

2870A1M AND 2870A2M "TOUCH-A-MATIC*" 32 TELEPHONE SET

IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

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1. GENERAL

1.01 This section contains information for the 2870A1M (MD) and 2870A2M TOUCH-A-MATIC telephone sets (Fig. 1).

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

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

- Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio fre-

quency energy and may radiate that energy, paragraph 1.01.

- Change all references to 95-type power unit to 95B1 power unit
- Show both 2012-type transformer and 95B1 power unit must be connected for 3B (MD) speakerphone system operation (Tables B and C)
- Show both 85B1 and 95B1 power unit must be connected for 4A speakerphone system operation (Tables D and E).

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

1.03 The 2870A1M (MD) telephone set equipped with D6AD mounting cord and 2870A2M telephone set equipped with 623P6 jack assembly are factory-wired for bridged or individual ringing. Mounting cord conductors provide for tip, ring, ac power (2870A1M), and A-lead control for 1A1, 1A2, or 6A key telephone systems (KTS).

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

1.05 The 2870A1M telephone set is field convertible to modular.

1.06 These telephone sets are available in the following colors:

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

1.07 The 2870B1-type faceplates are available in the following colors:

- Teak Woodgrain (-108)

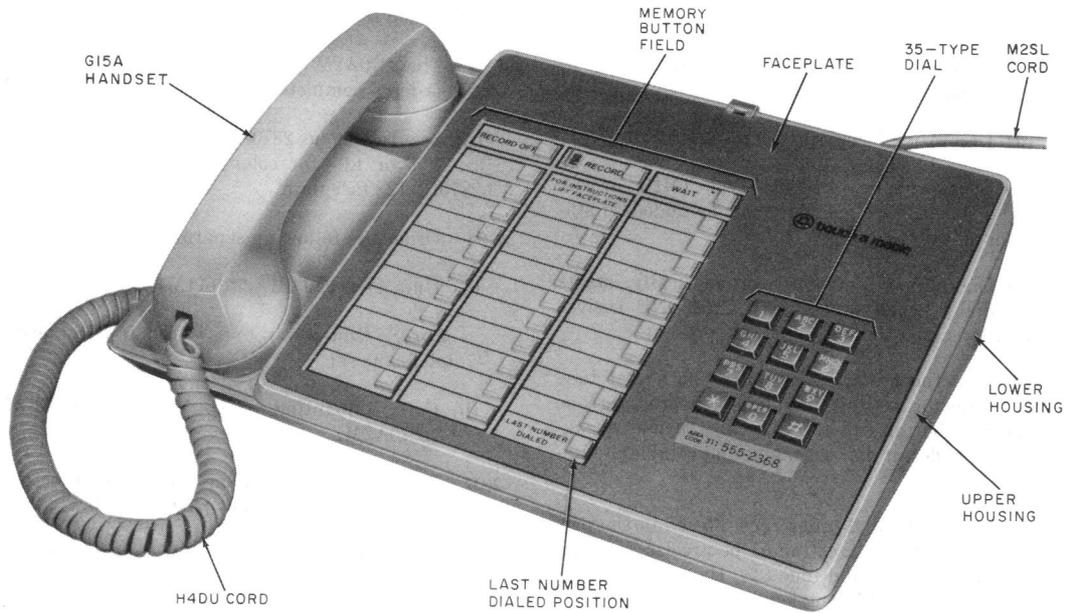


Fig. 1—2870A2M Telephone Set

- Walnut Woodgrain (-109)
 - Matte Aluminum (-122).
- 1.08 The 2870A2 (MD) faceplate is available in satin-silver (-87) only.

2. IDENTIFICATION

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

A. Design Features

2.02 Design features are as follows

- Modular telephone set
- Integrated circuit RC TOUCH-TONE† telephone dial oscillator

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- Integrated circuit memory
- Surge protector
- Polarity guard (removable for dry circuit application)
- Memory buttons from which to select pre-programmed telephone numbers for automatic dialing
- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each
- Last number manually dialed memory
- Plug-in battery
- Capability to pause for subsequent dial tones during automatic dialing (WAIT input)
- End-to-end signaling for data application.

B. Optional Features

2.03 Optional features are as follows (refer to Table A).

- (a) Decorative faceplate
- (b) Speakerphone: either 3-type (MD) or 4A speakerphone systems may be added to stations
- (c) Dial Tone Detector: automatically starts dialer when precise TOUCH-TONE service dial tone (350 Hz and 440 Hz) is present
- (d) One-Touch Calling (requires both dial tone detector and speakerphone): depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number

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

- (e) D-180818 Kit of Parts provides the following features:
 - (1) Record Disable: Turns off recording feature to prevent accidental erasures of previously stored numbers. No recording possible except for last number dialed memory which will automatically store digits manually dialed from the telephone set dial.
 - (2) Record Disable and Dial Intermix Feature: Digits dialed manually from telephone set dial and digits dialed automatically from memory may be intermixed without depressing RECORD OFF button (paragraph 5.07). Memories cannot be altered and LAST NUMBER DIALED feature is inoperative.
- (f) Amplifying Handset
- (g) KS-20419L1 or KS-20419L2 Buzzer
- (h) Head Telephone Set Operation (with jackset).

2.04 All options are implemented by as follows:

- (a) Wiring changes in the telephone set
- (b) Installation of appropriate additional items.

C. Ordering Guide

2.05 The 2870A2M (modular) telephone set may be ordered complete and ready to install as:

- (a) Set, Telephone, 2870A2M- (refer to paragraph 1.06 or 1.07 for color suffix) equipped with 2870B1-122 faceplate.

2.06 Order the following separately:

- (a) Unit, Power, 95B1 (2870A1M)

Note: One power unit is required for each telephone set.

- (b) Cord, Mounting, D4BU-29 or D6AM-87 (2870A2M).

2.07 The 2870A2M telephone set also may be ordered in its component parts as follows:

- (a) Housing, 870A1- (refer to paragraph 1.06 or 1.07 for color suffix)
- (b) Housing, upper, 870A1U- (refer to paragraph 1.06 or 1.07 for color suffix) (used with 2870B1 faceplate)
- (c) Faceplate, 2870B1-122 (matte aluminum)
- (d) Handset, G15A- (refer to paragraph 1.06 to 1.07 for color suffix)
- (e) Cord, Handset, H4DU- (refer to paragraph 1.06 or 1.07 for color suffix)
- (f) Base, Telephone Set, 2870A2M includes the following:
 - Dial, 35AG3A
 - Ringer, P1B
 - Network (4228-type)
 - Battery, KS-20390L4 or KS-20390L2
 - Jack, Handset, 616B
 - Jack Mounting Cord, 623P6 (2870A2M only)
 - Cord, Power, M2SL-87, 7-foot (2870A2M only)

TABLE A

OPTIONS

OPTION		ADDITIONAL ITEMS REQUIRED	CONNECTION PER	
			FIGURE	TABLE
Speakerphone	4A	108AA Loudspeaker	11	D, E
		680AE Transmitter	11	D, E
		223D Adapter	11	D, E
		85B1 Power Unit	11	D, E
		D-180492 Kit of Parts	9C	D, E
	3B (MD)	760A (MD) Loudspeaker	10	B, C
		666B (MD) Transmitter	10	B, C
		55-type (MD) Control Unit	10	B, C
		2012D Transformer	10	B, C
		D-180492 Kit of Parts	9C	B, C
		D6AD-87 Cord	10	B, C
One-Touch Calling	D-180493 Kit of Parts	9D, E	C, E	
	Speakerphone	9B	C, E	
Dial Tone Detector	D-180493 Kit of Parts	9D, E	F	
Adjunct. Key *	6040-, 6050-, or 6051-Type Key			
Convert 2870A1M to 2870A2M (paragraph 3.11)	623P6 Jack, 95B1 Power Unit D4BU Cord, M2SL Cord			
Buzzer (paragraph 3.10)	KS-20419L1, L2 Buzzer			
Amplifying Handsets (paragraph 6.09)	G6BM, G7BM, or G8BM Handset	9H		
Dry Circuit (without Polarity Guard)		9B		
Decorative Faceplate	2870B1-108 (Teak Woodgrain)			
	2870B1-109 (Walnut Woodgrain)			
Record Disable (paragraph 3.09)	D-180818 Kit of Parts †	9A	G	
Dial Intermix (paragraph 3.09)				
Head Telephone Set Operation (paragraph 3.13)	Plantronics Jackset Model JS0180-1A or JS0180-2A	Tables provided with Plantronics Jackset		
	Desired Head Telephone Set ‡			

* When a 6040-, 6050-, or 6051-type key is used in conjunction with the 2870A1M or 2870A2M telephone set, automatic dialing and recording features are not reset when switching from one line to another. To reset dialer, it will be necessary to go on-hook, flash the line switch, or depress the RECORD OFF button after termination of each call. If 6-button key service is desired, it is recommended that the 2872A2M telephone set be used because the reset function is automatically provided.

† If set is equipped with 2870A Memory, it must be replaced with a 2870B Memory.

‡ KS-19796, KS-20778, 52-Type, 53-Type, and 60-Type headsets are registered with the jackset models.

- Unit, Power, 95B1
- Memory, 2870B
- 840393672 Directory Sheet Set
- Subscriber Instruction Booklet, SIB-2455B.

2.08 Optional apparatus is as follows (order as required):

- Faceplate 2870B1: Teak Woodgrain (-108) or Walnut Woodgrain (-109)

Note: If set is equipped with older 2870A1 or 2870A2 faceplate, then an upper housing of the appropriate color must be ordered.

- Kit of Parts, D-180492 (must be used for speakerphone service)
- Kit of Parts, D-180493 (Dial Tone Detector and One-Touch Calling switch)
- Kit of Parts, D-180818 (Record Disable and Dial Intermix Features)

Note: This kit of parts may be used only with sets equipped with a 2870B Memory.

- Cord, Mounting, D4BU-29 or D6AM-87 (2870A1M, conversion to modular)
- Jack, Mounting, 623P6 (2870A1M, conversion to modular)
- Cord, M2SL, 7-foot (separate power cord for 2870A1M)
- Buzzer, KS-20419L1 or KS-20419L2
- Handset, Amplifying (G6BM-, G7BM-, or G8BM-type) (refer to paragraph 1.06 or 1.07 for color suffix)
- Set, Head Telephone [using Plantronics Jackset Model JS0180-1A (2-foot cord) or JS0180-2A (7-foot cord)] see Table A.

D. Operating Features

2.09 Operating features (Fig. 1) are as follows.

- Dial (TOUCH-TONE dialing).

- 32-button array of low force, low travel, nonlocking memory buttons arranged in three columns. Left and right columns have eleven buttons, center column has ten buttons.

- LAST NUMBER DIALED button located in lower right corner of memory array, when momentarily depressed, automatically redials the last number manually dialed.

- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp and enables the memory circuits to store telephone numbers.

- RECORD OFF button (nonlocking), when momentarily depressed extinguishes the RECORD lamp, indicating that the dialer is switched out of the record mode.

- WAIT button (nonlocking), when momentarily depressed during recording operation, enters a code into memory to initiate a halt in the automatic dialing sequence [used where access digit(s) are required].

3. INSTALLATION

STANDARD INSTALLATION

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

3.01 Make all wiring changes and optional modifications (Table A) before external connections are made to the set (Fig. 9).

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

Note: Write date of battery installation on label provided (Fig. 7).

3.03 Install power unit as follows.

- (1) For the 2870A2M the 95B1 power unit is factory-wired to PSB terminals 30 and 31 using the M2SL-87 cord.

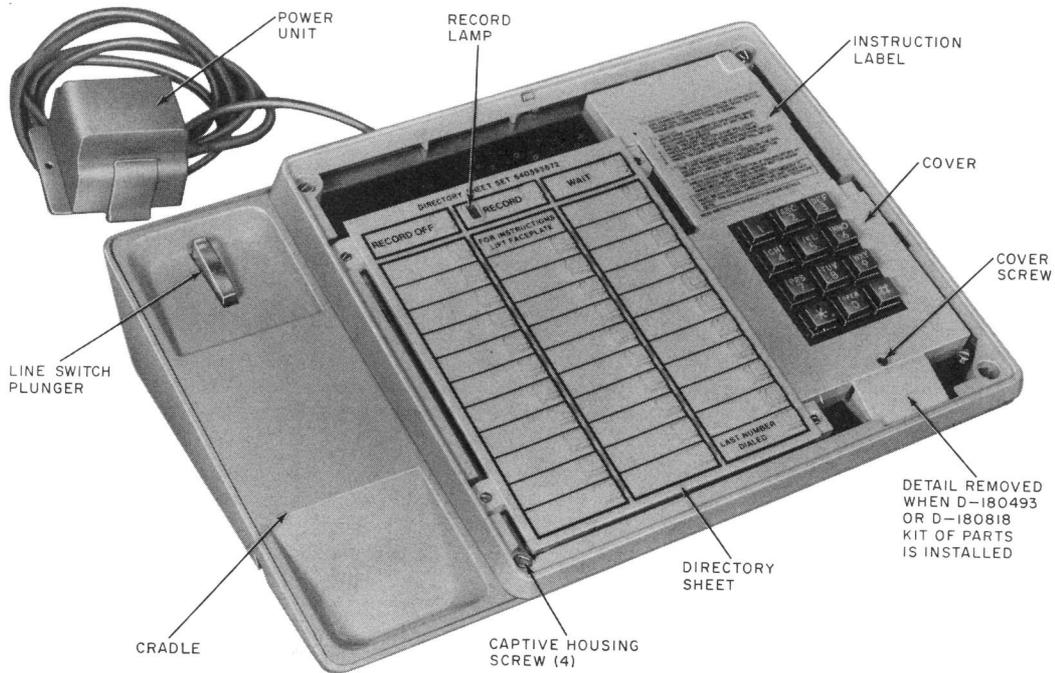


Fig. 2—Telephone Set—Faceplate and Handset Removed

(2) For the 2870AIM, install the 95B1 power unit within 150 feet (24 gauge conductors) of the telephone set. The power unit may be located at the equipment end of the cable and connected to the telephone set by the (G-W) and (W-G) conductors to terminals PSB-30 and PSB-31 by conductors separate from the mounting cord. When separate power conductors are used, disconnect, insulate, and store the (G-W) and (W-G) mounting cord leads on PSB-30 and PSB-31.

Note: The 95B1 power unit must be located no closer than 1-1/2 feet from the telephone set in order to prevent a noise problem.

Danger 1: If used, securely attach retaining clamp to ac outlet using outlet cover screw **BEFORE** attempting to install $\text{\textcircled{95B1}}$ power unit. The power unit

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

Danger 2: Care should be taken to trim and dress leads connecting to low voltage output terminals of $\text{\textcircled{95B1}}$ power unit to assure that inadvertent connection to conducting surfaces or other power source does not occur. If more than one power unit is plugged into a multiple receptacle power strip, there must be at

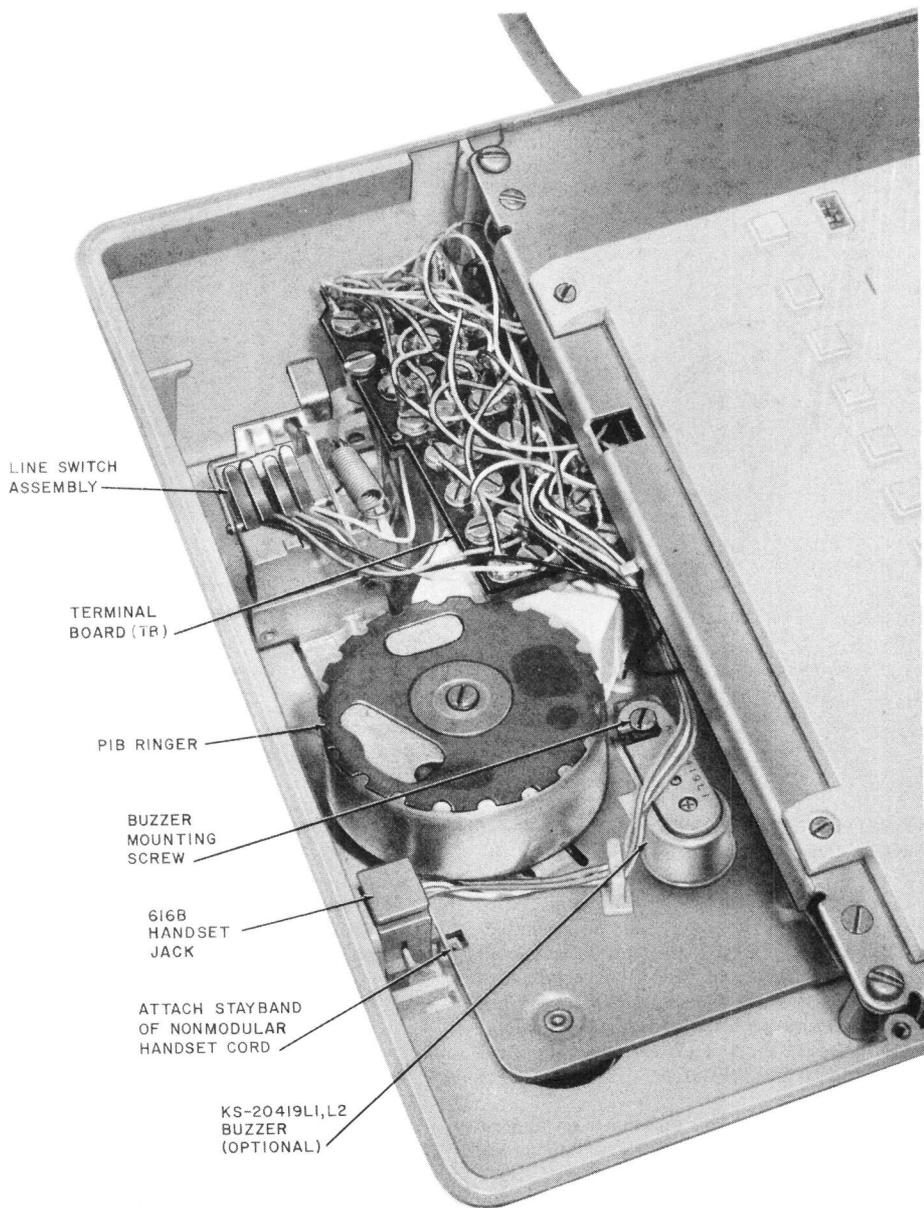


Fig. 3—Telephone Set With Faceplate, Handset, and Handset Cradle Removed

least one inch separation between power units. Only UL listed receptacle power strips with adequate power rating shall be used. Use of a continuous terminal power strip that allows the secondary output terminals of the power unit to be in close proximity to the ac line source is not recommended.

- (3) Plug the power unit into an ac outlet not controlled by a switch (continuous ac power is required).
- 3.04** The station number card retainer 812558039 (P-25E803) snaps into the faceplate below the dial.
- 3.05** The directory sheets (Fig. 2) fit over the buttons of the Memory and are held in place by the faceplate. Additional sheets are available in the directory sheet set (840393672).

Installation Check Procedure

- 3.06** Check telephone set installation per the following tests (refer to Part 5 for operation). In case of failure, refer to Trouble Analysis, Table H.
- (1) Disconnect power unit and manually dial a known telephone number to check that the telephone operates correctly in the absence of commercial power.
- (2) Reconnect power unit to ac outlet.
- (3) With handset on-hook, record digits 1 through 0 into consecutive memory locations, storing one digit per memory. Fill all memory locations except LAST NUMBER DIALED and location immediately above it [paragraph 5.01 (4) through (7)].
- (4) Manually dial CO dial test and ringer circuit and simultaneously record into memory location immediately above LAST NUMBER DIALED button [paragraph 5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.
- (5) Momentarily hang up handset and automatically dial the test circuit number recorded in Step (4) by depressing button immediately above

LAST NUMBER DIALED button and proceed as follows.

Note: The set should stop dialing if it reaches a stored *wait* input. Depress the memory button again and the remaining digits should be dialed.

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



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

- (c) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, depress the button of a memory location used in Step (3), to verify retention of stored numbers.
- (6) Dial the appropriate code for ring-back to test the ringer.
- (7) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (4). The speakerphone should turn on, dial tone should be detected, and the stored number should be automatically dialed.

OPTIONAL APPARATUS INSTALLATION

A. D-180492 Kit of Parts (With Speakerphone)

3.07 Install as follows.

- (1) Proceed as described in paragraph 3.18.
- (2) Make connections per appropriate Table B, C, D, or E.
- (3) Mount the kit assembly to the chassis with the screws provided (Fig. 4). Beveled corner of the

printed wiring board (PWB) should be at lower right corner.

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

3.08 Install as follows.

- (1) Remove the housing (paragraph 3.21), and access PSB terminal board (paragraph 3.18).
- (2) Insert the board assembly from the back of the set and locate as shown in Fig. 4, such that the two tabs on the board assembly fit into the slots in the chassis.
- (3) Lock the board into position by inserting the accompanying self threading screw through the right side of the chassis.
- (4) Mount the one-touch calling switch below the dial with the two screws provided.

Note: If switch for D-180818 Kit of Parts is already present, the one-touch calling switch cannot be installed. The PSB terminals to which the switch leads should be connected (Tables C and E) shall be strapped together. (The one-touch calling option can not be turned off by the subscriber.)

- (5) Make connections per Table C or E.
- (6) Break off the detail at the bottom of the cover (Fig. 2) and trim edge as required.
- (7) Verify correct operation of option.
- (8) Reassemble set.

C. D-180818 Kit of Parts (Record Disable and Dial Intermix Features)

3.09 Install as follows.

- (1) Remove faceplate (paragraph 3.19).
- (2) Loosen the captive screw at the bottom of the cover around the dial and remove the cover.
- (3) Disengage the four captive memory mounting screws (Fig. 4).
- (4) Disengage the two captive dial mounting screws and move dial aside.

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

Note: If the set is equipped with a 2870A Memory, replace it with a 2870B Memory and carefully pack and return the old memory according to local procedures.

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

Note: If the one-touch calling switch (D-180493 Kit of Parts) has been provided, it must be removed. The PSB terminals to which the switch leads were connected (Table C or E) must be strapped together. (The one-touch calling option can no longer be turned off by the subscriber.)

- (7) Connect switch lead connectors to post terminals on memory board per Table G and Fig. 6.
- (8) With feature switch in OFF position, verify that set operates in normal manner:

- Numbers can be recorded into memory.
- Numbers can be changed.
- Numbers can be deleted from memory.
- Numbers can be automatically dialed.

- (9) Set feature switch to ON position and verify feature provided.

- (a) For record disable feature only, proceed as follows.

- (1) RECORD lamp will not light when RECORD button is depressed.

- (2) No telephone numbers can be recorded, changed, or deleted in memory.

- (3) LAST NUMBER DIALED feature is operative.

- (b) For record disable and dial intermix feature, proceed as follows.

- (1) RECORD lamp will not light when RECORD button is depressed.

- (2) No telephone numbers can be recorded, changed, or deleted in memory.

(3) Manually and automatically dialed digits may be intermixed (paragraph 5.07).

(4) LAST NUMBER DIALED feature is disabled and the LAST NUMBER DIALED position can be utilized just like the other memory position to store frequently dialed numbers.

(10) Reassemble set.

D. KS-20419L1 or KS-20419L2 Buzzer

3.10 Install as follows.

(1) Remove faceplate (paragraph 3.19) and place handset aside.

(2) Remove handset cradle (paragraph 3.20).

(3) Remove screw from buzzer mounting bracket, and mount buzzer on bracket shown in Fig. 3.

(4) Connect two blue buzzer leads to TB-11 and TB-12 (Fig. 9H) and connect to 10-volt ac external circuit by changing the 623P6 jack connections as follows:

(a) With no A-lead control, proceed as follows.

(1) Move (W-O) or (BK) from TB-1 to TB-11.

(2) Move (O-W) or (Y) from TB-2 to TB-12.

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

(b) With A-lead control, (2870A2M) use D6AM-87 cord, proceed as follows.

(1) Move (BL) from insulate and store to TB-11.

(2) Move (W) from insulate and store to TB-12.

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

(5) Reassemble set (paragraphs 3.20 and 3.19).

E. Plug-Ended Mounting Cord (For Converting 2870A1M to 2870A2M Telephone Set)

3.11 Convert as follows.

(1) Remove the housing (paragraph 3.21) and access the PSB terminals (paragraph 3.18).

(2) Remove D6AD-87 mounting cord.

(3) Install the 623P6 jack as shown in Fig. 8.

(4) Connect the spade-tipped jack leads as follows:

(a) (R) wire to TB-4

(b) (G) wire to TB-8

(c) (Y) wire to TB-2

(d) (BK) wire to TB-1

(e) Insulate and store (W) and (BL) conductors.

(5) Connect (Y) lead of M2SL cord to PSB-30 and the (BK) lead to PSB-31 and route cord through housing.

(6) Connect the cord to the 95B1 power unit.

(7) Reassemble the set.

(8) Install a 625-type connecting block.

(9) Install the D4BU mounting cord.

F. Optional Power Connections

3.12 In some cases it may be possible and desirable to bring ac power into the set in a nonstandard manner. The following methods are approved alternatives.

(a) **2870AIM:** An M2SL-87 cord may be used to connect the 95B1 power unit to the telephone set as follows.

(1) Remove the housing (paragraph 3.21).

(2) Disconnect the (G-W) and (W-G) leads of the mounting cord from PSB-30 and PSB-31, and insulate and store.

(3) Thread the leads of the M2SL cord to the PSB area from the rear of the telephone set.

(4) Fasten the M2SL cord to the chassis by placing a No. 10-24 by 1/4-inch screw

[804216471 (P-421647)] through the hole in the S-hook and into the tapped hole in the chassis located behind the 623P6 jack.

- (5) Connect the (Y) lead to PSB-30 and the (BK) lead to PSB-31.
 - (6) Reassemble housing.
 - (7) Connect power unit to M2SL cord.
- (b) **2870A2M:** The ac power may be wired in at the connecting block and brought to the set via the mounting cord as follows.

- (1) With a D4BU-29 cord (no A-lead capability), proceed as follows.
 - (a) Disconnect and remove the M2SL-87 cord.
 - (b) Move the (BK) jack lead from TB-1 to PSB-16 and the (Y) lead from TB-2 to PSB-17.
 - (c) Add strap leads from PSB-16 to PSB-30 and from PSB-17 to PSB-31.
 - (d) Connect the power unit to the appropriate terminals of the 625-type connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.
- (2) With a D6AM-87 cord, proceed as follows.
 - (a) Disconnect and remove the M2SL-87 cord.
 - (b) Connect the normally insulated and stored (BL) and (W) jack leads to PSB-16 and PSB-17, respectively.
 - (c) Add strap leads from PSB-16 to PSB-30 and from PSB-17 to PSB-31.
 - (d) Connect the power unit to the appropriate terminals of the 74D connecting block. Power unit shall be installed within 150 feet of telephone set using 24 AWG wire.

G. Head Telephone Set

3.13 Install as follows.

- (1) Remove housing (paragraph 3.21).

- (2) Access PSB terminal area (paragraph 3.18).
- (3) Remove cradle (paragraph 3.20).
- (4) Thread cord of jackset through hole in rear of housing and make connections per appropriate table provided with Plantronics Jackset.
- (5) Reassemble telephone set.
- (6) Insert head telephone set plug into jackset.

COMPONENT LOCATION AND ACCESS INFORMATION

A. Location of Components

3.14 The components are located in three areas as follows:

- (a) The following are located under the handset cradle (Fig. 3):

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

- (b) The following are located under the faceplate, inside the set (Fig. 4 and 5):

- (1) Battery jack (Fig. 5)
- (2) Power supply (PSB) terminal area (Fig. 4)
- (3) Network (Fig. 4)
- (4) Options (Fig. 4) are as follows:
 - (a) D-180492 (relay kit for speakerphone)
 - (b) D-180493 (dial tone detector and one-touch calling switch kit)
 - (c) D-180818 (record disable/and dial intermix kits).

- (c) The battery is located in the bottom of the telephone set (Fig. 7).

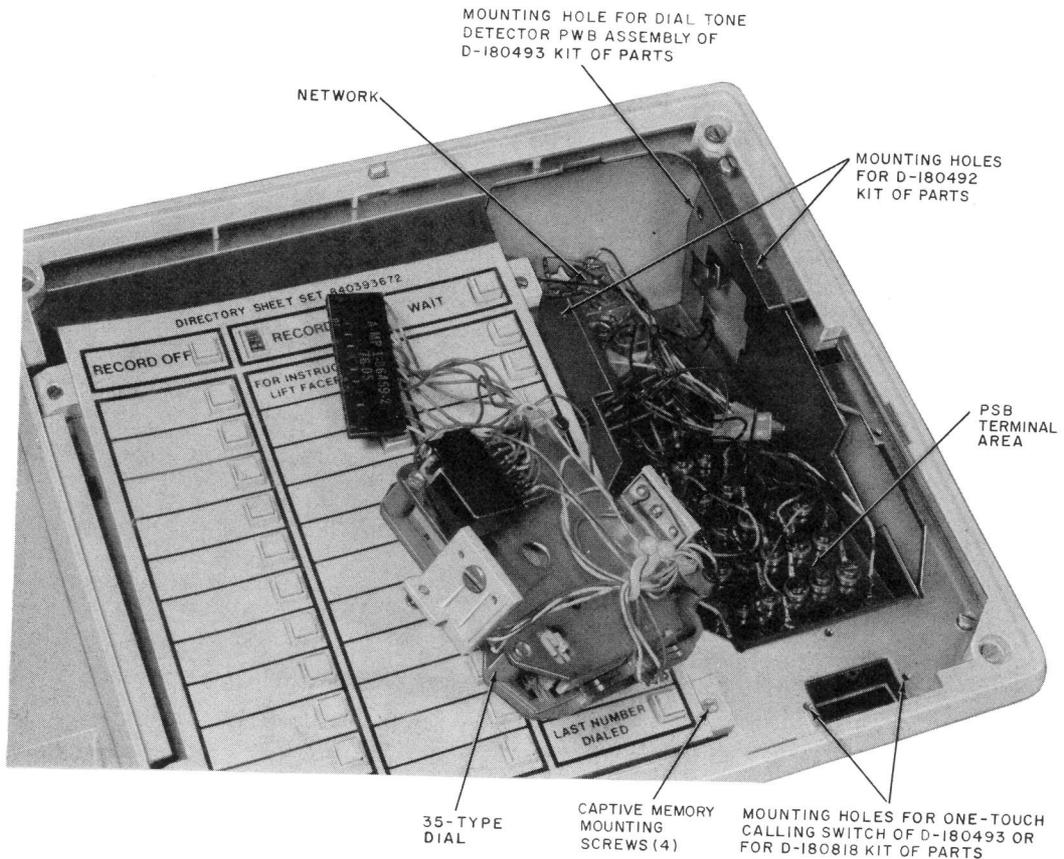


Fig. 4—Telephone Set—Dial Removed to Show Terminal Area

B. Mounting Cord

3.15 The D6AD-87 mounting cord (2870A1M) is spade-tip ended at both ends. The conductors provide for tip, ring, ac power, and A-lead control.

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

Note: If two extra leads are required, a D6AM-87 cord may be used.

C. Network Terminals

3.17 For access to the network terminals, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.
- (4) To replace the cover, the three tabs of the cover (one at the top center and one at each

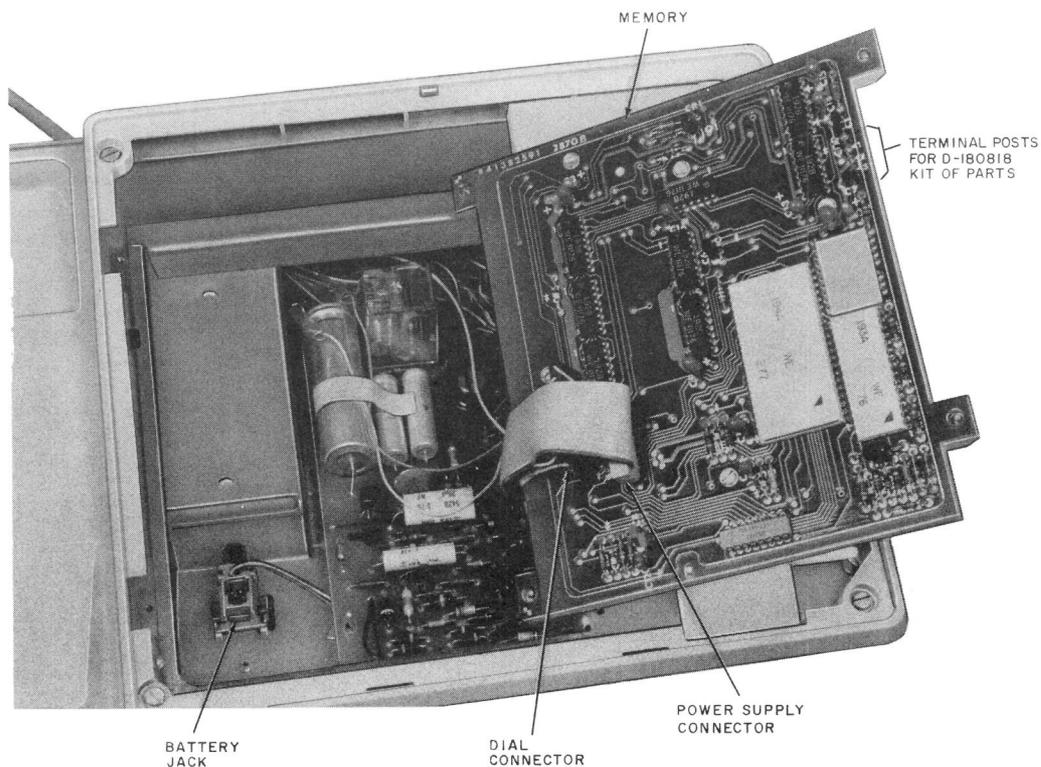


Fig. 5—Telephone Set, Internal View

side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

D. Power Supply Board (PSB) Terminals

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

- (1) Remove the faceplate (paragraph 3.19).
- (2) Loosen the captive cover screw at the bottom of the white cover around the dial (Fig. 2).
- (3) Remove the cover.

- (4) Loosen the two captive screws that hold the dial in place.

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

- (5) Gently raise the dial and disconnect 12 position plug from PSB.
- (6) Rotate dial over onto the memory.
- (7) To reassemble, reverse procedure.
- (8) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Fail-

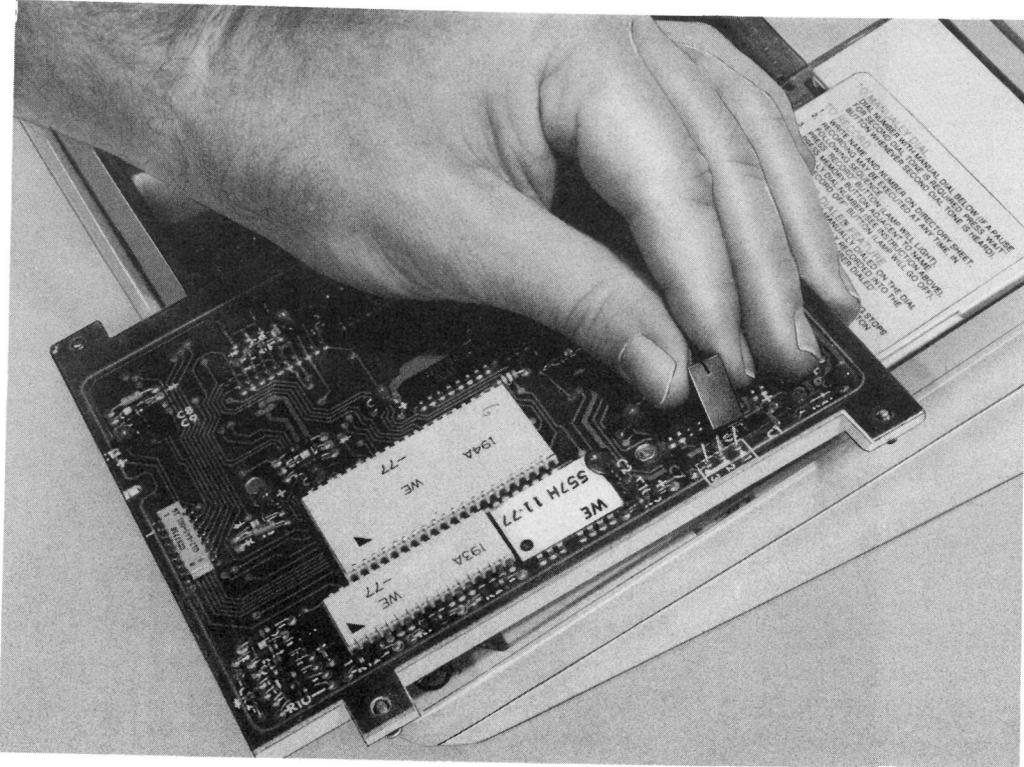


Fig. 6—2870A1M (MD) or 2870A2M Telephone Set Connections of D-180818 Kit of Parts, Record Disable Feature Only

ure to do this will result in improper seating of the faceplate.

E. Faceplate Removal

3.19 Removal will differ depending on faceplate being used. Proceed as follows.

- (a) The 2870B1-type faceplate is held in place by a spring clip attached to the 870A1U upper housing. To disengage the faceplate, lift up on the tab which protrudes from the center of the back edge of the faceplate.

Note: The 2870B1 faceplate is not a direct replacement for the 2870A2-87 faceplate. An

870A1U upper housing is also required with the 2870B1 faceplate (paragraph 6.10).

- (b) The 2870A2-87 faceplate is held in place by two snaps bonded to the faceplate and aligned to fit holes in the chassis. To remove the faceplate, grasp it by any convenient edge and lift.

F. Handset Cradle Removal

3.20 To remove the handset cradle from the housing, proceed as follows.

- (1) Remove the faceplate (paragraph 3.19) and place the handset aside.

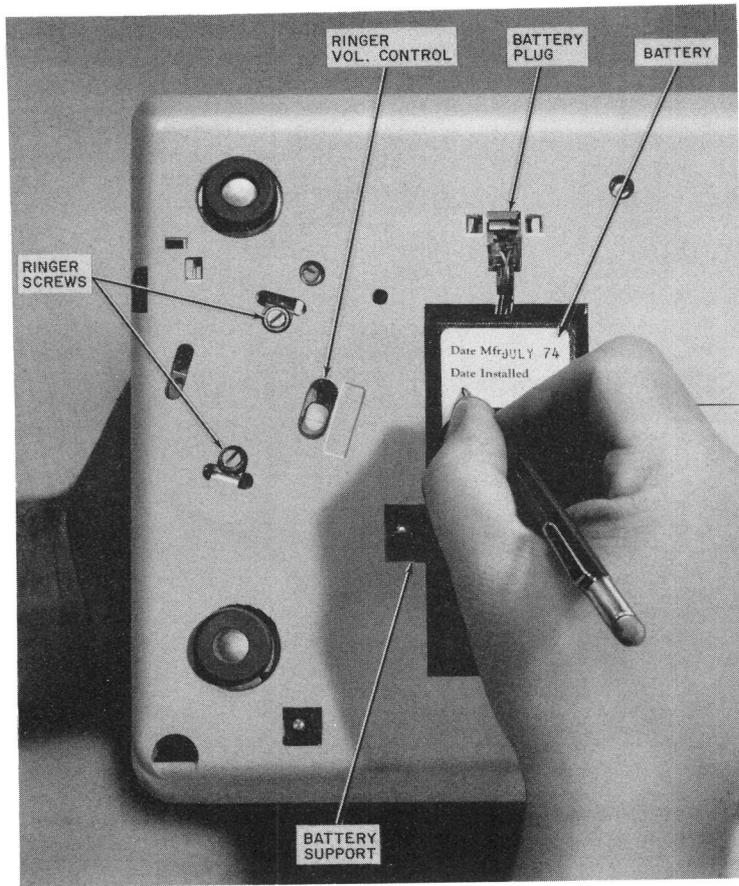


Fig. 7—Telephone Set, Bottom View

- (2) Remove upper housing, if provided [paragraph 3.21(b)].
- (3) Disengage the captive cradle screws located in the two tabs on the cradle.

Warning: *The plunger must be held from the top side of the cradle as it is slid into position to prevent damage to the line switch arm.*

- (4) Lift the cradle, by pulling up on the plunger, and remove.
- (5) Replace the handset cradle by sliding it sideways to engage the clips with the mating tabs in the side of the housing.
- (6) Refasten the captive cradle screws.

G. Housing Removal

3.21 To remove, proceed as follows.

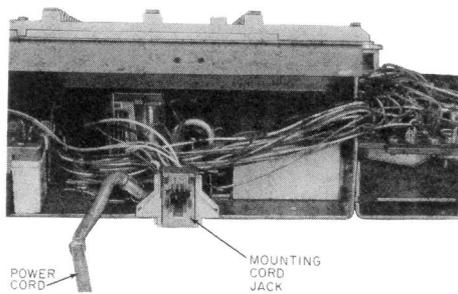


Fig. 8—2870A2M Telephone Set, Partial View

- (a) Remove lower housing as follows.
 - (1) Unplug the handset cord at the telephone set end and remove handset.
 - (2) Remove the faceplate (paragraph 3.19).

Warning: Attempting to remove the housing without removing the handset cradle may damage the line switch arm.

 - (3) Remove upper housing, if provided [paragraph 3.21(b)].
 - (4) Remove the handset cradle (paragraph 3.20).
 - (5) Disengage the captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.
 - (6) Unplug mounting cord (2870A2M).
 - (7) Separate the housing from the telephone set base.
 - (8) Disconnect the 95B1 power unit from M2SL-87 cord, if required (2870A2M).
 - (9) Feed cord through hole in bottom of housing as housing is removed.
 - (10) Before replacing the housing, lift the set to check that the shoulders of the battery jack are against the two tabs on the chassis.

Misalignment may cause the bottom of the housing to bow.

- (11) When replacing the housing, keep the handset jack from being trapped between the housing and chassis.
- (b) Removal upper housing as follows.
 - (1) Remove the faceplate (paragraph 3.19).
 - (2) Disengage the captive housing screws located in each corner of the upper housing (Fig. 2). This will release the lower housing.
 - (3) Pull the upper housing away from the chassis as each housing screw is backed out. This will separate the upper housing from the chassis.
 - (4) If necessary, thread screws out of housing.
 - (5) To reassemble, reverse procedures.

4. CONNECTIONS

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

- 4.01 Telephone set connections are shown in Fig. 9.
- 4.02 Refer to Table A for connection reference for all options.
- 4.03 A partial functional schematic is shown on Fig. 12.

5. OPERATION

A. Record a Number Into Memory

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

- 5.01 To record a number, proceed as follows.
 - (1) Remove the faceplate (paragraph 3.19).
 - (2) Write or type the desired name and telephone number for a selected memory button on the associated position of the directory sheet.

- (3) Replace the directory sheet and faceplate.
- (4) Depress the RECORD button. The RECORD lamp adjacent to the RECORD button will light. (A number can be called and recorded simultaneously by lifting handset before depressing the RECORD button.)
- (5) Depress the memory button adjacent to the desired telephone number listed on the directory sheet.
- (6) Manually dial the desired telephone number.

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

- (a) Dial the access digit(s) for the outside line.
- (b) Push the WAIT button. (The WAIT entry counts as one digit.)
- (c) Dial the telephone number.

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

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

B. Change a Number In Memory

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

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

C. Delete a Number From Memory

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

- 5.03 Complete the following operations in succession.

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

D. Automatically Dial a Number From Memory

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

- (a) For factory-wired sets, go off-hook, listen for dial tone, and depress the desired memory button. If WAIT input has been recorded, automatic dialing will stop. When second dial tone is heard, depress the memory button again to complete automatic dialing.
- (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the desired memory button.
- (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the desired memory button.

E. LAST NUMBER DIALED Feature

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

Note: If set is equipped with D-180818 Kit of Parts and dial intermix feature is provided, LAST NUMBER DIALED feature is functional only when the feature switch is in the OFF position.

- 5.06 Operation of LAST NUMBER DIALED feature as follows.

- (a) With no access digit(s) required:
 - (1) Go off-hook
 - (2) Listen for dial tone

- (3) Manually dial telephone number
- (4) To redial same number automatically, proceed as follows.
 - (a) For factory-wired sets, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button.
 - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
 - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the LAST NUMBER DIALED button.
- (b) When an access code and pause for second dial tone are required, proceed as follows:
 - (1) Go off-hook
 - (2) Listen for dial tone
 - (3) Dial access digit(s)
 - (4) Depress WAIT button
 - (5) Manually dial telephone number
 - (6) To redial same number automatically, proceed as follows.
 - (a) For factory-wired sets, go off-hook, listen for dial tone, and depress LAST NUMBER DIALED button. Automatic dialing will stop at the recorded *wait* input. When second dial tone is heard, depress LAST NUMBER DIALED button again to complete automatic dialing.
 - (b) For sets equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the LAST NUMBER DIALED button.
 - (c) For sets equipped with the one-touch calling option (with speakerphone and dial tone detector), depress the LAST NUMBER DIALED button.

F. End-to-End Signaling

5.07 For end-to-end signaling (such as data transmission) this set has the capability to intermix manual and automatic dialing. This can be accomplished if the following rules are observed:

Note: If the telephone set is to be used for end-to-end signaling, V option (with polarity guard) shall be used (Fig. 9B). Set is factory-wired with V option.

(1) If the telephone set is equipped with the one-touch calling option the initial number must be dialed automatically (even if the one-touch calling switch is in the OFF position). This allows the dial tone detector to complete its function and then additional numbers may be dialed automatically or manually if desired.

(a) **Standard Operation:** If, at any time, information is keyed in manually, the RECORD OFF button must be depressed before another number can be dialed from memory. (The RECORD lamp will not light at any time but depressing the RECORD OFF button will remove the set from the LAST NUMBER DIALED mode and allow additional automatic dialing.)

(b) **Dial Intermix (D-180818 Kit of Parts):** With the feature switch in ON position manually and automatically dialed digits may be intermixed as desired. Operation of the RECORD OFF button is not required.

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

6. MAINTENANCE

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

A. Trouble Analysis

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

- (1) Confirm improper operation either as a basic telephone set or as an automatic dialer (Part 5).

- (2) Check for improper connections.
- (3) Refer to Table H and the following paragraphs.
- (4) If removal of set is required, proceed as follows.
 - (a) Disconnect power unit from ac outlet and unplug battery.
 - (b) Disconnect telephone set.

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

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

B. Battery

6.03 The KS-20390L2 or KS-20390L4 battery has an expected life of about 4 years. It can be replaced without loss of memory provided that commercial ac power to the set is continuously maintained. To replace the battery, proceed as follows (Fig. 7):

- (1) Tilt the front of the set up
- (2) Unplug the battery
- (3) Loosen captive screw on the battery support
- (4) Remove battery support
- (5) Remove battery
- (6) Install new battery
- (7) When battery has been connected at least five minutes, check memory retention by momentarily disconnecting ac power and then automatically dialing a prerecorded telephone number.

C. Memory

6.04 The memory may be replaced as follows.

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

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

- (2) Remove the faceplate (paragraph 3.19).
- (3) Loosen the four captive memory mounting screws (Fig. 4).
- (4) Rotate the left edge of the memory upward as shown in Fig. 5.
- (5) Disengage the two connectors by pulling on them perpendicular to the printed wiring board and disconnect D-kit switch leads after noting connections.
- (6) Replace the memory by engaging the dial connector first. The dial connectors are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply cable should not be twisted. It should form a loop as shown in Fig. 5 when connected to the board. Reconnect D-kit switch leads.
- (7) Reassemble telephone set.
- (8) Reconnect battery and power unit.
- (9) Test per paragraph 3.06.
- (10) Reprogram memory (see Part 5).

D. Dial

6.05 Replace dial as follows.

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

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

- (2) Proceed per paragraph 3.18.
- (3) Loosen the four captive Memory mounting screws (Fig. 4).
- (4) Gently raise the left side of the Memory and rotate to position shown in Fig. 5. This will expose 10-position dial connector.
- (5) Carefully disengage the dial connector by pulling on it perpendicular to the printed wiring board.
- (6) Lift the dial out.
- (7) To install a new dial, reverse the previous steps. The connectors are keyed to orient them

relative to the pins. Observe the correct orientation and do not force the connection.

- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

E. Ringer

6.06 Replace ringer as follows.

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

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

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect ringer leads (Fig. 9H).
- (6) Tilt the front of the set up.
- (7) Loosen ringer mounting screws (Fig. 7).
- (8) Remove ringer.
- (9) Install new ringer. The leads should be routed as shown in Fig. 3 to prevent contact with the gong and subsequent damping of the ringer output. Dial ringback code to test ringer.
- (10) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (11) Reconnect battery and power unit.
- (12) Reprogram memory (see Part 5).

F. Buzzer (Optional)

6.07 Replace buzzer as follows.

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

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

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Loosen buzzer mounting screw, and remove buzzer.
- (6) Remove buzzer leads from the terminal board.
- (7) Install new buzzer.
- (8) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (9) Reconnect battery and power unit.
- (10) Reprogram memory (see Part 5).

G. Handset Jack (616B)

6.08 Replace handset jack as follows.

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

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

- (2) Remove the faceplate (paragraph 3.19) and place handset aside.
- (3) Remove upper housing, if provided [paragraph 3.21(b)].
- (4) Remove the cradle (paragraph 3.20).
- (5) Disconnect the handset jack leads and remove jack.
- (6) Install new 616B handset jack.
- (7) Reassemble telephone set [paragraphs 3.20, 3.21(b), and 3.19].
- (8) Reconnect battery and power unit.
- (9) Reprogram memory (see Part 5).

H. Handsets

- 6.09 A defective G15A handset may be replaced or changed to a modular amplifying handset

(G6BM, G7BM, or G8BM) by unplugging the H4DU cord and inserting it into the new handset. To replace the G15A handset with a nonmodular amplifying handset (G6B, G7B, or G8B), proceed as follows.

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

Note: Removal of ac and battery power results in the loss of stored numbers.
- (2) Unplug H4DU handset cord at telephone set end.
- (3) Remove faceplate (paragraph 3.19) and place handset aside.
- (4) Remove upper housing, if provided [paragraph 3.21(b)].
- (5) Remove handset cradle (paragraph 3.20).
- (6) Disconnect 616B handset jack (paragraph 6.08). (Jack may be removed or stored just to right of ringer.)
- (7) Insert spade-tipped end of handset cord through hole in the side of the housing.
- (8) Attach stayband hook to chassis (Fig. 3).
- (9) Route leads through wire guide as shown in Fig. 3.
- (10) Make connections (Fig. 9H).
- (11) Reassemble telephone set [paragraph 3.20, 3.21(b), and 3.19].

(12) Reconnect battery and power unit.

(13) Reprogram memory (see Part 5).

I. Faceplates

6.10 To replace a 2870A2-87 faceplate with a 2870B1-type faceplate, proceed as follows.

- (1) Remove the 2870A2-87 faceplate by lifting up at any of its edges.
- (2) Remove the four captive housing screws (Fig. 2) from the chassis.
- (3) Use the four housing screws to mount the 870A1U upper housing to the chassis and 870A1 housing. The three parts should be held tightly together as the screws are driven.
- (4) Place the two tabs located along the lower edge of the 2870B1 faceplate in the notches in the lower side of the 870A1U upper housing.
- (5) Lower the faceplate to rest on the memory. The spring clip located at the top center of the upper housing should retain the faceplate.

J. Speakerphone

6.11 For maintenance information on the 3-type (MD) or 4A speakerphone systems, refer to Section 512-620-100 or 512-700-100, respectively.

6.12 For speakerphone connections, use applicable Tables B through E.

♦TABLE B♦

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT							
		DESIG	COLOR		REMOVE FROM PSB	FROM		TO				
						TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
						PSB	TB		PSB	55A	55B	
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1					
		T	W-BL				2					
		A1	O-W				4					
		A	W-O				5					
		AC1	G-W				6					
		AC2	W-G				7					
	623P6 Jack Assy (2870A2M) †	Spare	W									
		A	BK									
		R	R									
		T	G									
		A1	Y									
		Spare	BL									
	Speakerphone Interconnection Cord D6AD-87	R1	BL-W		11					28	10	
		T1	W-BL		2					19	1	
		LK	G-W		33					11	35	
		A1	O-W			2				12	2	
		SPO	W-O		34					‡	‡	
		AG	W-G			1				5	11	
		Strap	BK		10					‡		
		Strap	BK		20					‡		
	D-180492 Kit of Parts		CE	BL-BK						10		
DB+			BK-BL						15			
SHa			R-BL						32			
LK			BL-R						33			
SHi			G-W						18			
PFR			BL-V						20			
VDD			W-G						21			
666B (MD) Trmtr	T7A Cord	M1	S-BK						4	7		
		P1	BL-R						13	8		
		-15V	BK-S						14	16		
		S	O-BK						3	18		
		A1	Y-O						29	19		
		F1	G-Y						2	17		
		LK	BK-O						11	35		

See note and footnotes at end of table.

TABLE B (Contd)

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 3B (MD) SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT						
		DESIG	COLOR		FROM		TO				
					TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
					PSB	TB		PSB	55A	55B	
760A (MD) LSPK	R2FK Cord	SP1	G						34	20	
		SP2	R						33¶	29¶	
95B1 Power Unit (2870A1M)	D-Station Wire	AC1					6				
		AC2					7				
95B1 Power Unit (2870A2M)*	M2SL-87 Cord	AC1	Y					30§			
		AC2	BK					31§			
2012B (MD or 2012D) Transf *	D-Station Wire	AC1							27	27	
		AC2							36	36	

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B). If a 55A control unit is used it must be modified for use with TOUCH-TONE telephone set. Control units having this modification are stamped 55A* (Modified).

* Both 2012-type transformer and 95B1 power unit must be connected for speakerphone operation.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ Insulate and store.

§ Connected at factory.

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

TABLE C

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,
[DIAL TONE DETECTOR AND 3B (MD) SPEAKERPHONE]

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT							
		DESIG	COLOR		REMOVE FROM PSB	FROM		TO				
						TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
						PSB	TB		PSB	55A	55B	
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1					
		T	W-BL				2					
		A1	O-W				4					
		A	W-O				5					
		AC1	G-W				6					
		AC2	W-G				7					
	623P6 Jack Assy (2870A2M)§	Spare	W									
		A	BK									
		R	R									
		T	G									
		A1	Y									
		Spare	BL									
	Speaker- phone Intercon- nection Cord D6AD-87	R1	BL-W		11					28	10	
		T1	W-BL		2					19	1	
		LK	G-W		33					11	35	
		A1	O-W			2				12	2	
		SPO	W-O		34					3	18	
		AG	W-G			1				5	11	
		Strap	BK	10								
		Strap	BK	19								
		Strap	BK	20								
		Strap	BK	26								
		Strap	BK	29								
	D-180493 Kit of Parts	Dial Tone Detector	Input	G-R						2		
			PB	O-BK						9		
			Input	G-R							11	
			LK	Y-G							33	
DT			O-Y							19		
VDD			R-O							21		
DR			Y-O							24		
PL			O-R							25		
DTT			BL-Y							26		
SPR			Y-BL							27		
COM			BK-O							29		
SPO	G-Y							34				

See note and footnotes at end of table.

†TABLE C (Contd)‡

**CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING,
[DIAL TONE DETECTOR AND 3B (MD) SPEAKERPHONE]**

APPARATUS		CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT						
			DESIG	COLOR		FROM		TO				
						TEL SET		44-TYPE BLOCK TERM.	TEL SET		CONTROL UNIT (SEE NOTE)	
						PSB	TB		PSB	55A	55B	
D-180493 Kit of Parts (Contd)	Switch*		S1	S					28			
			S2	S					29			
D-180492 Kit of Parts			CE	BL-BK					10			
			DB+	BK-BL					15			
			SHa	R-BL					32			
			LK	BL-R					33			
			SHi	G-W					18			
			PFR	BL-V					20			
			VDD	W-G					21			
666B (MD) Trmtr		T7A Cord	M1	S-BK						4	7	
			P1	BL-R						13	8	
			-15V	BK-S						14	16	
			S	O-BK						3	18	
			A1	Y-O						29	19	
			F1	G-Y						2	17	
			LK	BK-O						11	35	
760A (MD) LSPK		R2PK Cord	SP1	G						34	20	
			SP2	R						33**	29**	
95B1 Power Unit † (2870A1M)		D-Station Wire	AC1					6				
			AC2					7				
95B1 Power Unit † (2870A2M)		M2SL-87 Cord	AC1	Y					30 ‡			
			AC2	BK					31 ‡			
2012B (MD) or 2012D Trnsf †		D-Station Wire	AC1							27	27	
			AC2							36	36	

Note: Strap terminals 20 and 21 (55A) or 4 and 5 (55B). If a 55A control unit is used it must be modified for use with TOUCH-TONE telephone set. Control units having this modification are stamped: 55A* (Modified).

* One-touch calling switch must be set to ON position.

† Both 2012-type transformer and 95B1 power unit must be connected for speakerphone operation.

‡ Connected at factory.

§ Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

¶ Insulate and store.

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

♦TABLE D♦

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO				
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER	
					PSB	TB			
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1		
		T	W-BL				2		
		A1	O-W				4		
		A	W-O				5		
		AC1	G-W				6		
		AC2	W-G				7		
	623P6 Jack Assy (2870A2M)†	Spare	W						
		A	BK						
		R	R						
		T	G						
		A1	Y						
		Spare	BL						
		Strap	BK		10	¶			
		Strap	BK		20	¶			
D-180492 Kit of Parts		CE	BL-BK				10		
		DB+	BK-BL				15		
		SHa	R-BL				32		
		LK	BL-R				33		
		SHi	G-W				18		
		PFR	BL-V				20		
		VDD	W-G				21		
223D Adapter	M16H Cord ‡	AC	R-G				¶		
		AC	G-R				¶		
		LK	O-W				33		
		Spare	O-R				¶		
		Spare	R-O				¶		
		K5M	BR-W				¶		
		IT	W-G				¶		
		IR	G-W				¶		
		T1	W-BL				2		
		R1	BL-W				11		
		K4C	S-W				¶		
		K5C	W-S				¶		
		K4B	BL-R				¶		
		K5B	R-BL				¶		
		AG	W-O					1	
		A1	W-BR					2	

See footnotes at end of table.

♦TABLE D (Contd)♦

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH 4A SPEAKERPHONE ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO				
		DESIG	COLOR		REMOVE FROM PSB	TEL SET		44-TYPE BLK TERM.	223D ADAPTER
						PSB	TB		
95B1 Power Unit (2870A1M)*	D-Station Wire	AC1					6		
		AC2					7		
95B1 Power Unit (2870A2M)*	M2SL-87 Cord	AC1	Y		30**				
		AC2	BK		31**				
680-Type Trmtr	D8S Cord							Plugs into adapter	
108-Type LSPK	D20N Cord								
85B1 PWR Unit*	M2FC Cord‡	AC	BK						
		AC	Y						

* Both 85B1 and 95B1 power unit must be connected for speakerphone operation.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ To provide strain relief, the S-hook of the M16H cord shall be retained by the screw in the telephone set already used to retain the D6AD-87 cord (2870A1M) or the M2SL-87 cord (2870A2M).

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

¶ Insulate and store.

** Connected at factory.

TABLE E4

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO				
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER	
					PSB	TB			
Telephone Set	Mtg Cord D6AD-87 (2870A1M)	R	BL-W				1		
		T	W-BL				2		
		A1	O-W				4		
		A	W-O				5		
		AC1	G-W				6		
		AC2	W-G				7		
		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		
P1			O-R				25		
DTT			BL-Y				26		
SPR			Y-BL				27		
COM			BK-O				29		
SPO			G-Y				34		
Switch*			S1	S				28	
		S2	S				29		
D-180492 Kit of Parts		CE	BL-BK				10		
		DB+	BK-BL				15		
		SHa	R-BL				32		
		LK	BL-R				33		
		SHi	G-W				18		

See footnotes at end of table.

TABLE E (Contd)†

**CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH ONE-TOUCH CALLING
(DIAL TONE DETECTOR AND 4A SPEAKERPHONE)**

APPARATUS	CORD OR WIRE	LEAD		TEL SET REMOVE FROM PSB	CONNECT TO			
		DESIG	COLOR		TEL SET		44-TYPE BLK TERM.	223D ADAPTER
					PSB	TB		
D-180492 Kit of Parts (Contd)		PFR	Bl-V		20			
		VDD	W-G		21			
223D Adapter	M16H Cord	AC	R-G		¶			
		AC	G-R		¶			
		LK	O-W		33			
		SPO	O-R		34			
		Spare	R-O		¶			
		K5M	BR-W		¶			
		IT	W-G		¶			
		1R	G-W		¶			
		T1	W-BL		2			
		R1	BL-W		11			
		K4C	S-W		¶			
		K5C	W-S		¶			
		K4B	BL-R		¶			
		K5B	R-BL		¶			
		AG	W-O			1		
		A1	W-BR			2		
95B1 Power Unit (2870A1M) †	D-Station Wire	AC1					6	
		AC2					7	
95B1 Power Unit (2870A2M) †	M2SL-87 Cord	AC1	Y		30**			
		AC2	BK		31**			
680-Type Trmtr	D8S Cord						Plugs into adapter	
180-Type LSPK	D20N Cord							
85B1 PWR Unit †	M2FG §	AC	BK					
		AC	Y					

* One-touch calling switch must be set to ON position

† Both 85B1 and 95B1 power unit must be connected for speakerphone operation.

‡ Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

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

¶ Insulate and store.

** Connected at factory.

TABLE F4

CONNECTIONS — 2870A1M (MD) OR 2870A2M TELEPHONE SET WITH
DIAL TONE DETECTOR ONLY

APPARATUS	CORD OR WIRE	LEAD		TEL SET	CONNECT TO		
		DESIG	COLOR	REMOVE FROM	TEL SET	44-TYPE BLK TERM.	
				PSB	PSB		
Telephone Set	Mtg Cord P6AD-87 (2870A1M)	R	BL-W			1	
		T	W-BL			2	
		A1	O-W			4	
		A	W-O			5	
		AC1	G-W			6	
		AC2	W-G			7	
		623P6 Jack Assy (2870A2M)†	Spare	W			
	A		BK				
	R		R				
	T		G				
	A1		Y				
		Spare	BL				
		Strap	BK	19	‡		
		Strap	BK	26	‡		
D-180493 Kit of Parts	Dial Tone Detector	Input	G-R			2	
		PB	O-BK			9	
		Input	G-R			11	
		LK	Y-G			‡	
		DT	O-Y			19	
		VDD	R-O			21	
		DR	Y-O			24	
		PL	O-R			25	
		DTT	BL-Y			26	
		SPR	Y-BL			‡	
		COM	BK-O			29	
		SPO	G-Y			‡	
		Switch*	S1	S			‡
	S2		S			‡	
95B1 Power Unit (2870A1M)	D-Station Wire	AC1				6	
		AC2				7	
95B1 Power Unit (2870A2M)	M2SL-87 Cord	AC1	Y		30§		
		AC2	BK		31§		

* Switch not used for this option.

† Accepts D4BU or D6AM mounting cord which connects set to modular connecting block.

‡ Insulate and store.

§ Connected at factory.

TABLE G
CONNECTIONS FOR D-180818 KIT OF PARTS

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

Note 1: These posts are on the 2870B Memory PWB (Fig. 5).

Note 2: These are connectors attached to the switch leads. A single position connector with a (BK) lead and a double position connector with a (R) and (BK) lead.

Note 3: When this option is provided the LAST NUMBER DIALED (LND) feature is disabled and the 32nd memory may be used just like any other memory.

* Single position connector.

† Insulate and store.

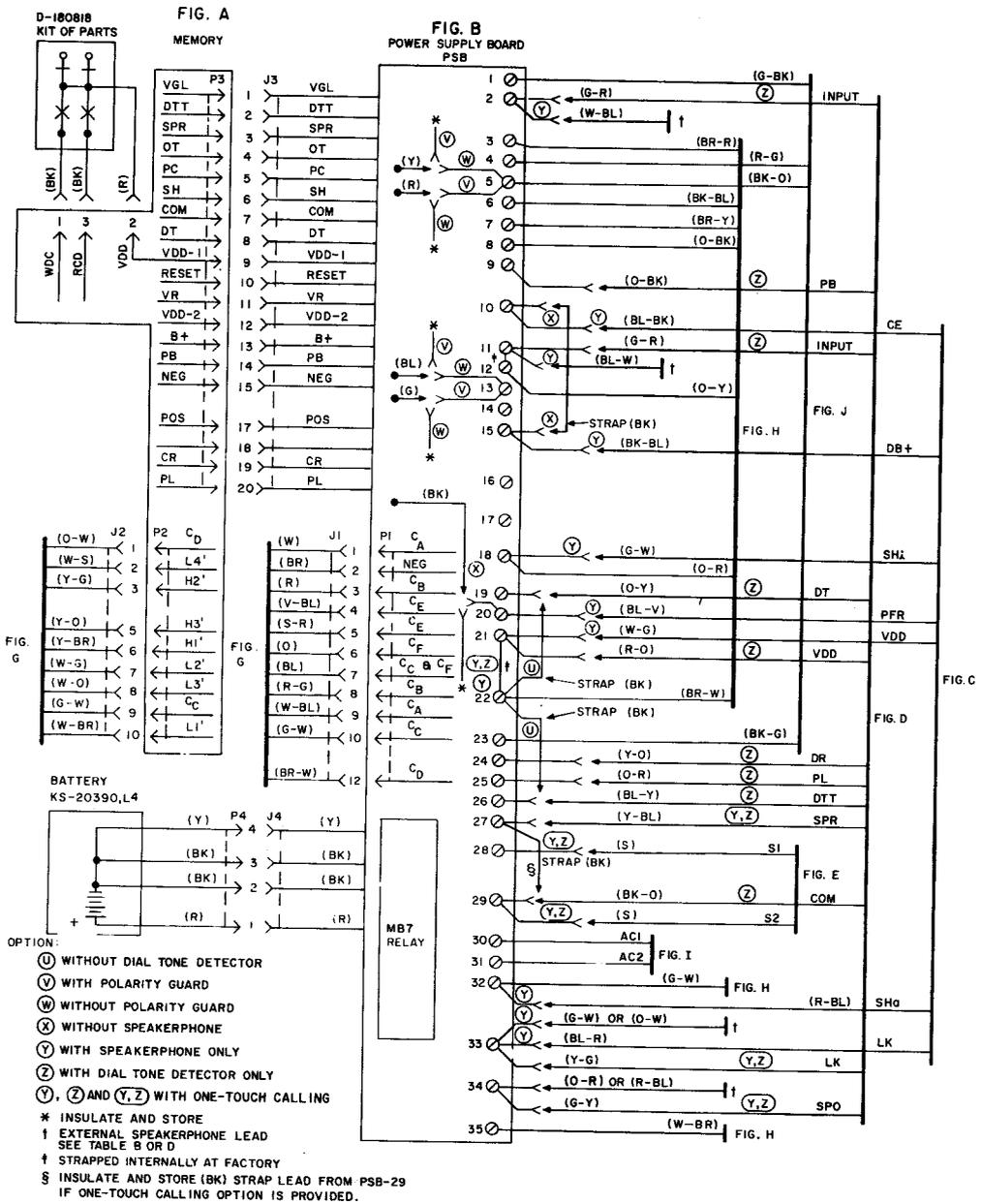


Fig. 9—Telephone Set, Connections (Sheet 1 of 4)

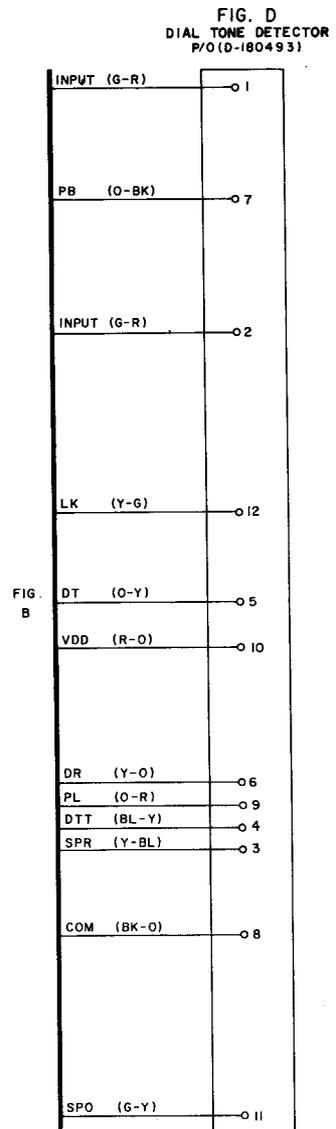
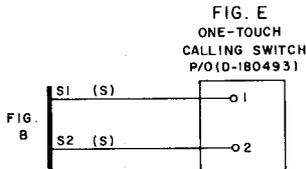
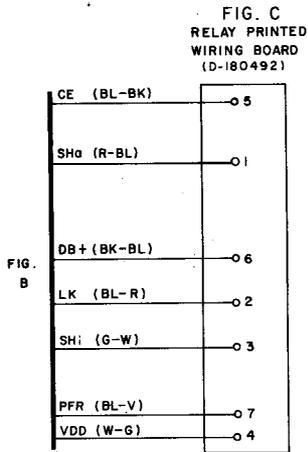


Fig. 9—Telephone Set, Connections (Sheet 2 of 4)

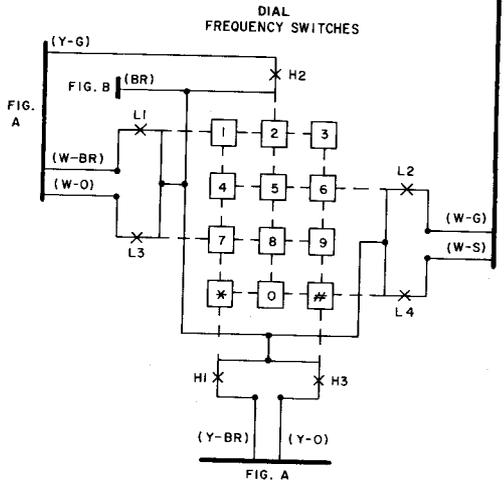
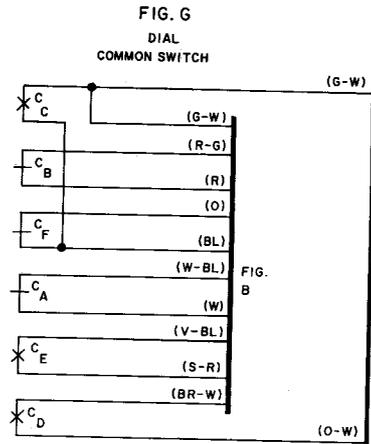
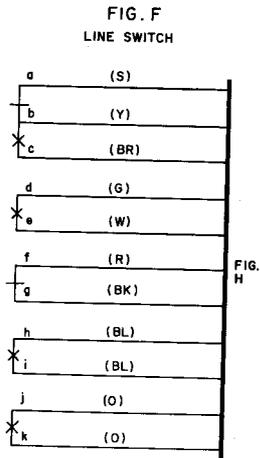


Fig. 9—Telephone Set, Connections (Sheet 3 of 4)

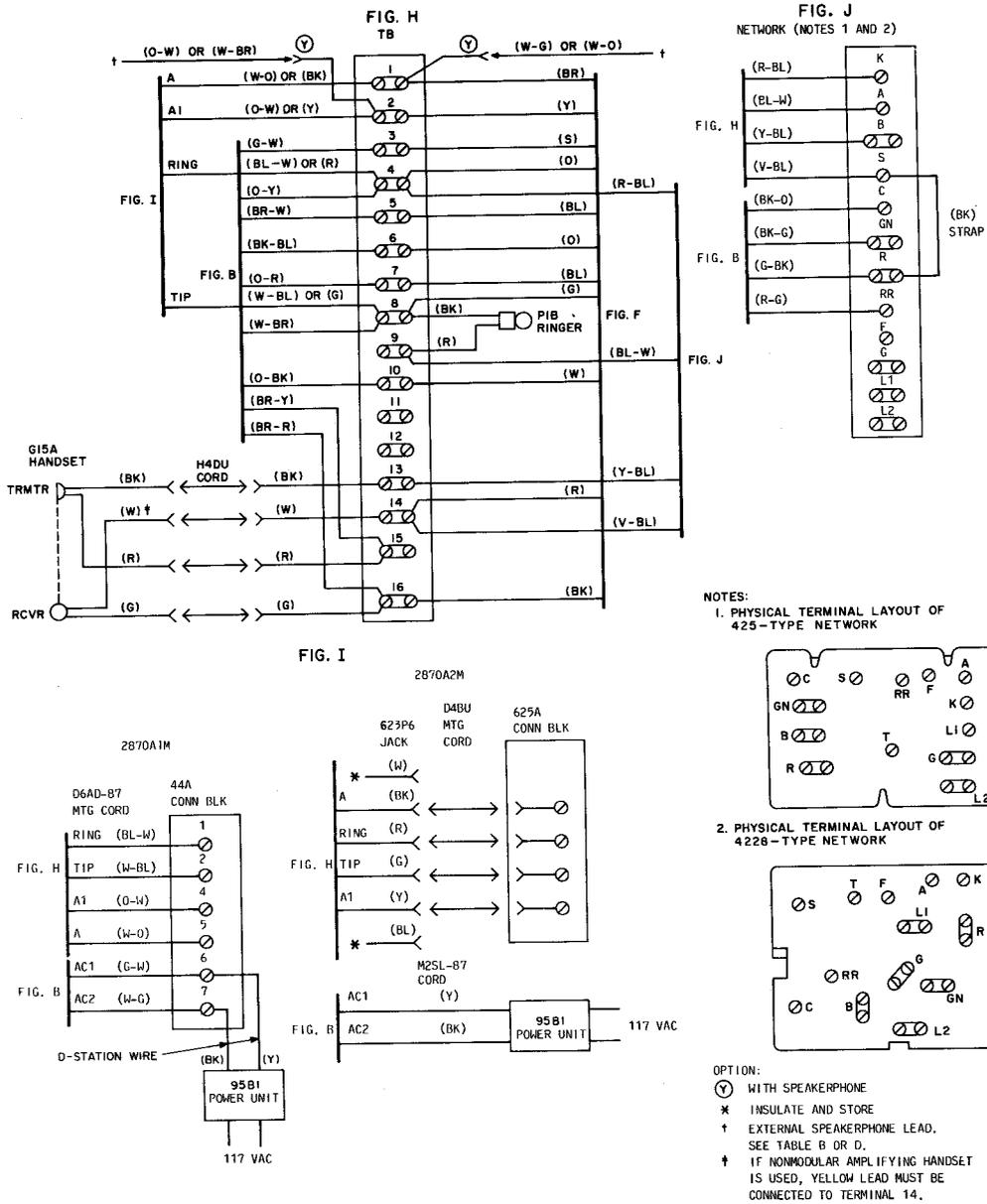


Fig. 9—Telephone Set, Connections (Sheet 4 of 4)

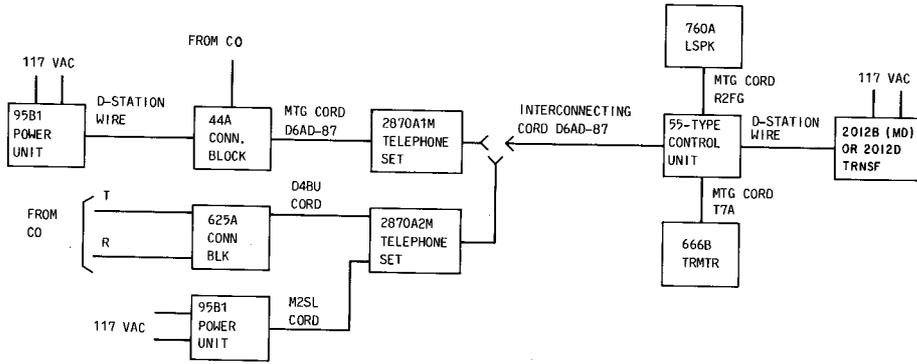


Fig. 10—Block Diagram—Telephone Set With 3-Type (MD) Speakerphone

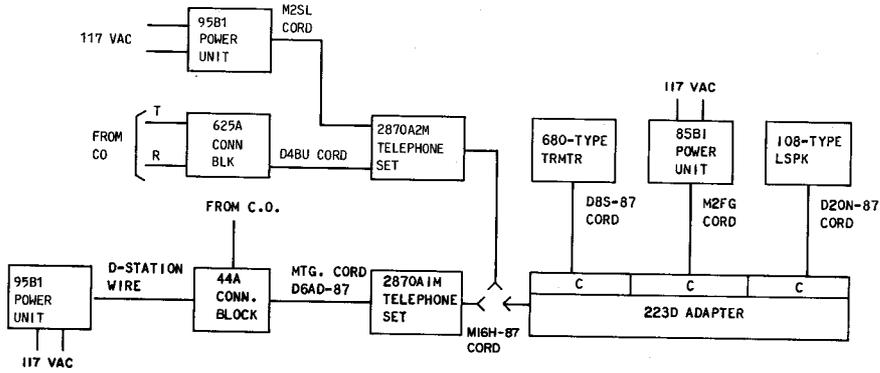


Fig. 11—Block Diagram—Telephone Set With 4A Speakerphone

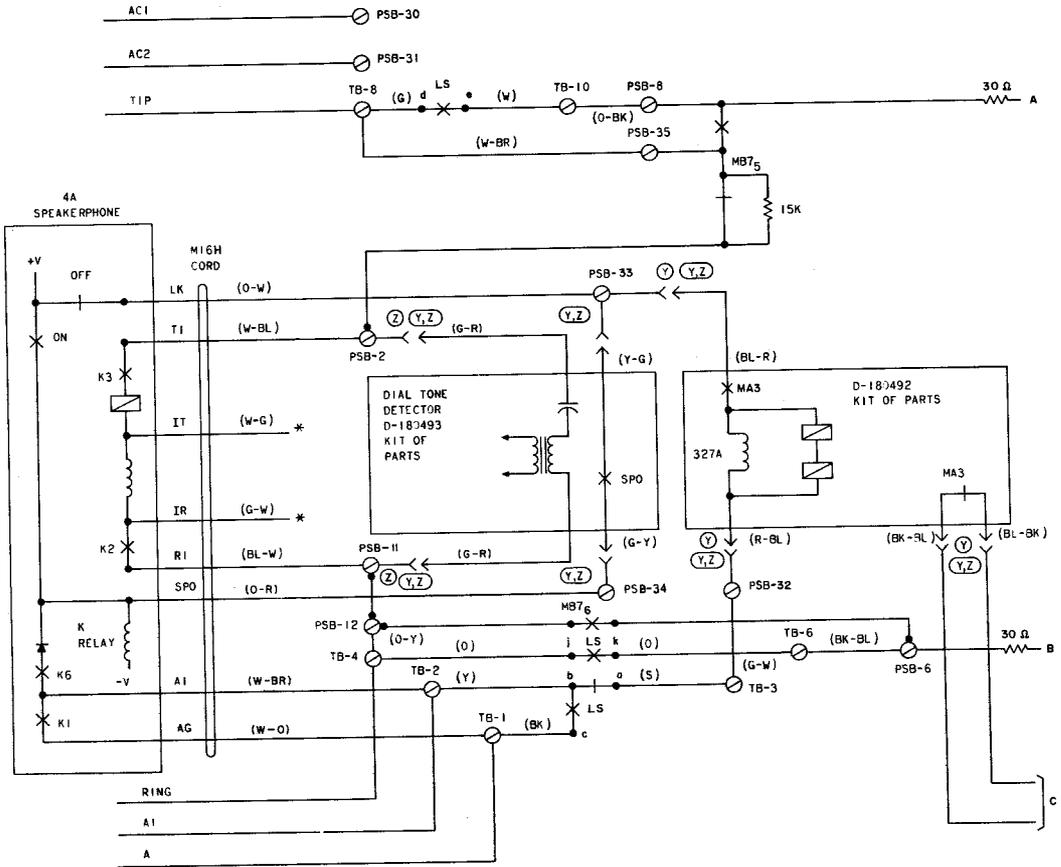


Fig. 12—Telephone Set—Partial Functional Schematic (Sheet 1 of 2)

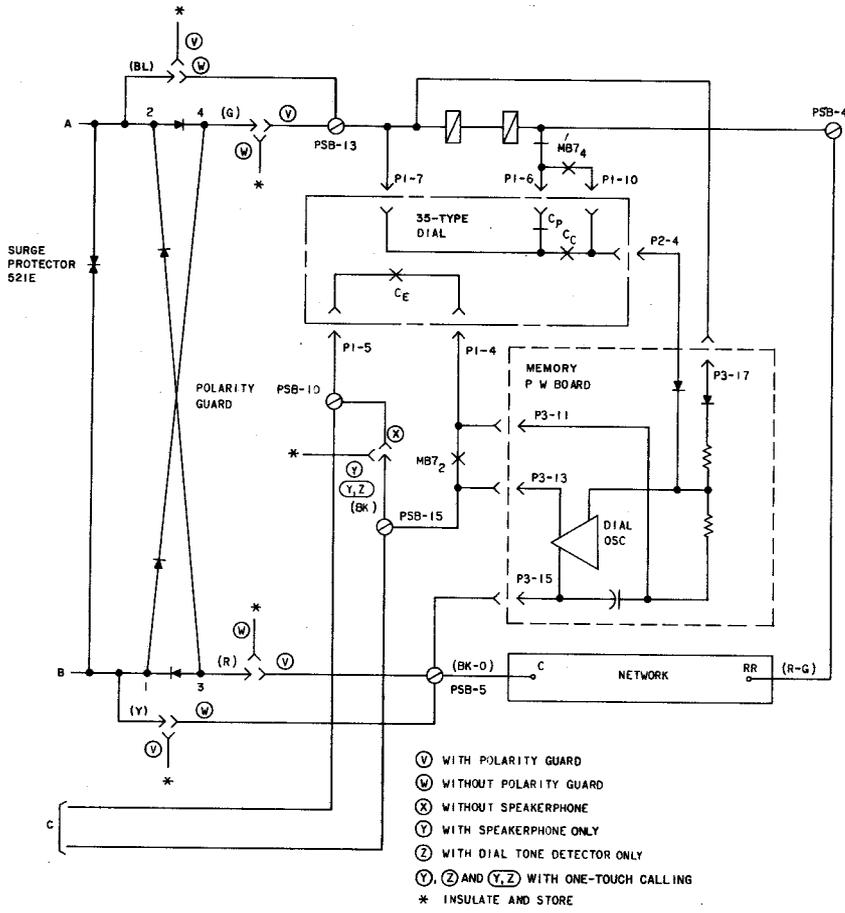


Fig. 12—Telephone Set—Partial Functional Schematic (Sheet 2 of 2)

TABLE H

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
1	Dead Set		Mounting cord improperly connected at equipment end	Check mounting cord connections
			Bad connection between handset and telephone set	1. Check handset cord connections 2. Check handset jack connections
			Defective receiver	Check handset
			Unknown	Replace telephone set*
		Dial tone is not present when speakerphone is on	Open tip or ring lead	Check leads
	Dial tone is present when speakerphone is on	Defective line switch d-e or j-k contacts	Replace telephone set*	
2	Cannot transmit or receive when off-hook using handset		Handset cord improperly inserted into handset or jack in telephone set	Check handset cord and/or handset
		Dial tone present, sidetone absent. No audible TOUCH-TONE dialing signal	12-pin connector or dial not properly inserted on pins on power supply board	1. Check connector insertion 2. Replace dial
			Defective 616B jack	Replace 616B jack
			Defective network	Replace telephone set*
3	Cannot manually dial when off-hook	Clicking sounds or damped TOUCH-TONE dialing signals heard when dial buttons are depressed. Cannot hang up set.	Bridged set off-hook	Place bridged set on-hook
		No audible TOUCH-TONE dialing signal present	20-pin power supply connector not properly inserted on pins on Memory PWB	Check connector insertion
			Dial connectors not properly inserted	1. Check connector insertion 2. Replace dial
			Defective Memory PWB	Replace Memory
			Unknown	Replace telephone set*
	Some TOUCH-TONE dialing frequencies incorrect	Static discharge damage	1. Contact TELCO Engineer for proper grounding procedure 2. Replace Memory	

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
4	Cannot manually dial some digits when off-hook		Open or loose leads to dial contacts	Check for proper insertion of leads into 10-position dial connector
			Defective frequency contacts on dial	Replace dial
			Defective Memory PWB	Replace Memory
			Unknown	Replace telephone set*
5	Cannot manually dial off-hook for ac power failure condition	Can manually dial off-hook with ac power on	Open strap lead between screw terminals 10 and 15 on PSB	Repair or replace strap lead
			Open path on PSB	Replace telephone set*
6	RECORD lamp does not function properly	RECORD lamp does not turn on when RECORD button is depressed or RECORD lamp is on and cannot be turned off	Battery not plugged in or defective	Plug in or replace battery
		RECORD lamp does not turn on when RECORD button is depressed	AC power not present	Check for commercial power
			Feature switch of D-180818 Kit of Parts in ON position	Change feature switch position to OFF
			AC power unit not plugged in or defective	Check or replace power unit (should read 13.4 to 18 V ac across screw terminals 30 and 31 on PSB)
			Open in IW	Check IW and connections
			Memory, RECORD OFF or WAIT button stuck down	Clear stuck button
			Defective lamp or lamp driver circuit	Replace Memory
			Static discharge damage	1. Consult TELCO engineer for proper grounding procedure 2. Replace Memory
			Unknown	Replace telephone set*

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Contd)		Record lamp flashes or lights erratically	Battery plug not connected	Connect battery plug
			Unknown	Replace telephone set*
		Lamp turns off, flashes, or lights erratically when any memory button is depressed or Lamp does not momentarily turn off when a dial button is depressed	Defective logic	Replace Memory
			Unknown	Replace telephone set*
7	Cannot record into memory	RECORD lamp momentarily flashes when RECORD button is depressed	Stuck RECORD OFF button	Check RECORD OFF button
			WAIT contacts closed even when WAIT button is not depressed	1. Check WAIT button 2. Replace Memory
8	Cannot record properly into the 31 memory positions or into the LAST NUMBER DIALED position	Warble tones heard when automatically dialing. Get "cannot complete" intercept for automatic or manual dialing	WAIT contacts closed even when WAIT button is not depressed	Replace Memory
			Party is reached when number is recorded as it is manually dialed. However, when number is subsequently dialed from memory, party is not reached—wrong number is dialed from memory	Feature switch of D-180818 Kit of Parts in ON position
			Incorrect dial contact sequence	Replace dial
			Defective logic	Replace Memory
		Open circuit on PSB	Replace telephone set*	

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION	
9	Cannot dial properly from memory		Did not record properly	1. Record per paragraph 5.01 2. See trouble No. 7	
		MB7 relay does not operate (no clicking sound heard) when memory button is depressed. No audible TOUCH-TONE dialing signal present	Battery plug not connected	Connect battery plug	
			Memory not securely mounted	Tighten Memory mounting screws	
			Open circuit in power path	Check for proper strap lead connections on PSB. See Fig. 9(B).	
			Defective logic	Replace Memory	
			Defective line switch h-i contacts	Replace telephone set*	
		MB7 relay operates (clicking sound heard) but holds for less than 0.1 second for a 15 digit number	Incorrect dial sequence	Replace dial	
					No audible TOUCH-TONE dialing signal present
					Audible gap in train of digits being dialed
		Digit dialed too rapidly (fast dialer)	Noise on ac power line (2870A1M tel set)	Minimize wire length between 95B1 power unit and telephone set	
Defective power supply PWB assembly (2870A2M)	Replace telephone set*				

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Contd)		No digits or random digits in memory	An ac power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory
			Disconnected or defective battery	<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 95B-type power unit from the ac power outlet and reinsert 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure
			Defective power supply circuit	Replace telephone set*
		No digits or all the same digits in random memory locations	Defective Memory	Replace Memory
		Two or more memory locations have some digits which are usually different from originally recorded digits	Static discharge damage	<ol style="list-style-type: none"> 1. Consult your TELCO engineer for proper grounding procedures 2. Replace Memory
Automatically dials through a "wait" after pausing momentarily at the "wait" space on a train of recorded digits	Defective WAIT contacts or defective circuit components	<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 paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
11 (Cont)		Speakerphone indicator lamp does not turn on	Improper connections or defective speakerphone power unit	<ol style="list-style-type: none"> 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 output. (85B1 power unit, 18 to 25 V ac across secondary screw terminals) [2012B (MD) or 2012D transformer, 15 to 18 V ac across secondary screw terminals].
			Improper connections or defective 95B1 power unit	<ol style="list-style-type: none"> 1. Check connections 2. Check or replace 95B1 power unit (should read 13.4 to 18 V ac 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 line switch a-b contacts	Replace telephone set*
		With temporary strap added between screw terminals TB-3 and PSB-32, speakerphone turns on when ON button is depressed	Open lead between TB-3 and PSB-32	Replace (G-W) lead between TB-3 and PSB-32
			Defective speakerphone	See appropriate speakerphone BSP
12	Cannot turn speakerphone off when handset is lifted off-hook (Wired for speakerphone option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Short circuit between screw terminals 2 and 3 on TB	Clear short
			Defective line switch a-b contacts	Replace telephone set*

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
13	RECORD lamp does not turn off when speakerphone ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on	Handset off-hook	Place handset on-hook
		With temporary strap added between screw terminals 32 and 33 on PSB, speakerphone turns on when ON button is depressed	Improper connections or defective LK relay circuit on D-180492 Kit of Parts	1. Check connections 2. Replace D-180492 Kit of Parts
		Operation of RECORD OFF button turns RECORD lamp off	Defective line switch h-i contacts	Replace telephone set*
14	Cannot break dial tone when dialing with speakerphone on (Wired for speakerphone option)	Cannot manually dial when off-hook	Refer to trouble number 3	Refer to trouble number 3
		When dial button is depressed, audible level of TOUCH-TONE dialing signal is high on speakerphone	Defective muting circuit on PSB	Replace telephone set*
15	Cannot hear tones when dialing with speakerphone on (Wired for speakerphone option)	With the speakerphone ON button held depressed, the audible tone level is normal	Physical spacing between speakerphone loudspeaker and transmitter units is too close	See appropriate speakerphone BSP for proper placement of units
		Normal conversational level on speakerphone	Defective muting circuit on PSB	Replace telephone set*
16	Cannot turn speakerphone off (Wired for one-touch option)	Speakerphone turns off when OFF button is depressed but turns on when OFF button is released	Strap lead on screw terminal 29 on PSB was not removed when option was wired	Remove the strap lead from terminal 29 on PSB, insulate and store
		Speakerphone turns off and stays off when (Y-BL) lead is disconnected from terminal 27 on PSB and OFF button is depressed	Defective output logic level from Memory PWB	Replace Memory
		Speakerphone turns off when handset is taken off-hook but turns on when handset is placed on-hook	Defective circuit on D-180493 Kit of Parts	Replace dial tone detector board assembly of D-180493 Kit of Parts

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
17	Speakerphone does not turn on when a memory button is momentarily depressed in the automatic dialing mode (Wired for one-touch option)	MB7 relay does not operate (no click heard) when memory button is depressed	Battery plug not connected	Connect battery plug
		With temporary strap between screw terminals 28 and 29 on PSB, speakerphone turns on when a memory button is depressed	One-touch calling switch turned off or defective	1. Turn one-touch calling switch on 2. Replace one-touch calling switch assembly of D-180493 Kit of Parts
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
		With temporary strap between screw terminals 33 and 34 on PSB, speakerphone turns on.	Defective connections between dial tone detector and PSB	Check (Y-G) and (G-Y) leads to PSB terminals 33 and 34, respectively
			Defective dial tone detector D-180493 Kit of Parts	Replace dial tone detector PWB assembly of D-180493 Kit of Parts
18	Delay time between depression of a memory button and initiation of automatic dialing exceeds 3-seconds (Wired for one-touch option)		Defective timing circuit	1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts
19	Speakerphone turns on but set does not automatically dial when memory button is depressed (Wired for one-touch option)		Strap leads to screw terminals 19 and 26 on PSB were not removed when option was wired	Remove strap leads from terminals 19 and 26 on PSB, insulate and store
		Set dials when screw terminals 26 and 29 on PSB are temporarily shorted	Precise dial tone not present	1. Check CO line for presence of precise dial tone (350 Hz and 440 Hz) 2. If correct dial tone is present, replace dial tone detector PWB assembly of D180493 Kit of Parts
		Set does not dial from memory when screw terminals 26 and 29 on PSB are temporarily shorted	Defective logic	Replace Memory

TABLE H (Contd)

TROUBLE ANALYSIS – 2870A1M (MD) OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
20	Automatic dialing commences for no apparent reason (Wired for one-touch option)		Static discharge damage	1. Consult your TELCO engineer for proper grounding procedures 2. Replace Memory
21	Calls not completed if handset is removed too quickly while automatically dialing on a speakerphone	Automatic dialing is terminated before all digits are dialed	Marginal line switch sequence between a-b and h-i contacts	1. Remove handset more slowly from handset 2. Replace telephone set*
22	Set dials automatically but does not wait for dial tone (Wired for one-touch dialing)		Noise on line	1. Add 0.05 μ f capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10K-50K) in series with (G-R) dial tone detector input leads
23	Cannot dial properly from memory when on handset (Wired with dial tone detector option)	MB7 relay does not operate (no click heard) when memory button is depressed	Battery plug not connected	Connect battery plug
			Precise dial tone may not be present	Make sure precise (350 Hz and 440 Hz) dial tone is present
			Memory not securely mounted	Tighten Memory mounting screws
			Improper installation of dial tone detector, D-180493	Check connections for D-180493 installation
		Same as above — Addition of strap lead between PSB terminals 26 and 29 does not correct problem	Improper connection to or defective Memory	1. Check connector cable 2. Replace Memory
		Addition of strap lead between PSB terminals 26 and 29 corrects problem	Defective Memory	Replace Memory
			Defective dial tone detector	Replace D-180493 dial tone detector
Unknown	Replace telephone set*			
24	Hum or noise caused by electrical apparatus (light dimmer switch, etc)		Unbalanced telephone line	Check for unintentional connections that might cause an unbalanced telephone line

*Refer to paragraph 6.02(4).