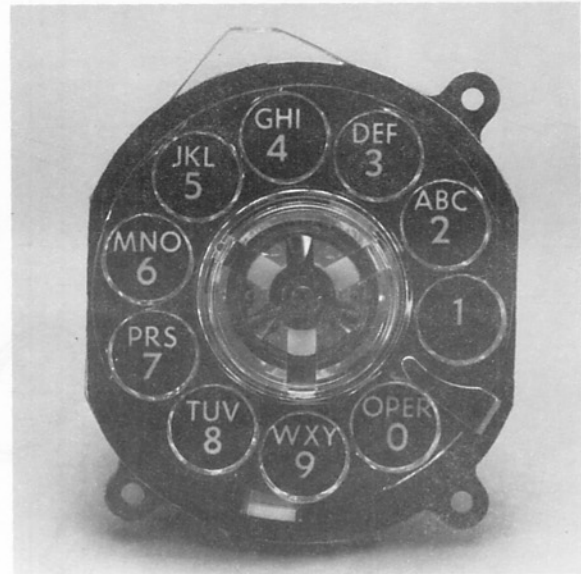


MODEL 10A ROTARY DIAL

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AW 85-173

Figure 1: Model 10A Rotary Dial

1. INTRODUCTION

1.01 This document covers the Model 10A rotary dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments are included.

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

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 10A rotary dial (see Figure 2) consists of a metal base plate assembly on which are mounted the gear train, contact spring assembly, numeral ring, numeral ring cover, finger stop, finger plate, and miscellaneous parts. The gear train is protected by a plastic dust cover. The Model 10A rotary dial is available with either a metropolitan-style numeral ring (letters and numerals) coded G, or a regular-style numeral ring (numerals only) coded D.

2.02 When the dial finger plate is rotated clockwise and released, a pair of pulsing contacts interrupts the telephone line current once for each

unit of the dialed digit. Telephone switching equipment is operated in accordance with the number of pulses received. The dials are factory-adjusted to 10 pulses per second (nominal), and a pulse ratio with a break period of 61.5% of the pulse duration. The movable finger stop moves clockwise approximately two hole spaces at the beginning of each dial windup until it encounters a fixed stop.

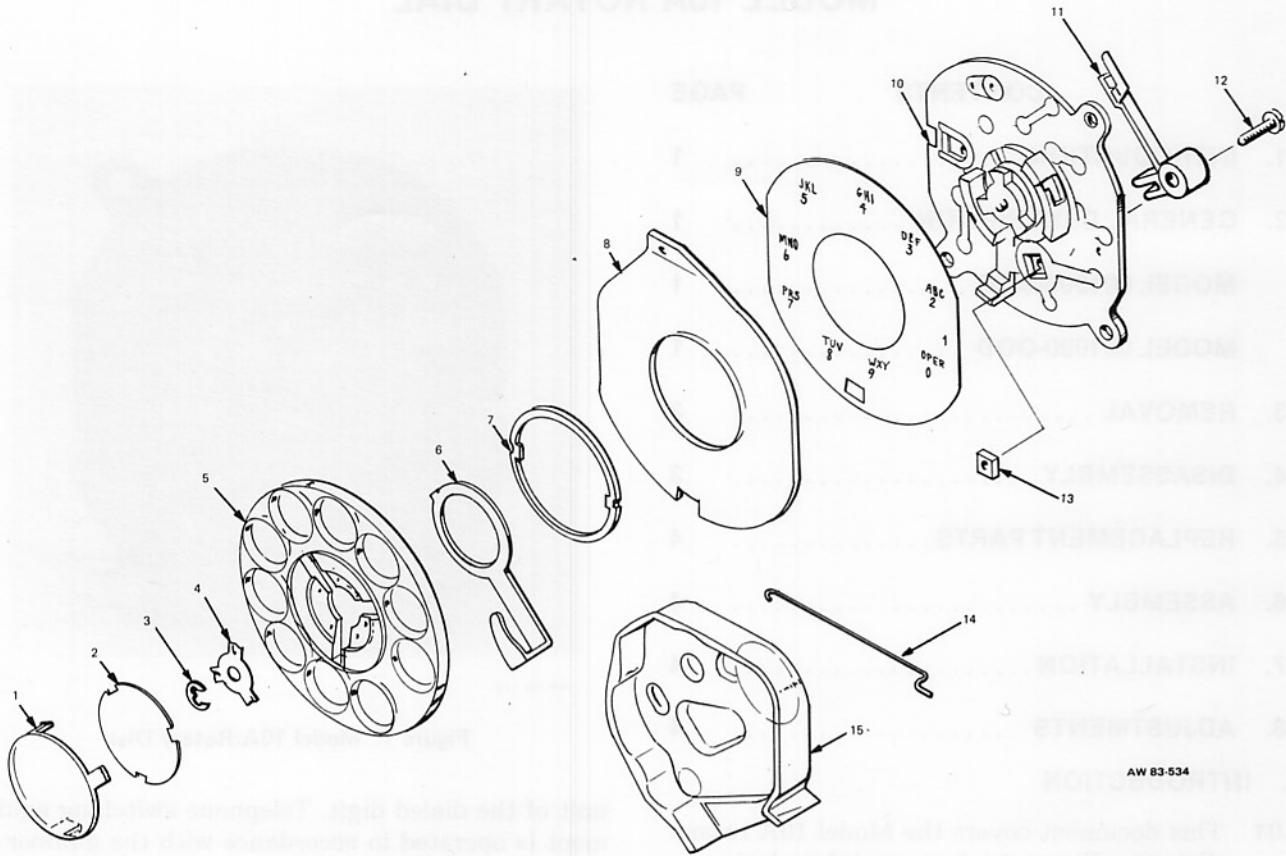
2.03 The Model 10A rotary dials are identified by a code number stamped in ink on the back of the dial. Refer to Table A for ordering information and for an explanation of each code number. Variations of the 10A rotary dials are briefly described in the following paragraphs.

MODEL 001000-OOG

2.04 The Model 001000-OOG rotary dial is designed for use in Trendline telephones. It contains one set of pulsing contacts to interrupt the line current once for each unit of a dialed digit. This dial has a 2-3/8-inch diameter, metropolitan-style numeral ring displaying both letters and numerals.

MODEL 001000-OOD

2.05 The Model 001000-OOD rotary dial is the same as the Model 001000-OOG rotary dial with the exception that it has a regular-style numeral ring displaying numerals only.



AW 83-534

Figure 2: Model 10A Rotary Dial, Exploded View

TABLE A
ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:			
		<u>001000</u>	<u>OOG</u>
(1) Dial Model Number (See Part 1)	_____		_____
(2) Numeral Ring Style (See Part 2)	_____		_____
PART 1 DIAL MODEL NUMBER		PART 2 NUMERAL RING STYLE	
CODE	DESCRIPTION	CODE	DESCRIPTION
001000	Model 10A Rotary Dial	OOG	Metropolitan (Letters And Numerals)
		OOD	Regular (Numerals Only)

AW 84-914

3. REMOVAL

3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the number card retainer, number card, and light shield from the telephone handset.
- (b) Loosen and remove the two screws that hold the handset housing to the handset cover. Remove the cover from the housing.
- (c) Remove the network and transmitter cup assembly by loosening and removing the one mounting screw, and by loosening the two screws securing the two mounting brackets. Lift the network and transmitter cup assembly from the handset housing.
- (d) Disconnect the network assembly leads from the dial.
- (e) Loosen and remove the three dial mounting screws and lift the dial from the telephone housing.

4. DISASSEMBLY

4.01 To disassemble the dial, proceed as follows:

- (a) Insert the straightened end of a paper clip or similar tool into the small hole located in the finger plate. (See Figure 3.) Pry the number card cover from the finger plate. Remove the finger wheel card from the finger plate.

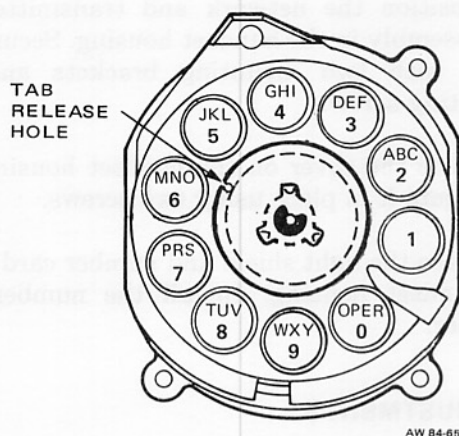


Figure 3: Location of Number Card Cover Release Hole

- (b) Remove the retainer ring from the main shaft. (See Figure 4.)

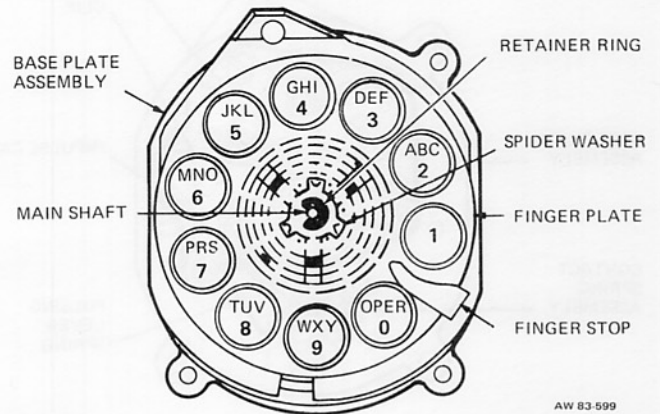


Figure 4: Front View of Dial (Partially Assembled)

- (c) Remove the spider washer, finger plate, and finger stop from the base plate assembly.
- (d) Rotate the retainer ring (see Figure 5) counterclockwise to clear the locking slot of the base plate assembly.

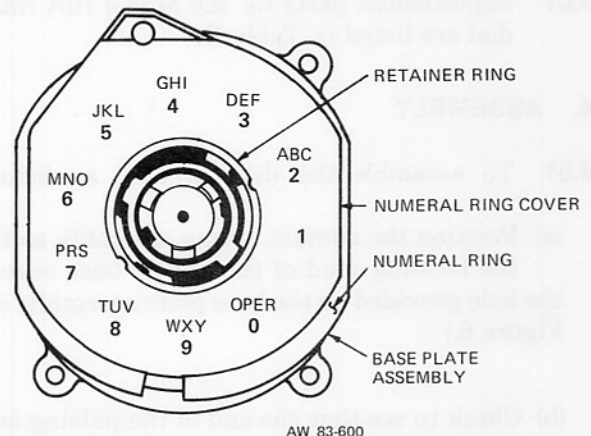
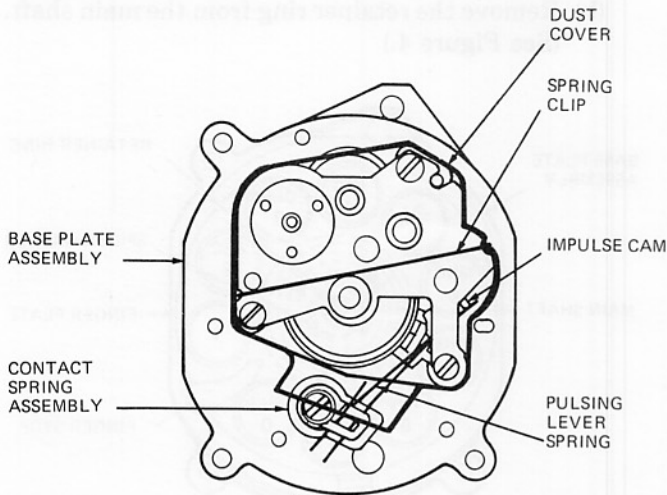


Figure 5: Front View of Dial (without Number Card Cover)

- (e) Lift the retainer ring, numeral ring cover, and numeral ring from the base plate assembly.
- (f) Remove the dust cover (see Figure 6) from the back of the base plate assembly by removing the spring clip and lifting the cover.
- (g) Loosen and remove the screw that holds the contact spring assembly to the base plate assembly, taking care not to damage the contacts. (See Figure 6.)



AW 83-594

Figure 6: Rear View of Dial (with Dust Cover)

Warning: Further disassembly of the base plate assembly is not recommended.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 10A rotary dial are listed in Table B.

6. ASSEMBLY

6.01 To assemble the dial, proceed as follows:

- (a) Position the contact spring assembly so that the locating stud of the plastic base seats in the hole provided on the base plate assembly. (See Figure 6.)
- (b) Check to see that the end of the pulsing lever spring rests on the surface of the impulse cam. (See Figure 6.)
- (c) Secure the contact spring assembly to the base plate assembly using one screw.
- (d) Position the dust cover on the back of the base plate assembly and secure it in place with the spring clip. (See Figure 6.)
- (e) Position the numeral ring, numeral ring cover, and retainer ring on the base plate assembly. Align the tabs on the retainer ring with the slots in the base plate assembly. (See Figure 5.)

(f) Rotate the retainer ring clockwise until it locks into position.

(g) Position the finger stop on the main shaft so the arm extends between the numbers zero and one. (See Figure 4.)

(h) Position the finger plate on the main shaft with the widest area between finger positions aligned with the finger stop arm. The three slots in the center of the finger plate will seat on the main shaft collar.

(j) Place the spider washer onto the main shaft.

(k) Press the retainer ring onto the main shaft. (See Figure 4.)

(m) Position the finger wheel card and the number card cover on the finger plate, align the tabs of the card cover with the slots in the finger plate, and press the card cover onto the finger plate. Take care not to damage the tabs.

7. INSTALLATION

7.01 To install the dial in a telephone handset, proceed as follows:

- (a) Position the dial in the handset housing; secure it in place using three screws.
- (b) Refer to the telephone circuit label and connect the network leads to the dial.
- (c) Position the network and transmitter cup assembly in the handset housing. Secure it in place with two mounting brackets and one mounting screw.
- (d) Place the cover on the handset housing and secure it in place using two screws.
- (e) Place the light shield and number card in the handset housing. Install the number card retainer.

8. ADJUSTMENTS

8.01 Adjustments to the 10A dial pertain to dial speed and contact springs. These adjustments are beyond the scope of this section.

TABLE B
REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED	
			10/00G	10/00D
		Model 10A Rotary Dial		
1	180314-101	Cover, Number Card	1	1
2	180308-101	Card, Finger Wheel	1	1
3	073538-110	Ring, Retainer	1	1
4	181028-101	Washer, Spider	1	1
5	180313-101	Plate, Finger	1	1
6	181029-101	Stop, Finger	1	1
7	181030-101	Ring, Retainer	1	1
8	182741-101	Cover, Numeral Ring	1	1
9	182740-101	Ring, Numeral	1	—
9	182738-101	Ring, Numeral	—	1
10	182430-101	Base Plate Assembly	1	1
11	182451-101	Contact Spring Assembly	1	1
12	182459-101	Screw	1	1
13	182458-101	Nut	1	1
14	180316-101	Clip, Spring	1	1
15	182429-101	Cover, Dust	1	1

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MODEL 186087 AUTO DIALER

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4. DISASSEMBLY	4
5. REPLACEMENT PARTS	4
6. ASSEMBLY	4
7. INSTALLATION	4

1. INTRODUCTION

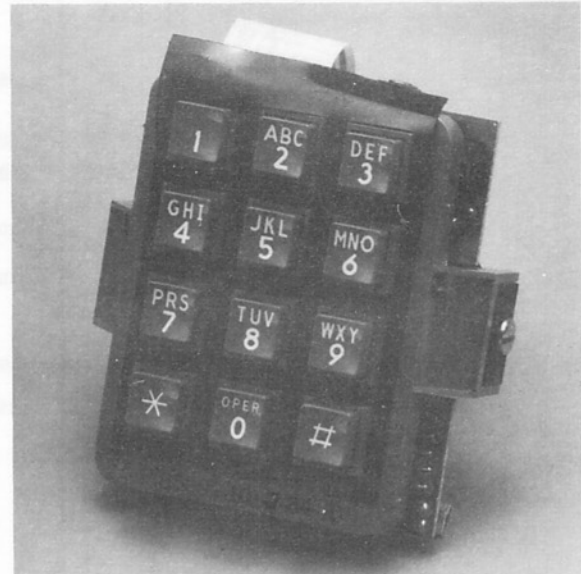
1.01 This document covers the Model 186087 auto dialer. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 186087 auto dialer consists of a pushbutton keypad and a printed circuit board (PCB) that provide memory storage of dialed digits. The auto dialer is available as a 13-pushbutton keypad with an attached PCB, or as a 12-pushbutton keypad with an attached PCB and an externally-mounted AUTO DIAL pushbutton. The auto dialer provides storage for ten 16-digit numbers, redialing of the last-number-dialed (LND), automatic dialing of any stored number, and predialing.



AW 85-179

Figure 1: Model 186087 Auto Dialer

Note: The Model 186087 auto dialer only provides memory storage of telephone numbers. The auto dialer does not provide dual tone multifrequency (DTMF) or dial pulse (DP) dialing. The auto dialer must be used in conjunction with a DTMF or DP PCB.

2.02 The Model 186087 auto dialer uses either a 12-pushbutton or 13-pushbutton keypad. (See Figure 2.) Both keypads consist of a cover plate, 12 standard keys (0-9, *, and #), a silicone switchplate, and a contact PCB assembly. The 13-pushbutton keypad has an additional AUTO DIAL pushbutton, while the 12-pushbutton keypad is used with an externally-mounted AUTO DIAL pushbutton.

2.03 The auto dialer PCB consists of a microprocessor integrated circuit (IC), a Random Access Memory (RAM) IC, and other solid-state components. (See Figure 3.) The microprocessor controls the operation of the memory storage and provides LND storage while the RAM provides the storage of the 16-digit numbers. The other solid-state components aid the microprocessor in its operation.

2.04 When a pushbutton is pressed on the keypad, a single keypad contact provides a row and column input to the auto dialer PCB. The PCB interprets the pressed pushbutton as an AUTO DIAL,

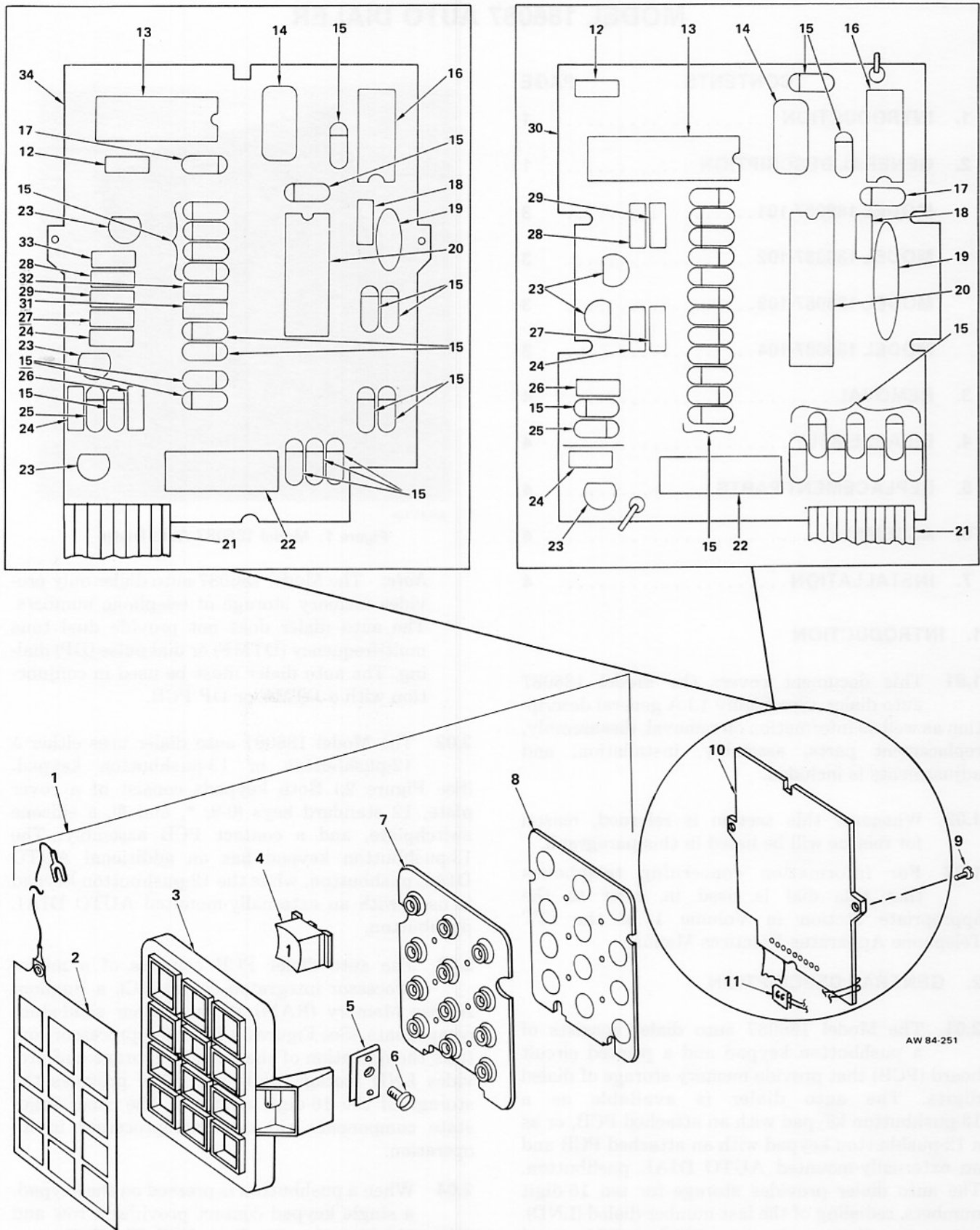


Figure 2: Model 186087 Auto Dialer, Exploded View

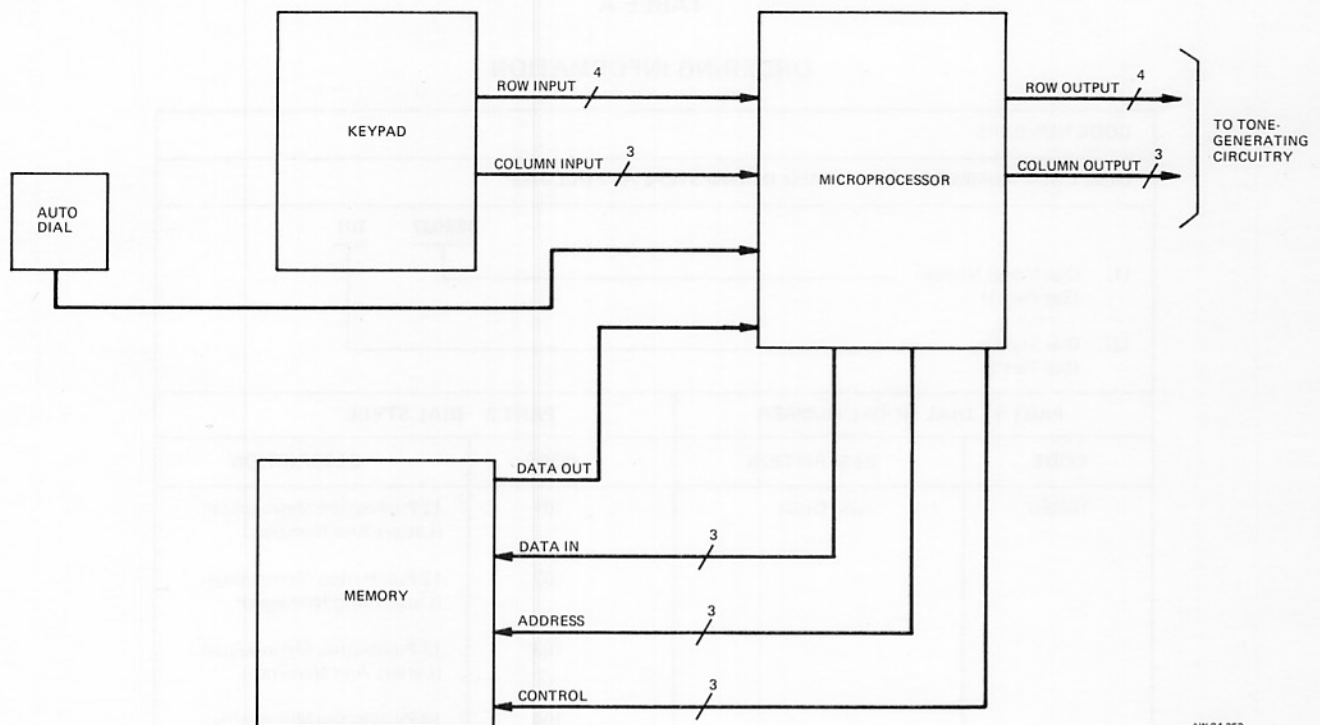


Figure 3: Model 186087 Auto Dialer, Block Diagram

control (* or #), or number (0-9) key, and operates in accordance with the sequence of keys pressed. Refer to the appropriate document containing the station operating instructions.

2.05 The output of the auto dialer is transmitted to a DTMF or DP PCB. This output is a row and column signal in the same format as the standard keypad output. This enables the auto dialer to be used in place of a standard keypad.

2.06 Operations that are controlled by the microprocessor are storage, LND, and predialing. The storage feature allows a number to be stored directly or as LND while the handset is on-hook. Predialing allows a number to be entered while the handset is on-hook, and then dialed automatically by going off-hook, selecting a line (if required), and pressing the AUTO DIAL pushbutton twice.

2.07 The auto dialer allows for a pause to be entered between any two digits entered on the keypad. The pause suspends dialing until the redial pushbutton (#) is pressed. Up to eight pauses can be inserted.

2.08 The Model 186087 auto dialer is identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for ordering information and for an explanation of each code. Variations of the Model 186087 auto dialer are briefly discussed in the following paragraphs.

MODEL 186087-101

2.09 The Model 186087-101 auto dialer has a 12-pushbutton keypad with metropolitan-style pushbuttons displaying both letters and numerals. The auto dialer is designed to be used with an external AUTO DIAL pushbutton in single-line telephones.

MODEL 186087-102

2.10 The Model 186087-102 auto dialer is the same as the Model 186087-101 auto dialer except it is used in multibutton electronic telephone subsets with the ITT System 3100.

MODEL 186087-103

2.11 The Model 186087-103 auto dialer has a 13-pushbutton keypad with metropolitan-style pushbuttons displaying both letters and numerals. The 13th pushbutton is an AUTO DIAL pushbutton, used in multibutton electronic telephone subsets with the ITT EKS-801.

MODEL 186087-104

2.12 The Model 186087-104 auto dialer is the same as the Model 186087-103 auto dialer except it is used in multibutton electronic telephone subsets with the ITT System 3100.

TABLE A

ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:			
(1) Dial Model Number (See Part 1)	_____		186087
(2) Dial Style (See Part 2)	_____		101
PART 1 DIAL MODEL NUMBER		PART 2 DIAL STYLE	
CODE	DESCRIPTION	CODE	DESCRIPTION
186087	Auto Dialer	101	12-Pushbutton Metropolitan (Letters And Numerals)
		102	12-Pushbutton Metropolitan (Letters And Numerals)
		103	13-Pushbutton Metropolitan (Letters And Numerals)
		104	13-Pushbutton Metropolitan (Letters And Numerals)

AW 84-947

3. REMOVAL

3.01 To remove the Model 186087 auto dialer from the telephone, proceed as follows:

- (a) Remove the telephone faceplate if required.
- (b) Remove the telephone housing.
- (c) Remove the auto dialer by loosening the screw on the side of each mounting bracket, and disconnecting the auto dialer leads.

Warning: *The Model 186087 auto dialer contains static-sensitive components. Personnel handling the auto dialer must have knowledge of proper handling techniques.*

4. DISASSEMBLY

4.01 To disassemble the auto dialer, remove the two screws on the tone-generating PCB and pull the PCB from the keypad assembly. This is the lowest level of disassembly suggested for the Model 186087 auto dialer. Further disassembly of the PCB requires removal of components. Further disassembly of the keypad requires removal of plastic stakes that hold the assembly together.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 186087 auto dialer are listed in Table B.

6. ASSEMBLY

6.01 To assemble the Model 186087 auto dialer, connect the auto dialer PCB to the keypad at the eight-pin connector and install the two retaining screws.

7. INSTALLATION

7.01 To install the Model 186087 auto dialer, proceed as follows:

- (a) Ensure that the electrostatic shield is in place on the dial prior to installation.
- (b) Connect the auto dialer leads. Refer to the circuit label for the telephone being assembled.
- (c) Mount the auto dialer in the dial mounting brackets and tighten the screws.
- (d) Install the telephone housing.
- (e) Install the telephone faceplate if removed.

TABLE B
REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED			
			101	102	103	104
		Model 186087 Auto Dialer				
1	184475-105	Keypad Assembly	1	1	—	—
1	184500-101	Keypad Assembly	—	—	1	1
2	186129-102	Shield, Electrostatic	1	1	—	—
2	186129-103	Shield, Electrostatic	—	—	1	1
3	184477-101	Plate, Cover	1	1	—	—
3	184491-102	Plate, Cover	—	—	1	1
4	184476-101	Button (1)	1	1	1	1
	184476-102	Button (2)	1	1	1	1
	184476-103	Button (3)	1	1	1	1
	184476-104	Button (4)	1	1	1	1
	184476-105	Button (5)	1	1	1	1
	184476-106	Button (6)	1	1	1	1
	184476-107	Button (7)	1	1	1	1
	184476-108	Button (8)	1	1	1	1
	184476-109	Button (9)	1	1	1	1
	184476-110	Button (*)	1	1	1	1
	184476-111	Button (0)	1	1	1	1
	184476-112	Button (#)	1	1	1	1
	184476-133	Button, AUTO DIAL (Not Shown)	—	—	1	1
5	184479-101	U-Nut	2	2	2	2
6	075487-102	Screw, Dial Mounting	2	2	2	2
7	184478-101	Switchplate, Silicone	1	1	1	1
8	184484-103	PCB Assembly	1	1	—	—
8	184499-101	PCB Assembly	—	—	1	1
9	095971-104	Screw, PCB Mounting	2	2	2	2
10	186071-101	PCB Assembly, Auto Dialer	1	—	—	—
	186071-102	PCB Assembly, Auto Dialer	—	1	—	—
	601844-536-001	PCB Assembly, Auto Dialer	—	—	1	—
	601844-536-002	PCB Assembly, Auto Dialer	—	—	—	1
11	184113-101	Battery Clip Assembly	1	1	1	1
12	181789-158	Resistor, 100 K, 1/4 W, ±5%, R3	1	1	1	1
13	185354-101	IC, 256 X 4 RAM, U2	1	1	1	1
14	181819-104	Capacitor, 10 MFD, 15 V, C2	1	1	1	1
15	180656-102	Diode, 1N4148, CR1-14, CR16, CR19-25	22	22	—	—
15	180656-102	Diode, 1N4148, CR1-10, CR12, CR14-20	—	—	18	18
16	185353-101	IC, CMOS Binary Counter, U3	1	1	1	1
17	184751-101	Diode, Schottky, CR15	1	1	—	—
17	184751-101	Diode, Schottky, CR11	—	—	1	1
18	181179-273	Resistor, 35.7 K, 0.1 W, ±1%, R5	1	1	—	—
18	180951-206	Resistor, 35.7 K, 0.1 W, ±1%, R5	—	—	1	1
19	182135-111	Capacitor, 470 PFD, C1	1	1	1	1
20	185355-102	IC, CMOS Microprocessor, U1	1	1	1	1
21	184313-102	Cable, Flat Ribbon	1	1	1	1
22	184652-101	Connector	1	1	1	1
23	182076-101	Transistor, Special 5484, Q1-Q3	3	3	3	3

TABLE B

REPLACEMENT PARTS LIST (Cont)

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED			
			101	102	103	104
		Model 186087 Auto Dialer				
24	181789-162	Resistor, 220 K, 1/4 W, $\pm 5\%$, R4, R8	2	2	2	2
25	182137-101	Diode, Zener, 1N5232A, CR17	1	1	—	—
25	182137-101	Diode, Zener, 1N5232A, CR13	—	—	1	1
26	181789-150	Resistor, 22 K, 1/4 W, $\pm 5\%$, R6	1	1	1	1
27	181789-156	Resistor, 68 K, 1/4 W, $\pm 5\%$, R7	1	1	1	1
28	181789-154	Resistor, 47 K, 1/4 W, $\pm 5\%$, R2	1	1	1	1
29	181789-149	Resistor, 18 K, 1/4 W, $\pm 5\%$, R1	1	1	1	1
30	186070-101	PC Board, Drilled	1	1	—	—
31	180464-112	Capacitor, 0.1 MFD, 50 V, C3	—	—	1	1
32	181789-155	Resistor, 56 K, 1/4 W, $\pm 5\%$, R9	—	—	1	1
33	180464-118	Capacitor, 0.01 MFD, C4	—	—	1	1
34	651844-536 -001	PC Board, Drilled	—	—	1	1

NOTE: All capacitor values are in microfarads (MFD) or picofarads (PFD).

AW 84-948

MODEL 185462 PUSHBUTTON DIAL NETWORK ASSEMBLY

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4. DISASSEMBLY	4
5. REPLACEMENT PARTS	4
6. INSTALLATION	4

1. INTRODUCTION

1.01 This document covers the Model 185462 pushbutton dial network assembly. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, and installation is included.

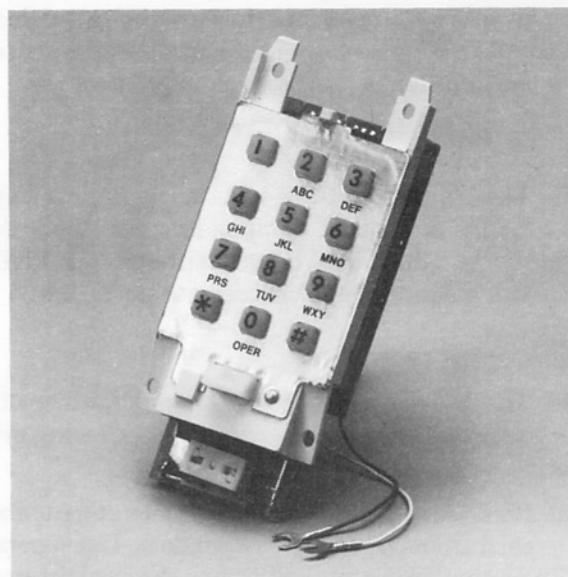
1.02 Whenever this section is reissued, reason for reissue will be listed in this paragraph.

1.03 For information concerning telephones that this pushbutton dial network assembly is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 185462 pushbutton dial network assembly is a 12-pushbutton keypad assembly with a tone-generating printed circuit board (PCB) attached. (See Figure 2.) The pushbutton dial network assembly is designed to be mounted in the handset of an ITT Trendline or Trendline II telephone. The pushbutton dial network assembly features a keypad assembly and network components consolidated onto the tone-generating PCB.

2.02 The keypad assembly consists of a cover plate, a silicone switchplate, 12 white translucent pushbuttons, a translucent recall switch, and a



AW 85-182

Figure 1: Model 185462 Pushbutton Dial Network Assembly

contact PCB assembly. The PCB has Light Emitting Diodes (LEDs) that are optional on the Trendline II telephones.

2.03 The tone-generating PCB that mounts to the keypad assembly provides a dual tone multifrequency (DTMF) output and all the components necessary to connect and to match the impedance of handset transmitter and receiver units to a two-wire telephone circuit. The PCB also provides connections for the Automatic Number Identification (ANI), and the optional receiver volume control in the Trendline II telephone. (See Figure 3.)

2.04 The Model 185462 pushbutton dial network assembly is available in three styles. The styles are briefly described in the following paragraphs. Refer to Table A for ordering information and for an explanation of each code number.

MODEL 185462-101

2.05 The Model 185462-101 provides standard telephone operation in the basic Trendline II telephones.

MODEL 185462-102

2.06 The Model 185462-102 is the same as the 185462-101 except it is equipped with LEDs and the other components for use in the deluxe Trendline II telephones. The LEDs are illuminated when the dial light on/off switch is pressed.

MODEL 185462-107

2.07 The Model 185462-107 is equipped with LEDs and other components necessary for use in the Trendline, dial light telephone. The LEDs illuminate when the station user goes off-hook.

REMOVAL

3.01 To remove the Model 185462 pushbutton dial network assembly, perform the following procedure:

- (a) Remove the number card retainer and number card from the telephone handset. Use a paper clip or similar instrument to pry the card retainer from the handset. (See Figure 4.)
- (b) Remove the two screws that hold the handset cover to the handset housing. Remove the handset cover.
- (c) Remove the receiver, transmitter, and handset connections from the tone-generating PCB.
- (d) Remove the two mounting screws and lift the pushbutton dial network assembly from the handset.

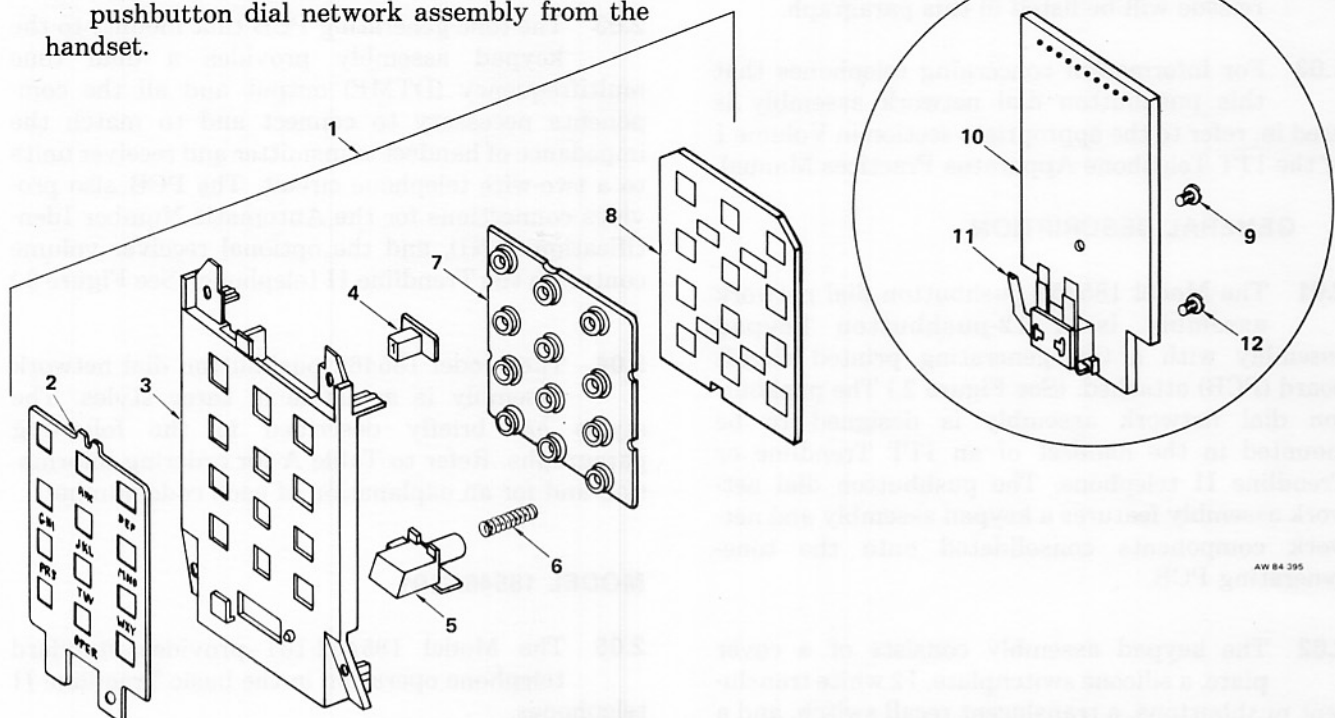
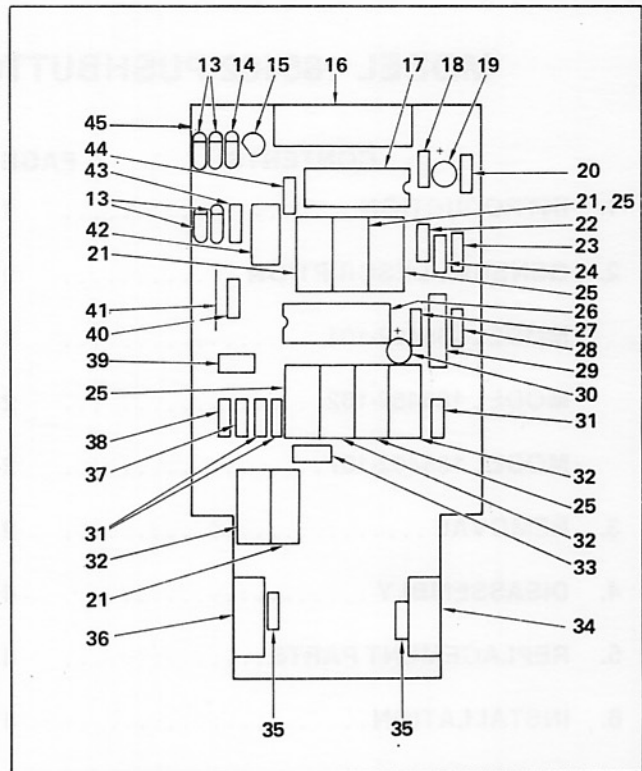


Figure 2: Model 185462 Pushbutton Dial Network Assembly, Exploded View

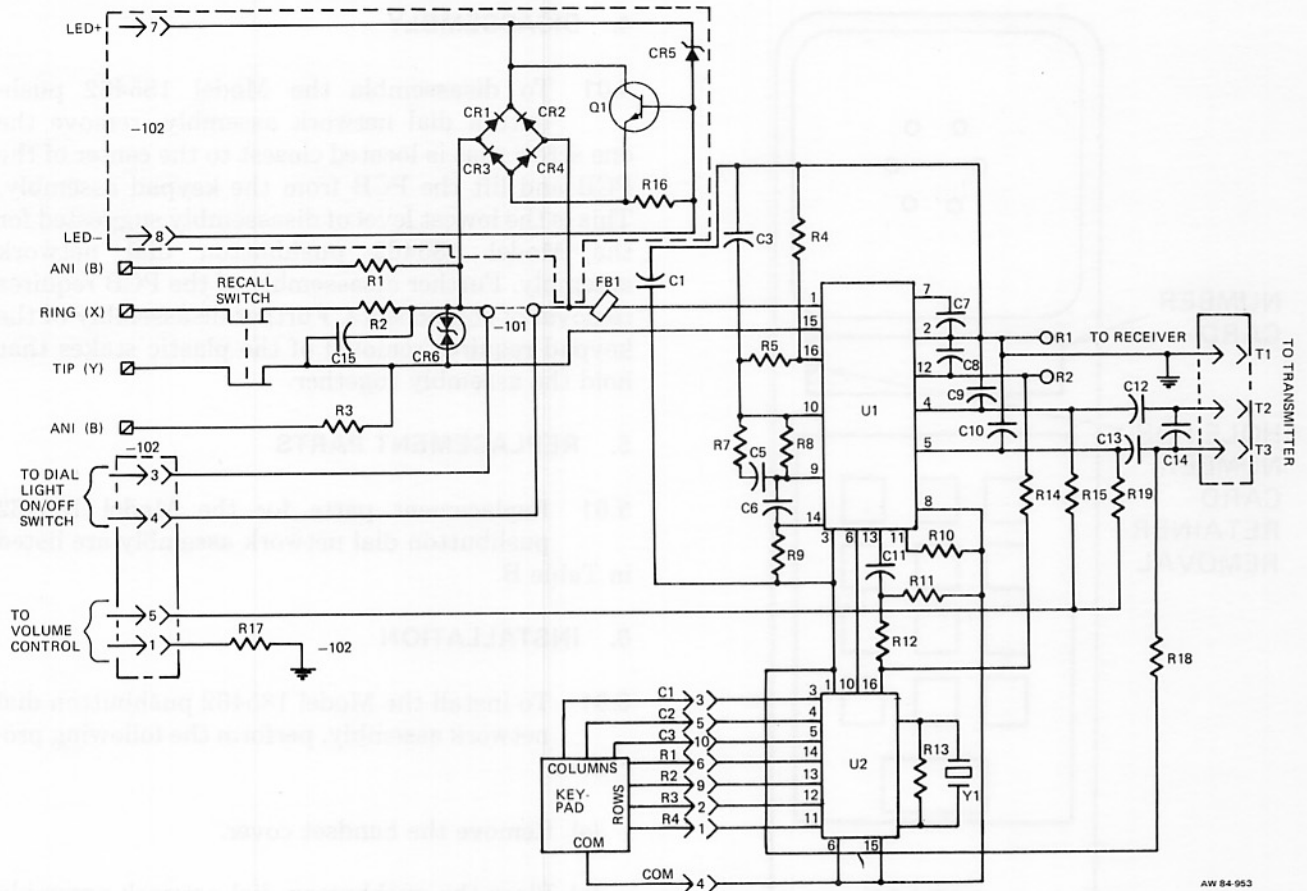


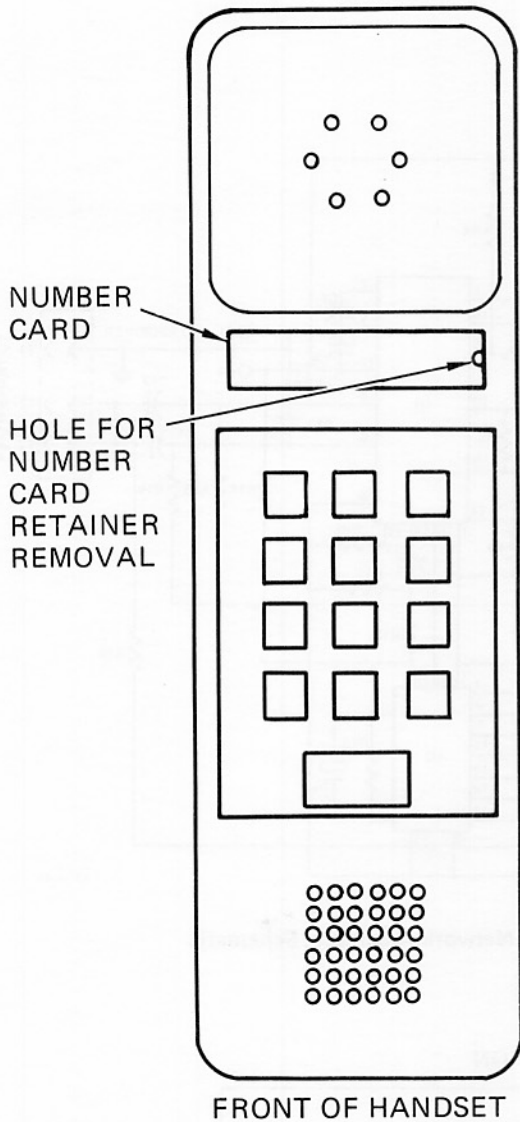
Figure 3: Model 185462-101, -102 Pushbutton Dial Network Assembly, Schematic

TABLE A

ORDERING INFORMATION

CODE NUMBERS	
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:	
(1) Dial Model Number (See Part 1)	185462
(2) Dial Style (See Part 2)	101
PART 1 DIAL MODEL NUMBER	
CODE	DESCRIPTION
185462	Model 185462 Pushbutton Dial Network Assembly
PART 2 DIAL STYLE	
CODE	DESCRIPTION
101	Tel-Touch Dial, Without LEDs For Use With The Basic Model Trendline II Telephone
102	Tel-Touch Dial, With LEDs For Use With The Deluxe Model Trendline II Telephone
107	Tel-Touch Dial, With LEDs For Use With The Dial Light Model Trendline Telephone

AW 84-974



AW 84-952

Figure 4: Number Card Removal

4. DISASSEMBLY

4.01 To disassemble the Model 185462 pushbutton dial network assembly, remove the one screw that is located closest to the center of the PCB and lift the PCB from the keypad assembly. This is the lowest level of disassembly suggested for the Model 185462 pushbutton dial network assembly. Further disassembly of the PCB requires removal of components. Further disassembly of the keypad requires removal of the plastic stakes that hold the assembly together.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 185462 pushbutton dial network assembly are listed in Table B.

6. INSTALLATION

6.01 To install the Model 185462 pushbutton dial network assembly, perform the following procedure:

- (a) Remove the handset cover.
- (b) Place the pushbutton dial network assembly into the handset and mount it with the two mounting screws.
- (c) Connect the transmitter, receiver, and handset connections. Refer to the telephone circuit label.
- (d) Place the handset cover on the housing and secure it using two mounting screws.
- (e) Install the number card and card number retainer in the slot provided.

TABLE B

REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED		
			101	102	107
		Model 185462 Pushbutton Dial Network Assembly	101	102	107
1	185440-101	Keypad Assembly	1	—	—
1	185440-102	Keypad Assembly	—	1	—
1	185440-107	Keypad Assembly	—	—	1
2	185439-101	Faceplate	1	1	1
3	185417-101	Plate, Cover	1	1	1
4	185416-101	Pushbutton (1)	1	1	1
	185416-102	Pushbutton (2)	1	1	1
	185416-103	Pushbutton (3)	1	1	1
	185416-104	Pushbutton (4)	1	1	1
	185416-105	Pushbutton (5)	1	1	1
	185416-106	Pushbutton (6)	1	1	1
	185416-107	Pushbutton (7)	1	1	1
	185416-108	Pushbutton (8)	1	1	1
	185416-109	Pushbutton (9)	1	1	1
	185416-110	Pushbutton (*)	1	1	1
	185416-111	Pushbutton (0)	1	1	1
	185416-112	Pushbutton (#)	1	1	1
5	185427-101	Button, Recall	1	1	1
6	185452-101	Spring	1	1	1
7	185418-101	Switchplate, Silicone	1	1	1
8	185424-101	PC Board Assembly (Nonlighted)	1	—	—
8	185424-102	PC Board Assembly (Lighted)	—	1	—
8	185424-103	PC Board Assembly	—	—	1
9	086135-102	Screw, PC Board Mounting	1	1	1
10	185601-101	PC Board Assembly	1	—	—
10	185601-102	PC Board Assembly	—	1	—
10	601847-536 -001	PC Board Assembly (Not Shown)	—	—	1
11	185426-101	Recall Switch Assembly	1	1	1
12	096407-102	Screw	1	1	1
13	180658-101	Diode, 1N4004, CR1-CR4	—	4	—
14	183611-139	Diode, Zener, 1N5227B, CR5	—	1	—
15	180146-101	Transistor, NPN, 2N4141, Q1	—	1	—
16	184652-105	Connector, Bottom Entry, 10-Pin	1	1	—
17	184295-101	IC, DTMF Generator, U2	1	1	—
18	181789-146	Resistor, 10 K, R12	1	1	—
19	182130-118	Capacitor, 100 MFD, 3 V, $\pm 20\%$, C1	1	1	—
20	181789-130	Resistor, 560 Ohm, R9	1	1	—
21	182075-106	Capacitor, 0.1 MFD, 100 V, $\pm 10\%$, C3 (-101), C8, C11	3	2	—
22	181789-153	Resistor, 39 K, R14	1	1	—
23	181789-123	Resistor, 150 Ohm, R10	1	1	—
24	181789-134	Resistor, 1 K, R11	1	1	—
25	182075-110	Capacitor, 0.22 MFD, 100 V, $\pm 20\%$, C3 (-102), C6, C12, C13	3	4	—
26	184296-102	IC, Hybrid Network, U1	1	1	—
27	181789-151	Resistor, 27 K, R8	1	1	—
28	181789-150	Resistor, 22 K, R7	1	1	—
29	182075-127	Capacitor, 0.0015 MFD, 400 V, $\pm 10\%$, C5	1	1	—
30	182130-114	Capacitor, 22 MFD, 15 V, $\pm 20\%$, C7	1	1	—
31	181789-129	Resistor, 470 Ohm, R15, R18, R19	3	3	—
32	182075-102	Capacitor, 0.022 MFD, 250 V, $\pm 10\%$, C9, C10, C15	3	3	—
33	182075-125	Capacitor, 0.33 MFD, 63 V, $\pm 10\%$, C14	1	1	—

TABLE B

REPLACEMENT PARTS LIST (Cont)

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED		
			101	102	107
		Model 185462 Pushbutton Dial Network Assembly	101	102	107
34	062948-401	Resistor, 12 Ohm, 1 W, R2	1	1	—
35	181789-138	Resistor, 2.2 K, R1, R3	2	2	—
36	183611-152	Diode, Zener, ZZ12, CR6	1	1	—
37	181789-132	Resistor, 820 Ohm, R5	1	1	—
38	181789-110	Resistor, 12 Ohm, R4	1	1	—
39	184289-101	Ferrite Bead, FB1	1	1	—
40	181789-185	Resistor, 51 K, R17	—	1	—
41	182126-101	Strap, Wire	1	—	—
42	183116-102	Crystal, 3.5795 MHz, Y1	1	1	—
43	181789-113	Resistor, 22 Ohm, R16	—	1	—
44	181789-172	Resistor, 10 M, R13	1	1	—
45	185600-101	PC Board, Drilled	1	1	—

NOTES:

AW 84-975

1. All resistors are 1/4 W, $\pm 5\%$ unless otherwise specified.
2. All capacitor values are in microfarads (MFD).

MODEL 188478 PUSHBUTTON DIAL

CONTENTS	PAGE
1. INTRODUCTION	1
2. GENERAL DESCRIPTION	1
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MODEL 188478-101	4
MODEL 188478-102	4
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4. DISASSEMBLY	5
5. REPLACEMENT PARTS	5
6. ASSEMBLY	5
7. INSTALLATION	5
8. ADJUSTMENTS	5



AW 85-176

Figure 1: Model 188478 Pushbutton Dial

Note: This dial can only be used when the associated central office equipment is arranged for DTMF.

1. INTRODUCTION

1.01 This document covers the Model 188478 pushbutton dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustment is included.

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

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

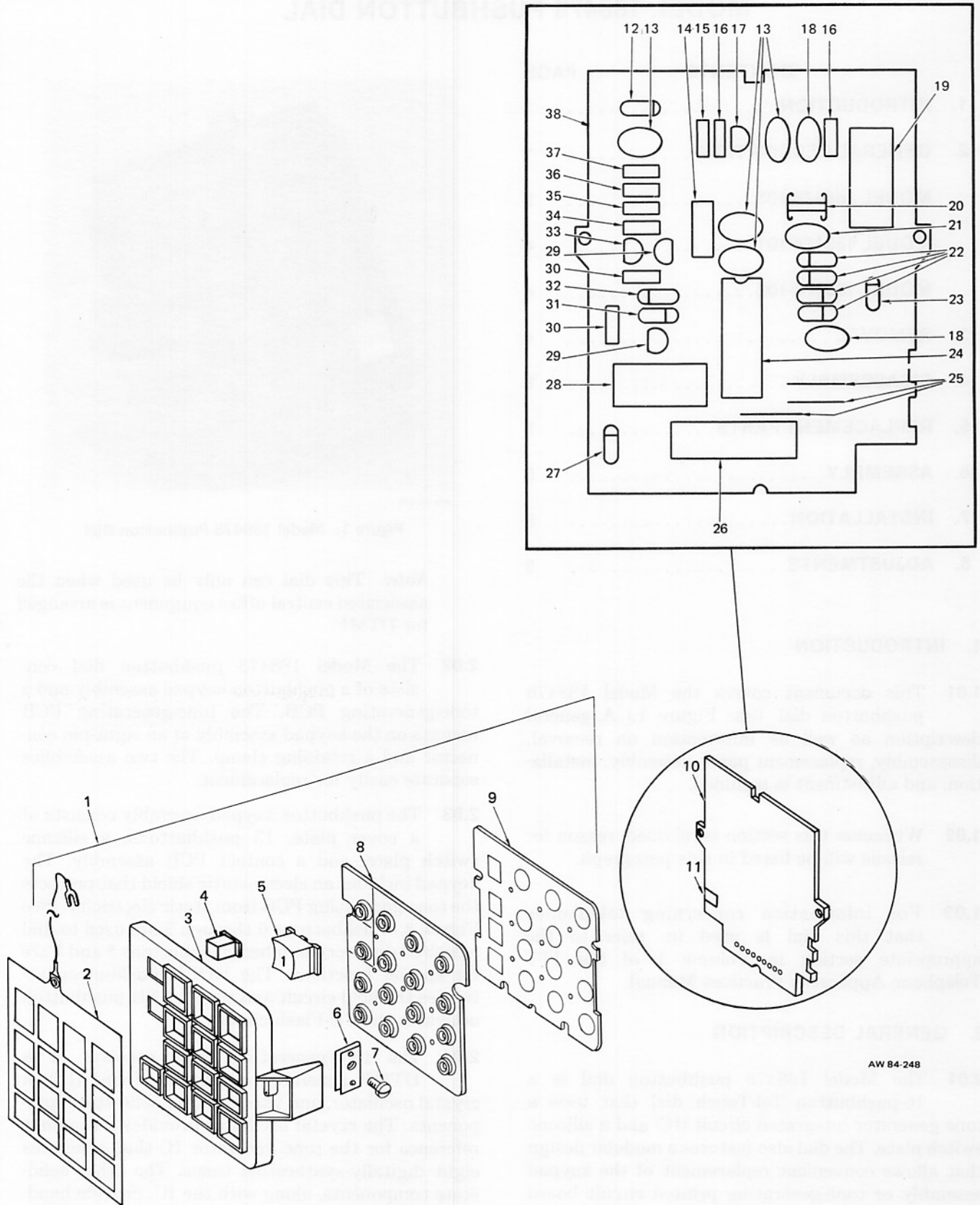
2. GENERAL DESCRIPTION

2.01 The Model 188478 pushbutton dial is a 16-pushbutton Tel-Touch dial that uses a tone generator integrated circuit (IC) and a silicone switch plate. The dial also features a modular design that allows convenient replacement of the keypad assembly or tone-generating printed circuit board (PCB). The dial is referred to as Tel-Touch because it produces dual tone multifrequency (DTMF) signals.

2.02 The Model 188478 pushbutton dial consists of a pushbutton keypad assembly and a tone-generating PCB. The tone-generating PCB mounts on the keypad assembly at an eight-pin connector and a retaining clamp. The two assemblies separate easily for replacement.

2.03 The pushbutton keypad assembly consists of a cover plate, 13 pushbuttons, a silicone switch plate, and a contact PCB assembly. The keypad includes an electrostatic shield that protects the tone-generating PCB from static electricity. (See Figure 2.) Pushbuttons 0 through 9 are used to dial a desired directory number, pushbuttons * and # are for special functions. The HOLD pushbutton activates the hold circuit and the FLASH pushbutton activates the Tel-Flash circuit.

2.04 The tone-generating PCB consists of a DTMF generator integrated circuit (IC), a crystal oscillator, and various other solid-state components. The crystal oscillator provides a constant reference for the tone generator IC that generates eight digitally-synthesized tones. The other solid-state components, along with the IC, provide handset receiver and transmitter muting, and polarity guard. (See Figure 3.)



AW 84-248

Figure 2: Model 188478 Pushbutton Dial, Exploded View

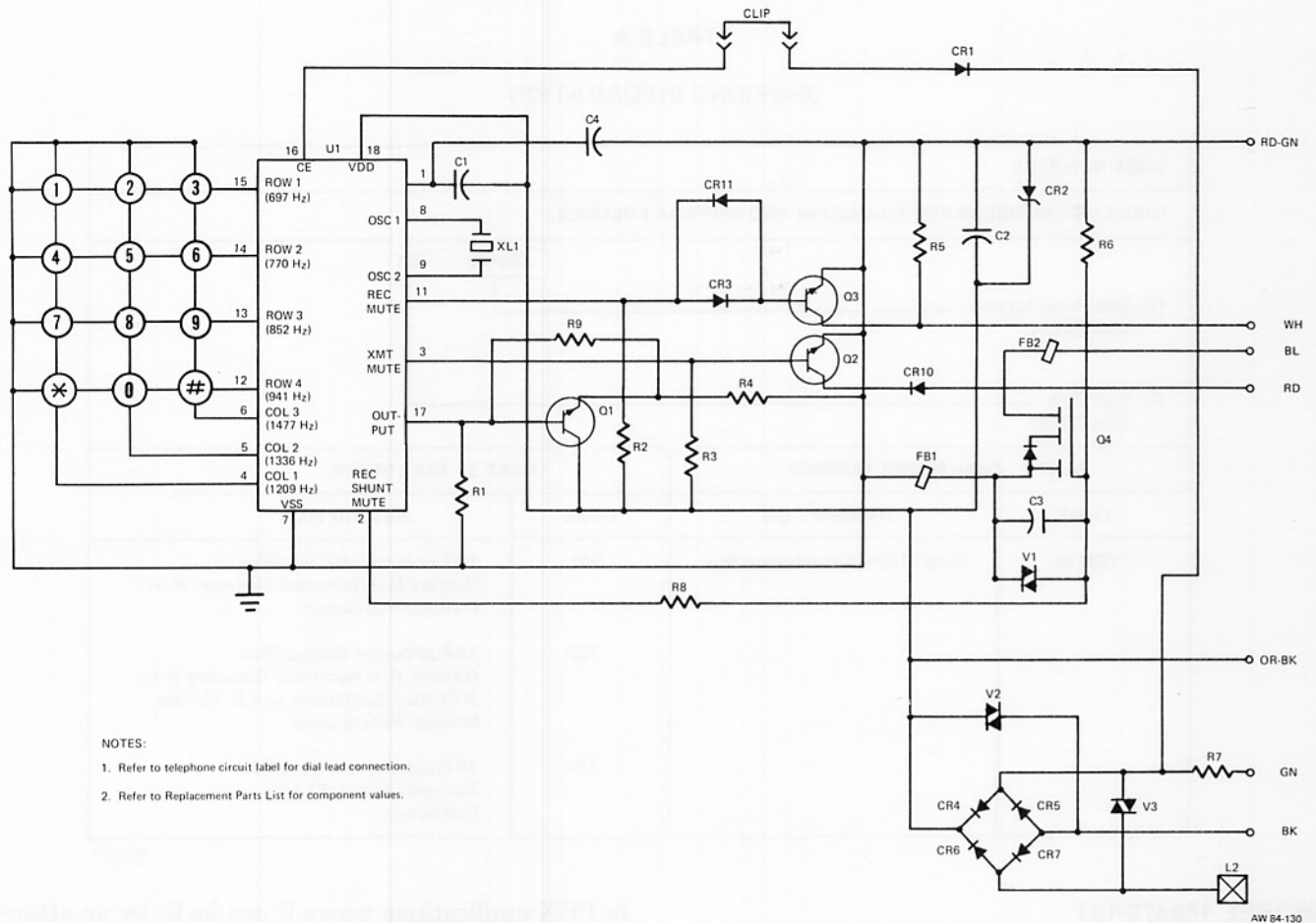


Figure 3: Model 188478 Pushbutton Dial, Schematic

2.05 When a number pushbutton (0-9) or a special function pushbutton (* or #) is pressed, a single silicone contact grounds two inputs (column and row) to the tone generator IC. This causes two tones to be transmitted.

2.06 The polarity guard circuit provides protection against improper connection of the Tip and Ring leads to the telephone. The IC on the tone-generating PCB must have a specific supply voltage polarity to transmit tones. In instances where the Tip and Ring leads may be reversed or unidentifiable at the station, the polarity guard circuit ensures tone transmission regardless of line polarity.

2.07 The Model 188478 pushbutton dial is identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for ordering information and for an explanation of each code. Variations of the Model 188478 pushbutton dial are briefly discussed in the following paragraphs.

MODEL 188478-103

2.08 The Model 188478-103 is a 16-pushbutton dial assembly that contains a FLASH button. The FLASH button activates the Tel-Flash circuit on the 186260-101 PCB mounted in the telephone. The Tel-Flash feature can be used with a PBX to provide a precise time period for hookswitch flash.

2.09 The hookswitch flash is activated when the station user presses the FLASH button. The line is momentarily disconnected for 500 to 700 milliseconds. The PBX places the call on hold and returns system dial tone to the station. The station user can then place another call or access other PBX features. To return to the held call, the station user must press the FLASH button or must press and release the telephone hookswitch.

TABLE A
ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:			
(1) Dial Model Number (See Part 1)		188478	
(2) Dial Style (See Part 2)		101	
PART 1 DIAL MODEL NUMBER		PART 2 DIAL STYLE	
CODE	DESCRIPTION	CODE	DESCRIPTION
188478	Model 188478 Pushbutton Dial	101	16-Pushbutton Metropolitan (Letters And Numerals) Equipped With A HOLD Pushbutton
		102	16-Pushbutton Metropolitan (Letters And Numerals) Equipped With A FLASH Pushbutton And A 70 Volt Message Waiting Lamp
		103	16-Pushbutton Metropolitan Equipped With A FLASH Pushbutton

AW 84-944

MODEL 188478-101

2.10 The Model 188478-101 is a 16-pushbutton dial assembly that contains a HOLD button and a hold indicator. The HOLD button activates the hold circuit on the 187995-101 PCB mounted in the telephone base. The hold circuit allows the station user to place a CO/PBX line on hold.

2.11 The hold feature is activated when the station user goes on-hook while pressing the HOLD button. The call is placed on hold and the hold indicator flashes. The hold feature is released and the hold indicator stops flashing when the station user goes off-hook and returns to the held call. The hold indicator flashes only at the extension with the activated hold feature. The hold feature is released and the hold indicator stops flashing when any connected extension goes off-hook.

MODEL 188478-102

2.12 The Model 188478-103 is the same as the Model 188478-102 except for the added 70 volt message waiting indicator. The lamp is for use

in PBX applications where it can be lit by an attendant to indicate that the station user should call the attendant for a waiting message.

3. REMOVAL

3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the telephone faceplate if required.
- (b) Remove the telephone housing.
- (c) Remove the dial by loosening the screw on the side of each dial mounting bracket. Lift the dial from the mounting brackets.
- (d) Disconnect the dial leads from the telephone and remove the rectangular connector located on the rear of the dial, beneath the HOLD/FLASH pushbutton.

Warning: The Model 188478 pushbutton dial contains static-sensitive components. Personnel handling the dial must have knowledge of proper handling techniques.

4. DISASSEMBLY

4.01 To disassemble the dial, remove the retaining clamp on the tone-generating PCB and pull the PCB from the keypad assembly. This is the lowest level of disassembly suggested for the Model 188478 dial. Further disassembly of the PCB requires removal of components. Further disassembly of the keypad requires removal of the plastic stakes that hold the assembly together.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 188478 pushbutton dial are listed in Table B and shown in Figure 2.

6. ASSEMBLY

6.01 To assemble the Model 188478 pushbutton dial, connect the tone-generating PCB to the keypad assembly at the eight-pin connector and install the retaining clamp.

7. INSTALLATION

7.01 To install the dial, proceed as follows:

- (a) Ensure that the electrostatic shield is in place on the dial prior to installation.

- (b) Connect the dial leads. Refer to the circuit label for the telephone being assembled.

- (c) Attach the rectangular connector to the mating pins located directly beneath the HOLD/FLASH pushbutton.

- (d) Mount the dial in the dial mounting brackets and tighten the screws.

- (e) Install the telephone housing.

- (f) Install the telephone faceplate if removed.

8. ADJUSTMENTS

8.01 The polarity guard feature can be disabled for certain applications of the Model 188478 pushbutton dial. Such applications would include toll restriction by a PBX that reverses line polarity to inhibit outward dialing. To disable the polarity guard feature, perform the following:

- (a) Remove the option clip from the storage (lower) notch on the circuit board at the rear of the dial.

- (b) Place the option clip in the polarity guard disable (upper) notch.

TABLE B

REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED		
			101	102	103
		Model 188478 Pushbutton Dial	101	102	103
1	184500-102	16-Pushbutton Keypad Assembly	1	—	—
1	184500-103	16-Pushbutton Keypad Assembly	—	1	—
1	184500-108	16-Pushbutton Keypad Assembly	—	—	1
2	186129-103	Shield, Electrostatic	1	1	1
3	184491-102	Plate, Cover	1	1	1
4	184493-101	Lens	1	1	—
5	184476-101	Pushbutton (1)	1	1	1
	184476-102	Pushbutton (2)	1	1	1
	184476-103	Pushbutton (3)	1	1	1
	184476-104	Pushbutton (4)	1	1	1
	184476-105	Pushbutton (5)	1	1	1
	184476-106	Pushbutton (6)	1	1	1
	184476-107	Pushbutton (7)	1	1	1
	184476-108	Pushbutton (8)	1	1	1
	184476-109	Pushbutton (9)	1	1	1
	184476-110	Pushbutton (*)	1	1	1
	184476-111	Pushbutton (0)	1	1	1
	184476-112	Pushbutton (#)	1	1	1
	184476-134	Pushbutton (HOLD)	1	—	—
	184476-135	Pushbutton (FLASH)	—	1	1
6	194479-101	U-Nut	2	2	2
7	075487-102	Screw, Dial Mounting	2	2	2
8	184492-101	Switchplate, Silicone	1	1	1
9	184499-102	PC Board Assembly	1	—	—
9	184499-103	PC Board Assembly	—	1	—
9	184499-108	PC Board Assembly	—	—	1
10	188488-101	PC Board Assembly	1	1	1
11	184144-101	Clip	1	1	1
12	185890-102	Diode, Zener, 12 V, 1 W, 1N4742, CR2	1	1	1
13	187945-201	Capacitor, 0.0068 MFD, 50 V, C1-C4	4	4	4
14	062948-160	Resistor, 2.0 K, 1/2 W \pm 10%, R8	1	1	1
15	181789-166	Resistor, 470 K, R6	1	1	1
16	184289-101	Bead, Ferrite, FB1, FB2	2	2	2
17	185748-101	Transistor, VMOS, BS170, Q4	1	1	1
18	184672-106	Varistor, ERZ-C10-DC-180, V1, V2	2	2	2
19	188483-101	Resistor, 10 Ohm, 5 W, R7	1	1	1
20	187948-101	Terminal, Spade-Lug	1	1	1
21	184672-105	Varistor, ERZ-C14-DK-180, V3	1	1	1
22	185890-101	Diode, Schottky, SD103, CR4-CR7	4	4	4
23	180658-101	Diode, 1N4004, CR1	1	1	1
24	185497-101	IC, DTMF Tone Generator, U1	1	1	1
25	184489-101	Strap, Wire	3	3	3
26	184652-101	Connector	1	1	1
27	180656-103	Diode, 1N4448, CR10	1	1	1

TABLE B

REPLACEMENT PARTS LIST (Cont)

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED		
			101	102	103
		Model 188478 Pushbutton Dial			
28	187060-101	Crystal, 3.58 MHZ, XL1	1	1	1
29	185930-101	Transistor, MPS8092, Q2, Q3	2	2	2
30	181789-140	Resistor, 3.3 K, R2, R3	2	2	2
31	185890-102	Diode, Schottky, SD164D, CR11	1	1	1
32	180656-102	Diode, 1N4148, CR3	1	1	1
33	180146-101	Transistor, NPN, 2N4141, Q1	1	1	1
34	181789-129	Resistor, 470 Ohm, R9	1	1	1
35	181789-180	Resistor, 5.1 K, R5	1	1	1
36	181789-146	Resistor, 10 K, R1	1	1	1
37	181789-121	Resistor, 100 Ohm, R4	1	1	1
38	188487-101	PC Board - Drilled	1	1	1

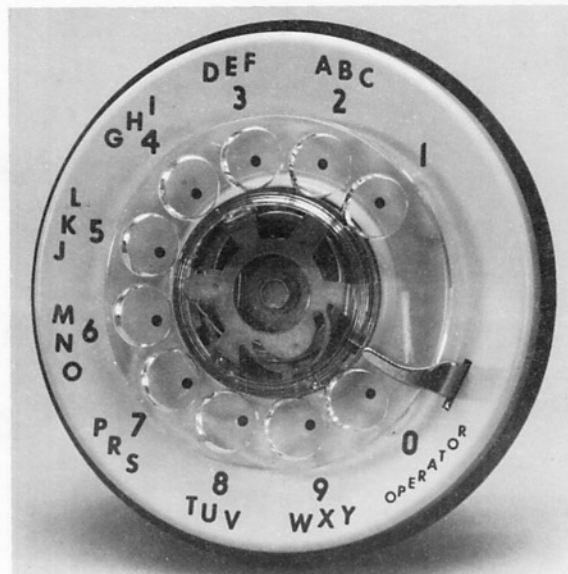
NOTES:

AW 84-945

1. All resistors are 1/4 W \pm 5% unless stated otherwise.
2. All capacitor values are in microfarads (MFD).

MODELS 30 AND 35 ROTARY DIALS

CONTENTS	PAGE
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MODEL 0030**-OOD	3
MODEL 0035**-OOG	3
MODEL 0035**-OOD	3
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4. DISASSEMBLY	3
5. REPLACEMENT PARTS	4
6. ASSEMBLY	4
7. INSTALLATION	6
8. ADJUSTMENTS	6



AW 85-187

Figure 1: Models 30 and 35 Rotary Dials

1. INTRODUCTION

1.01 This document covers the Models 30 and 35 rotary dials. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

1.03 For information concerning telephones that these dials are used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Models 30 and 35 rotary dials (see Figure 2) consist of a rigid metal bracket on which are mounted the gear train, contact spring assembly, numeral ring, mainspring and spider assembly, finger plate, and miscellaneous parts. The gear train is protected by a plastic dust cover. Each model is available with either a metropolitan-style numeral ring (letters and numerals) coded G, or a regular-style numeral ring (numerals only) coded D.

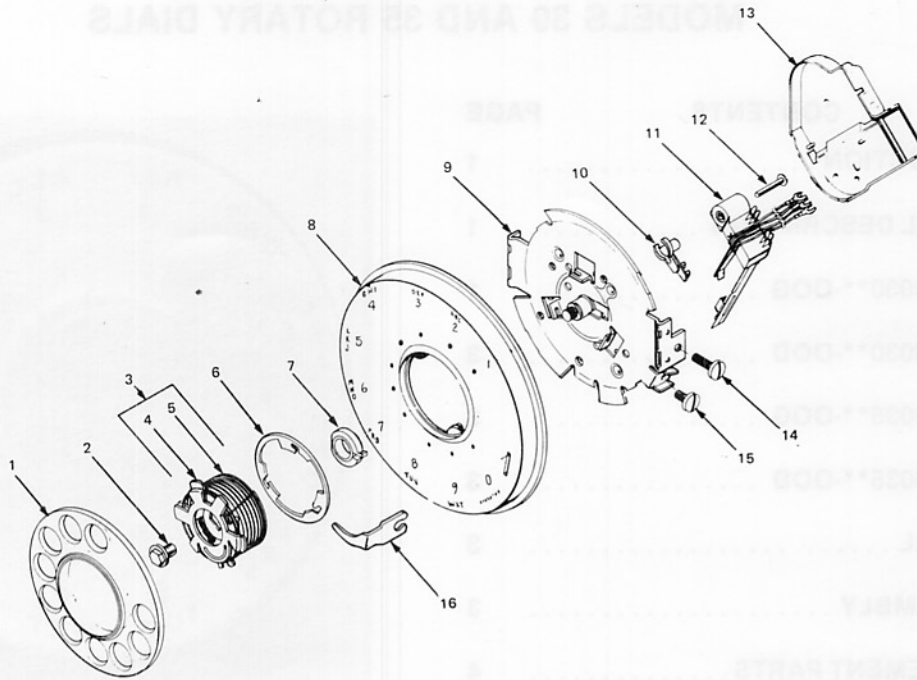
The Models 30 and 35 rotary dials are similar with the exception of an additional set of contacts appearing in the Model 35 rotary dial to allow its use with handsfree equipment.

2.02 When the dial finger plate is rotated clockwise and released, a pair of pulsing contacts interrupts the telephone line current once for each unit of the dialed digit. Telephone switching equipment is operated in accordance with the number of pulses received. The dials are factory-adjusted to 10 pulses per second (nominal) and a pulse ratio with a break period of 61.5% of the pulse duration.

2.03 The Models 30 and 35 rotary dials are identified by a code number stamped in ink on the back of the dial. Refer to Table A for ordering information and for an explanation of each code number. Variations of the Models 30 and 35 rotary dials are briefly described in the following paragraphs. (Substitute a two-digit color code in place of the ** to obtain the code number for a particular dial.)

MODEL 0030**-OOG

2.04 The Model 0030**-OOG rotary dial is designed for use in standard telephones. It contains one set of normally-open contacts that closes to short circuit the telephone receiver during dial-



AW 83-47

Figure 2: Models 30 and 35 Rotary Dials, Exploded View

TABLE A

ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN THREE STEPS AS FOLLOWS:			
(1) Dial Model Number (See Part 1)	_____	0030	00
(2) Color Code (See Part 2)	_____		OOG
(3) Numeral Ring Style (See Part 3)	_____		
PART 1 DIAL MODEL NUMBER			
CODE	DESCRIPTION	COLOR OFFERED	NUMERAL RING STYLE
0030	Model 30 Rotary Dial (For Standard Telephones)	00, 05, 09, 12, 13, 15, 43, 44, 45, 46, 47	OOG, OOD
0035	Model 35 Rotary Dial (For Handsfree Operations)	(Available On All Versions)	OOG, OOD
PART 2 COLORS		PART 3 NUMERAL RING STYLE	
CODE	COLORS	CODE	DESCRIPTION
00	Black	OOG	Metropolitan (Letters And Numerals)
05	Moss Green		
09	Ivory	OOD	Regular (Numerals Only)
12	Aqua Blue		
13	Beige		
15	White		
43	Orange		
44	Light Ash		
45	Cocoa Brown		
46	Harvest Gold		
47	Cherry Red		

AW 84 910

ing. One set of pulsing contacts is provided to interrupt the line current once for each unit of a dialed digit. This dial has a 4.5-inch diameter, metropolitan-style numeral ring displaying both letters and numerals.

MODEL 0030**-OOD

2.05 The Model 0030**-OOD rotary dial is the same as the Model 0030**-OOG rotary dial with the exception that it has a regular-style numeral ring displaying numerals only.

MODEL 0035**-OOG

2.06 The Model 0035**-OOG rotary dial is designed for use in standard telephones used in connection with handsfree equipment. It contains one set of normally-open contacts that closes to short circuit the telephone receiver during dialing. An additional set of normally-open contacts closes to mute the handsfree speaker during dialing. One set of pulsing contacts is provided to interrupt the line current once for each unit of a dialed digit. This dial has a 4.5-inch diameter metropolitan-style numeral ring displaying both letters and numerals.

MODEL 0035**-OOD

2.07 The Model 0035**-OOD rotary dial is the same as the Model 0035**-OOG rotary dial with the exception that it has a regular-style numeral ring displaying numerals only.

3. REMOVAL

3.01 To remove the dial from the telephone proceed as follows:

- (a) Remove the telephone housing.
- (b) Loosen the two dial mounting screws and lift the dial from the dial mounting brackets.
- (c) Disconnect the dial leads from the telephone.

4. DISASSEMBLY

4.01 To disassemble the dial, proceed as follows:

- (a) Rotate the finger plate completely clockwise.
- (b) Insert the straightened end of a paper clip or similar tool into the hole that is now approximately $\frac{1}{4}$ inch to the left of the tip of the finger stop. (See Figure 3.)

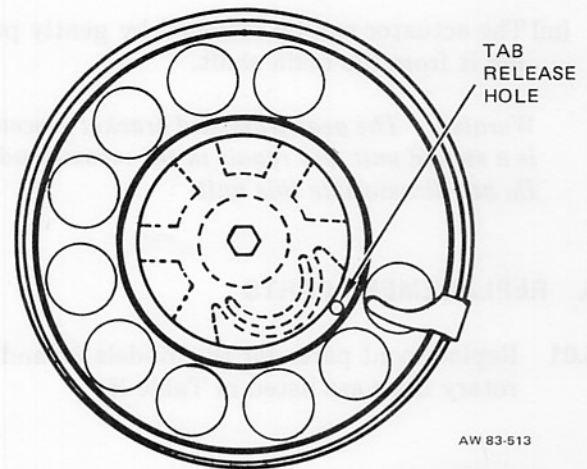


Figure 3: Location of Tab Release Hole

(c) Press down on the paper clip to spring the tab of the spider. Rotate the finger plate clockwise to release it. Work the finger plate off of the spider and out from under the finger stop.

(d) While holding the spider firmly, remove the hex-head screw. Lift the spider from the main shaft and work the mainspring out of the dial bracket.

Note: The mainspring can be removed from the spider assembly if necessary.

(e) Remove the bushing.

(f) Remove the finger stop by loosening the screw that holds the finger stop to the gear train and dial bracket assembly. Lift the finger stop from the dial.

(g) Rotate the retaining ring counterclockwise to clear the locking slots of the gear train and dial bracket assembly.

(h) Lift the retaining ring and numeral ring from the gear train and dial bracket assembly.

(j) The dust cover on the back of the dial is snapped into place. Remove the dust cover by gently lifting the edges.

(k) Loosen and remove the screw that holds the contact spring assembly to the gear train and dial bracket assembly. Lift the contact spring assembly from the gear train and dial bracket assembly, taking care not to damage the contacts.

(m) The actuator can be removed by gently pulling it from the main shaft.

Warning: *The gear train and bracket assembly is a staked unit and repair is not recommended. Do not disassemble this unit.*

5. REPLACEMENT PARTS

5.01 Replacement parts for the Models 30 and 35 rotary dials are listed in Table B.

6. ASSEMBLY

6.01 To assemble the dial, proceed as follows:

(a) If the actuator has been removed, slip it onto the main shaft with the flat side next to the surface of the main gear. Rotate the main shaft until the hole in the main gear aligns with the hole in the dial bracket. Rotate the actuator counterclockwise to stop on the main gear stud. (See Figure 4.)

(b) Route the leads of the contact spring assembly around and under the plastic base of the assembly. Position the contact spring

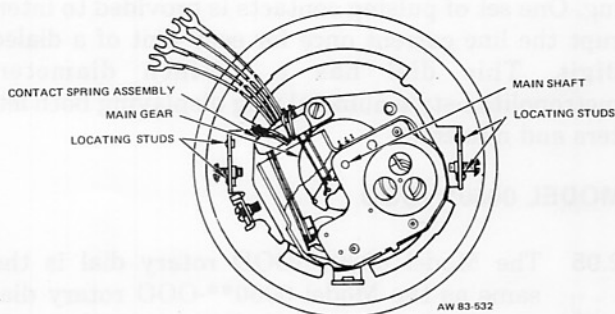


Figure 4: Rear View of Dial

assembly so that the two locating studs of the contact spring assembly seat in the two holes provided in the dial bracket. (See Figure 4.)

(c) Check to see that the end of the pulsing lever spring rests on the surface of the impulse cam.

Note: Be sure that the dial leads do not interfere with the contact springs or with the main gear. The inner stud of the actuator must rest against the lever spring of the normally-open switch, and the switch contacts must be open when the hole in the main gear is aligned with the hole in the dial bracket. (This applies only if the mainspring and spider are in place so that tension is applied to the actuator.)

TABLE B

REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED			
			30/00G	30/00D	35/00G	35/00D
		Models 30 And 35 Rotary Dials				
1	079284-101	Plate, Finger	1	1	1	1
2	189538-101	Screw, Hex-Head	1	1	1	1
3	088438-101	Spring And Spider Assembly	1	1	1	1
4	088439-101	Spider	1	1	1	1
5	190258-101	Spring	1	1	1	1
6	088418-101	Ring, Retaining	1	1	1	1
7	088416-101	Bushing	1	1	1	1
8	088403-0**	Ring, Numeral	1	—	1	—
	181457-0**	Ring, Numeral	—	1	—	1
9	088421-104	Gear Train And Bracket Assembly	1	1	1	1
10	088400-101	Actuator	1	1	1	1
11	088419-101	Contact Spring Assembly	1	1	—	—
	088419-102	Contact Spring Assembly (Handsfree)	—	—	1	1
12	180221-104	Screw, Contact Spring Mounting	1	1	1	1
13	088402-101	Cover, Dust	1	1	1	1
14	190262-102	Screw, Finger Stop Mounting	1	1	1	1
15	075487-102	Screw, Dial Mounting	2	2	2	2
16	088417-101	Finger Stop	1	1	1	1

NOTE:

** Substitute a two-digit color code when ordering.

AW 84-909

MODELS 32 AND 36 PUSHBUTTON DIALS

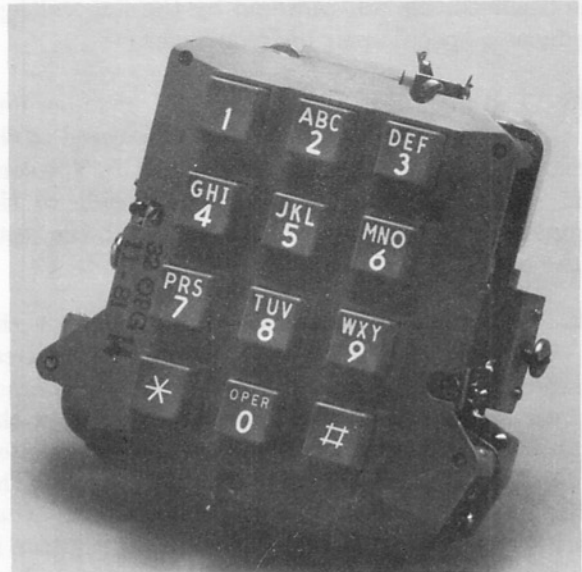
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1. INTRODUCTION

1.01 This document covers the Models 32 and 36 pushbutton dials. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.



AW 85-183

Figure 1: Models 32 and 36 Pushbutton Dials

2. GENERAL DESCRIPTION

2.01 The Models 32 and 36 dials are 12-pushbutton Tel-Touch dials available with either metropolitan-style pushbuttons (letters and numerals) coded G or regular-style pushbuttons (numerals only) coded D. Either dial may be equipped with polarity guard coded OPG or OPD. The Models 32 and 36 pushbutton dials are similar except for an additional set of contacts appearing in the Model 36 pushbutton dial to allow its use with handsfree equipment. Both dials are referred to as Tel-Touch dials because they produce dual tone multifrequency (DTMF) signals.

Note: These dials can only be used when the associated central office equipment is arranged for DTMF signaling.

2.02 The Models 32 and 36 pushbutton dials (see Figure 2) consist of a pushbutton assembly and a tone-generating printed circuit board (PCB). An insulator separates the two assemblies.

2.03 The pushbutton assembly consists of a cover plate, 12 pushbuttons, four horizontal cranks, three vertical cranks, 12 pushbutton return springs, a frame, an actuator slide, a mounting plate assembly, and a common switch.

2.04 The tone-generating PCB consists of a transistor oscillator with two tuned circuits, and may include an optional polarity guard circuit. The oscillator circuit, powered by the line voltage, produces a specific pair of frequencies.

2.05 The mounting plate assembly includes four groups of contacts that are connected to the tuned circuits of the tone-generating PCB. The common switch is mounted on the rear side of the mounting plate and its springs mesh with the teeth of the actuator slide.

2.06 Pressing a pushbutton rotates one of the horizontal (row) cranks and one of the vertical (column) cranks. The vertical cranks operate contact springs connected to the high-band coil, and the horizontal cranks operate contact springs connected to the low-band coil. (See Figures 3 and 4.) The horizontal cranks also move the actuator slide that operates the common switch. When a pushbutton is pressed, a single high-band tone and a single low-band tone are simultaneously transmitted through the common switch and polarity guard circuit (Models OPG and OPD).

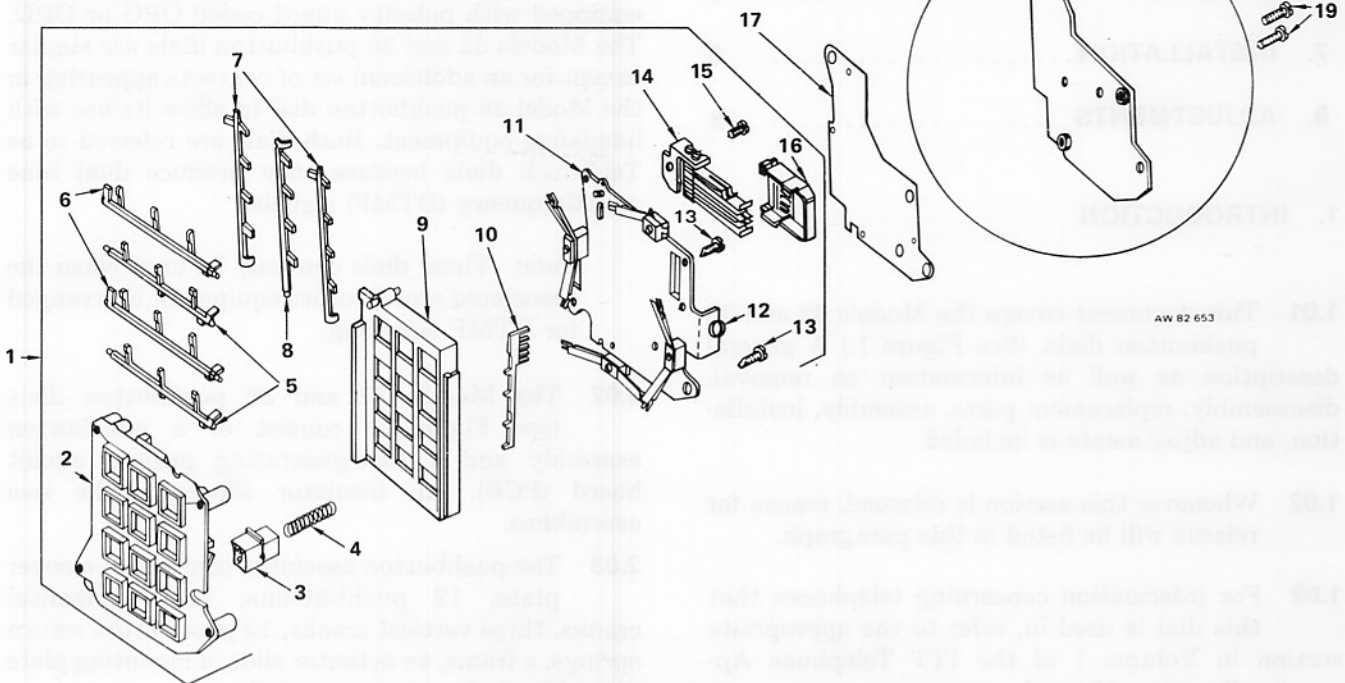
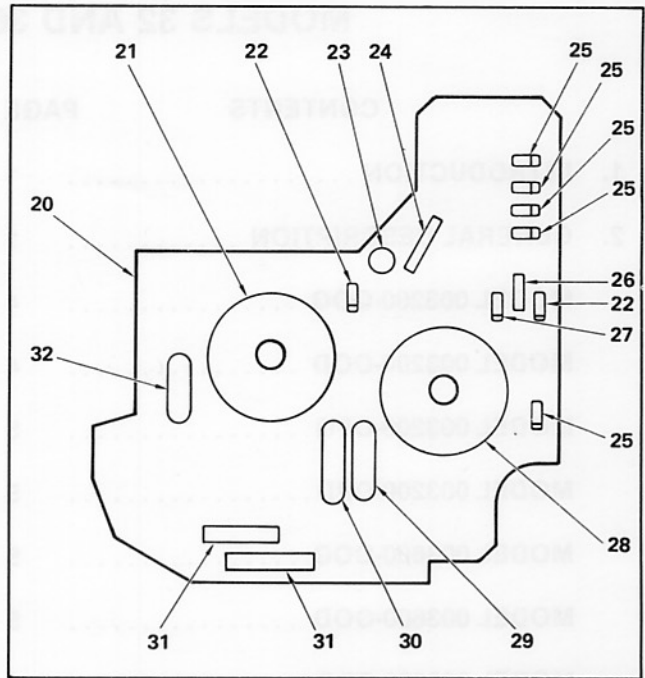
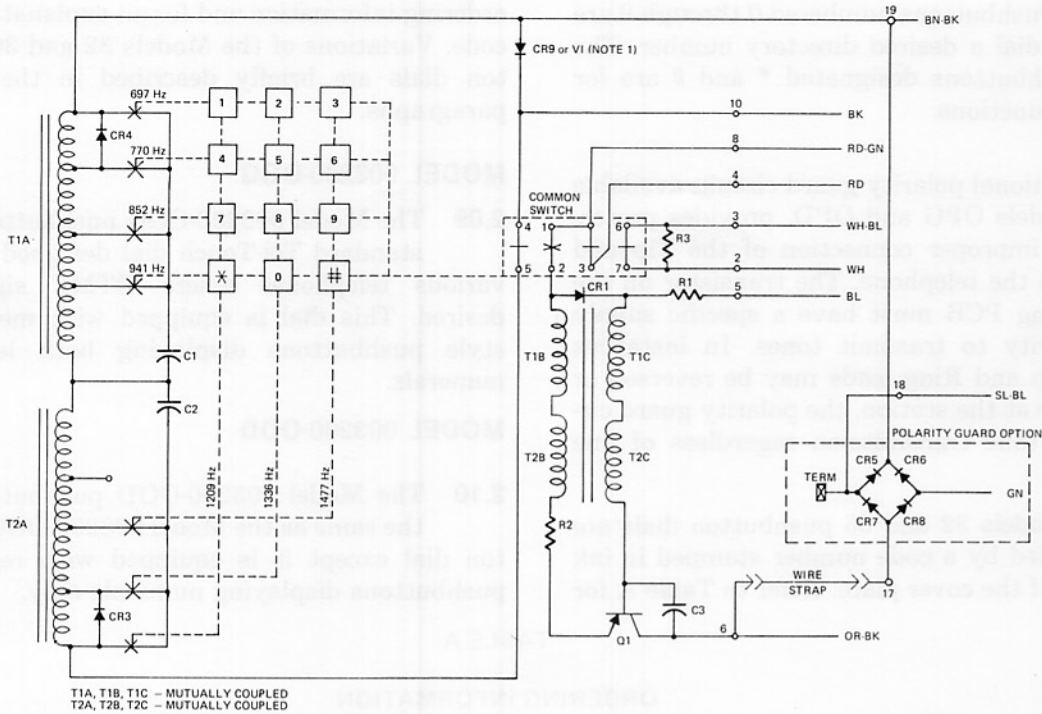


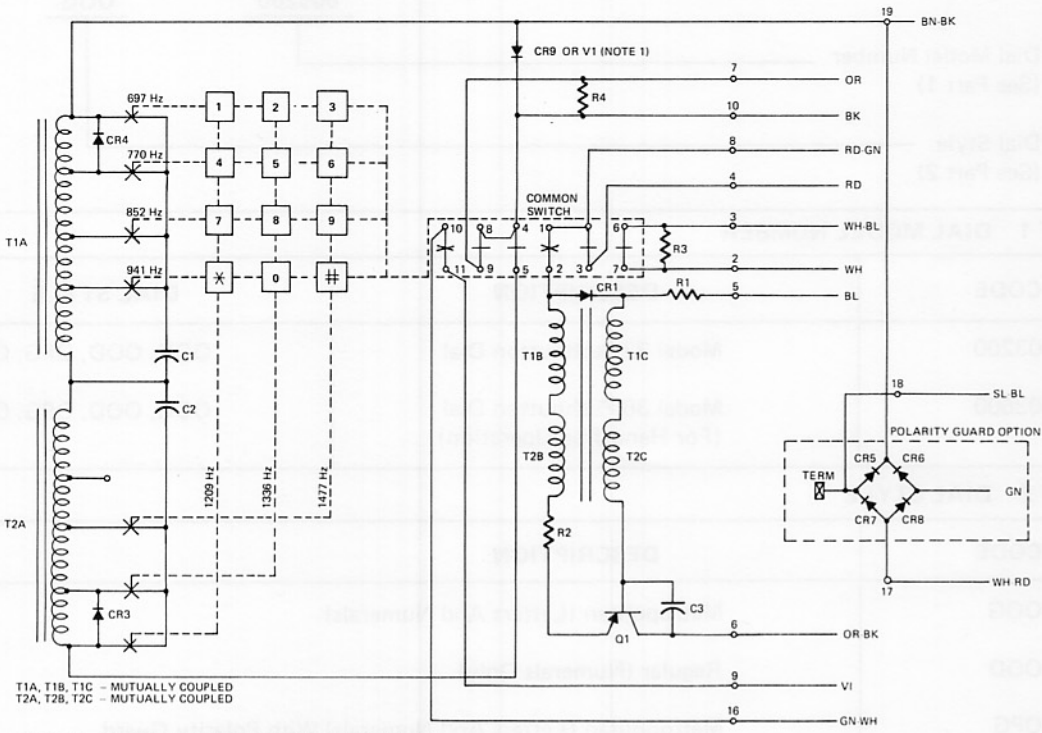
Figure 2: Models 32 and 36 Pushbutton Dials, Exploded View



- NOTES:
1. V1 (varistor) must be used on dials without the polarity guard option.
 2. This is the make-break sequence for the common switch.
The 6-7 springs break first.
Then, the 1-2 springs make.
Then, the 1-3 springs break.
The 4-5 springs break last.

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Figure 3: Model 32 Pushbutton Dial, Schematic



- NOTES:
1. V1 (varistor) must be used on dials without the polarity guard option.
 2. This is the make break sequence for the common switch.
The 6-7 springs break first.
Then, the 1-2 and 10-11 springs make.
Then, the 1-3 and 8-9 springs break.
The 4-5 springs break last.

AW 84 393

Figure 4: Model 36 Pushbutton Dial, Schematic

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Note: Pushbuttons numbered 0 through 9 are used to dial a desired directory number. The two pushbuttons designated * and # are for special functions.

2.07 The optional polarity guard circuit, available on Models OPG and OPD, provides protection against improper connection of the Tip and Ring leads to the telephone. The transistor on the tone-generating PCB must have a specific supply voltage polarity to transmit tones. In instances where the Tip and Ring leads may be reversed or unidentifiable at the station, the polarity guard circuit ensures tone transmission regardless of line polarity.

2.08 The Models 32 and 36 pushbutton dials are identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for

ordering information and for an explanation of each code. Variations of the Models 32 and 36 pushbutton dials are briefly described in the following paragraphs.

MODEL 003200-OOG

2.09 The Model 003200-OOG pushbutton dial is a standard Tel-Touch dial designed for use in various telephones where DTMF signaling is desired. This dial is equipped with metropolitan-style pushbuttons displaying both letters and numerals.

MODEL 003200-OOD

2.10 The Model 003200-OOD pushbutton dial is the same as the Model 003200-OOG pushbutton dial except it is equipped with regular-style pushbuttons displaying numerals only.

TABLE A

ORDERING INFORMATION

CODE NUMBERS		
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:		
(1) Dial Model Number (See Part 1)	<u>003200</u>	<u>OOG</u>
(2) Dial Style (See Part 2)		
PART 1 DIAL MODEL NUMBER		
CODE	DESCRIPTION	DIAL STYLE
003200	Model 32 Pushbutton Dial	OOG, OOD, OPG, OPD
003600	Model 36 Pushbutton Dial (For Handsfree Operation)	OOG, OOD, OPG, OPD
PART 2 DIAL STYLE		
CODE	DESCRIPTION	
OOG	Metropolitan (Letters And Numerals)	
OOD	Regular (Numerals Only)	
OPG	Metropolitan (Letters And Numerals) With Polarity Guard	
OPD	Regular (Numerals Only) With Polarity Guard	

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MODEL 003200-OPG

2.11 The Model 003200-OPG pushbutton dial is the same as the Model 003200-OOG pushbutton dial except it is equipped with polarity guard that allows the dial to operate regardless of line polarity.

MODEL 003200-OPD

2.12 The Model 003200-OPD pushbutton dial is the same as the Model 003200-OOD pushbutton dial except it is equipped with polarity guard that allows the dial to operate regardless of line polarity.

MODEL 003600-OOG

2.13 The Model 003600-OOG pushbutton dial is a Tel-Touch dial designed for use in handsfree telephones or in telephones used in connection with handsfree equipment where DTMF signaling is desired. This dial is equipped with metropolitan-style pushbuttons displaying both letters and numerals.

MODEL 003600-OOD

2.14 The Model 003600-OOD pushbutton dial is the same as the Model 003600-OOG pushbutton dial except it is equipped with regular-style pushbuttons displaying numerals only.

MODEL 003600-OPG

2.15 The Model 003600-OPG pushbutton dial is the same as the Model 003600-OOG pushbutton dial except it is equipped with polarity guard that allows the dial to operate regardless of line polarity.

MODEL 003600-OPD

2.16 The Model 003600-OPD pushbutton dial is the same as the Model 003600-OOD pushbutton dial except it is equipped with polarity guard that allows the dial to operate regardless of line polarity.

2.17 The Models 32 and 36 pushbutton dials are no longer manufactured. The Model 32 pushbutton dial has been replaced by the Model 42 pushbutton dial. The Model 36 pushbutton dial has been replaced by the Model 46 pushbutton dial.

3. REMOVAL

3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the telephone faceplate.
- (b) Remove the telephone housing.
- (c) Loosen the two dial mounting screws; lift the dial from the dial mounting brackets.
- (d) Disconnect the dial leads.

4. DISASSEMBLY

4.01 To disassemble the dial, proceed as follows:

- (a) Rotate the common switch cover clockwise until it clears the printed circuit board. Lift upward to remove the spring cover from the screw threads, if desired. (See Figure 5.)

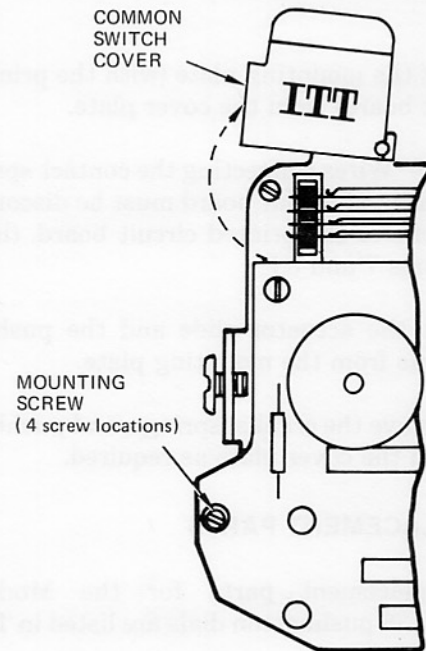


Figure 5: Rear View of Dial

- (b) Loosen the four screws that hold the mounting plate assembly to the cover plate. Note that one of the screws is located under the printed circuit board. A small screwdriver can be inserted through the hole in the printed circuit board and the screw can be loosened as the mounting plate is lifted from the cover plate. (See Figure 5.)

- (c) Place the dial face down in a holding fixture. (See Figure 6.)

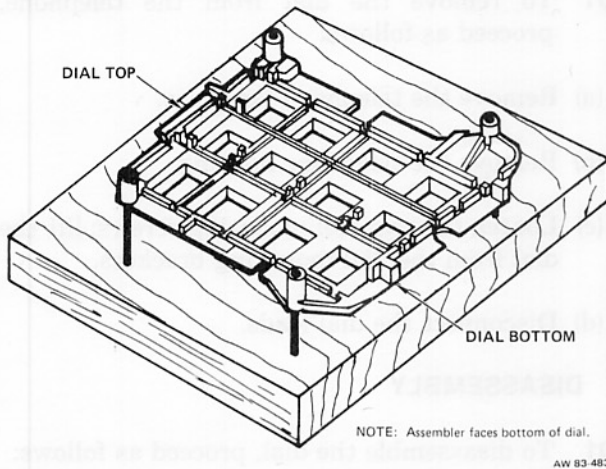


Figure 6: Holding Fixture

- (d) Loosen and remove the four screws that hold the mounting plate assembly to the cover plate.

- (e) Lift the mounting plate (with the printed circuit board) from the cover plate.

Note: Wires connecting the contact springs to the printed circuit board must be disconnected to remove the printed circuit board. (Refer to Figures 7 and 8.)

- (f) Lift the actuator slide and the pushbutton frame from the mounting plate.

- (g) Remove the cranks, springs, and pushbuttons from the cover plate as required.

5. REPLACEMENT PARTS

- 5.01 Replacement parts for the Models 32 and 36 pushbutton dials are listed in Table B.

6. ASSEMBLY

- 6.01 To assemble the dial, proceed as follows:

- (a) Place the cover plate face down on a holding fixture. (See Figure 6.)

- (b) Place the pushbuttons in the proper holes of the cover plate. Position the holding fixture so that the opening at the bottom of the dial cover

is toward the assembler. Starting with the pushbutton for the numeral 1 in the upper right-hand corner, progress from right to left and from top to bottom: 1, 2, 3, 4, 5, 6, 7, 8, 9, *, 0, and #.

- (c) Place the horizontal (row) cranks in position in the cover plate. The arms that contact the actuator slide must be to the assembler's left and must point upward. The round section of each crank must ride in the appropriate slots. (See Figure 9.)

- (d) Place the vertical (column) cranks in position. The arms of the cranks ride on the flanges of the pushbuttons. (See Figure 9.)

Note: One vertical (column) crank differs in design from the other two. This crank must be placed in the center slot position with the stop pointing toward the top of the dial. The two outside vertical (column) cranks must be placed with the stops pointing toward the bottom of the dial.

- (e) Place the pushbutton frame over the assembled parts so that the dowel pin of the frame inserts into the dowel hole of the cover plate.

- (f) Place one spring into position on each pushbutton.

- (g) Place the actuator slide in the frame so that the arms on the front side mesh below the arms of the four vertical (column) cranks.

- (h) Position the mounting plate and printed circuit board group over the assembled parts. Ensure that the teeth of the actuator slide mesh properly with the springs of the contact spring assembly. The top tooth goes above the top long flat spring. Each successive tooth goes above the subsequent long flat springs. The fourth tooth engages the stiffener spring of the contact spring assembly.

- (j) Secure the mounting plate to the cover plate using four screws.

- (k) Install the spring cover by pressing it down on the threads of the screw and rotating it counterclockwise until it engages the printed circuit board.

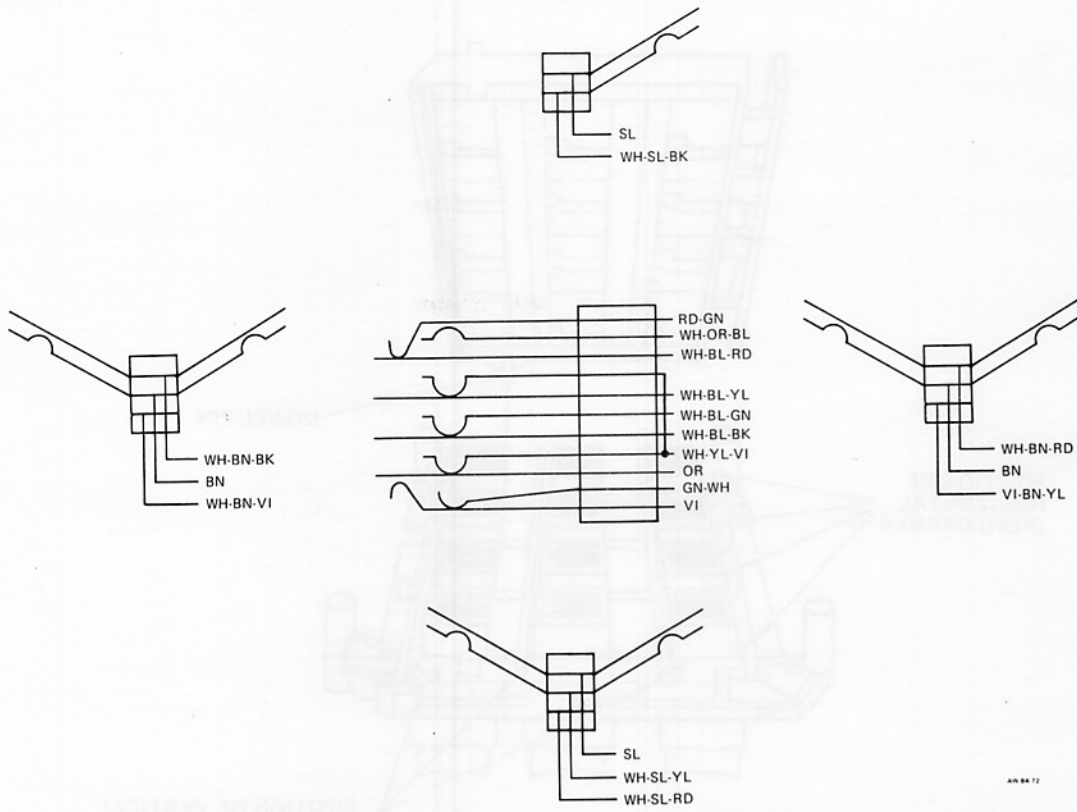


Figure 7: Model 36 Pushbutton Dial, Wiring Diagram

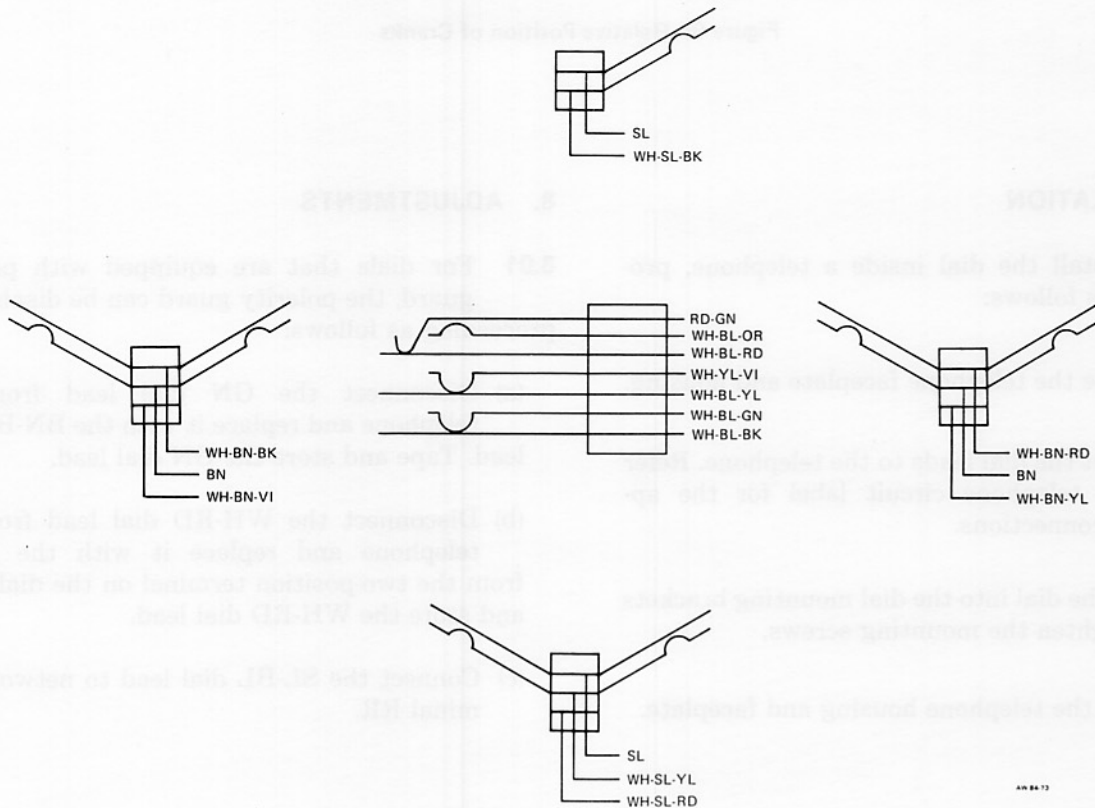


Figure 8: Model 32 Pushbutton Dial, Wiring Diagram

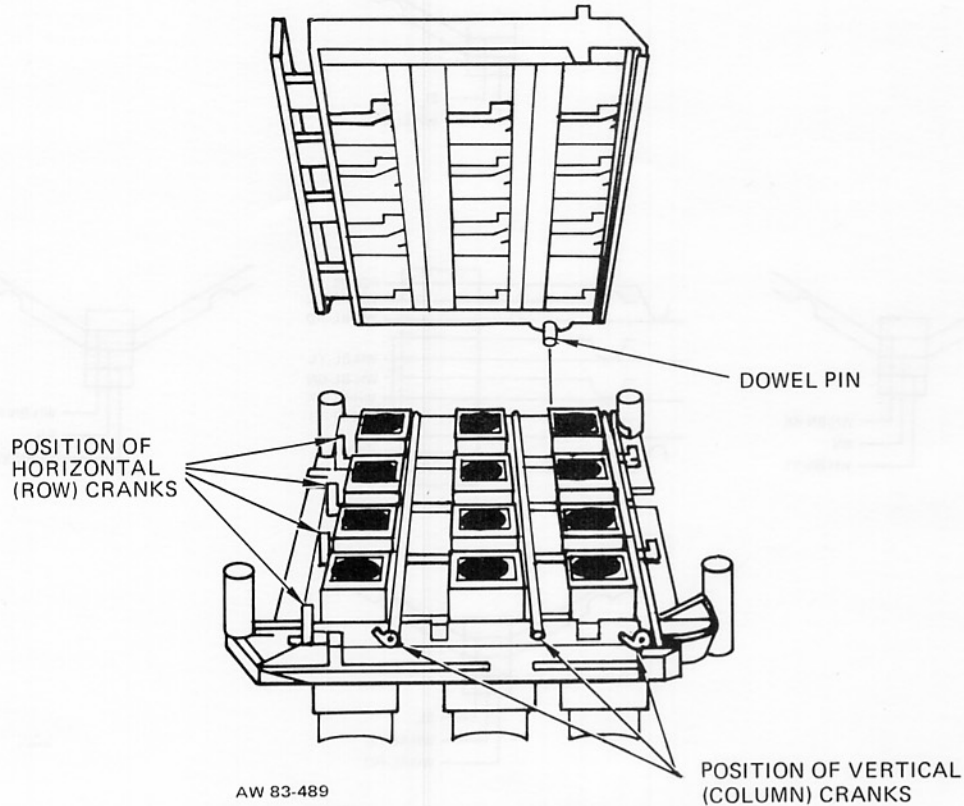


Figure 9: Relative Position of Cranks

7. INSTALLATION

7.01 To install the dial inside a telephone, proceed as follows:

- (a) Remove the telephone faceplate and housing.
- (b) Connect the dial leads to the telephone. Refer to the telephone circuit label for the appropriate connections.
- (c) Place the dial into the dial mounting brackets and tighten the mounting screws.
- (d) Install the telephone housing and faceplate.

8. ADJUSTMENTS

8.01 For dials that are equipped with polarity guard, the polarity guard can be disabled by proceeding as follows:

- (a) Disconnect the GN dial lead from the telephone and replace it with the BN-BK dial lead. Tape and store the GN dial lead.
- (b) Disconnect the WH-RD dial lead from the telephone and replace it with the lead(s) from the two-position terminal on the dial. Tape and store the WH-RD dial lead.
- (c) Connect the SL-BL dial lead to network terminal RR.

TABLE B
REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED											
			32/00G	32/00D	32/0PG	32/0PD	36/00G	36/00D	36/0PG	36/0PD				
		Models 32 And 36 Pushbutton Dials												
1	086134-103	Pushbutton Assembly	1	-	1	-	-	-	-	-	-	-	-	
1	086134-104	Pushbutton Assembly	-	1	-	-	-	-	-	-	-	-	-	
1	086134-105	Pushbutton Assembly	-	-	-	-	-	-	-	-	-	-	-	
1	086134-106	Pushbutton Assembly	-	-	-	-	-	-	-	-	-	-	-	
2	086101-104	Plate, Cover	1	1	1	1	1	1	1	1	1	1	1	
3	181452-101	Pushbutton, 1, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-111	Pushbutton, 1, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-102	Pushbutton, 2, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-112	Pushbutton, 2, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-103	Pushbutton, 3, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-113	Pushbutton, 3, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-104	Pushbutton, 4, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-114	Pushbutton, 4, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-105	Pushbutton, 5, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-115	Pushbutton, 5, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-106	Pushbutton, 6, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-116	Pushbutton, 6, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-107	Pushbutton, 7, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-117	Pushbutton, 7, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-108	Pushbutton, 8, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-118	Pushbutton, 8, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-109	Pushbutton, 9, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-119	Pushbutton, 9, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-110	Pushbutton, 0, Metropolitan	1	-	1	-	-	-	-	-	-	-	-	
	181452-120	Pushbutton, 0, Regular	-	1	-	-	-	-	-	-	-	-	-	
	181452-131	Pushbutton, *	1	1	1	1	1	1	1	1	1	1	1	
	181452-132	Pushbutton, #	1	1	1	1	1	1	1	1	1	1	1	
4	086112-101	Spring	12	12	12	12	12	12	12	12	12	12	12	
5	086109-101	Crank, Horizontal (2nd And 4th From Top)	2	2	2	2	2	2	2	2	2	2	2	
6	086108-101	Crank, Horizontal (1st And 3rd From Top)	2	2	2	2	2	2	2	2	2	2	2	
7	086111-101	Crank, Vertical (Outer Positions)	2	2	2	2	2	2	2	2	2	2	2	
8	086110-101	Crank, Vertical (Center Position)	1	1	1	1	1	1	1	1	1	1	1	
9	086102-101	Frame	1	1	1	1	1	1	1	1	1	1	1	
10	086113-101	Slide, Actuator	1	1	1	1	1	1	1	1	1	1	1	
11	086107-101	Mounting Plate Assembly	1	1	1	1	1	1	1	1	1	1	1	
12	182607-101	Screw, Dial Mounting	2	2	2	2	2	2	2	2	2	2	2	
13	076787-102	Screw, Self-Tapping	4	4	4	4	4	4	4	4	4	4	4	
14	086133-101	Common Spring Assembly	1	1	1	1	1	1	1	1	1	1	1	
14	088891-101	Common Spring Assembly	-	-	-	-	-	-	-	-	-	-	-	
15	071660-101	Screw, Mounting	1	1	1	1	1	1	1	1	1	1	1	
16	184068-101	Cover	1	1	1	1	1	1	1	1	1	1	1	

TABLE A
REPLACEMENT PARTS LIST (Cont)

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED																		
			32/00G	32/00D	32/0PG	32/0PD	36/00G	36/00D	36/0PG	36/0PD											
		Models 32 And 36 Pushbutton Dials																			
17	086106-101	Insulator	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	182831-101	PC Board Assembly	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	182831-102	PC Board Assembly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	182831-103	PC Board Assembly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	182831-104	PC Board Assembly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	079485-102	Screw, Mounting	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
20	182830-101	Board, Printed Circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	086125-102	Transformer, T2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	180656-103	Diode, 1N4448, CR3, CR4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
23	095830-101	Transistor, PNP, Germanium, Q1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	182135-104	Capacitor, 0.0068 MFD, 300 V, C3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	180658-101	Diode, 1N4004, CR1, CR5 - CR8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	181789-102	Resistor, 33 K, 1/4 W, ± 5%, R4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	095853-101	Varistor, V1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	180658-101	Diode, 1N4004, CR9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	086125-101	Transformer, T1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	181789-180	Resistor, 5.1 K, 1/4 W, ± 5%, R3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	181789-243	Resistor, 820 Ohm, 1/2 W, ± 5%, R1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	181608-101	Capacitor, 0.043 MFD, 100 V, C1, C2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	095535-118	Resistor, 45.3 Ohm, 1 W, ± 1%, R2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

NOTE: All capacitor values are in microfarads (MFD).

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MODELS 33 AND 38 ROTARY DIALS

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MODEL 003300-OOG	3
MODEL 003300-OOD	3
MODEL 003800-OOG	3
MODEL 003800-OOD	3
MODEL 003800-OOH	3
3. REMOVAL	3
4. DISASSEMBLY	3
5. REPLACEMENT PARTS	4
6. ASSEMBLY	4
7. INSTALLATION	6
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AW 85-188

Figure 1: Models 33 and 38 Rotary Dials

1. INTRODUCTION

1.01 This document covers the Models 33 and 38 rotary dials. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

1.03 For information concerning telephones that these dials are used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

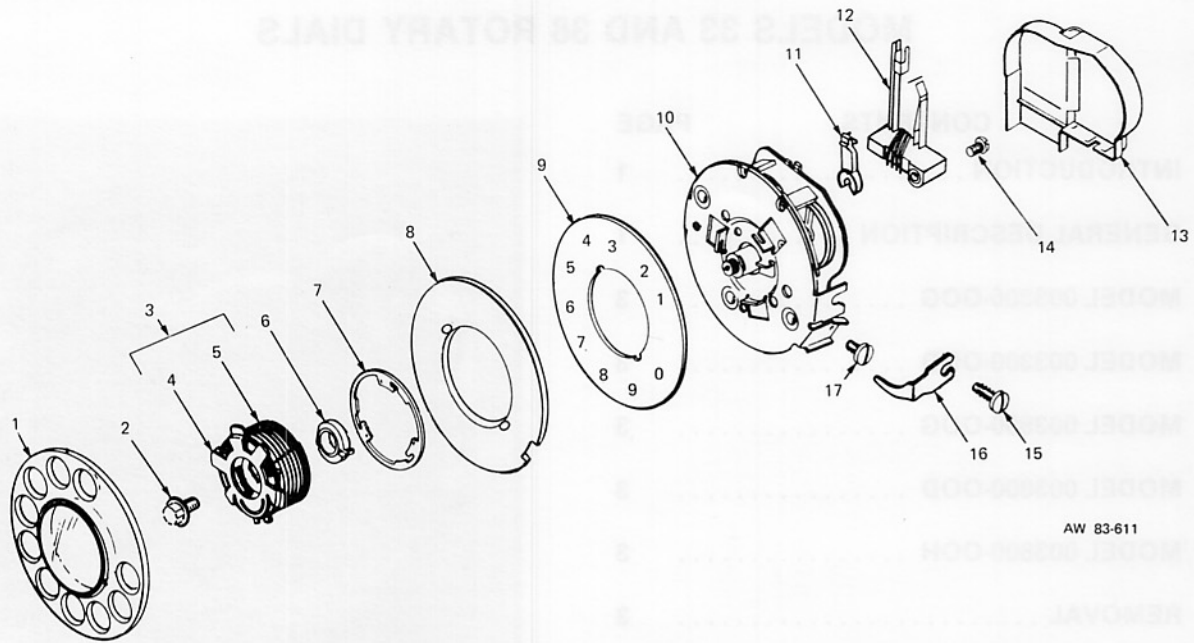
2. GENERAL DESCRIPTION

2.01 The Models 33 and 38 rotary dials (see Figure 2) consist of a rigid metal bracket on which are mounted the gear train, contact spring assembly, numeral ring, mainspring and spider assembly, finger plate, and miscellaneous parts. The gear train is protected by a plastic dust cover. Each

model is available with either a metropolitan-style numeral ring (letters and numerals) coded G, or a regular-style numeral ring (numerals only) coded D. The Model 38 rotary dial is also available with only dots at the finger holes (no letters or numerals) coded H. The Models 33 and 38 rotary dials are similar with the exception of an additional set of contacts appearing in the Model 38 rotary dial to allow its use with handsfree equipment.

2.02 When the dial finger plate is rotated clockwise and released, a pair of pulsing contacts interrupts the telephone line current once for each unit of the dialed digit. Telephone switching equipment is operated in accordance with the number of pulses received. The dials are factory-adjusted to 10 pulses per second (nominal), and a pulse ratio with a break period of 61.5% of the pulse duration.

2.03 The Models 33 and 38 rotary dials are identified by a code number stamped in ink on the back of the dial. Refer to Table A for ordering information and for an explanation of each code number. Variations of the Models 33 and 38 rotary dials are briefly described in the following paragraphs.



AW 83-611

Figure 2: Models 33 and 38 Rotary Dials, Exploded View

TABLE A

ORDERING INFORMATION

CODE NUMBERS		
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:		
(1) Dial Model Number (See Part 1)	003300	OOG
(2) Numeral Ring Style (See Part 2)		
PART 1 DIAL MODEL NUMBER		
CODE	DESCRIPTION	NUMERAL RING STYLE
003300	Model 33 Rotary Dial (For Standard Telephones)	OOG, OOD
003800	Model 38 Rotary Dial (For Handsfree Operation)	OOG, OOD, OOH
PART 2 NUMERAL RING STYLE		
CODE	DESCRIPTION	
OOG	Metropolitan (Letters And Numerals)	
OOD	Regular (Numerals Only)	
OOH	Dots Only	

AW 84 902

MODEL 003300-OOG

2.04 The Model 003300-OOG rotary dial is designed for use in multibutton telephones. It contains one set of normally-open contacts that closes to short circuit the telephone receiver during dialing. One set of pulsing contacts is provided to interrupt the line current once for each unit of a dialed digit. This dial has a 3-inch diameter, metropolitan-style numeral ring displaying both letters and numerals.

MODEL 003300-OOD

2.05 The Model 003300-OOD rotary dial is the same as the Model 003300-OOG rotary dial with the exception that it has a 3-inch diameter, regular-style numeral ring displaying numerals only.

MODEL 003800-OOG

2.06 The Model 003800-OOG rotary dial is designed for use in handsfree telephones, or multibutton telephones used in connection with handsfree equipment. It contains one set of normally-open contacts that closes to short circuit the telephone receiver during dialing, and also an additional set of contacts to mute the handsfree speaker during dialing. One set of pulsing contacts is provided to interrupt the line current once for each unit of a dialed digit. This dial has a 3-inch diameter, metropolitan-style numeral ring displaying both letters and numerals.

MODEL 003800-OOD

2.07 The Model 003800-OOD rotary dial is the same as the Model 003800-OOG rotary dial with the exception that it has a 3-inch diameter, regular-style numeral ring displaying numerals only.

MODEL 003800-OOH

2.08 The Model 003800-OOH rotary dial is the same as the Model 003800-OOG rotary dial with the exception that it has a 3-inch diameter numeral ring displaying only dots at the finger holes.

3. REMOVAL

3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the telephone faceplate.
- (b) Remove the telephone housing.
- (c) Loosen the two dial mounting screws and lift the dial from the dial mounting brackets.
- (d) Disconnect the dial leads from the telephone.

4. DISASSEMBLY

4.01 To disassemble the dial, proceed as follows:

- (a) Rotate the finger plate completely clockwise.
- (b) Insert the straightened end of a paper clip or similar tool into the hole that is now about 1/4 inch to the left of the tip of the finger stop. (See Figure 3.)

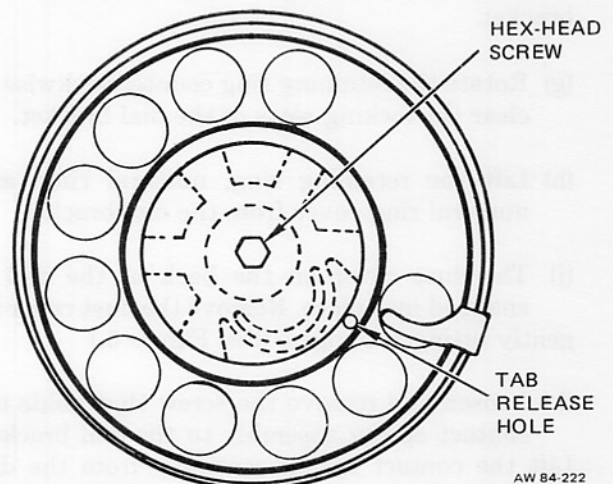
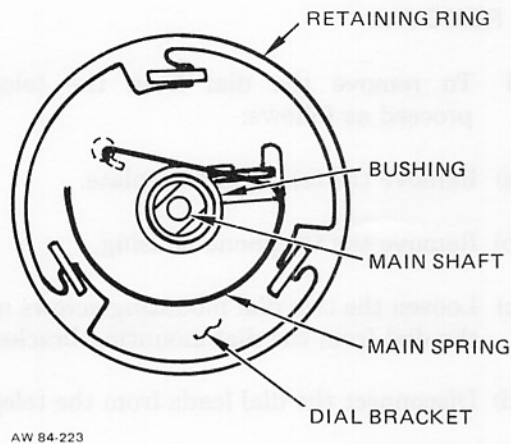


Figure 3: Location of Tab Release Hole

- (c) Press down on the paper clip to spring the tab of the spider. Rotate the finger plate clockwise to release it. Work the finger plate off of the spider and out from under the finger stop.
- (d) While holding the spider firmly, remove the hex-head screw. Lift the spider from the main shaft and work the mainspring out of the dial bracket. (See Figure 4).



AW 84-223

Figure 4: Installation of Spring and Spider Assembly

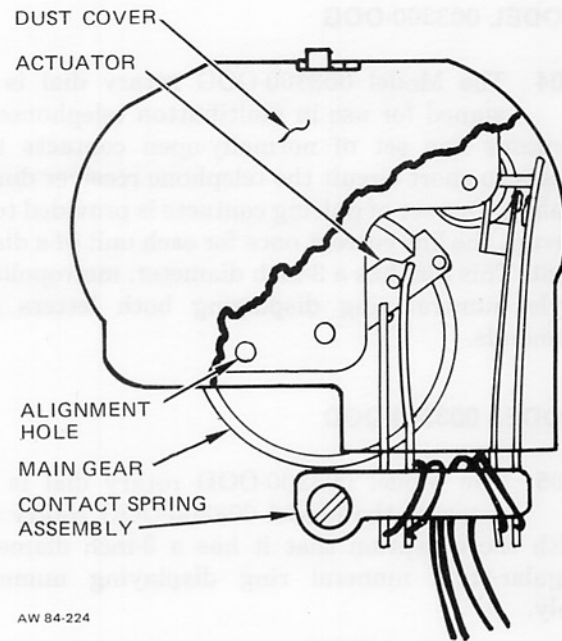
Note: The mainspring can be removed from the spider assembly if necessary.

- (e) Remove the bushing.
- (f) Remove the finger stop by loosening the screw that holds the finger stop to the dial bracket. Lift the finger stop from the dial bracket.
- (g) Rotate the retaining ring counterclockwise to clear the locking slots of the dial bracket.
- (h) Lift the retaining ring, numeral ring, and numeral ring cover from the dial bracket.
- (j) The dust cover on the back of the dial is snapped into place. Remove the dust cover by gently lifting the edges. (See Figure 5.)
- (k) Loosen and remove the screw that holds the contact spring assembly to the dial bracket. Lift the contact spring assembly from the dial bracket, taking care not to damage the contacts.
- (m) The actuator can be removed by gently pulling it from the main shaft.

Warning: *The gear train and bracket assembly is a staked unit and repair is not recommended. Do not disassemble this unit.*

5. REPLACEMENT PARTS

- 5.01 Replacement parts for the Models 33 and 38 rotary dials are listed in Table B.



AW 84-224

Figure 5: Installation of Dust Cover

6. ASSEMBLY

- 6.01 To assemble the dial, proceed as follows:

- (a) If the actuator has been removed, slip it onto the main shaft with the flat side next to the surface of the main gear. Rotate the actuator counterclockwise to the stop on the main gear. (See Figure 5.) The hole in the main gear will align with the hole in the dial bracket when assembly is complete.
- (b) Route the leads of the contact spring assembly around and under the plastic base of the assembly. Position the contact spring assembly so that the two locating studs of the plastic base seat in the two holes provided in the dial bracket. (See Figure 5.)
- (c) Check to see that the end of the pulsing lever spring rests on the surface of the impulse cam.

Note: Be sure the dial leads do not interfere with the contact springs or with the main gear. The inner stud of the actuator must rest against the lever spring of the normally-open switch, and the switch contacts must be open when the hole in the main gear is aligned with the hole in the dial bracket. (This applies only if the mainspring and spider are in place so that tension is applied to the actuator.)

Note: The mainspring has a larger diameter when it is free than when it is wound. Usually it will be found that some coils of the spring lie outside one of the three locking tabs on the dial bracket. Use a smooth tool, such as a screwdriver, to work the coils back inside the locking tab.

(m) Ensure that the number card is installed in the finger plate; position the finger plate over the spider so that the digit 0 (or operator) finger hole is over the digit 9 on the numeral ring. Let the finger plate drop into position over the spider; then, rotate the finger plate counterclockwise until it clicks into place.

(n) Install the finger stop to the dial bracket at the position where the slot is located on the numeral ring cover. Tighten the finger stop mounting screw.

Note: The finger stop can be adjusted slightly up or down to provide clearance for the finger plate.

(p) Position the dust cover on the back of the dial as shown in Figure 5 and snap it into place.

7. INSTALLATION

7.01 To install the dial in a telephone, proceed as follows:

- (a) Remove the telephone faceplate and housing.
- (b) Connect the dial leads to the telephone. Refer to the telephone circuit label for the appropriate connections.
- (c) Place the dial in the dial mounting brackets and tighten the mounting screws.
- (d) Install the telephone housing and faceplate.

8. ADJUSTMENTS

8.01 Adjustments to the Models 33 and 38 dials pertain to dial speed and contact springs. These adjustments are beyond the scope of this section.



MODEL 37 PUSHBUTTON DIAL

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3. REMOVAL	2
4. DISASSEMBLY	4
5. REPLACEMENT PARTS	4
6. ASSEMBLY	6
7. INSTALLATION	6

1. INTRODUCTION

1.01 This document covers the Model 37 pushbutton dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

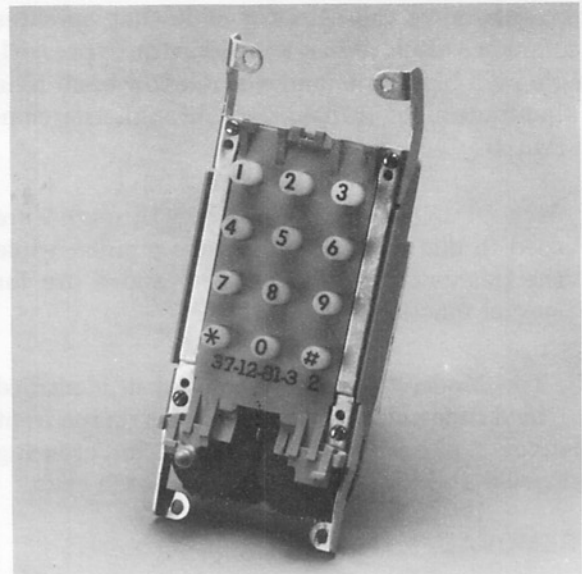
1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 37 pushbutton dial is a 12-pushbutton Tel-Touch dial with off-white translucent plastic pushbuttons that are illuminated by a light guide in the Trendline telephone handset. The dial is referred to as Tel-Touch because it produces dual tone multifrequency (DTMF) signals.

Note: This dial can only be used when the associated central office equipment is arranged for DTMF signaling.

2.02 The Model 37 pushbutton dial consists of a pushbutton assembly, base plate assembly, tone-generating printed circuit board (PCB), and miscellaneous components.



AW 85-171

Figure 1: Model 37 Pushbutton Dial

2.03 The pushbutton assembly consists of a cover plate, 12 pushbuttons, three vertical cranks, four horizontal cranks, and a frame which is mounted to the base plate assembly with four screws. (See Figure 2.) Seven contact springs, which are also mounted to the baseplate, contact with the cranks. The tone-generating PCB is soldered to the base plate assembly at the contact spring terminals.

2.04 The tone-generating PCB consists of two tuned-circuit oscillators and a common switch. The oscillator circuits, powered by the line voltage, produce a specific pair of frequencies. The common switch mutes the receiver, breaks the transmitter circuit, and connects the DTMF signal to the line.

2.05 The miscellaneous components of the Model 37 pushbutton dial consist of two brackets, a shield, an actuator slide, a common switch cover, and screws.

2.06 Pressing a pushbutton rotates one of the horizontal (row) cranks and one of the vertical (column) cranks. The vertical cranks operate contact

springs connected to the high-band coil, and the horizontal cranks operate contact springs connected to the low-band coil. (See Figure 3.) The horizontal cranks also move the actuator slide that operates the common switch. When a pushbutton is pressed, a single high-band tone and a single low-band tone are simultaneously transmitted through the common switch.

Note: Pushbuttons numbered 0 through 9 are used to dial a desired directory number while the pushbuttons designated * and # are for special functions.

2.07 The Model 37 pushbutton dial is identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for ordering information and for an explanation of each code.

3. REMOVAL

3.01 To remove the dial from the telephone handset, proceed as follows. (Refer to Figure 4 throughout the procedure.)

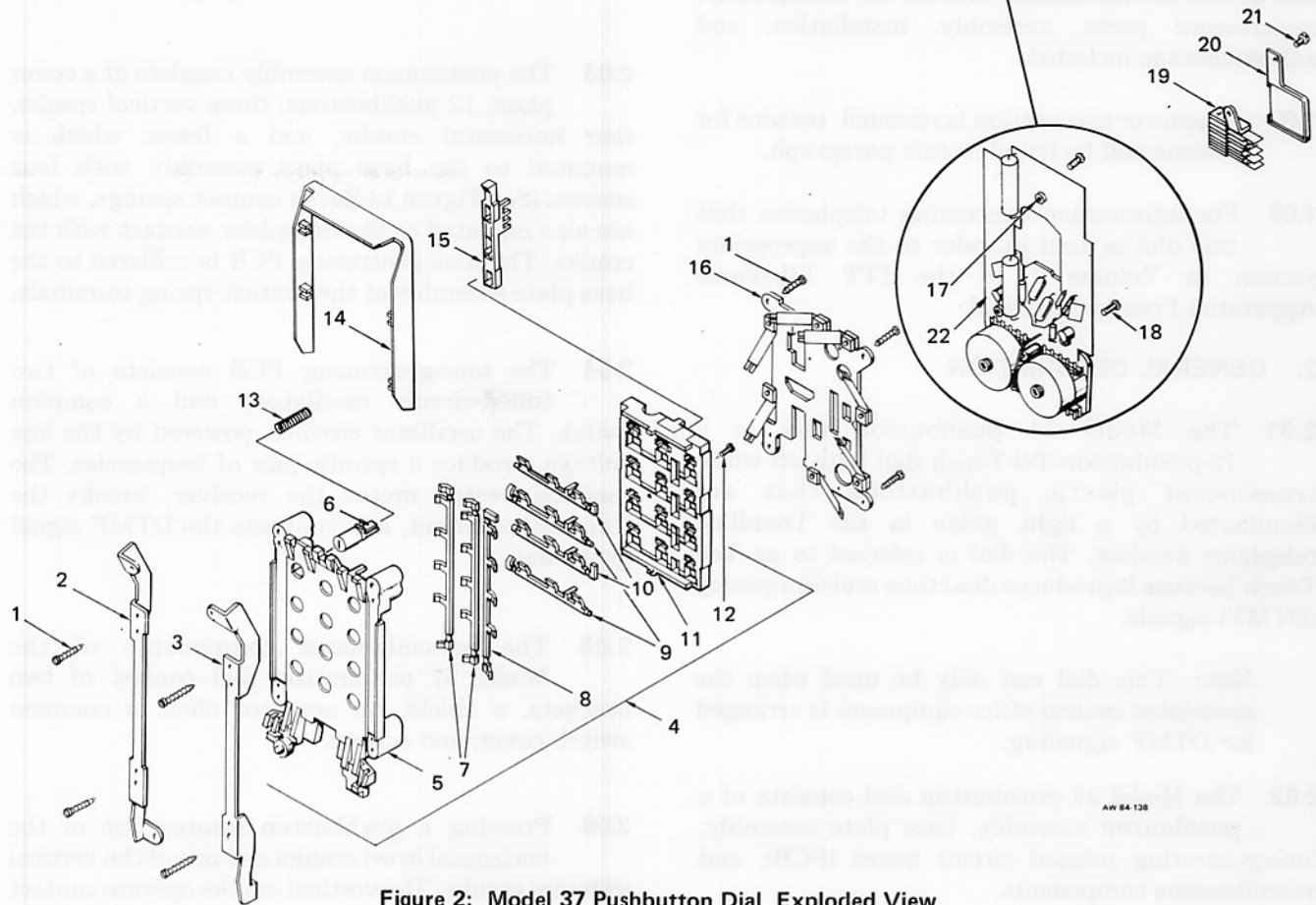
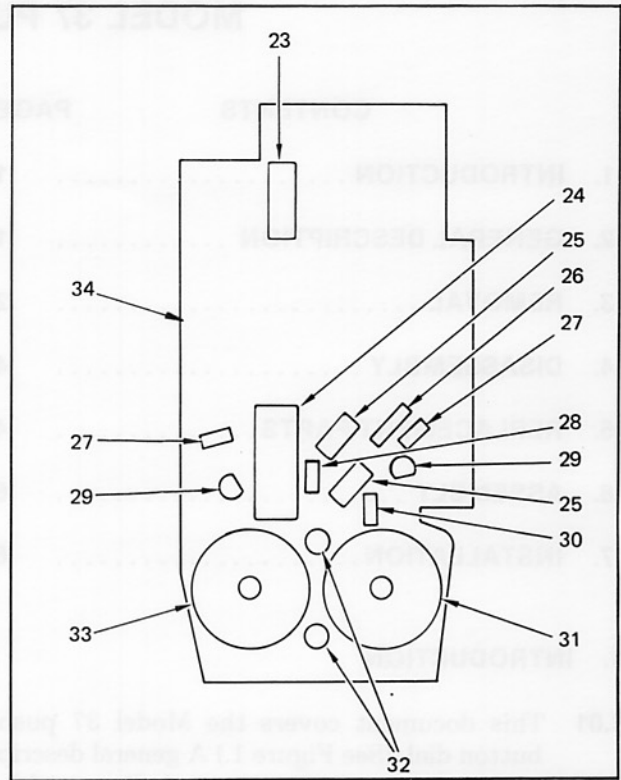


Figure 2: Model 37 Pushbutton Dial, Exploded View

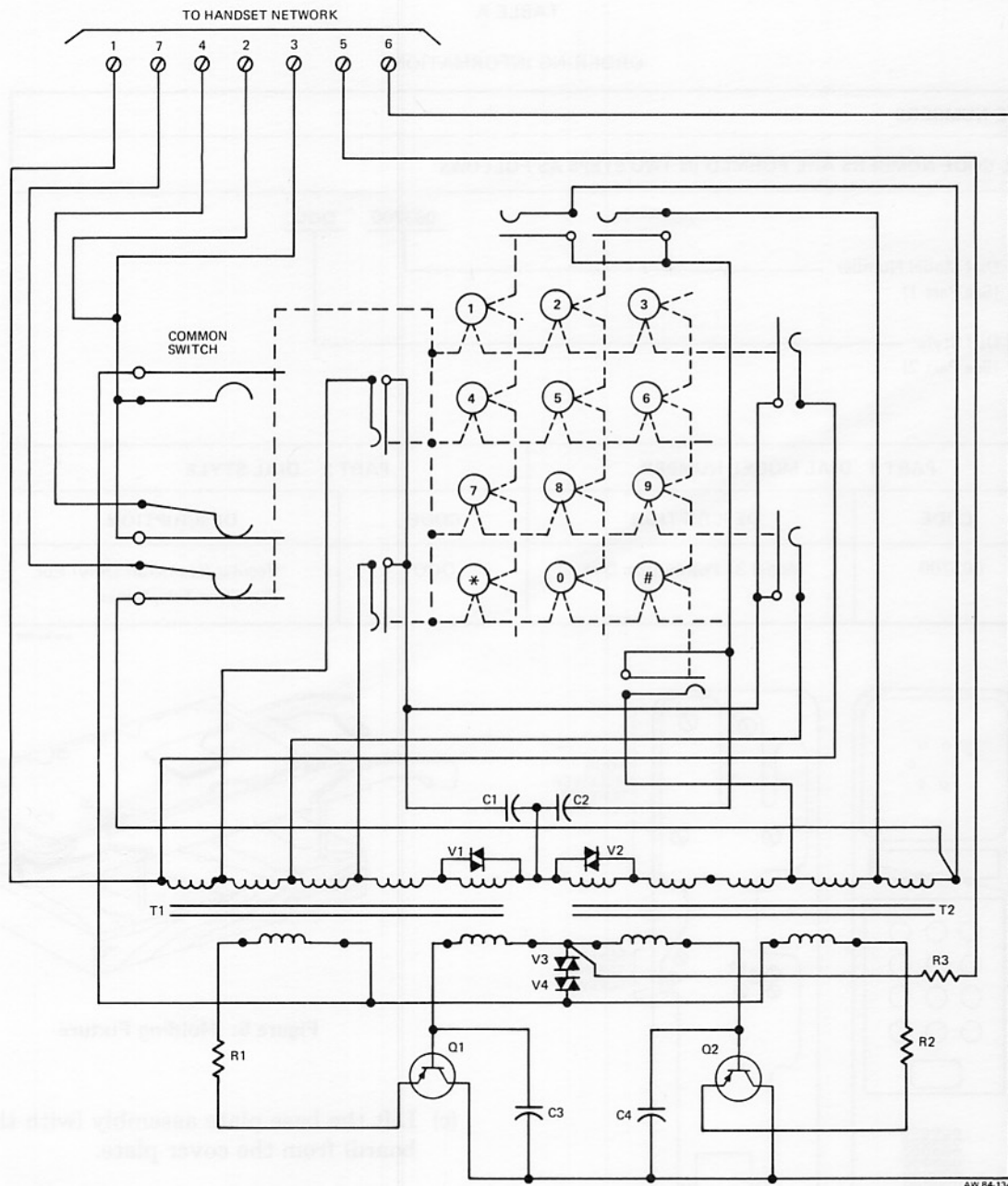


Figure 3: Model 37 Pushbutton Dial, Schematic

- (a) Remove the number card retainer, number card, and light shield from the handset of the Trendline telephone. Insert a paperclip into the hole to pry them loose.
- (b) Remove the screws located behind the number card retainer that secures the back of the handset.
- (c) Remove the back of the handset.
- (d) Remove the seven terminal screws that connect the flexprint network to the dial and the four screws that connect the flexprint network to the receiver.
- (e) Bend the flexprint network back to expose the four dial mounting screws.
- (f) Remove the four dial mounting screws.
- (g) Lift the pushbutton dial from the handset.

TABLE A

ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:			
		003700	000
(1) Dial Model Number (See Part 1)	_____		_____
(2) Dial Style (See Part 2)	_____		_____
PART 1 DIAL MODEL NUMBER		PART 2 DIAL STYLE	
CODE	DESCRIPTION	CODE	DESCRIPTION
003700	Model 37 Pushbutton Dial	000	Regular (Numerals Only) For Trendline Telephones

AW 84-908

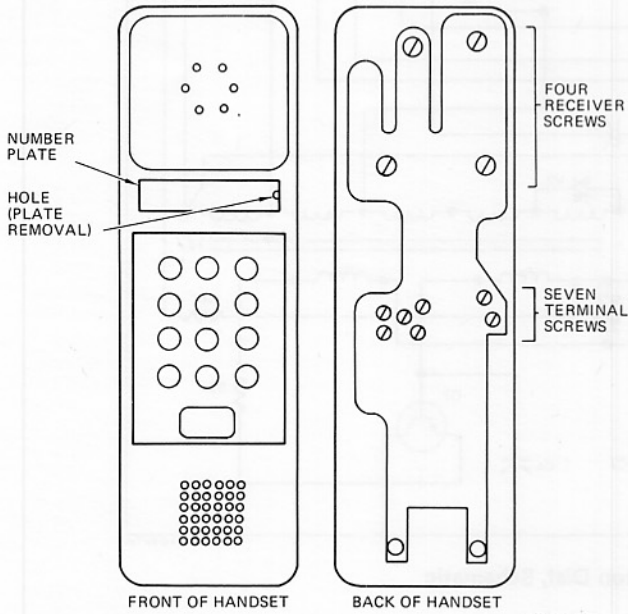


Figure 4: Trendline Handset

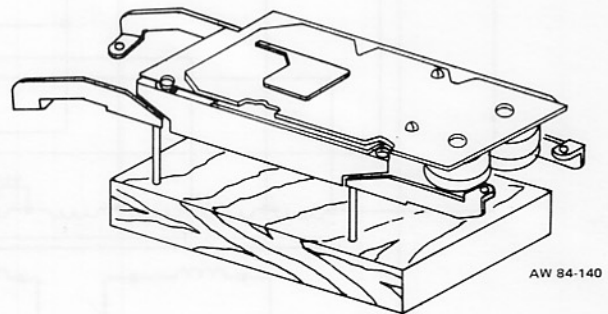


Figure 5: Holding Fixture

4. DISASSEMBLY

4.01 To disassemble the dial, proceed as follows:

- (a) Place the dial face down on a holding fixture. (See Figure 5.)
- (b) Remove the four screws that hold the base plate assembly to the pushbutton cover.

- (c) Lift the base plate assembly (with the circuit board) from the cover plate.
- (d) Lift the actuator slide and the screws from the cover plate. Remove the frame.
- (e) Remove the cranks, springs, and pushbuttons from the cover plate as required.

Note: Further component removal requires desoldering components and is beyond the scope of this section.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 37 pushbutton dial are listed in Table B.

TABLE B
REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED
		Model 37 Pushbutton Dial	37/000
1	182457-102	Screw (Dial Bracket And Mounting Plate Attaching)	8
2	180431-101	Bracket, Dial	1
3	180432-101	Bracket, Dial	1
4	180449-101	Pushbutton Assembly	1
5	180453-101	Plate, Cover	1
6	180355-101	Pushbutton (1)	1
	180355-102	Pushbutton (2)	1
	180355-103	Pushbutton (3)	1
	180355-104	Pushbutton (4)	1
	180355-105	Pushbutton (5)	1
	180355-106	Pushbutton (6)	1
	180355-107	Pushbutton (7)	1
	180355-108	Pushbutton (8)	1
	180355-109	Pushbutton (9)	1
	180355-110	Pushbutton (0)	1
	180355-111	Pushbutton (*)	1
	180355-112	Pushbutton (#)	1
7	180439-101	Crank, Vertical (Center And Left Side)	2
8	180440-101	Crank, Vertical (Right Side)	1
9	180438-101	Crank, Horizontal (2nd And 4th From Top)	2
10	180437-101	Crank, Horizontal (1st And 3rd From Top)	2
11	180454-101	Frame	1
12	095971-103	Screw (Frame Attaching)	1
13	180354-101	Spring	12
14	180433-101	Shield	1
15	180408-101	Slide, Actuator	1
16	180450-101	Base Plate Assembly	1
17	180339-101	Spacer	3
18	180344-101	Screw (PCB Mounting)	3
19	180413-101	Common Switch Assembly	1
20	180407-101	Cover, Common Switch	1
21	180345-101	Screw (Common Switch Attaching)	1
22	180448-101	Printed Circuit Board, Tone-Generating	1
23	181608-119	Capacitor, 0.044 MFD, C2	1
24	181608-118	Capacitor, 0.054 MFD, C1	1
25	095853-102	Varistor, V3 And V4	2
26	181789-132	Resistor, 820 Ohm, R3	1
27	180464-101	Capacitor, 4700 PFD, C3 And C4	2
28	180463-118	Resistor, 75 Ohm, R2	1
29	180488-101	Transistor, PNP, MPS 404A, Q1 And Q2	2
30	180463-114	Resistor, 68 Ohm, R1	1
31	180416-101	Transformer, T1 (Low-Band)	1
32	095853-101	Varistor, V1 And V2	2
33	180416-102	Transformer, T2 (High-Band)	1
34	180441-101	Board Printed Wiring	1
35	185661-101	Insulator Spacer (Not Shown)	1
36	180435-102	Flex Circuit And Terminals (Not Shown)	1

AW 84-907

NOTE: All capacitor values are in microfarads (MFD) or picofarads (PFD).

6. ASSEMBLY

6.01 To assemble the dial, proceed as follows:

- (a) Place the cover plate face down on a holding fixture. (See Figure 5.)
- (b) Place the pushbuttons in the proper holes of the cover plate. Position the holding fixture so that the opening at the bottom of the dial cover is toward the assembler. Starting with the pushbutton for the numeral 1 in the upper right-hand corner, progress from right to left and from top to bottom: 1, 2, 3, 4, 5, 6, 7, 8, 9, *, 0, and #.
- (c) Place the vertical (column) cranks in position. The arms of the cranks ride on the flanges of the pushbuttons. (See Figure 6.)
- (d) Place the horizontal (row) cranks in position in the cover plate. The arms that contact the actuator slide must be to the assembler's left and must point upward. The round section of each crank must ride in the appropriate slots. (See Figure 6.)

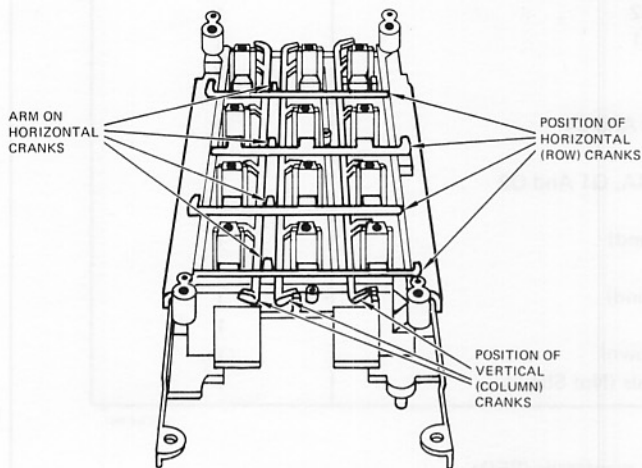
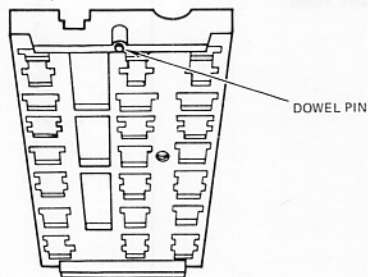


Figure 6: Relative Position of Cranks

- (e) Place the frame over the assembled parts so that the dowel pin of the frame inserts into the dowel hole of the cover plate. Install the screws to secure the frame to the cover plate.
- (f) Place one spring into position on each pushbutton.
- (g) Place the actuator slide in the slot on the frame so that the arms of the four horizontal (row) cranks slide the actuator when a button is pressed.
- (h) Position the mounting plate and printed circuit board group over the assembled parts. Ensure that the teeth of the actuator slide mesh properly with the springs of the contact spring assembly. The top tooth goes above the top spring. The third tooth contacts the second spring and the fourth tooth contacts the third spring.
- (j) Secure the mounting plate to the cover plate using four screws.
- (k) Install the common spring cover and secure it into place using a single screw.

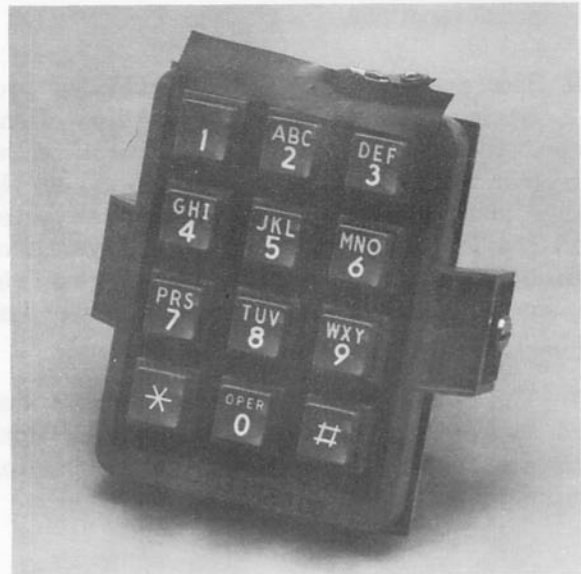
7. INSTALLATION

7.01 To install the dial inside the Trendline telephone, proceed as follows:

- (a) With the flexprint network of the telephone handset bent back, install the dial into the handset.
- (b) Secure the dial by installing the four bracket screws.
- (c) Position the network in place and mount it to the handset receiver using four screws.
- (d) Install the seven terminal screws. (See Figure 4.)
- (e) Place the back of the handset in place.
- (f) Secure the back of the handset by installing the two screws in the front of the dial where the number plate is to be installed.
- (g) Install the number card retainer, number card, and light shield.

MODEL 42 PUSHBUTTON DIAL

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AW 85-177

Figure 1: Model 42 Pushbutton Dial

1. INTRODUCTION

1.01 This document covers the Model 42 pushbutton dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 42 pushbutton dial is a 12-pushbutton Tel-Touch dial that uses a tone generator integrated circuit and a silicone switch plate. The dial also features a modular design that allows convenient replacement of the keypad assembly or tone-generating printed circuit board (PCB). The dial is referred to as Tel-Touch because it produces dual tone multifrequency (DTMF) signals.

Note: This dial can only be used when the associated central office equipment is arranged for DTMF.

2.02 The Model 42 pushbutton dial consists of a pushbutton keypad assembly and a tone-generating PCB. The tone-generating PCB mounts on the keypad assembly at an eight-pin connector with two retaining screws. The two assemblies separate easily for replacement.

2.03 The pushbutton keypad assembly consists of a cover plate, 12 pushbuttons, a silicone switch plate, and a contact PCB assembly. The keypad includes an electrostatic shield that protects the tone-generating PCB from static electricity. (See Figure 2.)

2.04 The tone-generating PCB consists of a DTMF generator integrated circuit (IC), a crystal oscillator, and various other solid-state components. The crystal oscillator provides a constant reference for the tone generator IC that generates eight digitally-synthesized tones. The other solid-state components, along with the IC, provide handset receiver and transmitter muting, and polarity guard. (See Figure 3.)

2.05 When a pushbutton is pressed on the keypad, a single silicone contact grounds two inputs (column and row) to the tone generator IC. This causes two tones to be transmitted.

Note: Pushbuttons numbered 0 through 9 are used to dial a desired directory number while the pushbuttons designated * and # are for special functions.

2.06 The polarity guard circuit provides protection against improper connection of the Tip and Ring leads to the telephone. The IC on the tone-generating PCB must have a specific supply voltage polarity to transmit tones. In instances where the Tip and Ring leads may be reversed or unidentifiable at the station, the polarity guard circuit ensures tone transmission regardless of line polarity.

2.07 The Model 42 pushbutton dial is identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for ordering information and for an explanation of each code.

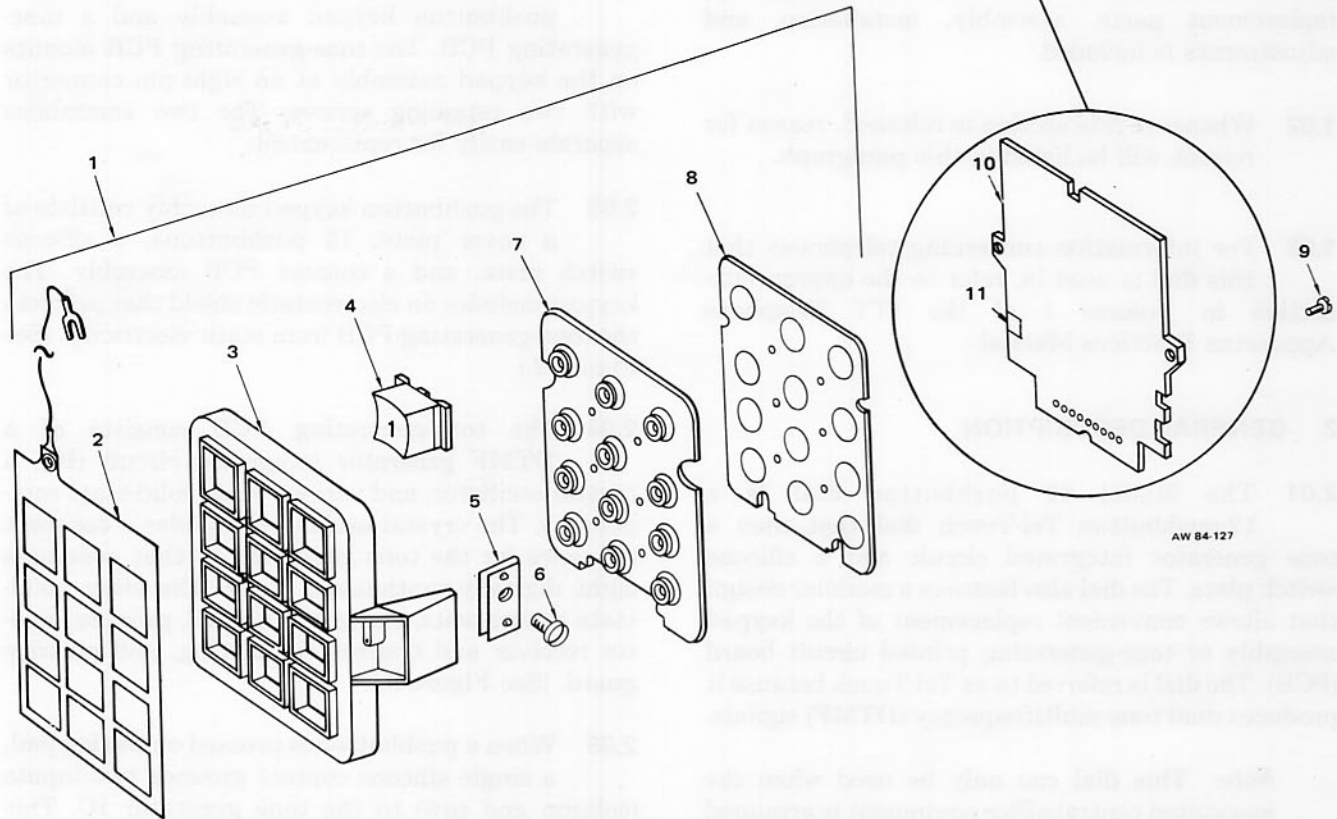
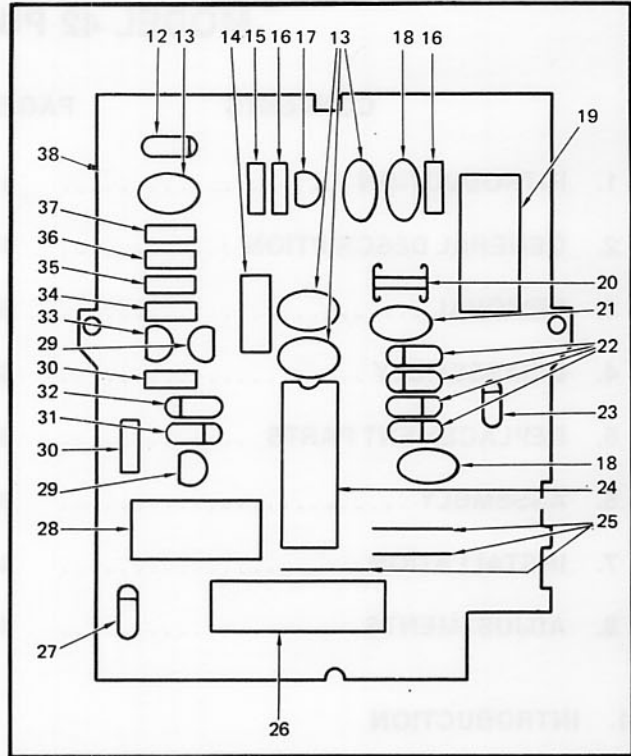


Figure 2: Model 42 Pushbutton Dial, Exploded View

TABLE A
ORDERING INFORMATION

CODE NUMBERS		
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:		
(1) Dial Model Number (See Part 1)	004200	OPG
(2) Dial Style (See Part 2)		
PART 1 DIAL MODEL NUMBER		
CODE	DESCRIPTION	DIAL STYLE
004200	Model 42 Pushbutton Dial	OPG, OPD
PART 2 DIAL STYLE		
CODE	DESCRIPTION	
OPG	Metropolitan (Letters And Numerals) With Polarity Guard	
OPD	Regular (Numerals Only) With Polarity Guard	

AW 84-901

3. REMOVAL

3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the telephone faceplate if required.
- (b) Remove the telephone housing.
- (c) Remove the dial by loosening the screw on the side of each dial mounting bracket, lifting the dial from the mounting brackets, and disconnecting the dial leads.

Warning: The Model 42 pushbutton dial contains static-sensitive components. Personnel handling the dial must have knowledge of proper handling techniques.

4. DISASSEMBLY

4.01 To disassemble the dial, remove the two retaining screws on the tone-generating PCB and pull the PCB from the keypad assembly at the eight-pin connector. This is the lowest level of disassembly suggested for the Model 42 pushbutton dial. Further disassembly of the PCB requires removal of components. Further disassembly of the keypad requires removal of the plastic stakes that hold the assembly together.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 42 pushbutton dial are listed in Table B.

6. ASSEMBLY

6.01 To assemble the Model 42 pushbutton dial, connect the tone-generating PCB to the keypad assembly at the eight-pin connector and install the two retaining screws.

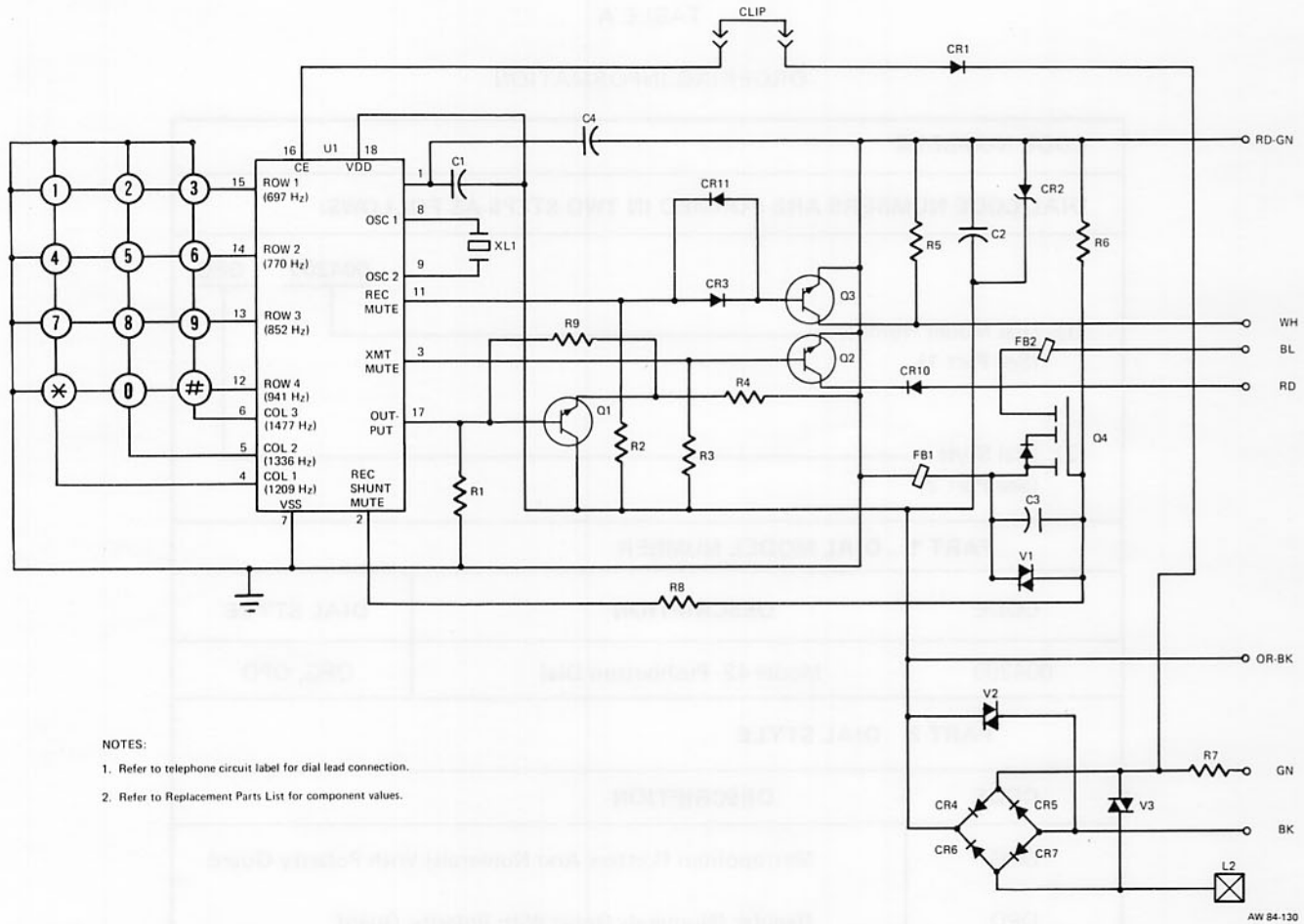


Figure 3: Model 42 Pushbutton Dial, Schematic

7. INSTALLATION

7.01 To install the dial, proceed as follows:

- Ensure that the electrostatic shield is in place on the dial prior to installation.
- Connect the dial leads. Refer to the circuit label for the telephone being assembled.
- Mount the dial in the dial mounting brackets and tighten the screws.
- Install the telephone housing.
- Install the telephone faceplate if removed.

8. ADJUSTMENTS

8.01 The polarity guard feature can be disabled for certain applications of the Model 42 pushbutton dial. Such applications would include toll restriction by a PBX that reverses line polarity to inhibit outward dialing. To disable the polarity guard feature, perform the following:

- Remove the option clip from the storage (lower) notch on the circuit board at the rear of the dial.
- Place the option clip in the polarity guard disable (upper) notch.

MODEL 46 PUSHBUTTON DIAL

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1.01 This document covers the Model 46 pushbutton dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

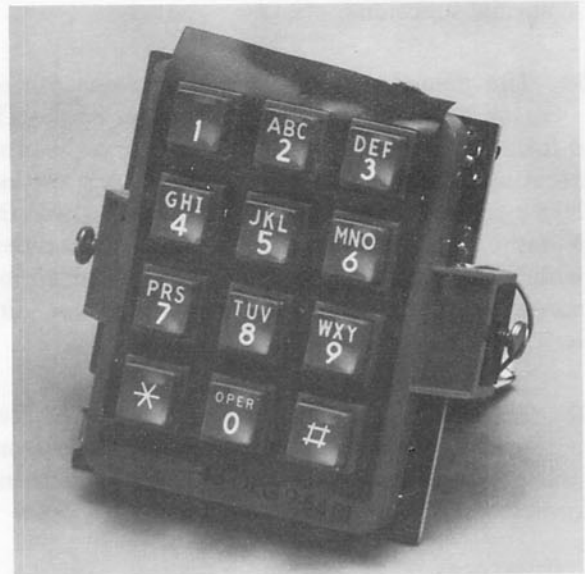
1.02 Whenever this section is reissued, reason for reissue will be listed in this paragraph.

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 46 pushbutton dial is a 12-pushbutton Tel-Touch dial that uses a tone generator integrated circuit (IC) and a silicone switch plate. The dial features a modular assembly design that allows convenient replacement of the keypad assembly or tone-generating printed circuit board (PCB). The dial is referred to as Tel-Touch because it produces dual tone multifrequency (DTMF) signals. The dial also mutes the handsfree speaker when used in a handsfree telephone.

Note: This dial can only be used when the associated central office equipment is arranged for DTMF service.



AW 85-175

Figure 1: Model 46 Pushbutton Dial

2.02 The Model 46 pushbutton dial consists of a pushbutton keypad assembly and a tone-generating PCB. The tone-generating PCB mounts on the keypad assembly at an eight-pin connector with two screws. The two assemblies separate easily for replacement.

2.03 The pushbutton keypad assembly consists of a cover plate, 12 pushbuttons, a silicone switchplate, and a contact PCB assembly. The keypad includes an electrostatic shield that protects the tone-generating PCB from static electricity. (See Figure 2.)

2.04 The tone-generating PCB consists of a DTMF generator integrated circuit, a crystal oscillator, and various other solid-state components. The crystal oscillator provides a constant reference for the tone generator IC that generates eight digitally-synthesized tones. The other solid-state components, along with the IC, provide handset receiver and transmitter muting, polarity guard, and muting of the handsfree speaker. (See Figure 3.)

2.05 When a pushbutton is pressed on the keypad, a single contact grounds two inputs (column and row) to the tone generator IC. This causes two tones to be transmitted.

Note: Pushbuttons numbered 0 through 9 are used to dial a desired directory number while the pushbuttons designated * and # are for special functions.

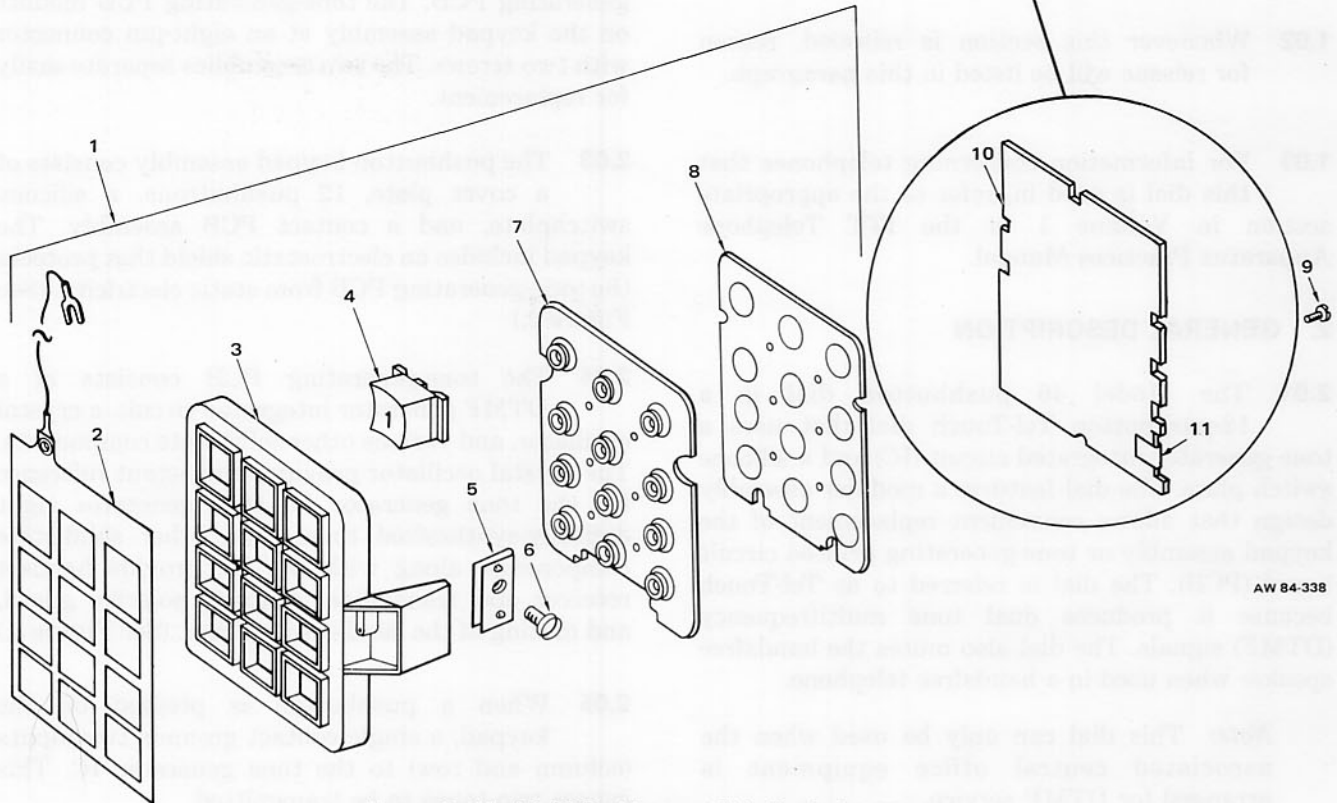
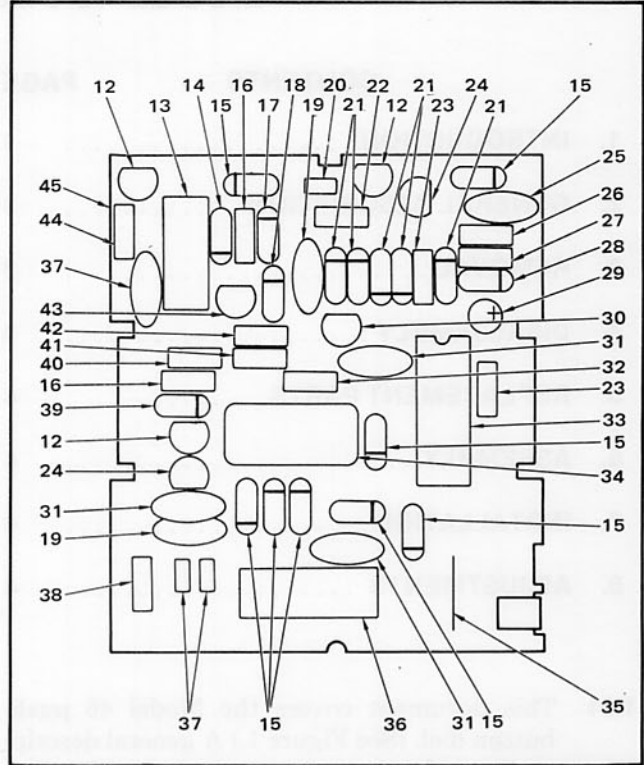
2.06 The polarity guard circuit provides protection against improper connection of the Tip and Ring leads to the telephone. The IC on the tone-generating PCB must have a specific supply voltage polarity to transmit tones. In instances where the Tip and Ring leads may be reversed or unidentifiable at the station, the polarity guard circuit ensures tone transmission regardless of line polarity.

2.07 The Model 46 pushbutton dial is identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for ordering information and for an explanation of each code.

3. REMOVAL

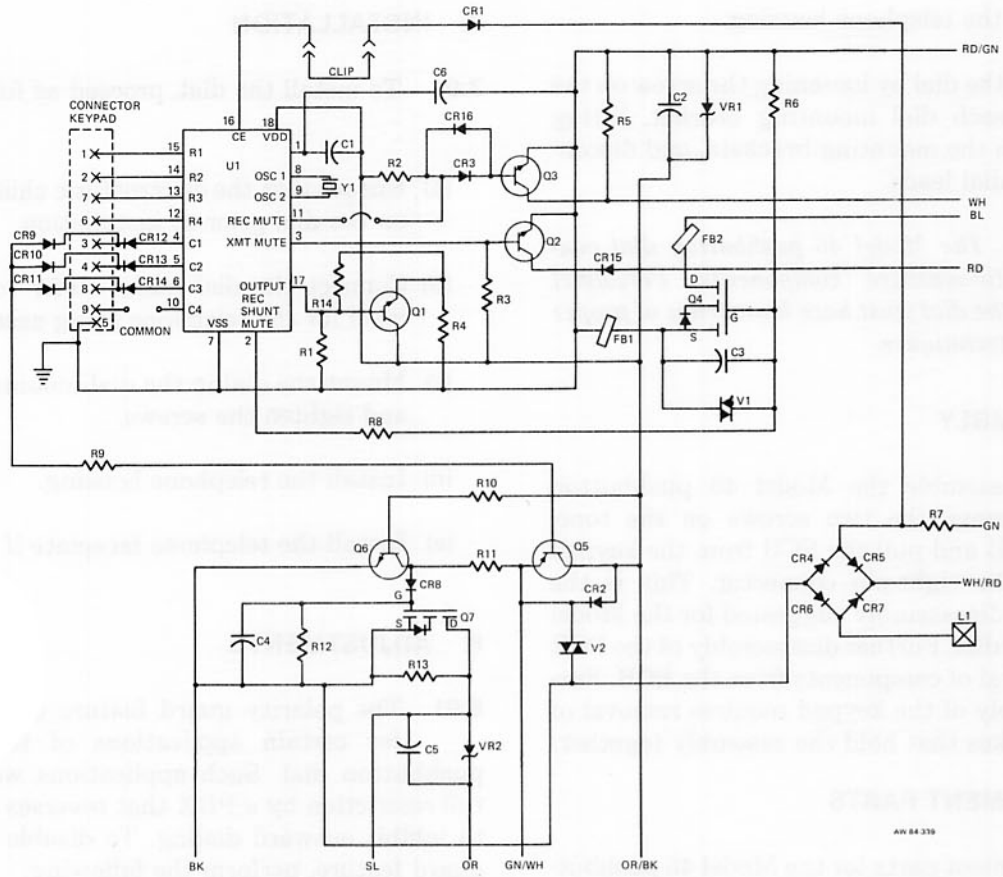
3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the telephone faceplate if required.



AW 84-338

Figure 2: Model 46 Pushbutton Dial, Exploded View



Model 46 Pushbutton Dial, Schematic

TABLE A

ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:			
(1) Dial Model Number (See Part 1)	004600	OPG	
(2) Dial Style (See Part 2)			
PART 1 DIAL MODEL NUMBER		PART 2 DIAL STYLE	
CODE	DESCRIPTION	CODE	DESCRIPTION
004600	Model 46 Pushbutton Dial	OPG	Metropolitan (Letters And Numerals) With Polarity Guard
		OPD	Regular (Numerals Only) With Polarity Guard

- (b) Remove the telephone housing.
- (c) Remove the dial by loosening the screw on the side of each dial mounting bracket, lifting the dial from the mounting brackets, and disconnecting the dial leads.

Warning: *The Model 46 pushbutton dial contains static-sensitive components. Personnel handling the dial must have knowledge of proper handling techniques.*

4. DISASSEMBLY

4.01 To disassemble the Model 46 pushbutton dial, remove the two screws on the tone-generating PCB and pull the PCB from the keypad assembly at the eight-pin connector. This is the lowest level of disassembly suggested for the Model 46 pushbutton dial. Further disassembly of the PCB requires removal of components from the PCB. Further disassembly of the keypad requires removal of the plastic stakes that hold the assembly together.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 46 pushbutton dial are listed in Table B.

6. ASSEMBLY

6.01 To assemble the Model 46 pushbutton dial, connect the tone-generating PCB to the keypad assembly at the eight-pin connector and install the two screws.

7. INSTALLATION

7.01 To install the dial, proceed as follows:

- (a) Ensure that the electrostatic shield is in place on the dial prior to installation.
- (b) Connect the dial leads. Refer to the circuit label for the telephone being assembled.
- (c) Mount the dial in the dial mounting brackets and tighten the screws.
- (d) Install the telephone housing.
- (e) Install the telephone faceplate if removed.

8. ADJUSTMENTS

8.01 The polarity guard feature can be disabled for certain applications of the Model 46 pushbutton dial. Such applications would include toll restriction by a PBX that reverses line polarity to inhibit outward dialing. To disable the polarity guard feature, perform the following:

- (a) Remove the option clip from the storage (lower) notch on the circuit board at the rear of the dial.
- (b) Place the option clip in the polarity guard disable (upper) notch.



DESCRIPTION	QTY	DESCRIPTION	QTY

TABLE B
REPLACEMENT PARTS LIST

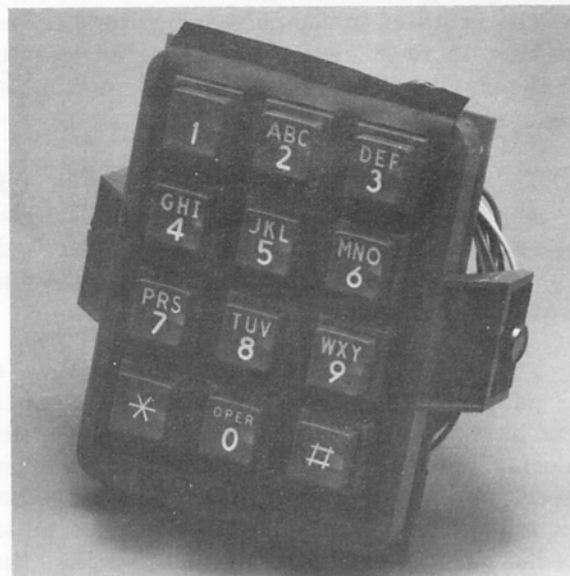
INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED	
			46/0PG	46/0PD
		Model 46 Pushbutton Dial		
1	184475-105	Keypad Assembly	1	—
1	184475-106	Keypad Assembly	—	1
2	186129-102	Shield, Electrostatic	1	1
3	184477-101	Plate, Cover	1	1
4	184476-101	Pushbutton, 1, Metropolitan	1	—
4	184476-113	Pushbutton, 1, Regular	—	1
	184476-102	Pushbutton, 2, Metropolitan	1	—
	184476-114	Pushbutton, 2, Regular	—	1
	184476-103	Pushbutton, 3, Metropolitan	1	—
	184476-115	Pushbutton, 3, Regular	—	1
	184476-104	Pushbutton, 4, Metropolitan	1	—
	184476-116	Pushbutton, 4, Regular	—	1
	184476-105	Pushbutton, 5, Metropolitan	1	—
	184476-117	Pushbutton, 5, Regular	—	1
	184476-106	Pushbutton, 6, Metropolitan	1	—
	184476-118	Pushbutton, 6, Regular	—	1
	184476-107	Pushbutton, 7, Metropolitan	1	—
	184476-119	Pushbutton, 7, Regular	—	1
	184476-108	Pushbutton, 8, Metropolitan	1	—
	184476-120	Pushbutton, 8, Regular	—	1
	184476-109	Pushbutton, 9, Metropolitan	1	—
	184476-121	Pushbutton, 9, Regular	—	1
	184476-111	Pushbutton, 0, Metropolitan	1	—
	184476-122	Pushbutton, 0, Regular	—	1
	184476-110	Pushbutton, *	1	1
	184476-112	Pushbutton, #	1	1
5	184479-101	U-Nut	2	2
6	075487-102	Screw, Dial Mounting	2	2
7	184478-101	Switchplate, Silicone	1	1
8	184484-103	PC Board Assembly	1	1
9	095971-104	Screw, PC Board Mounting	2	2
10	188384-101	PC Board Assembly	1	1
11	184144-101	Clip	1	1
12	185930-101	Transistor, NPN, MPS8092, Q2, Q3, Q6	3	3
13	188483-101	Resistor, 10 Ohm, 5 W, ±5%, R7	1	1
14	183611-145	Diode, Zener, 12 VDC, 1W, 1N4742, VR1	1	1
15	180656-102	Diode, 1N4148, CR3, CR8-CR14	8	8
16	181789-140	Resistor, 3.3 K, 1/4 W, ±5%, R2, R3	2	2
17	185890-102	Diode, Schottky, SD164-3, CR16	1	1
18	180658-101	Diode, 1N4004, CR2	1	1
19	184672-106	Varistor, ERZ-C10-DK-180, V1, V2	2	2
20	187948-101	Terminal, Spade-Lug	1	1
21	183611-174	Diode, 1N4007, CR1, CR4, CR5, CR6, CR7	5	5
22	181789-153	Resistor, 39 K, 1/4 W, ±5%, R10	1	1
23	181789-146	Resistor, 10 K, 1/4 W, ±5%, R1, R11	2	2
24	185748-101	Transistor, VMOS, BS170, Q4, Q7	2	2
25	187945-202	Capacitor, 0.01 MFD, 50 V, C4	1	1
26	181789-167	Resistor, 560 K, 1/4 W, ±5%, R12	1	1
27	181789-152	Resistor, 33 K, 1/4 W, ±5%, R13	1	1
28	183611-173	Diode, Zener, ZPD 2.7, VR2	1	1
29	184927-103	Capacitor, 22 MFD, C5	1	1
30	182310-101	Transistor, PNP, MPS8093, Q5	1	1
31	187945-201	Capacitor, 0.0068 MFD, 50 V, C1-C3, C6	4	4
32	181789-142	Resistor, 4.7 K, 1/4 W, ±5%, R9	1	1
33	185497-101	I.C, DTMF, U1	1	1
34	187060-101	Crystal, 3.58 MHZ, Y1	1	1
35	184489-101	Strap, Wire	1	1
36	184652-101	Connector, J1	1	1
37	184289-101	Bead, Ferrite, FB1, FB2	2	2
38	181789-166	Resistor, 470 K, 1/4 W, ±5%, R6	1	1
39	180656-103	Diode, 1N4448, CR15	1	1
40	181789-120	Resistor, 82 Ohm, 1/4 W, ±5%, R4	1	1
41	181789-404	Resistor, 2.0 K, 1/4 W, ±5%, R8	1	1
42	181789-129	Resistor, 470 Ohm, R14	1	1
43	180146-101	Transistor, NPN, 2N4141, Q1	1	1
44	181789-180	Resistor, 5.1 K, 1/4 W, ±5%, R5	1	1
45	188383-101	PC Board, Drilled	1	1

AW 84 920

NOTE: All capacitors are in microfarads (MFD).

MODEL 63 PUSHBUTTON DIAL

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AW 85-178

Figure 1: Model 63 Pushbutton Dial

1. INTRODUCTION

1.01 This document covers the Model 63 pushbutton dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustments is included.

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

1.03 For information concerning telephones that this dial is used in, refer to the appropriate section in Volume 1 of the ITT Telephone Apparatus Practices Manual.

2. GENERAL DESCRIPTION

2.01 The Model 63 pushbutton dial is a 12-pushbutton Tel-Pulse dial that uses a pulse generator integrated circuit (IC) and a silicone switch plate. The dial features include last-number-redial and a modular assembly design that allows convenient replacement of a keypad or printed circuit board (PCB). The dial is referred to as Tel-Pulse because it produces digit output pulsing similar to the output produced by a rotary dial. The dial also features polarity guard.

2.02 The Model 63 pushbutton dial consists of a pushbutton keypad assembly and a pulse-generating printed circuit board (PCB). The PCB mounts on the keypad assembly at an eight-pin connector with two retaining screws. The two assemblies separate easily for replacement.

2.03 The pushbutton keypad assembly consists of a cover plate, 12 pushbuttons, a silicone switch plate, and a contact PCB assembly. The keypad includes an electrostatic shield that protects the pulse-generating PCB from static electricity.

2.04 The pulse-generating PCB consists of a pulse generator IC and various other solid-state components. The pulse generator IC provides a pulse for each unit of the digit that the pressed key represents (e.g., pressing pushbutton 4 would produce four pulses). Dials are factory-strapped for 10 pulses per second, nominal, and a pulse ratio with a break period of 60% of the pulse duration. The other solid-state devices, along with the IC, provide handset receiver and transmitter muting and polarity-guard.

2.05 When a pushbutton is pressed, the pulse-generating PCB mutes the handset and outputs a number of pulses corresponding to the

number dialed. If the digits are entered faster than they are outpulsed, each digit will be separated with an interdigital pause. The digit that the pressed key represents is stored in the pulse generator IC. The IC retains up to 20 digits for the redial feature. After the last digit has been outpulsed, the handset is unmuted.

2.06 To redial the last-number-dialed, go off-hook and press the redial key (#). The last numbers entered on the keypad will be outpulsed. The last-number-dialed will be retained by the dial until any key on the keypad is pressed.

2.07 The redial feature on the dial allows a pause to be entered between any digits entered on the keypad. The pause suspends outpulsing during redialing until the redial button (#) is pressed again. Up to ten pauses can be inserted between any two digits dialed. To enter a pause, press the redial pushbutton (#) during dialing where the pause(s) are to occur. When the redial feature is activated by pressing the redial key (#), the dial outpulses digits until it encounters a pause; the dial will cease outpulsing until the redial key is pressed again. The redial key must be pressed once for each pause.

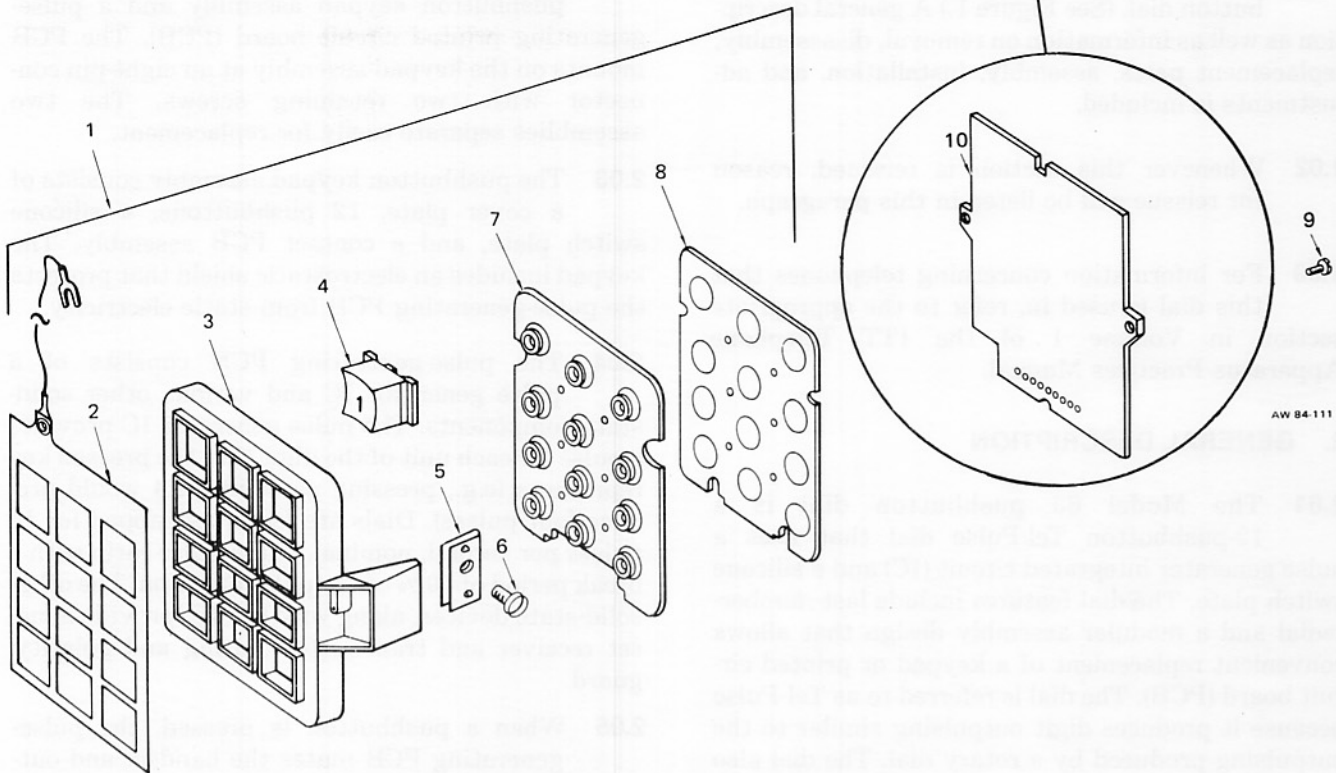
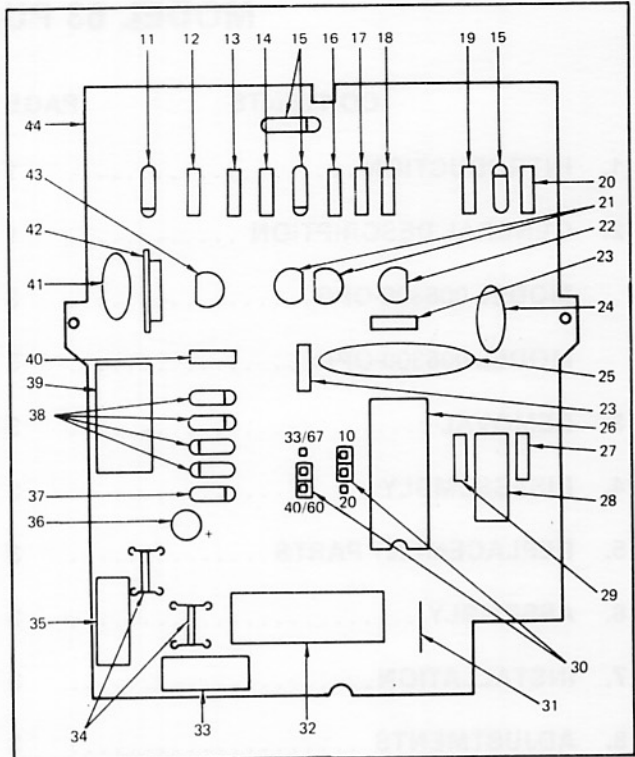


Figure 2: Model 63 Pushbutton Dial, Exploded View

Note: Pushbuttons 0 through 9 are used to dial a desired number, while pushbutton * is not used and # is used for last-number-redial only.

2.08 The polarity guard circuit provides protection against improper connection of the Tip and Ring leads to the telephone. The IC on the pulse-generating PCB must have a specific supply voltage polarity to transmit pulses. In instances where the Tip and Ring leads may be reversed or unidentifiable at the station, the polarity guard circuit ensures pulse transmission regardless of line polarity.

2.09 The Model 63 pushbutton dial is identified by a code number stamped in ink on the front of the cover plate. Refer to Table A for ordering information and for an explanation of each code. Variations of the Model 63 dial are briefly described in the following paragraphs.

MODEL 006300-OPG

2.10 The Model 006300-OPG pushbutton dial is a standard Tel-Pulse design for use in various telephones where electronic dial pulse service is desired. This dial is equipped with metropolitan-style pushbuttons displaying both letters and numerals. The dial is also equipped with polarity guard that allows dialing regardless of line polarity.

MODEL 006300-OPD

2.11 The Model 006300-OPD pushbutton dial is the same as the Model 006300-OPG pushbutton dial except it is equipped with regular-style pushbuttons displaying numerals only.

3. REMOVAL

3.01 To remove the dial from the telephone, proceed as follows:

- (a) Remove the telephone faceplate if required.
- (b) Remove the telephone housing.

Warning: The Model 63 pushbutton dial contains static-sensitive components. Personnel handling the dial must have knowledge of proper handling techniques.

- (c) Remove the dial by loosening the screw on the side of each dial mounting bracket, lifting the dial from the mounting brackets, and disconnecting the dial leads.

4. DISASSEMBLY

4.01 To disassemble the Model 63 pushbutton dial, remove the two screws on the pulse-generating PCB and pull the PCB from the keypad assembly. This is the lowest level of disassembly suggested for the Model 63 pushbutton dial. Further disassembly of the PCB requires removal of components. Further disassembly of the keypad requires removal of the plastic stakes that hold the assembly together.

5. REPLACEMENT PARTS

5.01 Replacement parts for the Model 63 pushbutton dial are listed in Table B.

6. ASSEMBLY

6.01 To assemble the Model 63 pushbutton dial, connect the pulse-generating PCB to the keypad at the eight-pin terminal connector and install the two retaining screws.

7. INSTALLATION

7.01 To install the dial, proceed as follows:

- (a) Ensure that the electrostatic shield is in place on the dial prior to installation.
- (b) Connect the dial leads; refer to the circuit label for the telephone being assembled.
- (c) Mount the dial in the dial mounting brackets and tighten the screws.
- (d) Install the telephone housing.
- (e) Install the telephone faceplate if removed.

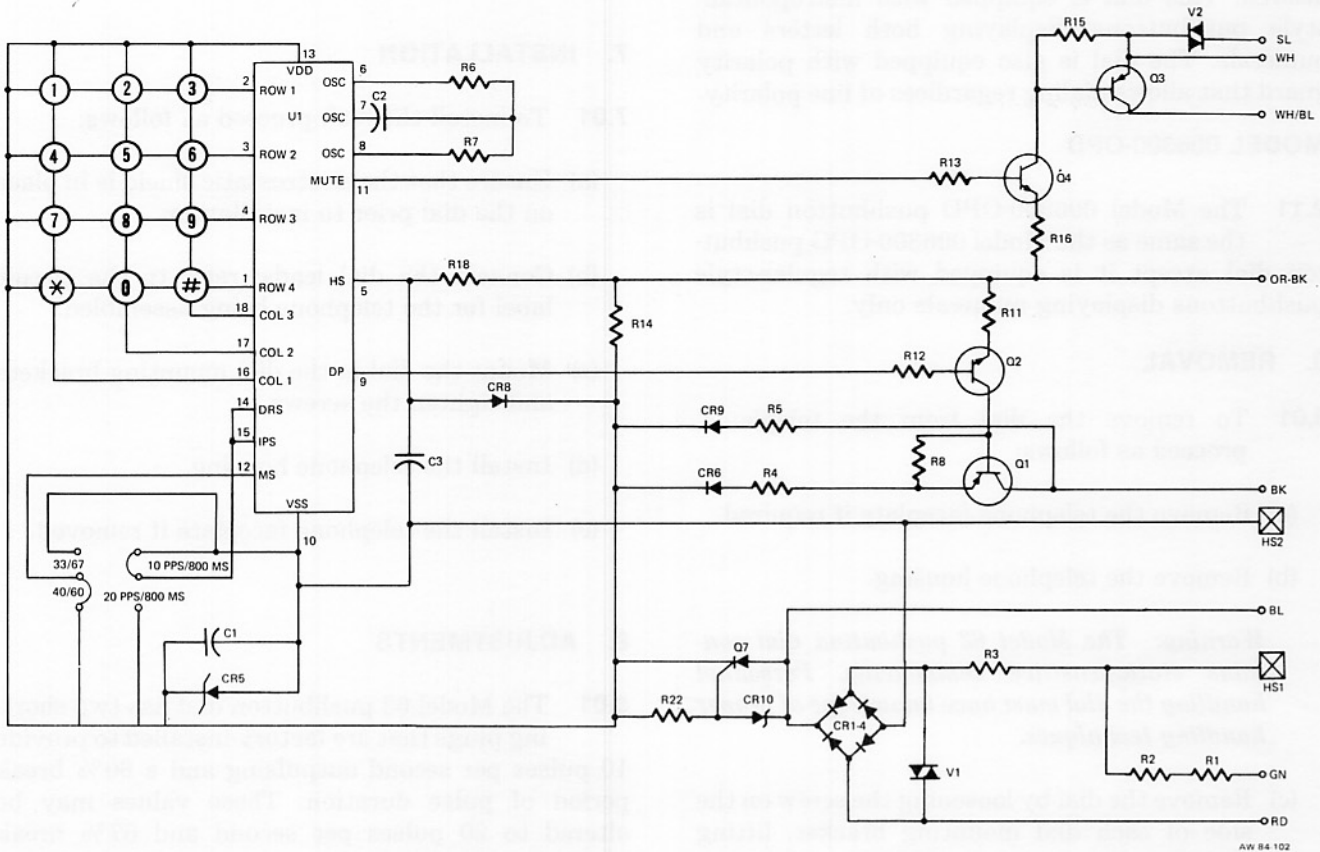
8. ADJUSTMENTS

8.01 The Model 63 pushbutton dial has two shorting plugs that are factory-installed to provide 10 pulses per second outpulsing and a 60% break period of pulse duration. These values may be altered to 20 pulses per second and 67% break period by repositioning the two respective shorting plugs. (See Figure 2.)

TABLE A
ORDERING INFORMATION

CODE NUMBERS			
DIAL CODE NUMBERS ARE FORMED IN TWO STEPS AS FOLLOWS:			
(1) Dial Model Number (See Part 1)	006300		OPG
(2) Dial Style (See Part 2)			
PART 1 DIAL MODEL NUMBER		PART 2 DIAL STYLE	
CODE	DESCRIPTION	CODE	DESCRIPTION
006300	Model 63 Pushbutton Dial	OPG	Metropolitan (Letters And Numerals) With Polarity Guard
		OPD	Regular (Numerals Only) With Polarity Guard

AW 84-905



AW 84-102

Figure 3: Model 63 Pushbutton Dial, Schematic

TABLE B

REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED	
			63/OPG	63/OPD
		Model 63 Pushbutton Dial		
1	184475-105	Keypad Assembly	1	—
1	184475-106	Keypad Assembly	—	1
2	186129-102	Shield, Electrostatic	1	1
3	184477-101	Plate, Cover	1	1
4	184476-101	Pushbutton, 1, Metropolitan	1	—
4	184476-113	Pushbutton, 1, Regular	—	1
	184476-102	Pushbutton, 2, Metropolitan	1	—
	184476-114	Pushbutton, 2, Regular	—	1
	184476-103	Pushbutton, 3, Metropolitan	1	—
	184476-115	Pushbutton, 3, Regular	—	1
	184476-104	Pushbutton, 4, Metropolitan	1	—
	184476-116	Pushbutton, 4, Regular	—	1
	184476-105	Pushbutton, 5, Metropolitan	1	—
	184476-117	Pushbutton, 5, Regular	—	1
	184476-106	Pushbutton, 6, Metropolitan	1	—
	184476-118	Pushbutton, 6, Regular	—	1
	184476-107	Pushbutton, 7, Metropolitan	1	—
	184476-119	Pushbutton, 7, Regular	—	1
	184476-108	Pushbutton, 8, Metropolitan	1	—
	184476-120	Pushbutton, 8, Regular	—	1
	184476-109	Pushbutton, 9, Metropolitan	1	—
	184476-121	Pushbutton, 9, Regular	—	1
	184476-111	Pushbutton, 0, Metropolitan	1	—
	184476-122	Pushbutton, 0, Regular	—	1
	184476-110	Pushbutton, *	1	1
	184476-112	Pushbutton, #	1	1
5	184479-101	U-Nut	2	2
6	075487-102	Screw, Dial Mounting	2	2
7	184478-101	Switchplate, Silicone	1	1
8	184484-103	PC Board Assembly	1	1
9	095971-104	Screw, PC Board Mounting	2	2

TABLE B

REPLACEMENT PARTS LIST (Cont)

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED	
			63/OPG	63/OPD
		Model 63 Pushbutton Dial		
10	186238-101	PC Board, Pulse-Generating	1	1
11	183611-177	Diode, Zener, 120 VDC, 1 W, CR10	1	1
12	181789-152	Resistor, 33 K, R8	1	1
13	181789-148	Resistor, 15 K, R5	1	1
14	181789-162	Resistor, 220 K, R4	1	1
15	180656-102	Diode, 1N4148, CR6, CR8, CR9	3	3
16	181789-121	Resistor, 100 Ohm, R11	1	1
17	181789-129	Resistor, 470 Ohm, R16	1	1
18	181789-158	Resistor, 100 K, R15	1	1
19	181789-166	Resistor, 470 K, R14	1	1
20	181789-154	Resistor, 47 K, R18	1	1
21	185326-101	Transistor, 2N5551, Q2, Q4	2	2
22	185327-101	Transistor, 2N5401, Q3	1	1
23	181789-149	Resistor, 18 K, R12, R13	2	2
24	095655-101	Varistor, V2	1	1
25	182135-107	Capacitor, 0.1 MFD, 25 VDC, C3	1	1
26	185324-101	IC, S2560, U1	1	1
27	181789-169	Resistor, 1 M, R6	1	1
28	182314-101	Capacitor, 560 PFD, 60 V, C2	1	1
29	181789-164	Resistor, 330 K, R7	1	1
30	183299-101	Shorting Plug	2	2
31	184489-101	Strap Wire	1	1
32	184652-101	Connector, Bottom Entry, J1	1	1
33	062948-102	Resistor, 22 M, ½ W, ±5%, R1	1	1
34	187948-101	Terminal, 2-Position	2	2
35	062948-800	Resistor, 30 M, ½ W, ±5%, R2	1	1
36	182130-130	Capacitor, 47 MFD, 6 VDC, C1	1	1
37	181011-107	Diode, Zener, 1N4622, CR5	1	1
38	180658-101	Diode, 1N4004, CR1, CR2, CR3, CR4	4	4
39	062948-401	Resistor, 12 Ohm, 1 W, R3	1	1
40	181789-109	Resistor, 10 Ohm, R22	1	1
41	184672-103	Varistor, V1	1	1
42	182821-102	SCR, S4006, 400 VDC, Q7	1	1
43	185327-102	Transistor, MPS-A92, Q1	1	1
44	186237-101	PC Board, Drilled	1	1

AW 84-904

NOTES:

1. All resistors are ¼ W, ±5% unless otherwise specified.
2. All capacitor values are in microfarads (MFD) or picofarads (PFD).