MODEL 188478 PUSHBUTTON DIAL

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1. INTRODUCTION

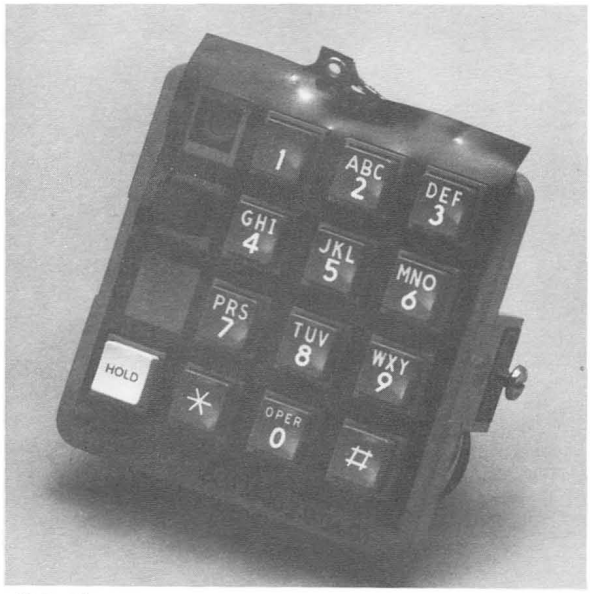
1.01 This document covers the Model 188478 pushbutton dial. (See Figure 1.) A general description as well as information on removal, disassembly, replacement parts, assembly, installation, and adjustment is included.

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.



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.

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.)

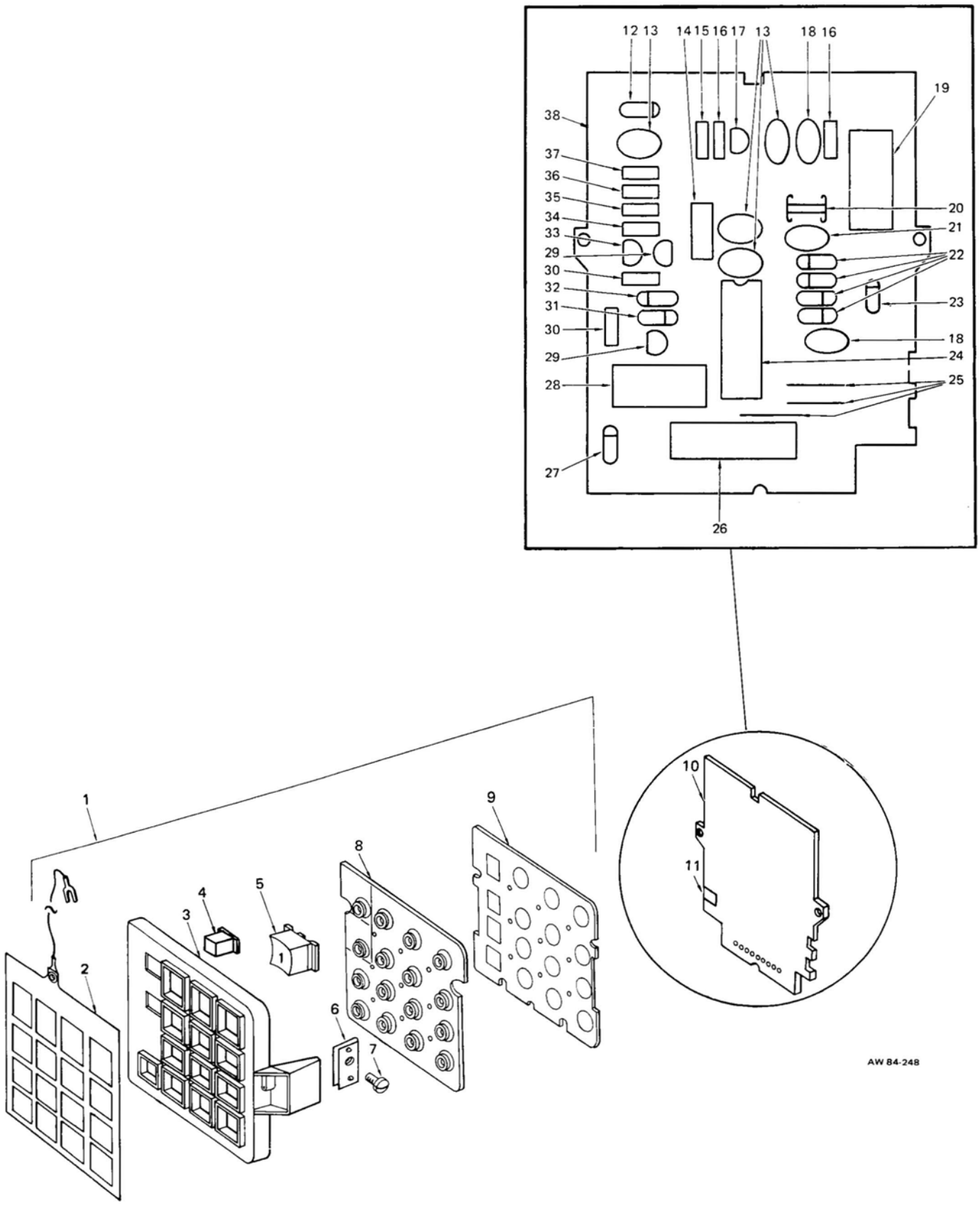


Figure 2: Model 188478 Pushbutton Dial, Exploded View

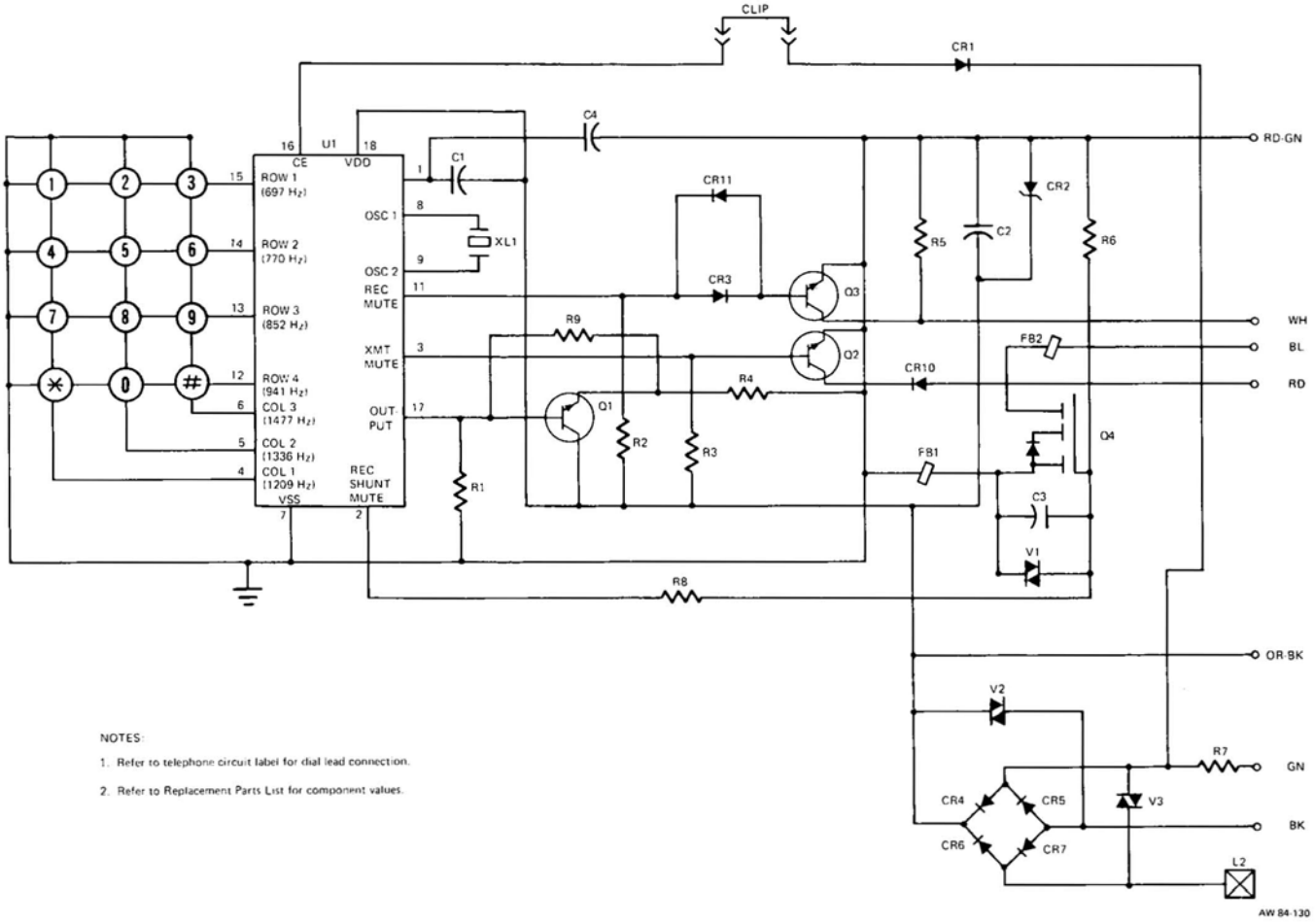


Figure 3: Model 188478 Pushbutton Dial, Schematic

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:

188478 101

(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
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		
		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 ±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		
		Model 188478 Pushbutton Dial	**101**	**102**	**103**
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 ±5% unless stated otherwise.
2. All capacitor values are in microfarads (MFD).