

TYPE 80E TELEPHONE SET
SHOP PROCEDURE

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1. **GENERAL**

1.01 This section provides the shop procedure for the Type 80E Telephone Set (Series HC-802 and HC-819).

1.02 The shop procedure covers disassembly, assembly, parts identification, replacement parts, adjustment, coding information, modifications, and cleaning for the Type 80E telephone.

1.03 This section is reissued to include the ringer tube mounting information, changes to the ringing-option information in Table 5, new Touch Calling Unit (TCU) information, and minor corrections. Marginal arrows are used to identify new material. Remove the previous issue of this section from the binder or microfiche file and replace it with this issue.

2. **IDENTIFICATION CODE**

2.01 The identification code for the telephone (Table 1) consists of a two-letter prefix, six digits, and a three-letter suffix. The prefix and the first three digits identify the type of telephone. The fourth and fifth digits refer to the color code. The sixth digit indicates whether or not there is a message waiting lamp. The first letter of the three-letter suffix refers to the type of dial or TCU. The second and third letters of the suffix indicate the ringer type. This identification code must be stamped on each telephone packing carton. For example, a carton containing a basic black three-conductor telephone without a message-waiting lamp and with an SATT rotary dial assembly and an adjustable ringer assembly would be stamped HC-802000-DSA. The interpretation of this number is as follows:

HC — Huntsville telephone with improved transmission network.
802 — Basic three-conductor desk telephone.
00 — Basic black color telephone.
0 — No message-waiting lamp provided.
D — SATT A dial assembly.
SA — Straight-line adjustable ringer.

3. **REPLACEMENT PARTS**

3.01 The component parts of the telephone are listed in Table 2 and are identified by corresponding item numbers in Figures 1 and 2. To determine the part number for any component of the telephone, proceed as follows:

- Locate the component in Figure 1 or 2.
- Using the Item number obtained in step (a) obtain the part number in Table 2.
- For facemat colors and faceplate numbers refer to Table 3.

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→ Table 1. Coding and Ordering.

STEP	ITEM	CODE	DESCRIPTION	ORDERING NO.
1	Telephone	Basic part number	Type 80E telephone three-conductor six-conductor	HC-802 HC-819
2	Color	4th and 5th digits	Basic black Basic white Antique white Espresso brown Sand beige	00 19 21 22 10
3	Message-waiting lamp	6th digit	Without With	0 1
4	Rotary Dial or Touch Calling Unit (TCU)	1st suffix	Rotary dial: 1 through 0 Number Plate Dial Blank ABC number plate SATT A party identification SATT B party identification TCU: 12-button ABC	A B C D E J
5	Ringer:	2nd and 3rd suffixes	Straight line with adjustment wheel Straight line without adjustment wheel 16.6-Hz harmonic 20-Hz harmonic or decimonic 25-Hz harmonic 30-Hz harmonic or decimonic 33.3-Hz harmonic 40-Hz decimonic 42-Hz harmonic 50-Hz harmonic 50-Hz decimonic 54-Hz harmonic 60-Hz decimonic 66-Hz harmonic 66.6-Hz harmonic Without ringer	SA VA 16 20 25 30 33 40 42 50 51 54 60 66 67 XX

EXAMPLE: The complete ordering number for the telephone with black housing, without message waiting, with ABC dial, and straight-line ringer with adjustment wheel would be HC-802000CSA.

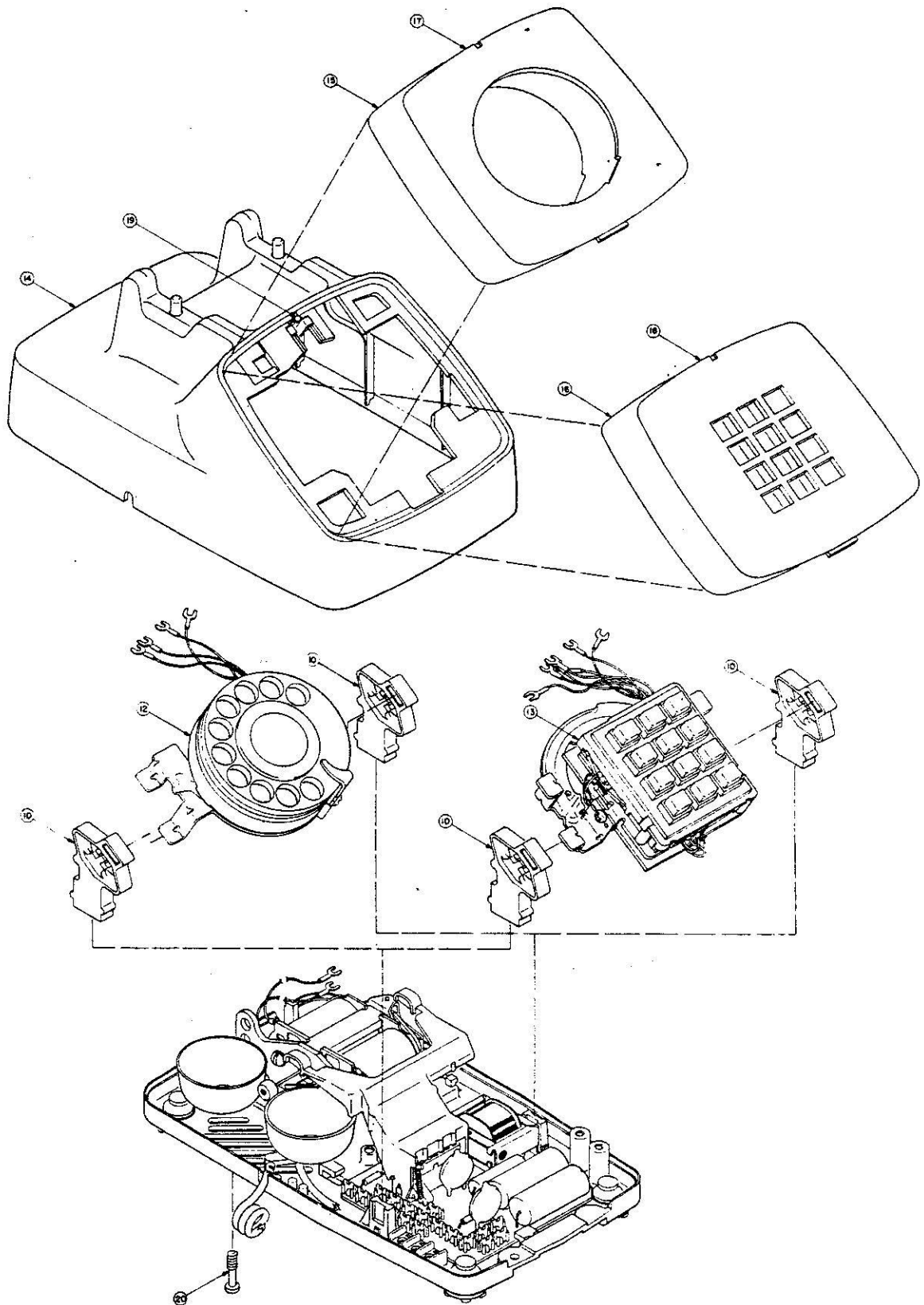


Figure 1. Exploded View of Telephone.

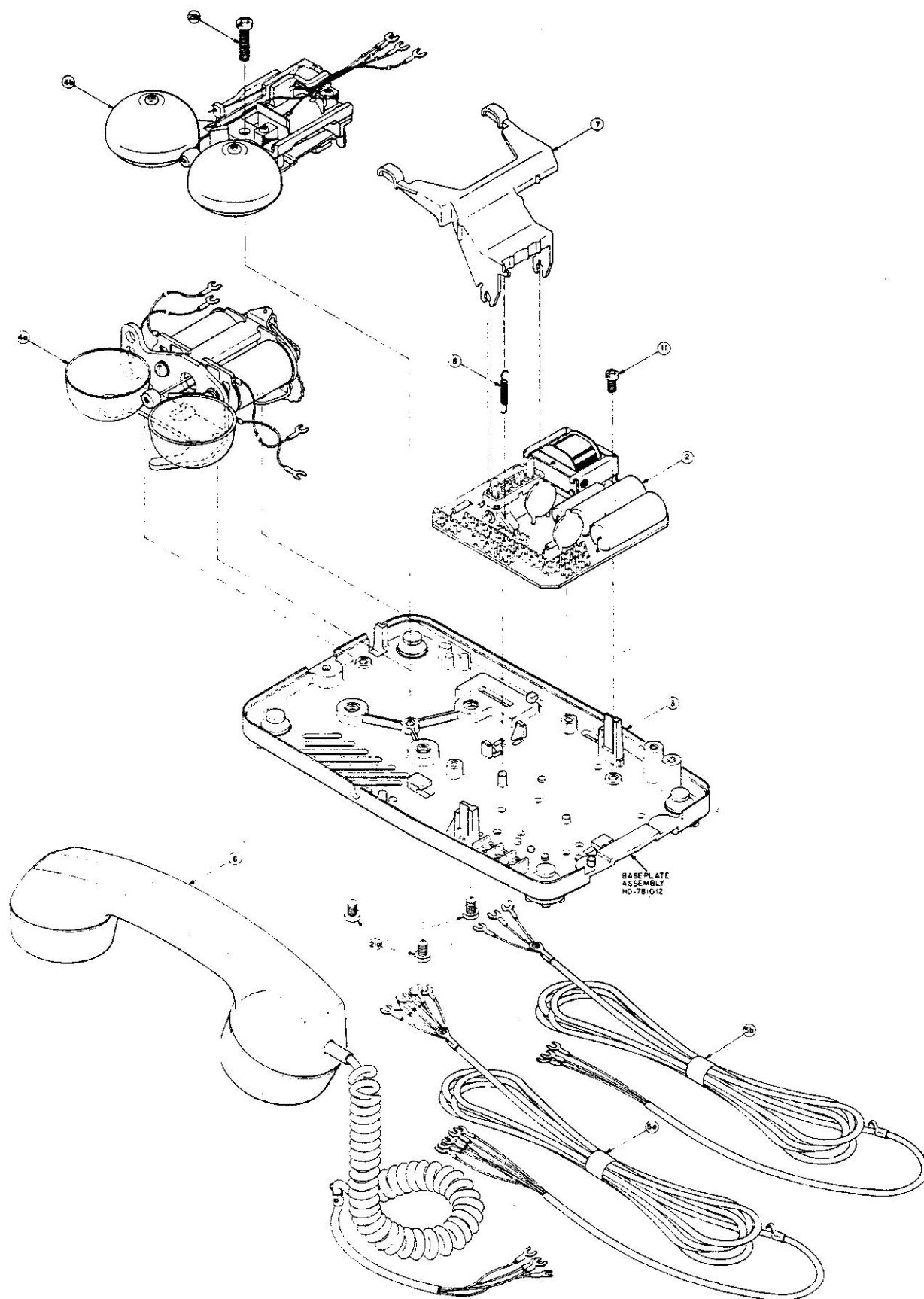


Figure 2. Exploded View of Base Assembly and Handset.

→ Table 2. Replacement Parts.

ITEM NUMBER	DESCRIPTION	PART NUMBER	BASIC BLACK	BASIC WHITE	ESPRESSO BROWN	ANTIQUE WHITE	BEIGE	QUANTITY USED	
								TCU	ROT.
2a	Transmission network	HB-1008-B						1	
2b	Transmission network	HB-1008-A						1	1
3	Baseplate assembly	HB-781012-A						1	1
4	Ringer	See Table 4							
5a	Six-conductor line cord	HD-540035-A						1	1
5b	Three-conductor line cord	HD-540117-A						1	1
6	Handset and cord	L-9054	DA	DM	DY	DN	DB	1	1
7	Hookswitch actuator	HD-160014-A						1	1
8	Hookswitch-return spring	HD-110029-A						1	1
9	Strapping bar	HD-580043-A							2
10	Shock absorber	HD-670011-A						2	2
11	Transmission-network screw	HD-765600-PP05						1	1
12	Rotary-dial assembly -- Type 154 SATT A SATT B	D-84975-	C	C	C	C	C		1
		HD-840118-	A	A	A	A	A		1
		HD-840118-	B	B	B	B	B		1
13	TCU	D-840001-	B	B	B	B	B	1	
14	Universal housing	HD-480033-	AA	AM	AY	AN	AB	1	1
15	Rotary-dial facemat	HD-530029-A	A	M	B	C	Q		1
16	TCU facemat	HD-530030-A	A	M	B	C	Q	1	
17	Rotary-dial faceplate	HD-780076	A	A	A	A	A		1
18	TCU faceplate	HD-780075	A	A	A	A	A	1	
19	Faceplate clip	HD-780079-A						1	1
20	Screw lockup	HD-764005-K						1	1
21	Ringer screw(s)	See Table 4							

3.02 Replacement ringer information is contained in Table 4.

4. **DISASSEMBLY**

4.01 This disassembly procedure covers the major components of the telephone. Some of these components can be further disassembled into subassemblies. For disassembly of the rotary dial, inductor-capacitor TCU, integrated circuit TCU, or handset, refer to the 473-802 and/or 997-306 subdivisions of GTE Practices.

Faceplate and Facemat

4.02 To remove the faceplate and facemat from the housing, proceed as follows:

- (a) Using a paper clip or other similar object, pry the arm of the faceplate-holding clip upward.

- (b) Exerting upward pressure on the faceplate, remove it from the housing.
(c) Remove the facemat.

Housing Removal

4.03 On earlier versions of the telephone, the front housing tab was omitted and a second baseplate mounting screw was used. On current versions, a mounting tab has been added and removal of the housing must be performed carefully. To remove the housing, (Figure 3) proceed as follows:

- (a) Remove the faceplate and facemat.
(b) Loosen the rear lockup screw.
(c) Place the front of the telephone approximately 2 inches over the edge of a desk or table.
(d) Lift the rear of the housing to an angle of approximately 25 or 30 degrees (about 2 inches).

Table 3. Facemat Options.

ORDERING NO.	SECOND SUFFIX	BACKGROUND	LETTERING*
HD-530029-A (Rotary Dial ABC)			
HD-530030-A (TCU)			
HD-530046-A (Rotary Dial 1 through 0)			
	A	Basic black	White
	B	Espresso brown	White
	C	Antique white	Black
	D	Apple green	Black
	E	Tan	Black
	F	Burnt orange	White
	G	Gold	Black
	H	Red	White
	J	Yellow	Black
	K	Navy	White
	M	Basic white	Black
	N	Avocado	Black
	O	Sand beige	Black

*The lettering color applies only to rotary dial facemats.
No lettering appears on TCU facemats.

→ Table 4. Ringers.

SECOND AND THIRD SUFFIX STOCKLIST													
SUFFIX	AMOUNT	PART NO.	DESCRIPTION	HERTZ	ITEM	CAPACITOR						21a	21b
						.08 μ F	.2 μ F	.7 μ F	.4 μ F	.7 μ F	.47 μ F	SCREWS	SCREWS
						HD-680005-B	HD-680006-B	HD-680007-B	HD-680008-B	HD-680009-B	HD-680017-B	HD-765832-PT05	HD-765800PP15
SA	1	HD-560010-ASA	Ringer (with adjustment wheel)		4b						1		1
VA	1	D-56548-CVA	Ringer		4a				1			3	
	1	D-52144-A	Vacuum tube										
	1	D-660256-A	Mounting bracket										
	1	D-1724-A	Washer — mounting bracket										
16	1	D-56548 -C16	Ringer — harmonic	16.6						1		3	
20		-C20	↑ harmonic or deci.	20						1		3	
25		-C25	harmonic	25				1				3	
30		-C30	harmonic or deci.	30			1					3	
33		-C35	harmonic	33.3			1					3	
40		-C40	decimonic	40			1					3	
42		-C42	harmonic	42			1					3	
50		-C50	harmonic	50			1					3	
51		-C51	decimonic	50			1					3	
54		-C54	harmonic	54			1					3	
60		-C60	decimonic	60			1					3	
66		-C66	harmonic	66			1					3	
67		-C67	↓ harmonic	66.6			1					3	
XX			Without ringer				1						

- (e) Rotate the housing clockwise, dropping the right front corner and raising the left front corner.
- (f) Continue rotating the housing while pulling it forward and off the telephone.

Rotary Dial or Touch Calling Unit Disassembly

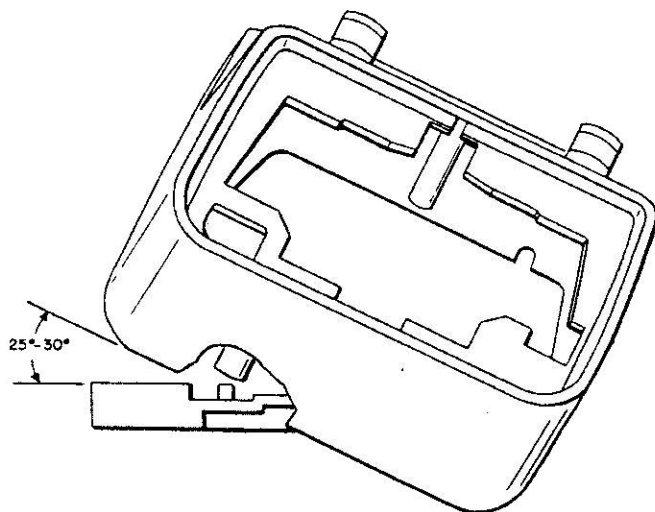
4.04 To remove the rotary-dial assembly (or TCU) from the telephone, proceed as follows:

- (a) Carefully disengage the rotary-dial assembly (or TCU) shock absorbers from their mounting posts.
- (b) Disconnect the rotary dial (or TCU) leads from the transmission network.
- (c) Remove the shock absorbers from the rotary-dial (or TCU) mounting bracket projections.
- (d) Remove the two rotary dial (or TCU) mounting bracket screws, and remove the rotary dial (or TCU) assembly from the bracket.

Ringer Disassembly

4.05 To remove the Type 45 or Type 48 ringer assembly, refer to Figure 2 and proceed as follows:

- (a) For the Type 45, remove the three ringer-mounting screws from the bottom of the baseplate assembly. For the Type 48, remove the mounting screw from the top of the ringer.
- (b) Disconnect and remove the ringer capacitor if used.
- (c) Disconnect the ringer leads from the transmission network.
- (d) Remove the ringer assembly from the telephone.



→ Figure 3. Housing Removal/Assembly.

Hookswitch Return Spring and Hookswitch Actuator Removal

4.06 To remove the hookswitch-return spring and the hookswitch actuator from the telephone proceed as follows:

- (a) Unhook the hookswitch-return spring (item 8) from the hookswitch actuator.
- (b) Unsnap the hookswitch actuator (item 7) to free it from the hookswitch cell.

NOTE: The actuator must be lifted straight up to prevent bending the hookswitch springs.

Handset Removal

4.07 To remove the handset (item 6), proceed as follows:

- (a) Disconnect the handset leads from the transmission network (item 2).
- (b) Remove the handset cord from its mounting tab and mounting bosses in the baseplate.
- (c) Disengage the handset J-hook clamp from its mounting projection alongside the U-shaped opening in the side of the baseplate (item 3) and remove the handset.

Line Cord Removal

4.08 To remove the line cord (item 5), proceed as follows:

- (a) Disconnect the line cord leads from the transmission network (item 2).
- (b) Disengage the line cord J-hook clamp on earlier versions or simply lift the line cord from its dress-down slots on current versions to free it.

Transmission Network Removal

4.09 To remove the transmission network (item 2), proceed as follows:

- (a) Disconnect any remaining leads from the transmission network.
- (b) Remove the transmission network mounting screw (item 11).
- (c) Lift the transmission network out of the telephone baseplate assembly by lifting it up so it clears its locating posts and pulling it out from under its hold down tabs.

5. **CLEANING AND INSPECTION**

Housing

5.01 To clean the telephone housing, wash it in a mild solution of water and nonabrasive soap. Inspect the hous-

ing for cracks or other defects. Discard and replace any housing found to be defective.

Interior Components

5.02 Wipe all of the interior components clean. Use care to prevent breaking or damaging the components. Use a 1-inch wide flat nonmetallic brush to remove accumulated dust or other foreign matter. Check all quick-connect terminals for proper receptacle size and connections. Check for frayed or poorly insulated leads and replace as necessary. Compressed air in the range of 30 psi may be used to expel dust and accumulated foreign matter.

6. **ASSEMBLY**

6.01 When making wiring connections from the various components to the terminal network, refer to Figures 4 and 5 for a rotary dial telephone, Figures 6 and 7 for an inductor-capacitor TCU telephone, and Figures 8, 9, 10 and 11 for an integrated circuit TCU telephone. Remove the housing (Figure 3) and use the insertion tool, BT-900493-SP (Figure 12), to make the connections. If the quick connect terminals on the transmission network have opened up either accidentally or by previous use of two connections, a receptacle adjusting tool, CT-900514SP (Figure 13) must be used to adjust the receptacle size. To resize this quick-connect terminal, insert the fingers of the adjusting tool into the terminal until the fingers contact the terminal network card. Squeeze the handles together firmly but do not twist the tool.

Transmission Network

6.02 To install the transmission network (item 2) on the baseplate (item 3), proceed as follows:

- (a) Position the transmission network in place in the baseplate assembly by sliding it under the hold-down tabs and over its locating posts.
- (b) Insert and fasten the transmission-network mounting screw (item 11).

Line Cord

6.03 To install the line cord (item 5a and 5b) on the telephone, proceed as follows:

- (a) Pass the end of the line cord through the U-shaped opening at the rear of the baseplate (item 3) and secure the line cord to its mounting posts. (On six-conductor cords use clamp D-731449C and screw HD-765600-PP05.)
- (b) Connect the three-conductor line-cord leads to the transmission network terminals as follows:
 - (1) RED to 10.
 - (2) GRN to 8.
 - (3) YEL to 9.

- (c) Connect the six-conductor line-cord leads to the transmission-network terminals as follows:

- (1) RED to 10.
- (2) WHT to 9.
- (3) YEL to 3.
- (4) BLK to 8.

- (d) Connect the remaining six-conductor line-cord leads to the following transmission network terminals:

INDUCTOR-CAPACITOR TCU

BLU to B
GRN to A

INTEGRATED CIRCUIT TCU

BLU to B
GRN to A

ROTARY DIAL

BLU to 15
GRN to 2

- (e) If the three-conductor cord has no J-hook, place the cord in the slot at the rear of the baseplate assembly. If it has a J-hook, secure the line cord J-hook clamp to its mounting projection.

NOTE: Proper routing of the line cord must be followed to avoid jamming the hookswitch actuator and spring.

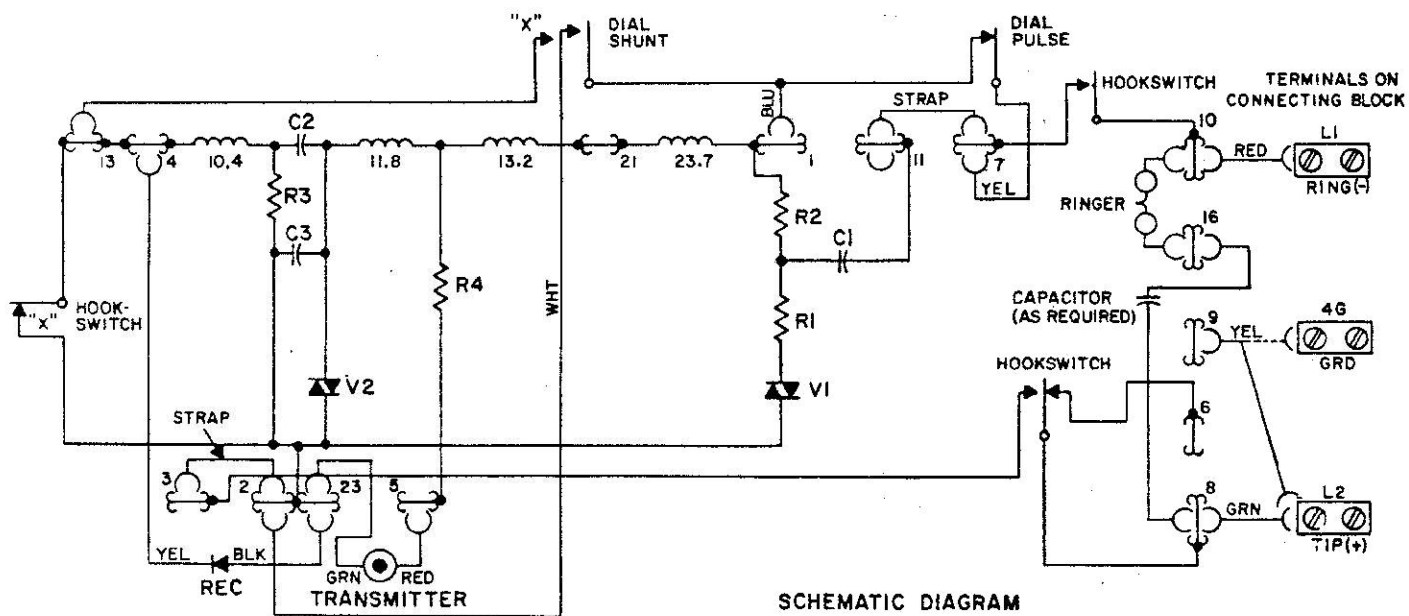
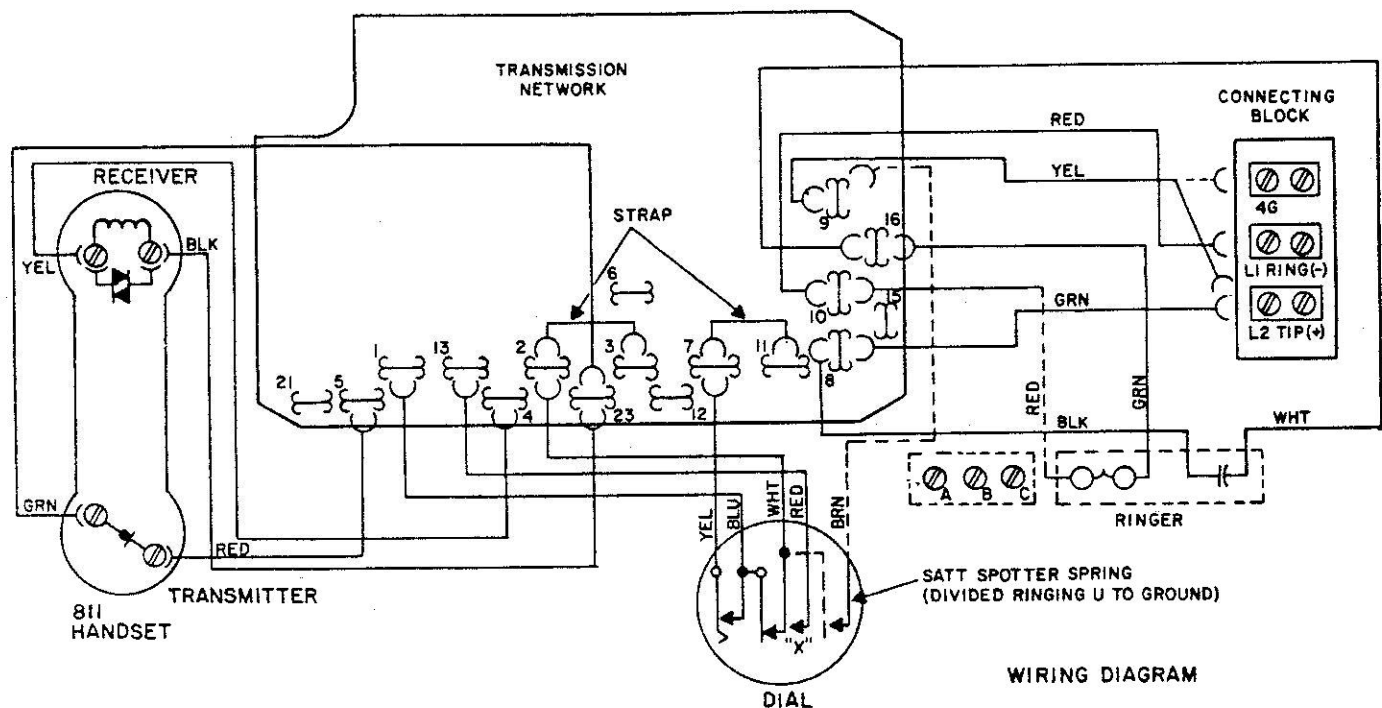
Handset

6.04 To install the handset in the telephone, proceed as follows:

- (a) Route the handset cord through the U-shaped slot in the side of the baseplate and route the handset cord through its mounting tab and around its mounting bosses.
- (b) Hook the J-hook clamp in place.
- (c) Connect the handset cord bracket leads to the transmission-network terminals as follows:

INDUCTOR-CAPACITOR TCU

RED to 5
GRN to 15
YEL to 12
BLK to 23



NOTE:
"X" CONTACTS TO MAKE FIRST AND BREAK LAST.

Figure 4. Wiring and Schematic Diagram of Three-Conductor Rotary Dial Version.

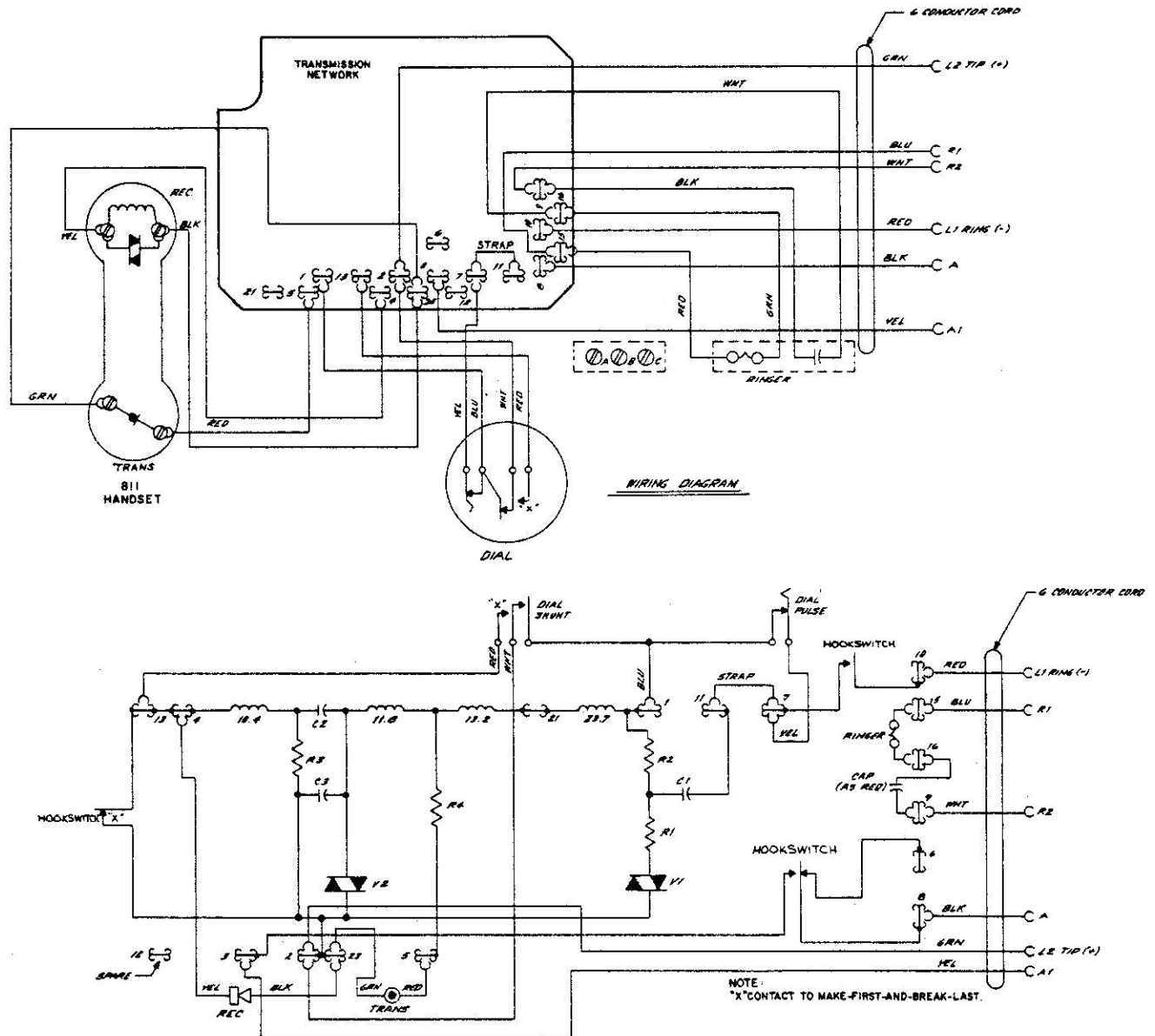


Figure 5. Wiring and Schematic Diagram of Six-Conductor Rotary Dial Version.

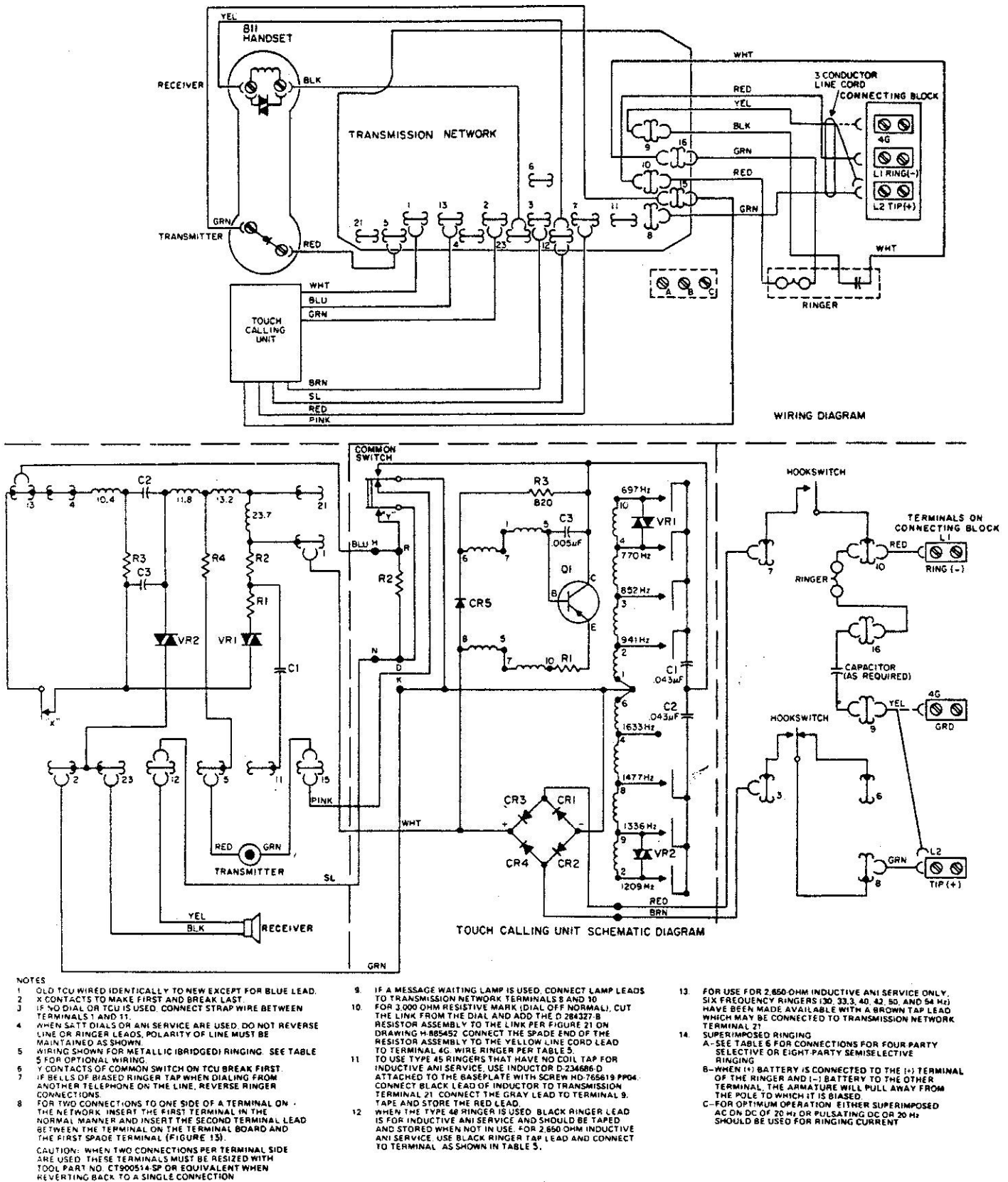


Figure 6. Wiring and Schematic Diagram of Three-Conductor, Inductor-Capacitor, Touch Calling Unit Version.



→ Figure 7. Wiring and Schematic Diagram of Six-Conductor, Inductor-Capacitor, Touch Calling Unit Version.

NOTES

1. OLD TCU WIRED IDENTICALLY TO NEW EXCEPT FOR BLUE LEAD
2. X CONTACTS TO MAKE FIRST AND BREAK LAST
3. IF NO DIAL OR TCU IS USED, CONNECT STRAP WIRE BETWEEN TERMINALS S1 AND I1
4. WHEN SAT DIALS OR ANI SERVICE ARE USED, DO NOT REVERSE LINE OR RINGER LEADS. POLARITY OF LINE MUST BE MAINTAINED AS SHOWN
5. WIRING SHOWN FOR METALLIC (BRIDGE) RINGING. SEE TABLE 5 FOR OPTIONAL WIRING
6. Y CONTACTS OF COMMON SWITCH ON TCU BREAK FIRST
7. IF BELLS OF BIAS IN RINGER TAP WHEN DIALING FROM ANOTHER TELEPHONE ON THE LINE, REVERSE RINGER CONNECTIONS
8. FOR TWO CONNECTIONS TO ONE SIDE OF A TERMINAL ON THE NETWORK, INSERT THE FIRST TERMINAL IN THE NORMAL MANNER AND INSERT THE SECOND TERMINAL LEAD BETWEEN THE TERMINAL ON THE TERMINAL BOARD AND THE FIRST SPADE TERMINAL (FIGURE 13).
- CAUTION: WHEN TWO CONNECTIONS PER TERMINAL SIDE ARE USED, THESE TERMINALS MUST BE RESIZED WITH TOOL PART NO. C700016 OR OF EQUIVALENT WHEN REVERTING BACK TO A SINGLE CONNECTION
9. IF A MESSAGE WAITING LAMP IS USED, CONNECT LAMP LEADS TO TRANSMISSION NETWORK TERMINALS 9 AND 10 FOR 3,000 OHM RESISTIVE MARK (DIAL OFF NORMAL). CUT THE LINK FROM THE DIAL AND ADD THE D 284327 B RESISTOR ASSEMBLY TO THE LINK PER FIGURE 24 ON DRAWING H 885452. CONNECT THE SPADE END OF THE RESISTOR ASSEMBLY TO THE YELLOW LINE CORD LEAD TO TERMINAL 4G. WIRE RINGER PER TABLE 5
10. TO USE TYPE 46 RINGERS THAT HAVE NO COIL TAP FOR INDUCTIVE ANI SERVICE, USE INDUCTOR D 234688 D ATTACHED TO THE BASEPLATE WITH SCREW NO 75614 PPM. CONNECT BLACK LEAD OF INDUCTOR TO TRANSMISSION TERMINAL 21. CONNECT THE GRAY LEAD TO TERMINAL 9 TAPE AND STORE THE RED LEAD
11. WHEN THE TYPE 48 RINGER IS USED, BLACK RINGER LEAD IS FOR INDUCTIVE ANI SERVICE AND SHOULD BE TAPED AND STORED WHEN NOT IN USE. FOR 2,650 OHM INDUCTIVE ANI SERVICE, USE BLACK RINGER TAP LEAD AND CONNECT TO TERMINAL AS SHOWN IN TABLE 5
12. FOR USE FOR 2,600 OHM INDUCTIVE ANI SERVICE ONLY, SIX FREQUENCY RINGERS (33, 40, 42, 50, AND 54 HZ) HAVE BEEN MADE AVAILABLE WITH A BROWN TAP LEAD WHICH MAY BE CONNECTED TO TRANSMISSION NETWORK TERMINAL 21
13. SUPERIMPOSED RINGING
 - A. SEE TABLE 6 FOR CONNECTIONS FOR FOUR PARTY SELECTIVE OR EIGHT PARTY SEMISELECTIVE RINGING
 - B. WHEN (-) BATTERY IS CONNECTED TO THE (-) TERMINAL OF THE RINGER AND (+) BATTERY TO THE OTHER TERMINAL, THE ARMATURE WILL PULL AWAY FROM THE POLE TO WHICH IT IS BIASED
 - C. FOR OPTIMUM OPERATION, EITHER SUPERIMPOSED AC OR DC OF 70 HZ OR PULSATING DC OR 20 HZ SHOULD BE USED FOR RINGING CURRENT

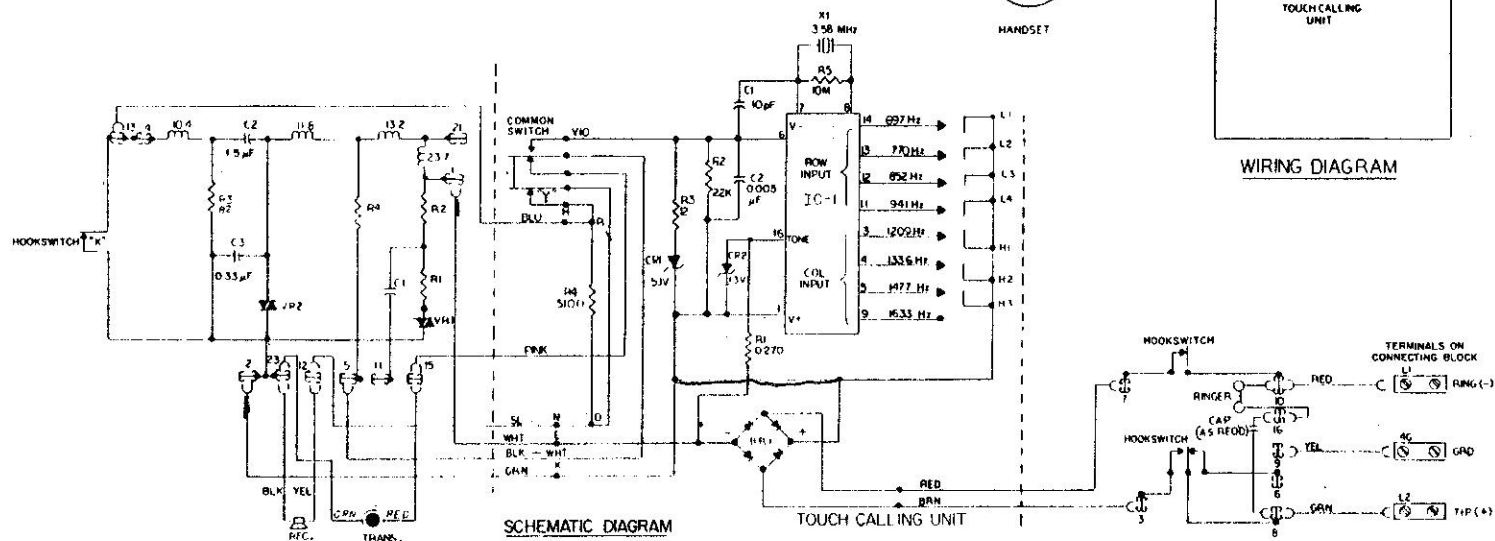
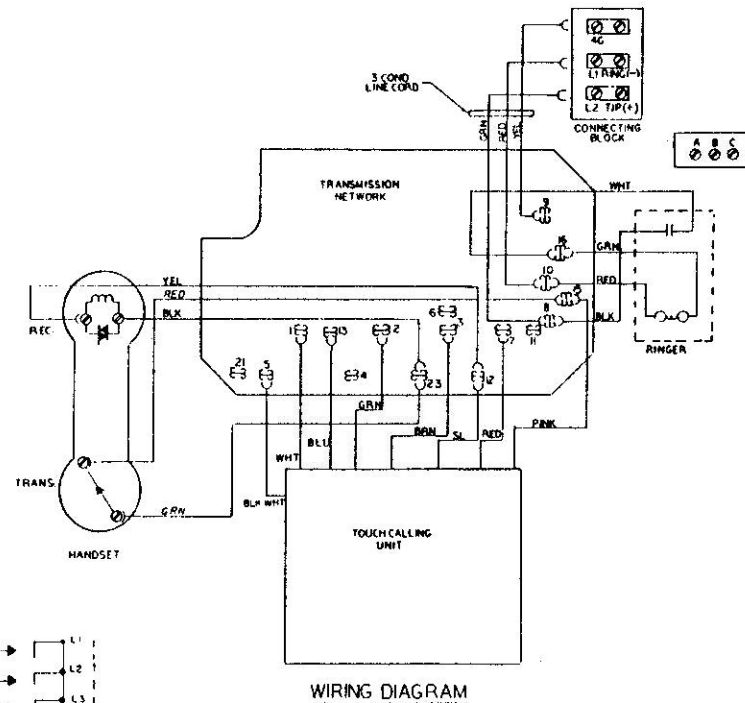


Figure 8. Wiring and Schematic Diagram of Three-Conductor Integrated Circuit Touch Calling Unit.

NOTES

1. X CONTACTS TO MAKE FIRST AND BREAK LAST.
2. Y CONTACTS OF COMMON SWITCH ON TCU BREAK FIRST.
3. FOR TWO CONNECTIONS TO ONE SIDE OF A TERMINAL ON THE NETWORK, INSERT THE FIRST TERMINAL IN THE NORMAL MANNER AND INSERT THE SECOND TERMINAL LEAD BETWEEN THE TERMINAL ON THE TERMINAL BOARD AND THE FIRST SPADE TERMINAL (FIGURE 13).
- CAUTION WHEN TWO CONNECTIONS PER TERMINAL SIDE ARE USED, THESE TERMINALS MUST BE RESIZED WITH TOOL PART NO. C180061N SP OR EQUIVALENT WHEN REVERTING BACK TO A SINGLE CONNECTION.
4. SCHEMATIC AND WIRING DIAGRAMS FOR USE WITH HB-5017-A IN STANDARD TYPE BDE TELEPHONE.

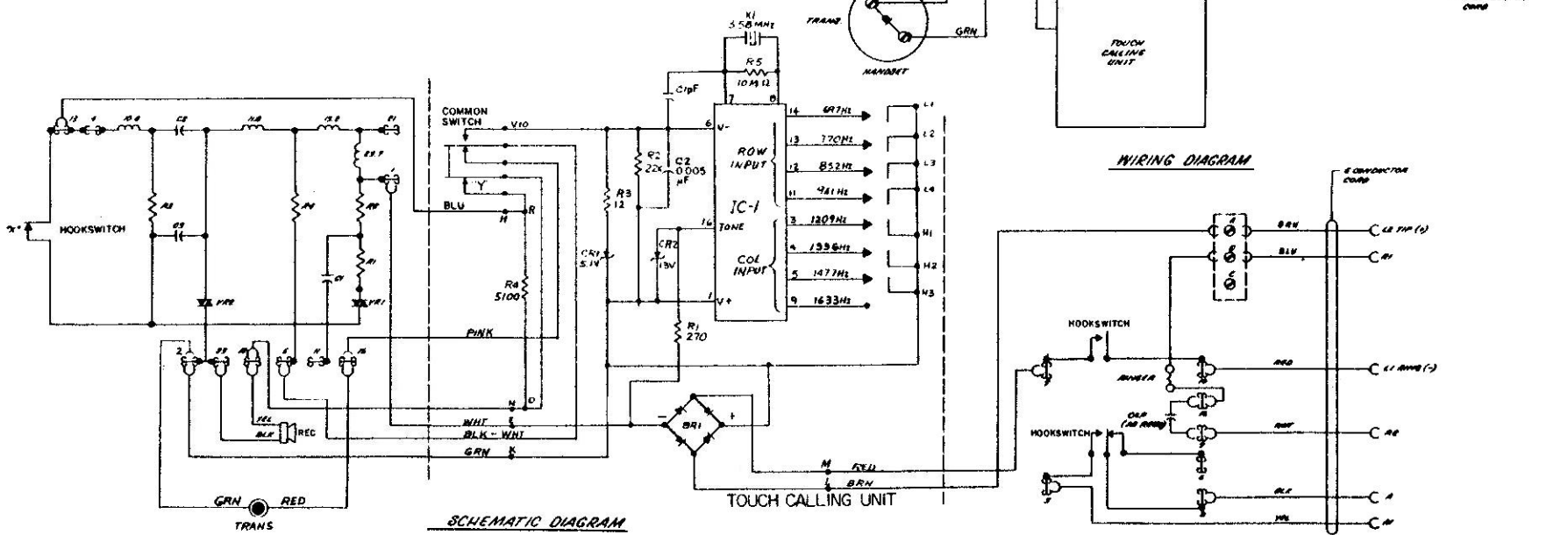


Figure 9. Wiring and Schematic Diagram of Six-Conductor Integrated Circuit Touch Calling Unit Version.

NOTES:

1. X CONTACTS TO MAKE FIRST AND BREAK LAST.
2. Y CONTACTS OF COMMON SWITCH ON TCU BREAK FIRST.
3. FOR TWO CONNECTIONS TO ONE SIDE OF A TERMINAL ON THE NETWORK, INSERT THE FIRST TERMINAL IN THE NORMAL MANNER AND INSERT THE SECOND TERMINAL LEAD BETWEEN THE TERMINAL ON THE TERMINAL BOARD AND THE FIRST SPARE TERMINAL (FIGURE 3).

CAUTION: WHEN TWO CONNECTIONS PER TERMINAL SIDE ARE USED, THESE TERMINALS MUST BE RESIZED WITH TOOL PART NO. CY9008 14 SP OR EQUIVALENT WHEN REVERTING BACK TO A SINGLE CONNECTION.

SCHEMATIC AND WIRING DIAGRAMS FOR USE WITH HB 5017-A IN STANDARD TYPE 30E TELEPHONE.

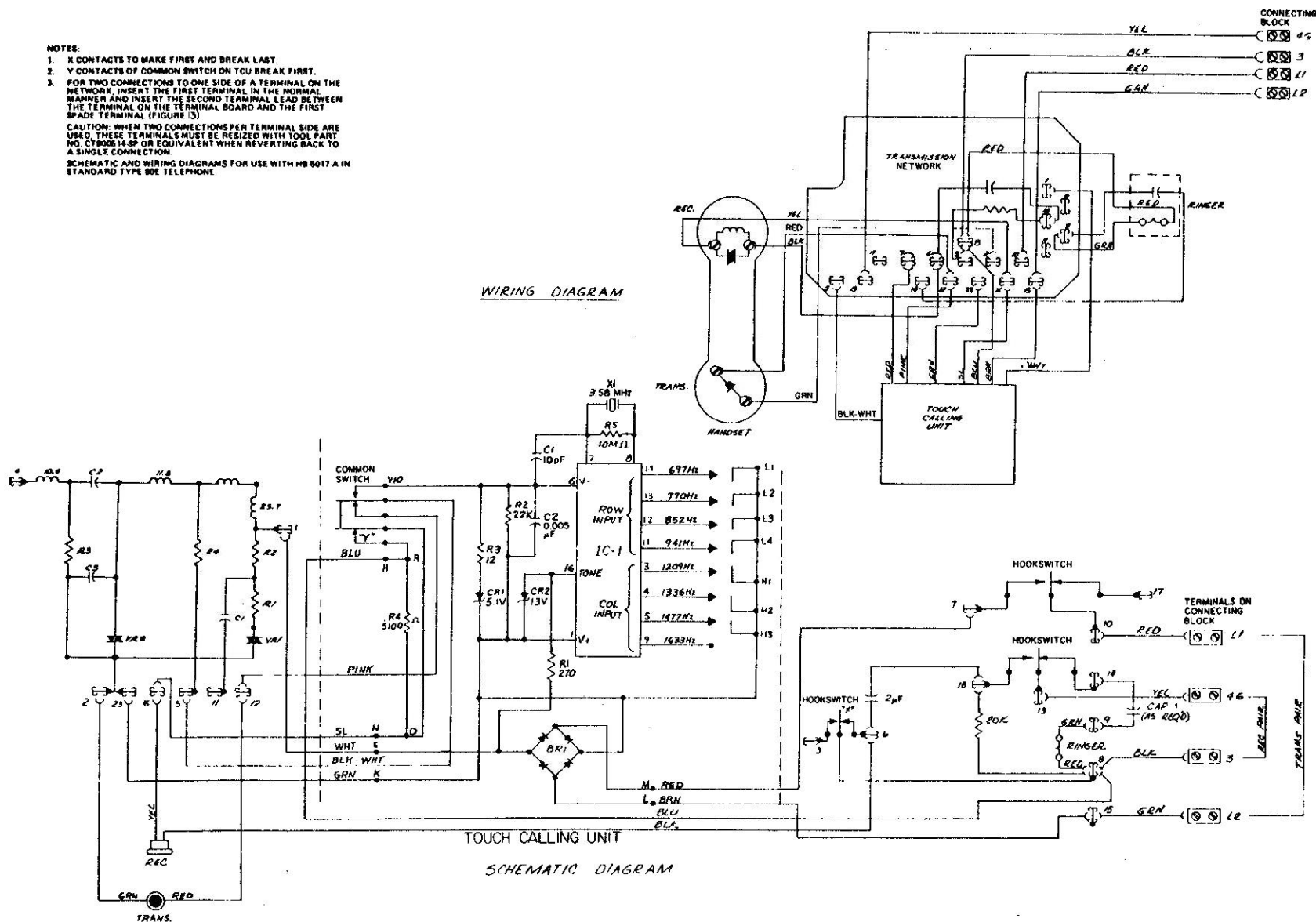


Figure 10. Wiring and Schematic Diagram of Four-Conductor, Ring on Receive, Integrated Circuit Touch Calling Unit Version.

NOTES

1. X CONTACTS TO MAKE FIRST AND BREAK LAST
2. Y CONTACTS OF COMMON SWITCH ON TCU BREAK FIRST
3. FOR TWO CONNECTIONS TO ONE SIDE OF A TERMINAL ON THE NETWORK, INSERT THE FIRST TERMINAL IN THE NORMAL MANNER AND INSERT THE SECOND TERMINAL LEAD BETWEEN THE TERMINAL ON THE TERMINAL BOARD AND THE FIRST SPARE TERMINAL (FIGURE 13)
- CAUTION: WHEN TWO CONNECTIONS PER TERMINAL SIDE ARE USED, THESE TERMINALS MUST BE RESIZED WITH TOOL PART NO. D19001A SP OR EQUIVALENT WHEN REVERTING BACK TO A SINGLE CONNECTION.
4. SCHEMATIC AND WIRING DIAGRAMS FOR USE WITH HB 6017-A IN STANDARD TYPE 80E TELEPHONE

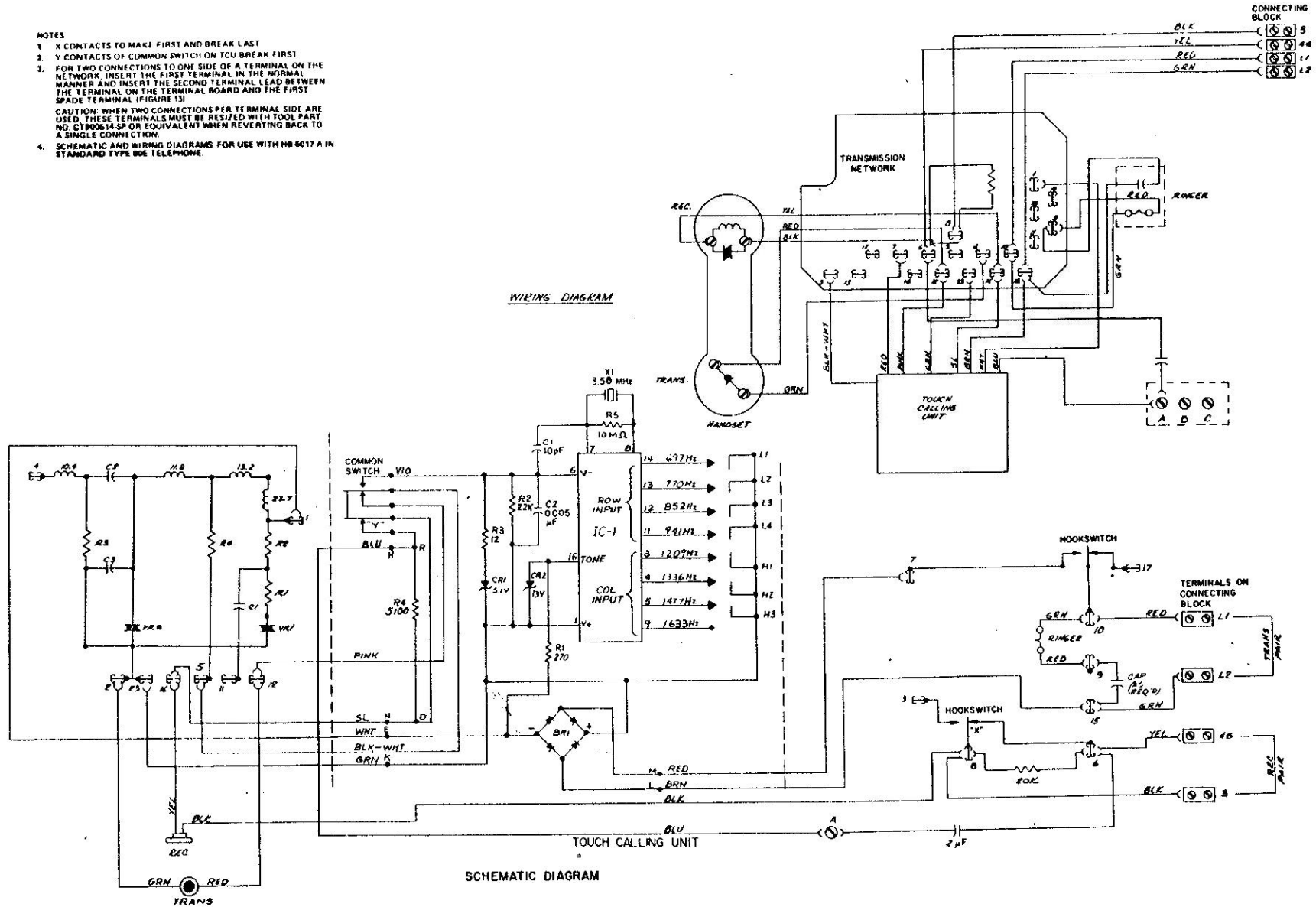


Figure 11. Wiring and Schematic Diagram of Four-Conductor, Ring on Transmit, Integrated Circuit Touch Calling Unit Version.

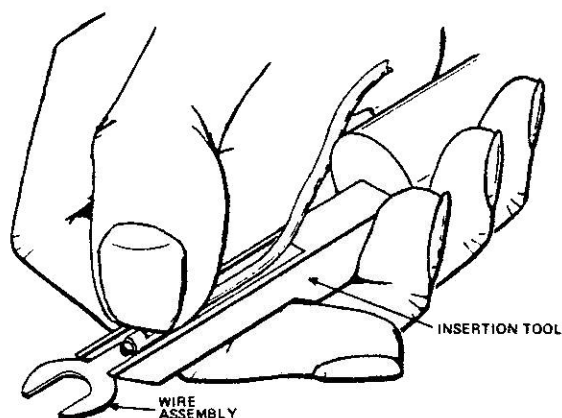


Figure 12. Terminal Insertion Tool (BT-900493-SP).

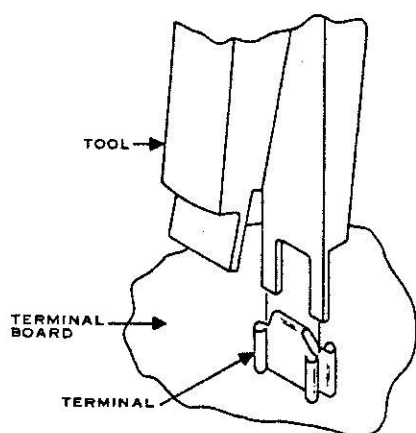


Figure 13. Receptacle Adjustment Tool.

INTEGRATED CIRCUIT TCU

RED to 15
GRN to 23
YEL to 12
BLK to 23

ROTARY DIAL

RED to 5
GRN to 23
YEL to 4
BLK to 23

Hookswitch Spring and Hookswitch Actuator

6.05 To install the hookswitch actuator (item 7) and the hookswitch return spring (item 8), proceed as follows:

- (a) Snap the hookswitch actuator in place over the hookswitch cell, being careful to avoid jamming or bending the springs.

- (b) Attach the hookswitch return spring from the hookswitch-cell notch to the notch on the hookswitch actuator.

Ringer

6.06 Tables 5 and 6 contain ringing connections and options. To install the Type 45 or 48 ringer, proceed as follows:

- (a) Place the ringer in place on the telephone baseplate.
- (b) Install the three mounting screws for the Type 45 ringer or the one mounting screw for the Type 48 ringer and fasten the ringer in place.
- (c) Connect the ringer leads to the following terminals:
 - (1) RED to transmission-network terminal 15 (for six-conductor version connect the RED lead to screw terminal B) of the baseplate assembly.
 - (2) GRN to transmission-network terminal 16.
- (d) Connect the ringer capacitor (if required) leads to transmission network terminals 16 and 9.

6.07 The following two methods may be used to mount the D-52144A ringer tube (kit No. D-52144 is available for this purpose):

- (a) The first method of mounting the ringer tube is as follows:
 - (1) Cut a 1-inch by 3/4-inch piece of 1/16-inch-thick double-sided adhesive foam tape.

NOTE: Foam tape is available at hardware and upholstery stores.
 - (2) Place the tape on the mounting surface of the tube socket and attach it to the baseplate between the transmission card and the ringer.
- (b) The second method of mounting the ringer tube is as follows:
 - (1) Drill a 0.156-inch-diameter hole at the rear of the baseplate.
 - (2) Attach the tube to the baseplate with the screw provided (part No. HD-765600-PP05).

NOTE: The terminals on the transmission card are capable of accepting two terminations on each side. Four connections are possible to any one terminal.

Rotary Dial

6.08 To install the rotary-dial assembly into the telephone, proceed as follows:

→ Table 5. Ringing Options.

RINGING OPTIONS	TERMINAL BLOCK CONNECTIONS			TRANSMISSION NETWORK TERMINALS							LINE CORD		SATT SPOTTER		ANI RINGER TAP TO NETWORK TERMINAL 21
	LINE CORD			INTERIOR WIRES			RINGER		CAPACITOR		RED	YEL	GRN	BRN	
	RED	GRN	YEL	RED	GRN	YEL	RED	GRN							
Bridged (Standard dial)	L1	L2	L2	L1	L2	—	10	16	8	16	10	9	8	—	
Divided — L2 ground (Standard dial)	L1	L2	4G	L1	L2	4G	16	9	8	16	10	9	8	—	
Divided — L1 ground (Standard dial)	L1	L2	4G	L1	L2	4G	10	16	9	16	10	9	8	—	
Bridged (SATT dial)	L1	L2	4G	L1	L2	4G	10	16	8	16	10	9	8	9	
Divided — L2 ground (SATT dial)	L1	L2	4G	L1	L2	4G	8	16	9	16	10	9	8	9	
Divided — L1 ground (SATT dial)	L1	L2	4G	L1	L2	4G	10	16	9	16	10	9	8	9	
ANI inductive tip for Type 45 ringer	L1	L2	4G	L1	L2	4G	9	16	16	6	10	9	8	—	None (Figure 8 Note 12) Brown (Figure 8 Note 14)
ANI inductive tip for Type 45 ringer	L1	L2	4G	L1	L2	4G	16	9	16	6	10	9	8	—	Black

Table 6. Superimposed Ringing.

STATION	TERMINAL BLOCK CONNECTIONS						TRANSMISSION-NETWORK TERMINALS							
	LINE CORD			INTERIOR WIRE			LINE CORD			RINGER		CATHODE TUBE LEADS		
	RED	GRN	YEL	RED	GRN	YEL	RED	YEL	GRN	GRN	RED	YEL	BLK	RED
No. 1 or No. 5 Station on ring (—) Line	L1	L2	4G	L1	L2	4G	10	9	8	10	16	16	9	9
No. 2 or No. 6 Station (—) on tip (+) Line	L1	L2	4G	L1	L2	4G	10	9	8	8	16	16	9	9
No. 3 or No. 7 Station (+) on ring (—) Line	L1	L2	4G	L1	L2	4G	10	9	8	16	10	9	16	16
No. 4 or No. 8 Station (+) on tip (+) Line	L1	L2	4G	L1	L2	4G	10	9	8	16	8	9	16	16

- (a) Attach the rotary dial assembly (item 12) to the U-shaped mounting bracket with the two mounting bracket screws, making sure the base of the U is down.
- (b) Attach the shock absorbers to the mounting tabs of the mounting bracket. These mounting tabs are identified by an R stamped on each tab.
- (c) Connect the rotary-dial leads to the transmission-network terminals as follows:
 - (1) YEL to 7.
 - (2) BLU to 1.
 - (3) WHT to 2.
 - (4) RED to 13.
- (d) Mount the shock absorbers over their mounting posts in the baseplate assembly.
- (e) Dress the leads clear of the dial springs and the hookswitch actuator and springs.

Touch Calling Unit

6.09 There are two 12C TCU types as follows:

- (a) Inductor-capacitor TCU, D-840000-A and HD-840109-A.
- (b) Integrated-circuit TCU, D-840000-F and HD-840109-D.

6.10 Identification of the type of TCU oscillator in the assembled telephone is by the color of the subface plate, the collar surrounding the pushbuttons. The inductor-

capacitor DTMF oscillator assembly is doeskin gray and the digital integrated-circuit DTMF oscillator assembly is dark gray.

6.11 The integrated-circuit DTMF tone generator used in the integrated-circuit version TCU is made using Metal Oxide Semiconductor (MOS) Technology. This manufacturing method produces a device that is susceptible to damage by electrostatic discharge. Despite protective circuitry included in the design, the TCU is still subject to voltage overstressing. To avoid TCU damage, the following safe grounding and handling procedures must be followed:

- (a) When handling the integrated-circuit TCU's, never grasp or touch the frequency spring electrical connections.
- (b) Never connect or disconnect the TCU from the telephone network while power is still applied.
- (c) Additional integrated-circuit handling procedures and work station set-up are available in GTEP-996-100-100.

6.12 To install the TCU in the telephone, proceed as follows:

- (a) Attach the TCU (item 13) to the U-shaped mounting bracket with the two mounting bracket screws, making sure the base of the U is up.
- (b) Attach the shock absorbers to the mounting tabs of the mounting bracket. These mounting tabs are identified by a T stamped on each tab.
- (c) Connect the TCU leads to the transmission-network terminals as follows:

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INDUCTOR CAPACITOR
TCU

WHT to 1
BLU to 13
GRN to 2
BRN to 3
SLT to 12
RED to 7
PINK to 15

INTEGRATED CIRCUIT
TCU

WHT to 1
BLU to 13
GRN to 2
BRN to 3
SLT to 12
RED to 7
PINK to 15
BLK-WHT to 5

- (d) Mount the shock absorbers over their mounting posts in the baseplate assembly.
- (e) Dress the leads clear of the hookswitch actuator and spring.

Housing

6.13 To replace the housing assembly (item 2), refer to Figure 3 and proceed as follows:

- (a) Place the front housing tab under the baseplate flange and position the front boss over the peg in the baseplate.
- (b) Assemble the housing by rotating it counterclockwise and lowering the rear of the housing until the housing drops in place.
- (c) Tighten lockup screw.

7. **TEST PROCEDURE**

7.01 To test the telephone when reassembled, refer to Figure 14 and proceed as follows:

- (a) Connect the telephone to a test line.
- (b) Lift the handset and place a call to the reverting call connector, testboard, or operator and call the line being tested.
- (c) Restore the handset and wait for the incoming signal.
- (d) Lift the handset to trip ring.

NOTE: It is necessary to remove the housing to perform these tests.

7.02 The hookswitch operation sequence can be electrically tested by performing the following test procedure (Item numbers are shown in Figure 14):

NOTE: An ohmmeter is required for this test.

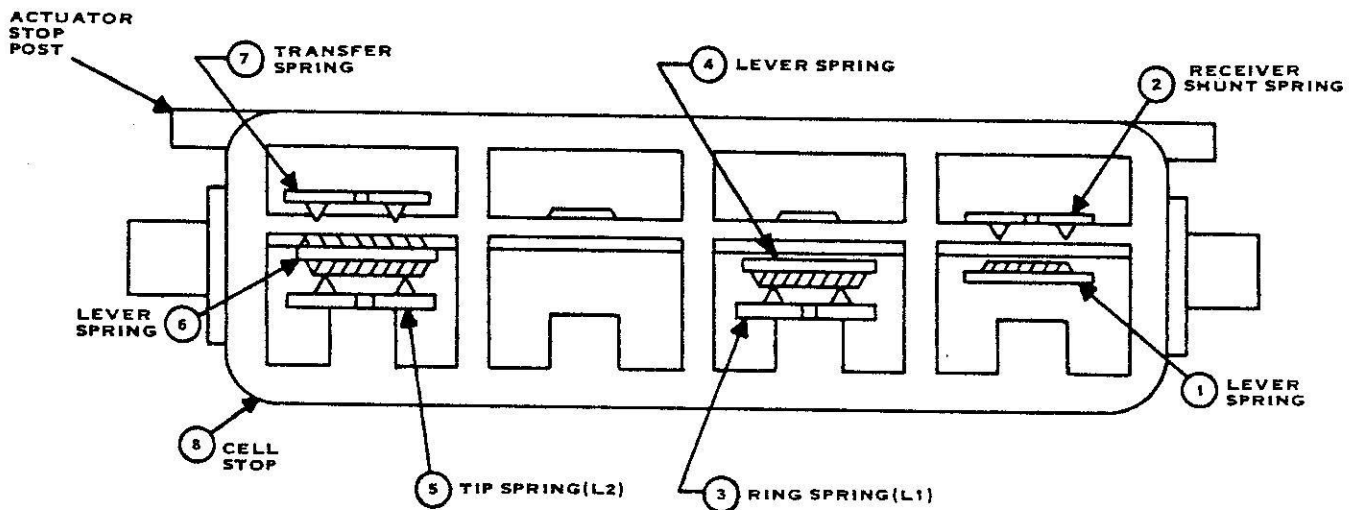
- (a) Disconnect all leads from the transmission network (including strapping bars).
- (b) Connect a 330-ohm resistor between terminal 10 and terminal 7 on the transmission network.
- (c) Connect a strap wire from terminal 6 to terminal 3.
- (d) Connect a strap wire from terminal 8 to terminal 10.
- (e) Connect a strap wire from terminal 7 to terminal 4.
- (f) Connect an ohmmeter between terminals 3 and 23. With the telephone set off-hook, the meter should indicate approximately 100 ohms.
- (g) Depress the hookswitch actuator slowly while observing the meter for the indications shown in Table 7. If the meter goes from 100 ohms to 330 ohms, the transmitter shunt is out of sequence. Move the short transmitter shunt spring (item 2) toward its lever spring (item 1).

- (1) An initial meter indication of 430 ohms indicates that the L1 contacts are open.
- (2) An initial meter indication of infinity indicates that the L2 contacts are open.
- (3) If the meter goes from 100 ohms to infinity, the L1 and L2 contacts are out of sequence.

- (h) When the hookswitch operation is in sequence, disconnect the test resistor, strap wires, and ohmmeter, and reconnect the leads to the transmission card. Replace the housing.
- (i) Connect the telephone to a test line and ensure that transmission can take place when the telephone is off-hook.

- (1) If transmission is not possible, the transmitter shunt contacts are closed. Move the short transmitter shunt spring (item 2) away from its lever spring (item 1).
- (2) If a pop is heard in the receiver when going from an off-hook to an on-hook condition, the transmitter shunt springs and the L1 springs are out of sequence. Move the short transmitter shunt spring (item 2) toward its lever spring (item 1).

- (j) Replace the housing and connect an ohmmeter between green line-cord lead and transmission network terminal 6. The meter shows continuity when the telephone is on-hook.
- (k) If the meter does not show continuity, move the short transfer contact spring (item 7) toward its lever spring (item 6) and recheck for continuity.



→ Figure 14. Type 80E Telephone Hookswitch (Off-Hook).

→ Table 7. Hookswitch Sequence of Operation.

EVENT SEQUENCE	OHMMETER INDICATIONS WHEN WIRED PER PARAGRAPH 7.02 (a) through (f)	NOMINAL PLUNGER HEIGHT ABOVE HOUSING (INCHES)	ELECTRICAL OPERATION	SPRING CONTACTS (FIGURE 14)
Off-Hook:				
—	100 ohms	0.360	Pretravel	
1	0	0.260	Transmitter shunt make	1 and 2
2	330 ohms	0.190	L1 ring contacts break	3 and 4
3	infinity	0.160	L2 tip contacts break	5 and 6
4	330 ohms	0.120	Transfer contact makes	6 and 7
On-Hook	330 ohms	0	Over-travel	

7.03 If any malfunction of the hookswitch occurs (events out of sequence, events missed, intermittent operation, etc), inspect the hookswitch (Figure 14) as follows:

- (a) Remove the hookswitch-actuator return spring and the actuator. Inspect the actuator for any damage (bent or broken arms, bent or broken snap-on tabs, etc).
- (b) Inspect the cell stop to ensure that it is seated securely on the cell. If it is unseated or broken, reseal or replace the cell stop and recheck it for proper operation.
- (c) Inspect the cell for broken actuator stop posts and replace the cell if required.
- (d) Inspect all spring blades for missing contacts.
- (e) Inspect all spring blades for straightness and straighten as required. Use needlenose pliers to make adjustments.
- (f) Inspect the hookswitch assembly for proper spring-blade position. All spring blades should be perpendicular to the transmission card and parallel to each other in the direction of their movement. If the blades require adjustment, use needlenose pliers to perform this adjustment down in the cell at the point where the blades exit from the cell holders.
- (g) When (a) through (f) are completed, replace the cell stop carefully. Seat the cell stop securely and ensure that the requirements specified in paragraphs 8.04 and 8.05 are met.
- (h) Replace the hookswitch actuator.

CAUTION: Be careful not to stub the inner actuating bar or edges of the hookswitch actuator on any of the springs.

- (i) Replace the return spring and recheck the hookswitch sequence electrically.

8. ADJUSTMENTS

8.01 The following adjustment procedure applies to the hookswitch and associated special spring combinations for the telephone. For adjustment of the Type 54 dial assembly, refer to Section 997-300-500. For the Types 45 and 48 ringer, refer to Section 997-308-500.

8.02 The twin contacts of a spring combination must make or break within 0.005 inch of each other, as gauged by eye, unless otherwise specified. The spring follow must be gauged by eye unless otherwise specified.

8.03 For the purpose of definition, break springs are closed with the hookswitch in the on-hook position and make springs are closed with the hookswitch in the off-hook position.

8.04 With the hookswitch in either the off-hook or on-hook position, there must be a clearance of 0.010 inch

between springs not designated to make contact. Refer to Figure 14 and Table 7.

8.05 With the hookswitch actuator removed, make springs 3 and 5 must follow perceptibly when the tension of springs 4 and 6, respectively, is removed.

8.06 The hookswitch sequence of operation is specified in Table 7 and shown in Figure 14. Table 7 lists the nominal amounts of plunger travel required to arrive at the various events. These events must occur in the sequence listed in Table 7 with a minimum plunger travel of 0.010 inch between events. There must be a minimum plunger travel of 0.030 inch between the off-hook position and the first event. There must be a minimum plunger travel of 0.020 inch between the last event and the on-hook position.

8.07 Proper event sequence should not be arrived at by any bending or forming of the lever springs other than straightening operations.

8.08 All positioning operations must be performed on the short make or break springs and these operations are preferably performed with the cell stop removed so as to eliminate the possibility of deforming the spring.

9. MODIFICATIONS

9.01 This part contains modification information for the following options or provisions:

- (a) Less-dial configuration.
- (b) Type 80 to 80E configuration.
- (c) Rotary dial use to TCU use.
- (d) TCU use to rotary dial use.
- (e) ANI inductor assembly.
- (f) Grounding pushbutton.
- (g) Message waiting.
- (h) Two-wire to four-wire connection.

Less-Dial Configuration

9.02 Referring to part 4, remove the housing and rotary dial assembly or TCU. Rewire the telephone as follows for the rotary-dial configuration, using conversion kit HH-880030:

- (a) Remove the strapping terminal between terminals 7 and 11.
- (b) Connect the BLU strapping wire (D-543069) between terminals 7 and 1.

9.03 Using kit HH-880030, rewire the telephone as follows for the TCU:

- (a) Move the YEL handset lead from terminal 12 to terminal 4.
- (b) For an inductor-capacitor TCU, move the GRN handset lead from terminal 15 to terminal 23.

- (c) For an integrated-circuit TCU, move the RED handset lead from terminal 15 to terminal 5.
- (d) Connect the strapping bar between terminals 2 and 3.
- (e) Connect the BLU strapping wire (D-543069) between terminals 7 and 1.
- (f) Replace the housing.
- (g) Install the blank facemat and faceplate. Using a straightened paper clip or other similar object, pry the arm of the faceplate clip upward while exerting a small downward pressure on the faceplate. When the faceplate has seated against the housing, remove the paper clip and allow the arm of the faceplate clip to snap into the rectangular recess of the faceplate.

Conversion from Type 80 to Type 80E Configuration

9.04 To convert an existing Type 80 rotary-dial telephone to the Type 80E rotary-dial configuration, conversion kit HH-880028 is necessary. To make this conversion proceed as follows:

- (a) Remove the rotary-dial housing by removing both housing-lockup screws from the baseplate.
- (b) Remove the rotary-dial assembly by unsnapping it from the tripod assembly and remove the two machine screws securing the rotary-dial assembly to the mounting bracket.
- (c) Remove the fingerwheel, remove the three screws used to retain the extended number plate, and remove the finger stop. Replace the extended number plate with the dial pointer plate (D-530390-M).
- (d) Replace the finger stop and tighten the retaining screw.
- (e) Place the spacer (HD-650020-A) between the rotary-dial assembly and the mounting bracket and reassemble the mounting bracket to the rotary-dial assembly using the two (HD-765440-PM06) mounting screws.
- (f) Snap the rotary-dial assembly back in place on the tripod assembly.
- (g) Install the actuator spacer (HD-650019-A) on the actuator arms by snapping it into position.
- (h) Install the faceplate clip (HD-780079-A) on the housing assembly.
- (i) Install the housing assembly using the lockup screw (HD-764005-K), making sure that the front tab is under the baseplate assembly.
- (j) Install the facemat and then the faceplate.
- (k) Replace the fingerwheel.

Conversion from Rotary Dial to Touch Calling Unit Operation

9.05 To change from rotary-dial operation to TCU use, proceed as follows:

- (a) Remove the rotary-dial assembly with its shock absorbers from the baseplate assembly.
- (b) Remove all rotary dial leads from the transmission network.
- (c) Remove the strapping bars (HD-580043-A) from between terminals 7 and 11 and from between 2 and 3 on the transmission network.
- (d) For an inductor-capacitor TCU disconnect the GRN and YEL handset leads from transmission network terminals 23 and 4. Reconnect the leads to terminals 15 and 12 per Figure 6 or 7.
- (e) For an integrated-circuit TCU, disconnect the RED and YEL handset leads from transmission-network terminals 15 and 12 per Figure 8, 9, 10 or, 11 as appropriate.
- (f) Remove the shock absorbers from the rotary-dial assembly's mounting bracket.
- (g) Remove the mounting bracket from the rotary-dial assembly by removing the two mounting screws.
- (h) Turn the U-shaped bracket over so that the T's stamped on the mounting tabs are up and attach the TCU to the bracket with the two mounting screws.
- (i) Place the shock absorbers on the T mounting tabs of the mounting bracket.
- (j) Connect the TCU leads to the transmission-network terminals as follows:

INDUCTOR-CAPACITOR TCU

WHT to 1
BLU to 13
GRN to 2
BRN to 3
SL to 12
RED to 7
PINK to 15

INTEGRATED-CIRCUIT TCU

WHT to 1
BLU to 13
GRN to 2
BRN to 3
SL to 12
RED to 7
PINK to 15
BLK-WHT to 5

- (k) Place the TCU and its shock absorbers on the mounting posts in the baseplate assembly.
- (l) Dress the TCU leads clear of the hookswitch actuator and spring.

Conversion from Touch Calling Unit to Rotary-Dial Operation

9.06 To change from TCU use to rotary dial use, proceed as follows:

- (a) Lift the TCU assembly and shock absorbers off their mounting post.
- (b) Disconnect all TCU leads from the transmission network.
- (c) From inductor-capacitor TCU, disconnect the GRN and YEL handset leads from transmission network terminals 15 and 12. Reconnect the leads to terminals 5 and 4.
- (d) From integrated-circuit TCU, disconnect the RED and YEL handset leads from the transmission network terminals 15 and 12. Reconnect the leads to terminals 5 and 4.
- (e) Add strapping bars (HD-580043-A) between terminals 7 and 11 and between 2 and 3 on the transmission network.
- (f) Remove the shock absorbers from the mounting bracket.
- (g) Remove the TCU mounting screws and remove the TCU from the mounting bracket.
- (h) Turn the mounting bracket over so that the R's stamped on the mounting tabs are up and mount the rotary dial to the mounting bracket with the two mounting screws.
- (i) Attach the shock absorbers to the mounting bracket's R mounting tabs.
- (j) Connect the rotary-dial leads to the transmission-network terminals as follows:

RED to 3
WHT to 2
BLU to 1
YEL to 7

- (k) Place the rotary dial and its shock absorbers on the mounting posts in the baseplate assembly.
- (l) Dress the rotary dial leads clear of the hookswitch actuator and spring.

ANI Inductor Installation

9.07 When second party ANI service is required, the telephone must be wired for inductive ground by using the Type 45 ringer (33-1/3 or 50 Hz) with ringer tap option or the Type 48 straight-line ringer with the ringer tap. On two-party lines, the second telephone must be equipped to provide an identifying ground without significant circuit unbalance. An inductor assembly kit (D-284686-C) may be required if a 2,650-ohm ringer tap is not available. To mount this inductor assembly kit refer to Figure 15 and proceed as follows:

- (a) Mount the inductor assembly on the ANI mounting boss and fasten it with the HD-765619-PP04 thread-forming screw provided.
- (b) Connect the inductor leads to the terminal network as follows:

BLK lead to terminal 21.
RED lead (tape and store).
GRAY lead to terminal 9.

9.08 For wiring information on providing further ANI service, refer to Table 5 and to the notes contained in Figure 8.

Grounding Pushbutton

9.09 To add a grounding pushbutton to the telephone, a grounding pushbutton conversion kit (HH-880019-1) must be used. For the installation procedure, refer to the instructions included with the conversion kit.

Message Waiting

9.10 To provide the message-waiting feature for the telephone use kit H-884686-1 and proceed as follows:

- (a) Remove the telephone housing (paragraph 4.03).
- (b) Using the template provided, drill a 5/16-inch diameter hole on the front center of the housing.
- (c) Place the escutcheon over the lamp wire and into position at the base of the lamp.
- (d) Insert the lamp into the mounting hole and install the push nut to secure the lamp in place.
- (e) Connect the lamp leads to terminal 8 and 10 of the transmission network.
- (f) Replace the housing (paragraph 6.13).

Modification from Two-Wire to Four-Wire

9.11 To modify the HC-819 version of the telephone to provide two-wire to four-wire service, modification kit H-888578-1 is used. Mount the FW relay on the dial (or TCU) mounting bracket (Figure 16). The relay is mounted to the bracket with the hex nut and lockwasher provided. Connect the FW relay leads (using the leads closest to the red dot on the relay) to the transmission-network leads as follows:

<u>ROTARY DIAL</u>	<u>TCU</u>
<u>TOP</u>	<u>TOP</u>
RED to 9	RED to 9
YEL to 12	YEL to C
WHT to 3	WHT to 3
BLU to 12	BLU to 12
<u>BOTTOM</u>	<u>BOTTOM</u>
RED to 15	RED to B
YEL to A	YEL*
WHT to 8	WHT to 8
BLU to 23	BLU to 23

* Splice and tape with BLK receiver lead.

Type 820 Handset Sound Booster Installation

9.12 Installation of the Type 182 Handset is basically the same for all types of telephones to which it can be connected. The following installation procedures are in four parts:

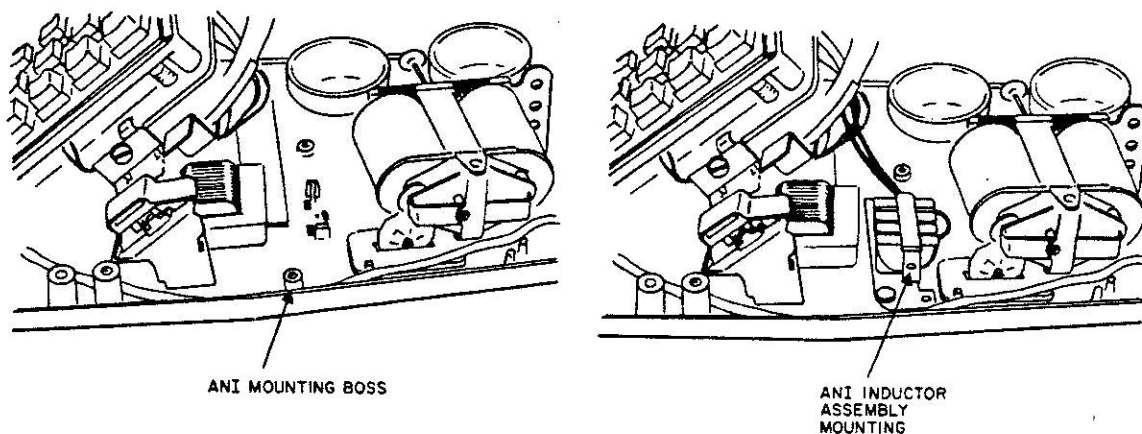


Figure 15. ANI Inductor Assembly Installation:

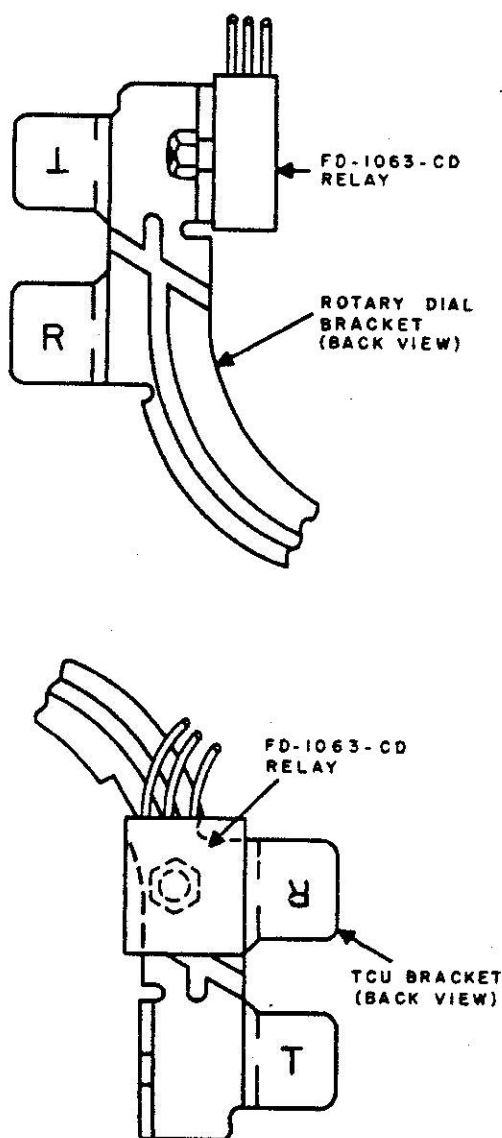


Figure 16. Four-Wire Relay Mounting.

- (a) Installation for the majority of self-compensating telephones.
- (b) Installation for the Type 182 and 182A telephones.
- (c) Installation for the Type 860A telephone.
- (d) Installation for the Type 880 telephone.

9.13 To install all self-compensating telephones excluding the Type 182, 182A, 860A and 880 telephones, proceed as follows:

- (a) Gain access to the transmission unit of the particular telephone to which the Type 820 Handset is to be connected.
- (b) Before removing the standard retractile handset cord, make note of the color of each handset cord lead and the terminal screw to which the colored lead is connected.
- (c) Remove the four standard retractile handset cord leads from their respective terminals.
- (d) Connect the Type 820 handset retractile cord leads to the same terminals (color for color) from which the standard retractile handset cord leads were disconnected. These leads are shown in Figure 17.
- (e) Reassemble the telephone, make a test call, and check operation of the volume control.

9.14 Type 182 and 182A Telephone. The Type 820 handset need not be modified for use with the Type 182 or 182A telephones. However, care must be exercised during installation of the handset to prevent the handset cord from interfering with normal telephone operation. The text applies to both telephones, except where indicated. Perform the following steps to install the handset:

- (a) Remove the handset and retractile cord from the Type 182 or 182A telephone, making note of the color on each handset cord lead and the terminal screw to which the colored lead is connected.
- (b) Connect the J-clip strain relief clamp, on the retractile cord of the Type 820 handset, to the

- (c) On the Type 182 telephone, remove the lacing cords from the existing leads inside the telephone.
- (d) Connect the Type 820 handset retractile cord leads to the same terminals (color for color) from which the standard retractile handset cord leads were disconnected. Refer to Figure 17.
- (e) Retie the lacing cords on the Type 182 telephone including the leads from the Type 820 handset.
- (f) Position the extra cord length to the right of the J-clip strain relief clamp.

NOTE: Make certain that the extra cord length does not interfere with the dial night light control (Type 182 telephone). Do not position this extra cord length to the left of the J-clip strain relief clamp because there is insufficient space and if the cord happens to slip under the hookswitch plunger, it is possible that it will keep the hookswitch in the "offhook" position.

9.15 Perform the following procedure to replace the handset cord at the Type 860A Key Telephone:

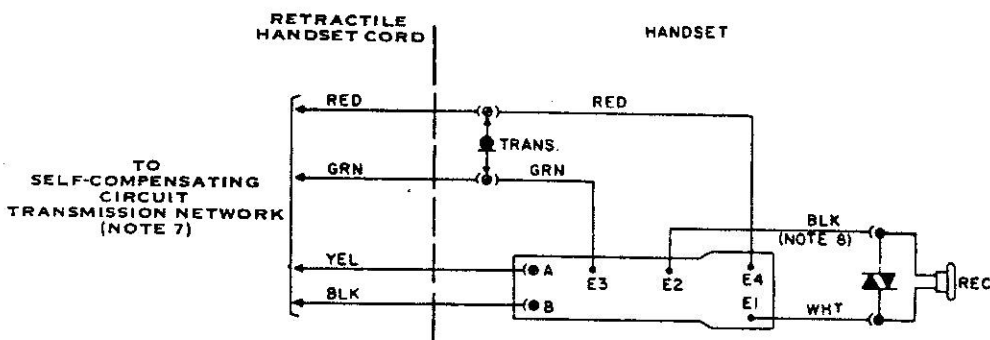
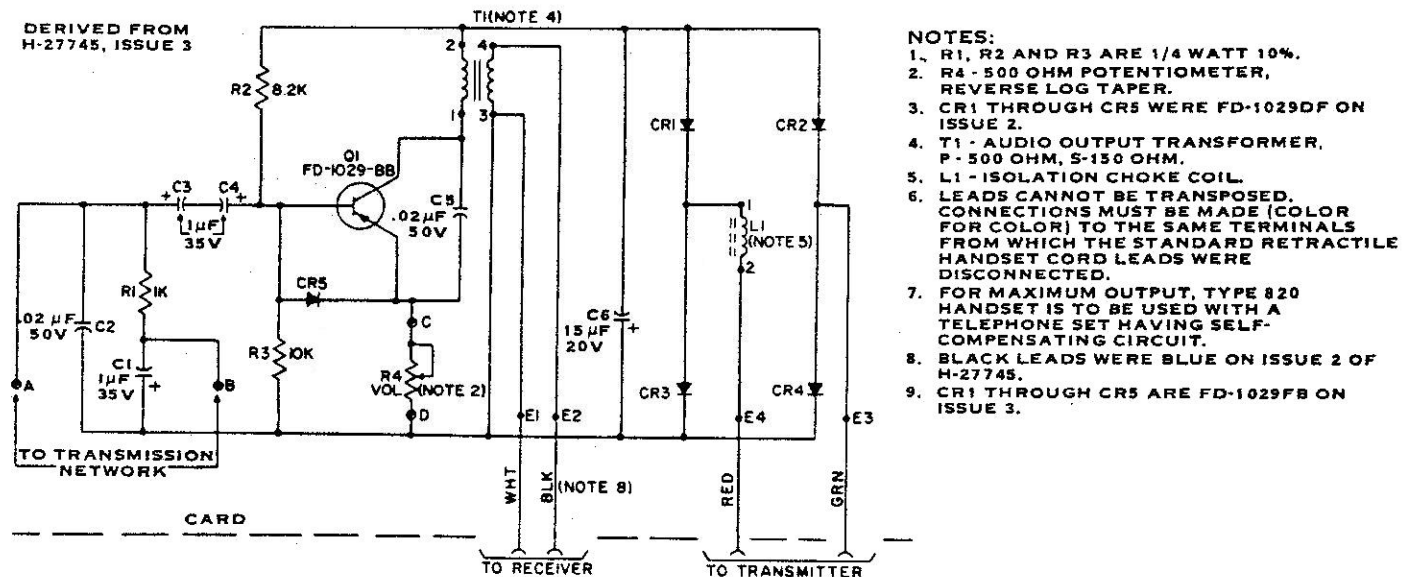


Figure 17. Wiring and Schematic Diagram of Type 820 Handset.

- (a) Gently lift off the clear plastic face plates and the colored facemat from the dial and keys.
- (b) Remove the key telephone housing after loosening the two rear housing lock screws.
- (c) Lift the rear of the housing from the base, being careful of the metal clips around the dial assembly.
- (d) Remove the plastic housing from the base by moving the housing forward to disengage the housing mounting hooks on the base of the unit.
- (e) Remove the dial after loosening the three dial plate mounting screws.
- (f) Untie the wire lacing and disconnect cord terminal, making note of the color of each handset cord lead and the terminal to which it is connected.
- (g) Unhook the J-clip strain relief clamp and slide the cord out from under the ringer assembly.
- (h) Install the Type 820 handset (equipped with the proper cord for this telephone) to the Type 860A Key Telephone by connecting the cord leads (color for color) to the same terminals from which the standard retractile handset cord leads were disconnected. Refer to Figure 17.
- (i) Retie the lacing cords, being sure to lace the wires so they will be free of the dial assembly.
- (j) Reassemble the telephone set, making a test call, and check the operation of the volume control.

NOTE: The trim length on the cord supplied with the Type 820 handset is not of sufficient length to allow the handset to be used with the Type 860A and 880 telephones. Therefore, the handset cord to be used with these telephones must be installed by the repair shop.

9.16 Use the following procedure to replace the handset cord at the Type 880 telephone (speakerphone):

- (a) Remove the upper housing.
- (b) Disconnect the handset cord from the transmission terminals, making note of the color of each handset cord lead and the terminal screw to which the colored lead is connected.
- (c) Release the handset cord holder from the speakerphone mounting plate and pull out the old cord.
- (d) Install the Type 820 handset (equipped with the proper cord for this telephone) by connecting the cord leads (color for color) to the same terminals from which the standard retractile handset cord leads were disconnected. Refer to Figure 17.
- (e) Hook the handset cord holder to the speakerphone mounting plate.
- (f) Replace the upper housing.

10. CONVERSION FROM ROTARY DIAL AND TOUCH CALLING UNIT TO KEY SYSTEM OPERATION

10.01 To convert the rotary dial version telephone to the key system telephone (HC819 version), refer to Figures 5 and 6 and proceed as follows:

- (a) Remove the three-conductor line cord.
- (b) Remove the strapping bar from transmission-network terminals 2 and 3.
- (c) Move the RED ringer lead from terminal 10 to terminal 15 of the transmission network.
- (d) Add the six-conductor line cord (HD-540035-A) and connect the line-cord leads to the transmission network terminals as follows:

GRN to 2.
YEL to 3.
BLK to 8.
RED to 10.
BLU to 15.
WHT to 9.

10.02 To convert the TCU telephone (HC802 version) to the key system telephone (HC819 version), refer to Figures 6 and 7 for the inductor-capacitor TCU and to Figures 8 and 9 for the integrated-circuit TCU and proceed as follows:

- (a) Remove the three-conductor line cord.
- (b) Add two screw terminals (D-150289-A) to positions A and B on the baseplate assembly for older version telephones. For later version telephones, use a HD-150071 terminal.
- (c) Move the BRN TCU lead from terminal 3 on the transmission network to spare terminal A.
- (d) Move the RED ringer lead from terminal 10 to spare terminal B.
- (e) Add the six-conductor line cord (HD-540035-A) and connect the following line-cord leads to the transmission-network terminals as follows:

YEL to 3.
BLK to 8.
RED to 10.
WHT to 9.

- (f) Make the following line-cord connections to the spare terminals on the baseplate assembly:

GRN to A.
BLU to B.

11. HOOKSWITCH ADJUSTMENT – CONVERSION OF TYPE 80 TELEPHONE TO TYPE 80E TELEPHONE

11.01 When a Type 80 telephone is being converted to a Type 80E telephone (as described in paragraph 9.04) and the hookswitch requires adjustment, perform the following (refer to Figure 18):

- (a) Verify that the plunger arm stop is in the off-hook position. The distance from the top of the plunger arm to the plane on which the hookswitch base is mounted should be 2.180 ± 0.020 inches for a rotary dial telephone and 2.315 ± 0.020 inches for a Touch Calling telephone.
- (b) When the plunger arm is in the on-hook position, the distance from the top of the plunger arm to the plane on which the hookswitch base is mounted should be 1.950 ± 0.020 inches for a rotary dial telephone and 2.050 ± 0.020 inches for a Touch Calling telephone.
- (c) Block the plunger arm in the on-hook position measured in step (b). Adjust back spring 1 (Figure 18) in such a way that, when the contacts of 1 and the contacts of lever spring 2 are engaged, the following conditions exist:

- (1) There is a minimum of 13 grams of force on the contacts as measured on the lever spring near the contacts.

- (2) The actuator buffer just touches lever spring 2 or has minimal clearance between it and lever spring 2.

- (d) After completing (c), check or adjust the remainder of the pile-up as necessary. Unblock the plunger arm and allow it to move slowly toward the off-hook position. Observe that the contacts of lever spring 2 break with the contacts of back spring 1 and that there is a minimum clearance of 0.010 inch (gauged visually) between the dual contacts on lever spring 2 and both the contacts of springs 1 and 3. With this clearance established, the buffer of lever spring 4 should begin moving 4 toward contact spring 5 with only the contacts of springs 6 and 7 closed at this point of the travel.
- (e) Verify that, as the contacts of lever spring 2 close with the contacts of spring 3, there is a minimum clearance of 0.010 inch between the contacts of lever spring 4 and the contacts of spring 5.
- (f) Verify that, with both the contacts of springs 2 and 3 closed and the contacts of springs 4 and 5 closed, there is perceptible clearance between the buffer on lever spring 4 and the tip of lever spring 7.
- (g) Verify that, as the actuator reaches the off-hook position, the buffer on lever spring 4 forces the contacts of lever spring 7 to break with spring 6 and have a minimum clearance of 0.010 inch.

NOTE: There should be a minimum follow of 0.015 inch of contact spring 3, 5, or 6 as lever spring 2, 4, or 7 is moved to cause the contacts to break from the fully closed position.

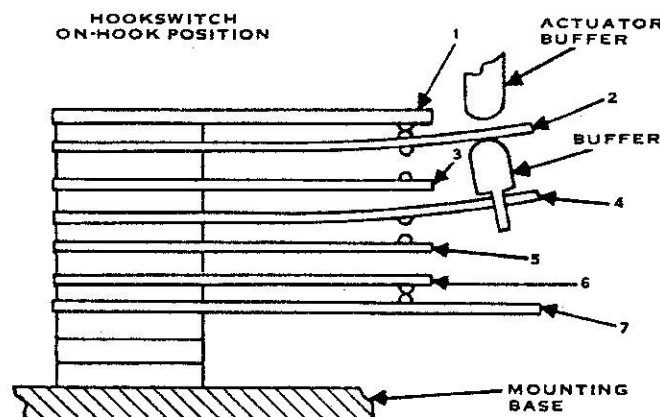


Figure 18. Type 80E Hookswitch Adjustment.