

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.

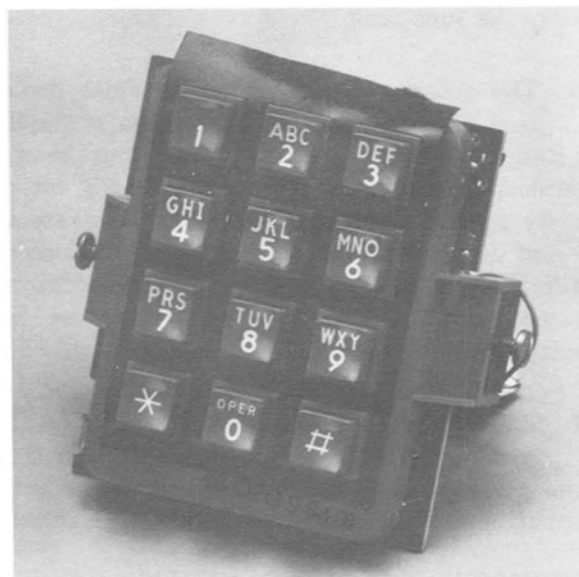
1.02 Whenever this section is reissued, reason for reissue will be listed in this paragraph.

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.



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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.

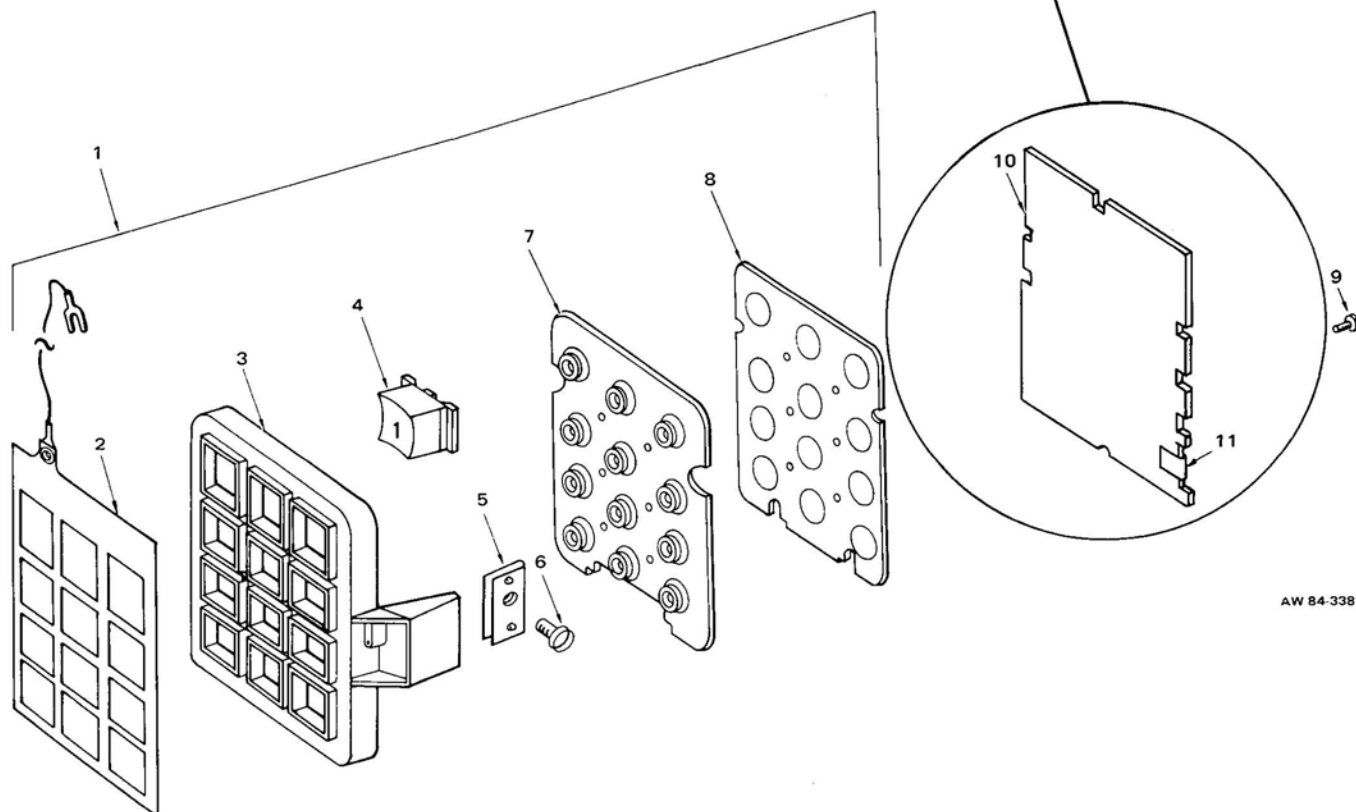
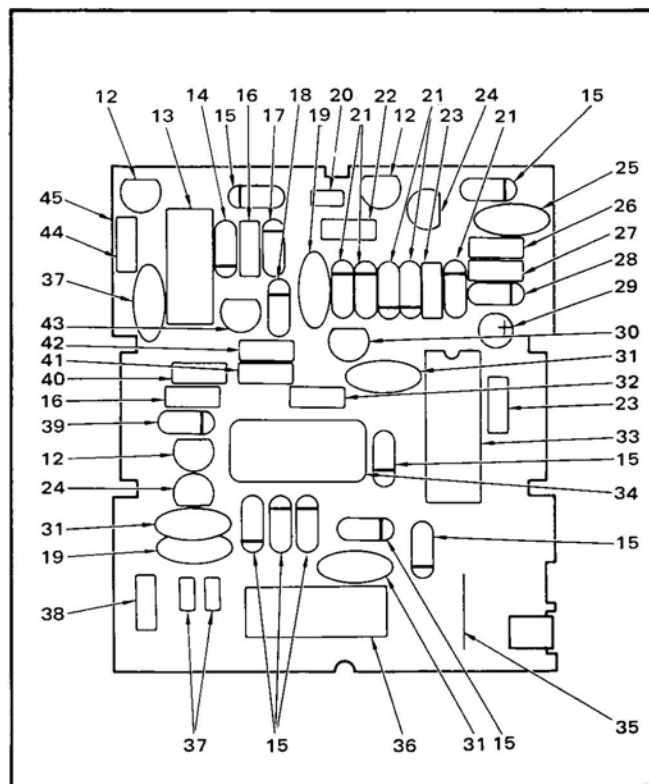
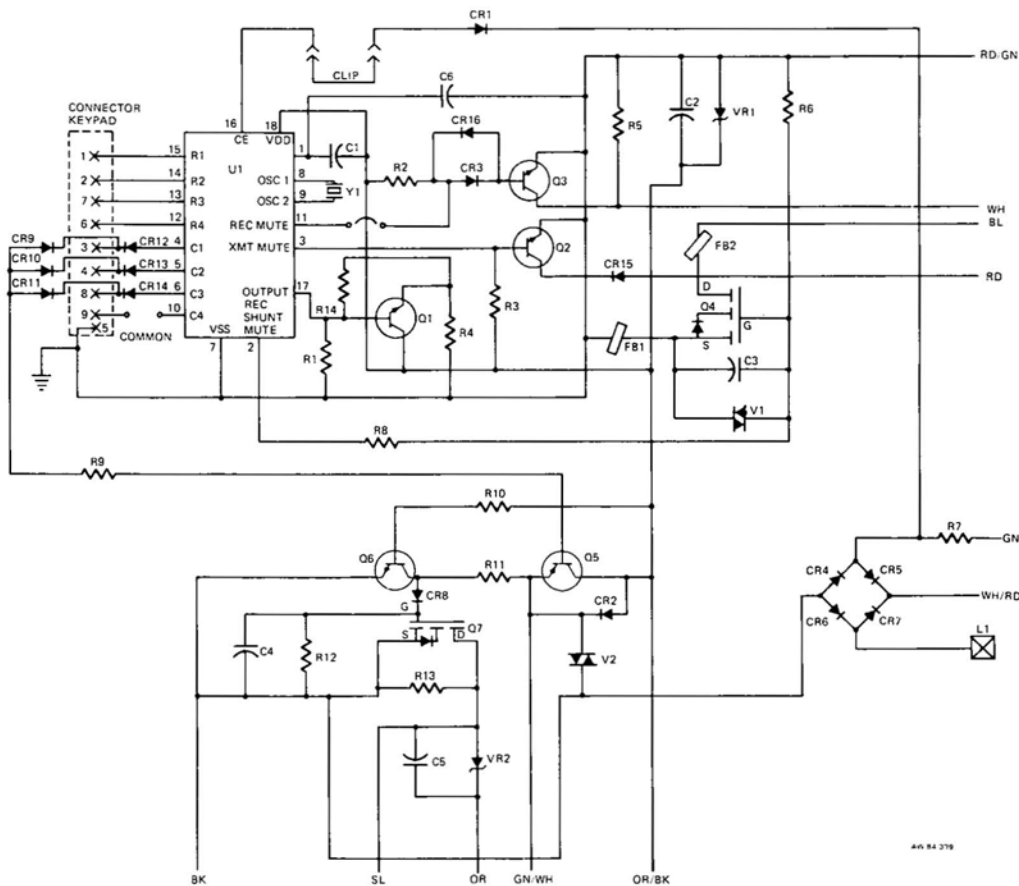


Figure 2: Model 46 Pushbutton Dial, Exploded View



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

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- (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.

TABLE B
REPLACEMENT PARTS LIST

INDEX NO	PART NUMBER	DESCRIPTION	QUANTITY USED	
			46/OPG	46/OPD
		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, $\pm 5\%$, 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, $\pm 5\%$, 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, $\pm 5\%$, R10	1	1
23	181789-146	Resistor, 10 K, 1/4 W, $\pm 5\%$, 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, $\pm 5\%$, R12	1	1
27	181789-152	Resistor, 33 K, 1/4 W, $\pm 5\%$, 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, $\pm 5\%$, 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, $\pm 5\%$, R6	1	1
39	180656-103	Diode, 1N4448, CR15	1	1
40	181789-120	Resistor, 82 Ohm, 1/4 W, $\pm 5\%$, R4	1	1
41	181789-404	Resistor, 2.0 K, 1/4 W, $\pm 5\%$, 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, $\pm 5\%$, R5	1	1
45	188383-101	PC Board, Drilled	1	1

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NOTE: All capacitors are in microfarads (MFD).