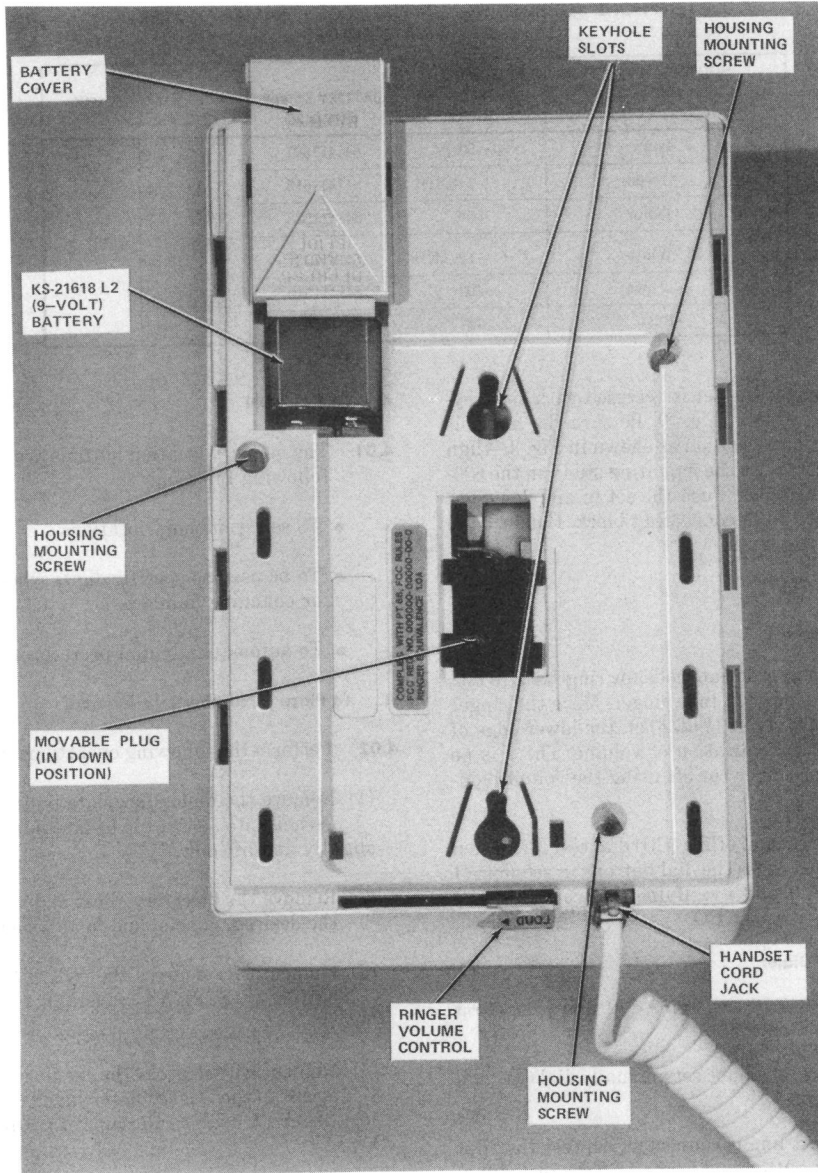


Fig. 3—5011T01A Telephone Set, Bottom View

key pad **cannot** be used to record a number into memory. A total of 16-digits can be recorded. When the 16th digit is recorded, the dialer will beep three (3) times and automatically end the recording procedure. If the dialer is inadvertently left in the record mode it will time out after 1-1/2 minutes, give three (3) beeps, and automatically reset.

(6) Momentarily depress the RECORD ON/OFF button. [The tone will cease and the dialer will be ready either for automatic dialing or to record another telephone number into memory. Repeat Step (3) through (6).]

(7) Replace the faceplate after all numbers have been recorded.

**Note:** The two top name and digit buttons are illuminated by red and green LEDs. Both buttons are illuminated for approximately 10 seconds when the handset is taken off-hook. This enables the user to identify important numbers such as police, fire, etc., especially in the dark. Other important numbers may be highlighted by use of the adhesive backed color dots furnished with the set.

#### B. To Change a Number in Memory

**4.03** When a new number is recorded in a previously used memory position it will automatically replace the previously stored number.

#### C. To Delete a Number From Memory

**4.04** Perform the following operations in sequence.

- (1) Remove the dialer faceplate by inserting finger nail into slot at top of faceplate, pull down slightly and lift out.
- (2) Momentarily depress the RECORD ON/OFF button.
- (3) Depress the memory button corresponding to the name and telephone number to be deleted.

(4) Momentarily depress the RECORD ON/OFF button.

(5) Remove the persons name and telephone number previously written or typed on the directory sheet.

(6) Replace the faceplate.

#### D. To Automatically Dial a Number From Memory

**4.05** Perform the following to automatically dial a number.

(1) Lift the handset and listen for dial tone.

(2) Depress the desired memory button on the dialer.

#### 5. MAINTENANCE

**5.01** Maintenance is limited to replacement of, faceplate, directory sheet, battery cover, handset cord, and handset.

**Note:** Only the M1A or M2A handset can be used with this telephone set.

**Caution:** Numbers stored in memory may be erased if battery is disconnected for longer than 1 minute during replacement.

**5.02** The battery is to be replaced by the customer. Refer to instruction label (Fig. 4) or Customer Instruction Booklet (CIB-2506) for detailed testing and replacement procedures.

**5.03** If a weak or dead battery is suspected, inform the customer a new battery is required.



**DIALER INSTRUCTIONS**

RECORD ON/OFF BUTTON

**TO RECORD**  
WRITE NAME AND NUMBER ON DIRECTORY SHEET AND PRESS IN SEQUENCE

1. "ON/OFF" BUTTON (TONE ON)
2. NAME BUTTON (TONE BRIEFLY INTERRUPTED TWICE)
3. DIGITS OF TELEPHONE NUMBER USING DIGIT BUTTONS ON DIALER (TONE INTERRUPTED WHILE BUTTON DEPRESSED)
4. "ON/OFF" BUTTON (TONE STOPS)

NAME BUTTONS & DIGIT BUTTONS

**TO CALL**

1. LISTEN FOR DIAL TONE
2. PRESS DESIRED NAME BUTTON

**TO CHANGE A NUMBER**

1. CHANGE ENTRY ON THE DIRECTORY SHEET
2. RECORD THE NEW NUMBER

**TO REMOVE A NUMBER**

ERASE ENTRY FROM THE DIRECTORY SHEET AND PRESS IN SEQUENCE

1. "ON/OFF" BUTTON
2. NAME BUTTON
3. "ON/OFF" BUTTON

**BATTERY CHECK**

PRESS A NAME BUTTON THAT HAS A RECORDED PHONE NUMBER. IF YOU HEAR THE DIALER "BEEP" THE BATTERY IS GOOD. IF YOU DO NOT HEAR THE DIALER "BEEP", REPLACE THE BATTERY

**BATTERY REPLACEMENT**

DESK SETS AND ADJUNCT SETS BEGIN WITH STEP 2

1. WALL SETS MUST FIRST BE REMOVED FROM WALL BY PUSHING UP THEN PULLING SET AWAY FROM WALL. TO REPLACE: ALIGN SET WITH WALL MOUNT THEN PUSH DOWN TO SECURE
2. USE A 9-VOLT ALKALINE BATTERY
3. TURN SET OVER AND REMOVE BATTERY FROM COVERED WELL
4. UNSNAP OLD BATTERY (MEMORY WILL BE PRESERVED FOR A SHORT PERIOD OF TIME WHEN BATTERY IS DISCONNECTED)
5. INSERT NEW BATTERY INTO WELL REPLACE COVER OVER BATTERY WELL

FOR MORE DETAILED INFORMATION CONCERNING INSTALLATION, OPERATION OR TROUBLE CONSULT YOUR INSTRUCTION BOOKLET

1

ABC 2

DEF 3

GHI 4

JKL 5

MNO 6

PRS 7

TUV 8

WXY 9

0

\*

#

NAME AND DIGIT BUTTONS

Fig. 4—Instruction Label

**2872A1M AND 2872A2M "TOUCH-A-MATIC\*" 32 TELEPHONE SETS  
IDENTIFICATION, INSTALLATION, CONNECTIONS,  
OPERATION, AND MAINTENANCE**

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Bell System except under written agreement

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J.	Faceplate . . . . .	24
K.	Speakerphone . . . . .	24

**1. GENERAL**

1.01 This section contains information on the 2872A1M (MD) and 2872A2M TOUCH-A-MATIC telephone sets equipped with a TOUCH-TONE\* telephone dial (Fig. 1).

**⚠Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.⚠**

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy and may radiate this energy, paragraph 1.01

\*Trademark of American Telephone and Telegraph Company.

- Change all references to 95B-type power unit to 95B1 power unit.
- Show that both 2012-type transformer and 95B1 power unit must be connected for 3B (MD) speakerphone system operation (Tables B and C)
- Show that both 85B1 and 95B1 power units must be connected for 4A speakerphone system operation (Tables D and E).

1.03 The 2872A1M (MD) or 2872A2M telephone set is factory-wired for use with 1A1, 1A2, or 6A key telephone systems (KTS). They may be converted (Table J) for use with 1A KTS.

1.04 The telephone sets are available in the following colors:

- Black (-03)
- Green (-51)
- White (-58)
- Light Beige (-60).

1.05 The 2872A1 (MD) faceplate is available in satin-silver (-87) color only.

1.06 The 2872B1 decorative faceplates are available in the following colors:

- Teak Woodgrain (-108)
- Walnut Woodgrain (-109)
- Matte Aluminum (-122).

**2. IDENTIFICATION**

2.01 The 2872A1M or 2872A2M telephone set provides all standard features of a 6-button key telephone set plus (manual) TOUCH-TONE† dialing, automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

†Registered Service Mark of American Telephone and Telegraph Company

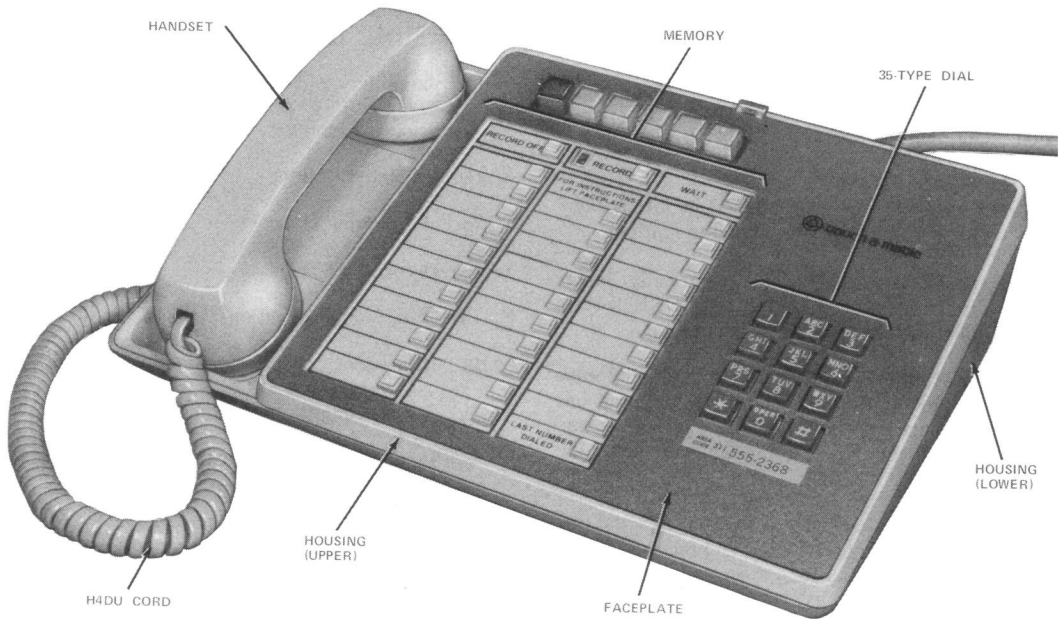


Fig. 1—2872A1M (MD) or 2872A2M Telephone Set

2.02 The 2872A2M telephone set differs from the 2872A1M set only in the battery circuit. The 2872A2M set has a battery interlock circuit that prevents the set from dialing automatically if the battery is not plugged in. Also, the 2872A2M telephone set utilizes a newly coded battery (KS-20390L4) which can not be used in the 2872A1M set.

#### A. Design Features

2.03 Design features are as follows:

- Modular key telephone set
- Convertible to single line operation
- Integrated circuit RC TOUCH-TONE telephone dial oscillator
- Integrated circuit memory
- Surge protector
- Polarity guard (removable for dry circuit application)
- Common audible ringing
- Buzzer
- Busy lamp diode
- Line pickup buttons convertible to nonlocking signal buttons
- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input)

- End-to-end signaling for data application.

#### B. Optional Features

**2.04** Optional features (refer to Table A) are as follows.

- (a) **Speakerphone:** Either 3B (MD) or 4A speakerphone systems may be added to stations
- (b) **Dial Tone Detector:** Automatically starts dialer when precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) is present.
- (c) **One-Touch Calling** (requires both dial tone detector and speakerphone): Depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number.

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE service dial tone if the call is to be completed automatically.

- (d) D-180818 Kit of Parts provides the following features.

**Note:** Telephone set must be equipped with 2870B memory.

- (1) **Record Disable:** Turns off recording feature to prevent accidental erasures of previously stored numbers. No recording possible except for last number dialed memory which will store digits manually dialed from the telephone set.
- (2) **Record Disable and Dial Intermix Feature:** Digits dialed manually from the telephone set dial and digits dialed automatically from memory may be intermixed without depressing RECORD OFF button. Memories cannot be altered and LAST NUMBER DIALED feature is inoperative.
- (e) **Station Busy Lamp** (busy lamp diode wired in set)
- (f) **2/4-Wire Service**
- (g) **Add-On-Conference**
- (h) **Exclusion (multiline)**

- (i) "I" Hold
- (j) Signaling
- (k) Bridged Ringing
- (l) Restricted Dialing
- (m) Amplifying Handset
- (n) Decorative Faceplate
- (o) Head telephone set operation using jacks.

**2.05** All options are implemented by:

- (a) Wiring changes in the telephone set
- (b) Installation of appropriate additional items.

#### C. Ordering Guide

**2.06** The 2872A2M telephone set is a modular type telephone set and may be ordered complete and ready to install.

- (a) Set, Telephone, 2872A2M- (refer to paragraph 1.04 for color suffix).

**2.07** The following must be ordered separately.

- (a) Unit, Power, 95B1 (required for operation of the automatic dialing feature).

**Note:** One power unit is required for each telephone set.

- (b) Decorative Faceplate, 2872B1-108 (Teak Woodgrain) or 2872B1-109 (Walnut Woodgrain).

**2.08** The 2872A2M set is comprised of the following component parts:

- (a) Housing, Lower, 870A1- (refer to paragraph 1.04 for color suffix)
- (b) Housing, Upper, 870A1U- (refer to paragraph 1.04 for color suffix) (used only with 2872B1 faceplate)
- (c) Faceplate, 2872B1-122 (matte aluminum)
- (d) Handset, G15A- (refer to paragraph 1.04 for color suffix)

TABLE A  
OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone* (Paragraph 3.08)	4 A	108AA Loudspeaker	12	D, E
		680AE Transmitter	12	D, E
		82B Connecting Block	12	D, E
		85BI Power Unit	12	D, E
		D-180492 Kit of Parts	9(C)	D, E
	3 B (MD)	760A (MD) Loudspeaker	11	B, C
		666B (MD) Transmitter	11	B, C
		55-Type (MD) Control Unit	11	B, C
		2012D Transformer	11	B, C
		149B Adapter	11	B, C
		D-180492 Kit of Parts	9(C)	B, C
One-Touch Calling (Paragraph 3.09)		D-180493 Kit of Parts	9(D, E)	C, E
		Speakerphone	9(B)	
Dial Tone Detector (Paragraph 3.09)		D-180493 Kit of Parts	9(D)	C, E, F
Station Busy Lamp			10	
"I" Hold			10	
Signaling				H
Exclusion (Multiline)			10	
Add-On-Conference			10	
Amplifying Handset (Paragraph 6.10)		G6BM, G7BM, or G8BM Handset	9(H)	
2/4 Wire Service* (Paragraph 3.10)		D-180494 Kit of Parts	13	G
Dry Circuit (without Polarity Guard)			9(B)	
1A Key Service				J
Restricted Dialing		533K Diode, Capacitor (> .5MF)	14	
Bridged Ringing				L, M
Record Disable (Paragraphs 3.11)		D-180818 Kit of Parts †		K
Dial Intermix (Paragraphs 3.11)				

See footnotes at end of table.

TABLE A (Contd)

## OPTIONS

OPTION	ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
		FIGURE	TABLE
Decorative Faceplate (Paragraph 1.06 and 6.11)	2872B1-108 (Teak Woodgrain) ‡		
	2872B1-109 (Walnut Woodgrain) ‡		
Head Telephone Set Operation	Plantronics Jackset Model JS0180-1A or JS0180-2A	Tables provided with Plantronics Jackset	
	Desired Head Telephone Set §		

\* D-kits for 2/4-wire service and speakerphone are designed to mount in the same place in the set. If both services are to be provided simultaneously, consult your Telco engineer.

† If set is equipped with the 2870A memory, replace with a 2870B memory.

‡ An 870A1U- upper housing may be required (paragraph 6.11).

§ The KS-19796, KS-20778, 52-, 53-, and 60-type headsets are registered with the Jackset Models.

(e) Cord, Handset, H4DU- (refer to paragraph 1.04 for color suffix)

(f) Base, Telephone Set, 2872A2M (includes the following):

- Dial, 35AG3A
- Key, 635BT5
- 812365039 (P-23F503) Collar
- Ringer, P1B
- Network, 425K (MD) or 4228-type
- Buzzer, KS-20419L1 or KS-20419L2
- Cord, Mounting, D50BB-87
- Battery, KS-20390L2 [may be used in either 2872A1M (MD) or 2872A2M sets]
- Battery, KS-20390L4 (2872A2M sets only)
- Jack, Handset, 616B
- Memory, 2870B
- 840393581 Power Supply Printed Wiring Board (PSB) Assembly [2872AM (MD) base]

- 841382658 Power Supply Printed Wiring Board (PSB) Assembly (2872A2M base)

- 840393672 Directory Sheet Set

- Booklet, Instruction, Subscriber, SIB-2455B.

**2.09** Order optional apparatus (order as required) as follows:

- Kit of Parts, D-180492 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Kit of Parts, D-180494 (for conversion to 4-wire service)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix)

**Note:** This kit of parts may be used only with sets equipped with a 2870B memory

- Faceplate, 2872B1- (refer to paragraph 1.06 for color suffix)

**Note:** If set is equipped with 2872A1-87 faceplate, then an upper housing (870A1U- [refer to

paragraph 1.04 for color suffix]) of the appropriate color must also be ordered.

- Handset, Amplifier (G6BM, G7BM, and G8BM)
- Set, Head Telephone [using Plantronics Jackset Model JS0180-1A (1-1/2 foot cord) or JS0180-2A (6 foot cord)].

#### D. Operating Features

##### 2.10 Operating features (Fig. 2) are as follows.

- Dial (TOUCH-TONE service).
- Line key (635BT5), 6-button key. Hold with five line pickup buttons which are convertible to nonlocking. An additional momentary contact (logic reset switch) is attached to the Hold side of the key to reset the logic circuit anytime a key button is depressed.
- 32-button array of low force, low travel nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed.
- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.
- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) required].

### 3. INSTALLATION

#### STANDARD INSTALLATION

**3.01** Make all wiring changes and telephone set modifications (Table A) before external connections are made to the set (paragraph 4.01).

**Warning:** *Do not plug in either battery or power unit until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.*

**3.02** The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery (Fig. 7) by tilting the set up, and inserting the battery plug into the mating jack.

**Note:** Write date of installation on label provided on battery.

**Danger 1:** *If used, securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install #95B1 power unit. The power unit and any other cord plugged into the ac outlet should always be unplugged completely from the outlet BEFORE attempting to attach or remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use retaining clamps on outlets where the cover mounting screw holds the duplex outlet in the box.*

**Danger 2:** *Care should be taken to trim and dress leads connecting to low voltage output terminals of #95B1 power unit to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.*

**3.03** Install the 95B1 power unit within 150 feet (24 gauge conductors) of the telephone set and plug into an ac outlet not controlled by a switch (con-



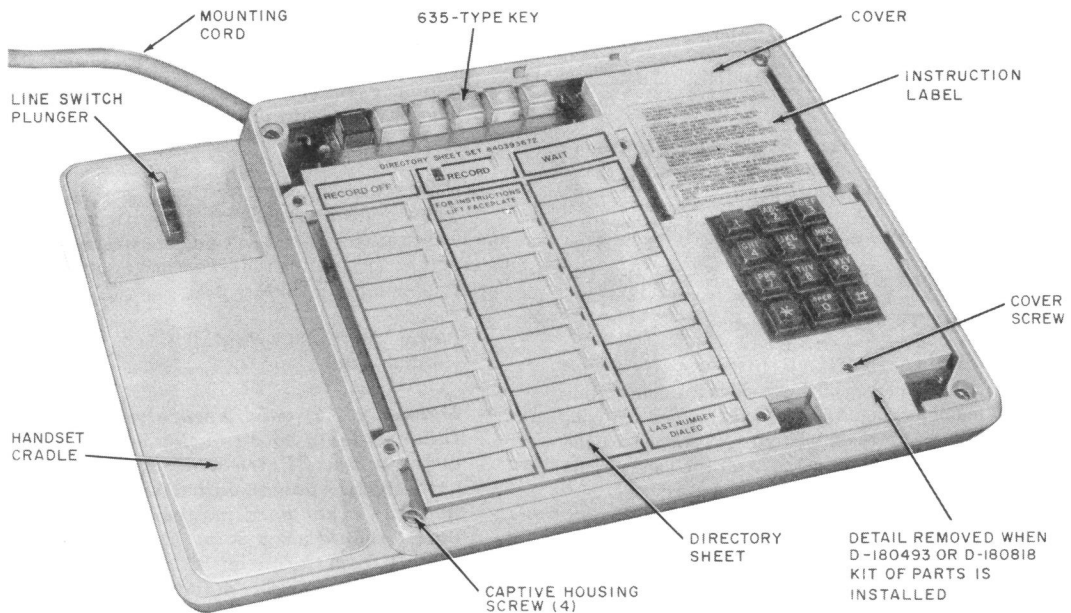


Fig. 2—2872A2M Telephone Set, Faceplate and Handset Removed

tinuous ac power is required). The power unit may be located at the equipment end of the cable or run directly into the telephone set by conductors separate from the mounting cord and connected to PSB terminals 30 and 31. Refer to applicable tables and Fig. 8 for particular type of installation. When separate power conductors are used, disconnect, insulate, and store the (BL-V) and (V-BL) mounting cord leads from PSB terminals 30 and 31.

**Note:** The 95B1 power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

**3.04** The station number card retainer 812558039 (P-25E803) snaps into the faceplate below the dial.

**3.05** The directory sheets (Fig. 2) fit over the buttons of the memory and are held in place by the faceplate. Additional sheets are available in the directory sheet set, 840393672.

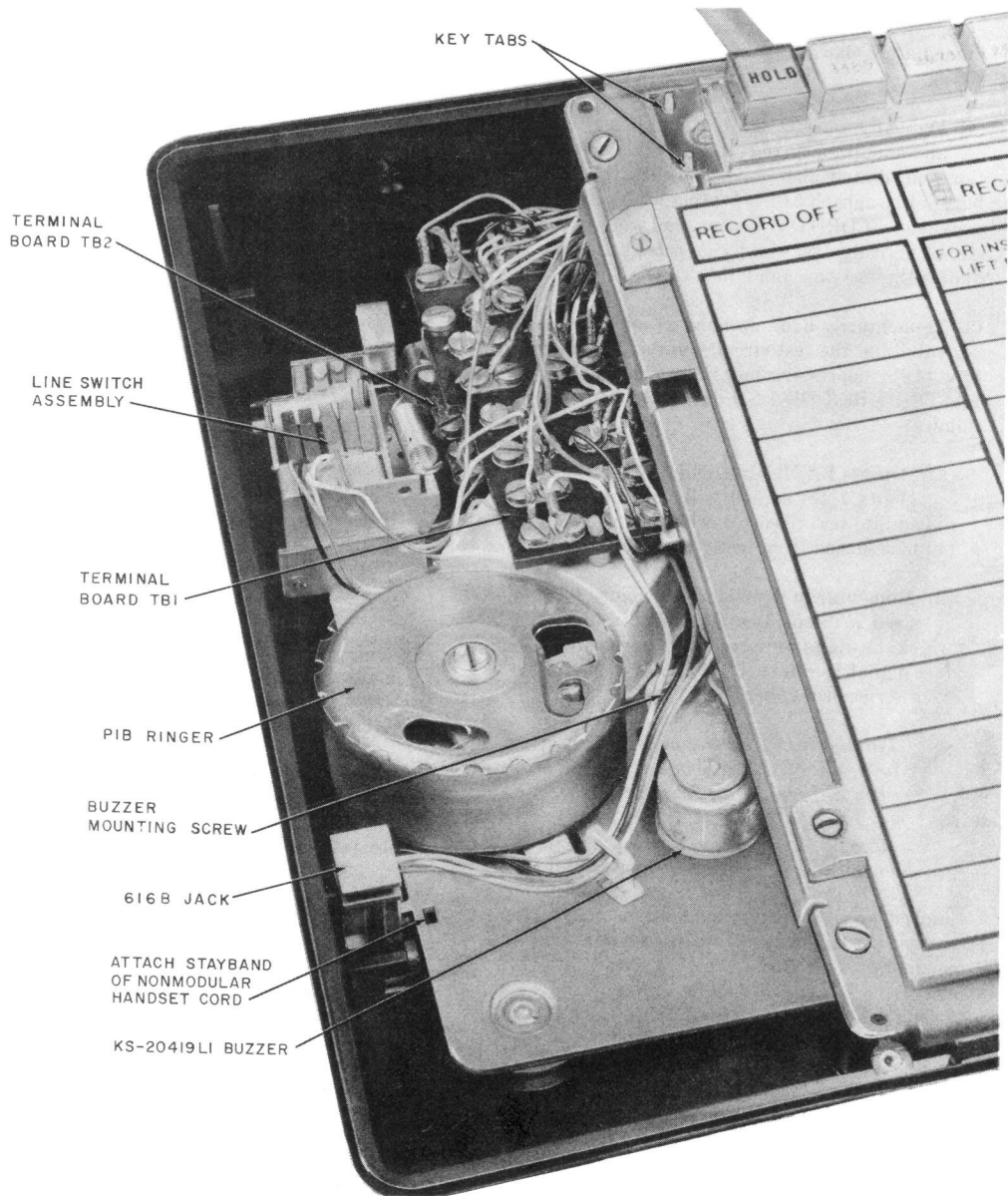
**3.06** Perform the following to designate the buttons of the 635-type 6-button key.

- (1) Use Form 5837 tabs.
- (2) Squeeze the sides of the key button caps gently and remove.
- (3) Insert the tabs.
- (4) Replace the caps so that small bumps on side of caps fit into small holes on sides of buttons.

#### Installation Check Procedure

**3.07** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Trouble Analysis, Table N.

- (1) Disconnect the power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
- (2) Reconnect the power unit to ac outlet.
- (3) With handset on-hook, record digits 1 through 0 into consecutive memory locations, storing



**Fig. 3—2872A2M Telephone Set With Faceplate, Handset, Handset Cradle, and Upper Housing Removed**

one digit per memory. Fill all memory locations except LAST NUMBER DIALED and location immediately above it [paragraph 5.01 (4) through (7)].

- (4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [paragraph 5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.
- (5) Momentarily hang up handset and automatically dial the test circuit number recorded in Step (4) by depressing button immediately above LAST NUMBER DIALED button and proceed as follows.

- (a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into test circuit. Verify that correct signal is returned from test circuit.
- (b) Momentarily depress the memory buttons used in Step (3) in the same sequence in which the digits were recorded. Verify that correct signal is returned from test circuit after each series of numbers.



**The battery and the power unit must be connected a minimum of five minutes before doing Step (c).**

- (c) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, depress a memory button of a memory location used in Step (3), to verify retention of memory.
- (6) Dial the appropriate code for ring-back to test the ringer.
- (7) Check operation of the logic reset switch by pressing the RECORD button (RECORD lamp will come on) and subsequently pressing an unoperated line button. The RECORD lamp must go out.
- (8) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory

button used in Step (4). The speakerphone should turn on, dial tone should be detected, and the stored number should be automatically dialed.

- (9) Go off-hook and manually dial a known telephone number with a WAIT input inserted in the telephone number.
- (10) Momentarily hang up the handset and then automatically dial the number by depressing the LAST NUMBER DIALED button. The set should stop dialing when it reaches the stored WAIT input. Depress the LAST NUMBER DIALED button again and the remaining digits should be dialed.

#### OPTIONAL APPARATUS INSTALLATION

##### A. D-180492 Kit of Parts (With Speakerphone)

###### 3.08 Install as follows.

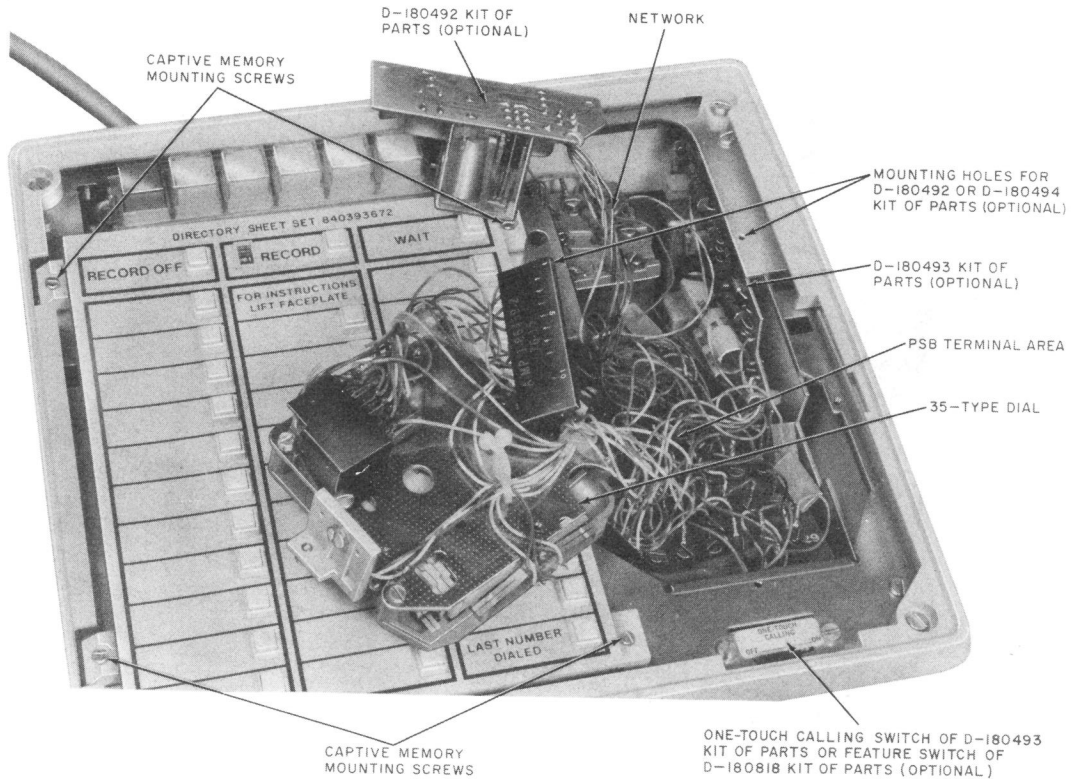
- (1) Perform steps in paragraph 3.16.
- (2) Make connections per the appropriate Tables B through E.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of printed wiring board (PWB) should be located at lower right corner.

##### B. D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)

###### 3.09 Install as follows.

- (1) Remove the housings (paragraph 3.21), and access PSB terminal board (paragraph 3.17).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the bottom of the chassis.
- (3) Lock the board into position by inserting the self-threading screw through the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If switch for D-180818 Kit of Parts is already present, the one-touch calling switch



**Fig. 4—2872A2M Telephone Set, Dial Removed To Show Terminal Area**

can not be installed. The PSB terminal where the switch leads should be connected (Table C or E) shall be strapped together. (The one-touch calling option cannot be turned off by the subscriber.)

- (5) Make connections per Table C, E, or F.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.
- (7) Verify correct operation of the option.
- (8) Reassemble set.

**C. D-180494 Kit of Parts (2/4-Wire Service)**

**3.10** Install as follows.

- (1) Perform steps in paragraph 3.17.
- (2) Make connections per Table G.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4).

**D. D-180818 Kit of Parts (Record Disable and Dial Inter-mix Features)**

**3.11** Install as follows.

- (1) Remove faceplate (paragraph 3.19).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.

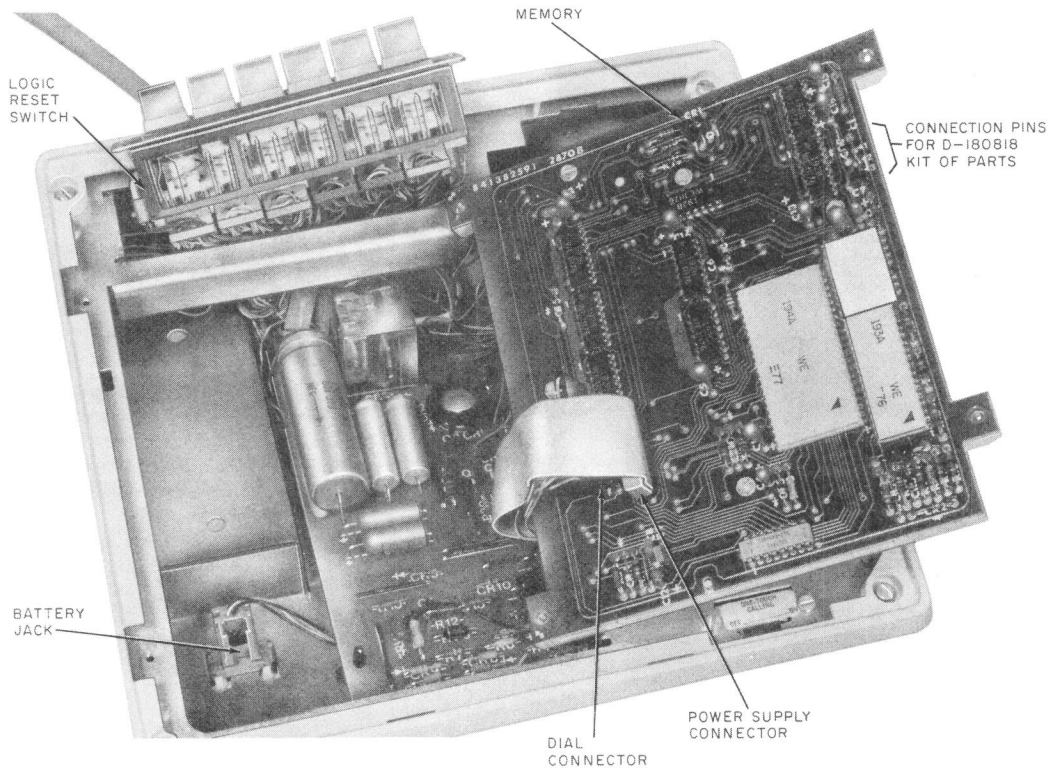


Fig. 5—2872A2M Telephone Set, Internal View, Overall

- (3) Disengage the four captive memory mounting screws (Fig. 4).
- (4) Disengage the two captive dial mounting screws and move dial aside.
- (5) Rotate left edge of the memory upward as shown by Fig. 5.

**Note:** If set is equipped with a 2870A Memory, replace it with 2870B Memory and carefully pack and return the old memory according to local procedures.

- (6) Mount switch below dial using the two screws provided (Fig. 4).

**Note:** If the one-touch calling switch (D-180493 Kit of Parts) has been provided, it must be removed. The PSB terminals where the switch leads were connected (Table C or E) must be strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

- (7) Connect switch lead connectors to post terminals on memory board per Table K.
- (8) With feature switch in OFF position, verify that set operates in normal manner:
  - Numbers can be recorded into memory.
  - Numbers can be changed.
  - Numbers can be deleted from memory.

(9) Set feature switch to ON position and verify feature provided.

- (a) For record disable feature, only.
- (1) RECORD lamp will not light when RECORD button is depressed.
  - (2) No telephone numbers can be recorded, changed, or deleted in memory.
  - (3) LAST NUMBER DIALED feature is operative.

(b) For record disable and dial intermix features.

- (1) RECORD lamp will not light when record button is depressed.
- (2) No telephone numbers can be recorded, changed, or deleted in memory.
- (3) LAST NUMBER DIALED feature is disabled.
- (4) Manually and automatically dialed digits may be intermixed (paragraph 5.07).

(10) Reassemble set.

#### E. Single Line Service

**3.12** The 2870A2M TOUCH-A-MATIC telephone set is available from the factory as a single line set. However, the 2872A1M (MD) and 2872A2M telephone sets may be converted to single line service as follows.

- (1) Remove the faceplate, key collar, and all buttons of the 635-type key.
- (2) Gain access to terminal area (paragraph 3.17).
- (3) Remove the cradle (paragraph 3.20).
- (4) Make connections per Table L.
- (5) Reassemble set and install a 2870B1 faceplate of the appropriate color.

**Note:** If set was originally equipped with a 2872A1-87 faceplate, refer to paragraph 6.11.

#### F. Head Telephone Set

**3.13** Install as follows.

- (1) Remove housing (paragraph 3.21).
- (2) Access PSB terminal area (paragraph 3.17).
- (3) Remove cradle (paragraph 3.20).
- (4) Thread jackset cord through hole in rear of housing and make connections per appropriate table provided with Plantronics Jackset.
- (5) Reassemble telephone set.
- (6) Insert head telephone set plug into jackset.



*Other optional components may be used such as SPOKESMAN\* loud-speaker sets, etc. Refer to the appropriate section for connection information for these components.*

#### COMPONENT LOCATION AND ACCESS INFORMATION

##### A. Location of Components

**3.14** The components are located in three areas as follows.

- (1) The following are located under the handset cradle (Fig. 3):
  - (a) Buzzer
  - (b) Ringer
  - (c) Line switch assembly
  - (d) Handset jack
  - (e) Terminal boards (TB1 and TB2).
- (2) The following are located under the faceplate, inside the set (Fig. 4 and 5):
  - (a) Battery jack (Fig. 5)
  - (b) Power supply (PSB) terminal area (Fig. 4)
  - (c) Network (Fig. 4)
  - (d) Options (Fig. 4) are:

(d) Options (Fig. 4) are:

- (1) D-180492 (relay kit for speakerphone)
- (2) D-180493 (dial tone detector and one-touch calling switch kit)
- (3) D-180494 (2/4-wire relay kit)
- (4) D-180818 (record disable and dial intermix feature switch).

(3) The battery is located in the bottom of telephone set (Fig. 7).

#### B. Mounting Cord

3.15 The D50BB-87 mounting cord is amphenol ended at the equipment end and equipped with 508-type plugs for terminating on the back of the 635-type key module at the telephone set end. The conductors terminated in the 508-type plugs provide the major line service requirements. Spade-tipped con-

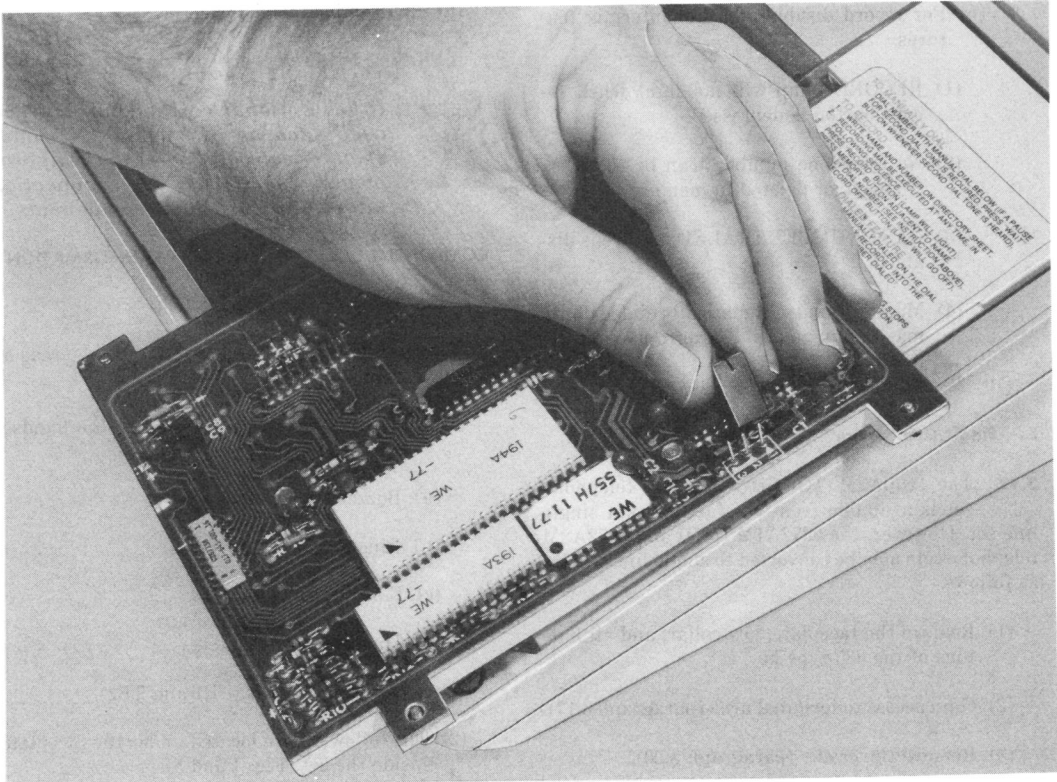


Fig. 6—2872A1M (MD) or 2872A2M Telephone Set, Connection of D-180818 Kit of Parts, Record Disable Feature Only

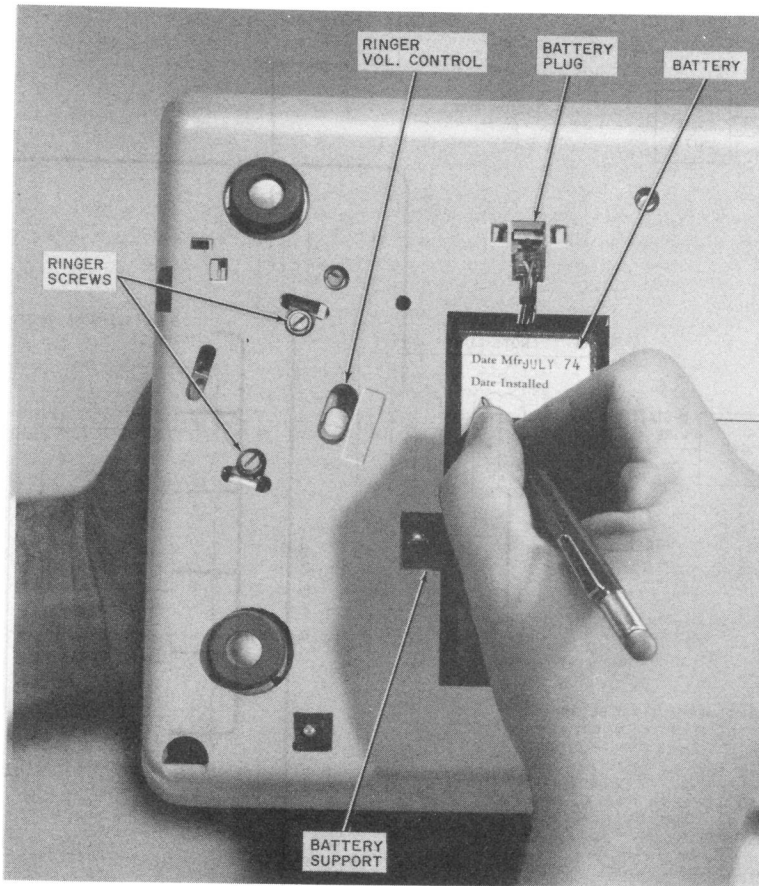


Fig. 7—2872A1M (MD) or 2872A2M Telephone Set, Bottom View

ductors are provided for auxiliary control functions or options and are terminated directly on associated equipment, terminal boards, or stored.

**Note:** Sets manufactured prior to fourth quarter 1976 are equipped with D50AM-87 mounting cords. The major difference in the cords is that TIP and RING contact strips are required with the D50AM-87, whereas individual conductors of the D50BB-87 connect to the TIP and RING contacts of the 635-type key.

### C. Network Terminals

3.16 For access to the network terminals, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.



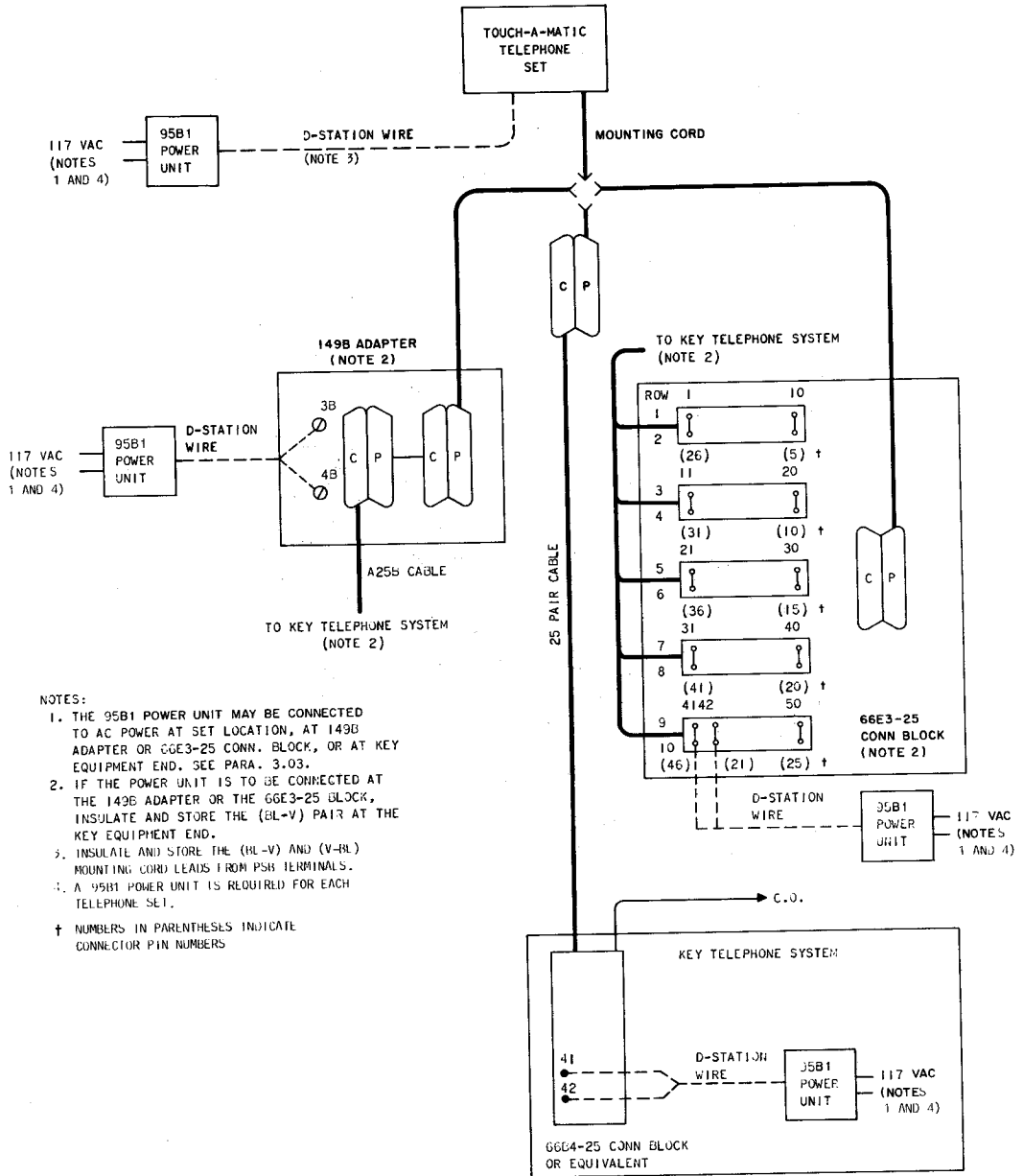


Fig. 8—2872A1M (MD) or 2872A2M Telephone Set, Alternate Power Connection Methods

♦ TABLE B ♦

## CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	LEAD		TEL. SET PSB TERM. (NOTE 1)		CONNECT		
					FROM		TO
	DESIG	COLOR			CONT UNIT (NOTE 2)		149B ADPT (D10R CORD)
			55A	55B	TERM.		
Tel Set	T1	V-G	*	2	19	1	8A
	R1	G-V	*	11	28	10	7A
	A1				12	2	A1
	AG	V-S	*	L2†	5	11	12A
	LK	S-V	*	17	11	35	11A
	R or R1				18	34	1B
	R or R1				9	25	1A
	B or B1				17	33	2B
	B or B1				8	24	2A
	Strap	BK	10	*			
Strap	BK	20	*				
D-180492 Kit of Parts	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
	VDD	W-G		21			
666B TRMTR (T7A Cord)	M1	S-BK			4	7	
	P1	BL-R			13	8	
	-15V	BK-S			14	16	
	S	O-BK			3	18	
	A1	Y-O			29	19	
	F1	G-Y			2	17	
	LK	BK-O			11	35	
760A LSPK (R2FK Cord)	SP1	G			34	20	
	SP2	R			33‡	29‡	
95B1 Pwr-Unit §	AC1						3B ¶
	AC2						4B ¶
2012B (MD) or 2012D Trnsf §	AC1				27	27	
	AC2				36	36	

Note 1: Plug telephone set mounting cord into 149B adapter.

Note 2: When 55A control unit is used, it must be the type modified for TOUCH-TONE dialing, and strap terminals 20 and 21 (55A) or 4 and 5 (55B).

\* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B)

§ Both 95B1 power unit and 2012B (MD) or 2012D transformer must be connected for speakerphone operation.

¶ Insulate and store (BL-V) and (V-BL) leads in connector cable.

- (4) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### D. Power Supply (PSB), Terminals

**3.17** To access the terminal field on the power supply board, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) Loosen the two captive screws that hold the dial in place.

**Note:** On sets with metal dial brackets, the screws will have to be removed.

- (5) Gently raise the dial and disconnect 12 position plug from terminal board.
- (6) Rotate dial over onto the memory.
- (7) To reassemble; reverse procedure.

- (8) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### E. Line Key Removal

**3.18** To remove, use the following procedure.

- (1) Remove faceplate (paragraph 3.19).
- (2) Push the key toward the rear of the set to unlock it from the tabs.

**Warning:** Do not damage logic reset switch attached on HOLD side of key. (Contact strips will only be found on sets equipped with D50AM-87 mounting cords.)

- (3) Raise the metal plate of the key just above the tabs and move the key toward the left, then

raise the right end of the key until it clears the chassis of the set.

- (4) Lift the key completely out of the set.
- (5) Replace key by reverse procedure.

#### F. Faceplate Removal

**3.19** Removal will differ depending on faceplate provided.

- (a) The 2872B1 faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The 2872B1 faceplate is not a direct replacement for the 2872A1-87 faceplate. An 870A1U upper housing is also required with the 2872B1 faceplate (see paragraph 6.11).

- (b) The 2872A1-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edges and lift.

#### G. Handset Cradle Removal

**3.20** To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19), and place the handset aside.
- (2) Remove upper housing, if provided, [paragraph 3.21(b)].
- (3) Disengage the captive cradle screws (if provided) located in the two tabs on the cradle (Fig. 2).

**Warning:** The plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the line switch arm.

- (4) Lift the cradle, by pulling up on the plunger, and remove.
- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

- (6) Refasten the captive cradle screws, if provided.

#### H. Housing Removal

3.21 To remove, proceed as follows.

(a) Remove lower housing as follows.

- (1) Unplug the handset cord, at the telephone set end and remove handset.
- (2) Remove the faceplate (paragraph 3.19).

**Warning:** Attempting to remove the housing without removing the handset cradle may damage the line switch arm.

- (3) Remove the handset cradle (paragraph 3.20).
- (4) Disengage the four captive housing screws (Fig. 2) located in each corner of the upper housing.
- (5) Separate the housing from the telephone set base.
- (6) Feed mounting cord through hole in bottom of housing as housing is removed.
- (7) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs on the chassis. Misalignment may cause the bottom of the housing to bow.
- (8) When replacing the housing, keep the handset jack from being trapped between the housing and the chassis.

(b) Remove upper housing as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Disengage the captive housing screws located in each corner of the upper housing (Fig. 2). This will release the lower housing.
- (3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.
- (4) If necessary, back screws out of upper housing.

- (5) To reassemble, reverse procedure.

#### 4. CONNECTIONS

**Caution:** Some conductor assignments are not standard (Table I).

- 4.01 Telephone set connections are shown in Fig. 9 and Table I.
- 4.02 Refer to Table A for connection reference for all options.
- 4.03 A partial functional schematic is shown in Fig. 15.

#### 5. OPERATION

##### A. Record a Number Into Memory

5.01 To record a number, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the directory sheet and faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

**Note:** If set is equipped with the D-180818 Kit of Parts, switch must be in the OFF position.

- (5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number, if an access code and pause for second dial tone is required:
  - (a) Dial the access digit(s) for the outside line.
  - (b) Push the WAIT button when the RECORD lamp relights. (The WAIT entry counts as one digit.)
  - (c) Dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

- (7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer will also be reset by a line switch, line key, or speakerphone operation.

#### B. Change a Number In Memory

**Note:** If set is equipped with a D-180818 Kit of Parts, switch must be in the OFF position.

- 5.02 Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

#### C. Delete a Number From Memory

**Note:** If set is equipped with a D-180818 Kit of Parts, switch must be in the OFF position.

- 5.03 Complete the following operations in succession.

- (1) Depress the RECORD button.
- (2) Depress the memory button corresponding to the name and number to be deleted.
- (3) Depress the RECORD OFF button.

#### D. Automatically Dial a Number From Memory

- 5.04 To automatically dial a number, proceed as follows.

- (a) For factory-wired sets go off-hook, listen for dial tone, and depress the desired memory button. If WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress memory button again to complete automatic dialing.
- (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the desired memory button.

- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the memory button.

#### E. LAST NUMBER DIALED Feature

- 5.05 The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED position (Fig. 1) any number dialed using the standard telephone dial. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

**Note:** If set is equipped with a D-180818 Kit of Parts, and dial intermix feature is provided, LAST NUMBER DIALED feature is functional only when the feature switch is in the OFF position.

- 5.06 Operation of LAST NUMBER DIALED feature is as follows.

- (a) With no access digit(s) required.
  - (1) Go off-hook
  - (2) Listen for dial tone
  - (3) Manually dial telephone number.
  - (4) To redial same number automatically, proceed as follows.
    - (a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button.
    - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
    - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.
- (b) When an access code and pause for second dial tone is required.
  - (1) Go off-hook
  - (2) Listen for dial tone

- (3) Dial access digit(s)
- (4) Depress WAIT button, after second dial tone is heard
- (5) Manually dial telephone number
- (6) To redial same number automatically, proceed as follows.

(a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded WAIT input. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.

(b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.

(c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.

#### F. End-to-End Signaling

**5.07** For end-to-end signaling (such as data transmission) this set has the capability to intermix manual and automatic dialing. This can be accomplished if the following procedures are observed.

**Note:** If the telephone set is to be used for end-to-end signaling, V option (with polarity guard) shall be used, (Fig. 9B).

(1) If the telephone set is equipped with the one-touch calling option the initial number must be dialed automatically (even if the one-touch calling switch is in the OFF position). This allows the dial tone detector to complete its function and then additional numbers may be dialed automatically or manually.

(a) **Standard Operation:** If, at any time, information is keyed in manually, the RECORD OFF button must be depressed before another number can be dialed from memory. (The RECORD lamp will not light at any time

but depressing the RECORD OFF button will remove the set from the "last number dialed" mode and allow additional automatic dialing.)

(b) **Dial Intermix (D-180818 Kit of Parts):** With the switch in the ON position, manually and automatically dialed digits may be intermixed as desired. Operation of the RECORD OFF button is not required.

**Note:** In this mode, the RECORD button and the LAST NUMBER DIALED feature are inoperative.

#### 6. MAINTENANCE

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

##### A. Trouble Analysis

**6.02** When trouble is encountered, the subsequent procedure should be followed.

(1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).

(2) Check for improper connections.

(3) Refer to Table N, and the following paragraphs.

(4) If removal of set is required, proceed as follows.

(a) Disconnect power unit from ac outlet and unplug battery.

(b) Disconnect telephone set.

**Warning: Failure to restrain plug can result in plug damage necessitating battery replacement.**

(c) Place battery plug sideways into housing slot below battery jack and tape into place.

##### B. Battery

**6.03** The KS-20390L2 and L4 batteries are not completely interchangeable. The List 2 battery

may be used in both sets but the List 4 battery should only be used in the 2872A2M telephone set. Either battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 7).

- (1) Tilt the front of the set up.
- (2) Unplug the battery.
- (3) Loosen captive screw on the battery support.
- (4) Remove battery support.
- (5) Remove battery.
- (6) Install new battery.
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a known telephone number.

#### C. Memory

**6.04** The memory may be replaced in the following manner.

- (1) Disconnect power unit from ac outlet and unplug battery.
 

**Note:** Removal of the memory or ac and battery power results in loss of stored telephone numbers.
- (2) Remove the faceplate (paragraph 3.19).
- (3) Loosen the four captive memory mounting screws (Fig. 4).
- (4) Rotate the left edge of the memory upward as shown in Fig. 5.
- (5) Disengage the two connectors by pulling on them perpendicular to the printed wiring board.
- (6) Replace the memory by engaging the dial connector first. The dial connectors are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply

cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board.

- (7) Reassemble set.
- (8) Reconnect battery and power unit.
- (9) Test per paragraph 3.07.
- (10) Reprogram memory (see Part 5).

#### D. Dial

**6.05** Replace dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in the loss of stored numbers.

- (2) Proceed per paragraph 3.17.
- (3) Loosen the four captive mounting screws of the memory (Fig. 4).
- (4) Gently raise the left side of the memory and rotate to position shown in Fig. 5. This will expose 10-position dial connector.
- (5) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (6) Lift the dial out.
- (7) To install a new dial, reverse the previous steps. The connectors are keyed to orient them relative to the pins. Observe the correct orientation and do not force the connection.
- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

#### E. 6-Button Line Key

**6.06** Replace line key as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove key per paragraph 3.18.
- (3) Access PSB terminal area per paragraph 3.17.
- (4) Disconnect logic reset leads from PSB terminals 14 and 29.
- (5) Remove the 508-type plugs and (if provided) the two contact strips from the back of the key.
- (6) Install new key.
- (7) Reassemble the set.
- (8) Reconnect battery and power unit.
- (9) Test for operation of the logic reset switch [paragraph 3.07(7)].
- (10) Reprogram memory (see Part 5).

#### F. Ringer

##### 6.07 Replace ringer as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided, [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect the ringer leads (Fig. 9I).
- (6) Tilt the front of the set up.
- (7) Loosen ringer mounting screws (Fig. 7).
- (8) Remove ringer.
- (9) Install new ringer and assemble in reverse order. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent dampening of the ringer output.
- (10) Reassemble set.

- (11) Reconnect battery and power unit.
- (12) Dial ringback code to test ringer.
- (13) Reprogram memory (see Part 5).

#### G. Buzzer

##### 6.08 Replace the buzzer as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Remove the faceplate (paragraph 3.19), and place handset aside.
- (3) Remove upper housing, if provided, [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Remove the buzzer mounting screw.
- (6) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (7) Move terminal board TB1 to gain access to the appropriate terminals on TB2.
- (8) Remove appropriate leads (Fig. 9H).
- (9) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.
- (10) Reconnect battery and power unit.
- (11) Reprogram memory (see Part 5).

#### H. Handset Jack

##### 6.09 Replace the 616B handset jack as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Remove the faceplate (paragraph 3.19), and place handset aside.



- (3) Remove upper housing, if provided, [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (6) Move terminal board TB1 to gain access to the appropriate terminals on TB2.
- (7) Disconnect the appropriate leads (Fig. 9H), and remove jack.
- (8) Reassemble. When replacing TB2, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.
- (9) Route leads through wire guide as shown in Fig. 3.
- (10) Reconnect battery and power unit.
- (11) Reprogram memory (see Part 5).

#### I. Handset

**6.10** A defective G15A handset may be replaced or changed to a modular amplifying handset (G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B) proceed as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.
 

**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Unplug H4DU handset cord at telephone set end.
- (3) Remove faceplate (paragraph 3.19), and place handset aside.
- (4) Remove upper housing, if provided, [paragraph 3.21(b)].
- (5) Remove handset cradle (paragraph 3.20).
- (6) Disconnect 616B handset jack (paragraph 6.09). (Jack may be removed or stored just to right of ringer.)

- (7) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (8) Attach stayband hook to bottom of chassis (Fig. 3).
- (9) Route leads as shown in Fig. 3.
- (10) Make connections (Fig. 9H).
- (11) Reassemble set.
- (12) Reconnect battery and power unit.
- (13) Reprogram memory (see Part 5).

#### J. Faceplate

**6.11** To replace a 2872A1-87 faceplate with a 2872B1 faceplate, proceed as follows.

- (1) Remove the 2872A1-87 faceplate by lifting up at any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U upper housing to the chassis and 870A1 housing. The three parts should be held tightly together as the screws are driven.
- (4) Place the two tabs located along the lower edge of the 2872B1 faceplate in the notches in the lower side of the 870A1U-type upper housing.
- (5) Lower the faceplate to rest on the memory. The spring clip located at the top center of the upper housing should retain the faceplate.

#### K. Speakerphone

**6.12** For maintenance information on the 3B (MD) or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively.

**6.13** For speakerphone connections use appropriate Tables, B through E.

◆ TABLE C ◆

CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 3B (MD) SPEAKERPHONE

APPARATUS	LEAD		TEL SET PSB TERM. (NOTE 1)		CONNECT		
					FROM		TO
	DESIG	COLOR	FROM	TO	CONT UNIT (NOTE 2)		149B ADPT (D10R CORD)
					55A	55B	TERM.
Tel Set	T1	V-G	*	2	19	1	8A
	R1	G-V	*	11	28	10	7A
	A1				12	2	A1
	AG	V-S	*	L2†	5	11	12A
	LK	S-V	*	17	11	35	11A
	SPO	O-V	*	34	3	18	5B
	R or R1				18	34	1B
	R or R1				9	25	1A
	B or B1				17	33	2B
	B or B1				8	24	2A
	Strap	BK	10	*			
	Strap	BK	20	*			
	Strap	BK	19	*			
	Strap	BK	26	*			
Strap	BK	29	*				
D-180493 Kit of Parts	Input	G-R		2			
	PB	O-BK		9			
	Input	G-R		11			
	LK	Y-G		17			
	DT	O-Y		19			
	VDD	R-O		21			
	DR	Y-O		24			
	PL	O-R		25			

See notes and footnotes at end of table.

◆ TABLE C (Contd) ◆

CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 3B (MD) SPEAKERPHONE

APPARATUS	LEAD		TEL SET PSB TERM. (NOTE 1)		CONNECT		
					FROM		TO
	DESIG	COLOR	FROM	TO	CONT UNIT (NOTE 2)		149B ADPT (D10R CORD)
					55A	55B	TERM.
D-180493 Kit of Parts (Contd)	DTT	BL-Y		26			
	SPR	Y-BL		27			
	COM	BK-O		29			
	SPO	G-Y		34			
	Switch	S			28		
		S			29		
D-180492 Kit of Parts	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
	VDD	W-G		21			
666B (MD) TRMTR (T7A Cord)	M1	S-BK			4	7	
	P1	BL-R			13	8	
	-15V	BK-S			11	16	
	S	O-BK			3	18	
	A1	Y-O			29	19	
	F1	G-Y			2	17	
	LK	BK-O			11	35	
760A (MD) Lspk (R2FK Cord)	SP1	G			34	20	
	SP2	R			33‡	29‡	

See notes and footnotes at end of table.

◆ TABLE C (Contd) ◆

**CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 3B (MD) SPEAKERPHONE**

APPARATUS	LEAD		TEL SET PSB TERM. (NOTE 1)		CONNECT		
					FROM		TO
	DESIG	COLOR	FROM	TO	CONT UNIT (NOTE 2)		149B ADPT (D10R CORD)
					55A	55B	TERM.
95B1 Pwr Unit §	AC1						3B ¶
	AC2						4B ¶
2012B (MD) or 2012D Trnsf §	AC1				27	27	
	AC2				36	36	

*Note 1:* Plug telephone set mounting cord into 149B adapter.

*Note 2:* When 55A control unit is used, it must be the type modified for TOUCH-TONE dialing, and strap terminals 20 and 21 (55A) or 4 and 5 (55B).

\* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

§ Both 95B1 power unit and 2012B (MD) or 2012D transformer must be connected for speakerphone operation.

¶ Insulate and store (BL-V) and (V-BL) leads in connector cable.

◆ TABLE D ◆

CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
4A SPEAKERPHONE ONLY, USING 82B CONNECTING BLOCK

APPARATUS	LEAD		TEL SET PSB TERM.		82B CONN BLK (NOTE)	CONN CABLE AT KEY EQUIP	
	DESIG	COLOR	FROM	TO		COLOR	TO
Tel Set	T1	V-G	*	2	‡		
	R1	G-V	*	11			
	A1						
	AG	V-S	*	L2†			
	LK	S-V	*	17			
	Strap	BK	10	*			
	Strap	BK	20	*			
D-180492 Kit of Parts	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
85B1 Power Unit §						BR-V	*
	AC1	BK			AC1		
95B1 Power Unit §						V-BR	*
	AC2	Y			AC2		
85B1 Power Unit §						BL-V	*
	AC1	R			21		
						V-BL	*
	AC2	G			46		

Note : Plug mounting cords of telephone set, 108-type loudspeaker, and 680-type transmitter into 82B connecting block. Install option plug in ringer cutoff mode.

\* Insulated and stored.

† Terminal on network.

‡ For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.

§ Both 85B1 and 95B1 power units must be connected for speakerphone operation.

◆ TABLE E ◆

CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 4A SPEAKERPHONE

APPARATUS	LEAD		TEL SET PSB TERM.		82B CONN BLK (NOTE )	CONN CABLE AT KEY EQUIP	
	DESIG	COLOR	FROM	TO		COLOR	TO
Tel Set	T1	V-G	*	2			
	R1	G-V	*	11			
	A1						
	AG	V-S	*	L2†	Strap 10 to 35	O-V	*
	LK	S-V	*	17			
	SPO	O-V	*	34			
	Strap	BK	10	*			
	Strap	BK	20	*			
	Strap	BK	19	*			
	Strap	BK	26	*			
	Strap	BK	29	*			
D-180493 Kit of Parts	Input	G-R		2			
	PB	O-BK		9			
	Input	G-R		11			
	LK	Y-G		17			
	DT	O-Y		19			
	VDD	R-O		21			
	DR	Y-O		24			
	PL	O-R		25			
	DTT	BL-Y		26			
	SPR	Y-BL		27			
	COM	BK-O		29			
	SPO	G-Y		34			
	SWITCH	S		28			
		S		29			

See notes and footnotes at end of table.

◆ TABLE E (Contd) ◆

**CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH  
ONE-TOUCH CALLING USING 4A SPEAKERPHONE**

APPARATUS	LEAD		TEL SET PSB TERM.		82B CONN BLK (NOTE)	CONN CABLE AT KEY EQUIP	
	DESIG	COLOR	FROM	TO		COLOR	TO
D-180492 Kit of Parts	CE	BL-BK		10			
	B+	BK-BL		15			
	SHa	R-BL		16			
	LK	BL-R		17			
	SHi	G-W		18			
	PFR	BL-V		20			
	VDD	W-G		21			
85B1 Power Unit §						BR-V	*
	AC1	BK			AC1		
						V-BR	*
95B1 Power Unit §	AC2	Y			AC2		
	AC1					BL-V	*
		R			21		
	AC2	G			46	V-BL	*

*Note* : Plug mounting cords of telephone set, 108-Type loudspeaker, and 680-Type transmitter into 82B connecting block. Install option plug in ringer cutoff mode.

\* Insulated and stored.

† Terminal on network.

‡ For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.

§ Both 85B1 and 95B1 power units must be connected for speakerphone operation.

**TABLE F**  
**CONNECTIONS – 2872A1M OR 2872A2M**  
**TELEPHONE SET WITH DIAL TONE**  
**DETECTOR ONLY (SEE NOTE)**

APPARATUS	LEAD		TEL SET PSB TERM.		
	DESIG	COLOR	FROM	TO	
Tel Set	Strap	BK	19	*	
	Strap	BK	26	*	
D-180493 Kit of Parts	Input	G-R		2	
	PB	O-BK		9	
	Input	G-R		11	
	LK	Y-G		*	
	DT	O-Y		19	
	VDD	R-O		21	
	DR	Y-O		24	
	PL	O-R		25	
	DTT	BL-Y		26	
	SPR	Y-BL		*	
	COM	BK-O		29	
	SPO	G-Y		*	
	Switch	S			*
		† S			*

*Note:* May be used for applications where first dial tone is not precise (350 Hz and 440 Hz) but all subsequent dial tones must be precise if number is to be dialed automatically.

\* Insulated and stored.

† Switch is not required when speakerphone is not provided.



**TABLE G**  
**CONNECTIONS FOR 2/4-WIRE SERVICE**

APPARATUS	LEAD COLOR	REMOVE FROM	CONNECT TO
Tel Set	BK-G	Net. GN	Net. L1
	BK	Net. R	*
	BR-V	*	PSB-17
	V-BR	*	PSB-34
D-180494 Kit of Parts	V		Net. T
	S		Net. L2
	BR		PSB-3
	Y-BR		Net. L1
	BL-R		Net. GN
	G-BK		PSB-17
	R-BR		Net. R
	R-O		Net. S
	BL-Y		PSB-34

\* Insulated and Stored.

**TABLE H**  
**CONVERSION OF KEYS FOR SIGNALING**

SELECTIVE SIGNALING							
508 PLUG (NOTE 1)	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions	HPPPPP	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-4
	HPPPPS	TB1-3	TB1-2	TB1-2	TB1-2	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-2	TB1-5	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-5	TB1-5	TB1-5	TB1-4
COMMON SIGNALING (NOTE 2)							
508 PLUG (NOTE 1)	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions	HPPP*P*S	TB1-3	TB1-3	TB1-2	TB1-2	TB1-2	TB1-3
	HPP*P*P*S	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-3

**Note 1:** Remove pins to make key nonlocking when used for signaling.

**Note 2:** Insulate and store (BK) strap lead from TB1-3.

\* These arrangements use line switch controlled ground for common signal key, used with private or intercommunicating lines. Common signal should be used to operate a common signal relay. Do not wire directly to a buzzer.

**TABLE I**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND. IN MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
R(1)	1	BL-W		BL	6	BL	6	BL-W	*
T(1)	26	W-BL		BL	3	BL	3	W-BL	*
A1	2	O-W	TB1-12			BL	2	W	TB1-3
A(1)	27	W-O		BL	1	BL	1	W-O	*
L(1)	3	G-W		BL	L				
LG(1)	28	W-G		BL	LG				
R(2)	4	BR-W		O	6				
T(2)	29	W-BR		O	3				
B(2)	5	S-W	*			O	2	R	TB1-2
A(2)	30	W-S		O	1				
L(2)	6	BL-R		O	L				
LG(2)	31	R-BL		O	LG				
R(3)	7	O-R		G	6				
T(3)	32	R-O		G	3				
B(3)	8	G-R	*			G	2	BK	TB1-2
A(3)	33	R-G	TB1-7			G	1	S-W	TB1-7
L(3)	9	BR-R		G	L				
LG(3)	34	R-BR		G	LG				
R(4)	10	S-R		BR	6				
T(4)	35	R-S		BR	3				
B(4)	11	BL-BK	*			BR	2	Y	TB1-2
A(4)	36	BK-BL	TB1-9			BR	1	BR	TB1-9
L(4)	12	O-BK		BR	L				
LG(4)	37	BK-O		BR	LG				
R(5)	13	G-BK		S	6				
T(5)	38	BK-G		S	3				
B(5)	14	BR-BK	*			S	2	V	TB1-2
A(5)	39	BK-BR	TB1-4			S	1	S	TB1-4
L(5)	15	S-BK		S	L				
LG(5)	40	BK-S		S	LG				
BZ1	168	BL-Y	TB2-11						
BZ	418	Y-BL	TB2-5						

See footnotes at end of table.

**TABLE I (Contd)**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLLR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND. IN MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
Spare	17	O-Y	*						
Spare	42	Y-O	*						
HL	18	G-Y	PSB-32						
HLG	43	Y-G	PSB-33						
SG	19	BR-Y	TB1-5						
BL	44	Y-BR	TB1-6						
R or R1	20	S-Y	TB1-13						
B or B1	45	Y-S	Net. K						
AC1 †	21 †	BL-V	PSB-30						
AC2 †	46 †	V-BL	PSB-31						
SPOs	22 †	O-V	*						
Spare	47	V-O	Net. T						
R1s	23	G-V	*						
T1s	48	V-G	*						
IR §	24	BR-V	*						
IT §	49	V-BR	*						
LK §	25	S-V	*						
AG §	50	V-S	*						
Tip						S	4	G	TB1-8
Ring						S	5	R	PSB-12
						Pink	HL	BR-W	PSB-32
						Pink	HLG	W-BR	PSB-33
						Pink	3	BL	*
						Pink	2	G	TB1-1
						Pink	1	Y-BL	TB1-3

\* Insulate and store.

† Nonstandard pin numbers.

‡ 95B1 power unit (TOUCH-A-MATIC telephone set power supply)

§ Designations for speakerphone options. Refer to Tables B through E.

TABLE J

TO CONVERT THE 2872A1M OR 2872A2M  
TELEPHONE SET FROM 1A1, 1A2, TO  
1A OPERATION (SEE NOTE)

LEAD DESIG	COLOR	FROM (1A1, 1A2)	TO (1A)
LSb	Y	TB1-12	TB1-5
Hold	Y-BL	TB1-3	TB1-16
Hold	BL	‡ (Pink 508 Plug)	TB1-3
Hold	G	TB1-1	Spare 1 §
Ring	R	PSB-12	Spare 1 §
LSc*	BR	TB1-1	TB1-6
Net. L2 †	R-BL	TB1-1	TB1-6

*Note:* Tables B through E provide speakerphone connections for 1A1 and 1A2 KTS. The same tables apply for 1A KTS.

\* Only required when busy-lamp option is provided.

† Only required when both busy-lamp and speakerphone options are provided.

‡ Insulated and stored.

§ Connect to same spare terminal or D-161488 connector.

TABLE K

CONNECTIONS FOR D-180818  
KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIG.	COLOR (NOTE 1)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX FEATURE (NOTE 2)
WDC	BK *	†	1
VDD	R	2	2
RCD	BK	3	3

*Note 1:* These are connectors attached to the switch leads. A single pin connector with a (BK) lead and a double pin connector with a (R) and (BK) lead.

*Note 2:* When this option is provided the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

\* Single pin connector.

† Insulate and store.

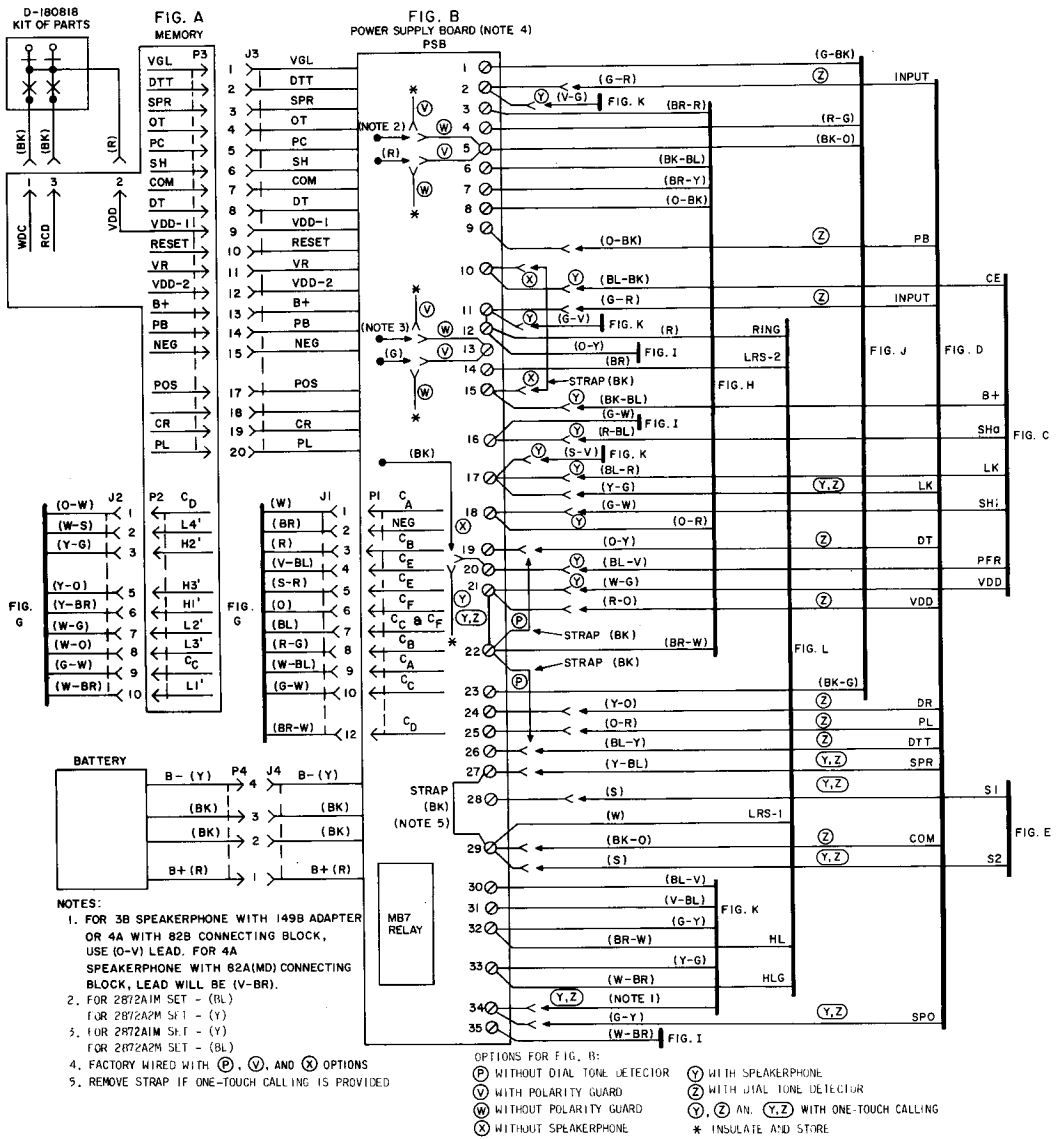
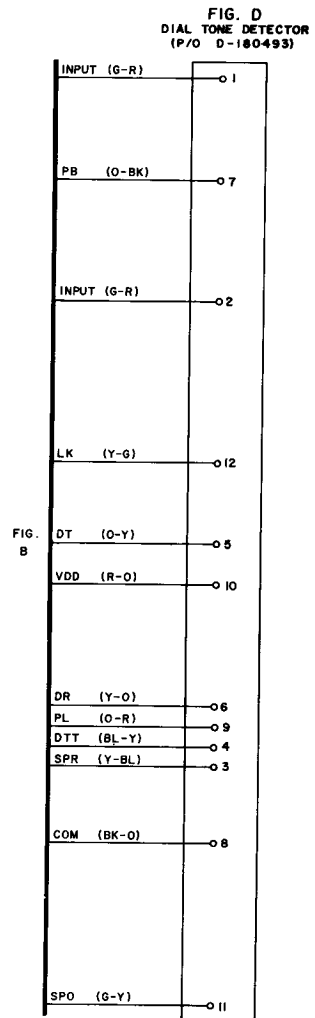
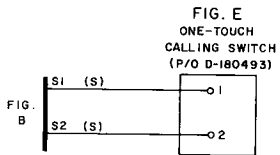
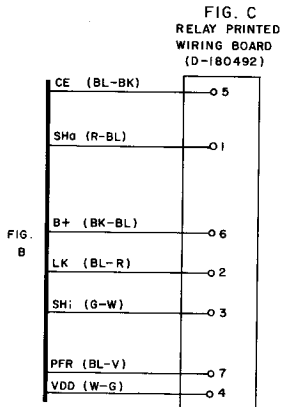


Fig. 9—2872A1M (MD) or 2872A2M Telephone Set, Connections (Sheet 1 of 5)



**Fig. 9—2872A1M (MD) or 2872A2M Telephone Set, Connections (Sheet 2 of 5)**

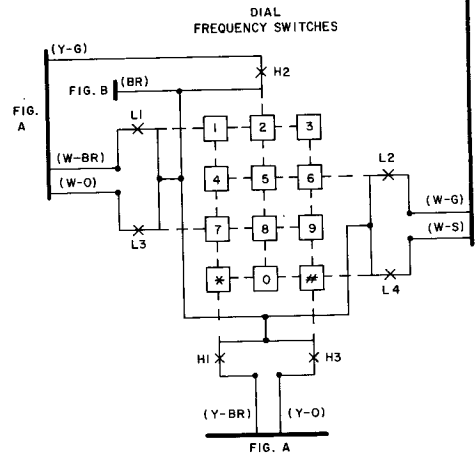
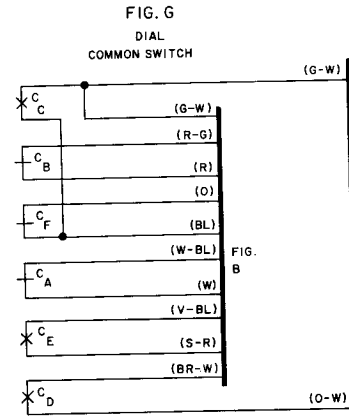
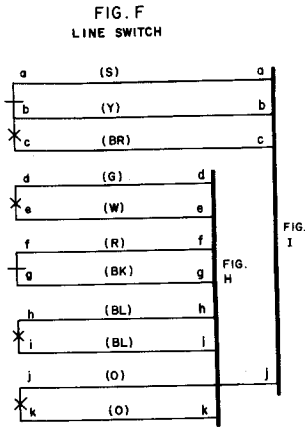


Fig. 9—2872A1M (MD) or 2872A2M Telephone Set, Connections (Sheet 3 of 5)

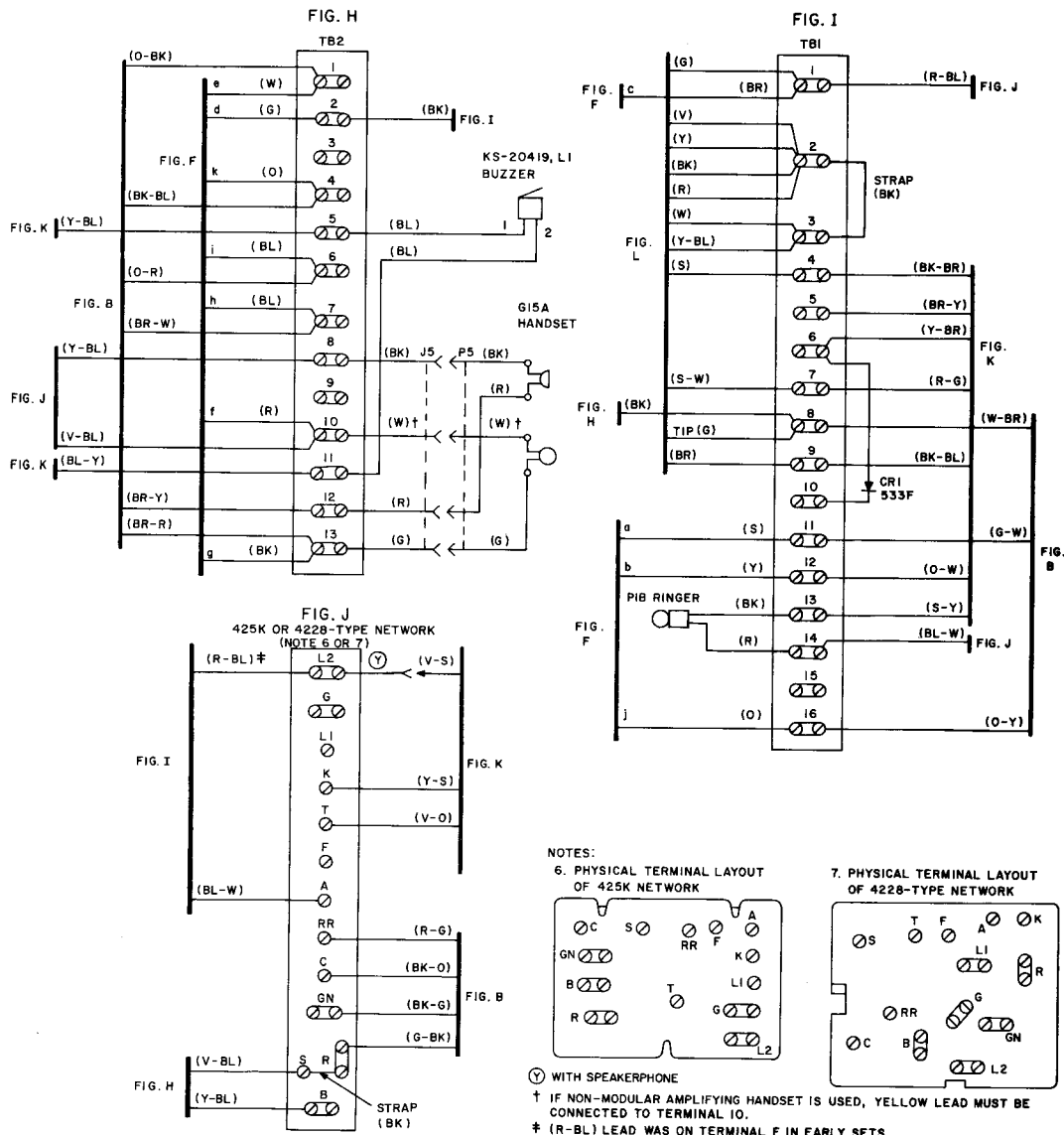
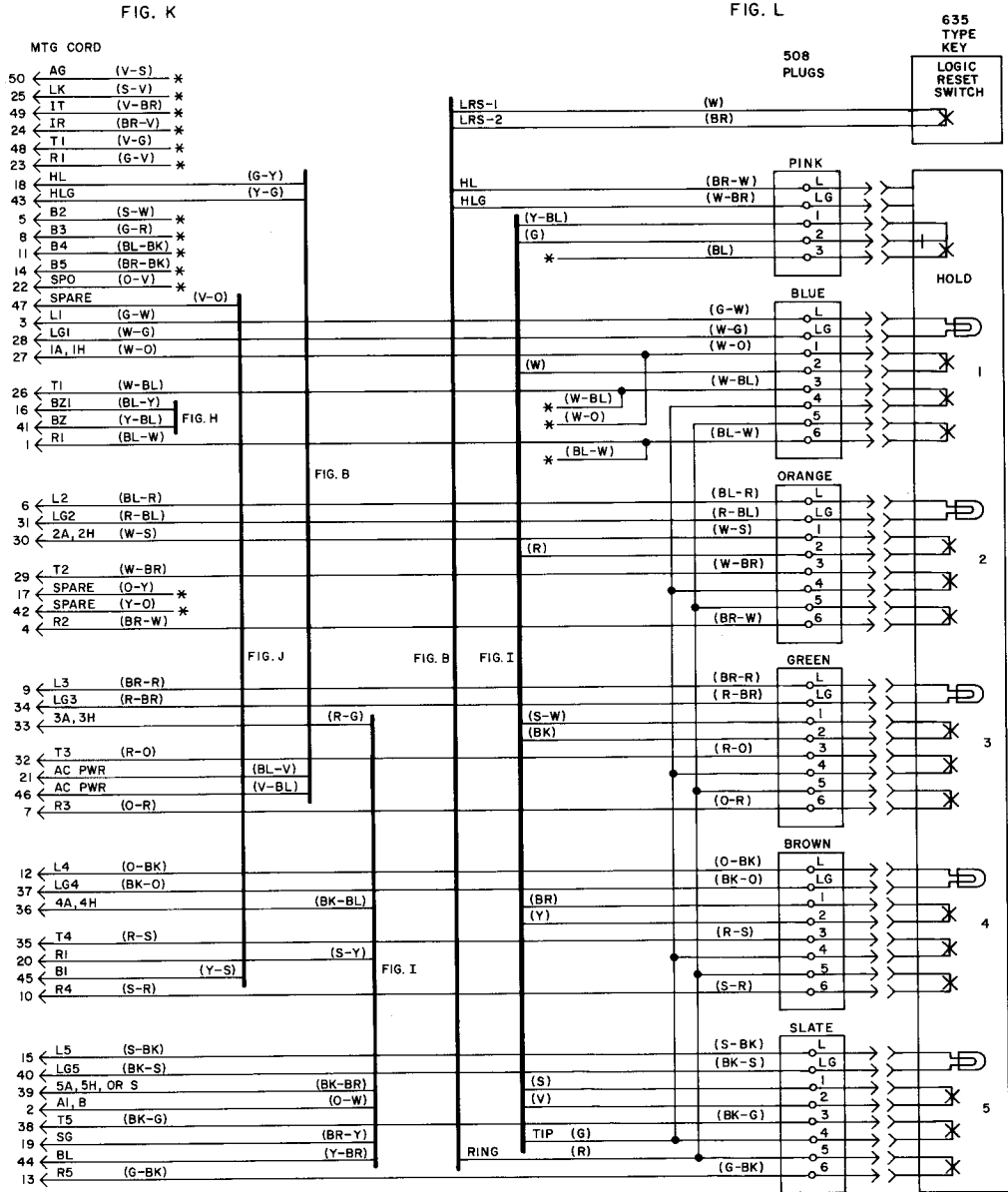


Fig. 9—2872A1M (MD) or 2872A2M Telephone Set, Connections (Sheet 4 of 5)





\* - INSULATE AND STORE.

Fig. 9—2872A1M (MD) or 2872A2M Telephone Set, Connections (Sheet 5 of 5)

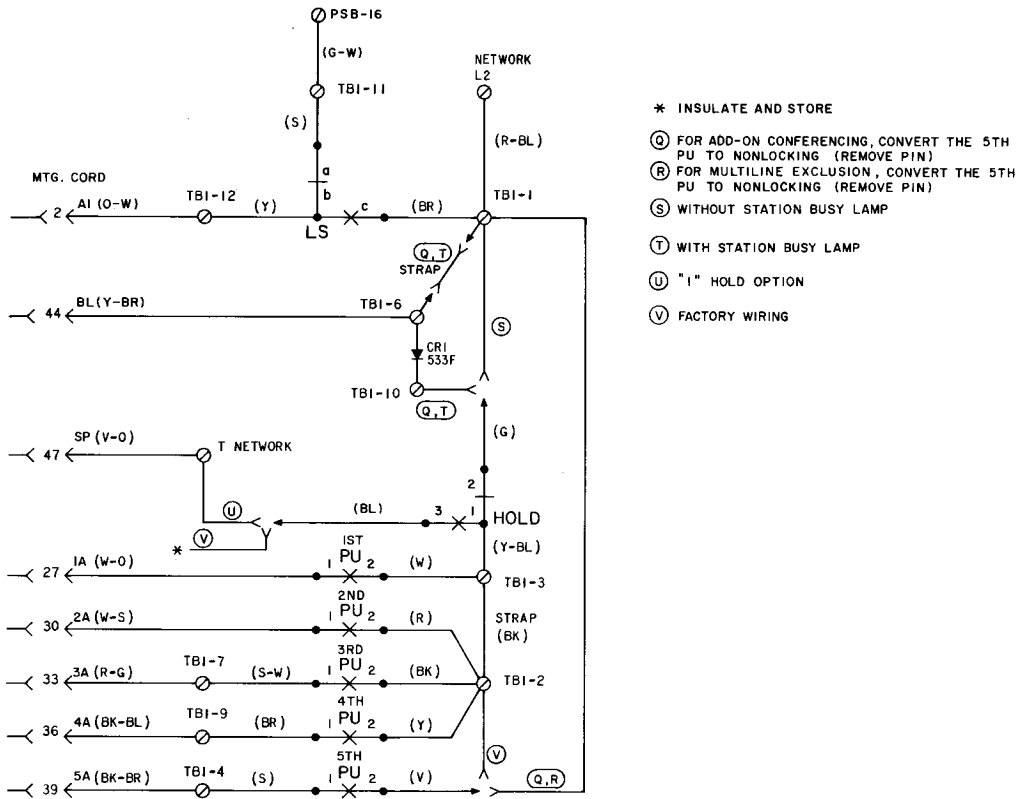


Fig. 10—"1" Hold, Exclusion, Station Busy Lamp, and Add-On Conferencing—1A1 or 1A2 KTS (Showing 5th Key Modified)

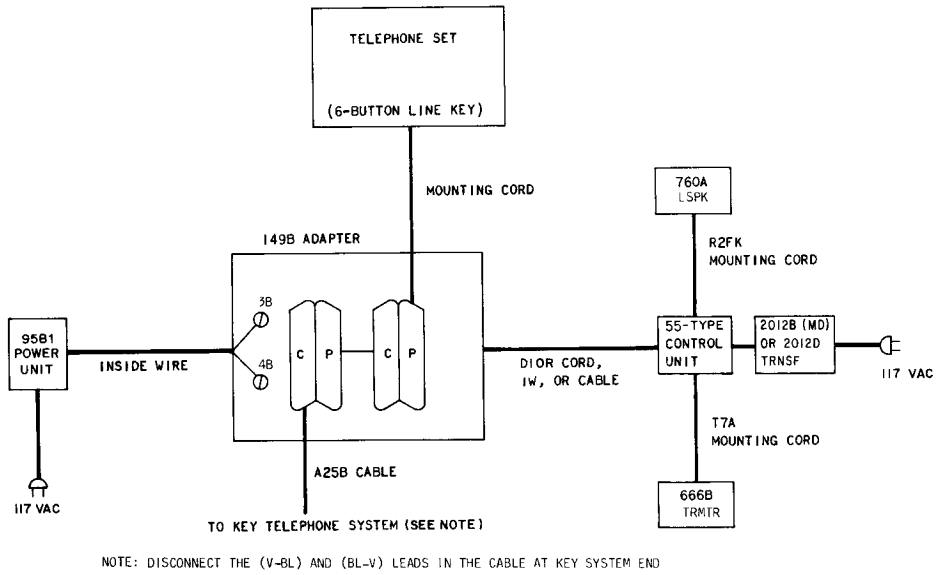
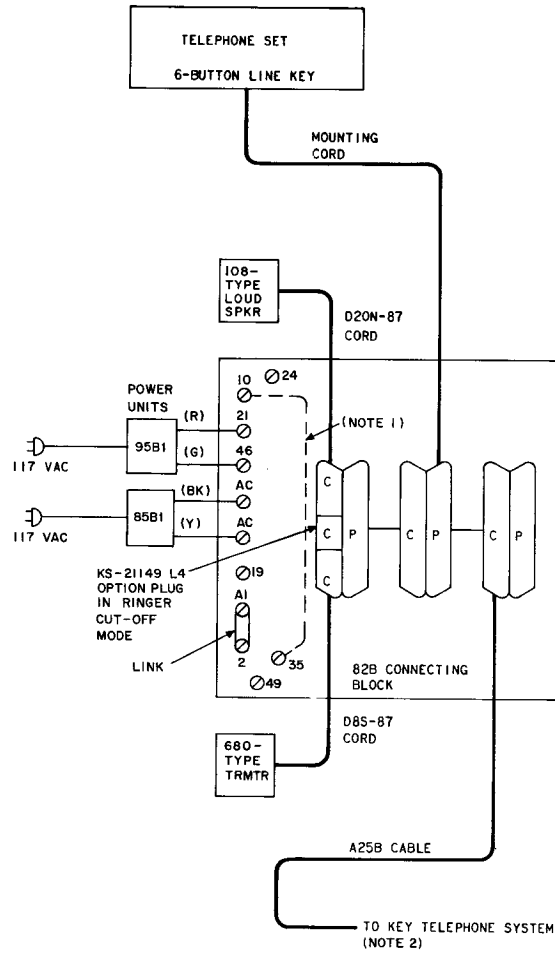


Fig. 11—Block Diagram—2872A1M (MD) or 2872A2M Telephone Set Using 3B (MD) Speakerphone



NOTES:

1. STRAP NECESSARY ONLY IF SET IS ALSO EQUIPPED WITH DIAL TONE DETECTOR TO PROVIDE ONE-TOUCH CALLING OPTION.
2. IF POWER IS PROVIDED THROUGH KEY CABLE, USE (BR-V) PAIR FOR 82B-TYPE POWER UNIT AND STRAP 24 TO AC1 AND 49 TO AC2 ON 82B CONNECTING BLOCK.

Fig. 12—Block Diagram—2872A1M (MD) or 2872A2M Telephone Set Using 4A Speakerphone

TABLE L

CONNECTIONS FOR CONVERSION  
TO SINGLE LINE SERVICE WITH  
BRIDGED RINGING

LEAD		CONNECT	
DESIG.	COLOR	FROM	TO
Tip	W-BL	(1PU-3)*	TB1-8
Ring	BL-W	(1PU-6)*	TB1-16
B1	Y-S	Net. K	*
Strap	BK	Net. K	PSB-35
R1	S-Y	TB1-13	*
Strap	BK	TB1-13	TB1-16
A-Lead	W-O	(1PU-1)*	TB1-1
Hold	Y-BL	TB1-3	*
LRS-2	BR	PSB-14	*

\* Insulated and stored.

TABLE M

CONVERSION TO BRIDGED  
RINGING ON FIRST LINE WITH  
6-BUTTON KEY SERVICE

LEAD		CONNECT	
DESIG.	COLOR	FROM	TO
Tip	W-BL	(1PU-3)*	Net. K
Ring	BL-W	(1PU-6)*	TB1-13
B1	Y-S	Net. K	*
R1	S-Y	TB1-13	*

\* Insulated and stored.

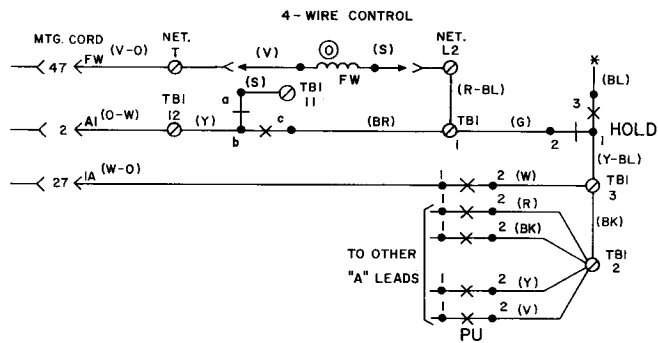
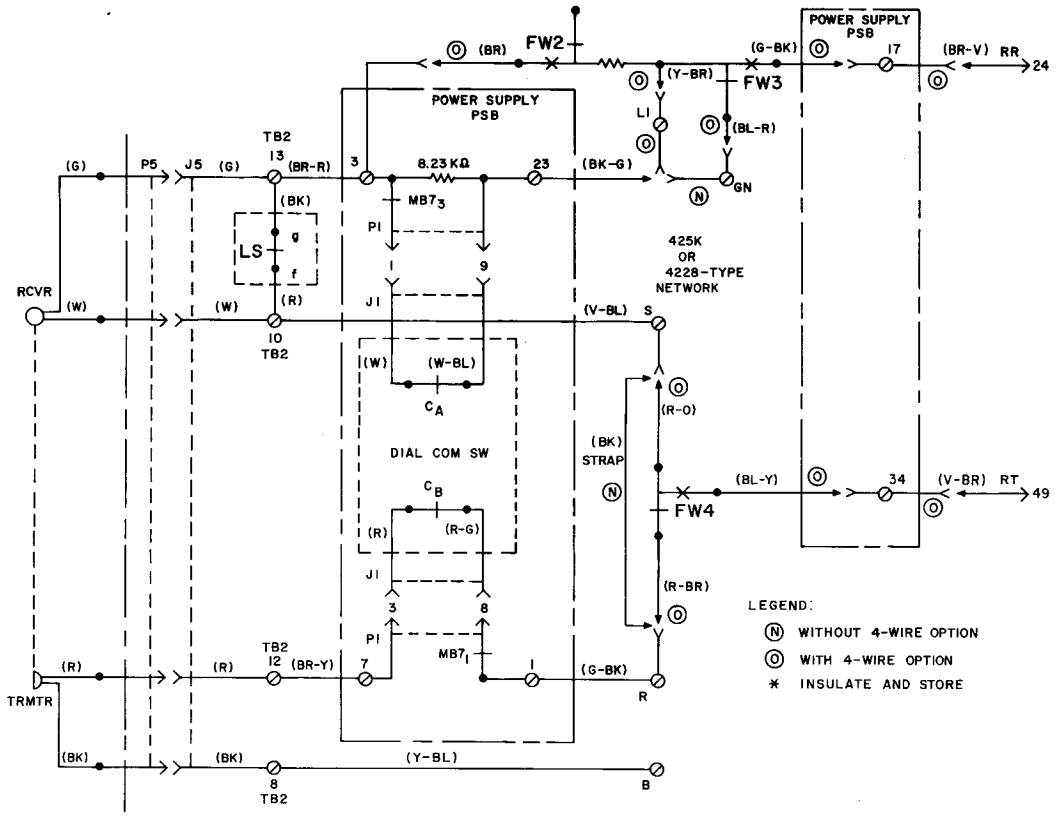
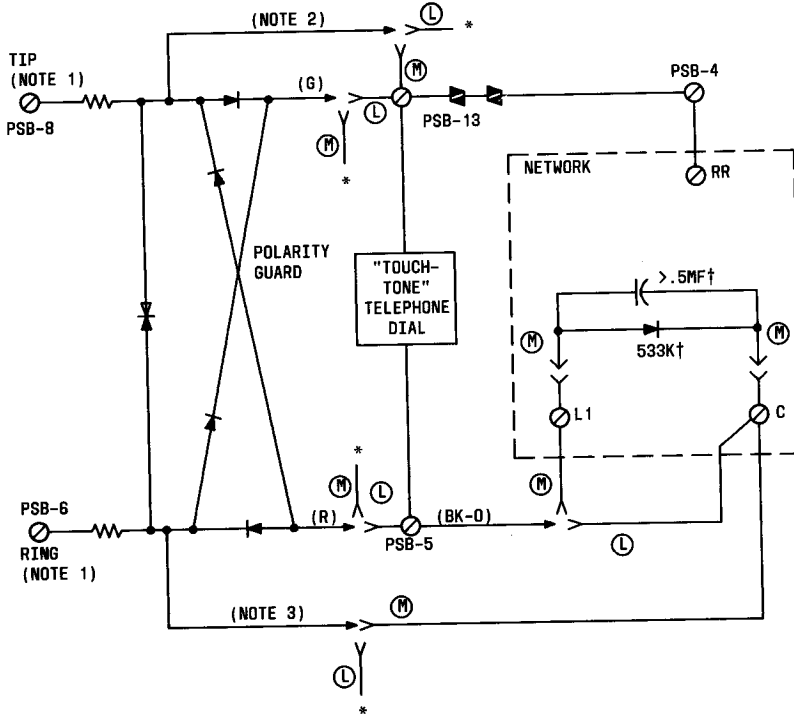


Fig. 13—2872A1M (MD) or 2872A2M Telephone Set—2/4-Wire Connections



- \* INSULATED AND STORED
  - † DIODE AND CAPACITOR ORDERED AND INSTALLED SEPARATELY
  - Ⓛ WITHOUT RESTRICTED DIALING (FACTORY WIRED)
  - Ⓜ WITH RESTRICTED DIALING
- NOTES:
1. REVERSE POLARITY ON TIP AND RING LEADS ON ALL LINES WITH RESTRICTED DIALING
  2. FOR 2872A1M SET - (Y)  
FOR 2872A2M SET - (BL)
  3. FOR 2872A1M SET - (BL)  
FOR 2872A2M SET - (Y)

Fig. 14—2872A1M (MD) or 2872A2M Telephone Set, Connections for Restricted Dialing Option

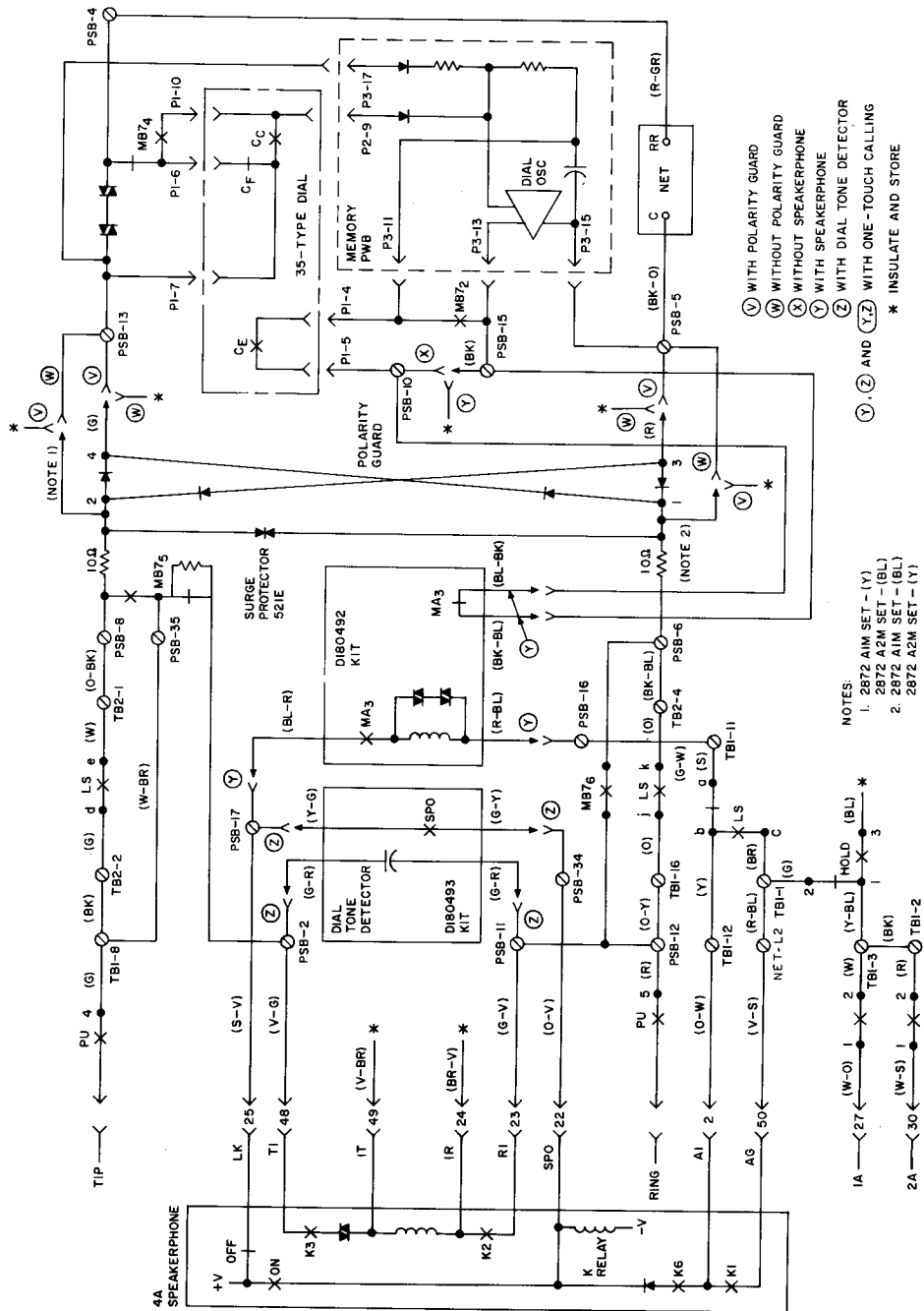


Fig. 15—2872A1M (MD) or 2872A2M Telephone Set, Partial Functional Schematic



♦ TABLE N ♦

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set on all lines	Line lamp does not come on when handset is taken off-hook	Mounting cord improperly inserted at equipment end	Check cord insertion and connections
		Line lamp comes on when handset is taken off-hook	Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
			Defective receiver	Check handset
		Unknown	Replace telephone set*	
		Dial tone is not present when speakerphone is on	Open tip or ring lead at line key	Check leads and connections from contact strips
Dial tone is present when speakerphone is on	Defective line switch d-e or j-k contacts	Replace telephone set*		
2	Cannot transmit or receive when off-hook using handset	Line lamp comes on	Handset cord improperly inserted into handset or jack in telephone set	Check handset cord and/or handset
		Dial tone present, but sidetone absent. No audible TOUCH-TONE dialing signal	12-pin connector or dial not properly inserted on pins on power supply board	1. Check connector insertion 2. Replace dial
			Defective 616B jack	Replace 616B jack
		Defective network	Replace telephone set*	
3	Cannot manually dial when off-hook	Clicking sounds or damped TOUCH-TONE dialing signals heard when dial buttons are depressed Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook
			No audible TOUCH-TONE dialing signal present	20-pin power supply connector not properly inserted on pins on memory PWB
		Dial connectors not properly inserted		1. Check connector insertion 2. Replace dial
		Defective memory PWB		Replace memory
		Unknown	Replace telephone set*	
Some TOUCH-TONE dialing frequencies incorrect	Static discharge damage	1. Consult Telco engineer for proper grounding procedure 2. Replace memory		
4	Cannot manually dial some digits when off-hook		Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on dial	Replace dial

\*Refer to paragraph 6.02(4).

♦ TABLE N (Contd) ♦

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
4 (contd)			Defective memory PWB	Replace memory.	
			Unknown	Replace telephone set*	
5	Cannot manually dial off-hook for ac power failure condition	Can manually dial off-hook with ac power	Open strap lead between screw terminals 10 and 15 on PSB	Repair or replace strap lead	
			Open path on PSB	Replace telephone set*	
6	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not plugged in, or defective	Plug in or replace battery	
			RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
				Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF
			AC power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 VAC across screw terminals 30 and 31 on PSB)	
				Open in IW	Check IW and connection
			Memory, RECORD OFF, or WAIT button stuck down	Clear stuck button	
			Defective lamp or lamp driver circuit	Replace memory	
			Defective logic reset switch on line key	Replace line key	
			Static discharge damage	1. Consult your Telco engineer for proper grounding procedures 2. Replace memory	
			Unknown	Replace telephone set*	
			Lamp turns off when any memory button is depressed or Lamp does not momentarily turn off when a dial button is depressed	Defective logic	Replace memory
Unknown	Replace telephone set*				
7	Cannot record into memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button	
			Wait contacts closed even when WAIT button is not depressed	1. Check WAIT button 2. Replace memory	

\*Refer to paragraph 6.02(4).

♦ TABLE N (Contd) ♦

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
8	Cannot record properly into the 31 memory positions or into the LAST NUMBER DIALED position	Warble tones heard when automatically dialing. Get "cannot complete" intercept for automatic or manual dialing	WAIT contacts closed even when WAIT button is not depressed	Replace memory	
			Switch of D-180818 Kit of Parts in ON position	Change switch position to OFF	
		Party is reached when number is recorded as it is manually dialed. However, when number is subsequently dialed from memory, party is not reached – wrong number is dialed from memory	Incorrect dial contact sequence	Replace dial	
			Defective logic	Replace memory	
			Open circuit on PSB	Replace telephone set*	
9	Cannot dial properly from memory		Did not record properly	1. Record per paragraph 5.01 2. See No. 7	
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE dialing signal present	Battery not plugged in (2872A2M tel set)	Plug battery in	
			Memory not securely mounted	Tighten memory mounting screws	
			Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 9 [B]	
			Defective logic	Replace memory	
			Defective line switch h-i contacts	Replace telephone set*	
		MB7 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number	Incorrect dial sequence	Replace dial	
					No audible TOUCH-TONE dialing signal present
					Audible gap in train of digits being dialed
		Digits dialed too rapidly (fast dialer)	Noise on ac power line (2872A1M)	Minimize wire length between 95B1 power unit and telephone set.	
			Defective power supply PWB assembly (2872A2M)	Replace telephone set*	

\*Refer to paragraph 6.02(4).

♦ TABLE N (Contd) ♦

TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (contd)		No digits or random digits in memory	AC power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory
			Disconnected or defective battery	<ol style="list-style-type: none"> <li>1. Plug in the battery</li> <li>2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B1 power unit from the ac power outlet and reinsert</li> <li>3. If previously stored numbers are not dialed from memory, replace the battery</li> <li>4. Repeat procedure</li> </ol>
			Defective power supply circuit	Replace telephone set*
		No digits or all the same digits in random memory locations	Defective memory	Replace memory
		Two or more memory locations have some digits which are usually different from originally recorded digits	Static discharge damage	<ol style="list-style-type: none"> <li>1. Consult your Telco engineer for proper grounding procedures</li> <li>2. Replace memory</li> </ol>
Automatically dials through a "wait" after pausing momentarily at the "wait" space on a train of recorded digits		Defective WAIT contacts or defective circuit components	Replace memory	
		Defective dial tone detector	Replace dial tone detector PWB assembly of D-180493 Kit of Parts (if option is provided).	
10	Cannot manually dial off-hook for ac power failure condition  (Wired for speakerphone option)	With a strap lead between screw terminals 10 and 15 on PSB, can manually dial off-hook for ac power failure condition	Defective circuit or connections on D-180492 Kit of Parts	<ol style="list-style-type: none"> <li>1. Check connections per Table B, C, D, or E</li> <li>2. Replace D-180492 Kit of Parts</li> </ol>
11	Cannot turn speakerphone on when ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on, but line lamp is lit.	Handset off-hook	Place handset on-hook
		No dial tone heard, but indicator lamp turns on	Line button not depressed	Depress line button
		Speakerphone indicator lamp does not turn on and neither does line lamp	Improper connections or defective 85B1 power unit	<ol style="list-style-type: none"> <li>1. Check connections per Table B, C, D, or E</li> <li>2. Check for commercial power</li> <li>3. Check that 85B1 power unit is plugged into commercial ac power outlet</li> <li>4. Check or replace 85B1 power unit (should read 18 to 25 VAC across secondary screw terminals)</li> </ol>

\*Refer to paragraph 6.02(4).

♦ TABLE N (Contd) ♦

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
11 (cont'd)		Speakerphone indicator lamp does not turn on but line lamp lights	Improper connections or defective 95B1 power unit	1. Check connections 2. Check or replace power unit (should read 13.4 to 18 VAC across screw terminals 30 and 31 on PSB)
		With temporary strap lead added between power supply screw terminals 16 and 17, speakerphone turns on when ON button is depressed	Defective 327A relay, MA3 relay or connecting leads on D-180492 Kit of Parts	Replace D-180492 Kit of Parts
		When temporary strap lead added between screw terminals 11 and 12 on TB1, speakerphone turns on when ON button is depressed	Defective line switch a-b contacts or connecting lead to PSB	1. Check (G-W) harness lead between screw terminal 11 on TB1 and terminal 16 on PSB 2. Replace telephone set*
			Defective speakerphone	See appropriate speakerphone BSP
12	Cannot turn speakerphone off when handset is lifted off-hook (Wired for speakerphone option)	Speakerphone turns off when OFF button is depressed but turns back on when OFF button is released	Short circuit between screw terminals 11 and 12 on TB1	Clear short
			Defective line switch a-b contacts	Replace telephone set*
13	RECORD lamp does not turn off when speakerphone ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on. Line lamp is lit	Handset off-hook	Place handset on-hook
		With temporary strap lead added between screw terminals 16 and 17 on power supply, speakerphone turns on when ON button is depressed and RECORD lamp goes off	LK relay circuit defective on D-180492 Kit of Parts	Replace D-180492 Kit of Parts
		Operation of RECORD OFF button or line key buttons turns RECORD lamp off	Defective line switch h-i contacts	Replace telephone set*
14	Cannot break dial tone when dialing with speakerphone on (Wired for speakerphone option)	Cannot manually dial when off-hook	Refer to trouble number 3	Refer to trouble number 3
		When dial button is depressed, audible level of TOUCH-TONE dialing signal is high on spkrphn	Defective muting circuit on PSB	Replace telephone set*
15	Cannot hear tones when dialing with speakerphone on (Wired for speakerphone option)	With the speakerphone ON button depressed, the audible tone level is normal	Physical spacing between speakerphone loudspeaker and transmitter units is too close	See appropriate speakerphone BSP for proper placement of units
		Normal conversational level on speakerphone	Defective muting circuit on PSB	Replace telephone set*

\*Refer to paragraph 6.02(4).

◆ TABLE N (Contd) ◆

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
16	Cannot turn speakerphone off (Wired for one-touch option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Black strap lead to PSB-27 was not insulated and stored	Remove the strap lead
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 27 on PSB and OFF button is depressed	Defective output logic level from memory PWB	Replace memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook	Defective circuit on D-180493 Kit of Parts	Replace dial tone detector board assembly of D-180493 Kit of Parts
17	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (Wired for one-touch option)	MB7 relay does not operate (no click heard) when memory button is depressed	Battery not plugged in (2872A2M set)	Plug battery in
			3B (MD) speakerphone: V-BR lead connected to PSB-34	Insulate and store V-BR lead, and connect O-V lead to PSB-34
			4A speakerphone installed using 82A connecting block	Change to 82B connecting block
			4A speakerphone with 82B block: strap not placed on 82B block	Add strap from terminal 10 to 35 in 82B block
		With temporary strap between screw terminals 28 and 29 on PSB, speakerphone turns on when a memory button is depressed	One-touch calling switch turned off or defective	1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
		With temporary strap between screw terminals 17 and 34 on PSB, speakerphone turns on.	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 17 and 34, respectively
Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts			
18	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (Wired for one-touch option)		Defective timing circuit	1. Replace memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts

\*Refer to paragraph 6.02(4).

♦TABLE N (Contd) ♦

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
19	Speakerphone turns on but set does not automatically dial when memory button is depressed		Black strap leads were not lifted from PSB terminals 19 and 26 when option was wired	Insulate and store strap leads.
	(Wired for one-touch option)	Set dials when screw terminals 26 and 29 on PSB are temporarily shorted	Precise dial tone not present	1. Check CO line for presence of precise dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D-180493 Kit of Parts
		Set does not dial from memory when screw terminals 26 and 29 on PSB are temporarily shorted	Defective logic	Replace memory
20	Automatic dialing commences for no apparent reason (wired for one-touch option)		Static discharge damage	1. Consult your Telco engineer for proper grounding procedures 2. Replace memory
21	Calls not completed if handset is quickly taken off-hook while automatically dialing on a speakerphone	Automatic dialing is terminated before all digits are dialed	Marginal switchhook sequence between a-b and h-i contacts	Remove handset more slowly from handset cradle
22	Set dials automatically but does not wait for dial tone (Wired for one-touch calling)		Noise on line	1. Add 0.05 uf capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10K $\Omega$ -50K $\Omega$ ) in series with (G-R) dial tone detector input lead.
23	Cannot dial properly from memory when on handset (Wired with dial tone detector option)	MB7 relay does not operate (no click heard) when memory button is depressed.	Battery not plugged in (2872A2M tel set)	Plug battery in
			Precise TOUCH-TONE service dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten memory mounting screws
		Improper installation of dial tone detector, D-180493	Check connections for D-180493 installation	
		Same as above – Addition of strap lead between PSB terminals 26 and 29 does not correct problem	Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Addition of strap lead between PSB terminals 26 and 29 corrects problem	Defective memory	Replace memory
	Defective dial tone detector	Replace D-180493 dial tone detector		
	Unknown	Replace telephone set*		

\*Refer to paragraph 6.02(4).

◆ TABLE N (Contd) ◆

## TROUBLE ANALYSIS – 2872A1M OR 2872A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
24	Hum or Noise caused by electrical apparatus (light dimmer switch, etc)		Unbalanced telephone line	Check for unintentional connections that might cause an unbalanced telephone line



## 872A1M "TOUCH-A-MATIC®" 32 TELEPHONE SET

### IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATIONS, AND MAINTENANCE

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## 1. GENERAL

1.01 This section contains information on the 872A1M rotary dial TOUCH-A-MATIC telephone set (Fig. 1).

**⚠Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class B computing device pursuant to subpart J or Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of the equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.⚡**

1.02 The reasons for reissuing this section are listed below. Revision arrows are used to emphasize the more significant changes.

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy and may radiate this energy, paragraph 1.01

- Change all references to 95B-type power unit to 95B1 power unit
- Show that both 2012-type transformer and 95B1 power unit must be connected for 3B (MD) speakerphone system operation (Tables B and C)
- Show that both 85B1 and 95B1 power units must be connected for 4A speakerphone system operation (Tables D and E).

1.03 The 872A1M telephone set is factory-wired for use with 1A1, 1A2, or 6A key telephone systems (KTS). It may be converted (see Table K) for use with 1A KTS.

1.04 The telephone set is available in the following colors:

- Black (-03)
- Green (-51)
- White (-58)
- Light. Beige (-60).

1.05 The 872A1 (MD) faceplate is available in only the satin-silver (-87) color.

1.06 The 872B1 decorative faceplates are available in the following colors:

- Teak Woodgrain (-108)
- Walnut Woodgrain (-109)
- Matte Aluminum (-122).

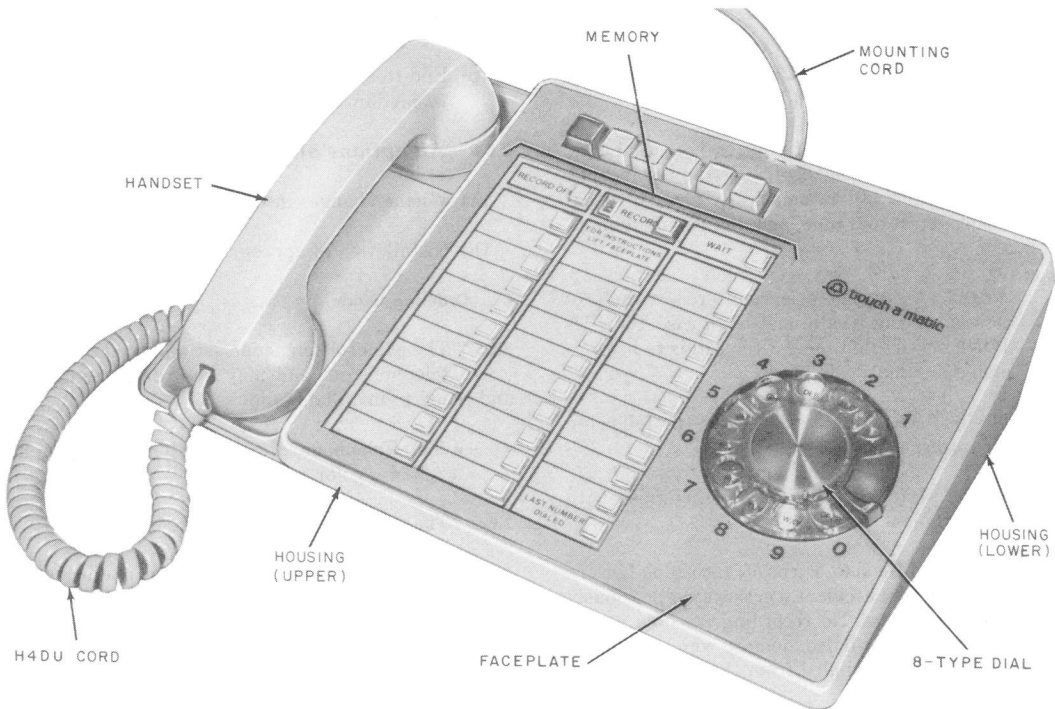
## 2. IDENTIFICATION

2.01 The 872A1M telephone set provides all standard features of a 6-button key telephone set plus automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED **scratch pad** memory.

### A. Design Features

2.02 Design features are as follows:

- Modular key telephone set



**Fig. 1—872A1M Telephone Set**

- Convertible to single line operation
  - Integrated circuit memory
  - Common audible ringing
  - Buzzer
  - Busy lamp diode
  - Line pickup buttons convertible to nonlocking signal buttons
  - Memory buttons from which to select preprogrammed telephone numbers for automatic dialing
  - Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
  - Last number dialed memory
  - Plug-in battery
  - Capability to pause for subsequent dial tones during automatic dialing (WAIT input).
- B. Optional Features**
- 2.03** Optional features (refer to Table A) are as follows:
- (a) Decorative Faceplate.

- (b) Speakerphone: Either 3B (MD) or 4A speakerphone systems may be added to stations.
- (c) Dial Tone Detector: Automatically starts dialer when precise TOUCH-TONE® service dial tone (350 Hz and 440 Hz) is present.
- (d) One-Touch Calling, (requires both dial tone detector and speakerphone): Depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number.

**Note:** All dial tones encountered in the process of placing a call must be precise TOUCH-TONE service dial tone, if the call is to be completed automatically.

- (e) D-180818 Kit of Parts provides the following features:

**Note:** Telephone set must be equipped with an 870B Memory.

- (1) Record Disable: Turns off recording feature to prevent accidental erasures of previously stored numbers. No recording possible except for last number dialed memory which will store digits manually dialed from the telephone set.
- (2) Record Disable and Dial Intermix Feature: Digits dialed manually from telephone set dial and digits dialed automatically from memory may be intermixed without depressing RECORD OFF button. Memories cannot be altered and LAST NUMBER DIALED feature is inoperative.
- (f) Station Busy Lamp.
- (g) 2/4-Wire Service.
- (h) Add-On-Conference.
- (i) Exclusion (multiline).
- (j) Bridged Ringing.
- (k) "I" Hold.
- (l) Signaling.
- (m) Restricted Dialing.

- (n) Amplifying Handset.
- (o) Head telephone set operation using jackset.
- (p) End-to-end signaling using 1035C3A (MD) or 1035AF3A dial (Section 501-164-130).

#### 2.04 All options are implemented by:

- (a) Wiring changes in the telephone set.
- (b) Installation of appropriate additional items.

#### C. Ordering Guide

2.05 The 872A1M telephone set is a modular type telephone set and may be ordered complete and ready to install as follows.

- Set, Telephone, 872A1M (refer to paragraph 1.04 for color suffix).

2.06 The following must be ordered separately:

- Unit, Power, 95B1 (required for operation of the automatic dialing feature)

**Note:** One power unit is required for each telephone set.

- Decorative Faceplate, 872B1-108 (Teak Woodgrain) or 872B1-109 (Walnut Woodgrain).

2.07 The 872A1M set is comprised of the following component parts:

- (a) Housing (Lower) 870A1-(refer to paragraph 1.04 for color suffix)
- (b) Housing, (Upper), 870A1U-(refer to paragraph 1.04 for color suffix) (used with 872B1 faceplate)
- (c) Faceplate, 872A1-87 (MD)
- (d) Faceplate, 872B1-122 (matte aluminum)
- (e) Handset, G15A-(refer to paragraph 1.04 for color suffix)
- (f) Cord, Handset, H4DU-(refer to paragraph 1.04 for color suffix)

◆ TABLE A ◆

## OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone (Paragraph 3.08)	4A	108AA Loudspeaker	12	D, E
		680AE Transmitter	12	D, E
		82B Connecting Block	12	D, E
		85B1 Power Unit	12	D, E
		D-180568 Kit of Parts	9 (C)	D, E
	3B (MD)	760A (MD) Loudspeaker	11	B, C
		666B (MD) Transmitter	11	B, C
		55-Type (MD) Control Unit	11	B, C
		2012D Transformer	11	B, C
		149B Adapter		B, C
		D-180568 Kit of Parts	9 (C)	B, C
	One-Touch Calling (Paragraph 3.09)	D-180493 Kit of Parts	9 (D, E)	C or E
		Speakerphone	9 (B)	
Dial Tone Detector (Paragraph 3.09)	D-180493 Kit of Parts	9 (D)	C, E, or F	
Station Busy Lamp		10		
"I" Hold		10		
Signaling			M	
Exclusion (Multiline)		10		
Add-On-Conference		10		
Bridged Ringing			H, I	
2/4 Wire Service * (Paragraph 3.10)	D-180494 Kit of Parts	13	G	
1A Key Service			K	
Amplifying Handset (Paragraph 6.10)	G6BM, G7BM, or G8BM Handset	9 (H)		
Restricted Dialing	533K Diode	14		
Record Disable (Paragraph 3.11)	D-180818 Kit of Parts †		L	
Dial Intermix (Paragraph 3.11)				
Decorative Faceplate (Paragraph 1.04 and 6.11)	872B2-108 (Teak)‡			
	872B1-109 (Walnut)‡			
Head Telephone Set Operation (Paragraph 3.13)	Plantronics Jackset Model JS0180-1A or JS0180-2A	Tables provided with Plantronics Jackset		
	Desired Head Telephone Set§			

\* D-Kits for 2/4 wire service and speakerphone are designed to mount in the same place in the set. If both services are to be provided simultaneously, consult your TELCO engineer.

† If set is equipped with an 870A memory, replace with an 870B memory.

‡ An 870A1U upper housing may be required (paragraph 6.11).

§ The KS-19796, KS-20778, 52-, 53-, and 60-type headsets are registered with the Jackset Models.

(g) Base, Telephone Set, 872AM (includes the following):

- Dial, 8EA-119
- Key, 635BT5
- 812365039 (P-23F503) Collar
- Ringer, P1B
- Network, 425K or 4228-type
- Buzzer, KS-20419L1 or KS-20419L2
- Cord, Mounting, D50BB-87
- Battery, KS-20390L4 or KS-20390L2
- Jack, Handset, 616B
- Memory, 870B
- 841382617 Power Supply Printed Wiring Board (PSB) Assembly
- 840393672 Directory Sheet Set
- Booklet, Instruction, Subscriber, SIB-2455B.

**2.08** Order optional apparatus (order as required) as follows:

- Kit of Parts, D-180568 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Kit of Parts, D-180494 (for conversion to 4-wire service)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix)

**Note:** This kit of parts may be used only with sets equipped with an 870B Memory.

- Faceplate, 872B1-(refer to paragraph 1.06 for color suffix.)

**Note:** If set is equipped with an 872A1-87 faceplate, then an upper housing (870A1U-

[refer to paragraph 1.06 for color suffix]) of the appropriate color must also be ordered.

- Handset, Amplifying (G6BM, G7BM, or G8BM)
- Set, Head Telephone [using Plantronics Jacket Model JS0180-1A (1-1/2 foot cord) or JS0180-2A (6-foot cord)].

#### D. Operating Features

**2.09** Operating features (Fig. 2) are as follows.

- Line key (635BT5), 6-button key. Hold with five line pickup buttons which are convertible to nonlocking. An additional momentary contact (logic reset switch) is attached to the hold side of the key to reset the logic circuit anytime a key button is depressed.
- 32-button array of low force, low travel, nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.
- LAST NUMBER DIALED button, located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed.
- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.
- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.
- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) required].

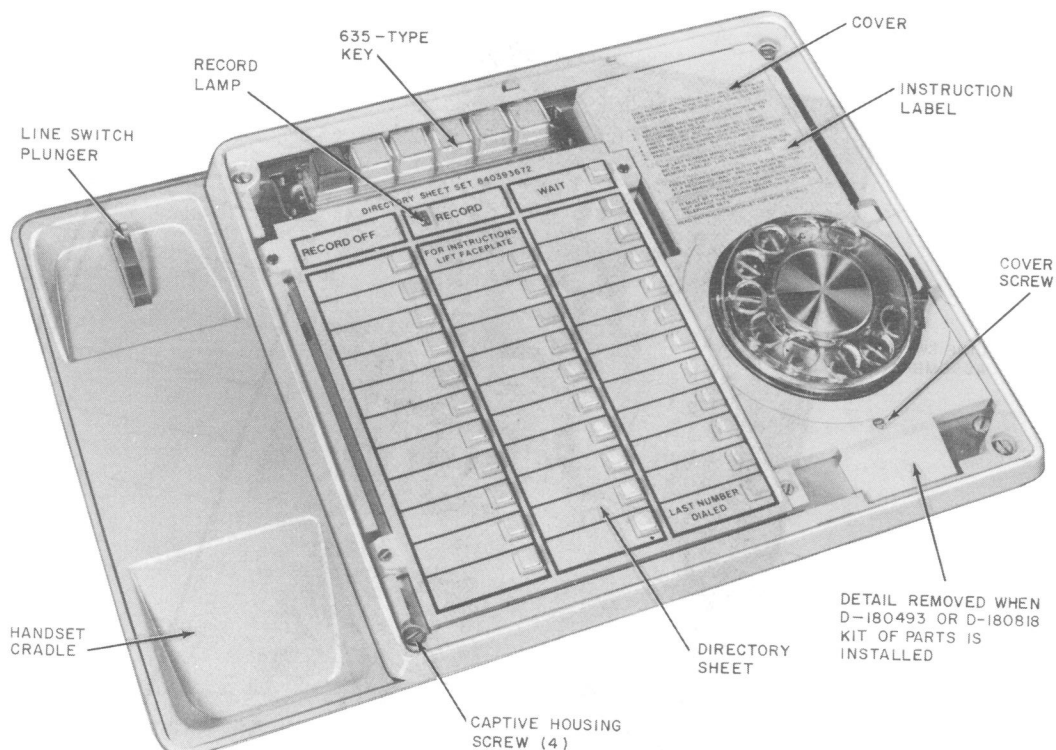


Fig. 2—872A1M Telephone Set—Faceplate and Handset Removed

### 3. INSTALLATION

#### STANDARD INSTALLATION

**Warning:** Do not plug in either battery or power unit until all connections and modifications are complete. Take extreme care not to damage the exposed components, circuit, etc. when the set is opened.

**3.01** Make all wiring changes and telephone set modifications (Table A) before external connections are made to the set, see Fig. 9 and Table J.

**3.02** The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery (Fig. 7), by tilting the set up, and inserting the battery plug into the mating jack.

**Note:** Write date of installation on label provided on battery.

**Danger 1:** If used, securely attach retaining clamp to ac outlet using outlet cover screw BEFORE attempting to install  $\nabla 95B1 \nabla$  power unit. The power unit and any other cord plugged into the ac outlet should always be unplugged completely from the outlet BEFORE attempt-

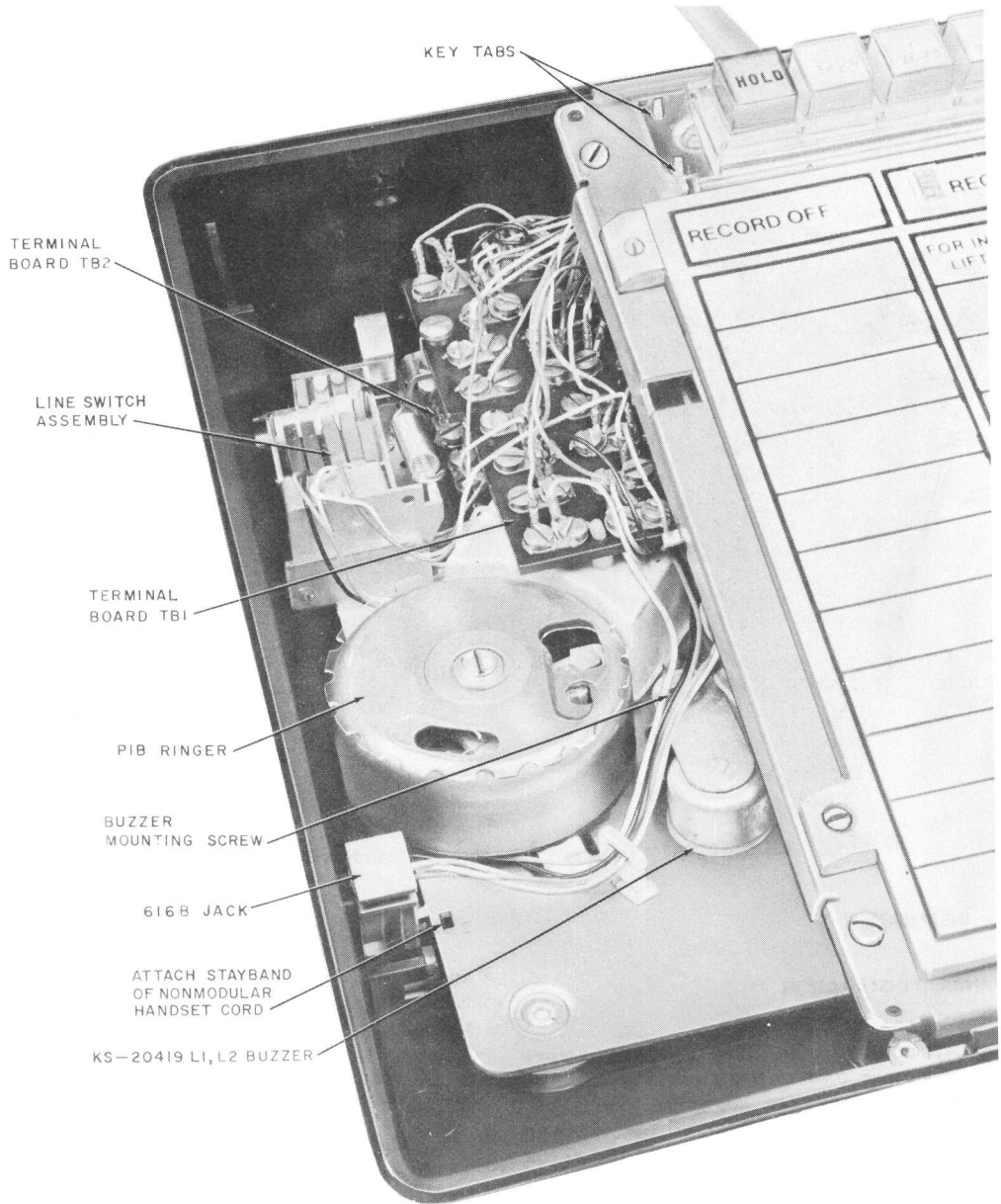


Fig. 3—872A1M Telephone Set With Faceplate, Upper Housing, Handset, and Handset Cradle Removed



*ing to attach or remove the retaining clamp. This will prevent the possibility of a loosened retainer clamp or metallic outlet cover making contact with the ac prongs of the power unit when partially withdrawn from outlet. Do not use retaining clamps on outlets where the cover mounting screw holds the duplex outlet in the box.*

**Danger 2:** *Care should be taken to trim and dress leads connecting to low voltage output terminals of 95B1 power unit to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.*

**3.03** Install the 95B1 power unit within 150 feet (24 gauge conductors) of the telephone set and plug into an ac outlet not controlled by a switch (continuous ac power is required). The power unit may be located at the equipment end of the cable or run directly into the telephone set by conductors separate from the mounting cord and connected to PSB terminals 24 and 25. When separate power conductors are used, disconnect, insulate, and store the (BL-V) and (V-BL) mounting cord leads from PSB terminals 24 and 25.

**Note:** The 95B1 power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

**3.04** The station number card shall be placed in the plastic fingerwheel of the dial. The silver disc provided with the dial shall be retained under the number card.

**3.05** The directory sheets (Fig. 2) fit over the buttons of the memory and are held in place by the faceplate. Additional sheets are available in directory sheet set, 840393672.

**3.06** To designate the 635-type 6-button key:

- (1) Use Form 5837 tabs
- (2) Squeeze the key button caps gently and remove
- (3) Insert the tabs
- (4) Replace the caps so that small bumps on side of caps are on sides of buttons.

#### Installation Check Procedure

**3.07** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Table N, Trouble Analysis.

- (1) Disconnect the power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
- (2) Reconnect the power unit to ac outlet.
- (3) With the handset on-hook, record known telephone numbers, storing consecutive digits of the numbers in sequential memory locations. Fill all memory locations except LAST NUMBER DIALED and location immediately above it [paragraph 5.01 (4) through (7)].
- (4) Automatically dial the telephone numbers stored in Step (3) by momentarily depressing the memory buttons in the same sequence in which the digits were recorded. Verify that the digits thus dialed produce the expected telephone numbers.
- (5) Go off-hook and simultaneously manually dial and record a known telephone number into memory location immediately above LAST NUMBER DIALED button [paragraph 5.01 (4) through (7)].
- (6) Momentarily hang up handset and then automatically dial the number recorded in Step (5).
- (7) Go off-hook and manually dial a known telephone number with a WAIT input inserted in the telephone number.

- (8) Momentarily hang up the handset and then automatically dial the number by depressing the LAST NUMBER DIALED button. The set should stop dialing when it reaches the stored WAIT input. Depress the LAST NUMBER DIALED button again and the remaining digits should be dialed.



***The battery and power unit must be connected a minimum of five minutes before doing Step (9).***

- (9) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, momentarily depress memory buttons in same sequence in which digits were recorded in Step (3). Verify that the correct telephone numbers are dialed.
- (10) Dial the appropriate code for ring-back to test the ringer.
- (11) Check operation of the logic reset switch by pressing the RECORD button (RECORD lamp will come on) and subsequently pressing an unoperated line button. (RECORD lamp must go out.)
- (12) If equipped with one-touch calling option, (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (5). The speakerphone should turn on, dial tone should be detected, and the stored number should be automatically dialed.

#### OPTIONAL APPARATUS INSTALLATION

##### A. D-180568 Kit of Parts (With Speakerphone)

**3.08** Install as follows:

- (1) Perform steps in paragraph 3.17
- (2) Make connections per one of the appropriate Tables, B through E
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of printed wiring board (PWB) should be at lower right corner.

##### B. D-180493 Kit of Parts (Dial Tone Detector and One-Touch Calling Switch)

**3.09** Install as follows.

- (1) Remove the housing (paragraph 3.21), and access PSB terminal board (paragraph 3.17).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the bottom of the chassis.
- (3) Lock the board into position by inserting the self-threading screw through the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

**Note:** If switch for D-180818 Kit of Parts is already present, the one-touch calling switch can not be installed. The PSB terminals to which the switch leads are normally connected (Table C or E), shall be strapped together. (The one-touch calling option can not be turned off by the subscriber.)

- (5) Make connections per Table C, E, or F.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.
- (7) Verify correct operation of option.
- (8) Reassemble set.

##### C. D-180494 Kit of Parts (2/4-Wire Service)

**3.10** Install as follows:

- (1) Perform steps in paragraph 3.17
- (2) Make connections per Table G
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4).

##### D. D-180818 Kit of Parts (Record Disable and Dial Inter-mix Features)

**3.11** Install as follows.

◆ TABLE B ◆

## CONNECTIONS – 872A1M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	LEAD		872A1M TEL SET PSB TERM. (NOTE)		CONNECT		
	DESIG	COLOR			FROM		149B ADPT (DIOR CORD)
					CONT UNIT		
	FROM	TO	55A	55B	TERM.		
872A1M Tel Set	T1	V-G	*	2	19	1	8A
	R1	G-V	*	9	28	10	7A
	A1				12	2	A1
	AG	V-S	*	L2†	5	11	12A
	LK	S-V	*	13	11	35	11A
	P3	V-BR	*	3	21	4	10A
	P4	BR-V	*	6	30	13	9A
	R or R1				18	34	1B
	R or R1				9	25	1A
	B or B1				17	33	2B
B or B1				8	24	2A	
D-180568 Kit of Parts	LK	BL-R		13			
	SHi	G-W		14			
	SHa	R-BL		16			
	VDD	W-G		17			
666B (MD) TRMTR (T7A Cord)	M1	S-BK			4	7	
	P1	BL-R			13	8	
	-15V	BK-S			14	16	
	S	O-BK			3	18	
	A1	Y-O			29	19	
	F1	G-Y			2	17	
	LK	BK-O			11	35	
760A (MD) Lspk (R2FK Cord)	SP1	G			34	20	
	SP2	R			33‡	29‡	
95B1 Pwr Unit §	AC1						3B¶
	AC2						4B¶
2012B (MD) or 2012D Trnsf §	AC1				27	27	
	AC2				36	36	

Note: Plug telephone set mounting cord into 149B adapter.

\*Insulated and stored.

†Terminal on network.

‡To reduce loudspeaker volume, move SP2 lead to terminal 24(55A) or 30(55B).

§Both 95B1 power unit and 2012B (MD) or 2012D transformer must be connected for speakerphone operation.

¶Insulate and store (BL-V) and (V-BL) leads in connector cable.

♦TABLE C♦

## CONNECTIONS – 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING USING 3B (MD) SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL SET PSB TERM. (NOTE)		CONNECT			CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR			FROM		TO		
			CONT UNIT		149B ADPT (DIOR CORD)				
			55A	55B	TERM.		COLOR	TO	
Tel Set	T1	V-G	*	2	19	1	8A		
	R1	G-V	*	9	28	10	7A		
	A1				12	2	A1		
	AG	V-S	*	L2†	5	11	12A		
	LK	S-V	*	13	11	35	11A		
	SPO	O-V	*	21	3	18	5B	O-V	*
	P3	V-BR	*	3	21	4	10A		
	P4	BR-V	*	6	30	13	9A		
	R or R1				18	34	1B		
	R or R1				9	25	1A		
	B or B1				17	33	2B		
	B or B1				8	24	2A		
	STRAP	BK		11	*				
	STRAP	BK		18	*				
STRAP	BK		23	*					
D-180493 Kit of Parts ‡	INPUT	G-R		2					
	PB	O-BK		7					
	INPUT	G-R		9					
	DT	O-Y		11					
	LK	Y-G		13					
	VDD	R-O		17					
	SPR	Y-BL		18					
	DR	Y-O		19					
	COM	BK-O		20					
	SPO	G-Y		21					
	PL	O-R		22					
	DTT	BL-Y		23					
Switch	S			15					
	S			20					
D-180568 Kit of Parts	LK	BL-R		13					
	SHi	G-W		14					
	SHa	R-BL		16					
	VDD	W-G		17					

See note and footnotes at end of table.

♦ TABLE C (Contd) ♦

## CONNECTIONS – 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING USING 3B (MD) SPEAKERPHONE

APPARATUS	LEAD		872A1M TEL SET PSB TERM. (NOTE)		CONNECT			CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR	FROM	TO	FROM		TO		
					CONT UNIT			149B ADPT (DIOR CORD)	
					55A	55B	TERM.	COLOR	TO
666B (MD TRMTR (T7A Cord)	M1	S-BK			4	7			
	P1	BL-R			13	8			
	--15V	BK-S			14	16			
	S	O-BK			3	18			
	A1	Y-O			29	19			
	F1	G-Y			2	17			
	LK	BK-O			11	35			
760A (MD Lspk (R2FK Cord)	SP1	G			34	20			
	SP2	R			33‡	29‡			
95B1 Pwr Unit ¶	AC1						3B	BL-V	*
	AC2						4B	V-BL	*
2012B (MD) or 2012D Trnsf ¶	AC1				27	27			
	AC2				36	36			

**Note:** Plug telephone set mounting cord into 149B adapter.

\*Insulated and stored.

†Terminal on network.

‡All dial tones encountered in the process of placing a call must be precise TOUCH-TONE service dial tone.

§To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

¶Both 95B1 power unit and 2012B (MD) or 2012D transformer must be connected for speakerphone operation.

- (1) Remove faceplate (paragraph 3.19).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover. Refer to paragraph 3.16(4).
- (3) Disengage the four captive memory mounting screws (Fig. 4).
- (4) Remove the two dial mounting screws and move dial aside.
- (5) Rotate left edge of memory upward as shown by Fig. 5.
- (6) Mount switch below dial using the two screws provided (Fig. 4).
- (7) Connect switch lead connectors to post terminals on memory board per Table L and Fig. 6.

**Note:** If the one-touch calling switch (D-180493 Kit of Parts) is already present, it must be removed. The PSB terminals to which the switch leads were connected (Table C or E), must be strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

**Note:** If set is equipped with an 870A Memory, replace it with an 870B Memory, and carefully pack and return the old memory according to local procedures.

- (8) With feature switch in OFF position, verify that set operates in normal manner.

- Numbers can be recorded into memory.

TABLE D4

## CONNECTIONS—872A1M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY USING 82B CONNECTING BLOCK

APPARATUS	LEAD		872A1M TEL SET PSB TERM.		82B CONN BLK (NOTE)	CONN CABLE AT KEY EQUIP	
	DESIG.	COLOR	FROM	TO		COLOR	TO
872A1M Tel Set	T1	V-G	*	2			
	R1	G-V	*	9			
	A1				‡		
	AG	V-S	*	L2†			
	LK	S-V	*	13			
	P3	V-BR	*	3			
	P4	BR-V	*	6			
D-180568 Kit of Parts	LK	BL-R		13			
	SHi	G-W		14			
	SHa	R-BL		16			
	VDD	W-G		17			
85B1 Power Unit § **	AC1	BK			AC1		
	AC2	Y			AC2		
95B1 Power Unit § **	AC1	R			21	BL-V	*
	AC2	G			46	V-BL	*
85B1 Power Unit ¶ **	AC1				Strap AC1 to 24	BR-V	AC1
	AC2				Strap AC2 to 49	V-BR	AC2
95B1 Power Unit ¶ **	AC1					BL-V	AC1
	AC2					V-BL	AC2

Note . Plug mounting cords of telephone set, 108-type loudspeaker, and 680-type transmitter into 82B connecting block. Install option plug in ringer cutoff mode.

\*Insulated and stored.

†Terminal on network.

‡For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.

§Preferred power connections.

¶Alternate power connections.

\*\*Both 85B1 and 95B1 power units must be connected for speakerphone operation.

- Numbers can be changed.
  - Numbers can be deleted from memory.
- (9) Set feature switch to ON position and verify feature provided.
- (a) For record disable feature, only:
- (1) RECORD lamp will not light when RECORD button is depressed.
  - (2) No telephone numbers can be recorded, changed, or deleted in memory.
  - (3) LAST NUMBER DIALED feature is operative.

◆ TABLE E ◆

**CONNECTIONS – 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING  
USING 4A SPEAKERPHONE**

APPARATUS	LEAD		872A1M TEL SET PSB TERM.		82B CONN BLK (NOTE )	CONN CABLE AT KEY EQUIP.		
	DESIG	COLOR	FROM	TO		COLOR	TO	
872A1M Tel Set	T1	V-G	*	2				
	R1	G-V	*	9				
	A1							‡
	AG	V-S	*	L2†				
	LK	S-V	*	13				
	SPO	O-V	*	21	Strap 10 to 35	O-V	*	
	P3	V-BR	*	3				
	P4	BR-V	*	6				
	Strap	BK	11	*				
	Strap	BK	18	*				
	Strap	BK	23	*				
D-180493 Kit of Parts §	Input	G-R		2				
	PB	O-BK		7				
	Input	G-R		9				
	DT	O-Y		11				
	LK	Y-G		13				
	VDD	R-O		17				
	SPR	Y-BL		18				
	DR	Y-O		19				
	COM	BK-O		20				
	SPO	G-Y		21				
	PL	O-R		22				
	DTT	BL-Y		23				
	Switch	S		15				
		S		20				
D-180568 Kit of Parts	LK	BL-R		13				
	SHi	G-W		14				
	SHa	R-BL		16				
	VDD	W-G		17				

See note and footnotes at end of table.

◆TABLE E (Contd)◆

**CONNECTIONS – 872A1M TELEPHONE SET WITH ONE-TOUCH CALLING  
USING 4A SPEAKERPHONE**

APPARATUS	LEAD		872A1M TEL SET PSB TERM.		82B CONN BLK (NOTE )	CONN CABLE AT KEY EQUIP.	
	DESIG	COLOR	FROM	TO		COLOR	TO
85B1 PWR Unit ¶ ††	AC1	BK			AC1		
	AC2	Y			AC2		
95B1 PWR Unit ¶ ††	AC1	R			21	BL-V	*
	AC2	G			46	V-BL	*
85B1 PWR Unit ** ††	AC1				Strap 24-AC1	BR-V	AC1
	AC2				Strap 49-AC2	V-BR	AC2
95B1 PWR Unit ** ††	AC1					BL-V	AC1
	AC2					V-BL	AC2

*Note* : Plug mounting cords of telephone set, 108-type loudspeaker, and 680 type transmitter into 82B connecting block. Install option plug in ringer cutoff mode.

\* Insulated and stored.

† Terminal on network.

‡ For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.

§ All dial tones encountered in placing a call must be precise TOUCH-TONE service dial tone.

¶ Preferred power connections.

\*\* Alternate power connections.

†† Both 85B1 and 95B1 power units must be connected for speakerphone operation.

(b) For record disable and dial intermix features:

- (1) RECORD lamp will not light when RECORD button is depressed.
- (2) No telephone numbers can be recorded, changed, or deleted in memory.
- (3) LAST NUMBER DIALED feature is disabled.
- (4) Manually and automatically dialed digits may be intermixed.

(10) Reassemble set

**E. Single-Line Service**

**3.12** The 870A2M TOUCH-A-MATIC telephone set is available from the factory as a modular single line set. However, with the addition of an 870B1 faceplate, the 872A1M telephone set may be converted to single line service as follows.

- (1) Remove the faceplate, key collar, and all buttons of the 635-type key.
- (2) Gain access to terminal area (paragraph 3.17).
- (3) Remove the cradle (paragraph 3.20).
- (4) Make connections per Table H.



**TABLE F**  
**CONNECTIONS – 872A1M TELEPHONE SET**  
**WITH DIAL TONE DETECTOR ONLY (SEE NOTE)**

APPARATUS	LEAD		872A1M TEL SET	
	DESIG	COLOR	FROM PSB TERM.	TO PSB TERM.
872A1M Tel Set	Strap	BK	11	*
	Strap	BK	23	*
D-180493 Kit of Parts	Input	G-R		2
	PB	O-BK		7
	Input	G-R		9
	DT	O-Y		11
	LK	Y-G		*
	VDD	R-O		17
	SPR	Y-BL		*
	DR	Y-O		19
	COM	BK-O		20
	SPO	G-Y		*
	PL	O-R		22
	DTT	BL-Y		23
	Switch	S		*
†	S		*	

*Note:* May be used for applications where first dial tone is not precise (350 Hz and 440 Hz) but all subsequent dial tones must be precise if number is to be dialed automatically.

\*Insulate and store.

†Switch not required when speakerphone is not provided.

- (5) Reassemble set and install an 870B1 faceplate of the appropriate color.

- (4) Thread jackset cord through hole in rear of housing and make connections per appropriate table provided with Plantronics Jackset.

*Note:* If set was originally equipped with an 872A1-87 faceplate, refer to paragraph 6.11.

- (5) Reassemble telephone set.

#### F. Head Telephone Set

##### 3.13 Install as follows.

- (1) Remove housing (paragraph 3.21).
- (2) Access PSB terminal area (paragraph 3.17).
- (3) Remove cradle (paragraph 3.20).



*Other optional components may be used such as SPOKESMAN® loud-speaker sets, etc. Refer to the appropriate section for connection information for these components.*

TABLE G

## CONNECTIONS FOR 2/4-WIRE SERVICE

APPARATUS	COLOR	REMOVE FROM	CONNECT TO
872A1M Tel Set	BK-G	GN	L1
	BK	R	*
	BR-V	*	PSB-13
	V-BR	*	PSB-21
D-180494 Kit of Parts	V		T
	S		L2
	BR		*
	Y-BR		L1
	BL-R		GN
	G-BK		PSB-13
	R-BR		R
	R-O		S
	BL-Y		PSB-21

\*Insulate and store.

TABLE H

## CONNECTIONS FOR CONVERSION TO SINGLE LINE SERVICE WITH BRIDGED RINGING

LEAD		REMOVE FROM	CONNECT TO
DESIG	COLOR		
Tip	W-BL	(1 PU-3)*	Net. K
Ring	BL-W	(1 PU-6)*	TB1-13
B1	Y-S	Net. K	*
R1	S-Y	TB1-13	*
A-Lead	W-O	(1 PU-1)*	TB1-1
Hold	Y-BL	TB1-3	*
LRS-1	W	PSB-20	*

\*Insulate and store.

## COMPONENT LOCATION AND ACCESS INFORMATION

## A. Location of Components

3.14 The components are located in three areas as follows.

(1) The following are located under the handset cradle (Fig. 3):

(a) Buzzer

TABLE I

## CONVERSION TO BRIDGED RINGING ON FIRST LINE WITH 6-BUTTON KEY SERVICE

LEAD		REMOVE FROM	CONNECT TO
DESIG	COLOR		
Tip	W-BL	(1 PU-3)*	Net. K
Ring	BL-W	(1 PU-6)*	TB1-13
B1	Y-S	Net. K	*
R1	S-Y	TB1-13	*

\*Insulate and store.

(b) Ringer

(c) Line switch assembly

(d) Handset jack

(e) Terminal boards (TB1 and TB2).

(2) The following are located under the faceplate, inside the set (Fig. 4 and 5):

(a) Battery jack (Fig. 5)

(b) Power supply board (PSB) terminal area (Fig. 4)

(c) Network (Fig. 4)

(d) Options (Fig. 4) are as follows

(1) D-180568 (relay kit for speakerphone)

(2) D-180493 (dial tone detector and one-touch calling switch kit)

(3) D-180494 (2/4-wire relay kit)

(4) D-180818 (record disable and dial intermix switch) Fig. 6.

(3) The battery is located under the telephone set (Fig. 7)

## B. Mounting Cord

3.15 The D50BB-87 mounting cord is amphenol ended at the equipment end and equipped with 508-type plugs for terminating on the back of the 635-type module at the telephone set end. The conductors

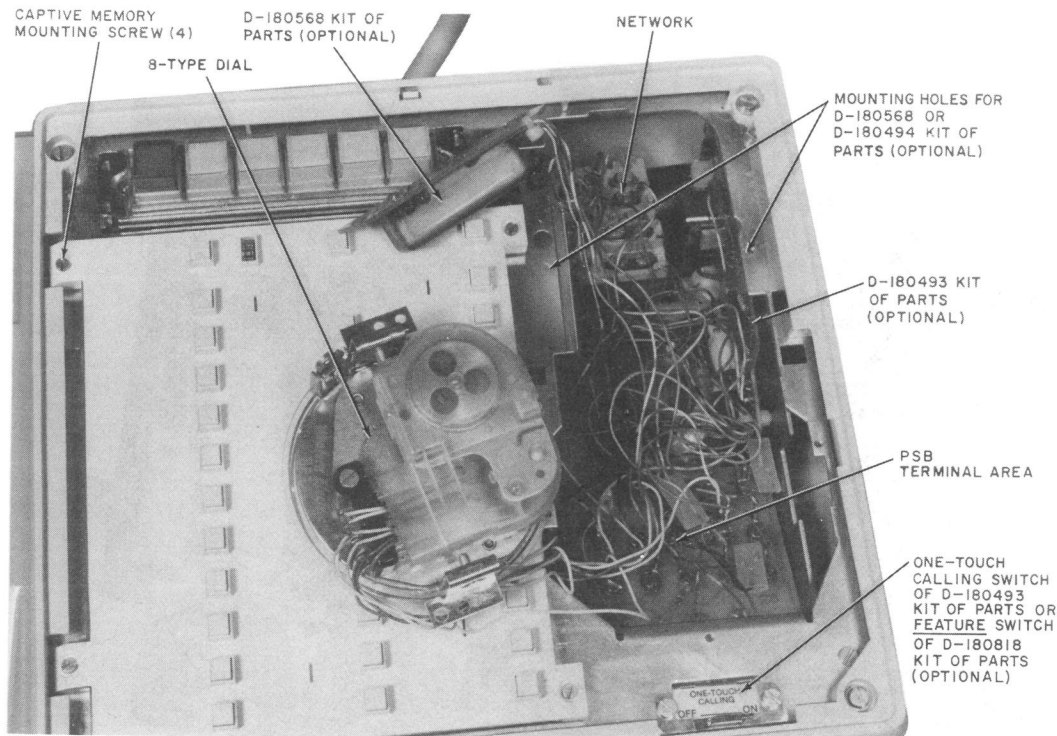


Fig. 4—872A1M Telephone Set—Dial Removed to Show Terminal Area

terminated in the 508-type plugs provide the major line service requirements. Spade-tipped conductors are provided for auxiliary control functions or options and are terminated directly on associated equipment, terminal boards, or stored.

**Note:** Sets manufactured prior to fourth quarter 1976 are equipped with D50AM-87 mounting cords. The major difference in the cords is that TIP and RING contact strips are required with the D50AM-87, whereas individual conductors of the D50BB-87 connect to the TIP and RING contacts of the 635-type key.

#### C. Network Terminals

3.16 For access to the network terminals, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

#### D. Power Supply Board (PSB) Terminals

3.17 To access the terminal field on the power supply board, proceed as follows.

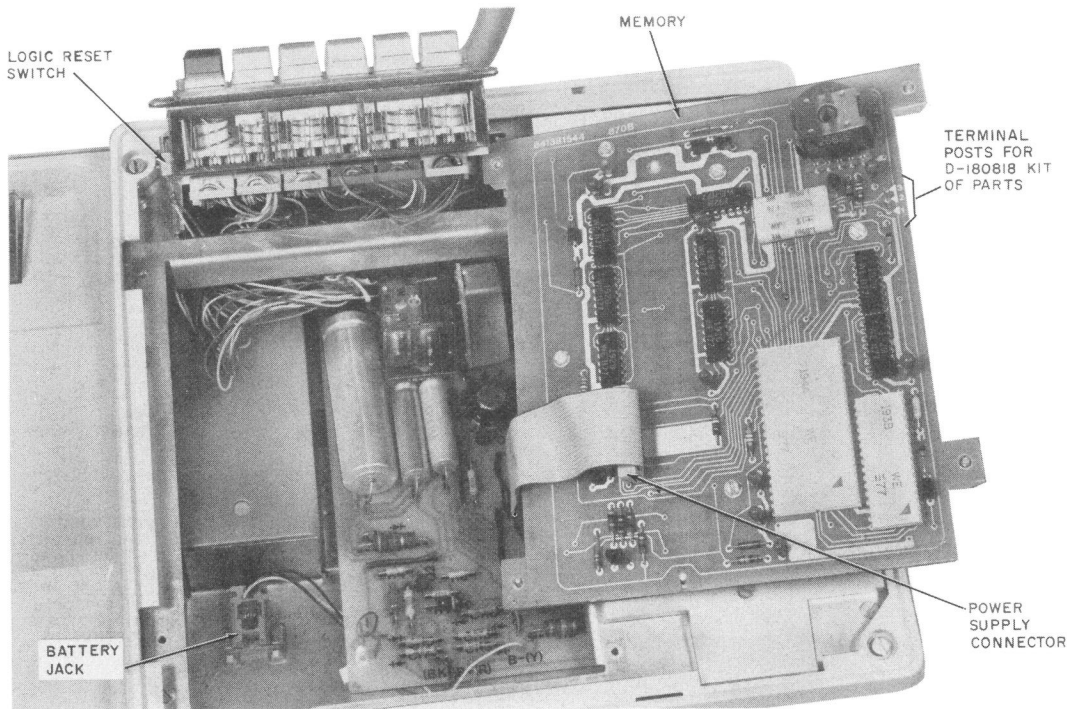


Fig. 5—872A1M Telephone Set, Overall Internal View

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) Remove the two screws that hold the dial in place.
- (5) Gently raise the dial and move aside.
- (6) To reassemble, reverse procedure.
- (7) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Fail-

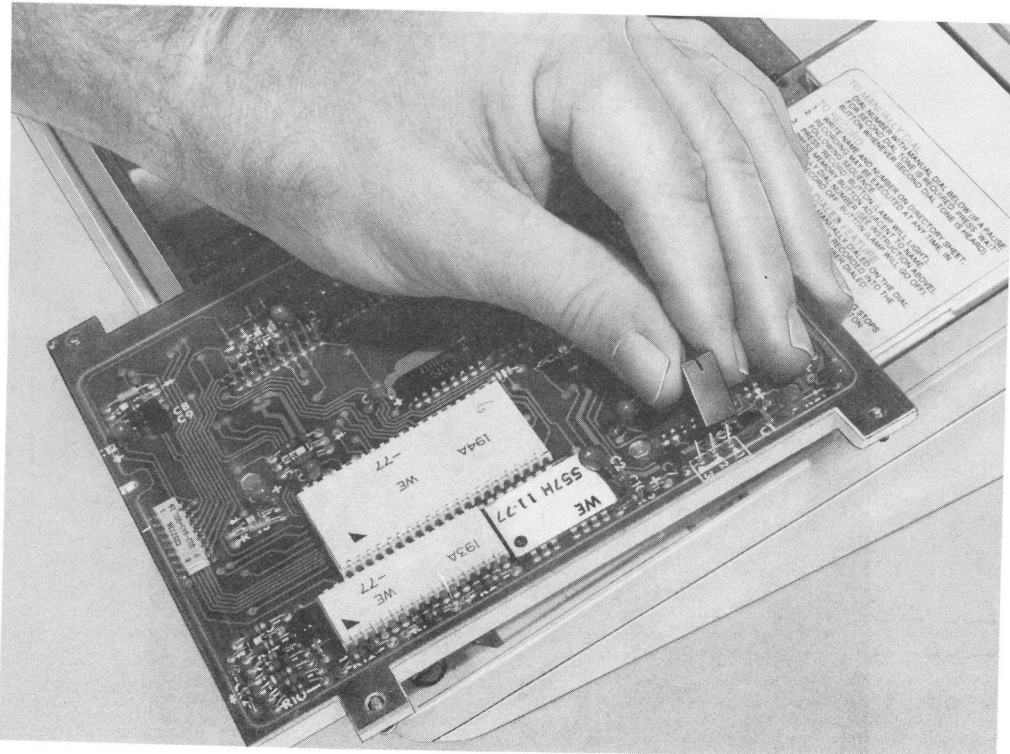
ure to do this will result in improper seating of the faceplate.

#### E. Line Key Removal

**Warning:** Do not damage logic reset switch attached on HOLD side of key. (Contact strips will only be found on sets equipped with D50AM-87 mounting cords.)

3.18 To remove, use the following procedure.

- (1) Remove faceplate (paragraph 3.19).
- (2) Push the key toward the rear of the set to unlock it from the tabs.



**Fig. 6—872A1M Telephone Set Connections of D-180818 Kit of Parts, Record Disable Feature Only**

(3) Raise the metal plate of the key just above the tabs and move the key toward the left, then raise the right end of the key until it clears the chassis of the set.

(4) Lift the key completely out of the set.

(5) Replace key by reverse procedure.

#### **F. Faceplate Removal**

**3.19** Removal will differ depending on faceplate provided.

(a) The 872B1-type faceplate is held in place by a spring clip attached to the 870A1U upper

housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

**Note:** The 872B1 faceplate is not a direct replacement for the 872A1-87 faceplate. An 870A1U upper housing is also required with the 872B1 faceplate (paragraph 6.11).

(b) The 872A1-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edges and lift.

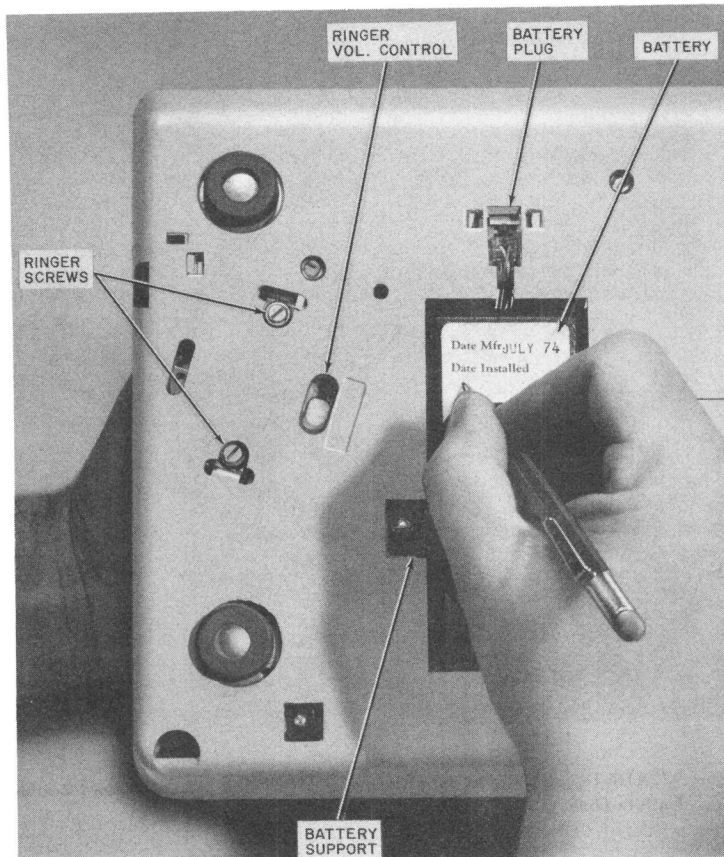


Fig. 7—872A1M Telephone Set, Bottom View

#### G. Handset Cradle Removal

3.20 To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19) and place the handset aside.
- (2) Remove upper housing, if provided, [paragraph 3.21(b)].

- (3) Disengage the captive cradle screws (if provided) located in the two tabs on the cradle (Fig. 2).
- (4) Lift the cradle by pulling up on the line switch plunger, and remove.

**Warning:** *The line switch plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the switchhook arm.*

- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.
- (6) Refasten the captive cradle screws, if provided.

#### H. Housing Removal

**Warning:** Attempting to remove the housing without removing the handset cradle may damage the line switch arm.

3.21 To remove, proceed as follows.

- (a) Remove lower housing as follows.
  - (1) Unplug the handset cord, at the telephone set end, and remove handset.
  - (2) Remove the faceplate (paragraph 3.19).
  - (3) Remove the handset cradle (paragraph 3.20).
  - (4) Disengage the four captive housing screws (Fig. 2), one located in each corner of the upper housing.
  - (5) Separate the housing from the telephone set base.
  - (6) Feed mounting cord through hole in bottom of housing as housing is removed.
  - (7) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs of the chassis. Misalignment may cause the bottom of the housing to bow.
  - (8) When replacing the housing, keep the handset jack from being trapped between the housing and chassis.
- (b) Remove upper housing as follows.
  - (1) Remove the faceplate (paragraph 3.19).
  - (2) Disengage the captive housing screws located in each corner of the upper housing, (Fig. 2). This will release the lower housing.

(3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.

(4) If necessary, back screws out of upper housing.

(5) To reassemble, reverse procedure.

#### 4. CONNECTIONS

**Caution:** Some conductor assignments are not standard (Table J).

- 4.01 Telephone set connections are shown in Fig. 9 and Table J.
- 4.02 Refer to Table A for connection information for all options.
- 4.03 A partial functional schematic is shown in Fig. 15.

#### 5. OPERATION

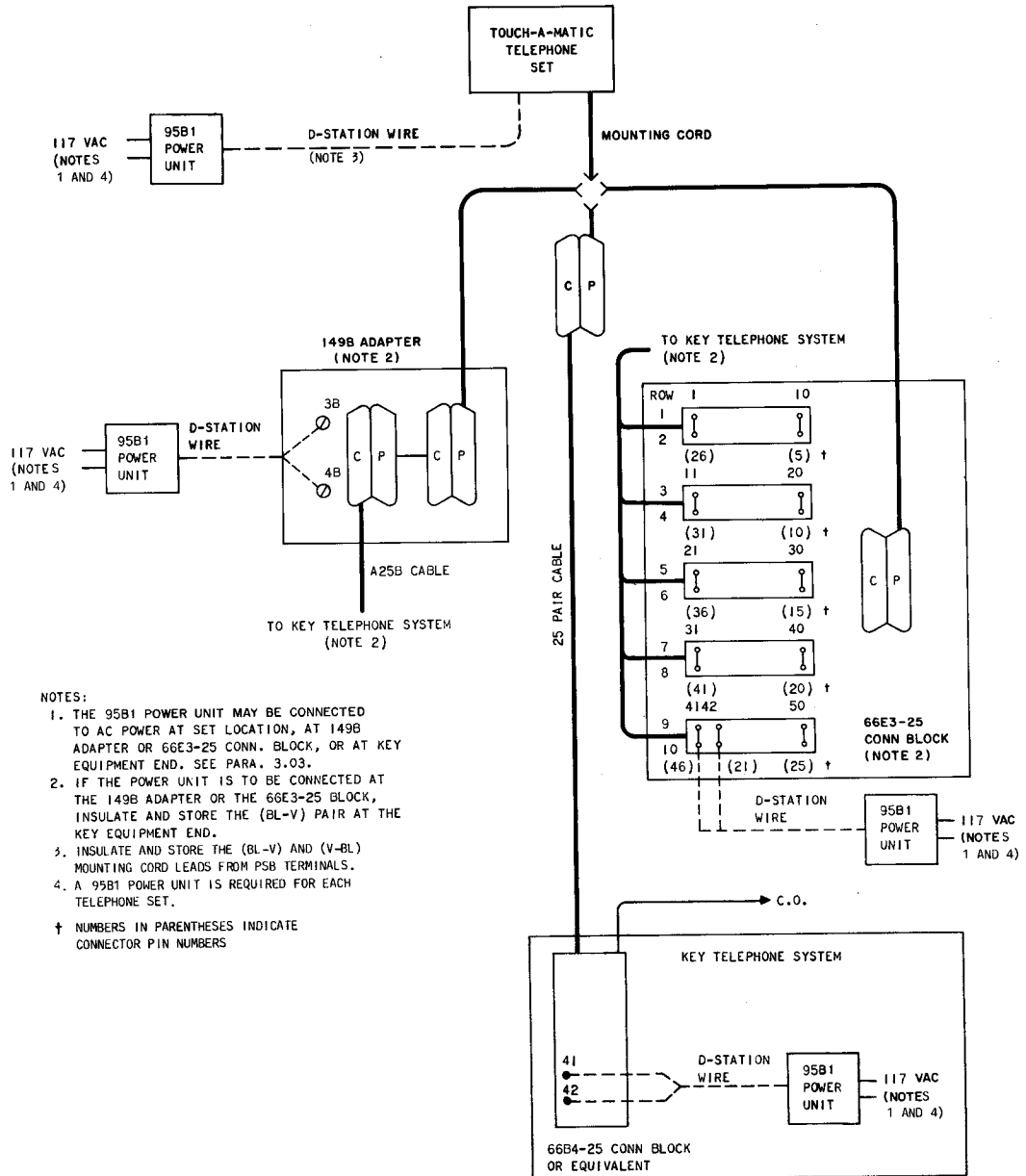
##### A. Record a Number Into Memory

**Note:** If telephone set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

5.01 To record number, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.
- (3) Replace the faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)

**Note:** If set is equipped with the D-180818 Kit of Parts, feature switch must be in the OFF position.



NOTES:

1. THE 95B1 POWER UNIT MAY BE CONNECTED TO AC POWER AT SET LOCATION, AT 149B ADAPTER OR 66E3-25 CONN. BLOCK, OR AT KEY EQUIPMENT END. SEE PARA. 3.03.
2. IF THE POWER UNIT IS TO BE CONNECTED AT THE 149B ADAPTER OR THE 66E3-25 BLOCK, INSULATE AND STORE THE (BL-V) PAIR AT THE KEY EQUIPMENT END.
3. INSULATE AND STORE THE (BL-V) AND (V-BL) MOUNTING CORD LEADS FROM PSB TERMINALS.
4. A 95B1 POWER UNIT IS REQUIRED FOR EACH TELEPHONE SET.

† NUMBERS IN PARENTHESES INDICATE CONNECTOR PIN NUMBERS

Fig. 8—872A1M Telephone Set, Alternate Power Connection Method



(5) Depress the specific memory button adjacent to the desired telephone number listed on the directory sheet.

(6) Manually dial the desired telephone number. If an access code and a pause for second dial tone is required.

- (a) Dial the access digit(s) for the outside line.
- (b) Push the WAIT button when the RECORD lamp relights. (The WAIT entry counts as one digit.)
- (c) Dial the telephone number.

**Note:** A number up to 15 digits in length may be recorded. The RECORD lamp will go out momentarily as each digit is dialed. If exactly 15 digits are recorded, the RECORD lamp will go out and stay out, indicating that the dialer has been reset. If a memory button has not been depressed, the RECORD lamp will go out when the first digit is dialed and recording operation will be voided.

(7) Depress the RECORD OFF button if less than 15 digits are recorded. The RECORD lamp will go out. The dialer will be reset. The number is now stored in the selected memory. The dialer can also be reset by a line switch, line key, or speakerphone operation.

#### B. Change a Number in Memory

**Note:** If the telephone set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

5.02 Whenever a new number is recorded in a previously used memory position, it will automatically replace the previously stored number.

#### C. Delete a Number From Memory

**Note:** If the telephone set is equipped with D-180818 Kit of Parts, switch must be in the OFF position.

5.03 Complete the following operations in succession.

- (1) Depress the RECORD button.

- (2) Depress the memory button corresponding to the name and number to be deleted.

- (3) Depress the RECORD OFF button.

#### D. Automatically Dial a Number From Memory

5.04 To automatically dial a number, proceed as follows.

- (a) For factory-wired sets go off-hook, listen for dial tone, and depress the desired memory button. If a WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress memory button again to complete automatic dialing.

- (b) For sets equipped with dial tone detector only, go off-hook, listen for dial tone and depress the memory button.

- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the memory button.

#### E. LAST NUMBER DIALED Feature

5.05 The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED position (Fig. 1) any number dialed using the standard telephone dial. Each number in the LAST NUMBER DIALED position is automatically replaced by the next number manually dialed. Although the unit is recording, the RECORD lamp does not light at any time during this operation.

**Note:** If telephone set is equipped with D-180818 Kit of Parts, and dial intermix feature is provided, LAST NUMBER DIALED feature is functional only when the feature switch is in the OFF position.

5.06 Operation of LAST NUMBER DIALED feature is as follows.

- (a) With no access digit(s) required:

- (1) Go off-hook
- (2) Listen for dial tone
- (3) Manually dial telephone number

- (4) To redial same number automatically, proceed as follows.
- (a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button.
  - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
  - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.
- (b) When an access code and pause for second dial tone is required, proceed as follows.
- (1) Go off-hook.
  - (2) Listen for dial tone.
  - (3) Dial access digit(s).
  - (4) Depress WAIT button, after second dial tone is heard.
  - (5) Manually dial telephone number.
  - (6) To redial same number automatically.
    - (a) For factory-wired sets, go off-hook, listen for dial tone and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded WAIT input. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.
    - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.
    - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the LAST NUMBER DIALED button.

## 6. MAINTENANCE

**6.01** In case of power failure, the automatic dialing feature cannot be used. The battery retains the number associated with each of the memory buttons for at least 24 hours. If power loss exceeds 24 hours, the numbers may have to be rerecorded.

### A. Trouble Analysis

**6.02** When trouble is encountered, the subsequent procedure should be followed.

- (1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).
- (2) Check for improper connections.
- (3) Refer to table N, and the following paragraphs.
- (4) If removal of set is required, proceed as follows.
  - (a) Disconnect power unit from ac outlet and unplug battery.
  - (b) Disconnect telephone set.

**Warning: Failure to restrain plug can result in plug damage necessitating battery replacement.**

- (c) Place battery plug sideways into housing slot below battery jack and tape into place.

### B. Battery

**6.03** The KS-20390L4 or L2 battery has an expected life of about 4 years. It can be replaced without loss of memory provided commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 7).

- (1) Tilt the front of the set up.
- (2) Unplug the battery.
- (3) Loosen the captive screw on the battery support.
- (4) Remove battery support.

- (5) Remove battery.
- (6) Install new battery.
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a known telephone number.

### C. Memory

**6.04** The memory may be replaced in the following manner.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of the memory or ac and battery power results in loss of stored telephone numbers.

- (2) Remove the faceplate (paragraph 3.19).
- (3) Loosen the four captive memory mounting screws (Fig. 4).
- (4) Rotate the left edge of the memory upward as shown in Fig. 5.
- (5) Disengage the connector by pulling it perpendicular to the printed wiring board.
- (6) Replace the memory. Do not twist the gray power supply cable. It should form a loop as shown in Fig. 5 when connected to the board.
- (7) Reassemble set.
- (8) Reconnect battery and power unit
- (9) Test per paragraph 3.07.
- (10) Reprogram memory (see Part 5).

### D. Dial

**6.05** Replace dial as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Access PSB terminal area per paragraph 3.17.
- (3) Disconnect dial leads and remove dial.
- (4) Install new dial by reversing procedure.
- (5) Reconnect battery and power unit.
- (6) Reprogram memory (see Part 5).

### E. 6-Button Line Key

**6.06** Replace line key as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove key per paragraph 3.18.
- (3) Access PSB terminal area per paragraph 3.17.
- (4) Disconnect logic reset leads from PSB terminals 10 and 20.
- (5) Remove the 508-type plugs and (if provided) the two contact strips from the back of the key.
- (6) Install new key.
- (7) Reassemble the set.
- (8) Reconnect battery and power unit.
- (9) Test for operation of the logic reset switch [paragraph 3.07(11)].
- (10) Reprogram memory (see Part 5).

### F. Ringer

**6.07** Replace ringer as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Remove the faceplate (paragraph 3.19) and place the handset aside.
- (3) Remove upper housing, if provided, [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect the ringer leads (Fig. 9I).
- (6) Tilt the front of the set up.
- (7) Loosen ringer mounting screws (Fig. 7).
- (8) Remove ringer.
- (9) Install new ringer and assemble in reverse order. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent dampening of the ringer output.
- (10) Reassemble set.
- (11) Reconnect battery and power unit.
- (12) Dial ringback code to test ringer.
- (13) Reprogram memory (see Part 5).

**G. Buzzer**

**6.08** Replace buzzer as follows..

- (1) Disconnect power unit from ac outlet and unplug battery.  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided, [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Remove the buzzer mounting screw.
- (6) Remove the mounting screw and spacer for TB1 (Fig. 3).

- (7) Move terminal board TB1 to gain access to the appropriate terminals on TB2.
- (8) Remove appropriate leads (Fig. 9H).
- (9) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.
- (10) Reconnect battery and power unit.
- (11) Reprogram memory (see Part 5).

**H. Handset Jack**

**6.09** Replace handset jack as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.  
**Note:** Removal of ac and battery power results in loss of stored numbers.
- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided, [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (6) Move terminal board TB1 to gain access to the appropriate terminals on TB2.
- (7) Disconnect the appropriate leads (Fig. 9H) and remove jack.
- (8) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.
- (9) Route leads through wire guide as shown in Fig. 3.
- (10) Reconnect battery and power unit.
- (11) Reprogram memory (see Part 5).

**I. Handset**

**6.10** A defective G15A handset may be replaced or changed to a modular amplifying handset (G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B), proceed as follows.

- (1) Disconnect power unit from ac outlet and unplug battery.

**Note:** Removal of ac and battery power results in loss of stored numbers.

- (2) Unplug H4DU handset cord at telephone set end.
- (3) Remove faceplate (paragraph 3.19) and place handset aside.
- (4) Remove upper housing, if provided [paragraph 3.21(b)].
- (5) Remove handset cradle (paragraph 3.20).
- (6) Disconnect 616B handset jack (paragraph 6.09). (Jack may be removed or stored just to right of ringer.)
- (7) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (8) Attach stayband hook to chassis.
- (9) Route leads through wire guide as shown in Fig. 3.
- (10) Make connections (Fig. 9H).

- (11) Reassemble set.

- (12) Reconnect battery and power unit.

- (13) Reprogram memory (see Part 5).

**J. Faceplate**

**6.11** To replace an 872A1-87 faceplate with an 872B1 faceplate, proceed as follows.

- (1) Remove the 872A1-87 faceplate by lifting up at any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U-type upper housing to the chassis and 870A1-type housing. The three parts should be held together tightly as the screws are driven.
- (4) Place the two tabs located along the lower edge of the 872B1 faceplate in the notches in the lower side of the 870A1U-type upper housing.
- (5) Lower the faceplate to rest on the memory. The spring clip located at the top center of the upper housing should retain the faceplate.

**K. Speakerphone**

**6.12** For maintenance information on the 3B (MD) or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively. For speakerphone connections, use applicable Tables B through E.

**TABLE J**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND. IN MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
R(1)	1	BL-W		BL	6	BL	6	BL-W	*
T(1)	26	W-BL		BL	3	BL	3	W-BL	*
A1	2	O-W	TB1-12			BL	2	W	TB1-3
A(1)	27	W-O		BL	1	BL	1	W-O	*
L(1)	3	G-W		BL	L				
LG(1)	28	W-G		BL	LG				
R(2)	4	BR-W		O	6				
T(2)	29	W-BR		O	3				
B(2)	5	S-W	*			O	2	R	TB1-2
A(2)	30	W-S		O	1				
L(2)	6	BL-R		O	L				
LG(2)	31	R-BL		O	LG				
R(3)	7	O-R		G	6				
T(3)	32	R-O		G	3				
B(3)	8	G-R	*			G	2	BK	TB1-2
A(3)	33	R-G	TB1-7			G	1	S-W	TB1-7
L(3)	9	BR-R		G	L				
LG(3)	34	R-BR		G	LG				
R(4)	10	S-R		BR	6				
T(4)	35	R-S		BR	3				
B(4)	11	BL-BK	*			BR	2	Y	TB1-2
A(4)	36	BK-BL	TB1-9			BR	1	BR	TB1-9
L(4)	12	O-BK		BR	L				
LG(4)	37	BK-O		BR	LG				
R(5)	13	G-BK		S	6				
T(5)	38	BK-G		S	3				
B(5)	14	BR-BK	*			S	2	V	TB1-2
A(5)	39	BK-BR	TB1-4			S	1	S	TB1-4
L(5)	15	S-BK		S	L				
LG(5)	40	BK-S		S	LG				
BZ1	16§	BL-Y	TB2-11						
BZ	41§	Y-BL	TB2-5						

\*Insulate and store.

§Nonstandard pin numbers

**TABLE J (Contd)**  
**MOUNTING CORD AND 508 PLUG CONNECTIONS**

AMPHENOL PLUG			INSIDE TELEPHONE SET						
DESIG	PIN NO.	COLOR	MTG CD TERMINATIONS			SPADE TIP CONDUCTORS FROM 508 PLUGS.			
			SPADE TIP COND IN. MTG. CD	508 PLUGS		PLUG COLOR	PLUG PIN NO.	COLOR	TERM.
				COLOR	PIN NO.				
Spare	17	O-Y	*						
Spare	42	Y-O	*						
HL	18	G-Y	PSB-26						
HLG	43	Y-G	PSB-27						
SG	19	BR-Y	TB1-5						
BL	44	Y-BR	TB1-6						
R or R1	20	S-Y	TB1-13						
B or B1	45	Y-S	Net. K						
AC1†	21§	BL-V	PSB-24						
AC2†	46§	V-BL	PSB-25						
SPO‡	22§	O-V	*						
Spare	47	V-O	Net. T						
R1‡	23	G-V	*						
T1‡	48	V-G	*						
P4-IR‡	24	BR-V	*						
P3-IT‡	49	V-BR	*						
LK‡	25	S-V	*						
AG‡	50	V-S	*						
Tip						S	4	G	TB1-8
Ring						S	5	R	PSB-9
						Pink	HL	BR-W	PSB-26
						Pink	HLG	W-BR	PSB-27
						Pink	3	BL	*
						Pink	2	G	TB1-1
						Pink	1	Y-BL	TB1-3

\*Insulate and store.

†95B1 Power Unit

‡Designations for speakerphone options. Refer to Tables B through E.

§ Nonstandard pin numbers.

TABLE K

TO CONVERT THE 872A1M TELEPHONE SET  
FROM 1A1, 1A2, TO 1A OPERATION (See Note)

LEAD DESIG	COLOR	FROM (1A1, 1A2)	TO (1A)
LSb	Y	TB1-12	TB1-5
HOLD	Y-BL	TB1-3	TB1-16
HOLD	BL	*(Pink 508 Plug)	TB1-3
HOLD	G	TB1-1	Spare 1 §
RING	R	PSB-9	Spare 1 §
LSc†	BR	TB1-1	TB1-6
Net. L2‡	R-BL	TB1-1	TB1-6

Note: Tables B through E provide speakerphone connections for 1A1 and 1A2 KTS. The same tables apply for 1A KTS.

\* Insulated and stored.

† Only required when busy-lamp option is provided.

‡ Only required when both busy-lamp and speakerphone options are provided.

§ Connect to same spare terminal or D-161488 connector.

TABLE L

CONNECTIONS FOR D-180818 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS (NOTE 1)	
DESIG.	COLOR (NOTE 2)	RECORD DISABLE ONLY	RECORD DISABLE AND DIAL INTERMIX (NOTE 3)
WDC	BK*	†	1
VDD	R	2	2
RCD	BK	3	3

Note 1: These terminal posts are found on the 870B Memory (Fig. 6).

Note 2: These are connectors attached to the switch leads. A single pin connector with a (BK) lead and a double pin connector with a (R) and a (BK) lead.

Note 3: When this option is provided, the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just as any other memory.

\* Single pin connector.

† Insulate and store.



**TABLE M**  
**CONVERSION OF KEYS FOR SIGNALING**

SELECTIVE SIGNALING							
508 PLUG (NOTE 1)	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions	HPPPPP	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-4
	HPPPPS	TB1-3	TB1-2	TB1-2	TB1-2	TB1-5	TB1-4
	HPPPSS	TB1-3	TB1-2	TB1-2	TB1-5	TB1-5	TB1-4
	HPPSSS	TB1-3	TB1-2	TB1-5	TB1-5	TB1-5	TB1-4
COMMON SIGNALING (NOTE 2)							
508 PLUG (NOTE 1)	COLOR:	BLUE	ORANGE	GREEN	BROWN	SLATE	
	PIN NO:	2	2	2	2	2	1
	LEAD COLOR:	W	R	BK	Y	V	S
Key Functions	HPPP*P*S	TB1-3	TB1-3	TB1-2	TB1-2	TB1-2	TB1-3
	HPP*P*P*S	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-3

*Note 1:* Remove pins to make key nonlocking when used for signaling.

*Note 2:* Remove (BK) strap from TB1-3, insulate and store.

\*These arrangements use line switch controlled ground for common signal key, used with private or intercommunicating lines. Common signals should be used to operate a common signal relay. Do not wire directly to a buzzer.

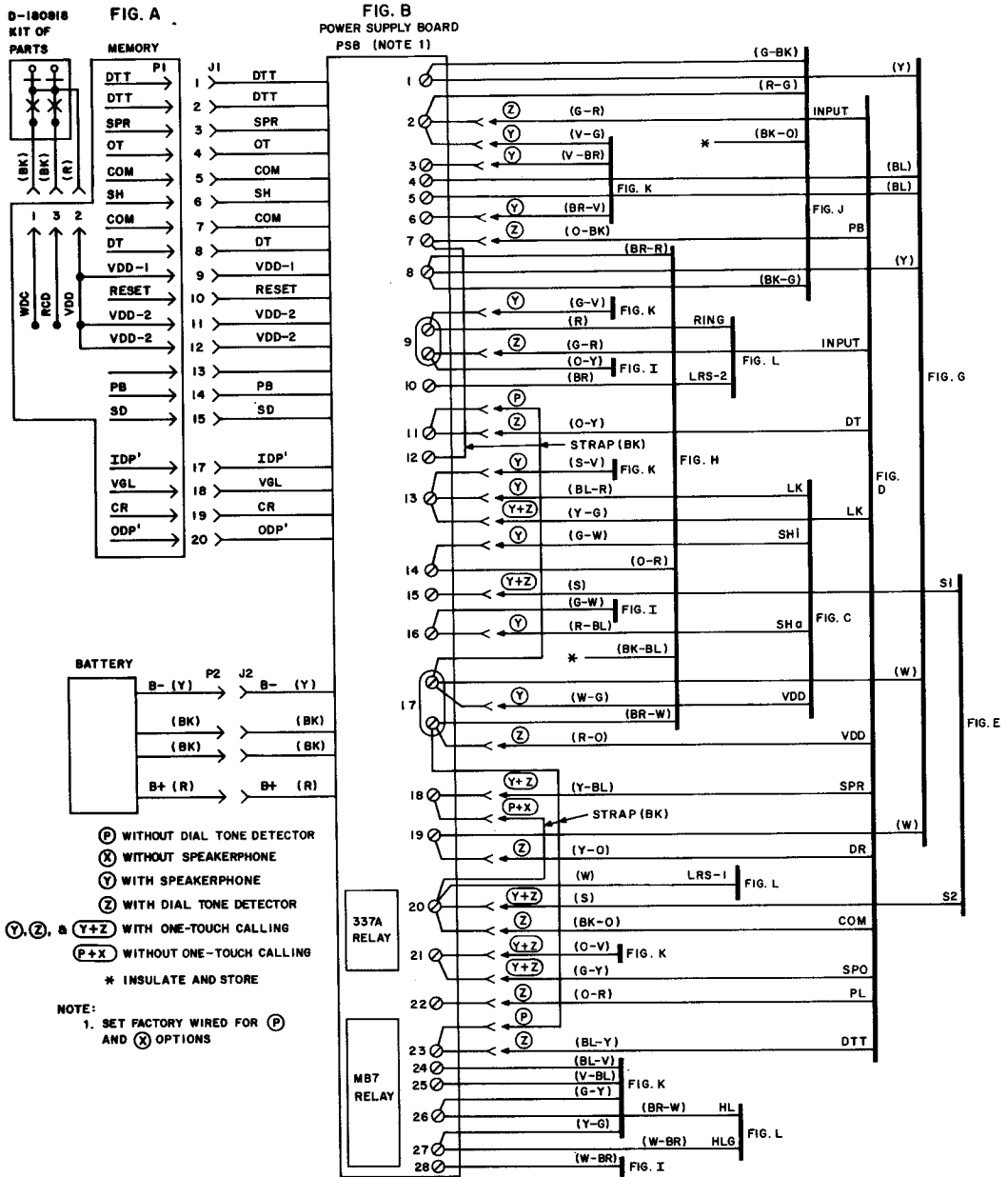


Fig. 9—872A1M Telephone Set, Connections (Sheet 1 of 4)

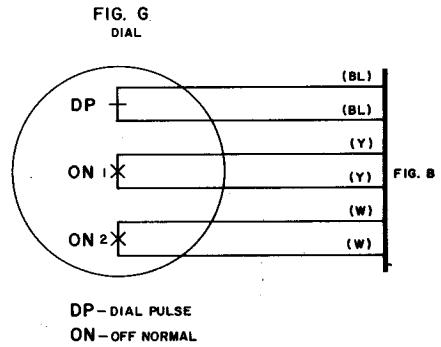
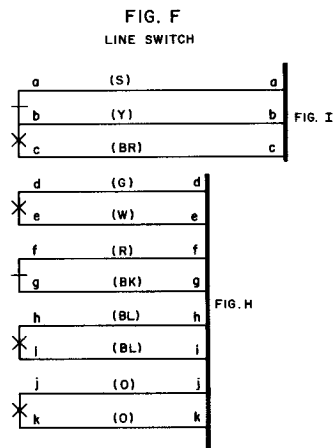
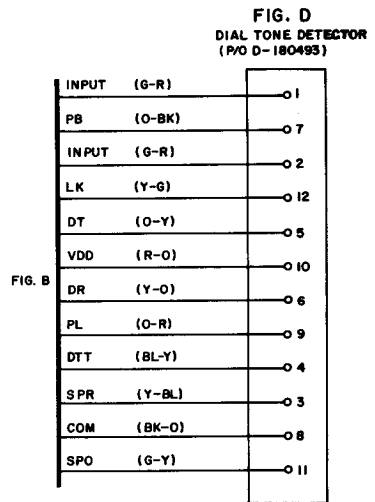
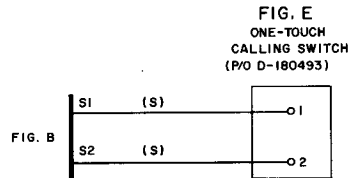
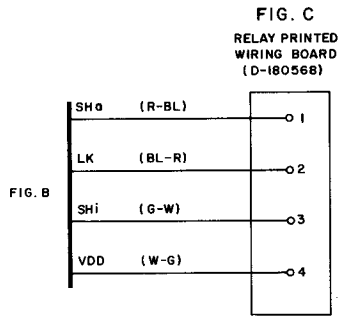


Fig. 9—872A1M Telephone Set, Connections (Sheet 2 of 4)

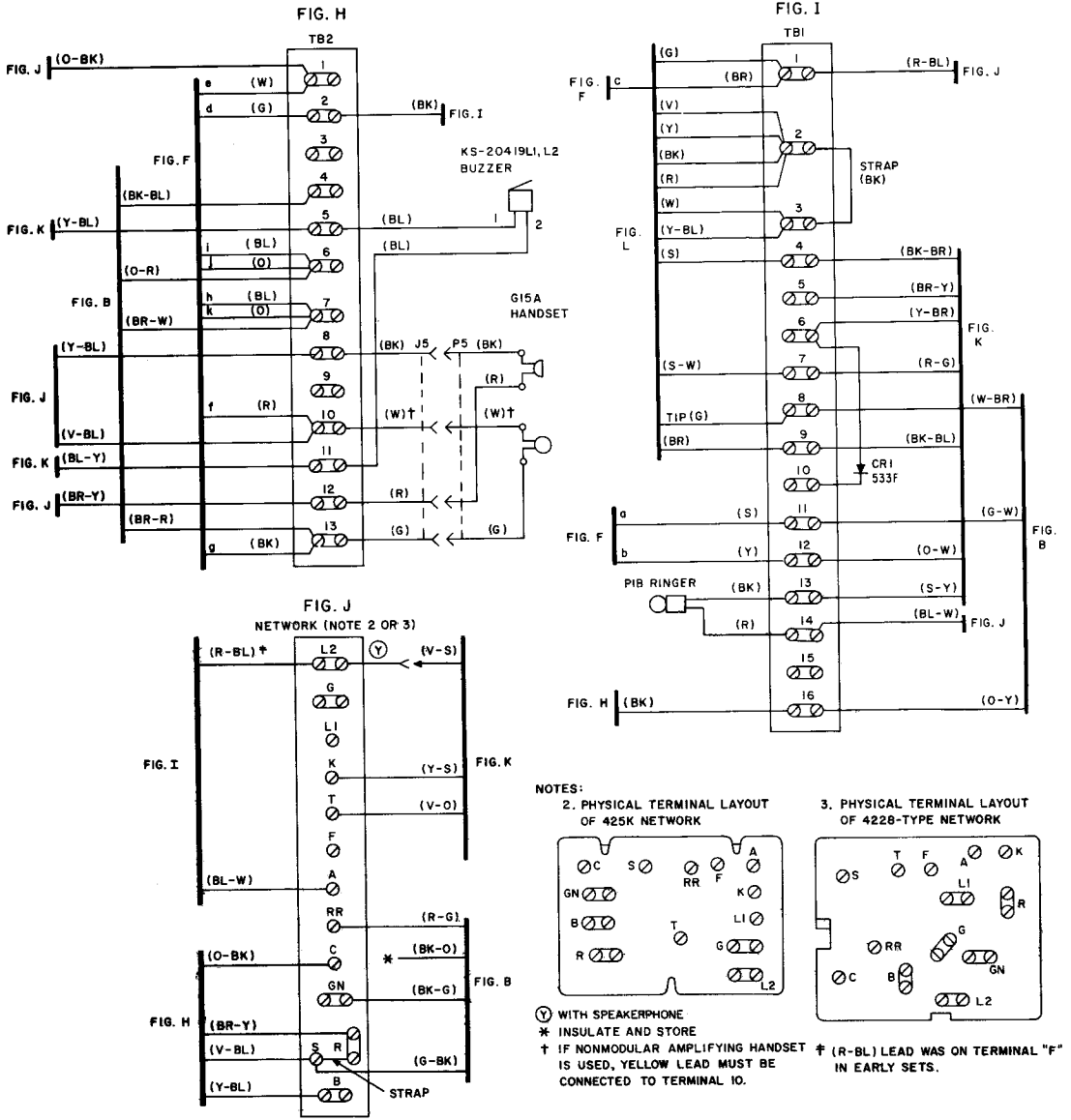


Fig. 9—872A1M Telephone Set, Connections (Sheet 3 of 4)

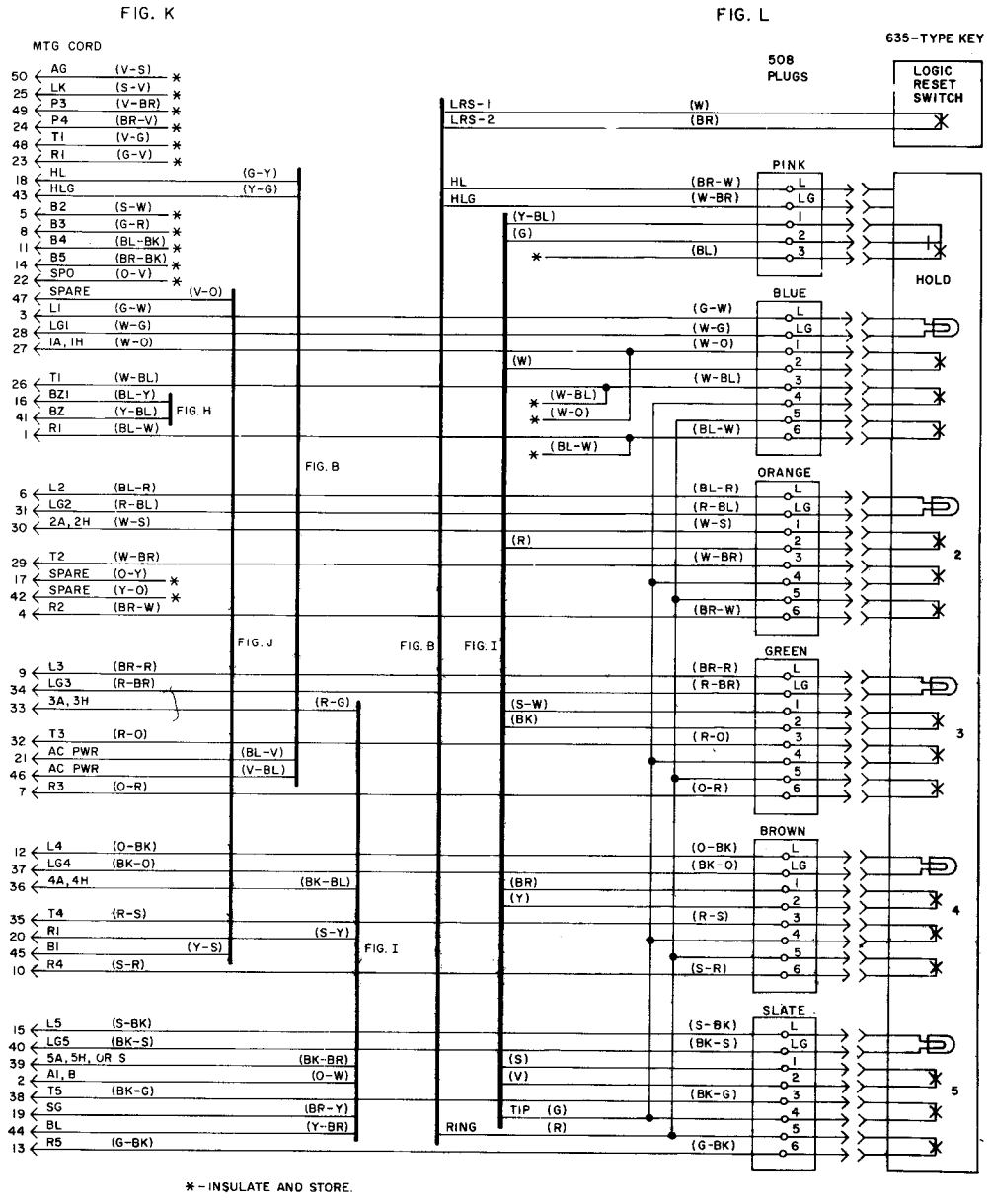
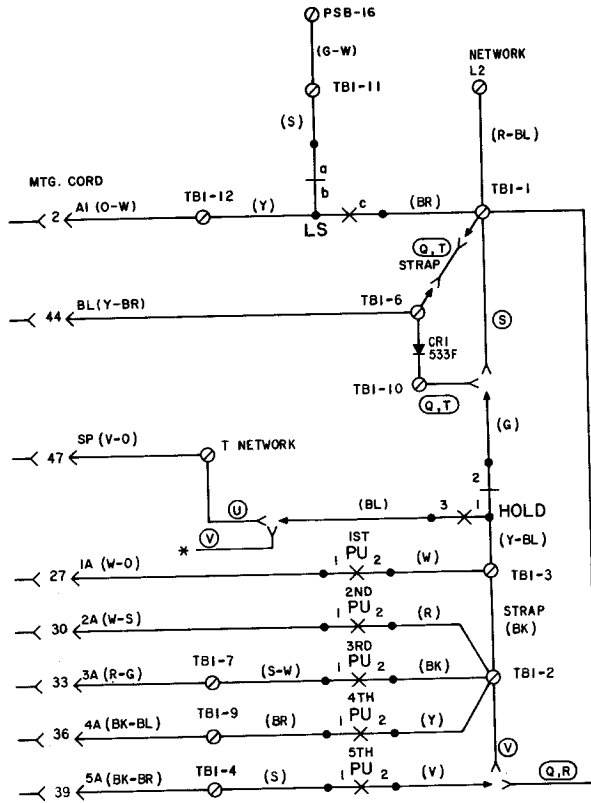


Fig. 9—872A1M Telephone Set, Connections (Sheet 4 of 4)



- \* INSULATE AND STORE
- Ⓞ FOR ADD-ON CONFERRING, CONVERT THE 5TH PU TO NONLOCKING (REMOVE PIN)
- Ⓡ FOR MULTILINE EXCLUSION, CONVERT THE 5TH PU TO NONLOCKING (REMOVE PIN)
- Ⓢ WITHOUT STATION BUSY LAMP
- Ⓣ WITH STATION BUSY LAMP
- Ⓤ "I" HOLD OPTION
- Ⓥ FACTORY WIRING

Fig. 10—"I" Hold, Exclusion, Station Busy Lamp, and Add-On Conference—1A1 and 1A2 KTS (Showing Fifth Key Modified)

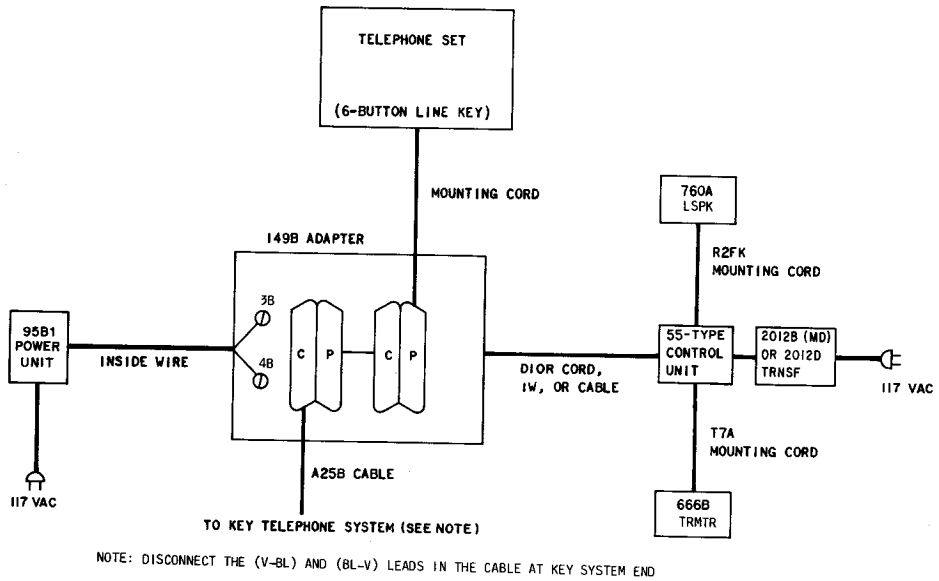
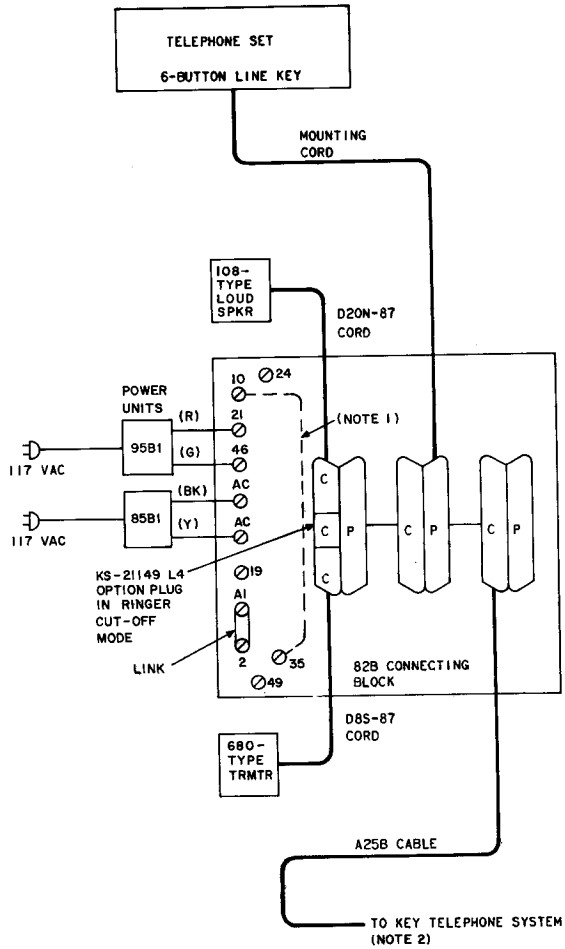


Fig. 11—Block Diagram—872A1M Telephone Set Using 3B (MD) Speakerphone



NOTES:

1. STRAP NECESSARY ONLY IF SET IS ALSO EQUIPPED WITH DIAL TONE DETECTOR TO PROVIDE ONE-TOUCH CALLING OPTION.
2. IF POWER IS PROVIDED THROUGH KEY CABLE, USE (BR-V) PAIR FOR 85-TYPE POWER UNIT AND STRAP 24 TO AC1 AND 49 TO AC2 ON 82B CONNECTING BLOCK.

Fig. 12—Block Diagram—872A1M Telephone Set Using 4A Speakerphone



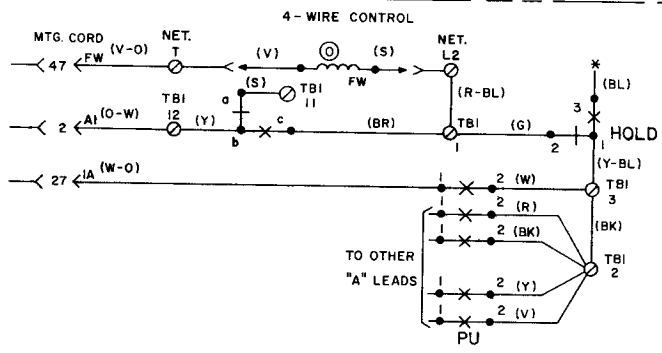
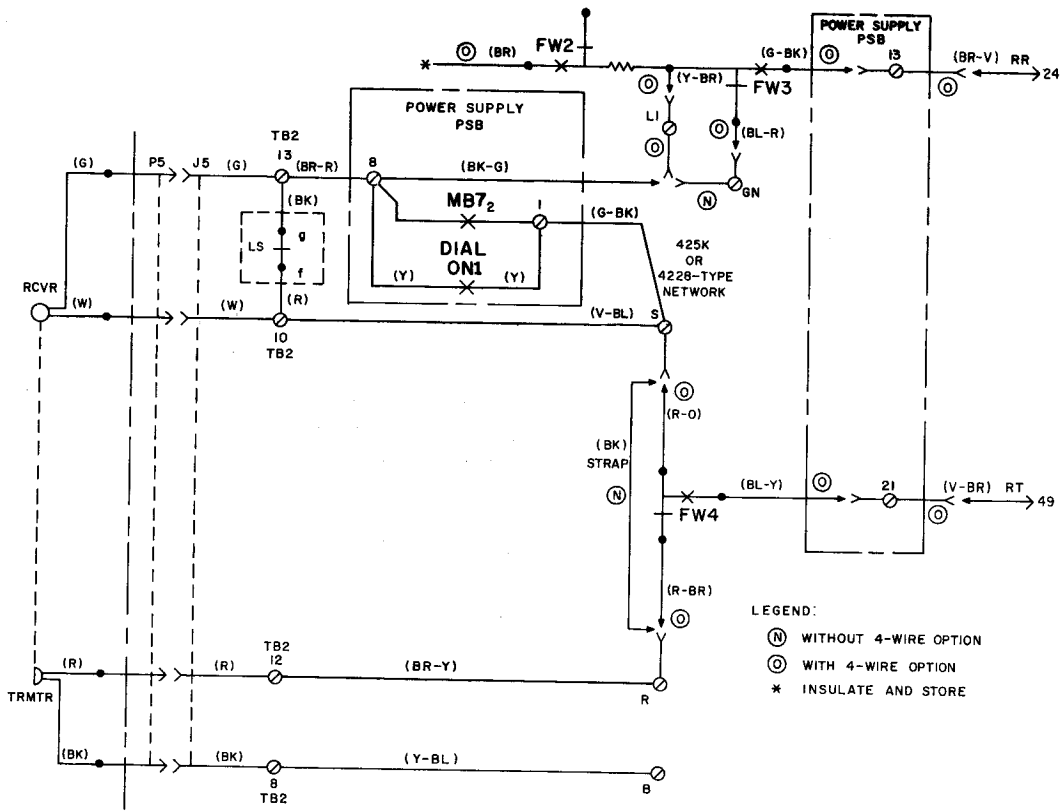
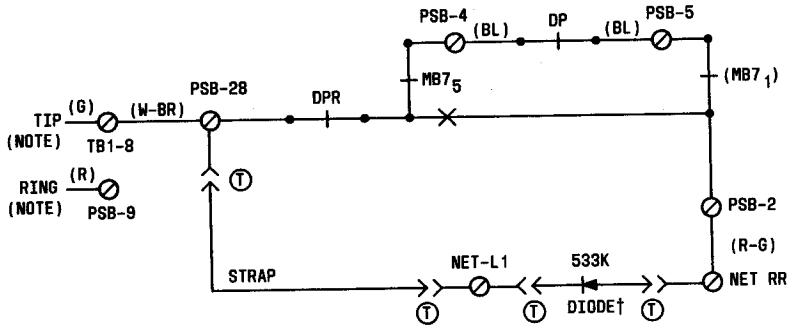


Fig. 13—872A1M Telephone Set—2- and 4-Wire Connections



† ORDERED AND INSTALLED SEPARATELY

Ⓣ - WITH RESTRICTED DIALING

NOTE: REVERSE POLARITY ON TIP AND RING LEADS ON ALL LINES WITH RESTRICTED DIALING.

Fig. 14—Connections for Restricted Dialing Option

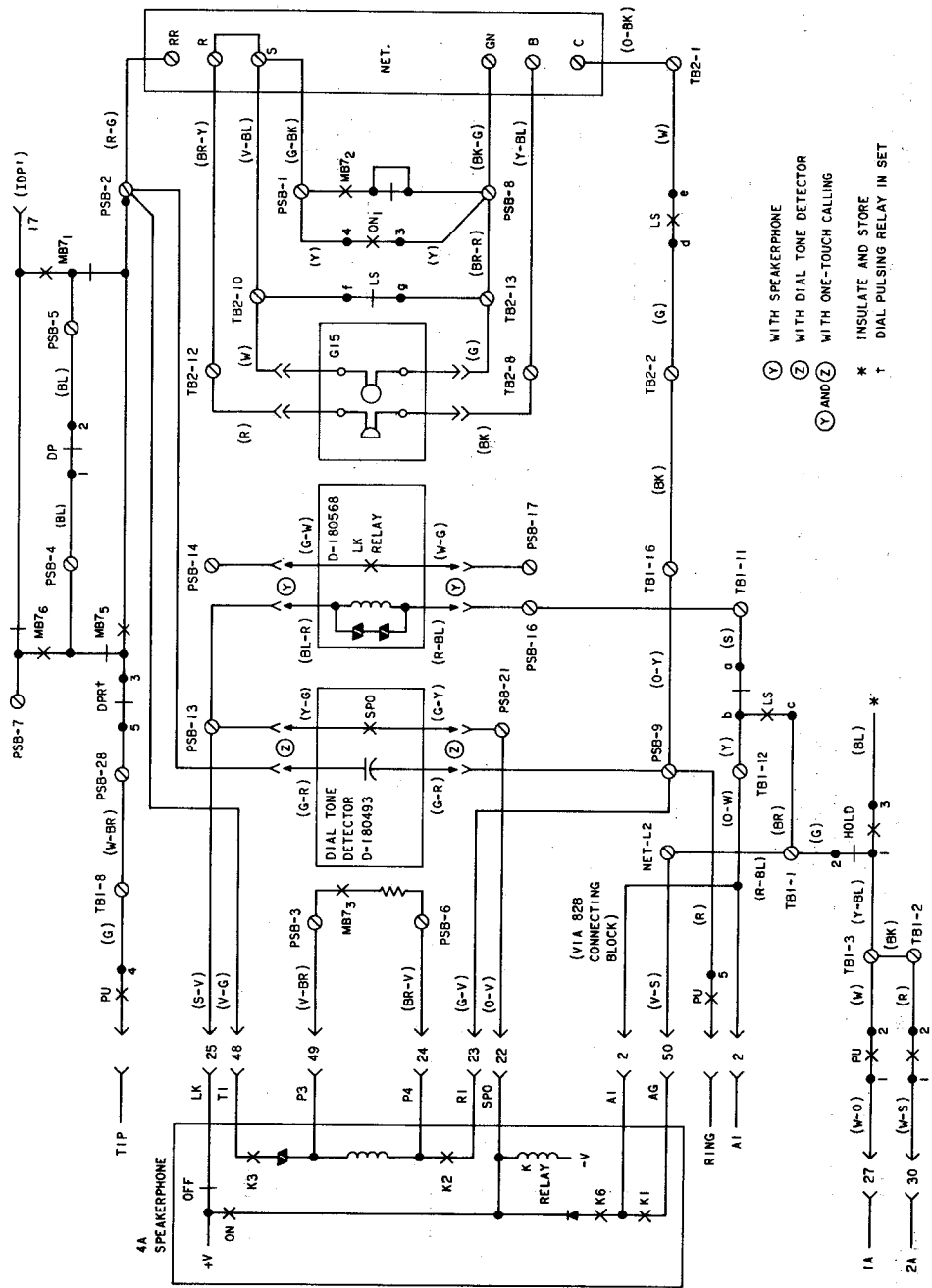


Fig. 15—872A 1M Telephone Set, Partial Functional Schematic

◆ TABLE N ◆  
TROUBLE ANALYSIS - 872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set on all lines when off-hook on handset	Line lamp does not come on when handset is taken off-hook.	Mounting cord improperly inserted at equipment end	Check cord insertion and connections
		Line lamp comes on when handset is taken off-hook. Set remains dead when 95B1 power unit is disconnected.	Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
		Dial tone is not present when speakerphone is on.	Defective receiver	Check handset
2	Dead set on all lines only when speakerphone is on	Line lamp comes on when handset is taken off-hook. Set becomes active when 95B1 power unit is disconnected.	Open tip or ring lead at 635-type line key	Check leads and connections from contact strips
		Set is active when off-hook on handset.	Unknown	Replace telephone set*
		Line lamp comes on when handset is taken off-hook. Set becomes active when 95B1 power unit is disconnected.	Improperly installed or defective memory	1. Check connector cable insertion 2. Replace memory
3	Cannot transmit when off-hook on handset.	Set is active when off-hook on handset.	Defective PSB	Replace telephone set*
		Line lamp comes on. Dial tone present, but sidetone absent.	Improperly connected or defective speakerphone	1. Check connections 2. See appropriate speakerphone BSP for trouble analysis
		Line lamp comes on. Dial tone present, but sidetone absent.	Handset cord improperly inserted into either handset or jack in telephone set	Check handset cord and/or handset
		Line lamp comes on. Dial tone present, but sidetone absent.	Defective transmitter	Replace transmitter or handset
			Defective 616B jack	Replace 616B jack
			Defective network	Replace telephone set*

\*Refer to paragraph 6.02(4).

◆ TABLE N (Contd)◆  
TROUBLE ANALYSIS—872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4	Cannot manually dial when off-hook on handset (dial tone is present).	Dialing clicks heard (in handset) when dial is returning.	Bridged set off-hook Speakerphone improperly installed or defective	Place bridged set on-hook Check appropriate speakerphone BSP for analysis
		No dialing clicks heard when dial is returning. Condition remains unchanged when 95B1 power unit is disconnected.	Improperly installed or defective rotary dial Unknown	1. Check connections 2. Replace rotary dial Replace telephone set*
5	Cannot manually dial when speakerphone is on. (Dial tone is present.)	No dialing clicks heard when dial is returning. With 95B1 power unit disconnected, set can manually dial.	Improperly installed or defective memory Defective PSB	1. Check connector cable 2. Replace memory Replace telephone set*
		Set does manually dial when off-hook on handset	Improperly installed on defective speakerphone	1. Check connections 2. See appropriate speakerphone BSP for trouble analysis
6	RECORD lamp does not function properly		Defective line switch	Replace telephone set*
			AC power not present	Check for commercial power
			Battery not connected	Connect battery
			95B1 power unit not plugged in or defective	Check or replace 95B1 power unit (should read 13.4 to 18 Vac across screw terminals 24 and 25 on PSB)
			Open in IW	Check IW and connections
			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
	Defective logic reset switch	Replace line key		
	Switch of D-180818 Kit of Parts in ON position.	Change switch position to OFF		

\*Refer to paragraph 6.02(4).

◆ TABLE N (Contd) ◆  
TROUBLE ANALYSIS—872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (contd)			Improperly installed or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace telephone set*
			Improperly installed or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace telephone set*
7	Cannot record properly into the 31 memory positions or into LAST NUMBER DIALED position.	Lamp does not turn off as dial is returning. No relay click heard at beginning of dial wind-up or at end of dial return.	Improperly connected or defective rotary dial (off-normal contact)	1. Check rotary dial connections 2. Replace telephone set*
			Improperly connected or defective memory	1. Check cable 2. Replace memory
			Unknown	Replace telephone set*
			Memory button was not depressed prior to the operation of the dial	Record per paragraph 5.01 (4) through (7)
			Defective memory	Replace memory
			Unknown	Replace telephone set*
			Defective memory	Replace memory
			Unknown	Replace telephone set*
			Record lamp functions properly and set dials manually	

\*Refer to paragraph 6.02(4).

▶ TABLE N (Contd) ◀  
TROUBLE ANALYSIS — 872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (contd)		Party is reached when number is recorded as it is manually dialed; however, when number is subsequently dialed from memory, party is not reached — wrong number is dialed from memory	Check recording procedure	Record per paragraph 5.01 (4) through (7)
			Defective memory	Replace memory
			Unknown	Replace telephone set*
8	Cannot dial properly from memory on handset.	MB7 relay does not operate (no click heard) when memory button is depressed	Battery not connected	Connect battery
			Memory not securely mounted	Tighten memory mounting screws
			Improper and/or defective strap from PSB terminal 18 to PSB terminal 20	Check and/or replace strap lead. See Fig. 9B
			Improper connection to or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace telephone set*
		MB7 relay operates (click heard) when memory button is depressed but no dialing clicks are heard. In addition, transmit and receive levels are very low.	WAIT button is stuck down or defective	Free stuck WAIT button or replace memory
			Unknown	Replace telephone set*
		No digits, random digits or all the same digits in memory location(s). Note: memory may or may not have functioned properly at some previous time.	AC power outage for 24 hours or longer	Reestablish ac power and record numbers into memory

\*Refer to paragraph 6.02(4).

↓ TABLE N (Contd) ↓  
TROUBLE ANALYSIS—872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
8 (contd)			Defective battery	<ol style="list-style-type: none"> <li>Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B power unit from the ac power outlet and reinsert</li> <li>If previously stored numbers are not dialed from memory, replace the battery</li> <li>Repeat procedure</li> </ol>
			Defective memory	Replace memory
9	Cannot dial properly from memory when on the handset (wired for dial tone detector option)	Two or more memory locations have same digits which are usually different from originally recorded digits  Automatically dials through a "wait"	Unknown	Replace telephone set*
			Static discharge damage	<ol style="list-style-type: none"> <li>Consult Telco Engineer for proper grounding procedure</li> <li>Replace memory</li> </ol>
			Memory not securely mounted	Tighten memory mounting screws
			Improper connection to PSB terminal 23	Check connection to and/or replace strap to PSB terminal 23
			Defective memory	Replace memory
			Unknown	Replace telephone set*
			Battery not connected	Connect battery
			Precise TOUCH-TONE service dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten memory mounting screws
			Improper installation of dial tone detector D-180493	Check connections for D-180493 installation

\*Refer to paragraph 6.02(4).



♦ TABLE N (Contd) ♦  
TROUBLE ANALYSIS — 872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (contd)		Same as above — Addition of strap lead between PSB terminals 20 and 23 does not correct problem.	Improper connection to or defective memory	1. Check connector cable 2. Replace memory
		Addition of strap lead between PSB terminals 20 and 23 corrects problem.	Defective memory	Replace memory
		Automatically dials through a "wait."	Defective dial tone detector	Replace D-180594 dial tone detector
		Speakerphone indicator lamp does not turn one, but line lamp is on.	Unknown	Replace telephone set*
		No dial tone heard, but indicator lamp turns on.	Memory not securely mounted	Tighten memory mounting screws
		With temporary strap lead added between PSB screw terminals 16 and 13, speakerphone turns on when ON button is depressed.	Improper connection to PSB terminals 23 and 11	Check installation of D-180493 Kit of Parts
10	Cannot turn speakerphone on when ON button is depressed (wired for speakerphone option).	Speakerphone indicator lamp does not turn one, but line lamp is on.	Handset off-hook	Place handset on-hook
		With temporary strap lead added between screw terminals 11 and 12 on TB1, speakerphone turns on when ON button is depressed.	Line button not depressed	Depress line button
		With temporary strap lead added between screw terminals 11 and 12 on TB1, speakerphone turns on when ON button is depressed.	Improper connections or defective D-180568 Kit of Parts	Check connections to and/or replace D-180568 Kit of Parts
		Speakerphone indicator lamp does not turn on and neither does line lamp	Defective line switch a-b contacts or connecting lead to power supply PSB.	1. Check (G-W) harness lead between screw terminal 11 on TB1 and PSB terminal 16 2. Replace telephone set*
			Improper connections or defective 85B1 power unit	1. Check for commercial power 2. Check connections per Tables B, C, D, and E

\*Refer to paragraph 6.02(4).

◆ TABLE N (Contd) ◆  
TROUBLE ANALYSIS—872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (contd)				3. Check that 85B1 power unit is plugged into commercial ac power outlet 4. Check or replace 85B1 power unit (should read 18 to 25 Vac across "open circuited" secondary screw terminals)  See appropriate speakerphone BSP for trouble analysis  Replace D-180568 Kit of Parts
11	RECORD lamp does not turn off when speakerphone ON button is depressed (wired for speakerphone option).	With temporary strap lead added between PSB screw terminals 14 and 17, speakerphone turns on when ON button is depressed and RECORD lamp goes off  Operation of RECORD OFF button or line key buttons turns RECORD lamp off.	Defective speakerphone  LK relay circuit defective on D-180568 Kit of Parts	Replace telephone set*
12	Cannot turn speakerphone off when handset is lifted off-hook (wired for speakerphone option).	Speakerphone turns off when OFF button is depressed but turns back on when OFF button is released	Short circuit between screw terminals 11 and 12 on TB1	Clear short
13	Cannot hear dial clicks when dialing with speakerphone on (wired for speakerphone option).	With the speakerphone ON button depressed, dialing clicks can be heard.	Defective line switch a-b contacts	Replace telephone set*
14	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (wired for one-touch option).	MB7 relay does not operate (no click heard) when memory button is depressed  With temporary strap between PSB screw terminals 15 and 20 speakerphone turns on when a memory button is depressed	Physical spacing between speakerphone, loudspeaker and transmitter units is too close  Battery not connected With 4A speakerphone, strap not added on 82B block One-touch calling switch turned off or defective	See appropriate speakerphone BSP for proper placement of units  Connect battery Add strap from terminal 10 to 35 in 82B block  1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts

\* Refer to paragraph 6.02(4).

TABLE N (Contd) ♣  
TROUBLE ANALYSIS—872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
14 (contd)			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
		With temporary strap between PSB screw terminals 13 and 21, speakerphone turns on.	Defective connections between dial tone detector and PSB.	Check (Y-G) and (G-Y) leads to PSB terminals 13 and 21, respectively
15	Speakerphone turns on but set does not automatically dial when memory button is depressed (Wired for one-touch option).		Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
			(BK) strap leads to screw terminals 11 and 23 on PSB were not insulated and stored when option was wired	Insulate and store strap leads.
		Set automatically dials when screw terminals 20 and 23 on PSB are temporarily shorted.	Precise TOUCH-TONE service dial tone not present or a defective dial tone detector	1. Check CO line for presence of precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D-180493 Kit of Parts
16	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (wired for one-touch option).		Defective timing circuit	1. Replace memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts

\*Refer to paragraph 6.02(4).

♦ TABLE N (Contd) ♦  
TROUBLE ANALYSIS — 872A1M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
17	Cannot turn speakerphone OFF (wired for one-touch calling)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released.	(BK) strap to screw terminal 18 on PSB was not insulated and stored when option was wired	Insulate and store strap lead
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 18 on PSB and OFF button is depressed.	Defective output logic level	Replace memory
18	Set dials automatically but does not wait for dial tone (wired for one-touch calling)	Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook.	Defective circuit of D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
			Noise on line	1. Add .5 mf capacitor between PSB-17 and PSB-23 2. Remove above capacitor and add resistor (10 K $\Omega$ to 50 K $\Omega$ ) in series with (G-R) dial tone detector input lead.
19	Automatic dialing commences for no apparent reason (wired for one-touch calling)		Static discharge damage	1. Consult Telco Engineer for proper grounding procedure 2. Replace memory
20	Hum or noise caused by electrical apparatus (light dimmer switch, etc.)		Unbalanced telephone line	Check for unintentional connections that might cause an unbalanced telephone line.