870A1 AND 2870A1 "TOUCH-A-MATIC*" 32 AUTOMATIC DIALER

IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION

AND MAINTENANCE

1. GENERAL

1.01 This section contains information on the 870A1 (rotary) and the 2870A1 (TOUCH-TONE† service) Fig. 1 dials.

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

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

(a) Include electromagnetic interference warning notice in compliance with the FCC ruling which requires that a warning statement be placed in the user's documentation for equipment that generates and uses radio frequency energy and may radiate that energy, paragraph 1.01

(b) Remove information on D-180837 Kit of Parts (never manufactured)

(c) Change all references to 95B-type power unit to 95B1 power unit

(d) Add 870B2-108, -109 and 2870B2-108, -109 faceplates.

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

FACEPLATE

UPPER HOUSING

LOWER HOUSING

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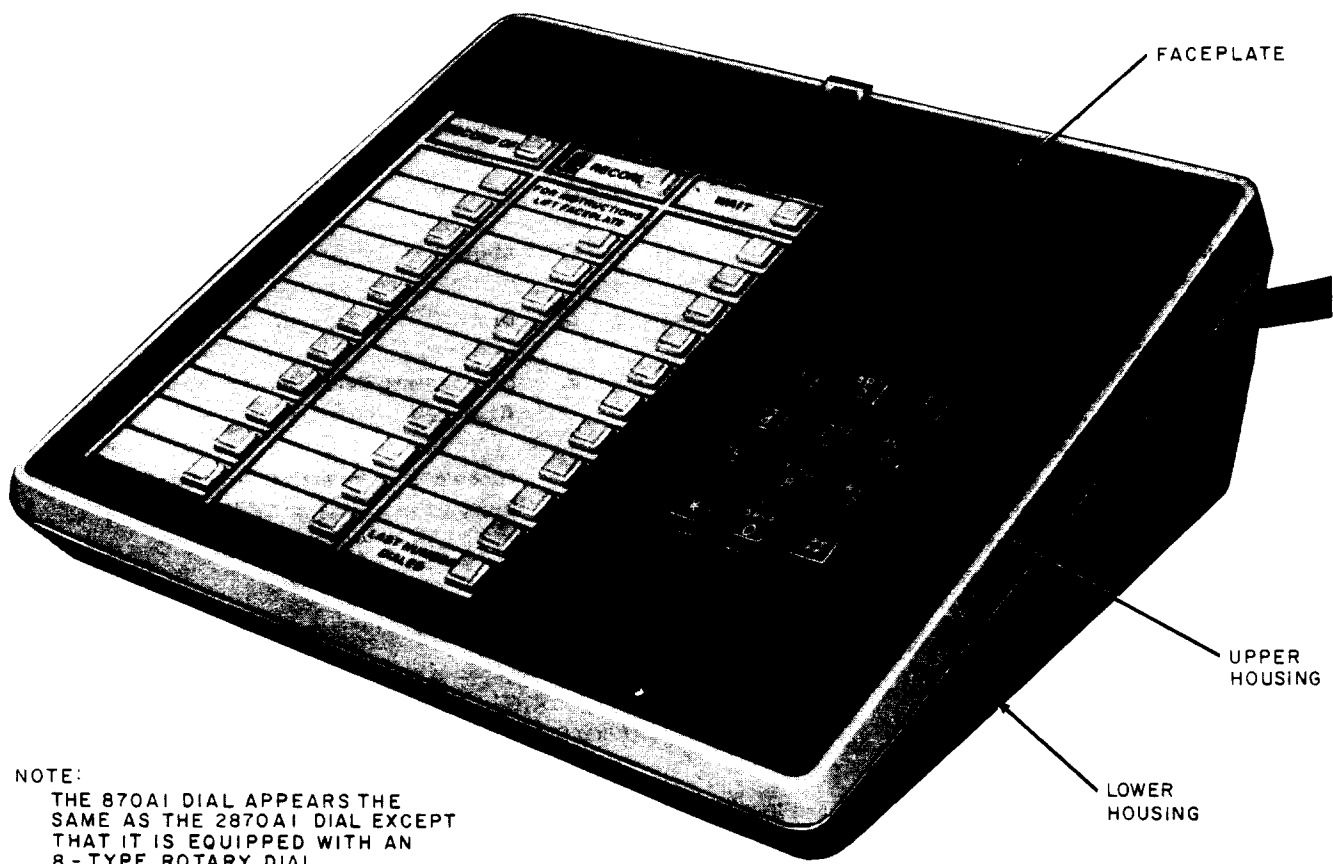THAT IT IS EQUIPPED WITH AN
8-TYPE ROTARY DIAL

Fig. 1—2870A1 Dial

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

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

2. IDENTIFICATION

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

A. Design Features

2.02 The following are design features:

- Integrated circuit memory.

- Memory buttons from which to select preprogrammed telephone numbers for automatic dialing.

- Capability to record and automatically dial 31 telephone numbers of up to 15 digits each.

- Last number manually dialed memory.

- Plug-in battery.

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

B. Optional Features

2.03 The following are optional features.

(a) Decorative Faceplate.

(b) Speakerphone: These dials interface with telephone sets using either 3B (MD) or 4A speakerphone systems.

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

(d) One-Touch Calling: Depressing one memory button will automatically turn on speakerphone, detect dial tone, and dial complete number.

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

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

(1) Record Disable Only: Turns off recording feature to prevent accidental erasures of

◆TABLE A◆

OPTIONS

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

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

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

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

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

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

(b) Disables the LAST NUMBER DIALED feature.

2.04 All options are implemented by the following.

● Wiring changes in the applicable dial.

● Wiring changes in the telephone set or console to which the dial is an adjunct.

● Installation of appropriate additional items.

C. Ordering Guide

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

● Dial, 870A1-50 (rotary service)

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

2.06 The following must be ordered separately:

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

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

● Decorative Faceplate, see paragraph 2.09.

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

(a) Housing, Lower, 870ADJ1-50

(b) Housing, Upper, 870A1U-50

(c) Faceplate, 870B1-122 (Matte Aluminum)

(d) 841382575 Dial Base (includes the following):

● Dial, 8EA-119

● 841382880 Line Sensing Printed Wiring Board Assembly

● Cord, Mounting, D10U-87

● Cord, Power, M2SL-87

● Battery, KS-20390L4

● Memory, 870B

● 841382617 Power Supply Printed Wiring Board (PSB) Assembly

● 840393672 Directory Sheet Set

● Booklet, Instruction, Subscriber, SIB-2481B

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

(a) Housing, Lower, 870ADJ1-50

(b) Housing, Upper, 870A1U-50

(c) Faceplate, 2870B1-122 (Matte Aluminum)

(d) 841381965 Dial Base (includes the following):

● Dial, 35AG3A

● 841382880 Line Sensing Printed Wiring Board Assembly

● Cord, Mounting, D10U-87

● Cord, Power, M2SL-87

● Battery, KS-20390L4

● Memory, 2870B

● 841382385 Power Supply Printed Wiring Board (PSB) Assembly

● 840393672 Directory Sheet Set

● Booklet, Instruction, Subscriber, SIB-2481B.

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

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

- Housing, Upper, 870A1U-(see Note 1)

- Faceplate, Decorative, 870B1-(see Note 2), 2870B1-(see Note 2) or 870B2-(see Note 2), 2870B2-(see Note 2)

- Cord, Mounting, D10Y-50 (required when adjunct dial connected to some MET sets and some COM-KEY* key telephone systems)

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

- Kit of Parts, D-180818 (Record Disable and Dial Intermix) (see Note 3)

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

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

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

D. Operating Features

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

- Dial.

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

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

- RECORD button (nonlocking), when momentarily depressed, lights the RECORD lamp

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and enables the memory circuits to store telephone numbers.

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

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

3. INSTALLATION

STANDARD INSTALLATION

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

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

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

Note: Write date of battery installation on label provided.

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

mounting screw holds the duplex outlet in the box.

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

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

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

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

Installation Check Procedure

870A1 Dial

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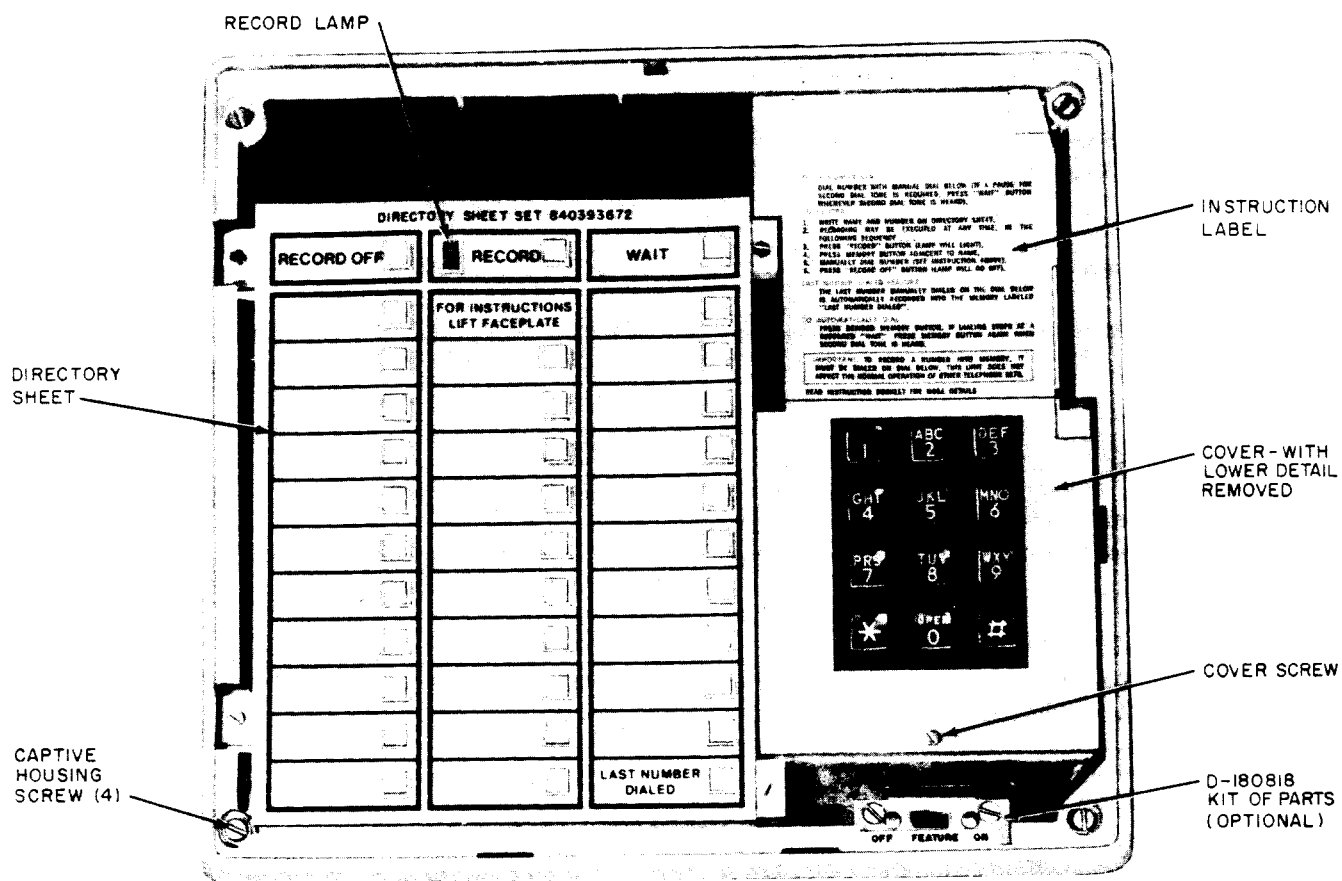

Fig. 2—2870A1 Dial, Faceplate Removed

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

   (a) With telephone handset on-hook, momentarily depress RECORD button. RECORD lamp should light.

   (b) Lift telephone handset off-hook. RECORD lamp should be extinguished.

(2) Using the telephone set dial, manually dial a known number to check that the telephone set operates correctly.

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

   (a) Obtain dial tone.

   (b) Dial code number for dial speed test.

   (c) After dial tone is heard again, manually dial digit 0. One of the following audible signals will indicate how the dial meets the requirements of the test.

      (1) Audible ringback: dial speed satisfactory.

      (2) Rapidly interrupted dial tone: dial speed fast.

      (3) Slowly interrupted dial tone: dial speed slow.

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

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

(6) Go off-hook and use the dial on the adjunct to record a known telephone number into mem-

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

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

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

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

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

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

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

(10) Momentarily disconnect the power unit (for 5 to 10 seconds). After reconnecting power unit, momentarily depress memory buttons in same sequence in which digits were recorded in Step (4). Verify that the correct telephone number is dialed.

(11) Dial the appropriate code for ring-back to test the telephone set ringer.

(12) If equipped with one-touch calling option, (D-180493 Kit of Parts and speakerphone), and with set in on-hook condition, depress the memory button used in Step (6). The speakerphone should turn on, dial tone should automatically be detected, and the stored number should be automatically dialed.

2870A1 Dial

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

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

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

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

    (b) Lift telephone handset. RECORD lamp should be extinguished.

(2) Using the telephone set dial, manually dial a known number to check that telephone set operates correctly.

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

(4) Lift handset off-hook and record CO dial test and ringer circuit number into memory location immediately above LAST NUMBER DIALED location [paragraph 5.01 (4) through (7)]. After depressing RECORD OFF button, and when dial test circuit is ready, test dial frequencies by manually dialing digits 1 through 0 into the test circuit.

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

    (a) Depress LAST NUMBER DIALED button. Digits 1 through 0 will be automatically dialed into test circuit. Verify that correct signal is returned from test circuit.

    (b) Momentarily depress the memory buttons used in Step (3) in the same sequence in which the digits were recorded. Verify that the correct signal is returned from the test circuit.

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

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

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

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

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

(7) If equipped with one-touch calling option (D-180493 Kit of Parts and speakerphone), and with the telephone set in on-hook condition, depress the memory button previously used in Step (4). The speakerphone should turn on, dial tone should automatically be detected, and the stored number should be automatically dialed.

OPTIONAL APPARATUS INSTALLATION

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

3.07   Install as follows.

(1) Remove the housing (paragraph 3.11) and access PSB terminal board (paragraph 3.09).

(2) Insert the dial tone detector board assembly from the back of the dial, such that the two tabs on the board assembly fit into the slots in the chassis (Fig. 3).

(3) Insert the self-threading screw through the side of the chassis to secure the board in position.

(4) Mount the one-touch calling switch below the dial with the two screws provided.

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

(5) Connect per Table B.

(6) Break off the detail at the bottom of the cover (Fig. 4) and trim edge as required.

(7) Verify correct operation of option.

(8) Reassemble.

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

3.08 Install as follows.

(1) Remove faceplate (paragraph 3.10).

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

(3) Disengage dial from chassis (paragraph 6.05 or 6.06).
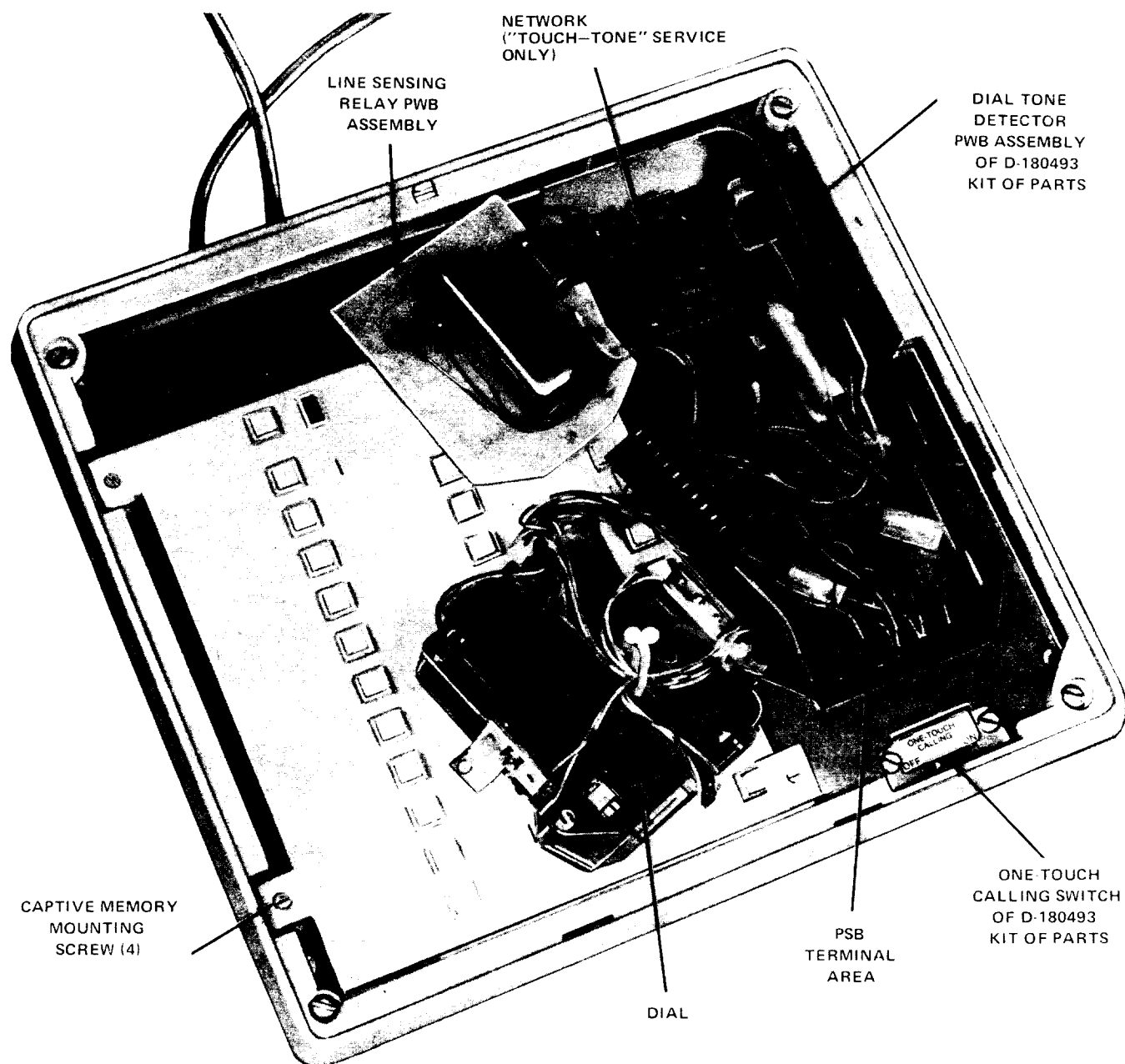
Fig. 3—2870A1 Dial, Dial and Memory Removed to Show Terminal Area
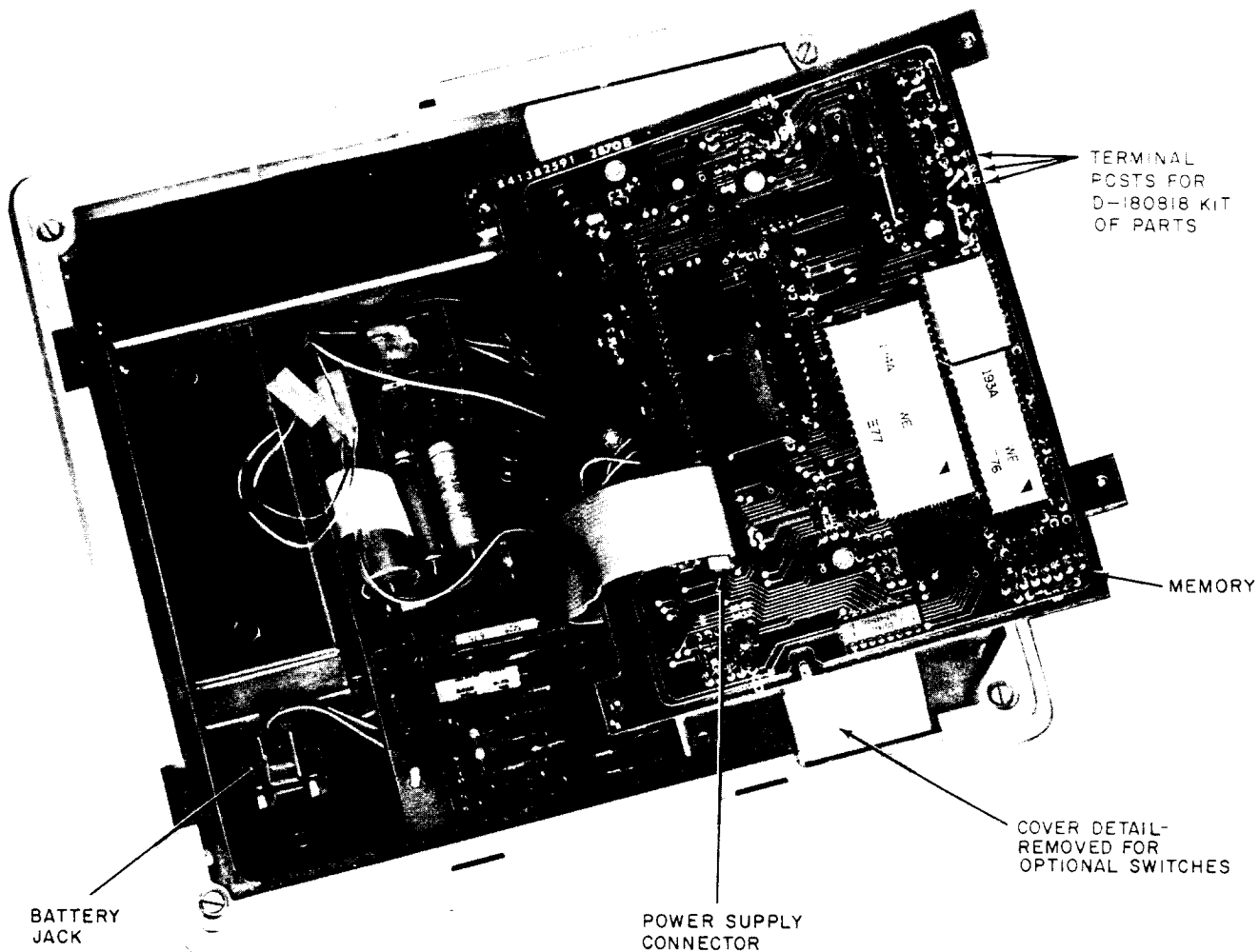
Fig. 4—2870A1 Dial, Internal View

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

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

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

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

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

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

(7) Connect switch lead connectors to terminal posts on memory board per Table C.

(8) Set FEATURE switch to OFF position and verify that dial operates in normal manner.

● Numbers can be recorded into memory

TABLE B

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

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

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

* Insulate and store.

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

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

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

● Numbers can be deleted or changed in memory

● Numbers can be automatically dialed.

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

(a) For record disable only feature.

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

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

(3) LAST NUMBER DIALED feature still operative.

(b) For record disable and dial intermix features.

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

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

(3) Manually and automatically dialed digits may be intermixed. (Depression of RE-CORD OFF button not required.)

(4) LAST NUMBER DIALED feature disabled.

(10) Reassemble adjunct dial.

COMPONENT LOCATION AND ACCESS INFORMATION

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

A. Power Supply Board (PSB) Terminals

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

(1) Disconnect power unit from ac outlet.

(2) Remove the faceplate (paragraph 3.10).

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

(4) Remove the cover.

(5) Loosen the two captive dial mounting screws.

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

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

TABLE C

CONNECTIONS FOR D-180818 KIT OF PARTS

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

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

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

* Insulate and store.

† Single pin connector.

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

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

(8) To reassemble, reverse this procedure.

B. Faceplate Removal

3.10 To remove, proceed as follows.

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

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

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

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

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

C. Housing Removal

3.11 To remove, proceed as follows.

(a) Remove lower housing as follows.

(1) Remove the faceplate (paragraph 3.10).

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

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

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

(b) Remove upper housing as follows.

(1) Remove the faceplate (paragraph 3.10).

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

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

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

(4) To reassemble, reverse procedure.

4. CONNECTIONS

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

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

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

- Table D—870A1 Dial Connections to Telephones

- Table E—2870A1 Dial Connections to Telephones

- Table F—870A1 Dial Connections to Consoles

- Table G—2870A1 Dial Connections to Consoles.

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

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

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

5. OPERATION

A. Record a Number Into Memory

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

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

(1) Remove the faceplate (paragraph 3.10).

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

(3) Replace the directory sheet and faceplate.

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

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

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

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

(a) Dial the access digit(s).

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

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

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

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

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

B. Change a Number In Memory

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

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

C. Delete a Number From Memory

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

5.03 To delete a number, proceed as follows.

(1) Depress the RECORD button.

(2) Depress the memory button corresponding to the name and number to be deleted.

(3) Depress the RECORD OFF button.

D. Automatically Dial a Number From Memory

5.04 To automatically dial a number, proceed as follows.

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

(2) If the adjunct dial is equipped with the dial tone detector only, go off-hook, listen for dial tone, and depress the memory button.

(3) If the adjunct dial is wired to provide the one-touch calling feature (telephone set is equipped with speakerphone, and adjunct dial equipped with dial tone detector), simply depress the memory button.

E. LAST NUMBER DIALED Feature

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

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

5.06 Operation of LAST NUMBER DIALED feature is as follows.

(a) If no access digit(s) are required, proceed as follows:

(1) Go off-hook on the telephone set

(2) Listen for dial tone

(3) Manually dial telephone number using the adjunct dial

(4) To redial same number automatically, go off-hook on telephone set, listen for dial tone, and depress LAST NUMBER DIALED button.

(b) If an access code and pause for second dial tone is required, proceed as follows:

(1) Go off-hook on the telephone set

(2) Listen for dial tone

(3) Dial access digit(s) using adjunct dial

(4) After second dial tone is heard depress WAIT button

(5) Manaully dial telephone number using adjunct dial

(6) To redial same number automatically, go off-hook, listen for dial tone, and depress

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

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

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

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

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

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

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

6. MAINTENANCE

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

A. Trouble Analysis

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

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

(2) Check connections.

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

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

(a) Disconnect power unit from ac outle unplug battery.

(b) Disconnect adjunct dial.

Warning: Failure to restrain plug result in plug damage requiring ba replacement.

(c) Place battery plug sideways into hc slot below battery pack and tape into

B. Battery

6.03 The battery has an expected life of at years. It can be replaced without loss of numbers provided that commercial ac power dial is continuously maintained. To replace th tery, proceed as follows:

(1) Tilt the front of the dial adjunct up

(2) Unplug the battery

(3) Loosen captive screw on the battery su

(4) Remove battery support

(5) Remove battery

(6) Install and check new battery (paragraph 3 or 3.06).

C. Memory

6.04 The memory may be replaced in the foll manner.

(1) Disconnect power unit from ac outle unplug battery.

Note: Removal of the memory or ac an tery power results in loss of stored numl

(2) Remove the faceplate (paragraph 3.10).

(3) Loosen the four captive memory moι screws (Fig. 3).

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

(5) Disengage the connector(s) by pulling them perpendicular to the printed wiring board.

(6) Replace the memory by engaging the dial connector (2870A1 only) first. The connector(s) are keyed, one position is filled and should fit over the vacant position in the row of pins. The flat power supply cable should not be twisted.

(7) Reassemble dial.

(8) Reconnect battery and power unit.

(9) Test per paragraph 3.05 or 3.06 as required.

(10) Reprogram memory (see Part 5).

D. Dial

6.05 Replace rotary dial as follows.

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

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

(2) Remove faceplate (paragraph 3.10).

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

(4) Remove the two dial mounting screws and set dial aside.

(5) Remove dial leads from terminals on PSB.

(6) Remove dial.

(7) Reverse procedure to replace dial.

(8) Reconnect battery and power unit.

(9) Reprogram memory (see Part 5).

6.06 Replace TOUCH-TONE* telephone dial as follows.

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

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

*Trademark of American Telephone and Telegraph Company.

(2) Remove faceplate (paragraph 3.10).

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

(4) Disengage the two dial mounting screws.

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

(5) Disengage the four captive memory mounting screws (Fig. 3).

(6) Gently raise the memory to a position that permits access to the dial connector.

(7) Disengage the dial connector by carefully pulling on it perpendicular to the printed wiring board.

(8) Disengage the second dial connector from the power supply printed wiring board.

(9) Lift the dial out.

(10) To replace with a new dial, reverse the previous steps. The connectors are keyed to orient them relative to the pins. Observe the correct orientation and do not force the connection.

(11) Reconnect battery and power unit.

(12) Reprogram memory, see Part 5.

E. Line Sensing Relay Printed Wiring Board Assembly

6.07 Replace as follows.

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

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

(2) Remove faceplate (paragraph 3.10).

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

(4) Remove the two dial mounting screws (870A1) or disengage (2870A1).

(5) Place the dial aside to gain access to the PSB terminals.

(6) Remove the two mounting screws for the Line Sensing Relay Board and move the board assembly to one side.

(7) Disconnect the leads of the Line Sensing Relay Board from associated terminals on the PSB, and remove the board assembly.

(8) Connect the leads of the replacement Line Sensing Relay Board to the appropriate terminals on the PSB (Fig. 9B and 9C for the 870A1 dial or Fig. 11B and 11C for the 2870A1 dial).

(9) Reassemble adjunct dial.

(10) Reconnect battery and power unit.

(11) Reprogram memory, see Part 5.

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

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

(1) Remove the A2 faceplate by lifting up on any of its edges.

(2) Remove the four captive housing screws (Fig. 2) from the chassis.

(3) Use the four housing screws to mount the 870A1U upper housing to the chassis and 870ADJ housing. The three parts should be held tightly together as the screws are driven.

(4) Place the two tabs located along the lower edge of the B1 faceplate in the notches in the lower side of the 870A1U upper housing.

(5) Lower the faceplate to rest on the memory. The spring clip located in the center of the upper side of the upper housing should retain the faceplate.

TABLE D

CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

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

TABLE D (Contd)

CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

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

TABLE D (Contd)

CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

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

TABLE D (Contd)

CONNECTIONS FOR 870A1 DIAL TO TELEPHONE SET

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

* Insulate and store.

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

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

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

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

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

†† From line key.

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

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

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

*** Network F when using 4A speakerphone.

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

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

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

TABLE E

CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

TEL SET	COMMON TIP PATH			COMMON RING PATH		
	LEAD COLOR	REMOVE FROM	CONNECT TO¶¶	LEAD COLOR	REMOVE FROM	CONNECT TO***
2565HK, 2565HKM	G††	Net. L2	Spare 1	G, G-V	9	Spare 2
2630DA 2630DAM	G‡‡	12	Spare 1	G¶¶¶	13	Spare 2
2631DA, 2631DAM	G‡‡	12	Spare 1	G¶¶¶	13	Spare 2
2634DA 2634DAM	W-BL	Net. L2	Spare 1	BL-W¶¶¶	13	Spare 2
2635DA 2635DAM	W-BL	Net. L2	Spare 1	BL-W¶¶¶	13	Spare 2
2636CA, CAM	G‡‡	12	Spare 1	BL-W	9	Spare 2
2637DA, DAM	G‡‡	12	Spare 1	BL-W	9	Spare 2
2830CM†	G††	8	Spare 1	R	6	Spare 2
2830CM‡	G††	16	Spare 1	R	6	Spare 2
2830CM§	G††	8	Spare 1	R	6	Spare 2
2830DM†,‡	G††	8	Spare 1	R	3	Spare 2
2830DM§	G††	8	Spare 1	R	3	Spare 2
2831CM†	(2) G††	8	Spare 1	(2) R	6	Spare 2
2831CM‡	(2) G††	16	Spare 1	(2) R	6	Spare 2
2831CM§	(2) G††	8	Spare 1	(2) R	6	Spare 2
2831DM†,‡,¶	(2) G††	8	Spare 1	(2) R	3	Spare 2
2831DM§,¶	(2) G††	8	Spare 1	(2) R	3	Spare 2
2832-Type¶	G	22	Spare 1	R	4	Spare 2
2833-Type¶	(2) G	22	Spare 1	(2) R	4	Spare 2
2851B, 2851BT, 2851BM	G	20†††	Spare 1	R	13	Spare 2
2851CM	G	2‡‡‡	Spare 1	R	13	Spare 2
2852A, 2852AM	G	4§§§	Spare 1	R	1	Spare 2
2870A1M	W-BL	TB1 8	TB1 11	BL-W	TB1 4	TB1 12
2870A2M	G	TB1 8	TB1 11	R	TB1 4	TB1 12
2870A1 Dial§§	W-O	PSB-2	Net. G	O-W	PSB-11	Net. L1
2872A1M, 2872A2M	G	TB1 8	TB1-15	R	PSB-12	Net. G
2960A01M	G	PSB-7	PSB-14	R	PSB-6	PSB-19
2981-Type**	Remove Shorting Bars					
2983-Type**						

TABLE E (Contd)

CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

D1OU-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	T1	LR	R1	A1	AG	LK	SPO	SPARE	
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S
Spare 1	Net. L2	9	Spare 2	1B	N	Net. L1			
12	Spare 1	13	Spare 2	8	7	4			
12	Spare 1	13	Spare 2	8	7	4			
Spare 1	Net. L2	Spare 2	13	10	56	4			
Spare 1	Net. L2	Spare 2	13	10	56	4			
12	Spare 1	9	Spare 2	8	7	*			
12	Spare 1	9	Spare 2	8	7	*			
Spare 1	8	Spare 2	6	10	22	29	See		
Spare 1	16	Spare 2	6	10	22	*	Fig. 8		
Spare 1	8	Spare 2	6	10	22	29			
Spare 1	8	Spare 2	3	10	22	29			
Spare 1	8	Spare 2	3	10	22	29			
Spare 1	8	Spare 2	6	10	22	29		*	*
Spare 1	16	Spare 2	6	10	22	29			
Spare 1	8	Spare 2	6	10	22	29			
Spare 1	8	Spare 2	3	10	22	29			
Spare 1	8	Spare 2	3	10	22	29			
Spare 1	22	Spare 2	4	10	8	29			
Spare 1	22	Spare 2	4	10	8	29			
Spare 1	20	Spare 2	13	4	3	Net. L1			
Spare 1	2‡‡‡	Spare 2	13	4	3	20			
Spare 1	4§§§	Spare 2	1	3	11	10			
TB1 11	TB1 8	TB1 12	TB1 4	TB1 2	TB1 1	PSB-17	PSB-34		
TB1 11	TB1 8	TB1 12	TB1 4	TB1 2	TB1 1	PSB-17	PSB-34		
PSB-2	Net. G	PSB-11	Net. L1	PSB-1	PSB-32	PSB-33	PSB-34		
TB1 15	TB1 8	Net. G	PSB-12	TB1 12	Net. L2****	PSB-17	PSB-34		
PSB-14	PSB-7	PSB-19	PSB-6	PSB-5	PSB-9	*	*		
Plug D10Y cord into set									

TABLE E (Contd)

CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

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

TABLE E (Contd)

CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE SET

D1OU-87 CORD (FROM ADJUNCT DIAL)									
STANDARD FUNCTIONS						SPEAKERPHONE/ONE-TOUCH			
LT	T1	LR	R1	A1	AG	LK	SPO	SPARE	
W-BL	W-O	BL-W	O-W	BR-W	W-BR	G-W	W-G	S-W	W-S
54	38	7	6	*	*	27	Fig. 8	*	*
Plug D10Y cord into set									
54	38	7	6	*	*	27	Fig. 8	*	*
Plug D10Y cord into set									
54	38	7	6	*	*	27	Fig. 8	*	*
Plug D10Y cord into set									

* Insulate and store.
† Manufactured after 2-77 with new line switch (new line switch is identified by two additional blue leads).
‡ Manufactured prior to 2-77 with new line switch.
§ Manufactured prior to 2-77 with old line switch (old line switch has no blue leads).
¶ Only CO lines can be dialed from adjunct dial (no intercom lines).
** Replace the D1OU-87 cord in the 2870A1 dial with a D10Y-50 cord, observing same color code.
†† From line key.
‡‡ From dial.
§§ Each adjunct dial adds 1 db loss to the loop. 20 ma loop current is required for proper operation of unit.
¶¶ Spare "1s" use same spare terminal or D-161488 connector in telephone set.
*** Spare "2s" use same spare terminal or D-161488 connector in telephone set.
††† Common tip lead from line key.
‡‡‡ Common tip lead from line key. Terminal 1 when using 4A speakerphone.
§§§ Common tip lead from line key. On terminal 2 in 2852AM sets manufactured before 3-4-77.
¶¶¶ If speakerphone is provided, speakerphone lead designated R1 must also be moved from 13 to spare 2.
**** Network terminal F in early telephone sets.

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

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

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

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

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

5. Remove (G) or (BL) dial lead from term. 28 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.
6. Remove (G) dial lead from term. 7 in console and connect to (W-G) lead of D10U cord using spare term. or D-161488 connector.
7. To allow proper placement of adjunct the D10U-87 cord may have to be replaced by a D10R-87 cord, observing same color code.
* Insulate and store.
† Spare "1s" use same spare term. or D-161488 connector in console.
‡ Spare "2s" use same spare term. or D-161488 connector in console.
§ If neither Privacy nor DSS option is provided, this will be terminal 22.

TABLE G
CONNECTIONS FOR 2870A1 DIAL TO TELEPHONE CONSOLE

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

Notes:
1. To allow proper placement of adjunct, the D10U-87 may have to be replaced by a D10R-87 mounting cord, observing same color code.
2. 2870A1 dial not compatible with 21, 41-, 45-, 51-Type or AGD-, A G H-Type (DIMENSION PBX) consoles.
* Insulate and store.

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

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

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

Fig. 6—▶Basic Interface Connections for 870A1 and 2870A1 Dials◀
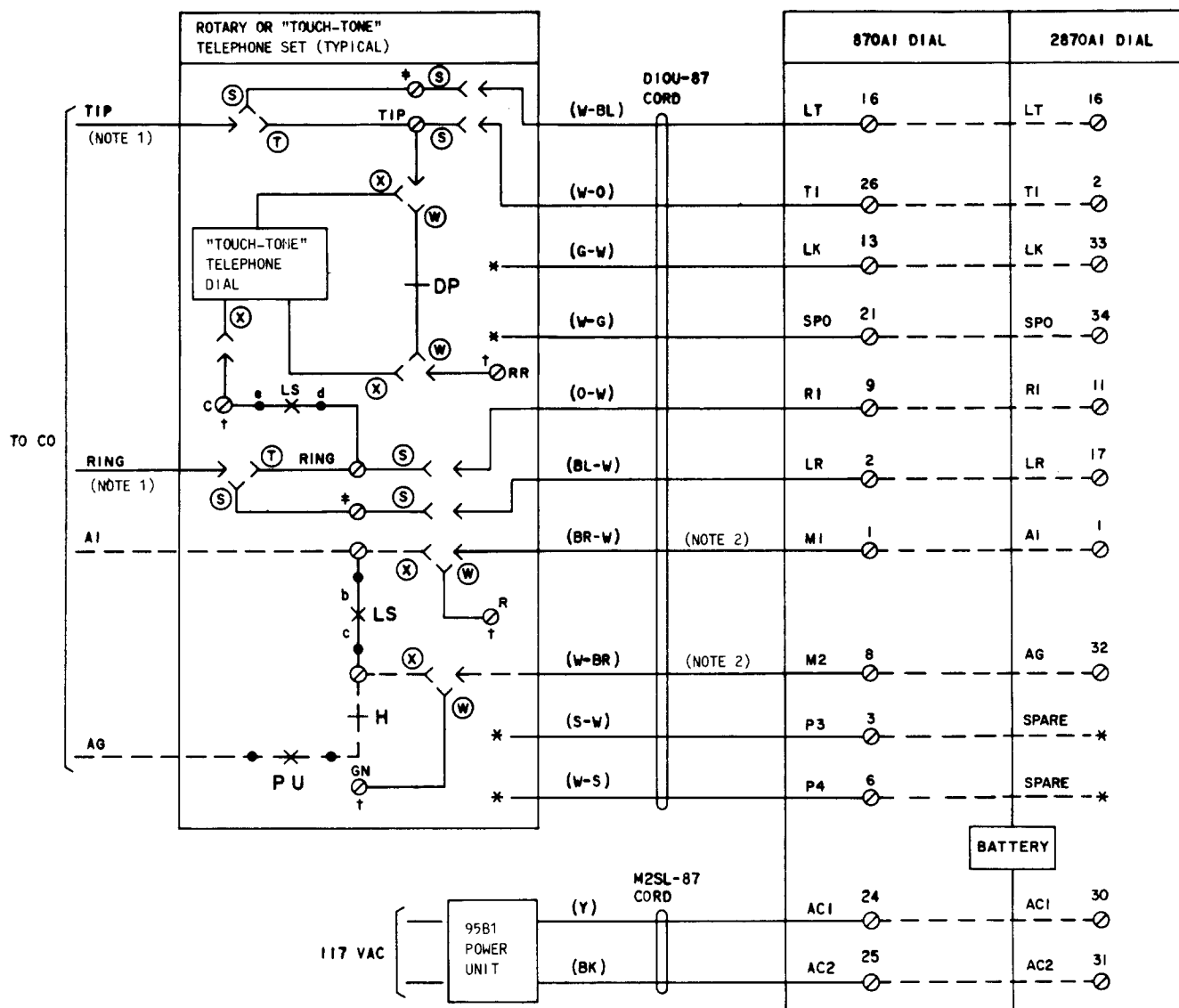
NOTES:

1. LT AND LR LEADS OF THE ADJUNCT DIAL MUST CONNECT TO THE INCOMING TIP AND RING LEADS IN THE TELEPHONE SET AT THE FIRST ACCESSIBLE POINT. IN THE CASE OF KEY TELEPHONE SETS, IT MUST BE BEHIND THE LINE PICKUP KEYS. THE LT, TI, AND LR, RI, LEADS MUST BE CONNECTED INTO THE TELEPHONE SET IN SERIES WITH THE TIP AND RING PATH.

2. THE (BR-W) AND (W-BR) ARE HANDSET MUTING LEADS ONLY IN CASE OF THE 870A1 DIAL ONLY.

Ⓢ CONNECTION WITH ADJUNCT DIAL

Ⓣ NORMAL TELEPHONE SET CONNECTION

Ⓦ ROTARY TEL SET

Ⓧ "TOUCH-TONE" TEL SET

＊ INSULATE AND STORE

† TERMINAL ON NETWORK

＊ SPARE TERMINAL OR 0-161488 CONNECTOR

DP DIAL PULSE

NOTES:
1. SEE FIG. 8 ON "SPO" CONNECTION AND APPLICABLE SECTION IN DIVISION 512.
2. ROTARY DIAL SET ONLY.
3. LT AND LR LEADS OF THE ADJUNCT DIAL MUST CONNECT TO THE INCOMING TIP AND RING LEADS IN THE TELEPHONE SET AT THE FIRST ACCESSIBLE POINT. IN THE CASE OF KEY TELEPHONE SETS, IT MUST BE BEHIND THE LINE PICKUP KEYS. THE LT, TI, AND LR, RI, LEADS MUST BE CONNECTED INTO THE TELEPHONE SET IN SERIES WITH THE TIP AND RING PATH.

(S) — CONNECTION WITH ADJUNCT DIAL.

(T) — NORMAL TELEPHONE SET CONNECTION.

(W) — ROTARY DIAL SET

(X) — "TOUCH-TONE" TELEPHONE SET DIAL

* — INSULATE AND STORE
† — TERMINAL ON NETWORK
‡ — SPARE TERMINAL OR D-161488 CONNECTOR

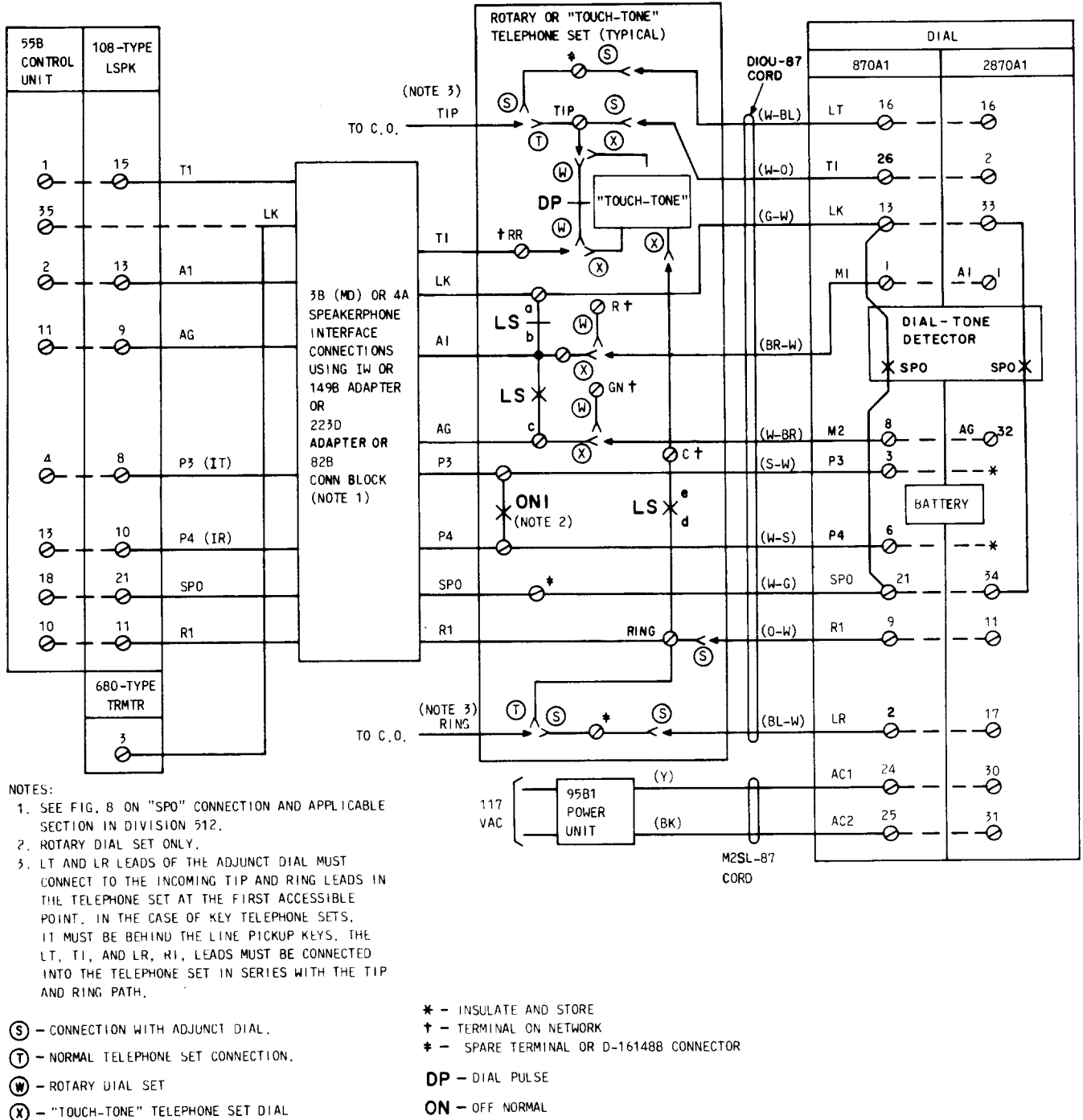DP — DIAL PULSE

ON — OFF NORMAL

Fig. 7 — ▶870A1 and 2870A1 Dials, Basic Interface Connections for One-Touch Calling Option◀
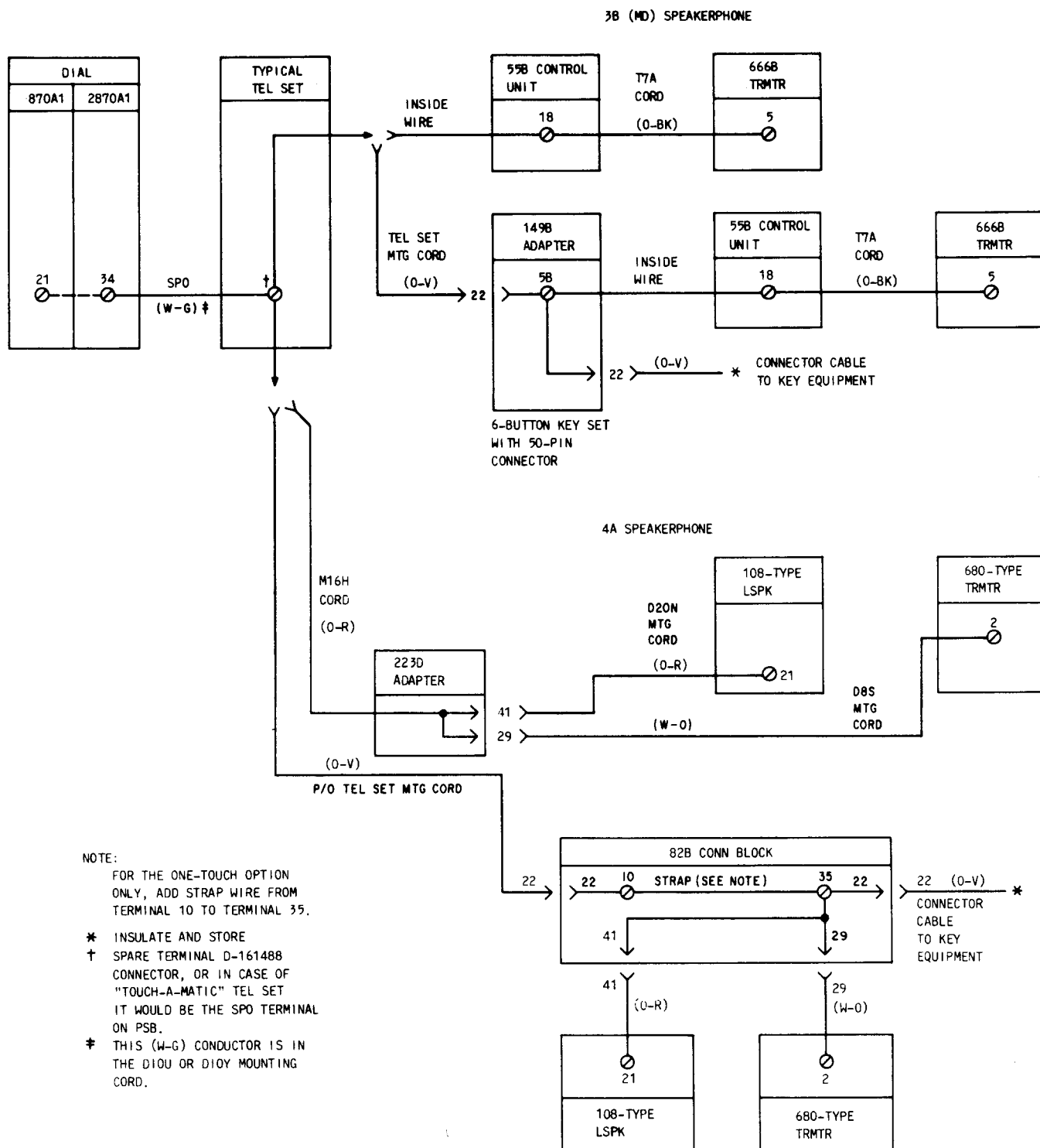
Fig. 8—870A1 and 2870A1 Dials, "SPO" Interface Connections for One-Touch Calling
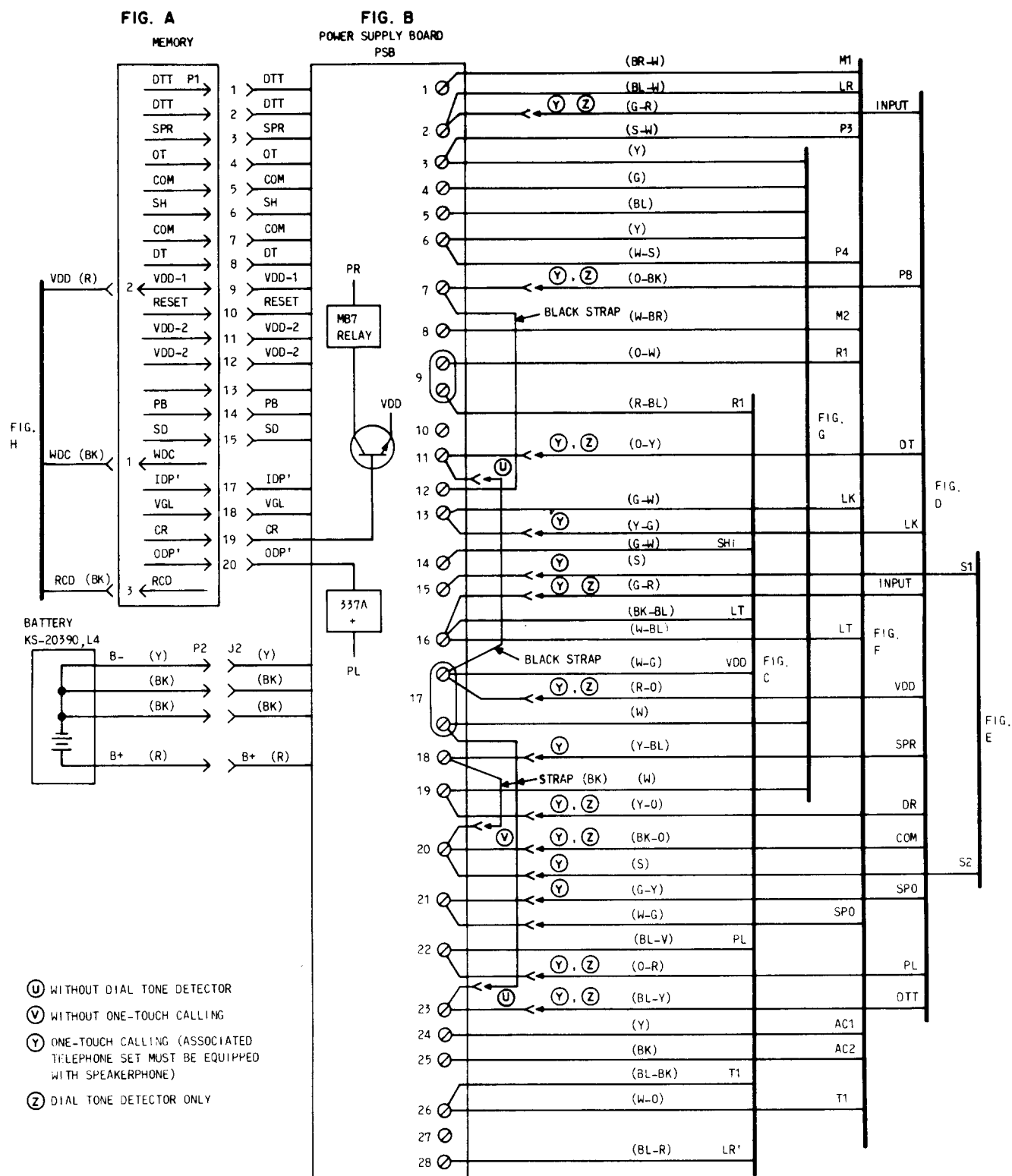
FIG. A

MEMORY

FIG. B

POWER SUPPLY BOARD
PSB

DTT P1	1	DTT	(BR-W) M1
DTT	2	DTT	(BL-W) LR
SPR	3	SPR	(G-R) INPUT
OT	4	OT	(S-W) P3
COM	5	COM	(Y)
SH	6	SH	(G)
COM	7	COM	(BL)
DT	8	DT	(Y)

VDD (R) 2 VDD-1 9 VDD-1 (W-S) P4

RESET 10 RESET (O-BK) PB

VDD-2 11 VDD-2 (W-BR) BLACK STRAP M2

VDD-2 12 VDD-2 (O-W) R1

13

PB 14 PB (R-BL) R1

SD 15 SD (O-Y)

WDC 1 WDC (G-W) LK

IDP' 17 IDP' (Y-G) LK

VGL 18 VGL (G-W) SHi

CR 19 CR (S)

ODP' 20 ODP' (G-R) INPUT

RCD 3 RCD (BK-BL) LT

(W-BL) LT

BATTERY
KS-20390,L4

PR

MB7
RELAY

VDD

PL

337A
+

(BLACK STRAP) (W-G) VDD

(R-O) VDD

(W)

(Y-BL) SPR

STRAP (BK) (W)

(Y-O) DR

(BK-O) COM

(S)

(G-Y) SPO

(W-G) SPO

(BL-V) PL

(O-R) PL

(BL-Y) DTT

(Y) AC1

(BK) AC2

(BL-BK) T1

(W-O) T1

(BL-R) LR'

B- (Y) P2 J2 (Y)
(BK) (BK)
(BK) (BK)
B+ (R) B+ (R)

FIG. H
VDD (R)
WDC (BK)
RCD (BK)

FIG. G
FIG. C
FIG. D
FIG. E
FIG. F

(U) WITHOUT DIAL TONE DETECTOR

(V) WITHOUT ONE-TOUCH CALLING

(Y) ONE-TOUCH CALLING (ASSOCIATED TELEPHONE SET MUST BE EQUIPPED WITH SPEAKERPHONE)

(Z) DIAL TONE DETECTOR ONLY

S1
S2

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

FIG. C
LINE SENSING RELAY PWB
841382880

LT	(BK-BL)	1
VDD	(W-G)	2
R1	(R-BL)	3
T1	(BL-BK)	4
PL	(BL-V)	5
LR'	(BL-R)	6
SHI	(G-W)	7

FIG. B

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

INPUT	(G-R)	1
INPUT	(G-R)	2
SPR	(Y-BL)	3
DTT	(BL-Y)	4
DT	(O-Y)	5
DR	(Y-O)	6
PB	(O-BK)	7
COM	(BK-O)	8
PL	(O-R)	9
VDD	(R-O)	10
SPO	(G-Y)	11
LK	(Y-G)	12

FIG. B

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

S1	(S)	1
S2	(S)	2

FIG. B

FIG. G
8EA -119 DIAL

DP - DIAL PULSE
ON - OFF NORMAL

FIG. F

DIOU-87
MOUNTING CORD

ASSOCIATED
TELEPHONE SET

T1	(W-O)	TIP
R1	(O-W)	RING
LK	(G-W) §	
SPO	(W-G) §	
LT	(W-BL)	†
LR	(BL-W)	†
M1	(BR-W)	‡
M2	(W-BR)	‡
P3	(S-W)	*
P4	(W-S)	*

FIG. B

M2SL-87
POWER CORD

95B1
POWER UNIT

AC1	(Y)	
AC2	(BK)	

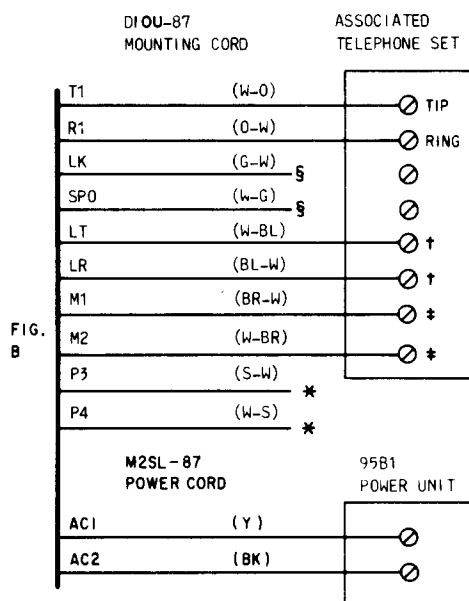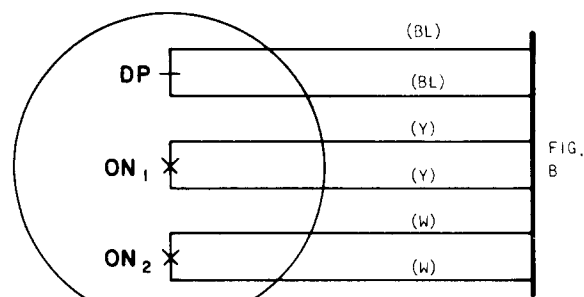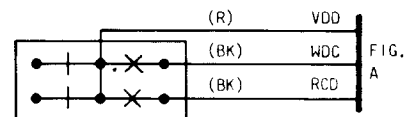### FIG. H
RECORD DISABLE/DIAL INTERMIX SWITCH   (D-180818)

FIG. A

DP - DIAL PULSE
ON - OFF NORMAL
* INSULATE AND STORE UNLESS SPEAKERPHONE IS PROVIDED
† SPARE TERMINAL OR D-161488 CONNECTOR
‡ APPROPRIATE TERMINAL TO PROVIDE MUTING OF RECEIVER
§ INSULATE AND STORE UNLESS ONE TOUCH CALLING IS PROVIDED
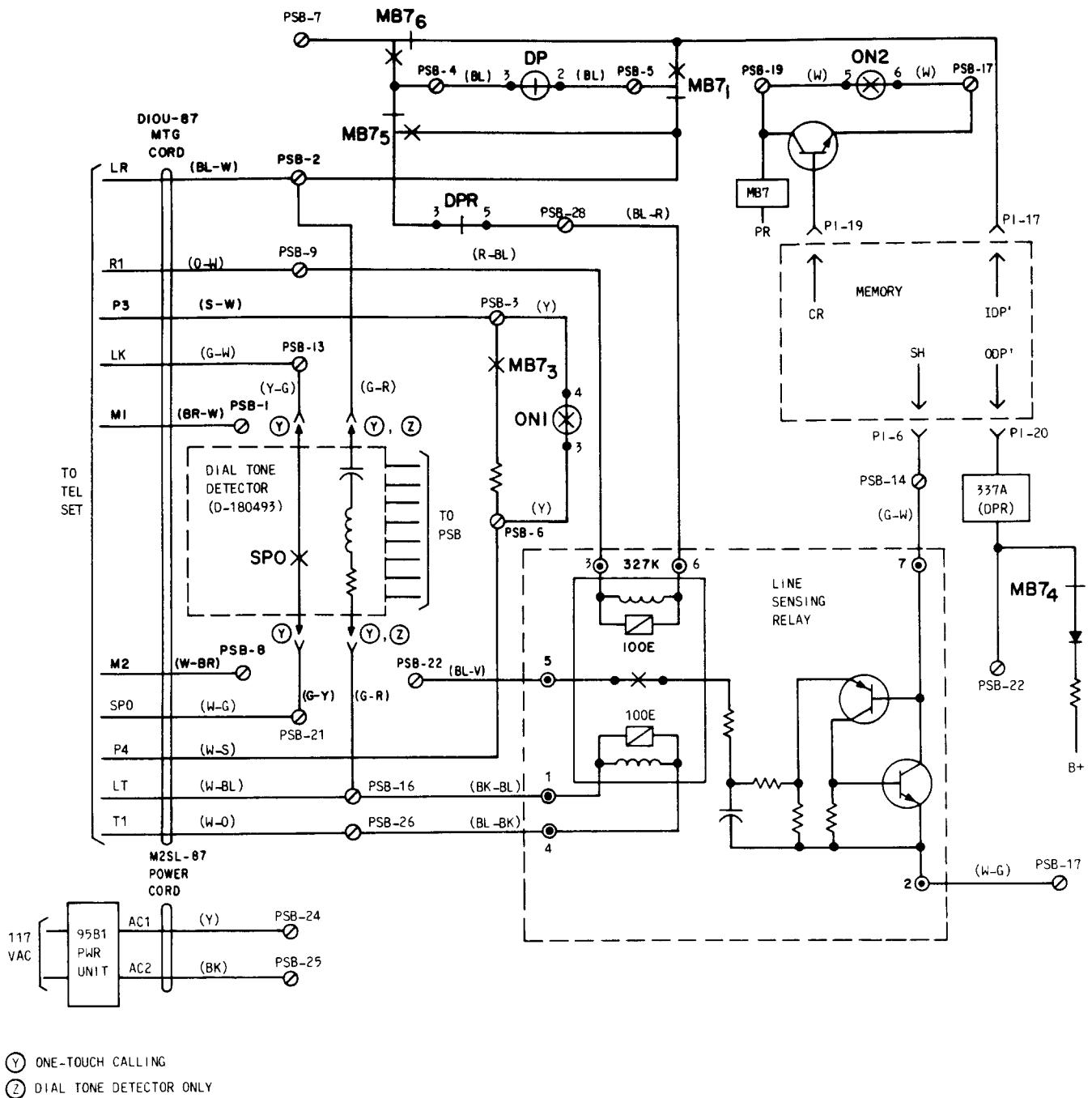
Fig. 9—▶870A1 Dial, Connections (Sheet 2 of 2)◀
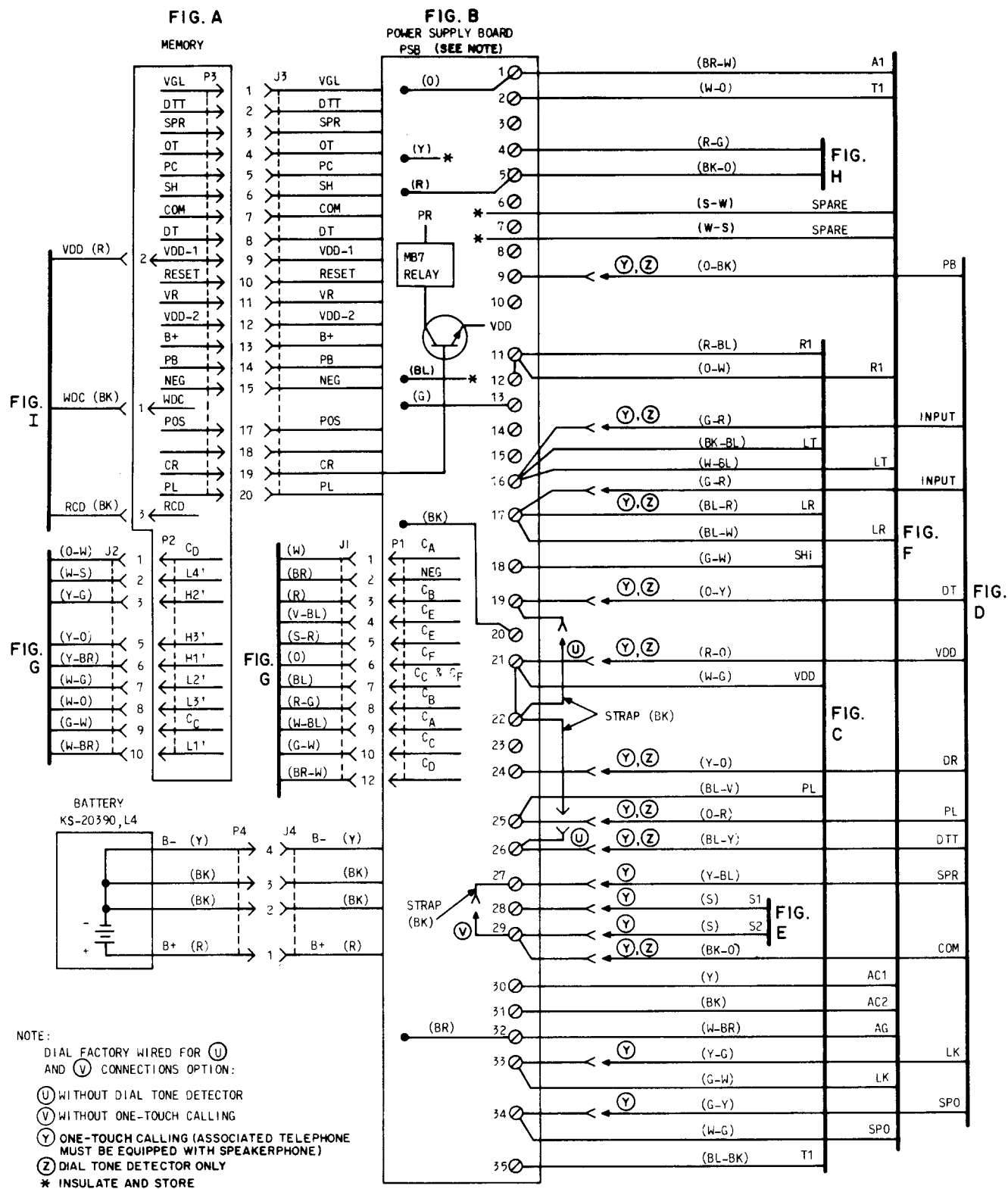
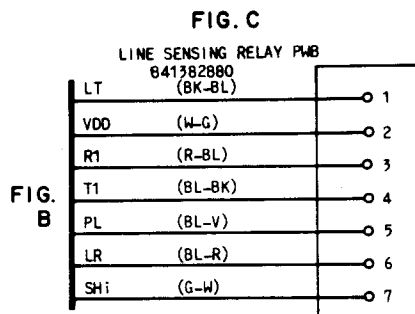Fig. 10—870A1 Dial, Partial Functional Schematic

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

FIG. C

LINE SENSING RELAY PWB
841382880

FIG. B

LT	(BK-BL)	1
VDD	(W-G)	2
R1	(R-BL)	3
T1	(BL-BK)	4
PL	(BL-V)	5
LR	(BL-R)	6
SHi	(G-W)	7

NOTE:

ASSOCIATED TELEPHONE SET
MUST BE EQUIPPED WITH
SPEAKERPHONE

✷ INSULATE AND STORE

✝ SPARE TERMINAL OR
D-161488 CONNECTOR

✚ INSULATE AND STORE UNLESS
ONE TOUCH CALLING IS PROVIDED
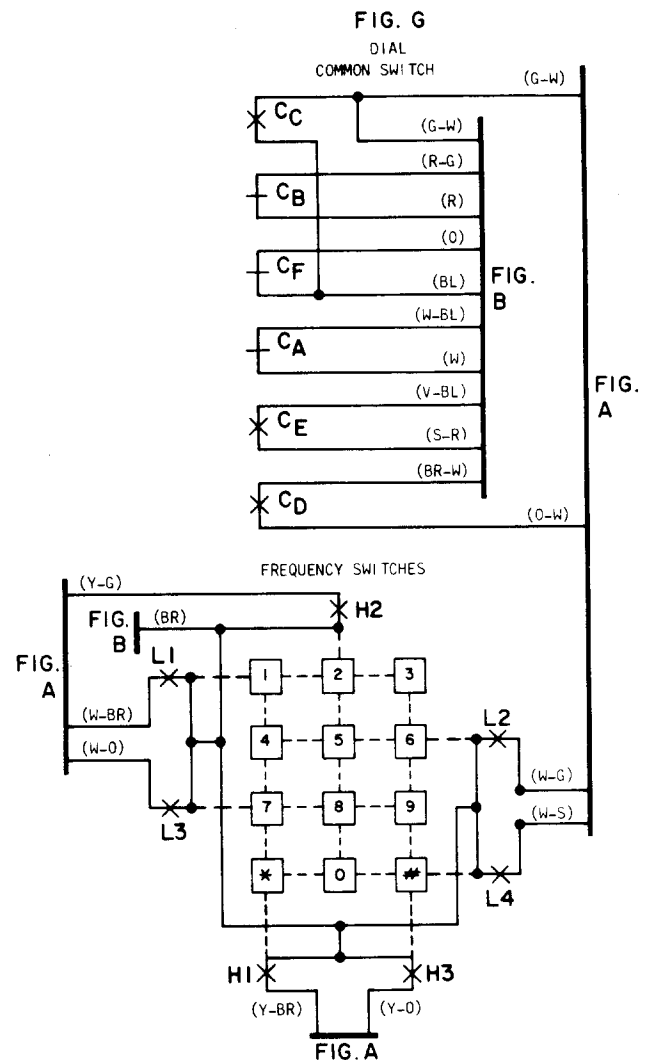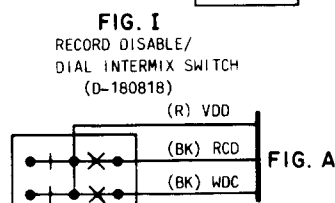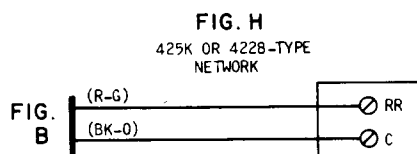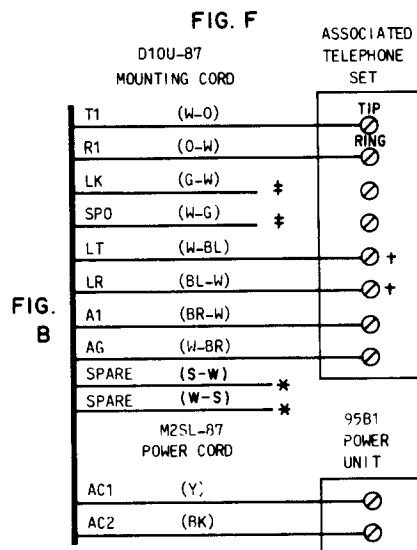(ASSOCIATED TELEPHONE
SET EQUIPPED WITH
SPEAKERPHONE)

FIG. D

DIAL TONE DETECTOR (P/O D-180493)

FIG. B

INPUT	(G-R)	1
INPUT	(G-R)	2
SPR	(Y-BL)	3
DTT	(BL-Y)	4
DT	(O-Y)	5
DR	(Y-O)	6
PB	(O-BK)	7
COM	(BK-O)	8
PL	(O-R)	9
VDD	(R-O)	10
SPO	(G-Y)	11
LK	(Y-G)	12

FIG. E

ONE-TOUCH CALLING SWITCH
(P/O D-180493) (SEE NOTE)

FIG. B

S1	(S)	1
S2	(S)	2

FIG. F

D10U-87
MOUNTING CORD

ASSOCIATED
TELEPHONE
SET

FIG. B

T1	(W-O)		TIP
R1	(O-W)		RING
LK	(G-W)	✚	
SPO	(W-G)	✚	
LT	(W-BL)		✝
LR	(BL-W)		✝
A1	(BR-W)		
AG	(W-BR)		
SPARE	(S-W)	✷	
SPARE	(W-S)	✷	

M2SL-87
POWER CORD

95B1
POWER
UNIT

AC1	(Y)	
AC2	(BK)	

FIG. G

DIAL
COMMON SWITCH

FIG. B

FIG. A

FREQUENCY SWITCHES

FIG. H

425K OR 4228-TYPE
NETWORK

FIG. B

(R-G)		RR
(BK-O)		C

FIG. I

RECORD DISABLE/
DIAL INTERMIX SWITCH
(D-180818)

(R)	VDD	
(BK)	RCD	
(BK)	WDC	

FIG. A

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

Fig. 12—2870A1 Dial, Partial Functional Schematic

◆ TABLE H ◆

TROUBLE ANALYSIS — 870A1 DIAL

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

*Refer to paragraph 6.02(4).

♦ TABLE H (Contd) ♦

TROUBLE ANALYSIS — 870A1 DIAL

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

*Refer to paragraph 6.02(4).

◆ TABLE H (Contd) ◆

TROUBLE ANALYSIS — 870A1 DIAL

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

*Refer to paragraph 6.02(4).

TABLE H (Contd)

TROUBLE ANALYSIS — 870A1 DIAL

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

*Refer to paragraph 6.02(4).

♦ TABLE H (Contd) ♦

TROUBLE ANALYSIS — 870A1 DIAL

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

♦ TABLE I ♦

TROUBLE ANALYSIS – 2870A1 DIAL

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

*Refer to paragraph 6.02(4).

◆ **TABLE I** (Contd) ◆

TROUBLE ANALYSIS – 2870A1 DIAL

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

*Refer to paragraph 6.02(4).

♦ TABLE I (Contd) ♦

TROUBLE ANALYSIS — 2870A1 DIAL

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

*Refer to paragraph 6.02(4).

♦ TABLE I (Contd) ♦

TROUBLE ANALYSIS – 2870A1 DIAL

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

*Refer to paragraph 6.02(4).

◆ TABLE I (Contd) ◆

TROUBLE ANALYSIS — 2870A1 DIAL

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

♦ TABLE I (Contd) ♦

TROUBLE ANALYSIS – 2870A1 DIAL

TROUBLE NUMBER	FAILURE	ADDITIONAL SYMPTOM	POSSIBLE CAUSE	REMEDIAL ACTION
14	Automatic dialing commences for no apparent reason (wired for ONE-TOUCH option)		Static discharge damage	1. Replace memory 2. Consult Telco engineer for proper grounding procedures
15	Adjunct dials automatically but does not wait for dial tone (wired for ONE-TOUCH option)		Noise on line	1. Add .05 μf capacitor between PSB-21 and PSB-26 2. Remove above capacitor and add resistor (10kΩ - 50kΩ) in series with a G-R dial tone detector input lead