2870A1M AND 2870A2M TELEPHONE SETS

TOUCH-A-MATIC® AUTOMATIC DIALER

CONTENTS	PAGE

1. GENERAL

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

1.02 This section is reissued to:

- Add D-180818 Kit of Parts

- Show 2870A2 faceplate MD

- Add 2870B1-type faceplate

- Add 870A1U upper housing

- Revise Table H

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 is provided the A and A1 leads must be disconnected, insulated,
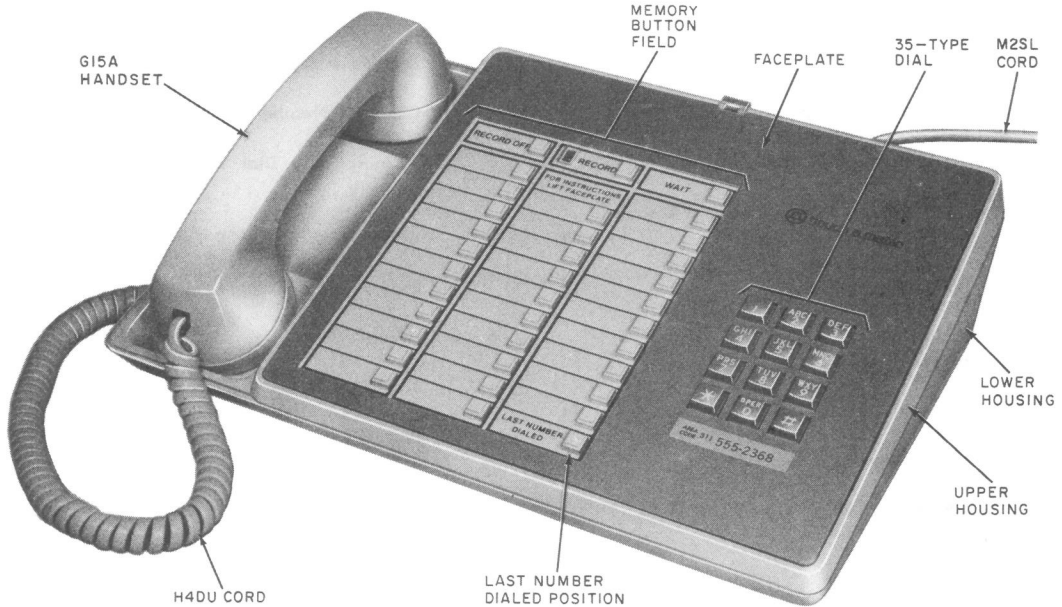
Fig. 1—2870A2M Telephone Set

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 and a M2SL-87 power cord installed with a 95B-type 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)

- Lt. Beige (-60)

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

- Teak Woodgrain (-108)

- 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 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 subsequent dial tones during automatic dialing (WAIT input)

- End-to-end signaling for data application.

2.03 *Optional Features (Refer to Table A).*

- Decorative Faceplate.

- Speakerphone: either 3B or 4A speakerphone systems may be added to stations.

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

- 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 dial tone (350 Hz and 440 Hz) if the call is to be completed automatically.

- Record Disable: turns off the recording feature to prevent accidental erasures of previously stored numbers.

- Dial Intermix: same as record disable feature plus.

  (a) Allows digits dialed from manual dial and from Memory to be intermixed without having to depress the RECORD OFF button (5.07).

(b) Disables the LAST NUMBER DIALED feature.

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

● Set, Telephone, 2870A2M-* E/W 2870B1-122 faceplate

(b) *Ordered Separately:*

● Unit, Power, 95B1 or 95B2 (2870A1M)

Note: A 95B-type power unit is required for each telephone set.

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

(c) *Modular Components:*

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

● Housing, 870A1-*

● Housing, upper, 870A1U-* (used with 2870B1 faceplate)

● Faceplate, 2870B1-122 (matte aluminum)

● Handset, G15A-*

● Cord, Handset, H4DU-*

● Base, Telephone Set, 2870A2M includes the following:

Dial, 35AG3A

Ringer, P1B

Network

Battery, KS-20390L4 or KS-20390L2

Jack, Handset, 616B

Jack Mounting Cord, 623P6 (2870A2M only)

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

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

Memory, 2870B

840393672 Directory Sheet Set

Subscriber Instruction Booklet, SIB-2455B.

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

● Faceplate 2870B1:

   (a) Teak Woodgrain (-108)

   (b) 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)

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
		223D Adapter	10	D, E
		85B1 Power Unit	10	D, E
		D-180492 Kit of Parts	8 C	D, E
	3B (MD)	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 (3.11)		623P6 Jack, 95B-Type Power Unit D4BU Cord, M2SL Cord		
Buzzer (3.10)		KS-20419L1 Buzzer		
Amplifying Handsets (6.09)		G6, G7, or G8-Type Handset	8 H	
Dry Circuit (without Polarity Guard)			8 D	
Decorative Faceplate		2870B1-108 (Teak Woodgrain)		
		2870B1-109 (Walnut Woodgrain)		
Record Disable (3.09)		D-180818 Kit of Parts (Note)	8 A	G
Dial Intermix (3.09)				
Head Telephone Set Operation (3.13)		Pantronics Jackset Model JS180-1 or JS180-2	Tables provided for Plantronics Jackset	
		Desired Head Telephone Set		

Note 1: If set is equipped with 2870A Memory, it must be replaced with a 2870B Memory.

* 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.

- Buzzer, KS-20419L1

- Handset, Amplifying (G6-*, G7-*, or G8-* type)

- Set, Head Telephone [using Plantronics Jackset Model JS180-1 (2-foot cord) or JS180-2 (7-foot cord)]

*Add appropriate color suffix (1.06 or 1.07).

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 array, when momentarily depressed, automatically redials the last number manually dialed.

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

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

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

3. INSTALLATION

STANDARD INSTALLATION

3.01 Make all wiring changes and optional modifications (Table A) before external connections are made to the set (Fig. 8).

> *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 2870A2M the 95B-type power unit is factory-wired to PSB terminals 30 and 31 via the M2SL-87 cord.

(2) For the 2870A1M, install the 95B-type 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 in the mounting cord. Alternatively 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.

> *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) Plug the power unit into an ac outlet not controlled by a switch (continues ac power is required). A retaining clamp (841050818) will be shipped with the 95-type power unit and should be mounted to the ac receptacle to hold power unit securely and prevent accidental loss of power.

> *Danger: Securely attach 841050818 or similar retaining clamp to ac outlet using outlet cover screw before attempting to install 95B-type 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 clamp. Do not use 841050818 or similar retaining clamp on outlets where center mounting screw holds the duplex outlet in the box.*

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).
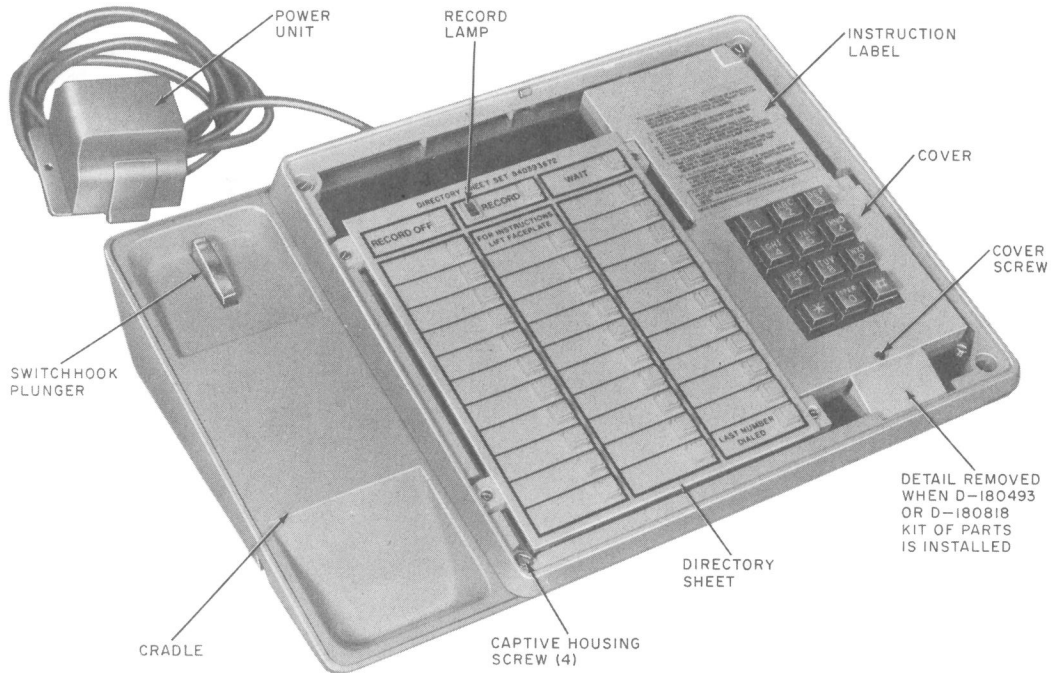
Fig. 2—Telephone Set—Faceplate and Handset Removed

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 [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.

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.

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SWITCHHOOK
ASSEMBLY

TERMINAL
BOARD

PIB RINGER

BUZZER
MOUNTING
SCREW

616B
HANDSET
JACK

ATTACH STAYBAND
OF NONMODULAR
HANDSET CORD

KS-20419LI
BUZZER
(OPTIONAL)

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

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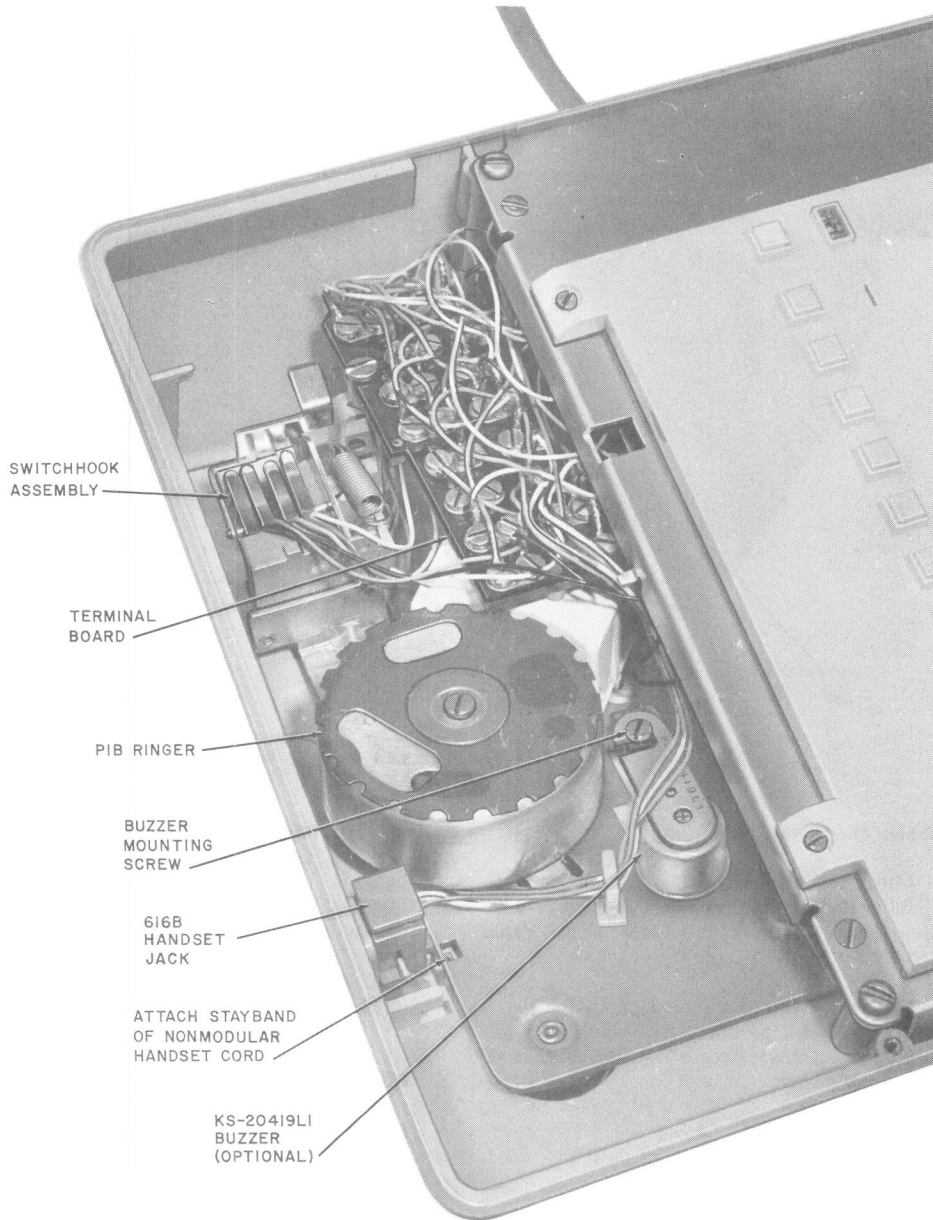
The battery and the power unit must be connected a minimum of five minutes before doing Step (c).

(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

D-180492 Kit of Parts (With Speakerphone)

3.07   To install.

(1) Proceed as described in 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.

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

3.08   To install.

(1) Remove the housing (3.21), and access PSB terminal board (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, E, or F.

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

(7) Verify correct operation of option.

(8) Reassemble self.

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

3.09   To install.

(1) Remove faceplate (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.

(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.

● Record disable feature only.

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

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

 (c) LAST NUMBER DIALED feature is operative.

● Record disable and dial intermix features.

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

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

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

(d) 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.

KS-20419L1 Buzzer

3.10 To install.

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

(2) Remove handset cradle (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 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 D6AM-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) Reassembly set (3.20 and 3.19).

Plug-Ended Mounting Cord (converting 2870A1M to 2870A2M)

3.11 To convert.

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

(2) Remove D6AD-87 mounting cord.

(3) Install the 623P6 jack as shown in Fig. 7.

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

    (a) (R) wire to TB-4.

    (b) (G) wire to TB-8.

    (c) (Y) wire to TB-2.

    (d) (BK) wire to TB-1.

    (e) Insulate and store (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 95B-type power unit.

(7) Reassemble the set.

(8) Install a 625-type connecting block.

(9) Install the D4BU mounting cord.

Optional Power Connections

3.12 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) *2870A1M:* A M2SL-87 cord may be used to connect the 95B-type power unit to the telephone set.

        (1) Remove the housing (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.

    (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 D6AM-87 cord.

        (a) Disconnect and remove the M2SL-87 cord.

        (b) Connect the normally insulated and stored (BL) and (W) jack leads to PSB-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.

Head Telephone Set

3.13 *To install.*

(1) Remove housing (3.21).

(2) Access PSB terminal area (3.18).

(3) Remove cradle (3.20).

(4) Thread cord of Jackset through hole in rear of housing and make connections per appropriate table provided for Plantronics Jackset.

(5) Reassemble telephone set.

(6) Insert head telephone set plug into jackset.

COMPONENT LOCATION AND ACCESS INFORMATION

Location of Components

3.14 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)

D-180818 (record disable/and dial intermix kits).

(c) Bottom of telephone set (Fig. 6):

- Battery.

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.

Network Terminals

3.17 For access to the network terminals.

(1) Remove the faceplate (3.19).

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

(3) Remove the cover.

(4) To replace the cover, the three tabs of the cover (one at the top center and one at each side just above the dial) must be aligned with holes in the chassis before the screw is refastened. Failure to do this will result in improper seating of the faceplate.

Power Supply Board (PSB), Terminals

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

(1) Remove the faceplate (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.

MOUNTING HOLE FOR DIAL TONE
DETECTOR PWB ASSEMBLY OF
D-180493 KIT OF PARTS

NETWORK

MOUNTING HOLES
FOR D-180492 OR
D-180494 KIT OF
PARTS

PSB
TERMINAL
AREA

35-TYPE
DIAL

CAPTIVE MEMORY
MOUNTING
SCREWS (4)

MOUNTING HOLES FOR ONE-TOUCH
CALLING SWITCH OF D-180493 OR
FOR D-180818 KIT OF PARTS
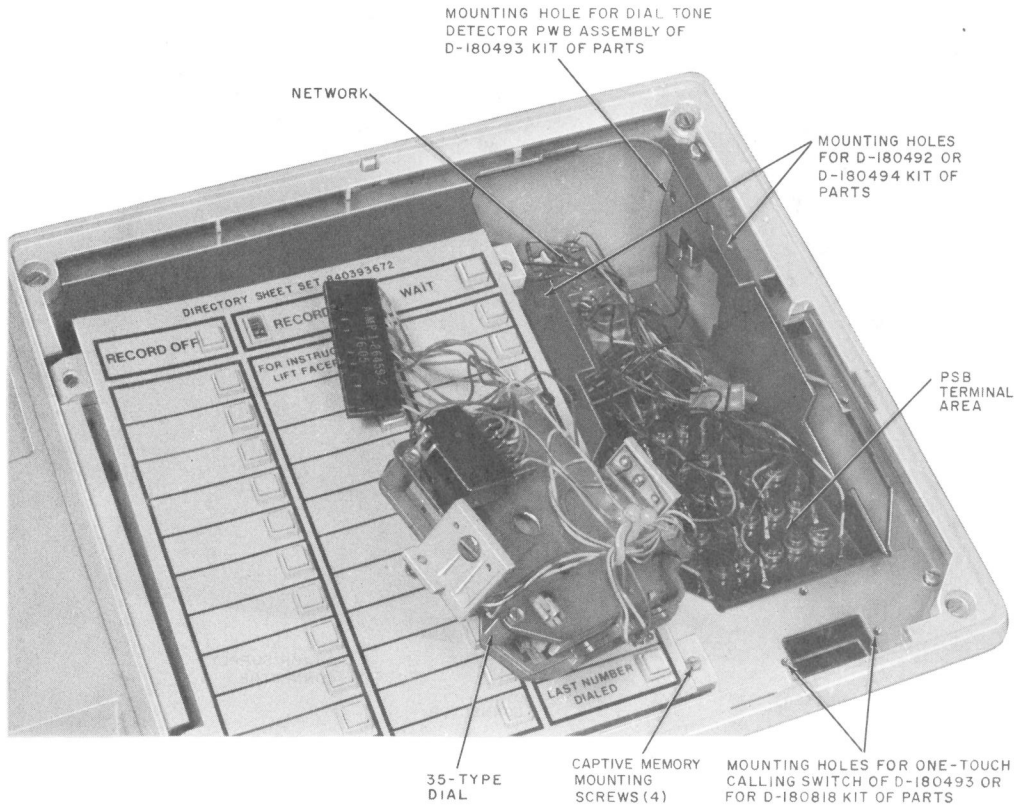
Fig. 4—Telephone Set—Dial Removed to Show Terminal Area

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.

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

Faceplate Removal

3.19 This will differ depending on faceplate being used:

(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.

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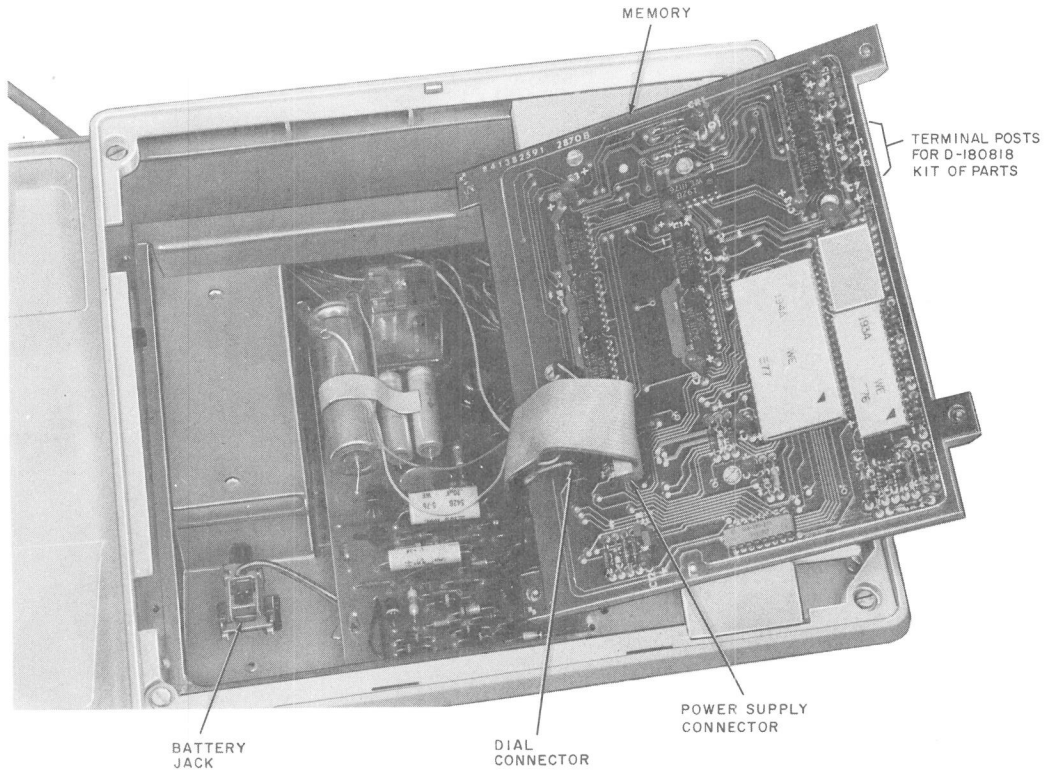
Fig. 5—Telephone Set, Internal View

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 (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.

Handset Cradle Removal

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

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

(2) Remove upper housing if provided [3.21(b)].

(3) Disengage the captive cradle screws located in the two tabs on the cradle.

(4) Lift the cradle, by pulling up on the plunger, and remove.

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

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.

(6) Refasten the captive cradle screws.
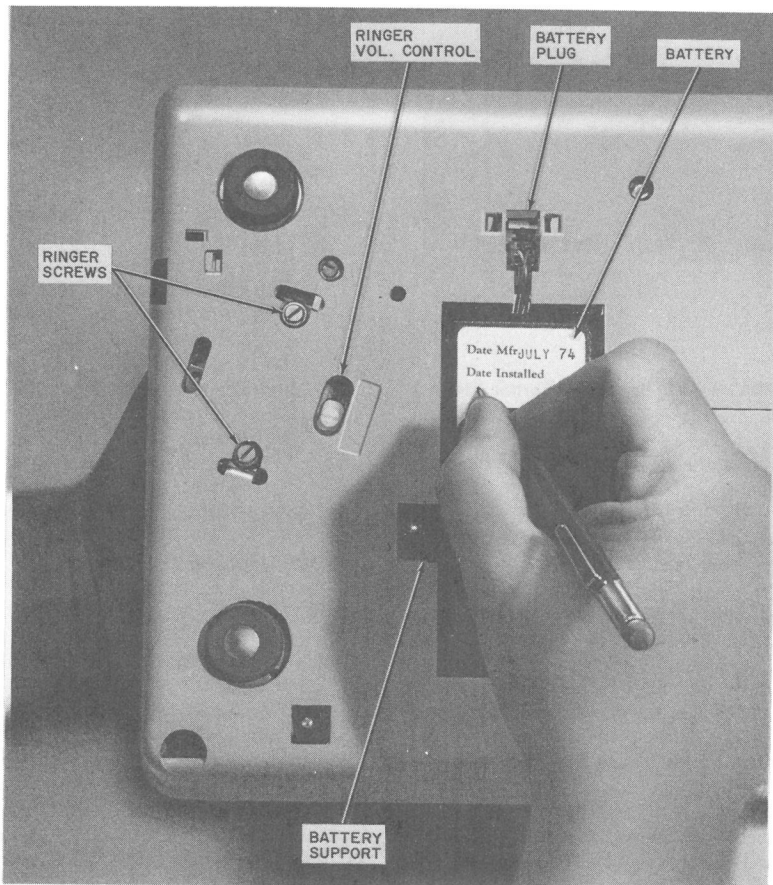
Fig. 6—Telephone Set, Bottom View

Housing Removal

3.21 To remove, proceed as follow.

(a) *Lower housing.*

(1) Unplug the handset cord, at the telephone set end and remove handset.

(2) Remove the faceplate (3.19).

(3) Remove upper housing of provided [3.21(b)].

(4) Remove the handset cradle (3.20).

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

(5) Disengage the captive housing screws (Fig. 2) located in the extreme upper and lower edges of the chassis.

(6) Unplug mounting cord (2870A2M).

POWER CORD

MOUNTING CORD JACK
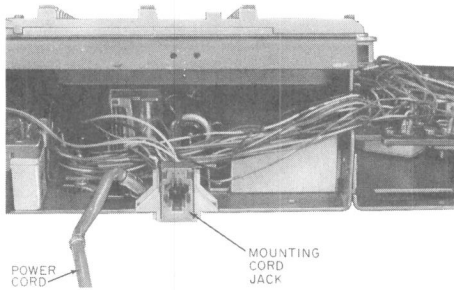
Fig. 7—2870A2M Telephone Set, Partial View

(7) Separate the housing from the telephone set base.

(8) Disconnect 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) *Upper housing.*

(1) Remove the faceplate (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

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.

5. OPERATION

Record A Number Into Memory

5.01 To record.

(1) Remove the faceplate (3.19).

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

(3) Replace the directory sheet and faceplate.

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

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

(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.

(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 switchhook, line key, or speakerphone operation.

Change A Number In Memory

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

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

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

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 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.

LAST NUMBER DIALED Feature

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

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. 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.

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. 8B). 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 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.

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 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-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. 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.

(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.

Memory

6.04 The Memory may be replaced as follows.

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

(1) Remove the faceplate (3.19).

(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 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.

(6) Reassemble telephone set.

(7) Test per 3.06.

Dial

6.05 To replace.

(1) Proceed per 3.18.

(2) Loosen the four captive Memory mounting screws (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 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 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 (3.19) and place handset aside.

(2) Remove upper housing, if provided [3.21(b)].

(3) Remove the cradle (3.20).

(4) Disconnect ringer leads (Fig. 8H).

(5) Tilt the front of the set up.

(6) Unfasten ringer mounting screws (Fig. 6).

(7) Remove ringer.

(8) 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.

(9) Reassemble telephone set [3.20, 3.21(b), and 3.19].

Buzzer (optional)

6.07 To replace.

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

(2) Remove upper housing, if provided [3.21(b)].

(3) Remove the cradle (3.20).

(4) Remove the buzzer mounting screw.

(5) Remove buzzer leads from the terminal board.

(6) Install new buzzer.

(7) Reassemble telephone set [3.20, 3.21(b), and 3.19].

Handset Jack (616B)

6.08 To replace.

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

(2) Remove upper housing, if provided [3.21(b)].

(3) Remove the cradle (3.20).

(4) Disconnect the handset jack leads and remove jack.

(5) Install new 616B handset jack.

(6) Reassemble telephone set [3.20, 3.21(b), and 3.19].

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) Unplug H4DU handset cord at telephone set end.

(2) Remove faceplate (3.19), and place handset aside.

(3) Remove upper housing, if provided [3.21(b)].

(4) Remove handset cradle (3.20).

(5) Disconnect 616B handset jack (6.08). (Jack may be removed or stored just to right of ringer.)

(6) Insert spade-tipped end of handset cord through hole in the side of the housing.

(7) Attach stayband hook to chassis (Fig. 3).

(8) Route leads through wire guide as shown in Fig. 3.

(9) Make connections (Fig. 8H).

(10) Reassemble telephone set [3.19, 3.20, 3.21(b)].

Faceplates

6.10 To replace a 2870A2-87 faceplate with a 2870B1-type faceplates.

(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.

SPEAKERPHONE

6.11 For maintenance information on the 3B (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 OR 2870A2M TELEPHONE SET WITH 3B SPEAKERPHONE

APPARATUS	CORD OR WIRE	LEAD DESIG	LEAD COLOR	TEL SET REMOVE FROM PSB	FROM TEL SET PSB	FROM TEL SET TB	TO 44-TYPE BLOCK TERM.	TO TEL SET PSB	TO CONTROL UNIT (NOTE) 55A	TO CONTROL UNIT (NOTE) 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 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 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 REMOVE FROM PSB	CONNECT					
					FROM			TO		
		DESIG	COLOR		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 D6AM mounting cord which connects set to modular connecting block.

§ 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 C

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

APPARATUS	CORD OR WIRE	LEAD DESIG	LEAD COLOR	TEL SET REMOVE FROM PSB	FROM TEL SET PSB	FROM TEL SET TB	TO 44-TYPE BLOCK TERM.	TO TEL SET PSB	TO CONTROL UNIT (NOTE) 55A	TO CONTROL UNIT (NOTE) 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 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 DESIG	LEAD COLOR	TEL SET REMOVE FROM PSB	CONNECT FROM TEL SET PSB	CONNECT FROM TEL SET TB	CONNECT FROM 44-TYPE BLOCK TERM.	CONNECT TO TEL SET PSB	CONNECT TO CONTROL UNIT (NOTE) 55A	CONNECT TO CONTROL UNIT (NOTE) 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 D6AM mounting cord which connects 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 stampted: 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.	223D 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			
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		

TABLE D (Cont)

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.	223D 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 D6AM mounting cord which connects set to modular connecting block.

§ Connected at factory.

¶ 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 (2970A1M) or the M2SL-87 cord (2870A2M).

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 PSB	TEL SET TB	44-TYPE BLK TERM.	223D ADAPTER
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	*			
		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			
	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.	223D ADAPTER
					PSB	TB		
D-180492 Kit of Parts (Cont)		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		
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							
180-Type LSPK	D20N Cord							Plugs into adapter
85B1 PWR Unit	M2FG†	AC	BK					
		AC	Y					

* Insulate and store.

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

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

§ Connected at factory.

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

TABLE F

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

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		*	
			S2	S		*	
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 D6AM mounting cord which connects set to modular connecting block.

§ Switch is not required when speakerphone is not provided.

¶ Connected at factory.

TABLE G

CONNECTIONS FOR D-180818 KIT OF PARTS

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

* Insulate and store.

† Single position connector.

Note 1: 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 2: 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.

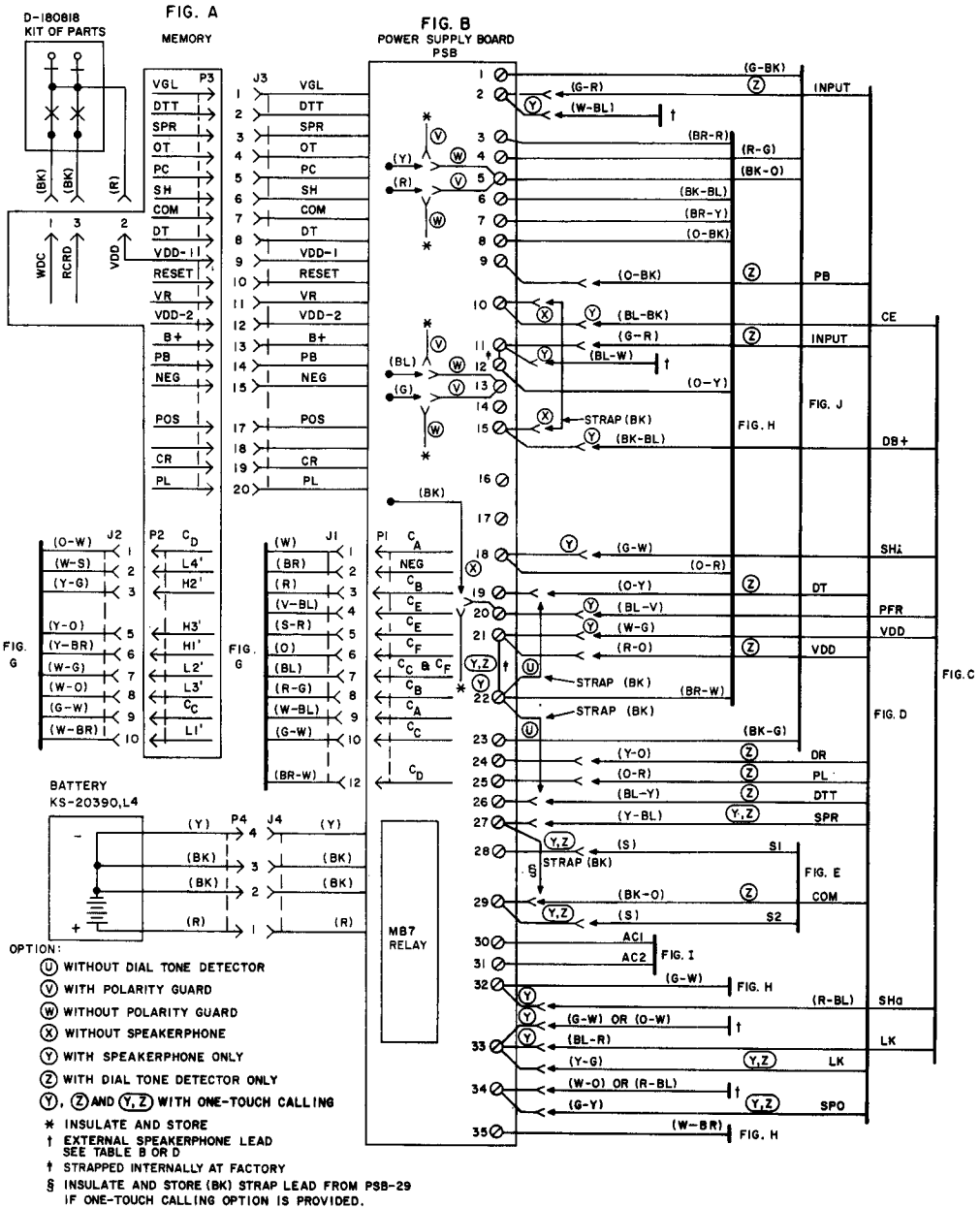*Note 3:* These posts are on the 2870B Memory PWB (Fig. 5).

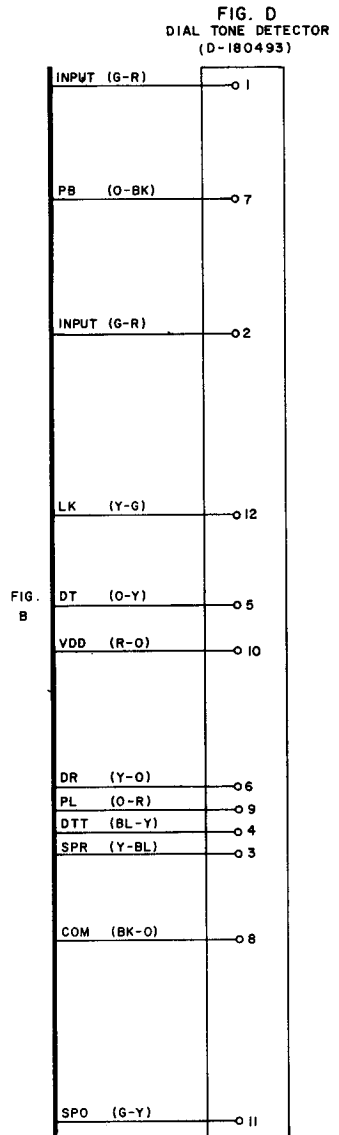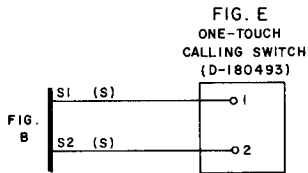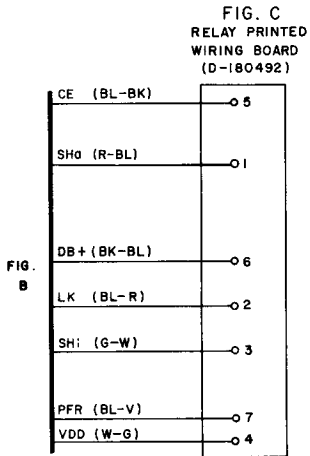**Fig. 8—Telephone Set, Connections (Sheet 1 of 4)**

FIG. D
DIAL TONE DETECTOR
(D-180493)

INPUT (G-R) ———————— o 1

PB (O-BK) ———————— o 7

INPUT (G-R) ———————— o 2

LK (Y-G) ———————— o 12

FIG.
B

DT (O-Y) ———————— o 5

VDD (R-O) ———————— o 10

DR (Y-O) ———————— o 6
PL (O-R) ———————— o 9
DTT (BL-Y) ———————— o 4
SPR (Y-BL) ———————— o 3

COM (BK-O) ———————— o 8

SPO (G-Y) ———————— o 11

FIG. C
RELAY PRINTED
WIRING BOARD
(D-180492)

CE (BL-BK) ———————— o 5

SHa (R-BL) ———————— o 1

FIG.
B

DB+ (BK-BL) ———————— o 6
LK (BL-R) ———————— o 2
SHi (G-W) ———————— o 3

PFR (BL-V) ———————— o 7
VDD (W-G) ———————— o 4

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

FIG.
B

SI (S) ———————— o 1

S2 (S) ———————— o 2

Fig. 8—Telephone Set, Connections (Sheet 2 of 4)

FIG. F
LINE SWITCH

FIG. G
DIAL
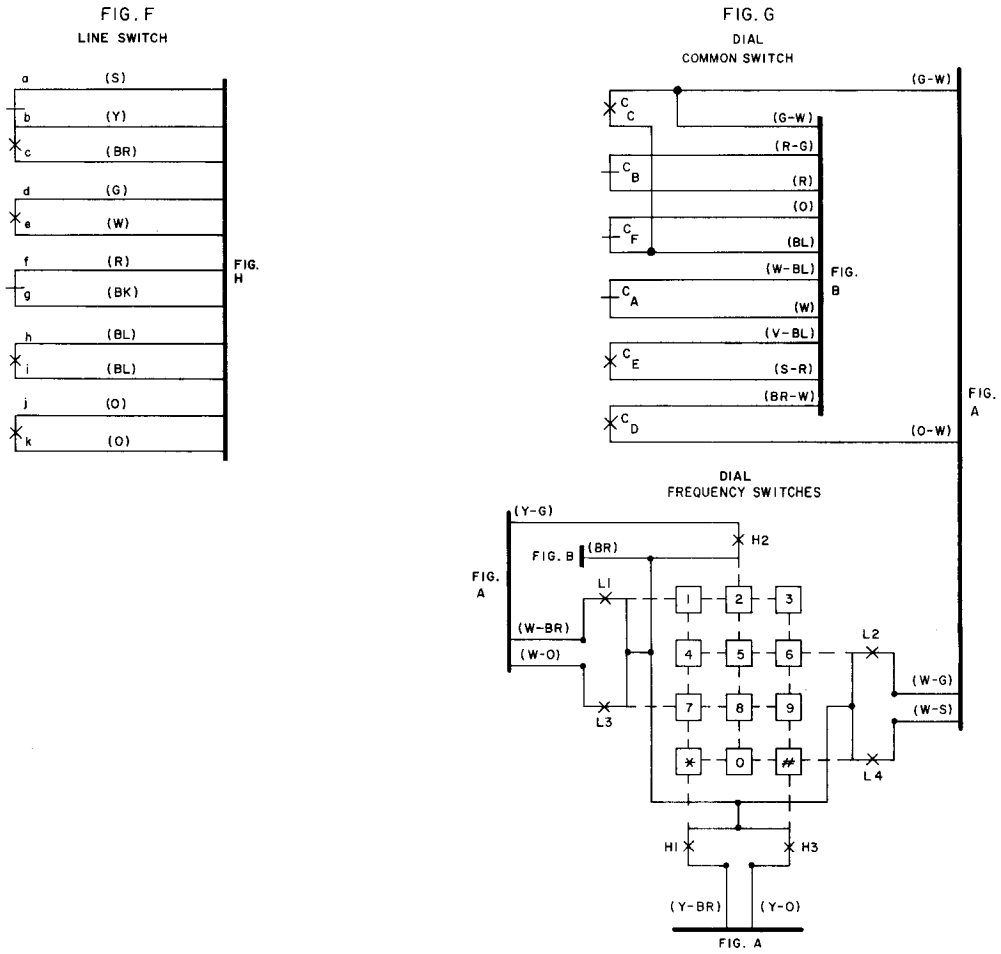COMMON SWITCH

DIAL
FREQUENCY SWITCHES

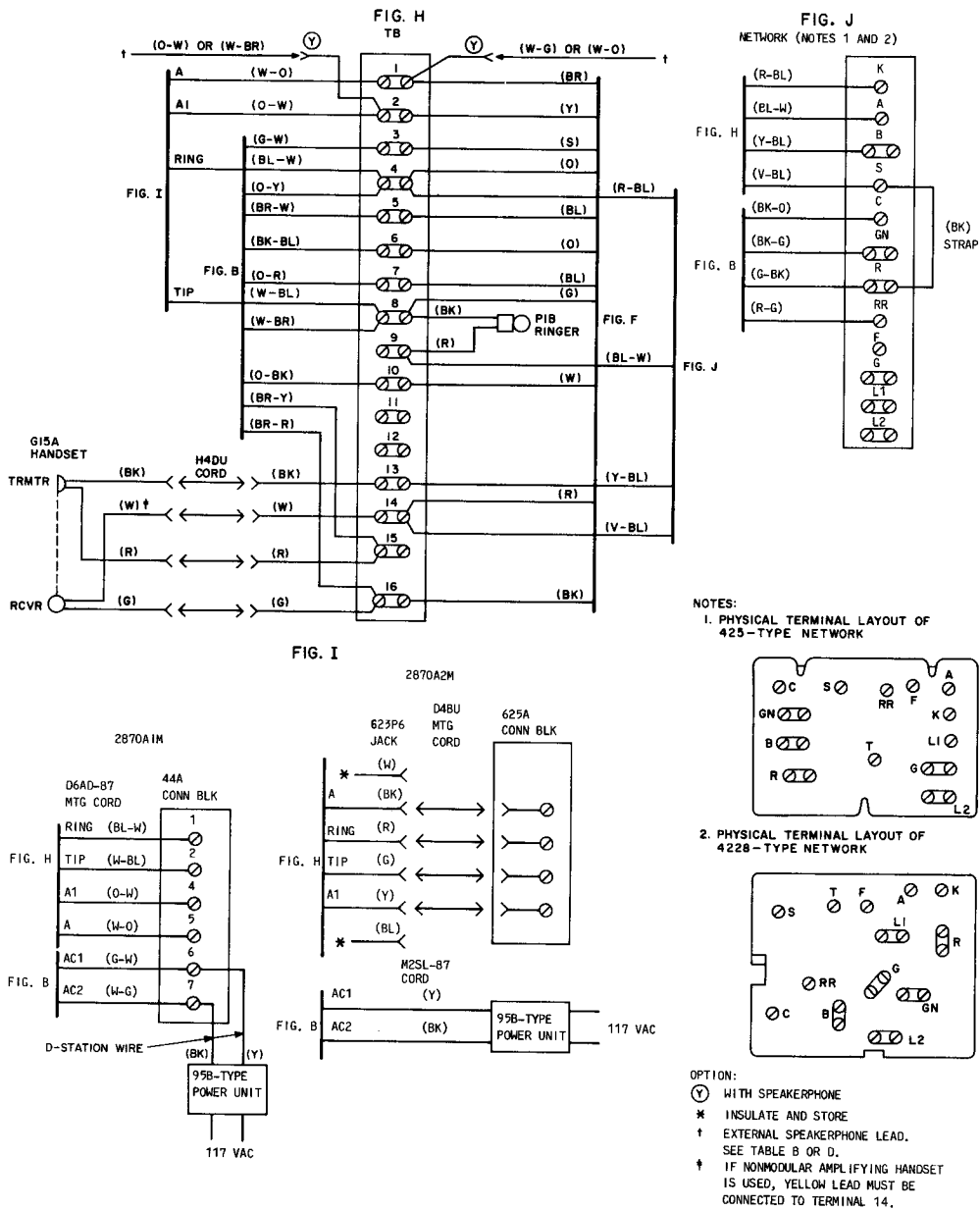**Fig. 8—Telephone Set, Connections (Sheet 3 of 4)**

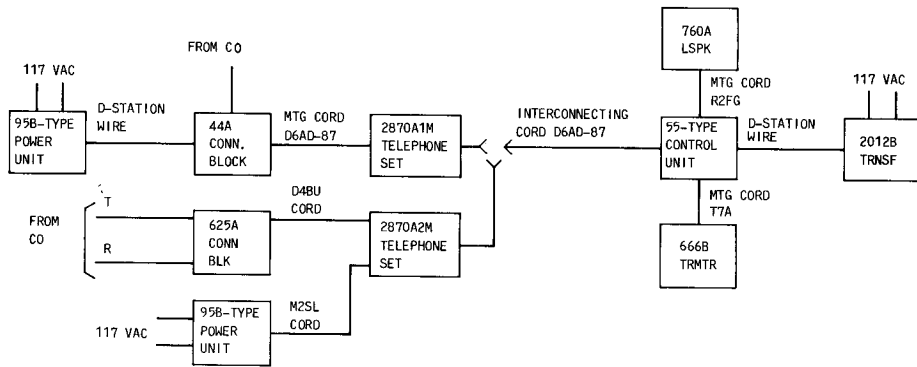**Fig. 8—Telephone Set, Connections (Sheet 4 of 4)**

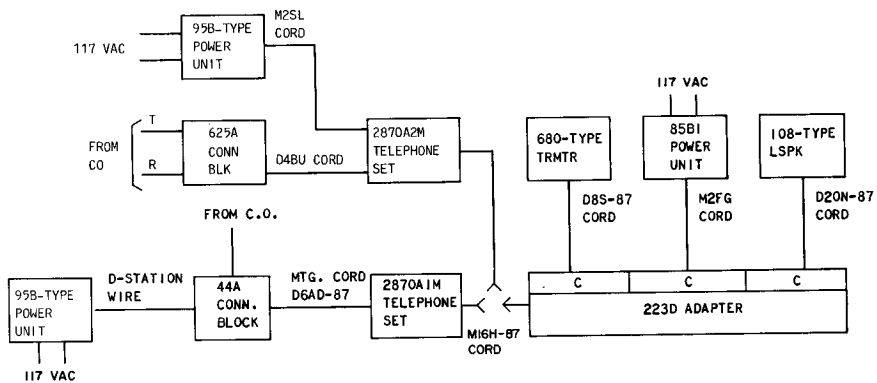**Fig. 9—Block Diagram—Telephone Set With 3B (MD) Speakerphone**

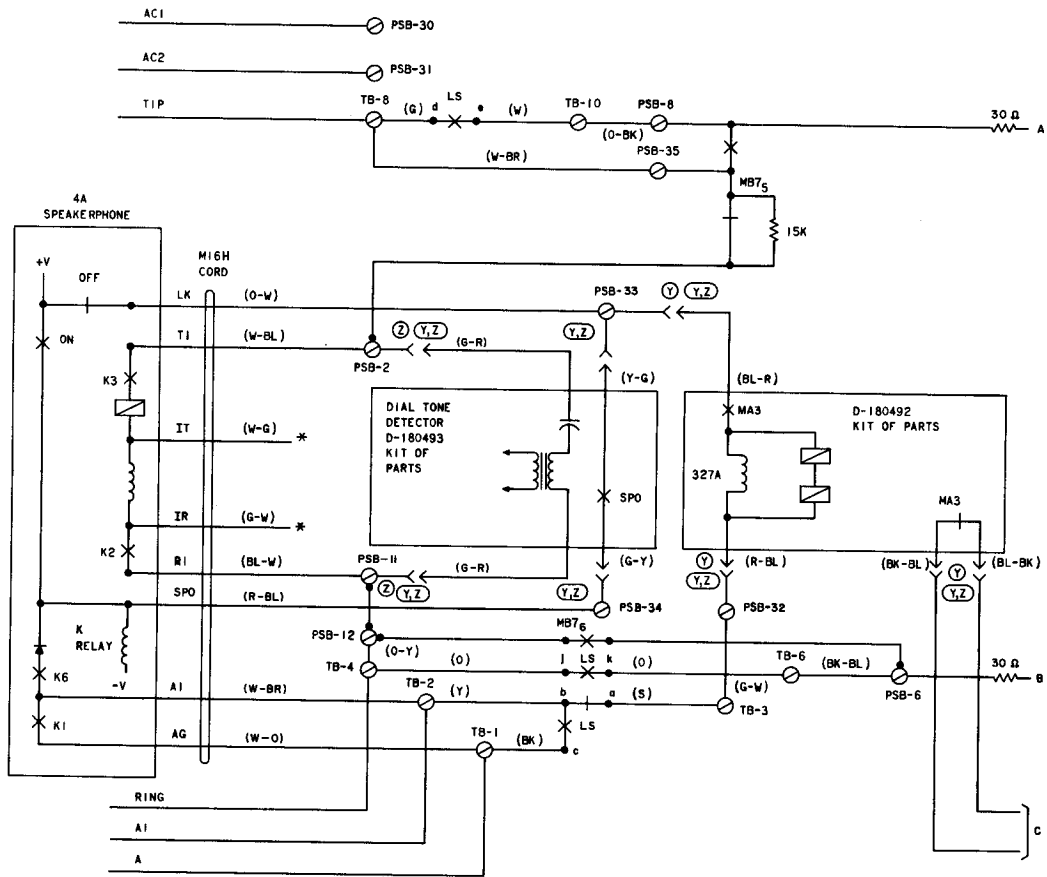**Fig. 10—Block Diagram—Telephone Set With 4A Speakerphone**

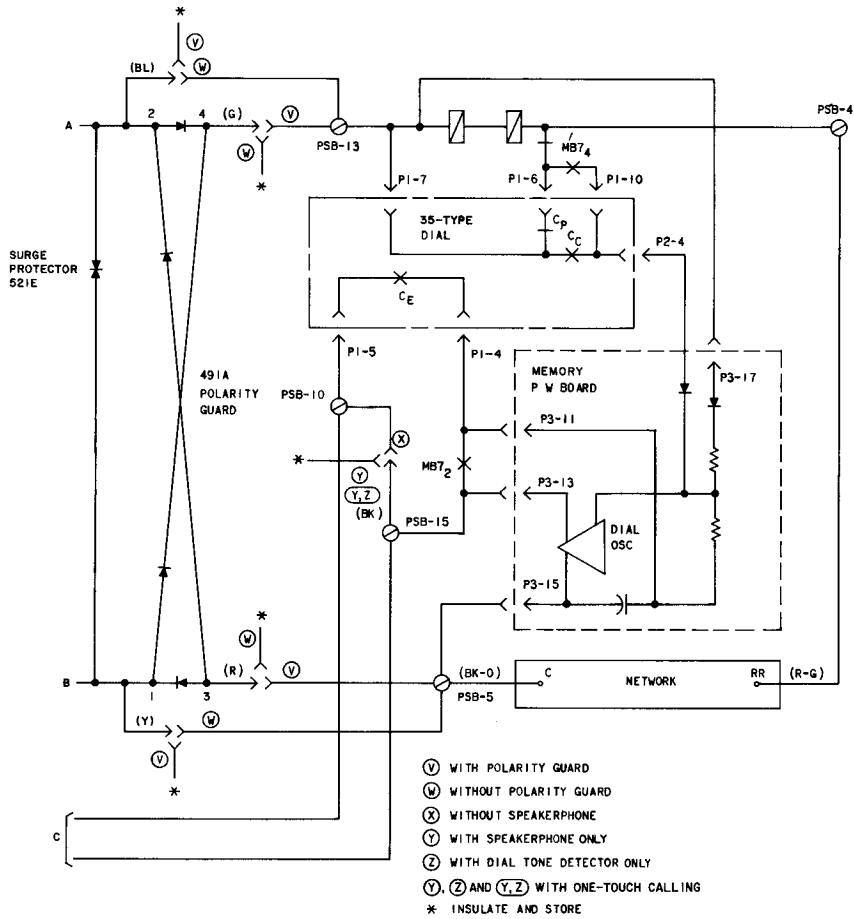Fig. 11—Telephone Set—Partial Functional Schematic (Sheet 1 of 2)

Fig. 11—Telphone Set—Partial Functional Schematic (Sheet 2 of 2)

TABLE H

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 absent. No audible TOUCH-TONE® 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 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
			Unknown	Replace telephone set*
		Some TOUCH-TONE dial frequencies incorrect	Static discharge damage	1. Contact TELCO Engineer for proper grounding procedure 2. Replace Memory

* Refer to 6.02 (4).

TABLE H (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 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 6.02(4).

TABLE H (Cont)

TROUBLE ANALYSIS — 2870A1M OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
6 (Cont)		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	Change feature switch position to OFF
			Incorrect dial contact sequence	Replace dial
			Defective logic	Replace Memory
			Open circuit on PSB	Replace telephone set*

* Refer to 6.02 (4).

TABLE H (Cont)

TROUBLE ANALYSIS — 2870A1M 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 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 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. 8 (D).
			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 signal present		
		Audible gap in train of digits being dialed		
		Digit dialed too rapidly (fast dialer)	Noise on ac power line (2870A1M tel set)	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
			Defective power supply PWB assembly (2870A2M)	Replace telephone set*

* Refer to 6.02 (4).

TABLE H (Cont)

TROUBLE ANALYSIS — 2870A1M OR 2870A2M TELEPHONE SET

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
9 (Cont)		No digits or random digits in memory	An ac power outage for 24 hours or longer	Reestablish ac power and rerecord numbers into memory
			Disconnected or defective battery	1. Plug in the battery 2. Allow the battery to be charged for a minimum of 5 minutes. Then momentarily remove the 95B-type power unit from the ac power outlet and reinsert 3. If previously stored numbers are not dialed from memory, replace the battery 4. Repeat procedure
			Defective power supply circuit	Replace telephone set*
		No digits or all the same digits in random memory locations	Defective Memory	Replace Memory
		Two or more memory locations have some digits which are usually different from originally recorded digits	Static discharge damage	1. Consult your TELCO engineer for proper grounding procedures 2. Replace Memory
		Automatically dials through a "wait" after pausing momentarily at the "wait" space on a train of recorded digits	Defective WAIT contacts or defective circuit components	1. Replace Memory 2. Replace dial tone detector PWB assembly of D-180493 Kit of Parts (if option is provided)
10	Cannot manually dial off-hook for ac power failure condition (Wired for speakerphone option)	With a strap lead between screw terminals 10 and 15 on PSB can manually dial off-hook for ac power failure condition	Defective circuit or connections on D-180492 Kit of Parts	1. Check connections per Table B, C, D, or E 2. Replace D-180492 Kit of Parts
11	Cannot turn speakerphone on when ON button is depressed (Wired for speakerphone option)	Speakerphone indicator lamp does not turn on.	Handset off-hook	Place handset on-hook
		No dial tone heard, but indicator lamp turns on	Open T1 or R1 leads	Check connections

* Refer to 6.02 (4).

TABLE H (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	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 transformer, 15 to 18 V ac across secondary screw terminals).
			Improper connections or defective 95B-type power unit	1. Check connections 2. Check or replace 95B-type 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 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 H (Cont)

TROUBLE ANALYSIS — 2870A1M 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 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 H (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
		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 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 de-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 (Cont)

TROUBLE ANALYSIS — 2870A1M 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 switchhook 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 0.05μf capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10K-50K) in series with (G-R) dial tone letecto: 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 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 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).