

STATION SPECIALTIES SERVICE MANUAL

STATION SPECIALTIES SERVICE MANUAL

VOLUME I

VOL I



 Bell System

SEPT 1977

325-052

SEPTEMBER 1977

Station Specialties Service Manual Vol I

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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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870A1 AND 2870A1 ADJUNCT REPERTORY DIALS

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NOTICE

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



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

1.02 This section is reissued to:

- Add D-180818 Kit of Parts (Record disable and data enhancement)
- Add new housing information
- Show 870A1 and 2870A1 faceplates MD
- Add new faceplate information
- Add Tables C through G
- Revise Tables A, B, H, and I
- Revise Fig. 6, 7, 8, 9, and 11.

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

1.03 These dials are factory-wired as an adjunct dialer to provide manual and automatic rotary (870A1) or TOUCH-TONE (2870A1) dialing service when interfaced with a telephone set or console.

1.04 These dials are shipped from the factory in the Ivory (-50) housing only. However, housings are available in additional colors per 2.05.

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.

2.02 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).

dialed digits from memory may be intermixed without depressing RECORD OFF button. Memories cannot be altered and LAST NUMBER DIALED feature is inoperative

- One-Touch Calling—depressing one memory button will automatically turn on speakerphone, detect dial tone, and complete number.

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

2.03 Optional Features:

- Decorative Faceplate
- Speakerphone—these dials interface with telephone sets using either 3B or 4A speakerphone systems
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE dial tone (350 Hz and 440 Hz) is present
- 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 manually dialed digits from adjunct dial
- Data Enhancement Mode—manually dialed digits from adjunct dial and automatically

2.04 All options are implemented by:

- 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.

2.05 Ordering Guide:

- (a) Either of these dials may be ordered complete and ready to install as:
 - Dial, 870A1-50 (Rotary)
 - Dial, 2870A1-50 (TOUCH-TONE service)
- (b) **Ordered Separately:**
 - Unit, Power, 95B1 or 95B2 (required for operation of the automatic dialing feature).

TABLE A
OPTIONS

OPTION	ADDITIONAL ITEMS REQUIRED	CONNECT 870A1 PER		CONNECT 2870A1 PER	
		FIG.	TABLE	FIG.	TABLE
One-Touch Calling (Note 1)	D-180493 Kit of Parts	9B, D, E	B	11B, D, E	B
Dial Tone Detector		9B, D		11B, D	
Record Disable	D-180818 Kit of Parts (Note 2)	5	C	5	C
Data Enhancement					

Notes:

1. Associated telephone set must be equipped with 3B or 4A speakerphone system.
2. An 870B or 2870B memory is required with this kit of parts.

Note: A 95B-type power unit is required for each adjunct dial.

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

- Housing, 870ADJ1-50
- Housing, Upper, 870A1U-50
- Faceplate, 870B1-122
- Base, Dial, 841382575 (includes the following):

Dial, 8EA-119

Line Sensing Printed Wiring Board Assembly, 841382880

Cord, Mounting, D10U-87

Cord, Power, M2SL-87

Battery, KS-20390L4

Memory, 870B

Power Supply Printed Wiring Board (PSB) Assembly, 841382617

Directory Sheet Set, 840393672

Booklet, Instruction, Subscriber, SIB-2481B

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

- Housing, 870ADJ1-50
- Housing, Upper, 870A1U-50
- Faceplate, 2870B1-122
- Base, Dial, 841381965 (includes the following):

Dial, 35AG3A

Line Sensing Printed Wiring Board Assembly, 841382880

Cord, Mounting, D10U-87

Cord, Power, M2SL-87

Battery, KS-20390L4

Memory, 2870B

Power Supply Printed Wiring Board (PSB) Assembly, 841382385

Directory Sheet Set, 840393672

Booklet, Instruction, Subscriber, SIB-2481B

(e) **Optional Apparatus (order as required):**

- Housing, 870ADJ1-*
- Housing, Upper, 870A1U-*
- Faceplate, 870B1-† or 2870B1-†
- Cord, Mounting, D10Y-50 (Required when adjunct dial connected to some MET sets)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling Switch)
- Kit of Parts, D-180818 (RECORD disable/Data Enhancement)

Note: Requires that the adjunct dial be equipped with an 870B or 2870B Memory.

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

† Color suffix as follows: (-108) Teak Woodgrain and (-109) Walnut Woodgrain.

2.06 Operating Features (Fig. 1):

- 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 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 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.

Caution: *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 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.

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

3.05 870A1 (Rotary) Dial:

- (1) Check operation of line sensing circuit as follows:
 - (a) With telephone handset on-hook, momentarily depress RECORD button—RECORD lamp lights.
 - (b) Lift telephone handset off-hook—RECORD lamp 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 [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.

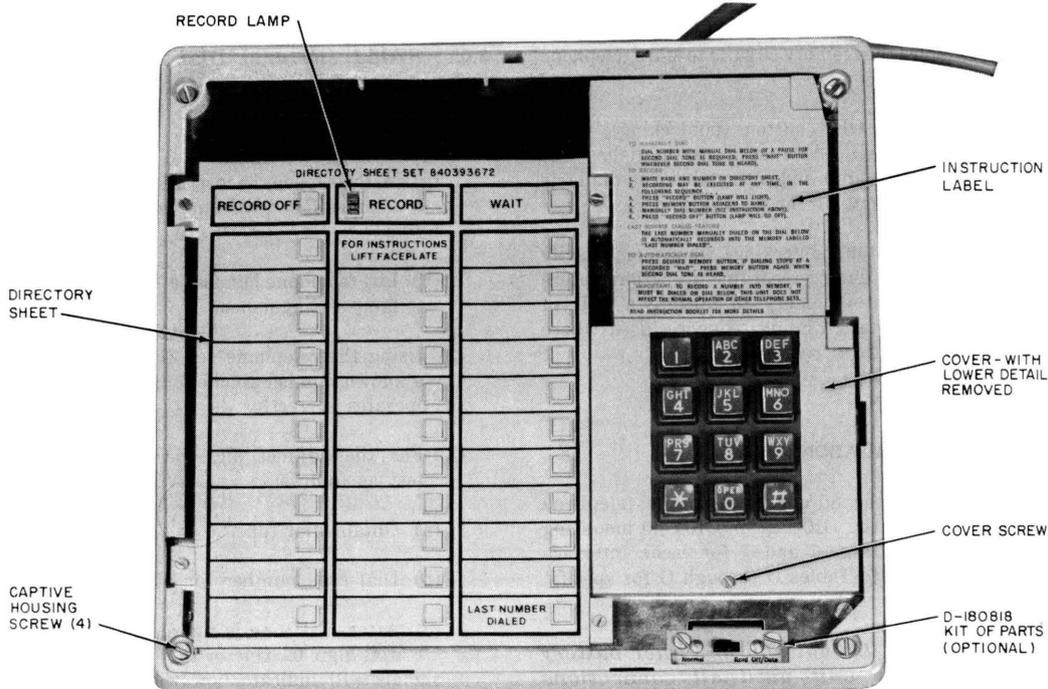


Fig. 2—2870A1 Dial, Faceplate Removed

(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 [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.

3.06 2870A1 (TOUCH-TONE Service) Dial:

(1) Check operation of the line sensing circuit as follows:

(a) With the telephone handset on-hook, momentarily depress the RECORD button—RECORD lamp lights.

(b) Lift telephone handset—RECORD lamp 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 [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 [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).

(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

D-180493 Kit of Parts (Dial Tone Detector)

3.07 To install:

(1) Remove the housing (3.11), and access PSB terminal board (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 Record Disable Switch (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 customer.)

- (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.

D-180818 Kit of Parts (Record Disable and Data Enhancement)

3.08 To install:

- (1) Remove faceplate (3.10).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (3) Disengage dial from chassis (6.05 or 6.06).
- (4) Loosen the four captive Memory mounting screws (Fig. 2).
- (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 is connected (Table B) shall 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 C.

- (8) Set switch to "NORMAL" position and verify that dial operates in normal manner.

- Numbers can be recorded into Memory
- Numbers can be automatically dialed.

- (9) Set switch to "RCRD OFF/DATA" position and verify feature provided.

- Record disable only feature:
 - (a) Record lamp will not light when RECORD button depressed.
 - (b) No telephone numbers can be recorded in memory.
 - (c) LAST NUMBER DIALED feature still operative.

- Data enhancement feature:
 - (a) Record lamp will not light when RECORD button depressed.
 - (b) No telephone numbers can be recorded in memory.
 - (c) Manually and automatically dialed digits may be intermixed. (Depression of RECORD OFF button not required.)
 - (d) LAST NUMBER DIALED feature disabled.

- (10) Reassemble set.

COMPONENT LOCATION AND ACCESS INFORMATION

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

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 (3.10).

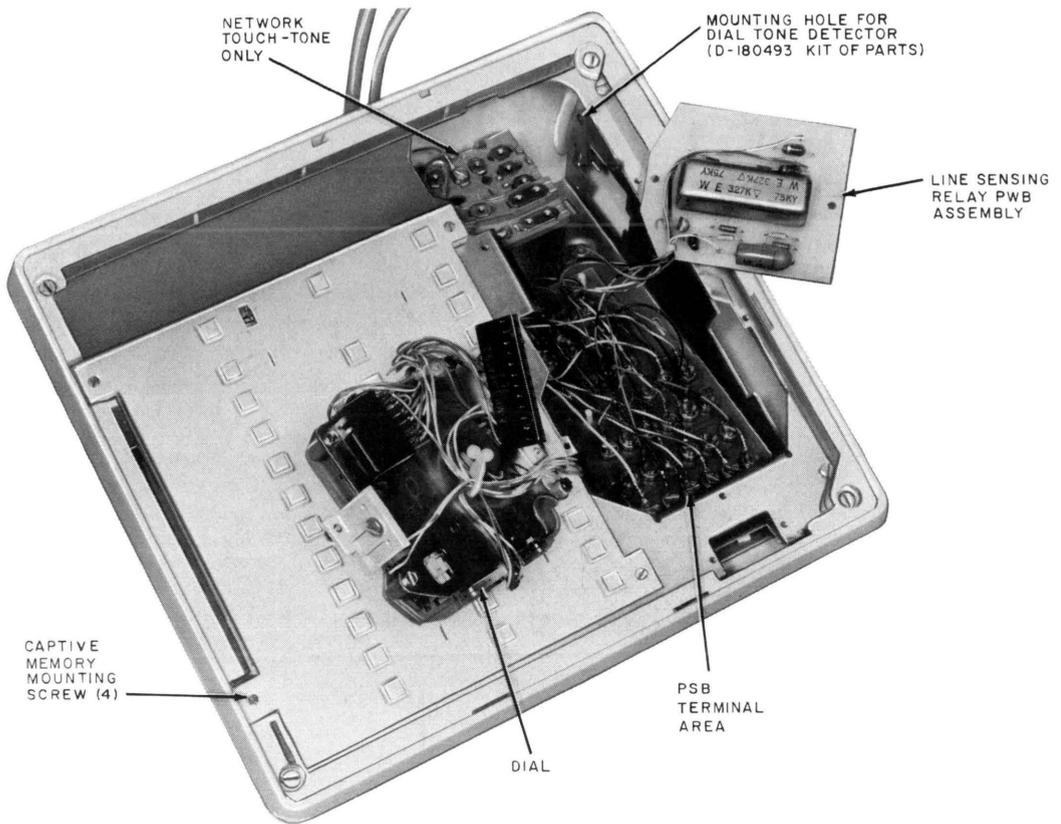


Fig. 3—2870A1 Dial, Dial and Memory Removed to Show Terminal Area

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

- (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.

Faceplate Removal

3.10 To remove, proceed as follows:

(a) **B1-type faceplate:**

- (1) The B1-type faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up

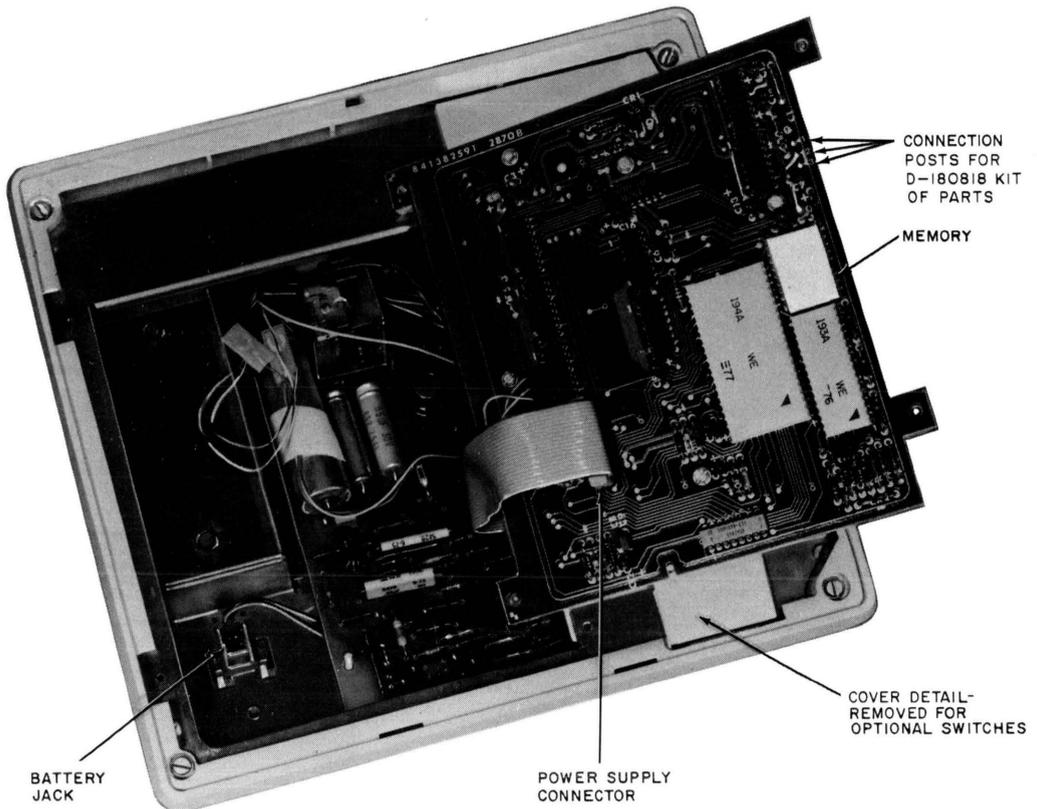


Fig. 4—2870A1 Dial, Internal View

on the tab which protrudes from the center of the back edge of the faceplate.

Note: The B1-type faceplate is not a direct replacement for the A1-87 faceplate described in (b). An 870A1U upper housing is also required (6.08).

(b) **A1-type (MD) faceplate:**

(1) For those adjunct dials equipped with a 870A1-87 or 2870A1-87 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.

Housing Removal

3.11 To remove, proceed as follows:

(a) **Lower housing:**

- (1) Disconnect the power unit from ac outlet.
- (2) Remove the faceplate (3.10).
- (3) Disengage the captive housing screws (Fig. 2). One is located in each of the four corners of the chassis.

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.

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

(5) Before replacing the housing, lift the dial 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) **Upper housing:**

(1) Disconnect the power unit from ac outlet.

(2) Remove the faceplate (3.10).

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

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

(5) If necessary, thread screws out of housing.

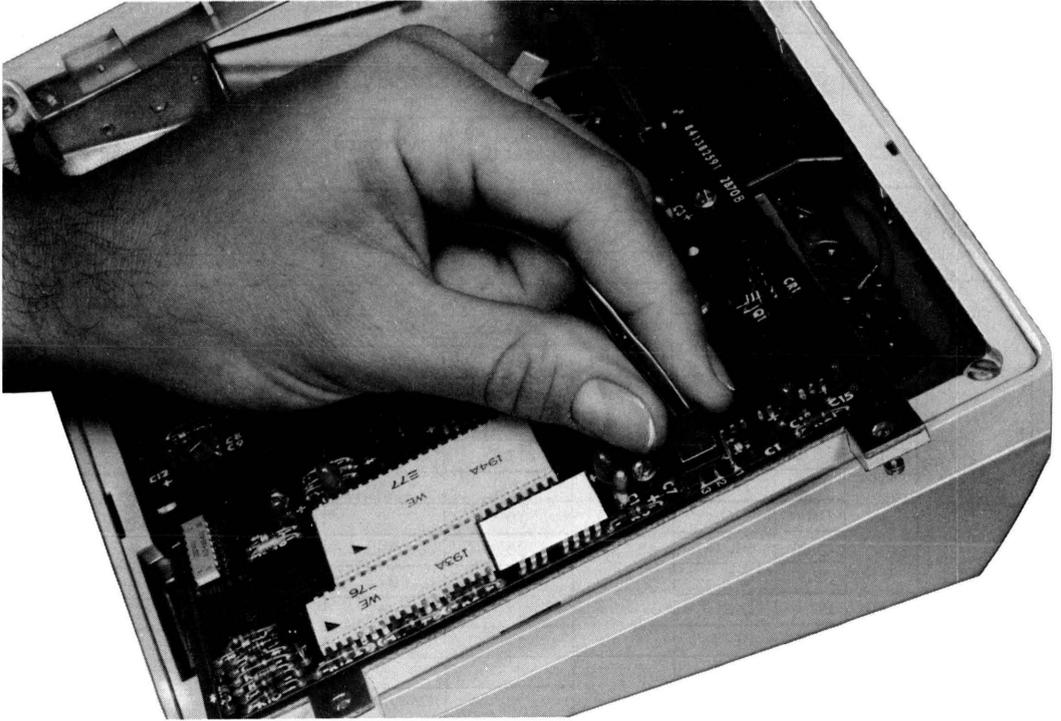


Fig. 5—2870A1 Dial, Connection of D-180818 Kit of Parts, Record Disable Feature Illustrated

TABLE C

CONNECTIONS FOR D-180818 KIT OF PARTS

D-KIT SWITCH LEADS		TERMINAL POSTS FOR SWITCH LEAD CONNECTORS	
DESIGN	COLOR (Note 1)	RECORD DISABLE ONLY	DATA ENHANCEMENT (Note 2)
WDC	BK†	*	1
VDD	R	2	2
RCRD	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) 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 dial 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—870A1 Dial Connections to Consoles.
- Table F—2870A1 Dial Connections to Telephones.
- Table G—2870A1 Dial Connections to Consoles.

4.04 Refer to Table A for connection reference for all options.

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

5. OPERATION

Record A Number Into Memory

Note: If equipped with the D-180818 Kit of Parts, switch should be in NORMAL 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 (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:

(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.

Change A Number In Memory

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

Delete A Number From Memory

5.03 To delete a number:

- (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.

Automatically Dial A Number From Memory

5.04 To automatically dial a number:

(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.

LAST NUMBER DIALED Feature

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:

(a) **If no access digit(s) 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.

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 calling 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.

(1) ***Standard Operation:***

- (a) 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.)

(2) ***Data Enhancement Mode:***

- (a) Manually and automatically dialed digits may be intermixed as desired when the switch is in the RCRD OFF/DATA 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.

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 adjunct dial.
 - (b) Unplug battery.
 - (c) Place battery plug sideways into housing slot below battery pack and tape into place.

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

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 (3.05 or 3.06).

Memory

6.04 The memory may be replaced in the following manner:

Note: Removal of the memory results in loss of stored numbers.

- (1) Remove power unit from ac outlet.
- (2) Remove the faceplate (3.10).
- (3) Loosen the four captive memory mounting screws (Fig. 2).
- (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 ac power.
- (9) Test per 3.05 or 3.06 as required.

Dial

6.05 To replace rotary dial:

- (1) Disconnect power unit from ac outlet.
- (2) Remove faceplate (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.

6.06 To replace TOUCH-TONE dial:

- (1) Disconnect power unit from ac outlet.
- (2) Remove faceplate (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 screw 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.

Caution: Do not remove the power supply connector in the process of changing the dial, since this will result in complete loss of stored numbers.

- (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.

Line Sensing Relay Printed Wiring Board Assembly

6.07 To replace:

- (1) Disconnect power unit from ac outlet.
- (2) Remove faceplate (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) Disconnect the Line Sensing Relay Board leads from associated terminals on the PSB.
- (7) Remove the two mounting screws for the Line Sensing Relay Board 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. 10B and 10C for the 2870A1 dial).
- (9) Reassemble set.

Faceplate (conversion from A1- to B1-type)

- 6.08** To replace a 870A1-87 or 2870A1-87 faceplate with a B1-type faceplate:
- (1) Remove the A1-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 the 870A1U-type upper housing to the chassis and 870A1-type 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-type 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 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	G	Net. F	Spare 1	G, G-V	9	Spare 2
564HL	G	Net. F	Spare 1	G	9	Spare 2
630DA, 630DAM	(2) G	Net. F	Spare 1	G	13	Spare 2
631DA, 631DAM	(2) G	Net. F	Spare 1	G	13	Spare 2
634DA	W-BL	Net. F	Spare 1	BL-W	13	Spare 2
635DA	W-BL	Net. F	Spare 1	BL-W	13	Spare 2
636CA	(2) G	Net. F	Spare 1	W-BL	13	Spare 2
637CA	(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
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
960A01M	G	7	14	R	6	19
981-TYPE**	Remove Shorting Bars					
983-TYPE**						

* 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).

TABLE D (Cont)
CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	TI	LR	RI	M1	M2	LK	SPD	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
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
14	7	19	6	8	20	*	*	*	*
Plug D10Y cord into set									

** 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.

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	G‡‡	12	Spare 1	BL-W	9	Spare 2
2637DA	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
2832-TYPE¶	G	22	Spare 1	R	4	Spare 2
2833-TYPE¶	(2) G	22	Spare 1	(2) R	4	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	7	14	R	6	19
2981-TYPE	Remove Shorting Bars					
2983-TYPE	Remove Shorting Bars					
2991A** 2991B	O	54	*	G-Y	7	6
2991C, 2991D	Remove Shorting Bars					
2992A**	O	54	*	G-Y	7	6
2992C	Remove Shorting Bars					
2993A**	O	54	*	G-Y	7	6
2993C	Remove Shorting Bars					
2994C	Remove Shorting Bars					

* 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.

TABLE E (Cont)
CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	TI	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			
TB1 11	TB1 8	TB1 12	TB1 4	TB1 2	TB1 1	PSB 17			
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. F	PSB 17	PSB 34		
14	7	19	6	5	9	*	*		
Plug D10Y cord into set									
54	38	7	6	*	*	27		*	*
Plug D10Y cord into set									
54	38	7	6	*	*	27		*	*
Plug D10Y cord into set									
54	38	7	6	*	*	27		*	*
Plug D10Y cord into set									

†† 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.

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 ‡
10-Type, 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
48A5R	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
21-Type	Not Compatible					
41-Type						
45-Type						
51-Type						
Com Key						
DIMENSION® PBX						
3-Type 4-Type	O-BK	Net. F	Spare 1	G-R	Net. C	Spare 2

Notes:

- The following changes shall be made in the 870A1 dial in addition to connections shown in table.
 - Remove (BL-R) lead from PSB-28 and (BL-W) lead from PSB-2 and connect together using spare term. or D-161488 connector.
 - Move the (G-W) lead from PSB-13 to PSB-2.
 - Move the (W-G) lead from PSB-21 to PSB-28.
- 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.
- 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.
- 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				
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	*	*	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
Not Compatible									
Spare 1	Net. F	Spare 2	Net. C	TB2 3	TB2 4	*	*	*	*

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.

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-Type, ‡ 2-Type ‡	Strap	TB1 9-14		Strap	TB1 3-8	
10-Type, 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
131-Type	BK	TB1 41§	TB1 3	Y-O	TB1 22	TB1 5
151-Type	BK	TB1 41§	TB1 3	Y-O	TB1 22	TB1 5

Notes:

1. To allow proper placement of adjunct, the D10U-87 may have to be replaced by a D10R-87 mounting cord, observing same color code.
2. 2870A1 dial not compatible with 21, 41-, 45-, 51-Type; AGD-, AGH-Type (DIMENSION® PBX); or 128- and 138-Type (Com Key) consoles.

* Insulate and store.

TABLE G (Cont)

CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE CONSOLE

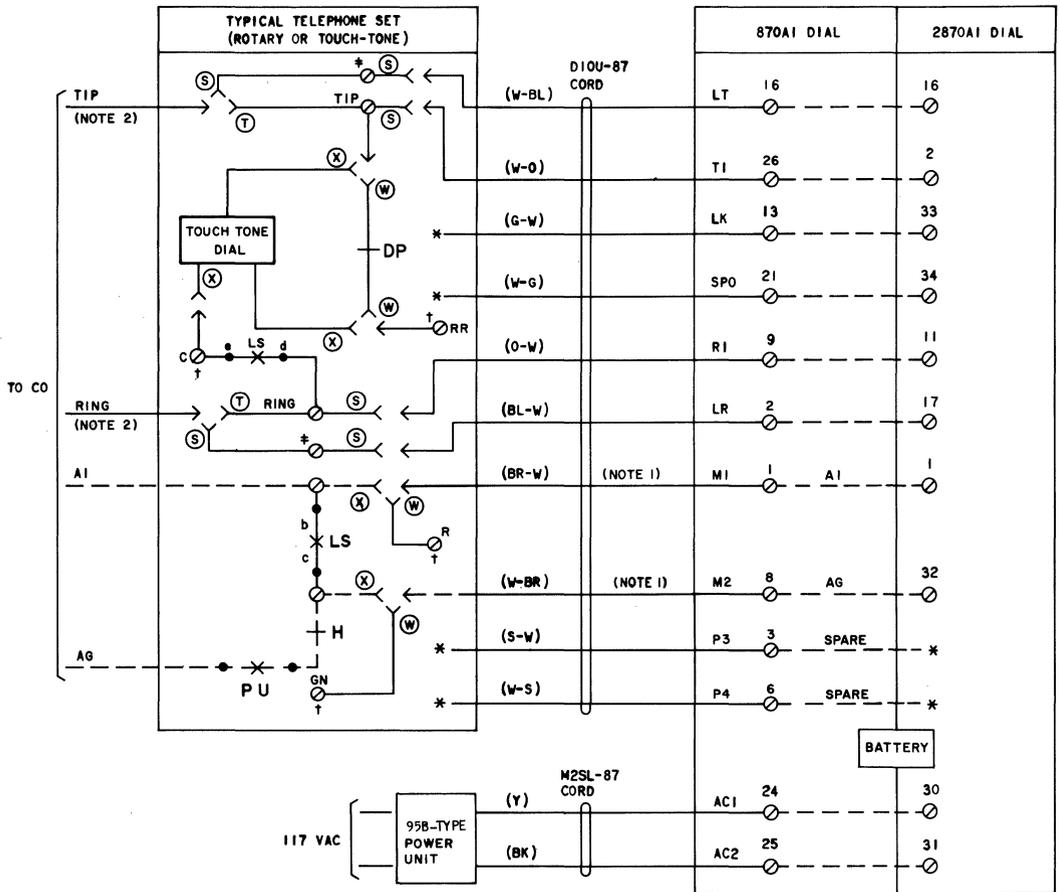
D10U-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	TI	LR	RI	AI	AG	LK	SPO	SPARE	
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S
TB1 14	TB1 9	TB1 8	TB1 3						
5	Spare 1	4	Spare 2						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 1	Net. RR	Spare 2	Net. C						
Spare 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						
Spare 1	Net. RR	Spare 2	Net. C						
TB1 41	TB1 3	TB1 5	TB1 22						
TB1 41	TB1 3	TB1 5	TB1 22						
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 dials only.

§ Lead from network terminal RR.

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



NOTES:

1. THE (BR-W) AND (W-BR) ARE HANDSET MUTING LEADS ONLY IN CASE OF THE 870A1 DIAL ONLY.
2. 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, RI, LEADS MUST BE CONNECTED INTO THE TELEPHONE SET IN SERIES WITH THE TIP AND RING PATH.

* SPARE TERMINAL OR D-161488 CONNECTOR
 DP DIAL PULSE

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

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

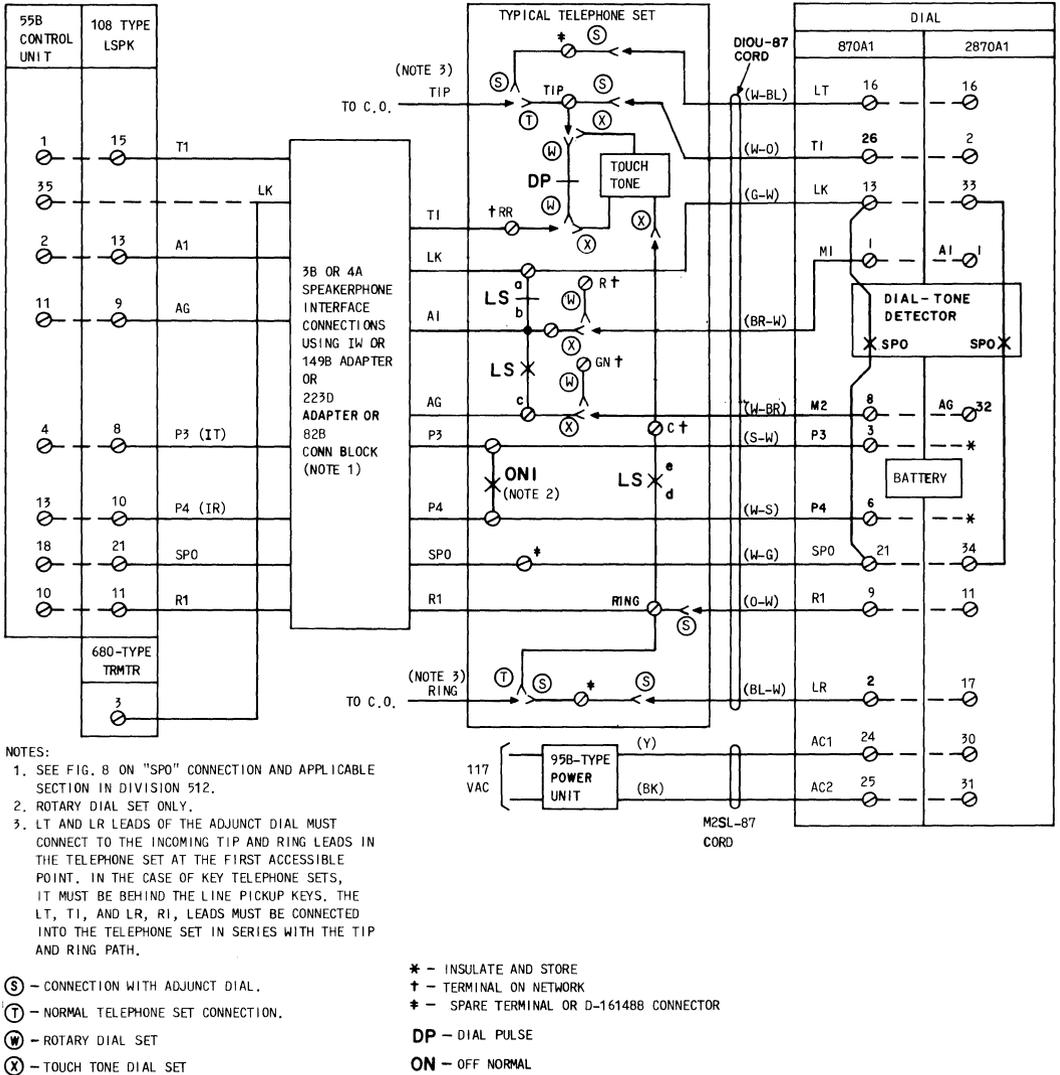


Fig. 7—870A1 and 2870A1 Dials, Basic Interface Connections for One-Touch Calling Option

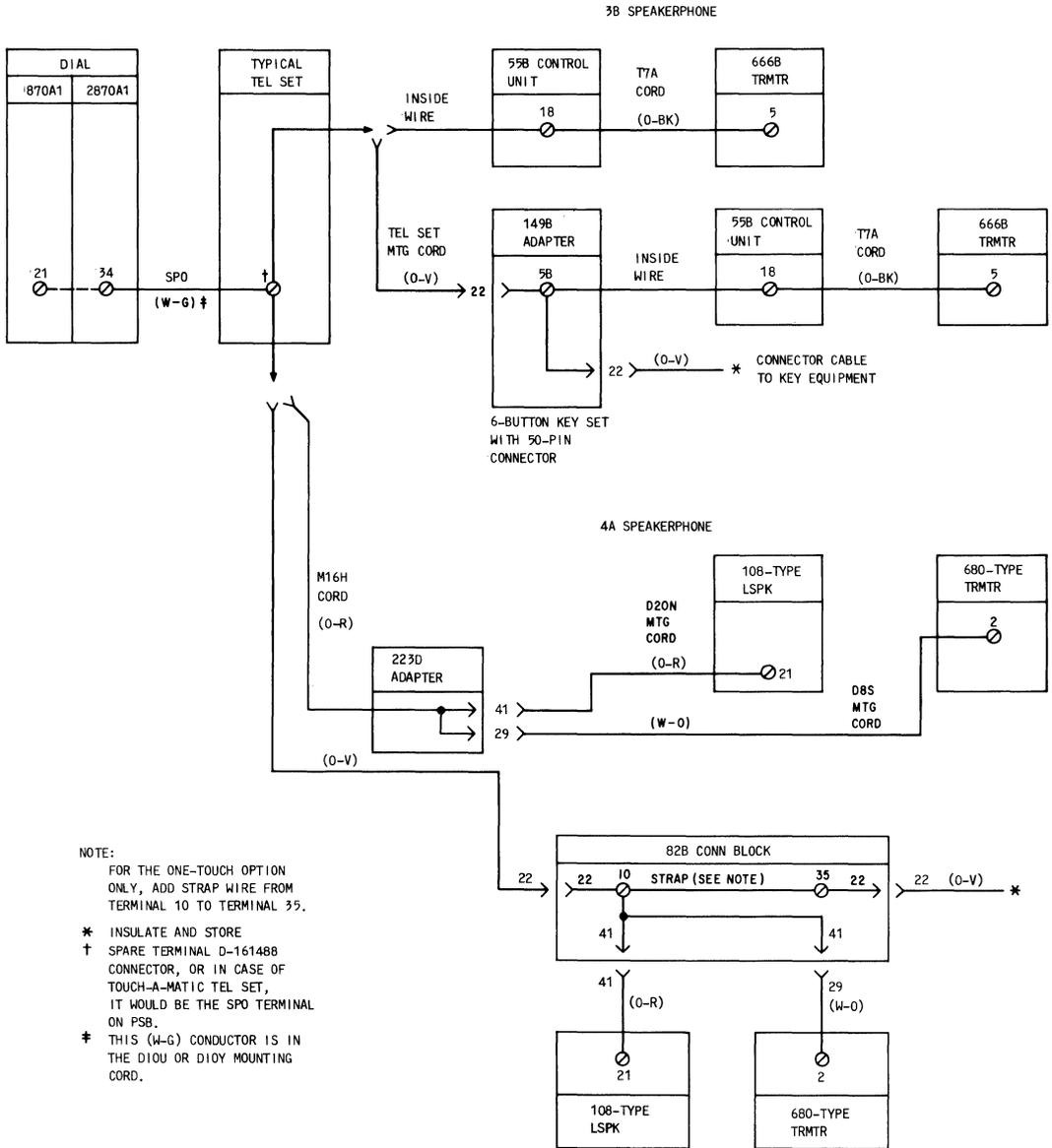


Fig. 8—870A1 and 2870A1 Dials, "SPO" Interface Connections for One-Touch Calling

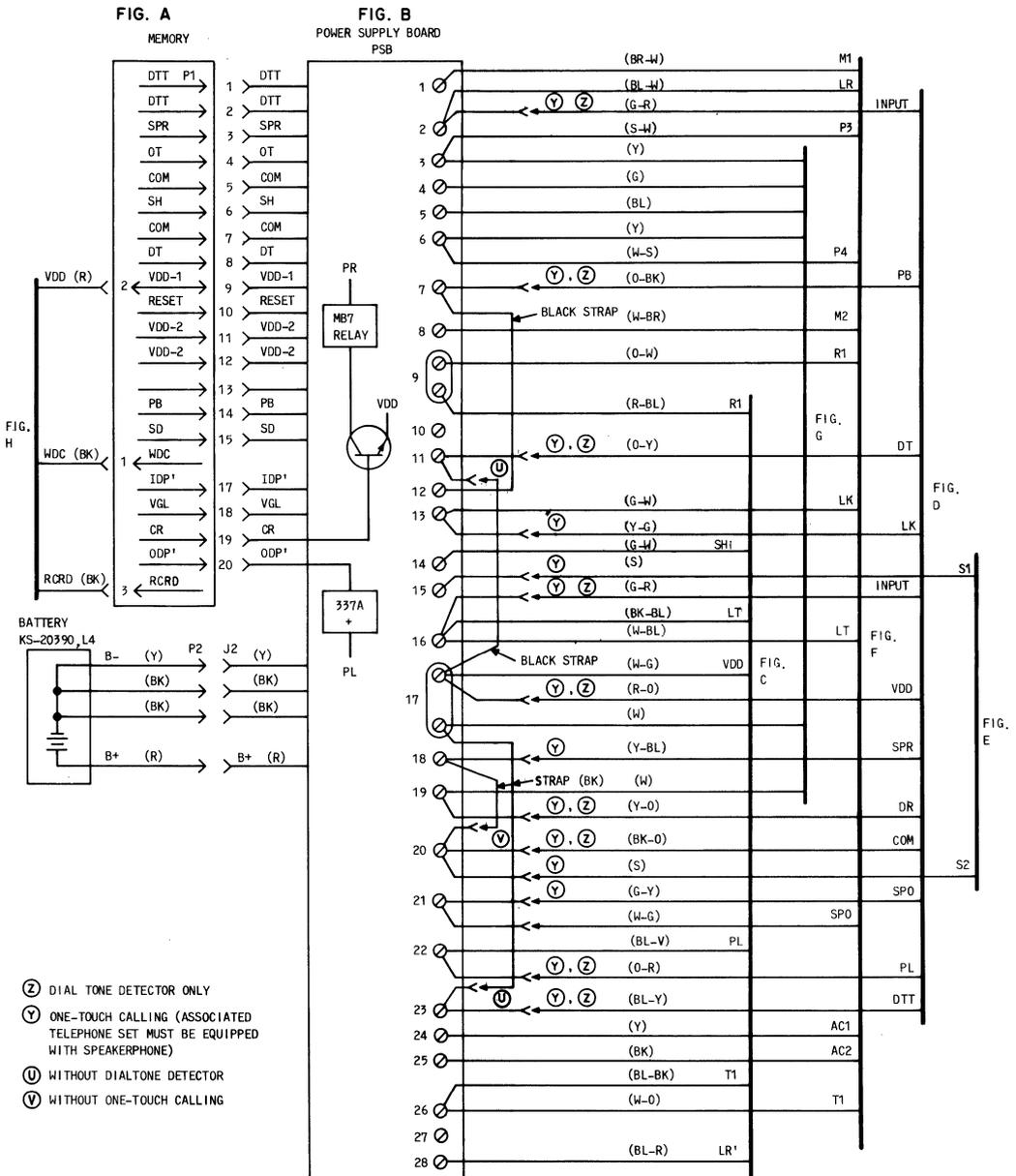


Fig. 9—870A1 Dial, Connections (Sheet 1 of 2)

FIG. C
LINE SENSING RELAY PWB
841382880

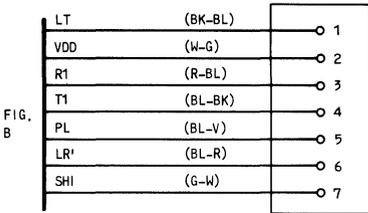


FIG. D
DIAL TONE DETECTOR
(D-180493)

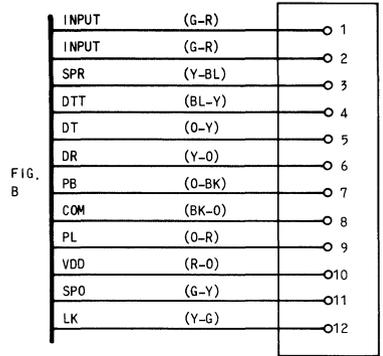


FIG. E
ONE-TOUCH CALLING SWITCH
(D-180493)



FIG. G
8EA -119 DIAL

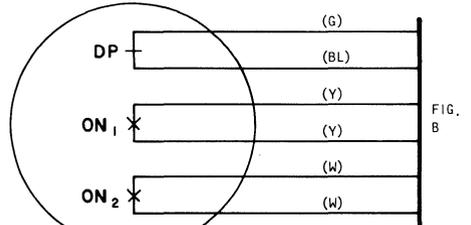


FIG. F
DIOU-87 MOUNTING CORD
ASSOCIATED TELEPHONE SET

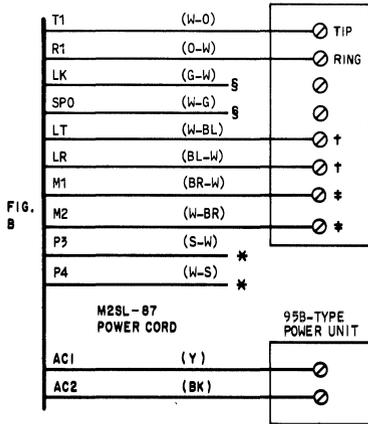
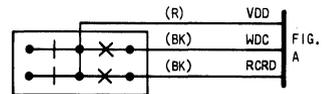
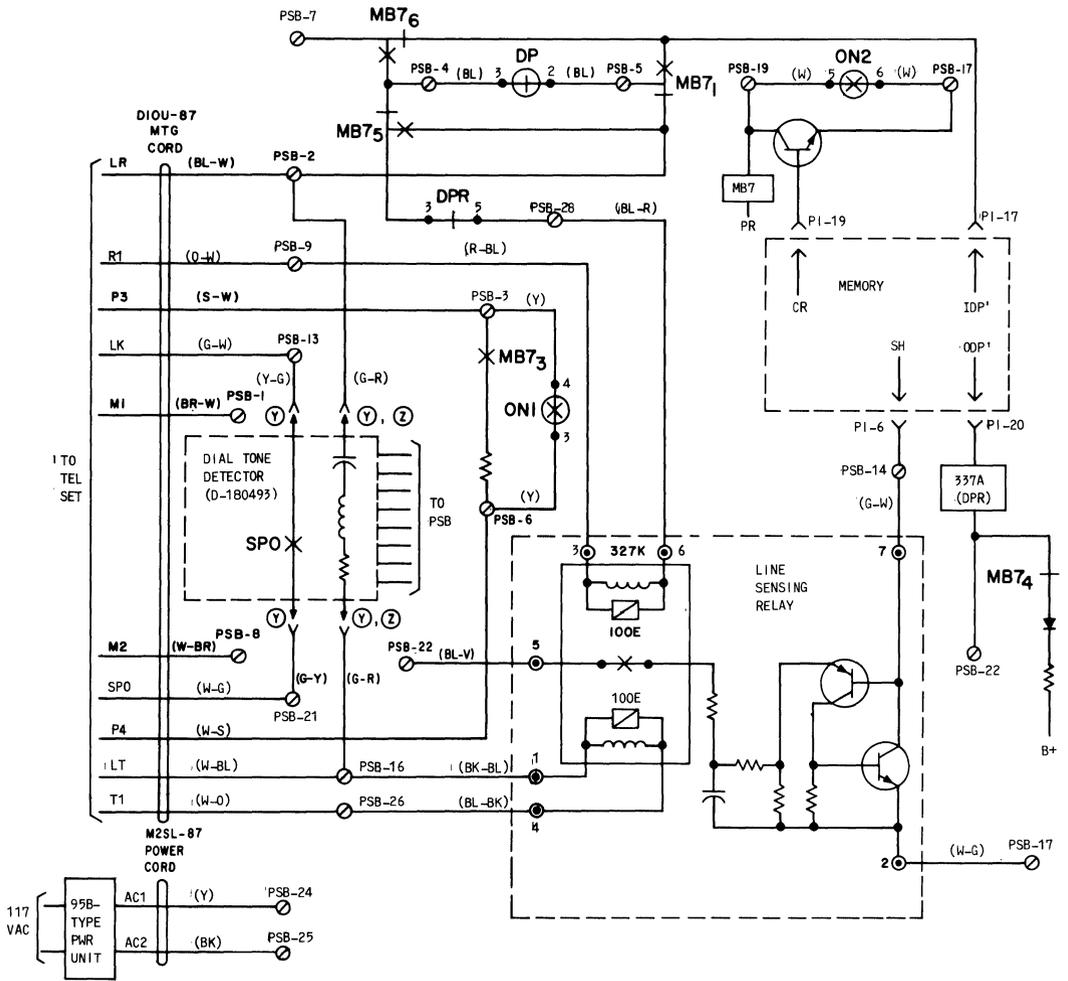


FIG. H
RECORD DISABLE/DATA ENHANCEMENT (D-180818)



- 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)



- Ⓜ DIAL TONE DETECTOR ONLY
- Ⓨ ONE-TOUCH CALLING

Fig. 10—870A1 Dial, Partial Functional Schematic

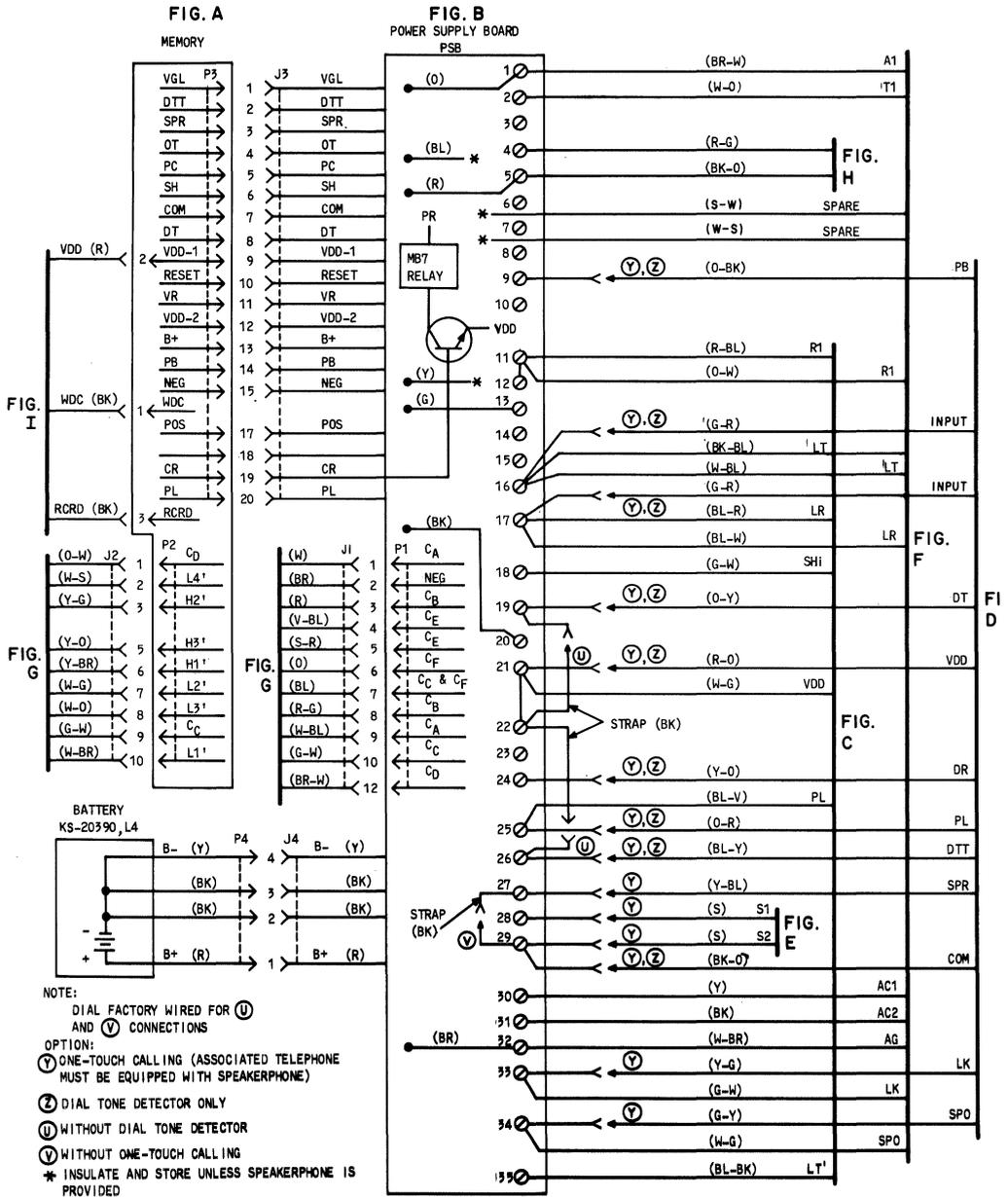


Fig. 11—2870A1 Dial, Connections (Sheet 1 of 2)

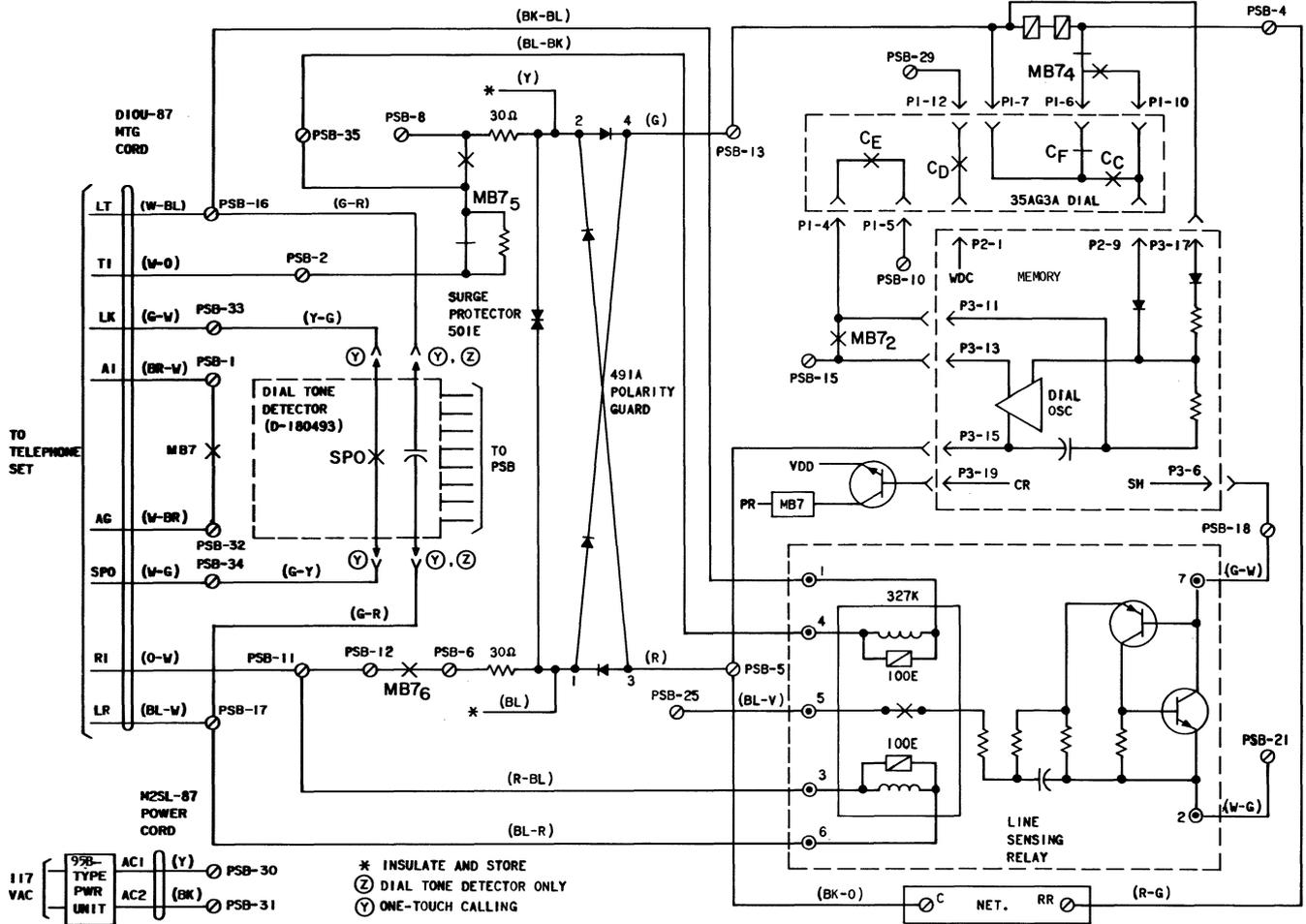


Fig. 12—2870A1 Dial, Partial Functional Schematic

TABLE H

TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set when off-hook	No dial tone. Connect 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 between telephone set and adjunct dial. See Fig. 6, 7 or Tables D—G.
			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 95B-type 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
			AC power not present	Check for commercial power
		RECORD lamp does not turn on when RECORD button is depressed	95B-type 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 RCRD OFF/DATA position	Change switch position to NORMAL
		Bad connections or defective M2SL-87 cord	1. Check connections and cord 2. Replace cord	

* Refer to 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 and 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 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 5.01
			Defective memory	Replace memory
			Switch of D-180818 Kit of Parts in RCRD OFF/DATA position	Change switch position to NORMAL
			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 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	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	Replace memory
			Unknown	Replace adjunct dial*
		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 adjunct dial*

* Refer to 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7	Cannot dial properly from memory when off-hook and using adjunct dial (wired for dial tone deted 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 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9	Speakerphone turns on but adjunct dial does not automatically dial when memory button is depressed (wired for ONE-TOUCH 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

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 between telephone set and adjunct dial. See Fig. 6, 7 or Tables D—G.
			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 D10U-87 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 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 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*
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 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 or D-180818 Kit of Parts in RCRD OFF/DATA position	Change switch position to NORMAL
			Defective lamp or lamp driver circuit	Replace memory
			Unknown	Replace adjunct dial*
		Lamp turns off 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	1. Check WAIT button 2. 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
			Switch of D-180818 Kit of Parts in RCRD OFF/DATA position	Change switch position to NORMAL

* Refer to 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 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 signal is 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	
					No audible TOUCH-TONE signal present
					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*	

* Refer to 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
		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 for 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. 9	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 6.02(4).

TABLE I (Contd)

TROUBLE ANALYSIS – 2870A1 DIAL

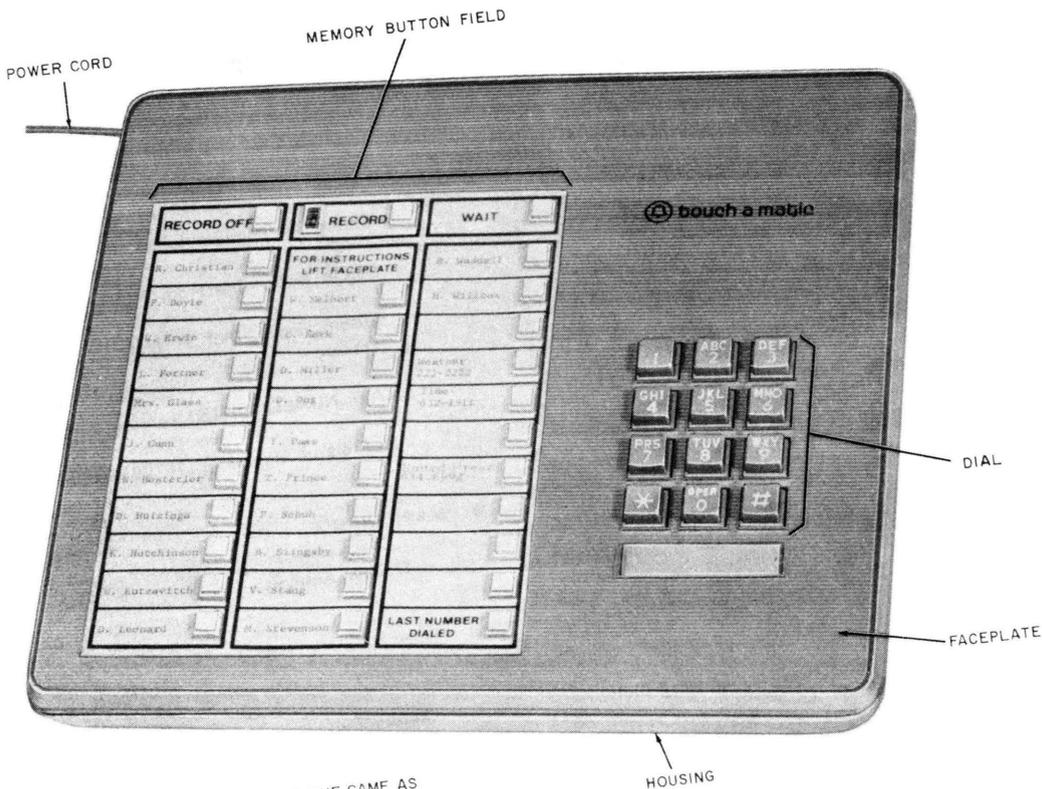
TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (Contd)		With addition of a temporary strap between PSB screw terminals 33 and 34, speakerphone turns on when a memory button is depressed	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to 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)		Strap leads from screw terminals 19 and 26 on PSB were not disconnected when option was wired	Disconnect, insulate and store strap leads
		Dial automatically dials when screw terminals 19 and 29 on PSB are temporarily shorted	Precise TOUCH-TONE dial tone not present or a defective dial tone detector	<ol style="list-style-type: none"> 1. Check CO line for presence of precise TOUCH-TONE 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.	<ol style="list-style-type: none"> 1. Replace memory 2. Replace D-180493 dial tone detector
13	Cannot turn speakerphone off	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

870B1M AND 2870B1M
TOUCH-A-MATIC® ADJUNCT REPERTORY DIALS

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OPTIONAL APPARATUS INSTALLATION	7	Line Sensing Relay Printed Wiring Board Assembly	13
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COMPONENT LOCATION AND ACCESS INFORMATION	7	1. GENERAL	
Power Supply Board (PSB) Terminals	7	1.01 This section provides identification, installation, connection, operation, and maintenance information on the 870B1M (rotary) and the 2870B1M (TOUCH-TONE Service) Fig. 1 dials.	
Faceplate Removal	7	1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.	
Housing Removal	7	1.03 These dials are factory wired to provide manual or automatic rotary (870B1M) or	
4. CONNECTIONS	7		
5. OPERATION	8		
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NOTICE

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



NOTE:
THE 870BIM DIAL APPEARS THE SAME AS
2870BIM EXCEPT IT IS EQUIPPED WITH
A ROTARY DIAL

Fig. 1—2870B1M Dial

TOUCH-TONE (2870B1M) dialing service when interfaced with a single line telephone set equipped with the same type dial.

1.04 These dials are available in Ivory (-50) color only, except as indicated in 2.05 (b) and (c).

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.

2.02 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

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

2.03 **Optional Features:**

- Dial Tone Detector — automatically starts dialer when precise TOUCH-TONE dial tone (350 Hz and 440 Hz) is present.

2.04 **All options are implemented by:**

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

2.05 **Ordering Guide:**

- (a) Either of these dials may be ordered complete and ready to install as:

- Dial, 870B1M-50 (Rotary)
- or
- Dial, 2870B1M-50 (TOUCH-TONE service)

- (b) ***The 870B1M-50 dial may be ordered in its component parts as follows:***

- Housing, 841365505

Note: The following colors are also available if an 870ADJ1-type housing is obtained and modified with a 798A tool:

Black (-03)

Green (-51)

White (-58)

Lt. Beige (-60)

- Faceplate, 870A2-87
- Base, Dial, 841387574 (includes the following):

Unit, Power, 95B1 or 95B2

Dial, 8ET-119 or 8EA-119

Relay, Line Sensing, 841382880

Jack, 623P4(2)

Cord, Mounting, D4BU-29

Cord, Interface, D4BU-29

Cord, Power, M2SL-87

Battery, KS-20390L4

Memory, 870A (includes button field)

Power Supply Printed Wiring Board (PSB) Assembly, 841382617

Directory Sheet Set, 840393672

Booklet, Instruction, Subscriber, SIB-2481B

- (c) ***The 2870B1M-50 dial may also be ordered in its component parts as follows:***

- Housing, 841365505

Note: The following colors are also available if an 870ADJ1-type housing is obtained and modified with a 798A tool:

Black (-03)

Green (-51)

White (-58)

Lt. Beige (-60)

- Faceplate, 2870A2-87
- Base, Dial, 841387566 (includes the following):

Unit, Power, 95B1 or 95B2

Dial, 35AG3A

Relay, Line Sensing, 841382880

Jack, 623P4 (2)

Cord, Mounting, D4BU-29

Cord, Interface, D4BU-29

Cord, Power, M2SL-87

Battery, KS-20390L4

Memory, 2870A (includes button field)

Power Supply Printed Wiring Board (PSB) Assembly, 841382385

Directory Sheet Set, 840393672

Booklet, Instruction, Subscriber, SIB-2481B

(d) **Optional Apparatus (order as required):**

- Kit of Parts, D-180493 (Dial Tone Detector)

2.06 Operating Features (Fig. 2):

Note: Instruction label on manufactured product will appear different from that shown in Fig. 2

- 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) 6.09.

3. INSTALLATION

STANDARD INSTALLATION

3.01 Connect the D4BU-29 mounting cord between the connecting block and the adjunct dial. Connect the D4BU-29 interface cord between the adjunct dial and the telephone set. Refer to Fig. 7 for basic interface connections.

Caution: 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 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. 5).

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.

3.04 Install the station number card in the location provided on the dial.

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

3.06 870B1M (Rotary) Dial:

- (1) Check operation of the line sensing circuit as follows:
 - (a) With handset on-hook, momentarily depress RECORD button. RECORD lamp shall light.

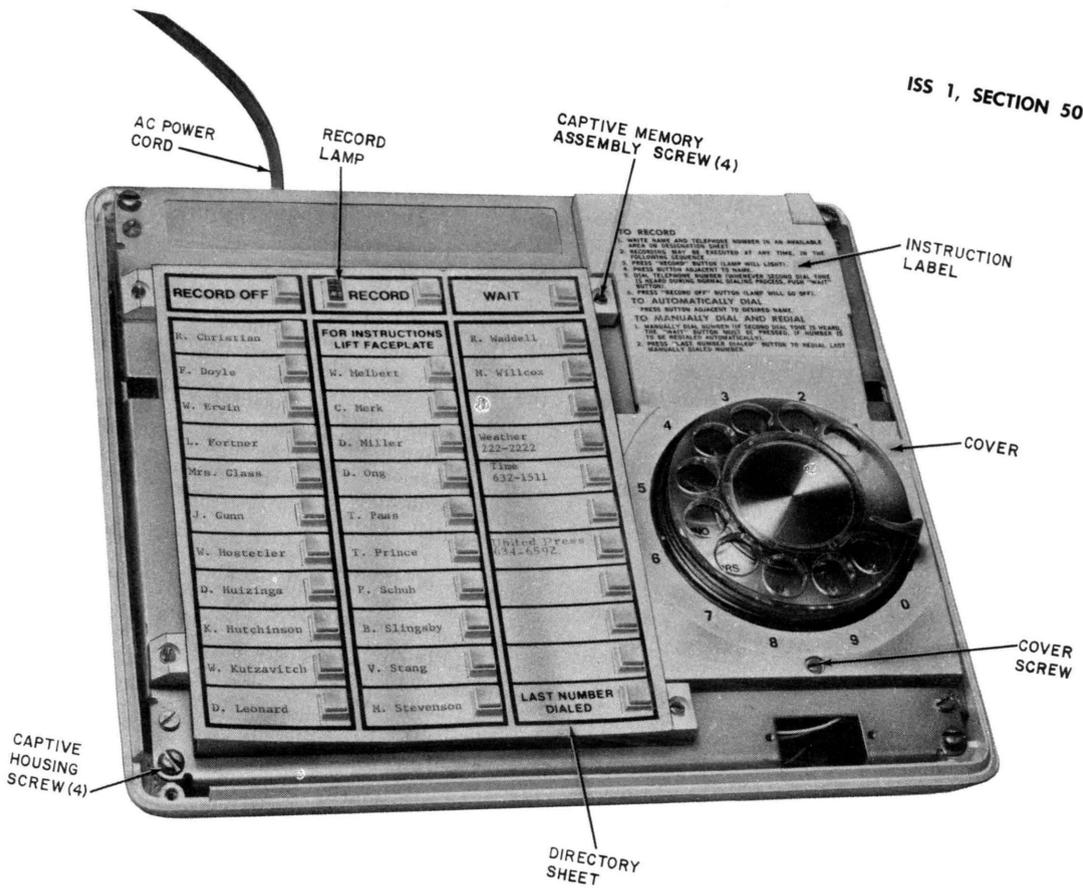


Fig. 2—870B1M Dial, Faceplate Removed

- (b) Go off-hook with handset. RECORD lamp shall extinguish.
- (2) Go off-hook and using the telephone set dial, manually dial a known number to check that the telephone set operates correctly.
- (3) 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 one of the following digits using the adjunct dial:
- Digit number 2 (test for 8 to 11 pulses per second)
 - Digit number 3 (readjust, test for 9.5 to 10.5 pulses per second).
- (d) Listen for dial tone again, dial digit 0. One of the following audible signals will indicate how the adjunct dial meets the requirements of the test:
- Audible ringback—dial speed satisfactory

- Rapidly interrupted dial tone—dial speed fast
- Slowly interrupted dial tone—dial speed slow.

- (4) With handset on-hook, record a known telephone number into all memory locations except LAST NUMBER DIALED and the location immediately above it [5.01 (4) through (7)].
- (5) Automatically dial the numbers stored in Step (4) and verify that they are correct.
- (6) Go off-hook and record a known telephone number into memory location immediately above LAST NUMBER DIALED location [5.01 (4) through (7)].
- (7) Momentarily hang up handset and then automatically dial (5.04) the number recorded in Step (6).
- (8) Go off-hook and manually dial a known telephone number.

Note: If a pause for second dial tone is required, dial the access digit(s) and depress the WAIT button after RECORD lamp relights.

- (9) Momentarily hang up handset and 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, depress a button of a memory location used in Step (4), to verify retention of stored numbers.
- (11) Dial the appropriate code for ring-back to test the telephone set ringer.

3.07 2870B1M (TOUCH-TONE Service) Dial:

- (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) Go off-hook and using the telephone set dial, manually dial a known number to check that the telephone set operates correctly.

- (3) With the telephone handset on-hook, use the adjunct dial to record digits 1 through 0 into all memory locations except LAST NUMBER DIALED location and the memory location immediately above it [5.01 (4) through (7)].

- (4) Go off-hook and record the CO dial test and ringer circuit number into memory location immediately above LAST NUMBER DIALED location [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) Depress buttons of memory locations recorded in Step (3) and verify that correct signal is returned from test circuit each time.



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. Depress the button of a memory location used in Step
- (3) to verify retention of memory.

OPTIONAL APPARATUS INSTALLATION

D-180493 Kit of Parts

3.08 To install:

- (1) Remove the housing (3.11), and access PSB terminal board (3.09).
- (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.
- (3) Lock the board into position by inserting the screw (provided) through the right side of the chassis.
- (4) Connect the Dial Tone Detector as shown in Table A.

COMPONENT LOCATION AND ACCESS INFORMATION

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

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 (3.10).
- (3) Loosen the captive cover screw at the bottom of the cover around the dial (Fig. 2).
- (4) Remove the cover.
- (5) Remove the two dial mounting screws.
- (6) On the 870B1M dial, place the rotory dial aside to gain access to some of the PSB terminals. On the 2870B1M dial, carefully

disengage the dial connector and rotate the dial onto the memory button field.

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

(8) To reassemble, reverse this procedure.

Faceplate Removal

3.10 The 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.

Housing Removal

3.11 To remove, proceed as follows:

- (1) Disconnect the power unit from AC outlet.
- (2) Remove the faceplate (3.10).
- (3) Remove mounting and interface cords from their respective jacks in the adjunct dial.
- (4) Disengage only the captive housing screws (Fig. 2) one located in each of the four corners of the chassis.
- (5) Separate the housing from the adjunct dial base while feeding the AC power cord through hole in bottom of housing.
- (6) 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.

4. CONNECTIONS

4.01 Basic interface connections are shown in Fig. 7 for the 870B1M dial and the 2870B1M dial.

4.02 Adjunct dial connections are shown in Fig. 8 for the 870B1M dial and in Fig. 10 for the 2870B1M dial.

4.03 Partial functional schematics are shown in Fig. 9 for the 870B1M dial and in Fig. 11 for the 2870B1M dial.

TABLE A
CONNECTIONS FOR DIAL TONE DETECTOR

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 Detec- tor	Input	G-R		21		2
		PB	O-BK		7		9
		Input	G-R		9		12
		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					

* Insulate and store.

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

5. OPERATION

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

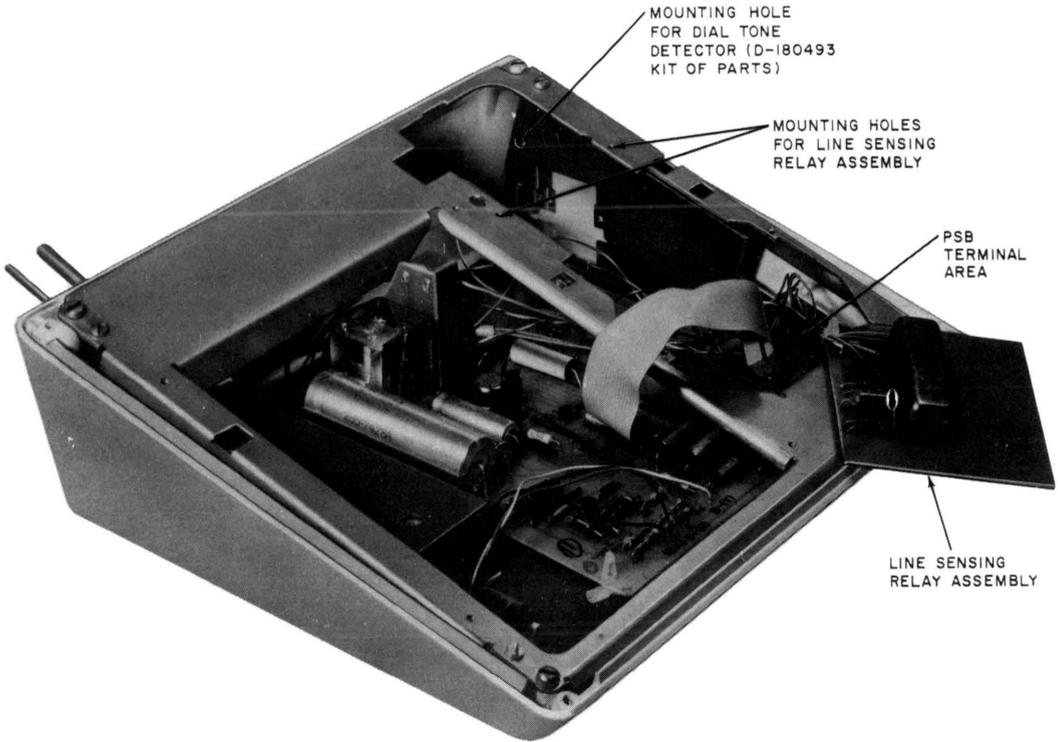


Fig. 3—870B1M Dial—Dial and Memory Removed to Show Terminal Area

Note: If an access code and pause for second dial tone is required:

- (a) Dial the access digit(s).
- (b) Push the WAIT button after RECORD lamp relights. (The WAIT entry counts as one digit.)
- (c) 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.

Change A Number In Memory

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

Delete A Number From Memory

5.03 To delete a number:

- (1) Depress the RECORD button.

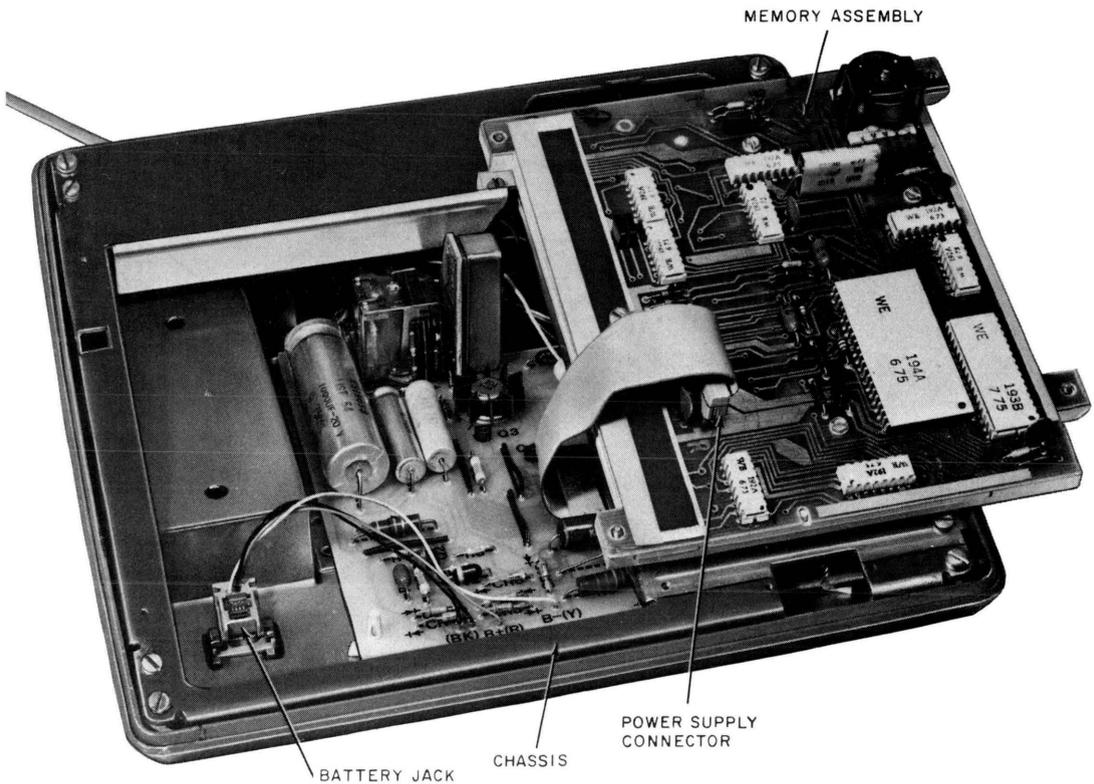


Fig. 4—870B1M Dial, Internal View

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

Automatically Dial A Number From Memory

5.04 To automatically dial a number:

- (1) Go off-hook on the telephone set, listen for dial tone, and depress the desired memory button.
- (2) If the adjunct dial is equipped with the dial tone detector, go off-hook and depress the desired memory button.

LAST NUMBER DIALED Feature

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:

(a) With no access digit(s) 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) Depress WAIT button after second dial tone is heard.
- (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.

End-to-End Signaling (2870B1M Only)

5.07 For end-to-end signaling (such as data transmission), the 2870B1M dial has the capability to intermix manual and automatic dialing. 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.)

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.

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 B for 870B1M dial and Table C for 2870B1M dial.

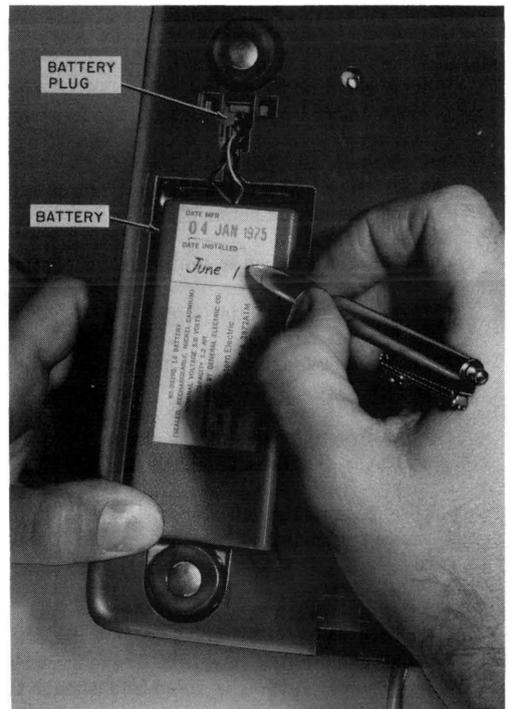


Fig. 5—870B1M or 2870B1M Dial, Partial Bottom View

Battery

6.03 The battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial AC power to

SECTION 501-164-202

the dial is continuously maintained. To replace the battery, proceed as follows (Fig. 5):

- (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 (3.02).

Memory

6.04 The memory may be replaced in the following manner:

Note: Removal of the memory results in loss of stored numbers.

- (1) Disconnect AC power unit from AC outlet.
- (2) Remove the faceplate (3.10).
- (3) Loosen the four captive memory mounting screws Fig. 2.
- (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 gray power supply cable should not be twisted.
- (7) Reassemble dial.
- (8) Reconnect AC power.
- (9) Test per 3.06 or 3.07 as required.

Dial

6.05 To replace rotary dial:

- (1) Disconnect power unit from AC outlet.
- (2) Remove faceplate (3.10).
- (3) Loosen captive screw at bottom of the cover around the dial and remove cover.
- (4) Remove the two dial mounting screws.
- (5) Remove dial leads from terminals on PSB.
- (6) Remove dial.
- (7) Reverse procedure to replace dial.

6.06 To replace TOUCH-TONE service dial:

- (1) Disconnect power unit from AC outlet.
- (2) Remove faceplate (3.10).
- (3) Loosen captive screw at bottom of the cover around dial and remove cover.
- (4) Remove the two dial mounting screws and lift the dial.
- (5) Disconnect dial connector from PSB.
- (6) Remove the four captive memory mounting screws (Fig. 2).
- (7) Gently raise the memory to a position that permits access to the dial connector.

Caution: Do not remove the gray power supply connector in the process of changing the dial, since this will result in complete loss of stored numbers.

- (8) Carefully disengage the dial connector by pulling on it perpendicular to the 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 AC power.

Line Sensing Relay Printed Wiring Board Assembly

6.07 To replace:

- (1) Disconnect power unit from AC outlet.
- (2) Remove faceplate (3.10).
- (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 TOUCH-TONE service dial onto the memory button field.
- (6) Disconnect the Line Sensing Relay Board leads from associated terminals on the PSB.
- (7) Remove the two mounting screws of the Line Sensing Relay Board and remove the board assembly.
- (8) Connect the leads of the replacement Line Sensing Relay Board to the appropriate terminals on the PSB (Fig. 8B and 8C for the 870B1M dial or Fig. 10B and 10C for the 2870B1M dial).
- (9) Reassembled dial.

Mounting and/or Interface Cord Jack

6.08 To replace:

- (1) Disconnect power unit from AC outlet.
- (2) Disconnect mounting cord and interface cord from mating jacks in adjunct dial.

- (3) Remove faceplate (3.10).
- (4) Remove cover [6.05 (3) or 6.06 (3)].
- (5) Remove housing (3.11).
- (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. 6).
- (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.

Dial Pulsing Muting

6.09 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. Connect as follows:

- (1) Move (BK) mounting cord jack lead on 870B1M dial from PSB-3 to PSB-1.
- (2) Move (Y) mounting cord jack lead on 870B1M dial from PSB-13 to PSB-8.
- (3) Connect (Y) and (BK) mounting cord jack leads on the associated telephone set across the fg line switch contacts.

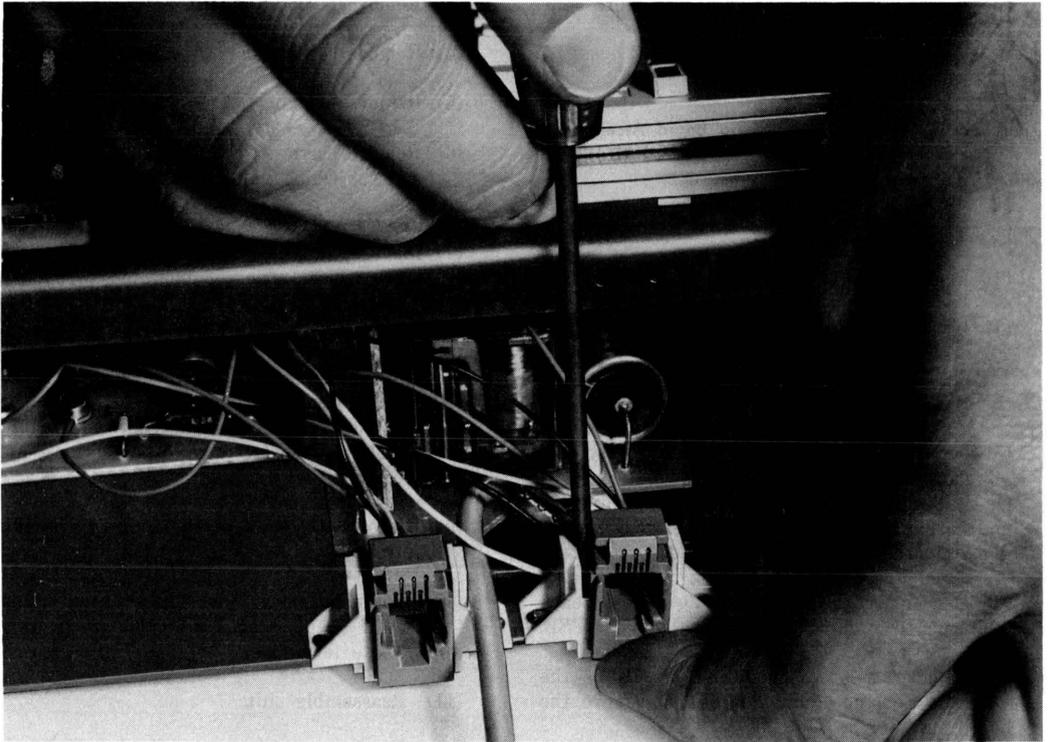


Fig. 6—Removing Mounting Cord or Interface Cord Jack from Dial Base

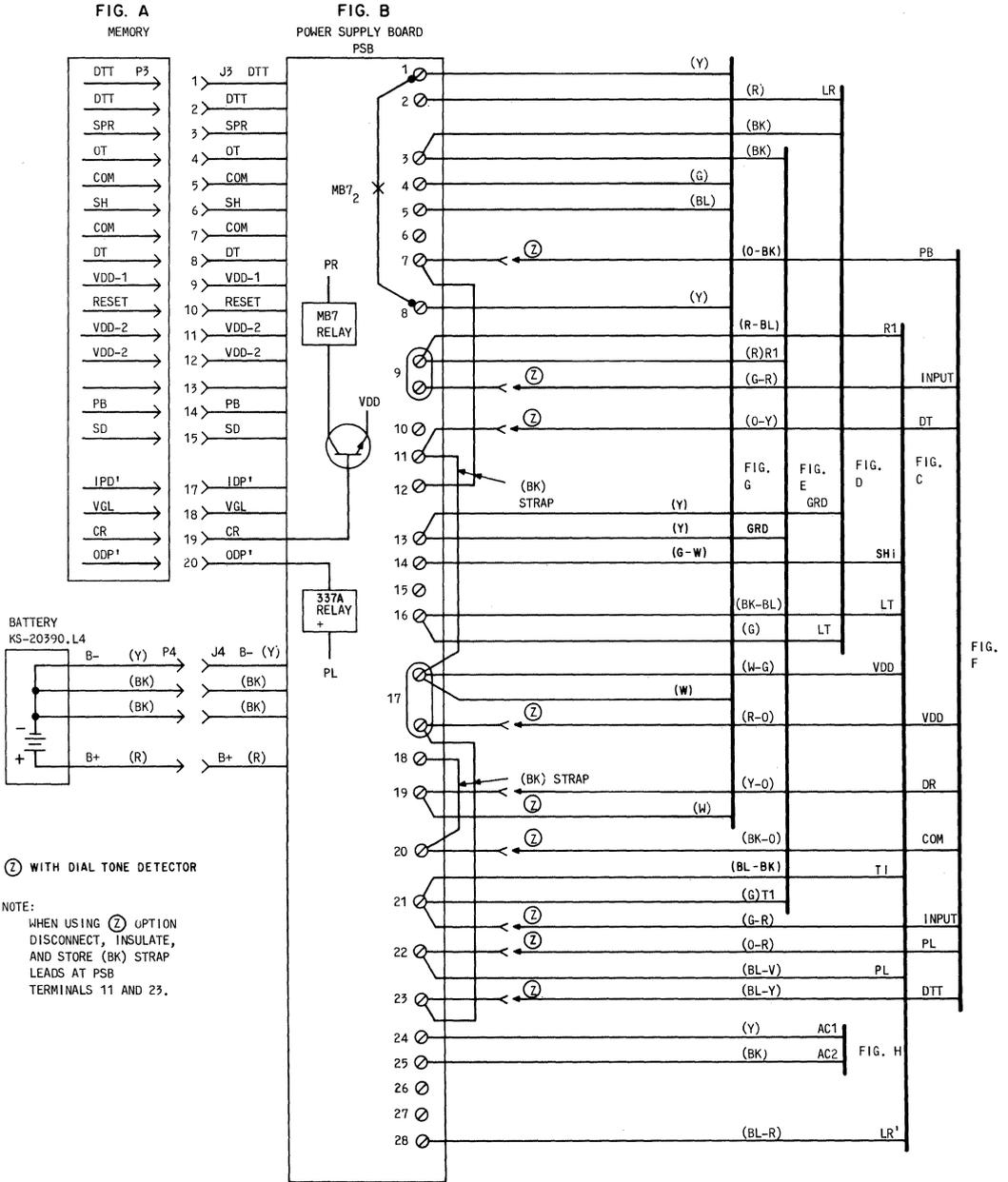


Fig. 8—870B1M Dial, Connections (Sheet 1 of 2)

FIG. C
LINE SENSING RELAY
PWB ASSY 841382880

FIG. B

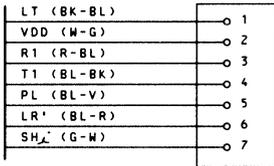


FIG. F
DIAL TONE DETECTOR
(D-180493)

FIG. B

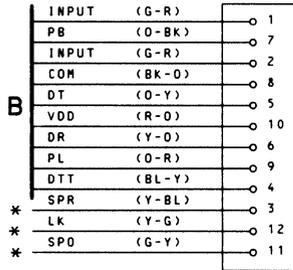


FIG. D
MTG CORD
D4BU-29

FIG. B

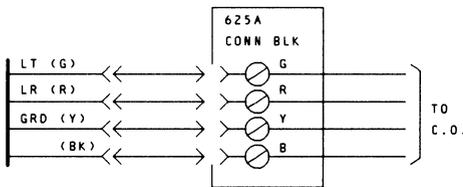


FIG. G

8ET-OR 8EA-119 DIAL

FIG. B

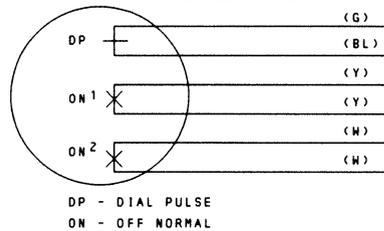


FIG. E
INTERFACE CORD
D4BU-29

FIG. B

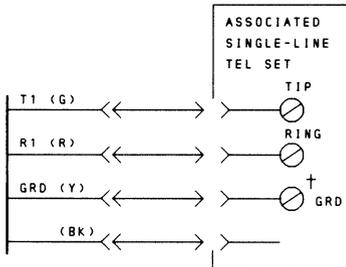


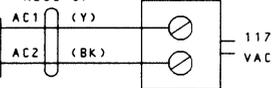
FIG. H

POWER UNIT
95B1 OR 95B2

FIG. B

CORD

M2SL-87



* INSULATE AND STORE
† APPROPRIATE TERMINAL

Fig. 8—870B1M Dial, Connections (Sheet 2 of 2)

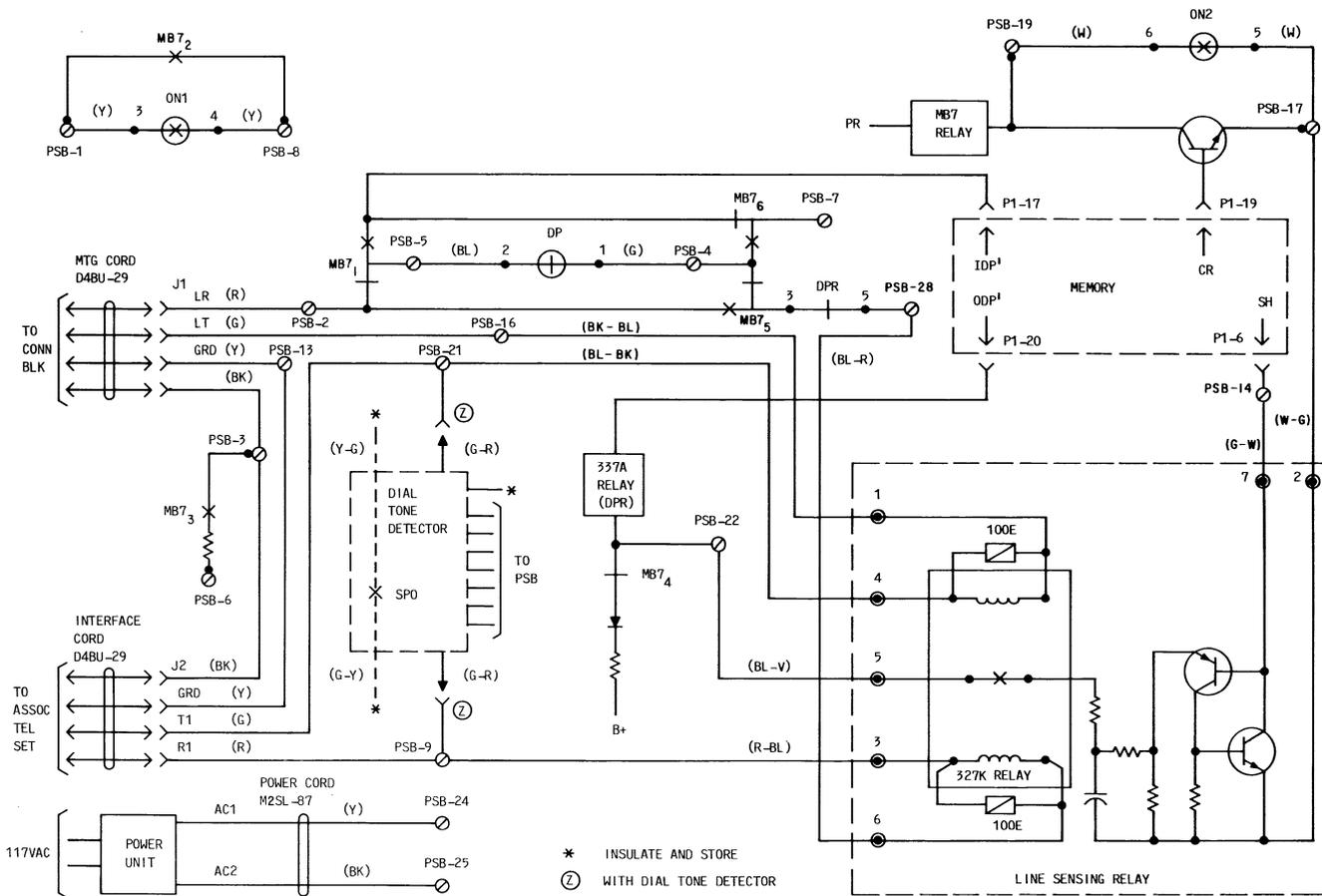


Fig. 9—870B1M Dial, Partial Functional Schematic

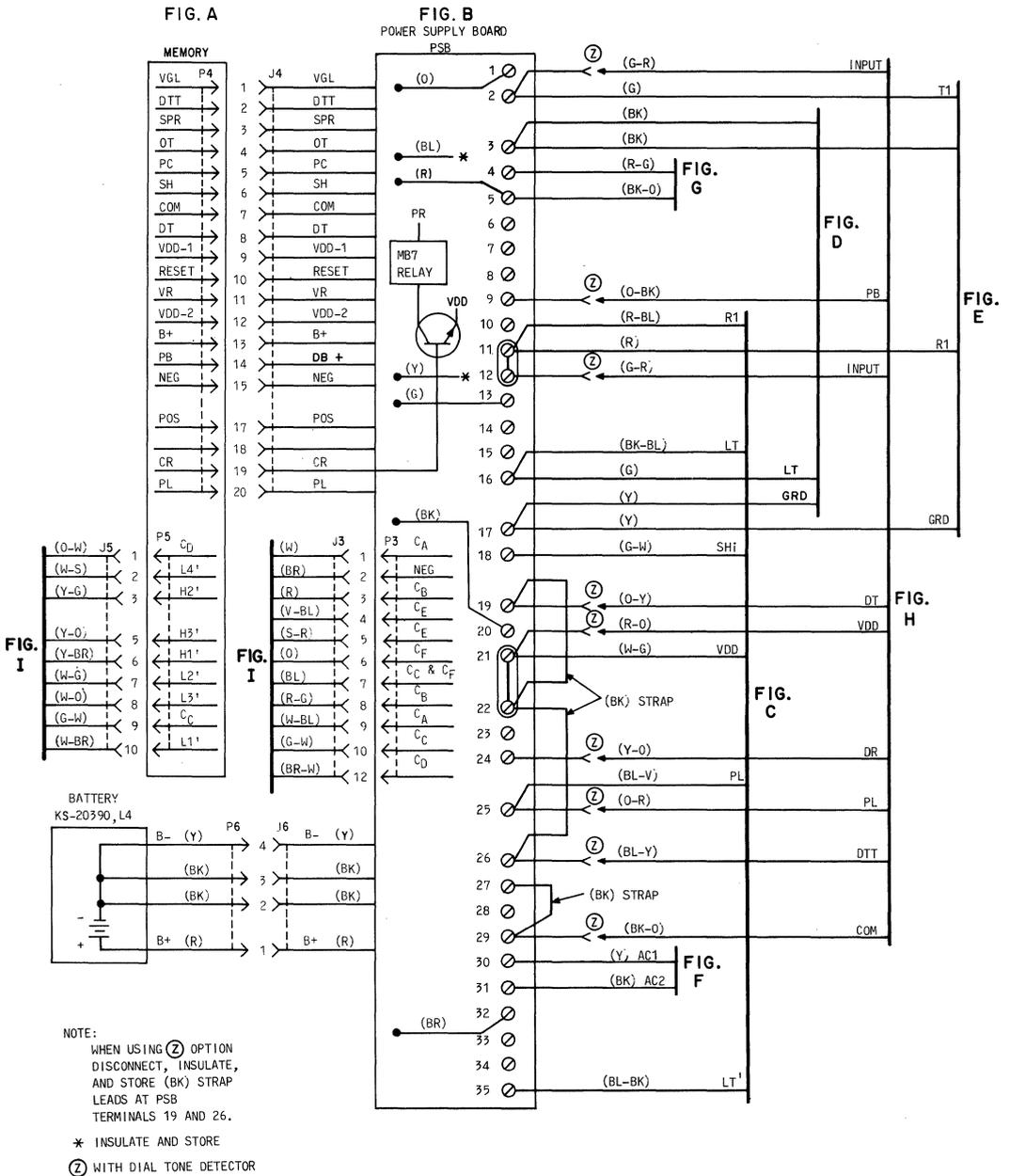


Fig. 10—2870B1M Dial, Connections (Sheet 1 of 2)

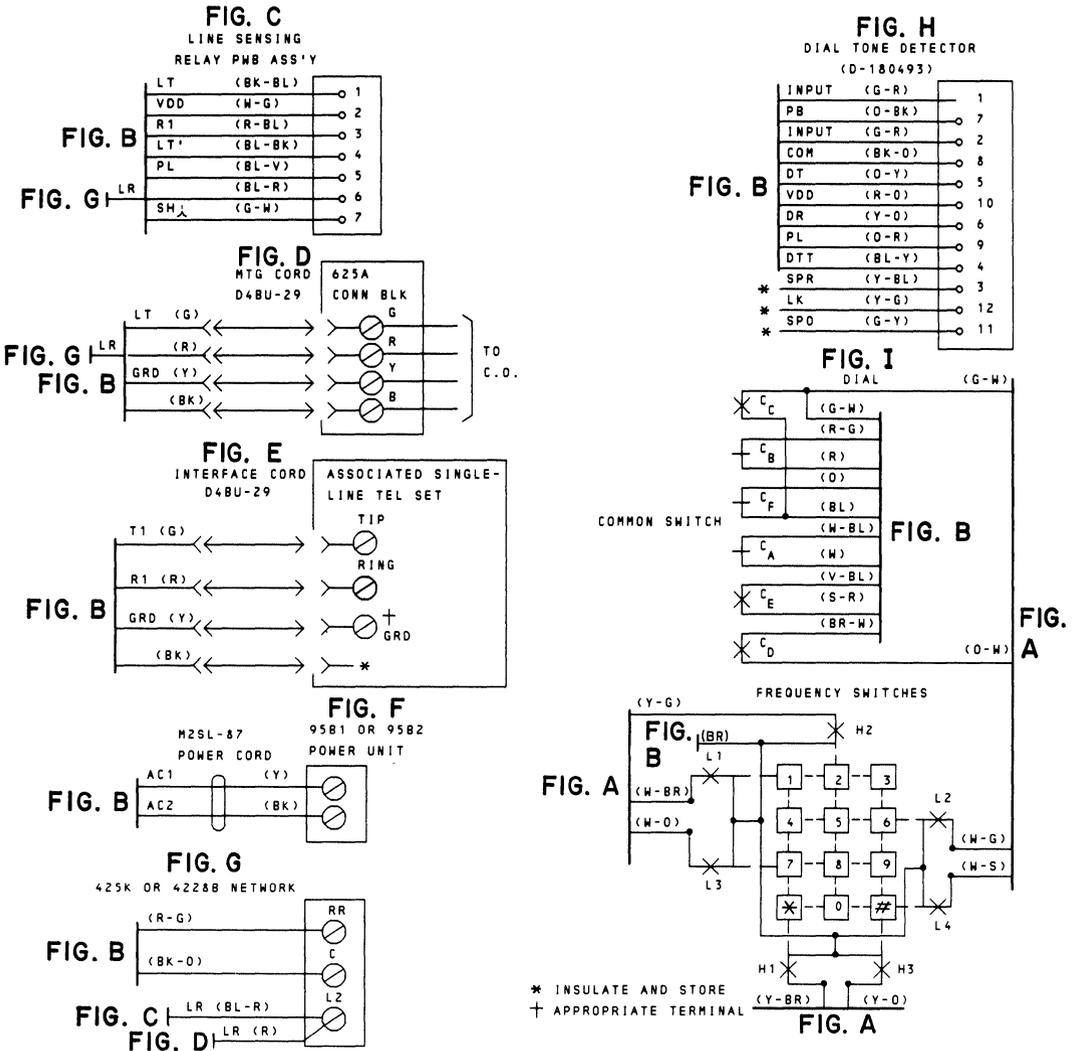


Fig. 10—2870B1M Dial, Connections (Sheet 2 of 2)

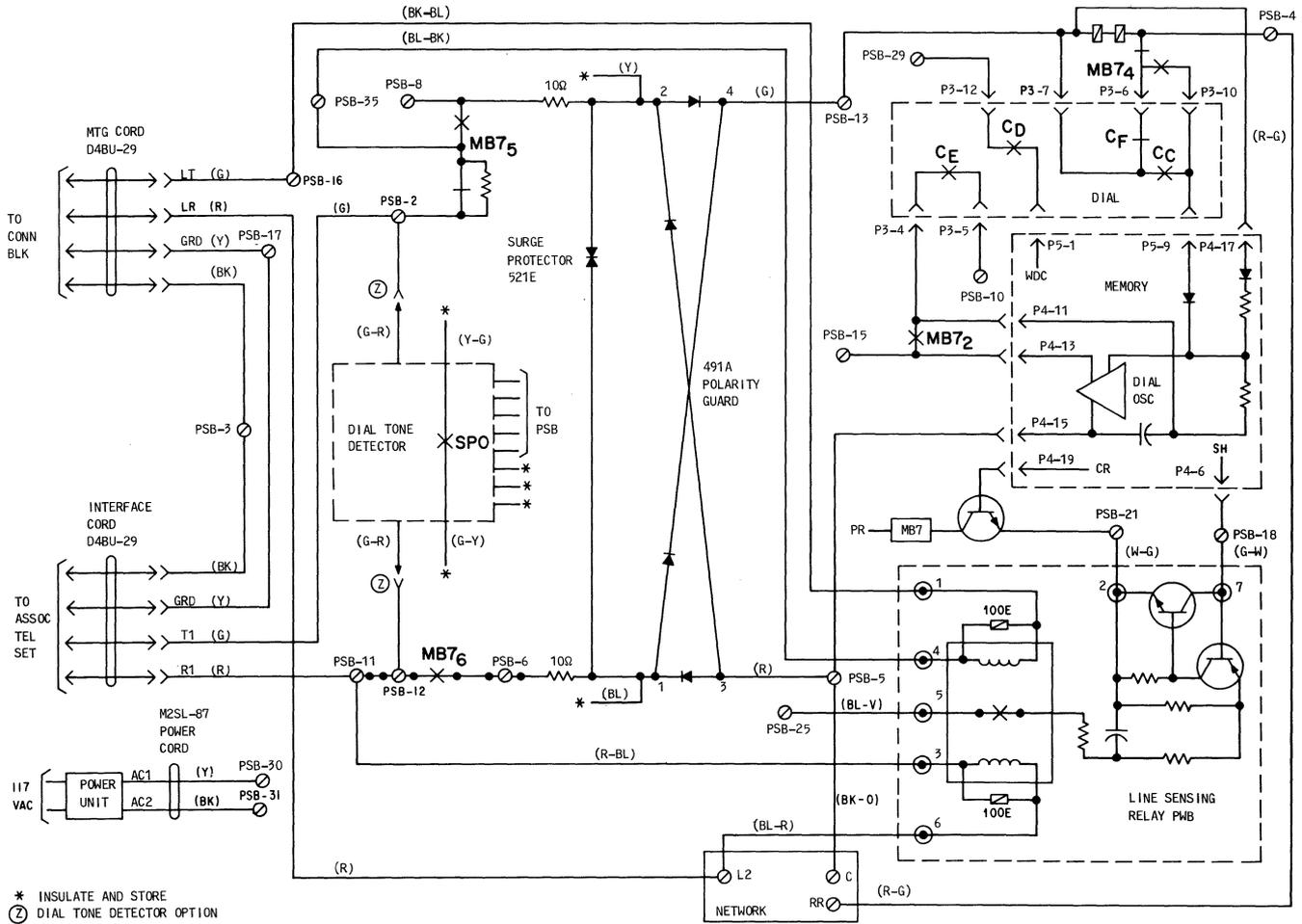


Fig. 11—2870B1M Dial, Partial Functional Schematic

TABLE B
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, 870B1M dial, and telephone set
			Defective lead connections from Line Sensing Relay to terminals on PSB. See Fig. 9	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
			Unknown	Replace 870B1M dial
2	Cannot manually dial when off-hook and using either telephone set dial or 870B1M adjunct dial	Cannot break dial tone or cannot hang-up set	Bridged set off-hook	Place bridged set on-hook
3	Cannot manually dial when off-hook using 870B1M adjunct dial	When AC power is disconnected cannot dial using set dial but can manually dial using 870B1M dial only	Improperly installed or defective Memory	1. Check cable 2. Replace Memory
			Defective PSB	Replace 870B1M dial
		No dialing clicks heard when dial is returning. Condition remains unchanged when power unit is disconnected.	Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial
			Defective PSB	Replace 870B1M dial
4	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 connected	Connect battery
			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)

TABLE B (Cont)

TROUBLE ANALYSIS – 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
4 (Cont)			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 870B1M dial	
		Lamp turns off when any memory button is depressed.	Defective logic	Replace Memory	
			Unknown	Replace 870B1M dial	
			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 rotary dial
				Unknown	Replace 870B1M dial
			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 cable 2. Replace Memory
				Unknown	Replace 870B1M 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 5.01	
			Defective Memory	Replace Memory	
			Unknown	Replace 870B1M dial	

TABLE B (Cont)

TROUBLE ANALYSIS – 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5	Cannot record properly into the 31 memory positions or into LAST NUMBER DIALED position.	RECORD lamp functions properly and can manually dial using 870B1M dial	Defective Memory	Replace Memory
			Unknown	Replace 870B1M 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 5.01
			Defective Memory	Replace Memory
			Unknown	Replace 870B1M 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.	Battery not connected	Connect battery
		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. 8B
			Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
		Can dial from memory with temporary strap lead between PSB terminals 14 and 17	Improperly installed or defective Line Sensing Relay	1. Check connections 2. Replace Line Sensing Relay
			Unknown	Replace 870B1M dial

TABLE B (Cont)

TROUBLE ANALYSIS – 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION	
6 (Cont)		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 870B1M dial	
		No digits, random digits or all the same digits in memory location(s). Note: memory may or may not 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 momentarily remove the 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 Memory	Replace Memory
				Unknown	Replace 870B1M dial

TABLE B (Cont)

TROUBLE ANALYSIS – 870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
6 (Cont)		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 870B1M dial	
7 (Cont)	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 TOUCH-TONE [®] 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 See Fig. 8B and F and Table A	
		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
				Defective dial tone detector	Replace D-180493 dial tone detector
Unknown	Replace 870B1M dial				

TABLE C
TROUBLE ANALYSIS – 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	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, 2870B1M dial, and telephone set
			Defective lead connections from Line Sensing Relay to terminals on PSB. See Fig. 11	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.
			Unknown	Replace 2870B1M dial
2	Cannot manually dial when off-hook using telephone set dial or 2870B1M adjunct dial.	Clicking sounds or damped TOUCH-TONE signals heard when dial buttons are depressed. Cannot hang up set.	Bridged set off-hook.	Place bridged set on-hook.
			Unknown	Replace 2870B1M dial
3	Cannot manually dial when off-hook and using 2870B1M adjunct dial.	No audible TOUCH-TONE signal present.	20-pin power supply connector not properly inserted on 2870A Memory.	Check connector insertion.
			Dial connectors not properly inserted.	1. Check connector insertion. 2. Replace dial.
			Defective Memory.	Replace Memory.
			Unknown.	Replace 2870B1M dial
4	Cannot manually dial some digits when off-hook and using 2870B1M adjunct dial.		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.	Replace Memory.
			Unknown.	Replace 2870B1M dial.

TABLE C (Cont)

TROUBLE ANALYSIS – 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
5	RECORD lamp does not function properly.	RECORD lamp does not turn on when RECORD button is depressed.	Battery not connected	Connect battery
			AC power not present.	Check for commercial power.
			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.
			Defective M2SL-87 cord or improper connections	1. Check and 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 2870B1M dial	
		Lamp turns off when any memory button is depressed. or Lamp does not momentarily turn off when 2870B1M dial button is depressed.	Defective logic.	Replace Memory.
Unknown.	Replace 2870B1M dial.			
6	Cannot record into memory.	See Trouble No. 5		
		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.

TABLE C (Cont)

TROUBLE ANALYSIS – 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION	
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.	
		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 2870B1M dial.	
Unknown.					
8	Cannot dial properly from memory.		Did not record properly.	1. Record per 5.01. 2. See trouble No. 6.	
			Battery not connected		Connect battery
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE signal is present.	Open circuit in power path.	Check for proper strap lead connections on PSB. See Fig. 10B.	
			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 dial.	
					No audible TOUCH-TONE signal present.
					Audible gap in train of digits being dialed.

TABLE C (Cont)

TROUBLE ANALYSIS – 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
8 (Cont)		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"> 1. Plug in the battery. 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 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 2870B1M dial
		No digits or all the same in random memory locations	Defective Memory.	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.	<ol style="list-style-type: none"> 1. Replace Memory. 2. Replace dial tone detector PWB assembly of D-180193 Kit of Parts (if option is provided).
9	Cannot dial properly from memory when off hook. (Wired with dial tone detector option.)	MB7 relay does not operate (no click heard) when memory button is depressed.	Precise TOUCH-TONE dial tone may not be present.	Make sure precise dial tone (350 Hz and 440 Hz) is present.
			Battery not connected	Connect battery
			Memory not securely mounted	Tighten Memory mounting screws.
			Improper installation of dial tone detector D-180493.	Check connections for D-180493 installation. See Table A

TABLE C (Cont)

TROUBLE ANALYSIS – 2870B1M DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Cont)		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 problems.	Defective Memory.	Replace Memory.
			Defective dial tone detector.	Replace D-180493 dial tone detector.
			Unknown.	Replace 2870B1M dial.

5000AM TRANSACTION I SET BASE WITH 220- OR 2220-TYPE HAND TELEPHONE SET

1. GENERAL

(as covered by 3.29) then it can only provide incoming service and card dialer service.

1.01 This section contains identification, installation, connection, and maintenance information for the Transaction I telephone set which consists of a 5000AM base, faceplate and a 220- or 2220-type hand telephone set. For detailed information on components, refer to CD- and SD-69926-01.

It can also automatically dial and electronically transmit information, read from a magnetic stripe on a credit card, or keyed on a 15-button manual entry pad (Fig. 1) to a data center for immediate credit authorization, check verification, or inventory control.

1.02 This section is reissued to:

- Revise installation procedures
- Add information on fuses
- Add information on 5000A dial.

2.02 *Design Features:*

- Modular type
- Magnetic stripe card reader (ABA Track 2)
- Automatic dialer
- Click-disc type 15-button manual entry pad
- Operating instruction lamps (light emitting diodes [LED])
- Green/yellow approval or referral lamps (LED).

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

1.03 For use behind a key system, A and A1 leads are provided by the black (BK) and yellow (Y) leads, respectively, in the mounting cord. If common audible ringing is to be provided, a separate ringer is required.

2.03 *Optional Features:*

- TT/DP (TOUCH-TONE/DIAL PULSE) option allows use of button pad and card reader into a rotary or a TOUCH-TONE dial office
- 15-button manual entry pad may be locked inoperable for outgoing calls
- TOUCH-TONE signal output level of set from button pad or card operation may be changed to compensate for loop loss
- An auxiliary manual entry pad (5000A-50 dial) may be connected to allow use of a Personal Identification Number (PIN).

1.04 For additional information on the Transaction telephone system, refer to Technical Reference, PUB 41804, titled "Switched Network Transaction Telephone System Interfacing With Audio Response Units," and PUB 41805, titled "Transaction Telephone Systems Interfacing With Transmission Control Units."

2. IDENTIFICATION

2.01 The 5000AM Transaction I telephone set base, equipped with a 220- or 2220-type hand telephone set (Fig. 1) provides the standard features of a single line rotary or TOUCH-TONE® telephone set.

Note: If the customer elects to have the dial of the hand telephone set made inoperable

NOTICE

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



Fig. 1—5000AM Transaction I Telephone Set Base Equipped With 220- or 2220-Type Hand Telephone Set

2.04 The 5000AM Transaction I telephone set base is available in Ivory (-50) only. These bases will be shipped with a disposable protective faceplate, so it is necessary to order the proper faceplate separately (Table A).

2.05 **Ordering Guide:**

(a) The 5000AM Transaction I telephone set base consists of all the necessary circuitry including power unit and card reader and should be ordered as:

- Base, Telephone Set, 5000AM (includes the following):

Cord, Handset, H4DU-50

Adapter, 227A (for handset cord)

Cord, Mounting, D4BU-29 (7-foot provided, 14- or 25-foot available)

840703904 Test Card A (additional cards may be ordered)

Subscriber Instruction Booklet (SIB-2459B).

(b) One of the following is also required and must be ordered separately:

- Set, Telephone, Hand, 220A-50 (Rotary dial)
- Set, Telephone, Hand, 2220B-50 (TOUCH-TONE dial).

(c) If the auxiliary manual entry pad is to be used, it will be necessary to order the D-180687 Kit of Parts (which includes the 5000A-50 dial) and also an appropriate faceplate (Table A).

3. **INSTALLATION**

3.01 Terminate the local loop into a connecting block suitable for the D4BU-29 mounting

**TABLE A
TRANSACTION I
FACEPLATE ORDERING GUIDE**

TEL SET	FACEPLATE CODE NUMBER	LETTERING	INTENDED USE
5000AM Tel Set Base	138A1-*	Blank	Without Auxiliary Manual Entry Pad
	138A2-*	Standard Instructions	
	138B1-*	Blank	With Auxiliary Manual Entry Pad
	138B3-*	Standard Instructions	

* Add appropriate color suffix from Table B.

cord, but do not connect the mounting cord at this time. The use of a 625-type connecting block (Fig. 2) is recommended. For information on other modular connecting blocks or adapters, refer to Section 503-100-100.

Warning: *Any magnetic stripe card may have its encoding destroyed if the card is carried or stored near a magnet or magnetized object.*

3.02 Connect the TRIMLINE® handset to the 5000AM telephone set base using the handset cord and adapter. (A 616P jack is provided on the front of the base.)

3.03 Insure that there is an available 110-volt 3-wire AC receptacle, not controlled by a switch, within reach of the 6-foot power cord.



A 3-wire outlet is required for safety and proper operation of the set. Third conductor must be grounded. If third wire is not provided and grounded, the resistance of the set to electrostatic damage is lowered and the probability of failure is greatly increased.

3.04 To install 138-type faceplate, proceed as follows:

- (1) Remove disposable faceplate by lifting at the midpoints of the left and right edges.

When faceplate is bowed slightly, the locking tabs at top and bottom will release.

Note: If auxiliary manual entry pad is to be installed, do not install faceplate at this time.

- (2) Install new faceplate by inserting bottom tab into housing and slightly bowing the faceplate enough to insert upper tabs into slots of housing.

TRANSMISSION MEASUREMENTS (INSERTION LOSS)

3.05 The signal output level of the TOUCH-TONE frequencies transmitted by the Transaction I set must be adjusted to match the loop being used. Make a loop insertion loss measurement using a 23D Transmission Measuring Set, or the equivalent, and a 900 ohm termination. Dial the milliwatt supply (1000 Hz) of the serving central office; read and record the loss of the loop.

3.06 It is recommended that at this time the set should be opened (3.07) and all option plugs on main printed wiring board (PWB) checked to insure that they are in their "when shipped" positions as shown by Tables C and D or Fig. 4. Check wiring terminations and if any loose connections are found, reterminate per Fig. 9.

1. CONNECT RED (R) GREEN (G) YELLOW (Y), AND BLACK (BK) CONDUCTORS OF STATION WIRE ALONG WITH (R), (G), (Y), AND (BK) JACK LEADS OF 625C TO TERMINALS R,G,Y, AND B, RESPECTIVELY, OF 42A CONNECTING BLOCK
2. PLACE 625C ONTO 42A AND SECURE
3. PLUG ONE END OF D4BU CORD INTO JACK OF 625C AND OTHER END INTO JACK IN BASE OF TELEPHONE SET

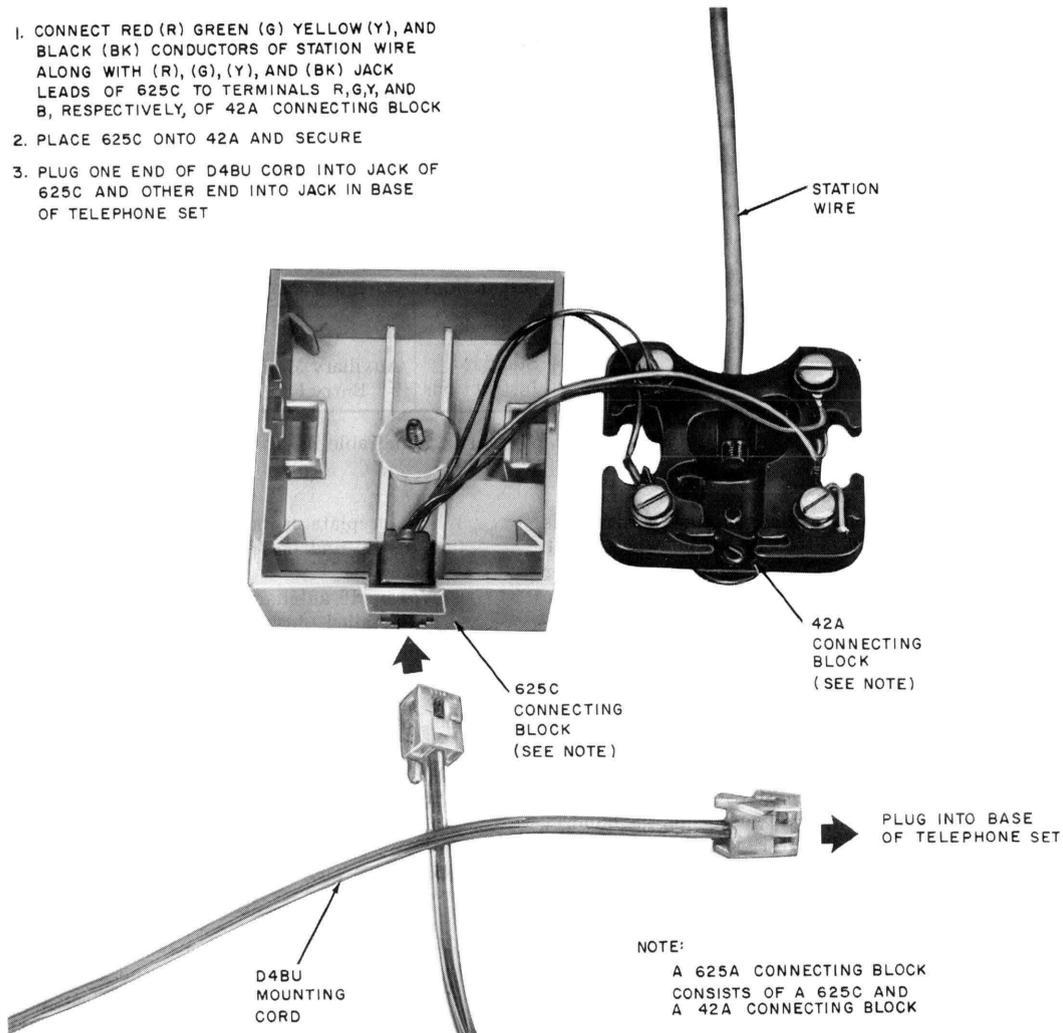


Fig. 2—Installation of 625A Connecting Block

3.07 To open set in order to access option plugs and/or terminals proceed as follows:

- (1) Disconnect power plug from AC outlet, if connected.
- (2) Invert set and loosen the two captive screws holding the upper housing and chassis (Fig. 3).
- (3) Lay the upper housing and chassis to the right, as shown by Fig. 5, without disconnecting any cables.

TABLE B

COLOR ORDERING GUIDE (SEE NOTE)

HAND TEL SET		FACEPLATES	
SUFFIX	COLOR	SUFFIX	COLOR
-50	Ivory	-100	Avocado
		-108	Teak
		-109	Walnut
		-111	Gold
		-112	Orange
		-113	Brown
		-114	Red
		-115	Blue
		-118	Black

Note: The 5000AM telephone set base is available in Ivory only and the hand telephone set should also be Ivory. The faceplate must be ordered separately.

(4) To reassemble, reverse procedure.

3.08 Set the TOUCH-TONE signal output level for the actual measured loss (AML) of the loop (3.05) as follows:

- (1) Place the option plugs in their proper positions for the measured loss. As shown in Table C and Fig. 4.
- (2) If the actual measured loss of the loop is 3.9 dB, or less, resistors R2 and R3 should be placed in the circuit. This is done by moving the orange (O) and slate (S) leads from pins T2 and R2 to pins O and S, respectively. See Table C and Fig. 9.

Note: Early production sets do not have the pin connector arrangement but have clip type terminals for placing resistors R2 and R3 in the circuit. The green (G) and red (R) leads from the 623E4 jack are connected to terminals T and R, respectively, and the (O) and (S) leads are connected across the

resistors by clip-type terminals. If the AML of the loop is 3.9 dB, or less, proceed as follows:

(a) Remove (G) lead from terminal T on control board. Remove either end of (O) lead from clip-type terminal at R3 and connect to terminal T. Connect (G) lead which was removed from T to now vacant R3 clip-type terminal.

(b) Remove (R) lead from terminal R on control board. Remove either end of (S) lead from clip-type terminal at R2 and connect to terminal R. Connect (R) lead which was removed from R to now vacant R2 clip-type terminal.

(3) If loss of loop exceeds 12 dB the quality of the service may be impaired. Defer, according to local procedures, until an acceptable loop is made available.

3.09 Connect the set to the telephone line by inserting the mounting cord into the connecting block.

3.10 Remove the gum-backed "OPTIONS" sticker which is packed with the base and attach it to the bottom of the base near the front. If the service order does not call for the implementation of any options (Dial Pulse, Lockout, or disconnection of the ringer) at this time, reassemble set and proceed to 3.12.

Note: If the order calls for making dial of hand telephone set inoperable, do not disable dial until all testing is completed.

OPTIONS



The service order must specify that each option is, or is not, required. If the service order does not so specify, the sales representative should be contacted, or refer to supervisor for clarification of requirements.

3.11 If the service order specifies that the Dial Pulse and/or Lockout options be activated,

TABLE C

ADJUSTMENT OF TOUCH-TONE OUTPUT LEVEL (NOTE)

LOOP LOSS IN DBs	OPTION PLUG POSITIONS ON MAIN PWB			WIRING ON CONTROL BOARD						NOMINAL OUTPUT LEVEL IN DBM
				RESISTOR - R2			RESISTOR - R3			
	R-34	R-35	R-36	LEAD COLOR	REMOVE FROM PIN	CONNECT TO PIN	LEAD COLOR	REMOVE FROM PIN	CONNECT TO PIN	
0 to 1.9†	E33-E34	E31-E32	E28-E29	(S)	R2	S	(O)	T2	O	-13.5
2.0 to 3.9†	E34-E35	E30-E31	E28-E29	(S)	R2	S	(O)	T2	O	-11.5
4.0 to 5.9	E34-E35‡	E30-E31‡	E27-E28‡	-	-	-	-	-	-	- 9.5
6.0 to 7.9	E34-E35	E30-E31	E28-E29	-	-	-	-	-	-	- 7.5
8.0 to 10.4	E34-E35	E31-E32	E27-E28	-	-	-	-	-	-	- 5.5
10.5 or more	E34-E35	E31-E32	E28-E29	-	-	-	-	-	-	- 3.0

Note: See Fig. 4 for location of option plugs on main PWB.

See Fig. 9 for location of wiring option on control board.

† If loop loss is 3.9 dB or less, resistors R2 and R3 should be connected into the circuit as shown. (See Note 4 of Fig. 9).

For early production sets, refer to note after 3.08 (2).

‡ Plug positions when shipped from factory.

TABLE D (SEE NOTE)

PLACEMENT OF OPTION PLUGS

OPTION	PLUG POSITION	RESULT
Key Pad Lock out	*E42—E43	Not locked (can dial out from key pad)
	E43—E44	Locked (cannot dial out from key pad)
TT/DP Dialing	*E21—E22	Key pad dials in TT frequencies
	E22—E23	Key pad sends out dial pulses
FSK†	*E40—E41	FSK receiver is not present
	E39—E40	FSK receiver is present

* Option plug positions when shipped.

† Frequency shift keying (FSK) option not available at this time.

Note: See Fig. 4 for location of option plugs.

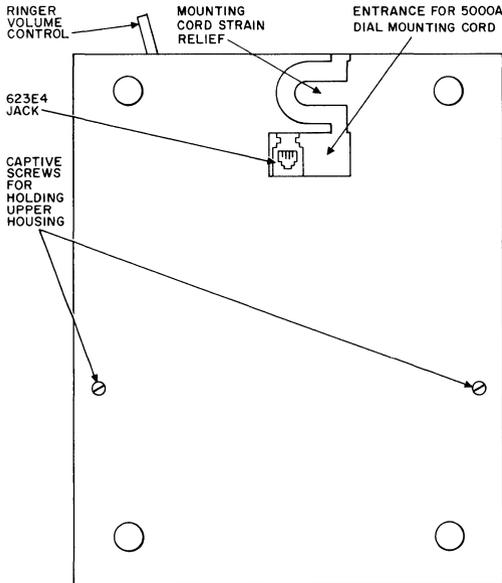


Fig. 3—Bottom of 5000AM Transaction I Telephone Base

or that ringer be disconnected, access the main PWB (3.07) and proceed as follows:

(a) If both the Dial Pulse and Lockout options are called for:

- (1) Place TT/DP option plug for DP per Table D.
- (2) Place upper housing and chassis back on set and reconnect AC power cord.
- (3) Go off-hook and, using manual entry pad, dial any test number and verify that the call is completed. This tests the dial pulse feature.
- (4) Disconnect power cord, lay upper housing and chassis aside, and move Lockout option plug to lockout position per Table D.
- (5) Reassemble set and reconnect AC power cord.
- (6) Test lockout by going off-hook and depressing any button on manual entry pad to verify absence of dial pulses being transmitted.

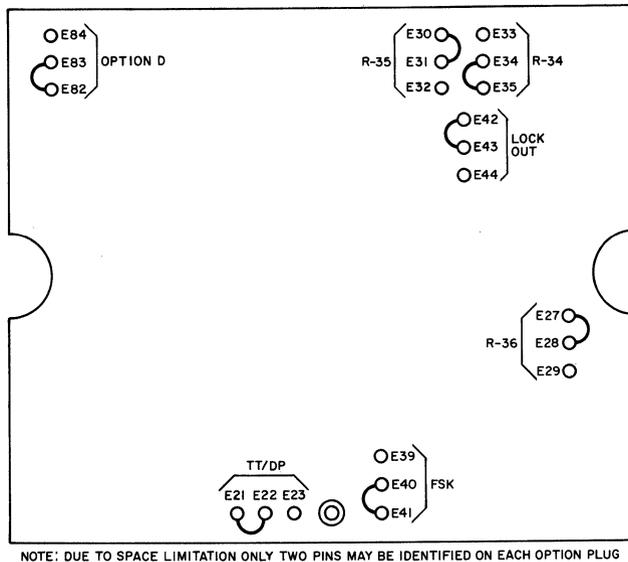


Fig. 4—Main PWB, Option Plug Locations Showing Plug Positions as Shipped

Note: If the service order specifies keyboard lockout, the TT/DP option plug must still be set for the correct class of service, TOUCH-TONE or Rotary.

(b) If only Dial Pulse option is specified:

- (1) Proceed as in (a) Step (1), (2), (3), and (5).

(c) If only Lockout option is specified:

- (1) Move Lockout option plug per Table D.
- (2) Reassemble set and reconnect AC power cord.
- (3) Test lockout by going off-hook and depressing any button on manual entry pad to verify absence of TOUCH-TONE frequency signals.

(d) To disconnect P2B ringer:

- (1) Remove red (R) and black (BK) ringer leads from terminal P1 and T, respectively, on control board, insulate and store.

- (2) Reassemble set and reconnect AC power cord.

Note: Indicate on the sticker on the base of the set any options that are implemented.

3.12 With handset on-hook, plug in power cord and then go off-hook momentarily to reset Transaction I telephone set.

Note: If no lamps light when handset is taken off-hook, either AC receptacle is defective or fuses may be open. If fuses are suspected, refer to 4.02 in Maintenance section.

PRELIMINARY TEST PROCEDURE

3.13 Go off-hook by lifting handset; first instruction lamp will light. Run test card A, (card is packed with the 5000AM base) through the card reader from right to left. Card must be held with the magnetic stripe down and to the front and must be moved through the slot smoothly and without hesitation. First instruction lamp should go out and second instruction lamp should light. Correct operation of these two lamps indicates that the test card is properly coded and the card reader

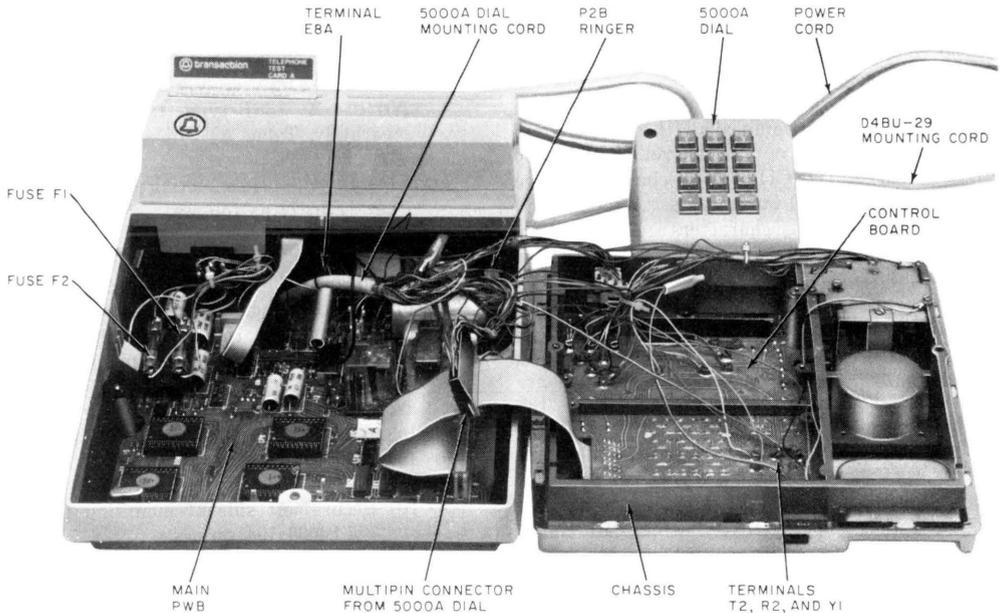


Fig. 5—5000AM Transaction I Telephone Set Base With Upper Housing and Chassis Laid Aside and 5000A Dial Connected

is good. If the card is not read correctly the first lamp will blink and the card reading procedure should be repeated.

INSTALLATION TEST PROCEDURES

3.14 Using the TRIMLINE handset, perform the normal tests, including ringback, for a rotary or TOUCH-TONE telephone set (as applicable) according to local procedures.

REMOTE TEST PROCEDURE



In the following test there must not be over a 10-second delay between steps or the test line will interpret this as an error.

Note: If an interrupted tone (1/2 second on, 1/2 second off), lasting about 5 seconds, is heard at any time, an error is indicated. The 1A Transaction Telephone Test Line Station (TTTLS) will disconnect at the end of the

interrupted tone. To retest, it will be necessary to redial the test line (3.15) through (3.19).

3.15 Go off-hook, first instruction lamp is lighted and dial tone is heard. Manually dial the number of the Transaction Telephone Test Line Station (TTTLS), using the TRIMLINE handset.

3.16 When the call is completed to the TTTLS, it will respond with a 3-second answer tone which will be heard on the TRIMLINE handset. After the answer tone has terminated, the test card should be passed through the reader two (2) times. The instruction lamps should sequence—the second instruction lamp should light after the card is passed through the first time, and when the card has been passed through the second time, the third lamp will be lighted.

3.17 Key in digits by depressing buttons on the manual entry pad, *in sequence*, 1 through 9, ●, 0, /, and END. The third instruction lamp will now be extinguished. While you are doing this, the set will transmit the buffered data as

TOUCH-TONE pulses. It is not necessary to wait for the end of transmission of data from the test card.

3.18 The green (G) lamp shall then light for 3 seconds and go out as the yellow (Y) lamp lights. Three TOUCH-TONE characters are transmitted as the (Y) lamp lights. After the (Y) lamp lights and the three characters are transmitted, depress the ERASE button and pause to listen for the transmission of two more TOUCH-TONE characters. Next, depress the ATTN button and hear two more characters transmitted. (If you do not hear an interrupted tone, the set is working properly.) You may hear a muted 3 second response tone. The TTTLs will disconnect. Place the handset on-hook. The yellow lamp may be extinguished by momentarily going off-hook.

3.19 Go off-hook, dial the TTTLs using the handset and then depress END button four times. As this call is answered by the test line, the fourth instruction lamp will be lighted. (On the standard faceplate, this lamp is labeled "Follow Special Instructions.") This tests the lamp and associated circuitry. Go on-hook to release test line. Go off-hook momentarily to reset Transaction telephone set and extinguish lamp. If no auxiliary manual entry pad is provided, proceed to 3.25.

AUXILIARY MANUAL ENTRY PAD (PERSONAL IDENTIFICATION NUMBER [PIN])

3.20 If the auxiliary manual entry pad is to be used, it should be installed at this time. Install the D-180687 Kit of Parts (Fig. 6), which includes:

- 1—5000A-50 dial
- 1—841934946 mounting plate
- 1—841935109 key (push-to-lock, push-to-unlock)
- 4—840694194 screws
- 1—840713366 label
- 2—D-161488 connectors (provided with kit of parts manufactured after 1st quarter of 1976).

- (1) Remove faceplate by lifting at the midpoints of the right and left edges. When faceplate

is bowed slightly, the locking tabs at top and bottom will release.

Note: A 138B-type faceplate (ordered separately, Table A) will also be required.

- (2) Install 841934946 mounting plate and 841935109 key (Fig. 7) as follows:

- (a) Remove screw holding static arrester spring (Fig. 7) and slide mounting plate under the spring. Replace the screw holding the spring and the associated lead. This should secure right side of mounting plate.

Note: The static arrester spring is intended to ground the faceplate and the chrome ring for electrostatic protection.

- (b) Secure left side of mounting plate with (2) 840694194 screws.

- (c) Insert 841935109 key with trimmed portion to right, the LED in the upper right, and the two indexing or alignment holes over tabs on the mounting plate to the left.

- (d) Secure right side of key using the other (2) 840694194 screws provided.

- (3) Install new 138B-type faceplate.

- (4) Open the set (3.07); lay the upper housing and chassis to the right (Fig. 5).

- (5) Hold the lower housing up on its side and feed the mounting cord of the dial through the cord entrance hole in the base pan. Using Fig. 5, make connections as follows:

- (a) Plug multipin connector of mounting cord into connector on flex ribbon cable.

Note: A polarizing key in the female connector assures proper mating of connectors.

- (b) Connect 508 plug to 841935109 key.

- (c) Connect the black (BK) spade-tipped mounting cord conductor to terminal E8A on the main PWB.

Note: In early production sets there is no terminal E8A. In this case, remove the black

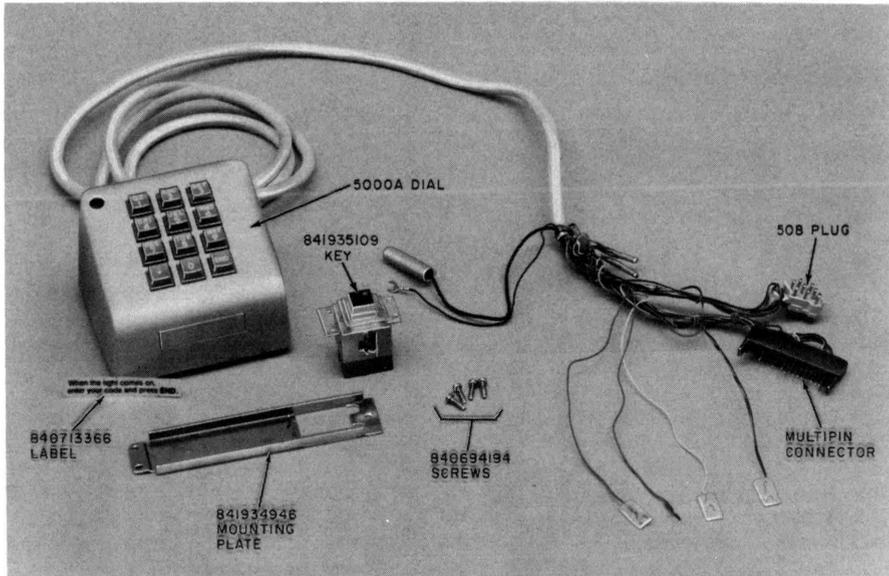


Fig. 6—D-180687 Kit of Parts

(BK) lead connected to terminal E8 and plug it into the connector on the black mounting cord conductor; tape or insulate the connection. Now connect the black spade-tipped mounting cord conductor to terminal E8.



If the auxiliary manual entry pad should ever be removed, it is imperative that leads be reconnected to their normal locations. Remove the (BK) lead from the connector on the black mounting cord conductor and reterminate on terminal E8.

(d) Connect the slate (S) spade-tipped mounting cord conductor to terminal Y1 on the control board (Fig. 9).

(e) Connect the white (W) spade-tipped mounting cord conductor to terminal W on the control board (Fig. 9).

Note: In later production models, there is no terminal W on the control board; in this

case, insulate and store the white mounting cord conductor.



In some early production sets, the control board had neither a Y1 nor a W terminal. If a PIN pad is to be provided with one of these sets, the (S) and (W) spade-tipped mounting cord conductors should be connected together using a D-161488 connector.

(f) Insulate and store any unused mounting cord leads.

(6) Replace upper housing and chassis and tighten captive screws holding upper and lower housing together.

(7) Place jacketed portion of mounting cord under strain relief as shown in Fig. 3.

(8) Affix 840713366 label to top of 5000A dial directly above number buttons.

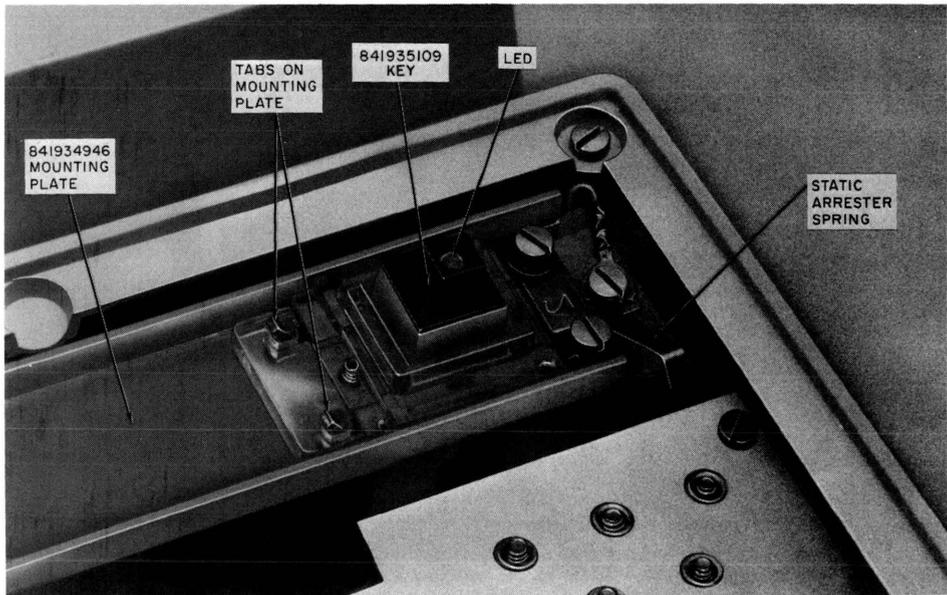


Fig. 7—5000AM With Faceplate Removed Showing Mounting Plate and 651G Key Installed

3.21 To test the auxiliary manual entry pad, press the Personal Identification Number (PIN) key to enable the pad. Observe that both Light Emitting Diodes (LED) light, one on the PIN key and one on the 5000A-50 dial. Depress the PIN key again and observe that both LED's are extinguished.

3.22 Repeat 3.15 and 3.16 and then press the PIN key to enable the pad.

3.23 Key in by depressing, *in sequence*, digits 1 through 9, ●, and 0 on the 5000A-50 dial. (It is not necessary to wait for data from card to be transmitted.) Depress / (slash) on the 5000AM base and then depress END on the 5000A-50 dial. The third instruction lamp shall be extinguished.

3.24 The green response lamp shall light for 3 seconds and go out as the yellow lamp lights. Depress the PIN key and place the handset on-hook. Go off-hook momentarily to extinguish the yellow lamp and reset the Transaction I set.

FINAL TEST PROCEDURE

3.25 If the customer has a dialing card, ask him to use his card and place a call to his data center to verify that data center can be reached.

3.26 This completes the test procedures. Write the telephone number of the TTLS on the test card for customer's future reference and give test card to customer along with the Subscriber Instruction Booklet. Explain to the customer the use of the test card per Subscriber Instruction Booklet.

DIAL RESTRICTION OF HAND TELEPHONE SET

3.27 Some customers may want the dial of the hand telephone set restricted from making outgoing calls. This feature is not recommended and will only be incorporated at the customer's insistence.

Note: If dial restriction is to be provided, all installation tests must be completed prior to making the modification.



If dial is restricted, the set can no longer be used as a normal telephone set since calls can only be initiated by a dialing card.

3.28 Only the 220-type hand telephone set may be restricted. If dial restriction is requested at a location that has been equipped for TOUCH-TONE service, the 2220-type hand telephone set should be replaced with a 220-type hand telephone set that has been modified per 3.29.

3.29 To restrict the dial in a 220-type hand telephone set, proceed as follows:

- (1) Remove handset cord from handset using KS-21107 releaser or equivalent.
- (2) Remove cover or number card retainer located just above dial using KS-21107 releaser or equivalent.
- (3) Remove light seal plate and the 2 screws located under retainer. This will release the cover from the handset.
- (4) Place a strap between the pulsing contacts as shown in Fig. 8. The dial will remain in the handset.

Note: If new 220C-50 handset has been provided, place strap between the two screws located near the top center of the flex wiring board.

- (5) Reassemble handset and reconnect handset cord.
 - (6) Note this modification on the option sticker.
- 3.30** Outgoing calls may now be made only by using a dialing card.

4. MAINTENANCE



Before attempting to make any maintenance tests, check option sticker under base of set, to see what options (3.11 or 3.29) may have been implemented

4.01 In case of commercial power failure, Transaction telephone sets can be used as standard telephone sets using the TRIMLINE handset. All

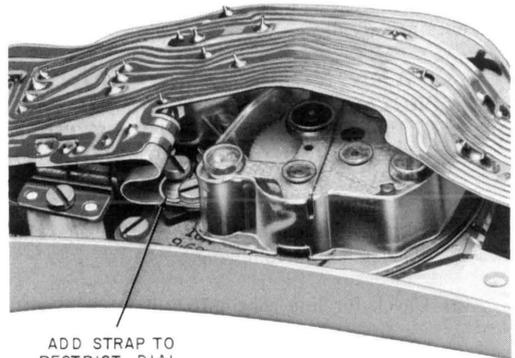


Fig. 8—Restricting Dial of 220-Type Hand Telephone Set

other functions of the Transaction telephone set are rendered inoperative by the loss of AC power.



If dial of hand telephone set has been restricted (3.29), the set cannot be used as a standard telephone set. The restricted handset may be unplugged and replaced for maintenance testing purposes. Be sure to reinstall customer's handset when testing is completed.

4.02 There are two fuses, (F1 for -12 volt and F2 for +5 volt circuitry) mounted on a block near the left rear corner of the main PWB, Fig. 5. If a fuse failure is suspected, the fuses may be removed (access per 3.07), and checked visually or observe the following indications:

- (1) If fuse F1 is open:
 - (a) No TOUCH-TONE or dial pulse signals may be heard on handset when buttons are depressed on manual entry pad.

Note: If Lockout option has been activated this would be an inconclusive test.

- (2) If F2 fuse is open, there will be no lamps operable on set. These are Bussman MDL

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one point six (1.6) ampere fuses and may be obtained locally.

WARNING: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE FUSES ONLY WITH 1.6 AMP SLO-BLO (BUS MDL) OR EQUIVALENT.

4.03 Other field maintenance of the sets shall consist of the following:

- (a) Check for line continuity (dial tone).
- (b) Check for proper connection of cords and jacks.
- (c) Check for loose wire or connections on main PWB or control board (Fig. 9).
- (d) Replacement of H4DU-50 handset cord and/or 227A adapter.

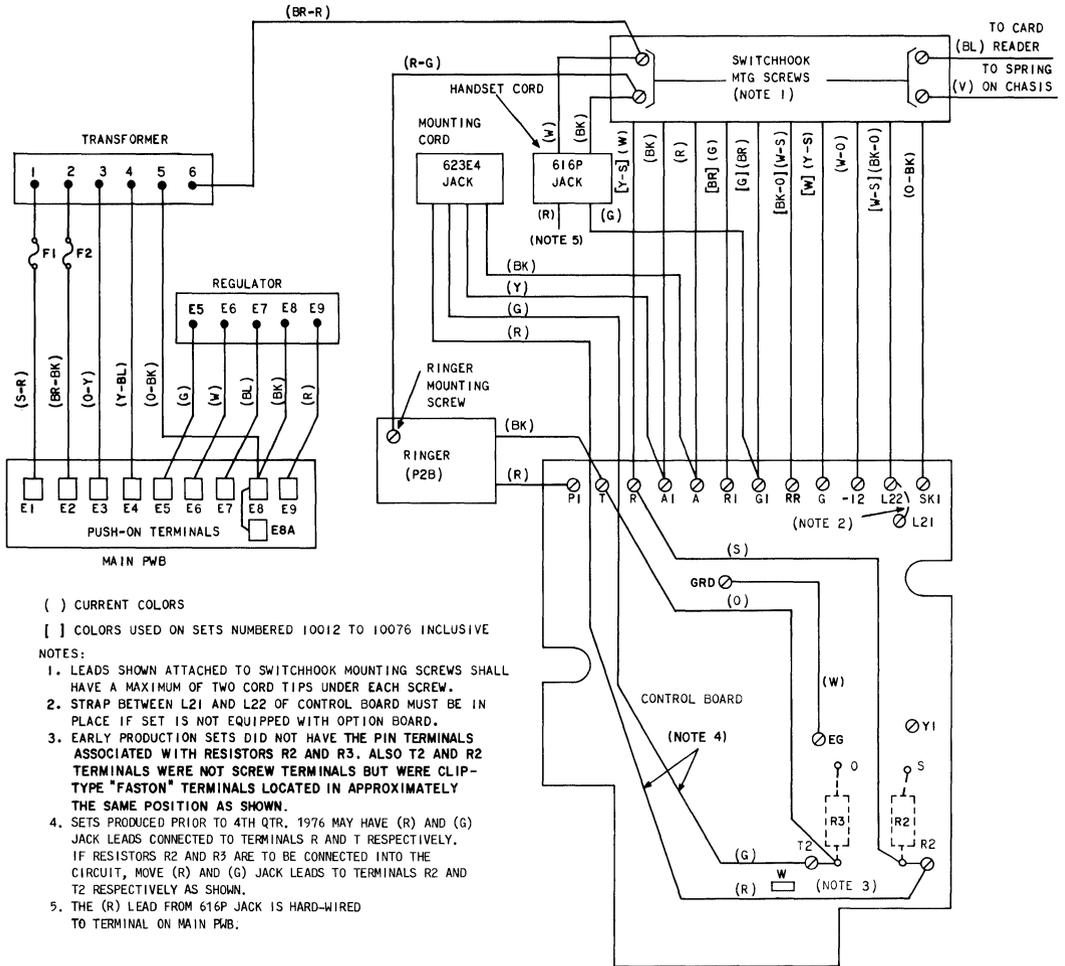
(e) Replacement of D4BU-29 mounting cord.

(f) Replacement of TRIMLINE handset.

(g) Replacement of auxiliary manual entry pad.

4.04 If the loss of the loop changes due to cable activity, etc. and/or difficulty is encountered in communicating with the remote data center, the loop loss should be measured and the TOUCH-TONE signal output level adjusted per 3.08.

4.05 Field repairs on the 5000AM base shall not be attempted. Return defective base to Western Electric Service Center in accordance with local procedures. If base is being replaced, return disposable faceplate from new base with defective base.



- () CURRENT COLORS
 [] COLORS USED ON SETS NUMBERED 10012 TO 10076 INCLUSIVE
- NOTES:
- LEADS SHOWN ATTACHED TO SWITCHHOOK MOUNTING SCREWS SHALL HAVE A MAXIMUM OF TWO CORD TIPS UNDER EACH SCREW.
 - STRAP BETWEEN L21 AND L22 OF CONTROL BOARD MUST BE IN PLACE IF SET IS NOT EQUIPPED WITH OPTION BOARD.
 - EARLY PRODUCTION SETS DID NOT HAVE THE PIN TERMINALS ASSOCIATED WITH RESISTORS R2 AND R3. ALSO T2 AND R2 TERMINALS WERE NOT SCREW TERMINALS BUT WERE CLIP-TYPE "FASTON" TERMINALS LOCATED IN APPROXIMATELY THE SAME POSITION AS SHOWN.
 - SETS PRODUCED PRIOR TO 4TH QTR, 1976 MAY HAVE (R) AND (G) JACK LEADS CONNECTED TO TERMINALS R AND T RESPECTIVELY. IF RESISTORS R2 AND R3 ARE TO BE CONNECTED INTO THE CIRCUIT, MOVE (R) AND (G) JACK LEADS TO TERMINALS R2 AND T2 RESPECTIVELY AS SHOWN.
 - THE (R) LEAD FROM 616P JACK IS HARD-WIRED TO TERMINAL ON MAIN PWB.

Fig. 9—Partial Schematic Showing Conductors Attached by Screws or Push-On Terminals

5100AM TRANSACTION TELEPHONE SET BASE WITH 220- OR 2220-TYPE HAND TELEPHONE SET

1. GENERAL

1.01 This section contains identification, installation, connection, and maintenance information for the Transaction II telephone set which consists of a 5100AM base, faceplate and a 220- or 2220-type hand telephone set. For detailed information on components, refer to CD- and SD-69926-01.

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

1.03 For use behind a key system, A and A1 leads are provided by the black (BK) and yellow (Y) leads, respectively, in the mounting cord. If common audible ringing is to be provided, a separate ringer is required.

1.04 For additional information on the Transaction telephone system, refer to Technical Reference, PUB 41804, titled "Switched Network Transaction Telephone System Interfacing With Audio Response Units."

2. IDENTIFICATION

2.01 The 5100AM Transaction telephone set base, equipped with a 220- or 2220-type hand telephone set (Fig. 1) provides the standard features of a single line rotary or TOUCH-TONE® telephone set.

Note: If the customer elects to have the dial of the hand telephone set made inoperable (as covered by 3.33) then it can only provide incoming service and card dialer service.

It can also automatically dial and electronically transmit information read from a magnetic stripe on a credit card, or keyed on a 15-button manual entry pad (Fig. 1), to a data center for immediate credit authorization, check verification, or inventory control. In addition, it is possible for a transaction to be accomplished in a hands-free mode.

2.02 *Design Features:*

- Modular type
- Magnetic stripe card reader (ABA Track 2)
- Automatic dialer
- Click-disc type 15-button manual entry pad
- Operating instruction lamps (light emitting diodes [LED])
- Hands-free operation
- Electronic switchhook and call progress sounder
- Volume control for call progress sounder
- Green/yellow approval or referral lamps (LED)
- Data receiver and an 8-digit alpha/numeric display.

2.03 *Optional Features:*

- TT/DP (TOUCH-TONE/DIAL PULSE) option allows use of button pad and card reader into a rotary or a TOUCH-TONE dial office
- 15-button manual entry pad may be locked inoperable for outgoing calls
- TOUCH-TONE signal output level of set from button pad or card operation may be changed to compensate for loop loss
- An auxiliary manual entry pad (5000A-50 dial) may be connected to allow use of a Personal Identification Number (PIN).

NOTICE

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

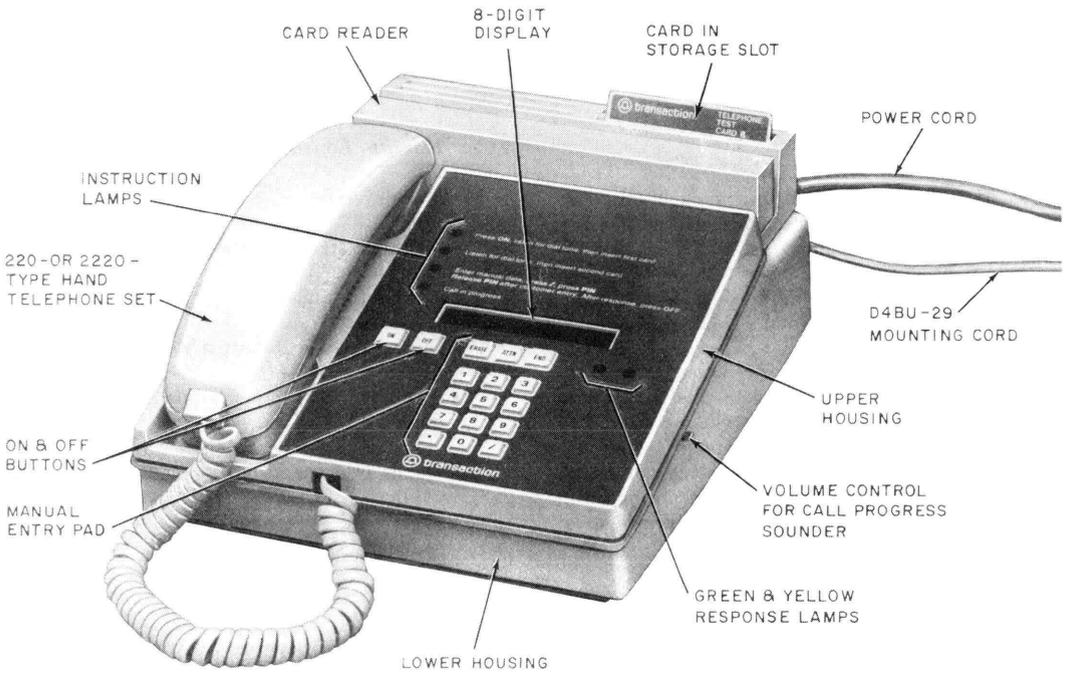


Fig. 1—5100AM Transaction II Telephone Set Base Equipped With 220- or 2220-Type Hand Telephone Set

2.04 The 5100AM Transaction II telephone set base is available in Ivory (-50) only. These bases will be shipped with a disposable protective faceplate, so it is necessary to order the proper faceplate separately (Table A).

840996003 Test Card B (additional cards may be ordered)

Subscriber Instruction Booklet (SIB-2482C)

2.05 Ordering Guide:

(a) The 5100AM Transaction II telephone set base consists of all the necessary circuitry including power unit and card reader and should be ordered as:

(b) One of the following is also required and must be ordered separately:

- Base, Telephone Set, 5100AM (includes the following):

- Set, Telephone, Hand, 220A-50 (Rotary dial)

Cord, Handset, H4DU-50

- Set, Telephone, Hand, 2220B-50 (TOUCH-TONE dial)

Cord, Mounting, D4BU-29 (7 foot provided, 14- or 25-foot available)

(c) If the auxiliary manual entry pad is to be used, it will be necessary to order the D-180687 Kit of Parts (which includes the 5000A-50 dial) and also an appropriate faceplate (Table A).

Adapter, 227A (for handset cord)

1. CONNECT RED (R) GREEN (G) YELLOW (Y), AND BLACK (BK) CONDUCTORS OF STATION WIRE ALONG WITH (R), (G), (Y), AND (BK) JACK LEADS OF 625C TO TERMINALS R,G,Y, AND B, RESPECTIVELY, OF 42A CONNECTING BLOCK
2. PLACE 625C ONTO 42A AND SECURE
3. PLUG ONE END OF D4BU CORD INTO JACK OF 625C AND OTHER END INTO JACK IN BASE OF TELEPHONE SET

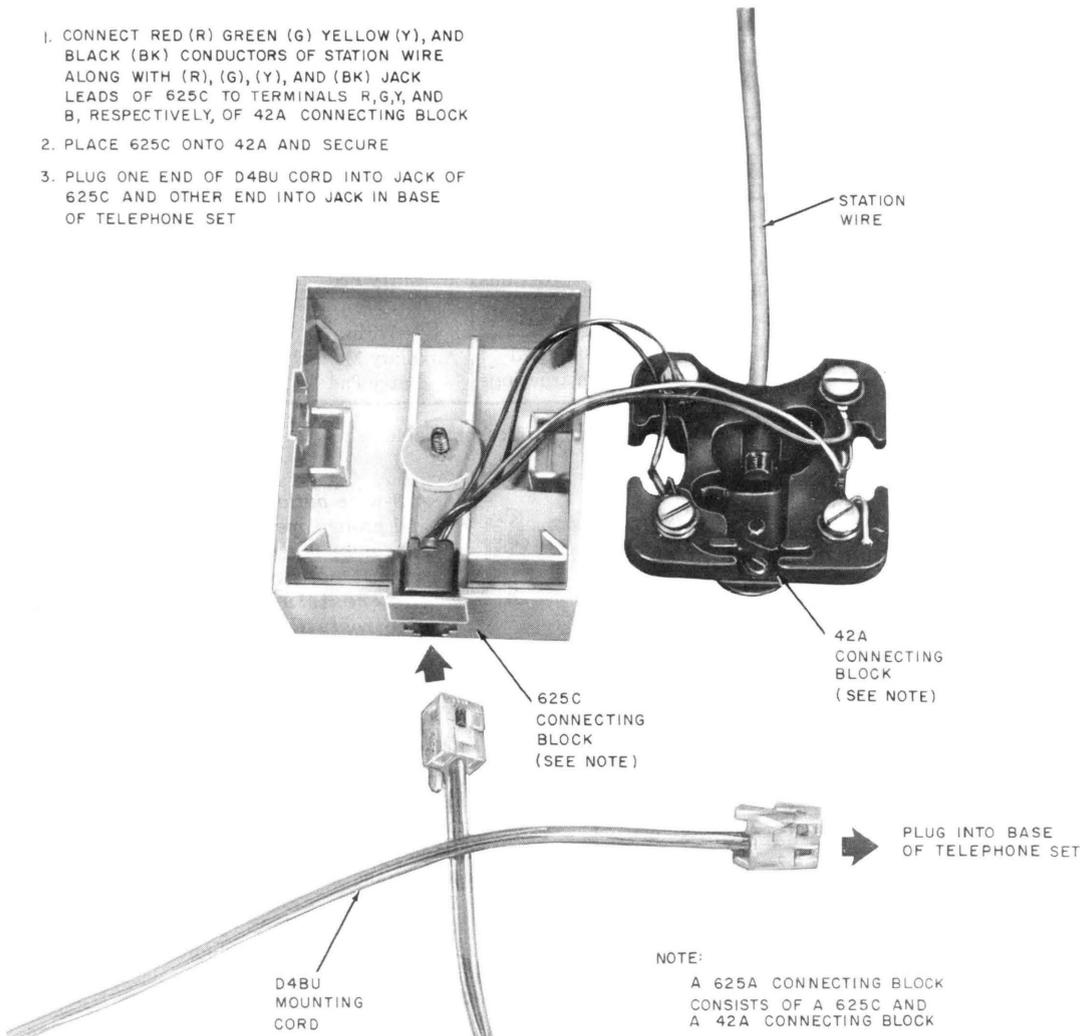


Fig. 2—Installation of 625A Connecting Block

3. INSTALLATION

3.01 Terminate the local loop into a connecting block suitable for the D4BU-29 mounting cord, but do not connect the mounting cord at this time. The use of a 625-type connecting block (Fig. 2) is recommended. For information on other

modular connecting blocks or adapters, refer to Section 503-100-100.

Warning: Any magnetic stripe card may have its encoding destroyed if the card is carried or stored near a magnet or magnetized object.

TABLE A
TRANSACTION II
FACEPLATE ORDERING GUIDE

TEL SET	FACEPLATE CODE NUMBER	LETTERING	INTENDED USE
5100AM Tel Set Base	138C1-*	Blank	Without Auxiliary Manual Entry Pad
	138C5-*	Standard Instructions	
	138D1-*	Blank	With Auxiliary Manual Entry Pad
	138D6-*	Standard Instructions	

* Add appropriate color suffix from Table B.

TABLE B
COLOR ORDERING GUIDE (SEE NOTE)

HAND TEL SET		FACEPLATES	
SUFFIX	COLOR	SUFFIX	COLOR
-50	Ivory	-100	Avocado
		-108	Teak
		-109	Walnut
		-111	Gold
		-112	Orange
		-113	Brown
		-114	Red
		-115	Blue
		-118	Black

Note: The 5100AM telephone set base is available in Ivory only and the hand telephone set should also be Ivory. The faceplate must be ordered separately.

3.02 Connect the TRIMLINE® handset to the 5100AM telephone set base using the handset cord and adapter. (A 616P jack is provided on the front of the base.)

3.03 Insure that there is an available 110-volt, 3-wire AC receptacle, not controlled by a switch, within reach of the 6-foot power cord.



A 3-wire outlet is required for safety and proper operation of the set. Third conductor must be grounded. If third wire is not provided and grounded, the resistance of the set to electrostatic damage is lowered and the probability of failure is greatly increased.

3.04 To install 138-type faceplate, proceed as follows:

- (1) Remove disposable faceplate by lifting at the midpoints of the left and right edges. When faceplate is bowed slightly, the locking tabs at top and bottom will release.
- (2) Install new faceplate by inserting bottom tab into housing and slightly bowing the faceplate enough to insert upper tabs into slots of housing.

Note: If auxiliary manual entry pad is to be installed, do not install faceplate at this time.

TRANSMISSION MEASUREMENTS (INSERTION LOSS)

3.05 The signal output level of the TOUCH-TONE frequencies transmitted by the Transaction II set must be adjusted to match the loop being used. Make a loop insertion loss measurement using a 23D Transmission Measuring Set, or the equivalent, and a 900 ohm termination. Dial the milliwatt supply (1000 Hz) of the serving central office, read and record the loss of the loop.

3.06 It is recommended that at this time the set should be opened up (3.07) and all option plugs on main printed wiring board (PWB) and control board checked to insure that they are in their "when shipped" positions as shown by Tables C and D or Fig. 4 and 5. Check wiring terminations and if any loose connections are found, reterminate per Fig. 11.

3.07 To open set in order to access option plugs and/or terminals proceed as follows:

- (1) Disconnect power plug from AC outlet, if connected.
- (2) Invert set and loosen the two captive screws holding the upper housing and chassis (Fig. 3).
- (3) Lay the upper housing and chassis to the right, as shown by Fig. 6, without disconnecting any cables.
- (4) To reassemble, reverse procedure.

3.08 Set the TOUCH-TONE signal output level for the actual measured loss of the loop (3.05) as follows:

- (1) Place the options on their proper positions. See Fig. 4 and Table C.
- (2) If the loss of the loop is 3.9 dB, or less, resistors R2 and R3 on the control board should be placed in the circuit. This is done by moving the option pins from B-C to A-B as shown by Fig. 5.
- (3) If loss of loop exceeds 12 dB the quality of the service may be impaired. Defer, according to local procedures, until an acceptable loop is made available.

3.09 Connect the set to the telephone line by inserting the mounting cord into the connecting block.

3.10 Remove the gum-backed "OPTIONS" sticker which is packed with the base and attach it to the bottom of the base near the front. If the service order does not call for the implementation of any options (Dial Pulse, Lockout, or disconnection of the ringer) at this time, reassemble set and proceed to 3.12.

Note: If the order calls for making dial of hand telephone set inoperable, do not disable dial until all testing is completed.

OPTIONS

3.11 If the service order specifies that the Dial Pulse and/or Lockout options be activated, or that ringer be disconnected, access the main PWB (3.07) and proceed as follows:

(a) If both Dial Pulse and Lockout options are called for:

- (1) Place TT/DP option plug for DP per Table D.
- (2) Place upper housing and chassis back on set and reconnect AC power cord.
- (3) Go off-hook and, using manual entry pad, dial any test number and verify that the call is completed. This tests the dial pulse feature.
- (4) Disconnect power cord, lay upper housing and chassis aside, and move Lockout option plug to lockout position per Table D.
- (5) Reassemble set and reconnect AC power cord.
- (6) Test lockout by going off-hook and depressing any button on manual entry pad to verify absence of TOUCH-TONE frequency signals.

(b) If only Dial Pulse option is specified:

- (1) Proceed as in (a) Steps (1), (2), (3) and (5).

(c) If only Lockout option is specified:

- (1) Move Lockout option plug per Table D.
- (2) Reassemble set and reconnect AC power cord.
- (3) Test lockout by going off-hook and depressing any button on manual entry pad to verify absence of TOUCH-TONE frequency signals.

TABLE C
ADJUSTMENT OF TOUCH-TONE OUTPUT LEVEL (NOTE)

LOOP LOSS IN DBs	OPTION PLUG POSITIONS ON MAIN PWB			WIRING ON CONTROL BOARD				NOMINAL OUTPUT LEVEL IN DBM
				RESISTOR - R2‡		RESISTOR - R3‡		
	R-34	R-35	R-36	REMOVE FROM	CONNECT TO	REMOVE FROM	CONNECT TO	
0 to 1.9*	E33-E34	E31-E32	E28-E29	B-C†	A-B	B-C†	A-B	-13.5
2.0 to 3.9*	E34-E35	E30-E31	E28-E29	B-C†	A-B	B-C†	A-B	-11.5
4.0 to 5.9	E34-E35†	E30-E31†	E27-E28†	-	-	-	-	- 9.5
6.0 to 7.9	E34-E35	E30-E31	E28-E29	-	-	-	-	- 7.5
8.0 to 10.4	E34-E35	E31-E32	E27-E28	-	-	-	-	- 5.5
10.5 to 12	E34-E35	E31-E32	E28-E29	-	-	-	-	- 3.0

* If loop loss is 3.9 dB or less, resistors R2 and R3 should be connected into the circuit as shown.

† Plug positions when shipped from factory.

‡ Designations are not on board, see Fig. 5.

Note: See Fig. 4 for location of option plugs on main PWB.

See Fig. 5 for location of wiring option on control board.

TABLE D
PLACEMENT OF OPTION PLUGS (SEE NOTE)

OPTION	PLUG POSITION	RESULT
Key Pad Lock out	E42-E43*	Not locked (can dial out from key pad)
	E43-E44	Locked (cannot dial out from key pad)
TT/DP Dialing	E21-E22*	Key pad dials in TT frequencies
	E22-E23	Key pad sends out dial pulses
Power Up Reset	E39-E40*	Resets terminal to ON-HOOK condition following commercial power failure.

* Option plug positions when shipped.

Note: See Fig. 4 for location of option plugs.

(d) To disconnect P2B ringer:

- (1) Remove red (R) and black (BK) ringer leads from terminal P1 and T, respectively, on control board, insulate and store.

- (2) Reassemble set and reconnect AC power cord.

Note: Indicate on the sticker on the base of the set any options that are implemented.

3.12 With handset on-hook, plug in power cord and then go off-hook momentarily to reset Transaction II telephone set.

Note: If no lamps light when handset is taken off hook, either AC receptacle is defective

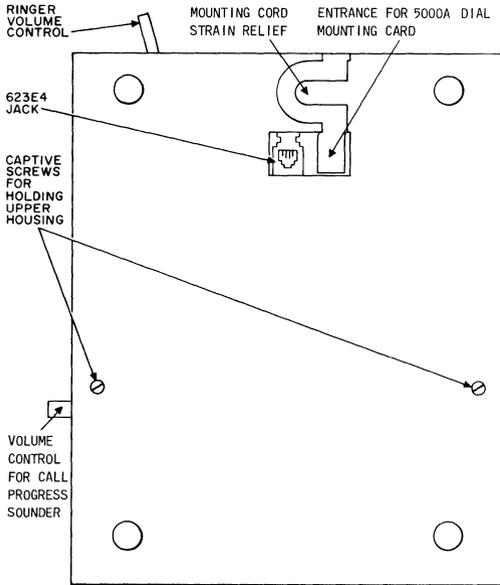


Fig. 3—Bottom of 5100AM Transaction II Telephone Base Showing Upper Housing Screws and Mounting Cord Jack

or fuses may be open. If fuses are suspected, refer to 4.02 in Maintenance section.

PRELIMINARY TEST PROCEDURE

3.13 Go off-hook by lifting handset; first and fourth instruction lamps will light. Replace the handset; both lamps will extinguish. Press the ON button; both lamps will light again. Run test card B (card is packed with the 5100AM base) through the card reader from right to left. Card must be held with the magnetic stripe down and to the front and must be moved through the slot smoothly and without hesitation. First instruction lamp should go out and second instruction lamp should light. Correct operation of these lamps indicates that the test card is properly coded and the card reader is good. If the card is not read correctly the first lamp will blink and the card reading procedure should be repeated. Press the OFF button; both lamps will extinguish.

INSTALLATION TEST PROCEDURES

3.14 Using the TRIMLINE handset, perform the normal tests, including ringback, for a rotary or TOUCH-TONE telephone set (as applicable) according to local procedures.

3.15 Depress ON button (listen to dial tone), and check operation of call progress tone sounder volume control (Fig. 1). Adjust volume control to acceptable level and depress OFF button.

REMOTE TEST PROCEDURE



In the following tests there must not be over a 10-second delay between steps or the test line will interpret this as an error.

Note: If an interrupted (1/2 second on, 1/2 second off), lasting about 5 seconds, is heard at any time, an error is indicated. The 1A Transaction Telephone Test Line Station (TTTLS) will disconnect at the end of the interrupted tone. To retest, it will be necessary to redial the test line (3.16) through (3.22).

3.16 Go off-hook by lifting the handset, first and fourth instruction lamps are lighted and dial tone is heard. (The fourth instruction lamp will remain lighted as long as the set is off-hook.) Manually dial the number of the 1A Transaction Telephone Test Line Station (TTTLS) using the TRIMLINE handset.

3.17 When the call is completed to the TTTLS, it will respond with a 3-second answer tone which will be heard on the TRIMLINE handset. After the answer tone has terminated, the test card should be passed through the reader two (2) times. The instruction lamps should sequence—the second instruction lamp should light after the card is passed through the first time, and when the card has been passed through the second time, the third lamp will be lighted.

3.18 Key in digits by depressing buttons on the manual entry pad, **in sequence**, 1 through 9, ●, 0, /, and END. The third instruction lamp will now be extinguished. While you are doing this, the set will transmit the buffered data as TOUCH-TONE pulses. The digits keyed in will have appeared on the visual display as they are

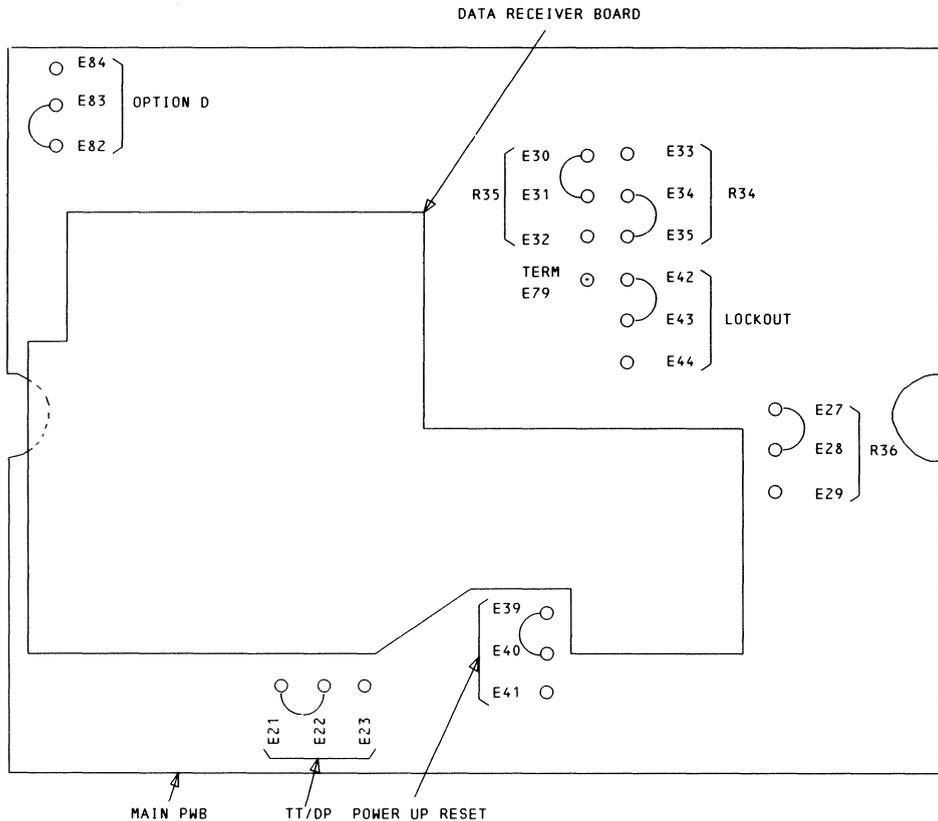


Fig. 4—Main PWB and Data Receiver Board Showing Option Plug Locations and Plug Positions as Shipped

keyed and the display will clear when transmission is completed.

3.19 The green (G) response lamp will then flash and the display shall be filled with 8's.

3.20 Press the ERASE button. The display should fill with decimal points, and the (G) response lamp will continue to flash.

3.21 Key in 1, 2, 3, END. The display should erase and the yellow (Y) lamp should light. If the (Y) lamp does not light and the display

shows E-0-0, reenter 1, 2, 3, END (you have 7 seconds to do this) and the (Y) lamp should light.

3.22 Press ATTN. A muted 3-second response is heard and the TTLS will disconnect. Place handset on-hook. The (Y) lamp may be extinguished by momentarily going off-hook.

AUXILIARY MANUAL ENTRY PAD

3.23 If the auxiliary manual entry pad is to be used, it should be installed at this time.

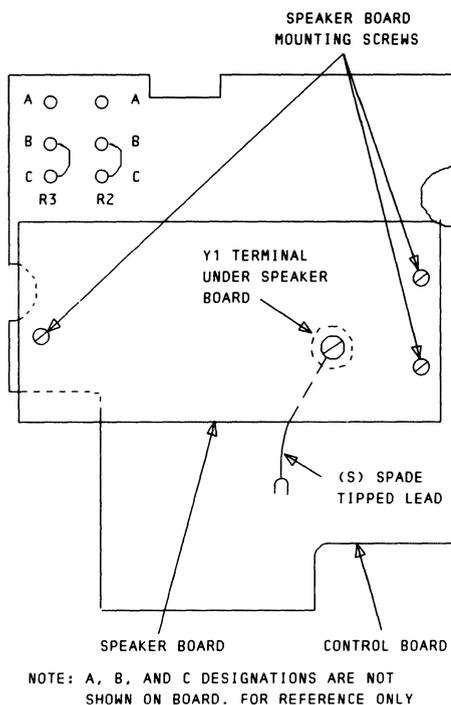


Fig. 5—Control Board and Speaker Board Showing Location of R2 and R3 Option Plugs and Terminal Y1

To install the D-180687 Kit of Parts (Fig. 7) which includes:

- 1 - 5000A-50 dial
- 1 - 841934946 mounting plate
- 1 - 651G key (push-to-lock, push-to-unlock)
- 4 - 840694194 screws
- 1 - 840713366 label
- 2 - D-161488 connectors (provided with kit of parts manufactured after 1st quarter of 1976).

- (1) Remove faceplate by lifting at the midpoints of the right and left edges. When faceplate

is bowed slightly, the locking tabs at top and bottom will release.

Note: An 138D-type faceplate (ordered separately, Table A) will also be required.

- (2) Install 841934946 mounting plate and 651G key (Fig. 8) as follows:

- (a) Remove screw holding static arrester spring (Fig. 8) and slide mounting plate under the spring. Replace the screw holding the spring and the associated lead. This should secure right side of mounting plate.

- (b) Secure left side of mounting plate with (2) 840694194 screws.

- (c) Insert 651G key with cut-out portion of key mounting to right and the two indexing or alignment holes over tabs on the mounting plate to the left.

- (d) Secure right side of key using the other (2) 840694194 screws provided.

- (3) Install new 138D-type faceplate.

- (4) Open the set (3.07); lay the upper housing and chassis to the right (Fig. 6).

- (5) Hold the lower housing up on its side and feed the mounting cord of the dial through the cord entrance hole in the base pan. Using Fig. 6, make connections as follows:

- (a) Plug multipin connector of mounting cord into connector on flex ribbon cable.

Note: A polarizing key in the female connector assures proper mating of connectors.

- (b) Connect 508 plug to 651G key.

- (c) Connect the black (BK) spade-tipped mounting cord conductor to terminal E8A on the main PWB.

- (d) Connect the spade-tipped blue-black (BL-BK) mounting cord conductor to the spade-tipped (BL-BK) lead from terminal E79 on the main PWB using a D-161488 connector. Insulate the connection.

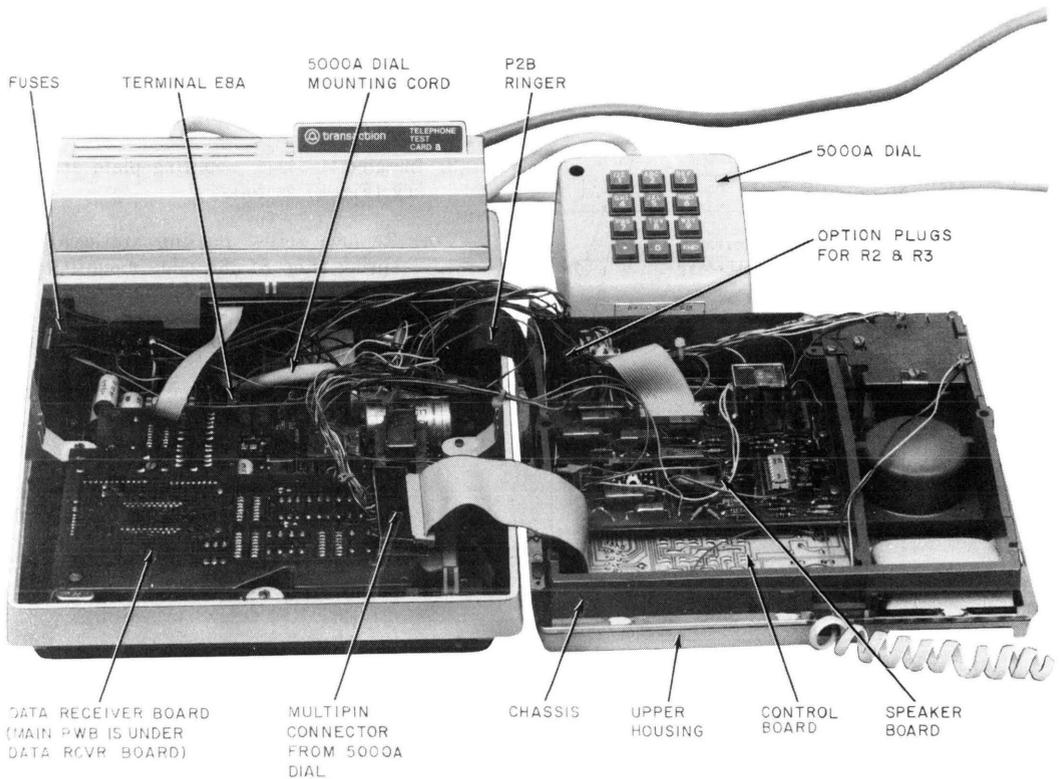


Fig. 6—5100AM Transaction II Telephone Set Base With Upper Housing and Chassis Laid Aside, 5000A Dial Connected

Note: In later production models there is a push-on terminal at E79 instead of a spade-tipped lead. Connect the (BL-BK) mounting cord conductor to this terminal.

(e) Connect the spade-tipped slate (S) mounting cord conductor to the spade-tipped (S) lead from terminal Y1 on the control board using a D-161488 connector. Insulate the connection.

Note: In later production models, terminal Y1 is accessible at the lower right corner of the control board. Connect the (S) mounting cord conductor to terminal Y1.

(f) Insulate and store any unused mounting cord leads.

(6) Pull slack out of mounting cord as upper housing and chassis are replaced. Invert set and tighten captive screws holding the upper and lower housing together.

(7) Place jacketed portion of mounting cord under strain relief as shown in Fig. 3.

3.24 To test the auxiliary manual entry pad, press the Personal Identification Number (PIN) key to enable the pad. Observe that both Light Emitting Diodes (LED) light, one on the PIN key and one on the 5000A-50 dial. Depress PIN key again and observe that both LED's are extinguished.

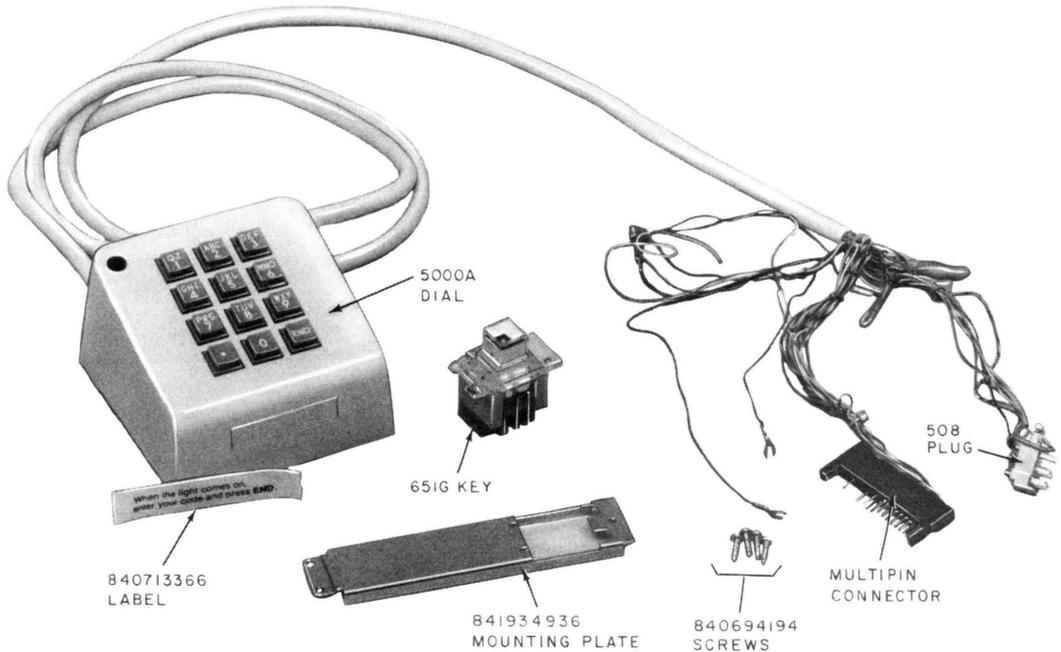


Fig. 7—D-180687 Kit of Parts

3.25 Repeat 3.16 and 3.17 and then press the PIN key to enable the pad.

3.26 Key in by depressing, *in sequence*, digits 1 through 9, ●, and 0 on the 5000A-50 dial. (None of the entries from the 5000A-50 dial should appear on the display.) Depress / (slash) on the 5100AM base and then depress END on the 5000A-50 dial. The third instruction lamp shall be extinguished.

3.27 The (G) response lamp shall flash and the display shall be filled with 8's. Depress the PIN key and observe that the LED's (on both the 5000A-50 dial and the 5100AM base) shall be extinguished. Hang up the hand telephone set.

3.28 Depress the PIN key and then the ON button. The first and fourth instruction lamps should light. Depress the END button on the manual entry pad of the 5100AM telephone set base and then depress the END button on the 5000A-50 dial. First instruction lamp is extinguished

and second lamp is lighted. Depress OFF button and then the PIN key. All lamps should now be extinguished. This completes the testing procedure of the auxiliary manual entry pad.

3.29 If the customer has a dialing card, ask him to use his card and place a call to his data center to verify that he can reach it.

3.30 This completes the test procedures. Write the telephone number of the TTTLs on the test card for customer's future reference and give test card to customer along with the Subscriber Instruction Booklet. Explain to the customer the use of the test card per Subscriber Instruction Booklet.

DIAL RESTRICTION OF HAND TELEPHONE SET

3.31 Some customers may want the dial of the hand telephone set restricted from making outgoing calls. This feature is not recommended

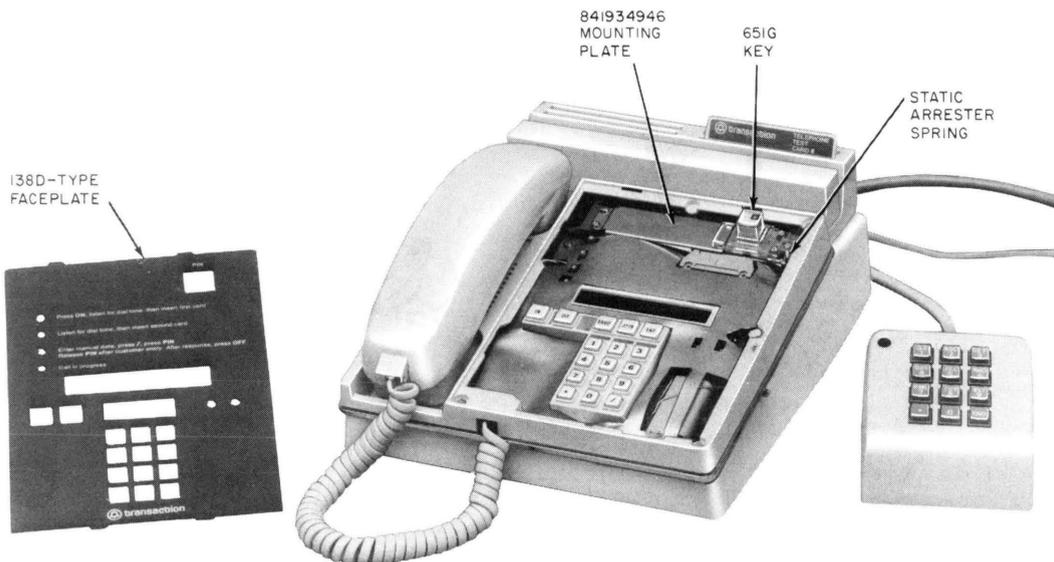


Fig. 8—5100AM Transaction II Telephone Set With Faceplate Removed for Installation of 651G Key

and will only be incorporated at the customer's insistence.

Note: If dial restriction is to be provided, all installation tests must be completed prior to making the modification.



If dial is restricted, the set can no longer be used as a normal telephone set since calls can only be initiated by a dialing card.

3.32 Only the 220-type hand telephone set may be restricted. If dial restriction is requested at a location that has been equipped for TOUCH-TONE service, the 2220-type hand telephone set should be replaced with a 220-type hand telephone set that has been modified per 3.33.

3.33 To restrict the dial in a 220-type hand telephone set, proceed as follows:

- (1) Remove handset cord from handset using KS-21107 releaser or equivalent.

- (2) Remove cover or number card retainer located just above dial using KS-21107 releaser or equivalent.

- (3) Remove light seal plate and the 2 screws located under retainer. This will release the cover from the handset.

- (4) Place a strap between the pulsing contacts as shown in Fig. 10. The dial will remain in the handset.

- (5) Reassemble handset and reconnect handset cord.

- (6) Note this modification on the option sticker.

3.34 Outgoing calls may now be made only by using a dialing card.

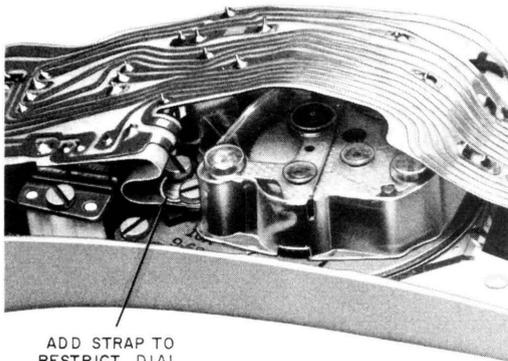
4. MAINTENANCE



Before attempting to make any maintenance tests, check option sticker under base of set, to see what options (3.11 or 3.33) may have been implemented.



Fig. 9—Transaction II Telephone Set With 5000A Dial Installed



ADD STRAP TO
RESTRICT DIAL

Fig. 10—Restricting Dial of 220A Hand Telephone Set

4.01 In case of commercial power failure, Transaction telephone sets can be used as standard telephone sets using the TRIMLINE handset. All

other functions of the Transaction telephone set are rendered inoperative by the loss of AC power.



If dial of hand telephone set has been restricted (3.33), the set can not be used as a standard telephone set. The restricted handset may be unplugged and replaced for maintenance testing purposes. Be sure to reinstall customer's handset when testing is completed.

4.02 There are two fuses, (F1 for -12 volt and F2 for +5 volt circuitry) housed in plastic "in-line" holders and located at the left rear corner of the main PWB. If a fuse failure is suspected, the fuses may be removed (access per 3.06), and checked visually or observe the following indications:

- (1) If fuse F1 is open:
 - (a) Depressing the ON button will not take set off-hook, (no dial tone heard on call progress sounder).

(b) No TOUCH-TONE signals may be heard on handset when buttons are depressed on manual entry pad.

Note: If Lockout option has been activated this would be an inconclusive test.

(c) Lights on set may or may not be operable.

(2) If F2 fuse is open, there will be no lamps operable on set. These are Bussman MDL two (2) ampere fuses and may be obtained locally.

WARNING: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE FUSES ONLY WITH 2 AMP SLO-BLO (BUS MDL) OR EQUIVALENT .

4.03 Other field maintenance of the sets shall consist of the following:

- (a) Check for line continuity (dial tone).
- (b) Check for proper connection of cords and jacks.

(c) Check for loose wire or connections on main PWB or control board (Fig. 11).

(d) Replacement of H4DU-50 handset cord and/or 227A adapter.

(e) Replacement of D4BU-29 mounting cord.

(f) Replacement of TRIMLINE handset.

(g) Replacement of auxiliary manual entry pad.

4.04 If the loss of the loop changes due to cable activity, etc. and/or difficulty is encountered in communicating with the remote data center, the loop loss should be measured and the TOUCH-TONE signal output level adjusted per 3.08.

4.05 Field repairs on the 5100AM base shall not be attempted. Return defective base to Western Electric Service Center in accordance with local procedures. If base is being replaced, return disposable faceplate from new base with the used base.

5000A TRANSACTION III TERMINAL SET

1. GENERAL

1.01 This section contains identification, installation, testing, and maintenance information for the Transaction III terminal set. For detailed information on the terminal set, refer to CD- and SD-69945-01.

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

1.03 For additional information on the Transaction Network Service (TNS) see Bell System Data Communication Technical Reference, PUB 41024, titled "Transaction Network Service" and Bell System Technical Reference, PUB 41025, titled "Transaction Network Service Polled Interface Specifications."

2. IDENTIFICATION

2.01 The 5000A Transaction III terminal set (Fig. 1) is designed for use only on private line networks. It satisfies the interface requirements of the polled access circuits of the Transaction Network Service. It may be used to perform transactions such as credit authorization, check verification, inventory control, or electronic funds transfer.

2.02 *Design Features:*

- Magnetic stripe card reader (ABA Track 2)
- Click-disc type 19-button pad
- Operating instruction lamps [light emitting diodes (LED)]
- Transaction progress indicator lamps (LED)
- Four response lamps (LED)
- Frequency-shift key (FSK) modem
- A 128 character text message length

- An 8-digit numeric display with paging capabilities.

2.03 *Optional Features:*

- An auxiliary manual entry pad (5000B dial, Fig. 7) may be connected to allow use of a Personal Identification Number (PIN).

2.04 The 5000A Transaction III terminal set is available in Ivory (-50) only. These terminal sets will be shipped with a disposable protective faceplate, so it will be necessary to order the proper faceplate separately (Table A).

2.05 *Ordering Guide:*

(a) The 5000A Transaction III terminal set consists of all the necessary circuitry including power unit and card reader and should be ordered as:

- Set, Terminal, 5000A, Transaction III includes the following: Cord, Mounting, D4BT-87 (7-foot provided, 14- or 25-foot cords are optional and may be ordered separately) and Test Card C.

(b) If the auxiliary manual entry pad is to be used, it will be necessary to order the 5000B dial.

3. INSTALLATION

3.01 Verify that a Transaction Network polled access line has been installed and terminated in a 150A Channel Service Unit (CSU).

Note: The mounting cord of the 5000A terminal set must interface directly with a 150A CSU which has been tested and the attenuator switches set for the correct signal level. For installation and testing of the CSU, refer to Section 590-101-000.

NOTICE

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

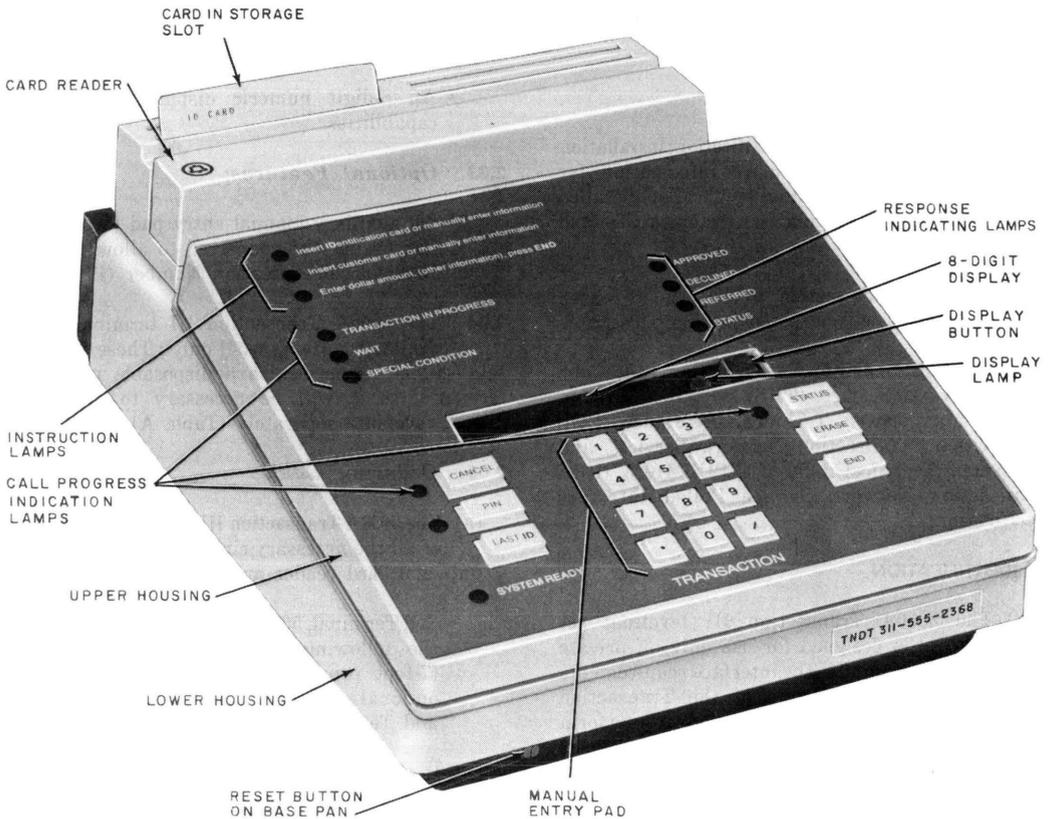


Fig. 1—5000A Transaction III Terminal Set

3.02 Secure the **J-hook** (Fig. 2) of the D4BT mounting cord into the baseplate of the CSU and terminate as follows:

- (1) Feed end of mounting cord under printed wiring board (PWB) to opposite side of CSU.
- (2) Terminate tip (G) and ring (R) cord conductors to CT and CR screw terminals, respectively, of CSU.
- (3) Insulate and store the (Y) and (BK) mounting cord leads so they will not interfere with wiring components of the CSU.

3.03 To open the 5000A terminal set, proceed as follows:

- (1) Invert set and loosen the two captive screws holding the upper housing and chassis.
- (2) Lay the upper housing and chassis to the right, as shown by Fig. 3 without disconnecting any cables.

3.04 The Terminal Identification (TID) for the terminal being installed (number is on the service order) should now be set on the terminal identification switches (Fig. 3). The 4 digits of the TID are set by closing the appropriate rocker-switches in each digit group which have

TABLE A
TRANSACTION III
FACEPLATE ORDERING GUIDE

FACEPLATE CODE		COLOR GUIDE	
139A.* LETTERING	139B.* LETTERING	SUFFIX	COLOR
Standard Instruction	Blank	-100	Avocado
		-108	Teak
		-109	Walnut
		-111	Gold
		-112	Orange
		-113	Brown
		-114	Red
		-115	Blue
		-118	Black

*Add appropriate color suffix.

values of 1, 2, 4, and 8 counting from left to right. If front side of rocker switch is depressed, the switch will close and the horizontal mark across the bar is not visible. If rear side of rocker switch is depressed, the switch will open and the horizontal mark across the bar is visible. Only closed switches produce a 1, 2, 4, or 8 (counting left to right) or a combination thereof. See Fig. 4 for example of switches coded for TID No. 5874.

Note: The TID number should be displayed in the number card holder on the set, both for future reference and for the subscriber's use. (Early production models may only have a gummed label on front of the lower housing. Write number on label.)

3.05 If no auxiliary manual entry pad is to be installed, close set and proceed to 3.06. If an auxiliary manual entry pad is to be used as a Personal Identification Number (PIN) pad, proceed as follows:

- (1) Hold the lower housing up on its side and feed the mounting cord of the 5000B dial through the cord entrance hole in the base pan.
- (2) Plug multipin connector of dial mounting cord into receptacle on main printed wiring board (PWB) Fig. 3. (Cord should extend toward

the front of the set when connector is correctly oriented.)

(3) Pull slack out of dial mounting cord as upper housing and chassis are replaced. Invert set and tighten captive screws holding the upper and lower housing together.

(4) Place jacketed portion of dial mounting cord under strain relief along with terminal set mounting cord which is shown in Fig. 5.

3.06 Remove the disposable faceplate by lifting at the midpoints of the left and right edges. Install new faceplate by inserting bottom tab into housing and then lower faceplate onto adhesive pads.

Note: Insure that static arrester spring (Fig. 6) at upper right corner has not been distorted. It must make contact with bottom of metallic faceplate.

3.07 Insure that there is an available 117-volt, 3-wire AC receptacle, not controlled by a switch, within reach of the 6-foot power cord.



A 3-wire outlet is required for safety and proper operation of the set. The third conductor must be grounded.

3.08 Connect power cord to AC outlet and verify that the first instruction light is on and the SYSTEM READY light is on. The blinking of the SYSTEM READY lamp indicates that the line is connected to the Transaction Network and that it is being polled.

Note: If no lamps light when power cord is connected, either AC receptacle is defective or fuses may be open. If fuses are suspected, refer to 5.02 and 5.03 in Part 5, Maintenance.

4. TESTING

4.01 The following is the test sequence required to determine if the Transaction III terminal set is operational.

Note: Any step that fails during the test means the test has failed. Repeat test before proceeding to the maintenance section.

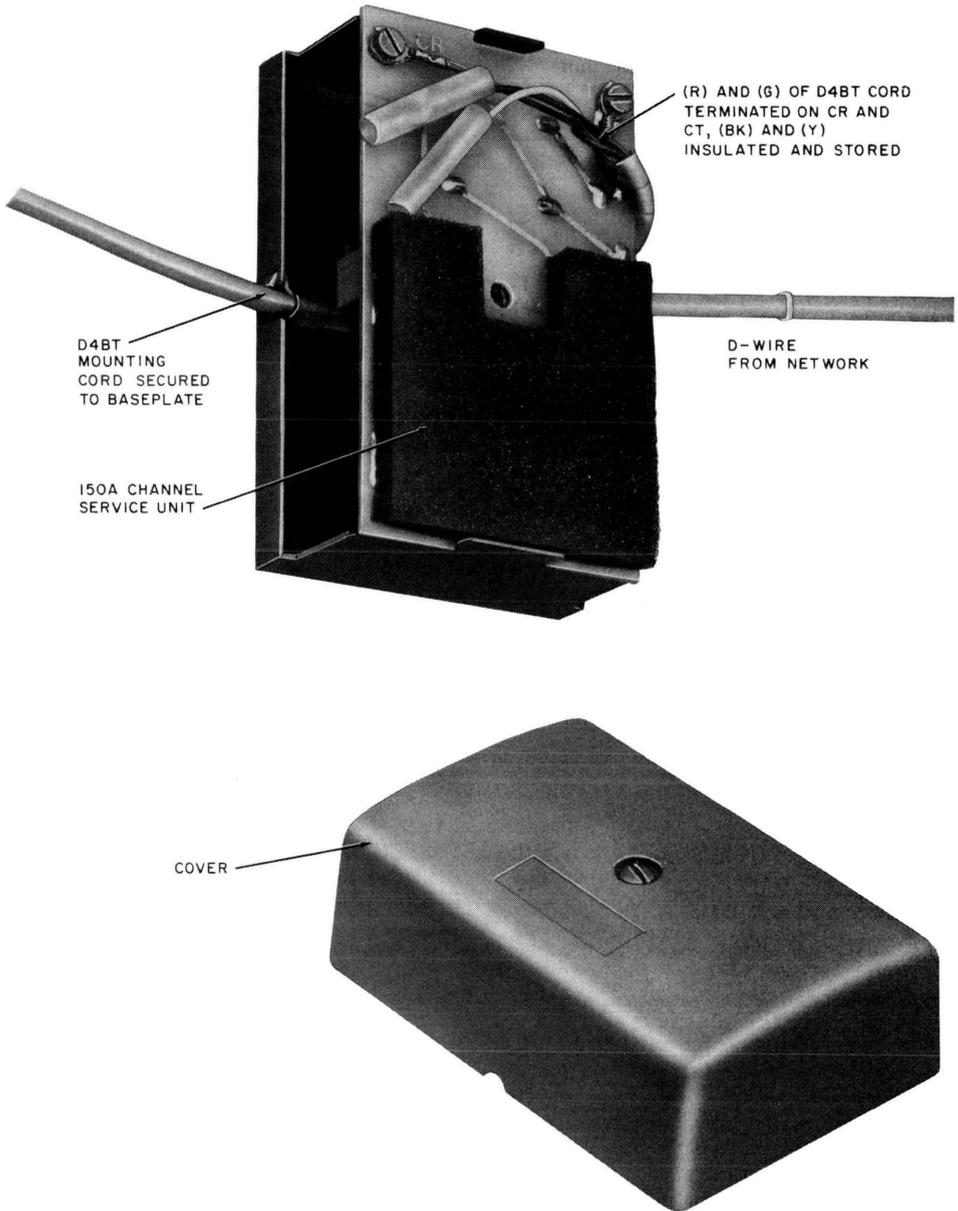


Fig. 2—150A Channel Service Unit Showing Connection of Transaction III Terminal Set

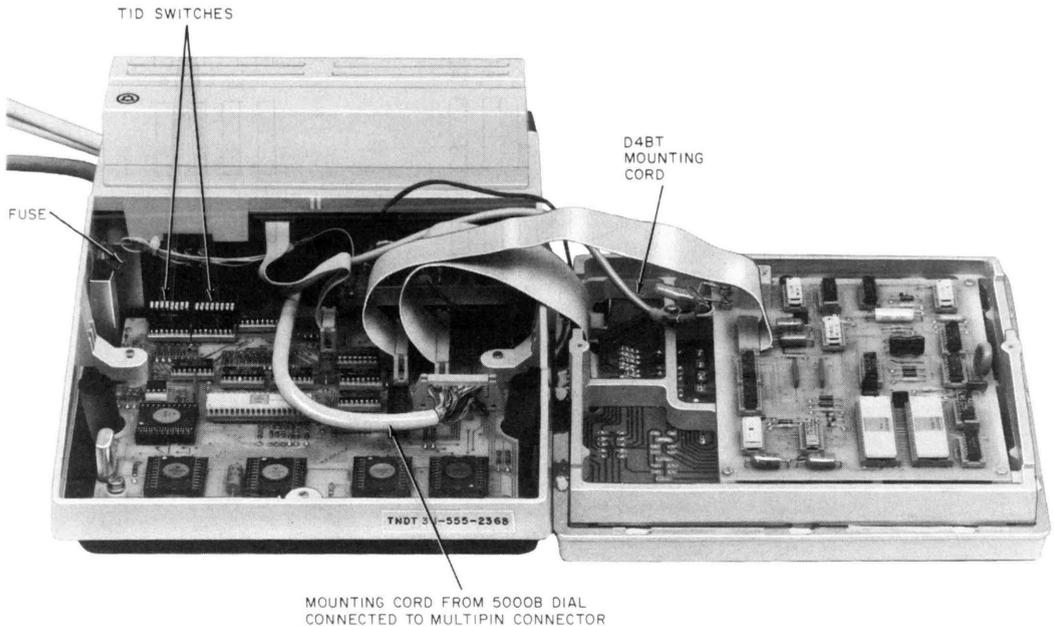


Fig. 3—5000A Transaction III Terminal Set With Upper Housing and Chassis Laid Aside—5000B Dial Connected

4.02 Depress and hold RESET button momentarily. The SYSTEM READY lamp should go off and stay off as long as RESET button is held down.

4.03 Release RESET button. The first instruction lamp should be on. SYSTEM READY lamp should be on and blinking. This may be considered to be the *initial state* of the terminal. If SYSTEM READY lamp is lighted but not blinking, it could indicate any of the following:

- (a) Terminal set not connected to network.
- (b) Trouble with Transaction Network or some component.

Note: If network failure is suspected, call the Transaction Network Customer Service Bureau.

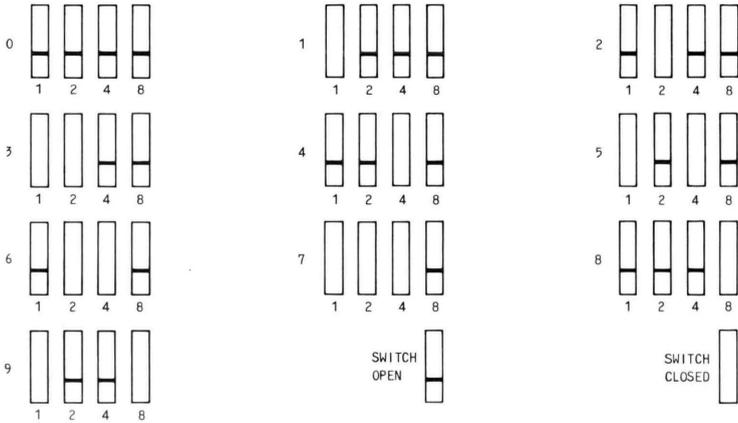
- (c) Trouble with the terminal set itself.

4.04 Verify TID by simultaneously depressing the RESET and END buttons. Release RESET button while holding END. The TID should appear on visual display.

Note: If the rocker switches associated with a digit are operated improperly, so that a number greater than a nine (9) is indicated, it will appear on the display as a dash (-) or invalid number.

If incorrect TID appears on display, disconnect power cord, open terminal (3.03), reset TID (3.04), and retest. If correct TID is displayed, depress RESET button to return terminal to its initial state.

4.05 Depress the 8 button eight times and the display shall be filled with 8's. Depress the ● (decimal point) button eight times and the display shall be filled with ●'s.



A. SWITCH SETTINGS FOR EACH DIGIT, 0 THRU 9



B. EXAMPLE OF TID SWITCHES SET FOR 5874

Fig. 4—Terminal Identification (TID) Switches

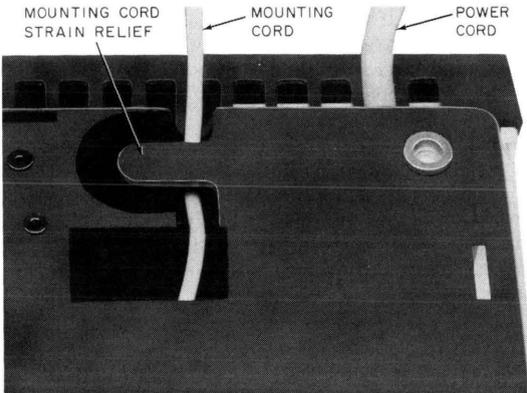


Fig. 5—Partial Bottom View of 5000A Terminal Set Showing Mounting Cord Strain Relief

4.06 Depress RESET button and run test card C (card is packed with 5000A terminal) through the card reader from right to left. Card must be held with the magnetic stripe down and to the front and must be moved through the slot smoothly and without hesitation. First instruction lamp should go out and second instruction lamp should light. Pass the test card through the reader a second time and the instruction lamps should sequence again.

WARNING: Any magnetic stripe card may have its encoding destroyed if the card is carried or stored near a magnet or magnetized object.

4.07 With third instruction lamp lighted, key in digits, *in sequence*, 1 through 9, ●, 0, and / (slash) on the manual entry pad.

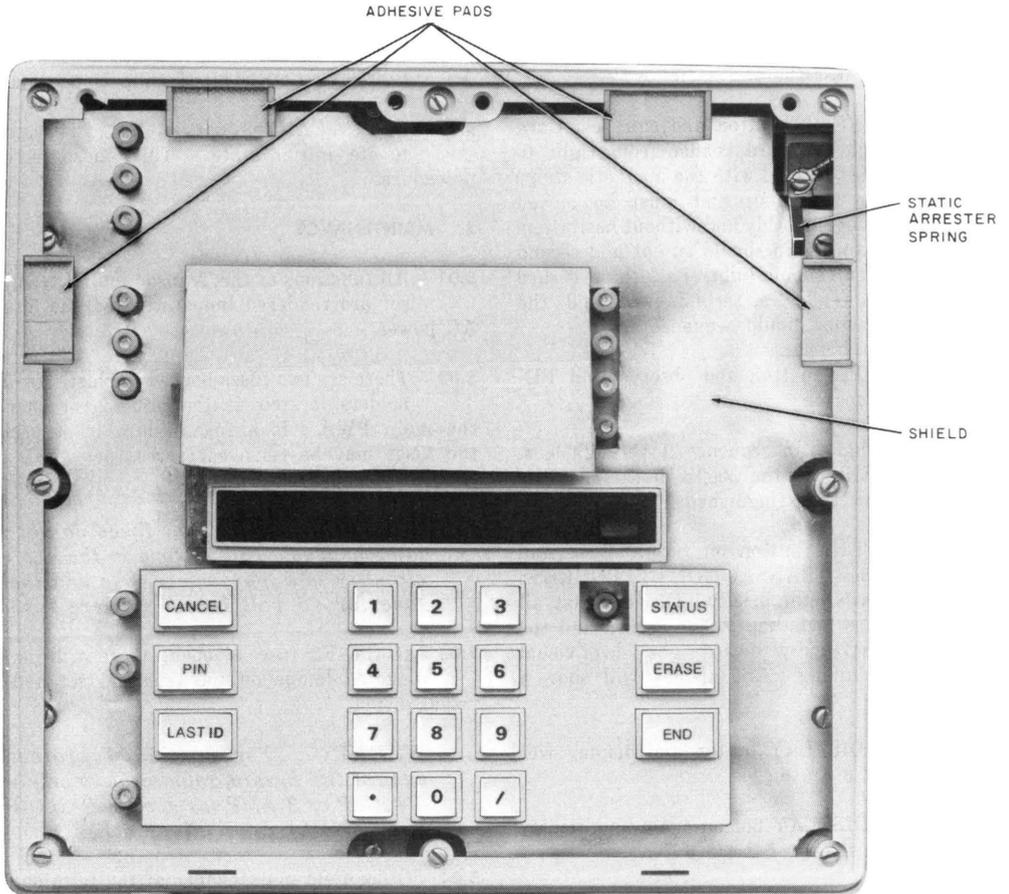


Fig. 6—5000A Transaction III Terminal Set With Faceplate Removed

4.08 Depress END button on terminal set and observe that TRANSACTION IN PROGRESS (TIP) lamp will light briefly. Observe that all response lamps including WAIT are on and the DISPLAY lamp (arrow toward right side of visual display) is blinking. The display will show • 2-999-0.

Note: If **Error 01** appears on display, possible problems may be:

- Incorrect TID number on service order

- Connected to wrong line.

4.09 Depress DISPLAY button and display will show 1 2 3 4 5 6.

4.10 Depress DISPLAY button again and display will now show 1 2 3 4 5 6 7 8.

4.11 Depress DISPLAY button again. Verify that display now shows 9•0—. Display lamp (blinking arrow) will now be extinguished. If

SECTION 502-323-402

no auxiliary manual entry pad is provided, proceed to 4.13.

4.12 If auxiliary manual entry pad has been provided, test the pad as follows:

(1) Depress RESET button and run Test Card C through the card reader from right to left. Card must be held with the magnetic stripe down and to the front and must be moved through the slot smoothly and without hesitation.

First instruction lamp should go out and second instruction lamp should light. Pass the test card through the reader a second time and the instruction lamps should sequence again.

(2) Depress PIN button and observe that PIN lamp comes on.

(3) Key in digits, in sequence, 1 through 9, 0, and END on the 5000B dial. The PIN lamp will now be extinguished.

(4) Depress END button on terminal set and observe that TRANSACTION IN PROGRESS (TIP) lamp will light briefly. Observe that all response lamps including WAIT are on and the DISPLAY lamp (arrow toward right side of visual display) is blinking. The display will show ● 2-999-0.

(5) Depress DISPLAY button and display will show 1 2 3 4 5 6.

(6) Depress DISPLAY button again and display will now show 1 2 3 4 5 6 7 8.

(7) Depress DISPLAY button again and verify that display shows 9 ● 0. Display lamp (blinking arrow) will now be extinguished.

4.13 Depress STATUS button and observe that all response lamps are extinguished, the visual display is now clear and that the STATUS button lamp lights.

4.14 Depress ERASE button and the STATUS lamp will be extinguished.

4.15 Depress CANCEL button. Observe that the CANCEL button lamp lights and TRANSACTION IN PROGRESS lamp will light briefly. After CANCEL lamp goes out, (there will be an entry appearing on the visual display), depress

RESET button to restore terminal set to its initial state.

4.16 Depress LAST ID button and observe that SPECIAL CONDITION lamp is blinking.

4.17 Depress CANCEL button and set is restored to its initial state. This ends the test procedure.

5. MAINTENANCE

5.01 All functions of the Transaction III terminal set are rendered inoperative by the loss of AC power.

5.02 There are two fuses housed in plastic *in-line* holders located at the left rear corner of the main PWB. If a fuse failure is suspected, the fuses may be removed (access per 3.03), and checked visually.

CAUTION: *Insure that fuses do not get interchanged. The F1 fuse in the -12 volt circuitry is a 3/4 ampere fuse and the F2 fuse for +5 volt is a 3 ampere fuse.*

5.03 If the F2 fuse is open, there will be no lighted lamps on the terminal set and no visual display.

WARNING: *For continued protection against fire hazard, replace fuses only with 3/4 AMP or 3 AMP (as specified) SLO-BLO (BUS MDL) or Equivalent.*

5.04 Other field maintenance of the terminal set shall consist of the following:

- (a) Check for proper connection of cord.
- (b) Replacement of D4BT-87 mounting cord.
- (c) Check for loose wires or connections on main PWB.
- (d) Replacement of auxiliary manual entry pad.

5.05 Field repairs on the 5000A terminal set shall not be attempted. Return defective set to Western Electric Service Center in accordance with local procedures. If set is being replaced, return disposable faceplate from new set with the used set.

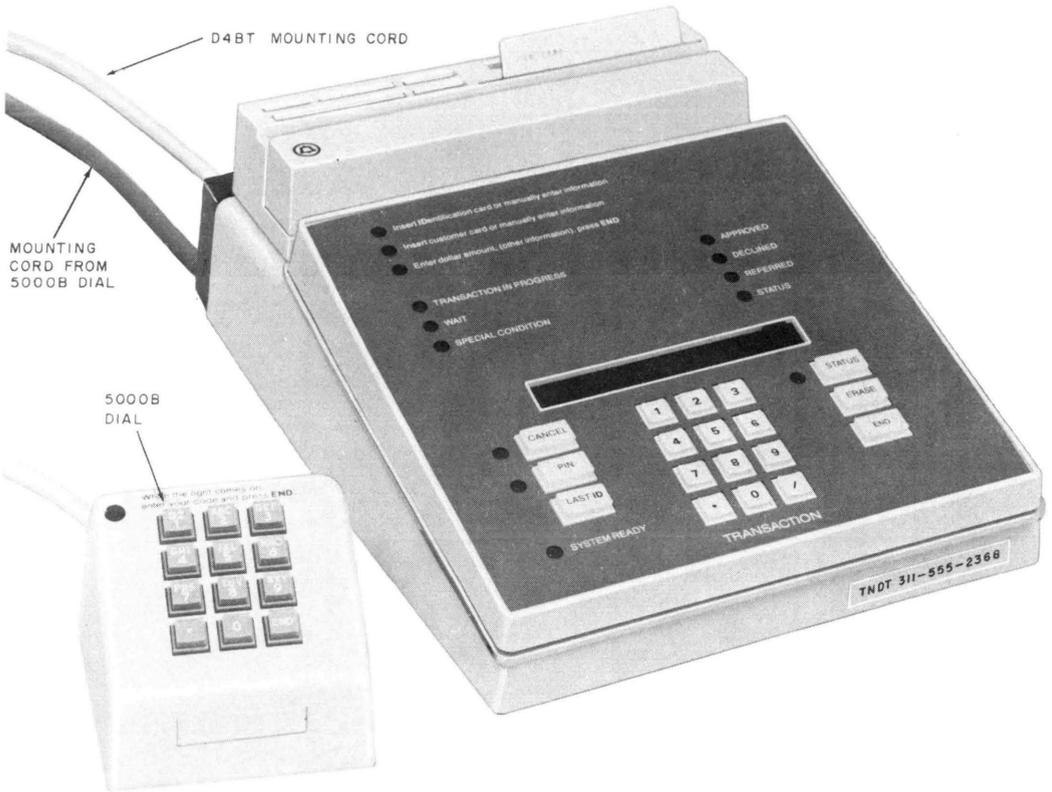


Fig. 7—5000A Transaction III Terminal Set With 5000B Dial Installed

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.

CONTENTS	PAGE
Handset Jack	16
Handsets	16
Speakerphone	16

- Show 870A1M convertible to 870A2M telephone set
- Add head telephone set information

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

1. GENERAL

1.01 This section provides identification, installation, connections, and maintenance information for the 870A1M (MD) or 870A2M telephone set (Fig. 1)

1.02 This section is reissued to:

- Add 870A2M telephone set
- Show 870A1M telephone set rated MD

1.03 The 870A1M (MD) telephone set equipped with D6AD mounting cord or 870A2M telephone set equipped with 623P6 jack assembly is 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).

Caution: 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

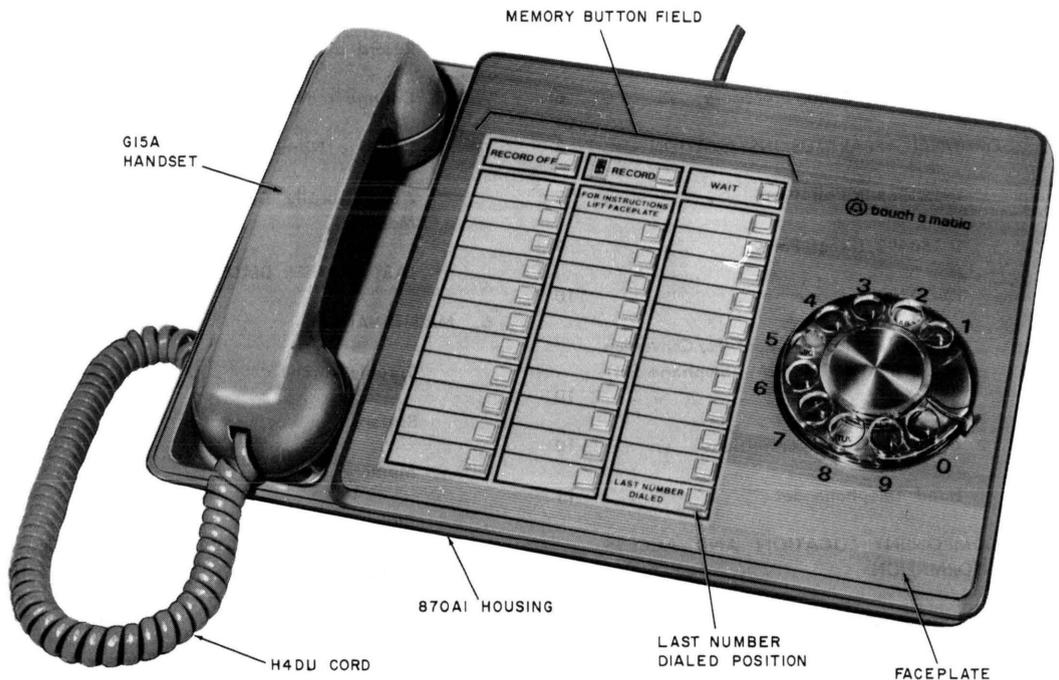
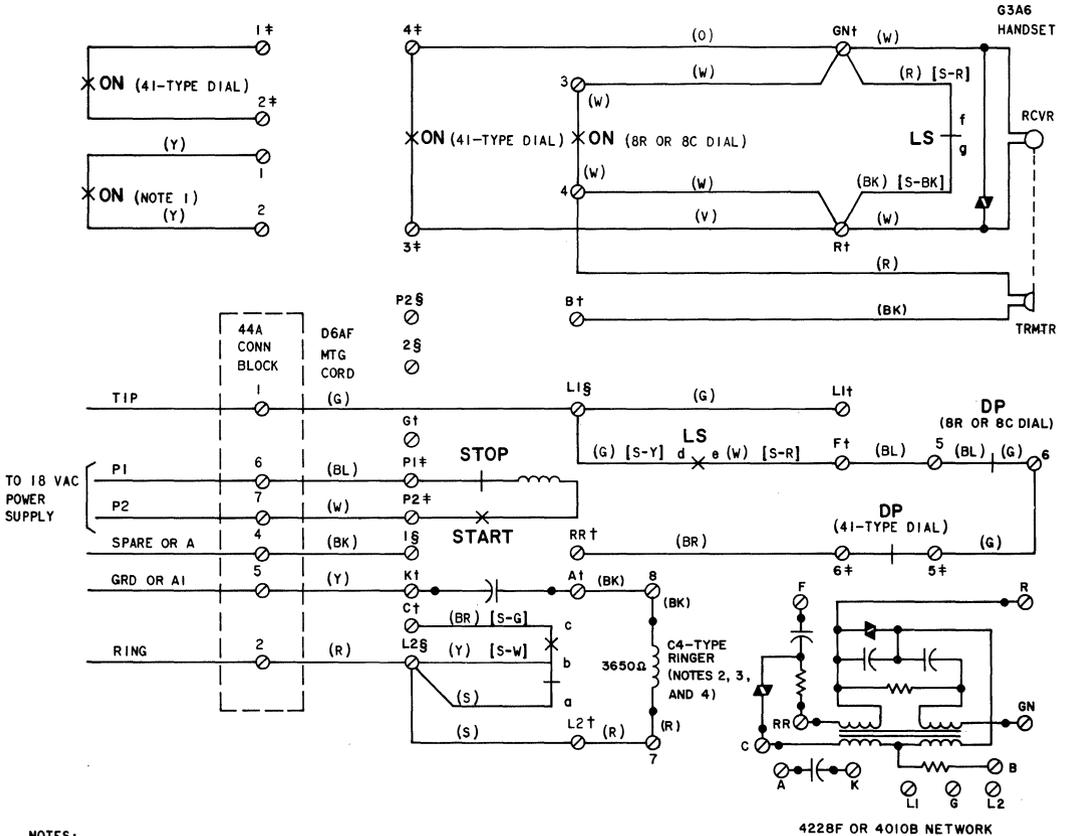


Fig. 1—870A1M or 870A2M Telephone Set



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 LEAD 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. 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.
 - (S) RINGER STRAP BETWEEN 9 OF TB2 AND K OF NETWORK.
 - (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

†† - (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 ◆

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
			5*	5	5	5 4
Mounting Cord	(G) (R) (Y) (BK)	Connecting Block	1	1	2	1
			2	2	1	2
			1	5	5	5
			4	4	4	4
Mounting Cord in Set	(G) (R) (Y) (BK)	TB1	L1	L1	L1	L1
			L2	L2	L2	L2
			K†	K†	K†	2
			1	1	1	1
Ringer Leads	(R) (BK)	TB2	7	7	7	7
			8	8	8	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	L2	2
			L2	L2	L2	2
			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	1	1	1	1	1		
			2	2	2	2	2	2		
Mounting Cord	(G) (R) (Y) (BK)	Connecting Block	5*	5	5	5	5	5	4	
			1	1	2	2	2	2	1	
			2	2	1	1	1	1	2	2
			1	5	5	5	5	5	5	5
Mounting Cord in Set	(G) (R) (Y) (BK)	TB1	4	4	4	4	4	4	4	
			L1	L1	L1	L1	L1	L1	L1	
			L2	L2	L2	L2	L2	L2	L2	
			G†	G†	G†	G†	G†	G†	2	
Ringer Leads	(R) (BK) (S) (S-R)	TB2	1	1	1	1	1	1	1	
			7	7	7	7	7	7	7	
			8	8	8	8	8	8	8	
			9	9	9	9	9	9	9	
Ringer Straps ‡	(S) (S-R)	Net.	10	10	10	10	10	10	10	
			L2	L2	L2	K	B	L2		
			G	G	G	G	B	C		
			K	K	K	B	K	K		
Line Switch	(S) [S-W] (Y) [S-G] (BR) [S-Y] (G)	TB1	A	A	A	B	G	A		
			L2	L2	L2	A†	A†	2		
			C†	C†	C†	L2	L2	2		
			L1	L1	L1	C†	C†	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	2	2	2
			5*	5	5	5
Mounting Cord	(W-BL) (BL-W) (O-W) (W-O)	Connecting Block	1	1	2	1
			2	2	1	2
			1	5	5	5
			4	4	4	4
Mounting Cord in Set	(W-BL) (BL-W) (O-W) (W-O)	Connecting Block	2†	2†	2†	2†
			L2‡	L2‡	L2‡	L2‡
			K‡	K‡	K‡	L2§
			1§	1§	1§	1§
Ringer Leads	(R) (BK)	TB2	7	7	7	7
			8	8	8	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	L2	L2
			L2	L2	L2	L2
			C‡	C‡	C‡	1
			2†	2†	2†	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 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	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§	
Ringer Leads	(R) (BK) (S) (S-R)	TB2	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	B 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 L2 C‡ 2†	
Straps	(S)	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†	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.

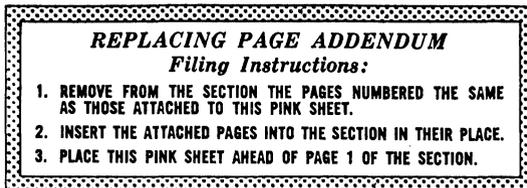
‡ Terminal on network.

§ 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.

1. GENERAL

The following change applies to Part 1 of this section:

- (a) 1.02—revised

Attached:

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

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 multipled 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 multipled 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
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: 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.

SECTION 502-617-402

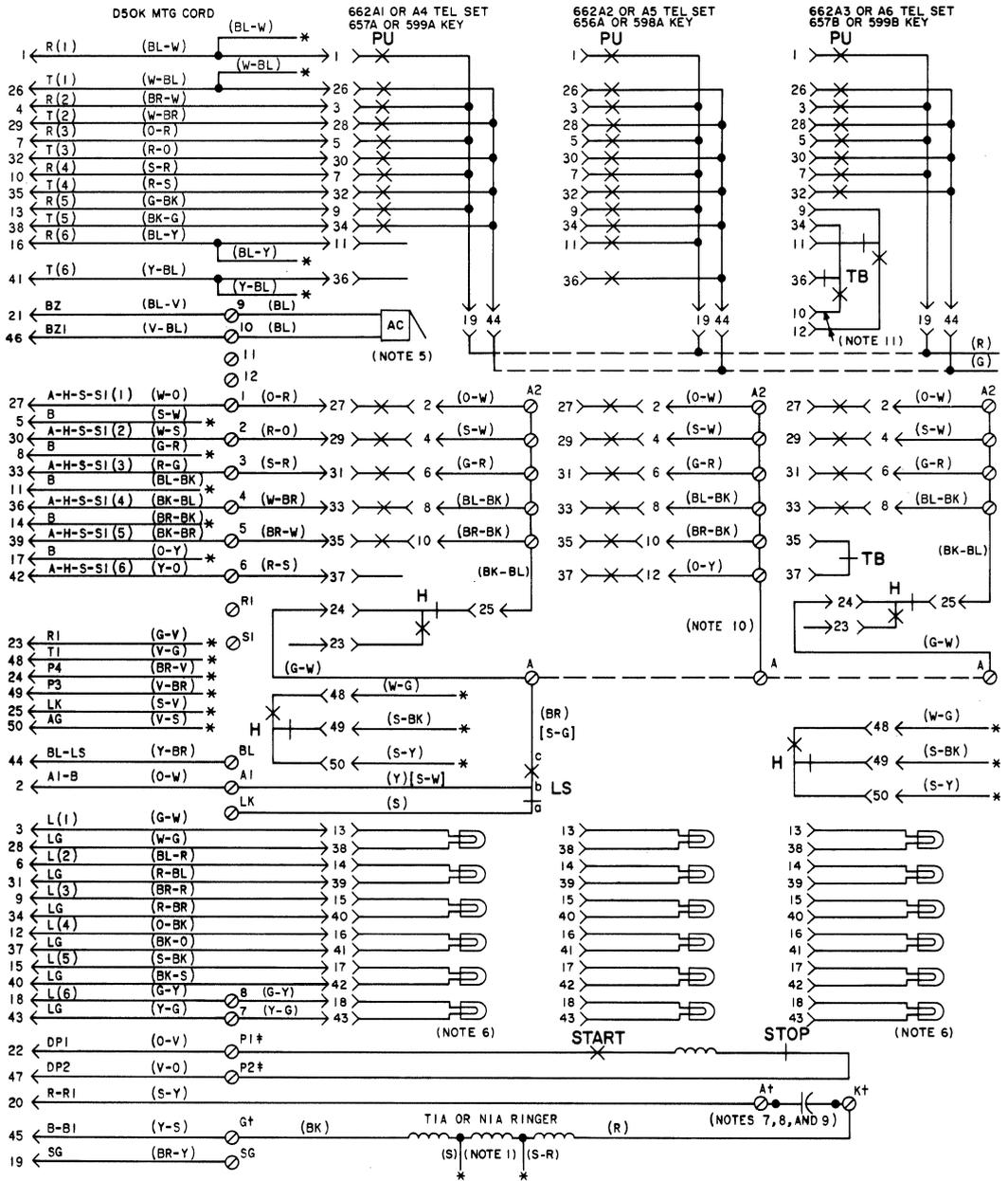


Fig. 1—662-Type Telephone Set, Connections (Sheet 1 of 2)

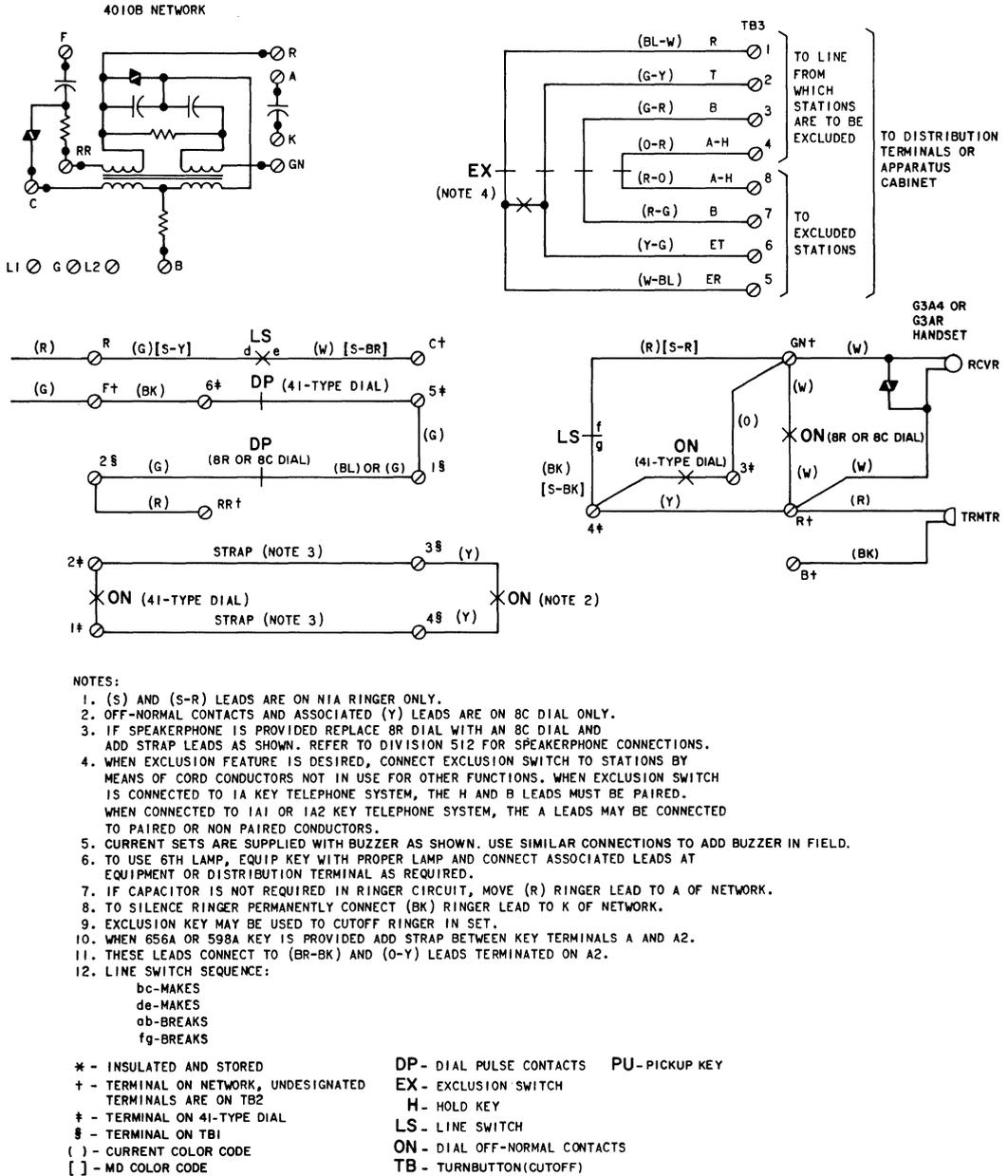
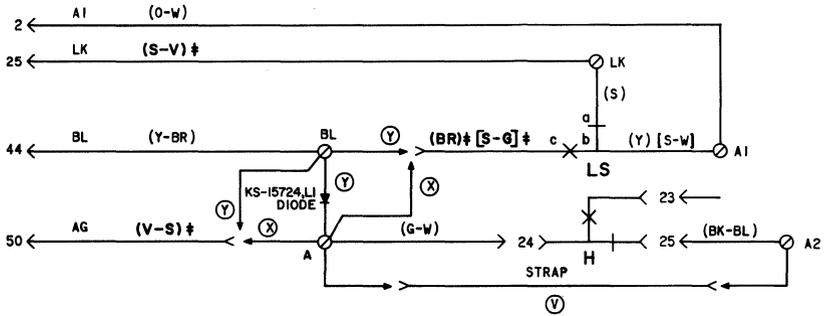
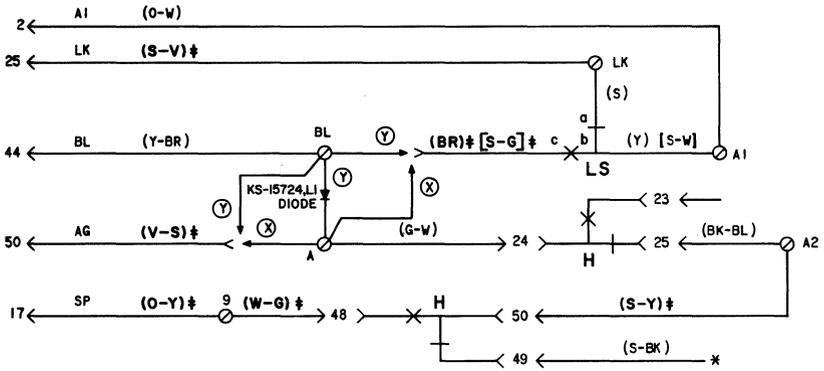


Fig. 1—662-Type Telephone Set, Connections (Sheet 2 of 2)Ⓢ



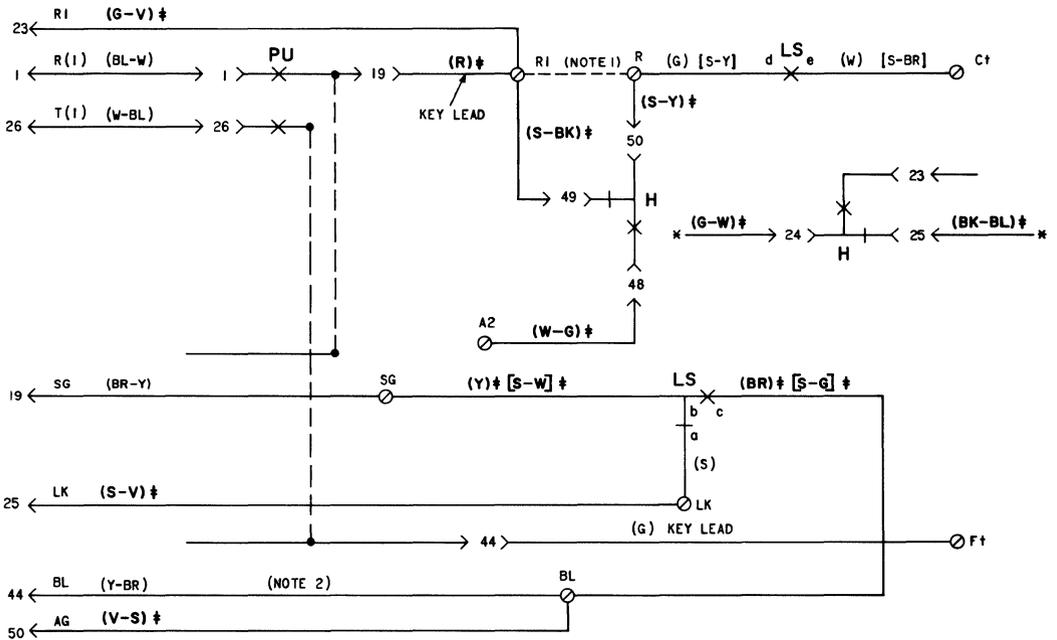
(A) WITHOUT I HOLD



(B) WITH I HOLD

- LS - LINESWITCH
- H - HOLD KEY
- ⊗ - WITHOUT BUSY LAMP
- ⊙ - WITH BUSY LAMP
- Ⓢ - ADD STRAP WHEN 656A OR 598A KEY IS FURNISHED
- () - CURRENT COLOR CODE
- [] - MD COLOR CODE
- * - 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
PPPPP*S*	A2	A2	A2	A2	S1	A2†	S1
PPPP*P*S*	A2	A2	A2	S1	S1	A2†	S1
PPP*P*P*S*	A2	A2	S1	S1	S1	A2†	S1
PP*P*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 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
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	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 signal circuit; connect 6th R and T (BL-Y) (Y-BL) pair to external signal].
- } connect 5th R and T (G-BK) (BK-G) pair to ringer or signal circuit.

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.

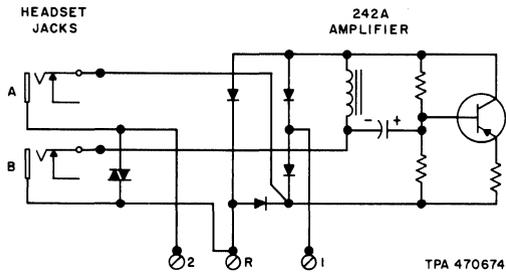


Fig. 1—242A Amplifier connections—663A1 Telephone Set

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	Connecting Block	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

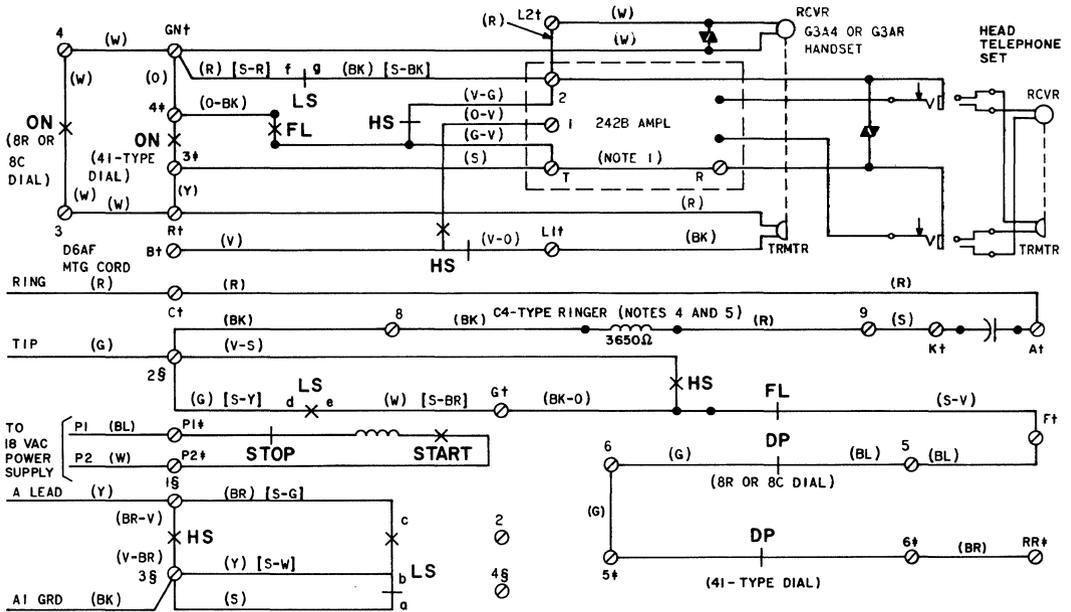
* Ground may be omitted if not required for service. Not required for protection of 41-type dial power supply.

† Network terminal.

‡ TB1.

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

¶ C4A ringer only



- NOTES:
1. P-29E318 STRAP.
 2. 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
 3. OFF-NORMAL CONTACTS AND ASSOCIATED (Y) LEADS ARE ON 8C DIAL ONLY.
 4. 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.
 5. TO SILENCE RINGER PERMANENTLY MOVE (BK) RINGER LEAD TO TERMINAL 9 OF TB2.
 6. 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

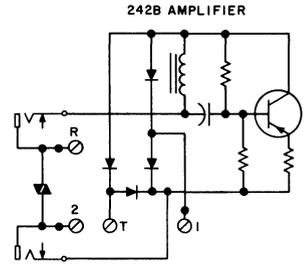
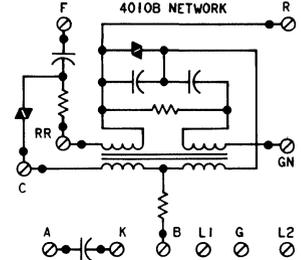
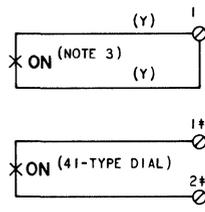


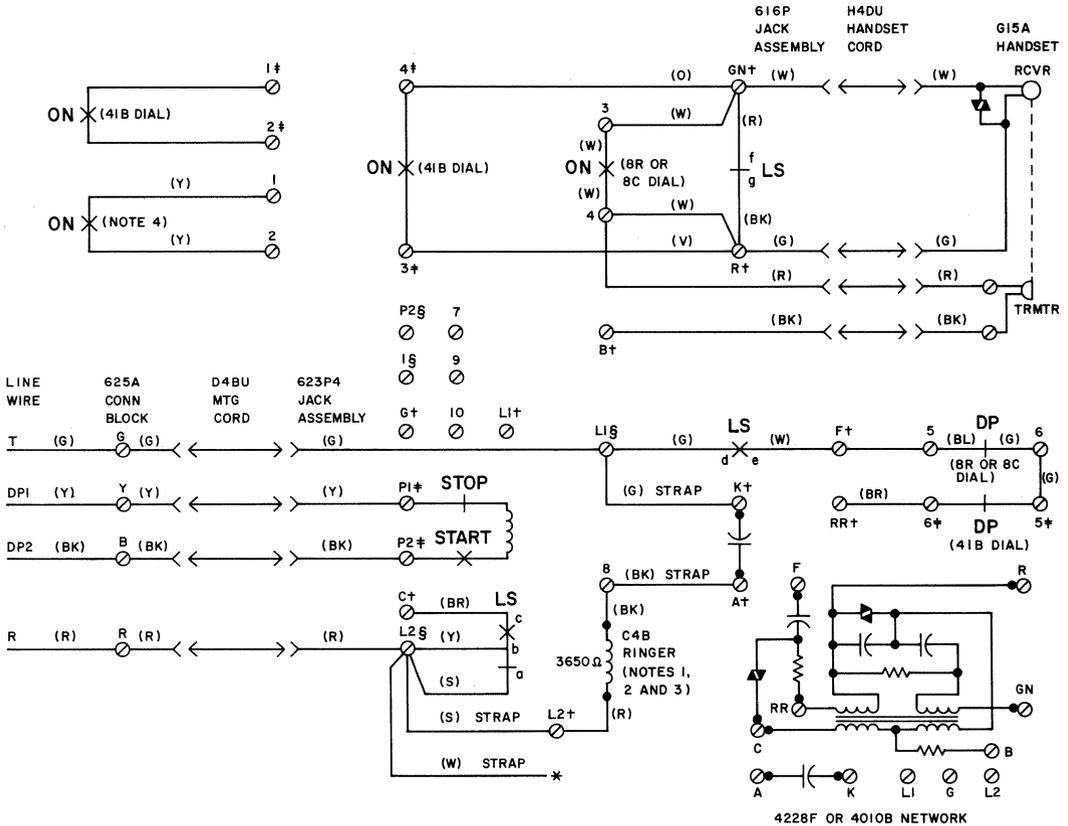
Fig. 2—663A1 Telephone Set, Connections

**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.

SECTION 502-617-405



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 ob - BREAKS
 de - MAKES fg - BREAKS

* - INSULATED AND STORED

DP - DIAL PULSE CONTACTS

† - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TB2

LS - LINE SWITCH

‡ - TERMINAL ON 41B DIAL

ON - DIAL OFF-NORMAL CONTACTS

§ - TERMINAL ON TB1

Fig. 1—660A1M Telephone Set, Connections

TABLE A

**LINE AND C4B 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 (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
			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	L2	G†
			L2	L2	L2	G†
			C†	C†	C†	1
			L1	L1	L1	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
			G†	G†	G†	G†	G†	G†
			1	1	1	1	1	1
	BL W	41B Dial	P1 P2	P1 P2	P1 P2	P1 P2	P1 P2	P1 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†	9 to K†
	‡		10 to A†	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		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	Connecting Block	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
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	1	
	Ring		2	2	2	2	2	2	
	Grd A1		5¶	5	5	5	5	5	5
	A		—	—	—	—	—	—	4
	T1		7	7	7	7	7	7	7
	R1		6	6	6	6	6	6	6
	P1		3	3	3	3	3	3	3
	P2		8	8	8	8	8	8	8
Mtg Cord	W-BL	Connecting Block	1	1	2	2	2	1	
	BL-W		2	2	1	1	1	2	
	O-W		5	5	5	5	5	5	
	W-O		4	4	4	4	4	4	
	W-G		7	7	7	7	7	7	
	G-W		6	6	6	6	6	6	
	W-BR		9	9	9	9	9	9	
	BR-W		10	10	10	10	10	10	
W-S	8	8	8	8	8	8			
S-W	3	3	3	3	3	3	3		
Mtg Cord in Set	W-BL	Connecting Block	2†	2†	2†	2†	2†	2†	
	BL-W		L2†	L2†	L2†	L2†	L2†	L2†	
	O-W		G†	G†	G†	G†	G†	L2§	
	W-O		1§	1§	1§	1§	1§	1§	
	W-G		6‡	6‡	6‡	6‡	6‡	6‡	
	G-W		5‡	5‡	5‡	5‡	5‡	5‡	
	W-BR		7‡	7‡	7‡	7‡	7‡	7‡	
	BR-W		8‡	8‡	8‡	8‡	8‡	8‡	
W-S	P2¶	P2¶	P2¶	P2¶	P2¶	P2¶			
S-W	P1¶	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†	
	**		10 to A†	10 to A†	10 to A†	10 to B†	10 to G†	10 to A†	
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.

SECTION 502-617-406

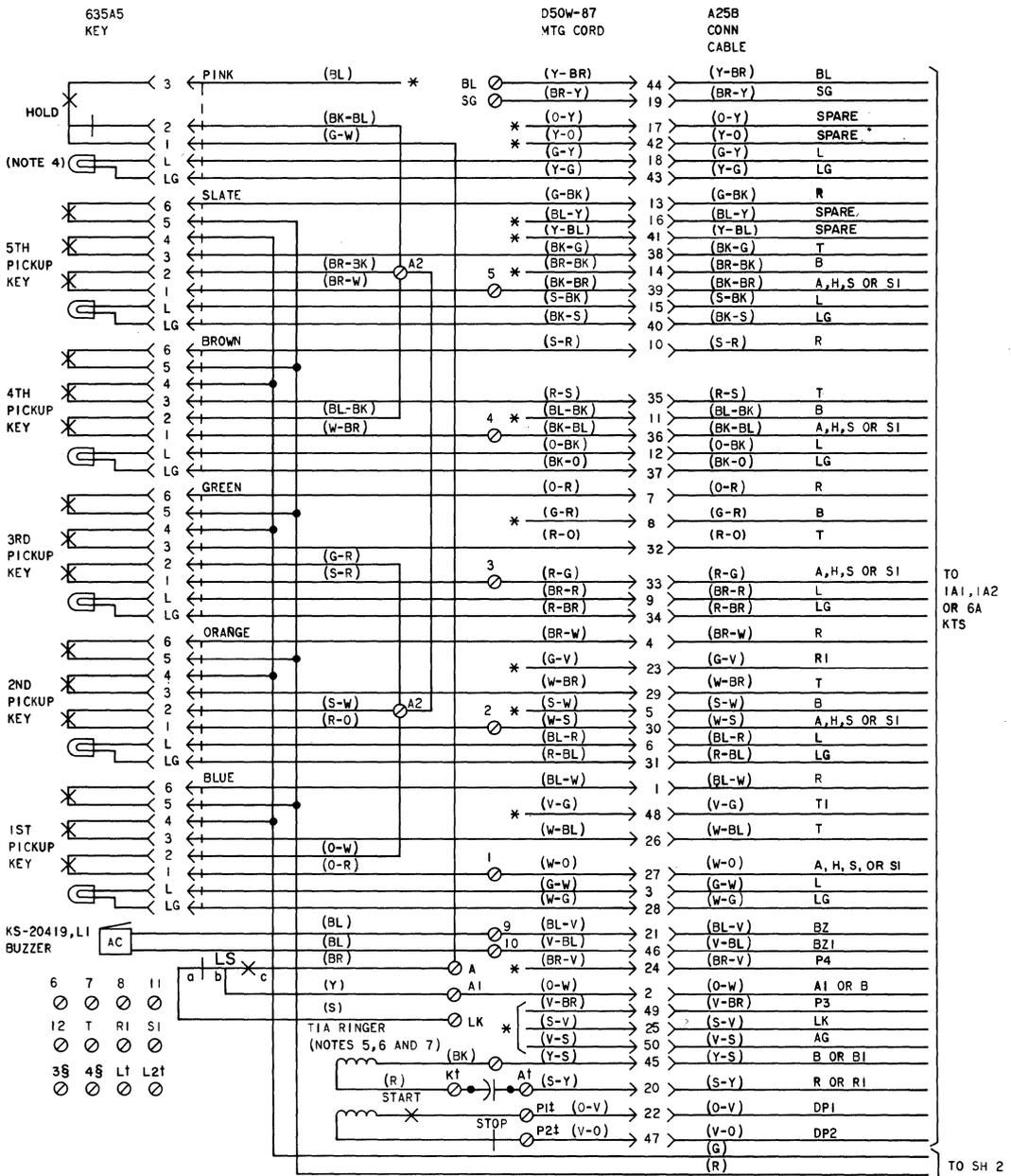


Fig. 1—662A1M Telephone Set Connections (Sheet 1 of 2)

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)

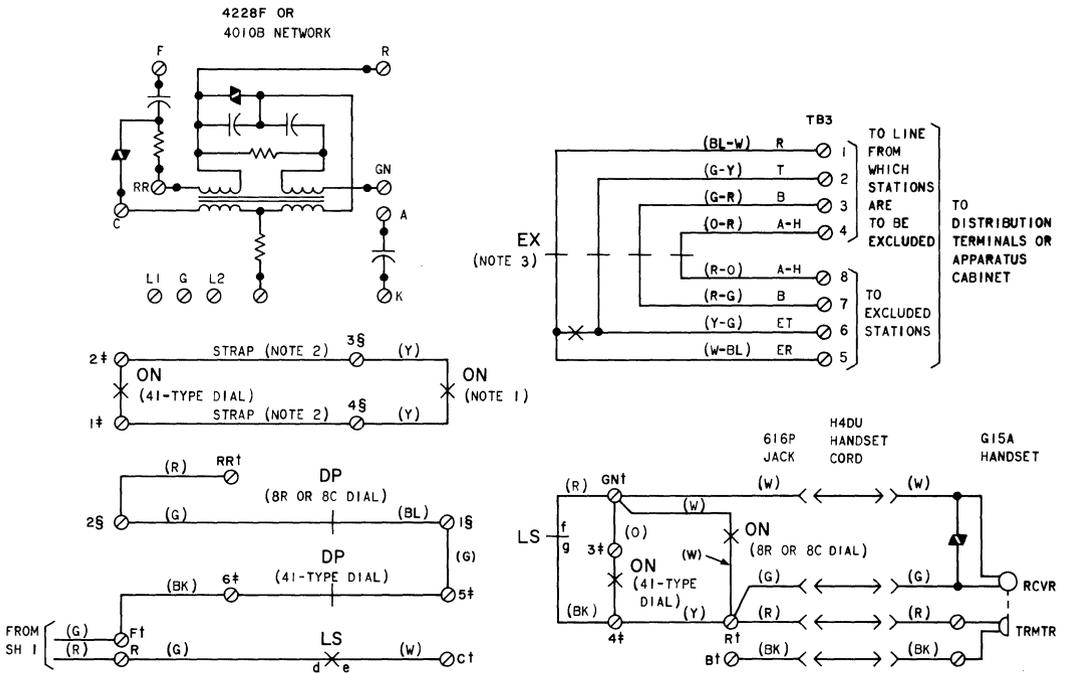
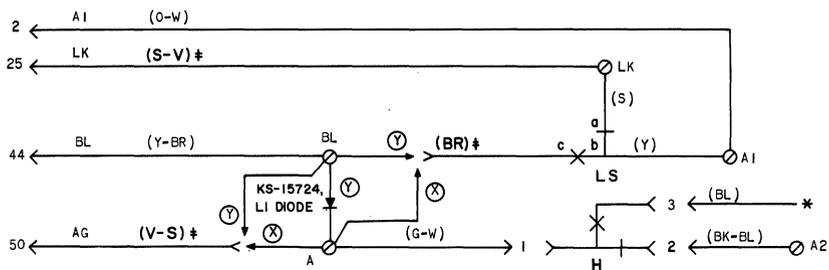
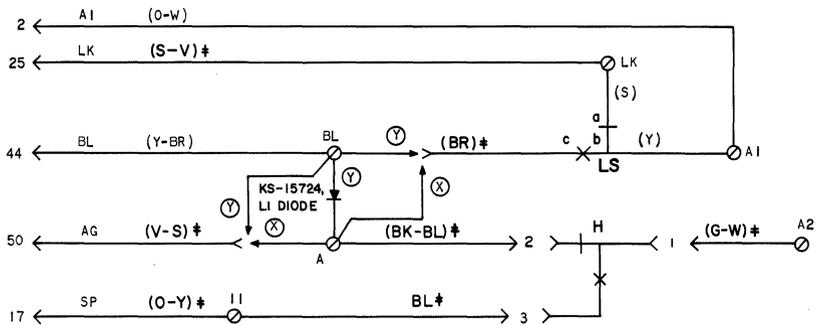


Fig. 1—662A1M Telephone Set Connections (Sheet 2 of 2)



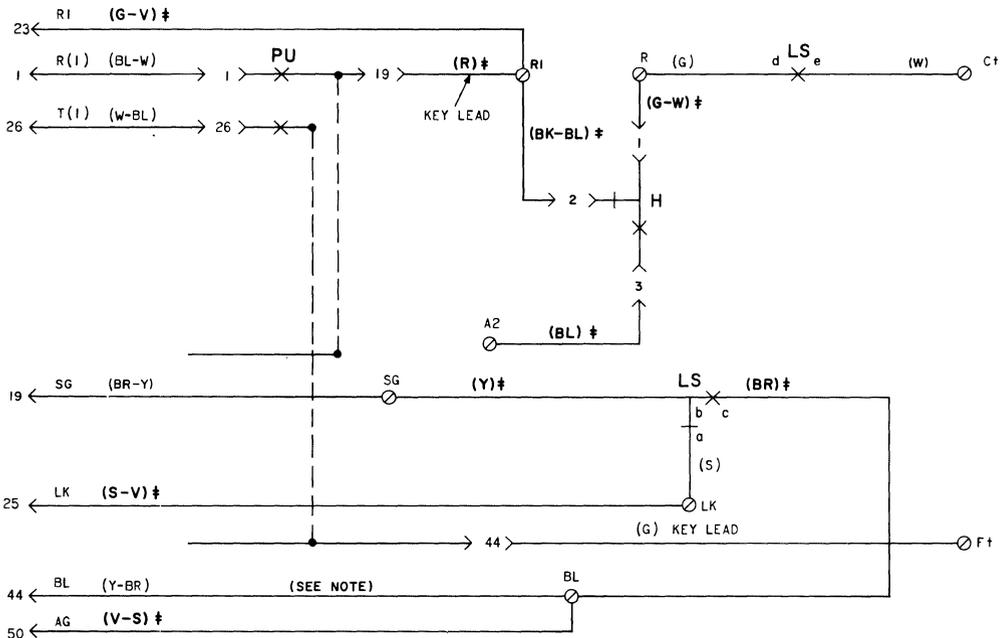
(A) WITHOUT I HOLD



(B) WITH I HOLD

- LS - LINESWITCH
- H - HOLD KEY
- ⊗ - WITHOUT BUSY LAMP
- ⊙ - 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	3	1	W-BL	26	1
R	6		BL-W	1	2
A, H, S, or S1 A1 or B†	TB2-1 TB2-A1	2	W-O	27	3
			O-W	2	4
LG	LG	3	W-G	28	5
L1	L		G-W	3	6
T	3	4	W-BR	29	7
R	6		BR-W	4	8
A, H, S, or S1 Spare or B†	TB2-2 *	5	W-S	30	9
			S-W	5	10
LG	LG	6	R-BL	31	11
L2	L		BL-R	6	12
T	3	7	R-O	32	13
R	6		O-R	7	14
A, H, S, or S1 Spare or B†	TB2-3 *	8	R-G	33	15
			G-R	8	16
LG	LG	9	R-BR	34	17
L3	L		BR-R	9	18
T	3	10	R-S	35	19
R	6		S-R	10	20
A, H, S, or S1 Spare or B†	TB2-4 *	11	BK-BL	36	21
			BL-BK	11	22
LG	LG	12	BK-O	37	23
L4	L		O-BK	12	24
T	3	13	BK-G	38	25
R	6		G-BK	13	26
A, H, S, or S1 Spare or B†	TB2-5 *	14	BK-BR	39	27
			BR-BK	14	28
LG	LG	15	BK-S	40	29
L5	L		S-BK	15	30
Spare	*	16	Y-BL	41	31
Spare	*		BL-Y	16	32
Spare	*	17	Y-O	42	33
Spare	*		O-Y	17	34
LG	LG	18	Y-G	43	35
L6	L		G-Y	18	36
BL	TB2-BL	19	Y-BR	44	37
SG	TB2-SG		BY-Y	19	38
B or B1 R or R1	G of net A of net	20	Y-S	45	39
			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 or T1	*	23	V-G	48	45
Spare or R1	*		G-V	23	46
Spare or P3	*	24	V-BR	49	47
Spare or P4	*		BR-V	24	48
Spare or AG	*	25	V-S	50	49
Spare or LK	*		S-V	25	50

* Insulate and store.

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

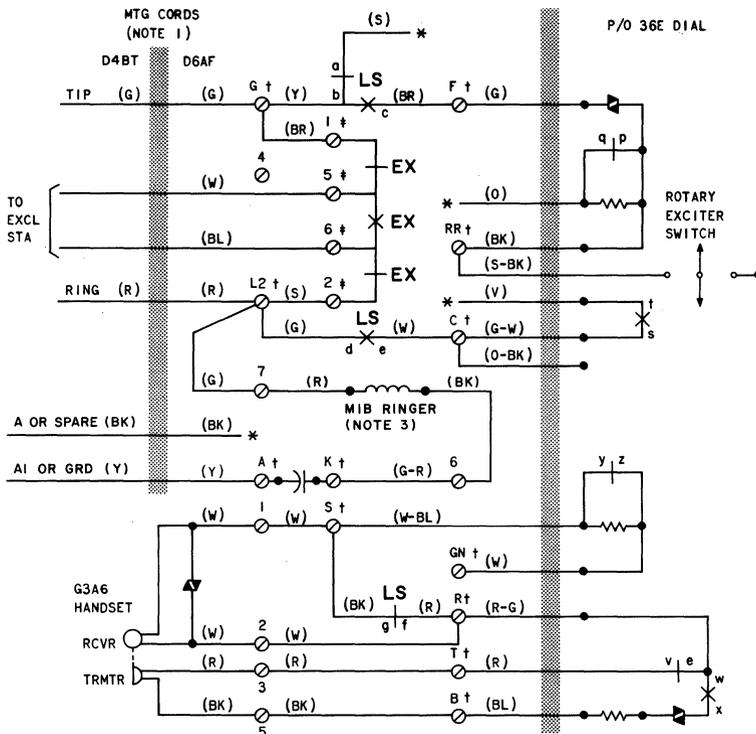
‡ Contacts of key plug unless otherwise noted.

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.

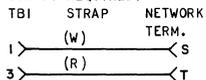


NOTES:

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.

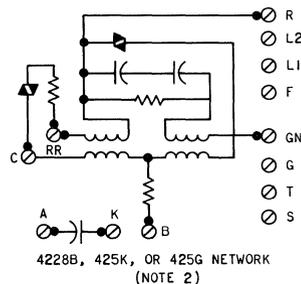
- * - INSULATED AND STORED.
- † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TBI.
- ‡ - EXCLUSION SWITCH TERMINAL BOARD.

§ - STRAPS REQUIRED:



LS - LINE SWITCH

EX - EXCLUSION SWITCH

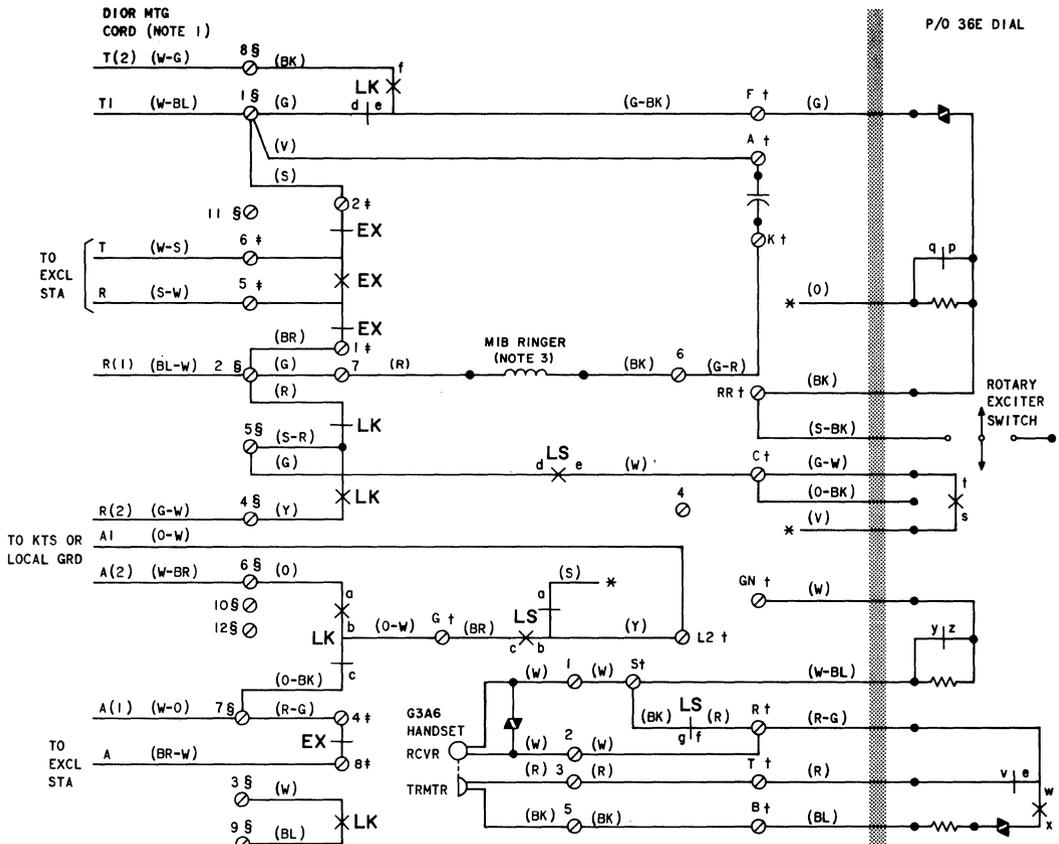


4228B, 425K, OR 425G NETWORK (NOTE 2)

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

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



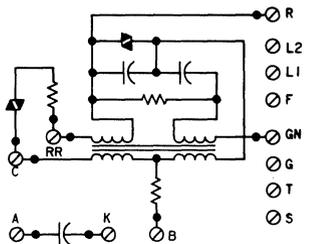
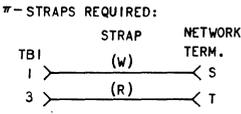
NOTES:

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

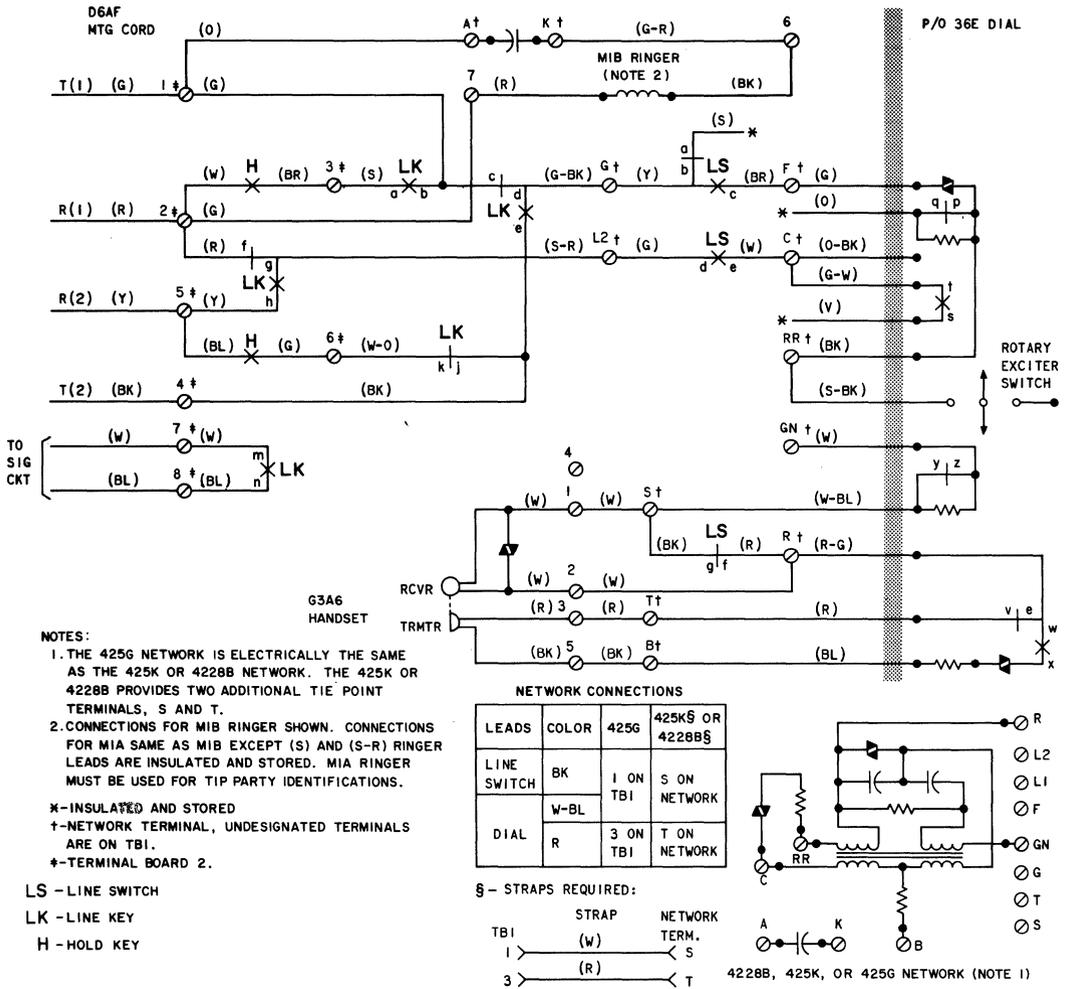


Fig. 3—2660A1 Telephone Set Modified for 2-Line Pickup and Hold (Nonkey Telephone Systems)

♦ 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	EXCLU- SION † (2660A2 ONLY)
					NO IDENT GROUND	IDENT GROUND			
						1000 Ω	2650 Ω		
Mounting Cord at Connecting Block	Tip	(G)	G	G	G	G	G	G	2
	Ring	(R)	R	R	R	R	R	R	1
	Grd A1	(Y)	G	Y	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	G	A	G
	Ring	(R)	L2	L2	L2	L2	L2	L2	L2
	Grd A1	(Y)	A	A	A	L1	L1	G	A
	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 CUT-OFF BY TURN KEY CONNECT TO	EXT. STA. OR RINGER AND SET RINGER CUTOFF BY TURN KEY CONNECT TO	
Line Switch	(Y)	G of network	L2 of network				
	(BR)	F of network	G of network				
	(G)	L2 of network	TB2-5				
Ringer Strap	(G)	L2 of network	TB2-2†	*	TB2-5	TB2-2	
D10R Mtg. Cord (added)	(W-BL)		TB2-1		A of network	F of network	
	(BL-W)		TB2-2		TB2-5		
	(W-O)		TB2-7		G of network		
	(O-W)		L2 of network		L2 of network		
	(W-G)		TB2-8		TB2-1		
	(G-W)		TB2-4		TB2-2		
	(W-BR)		TB2-6		TB2-7		
	(BR-W)		*	TB2-3		*	
	(W-S)		TB2-3	TB1-6‡		TB2-3	
	(S-W)		TB2-9	TB1-7		TB2-9	
Key Assy (added)	(O-W)		G of network				
	(G-BK)		F of network				
	(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				
Strap(added)	(V)		TB2-1 and A of net.†	Store in set	F of net. and A of net.	TB2-1 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
Strap (added)	O	TB2-1 and A of network
		Ringer Strap‡

*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.

SECTION 502-619-402

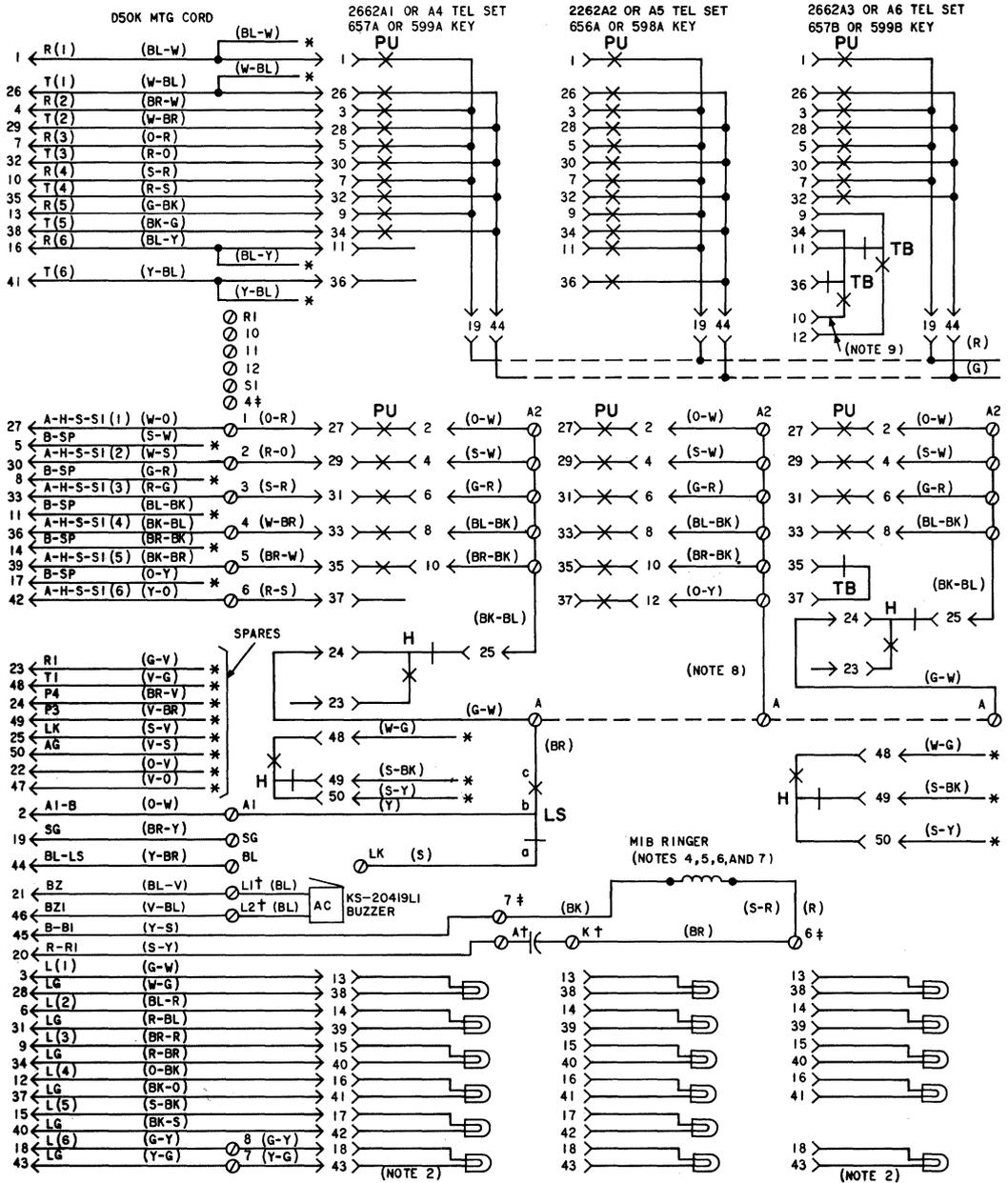


Fig. 1—2662-Type Telephone Set, Connections (Sheet 1 of 2)

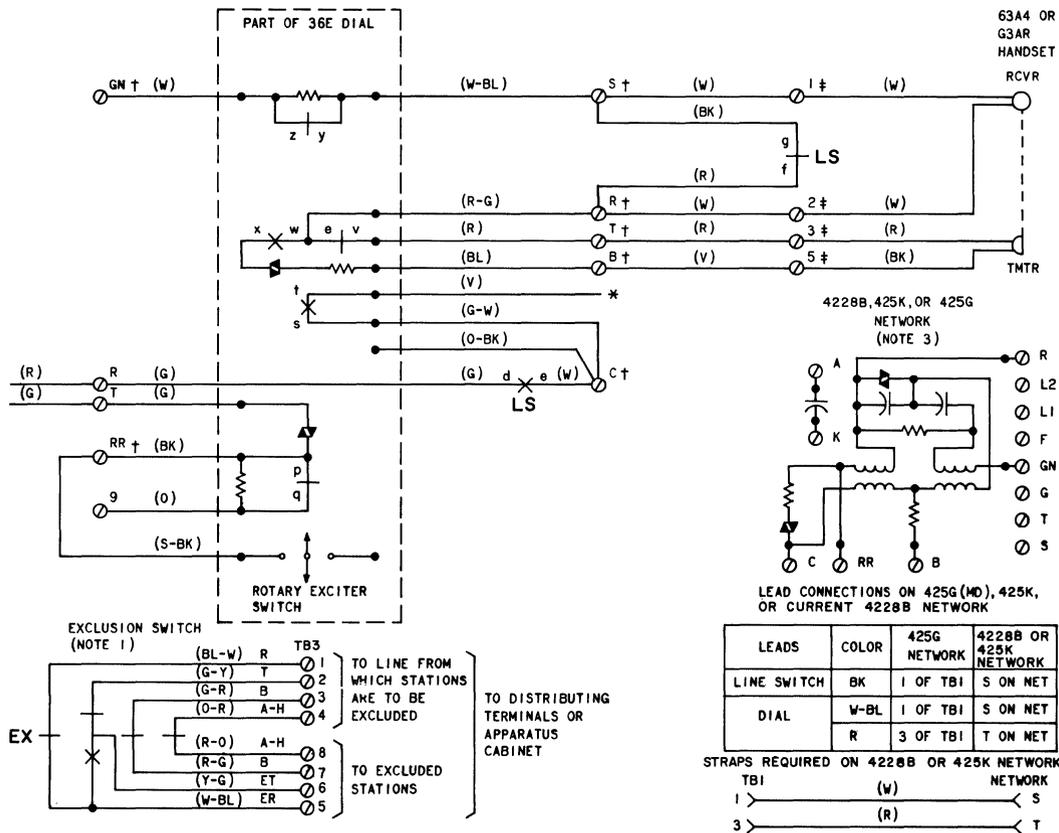
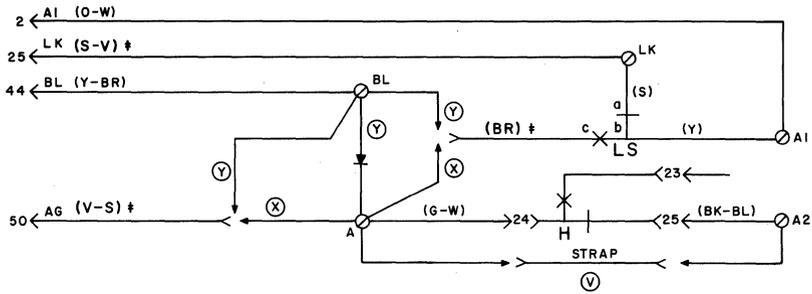
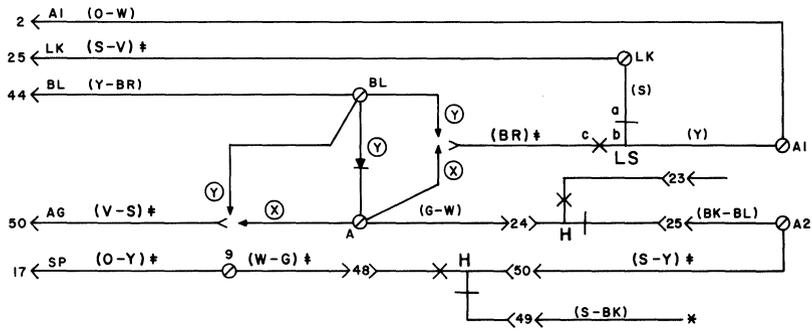


Fig. 1—2662-Type Telephone Set, Connections (Sheet 2 of 2)



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

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
PPPPP*S*	A2	A2	A2	A2	S1	A2†	S1
PPPP*P*S*	A2	A2	A2	S1	S1	A2‡	S1
PPP*P*P*S*	A2	A2	S1	S1	S1	A2‡	S1
PP*P*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.

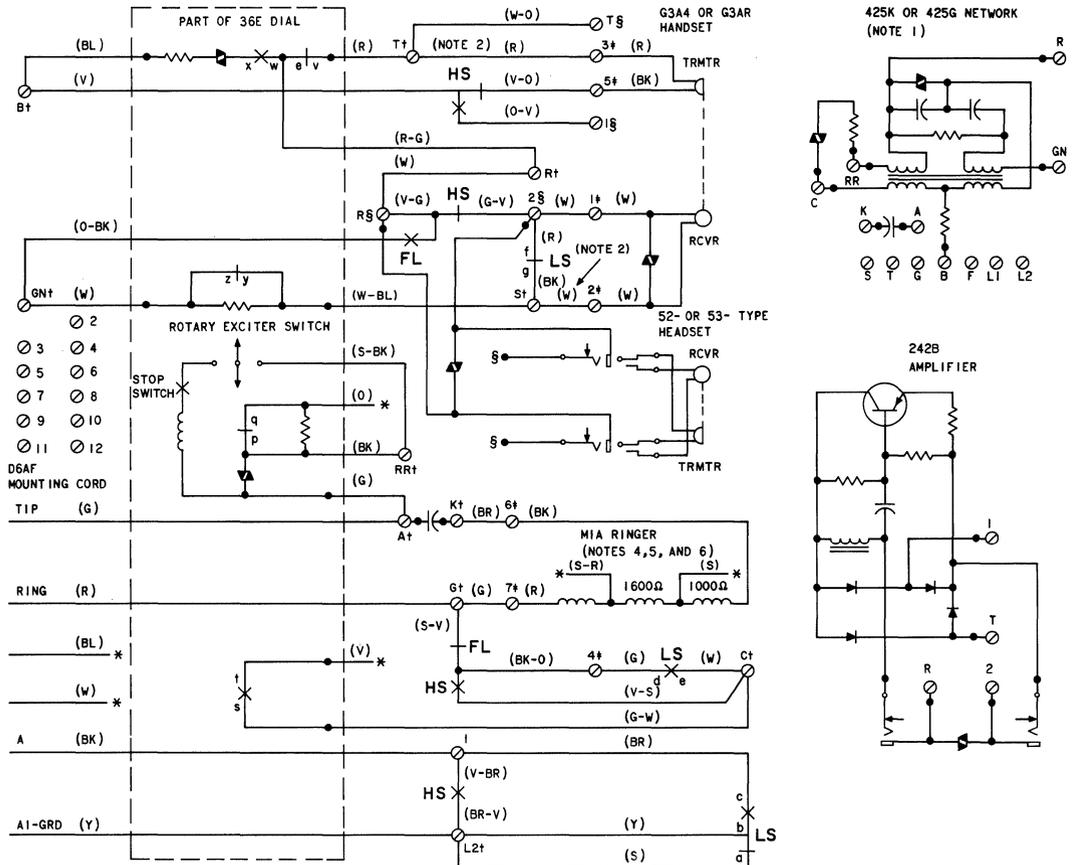
1.02 Connection information was formerly found in Section 502-660-423 which will be canceled.

TABLE A
P-90D012 POLARITY GUARD CONNECTIONS

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.

SECTION 502-619-403



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 T82
- ‡ - 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-O	3 OF TBI	T OF NETWORK

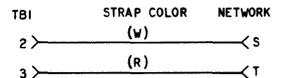


Fig. 1—2663A1 Telephone Set Connections

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

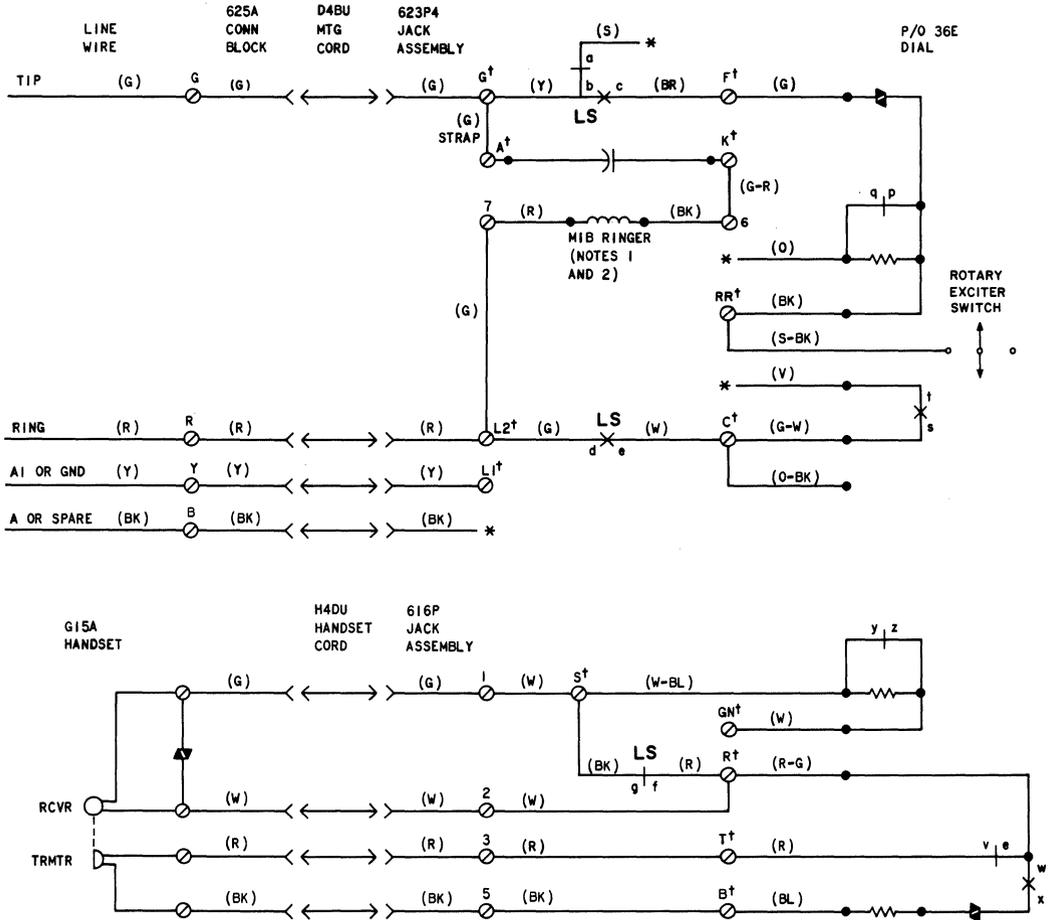
1. GENERAL

- 1.01** 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 502-603-121.
- 1.03** The 2660A1M (modular) telephone set (Fig. 1) is factory-wired for bridged ringing. For all other services refer to Table A.
- 1.04** When exclusion or 2-line pickup and hold (monkey telephone system) 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 D6AF-87 mounting cord, refer to Fig. 2 and 3.
- 1.05** If 2-line pickup and signaling or 2-line pickup and signaling plus exclusion is desired 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, see Fig. 4.
- 1.06** 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 2660A1M telephone set is used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, 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.

NOTICE

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

SECTION 502-619-405



- 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

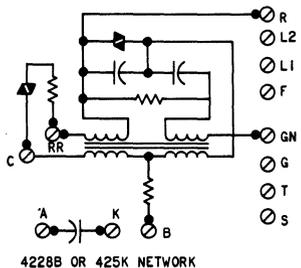


Fig. 1—2660A1M Telephone Set, Connections

LINE 625A D4BU 623P4
 WIRE CONN MTG JACK
 BLOCK CORD ASSEMBLY

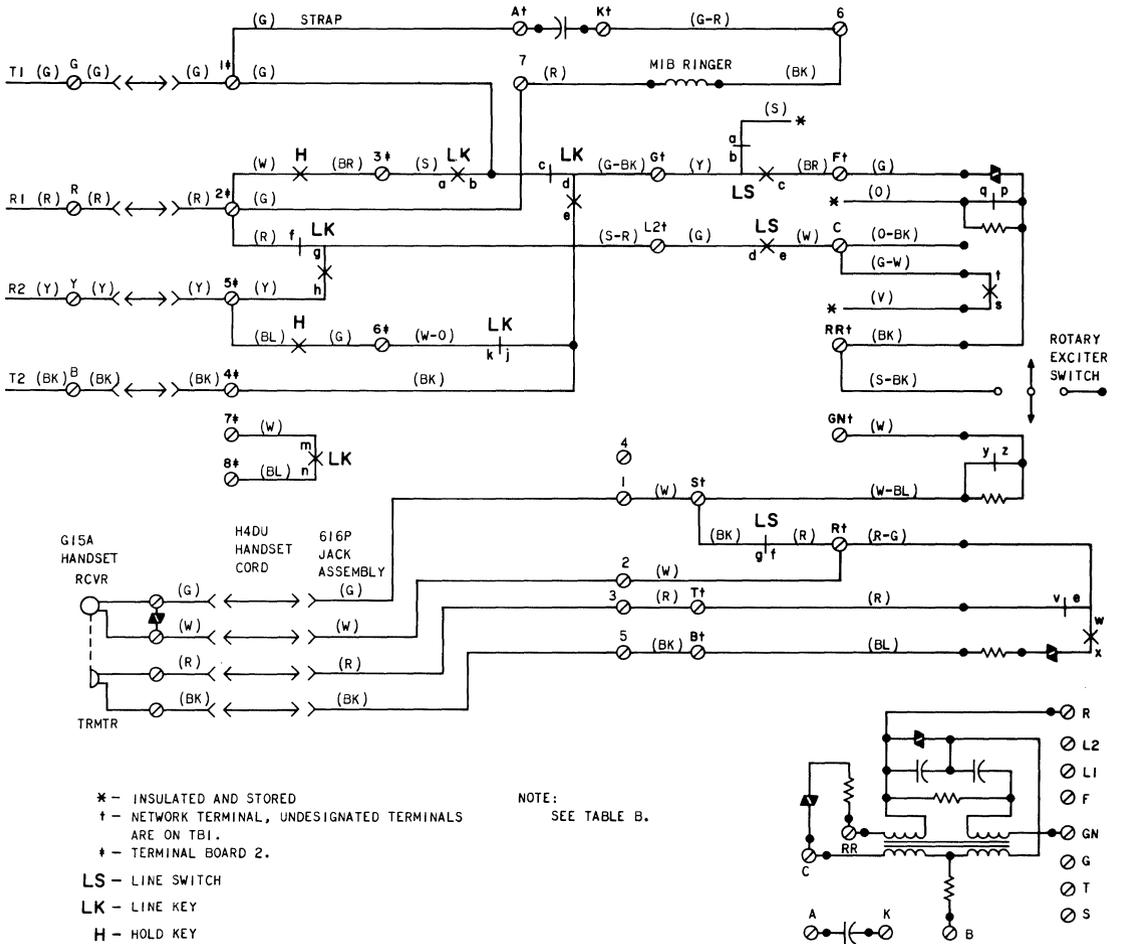


Fig. 2—2660A1M Telephone Set Modified for 2-Line Pickup and Hold (Nonkey Telephone Systems)

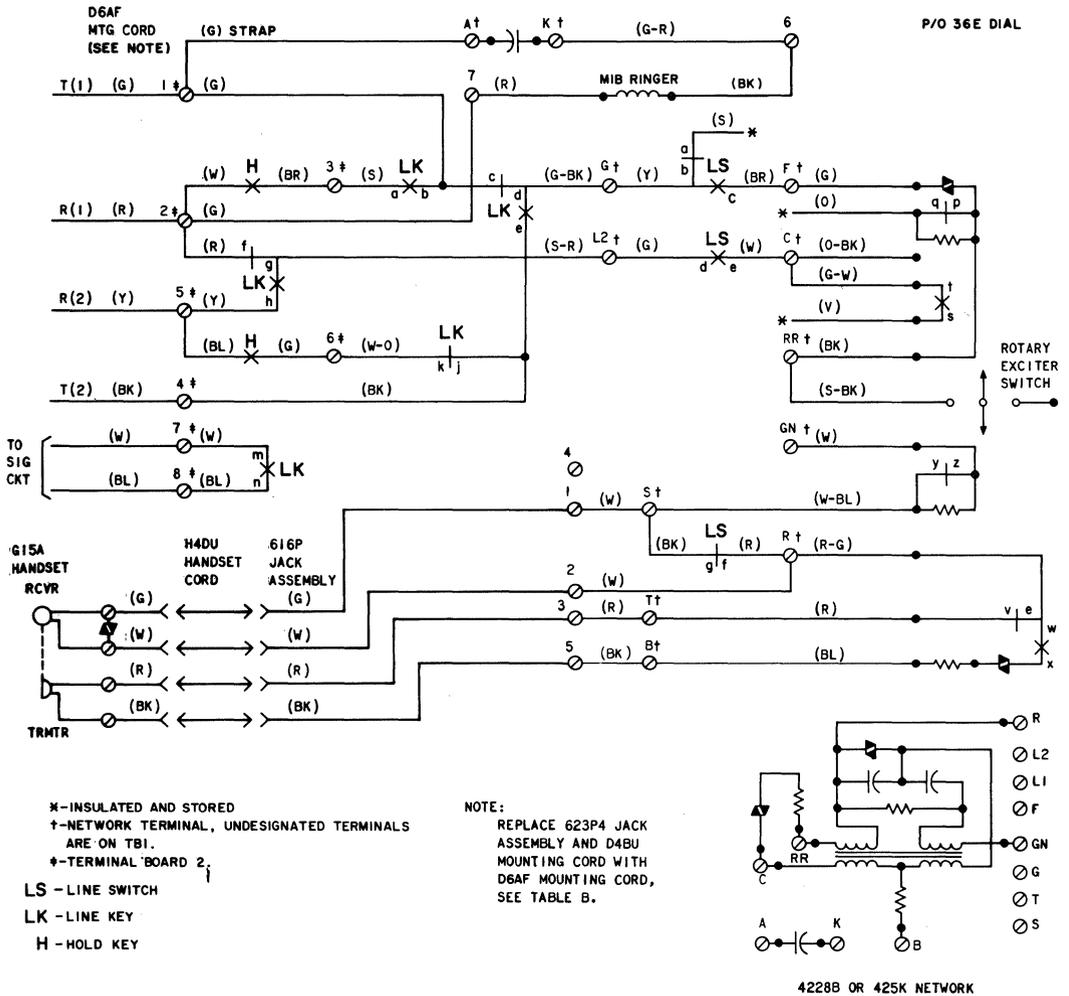
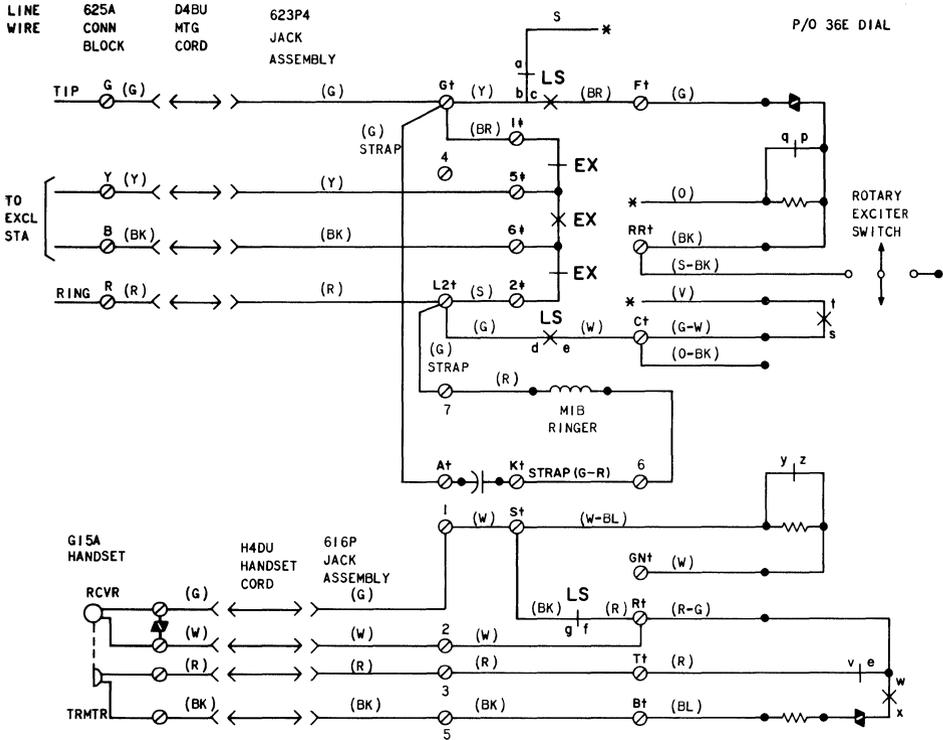


Fig. 3—2660A1M Telephone Set Modified for 2-Line Pickup and Hold (Nonkey Telephone Systems) Plus Signaling



NOTE:
SEE TABLE A:

- * - INSULATED AND STORED
- † - NETWORK TERMINAL, UNDESIGNATED TERMINALS ARE ON TBI.
- ‡ - EXCLUSION SWITCH TERMINAL BOARD.

- LS - LINE SWITCH
- EX - EXCLUSION SWITCH

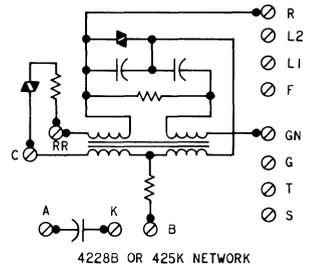


Fig. 4—2660A1M Telephone Set Modified for Exclusion

P/O 36E DIAL

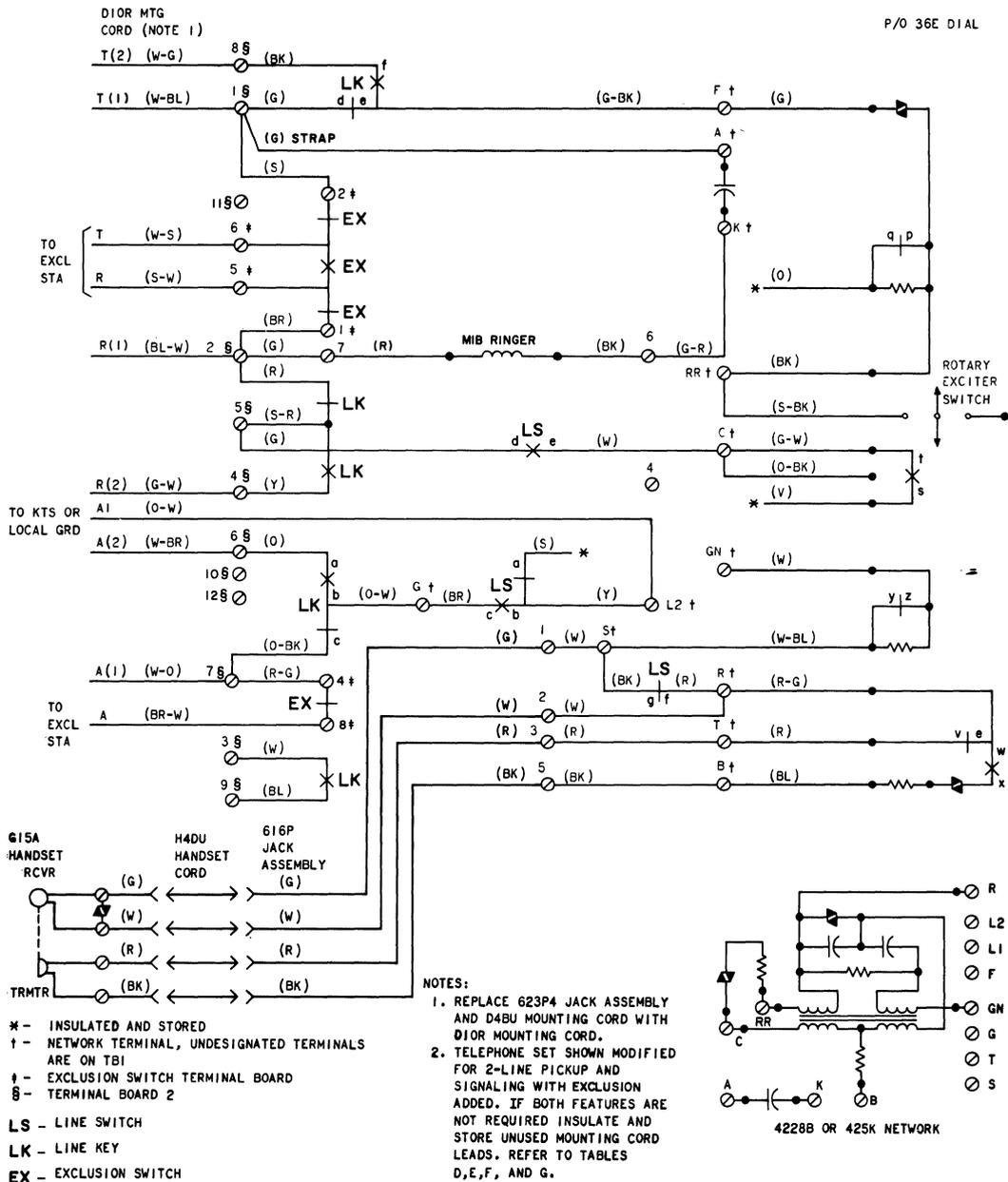


Fig. 6—2660A1M Telephone Set Modified for 2-Line Pickup and Signaling or 2-Line Pickup and Signaling with Exclusion

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	EXCLU-SION**	EXCLU-SION†
					NO IDENT GROUND	IDENT GROUND				
						1000Ω	2650Ω			
Mtg Cord at Conn. Block	Tip	(G)	G	G	G	G	G	G	G	2
	Ring	(R)	R	R	R	R	R	R	R	1
	Grd A1	(Y)	Y	Y	Y	Y	Y	Y		4
	A	(BK)						B		5
	ET	(BL)							Y	7
	ER	(W)							B	6
623P4 Jack Assy or Mtg Cord at Net.	Tip	(G)	G	G	G	G	G	A	G	G
	Ring	(R)	L2	L2	L2	L2	L2	L2	L2	L2
	Grd A1	(Y)	L1	L1	L1	L1	L1	G		L1
	A	(BK)						F		*
	ET††	(BK) or (BL)							6¶	6¶
	ER	(Y) or (W)							5¶	5¶
Ringer Leads at TB1	(R)		7	7	7	7	7	7	7	7
	(BK)		6	6	6	6	6	6	6	6
	(S) §		*	*	*	5	*	*	*	*
	(S-R) §		*	*	*	*	5	*	*	*
Line Switch Leads at Net.	(BR)		F	F	F	F	F	F	F	F
	(W)		C	C	C	C	C	C	C	C
	(S)		*	*	*	K	K	*	*	*
Dial Leads at Net.	(G)		F	F	F	F	F	A	F	F
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	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	6 to K
Exclusion Straps between Net. and Excl Term. Board	(BR)								G to 1‡	G to 1‡
	(S)								L2 to 2‡	L2 to 2‡
Strap between Net. Term.	(G)		A to G	A to L1	A to L1	A to *	A to *	A to *	A to G	A to G

* Insulated and stored.

† Replace 623P4 jack assembly and D4BU mounting cord with D6AF mounting cord.

‡ Exclusion switch terminal board

§ Leads on M1A ringer only.

¶ Terminal on exclusion terminal board.

** Set equipped with 623P4 jack assembly and D4BU mounting cord.

†† (BK) and (Y) are leads in D4BU mounting cord. (BL) and (W) are leads in D6AF mounting cord.

TABLE B
MODIFICATION FOR 2-LINE PICKUP AND HOLD (NONKEY TELEPHONE SYSTEM) OR 2-LINE PICKUP AND HOLD (NONKEY TELEPHONE SYSTEM) PLUS SIGNALING

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
623P4 Jack Assy or D6AF Mtg cord†	G	1
	R	2
	Y	5
	BK	4
	WS	7
	BS	8
Strap	G	TB2-1 and A of network
Ringer Strap‡	G	2

*Terminals on TB2 except where noted otherwise.

†D6AF mounting cord replaces original D3BN, or D4BU mounting cord when signaling is required.

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

§Leads on D6AF mounting cord only.

TABLE C
819040122 OR 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.

TABLE D

2660A1M TELEPHONE SET
 CONDUCTOR ASSIGNMENT USING 44A CONNECTING BLOCK
 (WHEN 2-LINE PICKUP AND SIGNALING IS PROVIDED)

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 E

**2660A1M TELEPHONE SET
CONDUCTOR ASSIGNMENT USING 44A CONNECTING BLOCK
(WHEN 2-LINE PICKUP AND SIGNALING PLUS EXCLUSION IS PROVIDED)**

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 F—MODIFICATION TO PROVIDE 2-LINE PICKUP AND SIGNALING

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 CUT-OFF BY TURN KEY CONNECT TO	EXT. STA. OR RINGER AND SET RINGER CUTOFF BY TURN KEY CONNECT TO	
Line Switch	(Y)	G of network	L2 of network				
	(BR)	F of network	G of network				
	(G)	L2 of network	TB2-5				
Ringer Strap	(G)	L2 of network	TB2-2*	*	TB2-5	TB2-2	
D10R Mtg. Cord (added)	(W-BL)		TB2-1		A of network	F of network	
	(BL-W)		TB2-2		TB2-5		
	(W-O)		TB2-7		G of network		
	(O-W)		L2 of network		L2 of network		
	(W-G)		TB2-8		TB2-1		
	(G-W)		TB2-4		TB2-2		
	(W-BR)		TB2-6		TB2-7		
	(BR-W)		*	TB2-3		*	
	(W-S)		TB2-3	TB1-6‡		TB2-3	
	(S-W)		TB2-9	TB1-7		TB2-9	
Key Assy (added)	(O-W)		G of network				
	(G-BK)		F of network				
	(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				
Strap	(G)	TB2-1 and A of net. †	Store in set		F of net. and A of net.	TB2-1 and A of net.	

*Insulate and store.

†For ringer on line 2 move strap (G) from TB2-2 to TB2-4 and strap (G) 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 G
MODIFICATION TO PROVIDE 2-LINE PICKUP AND SIGNALING PLUS EXCLUSION

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	
Strap	(G)		TB2-1 and A of net. ‡	A of net and Excl TB-5
Straps (added)	(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 †(G) from TB2-1 to TB2-8.

TABLE G (Cont)

MODIFICATION TO PROVIDE 2-LINE PICKUP AND SIGNALING PLUS EXCLUSION

LEADS		REMOVE FROM	FOR 1-LINE PICKUP - SET RINGER USED AS LINE RINGER		
			WITH EXCL 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		
Strap	(G)	A of net. and Excl TB-1	A of net. and Excl TB-5	TB2-1 and A of net.	
Straps (added)	(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.

SERVICE
2662A1M TELEPHONE SET

1. GENERAL

- 1.01** Whenever this section is reissued, the reason for reissue will be listed in this paragraph.
- 1.02** The 2662A1M 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 502-603-131.
- 1.04** To install polarity guard, 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 2662A1M telephone set is used as a speakerphone set and is multiplied with any other set capable of furnishing speakerphone feature, 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 circuits of the multiplied telephone sets.
- 1.06** For additional information on the modular concept, refer to Section 503-100-100.

TABLE A

**819040122 OR 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.

SECTION 502-619-406

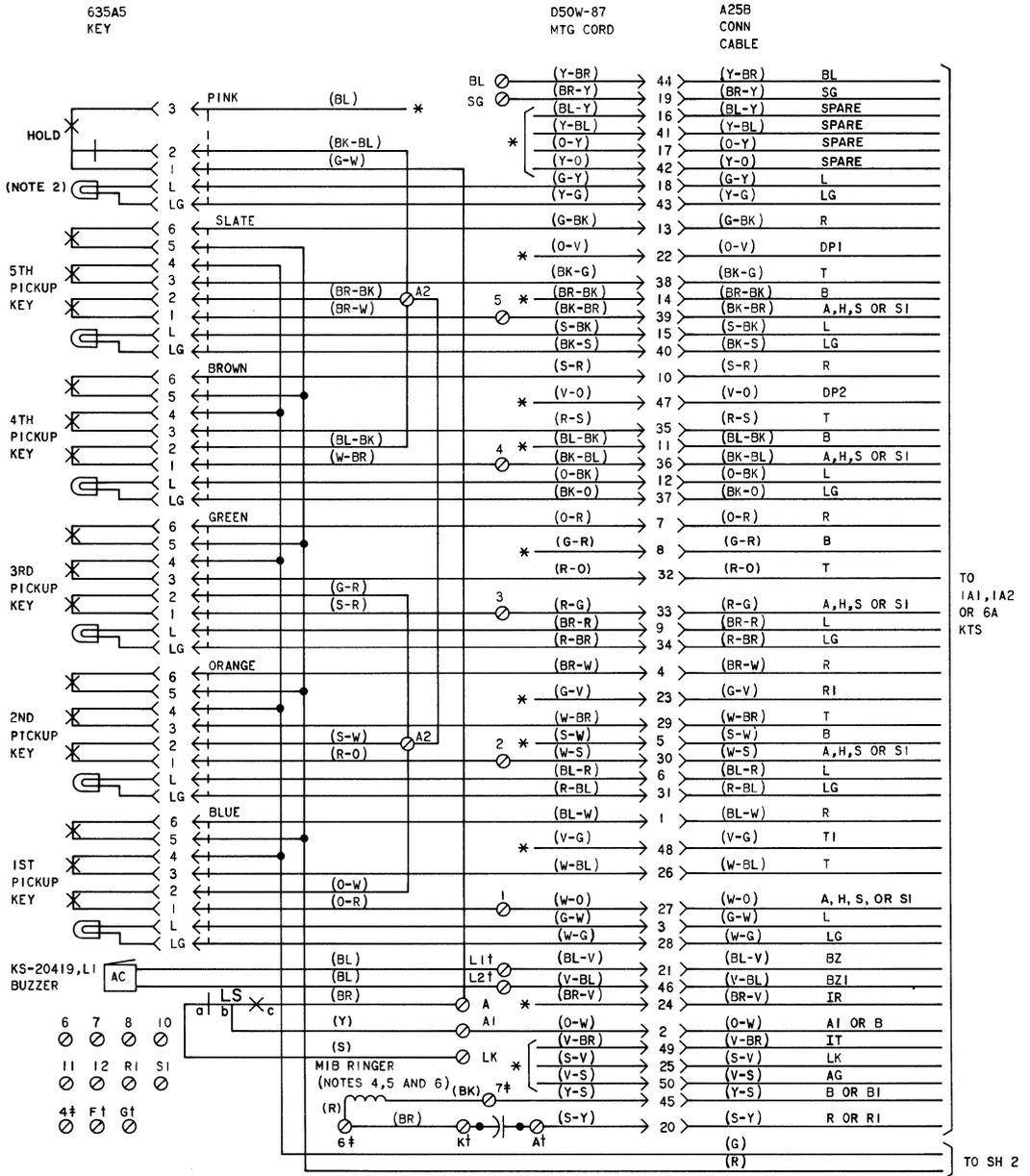
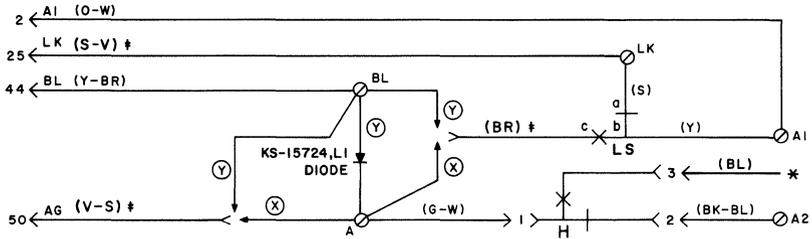
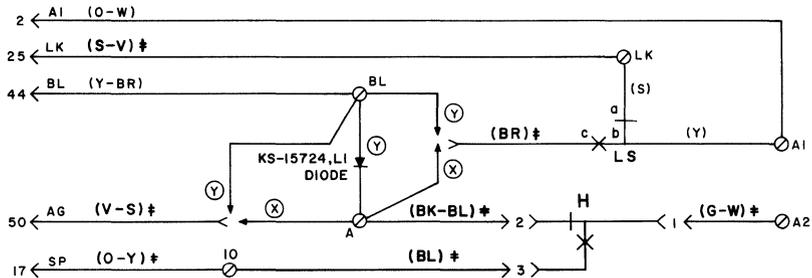


Fig. 1—2662A1M Telephone Set, Connections (Sheet 1 of 2)



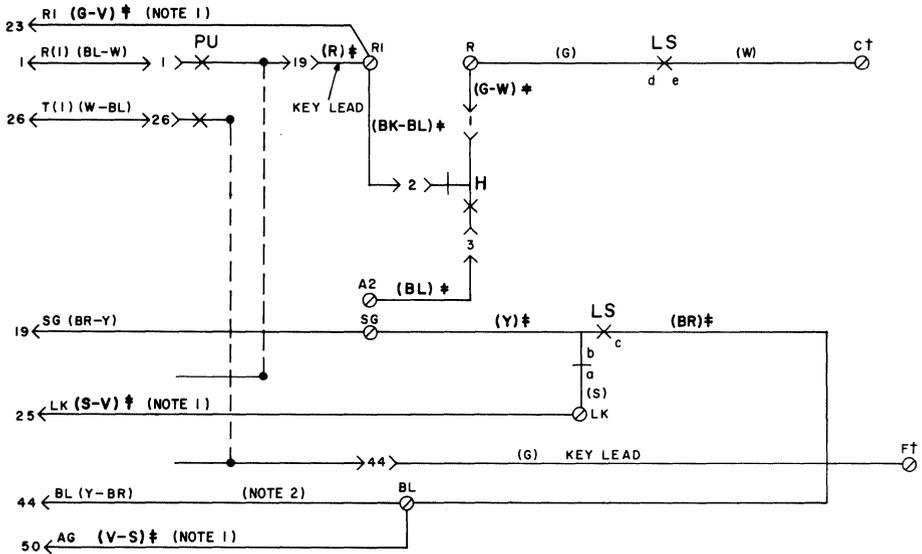
A. WITHOUT I HOLD



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, L1 DIODE

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



NOTES:

1. IF SPEAKERPHONE IS NOT REQUIRED 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
HPPPSS	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: 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	3	1	W-BL	26	1
R	6		BL-W	1	2
A, H, S, or S1 A1 or B†	TB2-1 TB2-A1	2	W-O	27	3
			O-W	2	4
LG	LG	3	W-G	28	5
L1	L		G-W	3	6
T	3	4	W-BR	29	7
R	6		BR-W	4	8
A, H, S, or S1 Spare or B†	TB2-2 *	5	W-S	30	9
			S-W	5	10
LG	LG	6	R-BL	31	11
L2	L		BL-R	6	12
T	3	7	R-O	32	13
R	6		O-R	7	14
A, H, S, or S1 Spare or B†	TB2-3 *	8	R-G	33	15
			G-R	8	16
LG	LG	9	R-BR	34	17
L3	L		BR-R	9	18
T	3	10	R-S	35	19
R	6		S-R	10	20
A, H, S, or S1 Spare or B†	TB2-4 *	11	BK-BL	36	21
			BL-BK	11	22
LG	LG	12	BK-O	37	23
L4	L		O-BK	12	24
T	3	13	BK-G	38	25
R	6		G-BK	13	26
A, H, S, or S1 Spare or B†	TB2-5 *	14	BK-BR	39	27
			BR-BK	14	28
LG	LG	15	BK-S	40	29
L5	L		S-BK	15	30
Spare	*	16	Y-BL	41	31
Spare	*		BL-Y	16	32
Spare	*	17	Y-O	42	33
Spare	*		O-Y	17	34
LG	LG	18	Y-G	43	35
L6	L		G-Y	18	36
BL	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 or DP2	*	22	V-O	47	43
Spare or DP1	*		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

* 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 TELEPHONE SETS
TOUCH-A-MATIC® AUTOMATIC DIALER

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NOTICE

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

at the connecting block to prevent shorting out dial light transformer.

- 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)
 - Lt. Beige (-60)

2. IDENTIFICATION

2.01 The 870A1M or 870A2M telephone set provides 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.

2.02 Design Features:

- 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 second dial tone during automatic dialing (WAIT input).

2.03 Optional Features:

- Speakerphone—either 3B or 4A speakerphone may be added to stations
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE® dial tone (350 and 440 Hz) is present
- One-Touch Calling, (requires both Dial Tone Detector and speakerphone)—depressing one memory button will automatically turn on speakerphone and dial number

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

- Plug-ended mounting cord (870A1M)
- KS-20419L1 buzzer
- Amplifying handset
- Head telephone set operation
- End-to-end signaling using 1035C3A Dial Adjunct (Section 501-164-130), manual dialing only

2.04 All options are implemented by:

- Wiring changes in the telephone set
- Installation of appropriate additional items.

2.05 Ordering Guide:

(a) The 870A1M (field convertible to modular) or 870A2M (modular) telephone set may be ordered complete and ready to install as:

- Set, Telephone, 870A1M-*
- Set, Telephone, 870A2M-*

(b) **Ordered Separately:**

- Unit, Power, 95B1 or 95B2 (870A1M)
- Cord, Mounting, D4BU-29 or D6AP-87 (870A2M)

TABLE A
OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIG.	TABLE
Speakerphone	4A	108-type Loudspeaker	9	D, E
		680-type Transmitter	9	D, E
		223A Adapter	9	D, E
		85B1 Power Unit	9	D, E
		D-180568 Kit of Parts	7 (C)	D, E
	3B	760A Loudspeaker	8	B, C
		666B Transmitter	8	B, C
		55-type Control Unit	8	B, C
		2012B Transformer	8	B, C
		D10R-87 Cord	8	B, C
		D-180568 Kit of Parts	7 (C)	B, C
One-Touch Calling		D-180493 Kit of Parts	7 (D, E)	C or E
		Speakerphone	7 (B)	
Dial Tone Detector		D-180493 Kit of Parts	7 (D)	F
Convert 870A1M to 870A2M (3.10)		623P6 Jack, D4BU Cord, M2SL Cord		
Buzzer, KS-20419L1 (6.07)				
Amplifying Handsets (6.09)				
Adjunct Keys * †		6040-, 6050-, or 6051-Type Key		

* When 6040-, 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 switchhook, or depress the RECORD OFF button after termination of each call.

† If 6-button key service is desired it is recommended that the 870A2M telephone set be used because the reset function is automatically provided.

(c) **Modular Components:**

(1) The 870A1M or 870A2M telephone set may also be ordered in its component parts as follows:

- Housing, 870A1-*
- Faceplate, 870A2-87
- Handset, G15A-*

- Cord, Handset, H4DU-*
- Base, Telephone Set, 870AM (870A1M) or 870A2M (870A2M) includes the following:
Dial, 8EA-119
Ringer, P1B
Network
Battery, KS-20390L4

Jack, Handset, 616B

Cord, Mounting, D6AD-87 (870A1M)

Jack, Mounting Cord, 623P6 (870A2M)

Cord, Power, M2SL-87 (7-foot; 870A2M)

Unit, Power, 95B1 or 95B2 (870A2M)

Memory, 870A (includes button field)

840393672, Directory Sheet Set

Subscriber Instruction Booklet, SIB-2455B

(d) **Optional Apparatus (order as required):**

- Kit of Parts, D-180568 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Cord, Mounting, D4BU-29 or D6AP-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
- Handset, Amplifying (G6-*, G7-*, or G8-*type).
- Set, Head Telephone
- Adapter, 274A-50 (required for headset operation)
- Cord, M16G-87, 2- and 7-foot (required for head telephone set operation).

*Add appropriate color suffix (1.06).

2.06 Operating Features (Fig. 2):

- 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 field, 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. 7).

Caution: *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).

3.03 Power Unit Connections:

- (1) For the 870A1M telephone set, install the 95B-type 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 and connected to the telephone set by

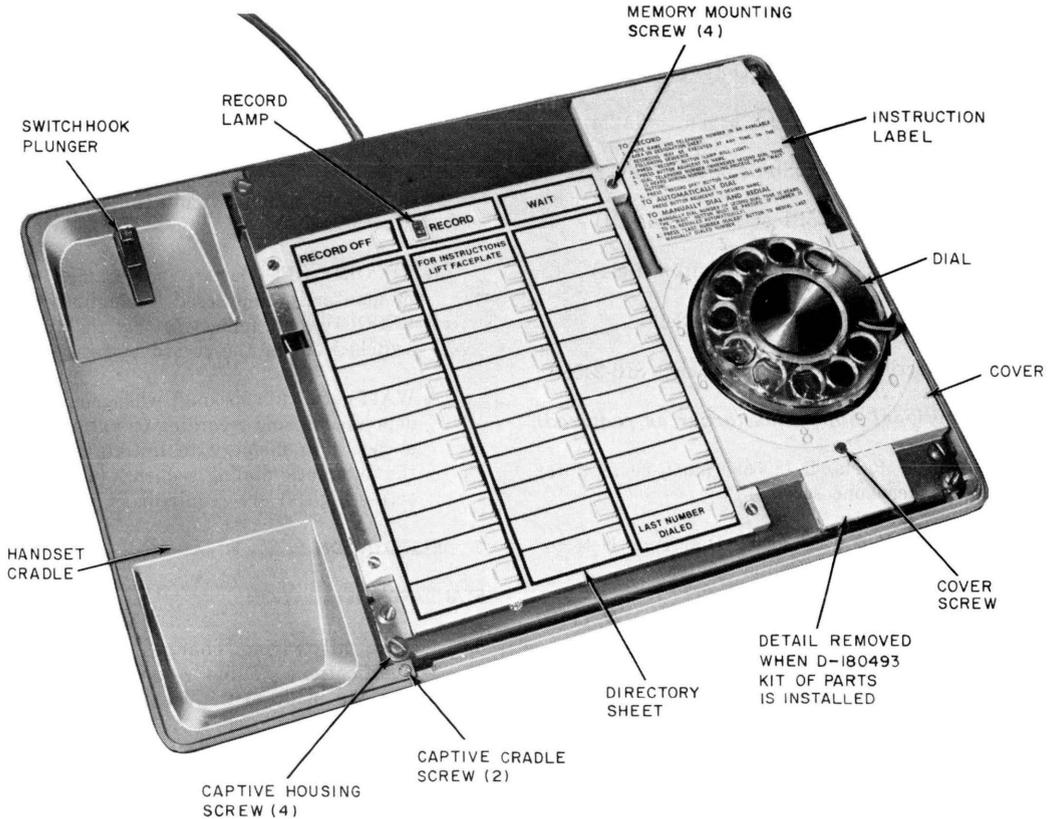


Fig. 2—Telephone Set—Faceplate and Handset Removed

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 and used, disconnect, insulate, and store the (G-W) and (W-G) mounting cord leads on PSB terminals 24 and 25.

(2) For the 870A2M telephone set, the 95B-type power unit is factory wired to terminals PSB-24 and PSB-25 via the M2SL-87 cord. Plug the unit into an AC outlet not controlled by a switch (continuous AC power is required).

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 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 G.

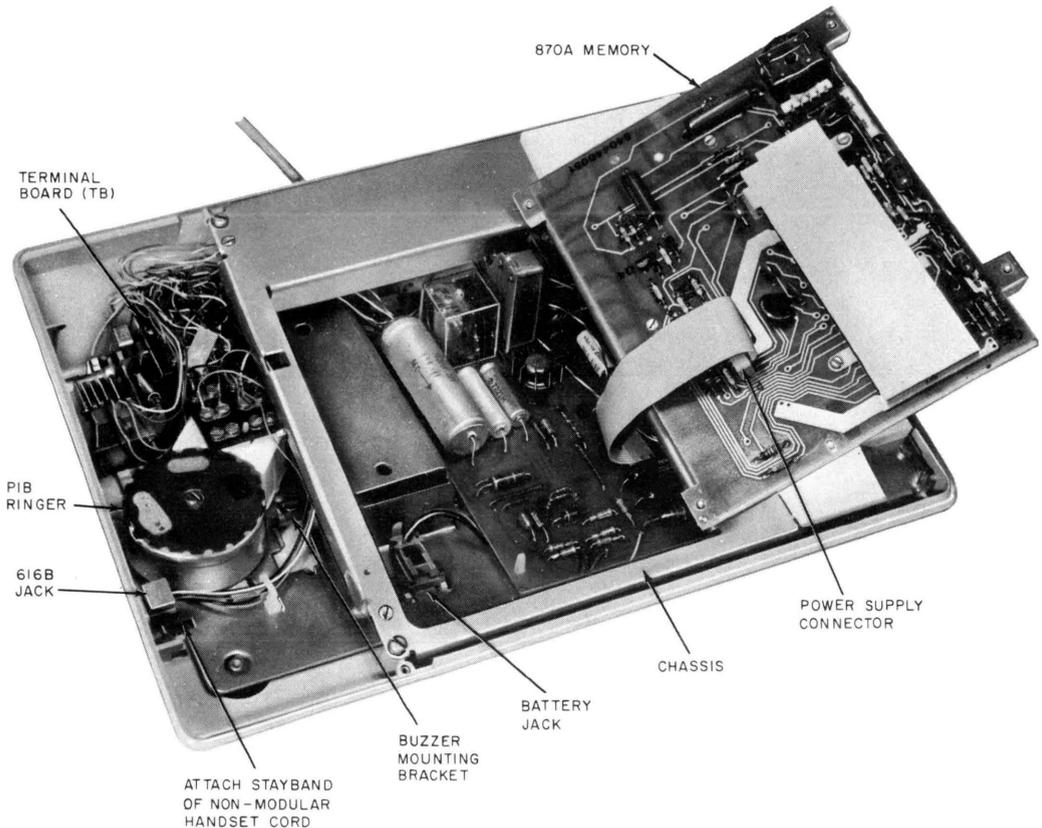


Fig. 3—870A1M Telephone Set, Internal View, Overall

- (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 a known telephone number into all memory locations except LAST NUMBER DIALED and the location immediately above it [5.01 (4) through (7)].

Note: If a pause for second dial tone is required, dial the access digit(s) and (after the record lamp relights) depress the WAIT button, then dial the telephone number.
- (4) Automatically dial the numbers stored in (3) and verify that they are correct.

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 [5.01 (4) through (7)].
- (6) Momentarily hang up handset and automatically dial the number recorded in (5) and verify that it is correct.

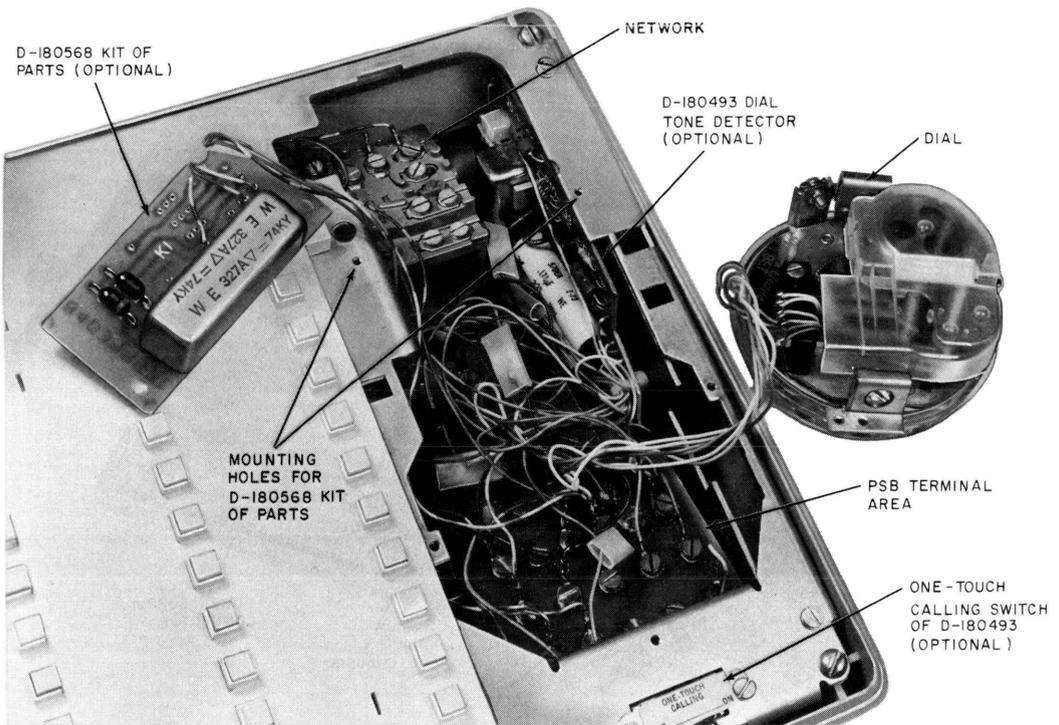


Fig. 4—Telephone Set—Dial Removed to Show Terminal Area

(7) Go off-hook and 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) and depress the WAIT button, then dial the telephone number.

(8) Momentarily hang up handset and then automatically dial the number by depressing the LAST NUMBER DIALED button.

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

(9) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, depress a memory location used in Step (3), to verify retention of memory.

(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 button previously used to record in Step (5). The set should automatically turn the speakerphone on and dial the number.



The KS-20390LA battery and the power unit must be connected a minimum of five minutes before doing Step (9).

OPTIONAL APPARATUS INSTALLATION

D-180568 Kit of Parts

3.07 To install:

- (1) Proceed as described in 3.17.
- (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.

D-180493 Kit of Parts**3.08** To install:

- (1) Remove the housing (3.20), and access PSB terminal board (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 chassis.

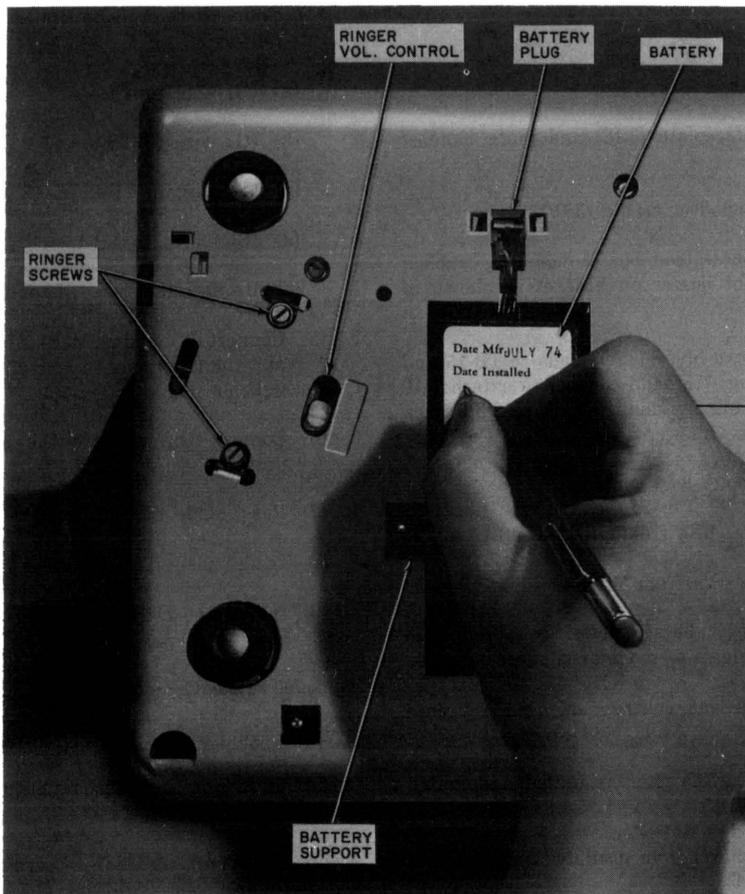


Fig. 5—Telephone Set, Bottom View

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- (3) Lock the board into position by inserting the accompanying screw from the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.
- (5) Make connections per Table C, E, or F.

Note: If dial tone detector is being used without speakerphone option, make connections per Table F.

- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.

KS-20419L1 Buzzer

3.09 To install:

- (1) Remove faceplate (3.18) and place handset aside.
- (2) Remove handset cradle (3.19).
- (3) Remove screw from buzzer mounting bracket, and mount buzzer on bracket as shown in Fig. 3.
- (4) Connect two blue buzzer leads to TB-15 and TB-16 (Fig. 7H), and connect to external 10 volt AC circuit by changing the 623P6 jack connections as follows:

(a) With no A-lead control:

- (1) Move (BK) from TB-1 to TB-15.
- (2) Move (Y) from TB-2 to TB-16.
- (3) Connect buzzer power to appropriate terminals of modular connecting block.

(b) With A-lead control, use D6AP-87 cord and

- (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 (3.19 and 3.18).

Plug-Ended Mounting Cord (for conversion of 870A1M to 870A2M telephone set)

3.10 To convert:

- (1) Remove the housing (3.20) and access the PSB terminals (3.17).
- (2) Remove D6AD-87 mounting cord.
- (3) Install the 623P6 jack as shown in Fig. 6.
- (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 95B-type power unit.

- (7) Reassemble the set.

- (8) Install modular connecting block.

- (9) Install the D4BU mounting cord.

Optional Power Connections

3.11 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:** A M2SL-87 cord may be used to connect the 95B-type power unit to the telephone set.

- (1) Remove the housing (3.20).

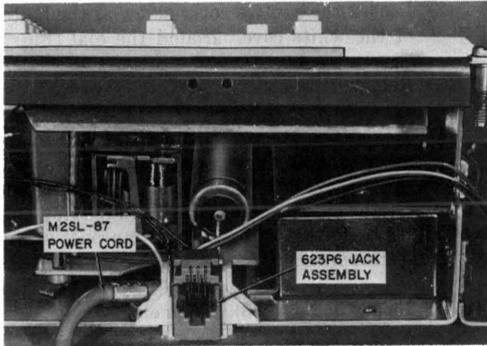


Fig. 6—870A2M Telephone Set, Partial View With 623P6 Jack

- (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.
 - (7) Connect power unit to M2SL cord.
- (b) **870A2M:** AC power may be wired in at the connecting block and brought to the set via the mounting cord.
- (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 D6AP-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 86A connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.

Head Telephone Set

3.12 To install:

- (1) Remove housing (3.20).
- (2) Access PSB terminal area (3.17).
- (3) Remove cradle (3.19).
- (4) Thread set side of M16G-87 cord from 274A-50 adapter through hole in rear of housing and attach to telephone set as described in Section 463-247-100.
- (5) Make connections per appropriate table in Section 463-247-100.
- (6) Reassemble telephone set.
- (7) Insert head telephone set plug into adapter.

COMPONENT LOCATION AND ACCESS INFORMATION

Location of Components

SECTION 503-300-100

3.13 The components are located in three areas as follows:

(a) Under the handset cradle (Fig. 3):

- Buzzer (optional)
- Ringer
- Switchhook assembly
- Handset jack
- Terminal board (TB).

(b) Under the faceplate, inside the set (Fig. 3 and 4):

- Battery jack (Fig. 3)
- Power supply (PSB) terminal area (Fig. 4)
- Network (Fig. 4)
- Options (Fig. 4):

D-180568 (relay kit for speakerphone)

D-180493 (dial tone detector and one-touch calling switch kit).

(c) Bottom of telephone set (Fig. 5):

- Battery.

Mounting Cord

3.14 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.

3.15 The D4BU plug-ended mounting cord (870A2M) conductors provided for tip, ring, and A-lead control.

Note: If two extra leads are required, a D6AP-87 cord may be used.

Network Terminals

3.16 For access to the network terminals:

- (1) Remove the faceplate (3.18).

- (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.

Power Supply Board (PSB) Terminals

3.17 To access the terminal field on the power supply board, proceed as follows:

- (1) Remove the faceplate (3.18).

- (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.

Faceplate Removal

3.18 The 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.

Handset Cradle Removal

3.19 To remove the handset cradle from the housing, proceed as follows:

- (1) Remove the faceplate (3.18), and place the handset aside.

- (2) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
- (3) Lift the cradle by pulling up on the plunger, and remove.
- (4) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

Caution: *The 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) Refasten the captive cradle screws.

Housing Removal

3.20 To remove, proceed 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 (3.18).
- (4) Remove the handset cradle (3.19).

Caution: *Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.*

- (5) Disengage only the four captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
- (6) Separate the housing from the telephone set base.
- (7) Disconnect the 95B-type power unit from the M2SL-87 cord, if required (870A2M).
- (8) Feed mounting cord through hole in bottom of housing as housing is removed.
- (9) 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.

- (10) When replacing the housing, keep the handset jack from being trapped between the housing and chassis.

4. CONNECTIONS

- 4.01** Telephone set connections are shown in Fig. 7.
- 4.02** Refer to Table A for connection reference for all options.
- 4.03** A partial functional schematic is shown in Fig. 10.

Caution: *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.*

5. OPERATION

Record A Number Into Memory

5.01 To record:

- (1) Remove the faceplate (3.18).
- (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 are required:

- (a) Dial the access digit(s).

(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 switchhook, line key, or speakerphone operation.

Change A Number From Memory

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

Delete A Number From Memory

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.

Automatically Dial A Number From Memory

5.04 To automatically dial a number:

- (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 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.

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.

5.06 Operation of LAST NUMBER DIALED feature:

(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 are 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. 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.

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.

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 G, and the following paragraphs.
- (4) If removal of the telephone set is required, do the following:
 - (a) Disconnect telephone set.
 - (b) Unplug the battery.
 - (c) Place the plug sideways into the housing slot below the battery jack and tape in place.

Caution: *Failure to restrain plug can result in plug damage necessitating battery replacement.*

Battery

6.03 The 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. 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 and check new battery (3.06).

Memory

6.04 The 870A Memory may be replaced in the following manner (Fig. 3):

Note: Removal of the Memory results in loss of the stored numbers.

- (1) Remove the faceplate (3.18).
- (2) Loosen the four captive screws of the Memory.
- (3) Rotate the left edge of the Memory upward as shown in Fig. 3.
- (4) Disengage the connector by pulling it out perpendicular to the board.
- (5) 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.
- (6) Reassemble set.
- (7) Test per 3.06.

Dial

6.05 To replace:

- (1) Access PSB terminal area [3.17 (1) through (5)].
- (2) Disconnect dial leads and remove dial.
- (3) To install a new dial, reverse the previous steps.

Ringer

6.06 To replace:

- (1) Remove the faceplate (3.18) and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Disconnect the ringer leads.
- (4) Tilt the front of the set up.
- (5) Unfasten ringer mounting screws (Fig. 5).
- (6) Remove ringer.
- (7) 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.
- (8) Reassemble set (3.19 and 3.18).

Buzzer (optional)

6.07 To replace:

- (1) Remove the faceplate (3.18), and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Remove the buzzer mounting screw.
- (4) Remove buzzer leads from the TB-15 and TB-16.
- (5) Install new buzzer.
- (6) Reassemble telephone set (3.19 and 3.18).

Handset Jack

6.08 To replace:

- (1) Remove the faceplate (3.18), and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Disconnect the handset jack leads and remove jack.
- (4) Install new 616B handset jack.
- (5) Reassemble set (3.19 and 3.18).

Handsets

6.09 A defective G15A handset may be replaced by unplugging the H4DU cord and inserting it into a new handset. To replace the G15A handset with a G3A handset or a G6-, G7-, or G8-type amplifying handset, proceed as follows:

- (1) Unplug H4DU handset cord at telephone set end.
- (2) Remove faceplate (3.18), and place handset aside.
- (3) Remove handset cradle (3.19).
- (4) Disconnect 616B handset jack (6.08). (Jack may be removed or stored just to right of ringer.)
- (5) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (6) Attach stayband hook to chassis (Fig. 3).
- (7) Route leads through wire guide as shown in Fig. 3.
- (8) Make connections (Fig. 7H).
- (9) Reassemble set (3.19 and 3.18).

Speakerphone

6.10 For maintenance information on the 3B or 4A speakerphone systems, refer to Sections 512-620-100 or 512-700-100, respectively.

TABLE B

CONNECTIONS – 870A1M OR 870A2M TELEPHONE SET WITH 3B SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		CONNECT							
				FROM		TO					
		DESIG	COLOR	TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (NOTE)		
				PSB	TB		PSB	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	V								
		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 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†	

TABLE B (Cont)

CONNECTIONS – 870A1M OR 870A2M TELEPHONE SET WITH 3B SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		CONNECT					
				FROM			TO		
		DESIG	COLOR	TEL SET		44-TYPE BLOCK TERM.	TEL SET	CONTROL UNIT (NOTE)	
				PSB	TB		PSB		
95B-Type PWR Unit (870A1M)	D-Station Wire	AC1				6			
		AC2				7			
95B-Type PWR Unit (870A2M)	M2SL-87 Cord	AC1	Y				24 §		
		AC2	BK				25 §		
2012B Trnsf	D-Station Wire	AC1						27	27
		AC2						36	36

* Insulate and store.

† To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

‡ Accepts D4BU or D6AP-87 mounting cord which connects set to modular connecting block.

§ Connected at Factory.

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B).

TABLE C

CONNECTIONS - 870A1M OR 870A2M TELEPHONE SET WITH ONE-TOUCH CALLING
(DIAL TONE DETECTOR AND 3B SPEAKERPHONE)

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT						
					FROM		TO				
					TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (NOTE)	
		PSB	TB	PSB	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								
	Speaker-phone Inter-connection 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		

TABLE C (Cont)

CONNECTION — 870A1M OR 870A2M TELEPHONE SET WITH ONE-TOUCH CALLING
(DIAL TONE DETECTOR AND 3B SPEAKERPHONE)

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT					
		DESIG	COLOR		FROM		TO			
					TEL SET		44-TYPE BLOCK TERM.	TEL SET PSB	CONTROL UNIT (NOTE)	
					PSB	TB			55A	55B
D-180493 Kit of Parts (Cont)	Dial Tone Detector (Cont)	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 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 §
95B-Type Pwr Unit (870A1M)	D-Station Wire	AC1					6			
		AC2					7			
95B-Type Pwr Unit (870A2M)	M2SL-87 Cord	AC1	Y					24 ¶		
		AC2	BK					25 ¶		
2012B Transf	D-Station Wire	AC1							27	27
		AC2							36	36

* Insulate and store.

† One touch calling switch must be set to ON position.

‡ Accepts D4BU or D6AP-87 mounting cord which connects cord to modular connecting block

§ To reduce loudspeaker volume move SP2 lead to terminal 24 (55A) or 30 (55B)

¶ Connected at factory.

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B).

TABLE D

CONNECTIONS – 870A1M OR 870A2M TELEPHONE SET WITH 4A SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		CONNECT TO			
		DESIG	COLOR	44-TYPE BLK. TERM.	TEL SET		223A 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		
223A Adapter	M16C Cord	AC	R-G		*		
		AC	G-R		*		
		LK	O-W		27		
		Spare	O-R		*		
		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			
95B-Type Pwr Unit (870A1M)	D-Station Wire	AC1		6			
		AC2		7			
95B-Type Pwr Unit (870A2M)	M2SL-87 Cord	AC1	Y		24 §		
		AC2	BK		24 §		

TABLE D (Cont)

CONNECTIONS – 870A1M OR 870A2M TELEPHONE SET WITH 4A SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		CONNECT TO			
		DESIG	COLOR	44-TYPE BLK. TERM	TEL SET		223A 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				

* Insulate and store.

† Only (Y) and (BK) leads are terminated in plug of M2FG cord.

‡ Accepts D4BU or D6AP-87 mounting cord which connects set to modular connecting block.

§ Connected at factory.

TABLE E

CONNECTIONS – 870A1M OR 870A2M 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		44-TYPE BLOCK TERM.	TEL SET		223A 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		*			
	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			
		S1	S			20			
D-180568 Kit of Parts			SHi	G-W			14		
	VDD		W-G			17			
	SHa		R-BL			26			
	LK		BL-R			27			

TABLE E (Cont)

**CONNECTIONS – 870A1M 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		223A ADAPTER
						PSB	TB	
223A Adapter	M16C Cord	AC	R-G			*		
		AC	G-R			*		
		LK	O-W			27		
		Spare	O-R			*		
		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 [‡]			21		
		K5B	R-BL			*		
		AG	W-O					1
A1	W-BR					2		
95B-Type Pwr Unit (870A1M)	D-Station Wire	AC1			6			
		AC2			7			
95B-Type Pwr Unit (870A2M)	M2SL-87 Cord	AC1	Y			24**		
		AC2	BK			25**		
680-Type Trmtr	D8S Cord							Plugs into Adapter
108-Type LSPK	D20N Cord							
85B1 Pwr Unit	M2FG Cord [¶]	AC	BK					
		AC	Y					

* Insulate and store

† One touch calling switch must be set to ON position.

‡ Accepts D4BU or D6AP-87 mounting cord which connects to modular connecting block.

§ Add strap inside 108-type loudspeaker from terminal 20 to 21.

¶ (Y) and (BK) leads only are terminated in plug of M2FG cord.

** Connected at factory.

TABLE F
CONNECTIONS – 870A1M 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	44-TYPE BLK. TERM:
						PSB	
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		
95B-Type Power Unit (870A1M)	D-Station Wire	AC1				6	
		AC2				7	
95B-Type Power Unit (870A2M)	M2SL-87 Cord	AC1	Y			24†	
		AC 2	BK			25†	

* Insulate and store

† Connected at factory.

‡ Accepts D4BU or D6AP-87 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.

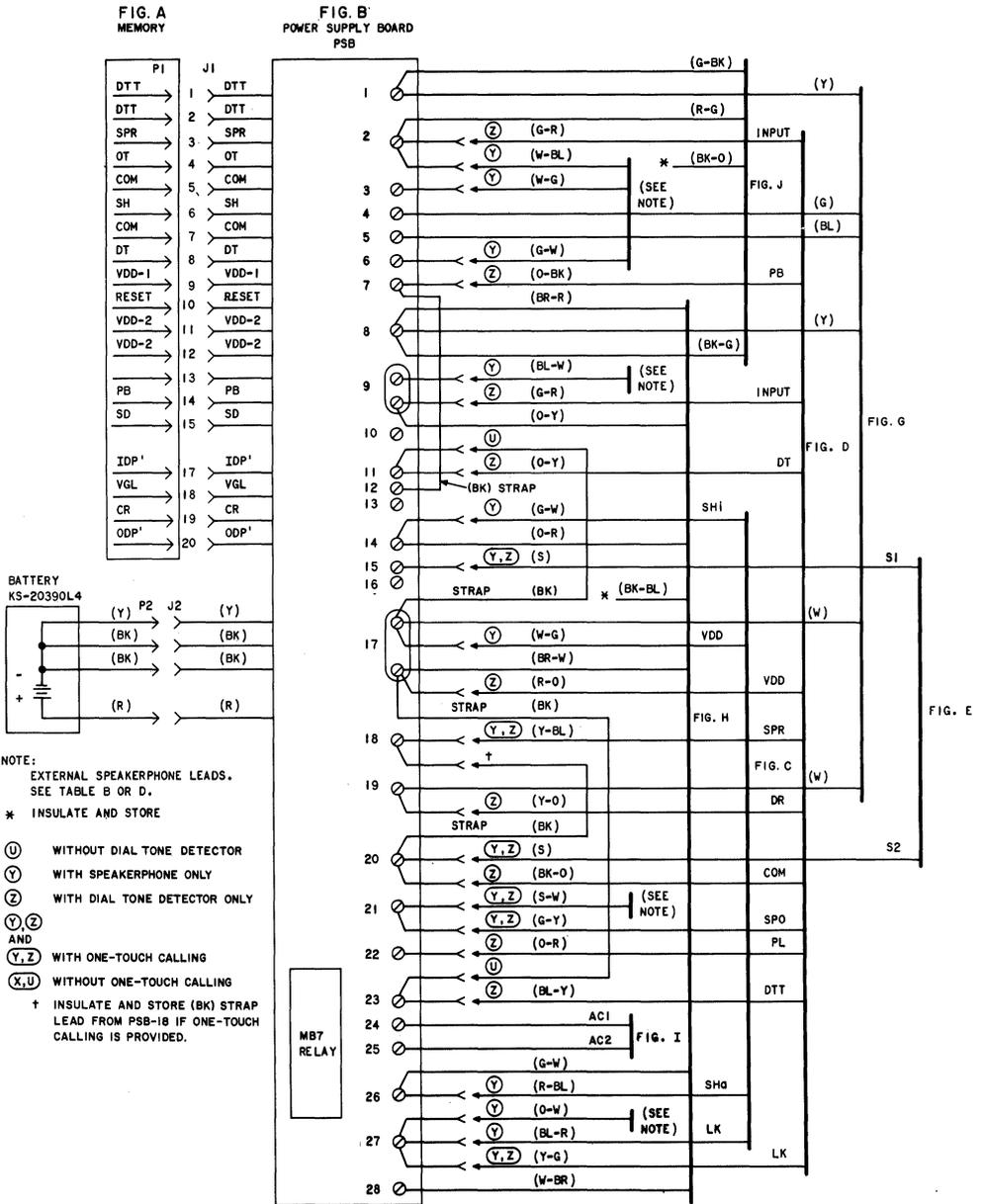


Fig. 7—Telephone Set, Connections (Sheet 1 of 3)

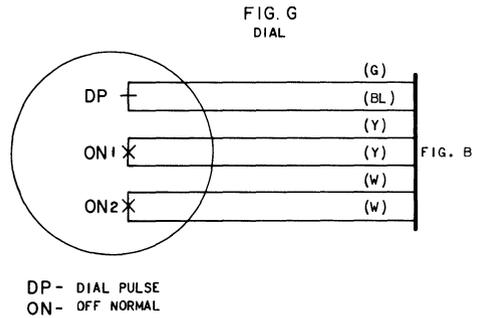
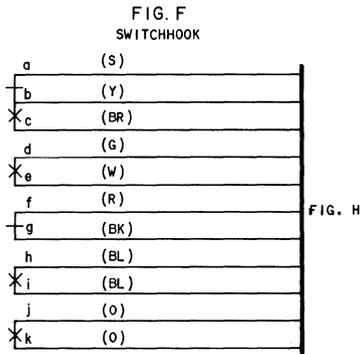
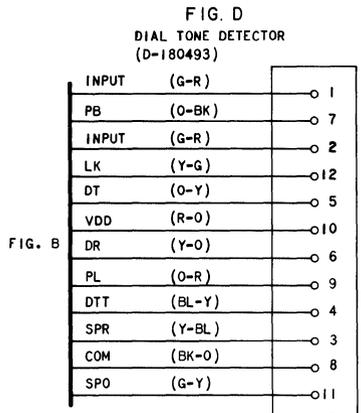
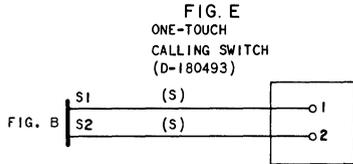
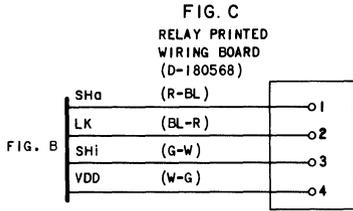
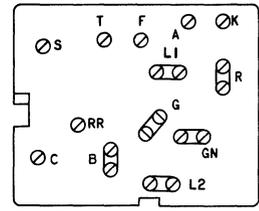
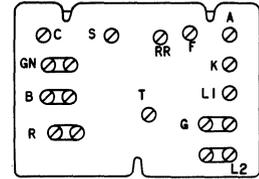
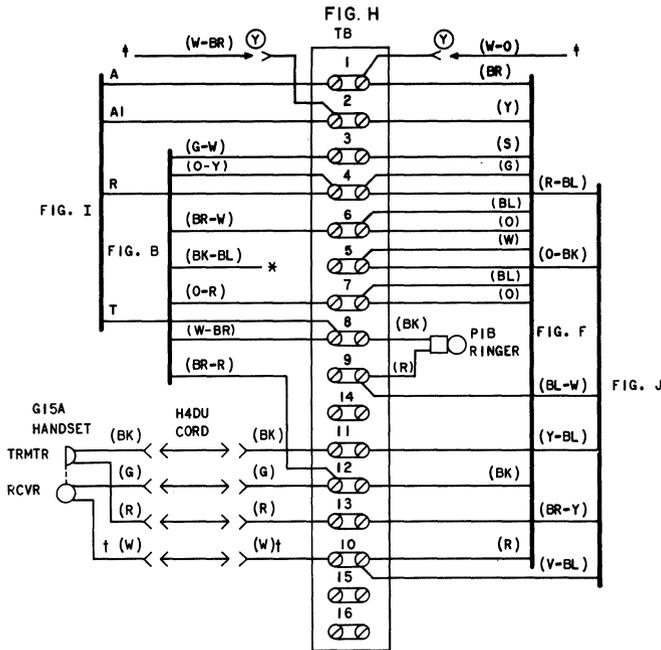


Fig. 7—Telephone Set, Connections (Sheet 2 of 3)

NOTES:
 1. PHYSICAL TERMINAL LAYOUT OF 425-TYPE NETWORK
 2. PHYSICAL TERMINAL LAYOUT OF 4228-TYPE NETWORK



Ⓢ WITH SPEAKERPHONE
 * INSULATE AND STORE
 † IF AMPLIFYING HANDSET IS USED, YELLOW LEAD MUST BE CONNECTED TO TERMINAL 10.
 ‡ EXTERNAL SPEAKERPHONE LEAD. SEE TABLE B OR D.

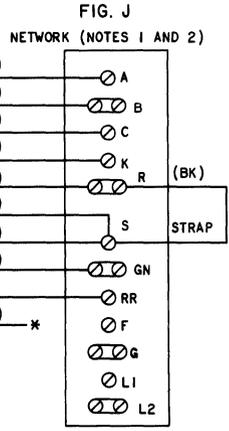
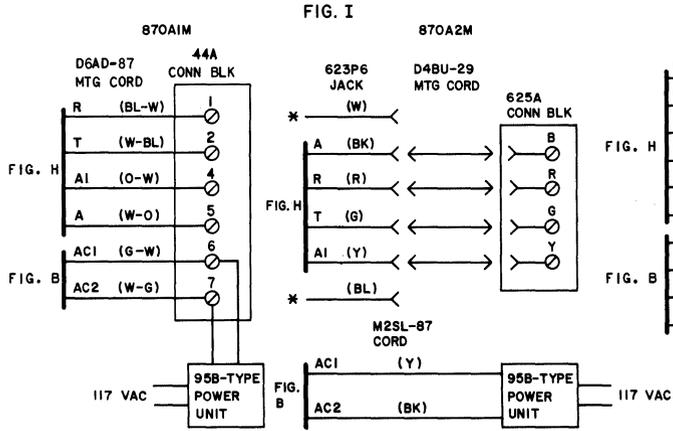


Fig. 7—Telephone Set, Connections (Sheet 3 of 3)

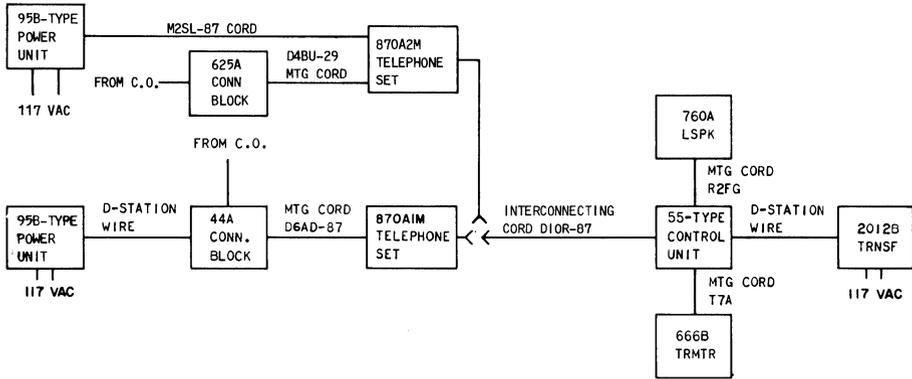


Fig. 8—Block Diagram—Telephone Set With 3B Speakerphone

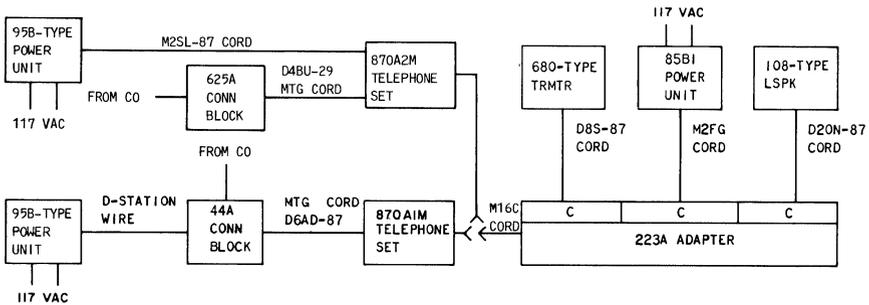


Fig. 9—Block Diagram—Telephone Set With 4A Speakerphone

TABLE G
TROUBLE ANALYSIS – 870A1M OR 870A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead set when off-hook on handset	Set remains dead when 95B-type power unit is disconnected.	Mounting cord improperly connected at equipment end	Check cord connections
			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 when 95B-type 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 95B-type power unit is disconnected.	Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial
			Unknown	Replace telephone set*
		No dialing clicks heard when dial is returning. With 95B-type power unit disconnected, set can manually dial.	Improperly installed or defective Memory	1. Check cable 2. Replace Memory
			Defective PSB	Replace telephone set*

* Refer to 6.02 (4)

TABLE G (Cont)
TROUBLE ANALYSIS – 870A1M OR 870A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
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 d-e switchhook 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
			95B-type 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)
			Battery not plugged in	Plug in battery
			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	1. Check connector cable 2. Replace Memory
			Unknown	Replace telephone set*
		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 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 5.01		
	Defective Memory	Replace Memory		
	Unknown	Replace telephone set*		

* Refer to 6.02 (4).

TABLE G (Cont)

TROUBLE ANALYSIS – 870A1M OR 870A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
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 5.01
			Defective Memory	Replace Memory
8	Cannot dial properly from Memory 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
		MB7 relay does not operate (no click heard) when memory button is depressed	Improper and/or defective strap from PSB terminal 18 to PSB terminal 20	Check and/or replace strap lead. See Fig. 7B
			Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
		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.	Unknown	Replace telephone set*
			WAIT button is stuck down or defective	Free stuck WAIT button or replace Memory
		No digits, random digits or all the same digits in memory location(s). Note: Memory may not have functioned properly at some previous time.	Unknown	Replace telephone set*
			AC power outage for 24 hours or longer	Reestablish AC power and record numbers
No digits, random digits or all the same digits in memory location(s). Note: Memory may not have functioned properly at some previous time.	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		

* Refer to 6.02 (4)

TABLE G (Cont)
TROUBLE ANALYSIS – 870A1M OR 870A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
8 (Cont)			Defective Memory	Replace Memory	
			Unknown	Replace telephone set*	
			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*
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 TOUCH-TONE® 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	
		Addition of strap lead between PSB terminals 20 and 23 corrects problem.	Defective Memory	Replace Memory	
			Defective dial tone detector	Replace D-180493 dial tone detector	
			Unknown	Replace telephone set*	
		Automatically dials through a "wait."	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 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 6.02 (4)

TABLE G (Cont)

TROUBLE ANALYSIS – 870A1M OR 870A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (Cont)				4. Check output of power unit or transformer: 85B1: 18-25 VAC open circuit 2012B: 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 switchhook 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 switchhook 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 switchhook a-b contacts	Replace telephone set*

* Refer to 6.02 (4)

TABLE G (Cont)

TROUBLE ANALYSIS – 870A1M OR 870A2M

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).		108-type loudspeaker not modified	Modify 108-type loudspeaker per note under Table E
		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	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 PSB screw terminals 27 and 21, 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 27 and 21, respectively
Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PSB assembly of D-180493 Kit of Parts			
15	Speakerphone turns on but set 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 20 and 23 on PSB are temporarily shorted.	Precise TOUCH-TONE dial tone not present or a defective dial tone detector	1. Check CO line for presence of precise TOUCH-TONE 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

TABLE G (Cont)

TROUBLE ANALYSIS – 870A1M OR 870A2M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTON	POSSIBLE CAUSE	REMEDIAL ACTION
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

2870A1M AND 2870A2M TELEPHONE SETS TOUCH-A-MATIC® AUTOMATIC DIALER

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL	2	Power Supply Board (PSB) Terminals	11
2. IDENTIFICATION	3	Faceplate Removal	11
Design Features	3	Handset Cradle Removal	11
Optional Features	3	Housing Removal	12
Ordering Guide	3	4. CONNECTIONS	14
Operating Features	5	5. OPERATION	15
3. INSTALLATION	6	Record A Number Into Memory	15
STANDARD INSTALLATION	6	Change A Number In Memory	15
Installation Check Procedure	8	Delete A Number From Memory	15
OPTIONAL APPARATUS INSTALLATION	8	Automatically Dial A Number From Memory	15
D-180492 Kit of Parts	8	LAST NUMBER DIALED Feature	16
D-180493 Kit of Parts	9	End-to-End Signaling	16
KS-20419L1 Buzzer	9	6. MAINTENANCE	16
Plug-Ended Mounting Cord (For converting 2870A1M to 2870A2M)	9	Trouble Analysis	17
Optional Power Connections	10	Battery	17
Head Telephone Set	10	Memory	17
COMPONENT LOCATION AND ACCESS INFORMATION	10	Dial	17
Location of Components	10	Ringer	18
Mounting Cord	11	Buzzer (Optional)	18
Network Terminals	11	Handset Jack	18

NOTICE

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

CONTENTS	PAGE
Handsets	18
Speakerphone	18

1. GENERAL

1.01 This section provides identification, installation, connections, and maintenance information for the 2870A1M (MD) and 2870A2M telephone sets (Fig. 1).

1.02 This section is reissued to:

- Add 2870A2M telephone set
- Show 2870A1M telephone set rated MD

- Show 2870A1M convertible to 2870A2M telephone set
- Add head telephone set information

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

1.03 The 2870A1M (MD) telephone set equipped with D6AD mounting cord or 2870A2M telephone set equipped with 623P6 jack assembly is 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).

Caution: Telephone sets are factory-wired for A-lead control. If set is installed in a location where dial-light service

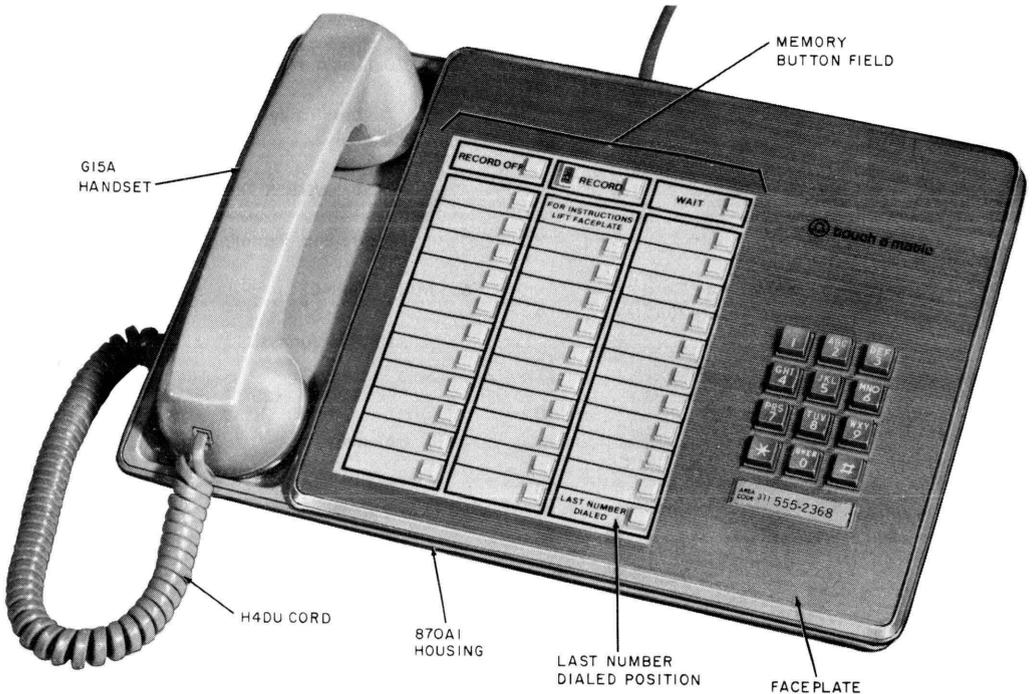


Fig. 1—2870A1M or 2870A2M Telephone Set

is provided the A and A1 leads must be disconnected, insulated, and stored at the connecting block to prevent shorting out dial light transformer.

1.04 The 2870A2M telephone set is shipped with a modular 623P6 mounting cord jack assembly, M2SL-87 power cord, and 95B1 power unit installed.

1.05 The 2870A2M telephone set is field convertible to modular.

1.06 These telephone sets are available in the following colors:

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

2. IDENTIFICATION

2.01 The 2870A1M or 2870A2M telephone set provides all standard features of a normal single line set plus (manual) TOUCH-TONE® dialing, automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED ***scratch pad*** memory.

2.02 Design Features:

- Modular telephone set
- Integrated circuit RC TOUCH-TONE oscillator
- Integrated circuit memory
- Surge protector
- Polarity guard (removable for dry circuit application)
- 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 second dial tone during automatic dialing (WAIT input)
- End-to-end signaling for data application.

2.03 Optional Features:

- Speakerphone—either 3B or 4A speakerphone may be added to stations
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE dial tone (350 and 440 Hz) is present
- One-Touch Calling, (requires both dial tone detector and speakerphone)—depressing one memory button will automatically turn on speakerphone and dial number

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

- Amplifying Handset
- KS-20419L1 Buzzer
- Head Telephone Set Operation.

2.04 All options are implemented by:

- Wiring changes in the telephone set
- Installation of appropriate additional items.

2.05 Ordering Guide:

(a) The 2870A1M (field convertible to modular) or 2870A2M (modular) telephone set is a modular type telephone set and may be ordered complete and ready to install as:

- Set, Telephone, 2870A1M-*
- Set, Telephone, 2870A2M-*

*Add appropriate color suffix (1.06).

(b) ***Ordered Separately:***

TABLE A

OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone	4A	108-type Loudspeaker	10	D, E
		680-type Transmitter	10	D, E
		223A Adapter	10	D, E
		85B1 Power Unit	10	D, E
		D-180492 Kit of Parts	8 C	D, E
	3B	760A Loudspeaker	9	B, C
		666B Transmitter	9	B, C
		55-type Control Unit	9	B, C
		2012B Transformer	9	B, C
		D-180492 Kit of Parts	8 C	B, C
		D6AD-87 Cord	9	B, C
One-Touch Calling	D-180493 Kit of Parts	8 D, E	C, E	
	Speakerphone	8 B	C, E	
Dial Tone Detector	D-180493 Kit of Parts	8 D, E	F	
Adjunct. Key *†	6040-, 6050-, or 6051-Type Key			
Convert 2870A1M to 2870A2M (3.10)	623P6 Jack D4BU Cord, M2SL Cord			
Buzzer, KS-20419L1 (3.09)				
Amplifying Handsets (6.09)		8 H		
Dry Circuit (without Polarity Guard)		8 B		

* 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 switchhook, 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.

- Unit, Power, 95B1 or 95B2 (2870A1M)
- Cord, Mounting, D4BU-29 or D6AP-87 (2870A2M).

(c) **Modular Components:**

(1) The 2870A1M or 2870A2M telephone set also may be ordered in its component parts as follows:

- Housing, 870A1-*
- Faceplate, 2870A2-87
- Handset, G15A-*
- Cord, Handset, H4DU-*
- Base, Telephone Set, 2870AM (2870A1M) or 2870A2M (2870A2M) includes the following:

Dial, 35AG3A

Ringer, P1B

Network

Battery, KS-20390L4

Jack, Handset, 616B

Cord, Mounting, D6AD-87 (2870A1M)

Jack, Mounting Cord, 623P6 (2870A2M)

Cord, Power, M2SL-87, 7-foot (2870A2M)

Unit, Power, 95B1 or 95B2 (2870A2M)

Memory, 2870A

840393672, Directory Sheet Set

Subscriber Instruction Booklet, SIB-2455B.

(d) **Optional Apparatus (order as required):**

- Kit of Parts, D-180492 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)

- Cord, Mounting, D4BU-29 or D6AP-87 (2870A1M conversion to modular)
- Jack, Mounting, 623P6 (2870A1M conversion to modular)
- Cord, M2SL, 7-foot (separate power cord for 2870A1M)
- Buzzer, KS-20419L1
- Handset, Amplifying (G6-*, G7-*, or G8-* type)
- Set, Head Telephone
- Cord, M16G-87, 2- and 7-foot (required for head telephone set operation)
- Adapter, 274A-50 (required for head set operation).

*Add appropriate color suffix (1.06).

2.06 Operating Features (Fig. 2):

- Dial (TOUCH-TONE 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 field, 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].

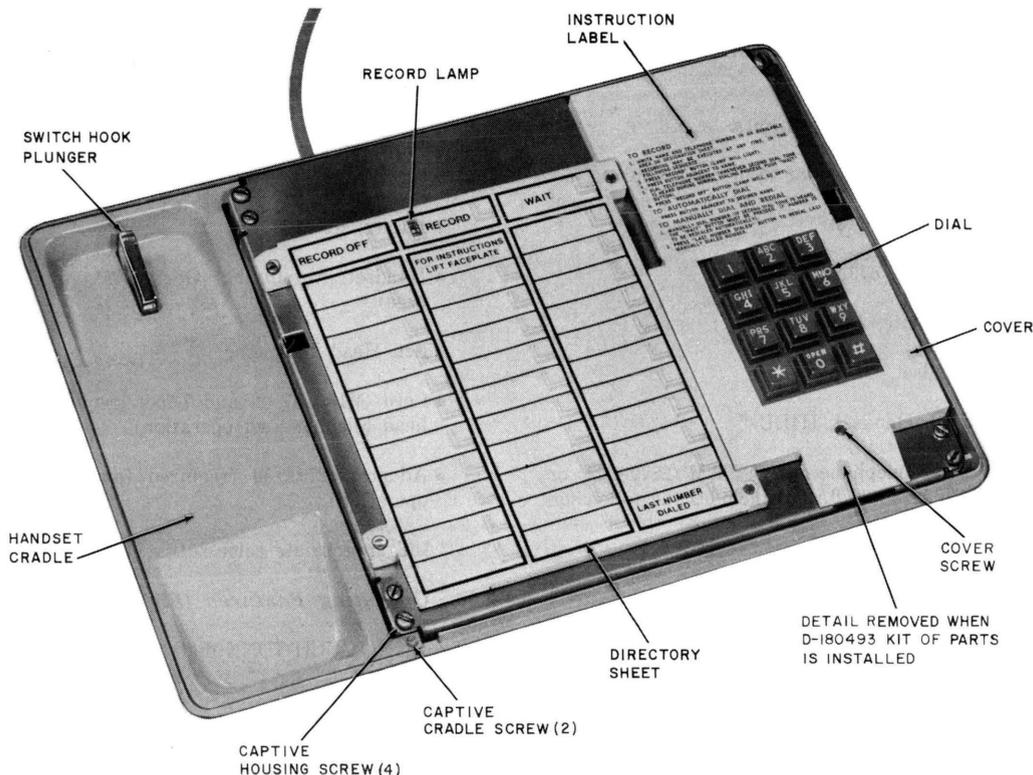


Fig. 2—Telephone Set—Faceplate and Handset Removed

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).

Caution: 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. 6).

3.03 Install power unit as follows:

- (1) For the 2870A1M, install the 95B-type 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 and connected to the telephone set by the (G-W) and (W-G) conductors in the mounting cord. Alternatively

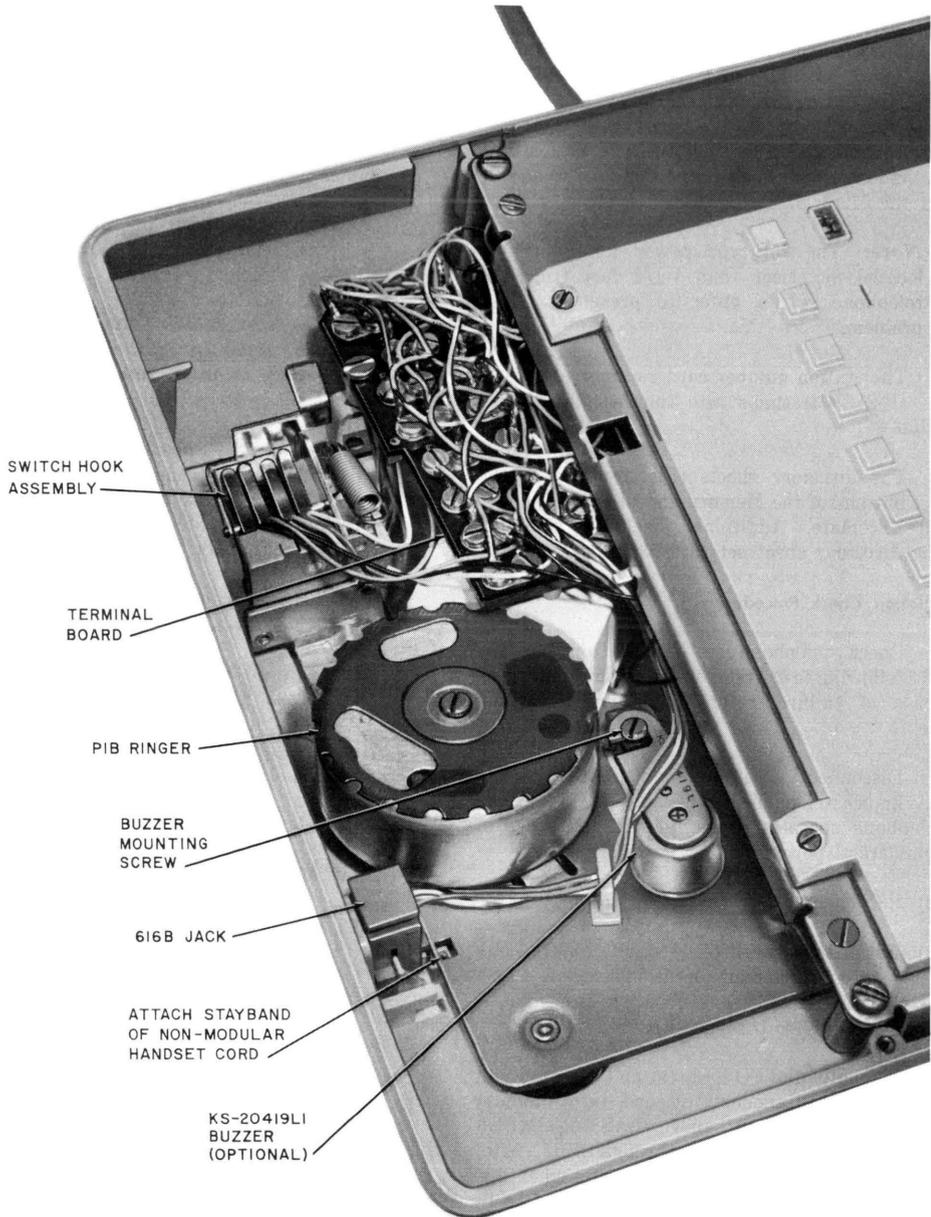


Fig. 3—Telephone Set With Faceplate, Handset, and Handset Cradle Removed

it may be connected 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.

- (2) For the 2870A2M the 95B-type power unit is factory-wired to PSB terminals 30 and 31 via the M2SL-87 cord.

Note: The 95B-type 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).

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 G.

- (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 all memory locations except LAST NUMBER DIALED and location immediately above it [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 [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) Depress buttons of memory locations recorded in Step (3) and verify that correct signal is returned from test circuit each time.



The KS-20390L4 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 button previously used to record in Step (4). The set should automatically turn the speakerphone on and dial the number.

OPTIONAL APPARATUS INSTALLATION

D-180492 Kit of Parts

- 3.07** To install:

- (1) Proceed as described in 3.17.
- (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.

D-180493 Kit of Parts**3.08** To install:

- (1) Remove the housing (3.20), and access PSB terminal board (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 chassis.
- (3) Lock the board into position by inserting the accompanying screw from the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.
- (5) Make connections per Table C, E, or F.

Note: If dial tone detector is being used without speakerphone option, make connections for the D-180493 Kit of Parts as shown in Table F.

- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.

KS-20419L1 Buzzer**3.09** To install:

- (1) Remove faceplate (3.18) and place handset aside.
- (2) Remove handset cradle (3.19).
- (3) Remove screw from buzzer mounting bracket, and mount buzzer on bracket as shown in Fig. 3.
- (4) Connect two blue buzzer leads to TB-11 and TB-12 and connect to 10-volt AC external circuit by changing the 623P6 jack connections as follows:

(a) With no A lead control:

- (1) Move (BK) from TB1-1 to TB-11.
- (2) Move (Y) from TB-2 to TB-12.

- (3) Connect buzzer power to appropriate terminals of modular connecting block.

(b) With A lead control, use D6AP-87 cord and:

- (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 (3.19 and 3.18).

Plug-Ended Mounting Cord (converting 2870A1M to 2870A2M)**3.10** To convert:

- (1) Remove the housing (3.20) and access the PSB terminals (3.17).
- (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 (W) and (BL) conductors.
- (5) Connect (W) 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 95B-type power unit.
- (7) Reassemble the set.
- (8) Install a 625-type connecting block.
- (9) Install the D4BU mounting cord.

Optional Power Connections

3.11 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) **2870A1M:** A M2SL-87 cord may be used to connect the 95B-type power unit to the telephone set.

- (1) Remove the housing (3.20).
- (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:** AC power may be wired in at the connecting block and brought to the set via the mounting cord.

- (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-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 D6AP-87 cord.
 - (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 86A connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.

Head Telephone Set**3.12 To install:**

- (1) Remove housing (3.20).
- (2) Access PSB terminal area (3.17).
- (3) Remove cradle (3.19).
- (4) Thread set side of M16G-87 cord from 274A-50 adapter through hole in rear of housing and attach to telephone set as described in Section 463-247-100.
- (5) Make connections per appropriate table in Section 463-247-100.
- (6) Reassemble telephone set.
- (7) Insert head telephone set plug into adapter.

COMPONENT LOCATION AND ACCESS INFORMATION**Location of Components**

3.13 The components are located in three areas as follows:

- (a) Under the handset cradle (Fig. 3):
 - Buzzer (optional)
 - Ringer

- Switchhook assembly
 - Handset jack
 - Terminal board (TB)
- (b) Under the faceplate, inside the set (Fig. 4 and 5):
- Battery jack (Fig. 5)
 - Power supply (PSB) terminal area (Fig. 4)
 - Network (Fig. 4)
 - Options (Fig. 4):
 - D-180492 (relay kit for speakerphone)
 - D-180493 (dial tone detector and one-touch calling switch kit)
 - D-180494 (2/4-wire relay kit).
- (c) Bottom of telephone set (Fig. 6):
- Battery.

Mounting Cord

- 3.14** 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.
- 3.15** The D4BU (2870A2M) plug-ended mounting cord conductors provide for tip, ring, and A lead control.

Note: If two extra leads are required, a D6AP-87 cord may be used.

Network Terminals

- 3.16** For access to the network terminals:
- (1) Remove the faceplate (3.18).
 - (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.

Power Supply Board (PSB), Terminals

- 3.17** To access the terminal field on the power supply board, proceed as follows:
- (1) Remove the faceplate (3.18).
 - (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 disconnect 12 position plug from PSB.
 - (6) Rotate dial over onto the Memory field.
 - (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.

Faceplate Removal

- 3.18** The 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.

Handset Cradle Removal

- 3.19** To remove the handset cradle from the housing, proceed as follows:
- (1) Remove the faceplate (3.18), and place the handset aside.
 - (2) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
 - (3) Lift the cradle, by pulling up on the plunger, and remove.

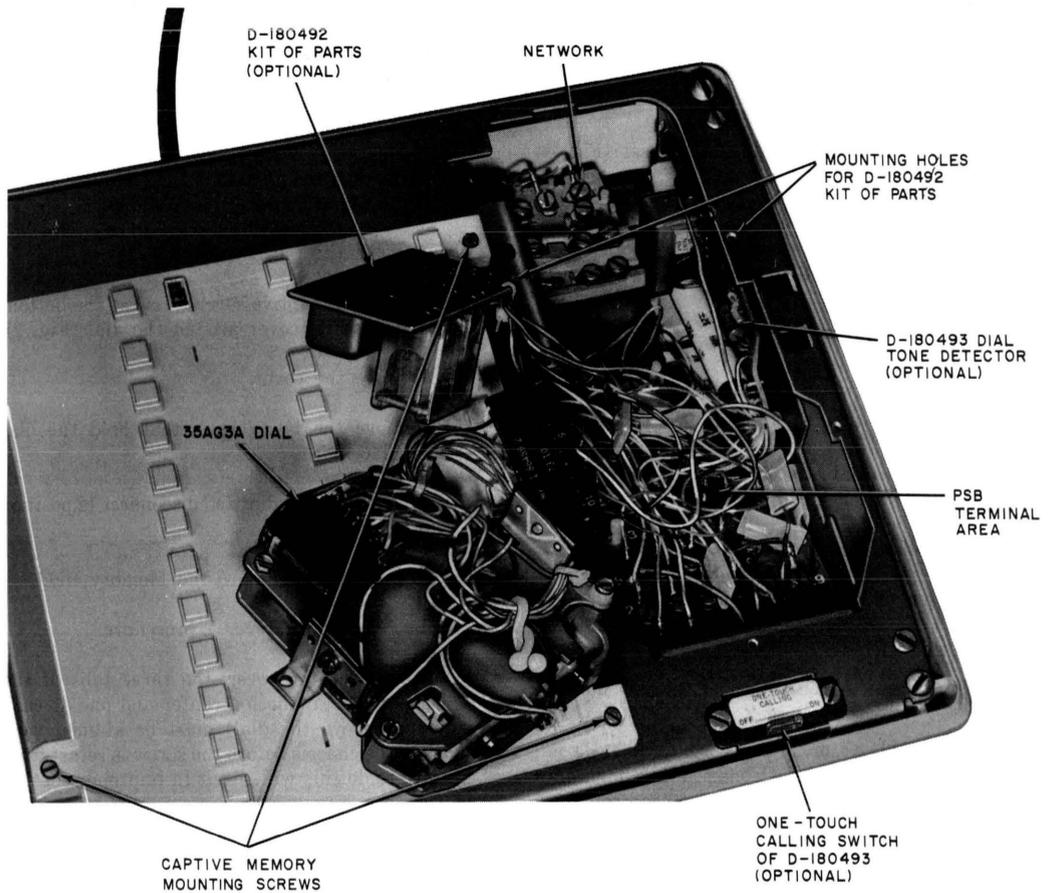


Fig. 4—Telephone Set—Dial Removed to Show Terminal Area

- (4) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

Caution: *The 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) Refasten the captive cradle screws.

Housing Removal

3.20 To remove, proceed as follows:

- (1) Unplug the handset cord, at the telephone set end and remove handset.
- (2) Remove the faceplate (3.18).
- (3) Remove the handset cradle (3.19).

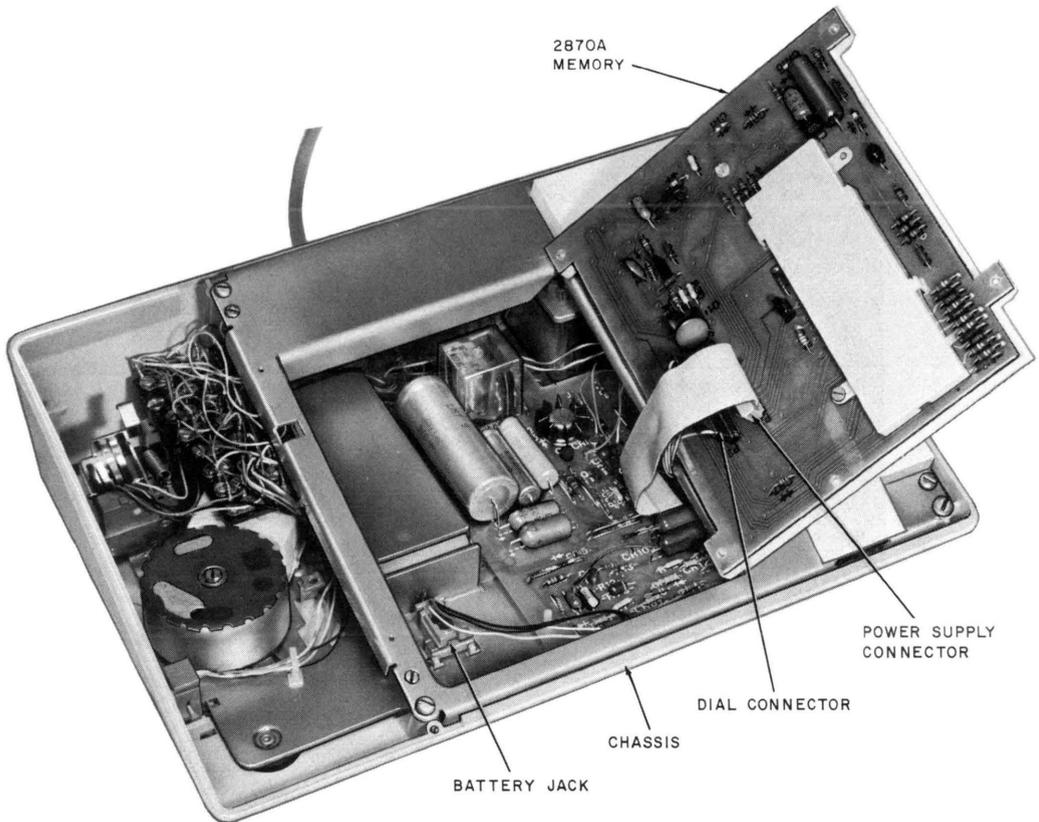


Fig. 5—Telephone Set, Internal View, Overall

Caution: Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.

- (4) Disengage only the four captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
- (5) Unplug mounting cord (2870A2M).
- (6) Separate the housing from the telephone set base.
- (7) Disconnect power unit from M2SL-87 cord, if required (2870A2M).
- (8) Feed cord through hole in bottom of housing as housing is removed.
- (9) 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.

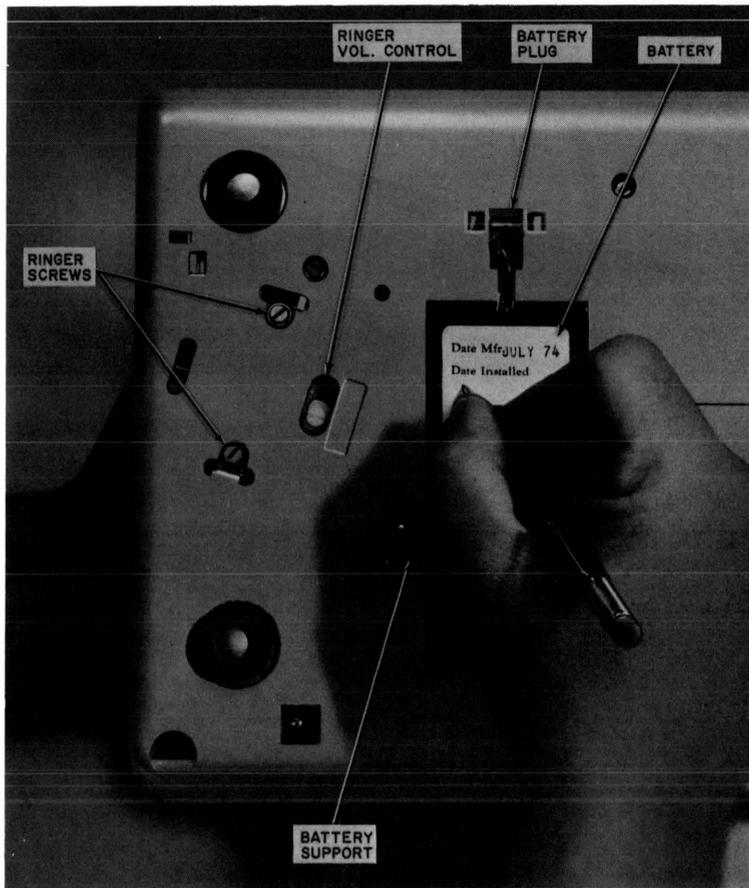


Fig. 6—Telephone Set, Bottom View

(10) When replacing the housing, keep the handset jack from being trapped between the housing and chassis.

4. CONNECTIONS

4.01 Telephone set connections are shown in Fig. 8.

4.02 Refer to Table A for connection reference for all options.

4.03 A partial functional schematic is shown on Fig. 11.

Caution: 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.

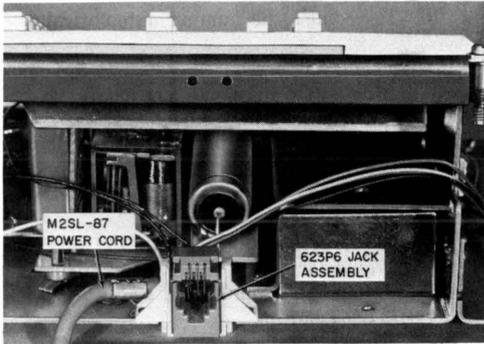


Fig. 7—2870A2M Telephone Set, Partial View With 623P6 Jack Installed

5. OPERATION

Record A Number Into Memory

5.01 To record:

- (1) Remove the faceplate (3.18).
- (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:

- (a) Dial the access digit(s).
- (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 switchhook, line key, or speakerphone operation.

Change A Number Into Memory

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

Delete A Number From Memory

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.

Automatically Dial A Number From Memory

5.04 To automatically dial a number:

- (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 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.

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.

5.06 Operation of LAST NUMBER DIALED feature:

- (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 are required:
 - (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:

- (a) For factory-wired sets, 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.
- (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.

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 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. 8B). Set is factory-wired with V option.

- (a) 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) 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.

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.

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 G and the following paragraphs.
- (4) If removal of set is required, proceed as follows:
 - (a) Disconnect telephone set.
 - (b) Unplug battery.
 - (c) Place plug sideways into housing slot below battery jack and tape in place.

Caution: Failure to restrain plug can result in plug damage necessitating battery replacement.

Battery

6.03 The 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. 6):

- (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 and check new battery (3.06).

Memory

6.04 The 2870A Memory may be replaced as follows:

Note: Removal of the Memory results in loss of the stored numbers.

- (1) Remove the faceplate (3.18).
- (2) Loosen the four captive screws of the Memory (Fig. 4).
- (3) Rotate the left edge of the Memory upward as shown in Fig. 5.
- (4) Disengage the two connectors by pulling them perpendicular to the board.
- (5) 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 gray power supply cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board.
- (6) Reassemble set.
- (7) Test per 3.06.

Dial

6.05 To replace:

- (1) Proceed per 3.17.
- (2) Loosen the four captive screws of the Memory (Fig. 4).
- (3) Gently raise the left side of the Memory and rotate to position shown in Fig. 5. This will expose 10-position dial connector.

Caution: Do not remove the gray power supply connector in the process of changing the dial, since this will result in complete loss of stored telephone numbers.

- (4) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (5) Lift the dial out.

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(6) 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.

Ringer

6.06 To replace:

- (1) Remove the faceplate (3.18) and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Disconnect ringer leads (Fig. 8H).
- (4) Tilt the front of the set up.
- (5) Unfasten ringer mounting screws (Fig. 6).
- (6) Remove ringer.
- (7) 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.
- (8) Reassemble set (3.19 and 3.18).

Buzzer (optional)

6.07 To replace:

- (1) Remove the faceplate (3.18), and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Remove the buzzer mounting screw.
- (4) Remove buzzer leads from the terminal board.
- (5) Install new buzzer.
- (6) Reassemble telephone set (3.19 and 3.18).

Handset Jack (616B)

6.08 To replace:

- (1) Remove the faceplate (3.18), and place handset aside.

(2) Remove the cradle (3.19).

(3) Disconnect the handset jack leads and remove jack.

(4) Install new 616B handset jack.

(5) Reassemble set (3.19 and 3.18).

Handsets

6.09 A defective G15A handset may be replaced by unplugging the H4DU cord and inserting it into a new handset. To replace the G15A handset with a G3A handset or a G6-, G7-, or G8-type amplifying handset, proceed as follows:

- (1) Unplug H4DU handset cord at telephone set end.
- (2) Remove faceplate (3.18), and place handset aside.
- (3) Remove handset cradle (3.19).
- (4) Disconnect 616B handset jack (6.08). (Jack may be removed or stored just to right of ringer.)
- (5) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (6) Attach stayband hook to chassis (Fig. 3).
- (7) Route leads through wire guide as shown in Fig. 3.
- (8) Make connections (Fig. 8H).
- (9) Reassemble telephone set (3.19 and 3.18).

SPEAKERPHONE

6.10 For maintenance information on the 3B or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively.

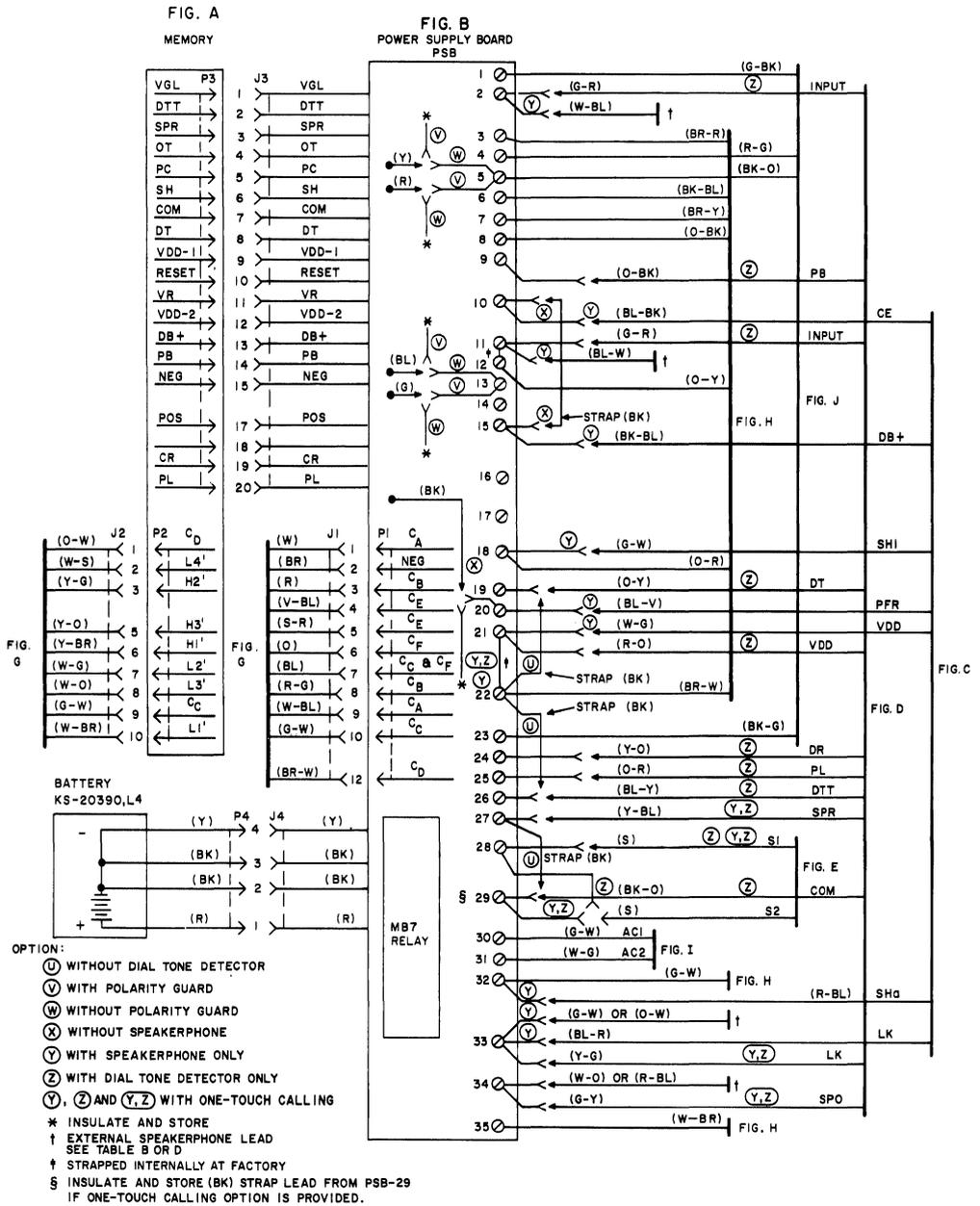


Fig. 8—Telephone Set, Connections (Sheet 1 of 4)

FIG. C
RELAY PRINTED
WIRING BOARD
(D-180492)

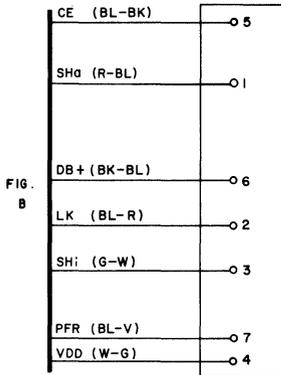


FIG. E
ONE-TOUCH
CALLING SWITCH
(D-180493)

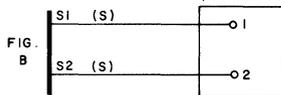


FIG. D
DIAL TONE DETECTOR
(D-180493)

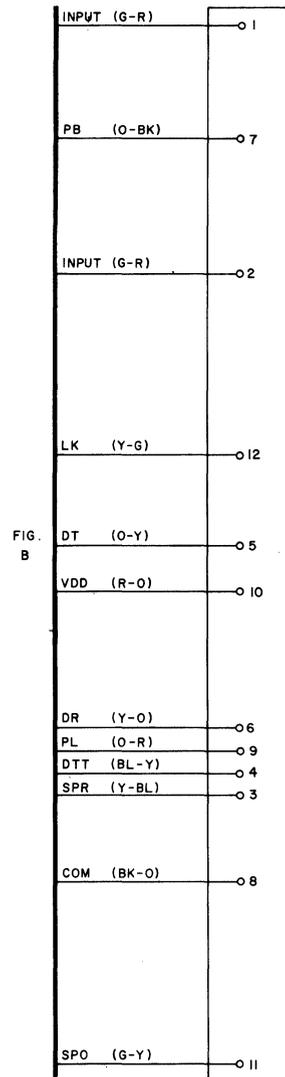


Fig. 8—Telephone Set, Connections (Sheet 2 of 4)

FIG. F
SWITCHHOOK

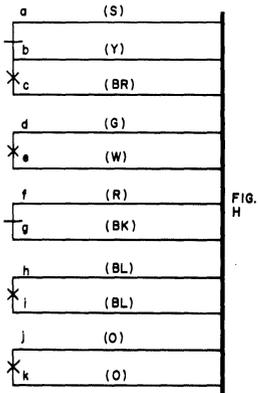


FIG. G
DIAL
COMMON SWITCH

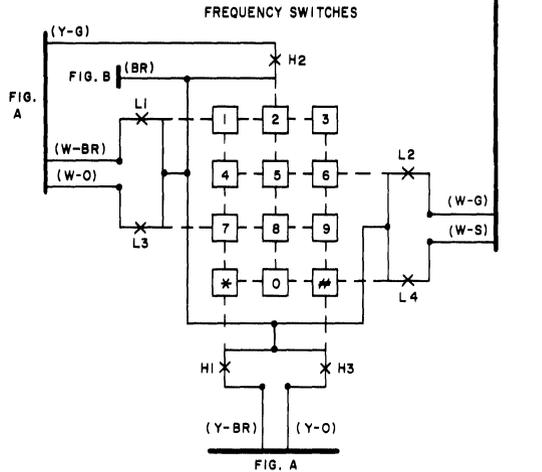
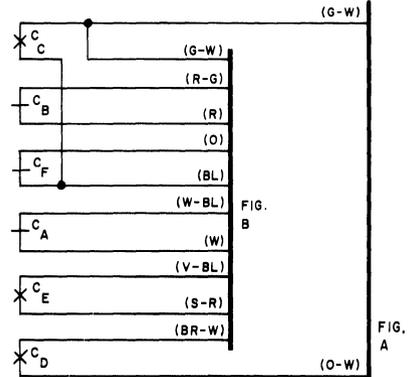


Fig. 8—Telephone Set, Connections (Sheet 3 of 4)

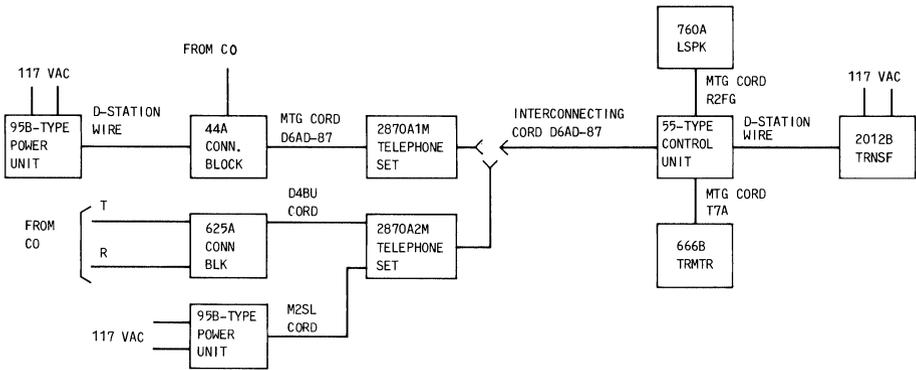


Fig. 9—Block Diagram—Telephone Set With 3B Speakerphone

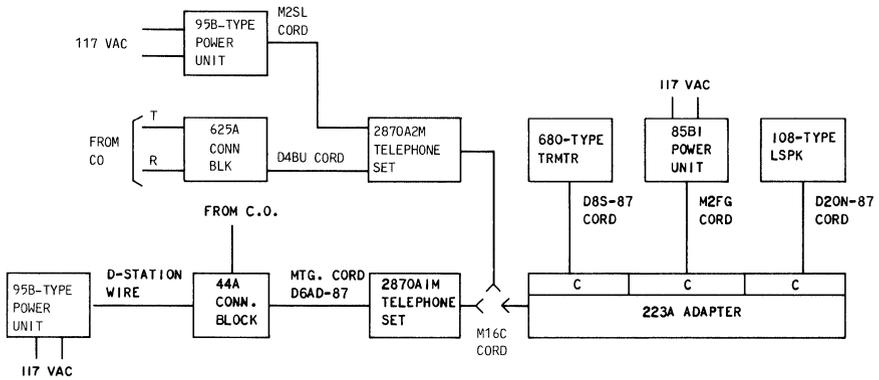


Fig. 10—Block Diagram—Telephone Set With 4A Speakerphone

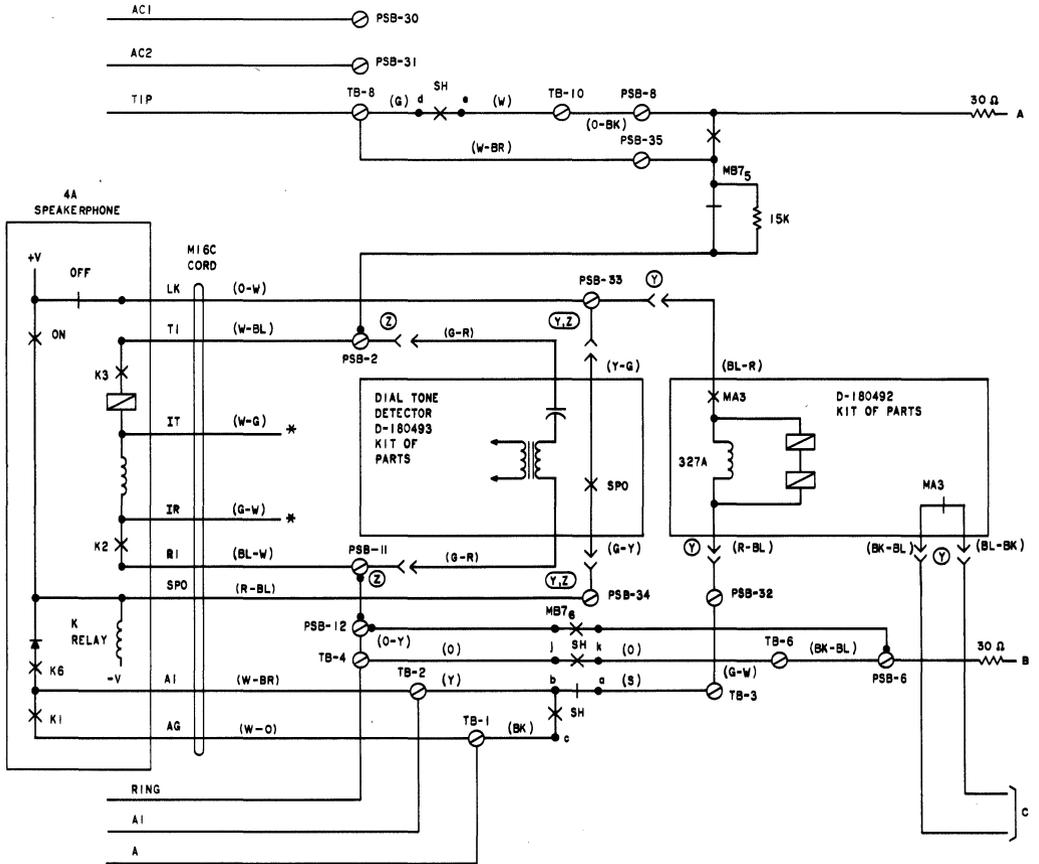


Fig. 11—Telephone Set—Partial Functional Schematic (Sheet 1 of 2)

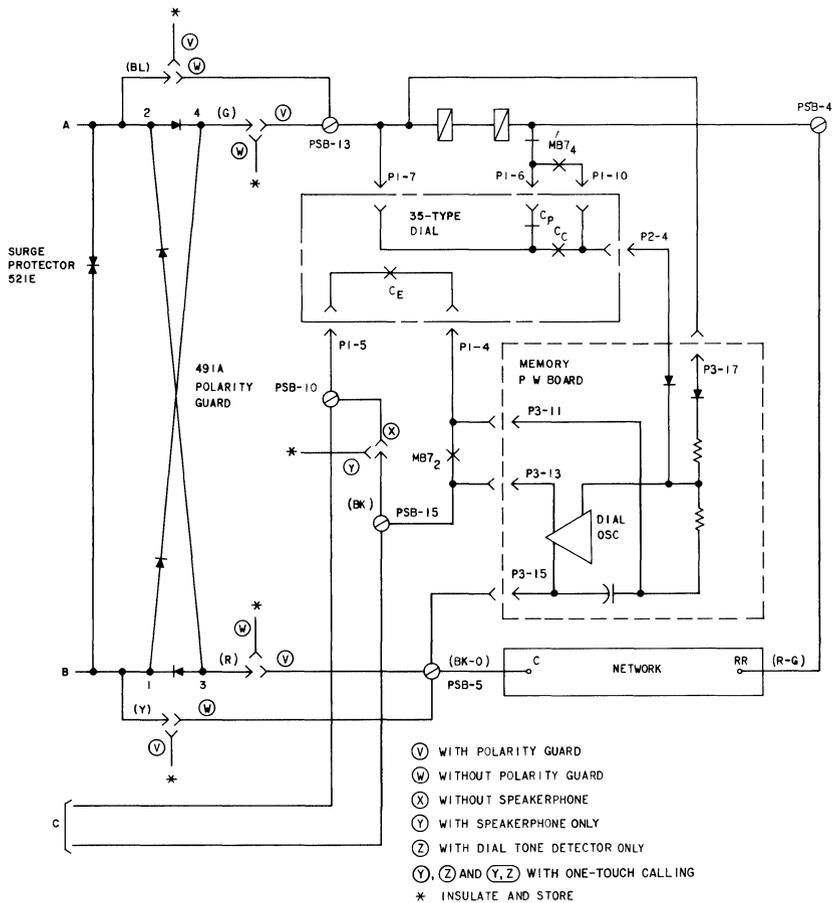


Fig. 11—Telephone Set—Partial Functional Schematic (Sheet 2 of 2)

TABLE B

CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH 3B SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT						
					FROM		TO				
		DESIG	COLOR	REMOVE FROM PSB	TEL SET		44-TYPE BLOCK TERM.	TEL SET	CONTROL UNIT (NOTE)		
					PSB	TB		PSB	55A	55B	
Tel 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				*	*
		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 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	

TABLE B (Cont)

CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH 3B SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT					
				REMOVE FROM PSB	FROM	TO				
		TEL SET			44-TYPE BLOCK TERM.	TEL SET	CONTROL UNIT (NOTE)			
		PSB	TB			PSB	55A	55B		
760A LSPK	R2FK Cord	SP1	G						34	20
		SP2	R						33†	29†
95B-Type Power Unit (2870A1M)	D-Station Wire	AC1				6				
		AC2				7				
95B-Type Power Unit (2870A2M)	M2SL-87 Cord	AC1	Y					30§		
		AC2	BK					31§		
2012B Trnsf	D-Station Wire	AC1							27	27
		AC2							36	36

* Insulate and store.

† To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

‡ Accepts D4BU or D6AP mounting cord which connects set to modular connecting block.

§ Connected at battery.

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B). If a 55A control unit is used it must have been modified for use with TOUCH-TONE® set. Control units having this modification are stamped 55A* (Modified).

TABLE C

CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,
(DIAL TONE DETECTOR AND 3B SPEAKERPHONE)

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT						
				REMOVE FROM PSB	FROM		TO				
					TEL SET		44-TYPE BLOCK TERM.	TEL SET	CONTROL UNIT (NOTE)		
		PSB	TB		PSB	55A		55B			
Tel 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				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					

TABLE C (Cont)

**CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,
(DIAL TONE DETECTOR AND 3B SPEAKERPHONE)**

APPARATUS		CORD OR WIRE	LEAD		TEL SET		CONNECT						
					REMOVE FROM PSB	FROM		TO			CONTROL UNIT (NOTE)		
			DESIG	COLOR		TEL SET		44-TYPE BLOCK TERM.	TEL SET PSB	55A			55B
						PSB	TB			PSB	55A	55B	
D-180493 Kit of Parts (cont)	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 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†		
95B-Type Power Unit (2870A1M)	D-Station Wire		AC1					6					
			AC2					7					
95B-Type Power Unit (2870A2M)	M2SL-87 Cord		AC1	Y					30¶				
			AC2	BK					31¶				
2012B Trnsf	D-Station Wire		AC1							27	27		
			AC2							36	36		

* Insulate and store.

† To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

‡ Accepts D4BU or D6AP mounting cord which converts set to modular connecting block.

§ One-touch calling switch must be set to ON position.

¶ Connected at factory.

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B). If a 55A control unit is used it must have been modified for use with TOUCH-TONE® set. Control units having this modification are stamped: 55A* (Modified).

TABLE D

CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH 4A SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO				
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223A ADAPTER	
					PSB	TB			
Tel 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		
223 A Adapter	M16C 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		

TABLE D (Cont)

CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH 4A SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO			
		DESIG	COLOR	REMOVE FROM PSB	TEL SET		44-TYPE BLK TERM.	223A ADAPTER
					PSB	TB		
95B-Type Power Unit (2870A1M)	D-Station Wire	AC1					6	
		AC2					7	
95B-Type 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	M2FG Cord †	AC	BK					
		AC	Y					

* Insulate and store.

† Only (Y) and (BK) leads are terminated in plug of M2FG Cord.

‡ Accepts D4BU or D6AP mounting cord which connects set to modular connecting block.

§ Connected at factory.

TABLE E

CONNECTIONS – 2870A1M 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.	223A ADAPTER	
					PSB	TB			
Tel 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	19	*				
		Strap	BK	20	*				
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		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				
	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				

TABLE E (Cont)

CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)

APPARTUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO			
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223A ADAPTER
					PSB	TB		
D-180492 Kit of Parts (Cont)		PFR	BL-V		20			
		VDD	W-G		21			
223A Adapter	M16C 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†		34			
		K5B	R-BL		*			
		AG	W-O					
A1	W-BR		2					
95B-Type Power Unit (2870A1M)	D-Station Wire	AC1					6	
		AC2					7	
95B-Type 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					

* Insulate and store.

† Add strap inside 108-type loudspeaker from terminal 20 to 21.

‡ Accepts D4BU to D6AP mounting cord which connects to modular connecting block.

§ Connected at factory.

¶ One-touch calling switch must be set to ON position.

** (Y) and (BK) leads are terminated in plug of M2FG cord.

TABLE F

**CONNECTIONS – 2870A1M OR 2870A2M TELEPHONE SET WITH
DIAL TONE DETECTOR**

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO		
		DESIG	COLOR		TEL SET PSB	44-TYPE BLK TERM.	
Tel 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		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			28†	
		S2	S			28†	
95B-Type Power Unit (2870A1M)	D-Station Wire	AC1				6	
		AC2				7	
95B-Type Power Unit (2870A2M)	M2SL-87 Cord	AC1	Y			30 ¶	
		AC2	BK			31 ¶	

* Insulate and store.

† Switch not used for this option.

‡ Accepts D4BU or D6AP mounting cord which connects set to modular connecting block.

§ One-touch calling switch must be set to ON position.

¶ Connected at factory.

TABLE G

TROUBLE ANALYSIS – 2870A1M 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 switchhook 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 abset. No audible TOUCH-TONE® signal	12-pin connector of 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 signals heard when dial buttons are depressed Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook
		No audible TOUCH-TONE 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 assembly
			Unknown	Replace telephone set*

* Refer to 6.02(4)

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M 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	AC power not present	Check for commercial power
			95B-type 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)
			Battery plug not connected	Connect battery plug
			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
			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 or Lamp does not momentarily turn off when a dial button is depressed	Defective logic	Replace Memory
			Unknown	Replace telephone set*

* Refer to 6.02(4)

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
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	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 5.01 2. See No. 7	
			Battery plug not connected	Connect battery plug	
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE signal present	Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 8 (B).	
			Defective logic	Replace Memory	
			Defective switchhook 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 signal present
Audible gap in train of digits being dialed					

* Refer to 6.02(4)

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Cont)		Digit dialed too rapidly (fast dialer)	Noise on AC power line	<ol style="list-style-type: none"> 1. Minimize wire length between 95B-type power unit and telephone set 2. Insert 145A filter between 95B-type power unit and commercial power outlet
		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"> 1. Plug in the KS-20390L4 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
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"> 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	<ol style="list-style-type: none"> 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 6.02(4)

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M 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"> 1. Check connections per Table B, C, D, or E 2. Check that speakerphone power unit is plugged into commercial AC power outlet 3. Check for commercial power 4. Check speakerphone power unit for correct correct output. (85B1 power unit, 18 to 25 VAC across secondary screw terminals) (2012B transformer, 15 to 18 VAC across secondary screw terminals).
			Improper connections or defective 95B-type power unit	<ol style="list-style-type: none"> 1. Check connections 2. Check or replace 95B-type power unit (should read 13.4 to 18 VAC across screw terminals 30 and 31 on PSB)
		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 switchhook 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 switchhook a-b contacts	Replace telephone set*

* Refer to 6.02(4)

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
13	RECORD lamps 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 switchhook 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 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 6.02(4).

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M 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
			108-type loudspeaker not modified	Modify 108-type loudspeaker per note under Table E
		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 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 dial tone detector D-180493 Kits 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 440Hz) 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

TABLE G (Cont)

TROUBLE ANALYSIS – 2870A1M OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
20	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 switchhook sequence between a-b and h-i contacts	1. Remove handset more slowly from handset 2. Replace telephone set*
21	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	Precise TOUCH-TONE® dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Battery plug not connected	Connect battery plug
			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 6.02(4).

960A01M TELEPHONE SET (TOUCH-A-MATIC® 16 SET)

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL	1	Automatically Dial A Number From Memory	14
2. IDENTIFICATION	2	LAST NUMBER DIALED Feature	14
Design Features	2	Access Code	14
Optional Features	3	Speakerphone Option	14
Operating Features	3	Multiline Service	14
Ordering Guide	3	6. MAINTENANCE	15
3. INSTALLATION	5	Return Procedure	15
Installation Check Procedures	7	Trouble Analysis	15
COMPONENT LOCATION AND ACCESS INFORMATION	9	Battery	15
Location of Components	9	Memory	15
Access of Components	10	11E Dial	16
Faceplate Removal	10	P1A Ringer	16
Upper Housing Removal	11	Handset Jack	17
Lower Housing Removal	11	7. CONVERSION FROM DESK SET TO WALL SET	17
Power Supply Board (PSB) Terminals	11	8. CORD DRESSING FOR OPTIONAL SERVICES (ADJUNCTS)	19
4. CONNECTIONS	11	1. GENERAL	
5. OPERATION	11	1.01 This section contains identification, installation, connections, operations, and maintenance information on the 960A01M 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.	
Record A Number Into Memory	12		
Change A Number In Memory	13		
Delete A Number From Memory	14		

NOTICE

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

1.02 This section is reissued to:

- Add information on shield
- Add connections for multiline service
- Add new Fig. 18
- Revise Fig. 3, 5, 6, 10, 12, 13, 14, and 19
- Revise Tables B, C, D, and F.

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, or 6A 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.

2.02 Design Features:

- Modular telephone set
- Integrated circuit memory



Fig. 1—960A01M Telephone Set

- 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.

2.03 *Optional Features:*

- Selective ringing
- Tip party with identification ground
- 4-party full selective or 8-party semiselective ringing using an 11-type extender, 426N diode, or 28A ringer isolator as a coupling device
- A-lead control for 1A1, 1A2, and 6A key telephone systems
- Speakerphone—either 3B or 4A speakerphone may be interfaced with the telephone set

Note: For use with a speakerphone, all dialing must be performed with the handset off-hook (5.08). Speakerphone and tip party identification options cannot be provided at the same time.

- ♦Multiline service—using adjunct key

Note: Replacing the handset each time a line is changed assures proper dialer operation (5.09).♦

- 107-type loudspeaker set (SPOKESMAN® unit) may be interfaced with the telephone set (See Section 463-221-100).

- ♦274A adapter—provides interface with headset (Section 463-247-100).♦

2.04 *All options are implemented by:*

- Wiring changes in the telephone set
- Installation of appropriate additional items.

2.05 *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.

2.06 *Ordering Guide:*

- The 960A01M telephone set is a modular type set and may be ordered as follows:
 - Set, Telephone, 960A01M-50

SECTION 503-301-100

This includes:

- (1) Adapter, 248A (to connect D4BU modular cord to 2012B transformer) Fig. 2.
- (2) Plug, 523B4, (used when converting from a desk set to a wall set) Fig. 10.
- (3) Cord, Handset, H4DU-50.
- (4) All components listed in (c) Replaceable Components except faceplate and D4BU-29 cords.

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 9 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 subscribers premises. Cardboard insert shipped with set is discarded at time of installation.

(b) Ordered separately:

- Transformer, 2012B (required to provide AC power for operation of the automatic dialer)

Note: A 2012A transformer shall not be substituted for a 2012B, as proper operation can not be assured.

- ♦Clamp, 2A (used to secure 2012B transformer to outlet)♦
 - Faceplate, 60A-* (See Table A)
 - Cord, Mounting, D4BU-29
 - Cord, Mounting, D4BU-29 (power cord, maximum 14 feet)
 - ♦Cord Clips B (for dressing cords as needed)♦
- (c) Replaceable components which may be ordered separately as follows:**
- Lower Housing Assembly, 60AL-50
 - Upper Housing Assembly, 60AU-50
 - Faceplate, 60A-* (See Table A)
 - Handset, K1B-50
 - Cord, Handset, H4DU-50
 - Cord, Mounting, D4BU-29
 - Cord, Mounting, D4BU-29 (Power Cord, maximum 14 feet)
 - Jack, Handset, 616J
 - Battery, KS-20390L5
 - Ringer, P1A
 - Dial, 11E
 - Memory, 960A (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
 - ♦841388713 Shield (Fig. 4)♦
 - Subscriber Instruction Booklet (SIB-2480C)

(d) *Optional apparatus*

- See Table B for apparatus required

*Add appropriate color suffix per Table A.

3. INSTALLATION

Caution: Do not turn on the battery switch or plug in the 2012B 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. 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.

3.02 Lay shield aside and make all wiring changes and telephone set modifications (Table B) before external connections are made to the set (4.01). Remove upper housing (3.15), if necessary, for set modification.

Caution: Protection of the integrated circuits from static discharge depends on the black (BK) lead from the shield being connected to earth ground. Factory-wired sets depend on the yellow (Y) lead of the 625- or 630-type

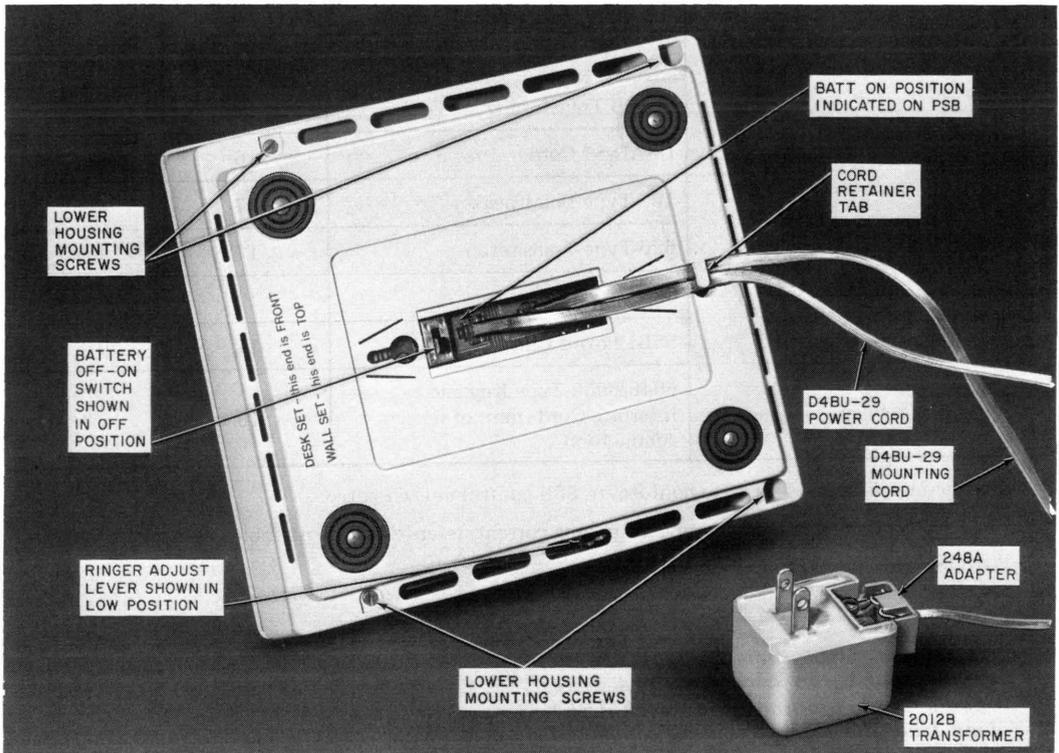


Fig. 2—960A01M Telephone Set, Bottom View

TABLE B
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 ‡		10 and 14B	
		630A4 Connecting Block			
Speakerphone	3B	760A Loudspeaker		16	D
		666B Transmitter		16	D
		Control Unit	55A*	16	D
			55B	16	D
		2012B Transformer		16	D
	D6AD-87 Cord		16	D	
	4A	108-Type Loudspeaker		17	E
		680-Type Transmitter		17	E
223A Adapter		17	E		
85B1 Power Unit		17	E		
Multiline Service		6040/6050-Type Key and Interface Cord (min. of 6 conductors)		18	

* Modified by Western Electric to conform to 55B control unit circuitry.

† For selective ringing with superimposed ringing current, refer to Note 1 of Table C and/or Fig. 15.

‡ Provided with initial production sets.

connecting block being connected to earth ground. In wiring options, care should be taken that the black (BK) lead from the shield remains connected to earth ground.⚡

3.03 Replace upper housing and install faceplate of subscriber's choice, (see note, Table A).

3.04 Attach 248A adapter to 2012B 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 power cord (maximum 14 feet) into the power jack on the bottom of the set (Fig. 13C) and the other end into the 248A adapter.

Note: The 2012B transformer must be located no closer than 1-1/2 feet from the telephone set in order to avoid a potential noise condition.

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. 13C for the wiring options and the maximum conductor lengths). **The transformer should not be used for furnishing power to anything other than this set, i.e., dial/night light power to another set, etc.**

Caution: AC power to the 960A01M 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.

3.06 The set is shipped from the factory with a discharged battery installed and 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 (now 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.

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.

Caution: Stapling of the D4BU-29 cords can break the conductors. Use a B-cord clip for dressing.

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 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 F.

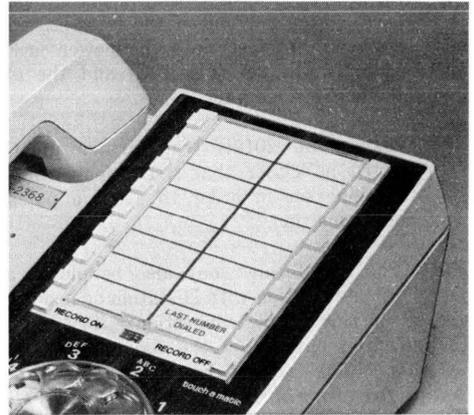
(1) Disconnect the 2012B transformer from AC power and manually dial the appropriate code for ring-back to test the ringer and to check that the basic telephone operates properly in the absence of commercial power.

(2) Reconnect the 2012B transformer to AC outlet.

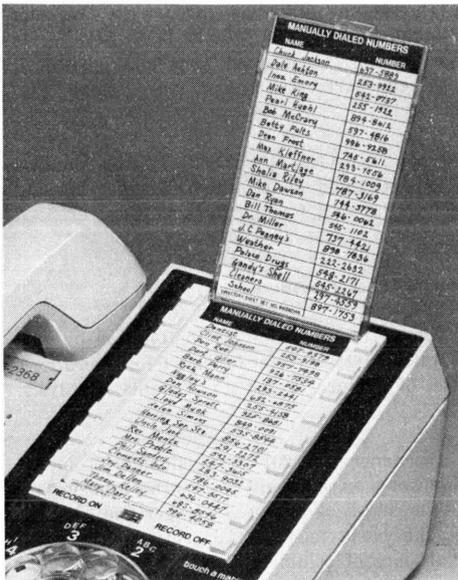
(3) With the handset on-hook, record a known telephone number into all memory locations except LAST NUMBER DIALED and the button immediately above [5.01 (4) through (7)].



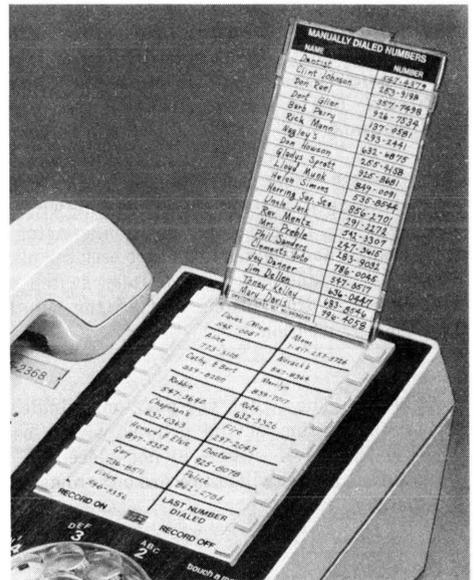
A. DIRECTORY DISPLAYED (WINDOW CLOSED)



C. DIRECTORY PRIVACY (WINDOW CLOSED)



B. DIRECTORY DISPLAYED (WINDOW OPEN)



D. DIRECTORY PRIVACY (WINDOW OPEN)

Fig. 3—Optional Methods of Installing Directory Cards

- (4) Automatically dial the numbers recorded in Step (3) and verify that they are correct (5.04).
- (5) Go off-hook and simultaneously manually dial and record a known telephone number into memory location immediately above LAST NUMBER DIALED button [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 transformer must be connected a minimum of five minutes before doing Step (9).

- (9) Momentarily disconnect the 2012B transformer (for 5 to 10 seconds). After reconnecting the 2012B and securing with a 2A clamp, automatically dial any of the previously recorded numbers. This verifies retention of memory with commercial power disconnected.

COMPONENT LOCATION AND ACCESS INFORMATION

Location of Components

3.13 The components are located as follows:

- **Faceplate**—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**—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**—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**—fastened by two screws to bosses on the bottom of the chassis (Fig. 7A) 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**—soldered to power supply printed wiring board and located at left-rear corner of power supply board (PSB) (Fig. 5).
- **Rotary Dial**—fastened by two screws and located on the top side at right-front corner of the chassis (Fig. 4).
- **Memory**—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**—fastened by six screws to bosses on the bottom of the chassis (Fig. 7).
- **Power Supply Printed Wiring Board Screw Terminal Areas**—(Fig. 5 and 6).
- **Mounting Cord and Power Cord Jacks**—slid 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 7).
- **Lower Housing**—fastened by four screws to the bottom of the chassis (Fig. 2).
- **Upper Housing**—fastened by four screws to the top side of the chassis (Fig. 4).
- **Chassis**—main structural member to which other component assemblies are fastened,

including the upper and lower housings (Fig. 5 and 7).

Access of Components

Faceplate Removal

3.14 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.

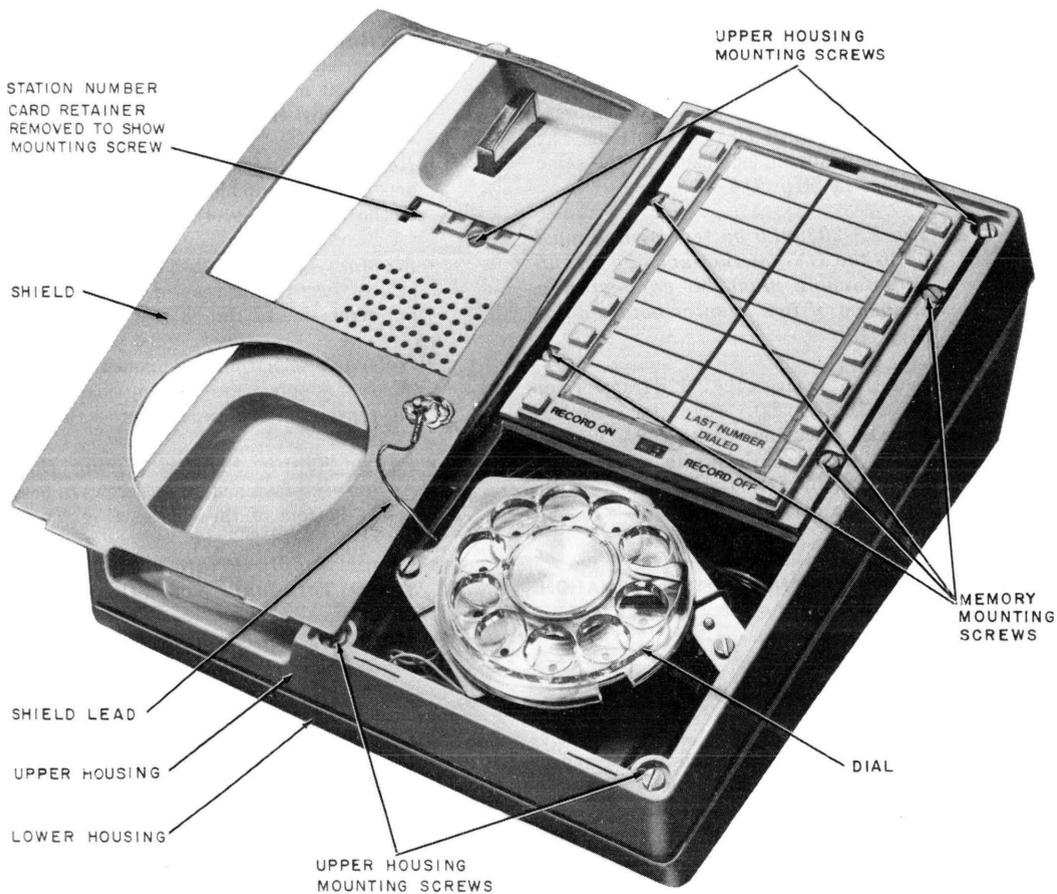


Fig. 4—960A01M Telephone Set With Handset and Faceplate Removed, and Shield Laid Aside

Upper Housing Removal

3.15 To remove the upper housing, proceed as follows:

- (1) Unplug the modular handset cord at the telephone set end and remove handset.
- (2) Remove the faceplate (3.14) and place the shield aside (Fig. 4).

Caution: Use extreme care when handling shield. Do not bend shield or break solder connection on attached lead.

- (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

3.16 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

3.17 To access the screw terminals 1 through 13 (under the dial) on the power supply board, proceed as follows:

- (1) Remove the faceplate (3.14) 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. 8.
- (4) To reassemble, reverse the procedure.

3.18 To access screw terminals 14 through 21 (under the battery) on the power supply board, proceed as follows:

- (1) Remove the upper housing (3.15).
- (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. 13.
- 4.02** Refer to Table B for connection information for all options.
- 4.03** A partial functional schematic is shown on Fig. 19.

5. OPERATION

Note: If the telephone set is used behind a PBX, etc., where an access code is required, refer to 5.06.

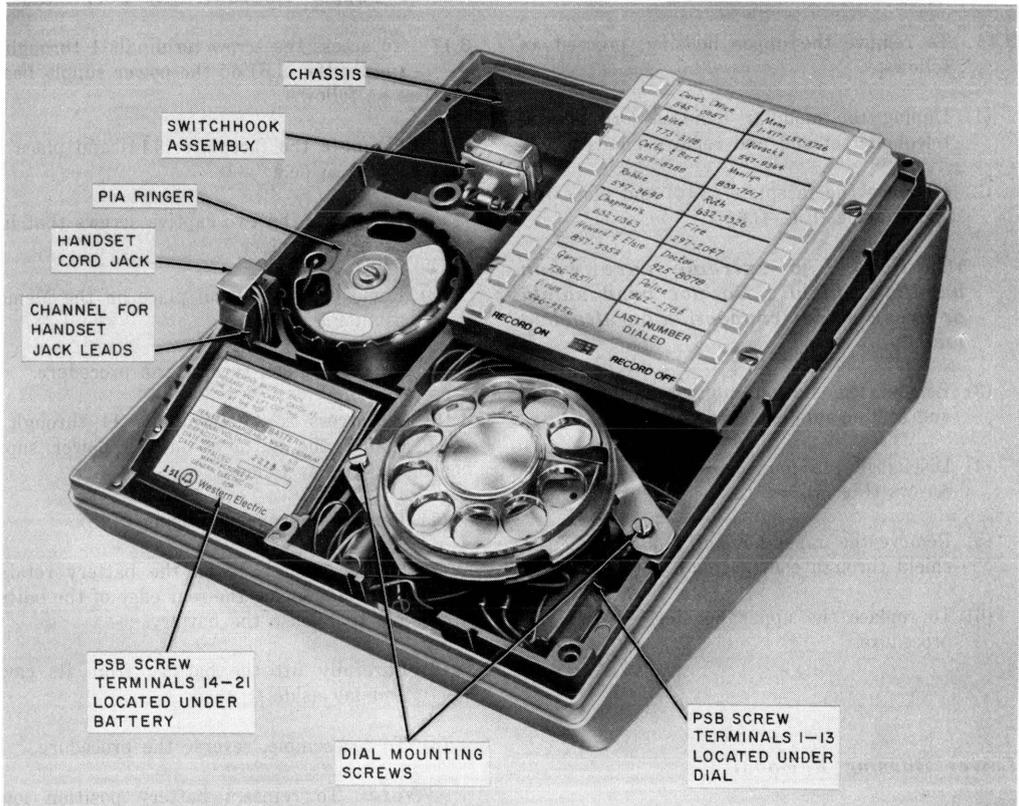


Fig. 5—960A01M Telephone Set With Handset, Faceplate, Shield and Upper Housing Removed

Record A Number Into Memory

5.01 To record:

- (1) Remove the directory card labeled LAST NUMBER DIALED from its position.
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory card.
- (3) Replace the directory card.
- (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 card.
- (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

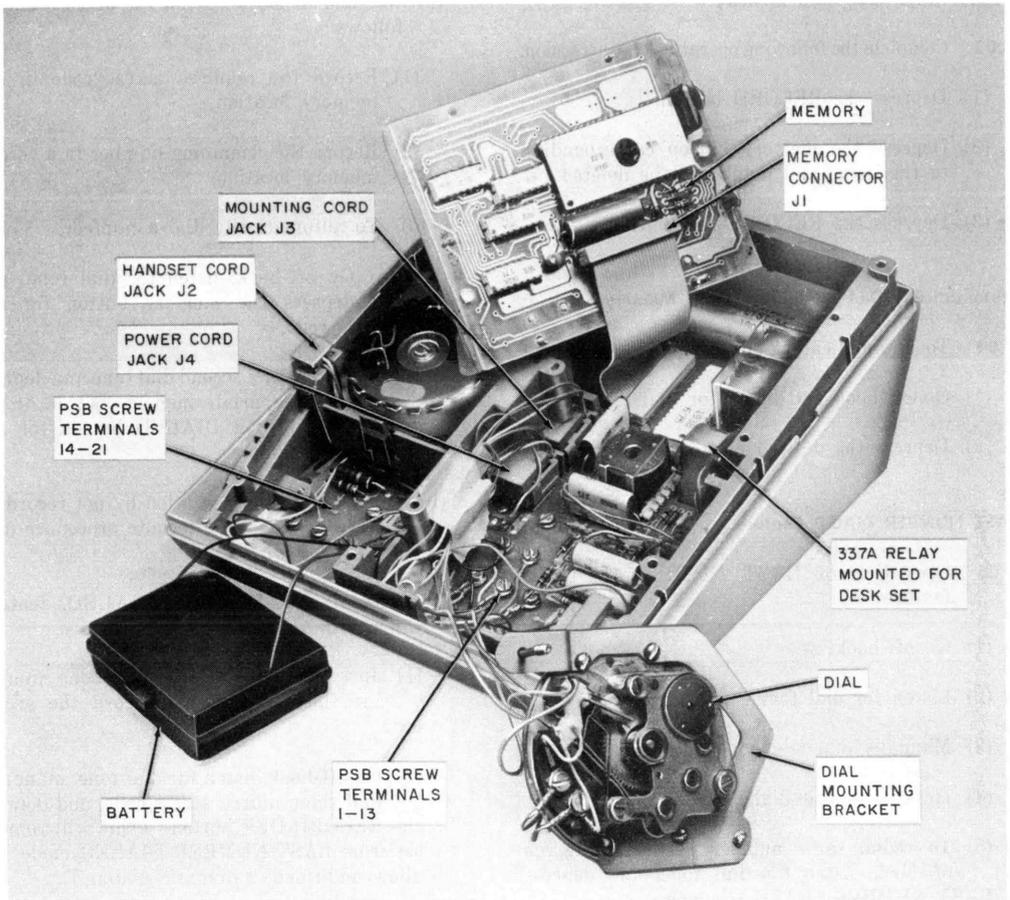


Fig. 6—960A01M Chassis and Lower Housing With Dial, Memory, and Battery Laid Aside, and Shield Removed

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.

Change A Number In Memory

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

SECTION 503-301-100

Delete A Number From Memory

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.

Automatically Dial A Number From Memory

5.04 To automatically dial a number:

- (1) Go off-hook and listen for dial tone.
- (2) Depress the desired memory button.

LAST NUMBER DIALED Feature

5.05 Operation of LAST NUMBER DIALED feature:

- (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.◆

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 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 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.

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.

◆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.

⚡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.⚡

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 F and 6.04 through 6.08.

Battery

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 (3.15).
- (2) Release the battery [3.18 (2) and (3)].
- (3) Disconnect the battery leads.

Caution: Do not short battery terminals:

- (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 transformer (for 5 to 10 seconds). After reconnecting the 2012B and securing with a 2A clamp, automatically dial the previously recorded known telephone number. This will verify retention of memory by the new battery.⚡

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) Remove the faceplate (3.14) and place the shield aside.
- (2) Disengage the four captive memory screws (Fig. 4).
- (3) Rotate the right edge of the Memory upward.

- (4) Disengage the connector at the Memory (Fig. 6) by pulling it perpendicular to the circuit board.
- (5) 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.
- (6) Tighten the four captive screws.
- (7) Replace the shield and faceplate.
- (8) Test per 3.12.
- (9) Place the old Memory in shipping container of the new Memory (carton 900314535), affix a defective label and return to the repair location.

11E Dial

6.06 To replace:

- (1) Remove the faceplate (3.14) and place the shield aside.
- (2) Remove the upper housing (3.15).
- (3) Gently push back on the battery retainer catch and swing the rear edge of the battery upward to release the battery.
- (4) Carefully lift the battery from its cavity and place onto the ringer.
- (5) Disconnect the (W) dial lead from screw terminal 20 on the power supply board.
- (6) Disengage the two captive screws that hold the dial in place.
- (7) Lift the dial out of the way and disconnect the appropriate leads (Fig. 13B).
- (8) Remove dial mounting bracket from the dial (Fig. 6).
- (9) To install a new dial, reverse procedure.
- (10) Test per 3.12 (7) and (8).

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, Step (11) and (14).

- (1) Remove the lower housing (3.16).
- (2) Disengage and remove the two ringer mounting screws which can be accessed through the clearance holes in the power supply board (Fig. 7).
- (3) Temporarily replace the lower housing and place the set on its feet.
- (4) Remove the upper housing (3.15).
- (5) Release the dial [3.17 (2) and (3)] and place aside (Fig. 8).
- (6) Disconnect the ringer leads (Fig. 13B and Table C) and remove ringer.
- (7) 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.
- (8) 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. 8).
- (9) Replace the dial.
- (10) Remove the lower housing. Holding the ringer in position, turn the chassis over to expose the clearance holes in the power supply board.
- (11) Attach one ringer mounting screw onto the blade of a screwdriver, (see note preceding this section).
- (12) Insert the ringer mounting screw into one location and secure ringer.
- (13) Align the ringer adjust arm over the ringer volume control button (Fig. 8).

- (14) Replace the remaining ringer mounting screw with the *special* screwdriver and tighten ringer into place.
- (15) Replace the housings, shield, faceplate, and handset.
- (16) ♦Dial the appropriate code for ring-back to test the ringer.♦

Handset Jack

6.08 To replace the 616J handset jack (Fig. 5 and 6):

- (1) Remove the upper housing (3.15).
- (2) Release the battery and place aside [3.18 (2) and (3)].
- (3) Release the dial [3.17 (2) and (3)] and place aside (Fig. 8).
- (4) Disconnect the appropriate leads (Fig. 13B) and remove jack.
- (5) Replace the jack and dress jack leads in channel behind jack (Fig. 5).
- (6) Reassemble set.
- (7) ♦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 (3.16).
- (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. 7A.♦
- (3) Relocate the 337A relay on the printed wiring board (Fig. 7B) 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. 10). 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. 10).

(7) ♦Connect the power cord to the telephone set per the appropriate option of Fig. 13C.♦

(8) Place the lower housing on the chassis according to the instructions on the bottom (Fig. 10), 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. 9).

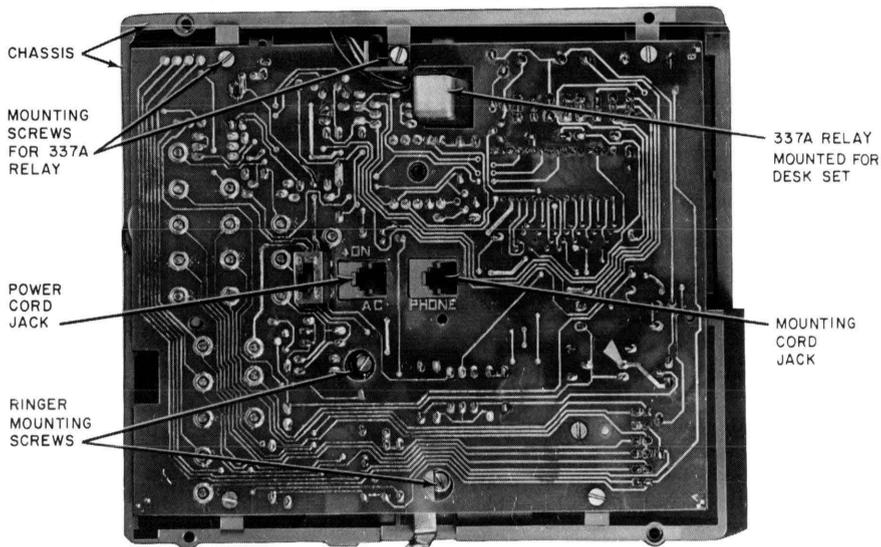
(13) Replace the station number card and card retainer.

(14) The converted wall set is intended to plug into and secure to a 630A4 connecting block (Fig. 10 and 14B).

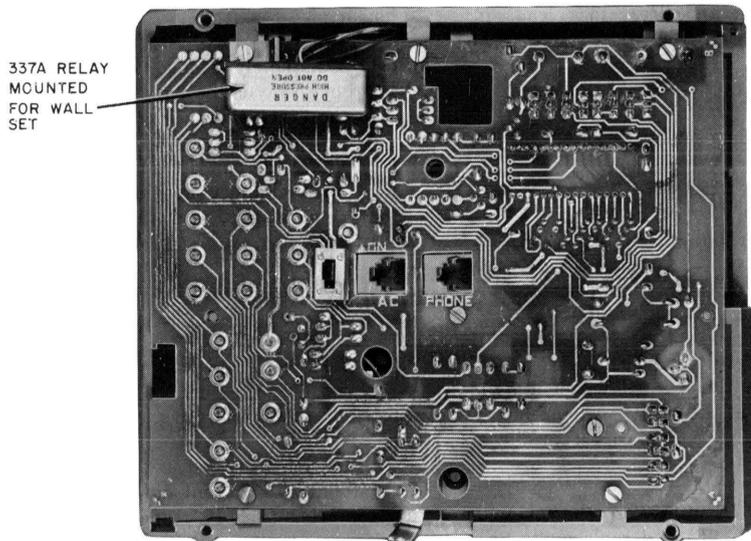
7.02 When connecting set to wall, proceed as follows to prevent damage to 523B4 plug or to receptacle in 630A4 connecting block:

(1) Begin with slight engagement of plug in receptacle.

(2) Raise set (with plug slightly engaged) and push toward wall to engage studs in



A. SHOWING 337A RELAY MOUNTED FOR DESK SET SERVICE



B. SHOWING 337A RELAY MOUNTED FOR WALL SET SERVICE

Fig. 7—Bottom View of Power Supply Board (Lower Housing Removed)



Fig. 8—Ringer Being Installed in 960A01M Chassis With Dial Rotated Onto Memory and Shield Removed

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. 11), to accommodate

the additional cords associated with the connections of wiring options such as speakerphone, SPOKESMAN 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. 12). Proper precautions must be taken so that the stay band and hooks



Fig. 9—960A01M Telephone Set With Handset Hook Reversed for Wall Mounting

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. 12).

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. 12).

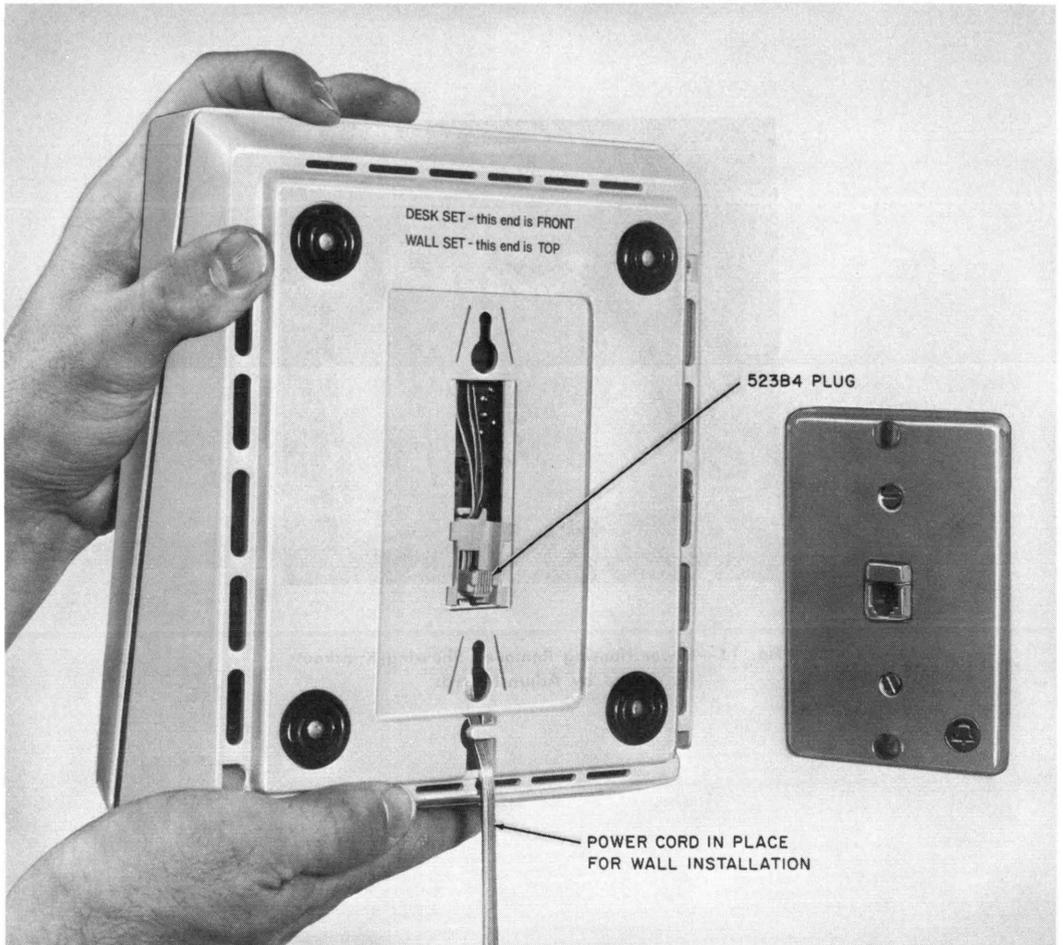


Fig. 10—960A01M Wall Set and 630A4 Connecting Block

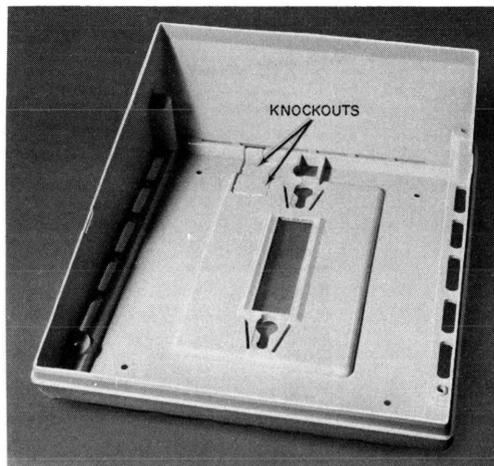


Fig. 11—Lower Housing Removed Showing Knockouts
for Access by Adjunct Cords

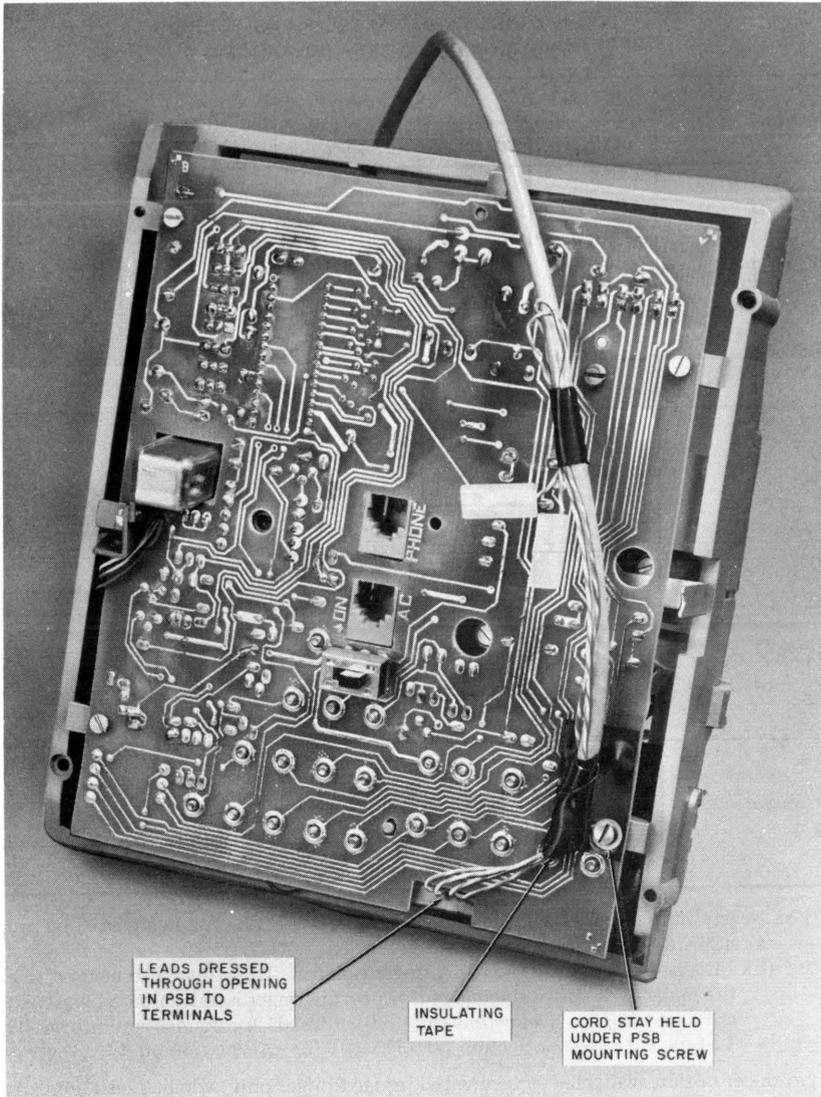


Fig. 12—Bottom of Set With Lower Housing Removed Showing an Adjunct Cord Dressed Across Power Supply Board (PSB)

TABLE C

**CONNECTIONS – 960A01M TELEPHONE SET FOR
RINGER OR A LEAD CONTROL OPTIONS**

OPTION		LEAD		REMOVE FROM PSB TERM.	CONNECT TO PSB TERM.	REMARKS	
		DESIG.	COLOR				
Selective Ringing (Note 1)	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		(Note 3)				
	Spade Tip Leads on PSB	BL		6	10		
		BK		11	9		
G			*	19			
A-Lead Control (Note 2)	Mtg Cord Jack	Y		1	5	A1	Leads must be dedicated
		BK		*	9	A	
	Shield	BK		1	5		

Note 1: For 4-party full selective or 8-party semiselective, one of the following must be provided:

- (a) 426N diode. For connections, see Fig. 15.
- (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.

2: No ringer option available (factory wired bridged ringer only) when A lead control option is used.

3: Strap PSB terminal 5 to PSB terminal 7.

* Insulated and stored.

† Approximately 2600 ohm identification ground only.

TABLE D

**CONNECTIONS — 960A01M TELEPHONE SET WITH
3B SPEAKERPHONE**

APPARATUS	CORD OR WIRE	LEAD		CONNECT		
				FROM	TO	
		DESIG.	COLOR	PSB TERM.	CONTROL UNIT	
					55A* (NOTE)	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 Trnsf	D-Station Wire	AC1			27	27
		AC2			36	36

Note: 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. A
960A
MEMORY

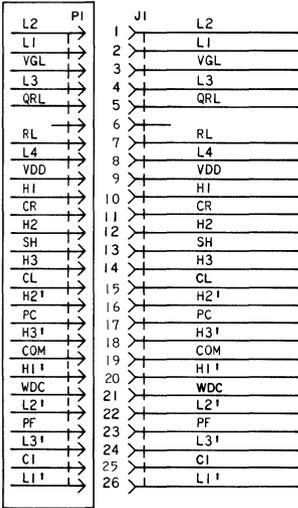


FIG. B
POWER SUPPLY
BOARD

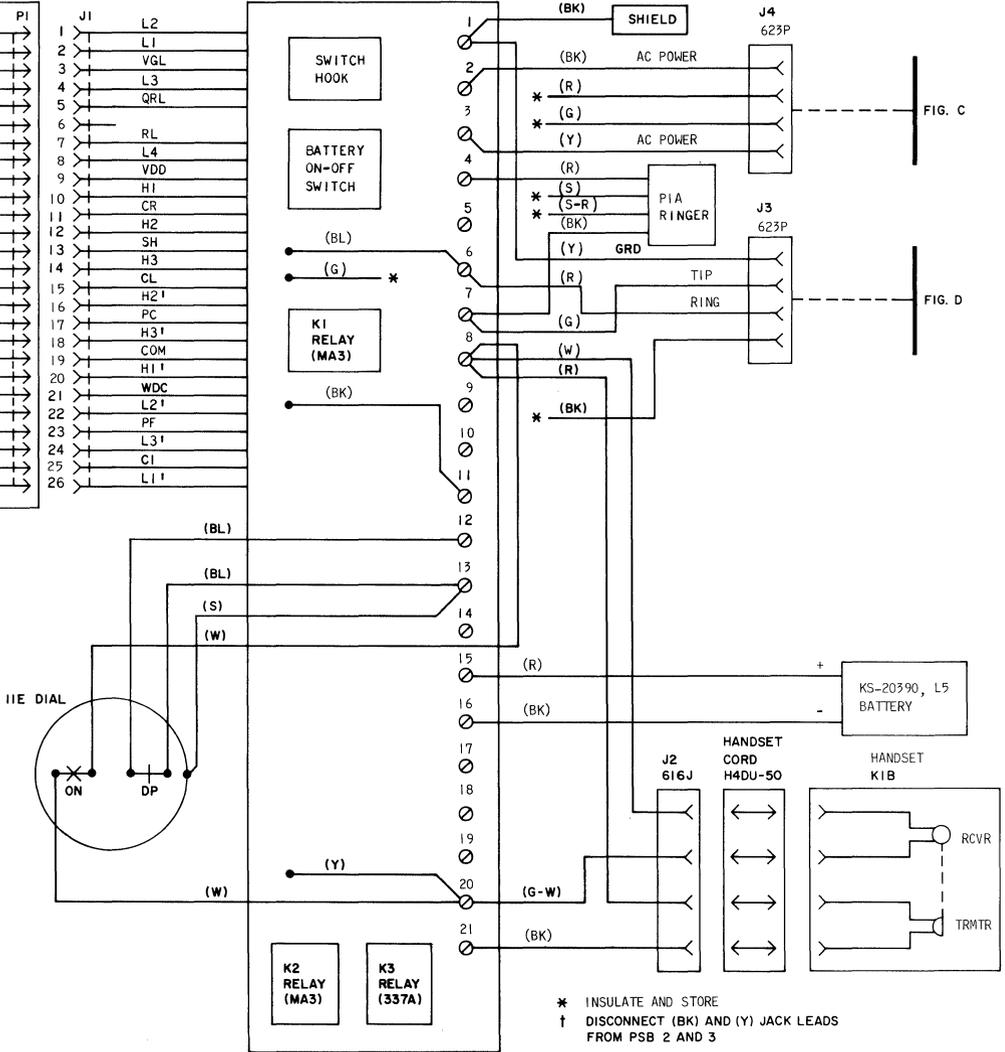


Fig. 13—960A01M Telephone Set, Connections (Sheet 1 of 2)

FIG. C
POWER CONNECTIONS

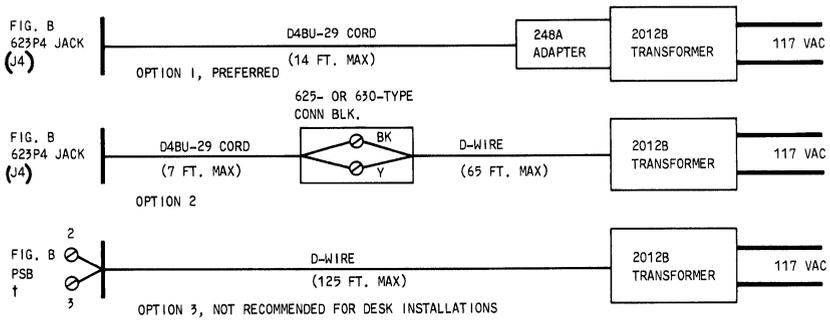
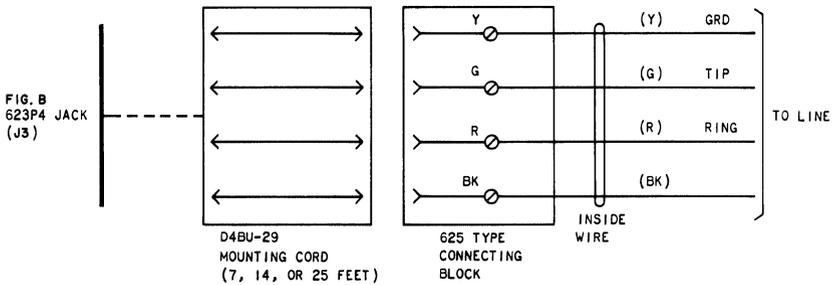
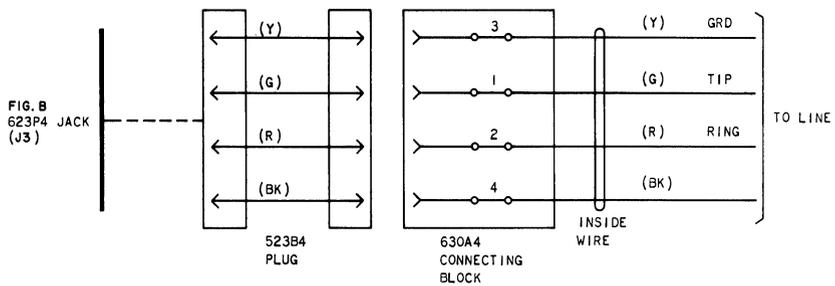


FIG. D
LINE CONNECTIONS



FOR DESK SET INSTALLATION



FOR WALL SET INSTALLATION

Fig. 13—960A01M Telephone Set, Connections (Sheet 2 of 2)

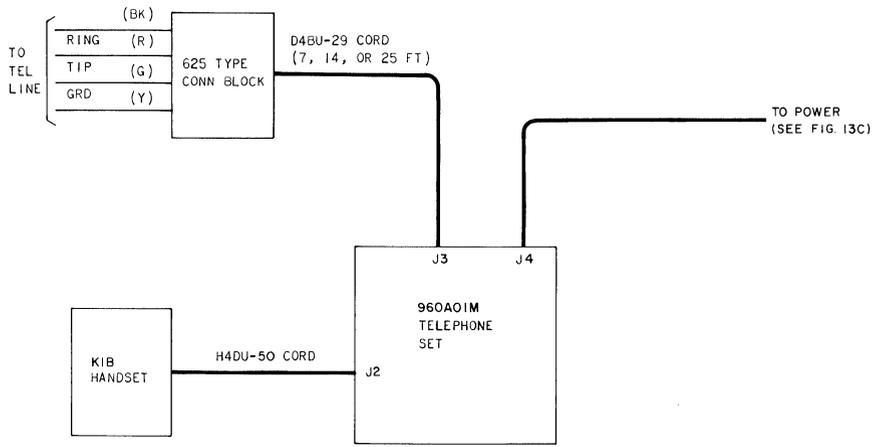
TABLE E

**CONNECTIONS – 960A01M TELEPHONE SET
WITH 4A SPEAKERPHONE**

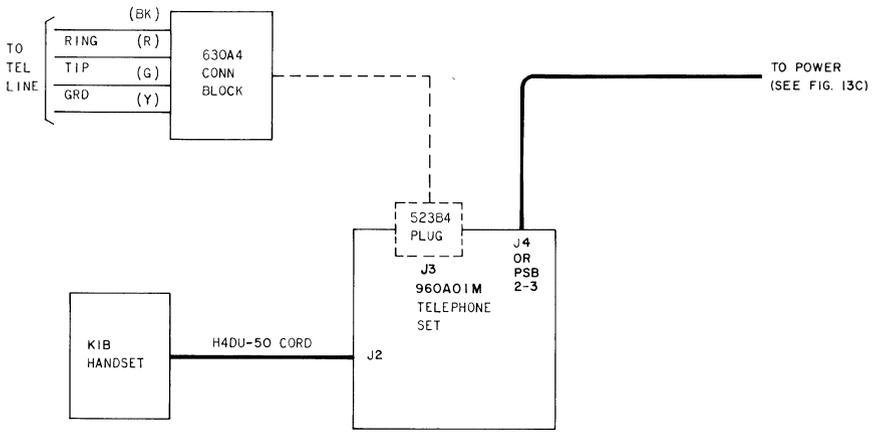
APPARATUS	CORDS (SEE NOTE)	LEAD		CONNECT TO
		DESIG.	COLOR	
960A01M Tel Set	M16C Cord	AC	R-G	*
		AC	G-R	*
		LK	O-W	PSB-10
		Spare	O-R	*
		Spare	R-O	*
		K5M	BR-W	*
		IT	W-G	*
		IR	G-W	*
		T1	W-BL	PSB-7
		R1	BL-W	PSB-6
		K4C	S-W	*
		K5C	W-S	*
		K4B	BL-R	*
		K5B	R-BL	*
		AG	W-O	PSB-9
A1	W-BR	PSB-5		
680-Type 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 223A adapter. (See Fig. 17 for block diagram of interface.)

* Insulate and store



A. DESK SET



B. WALL SET

Fig. 14—Block Diagram—960A01M Telephone Set, Desk- and Wall-Type

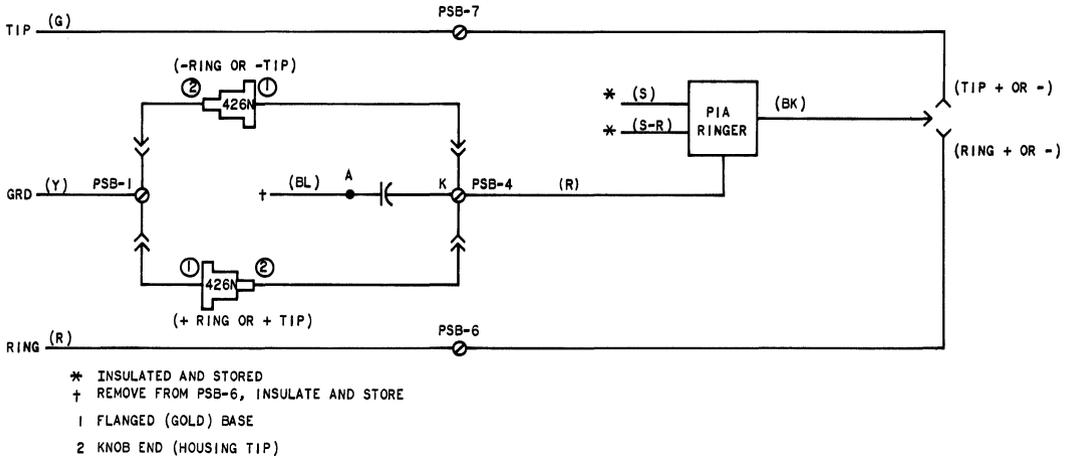


Fig. 15—4-Party Full Selective Ringing, Connections Using 426N Diode (300 Ohm Minimum Loop to Prevent Pretrip)

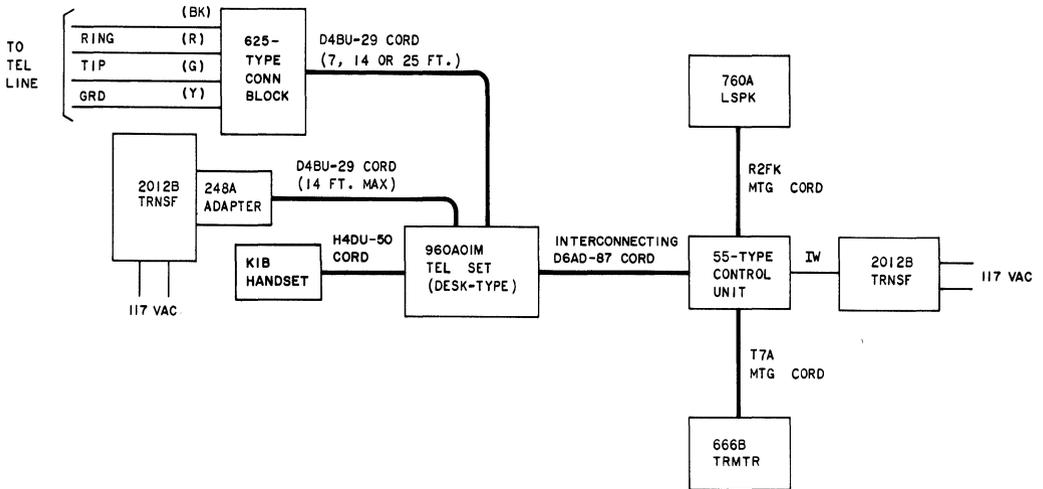


Fig. 16—Block Diagram—960A01M Telephone Set With 3B Speakerphone

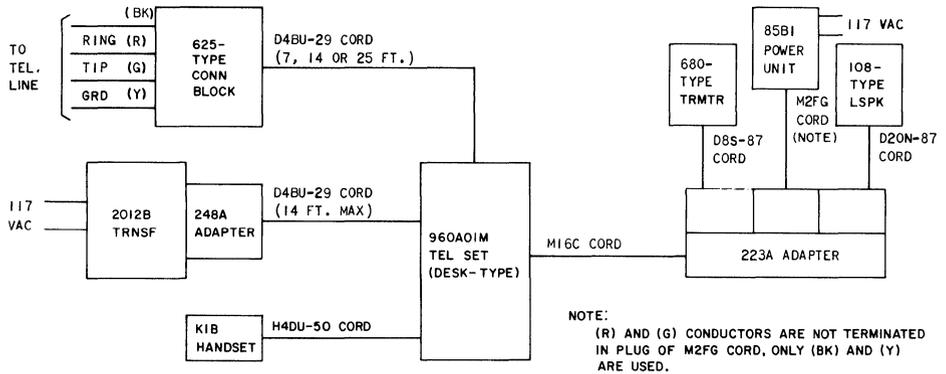


Fig. 17—Block Diagram—960A01M Telephone Set With 4A Speakerphone

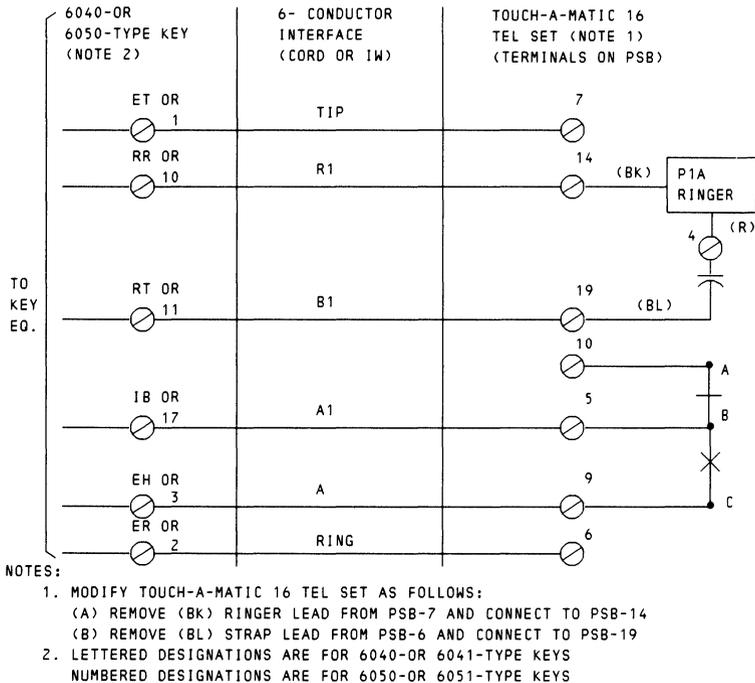


Fig. 18—Connections From Telephone Set to 6040/6050-Type Key

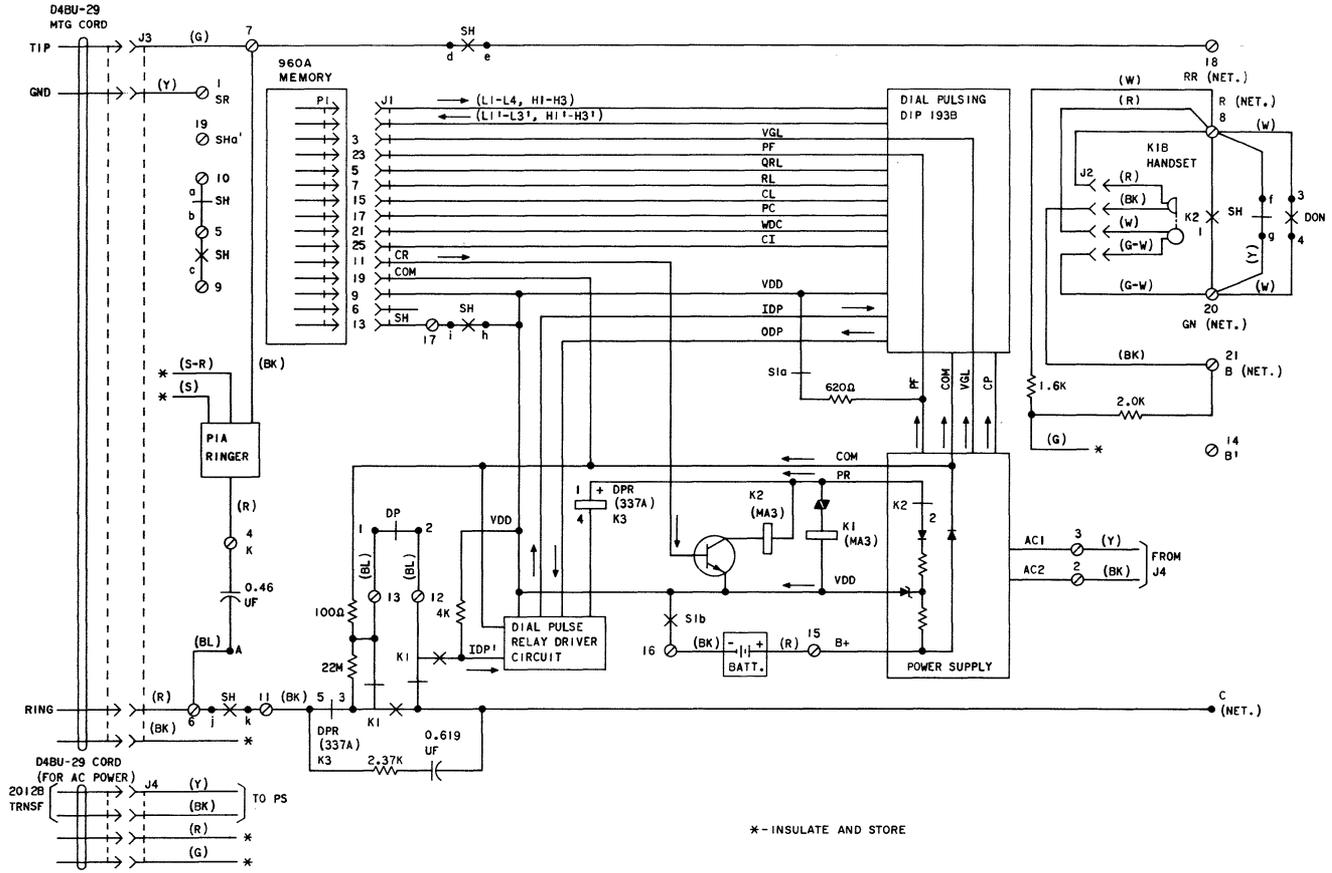


Fig. 19—960A01M Telephone Set, Partial Functional Schematic

TABLE F

TROUBLE ANALYSIS – 960A01M

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 switch-hook contacts d-e and/or j-k.	Replace telephone set
			Unknown	Replace telephone set
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 switch-hook f-g contacts	Replace telephone set
			Unknown	Replace telephone set

TABLE F (Cont)

TROUBLE ANALYSIS – 960A01M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4	Cannot manually dial when off-hook (dial tone is present)	Dialing clicks heard (in hand-set) 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 transformer is disconnected	Improperly installed or defective rotary dial	1. Check connections 2. Replace rotary dial
			Unknown	Replace telephone set
		No dialing clicks heard when dial is returning. With 2012B transformer disconnected, set can manually dial	Improperly installed or defective memory	1. Check cable 2. Replace memory
Defective PSB	Replace telephone set			
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
			D4BU-29 power cord improperly inserted	Check cord insertion at set and 248A adapter
			2012B transformer defective or not plugged in	Check or replace 2012B 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
			Unknown	Replace telephone set
		Lamp turns off when any memory button is depressed	Improperly installed or defective memory	1. Check connector cable 2. Replace memory
			Unknown	Replace telephone set
		Lamp does not turn off as dial is returning. Can not manually dial off-hook	Improperly connected or defective rotary dial (dial pulsing contacts)	1. Check rotary dial connections 2. Replace rotary dial
			Unknown	Replace telephone set

TABLE F (Cont)

TROUBLE ANALYSIS – 960A01M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
5 (cont'd)		Lamp does not turn off as dial is returning. 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 5.01
			Defective Memory	Replace Memory
			Unknown	Replace telephone set
6	Cannot record into Memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
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, when number is subsequently dialed from Memory, party is not reached — wrong number is dialed from Memory	Check recording procedure	Record per 5.01
			Defective Memory	Replace Memory
			Unknown	Replace telephone set
8	Cannot dial properly from Memory	MA ₃ relay does not operate (no click heard) when memory button is depressed	Improperly connected or defective Memory	1. Check connector cable 2. Replace Memory
			Unknown	Replace telephone set
		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	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 transformer from the AC power outlet and reinsert.

TABLE F (Cont)
TROUBLE ANALYSIS – 960A01M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
8 (cont'd)				3. If previously stored numbers are not dialed from Memory 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
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 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

TABLE F (Cont)

TROUBLE ANALYSIS – 960A01M

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
12 (cont'd)			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

2960A01M TELEPHONE SET
(TOUCH-A-MATIC® 16 SET)

CONTENTS	PAGE	CONTENTS	PAGE
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2. IDENTIFICATION	2	LAST NUMBER DIALED Feature	14
Design Features	2	End-to-End Signaling	14
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Operating Features	3	Speakerphone Option	15
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Installation Check Procedures	10	Return Procedure	15
COMPONENT LOCATION AND ACCESS		Trouble Analysis	15
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Location of Components	10	Memory	16
Access of Components	12	35AT3A Dial	17
Faceplate Removal	12	P1A Ringer	17
Upper Housing Removal	12	Handset Jack	18
Lower Housing Removal	12	7. CONVERSION FROM DESK SET TO WALL SET	19
Power Supply Board (PSB) Terminals	13	8. CORD DRESSING FOR OPTIONAL SERVICES (ADJUNCTS)	20
4. CONNECTIONS	13	1. GENERAL	
5. OPERATION	13	1.01 This section contains identification, installation, connections, operation, and maintenance information on the 2960A01M telephone set. This set is shipped from the factory as a desk set	
Record A Number Into Memory	13		
Change A Number In Memory	13		
Delete A Number From Memory	14		

NOTICE

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

(Fig. 1) and can easily be converted to a wall set with no additional parts required.

1.02 This section is reissued to:

- Add information on shield
- Add connections for multiline service
- Add new Fig. 18
- Revise Fig. 3, 5, 6, 10, 12, 13, 14, and 19
- Revise Tables B, C, D, and F

1.03 The 2960A01M 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, or 6A 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 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.

2.02 Design Features:

- Modular telephone set
- Integrated circuit memory and dial
- Surge protector



Fig. 1—2960A01M Telephone Set

- 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.

2.03 *Optional Features:*

- Selective ringing
- Tip party with identification ground
- 4-party full selective or 8-party semiselective ringing using an 11-type extender, 426N diode, or 28A ringer isolator as a coupling device
- A-lead control for 1A1, 1A2, or 6A key telephone systems
- Speakerphone—either 3B or 4A speakerphone may be interfaced with the telephone set

Note: For use with a speakerphone, all dialing must be performed with the handset off-hook (5.09). Speakerphone and tip party identification options cannot be provided at the same time.

- ♦Multiline service—using adjunct key

Note: Replacing the handset each time a line is changed assures proper dialer operation (5.10).♦

- 107-type loudspeaker set (SPOKESMAN® unit) may be interfaced with the telephone set (See Section 463-221-100)

- ♦274A adapter—provides interface with headset (refer to Section 463-247-100).♦

2.04 *All options are implemented by:*

- Wiring changes in the telephone set
- Installation of appropriate additional items.

2.05 *Operating Features*

- Dial (TOUCH-TONE 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
- 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.

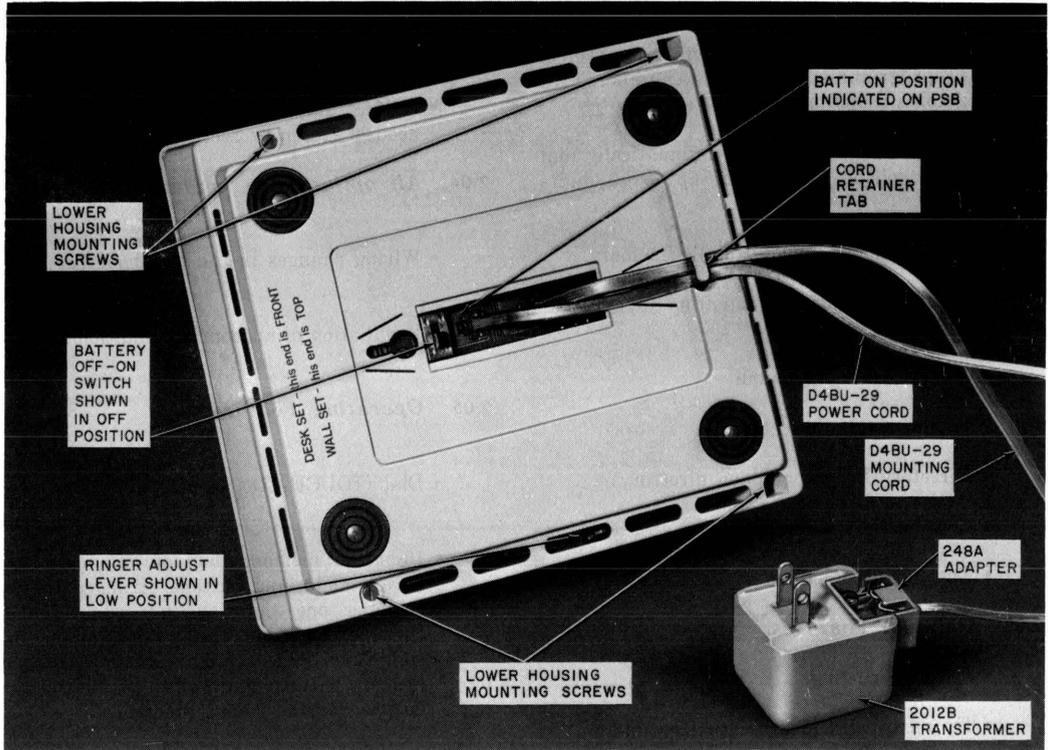


Fig. 2—2960A01M Telephone Set, Bottom View

2.06 Ordering Guide:

- (a) The 2960A01M telephone set is a modular type set and may be ordered as follows:

- Set, Telephone, 2960A01M-50

This includes:

- (1) Adapter, 248A (to connect D4BU modular cord to 2012B transformer) Fig. 2.
- (2) Plug, 523B4, (used when converting from a desk set to a wall set) Fig. 10.
- (3) Cord, Handset, H4DU-50.

- (4) All components listed in (c) Replaceable Components, except faceplates and D4BU-29 cords.

(b) **Ordered separately:**

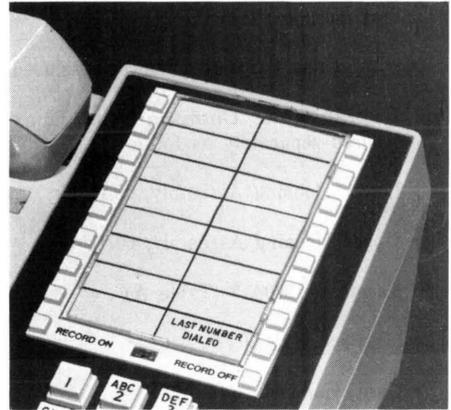
- Transformer, 2012B (required to provide AC power for operation of the automatic dialer)

Note: A 2012A transformer shall not be substituted for a 2012B, as proper operation can not be assured.

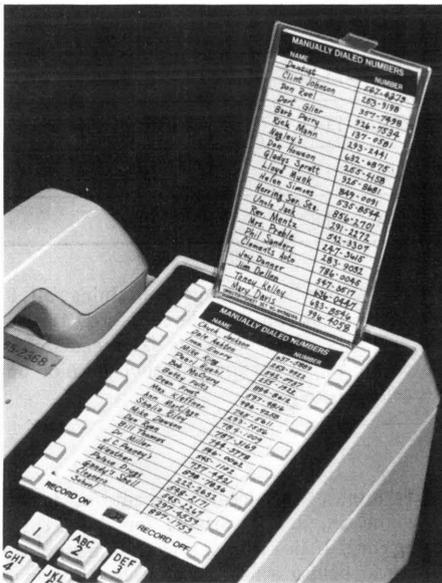
- Clamp, 2A (used to secure 2012B transformer to outlet)
- Faceplate, 260A-* (Table A)
- Cord, Mounting, D4BU-29



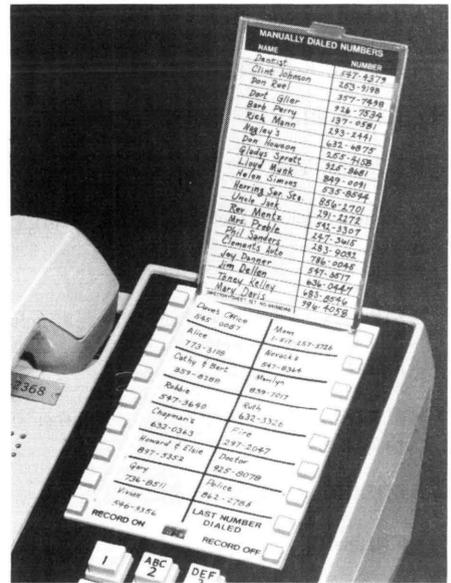
A. DIRECTORY DISPLAYED (WINDOW CLOSED)



C. DIRECTORY PRIVACY (WINDOW CLOSED)



B. DIRECTORY DISPLAYED (WINDOW OPEN)



D. DIRECTORY PRIVACY (WINDOW OPEN)

Fig. 3—Optional Methods of Installing Directory Card

- Cord, Mounting, D4BU-29 (power 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-* (Table A)
 - Handset, K1B-50
 - Cord, Handset, H4DU-50
 - Cord, Mounting, D4BU-29
 - Cord, Mounting, D4BU-29 (power cord, maximum 14 feet)
 - Jack, Handset, 616J
 - Battery, KS-20390L5
 - Ringer, P1A
 - Dial, 35AT3A
 - Memory, 960A (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
 - ♦841388721 Shield (Fig. 4)♦
 - Subscriber Instruction Booklet (SID-2480C)

(d) **Optional apparatus**

- See Table B for apparatus required

*Add appropriate color suffix per Table A.

3. INSTALLATION

Caution: Do not turn on the battery switch or plug in the 2012B transformer until all connections and modifications are completed. Take extreme care not to damage the exposed components, circuits, etc. when the set is opened.

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 subscribers premises.

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. 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.

3.02 ♦Lay shield aside and make all wiring changes and telephone set modifications

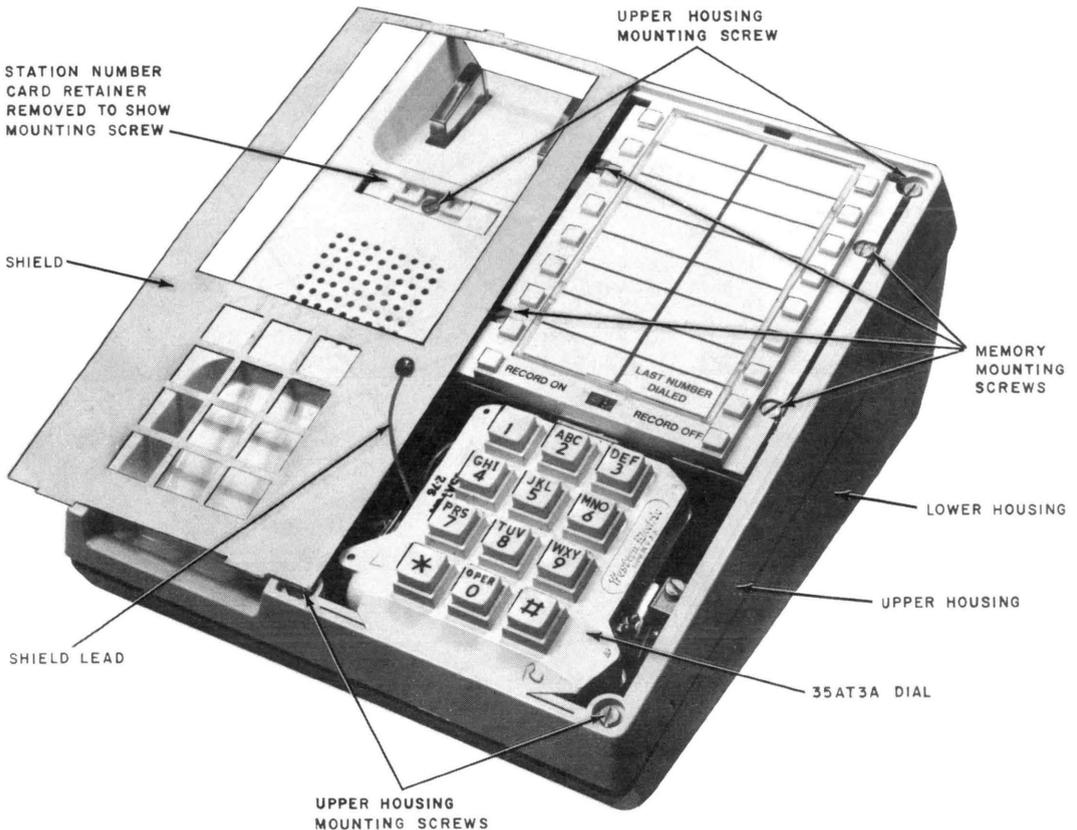


Fig. 4—2960A01M Telephone Set With Handset and Faceplate Removed and Shield Laid Aside

(Table B) before external connections are made to the set (4.01). Remove upper housing (3.15), if necessary, for set modification.

Caution: Protection of the integrated circuits from static discharge depends on the black (BK) lead from the shield being connected to earth ground. Factory-wired sets depend on the yellow (Y) lead of the 625- or 630-type connecting block being connected to earth ground. In wiring options, care should be taken that the black (BK) lead from the shield remains connected to earth ground.

3.03 Replace upper housing and install faceplate of subscriber's choice, (see note, Table A).

3.04 Attach 248A adapter to 2012B 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 power cord (maximum 14 feet) into the power jack on the bottom of the set (Fig. 13D) and the other end into the 248A adapter.

Note: The 2012B transformer must be located no closer than 1-1/2 feet from the telephone set in order to avoid a potential noise condition.

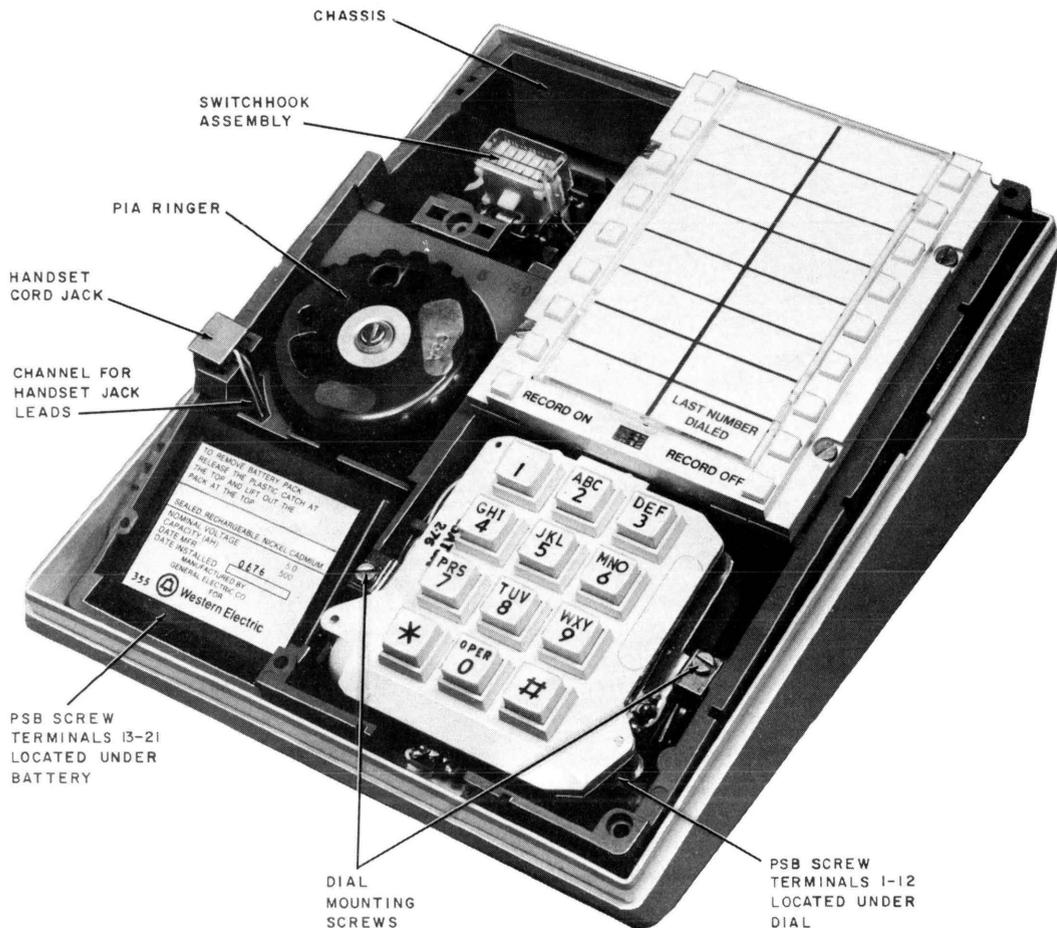


Fig. 5—2960A01M Telephone Set With Handset, Faceplate, Shield, and Upper Housing Removed

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. 13D for the wiring options and the maximum conductor lengths.) The transformer should not be used for furnishing power to anything other than this set.

Caution: 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.

3.06 The set is shipped from the factory with a discharged battery installed and 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 (now visible in the bottom view of the set, Fig. 2) to the ON position.

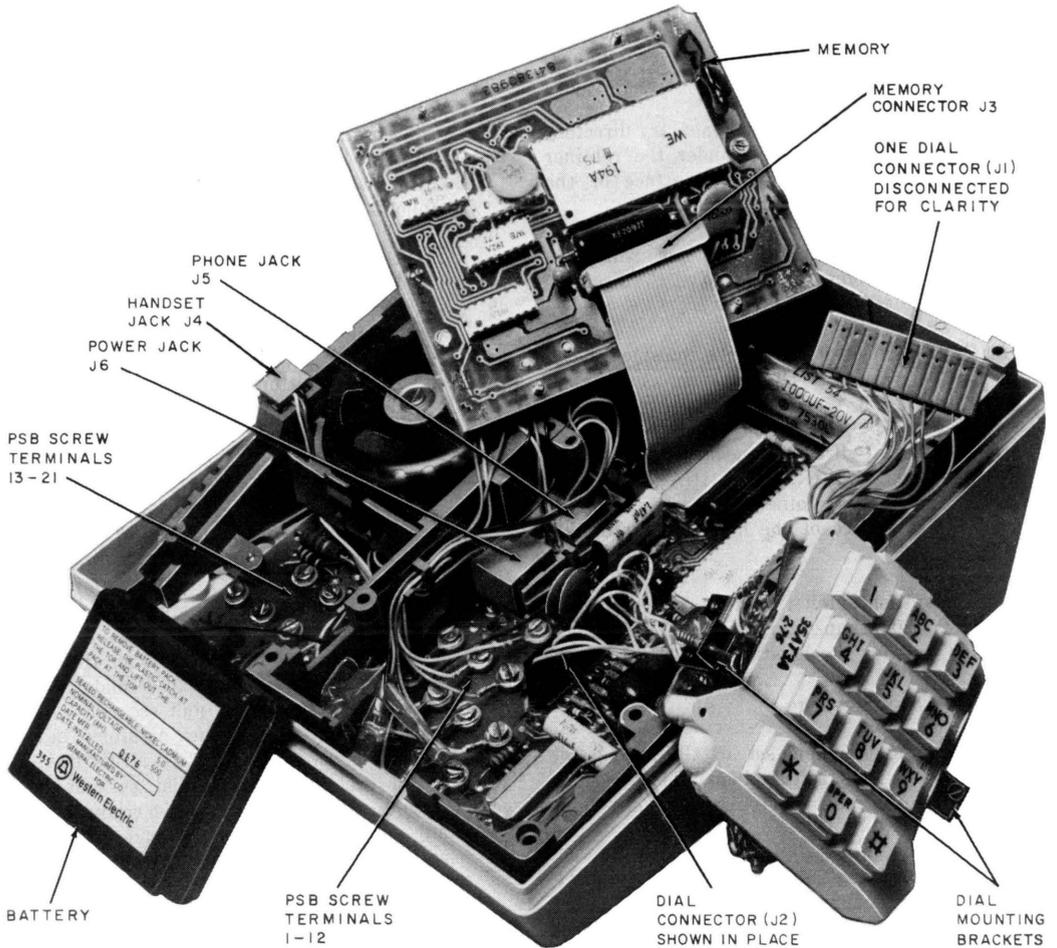


Fig. 6—2960A01M Chassis and Lower Housing With Dial, Memory, and Battery Laid Aside and Shield Removed

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.

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.

Caution: Stapling of the D4BU-29 cord can break the conductor. Use a B-cord clip for dressing.

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 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 F.

- (1) Disconnect the 2012B 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 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 [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 [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 transformer must be connected a minimum of five minutes before doing Step (c).

(c) Momentarily disconnect from the 2012B transformer (for 5 to 10 seconds). After reconnecting the 2012B 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.

COMPONENT LOCATION AND ACCESS INFORMATION

Location of Components

3.13 *The components are located as follows:*

- **Faceplate**—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**—underneath faceplate and is positioned over the dial and Memory (Fig. 4).

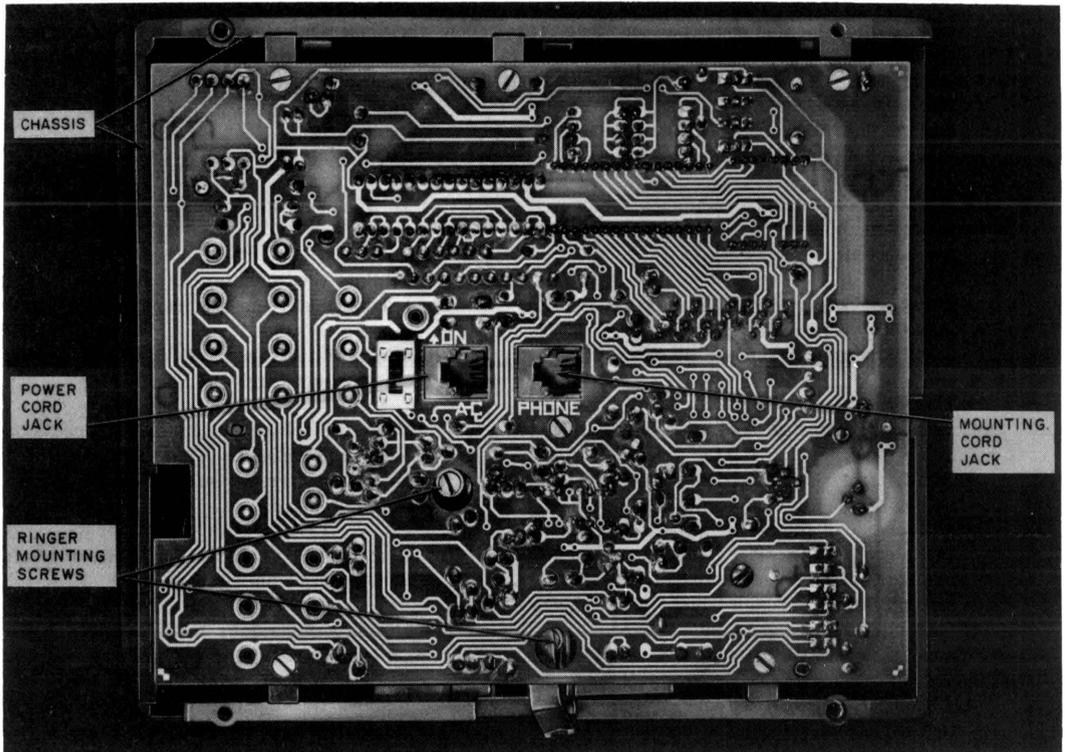


Fig. 7—Bottom View of Power Supply Board (Lower Housing Removed)

- **Battery**—snaps into a cavity on the top side and left front corner of the chassis (Fig. 5).
- **Battery Switch**—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**—fastened by two screws to bosses on the bottom of the chassis (Fig. 7) 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**—soldered to power supply printed wiring board and located at left-rear corner of power supply board (PSB) (Fig. 5).

- **TOUCH-TONE Dial**—fastened by two screws and located on the top side at right-front corner of the chassis (Fig. 4).
- **Memory**—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**—fastened by six screws to bosses on the bottom of the chassis (Fig. 7).
- **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 7).
- **Lower Housing**—fastened by four screws to the bottom side of the chassis (Fig. 2).
- **Upper Housing**—fastened by four screws to the top side of the chassis (Fig. 4).
- **Chassis**—main structural member to which other component assemblies are fastened, including the upper and lower housings (Fig. 5 and 7).

Access of Components

Faceplate Removal

3.14 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

3.15 To remove the upper housing, proceed as follows:

- (1) Unplug the modular handset cord at the telephone set end and remove handset.
- (2) ♦Remove the faceplate (3.14) and place the shield aside (Fig. 4).♦

♦**Caution: Use extreme care when handling shield. Do not bend the shield or break solder connection of attached lead.**♦

- (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

3.16 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

3.17 To access the screw terminals 1 through 12 (under the dial) on the power supply board, proceed as follows:

- (1) Remove the faceplate (3.14) 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. 8.
- (4) Check that dial connections are properly seated and reassemble by reversing the procedure.

3.18 To access screw terminals 13 through 21 (under the battery) on the power supply board, proceed as follows:

- (1) Remove the upper housing (3.15).
- (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. 13.
- 4.02** Refer to Table B for connection information for all options.
- 4.03** A partial functional schematic is shown on Fig. 19.

5. OPERATION

Note: If the telephone set is used behind a PBX, etc., where an access code is required, see 5.07.

Record A Number Into Memory

5.01 To record:

- (1) Remove the directory card labeled LAST NUMBER DIALED from its position on the memory cover.
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory card.
- (3) Replace the directory card.
- (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 card.
- (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.

Change A Number In Memory

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

Delete A Number From Memory

5.03 Complete the following operations in sequence:

- (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.

Automatically Dial A Number from Memory

5.04 To automatically dial a number:

- (1) Go off-hook and listen for dial tone.
- (2) Depress the desired memory button.

LAST NUMBER DIALED Feature

5.05 Operation of LAST NUMBER DIALED feature:

- (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.◆

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) 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.)

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 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.

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.

◆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.

◆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.



Always place battery switch in OFF position when set is removed from service.◆

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 F and 6.04 through 6.08.

Battery

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 (3.15).
- (2) Release the battery [3.18 (2) and (3)].
- (3) Disconnect the battery leads.

Caution: Do not short battery terminals.

- (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 transformer (for 5 to 10 seconds). After reconnecting the 2012B and securing with a 2A clamp, automatically dial the previously recorded known telephone number. This will verify retention of memory by the new battery.◆

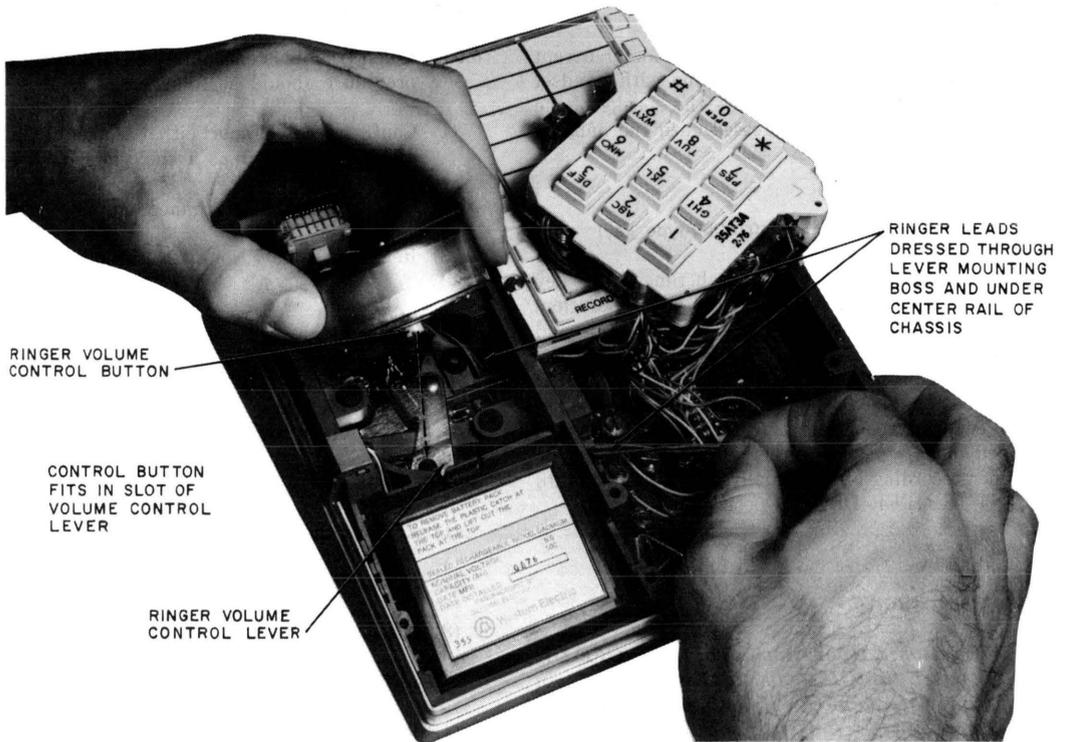


Fig. 8—Ringer Being Installed in 2960A01M Chassis With Dial Rotated onto Memory and Shield Removed

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) Remove the faceplate (3.14) and place the shield aside.
- (2) Disengage the four captive memory screws (Fig. 4).
- (3) Rotate the right edge of the memory upward.
- (4) Disengage the connector at the memory (Fig. 6) by pulling it perpendicular to the circuit board.
- (5) 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.
- (6) Tighten the four captive screws.
- (7) Replace the shield and faceplate.
- (8) Test per 3.12.
- (9) Place the old Memory in the shipping container of the new Memory (carton 900314535), affix a defective label and return to the repair location.

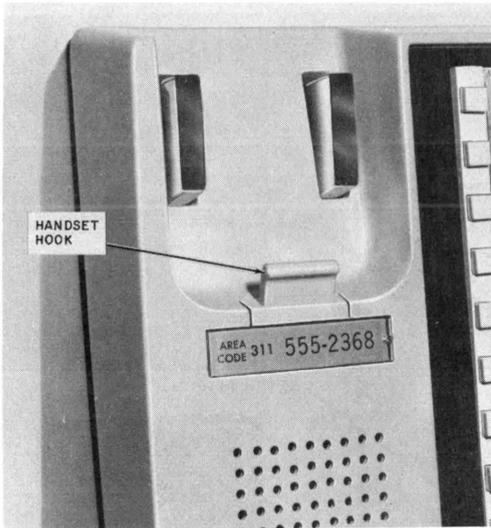


Fig. 9—2960A01M Telephone Set With Handset Hook Reversed for Wall Mounting

35AT3A Dial

6.06 To replace:

- (1) Remove the faceplate (3.14) and place the shield aside.
- (2) Disengage the two captive screws that hold the dial in place.
- (3) Disengage the four captive memory screws (Fig. 4), gently lift and rotate Memory counterclockwise and rest lightly on top of housing.
- (4) Lift dial out and carefully disengage the dial connectors by pulling up perpendicular to the printed wiring board.
- (5) Remove the two dial mounting brackets from the dial (Fig. 6).
- (6) 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.

- (7) To test the dial for both manual and automatic operation:
 - (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).

P1A Ringer

6.07 To replace the P1A ringer proceed 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) Remove the lower housing (3.16).
- (2) Disengage and remove the two ringer mounting screws which can be accessed through the clearance holes in the power supply board (Fig. 7).
- (3) Temporarily replace the lower housing and place the set on its feet.
- (4) Remove the upper housing (3.15).
- (5) Remove the dial [3.17 (2) and (3)] and place aside (Fig. 8).
- (6) Disconnect the ringer leads and remove ringer.
- (7) 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.
- (8) 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. 8).
- (9) Replace the dial.
- (10) Remove the lower housing. Holding the ringer in position, turn the chassis over to expose the clearance holes in the power supply board.
- (11) Attach one ringer mounting screw onto the blade of a screwdriver, (see note).

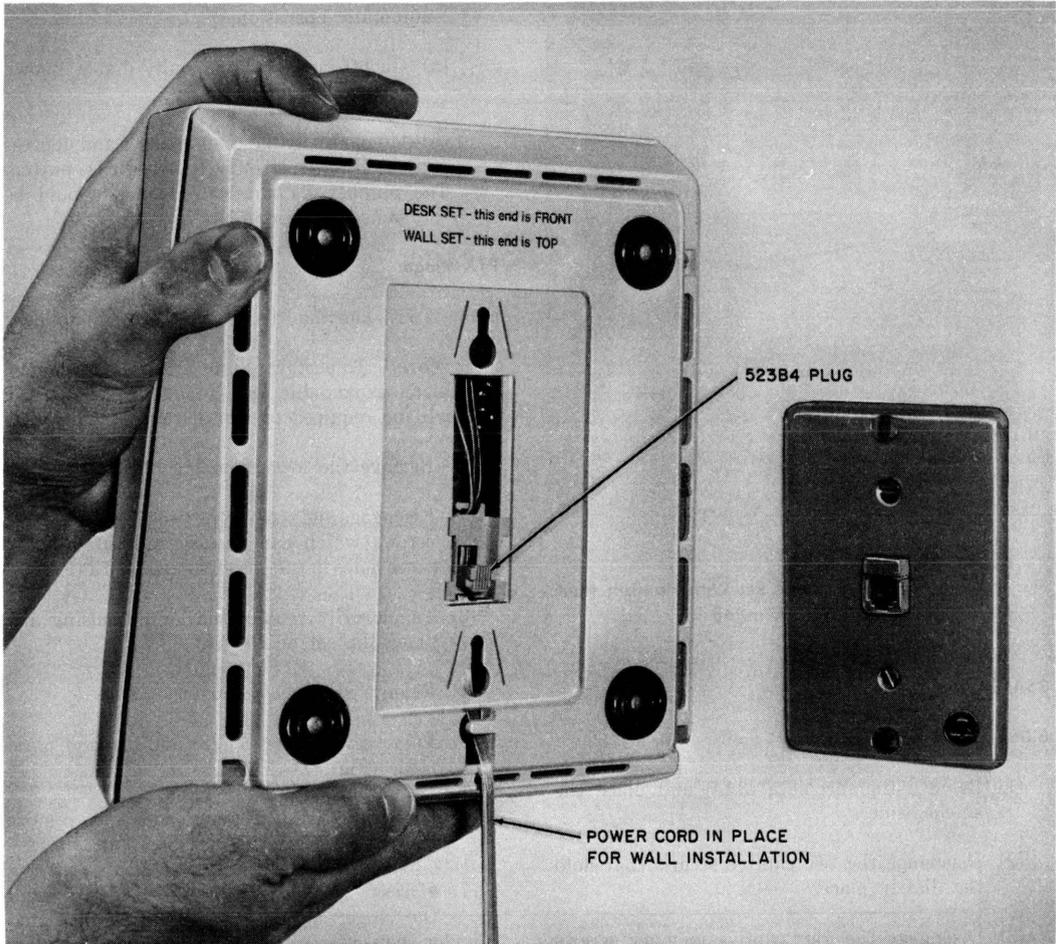


Fig. 10—2960A01M Wall Set and 630A4 Connecting Block

- (12) Insert the ringer mounting screw into one location and secure ringer.
- (13) Align the ringer adjust arm over the ringer volume control button (Fig. 8).
- (14) Replace the remaining ringer mounting screw with the "special" screwdriver and tighten ringer into place.
- (15) Replace the housings, shield, faceplate, and handset.

- (16) Dial appropriate code for ring-back to test the ringer.

Handset Jack

6.08 To replace the 616J handset jack (Fig. 5 and 6):

- (1) Remove the upper housing (3.15).
- (2) Release the battery and place aside [3.18 (2) and (3)].

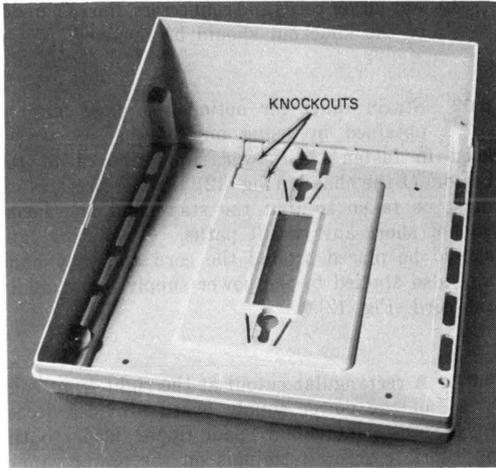


Fig. 11—Lower Housing Removed Showing Knockouts for Access by Adjunct Cords

- (3) Release the dial [3.17 (2) and (3)] and place aside (Fig. 8).
- (4) Disconnect the appropriate leads (Fig. 13B) and remove jack.
- (5) Replace the jack and dress jack leads in channel behind jack (Fig. 5).
- (6) Reassemble set.
- (7) ♦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 (3.16).
- (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. 10). 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. 10).

(5) ♦Connect the power cord to the telephone set per the appropriate option of Fig. 13D.♦

(6) Place the lower housing on the chassis according to the instructions on the bottom (Fig. 10).

(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. 9).

(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. 10 and 14B).

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.)

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(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. 11), to accommodate the additional cords associated with the connections of wiring options such as speakerphone, SPOKESMAN® 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. 12). 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. 12).

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. 12).

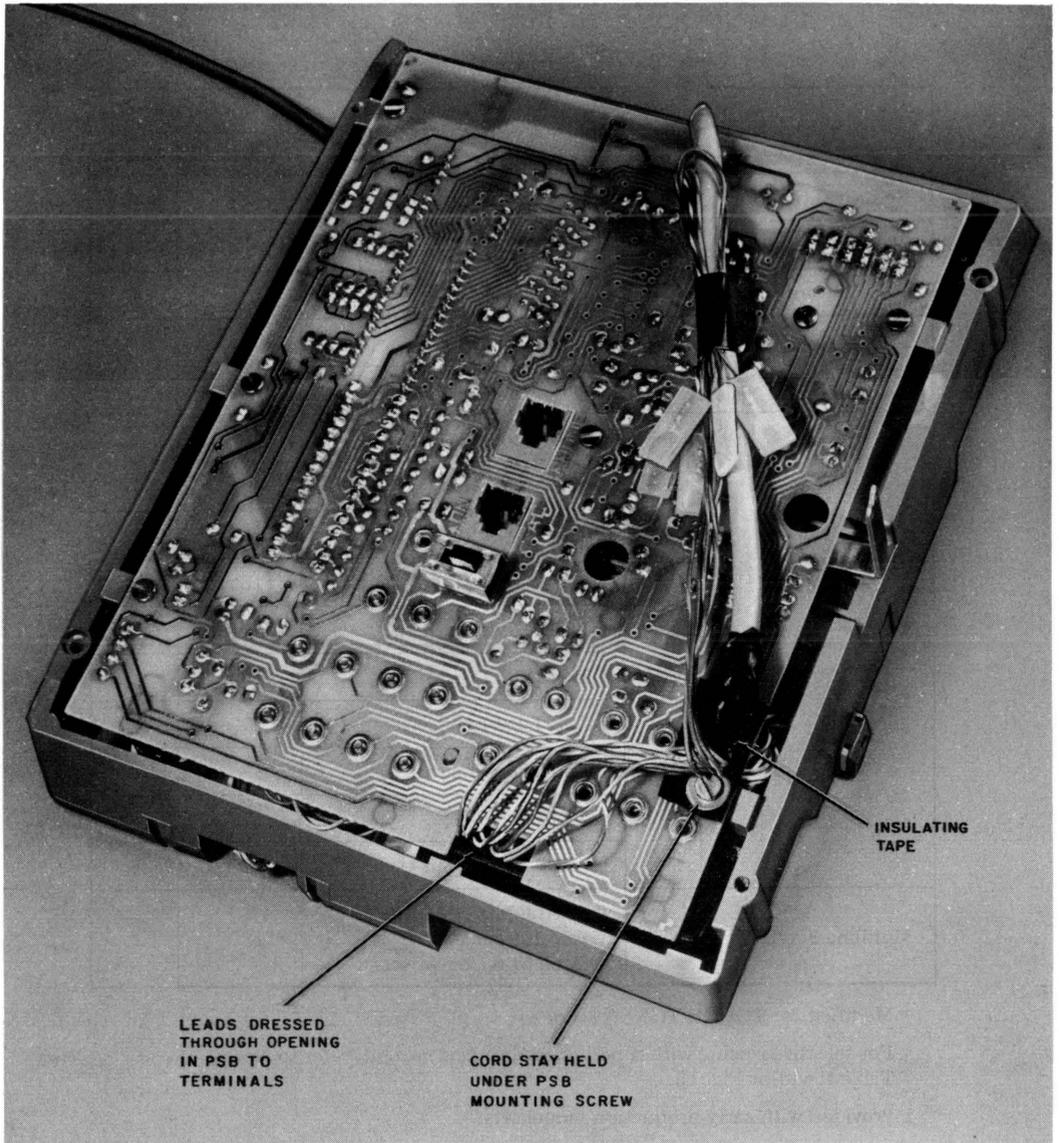


Fig. 12—Bottom of Set With Lower Housing Removed Showing an Adjunct Cord Dressed Across Power Supply Board (PSB)

◆ TABLE B ◆

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 ‡		10 & 14B	
		630A4 Connecting Blk			
Speakerphone	3B	760A Loudspeaker		16	D
		666B Transmitter		16	D
		Control Unit	55A*	16	D
			55B	16	D
		2012B Transformer		16	D
		D6AD-87 Cord		16	D
	4A	108-Type Loudspeaker		17	E
		680-Type Transmitter		17	E
		223A Adapter		17	E
		85B1 Power Unit		17	E
Multiline Service		6040/6050-Type Key And Interface Cord (Min. of 6 Conductors)		18	

* Modified for TOUCH-TONE® service.

† For selective ringing with superimposed ringing current, refer to Note 1 of Table C and/or Fig. 15.

‡ Provided with early production model sets.

◆ TABLE C ◆

**CONNECTIONS – 2960A01M TELEPHONE SET FOR
RINGER OR A-LEAD CONTROL OPTIONS**

OPTION		LEAD		REMOVE FROM PSB TERM.	CONNECT TO PSB TERM.	REMARKS	
		DESIG.	COLOR				
Selective Ringing (Note 1)	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	R	6	7		
Tip Party with Identification Ground	Ringer Leads	BK	BK	7	1	Ringing current from Tip to Grd	
		S†	S†	*	6		
		S-R	S-R	*	*		
	Mtg Cord Jack	G	G	7	5		
		R	R	6	7		
	Spade Tip Leads on PSB	BL	BL	6	10		
		BK	BK	11	9		
G	G	*	11				
A-Lead Control (Note 2)	Mtg Cord Jack	Y	Y	1	5	A1	Leads must be dedicated
		BK	BK	*	9	A	
	Shield	Shield	BK	1	5		

Note 1: For 4-party full selective or 8-party semiselective, one of the following must be provided:

(a) 426N diode. For connections, see Fig. 15.

(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 connection information using 28A isolator.

Note 2: No ringer option available (factory wired bridged ringer only) when A lead control option is used.

* Insulated and stored.

† Approximately 2600 ohm identification ground only.

TABLE D
CONNECTIONS – 2960A01M TELEPHONE SET WITH
3B SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD		CONNECT		
				FROM	TO	
		DESIG.	COLOR	PSB TERM.	CONTROL UNIT (NOTE 2)	
					55A* (NOTE 1)	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 Trnsf	D-Station Wire	AC1			27	27
		AC2			36	36

Notes:

1. 55A* control unit modified by Western Electric for use with TOUCH-TONE dial equipped telephone sets.
2. Strap terminals 20 and 22 (55A*) or 4 and 5 (55B). (See Fig. 16 for block diagram of interface.)

* Insulate and store.

† To reduce loudspeaker volume, move SP1 lead to terminal 24 (55A*) or 30 (55B).

TABLE E

CONNECTIONS – 2960A01M TELEPHONE SET
WITH 4A SPEAKERPHONE

APPARATUS	CORDS (SEE NOTE)	LEAD		CONNECT TO
		DESIG.	COLOR	
2960A01M Tel Set	M16C 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 223A adapter. (See Fig. 17 for block diagram of interface.)

* Insulate and store

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FIG. A
960A
MEMORY

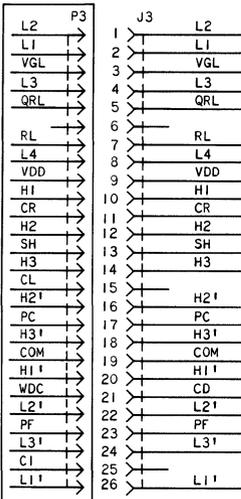


FIG. B
POWER SUPPLY
BOARD

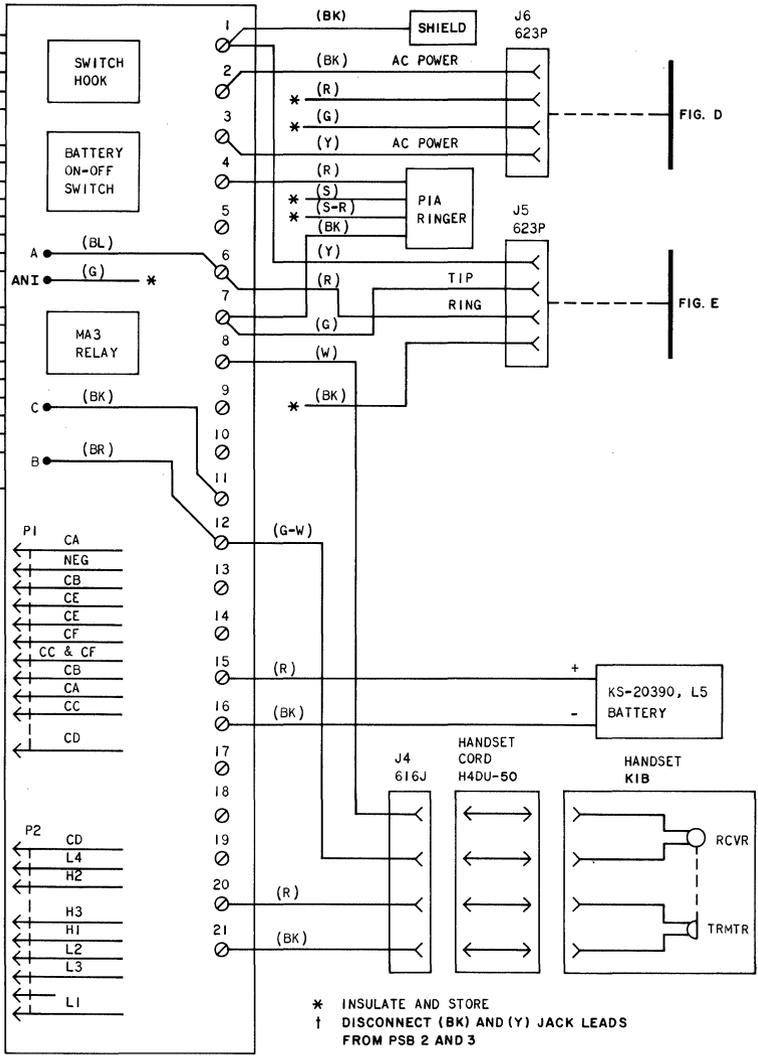


Fig. 13—2960A01M Telephone Set, Connections (Sheet 1 of 3)

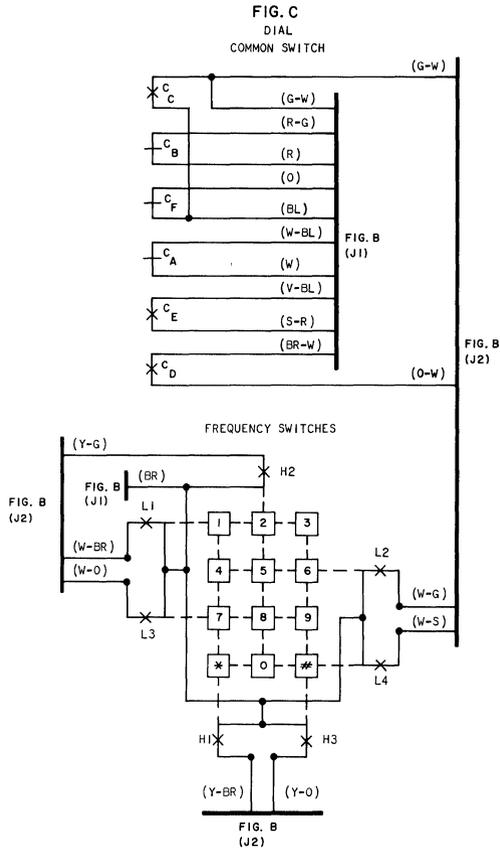


Fig. 13—2960A01M Telephone Set, Connections (Sheet 2 of 3)

FIG. D
POWER CONNECTIONS

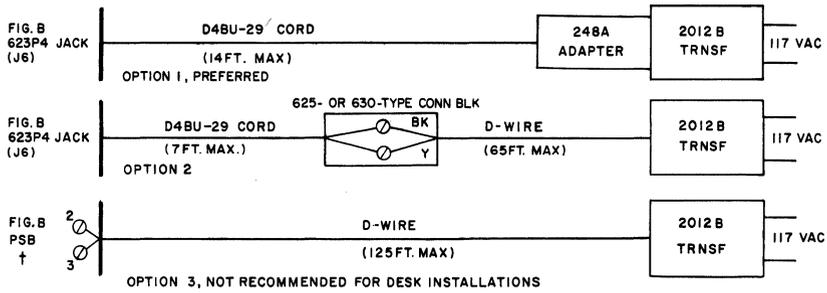
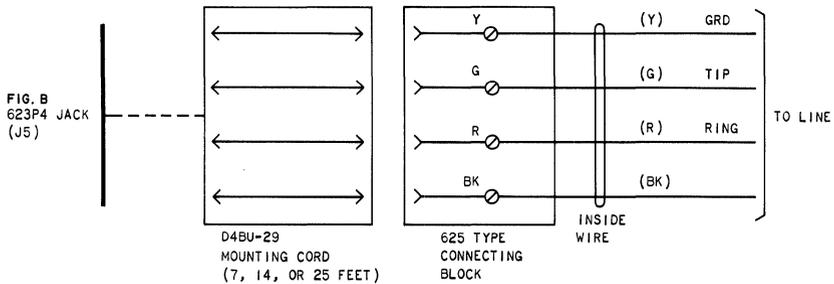
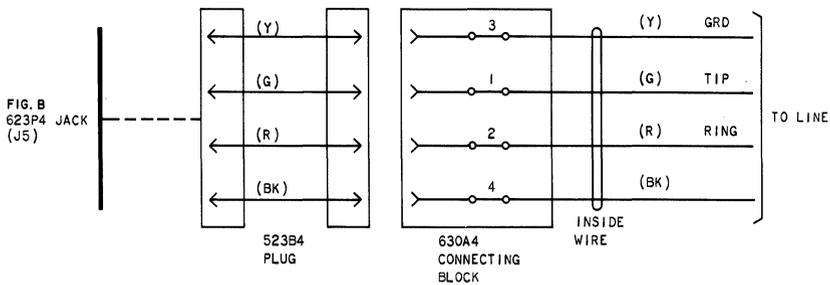


FIG. E
LINE CONNECTIONS

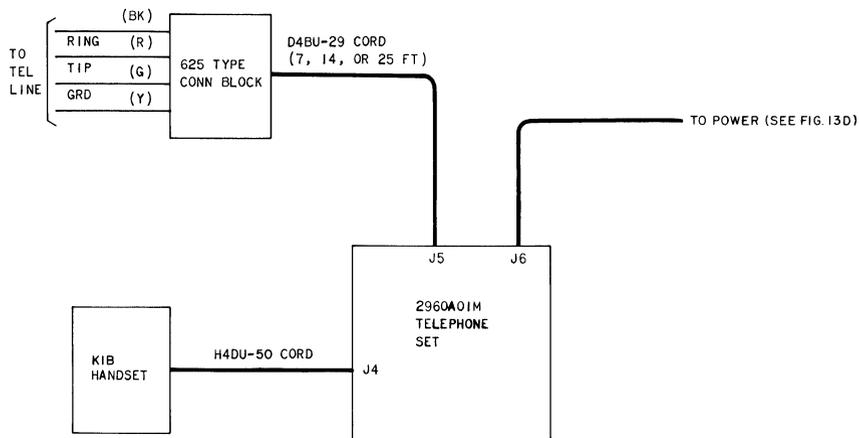


FOR DESK SET INSTALLATION

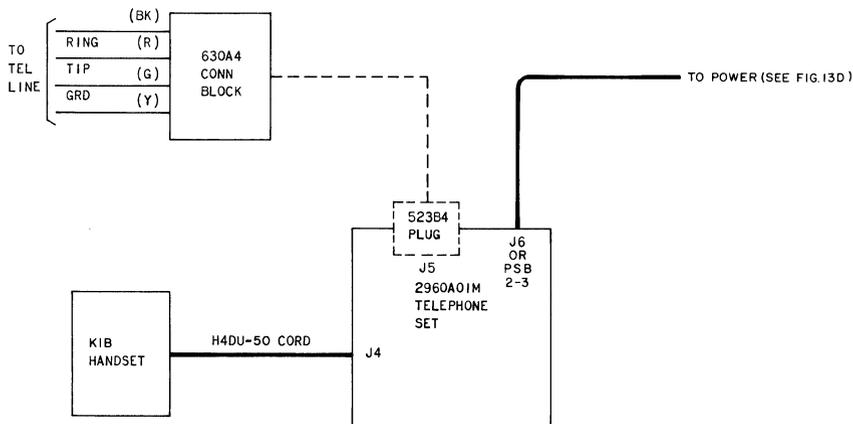


FOR WALL SET INSTALLATION

Fig. 13—2960A01M Telephone Set, Connections (Sheet 3 of 3)



A. DESK SET



B. WALL SET

Fig. 14—Block Diagram—2960A01M Telephone Set, Desk- and Wall-Type

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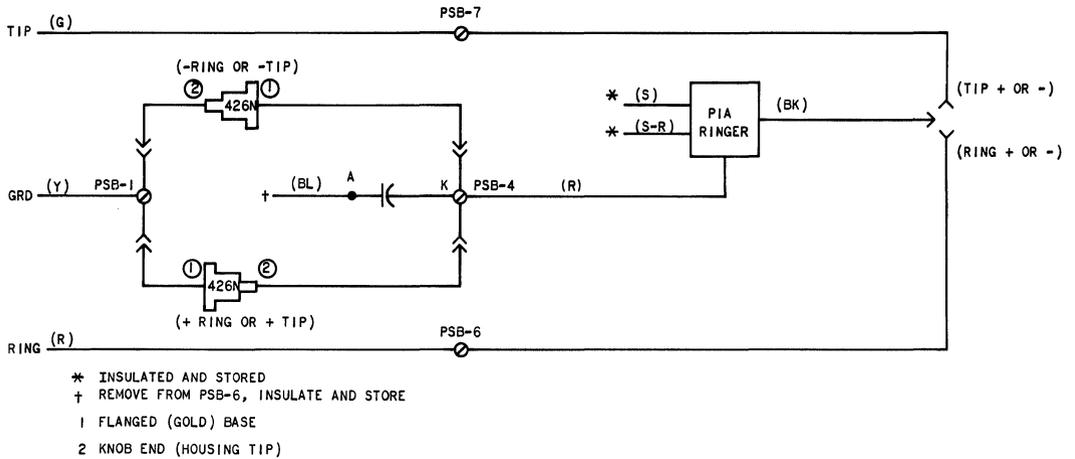


Fig. 15—4-Party Full Selective Ringing, Connections Using 426N Diode (300 Ohm Minimum Loop to Prevent Pretrip)

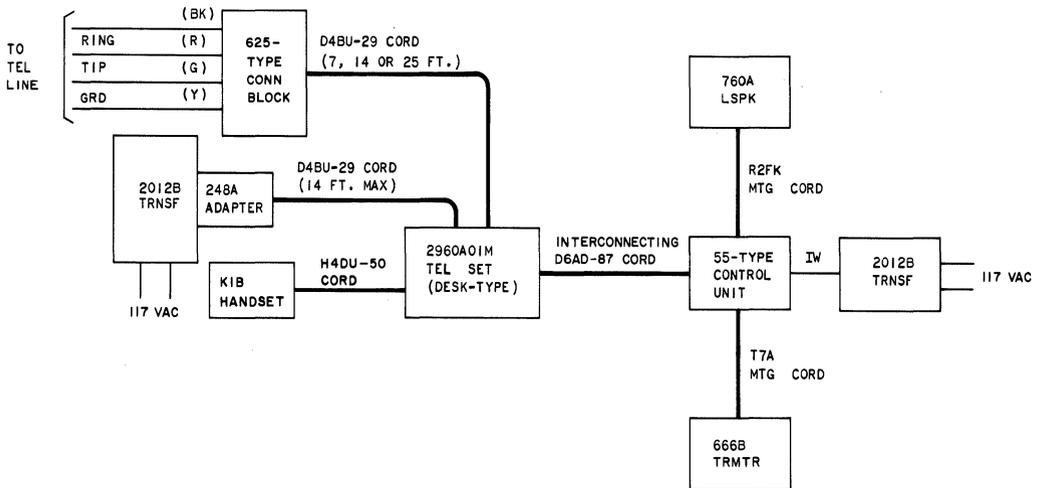
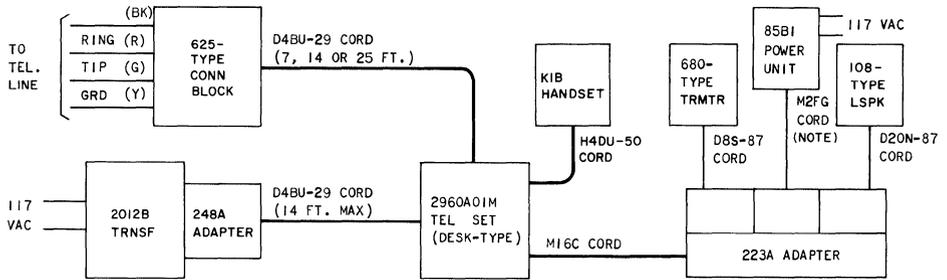
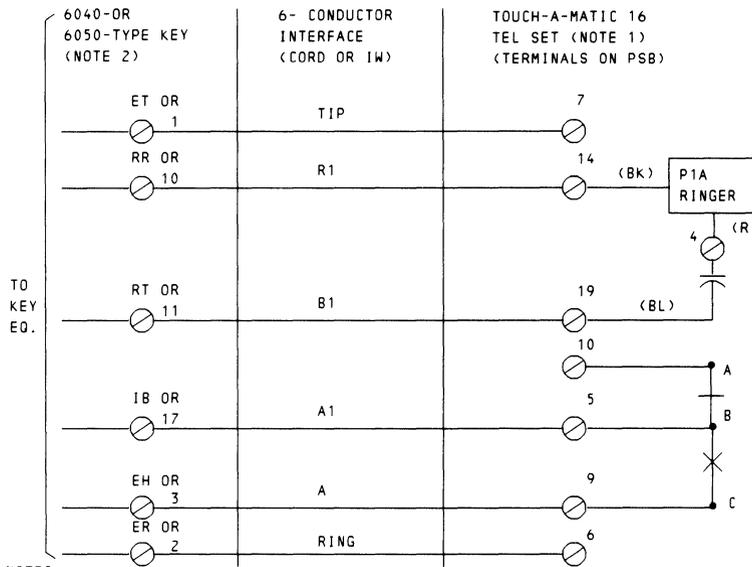


Fig. 16—Block Diagram—2960A01M Telephone Set With 3B Speakerphone



NOTE:
 (R) AND (G) CONDUCTORS ARE NOT TERMINATED IN PLUG OF M2FG CORD.
 ONLY (BK) AND (Y) ARE USED.

Fig. 17—Block Diagram—2960A01M Telephone Set With 4A Speakerphone



NOTES:

1. MODIFY TOUCH-A-MATIC 16 TEL SET AS FOLLOWS:
 (A) REMOVE (BK) RINGER LEAD FROM PSB-7 AND CONNECT TO PSB-14
 (B) REMOVE (BL) STRAP LEAD FROM PSB-6 AND CONNECT TO PSB-19
2. LETTERED DESIGNATIONS ARE FOR 6040-OR 6041-TYPE KEYS
 NUMBERED DESIGNATIONS ARE FOR 6050-OR 6051-TYPE KEYS

Fig. 18—Connections from Telephone Set to 6040/6050—Type Key

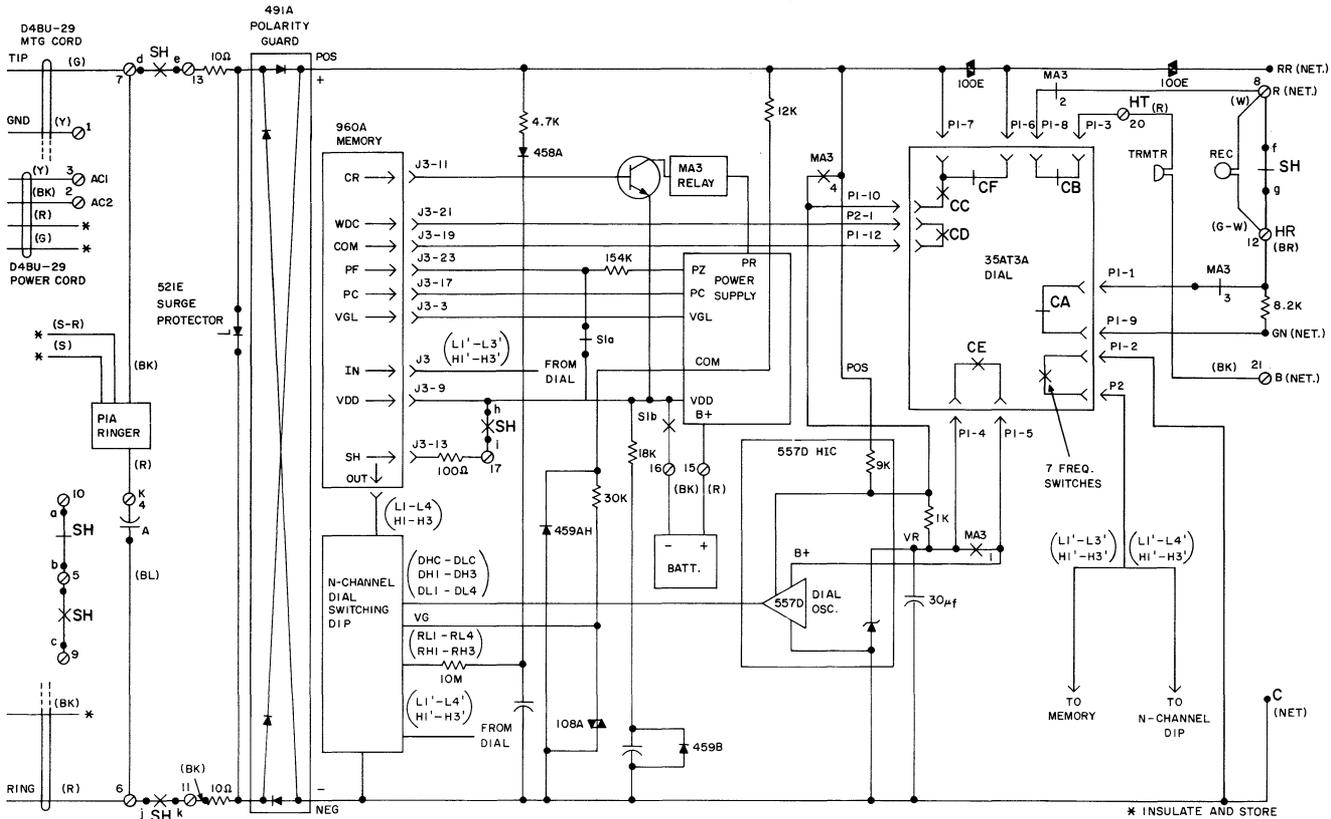


Fig. 19—2960A01M Telephone Set, Partial Functional Schematic

TABLE F

TROUBLE ANALYSIS – 2960A01M

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 switch-hook 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

TABLE F

TROUBLE ANALYSIS – 2960A01M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
4	Cannot manually dial when off-hook	Clicking sounds or damped TOUCH-TONE signals heard when dial buttons are depressed. Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook	
			No audible TOUCH-TONE signal present	Dial connectors not properly inserted	1. Check connector insertion 2. Replace 35AT3A dial
				Defective dialing circuits on PSB	Replace telephone set
				Unknown	Replace telephone set
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	AC power not present	Check for commercial power	
			D4BU-29 power cord improperly inserted	Check cord insertion at set and at 248A adapter	
			2012B transformer not plugged in or defective	Check or replace 2012B transfer. (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	

TABLE F

TROUBLE ANALYSIS – 2960A01M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (Cont)			Unknown	Replace telephone set
		Lamp turns off when any memory button is depressed or	Defective Memory logic	Replace Memory assembly
		Lamp does not momentarily turn off when a dial button is depressed	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
10	Cannot dial properly from Memory		Did not record properly	1. Record per 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 signal present	Defective Memory logic	Replace Memory assembly
			Open circuit in power path	Replace telephone set
			Defective switch-hook 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 signal present		
		Audible gap in train of digits being dialed.		
No digits or random digits in memory	AC power outage for 16 hours or longer	Reestablish AC power and rerecord numbers into Memory		

◆ TABLE F ◆

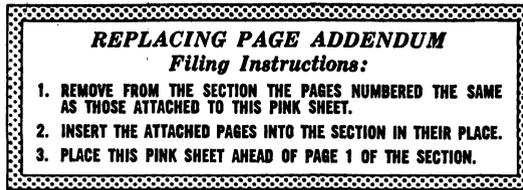
TROUBLE ANALYSIS – 2960A01M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
10 (Cont)			Disconnected battery leads or defective battery	<ol style="list-style-type: none"> 1. Check KS-20390L5 battery connections 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 2012B 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
12	Ringer does not operate	Operates with adjust level 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 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	<ol style="list-style-type: none"> 1. Check connections to PSB terminals 2 and 3 2. If IW is used to run power from 2012B to PSB terminals 2 and 3, check for unwanted ground 	

◆ TABLE F ◆

TROUBLE ANALYSIS – 2960A01M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
13 (Cont)			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)	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 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			



TELEPHONE SETS—2671B1M

Call-a-matic®

IDENTIFICATION, ASSEMBLY, CONNECTIONS, OPERATION, AND MAINTENANCE

1. GENERAL

1.001 This addendum supplements Section 503-550-101, Issue 3. The attached pages must be inserted in the section in accordance with filing instructions above.

1.002 This addendum is issued to add lamp change-out procedure on 635A5 key.

5. MAINTENANCE

The following change applies to Part 5 of this section:

- (a) 5.02.1—added

Attached:

Page 9 dated March 1973—Reissued

Page 10 dated March 1973—Revised

SEE ADDENDUM

TELEPHONE SETS—2671B1M

Call-a-matic®

IDENTIFICATION, ASSEMBLY, CONNECTIONS, OPERATION, AND MAINTENANCE

1. GENERAL

1.01 This section is reissued to:

- Add information on 635A5 key, P-23F503 collar, and E-5837 key designation tabs.
- Change index space color on cartridge tape from light to dark color, Fig. 1, 3, 5, and 8.



Fig. 1—2671B1M Telephone Station With Speakerphone

2. IDENTIFICATION

Purpose

2.01 This set provides for automatic dialing of up to 500 prerecorded, fourteen digit telephone numbers on CO or PBX line circuits.

Application

2.02 The 2671B1M telephone set can be equipped as follows:

- Single line service—with or without speakerphone, A lead control, and station busy lamp.
- Five line pickup and hold—in 1A, 1A1, 1A2, or 6A KTS with or without speakerphone and station busy lamp.

Note: Speakerphone can be either internal or external.

ORDERING GUIDE

Note: When ordering a 2671B1M telephone set, depending on the services required as shown in Table A, coded apparatus listed as modular items must be separately ordered and installed to furnish a complete telephone station as shown in Fig. 1.

- Set, Telephone, 2671B1M—Consists of a 35S3A TOUCH-TONE® dial, 51B (CALL-A-MATIC® set) dial, 635A2 or 635A5 key, 425K network, P1A ringer, 165A adapter, and P-90D212 cord assembly.

(a) **Modular Items (see Table A)**

- Cord Mounting, D10S-*, D10T-*, D20L-*, D20M-*, or D50AB-*
- Cartridge, 1B1 (250 entries) or 1B2 (500 entries)—includes an alphabetical designation strip (KS-20166L4 on the 1B1 cartridge and KS-20166L1 on the 1B2 cartridge).
- Set, Hand, G12A-* and Cord, H4DB-*

SECTION 503-550-101

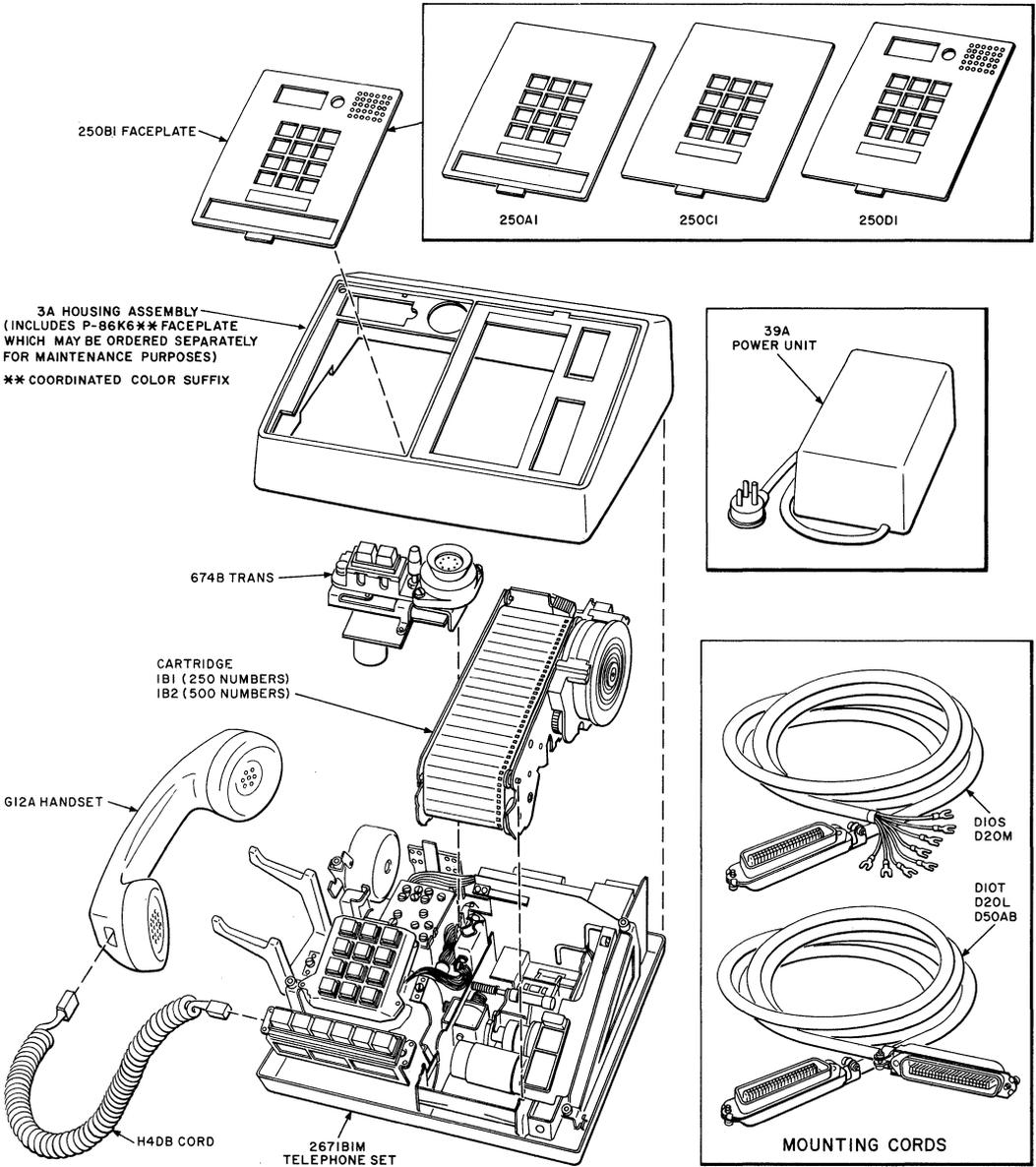


Fig. 2—Station Modular Arrangement, 2671B1M Telephone Set

- Faceplate, 250A1-*, 250B1-*, 250C1-*, or 250D1-*
- Housing Assembly, 3A-* (includes P-86K6-* faceplate)

(b) **Replaceable Components**

- Dial, 35S3A
- Dial, 51B
- Key, 635A2, or ♦635A5♦ (see appropriate section in Division 512 for components)
- ♦P-23F503 Collar (635A5 key)♦
- P-88E166 Collar (635A2 key)
- All items listed as modular
- Strip, Designation, E-5253 (635A2 key)
- ♦Strip, Designation, E-5837 (635A5 key)♦
- P-86K6* Faceplate (51B dial faceplate)

* Add color or coordinated color suffix.

(c) **Optional Components (order separately)**

- KS-20166L2 (1B2 numerical)
 - KS-20166L3 (1B1 or 1B2 blank)
 - KS-20166L5 (1B1 numerical)
 - Buzzer, KS-8109L2
 - ♦Buzzer, KS-20419L1♦
 - P-90D012 Guard Assembly (polarity guard)
 - Diode, KS-15724L1 (station busy lamp)
 - Transmitter, 674B (internal) or P-90D234 Relay Assembly (external)
 - Loudspeaker, 760A-*
 - Unit, Control, 55B or modified 55A
 - Transformer, 2012B
- } Strip Designation
- } Speaker phone

- Transmitter, 666B (external)

(d) **Associated Items**

- Unit, Power 39A (order separately—one per CALL-A-MATIC telephone set required)
- ♦Subscriber Instruction Booklet, SIB-2435♦ (packaged with set)

Design Features

- Six service configurations by addition of modular and optional items to 2671B1M telephone set (Table A).
- Choice of cartridges with capacity of 250 numbers (1B1) or 500 numbers (1B2)
- Removable faceplate for handwritten entries on directory tape.
- Cartridge removable for typewritten entries on tape.
- Interlock switch disconnects power to directory tape drive motor on 51B dial when faceplate is removed.
- Automatic reset after approximately 9-second delay in dialing or recording action.
- Operating instructions imprinted on beginning of tape and on decal near dialer control buttons.
- Replaceable directory selector designation strips.
- All pickup keys convertible to signaling.
- Individual line or common ringer.
- Station busy lamp (optional).
- AC or DC operated buzzer (optional).
- Internal or external speakerphone (optional).
- Designed for use in business type surroundings not subject to excessive amounts of dust or dirt. Operating temperature range is from 40°F to 120°F with maximum relative humidity of 95 percent.

TABLE A
REQUIRED MODULAR ITEMS (ORDERED SEPARATELY)

TYPE OF SERVICE	CARTRIDGE	HOUSING ASSEMBLY	HANDSET	HANDSET CORD	MOUNTING CORD (NOTE 1)	FACE-PLATE	TRANSMITTER
Single Line Set	1B1 or 1B2	3A-*	G12A-*	H4DB-*	D10S-* or D10T-*	250C1-*	
Single Line Set With Internal Speaker- phone					D20L-* or D20M-*	250D1-*	674B
Single Line Set With External Speaker- phone					D20L-* or D20M-*	250C1-*	Note 2
6-Button Key Set					D50AB-*	250A1-*	
6-Button Key Set Internal Speaker- phone					D50AB-*	250B1-*	674B
6-Button Key Set External Speaker- phone					D50AB-*	250A1-*	Note 2

* Add color or coordinated color suffix.

Notes:

1. The D10S and D20M cords are spade tip ended for connection to 44-type connecting blocks. The D10T, D20L, and D50AB are plug ended for use with 66E3-type connecting blocks or A25B connector cables.
2. Requires a P-90D234 relay assembly and external 666B transmitter. Relay assembly is installed in place of 674B transmitter.

Operating Features

(a) 51B Dial

- RECORD button—when pulled, places 51B dial in record mode. When pushed, resets recording head to start position.
- WAIT button—used while recording to provide stop for second dial tone.
- CALL button—for dialing prerecorded numbers.

(b) 1B-Type Cartridge

- DIRECTORY SELECTOR—drives directory tape to desired index location.
- NAME SELECTOR—rotated to position specific name over index space.

3. ASSEMBLY AND CONNECTIONS

3.01 The basic CALL-A-MATIC telephone set is shipped with a housing to protect the modular components. This housing is not intended for use after the telephone set is put in service, and can be disposed of per local instructions. It is not intended for reuse by the distributing house.



Fig. 3—Location of Components

3.02 The 2671B1 telephone set is furnished wired for 6-button key use on 1A1 or 1A2 KTS. When used as a single-line set, wiring changes must be made as shown in Table C. Buzzer leads and certain speakerphone leads are insulated and stored.

3.03 When used as a 6-button set with internal speakerphone, only two of the three combinations of features shown in Table B can be provided at one time, due to a lack of mounting cord conductors.

3.04 When used as a 6-button set without speakerphone or with external speakerphone transmitter, all three of the options may be supplied simultaneously.

Optional Components

3.05 Assemble and connect the required optional components to the 2671B1M telephone set as follows:

- (1) Loosen 35S3A dial mounting screws and move dial to one side. Dial should not be unplugged for normal component assembly. 51B dial must be removed whenever it is necessary to unplug the 35SA dial.

THINK *All connections or wiring changes should be made before assembling the 35S3A dial and the 674B transmitter*

or P-90D234 relay assembly to the telephone set.

- (2) Add a P-90D012 polarity guard assembly, when specified by local instructions. The guard assembly mounts to a bracket on the base located under the 35S3A dial and in front of the network. Fasten guard with two screws supplied with the telephone set and connect leads as shown in Table G.

- (3) Mount the KS-8109L2 buzzer, if required, to the plastic block on left side of 35S3A dial support bracket so that its frame is insulated from metal parts of set; also position the buzzer so its adjusting screw is accessible when the faceplate is removed. Refer to Fig. 13B for buzzer connections.

- (4) The KS-20419L1 buzzer (optional) will mount on one of the screws which is part of the plastic block covered in 3.05(3). Refer to Fig. 13B for connections.

- (5) Connect the 674B transmitter (for internal transmitter feature) as shown in Fig. 11 or the P-90D234 relay assembly (for external transmitter feature) as shown in Fig. 12.

- (6) Mount the 674B transmitter or the P-90D234 relay assembly to the brackets on the base of the set (Fig. 6). Either the transmitter or the relay assembly are compatible to mounting on these brackets.

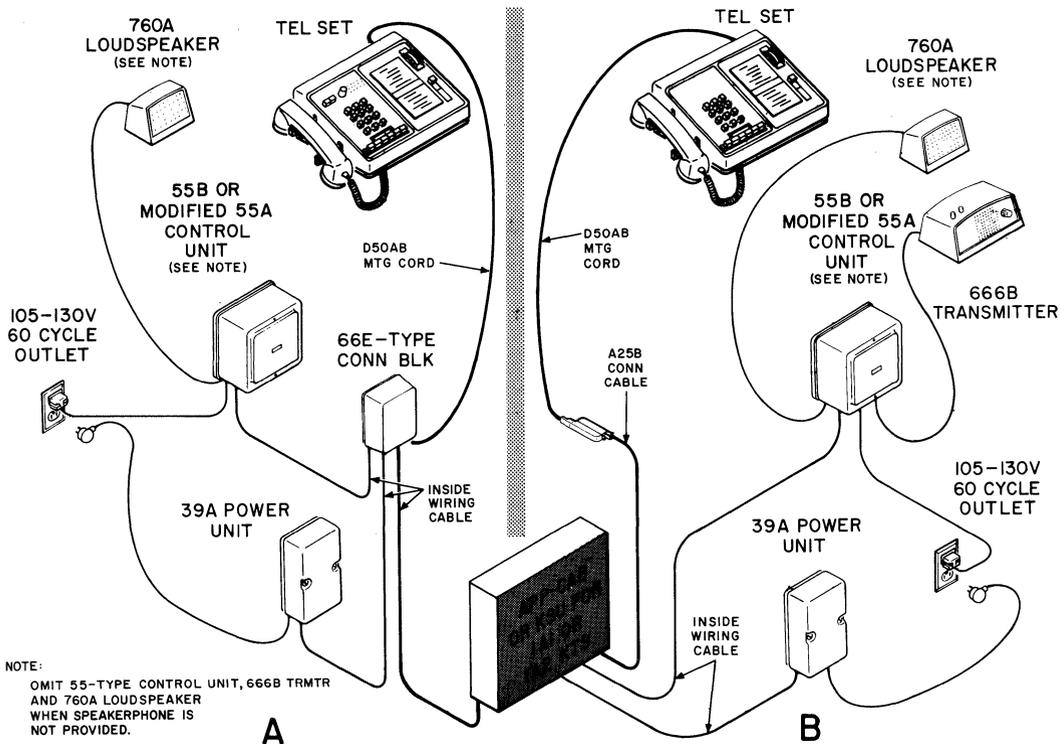
Modular Components

- (7) Fasten 35S3A dial in its proper position on the mounting brackets.

- (8) Install the 1B1 or 1B2 cartridge as follows:

- (a) Raise latch on top of cartridge to open position (Fig. 8).

- (b) Insert front end of cartridge into 51B dial until shaft extensions engage slots in dial. Lower rear of cartridge into place and close latch. When power is applied to 51B dial, tape may run to location indicated on directory selector.



A — Using 66E-Type Connecting Block and Internal Speakerphone
B — Using A25B Connector Cable and External Speakerphone

Fig. 4—Two Typical Installation Layouts For 6-Button Key Sets

- (9) Install the housing with both faceplates removed and fasten housing in place with four captive screws.
- (10) Install 51B dial faceplate (Fig. 5).
- (11) The proper 250-type faceplate (Table A) must be installed over the 35S3A dial. If single-line service is provided, the collar, buttons, and caps must be removed from the 635-type key before installing the 250-type faceplate.

Note: 635-type key is left in place but is electrically inoperative. Rewire set as shown in Table C. (Retain or dispose of collar, buttons, and caps per local instructions.)

- (12) Connect mounting cord by carefully tipping the telephone set up on its front edge to expose cord connector. Plug cord into connector and secure.
- (13) Connect handset and cord. Jacks are provided in both the handset and telephone set to receive the proper plug of the H4DB cord. The wedge-shaped end of the cord is plugged into the handset and the square end into the base.

THINK → *When using these push-in-lock type plugs make sure the contacts are in proper position to make electrical connection with the mating contacts,*

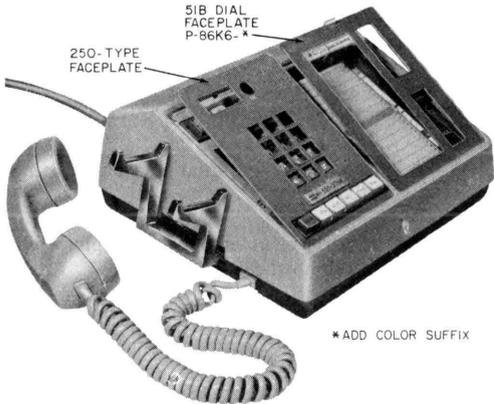


Fig. 5—Faceplate Location



Fig. 8—Removal of 1B Cartridge

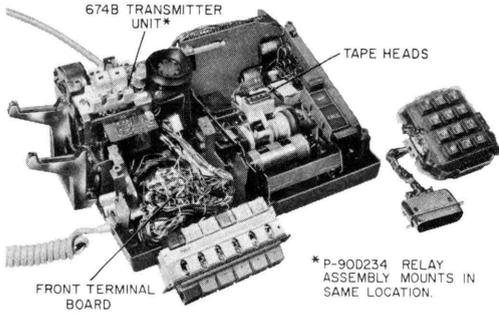


Fig. 6—2671B1M Telephone Set, 635-Type and 35S3A Dial Removed



Fig. 9—Placing 1B Cartridge in Typewriter

and that the plug is placed in the proper receptacle. Either error will cause circuitry problems and extreme difficulty in removing the plug.

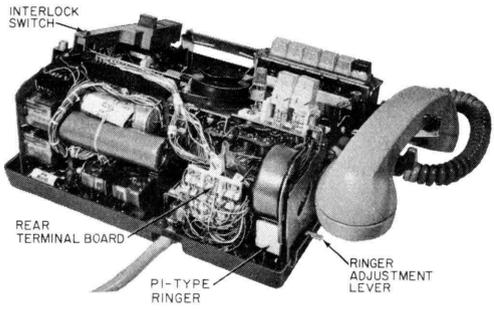


Fig. 7—2671B1M Telephone Set, Rear View

3.06 When selecting a location for installing the 39A power unit the following precautions and specifications should be met:

Caution: *Disconnect ac power to the 39A power unit before connecting or removing wiring from unit.*

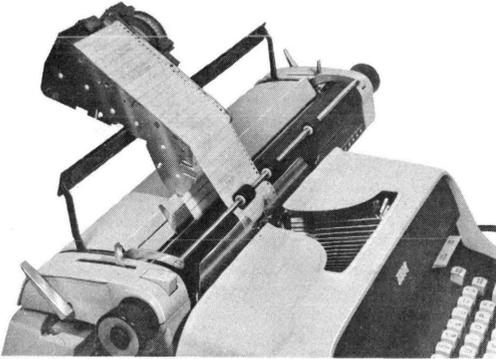


Fig. 10—1B Cartridge in Place For Typing Entries

- Must be located within 18 inches of a 3-wire, 105- to 130-volt ac power outlet not under control of a switch.
- Must be separated at least 6 inches from a 55-type control unit, telephone set, or auxiliary ringer.
- Resistance of the conductors between the power unit and telephone set must not exceed 2-1/2 ohms per conductor, for example:

D station wire (22 ga)	150 feet
E block wire (21-1/2 ga)	175 feet
KS-7144 flat cordage (18 ga)	370 feet
ABAM cable (22 ga)	150 feet
ABMM cable (24 ga)	100 feet
D inside wiring cable (24 ga)	100 feet
A-type connector cable (24 ga)	100 feet

- Power unit is mounted on backplate secured to wall.

3.07 Install the directory selector designation strip, where required, as follows:

- (1) Move the Directory Selector wheel to the "I" on tape and wait for tape to run to proper position.

- (2) Disconnect tape drive power to dial by removing faceplate.
- (3) Rotate thumbwheel until raised portion (island) between YZ and 1 appears.
- (4) Peel off existing designation strip starting at island.
- (5) Start new strip at island and apply while rotating thumbwheel.
- (6) Replace faceplate which should restore power to the dial.

3.08 An instruction booklet, SIB-2435, "How to Use the CALL-A-MATIC® Telephone" is packed with each set and should be left with the customer.

4. OPERATION

51B Dial Controls

- RECORD—Pull up and release for record mode. Push to reset dialer to start position.

Note: Dialer automatically resets after an approximate 9-second delay in any portion of record operation.

- WAIT—Push after recording access digits to condition dialer to stop for second dial tone.
- CALL—Push, after receiving dial tone to dial prerecorded numbers.
- DIRECTORY SELECTOR—Rotate for automatic scanning of directory tape. Designations on selector thumbwheel correspond to those on directory tape.
- NAME SELECTOR—Rotate to position a specific directory tape entry over the index area (dark area).

Recording a Number

- (1) Rotate DIRECTORY SELECTOR to proper group position.

- (2) After directory tape has stopped, use NAME SELECTOR to position a vacant space on tape over index area.
- (3) Remove 51B dial faceplate and with a pencil, write name and complete telephone number including access digits if required, between lines of index space.
- (4) Pull the RECORD button.
- (5) Dial complete telephone number as written in index space using the TOUCH-TONE dial.

Note: If number includes access code, depress WAIT button momentarily after dialing access digits, then dial remainder of number.

- (6) Push RECORD button.

Note: Dialer will reset automatically after approximately 9 seconds if button is not pushed. Any previously recorded number will be automatically erased.

4.01 Recording a Number While Making a

Call: A line key must be depressed and handset removed or speakerphone ON button depressed before proceeding with the six operation steps required to record a number.

Calling a Recorded Number

4.02 To use the 51B dial to originate a call proceed as follows:

- (1) Rotate DIRECTOR SELECTOR to group position where name and number are recorded.
- (2) Position name and number to be called over index space, using NAME SELECTOR. Make certain that lines on tape correspond closely with index space.
- (3) Depress a line key, lift handset or push speakerphone ON button and listen for dial tone.
- (4) Push CALL button momentarily.
- (5) If called number has an access code, dialer will stop after access code is dialed. When second dial tone is heard, depress CALL button again to complete dialing.

Note: If it is desired to bypass the access code; for example, with night service, push CALL button before lifting handset. When dialer stops, lift handset, listen for dial tone and push CALL button again.

Typing Entries on Directory Tape

4.03 To record names and telephone numbers on the directory tape with a standard typewriter proceed as follows for proper handling of the 1B cartridge:

- (1) Rotate directory selector to "1" position and allow tape to come to rest.
- (2) Remove 51B dial faceplate.
- (3) Rotate directory latch, grasp latch and lift 1B cartridge out of set (Fig. 8).
- (4) Remove platen (roller) from typewriter, pull a loop in directory tape from bottom roller of cartridge and carefully feed platen through loop. Be sure tape is under typewriter ball (Fig. 9).
- (5) Lock roller in place and position 1B cartridge on carriage as shown in Fig. 10. Rapid return of carriage may require supporting 1B cartridge.
- (6) Type entries between lines on directory tape. Use pencil type eraser to remove entries or errors, taking care not to wrinkle or tear tape.

Caution: Do not use ink eradicator or typewriter eraser. Cartridge must be replaced if tape is torn.

- (7) Remove cartridge from typewriter and replace in telephone set.

Note: Any access slack in tape in the typing process should be fed back into the cartridge with the name selector wheel.

- (8) Replace faceplate making certain that it is fully seated so that interlock switch is operated.

5. MAINTENANCE

Caution: Disconnect power to 39A power unit before working on set.

5.01 Maintenance of the 2671B1M telephone set should be limited to a physical check of wiring shown in Fig. 13 and replacement of the items listed under the Ordering Guide as:

- Modular items
- Replaceable components
- Options
- Associated items

5.02 Detailed information on the 51B dial is contained in Division 812. Maintenance of the 51B dial is not recommended; if defective, replace set.

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

TABLE B
FEATURE COMBINATION CONNECTIONS

FEATURE COMBINATION	RINGER	BUZZER	HOLD LAMP
Ringer and buzzer	Factory-wired	(V-BL) (BL-V)	
Ringer and Hold Lamp	Factory-wired		(V-BL) (BL-V) Note
Buzzer and Hold Lamp		(V-BL) (BL-V)	(Y-S) (S-Y) Note

Note: Connect to (Y-G)(G-Y) hold lamp leads from pink plug using spare terminals (2 of rear board and 1 of front board) or D-161488 connectors.

5.03 When replacing set, install customer's indexed cartridge in new set to avoid necessity of entering listings on new cartridge.

5.04 If 51B dial is not operating properly:

- (1) Check power supply to set.
- (2) Look for foreign material in gears.
- (3) Make certain interlock switch is closed.
- (4) It may be necessary to reset dialer by removing cartridge and operating CALL button.



Resetting the dialer, by removing the tape cartridge and operating the CALL button, may be necessary if the RECORD or CALL button is used while the entry space is misaligned by 1/3 or more of its width and the directory selector wheel is moved causing the unit to jam.

TABLE C
SINGLE-LINE SET CONNECTIONS
MOUNTING CORD ARRANGEMENTS
(Note 2)

MTG CORD COLOR	WITHOUT SPEAKERPHONE D10S OR D10T MTG CORD	WITH SPEAKERPHONE (NOTE 1) D20L OR D20M MTG CORD
W-BL BL-W	T R	T R
W-O O-W	A or H A1 or B	A or H A1 or B
Y-BL BL-Y	AC AC	AC AC
Y-O O-Y		F1 A1
Y-G G-Y		P1 S
Y-S S-Y	B or B1 R or R1	B or B1 R or R1

TABLE C (Cont)
SINGLE-LINE SET CONNECTIONS
MOUNTING CORD ARRANGEMENTS

MTG CORD COLOR	WITHOUT SPEAKERPHONE D10S OR D10T MTG CORD	WITH SPEAKERPHONE (NOTE 1) D20L OR D20M MTG CORD
V-O O-V		-15 M1
V-G G-V		T1 R1
V-BR BR-V		IT IR
V-S S-V	Spare Com	AG COM

Notes: 1. Certain speakerphone leads are insulated and stored and must be connected as shown in Fig. 11 and 12.

2. Modify set for single line service as follows:
 - Disconnect, insulate and store (R-G) and (G-R) key leads from 9 and 10 of front terminal board.
 - Connect stored (BL-W) key strap to 9 of front terminal board and (W-BL) strap to 10 of front board.
 - Remove, insulate and store (BR-V) key lead from 8 of front terminal board. Connect stored (W-O) key strap to 8 of front board.
 - When internal speakerphone is furnished, disconnect, insulate and store (Y-G) (G-Y) hold lamp leads from terminals 1 and 10 of rear board.

TABLE D
CONNECTIONS FOR 1A KTS AND/OR STATION BUSY LAMP

STATION BUSY LAMP		LINE SWITCH			HOLD KEY		MOUNTING CORD		DIODE K5-15724, L1	M1W CORD
		Y	BR	G	V-BR	BL	Y-BR	V-5 NOTE 2		
Without	1A	7	6	8	9	2	L2	6		
	1A1-1A2	7	8	9	2	*	L2	8		
With	1A	11	L2	8	9	2	L2	L2		
	1A1-1A2	7	L2	9	2	*	L2	L2		

*Insulated and stored.

- Notes:** 1. Numbered terminals are on the front terminal board. Lettered terminals are on the network.
2. Connection shown is for speakerphone. If speakerphone is not furnished, insulate and store lead.

TABLE E

635A2 OR 633A5 KEY—PICKUP TO SIGNALING KEY
CONVERSION

KEY ARRANGEMENT	KEY LEADS ON FRONT TERMINAL BOARD				
	R	BK	Y	V	S
HPPPPP	3	3	3	3	5
HPPPPS	3	3	3	11	5
HPPPSS	3	3	11	11	5
HPPSSS	3	11	11	11	5
I PPP*P*S	2	3	3	3	8
HPP*P*P*S	3	3	3	3	8

* For common signaling, remove (G) strap between terminals 2 and 3. Convert 6th key to nonlocking for signaling key.

TABLE F

39A POWER SUPPLY CONNECTIONS

LEAD DESIGNATION	39A POWER SUPPLY TERMINAL	CONN. CABLE AND MTG. CD. CONDUCTOR		TELEPHONE SET TERMINAL J2
		PIN	COLOR	
AC	AC	41	Y-BL	16
AC	AC	16	BL-Y	14
COM	GRD	25	S-V	17

Caution: Proper supply connections must be made as shown in Table F. Transposition of COM lead, with AC leads will result in improper operation of and possible damage to the 51B dial.

TABLE G

P-90D012 GUARD ASSEMBLY CONNECTIONS

WIRE OR LEAD		REMOVE FROM	CONNECT TO
Dial	G-W BK	C RR	S* T*
Line Switch	W	C	S*
Polarity Guard	W G		C RR
674B Trmtr or P-90D234 Relay Assy	BK-O	C	S*

* Terminal on polarity guard.

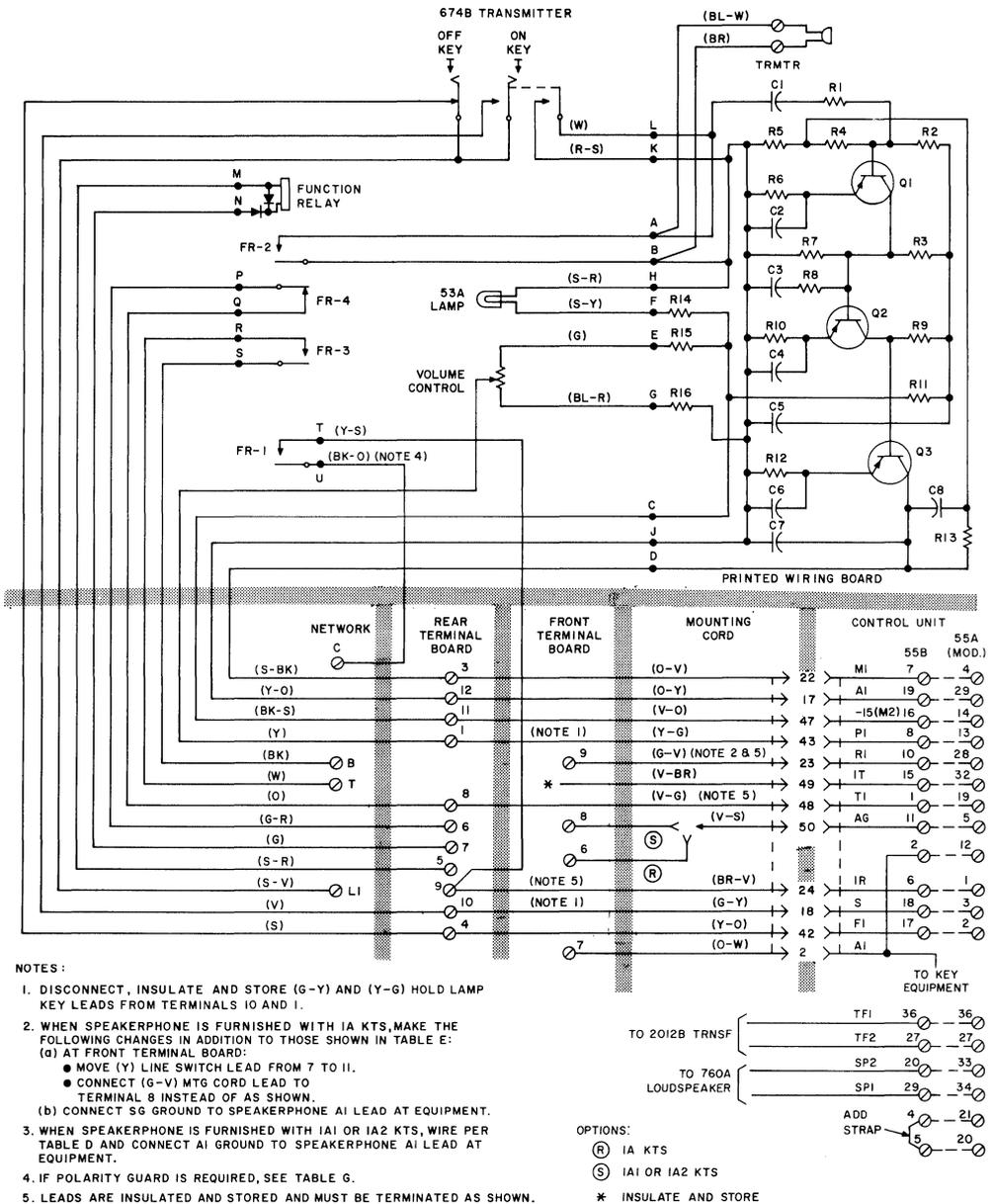


Fig. 11—Connections for Adding Internal Speakerphone to 2671B1M Telephone Set

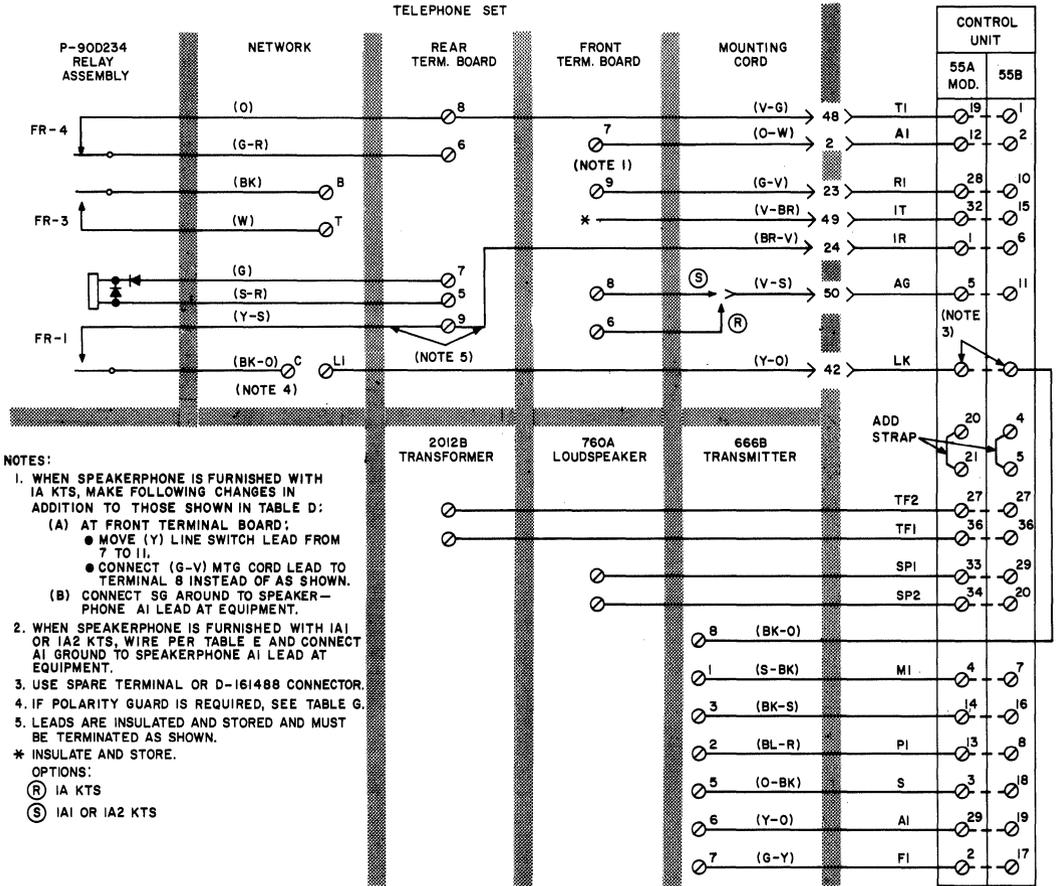
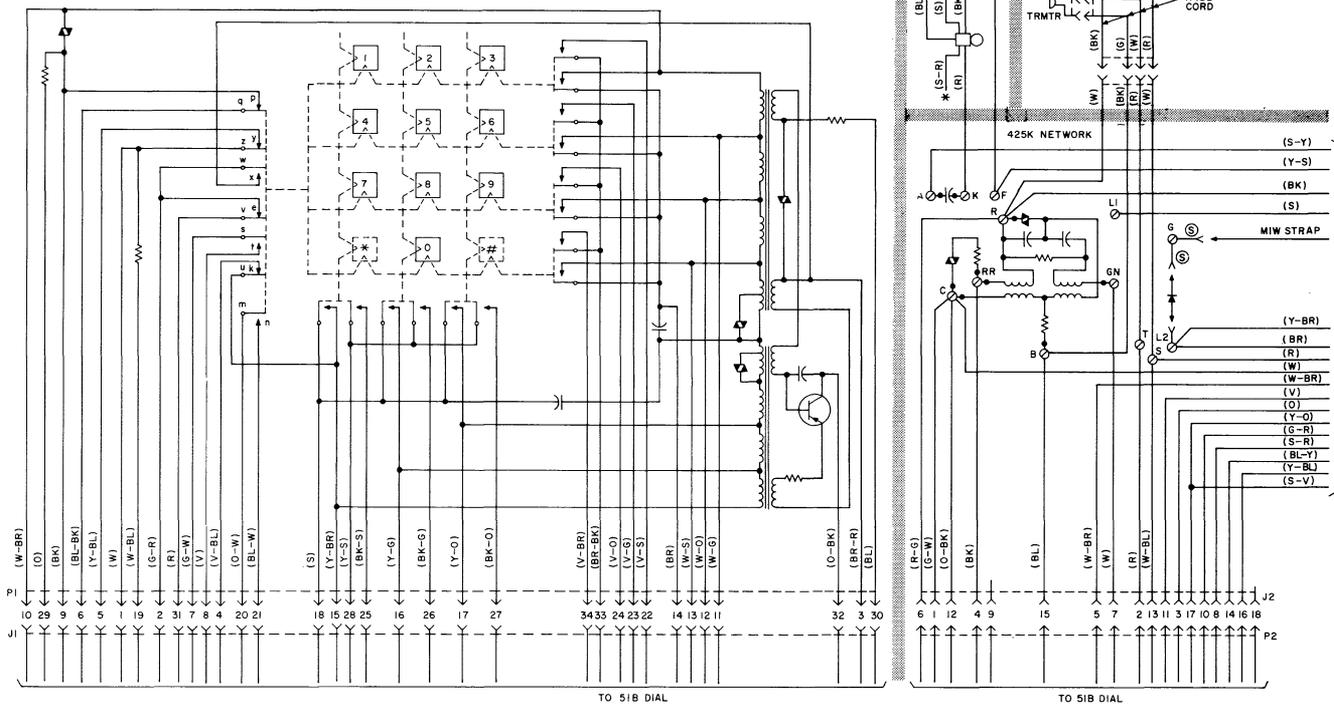


Fig. 12—Connections for Adding External Speakerphone to 2671B1M Telephone Set



NOTES:

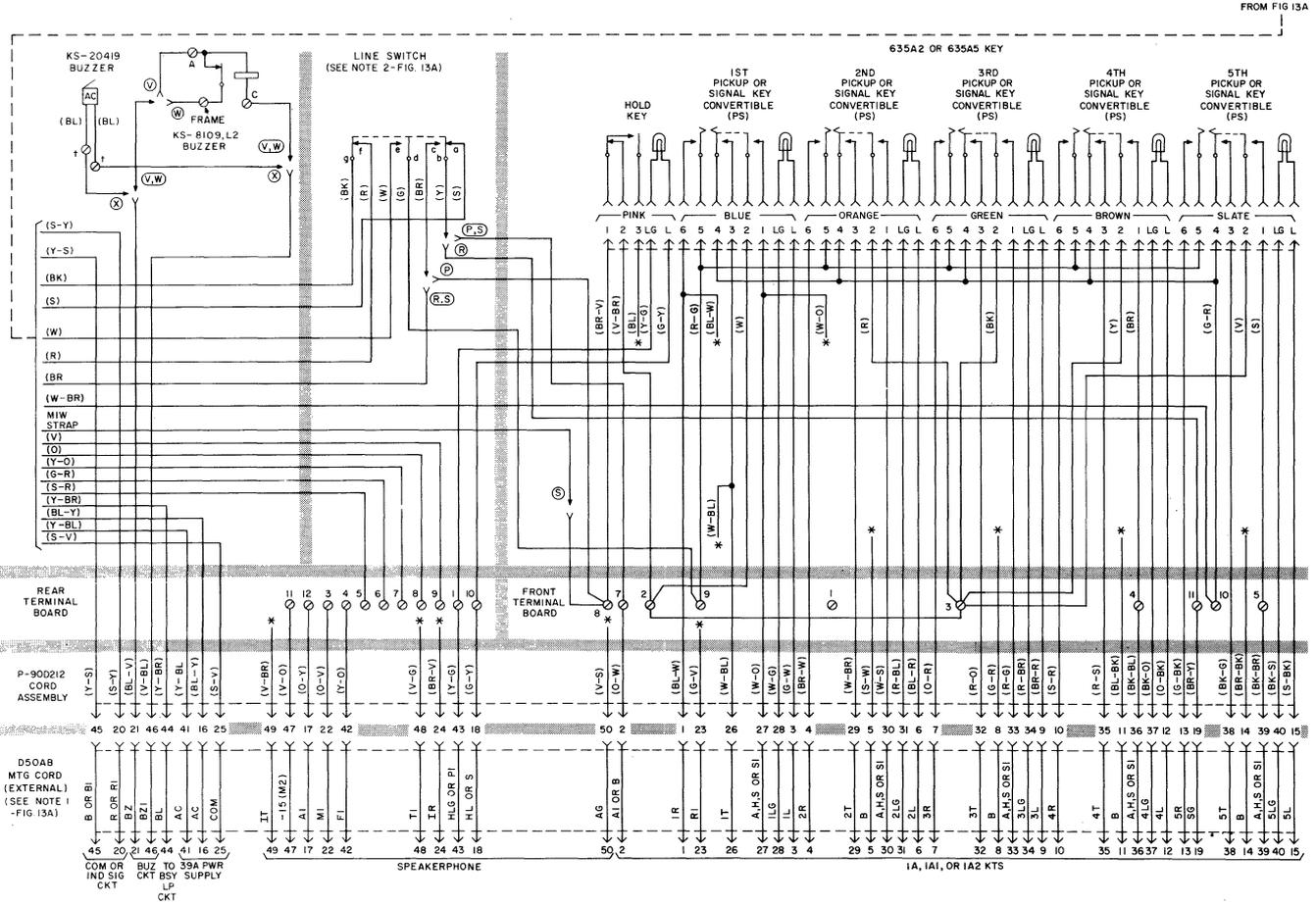
- 1 CONDUCTOR COLORS FOR D50AB CORD AND P-30D2/C CORD ASSEMBLY ARE IDENTICAL.
- 2 LINE SWITCH OPERATING SEQUENCE:
 - ab BREAKS
 - bc MAKES
 - de MAKES
 - fg BREAKS
 WHEN RESTORING HANDSET, de MUST BREAK BEFORE bc BREAKS.
- 3 PIA RINGER SHOWN, PIB RINGER HAS SINGLE COIL (5200 OHMS) AND ONLY (R) AND (BK) LEADS.

- * INSULATE AND STORE
- † SPARE TERMINAL OR D-161488 CONNECTOR
- Ⓟ 18 VAC BUZZER
- Ⓜ 18 VDC BUZZER
- Ⓧ 10 VAC BUZZER

- Ⓟ WITHOUT BUSY LAMP
- Ⓡ IA KTS WITH BUSY LAMP
- Ⓢ IA1 OR IA2 KTS WITH BUSY LAMP

TO FIG 13B OR 13C

Fig. 13A—2671B1M Telephone Set, Connections



FROM FIG 13A

Fig. 13B—2671B1M Telephone Set, Wired for 6-Button Key Set

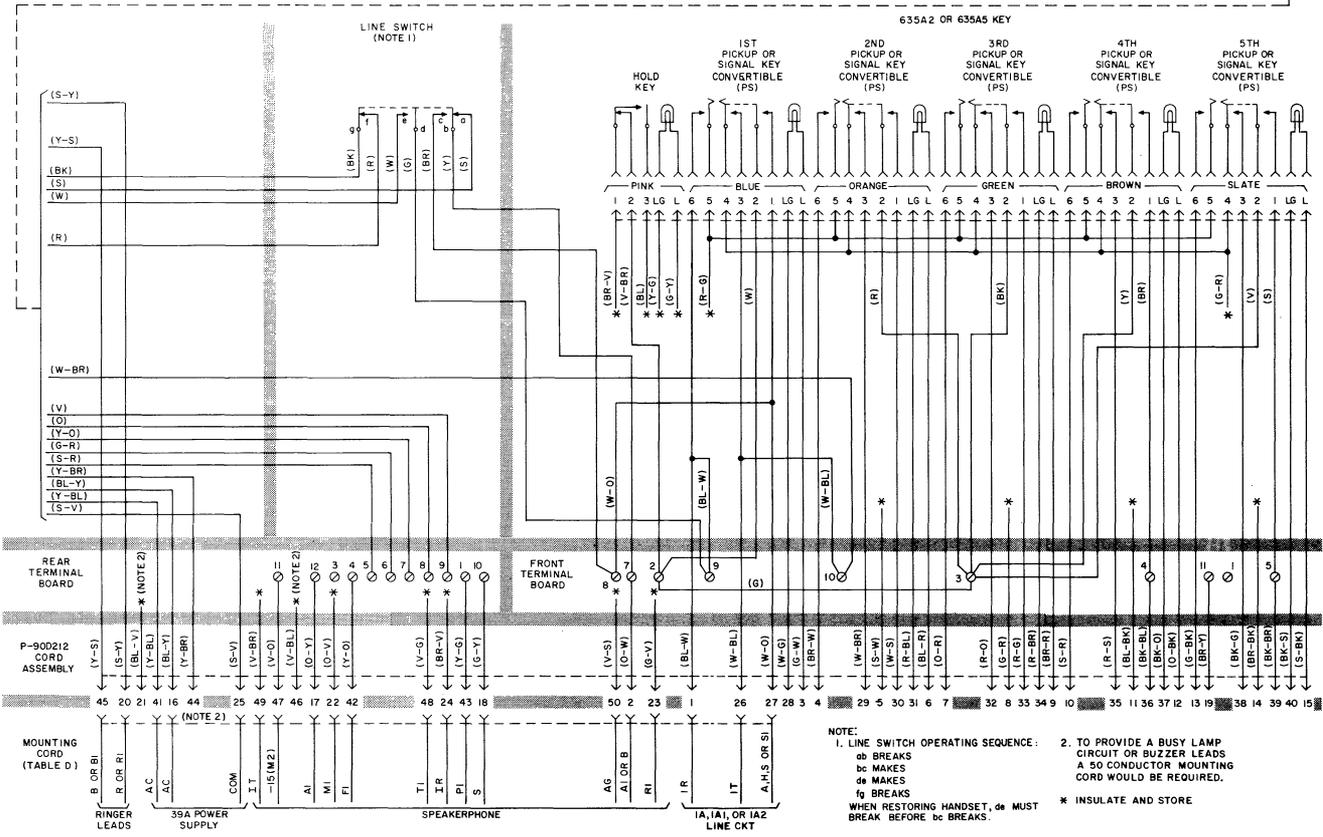


Fig. 13C—2671B1M Telephone Set, Wired for Single Line Service

**2872A1M OR 2872A2M TELEPHONE SET
(TOUCH-A-MATIC® REPERTORY DIALER)**

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Faceplate Removal	14	1.01 This section provides identification, installation, connections, operation, and maintenance	
Handset Cradle Removal	14		

NOTICE

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

information on the 2872A1M or 2872A2M telephone set (TOUCH-A-MATIC service) (Fig. 1).

1.02 This section is reissued to:

- Add 2872A2M
- Revise tables, figures, and text.

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

1.03 The 2872A1M or 2872A2M telephone set is factory wired for use with 1A1, 1A2, or 6A key telephone systems (KTS). They may be converted (Table L) for use with 1A KTS.

1.04 The telephone sets are available in the following colors:

- Black (-03)

- Green (-51)
- White (-58)
- Lt. Beige (-60)

2. IDENTIFICATION

2.01 The 2872A1M or 2872A2M telephone set provides all standard features of 6-button key telephone sets plus (manual) TOUCH-TONE® dialing, automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

2.02 Design Features:

- Modular key telephone set
- Integrated circuit RC TOUCH-TONE oscillator
- Integrated circuit memory

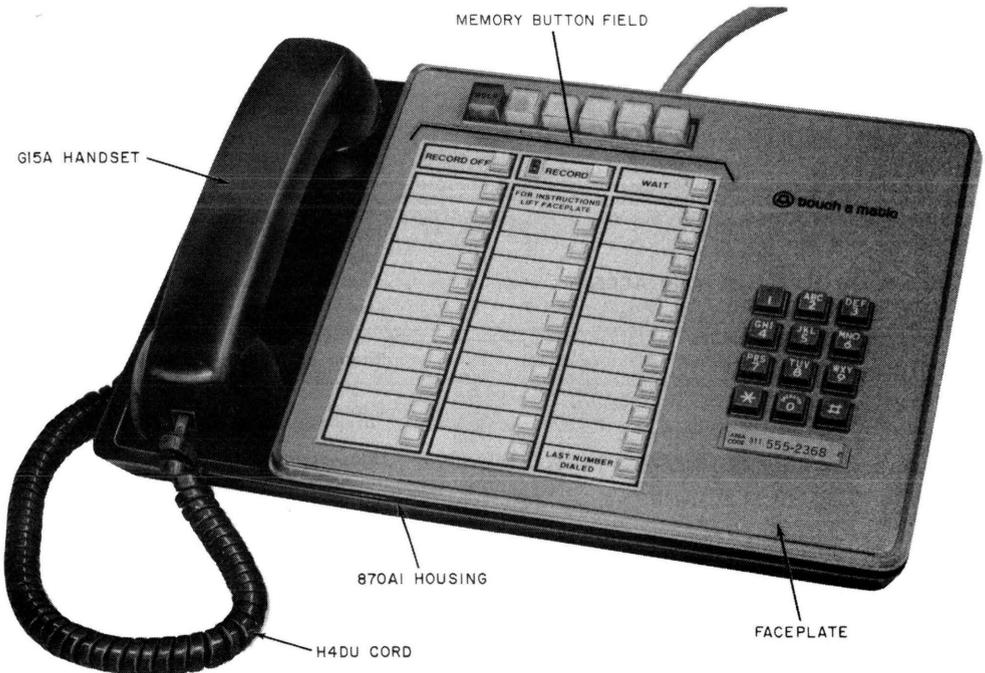


Fig. 1—2872A1M or 2872A2M Telephone Set

- 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 second dial tone during automatic dialing (WAIT input)
- End-to-end signaling for data application.

2.03 *Optional Features:*

- Speakerphone—either 3B or 4-type speakerphone may be added to stations
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE dial tone (350 Hz and 440 Hz) is present.

Note: All dial tones encountered in the process of placing a call must be precise TOUCH-TONE dial tone if the call is to be completed automatically.

- One-Touch Calling, (requires both Dial Tone Detector and speakerphone)—depressing one memory button will automatically turn on speakerphone and dial number.
- Station Busy Lamp
- 2/4 Wire Service

- Add-On-Conference
- Exclusion (electrical)
- "I" Hold
- Signaling
- Amplifying Handset.

2.04 All options are implemented by:

- Wiring changes in the telephone set
- Installation of appropriate additional items.

2.05 *Ordering Guide:*

(a) The 2872A1M or 2872A2M telephone set is a modular type telephone set and may be ordered complete and ready to install as:

- Set, Telephone, 2872A1M-*
- Set, Telephone, 2872A2M-*

(b) ***Ordered Separately:***

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

(c) The 2872A1M or 2872A2M may also be ordered in their component parts as follows:

- Housing, 870A1-*
- Faceplate, 2872A1-87
- Handset, G15A-*
- Cord, Handset, H4DU-*
- Base, Telephone Set, 2872AM or 2872A2M (includes the following):

Dial, 35AG3A

Key, 635BT5

Collar, P-23F503 or 812365039

Ringer, P1B

Network, 425K or 4228B

TABLE A
OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED		CONNECTION PER	
				FIGURE	TABLE
Speakerphone*	4A	108-type Loudspeaker		11	D-G
		680-type Transmitter		11	D-G
		CONNECTOR BLOCK	82A	11	D, E
			82B	11	F, G
		85B1 Power Unit		11	D-G
	D-180492 Kit of Parts		8 (C)	B-G	
	3B	760A Loudspeaker		10	B, C
		666B Transmitter		10	B, C
		55-Type Control Unit		10	B, C
		2012B Transformer		10	B, C
		149B Adapter			B, C
		D-180492 Kit of Parts		8 (C)	B-G
One-Touch Calling		D-180493 Kit of Parts	8 (D, E)	C, E,	
		Speakerphone	8 (B)	or G	
Dial Tone Detector		D-180493 Kit of Parts	8 (D)	C,E,G,H	
Station Busy Lamp			9		
"I" Hold			9		
Signaling				J	
Exclusion (Electrical)			9		
Add-On-Conference			9		
Amplifying Handset		G6-, G7-, or G8-Type Handset	8(H)		
2/4 Wire Service*		D-180494 Kit of Parts	12	I	
Dry Circuit (without Polarity Guard)			8 (B)		
1A Key Service				L	

*2/4 wire option and speakerphone cannot be used simultaneously.

Buzzer, KS-20419L1

Cord, Mounting, D50AM-87

Battery, KS-20390L2 (2872AM or 2872A2M base)

Battery, KS-20390L4 (2872A2M base only)

Jack, Handset, 616B

Memory, 2870A (includes button field)

Power Supply Printed Wiring Board (PSB) Assembly, 840393581 (2872AM base)

Power Supply Printed Wiring Board (PSB) Assembly, 841382658 (2872A2M base)

Directory Sheet Set, 840393672 (2)

Booklet, Instruction, Subscriber, SIB-2455

(d) **Optional Apparatus (order as required):**

- 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)
- Handset, Amplifying (G6-, G7-, or G8-type).

*Add appropriate color suffix (1.04).

2.06 Operating Features (Fig. 2):

- Dial (TOUCH-TONE dial)
- 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 field, 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 (4.01).

Caution: 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. 6) by tilting the set up, and inserting the battery plug into the mating jack.

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

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) (Fig. 13). 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 card and connected to PSB terminals 30 and 31. Refer to applicable tables and Fig. 7 for particular type of installation. When separate power conductors are used, disconnect, insulate, and store the (G-W) and (W-G) 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 (P-25E803 or 812558039) 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 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.

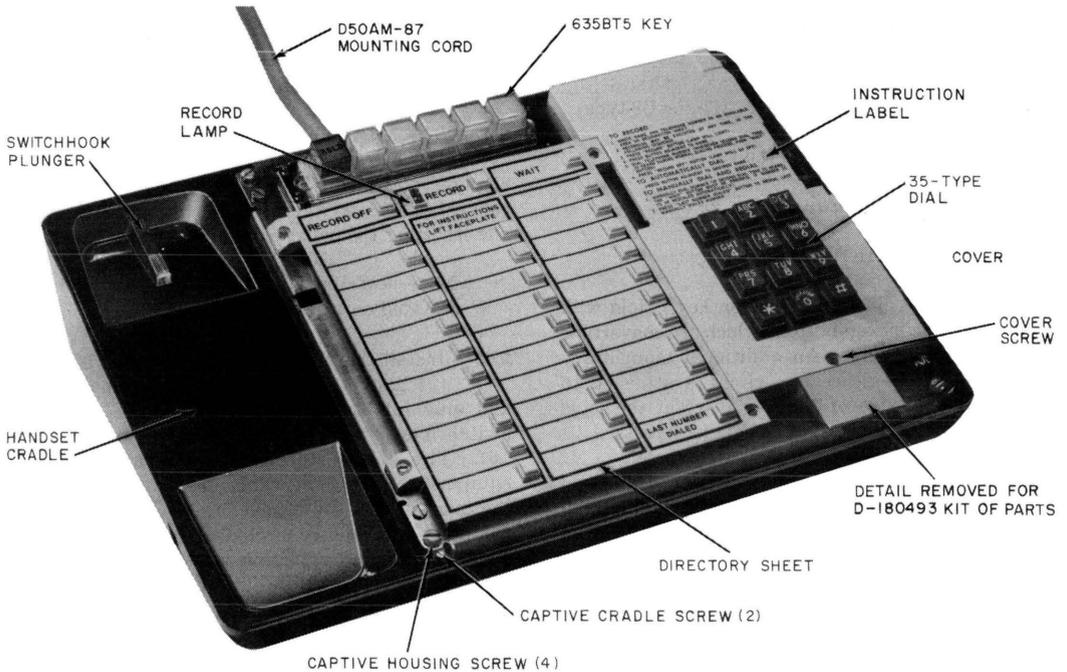


Fig. 2—2872A1M or 2872A2M Telephone Set—Faceplate and Handset Removed

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 M.

- (1) Disconnect 95B1 power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
- (2) Reconnect 95B1 power unit to AC outlet.
- (3) With handset on-hook, record digits 1 through 0 into all memory locations except LAST NUMBER DIALED and location immediately above it [5.01 (4)-(7)].
- (4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [5.01 (4)-(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) Depress buttons of memory locations recorded in Step (3) and verify that correct signal is returned from test circuit each time.



The battery and 95B1 power unit must be connected a minimum of five minutes before doing Step (c).

- (c) Momentarily disconnect the 95B1 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 a 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 button previously used to record in Step (4). The set should automatically turn the speakerphone on and dial the number.

OPTIONAL APPARATUS INSTALLATION

D-180492 Kit of Parts

3.08 To install:

- (1) Proceed as described in 3.15.
- (2) Make connections per Tables B through G.
- (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.

D-180493 Kit of Parts

3.09 To install:

- (1) Remove the housing (3.19), and access PSB terminal board (3.15).
- (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 accompanying screw from the side of the set.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

Note: If dial tone detector is being used without speakerphone option, make connections for the D-180493 Kit of Parts found in Table H.

- (5) Make connections per Table C, E, G, or H.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.

D-180494 Kit of Parts

3.10 To install:

- (1) Proceed as described in 3.15.
- (2) Make connections per Table I.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4).

Single-line Service

3.11 Previous issues of this section described the conversion of the 2872A1M telephone set to provide single line service. These instructions have been deleted from this issue since a set coded 2870A1M is now available from the factory to provide single line service.

COMPONENT LOCATION AND ACCESS INFORMATION

Location of Components

3.12 The components are located in three areas as follows:

- (a) Under the handset cradle (Fig. 3):
 - Buzzer
 - Ringer
 - Switchhook assembly
 - Handset jack
 - Terminal boards (TB1 and TB2).
- (b) Under the faceplate, inside the set (Fig. 4 and 5):
 - Battery jack (Fig. 5)

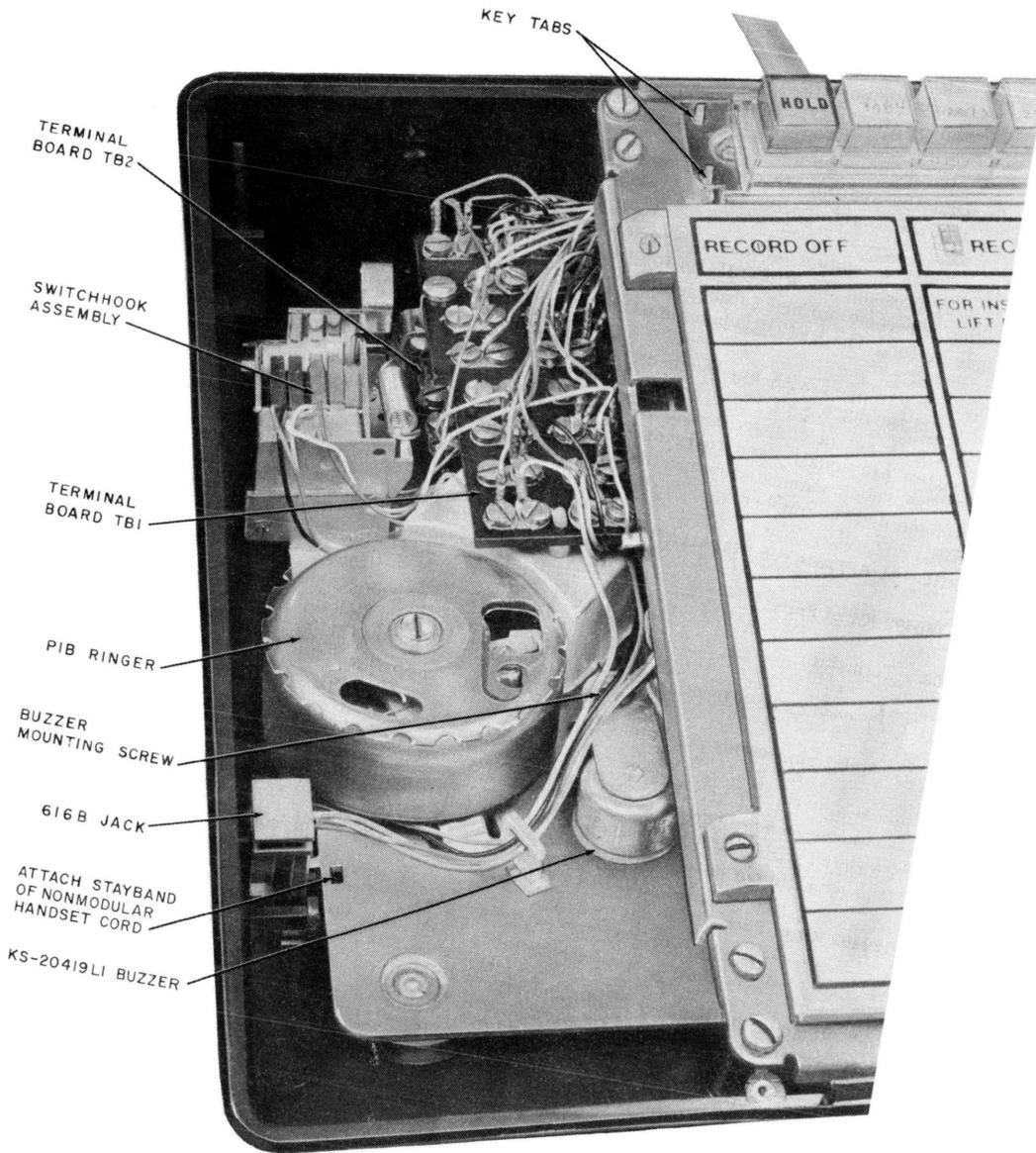


Fig. 3—2872A1M or 2872A2M Telephone Set With Faceplate, Handset, and Handset Cradle Removed

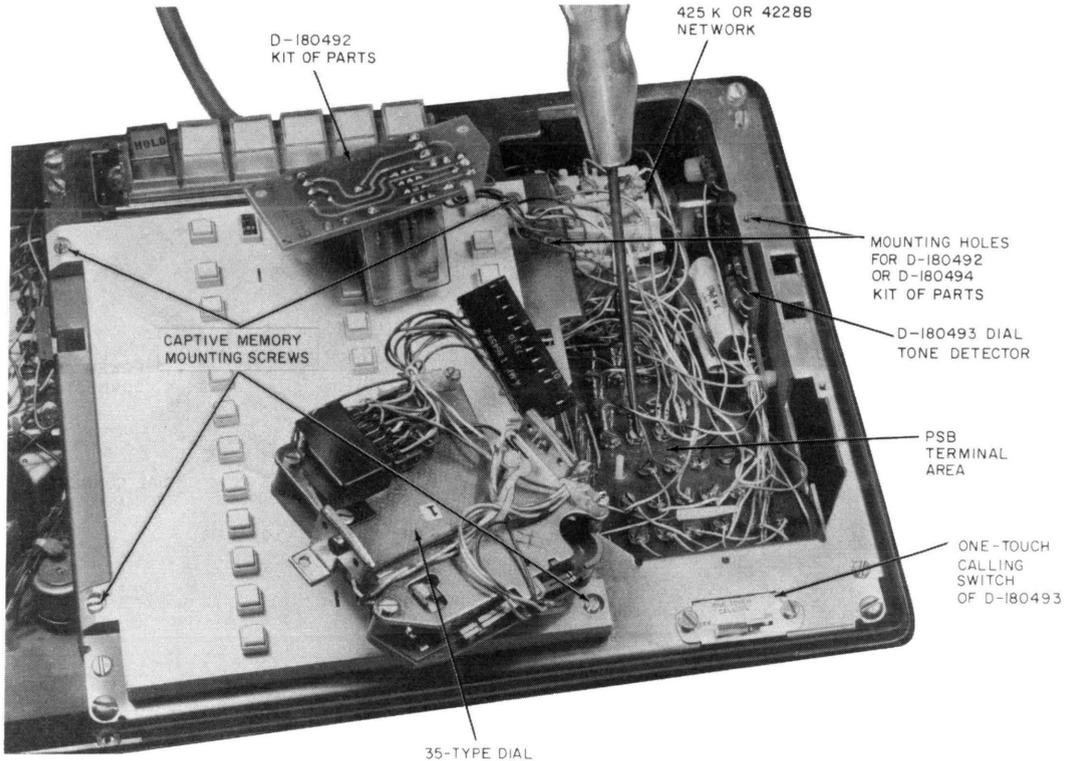


Fig. 4—2872A1M or 2872A2M Telephone Set—Dial Removed To Show Terminal Area

- Power supply (PSB) terminal area (Fig. 4)
- Network (Fig. 4)
- Options (Fig. 4):

D-180492 (relay kit for speakerphone)

D-180493 (dial tone detector and one-touch calling switch)

D-180494 (2/4-wire relay kit).

(c) Bottom of telephone set (Fig. 6):

- Battery

Mounting Cord

3.13 The D50AM-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 conductors are provided for auxiliary control functions or options and are terminated directly on associated equipment, terminal boards, or stored.

Network Terminals

3.14 For access to the network terminals:

- (1) Remove the faceplate (3.17).

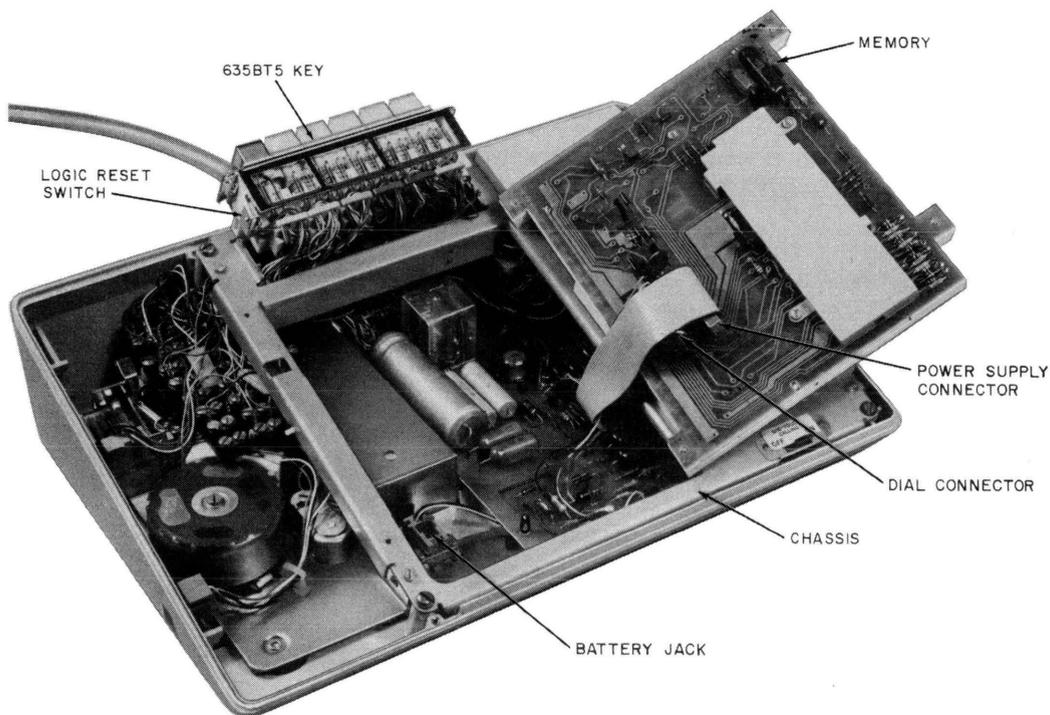


Fig. 5—2872A1M or 2872A2M Telephone Set, Internal View, Overall

- (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.
- Power Supply (PSB), Terminals**
- 3.15** To access the terminal field on the power supply board, proceed as follows:
- (1) Remove the faceplate (3.17).
 - (2) Loosen the captive cover screw at the bottom of the white cover around the 35AG3A dial (Fig. 2).
 - (3) Remove the cover.
 - (4) Remove the two screws that hold the dial in place.
 - (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.

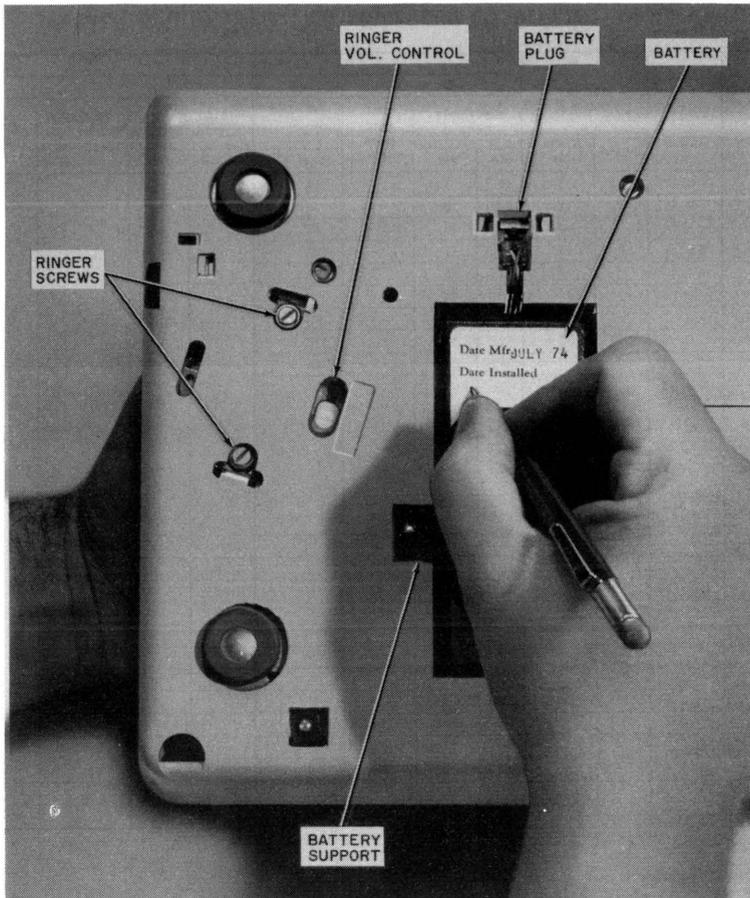


Fig. 6—2872A1M or 2872A2M Telephone Set, Bottom View

Failure to do this will result in improper seating of the faceplate.

Line Key Removal

3.16 To remove, use the following procedure:

- (1) Remove faceplate (3.17).
- (2) Push the key toward the rear of the set to unlock it from the tabs.

- (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.

Caution: Do not damage contact strips which protrude from bottom right side of key or logic reset switch attached on HOLD side of key.

- (4) Lift the key completely out of the set.
- (5) Replace key by reverse procedure.

TABLE B
CONNECTIONS—2872A1M OR 2872A2M TELEPHONE SET WITH 3B SPEAKERPHONE

LEAD DESIG	COLOR	TEL. SET (NOTE 1)		CONNECT										CONN CABLE AT KEY EQUIP	
				FROM					TO						
				CONT UNIT (NOTE 4)		95B1 PWR UNIT (NOTE 3)	149B ADPT (DIOR CORD)	666B TRANS. (T7A CORD)		760A LSPK (R2FK CORD)	2012B TRNSF				
				55A	55B			TERM.	COLOR			TERM.	COLOR		
FROM	TO PSB TERM.	55A	55B	TERM.	COLOR	TERM.	COLOR	COLOR	TO						
Tel Set	T1	V-G	*	2	19	1		8A							
	R1	G-V	*	11	28	10		7A							
	A1				12	2		A1							
	AG	V-S	*	F†	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							
D-180492 Kit of Parts (Note 2)	VDD	W-G		21											
	PFR	BL-V		20											
	SHi	G-W		18											
	LK	BL-R		17											
	SHa	R-BL		16											
	B+	BK-BL		15											
C _E	BL-BK		10												
666B Trans	M1				4	7			S-BK	1					
	P1				13	8			BL-R	2					
	-15V				14	16			BK-S	3					
	S				3	18			O-BK	5					
	A1				29	19			Y-O	6					
	F1				2	17			G-Y	7					
	LK				11	35			BK-O	8					
760A LSPK	SP1				34	20						G			
	SP2				33‡	29‡						R			
95B1 Pwr Unit	AC1						3	3B						BL-V	*
	AC2						4	4B						V-BL	*
2012B Trnsf	AC1				27	27							1		
	AC2				36	36							2		

* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

Notes:

1. Plug telephone set mounting cord into 149B adapter.
2. When installing the D-180492 Kit of Parts, remove (BK) strap lead between PSB terminals 10 and 15; remove (BK) lead from PSB terminal 20; insulate and store.
3. Both 95B1 power unit and 2012B transformer must be connected for speakerphone operation.
4. When 55A control unit is used, it must be the type modified for TOUCH-TONE, and strap terminals 20 and 21 (55A) or 4 and 5 (55B).

TABLE C

CONNECTIONS – 2872A1M OR 2872A2M TELEPHONE SET WITH 3B SPEAKERPHONE AND ONE-TOUCH CALLING

LEAD DESIG	COLOR	TEL SET (NOTE 1)		CONNECT								CONN CABLE AT KEY EQUIP		
				FROM				TO						
				FROM	TO PSB TERM.	CONT UNIT (NOTE 5)		95B1 PWR UNIT (NOTE 3)	149B ADPT (DIOR CORD)	666B TRANS (77A CORD)		760A LSPK (R2FK CORD)	2012B TRNSF	COLOR
55A	55B	TERM.	COLOR	TERM.	COLOR									
Tel Set	T1	V-G	*	2	19	1		8A						
	R1	G-V	*	11	28	10		7A						
	A1				12	2		A1						
	AG	V-S	*	F†	5	11		12A						
	LK	S-V	*	17	11	35		11A						
	SPO	O-V	*	34	3	18		5B					O-V	*
	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-180492 Kit of Parts (Note 2)	VDD	W-G		21										
	PFR	BL-V		20										
	SHi	G-W		18										
	LK	BL-R		17										
	SHa	R-BL		16										
	B+	BK-BL		15										
	C _E	BL-BK		10										
D-180493 Kit of Parts (Note 4)	SPO	G-Y		34										
	COM	BK-O		29										
	SPR	Y-BL		27										
	DTT	BL-Y		26										
	PL	O-R		25										
	DR	Y-O		24										
	VDD	R-O		21										
	DT	O-Y		19										
	LK	Y-G		17										
	INPUT	G-R		11										
	PB	O-BK		9										
	INPUT	G-R		2										
	S			28										
	Switch	S		29										
666B Trans	M1				4	7			S-BK	1				
	P1				13	8			BL-R	2				
	-51V				14	16			BK-S	3				
	S				3	18			O-BK	5				
	A1				29	19			Y-O	6				
	F1				2	17			G-Y	7				
	LK				11	35			BK-O	8				
760A Lspk	SP1				34	20				G				
	SP2				33‡	29‡				R				
95B1 Pwr Unit	AC1						3	3B					BL-V	*
	AC2						4	4B					V-BL	*
2012B Trnsf	AC1				27	27						1		
	AC2				36	36						2		

* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

Notes:

1. Plug telephone set mounting cord into 149B adapter.
2. When installing the D-180492 Kit of Parts, remove (BK) strap lead between PSB terminals 10 and 15; remove (BK) lead from PSB terminal 20; insulate and store.
3. Both 95B1 power unit and 2012B transformer must be connected for speakerphone operation.
4. When installing the D-180493 Kit of Parts, remove (BK) strap leads from PSB terminals 19, 26, and 29; insulate and store.
5. When 55A control unit is used, it must be the type modified for TOUCH-TONE, and strap terminals 20 and 21 (55A) or 4 and 5 (55B).

TABLE D
CONNECTIONS—2872A1M OR 2872A2M TELEPHONE SET WITH 4A SPEAKERPHONE, USING 82A CONNECTING BLOCK

LEAD DESIG	COLOR	TEL SET		82A CONN BLK (NOTE 1)	66E3-25 CONN BLOCK			
		FROM	TO PSB TERM.		COLOR	FROM	TO	
Tel Set	T1	V-G	*	2	(Note 2)			
	R1	G-V	*	11				
	A1							
	AG	V-S	*	F †				
	LK	S-V	*	17				
D-180492 Kit of Parts (Note 3)	VDD	W-G		21				
	PFR	BL-V		20				
	SHi	G-W		18				
	LK	BL-R		17				
	SHa	R-BL		16				
	B+	BK-BL		15				
C _E	BL-BK		10					
85B1 Power Unit	AC1	BK			Strap AC1 to 24	BR-V	48	*
	AC2	Y			Strap AC2 to 49	V-BR	47	*
95B1 Power Unit (Note 4)	AC1	R				BL-V	42	*
	AC2	G				V-BL	41	*

* Insulated and stored.

† Terminal on network.

Notes:

1. Plug mounting cords of telephone set, 108A loudspeaker, and 680A transmitter into 82A connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. When installing D-180492 Kit of Parts, remove the (BK) strap lead between PSB terminals 10 and 15. Also remove the (BK) lead from PSB-20, insulate and store.
4. Both 95B1 and 85B1 power units must be connected for speakerphone operation.

Faceplate Removal

3.17 The 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.

Handset Cradle Removal

3.18 To remove the handset cradle from the housing, proceed as follows:

- (1) Remove the faceplate (3.17), and place the handset aside.

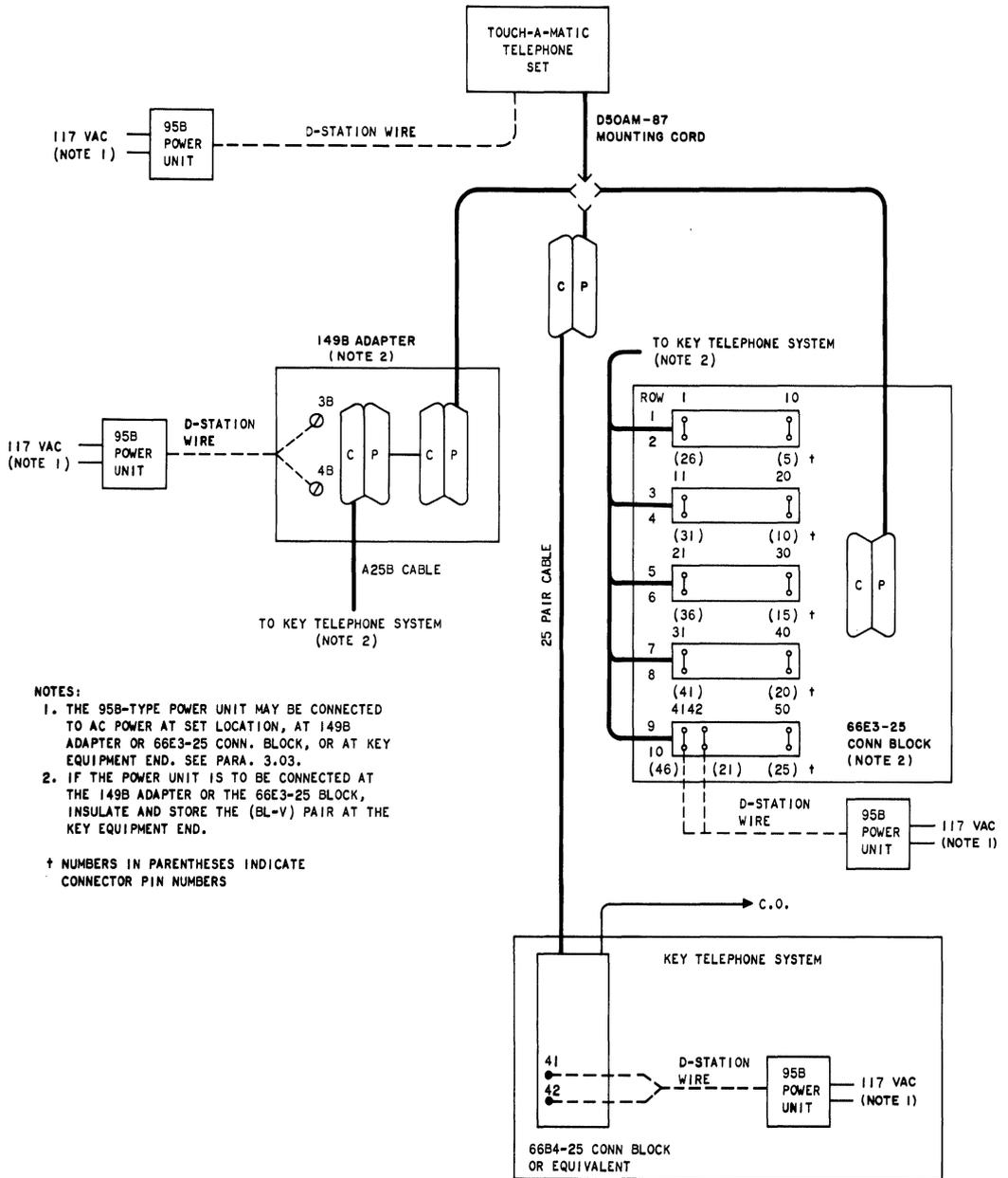


Fig. 7—2872A1M or 2872A2M Telephone Set, Alternate Power Connection Methods

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- (2) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
- (3) Lift the cradle, by pulling up on the plunger, and remove.
- (4) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

Caution: *The plunger must be held from the topside of the cradle as it is slid into position to prevent damage to the switchhook arm.*

- (5) Refasten the captive cradle screws.

Housing Removal

3.19 To remove, proceed as follows:

- (1) Unplug the handset cord, at the telephone set end and remove handset.
- (2) Remove the faceplate (3.17).
- (3) Remove the handset cradle (3.18).

Caution: *Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.*

- (4) Disengage only the four captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
- (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.

4. CONNECTIONS

- 4.01** Telephone set connections are shown in Fig. 8 and Table K.

Caution: *Some conductor assignments are not standard (Table K).*

- 4.02** Refer to Table A for connection reference for all options.
- 4.03** A partial functional schematic is shown on Fig. 13.

5. OPERATION

Record A Number Into Memory

- 5.01** To record:

- (1) Remove the faceplate (3.17).
- (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
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 switchhook, line key, or speakerphone operation.

Change A Number In Memory

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

Delete A Number From Memory

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.

Automatically Dial A Number From Memory

5.04 To automatically dial a number:

- (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 and depress the memory button.
- (c) For sets equipped with the one-tone calling option (with speakerphone and dial tone detector), simply depress the memory button.

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.

5.06 Operation of LAST NUMBER DIALED feature:

- (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 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) With 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. If WAIT input has been recorded, automatic dialing will

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stop. 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 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.

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:

(a) 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.

(b) 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.)

Note: If the telephone set is to be used for end-to-end signaling, V option (with polarity guard) shall be used, [Fig. 8 (B)].

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.

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 M, and the following paragraphs.

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. 6):

- (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.

Memory

6.04 The memory may be replaced in the following manner:

Note: Removal of the memory results in loss of stored telephone numbers.

- (1) Remove the faceplate (3.17).
- (2) Loosen the four captive memory mounting screws (Fig. 4).
- (3) Rotate the left edge of the memory upward as shown in Fig. 5.

- (4) Disengage the two connectors by pulling them perpendicular to the printed wiring board.
- (5) 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 gray power supply cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board.
- (6) Reassemble set.
- (7) Test per 3.07

Dial**6.05** To replace:

- (1) Proceed per 3.15.
- (2) Loosen the four captive mounting screws of the memory (Fig. 4).
- (3) Gently raise the left side of the memory and rotate to position shown in Fig. 5. This will expose 10-position black dial connector.

Caution: *Do not remove the gray power supply connector in the process of changing the dial, since this will result in complete loss of stored telephone numbers.*

- (4) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (5) Lift the dial out.
- (6) To replace 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.

Line Key**6.06** To replace:

- (1) Remove key per 3.16.
- (2) Access PSB terminal area per 3.15.

- (3) Disconnect logic reset leads from PSB terminals.
- (4) Remove the two contact strips and the 508-type plugs from the back of the key.
- (5) Install new key.
- (6) Reassemble the set.
- (7) Test for operation of the logic reset switch [3.07(7)].

Ringer**6.07** To replace:

- (1) Remove the faceplate (3.17) and place handset aside.
- (2) Remove the cradle (3.18).
- (3) Disconnect the ringer leads.
- (4) Tilt the front of the set up.
- (5) Unfasten ringer mounting screws (Fig. 6).
- (6) Remove ringer.
- (7) Replace 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 damping of the ringer output. Dial ringback code to test ringer.
- (8) Reassemble set.

Buzzer**6.08** To replace the buzzer:

- (1) Remove the faceplate (3.17), and place handset aside.
- (2) Remove the cradle (3.18).
- (3) Remove the buzzer mounting screw.
- (4) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (5) Move board TB1 to gain access to the appropriate terminals on TB2.

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- (6) Remove appropriate leads [Fig. 8(H)].
- (7) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

Handset Jack

6.09 To replace the 616B handset jack:

- (1) Remove the faceplate (3.17), and place handset aside.
- (2) Remove the cradle (3.18).
- (3) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (4) Move board TB1 to gain access to the appropriate terminals on TB2.
- (5) Disconnect the appropriate leads [Fig. 8(H)], and remove jack.
- (6) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

Handset

6.10 A defective G15A handset may be replaced by unplugging the H4DU cord and inserting

it into a new handset. To replace the G15A handset with a G3A handset or a G6-, G7-, or G8-type amplifying handset, proceed as follows:

- (1) Unplug H4DU handset cord at telephone set end.
- (2) Remove faceplate (3.17), and place handset aside.
- (3) Remove handset cradle (3.18).
- (4) Disconnect 616B handset jack (6.09). (Jack may be removed or stored just to right of ringer).
- (5) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (6) Attach stayboard hook to bottom of chassis (Fig. 3).
- (7) Route leads as shown in Fig. 3.
- (8) Make connections [Fig. 8(H)].
- (9) Reassemble set.

6.11 For maintenance information on the 3B or 4A speakerphone systems, refer to Sections 512-620-100 or 512-700-100, respectively.

TABLE E

**CONNECTIONS—2872A1M OR 2872A2M TELEPHONE SET WITH 4A SPEAKERPHONE AND ONE-TOUCH CALLING,
USING 82A CONNECTING BLOCK**

LEAD DESIG	COLOR	TEL SET		82A CONN BLK (NOTE 1)	66E3-25 CONN BLOCK			108A LSPK SET		
		FROM	TO PSB TERM.		COLOR	FROM	TO	COLOR	FROM	TO
Tel Set	T1	V-G	*	2						
	R1	G-V	*	11						
	IT	V-BR	*	34				W-G	8	21
	IR							G-W	10	*
	A1				(Note 2)					
	AG	V-S	*	F †						
	LK	S-V	*	17						
D-180492 Kit of Parts (Note 3)	VDD	W-G		21						
	PFR	BL-V		20						
	SHi	G-W		18						
	LK	BL-R		17						
	SHa	R-BL		16						
D-180493 Kit of Parts (Note 4)	B+	BK-BL		15						
	C _E	BL-BK		10						
	SPO	G-Y		34						
	COM	BK-O		29						
	SPR	Y-BL		27						
	DTT	BL-Y		26						
	PL	O-R		25						
	DR	Y-O		24						
	VDD	R-O		21						
	DT	O-Y		19						
	LK	Y-G		17						
	INPUT	G-R		11						
	PB	O-BK		9						
	INPUT	G-R		2						
S			28							
SWITCH	S		29							
	S									
85B1 Power Unit	AC1	BK			Strap AC1 to 24	BR-V	48	*		
									48	
AC2	Y				Strap AC2 to 49	V-BR	47	*		
									47	
95B1 Power Unit (Note 5)	AC1	R				BL-V	42	*		
									42	
	AC2	G				V-BL	41	*		
									41	

* Insulated and stored.

† Terminal on network.

Notes:

1. Plug mounting cords of telephone set, 108A loudspeaker, and 680A transmitter into 82A connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. When installing D-180492 Kit of Parts, remove the (BK) strap lead between PSB terminals 10 and 15. Also remove the (BK) lead from PSB-20; insulate and store.
4. Remove (BK) lead from PSB terminals 19, 26, and 29; insulate and store.
5. Both 95B1 and 85B1 power units must be connected for speakerphone operation.

TABLE F
CONNECTIONS—2872A1M OR 2872A2M TELEPHONE SET WITH 4A SPEAKERPHONE, USING 82B CONNECTING BLOCK

LEAD DESIG	COLOR	TEL SET		82B CONN BLK (NOTE 1)	CONN CABLE AT KEY EQUIP		
		FROM	TO PSB TERM.		COLOR	TO	
Tel Set	T1	V-G	*	2	(Note 2)		
	R1	G-V	*	11			
	A1						
	AG	V-S	*	F †			
	LK	S-V	*	17			
D-180492 Kit of Parts (Note 3)	VDD	W-G		21			
	PFR	BL-V		20			
	SHi	G-W		18			
	LK	BL-R		17			
	SHa	R-BL		16			
	B+	BK-BL		15			
C _E	BL-BK		10				
85B1 Power Unit	AC1	BK		AC1	BR-V	*	
	AC2	Y		AC2	V-BR	*	
95B1 Power Unit (Note 4)	AC1	R		21	BL-V	*	
	AC2	G		46	V-BL	*	

* Insulated and stored.

† Terminal on network.

Notes:

1. Plug mounting cords of telephone set 108A loudspeaker, and 680A transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. When installing D-180492 Kit of Parts, remove the (BK) strap lead between PSB terminals 10 and 15. Also remove the (BK) lead from PSB-20 ; insulate and store.
4. Both 95B1 and 85B1 power units must be connected for speakerphone operation.

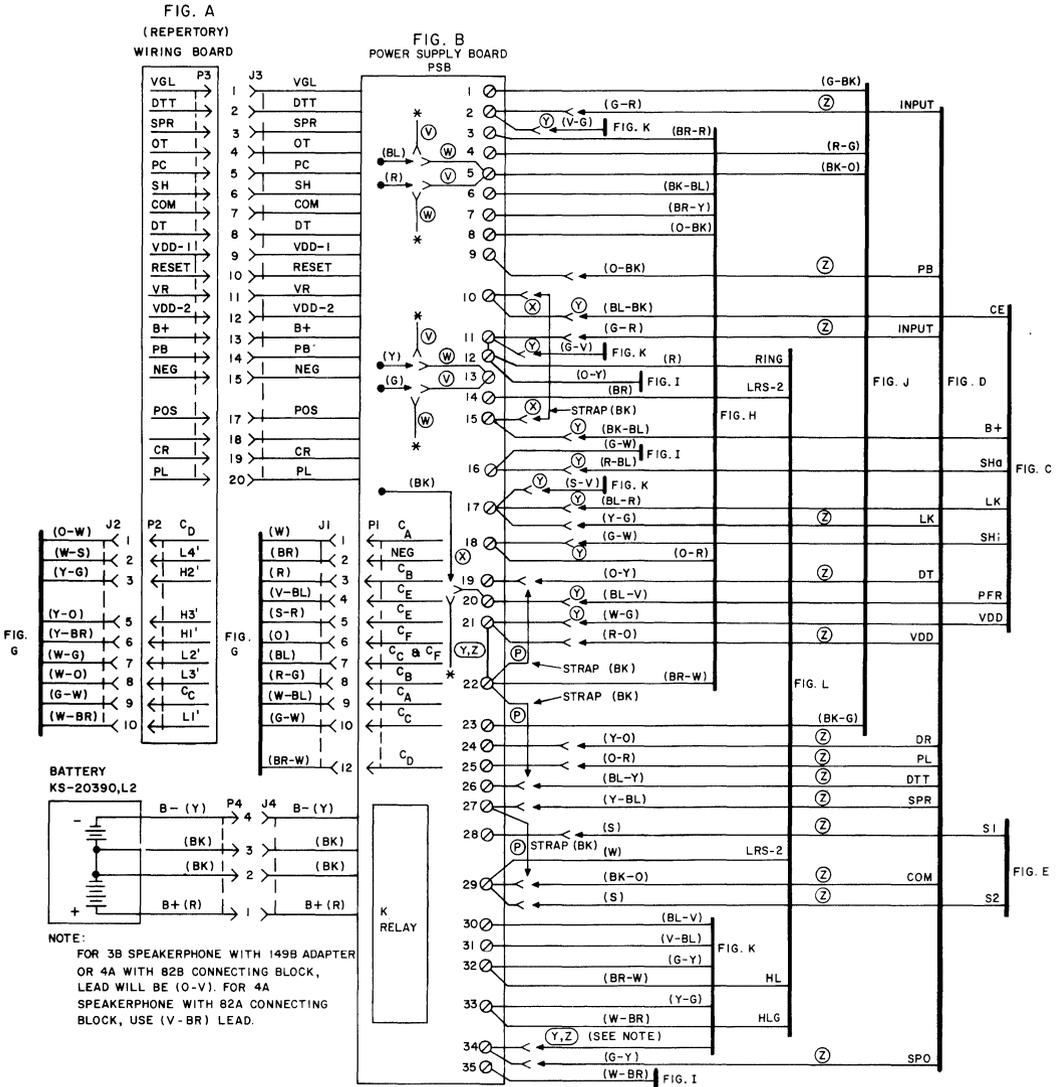


Fig. 8—2872A1M or 2872A2M Telephone Set, Connections (Sheet 1 of 5)

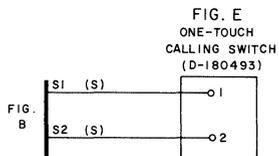
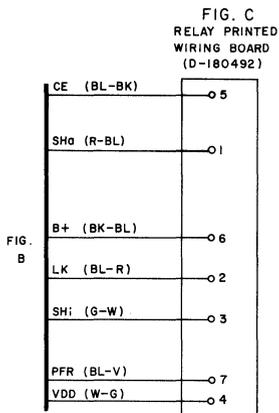
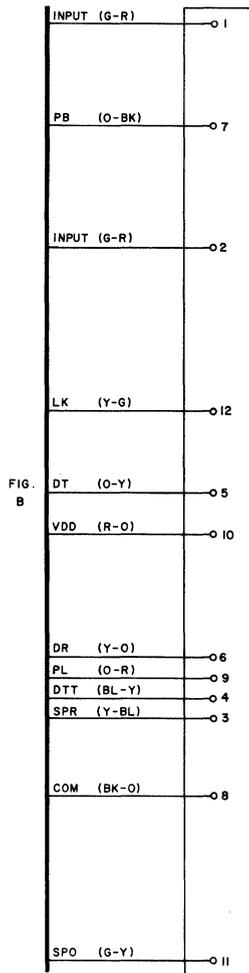


FIG. D
DIAL TONE DETECTOR
(D-180493)



OPTIONS FOR FIG. B:

- | | |
|--------------------------------|-----------------------------|
| (P) WITHOUT DIAL TONE DETECTOR | (Z) WITH DIAL TONE DETECTOR |
| (V) WITH POLARITY GUARD | (Y,Z) WITH ONE-TOUCH OPTION |
| (W) WITHOUT POLARITY GUARD | * INSULATE AND STORE |
| (X) WITHOUT SPEAKERPHONE | |
| (Y) WITH SPEAKERPHONE | |

Fig. 8—2872A1M or 2872A2M Telephone Set, Connections (Sheet 2 of 5)

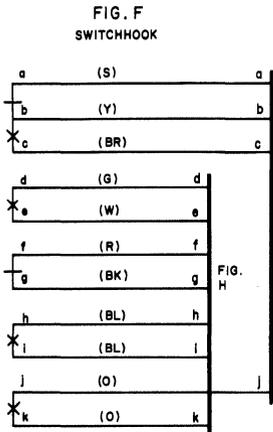


FIG. I

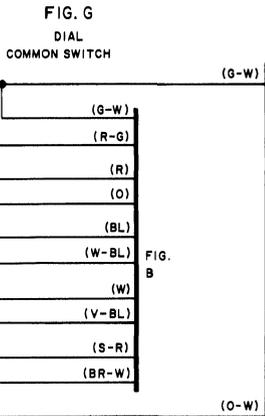


FIG. B

FIG. A

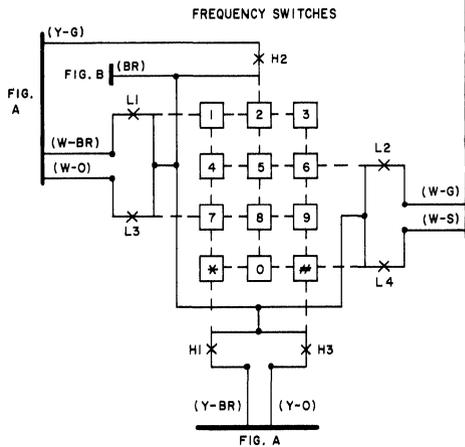


Fig. 8—2872A1M or 2872A2M Telephone Set, Connections (Sheet 3 of 5)

TABLE G

**CONNECTIONS—2872A1M OR 2872A2M TELEPHONE SET WITH 4A SPEAKERPHONE AND ONE-TOUCH CALLING,
USING 82B CONNECTING BLOCK**

LEAD DESIG	COLOR	TEL SET		82B CONN. BLK (NOTE 1)	CONN CABLE AT KEY EQUIP.		
		FROM	TO PSB TERM.		COLOR	TO	
Tel Set	T1	V-G	*	2	(Note 2)		
	R1	G-V	*	11			
	A1						
	AG	V-S	*	F †			
	LK	S-V	*	17			
	SPO	O-V	*	34	Strap 10 to 35	O-V	*
D-180492 Kit of Parts (Note 3)	VDD	W-G		21			
	PFR	BL-V		20			
	SHi	G-W		18			
	LK	BL-R		17			
	SHa	R-BL		16			
	B+	BK-BL		15			
	C _E	BL-BK		10			
D-180493 Kit of Parts (Note 4)	SPO	G-Y		34			
	COM	BK-O		29			
	SPR	Y-BL		27			
	DTT	BL-Y		26			
	PL	O-R		25			
	DR	Y-O		24			
	VDD	R-O		21			
	DT	O-Y		19			
	LK	Y-G		17			
	INPUT	G-R		11			
	PB	O-BK		9			
	INPUT	G-R		2			
	SWITCH	S		28			
		S		29			
85B1 Power Unit	AC1	BK		AC1	BR-V	*	
					V-BR	*	
	AC2	Y		AC2			
95B1 Power Unit (Note 5)	AC1	R		21	BL-V	*	
					V-BL	*	
	AC2	G		46			

* Insulated and stored.

† Terminal on network.

Notes:

1. Plug mounting cords of telephone set, 108A loudspeaker, and 680A transmitter into 82A connecting block. Install option plug in ringer cutoff mode.
2. For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
3. When installing D-180492 Kit of Parts, remove the (BK) strap lead between PSB terminals 10 and 15. Also remove the (BK) lead from PSB-20; insulate and store.
4. Remove (BK) lead from PSB terminals 19, 26, and 29; insulate and store.
5. Both 95B1 and 85B1 power units must be connected for speakerphone operation.

TABLE H

**CONNECTIONS – 2872A1M OR 2872A2M
TELEPHONE SET WITH DIAL TONE DETECTOR**

LEAD DESIG		COLOR	2872A1M OR 2872A2M TEL SET	
			FROM	TO PSB TERM
2872A1M or 2872A2M Tel Set	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		
S				*

* Insulated and stored.

† Switch is not required when speakerphone is not provided.

TABLE I
CONNECTIONS FOR 2/4-WIRE SERVICE

D-KIT NUMBER	COLOR	CONNECT TO POWER SUPPLY BOARD OR NET. TERM.
D-180494 (Notes 1, 2, and 3)	V	T
	S	F
	BR	PSB-3
	Y-BR	L1
	BL-R	GN
	G-BK	PSB-17
	R-BR	R
	R-O	S
BL-Y	PSB-34	

- Notes:*
1. Move (BK-G) lead from network terminal GN to network terminal L1.
 2. Remove strap lead between network terminal R and S.
 3. Take mounting cord leads (BR-V) and (V-BR) which are insulated and stored, and connect to PSB terminals 17 and 34, respectively.

TABLE J
CONVERSION OF KEYS FOR SIGNALING

SELECTIVE SIGNALING							
508 PLUG	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 (SEE NOTE)							
508 PLUG	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: Remove (BK) strap between TB1-2 and 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.

† Remove pins to make key nonlocking when used for signaling.

TABLE K
D50AM-87 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.

TABLE K (CONT)
D50AM-87 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-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						
SPO‡	22§	O-V	*						
Spare	47	V-O	Net. T						
R1‡	23	G-V	*						
T1‡	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.

† 95B1 Power Unit (Touch-A-Matic Power Supply)

‡ Designations for speakerphone options. Refer to Tables B through G.

§ Nonstandard pin numbers.

TABLE L
TO CONVERT THE 2872A1M OR 2872A2M
TELEPHONE SET FROM 1A1, 1A2, TO
1A OPERATION (SEE NOTE)

LEAD DESIG	COLOR	FROM (1A1, 1A2)	TO (1A)
SHb	Y	TB1-12	TB1-5
HOLD	Y-BL	TB1-3	TB1-16
HOLD	BL	* (Pink 508 Plug)	TB1-3
HOLD	G	TB1-1	Net. L2
RING	R	PSB-12	Net. L2
SHc †	BR	TB1-1	TB1-6
Net. F ‡	R-BL	TB1-1	TB1-6

* Insulated and stored.

† Only required when busy-lamp option is provided.

‡ Only required when both busy-lamp and speakerphone options are provided.

Note: Tables B through G provide speakerphone connections for 1A1 and 1A2 KTS. The same tables apply for 1A KTS with the following changes:

- (a) The (G-V) R1 lead from the telephone set will connect to L2 of network instead of PSB-11 in all tables.
- (b) If one-touch calling option is provided, input lead from D-180493 Kit of Parts will connect to L2 of network instead of PSB-11 in Tables C, E, and G.

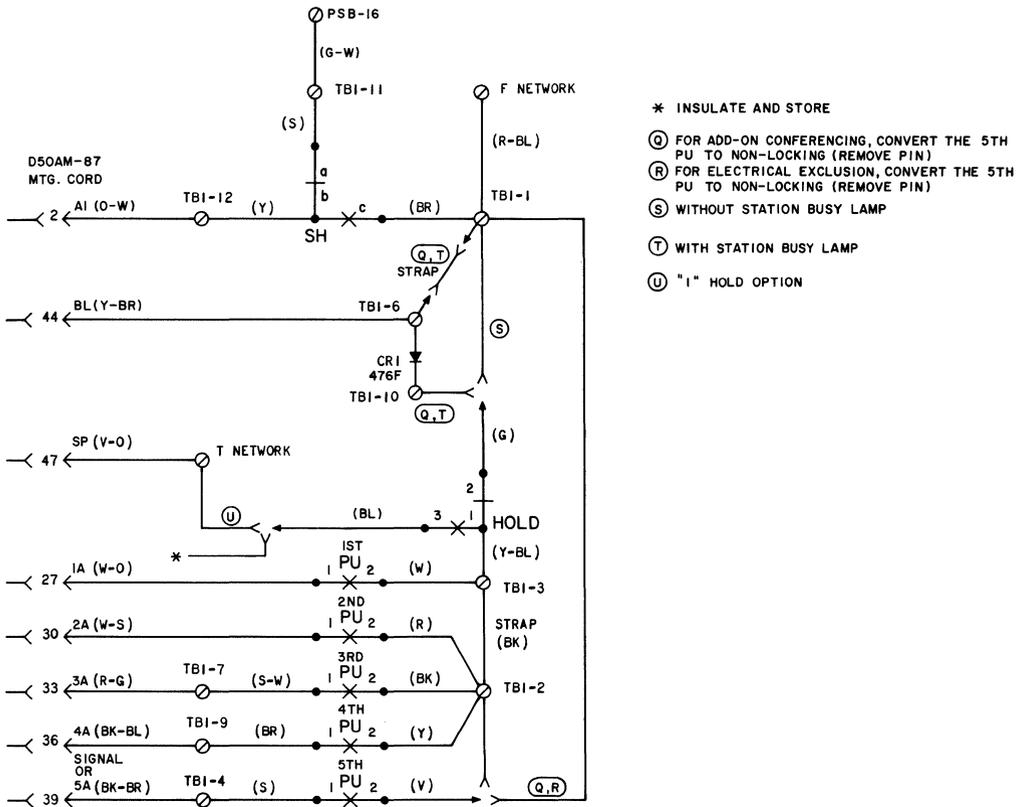


Fig. 9—"I" Hold, Exclusion, Station Busy Lamp, and Add-On Conferencing—1A1 and 1A2 KTS

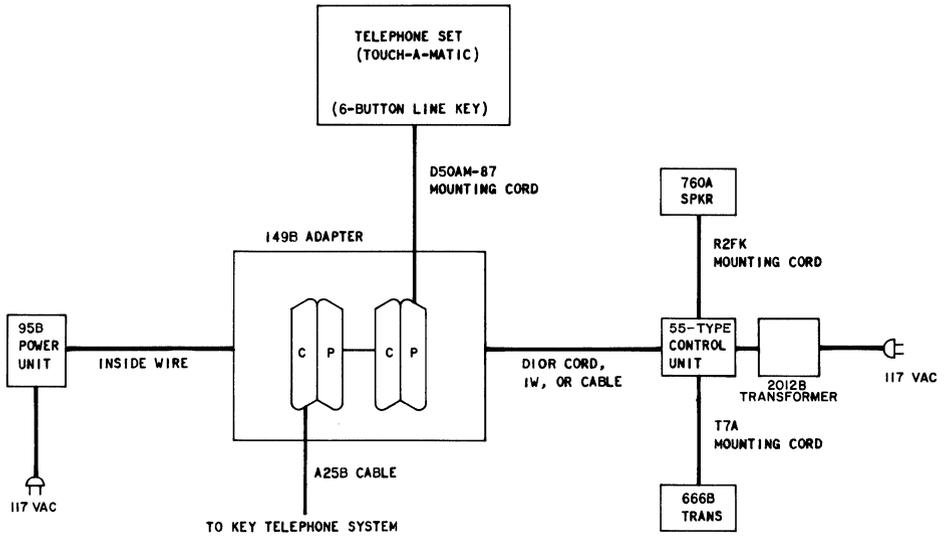
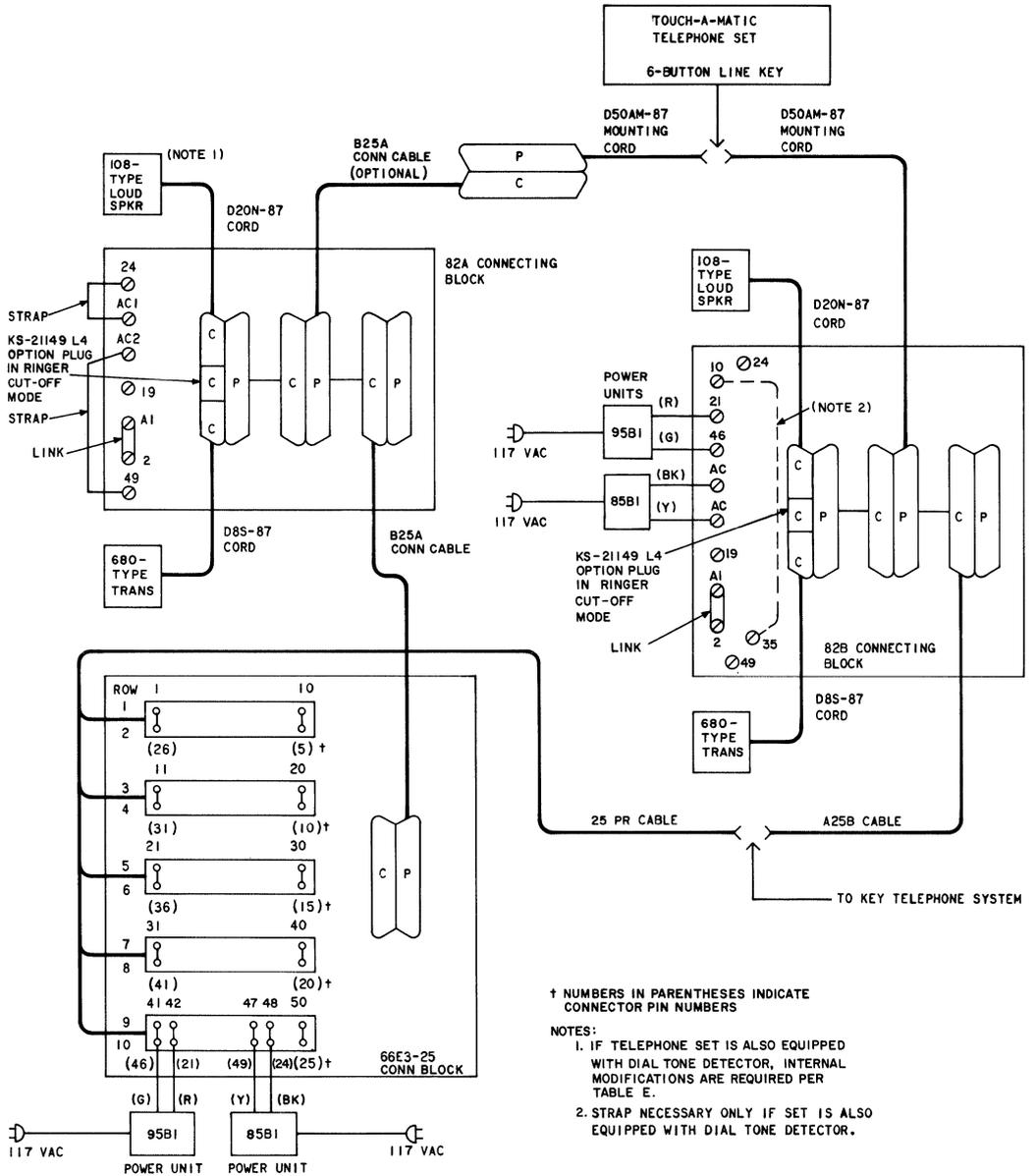


Fig. 10—Block Diagram—2872A1M or 2872A2M Telephone Set Using 3B Speakerphone



† NUMBERS IN PARENTHESES INDICATE CONNECTOR PIN NUMBERS

NOTES:

1. IF TELEPHONE SET IS ALSO EQUIPPED WITH DIAL TONE DETECTOR, INTERNAL MODIFICATIONS ARE REQUIRED PER TABLE E.
2. STRAP NECESSARY ONLY IF SET IS ALSO EQUIPPED WITH DIAL TONE DETECTOR.

Fig. 11—Block Diagram—2872A1M or 2872A2M Telephone Set Using 4A Speakerphone (Alternate Methods of Installation)

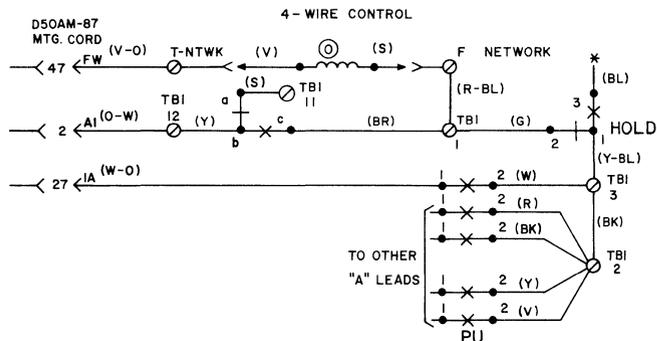
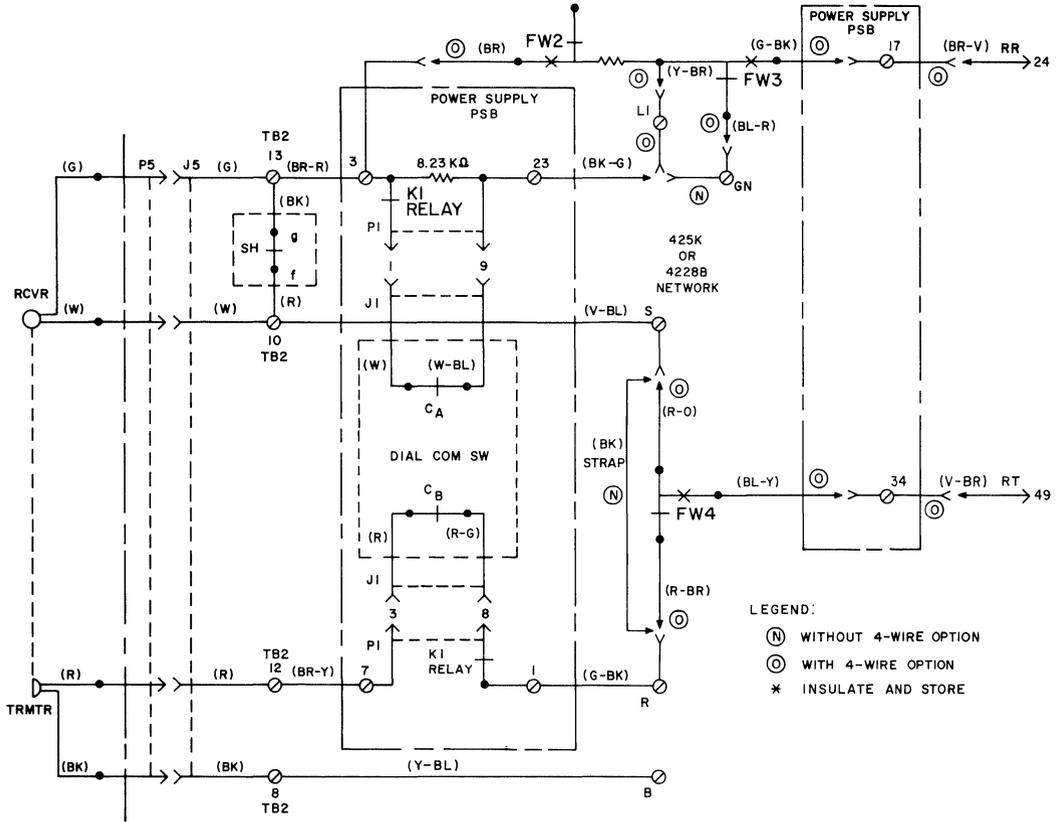


Fig. 12—2872A1M or 2872A2M Telephone Set—2/4 Wire Connections

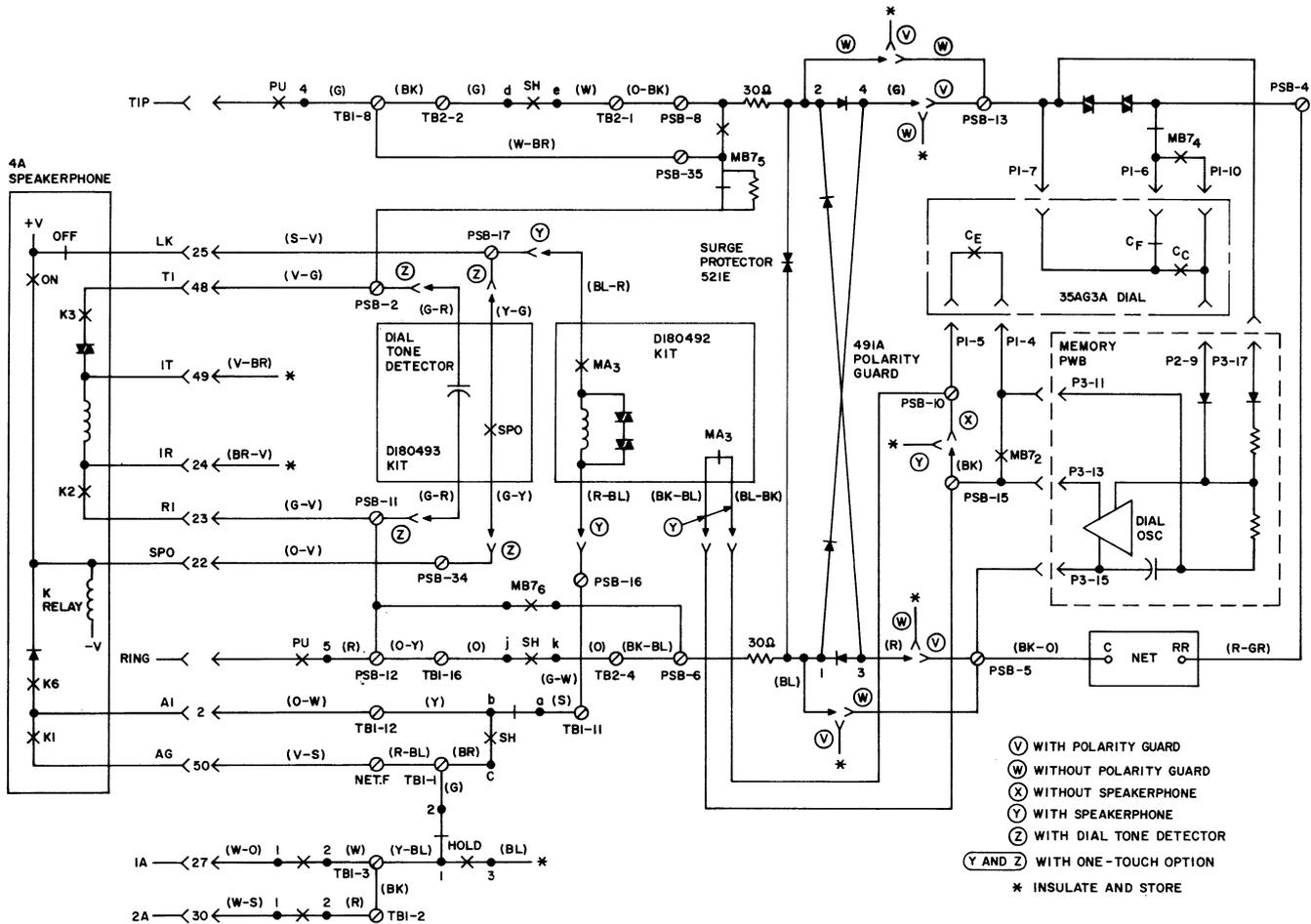


Fig. 13—2872A1M or 2872A2M Telephone Set, Partial Functional Schematic

TABLE M
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 switchhook 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® signal	12-pin connector of 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 signals heard when dial buttons are depressed Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook
			No audible TOUCH-TONE 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 35AG3A dial
		Defective memory PWB		Replace memory assembly
		Unknown	Replace telephone set	
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

TABLE M
TROUBLE ANALYSIS – 2872A1M OR 2872A2M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
4 (cont'd)			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	AC power not present	Check for commercial power	
			Battery not plugged in (2872A2M tel set)	Plug battery in	
			95B1 power unit not plugged in or defective	Check or replace 95B1 power unit (should read 13.4 to 18 VAC 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	
			Defective logic reset switch on line key	Replace line key	
			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	
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	Incorrect dial contact sequence	Replace dial
			Defective logic	Replace memory	
			Open circuit on PSB	Replace telephone set	

TABLE M
TROUBLE ANALYSIS – 2872A1M OR 2872A2M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9	Cannot dial properly from memory		Did not record properly	1. Record per 5.01 2. See No. 7
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE signal present	Battery not plugged in (2872A2M tel set)	Plug battery in
			Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 8 [B]
			Defective logic	Replace memory
			Defective switch-hook 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 signal present		
		Audible gap in train of digits being dialed		
		Digits dialed too rapidly (fast dialer)	Noise on AC power line	1. Insert 145A filter between 95B1 power unit and commercial power outlet 2. Minimize wire length between 95B1 power unit and telephone set.
		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	1. Plug in the battery 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 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
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).		

TABLE M
TROUBLE ANALYSIS – 2872A1M OR 2872A2M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
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, E, F, or G. 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, 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	1. Check connections per Table B, C, D, E, F, or G. 2. Check for commercial power 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 secondary screw terminals)
		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 95B1 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 327 A 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 switchhook 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 switchhook a-b contacts	Replace telephone set

TABLE M
TROUBLE ANALYSIS – 2872A1M OR 2872A2M (Cont)

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. 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 switch-hook 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 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 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	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

TABLE M
TROUBLE ANALYSIS – 2872A1M OR 2872A2M (Cont)

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 not plugged in	Plug battery in
		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 when a memory button is depressed.	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
19	Speakerphone turns on but set does not automatically dial when memory button is depressed (Wired for one-touch option)		Black strap leads were not lifted from PSB terminals 19 and 26 when option was wired	Insulate and store strap leads.
		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	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

TABLE M
TROUBLE ANALYSIS – 2872A1M OR 2872A2M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
21	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 [®] dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Loose memory mounting	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			

872A1M TELEPHONE SET (TOUCH-A-MATIC® SET)

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Power Supply Board (PSB) Terminals	15	1. GENERAL	
635-Type Key Removal	15	1.01 This section provides identification, installation, connections, operation, and maintenance information on the 872A1M TOUCH-A-MATIC® telephone set (Fig. 1).	
Faceplate Removal	16	1.02 The 872A1M telephone set is factory wired for use with 1A1, 1A2, or 6A key telephone	
Handset Cradle Removal	16		

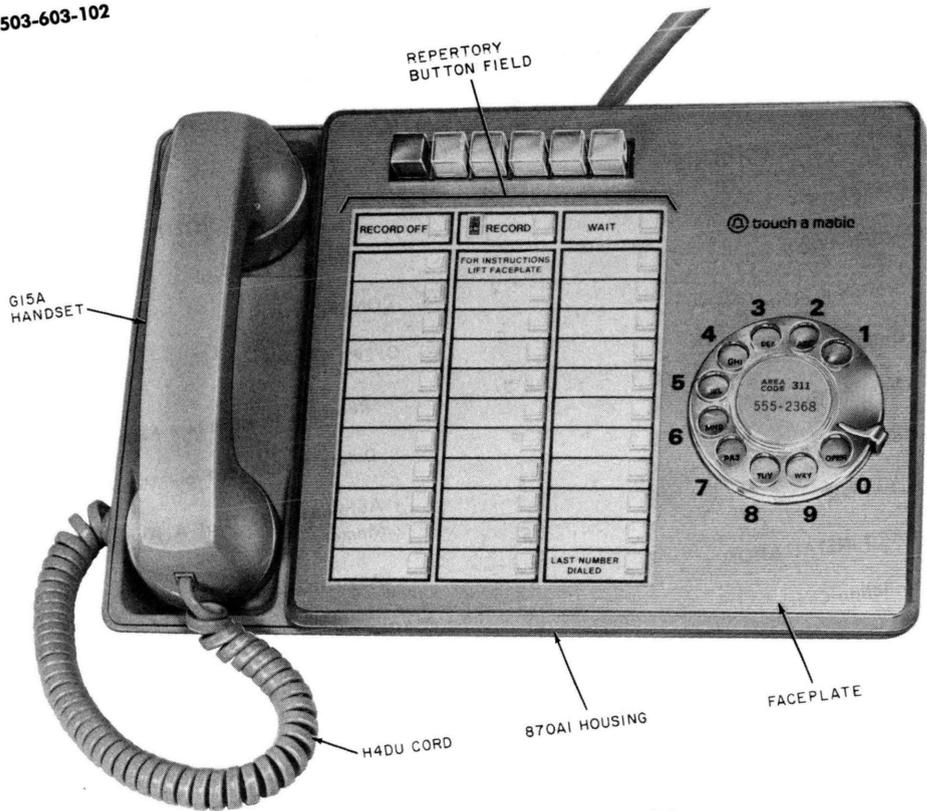


Fig. 1—872A1M Telephone Set

systems (KTS). It may be converted (Table K) for use with 1A KTS.

1.03 The telephone set is available in the following colors:

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

2. IDENTIFICATION

2.01 The 872A1M telephone set provides all standard features of a 6-button key telephone set (convertible to single-line operation) plus automatic

dialing of 31 frequently called numbers, and a LAST NUMBER DIALED *scratch pad* memory.

2.02 Design Features:

- Modular key telephone set
- Integrated circuit memory
- Common audible ringing
- Buzzer
- Busy lamp diode
- Line pickup buttons convertible to nonlocking signal buttons

TABLE A
OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone*	4A	108-type Loudspeaker	11	D,E
		680-type Transmitter	11	D,E
		82B Connecting Block	11	D,E
		85B1 Power Unit	11	D,E
		D-180568 Kit of Parts	8(C)	D,E
	3B	760A Loudspeaker	10	B,C
		666B Transmitter	10	B,C
		55B Control Unit	10	B,C
		2012B Transformer	10	B,C
		149B Adapter		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)	C,E
Station Busy Lamp			9	
"I" Hold			9	
Signaling				I
Exclusion (Electrical)			9	
Add-On-Conference			9	
Nonkey Service (Single Line)		870A1-87 Faceplate	13	H
2/4 Wire Service*		D-180494 Kit of Parts	12	G
1A Key Service				K
Amplifying Handset			8(H)	

* 2/4 wire option and speakerphone cannot be used simultaneously.

- 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 second dial tone during automatic dialing (WAIT input).

2.03 *Optional Features:*

- Speakerphone—either 3B or 4-type speakerphone may be added to stations
- Dial Tone Detector—automatically starts dialer when precise TOUCH-TONE® dial tone is present

Note: All dial tones encountered in the process of placing a call must be precise TOUCH-TONE dial tone, if the call is to be completed automatically.

- One-Touch Calling, (requires both Dial Tone Detector and speakerphone)—depressing one

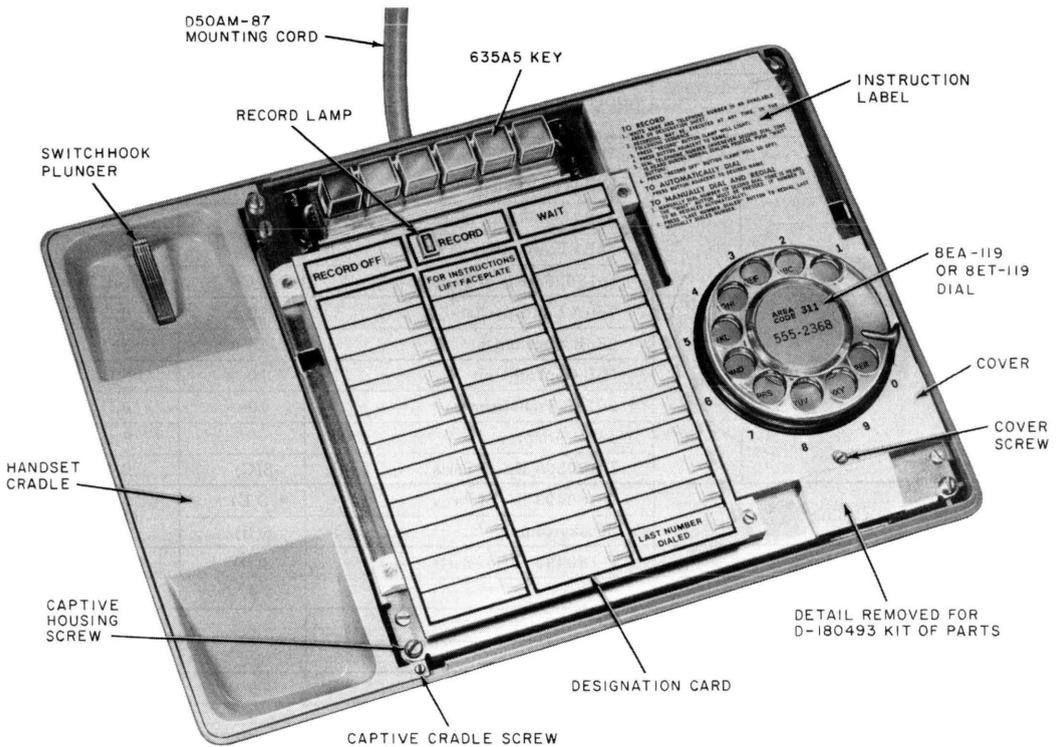


Fig. 2—872A1M Telephone Set—Faceplate and Handset Removed

memory button will automatically turn on speakerphone and dial number.

- Station Busy Lamp
- 2/4-Wire Service
- Add-On-Conference
- Exclusion (electrical)
- Nonkey Service (single line)
- "I" Hold
- Signaling
- Amplifying handset

- 1035C3A Dial Adjunct (Section 501-164-130).

2.04 All options are implemented by:

- Wiring changes in the telephone set
- Installation of appropriate additional items

2.05 Ordering Guide:

(a) The 872A1M telephone set is a modular type telephone set and may be ordered complete and ready to install as:

- Set, Telephone, 872A1M-*

(b) **Ordered Separately:**

- Unit, Power, 95B1 (required for operation of the repertory feature).

(c) The 872A1M may also be ordered in its component parts as follows:

- Housing, 870A1-*
- Faceplate, 872A1-87
- Handset, G15A-*
- Cord, Handset, H4DU-*
- Base, Telephone Set, 872AM (includes the following):

Dial, 8EA-119 or 8ET-119

Key, 635A5

Switch, Line Key (840393631)

Collar, P-23F503

Ringer, P1B

Network, 425K or 4228B

Buzzer, KS-20419L1

Cord, Mounting, D50AM-87

Battery, KS-20390L2

Jack, Handset, 616B

Repertory Assembly, 840401970 (includes button field)

Power Supply Printed Wiring Board (PSB) Assembly, 840440077

Designation Card Set, 840393672

Booklet, Instruction, Subscriber, SIB-2455

(d) **Optional Apparatus (order as required):**

- 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)

- Faceplate, 870A1-87 (for conversion to nonkey service)

- Handset, Amplifying (G6-, G7-, or G8-Type)

*Add appropriate color suffix (1.03).

2.06 Operating Features (Fig. 2):

- Line key (635A5), 6-button key. Hold with five line pickup buttons which are convertible to nonlocking. A switch has been attached to the standard key to reset the logic circuit anytime a key button is depressed.
- 32-button repertory field, of low force, low travel nonlocking 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 repertory field, 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 (4.01).

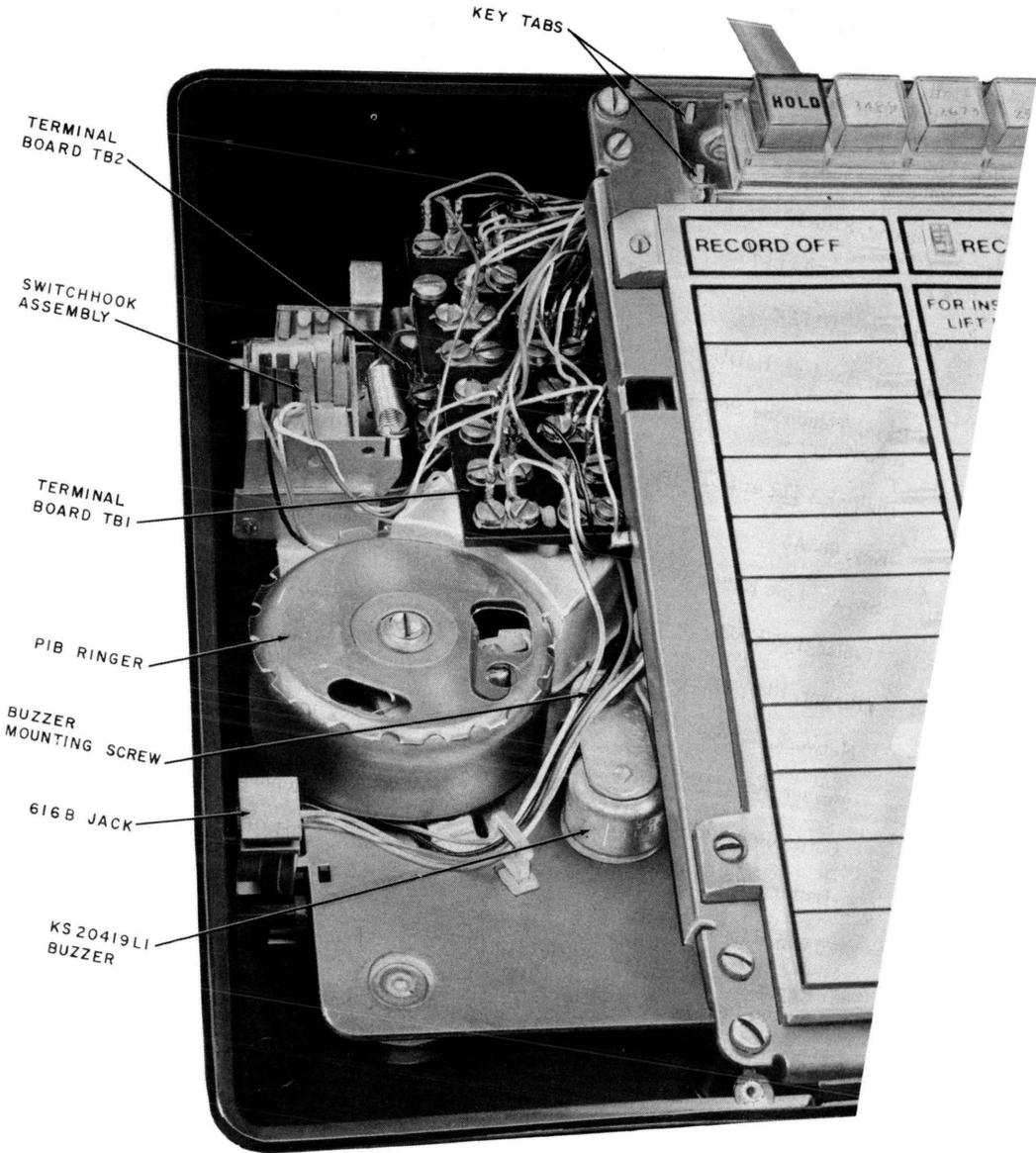


Fig. 3—872A1M Telephone Set With Faceplate, Handset, and Handset Cradle Removed

Caution: *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.*

3.02 The set is shipped from the factory with the battery disconnected. After all wiring changes and modifications have been completed, connect the battery (Fig. 6), by tilting the set up, and inserting the battery plug into the mating jack.

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

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) (Fig. 13).

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 designation card (Fig. 2) is installed by removing the faceplate (3.17) and aligning the holes in the card with the buttons of the repertory assembly and laying it on the telephone set. The memory buttons and faceplate hold the designation card in its proper position. Additional cards are provided in the designation card set, 840393672. These should be left with the subscriber.

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 L, Trouble Analysis.

- (1) Disconnect 95B1 power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
 - (2) Reconnect 95B1 power unit to AC outlet.
 - (3) With handset on-hook, record a known telephone number into all memory locations except LAST NUMBER DIALED and the location immediately above it [5.01 (4)-(7)].
 - (4) Automatically dial the numbers stored in Step (3) and verify that they are correct.
 - (5) Go off-hook and simultaneously manually dial and record a known telephone number into memory location immediately above LAST NUMBER DIALED button [5.01 (4)-(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 the WAIT input inserted in the middle of the telephone number.
 - (8) Momentarily hang up 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 KS-20390L2 battery and 95B1 power unit must be connected a minimum of five minutes before doing Step (9).
- (9) Momentarily disconnect the 95B1 power unit (for 5 to 10 seconds). After reconnecting power unit, depress a button of a memory location used in Step (3), to verify retention of memory.
 - (10) Dial the appropriate code for ring-back to test the ringer.

SECTION 503-603-102

- (11) Check operation of the line key switch by pressing the RECORD button (RECORD lamp will come on) and subsequently pressing a 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 button previously used to record in Step (5). The set should automatically turn the speakerphone on and dial the number.

OPTIONAL APPARATUS INSTALLATION

D-180568 Kit of Parts

3.08 To install:

- (1) Proceed as described in 3.15.
- (2) Make connections per Tables B through E.
- (3) Mount the kit assembly to the top plate with the screws provided (Fig. 4). Beveled corner of PWB should be at lower right corner.

D-180493 Kit of Parts

3.09 To install:

- (1) Remove the housing (3.19), and access PSB terminal board (3.15).
- (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 metal plate.
- (3) Lock the board into position by inserting the accompanying screw from the side of the set.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

Note: If dial tone detector is being used without speakerphone option, place switch in OFF position and make connections for the D-180493 Kit of Parts found in Table E.

- (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.

D-180494 Kit of Parts

3.10 To install:

- (1) Proceed as described in 3.15.
- (2) Make connections per Table G.
- (3) Mount the kit assembly to the top plate with the screws provided (Fig. 4).

Conversion to Single-line Service

3.11 To convert key set:

- (1) Remove the faceplate, key collar, and all buttons of the 635A5 key.
- (2) Release the key from the tabs by pushing it toward the rear of the set.
- (3) Raise the HOLD side of the key enough to slip the hook of the key cover (included with the 870A1-87 faceplate) around left side of metal plate of the key (Fig. 7).
- (4) Snap the key into position by pushing it down and forward.
- (5) Squeeze the sides of the key cover while pushing down, beginning adjacent to the hook and working along the cover until it is completely inserted in the key top plate (Fig. 7).
- (6) Gain access to terminal area (3.15).
- (7) Remove the cradle (3.18).
- (8) Make connections per Table H.
- (9) Reassemble set and install the 870A1-87 faceplate.

COMPONENT LOCATION AND ACCESS INFORMATION

Location of Components

3.12 The components are located in three areas as follows:

- (a) Under the handset cradle (Fig. 3):
 - Buzzer

TABLE B
 CONNECTIONS – 872A1M TELEPHONE SET WITH 3B SPEAKERPHONE

LEAD DESIG	COLOR	872A1M TEL. SET (NOTE 1)		CONNECT								2012B TRNSF	CONN CABLE AT KEY EQUIP		
				FROM				TO							
				FROM	TO PSB TERM.	CONT UNIT		95B1 PWR UNIT	149B ADPT (DIOR CORD)	666B TRANS. (T7A CORD)					706A LSPK (R2FK CORD)
						55A	55B		TERM.	COLOR	TERM.				COLOR
8 7 2 A 1 M T e l S e t	T1	V-G	*	2	19	1		8A							
	R1	G-V	*	9	28	10		7A							
	A1				12	2		A1							
	AG	V-S	*	F†	5	11		12A							
	LK	S-V	*		11	35		11A							
	P3	V-BR	*		21	4		10A							
	P4	BR-V	*		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	VDD	W-G		17											
	SHa	R-BL		16											
	SHi	G-W		14											
	LK	BL-R		13											
666B Trans	M1				4	7		S-BK	1						
	P1				13	8		BL-R	2						
	-15V				14	16		BK-S	3						
	S				3	18		O-BK	5						
	A1				29	19		Y-O	6						
	F1				2	17		G-Y	7						
	LK				11	35		BK-O	8						
760A Lspk	SP1				34	20				G					
	SP2				33‡	29‡				R					
95B1 Pwr Unit	AC1						3	3B					BL-V	*	
	AC2						4	4B					V-BL	*	
2012B Trnsf	AC1				27	27						1			
	AC2				36	36						2			

* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24(55A) or 30(55B).

Note: Plug telephone set mounting cord into 149B adapter.

TABLE C (Cont)

CONNECTIONS – 872A1M TELEPHONE SET WITH 3B SPEAKERPHONE AND ONE-TOUCH CALLING

LEAD DESIG	COLOR	872A1M TEL SET (NOTE 1)		CONNECT								2012B TRNSF	CONN CABLE AT KEY EQUIP.	
				FROM				TO					COLOR	TO
				CONT UNIT		95B1 PWR UNIT	149B ADPT (DIOR CORD)	666B TRANS (T7A CORD)		760A LSPK (R2FK CORD)				
				FROM	TO PSB TERM.		55A	55B	TERM.	COLOR	TERM.			
666B Trans	M1			4	7			S-BK	1					
	P1			13	8			BL-R	2					
	-15V			14	16			BK-S	3					
	S			3	18			O-BK	5					
	A1			29	19			Y-O	6					
	F1			2	17			G-Y	7					
LK			11	35			BK-O	8						
760A Lspk	SP1			34	20						G			
	SP2			33 ‡	29 ‡						R			
95B1 Pwr Unit	AC1					3	3B					BL-V	*	
	AC2					4	4B					V-BL	*	
2012B Trnsf	AC1			27	27						1			
	AC2			36	36						2			

* Insulated and stored.

† Terminal on network.

‡ To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or 30 (55B).

Notes:

1. Plug telephone set mounting cord into 149B adapter.
2. When installing the D-180493 Kit of Parts, remove (BK) strap leads between PSB terminals 11 and 17; 17 and 23; and 18 and 20.

TABLE D
CONNECTIONS – 872A1M TELEPHONE SET WITH 4A
SPEAKERPHONE, USING 82B CONNECTING BLOCK

LEAD DESIG	COLOR	872A1M TEL SET		82B CONN BLK (NOTE 1)	CONN CABLE AT KEY EQUIP		
		FROM	TO PSB TERM.		COLOR	TO	
872A1M Tel Set	T1	V-G	*	2	(Note 2)		
	R1	G-V	*	9			
	A1						
	AG	V-S	*	F†			
	LK	S-V	*	13			
	P3	V-BR	*	3			
	P4	BR-V	*	6			
D-180568 Kit of Parts	VDD	W-G		17			
	SHa	R-BL		16			
	SHi	G-W		14			
	LK	BL-R		13			
85B1 Power Unit (Note 3)	AC1				AC1	BR-V	
		BK					
	AC2				AC2	V-BR	
		Y					
95B1 Power Unit (Note 4)	AC1				21	BL-V	*
		R					
	AC2	G			46	V-BL	*

* Insulated and stored.

† Terminal on network.

Notes:

- Plug mounting cords of telephone set, 108A loudspeaker, and 680A transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
- For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
- If power is to be provided from the key equipment room, the 85B1 power unit must be connected to the BR-V pair (pins 24 and 49) of the connecting cable. Terminals (24, AC1) and (49, AC2) must then be strapped together on the 82B connecting block. The BR-V pair must remain insulated and stored in the telephone set.
- If power is to be provided from the key equipment room, the 95B1 power unit must be connected to the BL-V pair (pins 21 and 46) of the connecting cable.

- Ringer
- Switchhook assembly
- Handset jack
- Terminal boards (TB1 and TB2).
- (b) Under the faceplate, inside the set (Fig. 4 and 5):
 - Battery jack (Fig. 5)
 - Power supply (PSB) terminal area (Fig. 4)

TABLE E

**CONNECTIONS – 872A1M TELEPHONE SET WITH 4A SPEAKERPHONE
AND ONE-TOUCH CALLING, USING 82B CONNECTING BLOCK**

LEAD DESIG	COLOR	872A1M TEL SET		82B CONN. BLK (NOTE 1)	CONN CABLE AT KEY EQUIP.					
		FROM	TO PSB TERM.		COLOR	TO				
872A1M Tel Set	T1	V-G	*	2	(Note 2)					
	R1	G-V	*	9						
	A1									
	AG	V-S	*	F†						
	LK	S-V	*	13						
	SPO	O-V	*	21				Strap 10 to 35	O-V	*
	P3	V-BR	*	3						
	P4	BR-V	*	6						
D-180568 Kit of Parts	VDD	W-G		17						
	SHa	R-BL		16						
	SHi	G-W		14						
	LK	BL-R		13						
D-180493 Kit of Parts (Note 3)	DTT	BL-Y		23						
	PL	O-R		22						
	SPO	G-Y		21						
	COM	BK-O		20						
	DR	Y-O		19						
	SPR	Y-BL		18						
	VDD	R-O		17						
	LK	Y-G		13						
	DT	O-Y		11						
	Input	G-R		9						
	PB	O-BK		7						
	Input	G-R		2						
	Switch	S		15						
		S		20						
85B1 Power Unit (Note 4)	AC1	BK			AC1	BR-V				
						V-BR				
95B1 Power Unit (Note 5)	AC2	Y			AC2	BL-V	*			
					21	V-BL	*			
AC2	R									
	G				46					

* Insulated and stored.

† Terminal on network.

Notes:

- Plug mounting cords of telephone set, 108A loudspeaker, and 680A transmitter into 82B connecting block. Install option plug in ringer cutoff mode.
- For 1A1 or 1A2 KTS, connect link between 2 and A1. For 1A KTS, connect link between 19 and A1.
- Remove (BK) strap leads between PSB terminals 11 and 17; 17 and 23; and 18 and 20.
- If power is to be provided from the key equipment room, the 85B1 power unit must be connected to the BR-V pair (pins 24 and 49) of the connecting cable. Terminals (24, AC1) and (49, AC2) must then be strapped together on the 82B connecting block. The BR-V pair must remain insulated and stored in the telephone set.
- If power is to be provided from the key equipment room, the 95B1 power unit must be connected to the BL-V pair (pins 21 and 46) of the connecting cable.

TABLE F

**CONNECTIONS – 872A1M TELEPHONE SET
WITH DIAL TONE DETECTOR ONLY**

LEAD DESIGNATION		COLOR	872A1M TEL SET	
			FROM	TO PSB TERM.
872A1M Tel Set	Strap	BK	PSB-11	*
	Strap	BK	PSB-23	*
D-180493 Kit of Parts	Input	G-R		2
	PB	OR-BK		7
	Input	G-R		9
	DT	O-Y		11
	LK	Y-G		13
	VDD	R-O		17
	SPR	Y-BL		*
	DR	Y-OR		19
	COM	BK-O		20
	SPO	G-Y		21
	PL	O-R		22
	DTT	BL-Y		23
	Switch	S		
S				20

* Insulate and store.

- Network (Fig. 4)

(c) Under the telephone set (Fig. 6):

- Options (Fig. 4):

- Battery

D-180568 (relay kit for speakerphone)

Mounting Cord

D-180493 (dial tone detector and one-touch calling switch kit)

3.13 The D50AM-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.

D-180494 (2/4 wire relay kit).

TABLE G
CONNECTIONS FOR 2/4-WIRE SERVICE

D-KIT NUMBER	COLOR	CONNECT TO POWER SUPPLY BOARD OR NET. TERM.
D-180494 (Notes 1, 2, and 3)	V	T
	S	F
	BR	*
	Y-BR	L1
	BL-R	GN
	G-BK	PSB-13
	R-BR	R
	R-O	S
	BL-Y	PSB-21

- Notes:*
1. Move (BK-G) lead from network terminal GN to network terminal L1.
 2. Remove strap lead between network terminal R and S.
 3. Take mounting cord leads (BR-V) and (V-BR) which are insulated and stored, and connect to PSB terminals 13 and 21, respectively.

TABLE H
CONNECTIONS FOR CONVERSION TO SINGLE LINE SET WITH BRIDGED RINGER

LEAD COLOR	ADD STRAP LEAD	REMOVE FROM	CONNECT TO	CONNECT TO
Y-S	—	Net. K	*	—
Y-BL	—	TB1-3	*	—
S-Y	—	TB1-13	*	—
W-BL	—	(1PU-3)*	TB1-8	—
BL-W	—	(1PU-6)*	TB1-16	—
W-O	—	(1PU-1)*	TB1-1	—
BK	Yes	—	Net. K	PSB-28
BK	Yes	—	TB1-16	TB1-13
BR	—	PSB-10	*	—

*Insulate and store.

The conductors 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.

Network Terminals

3.14 For access to the network terminals:

- (1) Remove the faceplate (3.17).
- (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 metal top plate before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

Power Supply Board (PSB) Terminals

3.15 To access the terminal field on the power supply board, proceed as follows:

- (1) Remove the faceplate (3.17).
- (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 metal top plate before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

635-Type Key Removal

3.16 To remove, use the following procedure:

- (1) Remove faceplate (3.17).
- (2) Push the key toward the rear of the set to unlock it from the tabs.

TABLE I
CONVERSION OF KEYS FOR SIGNALING

SELECTIVE SIGNALING							
508 PLUG	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 (SEE NOTE)							
508 PLUG	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	TB1-5
	HPP*P*P*S	TB1-3	TB1-2	TB1-2	TB1-2	TB1-2	TB1-5

Note; Remove (BK) strap between TB1-2 and TB1-3.

*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.
†Remove pins to make key nonlocking when used for signaling.

- (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 top plate of the set.

Caution: Do not damage contact strips which protrude from the right side of the key or line key switch attached on HOLD side of key.

- (4) Lift the key completely out of the set.
- (5) Replace key by reverse procedure.

Faceplate Removal

3.17 The 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.

Handset Cradle Removal

3.18 To remove the handset cradle from the housing, proceed as follows:

- (1) Remove the faceplate (3.17), and place the handset aside.
- (2) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
- (3) Lift the cradle by pulling up on the plunger, and remove.
- (4) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

Caution: The 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) Refasten the captive cradle screws.

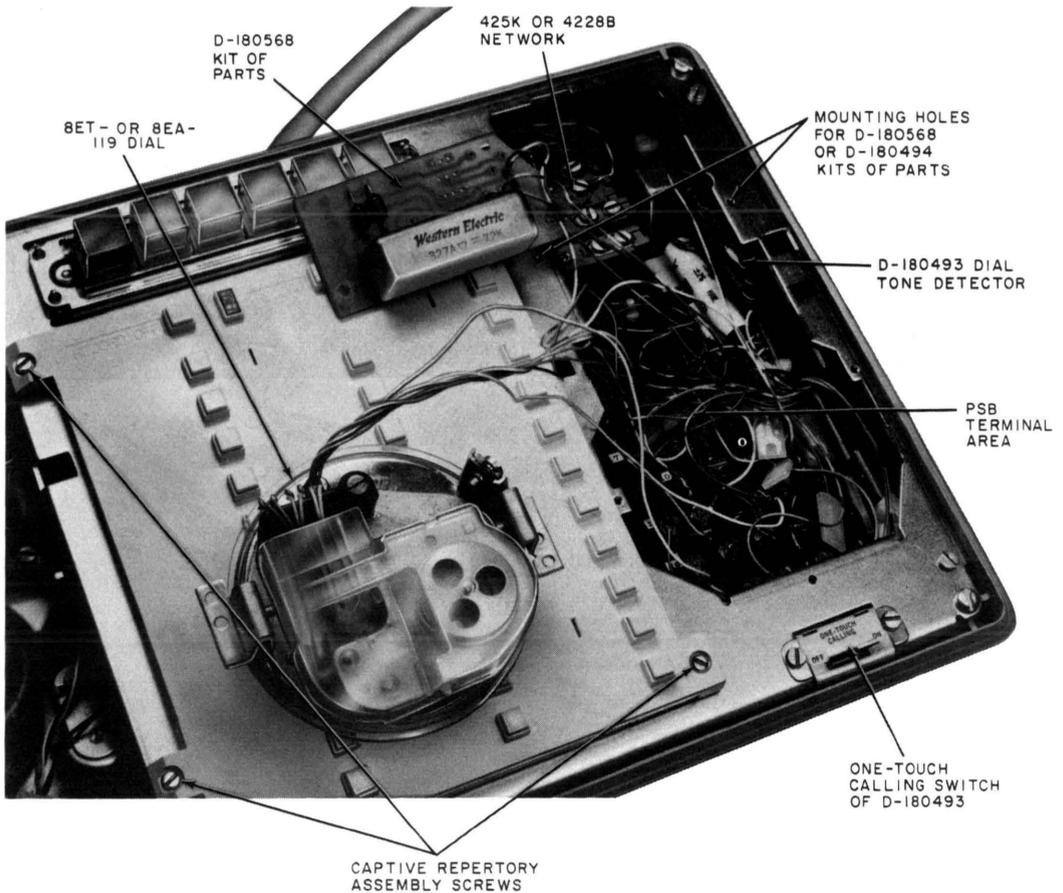


Fig. 4—872A1M Telephone Set—Dial Removed To Show Terminal Area

Housing Removal

3.19 To remove, proceed as follows:

- (1) Unplug the handset cord, at the telephone set end, and remove handset.
- (2) Remove the faceplate (3.17)
- (3) Remove the handset cradle (3.18).
- (4) Disengage only the four captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
- (5) Separate the housing from the telephone set base.
- (6) Feed mounting cord through hole in bottom of housing as housing is removed.

Caution: Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.

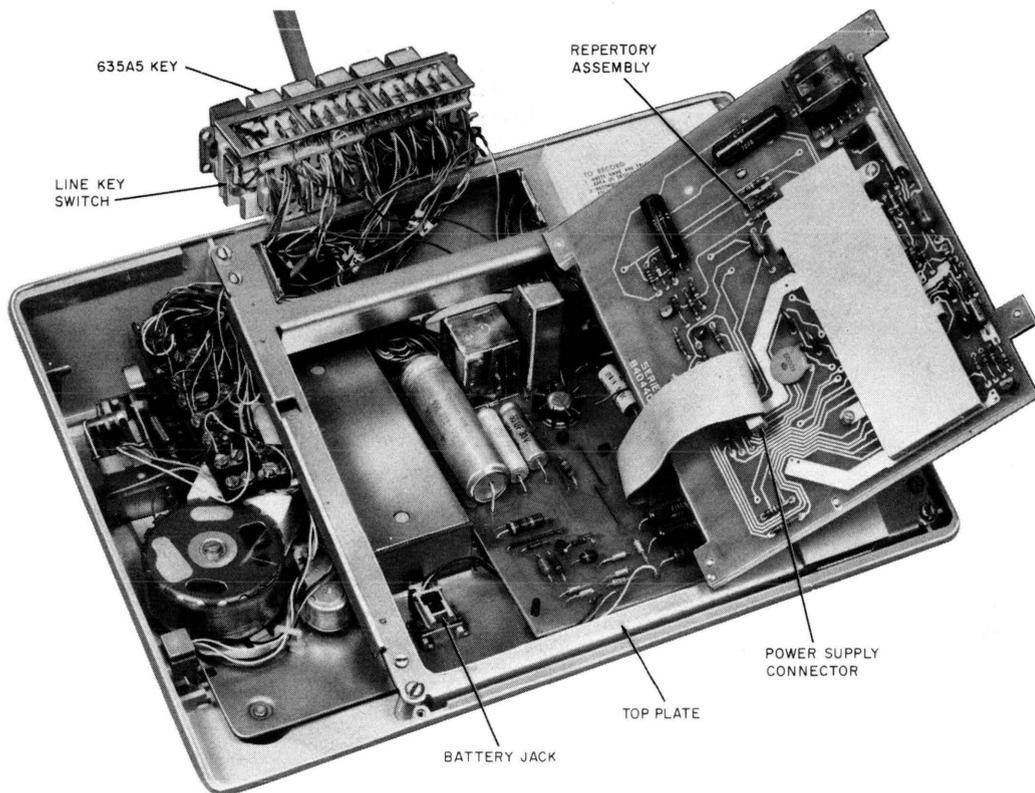


Fig. 5—872A1M Telephone Set, Overall Internal View

(7) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the metal tabs of the bottom plate. 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 base plate.

4. CONNECTIONS

4.01 Telephone set connections are shown in Fig. 8 and Table J.

Caution: Some conductor assignments are not standard (Table J).

4.02 Refer to Table A for connection information for all options.

4.03 A partial functional schematic is shown in Fig. 14.

5. OPERATION

Record a Number Into Memory

5.01 To record:

- (1) Remove the faceplate (3.17).
- (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the designation card.

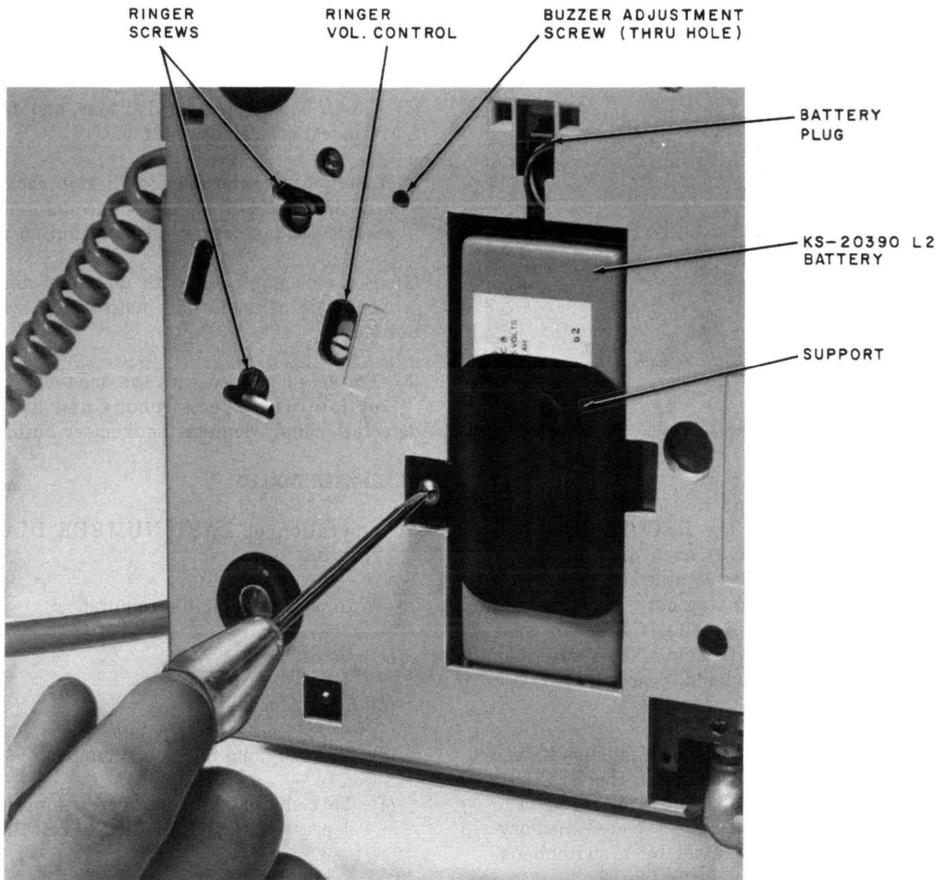


Fig. 6—872A1M Telephone Set, Bottom View

- (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.)
- (5) Depress the specific memory button adjacent to the desired telephone number listed on the designation card.
- (6) Manually dial the desired telephone number. If an access code 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.

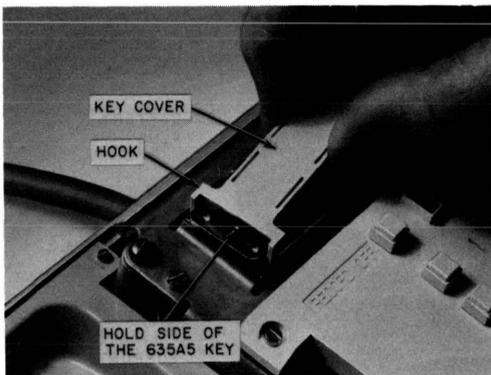


Fig. 7—Key Cover—Installed for Single Line Set

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 Step (5) were omitted, 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, line key, or speakerphone operation.

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

Delete Number From Memory

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.

Automatically Dial a Number From Memory

5.04 To automatically dial a number:

- (1) Go off-hook, listen for dial tone, and depress the desired memory button.

Note: Automatic dialer will stop each time a recorded WAIT signal is encountered. To resume dialing, depress memory button again.

- (2) For sets equipped with dial tone detector only, go off-hook and depress the memory button.
- (3) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), simply depress the memory button.

LAST NUMBER DIALED

5.05 Operation of LAST NUMBER DIALED feature:

(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, depress LAST NUMBER DIALED button.

(b) Access digit(s) required:

- (1) Go off-hook.
- (2) Listen for dial tone.
- (3) Dial access digit(s).
- (4) When dial has returned to normal position, depress WAIT button.
- (5) Manually dial telephone number after hearing dial tone.
- (6) To redial same number automatically, depress LAST NUMBER DIALED button. When dialer pauses at WAIT signal, LAST NUMBER DIALED button must be depressed again.

TABLE J
D50AM-87 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.

TABLE J (CONT)
D50AM-87 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.				
	17	O-Y	*						
	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	*						
	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.

§ Non-standard pin numbers.

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.

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 a repertory dialer (Part 5).

TABLE K

TO CONVERT THE 872A1M TELEPHONE SET
FROM 1A1, 1A2, TO 1A OPERATION (See Note)

LEAD DESIG	COLOR	FROM (1A1, 1A2)	TO (1A)
SHb	Y	TB1-12	TB1-5
HOLD	Y-BL	TB1-3	TB1-16
HOLD	BL	* (Pink 508 Plug)	TB1-3
HOLD	G	TB1-1	Net. L2
RING	R	PSB-9	Net. L2
SHc†	BR	TB1-1	TB1-6
Net. F‡	R-BL	TB1-1	TB1-6

*Insulated and stored.

†Only required when busy-lamp option is provided.

‡Only required when both busy-lamp and speakerphone options are provided.

Note: Tables B through E provides speakerphone connections for 1A1 and 1A2 KTS. The same tables apply for 1A KTS with the following changes:

- (a) The (G-V) R1 lead from 872A1M telephone set will connect to L2 of network instead of PSB-9 in all tables.
- (b) If one-touch calling option is provided, input lead from D-180493 Kit of Parts will connect to L2 of network instead of PSB-9 in Tables C and E.

- (2) Check connections.
- (3) Refer to Table L, and the following paragraphs.

Battery

6.03 The KS-20390L2 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. 6):

- (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.

Repertory Assembly

6.04 The repertory assembly may be replaced in the following manner:

Note: Removal of the repertory assembly results in loss of memory.

- (1) Remove the faceplate (3.17).
- (2) Loosen the four captive repertory assembly screws (Fig. 4).
- (3) Rotate the left edge of the repertory assembly upward as shown in Fig. 5.
- (4) Disengage the connector by pulling it perpendicular to the board.
- (5) Replace the repertory assembly. Do not twist the gray power supply cable. It should form a loop as shown in Fig. 5 when connected to the board.
- (6) Reassemble set.
- (7) Test per 3.07

8EA-119 or 8ET-119 Dial

6.05 To replace:

- (1) Proceed per 3.15.
- (2) Disconnect dial leads and remove dial.
- (3) To replace a new dial, reverse the previous steps.

635-Type Key

6.06 A defective 635A5 line key may be replaced as follows:

- (1) Remove key per 3.16.
- (2) Remove the 508-type plugs and two contact strips.
- (3) Remove the screw from the HOLD side of the key. This will release the line key switch.

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- (4) Replace the screw in the removed 635A5 key.
- (5) Assemble the new key in the reverse sequence.
When mounting the line key switch, care must be taken to ensure that the surface of the switch is flush with the surface of the 635A5 key. Bias the switch toward the front of the key before tightening the screw.
- (6) Reassemble the set.
- (7) Test for operation of the line key switch [3.07(11)].

Ringer

6.07 To replace the P1B ringer:

- (1) Remove the faceplate (3.17) and place the handset aside.
- (2) Remove the cradle (3.18).
- (3) Disconnect the ringer leads.
- (4) Tilt the front of the set up.
- (5) Unfasten ringer mounting screws (Fig. 6).
- (6) Remove ringer.
- (7) Replace 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 damping of the ringer output.

Buzzer

6.08 The KS-20419L1 buzzer may be adjusted by inserting a KS-6854 screwdriver (or smaller) through the hole in the base of the set (Fig. 6) to engage the adjusting screw. The buzzer will accommodate about a one turn rotation in either direction.

Caution: *Do not push too hard on the adjusting screw with the screwdriver, or the buzzer bracket may bend.*

6.09 To replace the buzzer:

- (1) Remove the faceplate (3.17) and place handset aside.

- (2) Remove the cradle (3.18).
- (3) Remove the buzzer mounting screw.
- (4) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (5) Move board TB1 to gain access to the appropriate terminals on TB2.
- (6) Remove appropriate leads [Fig. 8(H)].
- (7) Reassemble. When replacing TB1, locate its tabs in the slots of the metal plate before refastening the TB1 mounting screw.

Handset Jack

6.10 To replace the 616B handset jack:

- (1) Remove the faceplate (3.17) and place handset aside.
- (2) Remove the cradle (3.18).
- (3) Remove the mounting screw and spacer for TB1 (Fig. 3).
- (4) Move board TB1 to gain access to the appropriate terminals on TB2.
- (5) Disconnect the appropriate leads [Fig. 8(H)] and remove jack.
- (6) Reassemble. When replacing TB1, locate its tabs in the slots of the metal plate before refastening the TB1 mounting screw.

Handset

6.11 A defective G15A handset may be replaced by unplugging the H4DU cord and inserting it into a new handset. To replace the G15A handset with a G3A handset, or with a G6-, G7-, or G8-type amplifying handset, proceed as follows:

- (1) Unplug H4DU handset cord at telephone set end.
- (2) Remove faceplate (3.17) and place handset aside.
- (3) Remove handset cradle (3.18).

- (4) Disconnect 616B handset jack (6.10). (Jack may be removed or stored just to right of ringer).
 - (5) Insert spade-tipped end of handset cord through hole in the side of the housing.
 - (6) Attach stayband hook to bottom of metal plate.
 - (7) Route leads through wire guide as shown in Fig. 3.
 - (8) Make connections [Fig. 8(H)].
 - (9) Reassemble set.
- 6.12** For maintenance information on the 3B or 4-type speakerphone systems, refer to Sections 512-620-100 or 512-700-100, respectively.

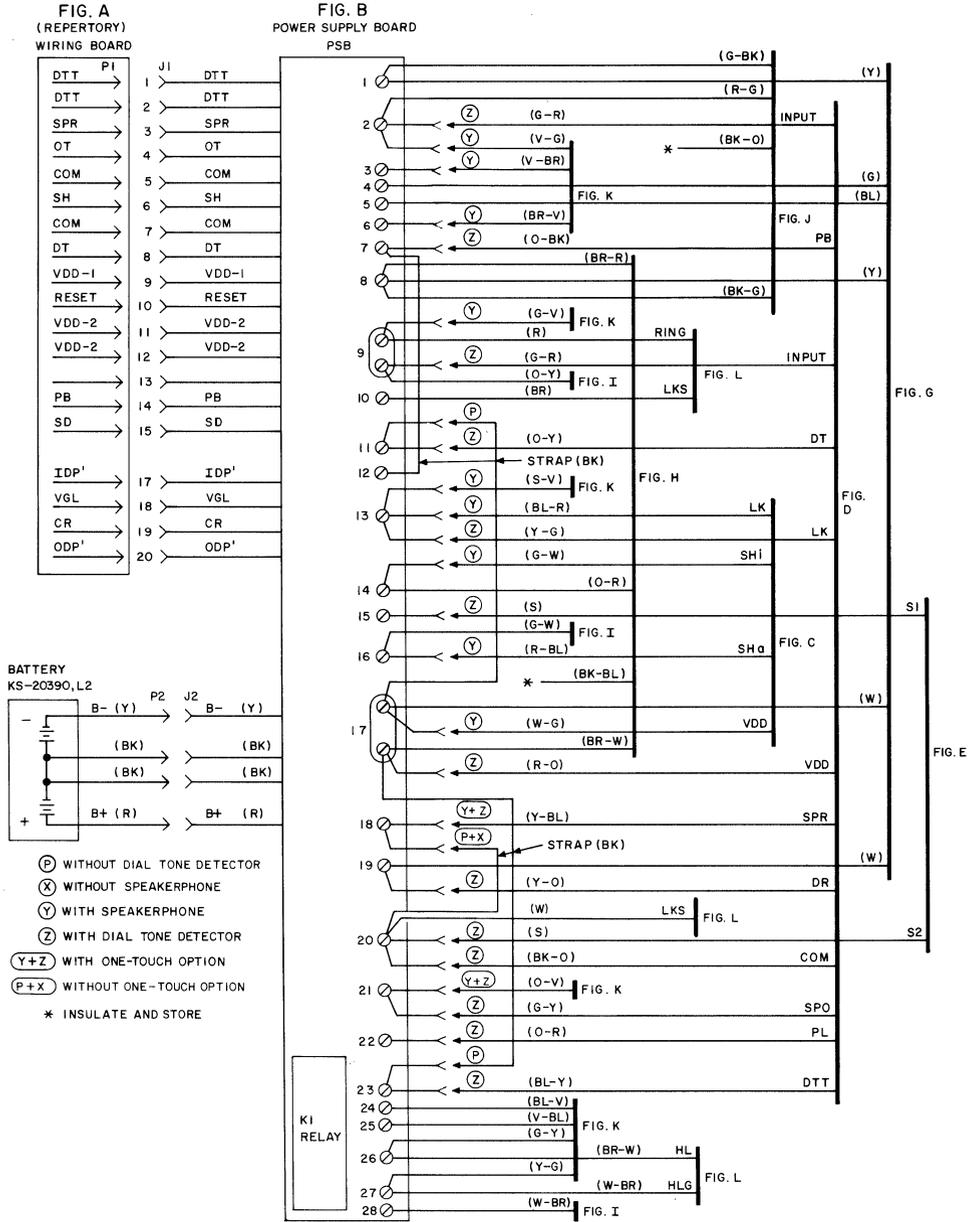


Fig. 8—872A1M Telephone Set, Connections (Sheet 1 of 4)

FIG. C
RELAY PRINTED
WIRING BOARD
(D-180568)

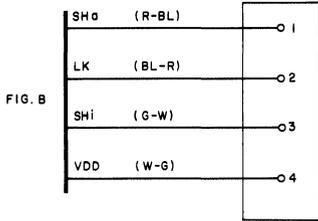


FIG. E
ONE-TOUCH
CALLING SWITCH
(D-180493)

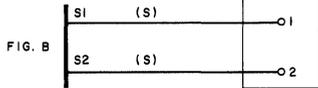


FIG. D
DIAL TONE DETECTOR
(D-180493)

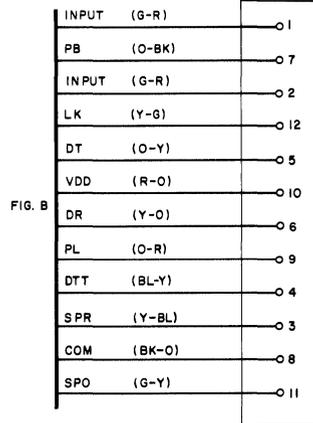


FIG. F
SWITCHHOOK

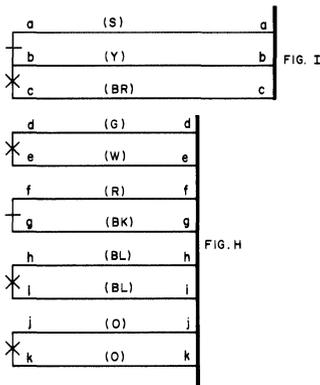


FIG. G
8ET-OR 8EA-119 DIAL

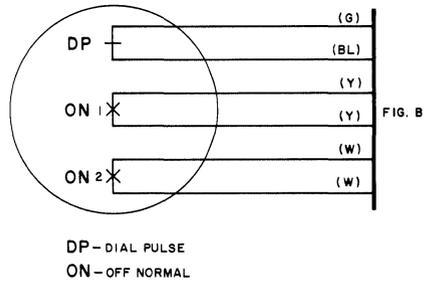


Fig. 8—872A1M Telephone Set, Connections (Sheet 2 of 4)

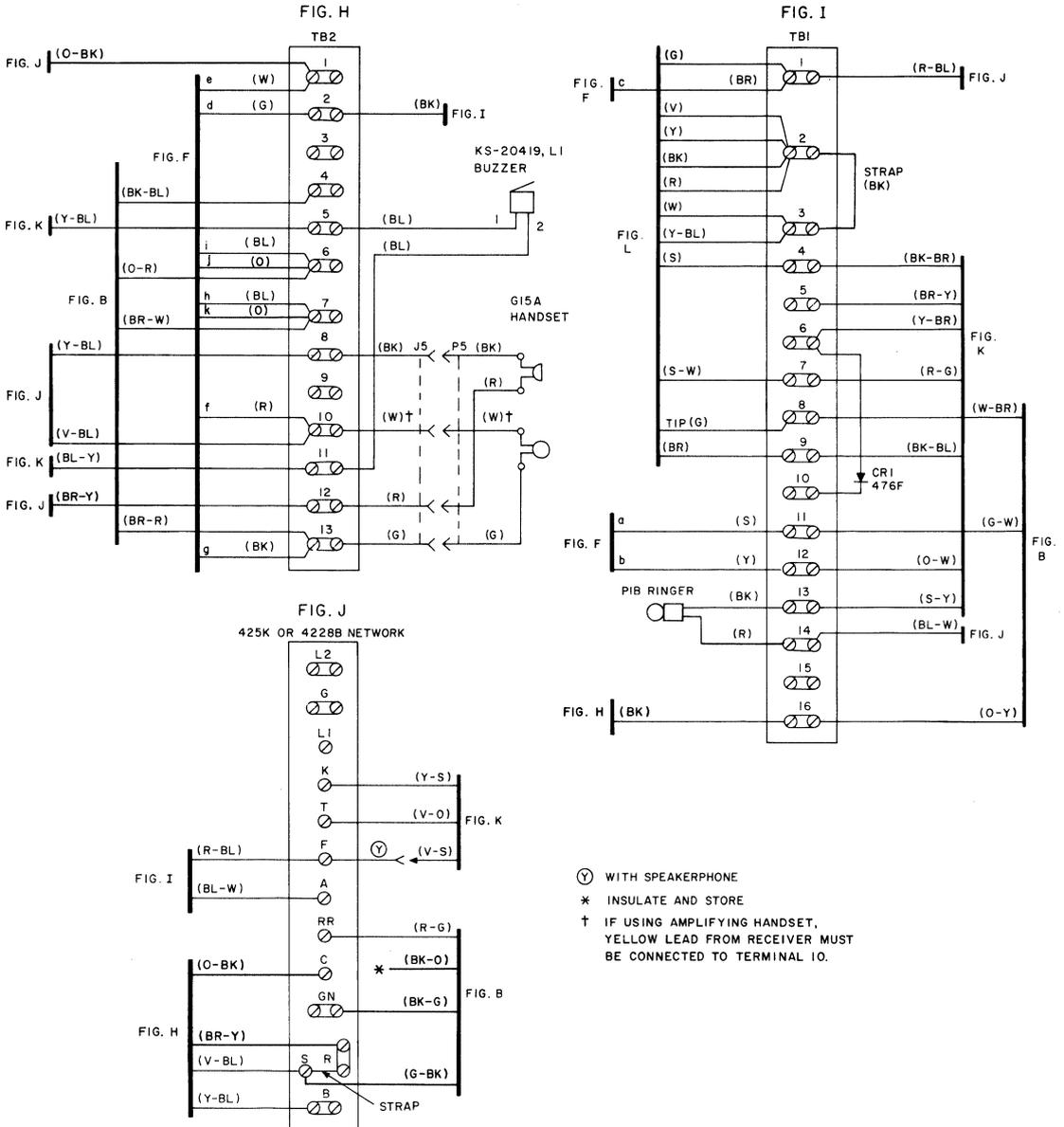


Fig. 8—872A1M Telephone Set, Connections (Sheet 3 of 4)

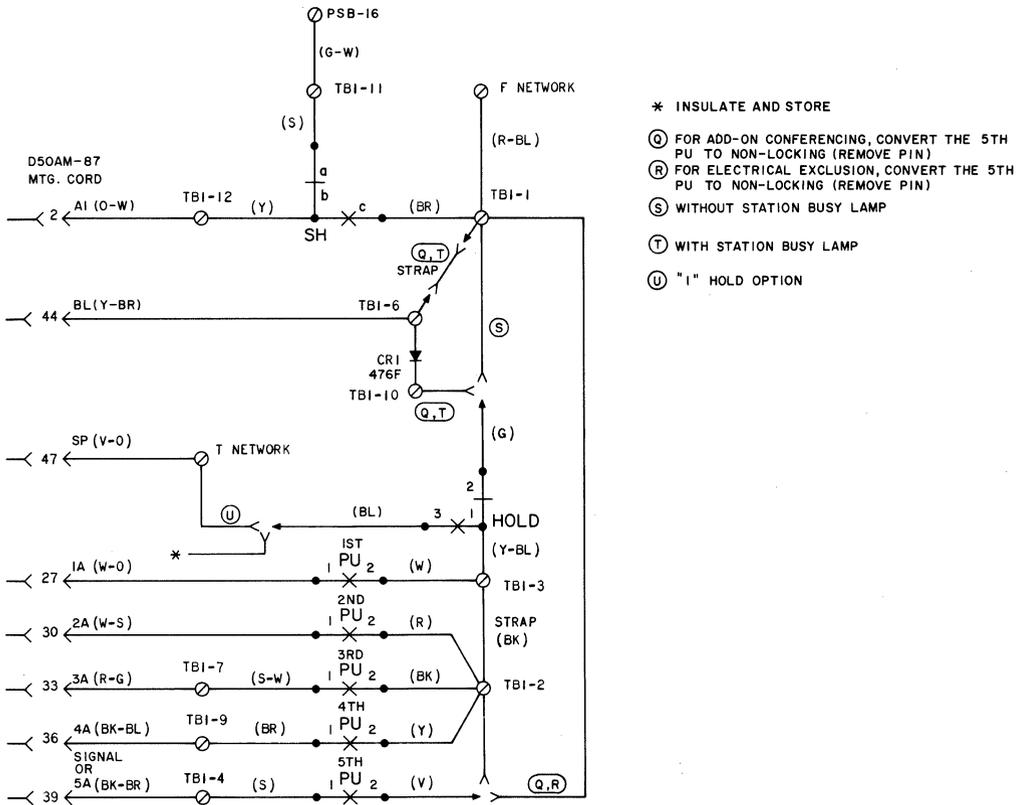


Fig. 9—"1" Hold, Exclusion, Station Busy Lamp, and Add-On Conference—1A1 and 1A2 KTS

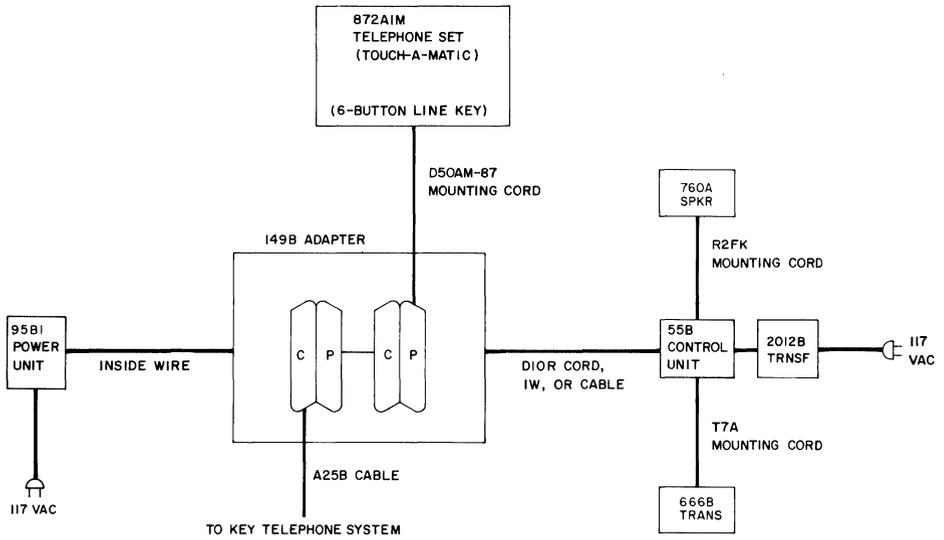
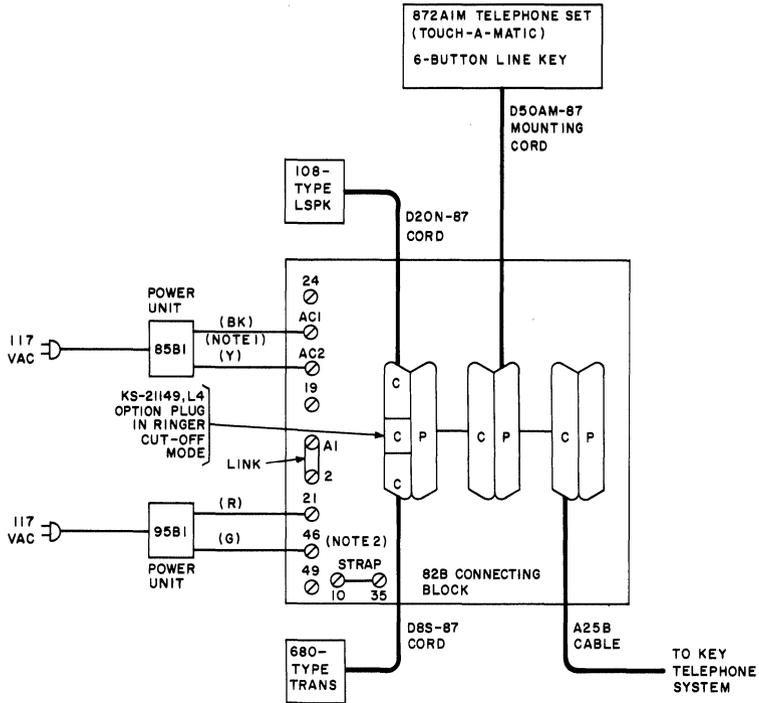


Fig. 10—Block Diagram—872A1M Telephone Set Using 3B Speakerphone



- NOTES:
1. IF POWER IS FED THROUGH KEY CABLE, USE BR-V PAIR FOR 85BI POWER UNIT AND STRAP 24 TO AC1 AND 49 TO AC2 ON 82B CONNECTING BLOCK
 2. WHEN BOTH SPEAKERPHONE AND DIAL TONE DETECTOR ARE PROVIDED, STRAP 10 TO 35.

Fig. 11—Block Diagram—872A1M Telephone Set Using 4A Speakerphone (Alternate Methods of Installation)

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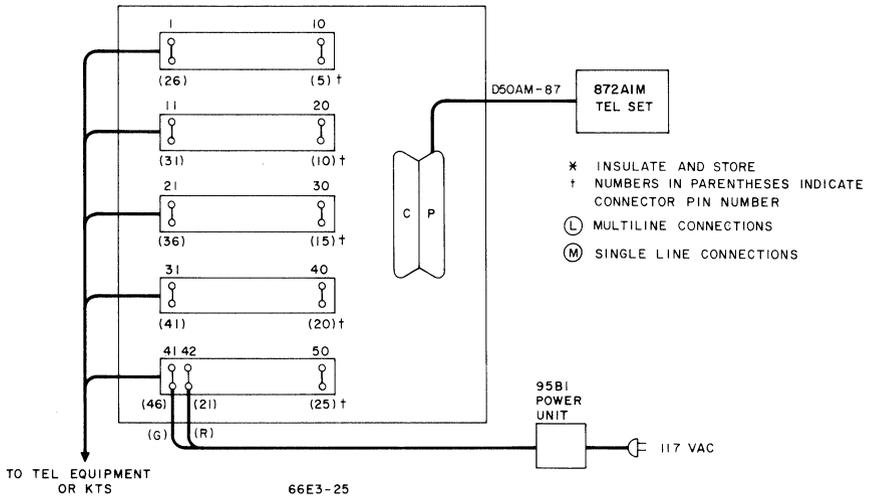
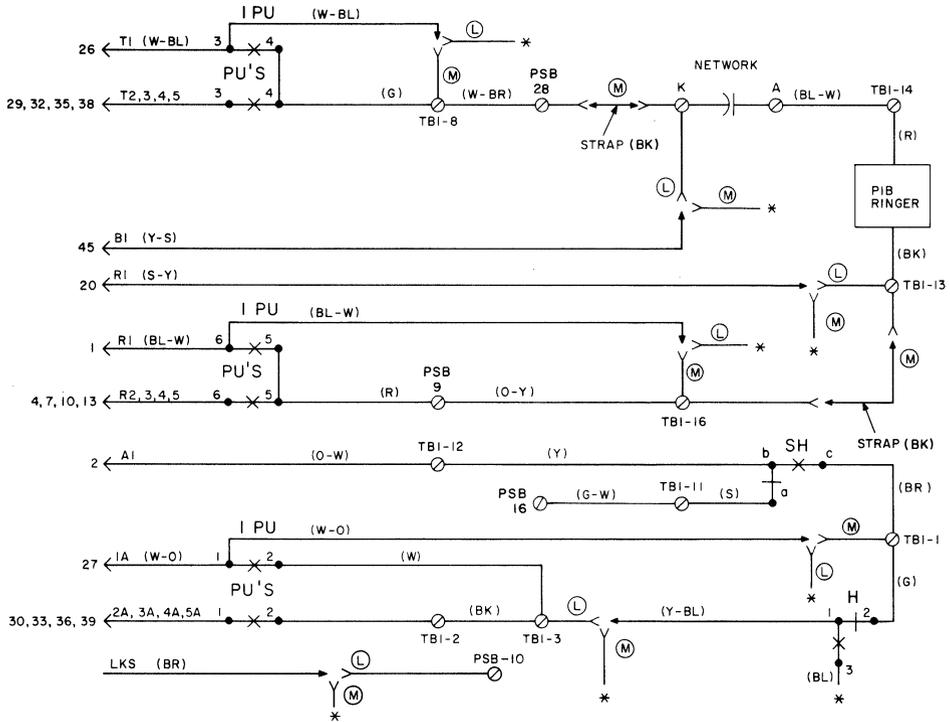


Fig. 13—Schematic and Block Diagram of Key and Single Line Connections

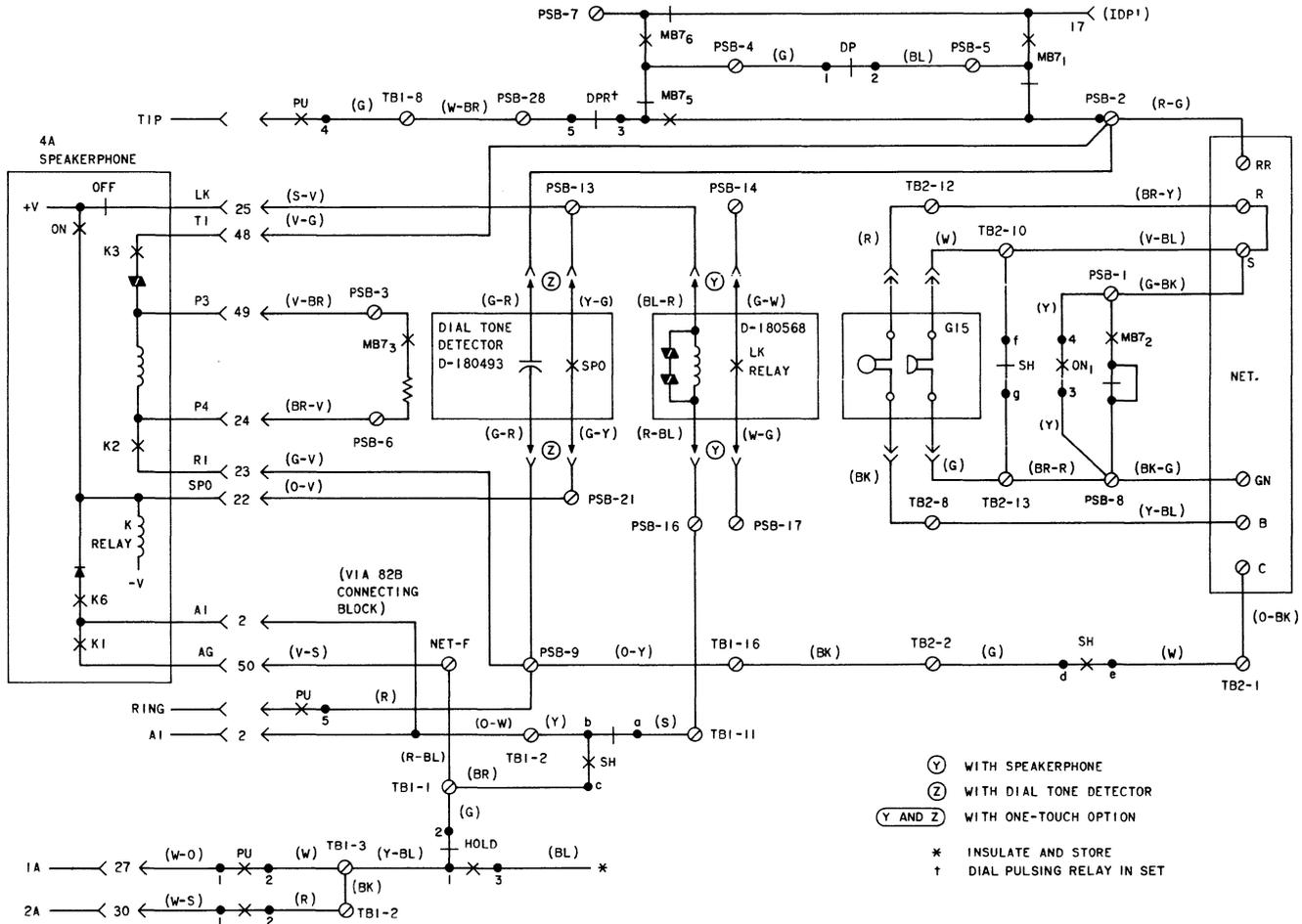


Fig. 14—872A1M Telephone Set, Partial Functional Schematic

TABLE I
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.	D50AM-87 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
			Defective receiver	Check handset
			Open tip or ring lead at 635A5 line key	Check leads and connections from contact strips
		Line lamp comes on when handset is taken off-hook. Set becomes active when 95B1 power unit is disconnected.	Unknown	Replace telephone set
			Improperly installed or defective repertory assembly	1. Check repertory cable insertion 2. Replace repertory assembly
Defective PSB	Replace telephone set			
2	Dead set on all lines 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.	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
			Defective transmitter	Replace transmitter or handset
			Defective 616B jack	Replace 616B jack
			Defective network	Replace telephone set

TABLE L
TROUBLE ANALYSIS – 872A1M (Cont)

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	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
		No dialing clicks heard when dial is returning. With 95B1 power unit disconnected, set can manually dial.	Improperly installed or defective repertory assembly	1. Check cable 2. Replace repertory assembly
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 d-e switchhook 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
			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 appended switch on line key	Check and/or replace appended line key switch

TABLE I
TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (cont'd)			Improperly installed or defective repertory assembly	1. Check connector cable 2. Replace repertory assembly
			Unknown	Replace telephone set
		Lamps turns off when any memory button is depressed.	Improperly installed or defective repertory assembly	1. Check connector cable 2. Replace repertory assembly
			Unknown	Replace telephone set
		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 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 repertory assembly	1. Check cable 2. Replace repertory assembly
			Unknown	Replace telephone set
		Lamp turns off as dial is returning and stays off. Can manually dial off-hook.	Memory button was not depressed prior to the operation of the dial	Record per 5.01
			Defective repertory assembly	Replace repertory assembly
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 repertory assembly	Replace repertory assembly
			Unknown	Replace telephone set

TABLE I

TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
7 (cont'd)		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 5.01
			Defective repertory assembly	Replace repertory assembly
			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	Loose repertory assembly mounting	Tighten repertory assembly mounting screws
			Improper and/or defective strap from PSB terminal 18 to PSB terminal 20	Check and/or replace strap lead. See Fig 8B
			Improper connection to or defective repertory assembly	1. Check connector cable 2. Replace repertory assembly
			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 repertory assembly
			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

TABLE I
TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
8 (cont'd)			Disconnected or defective battery	<ol style="list-style-type: none"> 1. Plug in the KS-20390L2 battery 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 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure 	
			Defective repertory assembly	Replace repertory assembly	
			Unknown	Replace telephone set	
		Automatically dials through a "wait".		Loose repertory assembly mounting	Tighten repertory assembly mounting screws
				Improper connection to PSB terminal 23	Check connection to and/or replace strap to PSB terminal 23
				Defective repertory assembly	Replace repertory assembly
				Unknown	Replace telephone set
9	Cannot dial properly from memory when on the handset (wired for dial tone detector option)	MB7 relay does not operate (no click heard) when memory button is depressed.	Precise TOUCH-TONE® dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present	
			Loose repertory assembly mounting	Tighten repertory assembly mounting screws	
			Improper installation of dial tone detector D-180493	Check connections for D-180493 installation	

TABLE L
TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (cont'd)		Same as above – Addition of strap lead between PSB terminals 20 and 23 does not correct problem	Improper connection to or defective repertory assembly	1. Check connector cable 2. Replace repertory assembly
		Addition of strap lead between PSB terminals 20 and 23 corrects problem.	Defective repertory assembly	Replace repertory assembly
			Defective dial tone detector	Replace D-180493 dial tone detector
			Unknown	Replace telephone set
		Automatically dials through a "wait."	Loose repertory assembly mounting	Tighten repertory assembly 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, but line lamp is on.	Handset off-hook	Place handset on-hook
		No dial tone heard, but indicator lamp turns on.	Line button not depressed	Depress line button
		With temporary strap lead added between PSB screw terminals 16 and 13, 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 11 and 12 on TB1, speakerphone turns on when ON button is depressed.	Defective switchhook 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
		Speakerphone indicator lamp does not turn on and neither does line lamp	Improper connections or defective 85B1 power unit	1. Check for commercial power 2. Check connections per Tables B, C, D, and E

TABLE I
TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (cont'd)				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)
			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 or line key buttons turns RECORD lamp off.	Defective switch-hook 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 11 and 12 on TB1	Clear short
			Defective switch-hook a-b contacts	Replace telephone set
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, loud-speaker 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).	With temporary strap between PSB screw terminals 15 and 20, 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

TABLE I
TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
14 (cont'd)			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 when a memory button is depressed.	Defective connections between dial tone detector and PSB.	Check (Y-G) and (G-Y) leads to PSB terminals 13 and 21, respectively
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
15	Speakerphone turns on but set does not automatically dial when memory button is depressed (Wired for one-touch option).		Strap leads between screw terminals 11 and 17 and between 23 and 17 on PSB were not removed when option was wired	Remove strap leads
		Set automatically dials when screw terminals 20 and 23 on PSB are temporarily shorted.	Precise TOUCH-TONE dial tone not present or a defective dial tone detector	<ol style="list-style-type: none"> 1. Check CO line for presence of precise TOUCH-TONE 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	<ol style="list-style-type: none"> 1. Replace repertory assembly 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts
17	Cannot turn speakerphone off (wired for one-touch option).	Normal conversational level on speakerphone.	Defective muting circuit	Replace telephone set

TABLE I
TROUBLE ANALYSIS – 872A1M (Cont)

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
17 (cont'd)		Speakerphone turns off when OFF button is depressed but turns on when OFF button is released.	Strap lead to screw terminal 18 on PSB was not removed when option was wired	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 repertory PWB	Replace repertory assembly
		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 PWB assembly of D-180493 Kit of Parts

F-59796, F-59797, F-59798, F-59799, F-60208, F-60209, F-60210, AND F-60211

TELEPHONE SETS
(TOUCH-A-MATIC® REPERTORY DIALER)

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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 provides identification, installation, connection, operation, and maintenance information for the F-59796 through F-59799 (MD) or F-60208 through F-60211 telephone sets (TOUCH-A-MATIC® service), Fig. 1.
- 1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.
- 1.03 The F-59797 through F-59799 telephone sets use a KS-20390L2 battery only.
- 1.04 A KS-20390L4 battery is furnished with the F-60208 through F-60211 telephone sets. If necessary these sets can use the KS-20390L2 battery.

The KS-20390L4 battery cannot be used in the F-59796 through F-59799 telephone sets.

1.05 The F-60208 through F-60211 telephone sets have a battery interlock feature where by the automatic dialing functions are inoperative if the battery is not plugged in.

1.06 These sets are factory-wired for use with the 1A1, 1A2, or 6A key telephone systems (KTS).

2. IDENTIFICATION

2.01 These telephone sets (Fig. 1) provide the standard features of a 10 button key telephone set plus (manual) TOUCH-TONE® dialing, automatic dialing of 31 frequently called numbers, and a LAST NUMBER DIALED scratch pad memory.

2.02 Design Features:

- Modular key telephone set



Fig. 1—F-59796, F-59797, F-59798, F-59799, F-60208, F-60209, F-60210, and F-60211 Telephone Set

- Integrated circuit RC TOUCH-TONE 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 second dial tone during automatic dialing (WAIT input)
- End-to-end signaling for data application
- Dial Tone Detector—automatically starts dialer when precise (350 Hz and 440 Hz) TOUCH-TONE dial tone is present
- Set is prewired for use with speakerphone. If speakerphone is provided, set is capable of one-touch calling - depressing a memory button will automatically turn on speakerphone and dial number.

2.03 *Optional Features:*

- Speakerphone—either 3B or 4A speakerphone may be added to stations
- Station Busy Lamp (busy lamp diode wired in set)
- Add-On-Conference

- Exclusion (Multiline)
- I Hold
- Signaling
- 2C PICTUREPHONE® service
- Amplifying Handset
- Restricted Dialing
- Bridged Ringing.

2.04 All options are implemented by:

- Wiring changes in the telephone set
- Installation of appropriate additional items.

2.05 *Ordering Guide:*

Note: Modular components for the telephone sets are installed and the telephone sets will be shipped as complete instruments, ready to install with a 3B or 4A speakerphone (ordered separately).

- (a) These are modular type telephone sets and may be ordered as:

- Set, Telephone, F-60208 (Black)
- Set, Telephone, F-60209 (Light Beige)
- Set, Telephone, F-60210 (Green)
- Set, Telephone, F-60211 (White)

- (b) ***Ordered Separately:***

- Unit, Power, 95B1 or 95B2 (required for operation of the automatic dialing feature)

- (c) Sets may also be ordered by their component parts as follows:

- Housing, 870A1—*
- Faceplate, 840397186
- Handset, G15A—*
- Cord, Handset, H4DU—*

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- Cord, F-59336 (Power)
- Base, Telephone Set, 841385966 (includes the following:
 - Dial, 35AG3A
 - Key, 652K5
 - Ringer, P1B
 - Network, 4228T
 - Buzzer, KS-20419L1
 - Cord, Mounting, D50AK-87
 - Cord, F-59337
 - Battery, KS-20390L4
 - Jack, Handset, 616B
 - Memory, 2870A (includes button field)
 - Directory Sheet Set, 840393672
 - D-180492 Kit of Parts (Speakerphone Relay)
 - D-180493 Kit of Parts (Dial Tone Detector)

*For component parts, add appropriate color suffix of:

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

2.06 Operating Features (Fig. 2):

- Dial (TOUCH-TONE dial)
- Line Key, 10-button key. Hold with eight line pickup buttons which are convertible to nonlocking. Button 10 is nonlocking and factory wired for signaling. An additional momentary contact (logic reset switch) is attached to the hold side of line key to reset the logic circuit anytime a key button is

depressed. There is no lamp indication for the Hold or signaling buttons.

- 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 field, 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 before external connections are made to the set (4.01).

Caution: 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.

Note: Sets are factory wired for use with 3B or 4A speakerphone. If set is to be installed without speakerphone, check to insure that the one-touch calling switch (of the D-180493 Kit of Parts) is in the OFF position and make the following changes:

- (a) Mount a 66E3-25 connecting block and plug in the F-59337 cord.

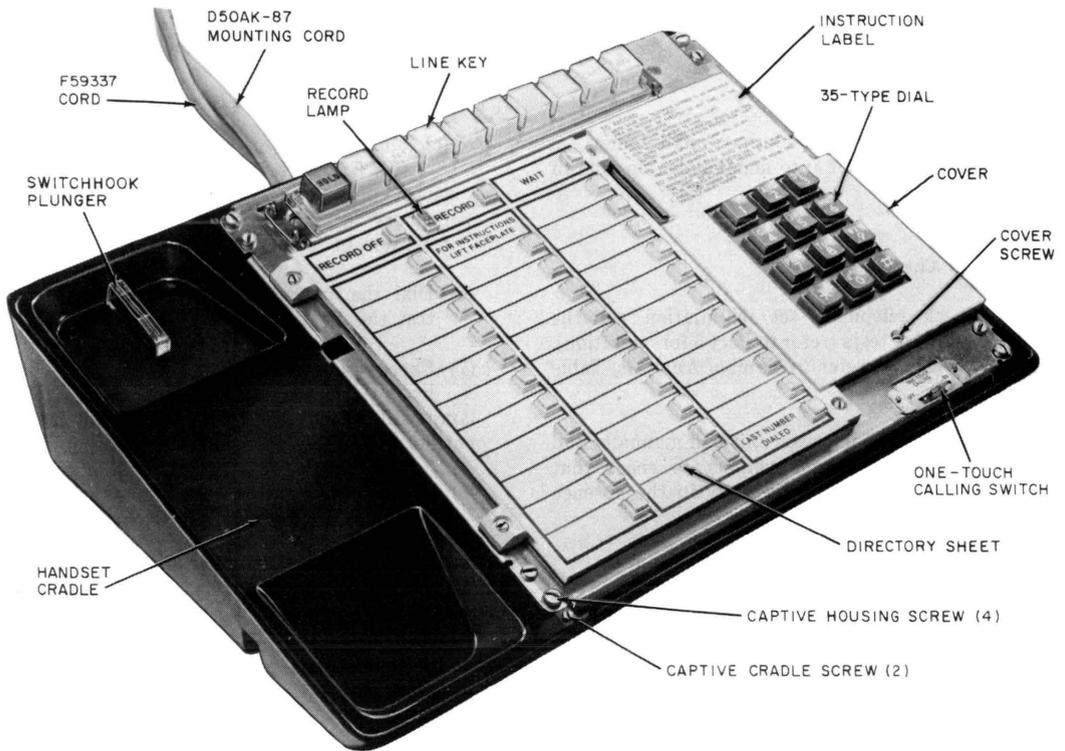


Fig. 2—Telephone Set With Handset and Faceplate Removed

- (b) To provide ringer connections, strap terminals 38 to 40 and 44 to 46 on the connecting block.
- (c) To provide power to the set, connect the cord from the 95B-type power unit to terminals 23 and 24 of connecting block.
- (d) Connect the D50AK mounting cord to connector cable from the key equipment.
- 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. 6), by tilting the set up, and inserting the battery plug into the mating jack.
- Note:** Write date of installation on label provided on battery.
- 3.03** Install the 95B-type 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) (Fig. 9, 12, or 13).
- 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 field and are held in place by the faceplate. Additional sheets are available in the directory sheet set, 840393672.
- 3.06** To designate the buttons of the 10-button key:
- (1) Use tabs (Form 5837).

- (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 fit into small holes on side of button.

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 C.

- (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 power unit to AC outlet.
- (3) With the handset on-hook, record digits 1 through 0 into all memory locations except LAST NUMBER DIALED and button immediately above it [5.01 (4)-(7)].
- (4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [5.01 (4)-(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) Depress buttons of memory locations recorded in Step (3) and verify that correct signal is returned from test circuit each time.



The battery and 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 be lighted, then by pressing a line button, the RECORD lamp will be extinguished.
- (8) If equipped with speakerphone and with one-touch calling switch in ON position, and with set in on-hook condition, depress the button previously used to record in Step (4). The set should automatically turn the speakerphone on and dial the number.

OPTIONAL APPARATUS INSTALLATION

4A Speakerphone

3.08 Connections for interfacing with the 4A speakerphone are shown in Fig. 8 and 9. All speakerphone components and power unit must be ordered separately. For additional information on the 4A speakerphone, refer to Section 512-700-100.

Note: A 223A adapter must be ordered separately for interfacing the 4A speakerphone. The M16C and M2FG cords furnished with the 223A adapter shall be replaced with the F-59337 and F-59336 cords, respectively. The F-59336 cord connects AC power from the 85B1 and 95B-type power units to the loudspeaker and telephone set, respectively, via the 223A adapter (Fig. 7).

3B Speakerphone

3.09 Sets may be used with 3B speakerphone system. Fig. 12 shows block diagram, and connections are shown in Table B. For additional information on 3B speakerphone, refer to Section 512-620-100.

2C PICTUREPHONE Service

3.10 Sets may be used with 2C PICTUREPHONE service, refer to Fig. 13. For additional information on 2C PICTUREPHONE service, refer to Section 518-800-110.

COMPONENT LOCATION AND ACCESS INFORMATION**Location of Components**

3.11 The components are located in three areas as follows:

- (a) Under the handset cradle (Fig. 3):
 - Buzzer
 - Ringer
 - Switchhook assembly
 - Handset jack
 - Terminal boards (TB1 and TB2).
- (b) Under the faceplate, inside the set (Fig. 4 and 5):
 - Battery jack (Fig. 5)
 - Power supply (PSB) terminal area (Fig. 4)
 - Network (Fig. 4)
 - D-180492 (relay kit for speakerphone)
 - D-180493 (dial tone detector and one-touch calling switch kit)
- (c) Under the telephone set (Fig. 6):
 - Battery.

Mounting Cord

3.12 The D50AK-87 mounting cord is amphenol ended at the equipment end and equipped with 508-type plugs for terminating on the back of the key module at the telephone set end. The conductors 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.

3.13 The F-59337 cord is used for speakerphone connections and is factory wired in the set.

3.14 The F-59336 cord is used to supply AC power to the telephone set and the speakerphone. It is shipped loose with the set.

Network Terminals

3.15 For access to the network terminals:

- (1) Remove the faceplate (3.18).
- (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 key (3.17).
- (5) To replace the cover, the two tabs of the cover (one at each side just above the opening for 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.

Power Supply (PSB) Terminals

3.16 To access the terminal field on the power supply board, proceed as follows:

- (1) Remove the faceplate (3.18).
- (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 disconnect 12 position plug from terminal board.
- (6) Rotate dial over onto the Memory.
- (7) To reassemble; reverse procedure.

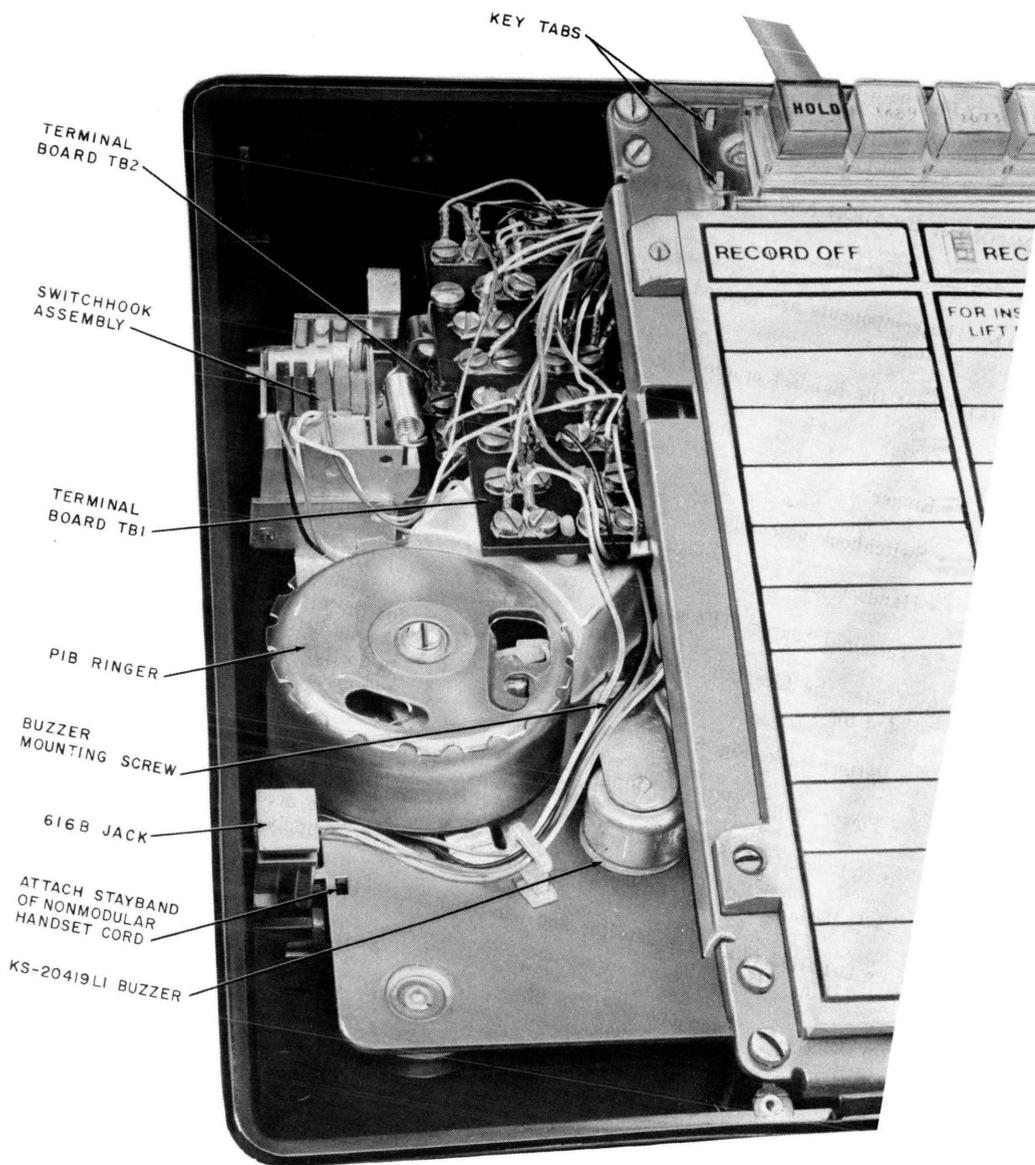


Fig. 3—Telephone Set With Faceplate, Handset and Handset Cradle Removed

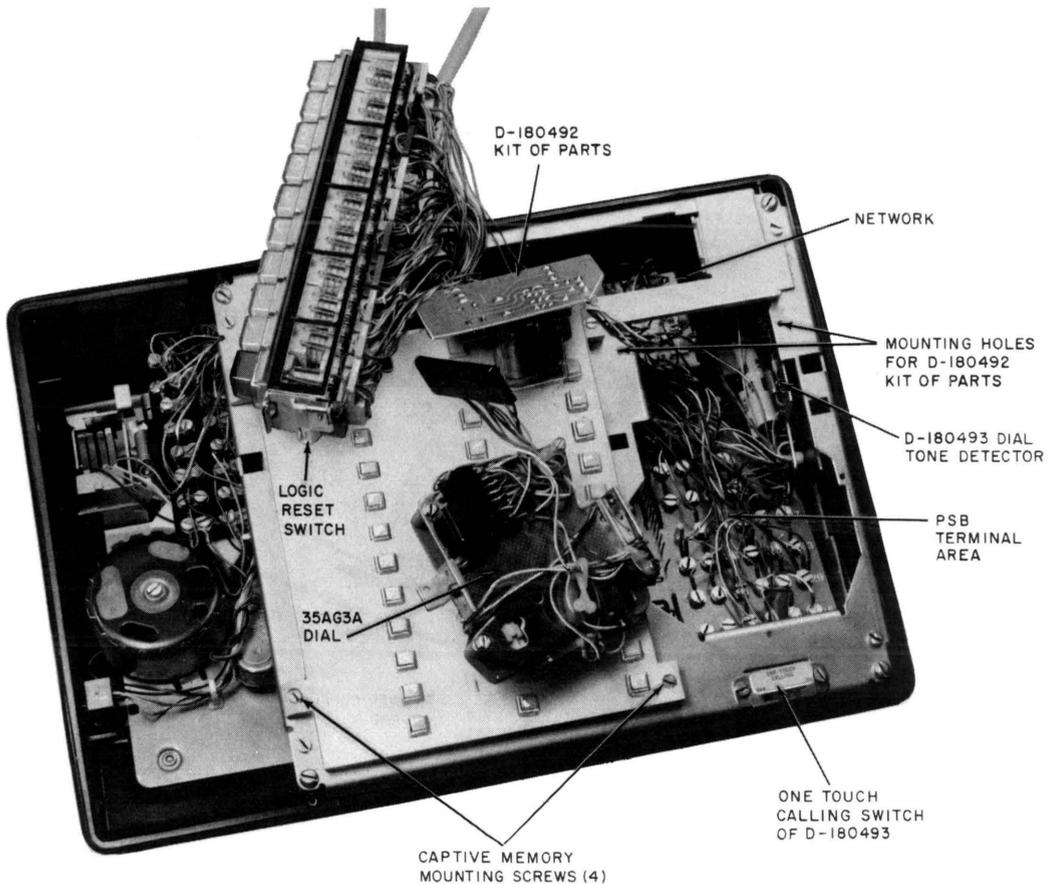


Fig. 4—Telephone Set With Dial Removed to Show Terminal Area

10-Button Key Removal

3.17 To remove, use the following procedure:

- (1) Remove faceplate (3.18).
- (2) Push the key toward the rear of the set to unlock it from the tabs.
- (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.

Caution: Do not damage contact strips which protrude from bottom right side of key or logic reset switch attached on HOLD side of key.

- (4) Lift the key completely out of the set.
- (5) Replace key by reverse procedure.

Faceplate Removal

3.18 The faceplate is held in place by two snaps bonded to the faceplate and aligned to fit

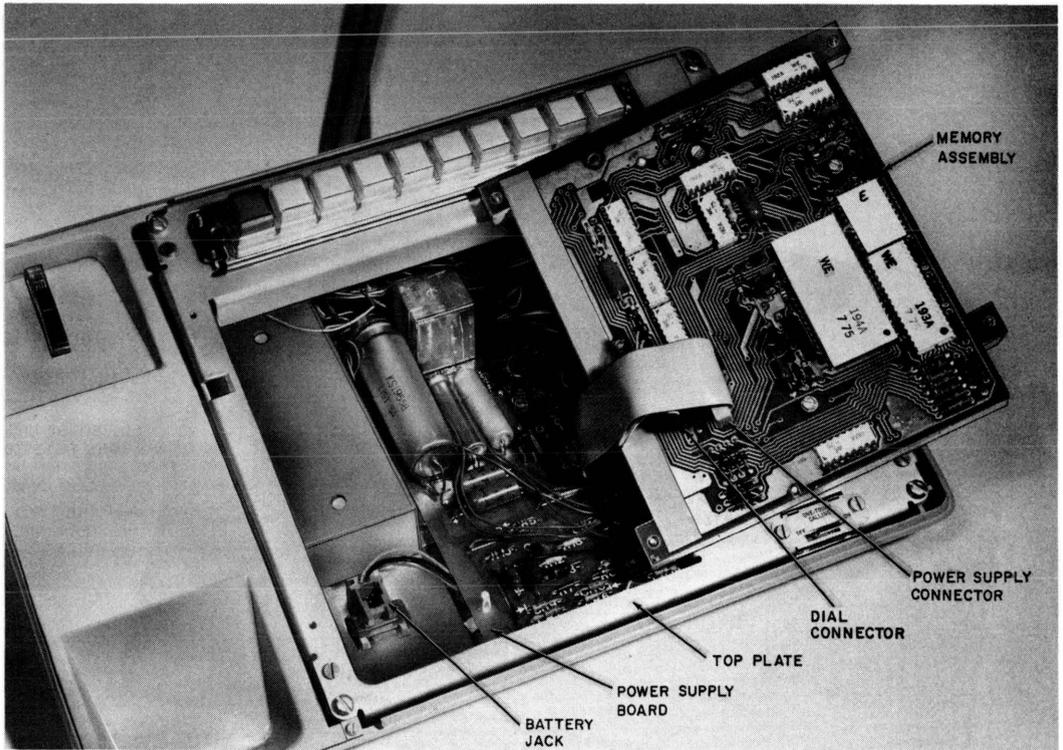


Fig. 5—Telephone Set, Internal View, Overall

holes in the chassis. To remove the faceplate, grasp it by any convenient edges and lift.

Handset Cradle Removal

3.19 To remove the handset cradle from the housing, proceed as follows:

- (1) Remove the faceplate (3.18), and place the handset aside.
- (2) Disengage the captive cradle screws located in the two tabs on the cradle (Fig. 2).
- (3) Lift the cradle by pulling up on the plunger and remove.

- (4) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.

Caution: *The 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) Refasten the captive cradle screws.

Housing Removal

3.20 To remove, proceed as follows:

- (1) Unplug the handset cord, at the telephone set end, and remove handset.
- (2) Remove the faceplate (3.18).

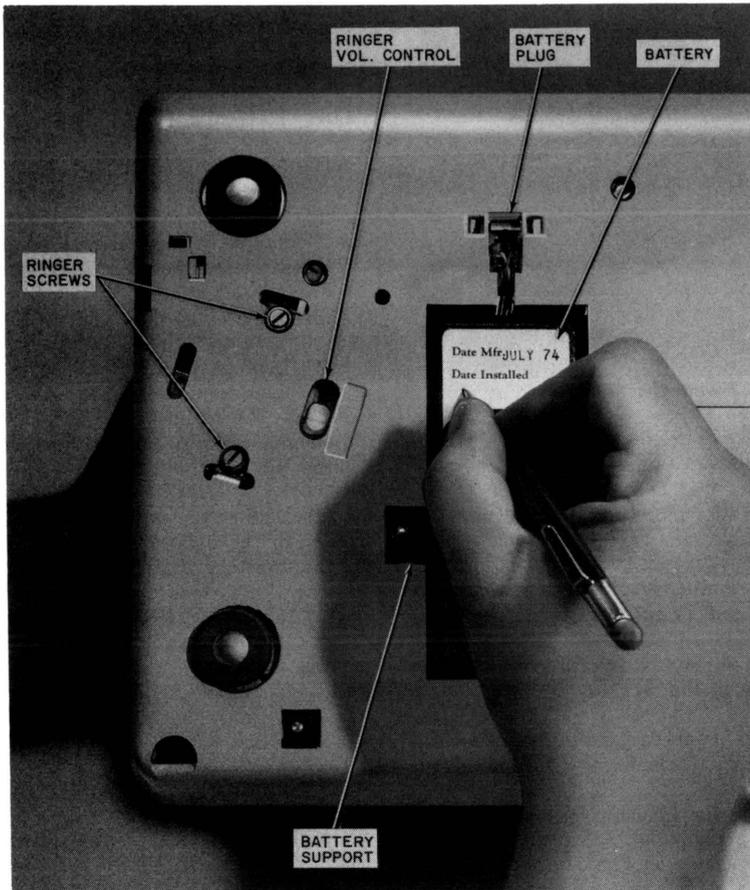


Fig. 6—Telephone Set, Bottom View

- (3) Remove the handset cradle (3.19).

Caution: Attempting to remove the housing without removing the handset cradle may damage the switchhook arm.

- (4) Disengage only the four captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
- (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 metal tabs of the bottom plate. 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 base plate.

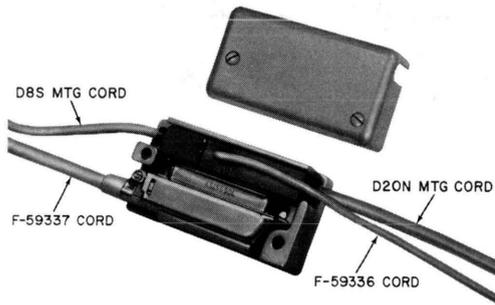


Fig. 7—Interface Adapter

4. CONNECTIONS

4.01 Telephone set connections are shown in Fig. 10 and Table A.

Caution: Some conductor assignments are not standard (Table A).

4.02 Connections for interfacing with 4A speakerphone are shown in Fig. 8.

4.03 Connections for interfacing with 3B speakerphone are shown in Table B.

4.04 Connections for *I* Hold, Exclusion (multiline only), station busy lamp, and add-on conferencing are shown on Fig. 11.

4.05 Connections for interfacing with the 2C PICTUREPHONE service are shown in Fig. 13.

4.06 Connections for dry circuits where the polarity guard is not used are indicated on Fig. 10(B). When this option is used, the tip of any line must be positive with respect to ring for proper operation.

4.07 Connections for restricted dialing are shown in Fig. 15.

4.08 Connections for ringer are shown in Fig. 16.

4.09 A partial functional schematic is shown in Fig. 14.

5. OPERATION

Record A Number Into Memory

5.01 To record:

- (1) Remove the faceplate (3.18).
- (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. 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 whenever dial tone is heard during normal dialing process. (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 switchhook, line key, or speakerphone operation.

TABLE A

D50AK-87 MOUNTING CORD AND 508 PLUG CONNECTIONS

AMPHENOL PLUG			INSIDE TELEPHONE SET						
LEAD 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				
T(1)	26	W-BL		BL	3				
A1	2	O-W	TB1-12						
A(1)	27	W-O		BL	1				
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				
S(9)	5	S-W		Y	1				
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				
A(8)	8	G-R		BK	1				
A(3)	33	R-G		G	1				
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				
A(7)	11	BL-BK		R	1				
A(4)	36	BK-BL		BR	1				
L(4)	12	O-BK		BR	L				
LG(4)	37	BK-O		BR	LG				
R(5)	13	G-BK		S	6				

TABLE A (CONT)

D50AK-87 MOUNTING CORD AND 508 PLUG CONNECTIONS

AMPHENOL PLUG			INSIDE TELEPHONE SET						
LEAD 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.				
T(5)	38	BK-G		S	3				
A(6)	14	BR-BK		W	1				
A(5)	39	BK-BR		S	1				
L(5)	15	S-BK		S	L				
LG(5)	40	BK-S		S	LG				
R(6)	16	BL-Y		W	6				
T(6)	41	Y-BL		W	3				
SG	17†	O-Y	TB1-5						
BL	42†	Y-O	TB1-6						
L(6)	18	G-Y		W	L				
LG(6)	43	Y-G		W	LG				
R(7)	19	BR-Y		R	6				
T(7)	44	Y-BR		R	3				
R or R1	20	S-Y	NET L1						
B or B1	45	Y-S	NET S						
L(7)	21	BL-V		R	L				
LG(7)	46	V-BL		R	LG				
R(8)	22	O-V		BK	6				
T(8)	47	V-O		BK	3				
BZ	23†	G-V	TB1-15						
BZ1	48†	V-G	TB1-16						
L(8)	24	BR-V	PSB-32			BK	L	BR-V	PSB-32
LG(8)	49	V-BR	PSB-33			BK	LG	V-BR	PSB-33
R(9)	25	S-V		Y	6				
T(9)	50	V-S		Y	3				

TABLE A (CONT)

D50AK-87 MOUNTING CORD AND 508 PLUG CONNECTIONS

AMPHENOL PLUG			INSIDE TELEPHONE SET						
LEAD 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.				
Tip						Y	4	G	TB1-8
Ring						Y	5	R	PSB-12
						Pink	HL	G-Y	*
						Pink	HLG	Y-G	*
						Pink	3	O-BK	*
						Pink	2	BK-BL	TB1-1
						Pink	1	G-W	TB1-3
						BL	2	O-W	TB1-3
						O	2	S-W	TB1-2
						G	2	G-R	TB1-2
						BR	2	BL-BK	TB1-2
						S	2-	BR-BK	TB1-2
						W	2	BK-BR	TB1-2
						R	2	BK-BL	TB1-3
						BK	2	R-G	TB1-3
						Y	L	G-V	TB1-4
						Y	LG	V-G	TB1-7
						Y	2	W-S	TB1-5

*Insulate and store.

†Nonstandard pin numbers

Change A Number In Memory

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

Delete A Number From Memory

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.

Automatically Dial Number From Memory

5.04 To automatically dial a number:

- (a) Go off-hook and depress the memory button.

- (b) For sets equipped with speakerphone simply depress the memory button.

- (b) For sets equipped with speakerphone, simply depress the LAST NUMBER DIALED button.

LAST NUMBER DIALED Feature

5.05 The TOUCH-A-MATIC telephone set automatically records into the LAST NUMBER DIALED memory any number dialed using the standard telephone dial. Each number in the LAST NUMBER DIALED memory 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:

- (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) Go off-hook, and depress LAST NUMBER DIALED button.
 - (b) For sets equipped with speakerphone, simply depress the LAST NUMBER DIALED button.
- (b) When 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.
 - (5) Manually dial telephone number.
 - (6) To redial same number automatically:
 - (a) Go off-hook, and depress LAST NUMBER DIALED button.

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. 10(B)].

- (a) 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. Additional numbers may then be dialed manually or automatically.
- (b) If, at any time, digits are keyed 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.)

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.

Trouble Analysis

- 6.02** When trouble is encountered, the subsequent procedure should be followed:
- (1) Confirm improper operation as a basic telephone set or as automatic dialer (Part 5).
 - (2) Check for improper connections.
 - (3) Refer to Table C, and the following paragraphs.

Battery

6.03 The KS-20390L2 and L4 batteries are not completely interchangeable. The List 2 battery may be used in all sets, but the List 4 should only be used in the F-60208 through F-60211 telephone sets. Either battery has an expected life of about 4 years. It can be replaced without loss of memory providing that commercial AC power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 6):

- (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.

Memory

6.04 The Memory may be replaced in the following manner:

Note: Removal of the Memory results in loss of stored telephone numbers.

- (1) Remove the faceplate (3.18).
- (2) Loosen the four captive Memory mounting screws (Fig. 4).
- (3) Rotate the left edge of the Memory upward as shown in Fig. 5.
- (4) Disengage the two connectors by pulling on them perpendicular to the printed wiring board.
- (5) Replace the Memory by engaging the dial connector first. The connectors are keyed, one position is filled and should fit over the vacant position in the row of pins. The gray power supply cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board.
- (6) Reassemble set.

- (7) Test per 3.07

Dial

6.05 To replace:

- (1) Proceed per 3.16.
- (2) Loosen the four mounting screws of the Memory (Fig. 4).
- (3) Gently raise the left side of the Memory and rotate to position shown in Fig. 5. This will expose the 10-position dial connector.

Caution: Do not remove the power supply connector in the process of changing the dial, since this will result in complete loss of stored telephone numbers.

- (4) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (5) Lift the dial out.
- (6) To add 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.

10-Button Key

6.06 To replace:

- (1) Remove key per 3.17.
- (2) Access PSB terminal area per 3.16.
- (3) Disconnect logic reset switch leads from PSB terminals.
- (4) Remove the 508-type plugs and the two contact strips from the back of the key.
- (5) Install new key.
- (6) Reassemble the set.
- (7) Test for operation of the LOGIC RESET switch by pressing the RECORD button, RECORD lamp will be lighted, then by pressing a line button, RECORD lamp will be extinguished.

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Ringer

6.07 To replace the ringer:

- (1) Remove the faceplate (3.18) and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Disconnect the ringer leads
- (4) Tilt the front of the set up.
- (5) Unfasten ringer mounting screws (Fig. 6).
- (6) Remove ringer.
- (7) 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 damping of the ringer output. Dial ringback code to test ringer.
- (8) Reassemble set.

Buzzer

6.08 To replace buzzer:

- (1) Remove the faceplate (3.18), and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Remove the buzzer mounting screw.
- (4) Remove appropriate leads [Fig. 10(I)].
- (5) Install new buzzer.
- (6) Reassemble set.

Handset Jack

6.09 To replace the 616B handset jack:

- (1) Remove the faceplate (3.18), and place handset aside.
- (2) Remove the cradle (3.19).
- (3) Remove the mounting screw and spacer for TB1 (Fig. 3).

(4) Move board TB1 to gain access to the appropriate terminals on TB2.

(5) Remove the appropriate leads [Fig. 10(H)].

(6) Install new jack.

(7) Reassemble. When replacing TB1, locate its tabs in the slots of the chassis before refastening the TB1 mounting screw.

Handset

6.10 A defective G15A handset may be replaced by unplugging the H4DU cord and inserting it into a new handset. To replace the G15A handset with a G3A handset or a G6-, G7-, or G8-type amplifying handset, proceed as follows:

- (1) Unplug H4DU handset cord at telephone set end, and place handset aside.
- (2) Remove faceplate (3.18).
- (3) Remove handset cradle (3.19).
- (4) Disconnect 616B handset jack (6.09). (Jack may be removed or stored just to right of ringer.)
- (5) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (6) Attach stayband hook to chassis (Fig. 3).
- (7) Route leads as shown in Fig. 3.
- (8) Make connections [Fig. 10(H)].
- (9) Reassemble set.

Kit of Parts

6.11 To replace D-180492 Kit of Parts:

- (1) Proceed as described in 3.16.
- (2) Remove the screws securing the kit assembly to the chassis (Fig. 4), and disconnect leads from the terminals on PSB.
- (3) Make connections of new kit of parts per Table B and mount assembly.

- (4) Reassemble set
- 6.12** To replace D-180493 Kit of Parts dial tone detector and one-touch calling switch:
- (1) Remove housing (3.20), and access PSB terminal board (3.16).
 - (2) Remove locking screw from side of chassis.
 - (3) Disconnect leads and remove board assembly from the back of the set. The one-touch calling switch is mounted below the dial and may be replaced if necessary.
- (4) Insert new 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 of the bottom chassis.
 - (5) Lock the board into position by inserting screw from the side of chassis.
 - (6) Make connections to kit of parts per Table B.
- 6.13** For maintenance information on the 3B or 4A speakerphone systems, refer to Sections 512-620-100 or 512-700-100, respectively.

TABLE B

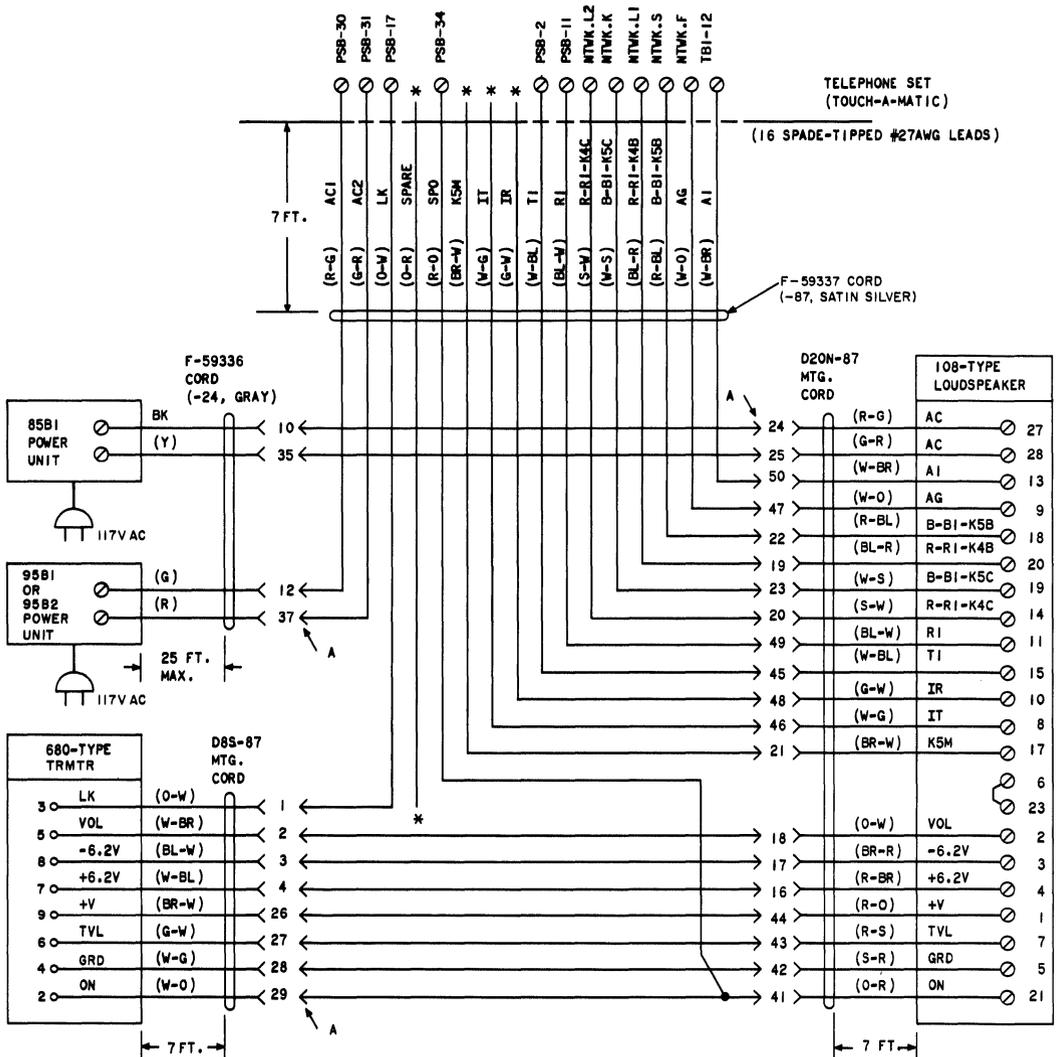
CONNECTIONS, TELEPHONE SET WITH 3B SPEAKERPHONE AND ONE-TOUCH CALLING

APPARATUS	LEAD		APPARATUS TERMINAL	CONNECT			
	DESIG	COLOR		FROM	TO		66E3-25 BLOCK
				TERM. ON 66E3-25 BLOCK (NOTE 1)	CONTROL UNIT (NOTE 3)		
		55A (NOTE 4)	55B				
TEL SET F-59337 (Cord)	T1	W-BL	PSB-2	39	19	1	
	R1	BL-W	PSB-11	47	28	10	
	A1	W-BR	TB1-12	49	12	2	
	AG	W-O	Net. F	43	5	11	
	LK	O-W	PSB-17	2	11	35	
	SPO	R-O	PSB-34	31	3	18	
	R or R1	R-BL	Net. S	44	18	34	
	R or R1	W-S	Net. K	46	9	25	
	B or B1	BL-R	Net. L1	38	17	33	
	B or B1	S-W	Net. L2	40	8	24	
	D-180492 Kit of Parts (Factory Wired)	C _E	BL-BK	PSB-10	(Note 3)		
B+		BK-BL	PSB-15				
SH _a		R-BL	PSB-16				
LK		BL-R	PSB-17				
SH _i		G-W	PSB-18				
PFR		BL-Y	PSB-20				
VDD		W-G	PSB-21				
D-180493 Kit of Parts (Factory Wired)	Input	G-R	PSB-2	(Note 3)			
	PB	O-BK	PSB-9				
	Input	G-R	PSB-11				
	LK	Y-G	PSB-17				
	DT	O-Y	PSB-19				
	VDD	R-O	PSB-21				
	DR	Y-O	PSB-24				
	PL	O-R	PSB-25				
	DTT	BL-Y	PSB-26				
	SPR	Y-BL	PSB-27				
	COM	BK-O	PSB-29				
	SPO	G-Y	PSB-34				
	Switch	S	PSB-28				
		S	PSB-29				
	666B TRMTR (T7A Cord)	M1	S-BK				
P1		BL-R	2		13	8	
M2		BK-S	3		14	16	
S		O-BK	5		3	18	
A1		Y-O	6		29	19	
F1		G-Y	7		2	17	
LK		BK-O	8		11	35	
760A LSPK (R2FK Cord)	SP1	G			34	20	
	SP2	R			33*	29*	
95B1 or 95B2 PWR UNIT (Note 2)	AC1						24
	AC2						23
2012B TRNSF (Note 2)	AC1				27	27	
	AC2				36	36	

*To reduce loudspeaker volume, move SP2 lead to terminal 24 (55A) or terminal 30 (55B).

Notes:

1. Plug F-59337 cord of telephone set into 66E3-25 block.
2. Both 95B1 or 95B2 power unit and 2012B transformer must be connected for speakerphone operation.
3. Place strap between terminals 20 and 21 (55A) or between terminals 4 and 5 (55B).
4. When 55A control unit is used it must be the type modified for TOUCH-TONE service. Control units having this modification are stamped 55* (modified).



NOTE:
A 223A ADAPTER IS USED TO INTERFACE THE SPEAKERPHONE. REPLACE THE M16C AND M2FG CORDS FURNISHED WITH ADAPTER WITH THE F-59337 AND F-59336 CORDS.

A - PART OF KS-16689 L11 AMPHENOL CONNECTOR (SEE NOTE)

* INSULATE AND STORE

Fig. 8—Interface Connections for Telephone Set With 4A Speakerphone

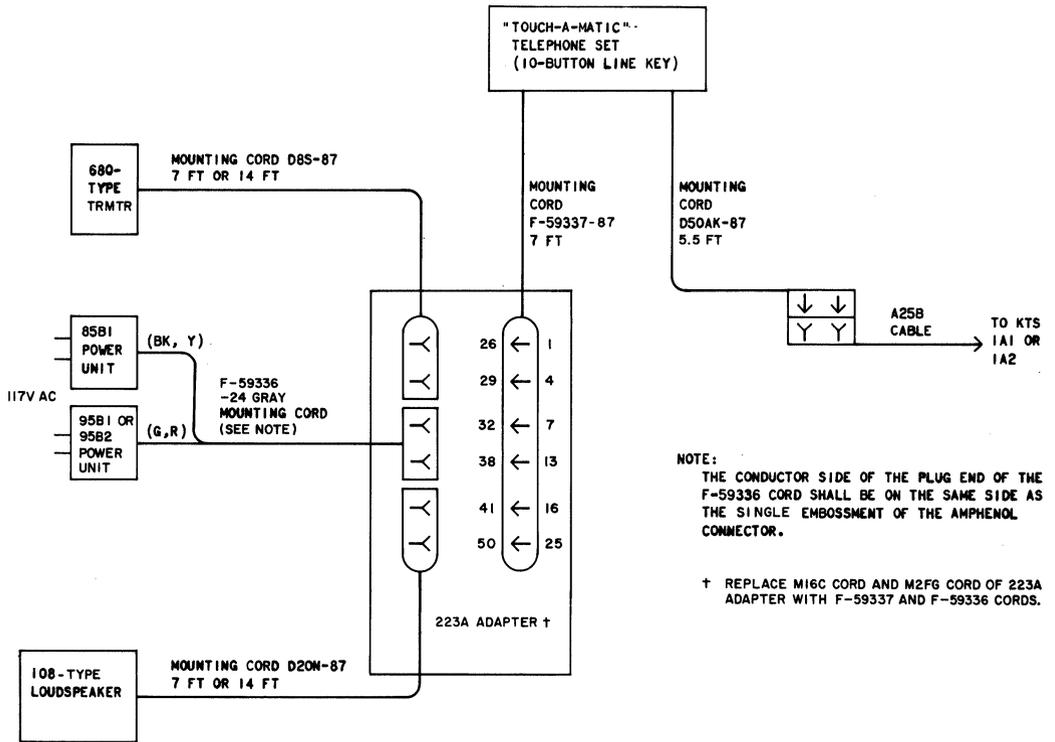


Fig. 9—Telephone Set With 4A Speakerphone, Block Diagram

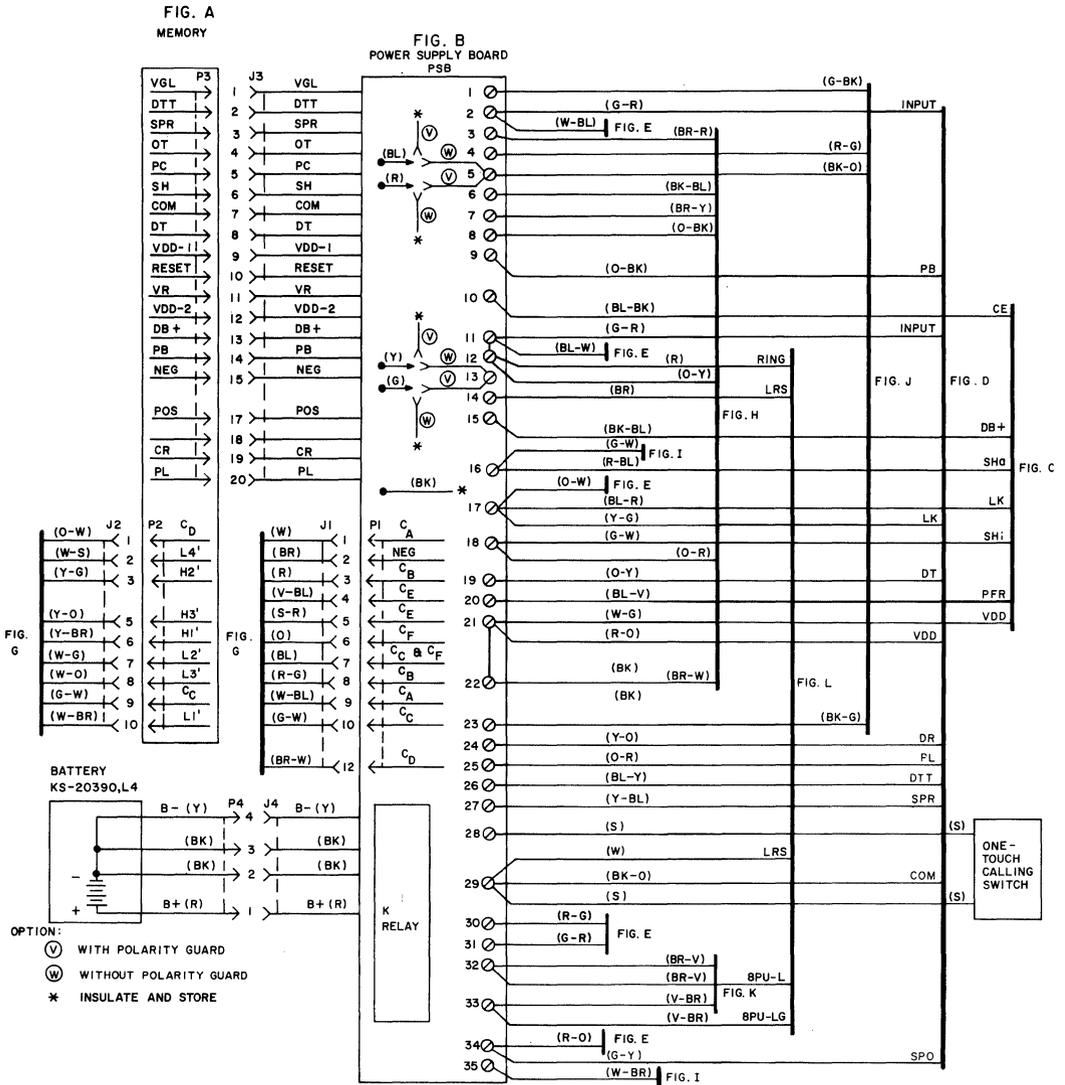


Fig. 10—Telephone Set, Connections (Sheet 1 of 5)

FIG. D
DIAL TONE DETECTOR
(D-180493)

FIG. C
RELAY PRINTED
WIRING BOARD
(D-180492)

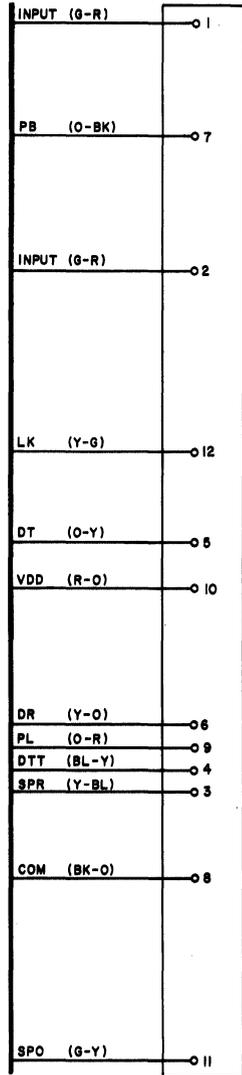
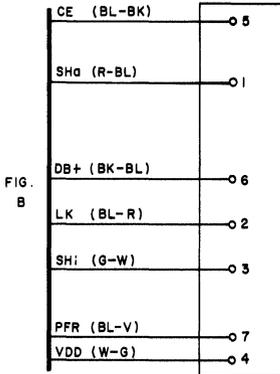
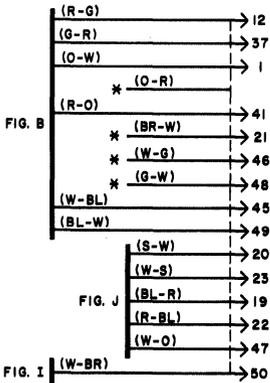


FIG. E
F-59337 CORD



* INSULATE AND STORE

Fig. 10—Telephone Set, Connections (Sheet 2 of 5)

FIG. F
SWITCHHOOK

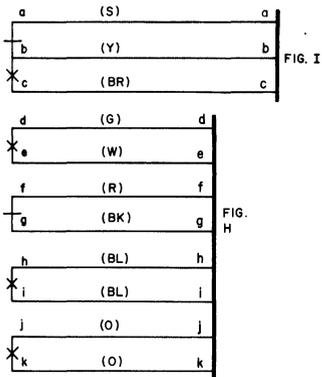


FIG. G
DIAL
COMMON SWITCH

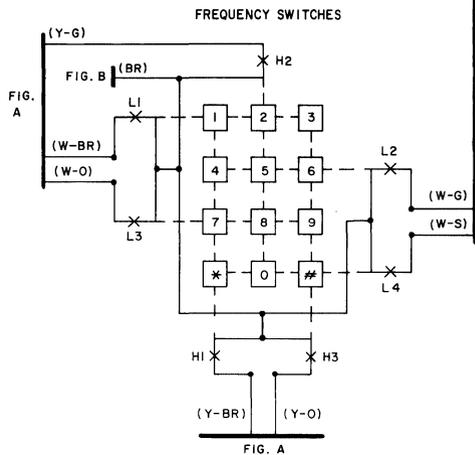
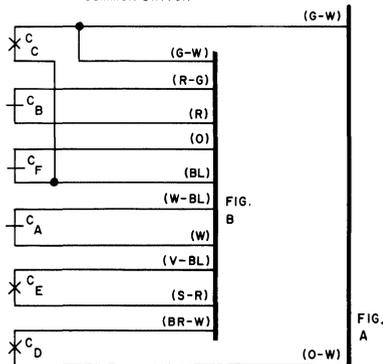


Fig. 10—Telephone Set, Connections (Sheet 3 of 5)

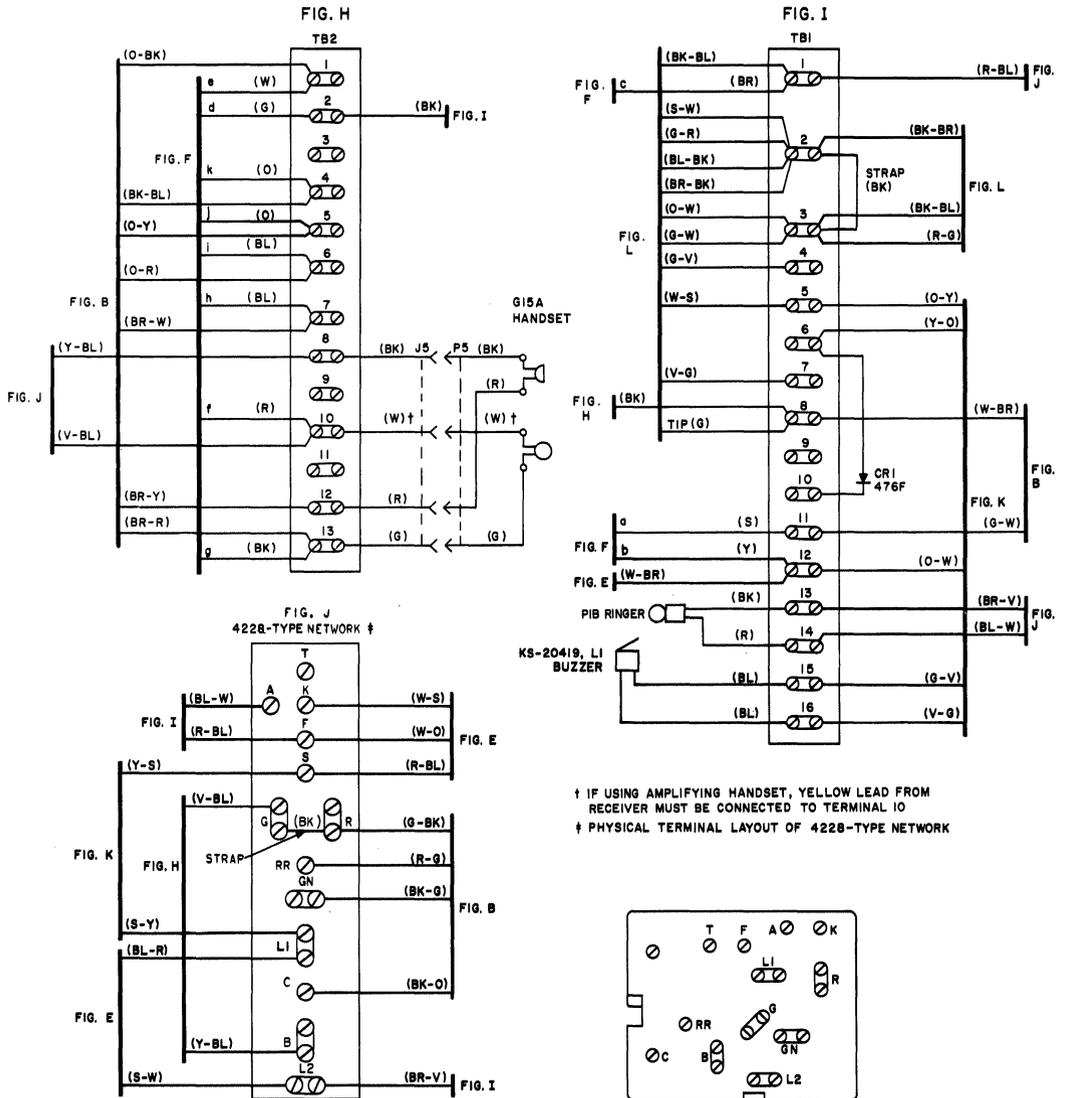
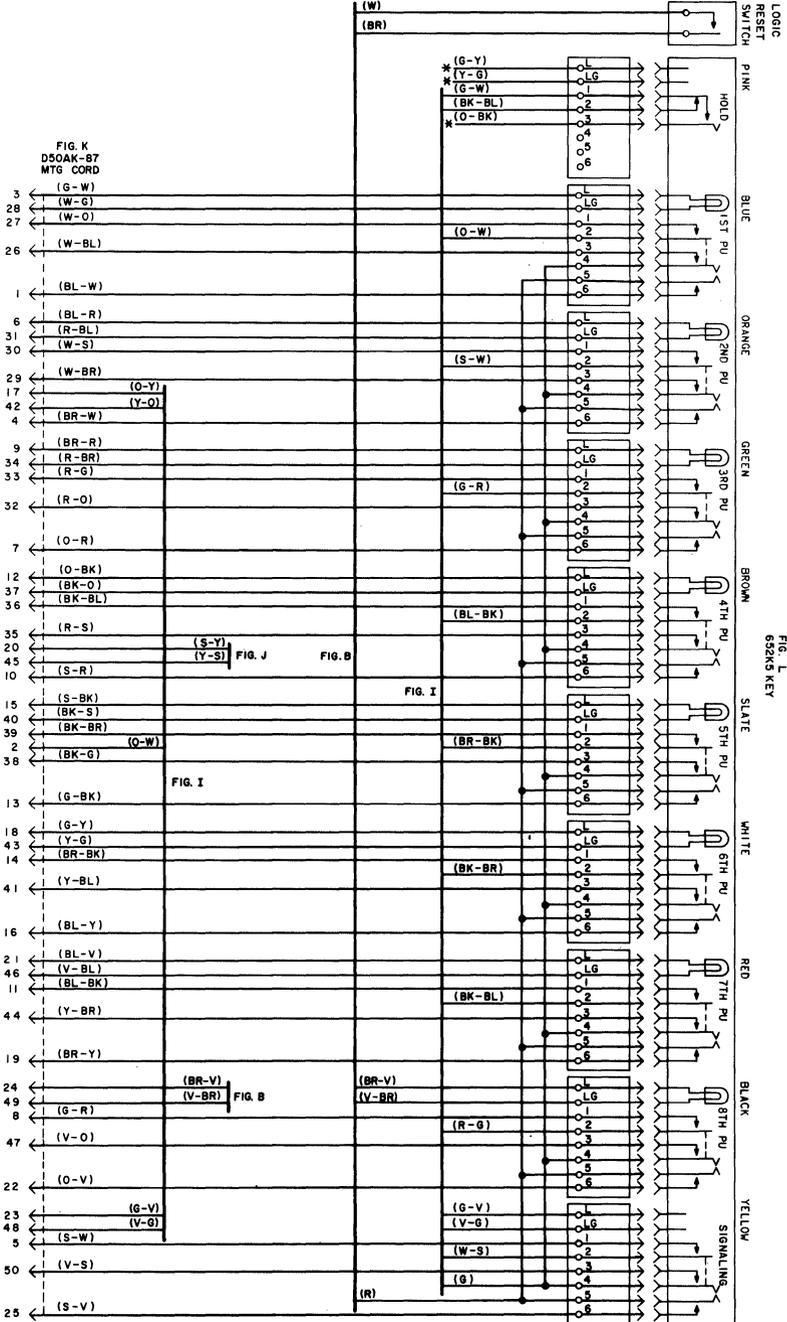
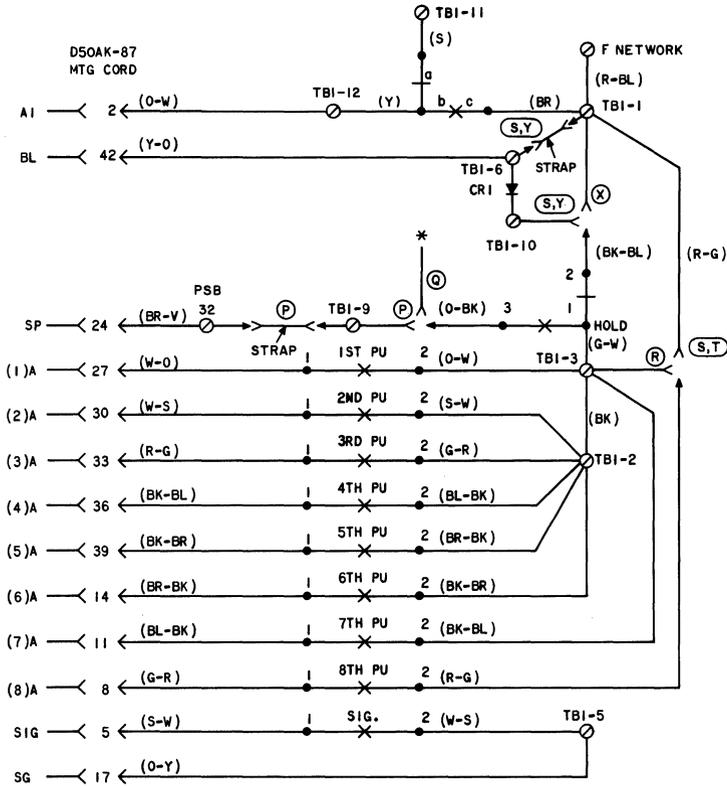


Fig. 10—Telephone Set, Connections (Sheet 4 of 5)

Fig. 10—Telephone Set, Connections (Sheet 5 of 5)





- * INSULATE AND STORE
- (P) I HOLD OPTION
I HOLD REQUIRES GIVING UP LAMP ON 8TH PU.
REMOVE (BR-V) KEY LEAD FROM PSB-32 AND STORE.
REMOVE (V-BR) KEY LEAD FROM PSB-33 AND STORE.
- (Q) WITHOUT I HOLD
- (R) WITHOUT MULTILINE EXCLUSION OR ADD-ON CONFERRING
- (S) FOR ADD-ON CONFERRING, CONVERT THE 8TH PU TO NON-LOCKING (REMOVE PIN)
- (T) FOR MULTILINE EXCLUSION, CONVERT THE 8TH PU TO NON-LOCKING (REMOVE PIN)
- (X) WITHOUT STATION BUSY LAMP
- (Y) WITH STATION BUSY LAMP

Fig. 11—I Hold, Exclusion, Station Busy Lamp, and Add-On Conferencing—1A1 and 1A2 KTS

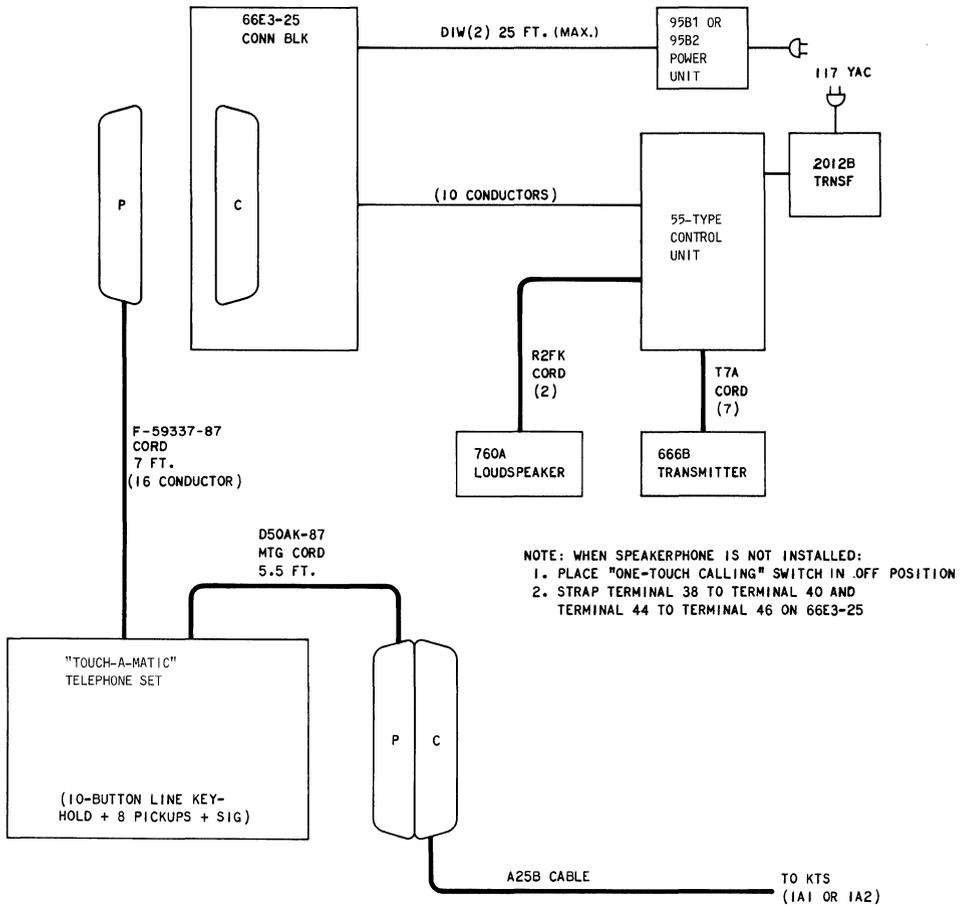


Fig. 12—Block Diagram—Installation of Telephone Set With 3B Speakerphone and 1A1 or 1A2 KTS

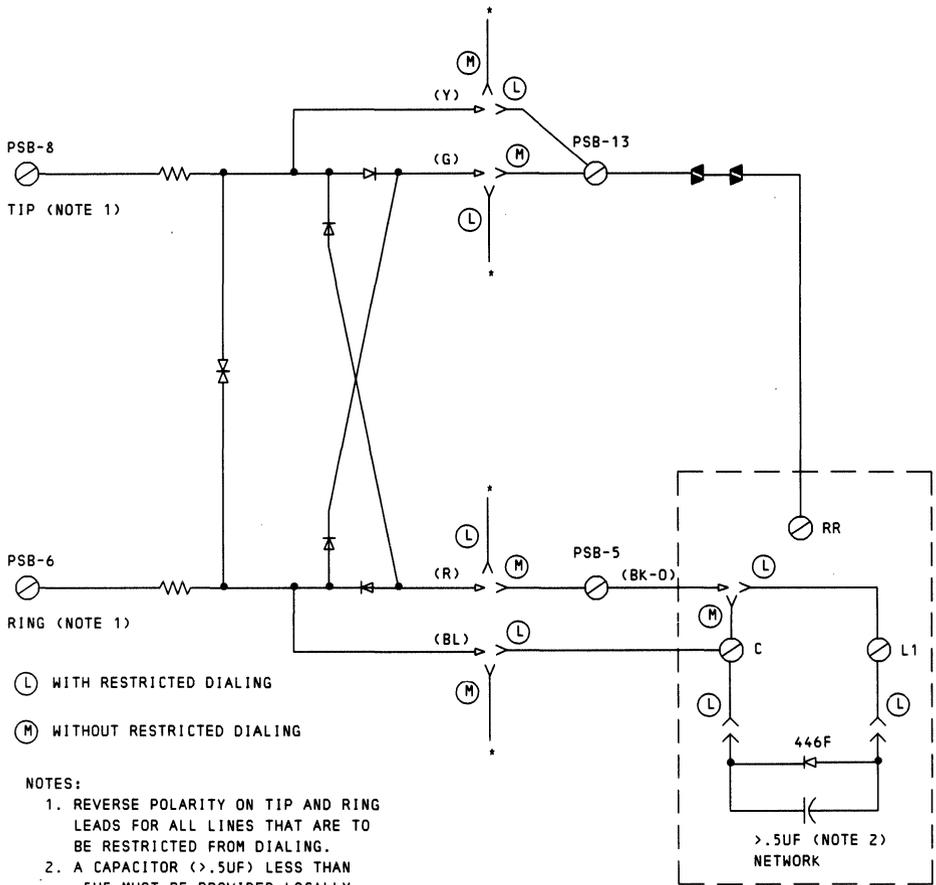


Fig. 15—Restricted Dialing, Connections for Unrestricted Lines

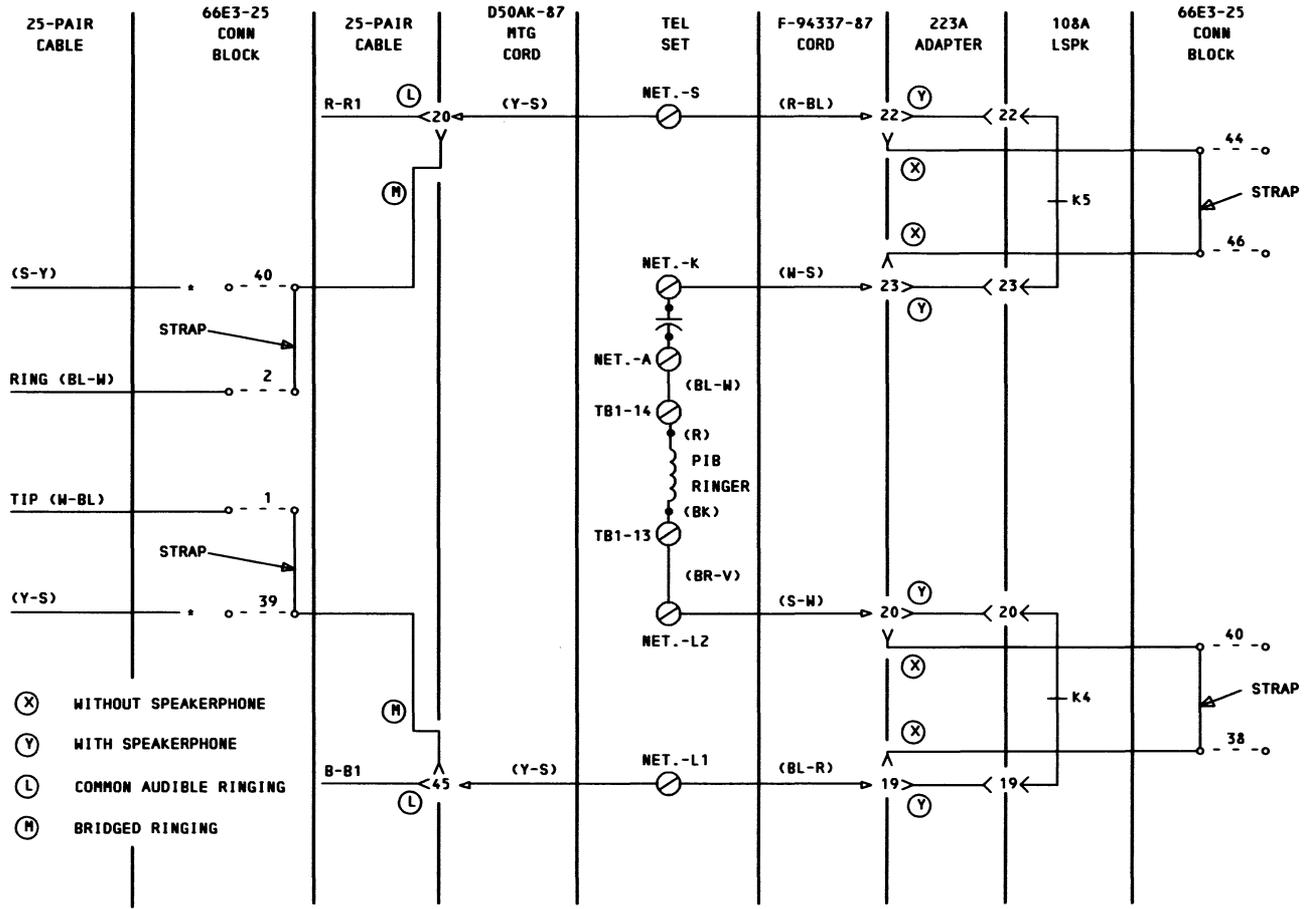


Fig. 16—Ringer Connections

TABLE C
TROUBLE ANALYSIS

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.	D50AK-87 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	1. Unplug battery 2. 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 switchhook d-e or j-k contacts	1. Unplug battery 2. 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 [®] signal	12-pin connector of 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	1. Unplug battery 2. Replace telephone set
3	Cannot manually dial	Clicking sounds or damped TOUCH-TONE signals heard when dial buttons are depressed. Cannot hang up set	Bridged set off-hook	Place bridged set on-hook

TABLE C (Cont)

TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
3 (Cont)		No audible TOUCH-TONE 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	1. Unplug battery 2. Replace telephone set
4	Cannot manually dial some digits		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	1. Unplug battery 2. Replace telephone set
5	Cannot manually dial with AC power off	Can manually dial with AC power on	Defective dial	Replace dial
			Open path on PSB	1. Unplug battery 2. Replace telephone set
		Same as above but can manually dial with AC power off when strap lead is connected between terminals PSB-10 and PSB-15	Defective circuit or connections on D-180492 Kit of Parts	1. Check connections per Table B and Fig. 8 or 10 2. Replace D-180492 Kit of Parts

TABLE C (Cont)

TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
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 (F-60208 thru 211 telephone set) see 3.07	Connect or replace battery
		RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			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 of PSB)
			Open in IW	Check IW and connections
			Memory, RECORD OFF, or WAIT button stuck down	Clear stuck button
			Defective LOGIC RESET switch on line key	Replace line key
			Defective lamp or lamp driver circuit	Replace Memory
			Unknown	1. Unplug battery 2. Replace telephone set
		RECORD lamp sometimes does not turn on when RECORD button is depressed	Memory not securely mounted	Tighten Memory mounting screws
		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	1. Unplug battery 2. Replace telephone set			

TABLE C (Cont)

TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
7	Cannot record into memory	RECORD lamp momentarily flashes when RECORD button is depressed	Refer to trouble number 6	Refer to trouble number 6	
			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 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	Incorrect dial contact sequence	Replace dial
				Defective logic	Replace Memory
				Open circuit on PSB	1. Unplug battery 2. Replace telephone set
9	Cannot dial properly from memory		Did not record properly	1. Record per 5.01 2. Refer to trouble number 7	
			RECORD lamp does not turn on when RECORD button is depressed	Battery not plugged in or defective F-60208 thru 211 telephone set) see 3.07	Connect or replace battery
				Memory not securely mounted	Tighten Memory mounting screws
			MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE signal present	Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 10(B)
				Defective logic	Replace Memory
				Defective switchhook h-i contacts	1. Unplug battery 2. Replace telephone set

TABLE C (Cont)

TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Cont)		Same as above — with addition of strap lead between PSB terminals 26 and 29, set automatically dials from Memory	Precise dial tone not present and/or defective dial tone detector	<ol style="list-style-type: none"> 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
		With addition of strap lead between PSB terminals 26 and 29, set does not automatically dial	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 dial
		No audible TOUCH-TONE signal present		
		Audible gap in train of digits being dialed		
		Digits dialed too rapidly (fast dialer)	Noise on AC power line	<ol style="list-style-type: none"> 1. Connect AC power to set via isolated pair of wires 2. Minimize wire length between power unit and telephone set
		No digits or random digits in Memory	AC power outage for longer than 24 hours	Reestablish AC power and rerecord numbers into memory
			Disconnected or defective battery	<ol style="list-style-type: none"> 1. Plug in battery 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the power unit from the AC power outlet and reinsert

TABLE C (Cont)

TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Cont)				<ol style="list-style-type: none"> 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure
			Defective power supply circuit	<ol style="list-style-type: none"> 1. Unplug battery 2. Replace telephone set
		No digits or all the same digits in random memory locations	Defective Memory	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	<ol style="list-style-type: none"> 1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts
10	Cannot turn speakerphone on when ON button is depressed (With 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"> 1. Check connections per Table B and Fig. 8 and 9 or 12 2. Check for commercial power 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 secondary screw terminals)

TABLE C (Cont)
TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
10 (Cont)		Speakerphone indicator lamp does not turn on but line lamp lights	Improper connections or defective 95B-type power unit	<ol style="list-style-type: none"> 1. Check connections 2. Check or replace 95B-type unit (should read 13.4 to 18 VAC across open circuited screw terminals 30 and 31 on power supply)
		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 switchhook a-b contacts or connecting lead to PSB	<ol style="list-style-type: none"> 1. Check (G-W) harness lead between screw terminals 11 on TB1 and terminal 16 on power supply 2. Unplug battery 3. Replace telephone set
			Defective speakerphone	See appropriate speakerphone BSP
11	Cannot turn speakerphone off when handset is lifted off-hook (With 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 switchhook a-b contacts	<ol style="list-style-type: none"> 1. Unplug battery 2. Replace telephone set
12	RECORD lamp does not turn off when speakerphone ON button is depressed (With 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

TABLE C (Cont)

TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
12 (Cont)		Operation of RECORD OFF button or line key buttons turns RECORD lamp off	Defective switchhook h-i contacts	1. Unplug battery 2. Replace telephone set
13	Cannot break dial tone when dialing with speakerphone on (With 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 signal is high on speakerphone	Defective muting circuit on PSB	1. Unplug battery 2. Replace telephone set
14	Cannot hear tones when dialing with speakerphone on (With 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	1. Unplug battery 2. Replace telephone set
15	Cannot turn speakerphone off (With speakerphone option)	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
16	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (With speakerphone option)	MB7 relay does not operate (no clicking sound heard) when memory button is depressed	Battery not plugged in or defective (F-60208 thru 211 telephone set) (see 3.07)	Connect or replace battery

TABLE C (Cont)
TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
16 (Cont)		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	<ol style="list-style-type: none"> 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 when a memory button is depressed	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
17	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3 seconds (With speakerphone option)		Defective timing circuit	<ol style="list-style-type: none"> 1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts
18	Speakerphone turns on but set does not automatically dial when memory button depressed (With speakerphone option)	Set dials when screw terminals 26 and 29 on PSB are temporarily shorted	Precise TOUCH-TONE dial tone not present	<ol style="list-style-type: none"> 1. Check CO line for presence of precise TOUCH-TONE 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

TABLE C (Cont)
TROUBLE ANALYSIS

TROUBLE NUMBER	FAILURE	ADDITIONAL ANALYSIS	POSSIBLE CAUSE	REMEDIAL ACTION
19	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
20	At termination of non-speakerphone call, speakerphone turns on when handset is placed on hook	When SPR (Y-BL) lead of D-180493 Kit of Parts is removed from PSB-27 and connected to PSB-21, failure is not corrected	Defective dial tone detector	Replace dial tone detector portion of D-180493 Kit of Parts
		Same as above, except failure is corrected	Defective logic	Replace Memory
			Defective switchhook	1. Unplug battery 2. Replace telephone set

