

PART V STATION APPARATUS

PRACTICE NUMBER	TITLE
480-101-301	Contempra Telephone Sets Description
480-101-310	Telephone Sets—Trendline (Trim-Line) Description
480-101-401	Telephone Set Contempra Installation and Maintenance
480-101-410	Trendline (Trim-Line)—Installation and Connection
480-105-300	Telephone Set—500 Type Description
480-105-404	Telephone Sets—510-30 and 510-36 Connections
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480-105-406	Type 554—Connections
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480-105-455	Telephone Sets—2558 Connections
480-110-300	700 Series Desk Type Telephones
480-110-401	Telephone Set—Type 701 (LR) 30 Desk Connections
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480-110-403	Telephone Set—Type 703 (LR) 30 Desk Connections
480-110-404	Telephone Set—Type 703 (LR) 37 and 38 Connections
480-110-600	Telephone Sets—Types 701, 703 Maintenance
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480-190-301	Modular Telephone Apparatus—Description and Installation

CONTEMPRA TELEPHONE SETS
DESCRIPTION

1. GENERAL

1.01 This practice covers the description of the Northern Electric Contempraphone QSK100AX (rotary dial) and QSK2100AX (digitone dial).

2. DESCRIPTION

2.01 The Contempra Set is a dial-in handset telephone which may be used as a desk or wall set. See Figure 1-a, b, and c.

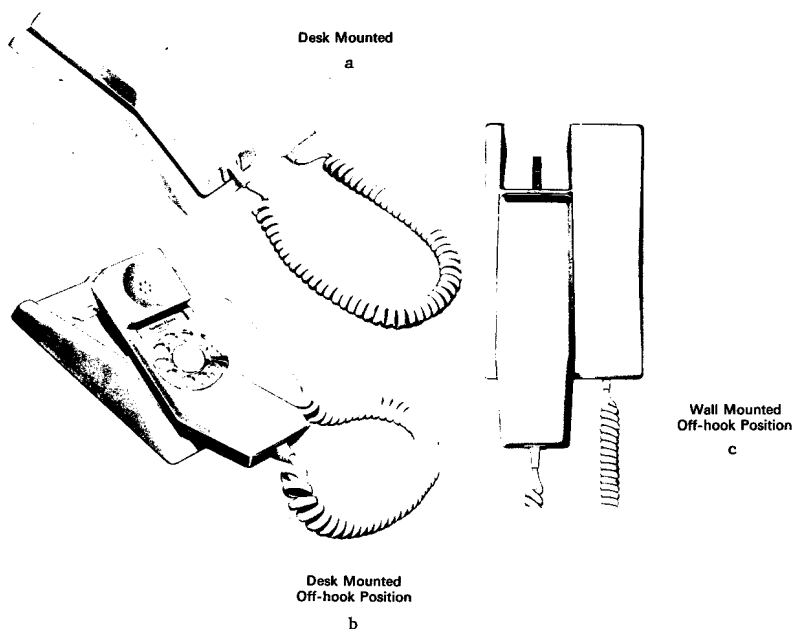


FIGURE 1

2.02 These telephones come in nine decorative colors with a number coding as follows:

Ivory	-50	Mauve	-22
Green	-51	Bright Red	-23
Light Beige	-60	Pale Yellow	-24
Warm White	-20	Deep Blue	-25
Deep Turquoise	-21		

2.03 The set uses a modified NE-D1B ringer which is used in the 600 Series Telephones. This modified ringer (NE-D1QA) uses a volume control wheel which requires a slight relocation of components.

2.04 The T1 and U1 Transmitter and Receiver units are used in conjunction with a repackaged network and are electrically compatible to the standard 500 Series.

2.05 The Contempra Set is equipped with non-skid pads for desk use, and a provision for wall mounting which includes entrance holes for concealed or surface wiring.

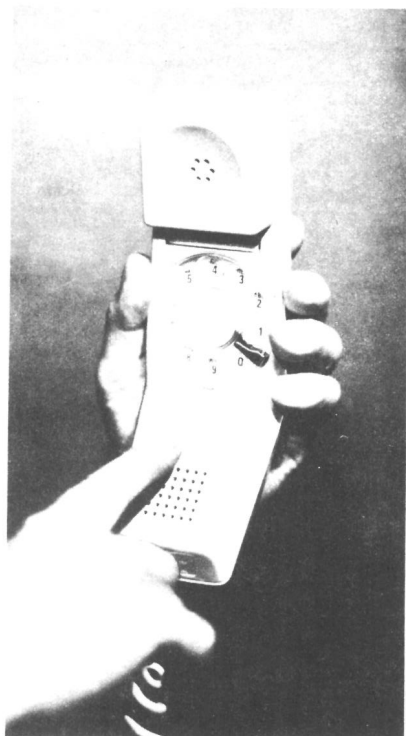
2.06 The dial finger wheel has a smaller diameter than that used in the 500 Sets, but the size of the finger holes has not been reduced proportionally, therefore, the ten finger holes occupy the full 360 degree circumference. The finger stop moves clockwise so that the actual rotational movement is more than 360 degrees. When dialing a selected number, the full rotational follow of the finger stop is required.

2.07 A rectangular recall button is located just below the dial (Figures 2 and 3) so the subscriber can disconnect a call by depressing the button like a switch hook.

2.08 The Contempra Set is designed so that the handset may be placed in an obvious and secure call-waiting position. When used as a desk set, see Figure 4; for wall mounted sets, see Figure 1c.

2.09 The ringer volume control wheel is located on the right side of the telephone. A clockwise rotation of the control wheel increases the volume, and a counterclockwise rotation decreases the volume of the ringer. See Figure 5.

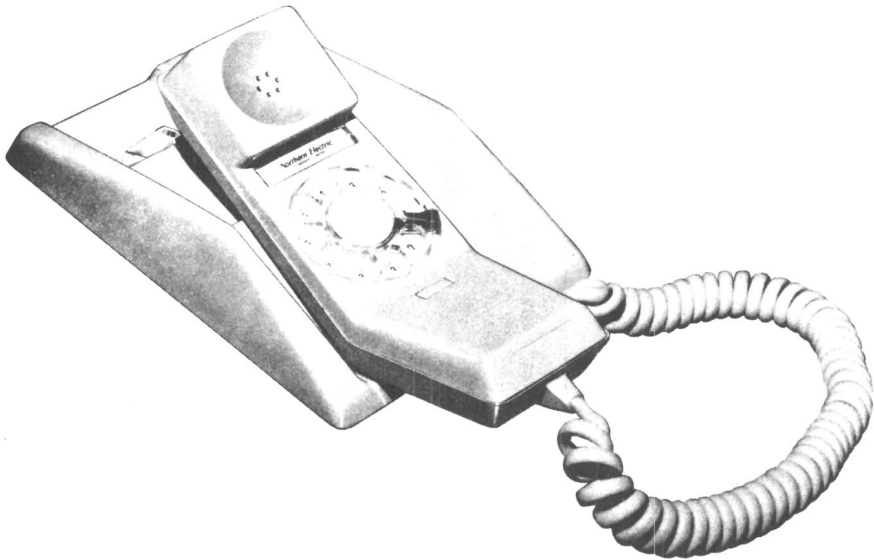
2.10 Contempra Sets are authorized for use only in areas or companies approved by the St. Louis corporate office.



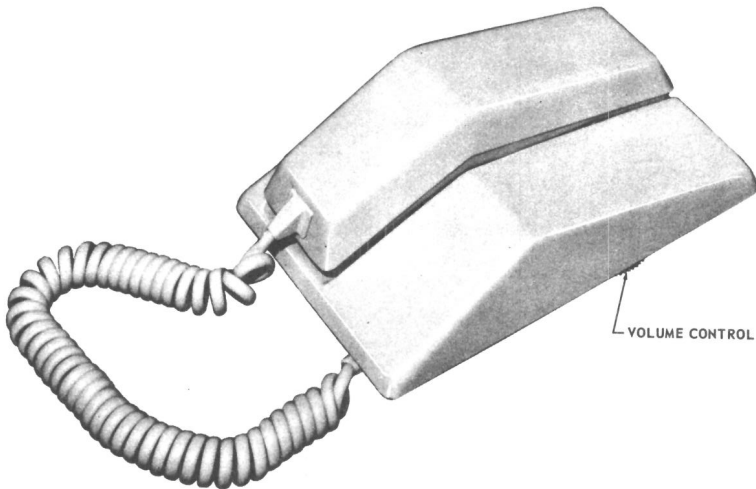
RECALL BUTTON
FIGURE 2



FIGURE 3



DESK MOUNTED CONTEMPRA TELEPHONE IN "OFF-HOOK" POSITION
FIGURE 4



LOCATION OF RINGER VOLUME CONTROL WHEEL
FIGURE 5

TELEPHONE SETS
TRENDLINE (TRIM-LINE)
DESCRIPTION

1. GENERAL

1.01 This practice covers the description of the Kellogg Trendline K-220C and K-220D.

2. DESCRIPTION

2.01 The Trendline set is a dial-in-handset telephone which may be used as a desk or wall set. The 220C and 220D have different bases but utilize the same type of handset and cord. See Figure 1.

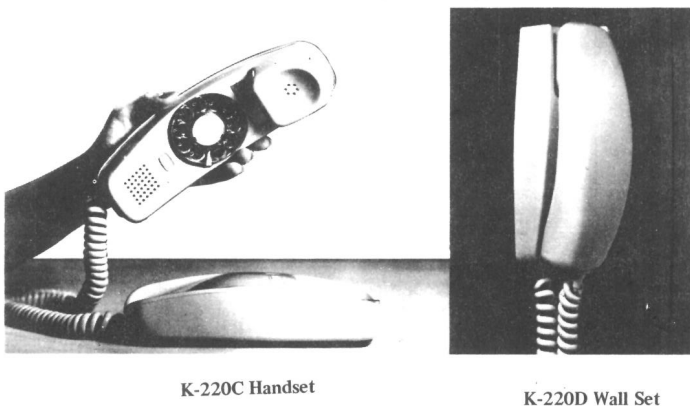


FIGURE 1.

2.02 The handset is equipped with a lamp which illuminates the dial when the phone is off hook. The light is powered by a transformer which is plugged into a nearby electrical outlet.

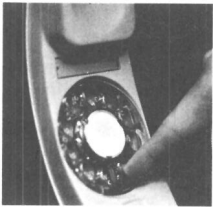
2.03 Trendline phones are available in six colors with a number code as follows:

- a. Green - 05
- b. Rose pink - 11
- c. Aqua blue - 12
- d. Light beige - 13
- e. White - 15
- f. Turquoise - 30

- 2.04 The set uses a 152- or 153-type ringer.
- a. The 153 (BA) 470 is a straight line biased ringer.
 - b. The 152 (-) 470 is a frequency selective ringer which includes the matching capacitor.
The breakdown is as follows:

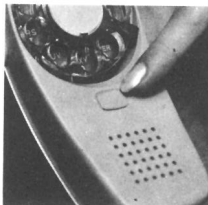
Harmonic		Synchronomic		Decimonic	
Code	Frequency	Code	Frequency	Code	Frequency
HA 1	33-1/3 CPS	HB 1	30 CPS	HC 1	20 CPS
HA 2	50 CPS	HB 2	42 CPS	HC 2	60 CPS
HA 3	66-2/3 CPS	HB 3	54 CPS	HC 3	30 CPS
HA 4	16-2/3 CPS	HB 4	66 CPS	HC 4	40 CPS
HA 5	25 CPS	HB 5	16 CPS	HC 5	50 CPS

- 2.05 The dial fingerwheel has a smaller diameter than that used in the 500 type sets. The size of the finger holes are not reduced proportionately; therefore, the ten finger holes occupy a full 360° circumference. The fingerstop moves clockwise so that the actual rotational movement is more than 360°. When dialing a selected number, the full rotational follow of the fingerstop is required. See Figure 2.



Finger Wheel Stop
FIGURE 2.

- 2.06 A small recall button is located below the dial (Figure 3) so that the customer can disconnect a call by depressing the button.



Recall Button
FIGURE 3.

- 2.07 The Trendline wall phone model is designed so that the handset may be placed in an obvious and secure call waiting position. See Figure 4.



Volume Control
Call Waiting Position
FIGURE 4.

- 2.08 The ringer volume control wheel is located on the bottom of the desk set and on the right side of the wall set.

QSK100 AND 2100 TYPE CONTEMPRA TELEPHONE SET INSTALLATION AND MAINTENANCE

CONTENTS	PARAGRAPH
GENERAL	1
DESCRIPTION	2
IDENTIFICATION	3
INSTALLATION	4
MAINTENANCE	5

1. GENERAL

1.01 This practice provides the description, installation, and maintenance information for the QSK100 and 2100 Type Contempra telephone sets.

1.02 This practice is reissued to update information on the Contempra sets. Because of the extensive additions, the location of these additions is not noted throughout this practice. **Remove from the file and destroy all copies of CTSP 480-101-401, Issue 1, 1969.**

2. DESCRIPTION

2.01 The Contempra is a two-piece telephone set (Figure 1) consisting of base and handset, and is a combined desk-wall-type telephone. When used as a desk-type telephone, it rests on the feet provided in the base of the set. When used as a wall-type set, it is mounted by using the mounting holes in the baseplate.

2.02 When the Contempra telephone set is used as a desk set, and the handset is in place, it rests in the recess provided in the base of the set. When the Contempra telephone is used as a wall set and the handset is in place, the lower edge of that portion of the handset that houses the receiver unit engages a projection provided as part of the handset recess.

2.03 The transmission circuit is the same as for a 500 type telephone set.

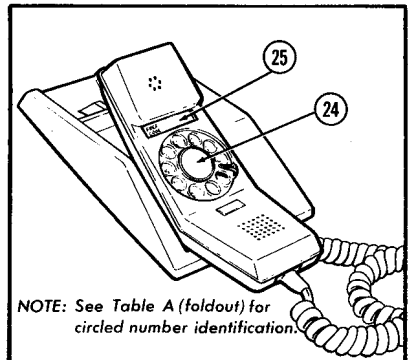
2.04 The QSK100 type telephone sets are equipped with a NE-10QA rotary dial (except QSK100C which has no dial), while the QSK2100 type telephone sets are equipped with a QDC1A Digitone dial.

2.05 The QSK100A and 2100A telephone sets are single-line telephone sets equipped with rotary and Digitone dials respectively (Figures 1 and 2).

2.06 The QSK100B and 2100B are the rotary and Digitone dial versions of the "Message Waiting" telephone sets (Figure 3).

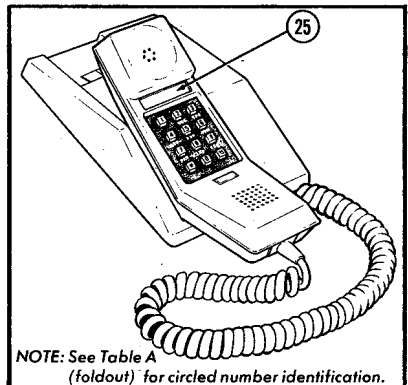
2.07 The QSK100C is the "manual" version of the QSK100A and no dial is required (Figure 4).

2.08 The QSK191A and 219A telephone sets are similar to the QSK100A and 2100A single-line sets except that they are not equipped with a ringer; instead, they have a mounting bracket mounted in place of the ringer, which may be used to mount a frequency selective type ringer.



NOTE: See Table A (foldout) for circled number identification.

FIGURE 1. Desk Mounted "Off-Hook" Position



NOTE: See Table A (foldout) for circled number identification.

FIGURE 2. Desk Mounted "Off-Hook" Position

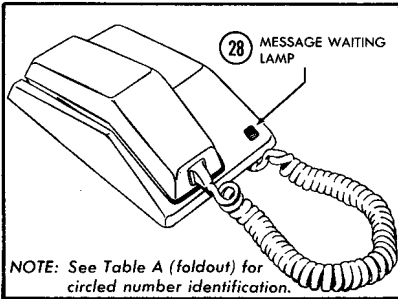


FIGURE 3. QSK100B Message Waiting Telephone

2.09 The QSK110A and 2110A are two-line telephone sets, equipped with a nonlocking press-to-operate key which provides a signaling or grounding feature.

2.10 Telephone sets coded with a letter (A, B, etc.) are for telephone company use only, and have "Telephone Company Property—Not for Sale" marked permanently on the underside of the baseplate.

2.11 A three-conductor cord is supplied with all codes of the Contempra (except the QSK110A and 2110A) which are equipped with a six-conductor cord. Other mounting cords, if required, may be ordered separately.

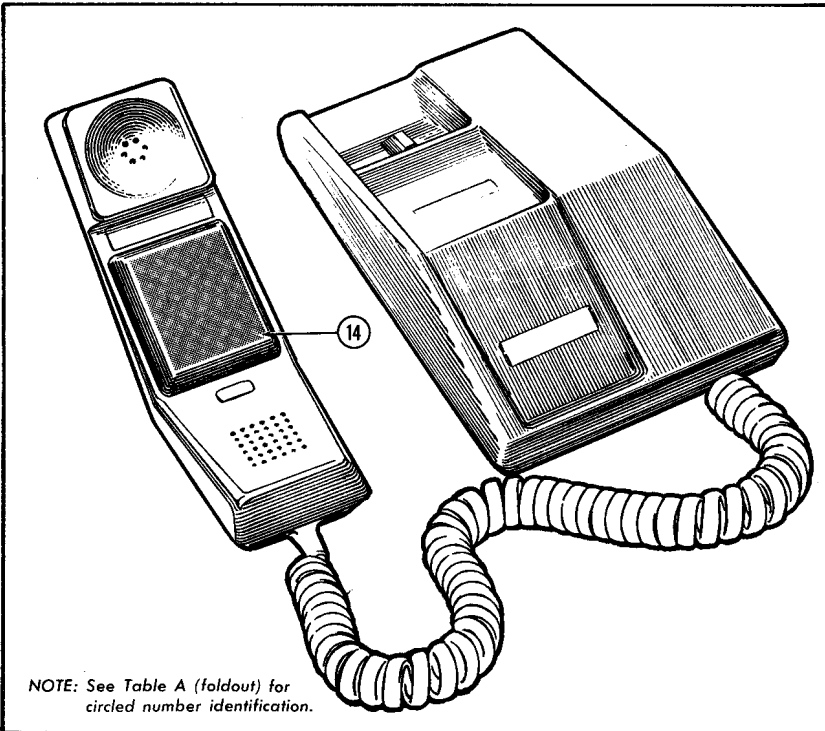


FIGURE 4. QSK100C Manual Telephone

3. IDENTIFICATION

3.01 All single-line Contempra telephone sets are furnished wired for individual service. Wiring changes can be made to allow their use for the following services:

- a. Tip party flat rate.
- b. Ring party flat rate.
- c. 1A1 Key Systems.
- d. Tip party dial message rate.
- e. Tip party automatic message identification.

3.02 Figures 1 through 8 show component parts of the Contempra. The circled numbers in Figures 1 through 8 are identified in Table A. The wiring options for the QSK110A and 2110A two-line Contempra sets are shown in Tables B and C.

3.03 All Contempra telephone sets are available in the following colors:

- a. Warm White—20.
- b. Deep Turquoise—21.
- c. Mauve—22.
- d. Bright Red—23.
- e. Pale Yellow—24.
- f. Deep Blue—25.
- g. Ivory—50.
- h. Green—51.
- i. Beige—60.

3.04 The QSK110 and 2110 sets are equipped with a dual purpose switch on the right-hand side of the baseplate (Figure 7) in front of the ringer volume control. The switch located closest to the front of the set is a two-position slide switch. The position towards the front of the set is referred to as "Line 1", while the position towards the volume control is referred to as "Line 2". The movement of this switch transfers the

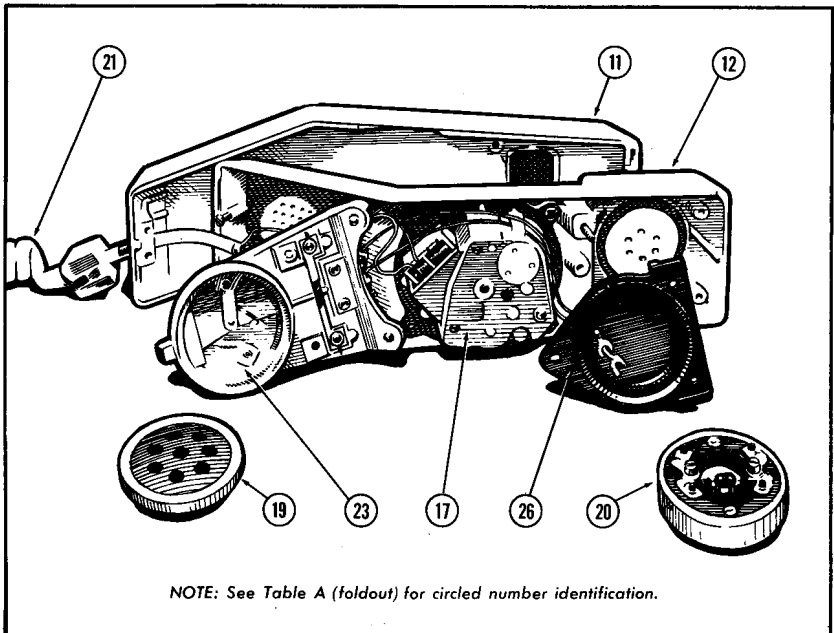


FIGURE 5. Parts of Handset Assembly NE-H1Q Type

TABLE B. QSK100A Connections Single-Line Telephone, Rotary Dial

CLASS OF SERVICE	CONNECTIONS AT CONNECTING BLOCK DESK TYPE ONLY										CONNECTIONS AT NETWORK & TERM STRIP DESK AND WALL											
	LINE					MTG. CORD					BASE CORD OR STATION WIRE				RINGER LEADS*				SWITCH LEADS			
	Ring	Tip	GND (A1)	A	LK	R	G	Y	BK	W	R	G	Y	BK	W	R	BK	S	S R	S	S Y	S BR
Bridged	R	G	Y	—	—	R	G	G	—	—	L2	L1	G	—	—	L2	L1	K	A	L3	L2	C
Ring Party (See Note 3)	R	G	Y	—	—	R	G	Y	—	—	L2	L1	G	—	—	L2	G	K	A	L3	L2	C
Tip Party Except Dial Message Rate (See Note 3)	R	G	Y	—	—	G	R	Y	—	—	L2	L1	G	—	—	L2	G	K	A	L3	L2	C
Tip Party Dial Message Rate (See Note 1)	R	G	Y	—	—	G	R	Y	—	—	(L1)	(L2)										
Tip Party Automatic Number Identification (See Note 1)	R	G	Y	—	—	G	R	Y	—	—	L2	L1	G	—	—	K	A	G	L2	L3	L2	C
1A1 Key System (See Note 2)	R	G	Y	BK	—	R	G	Y	BK	—	□	L1	G	L2	—	C	L1	K	A	L3	G	L2

Circled letters (L1) indicate terminals on wall set. All other other terminals are common.
☐ For wall mounted set, connect ring (red) incoming line to Y on terminal strip and strap Y to C of network using an NE-MTW cord.

NOTE 1: For these connections, the NE-H1QBX Handset and H8QA-cord are necessary for proper operation of recall switch and central office equipment. (See Table C.)

NOTE 2: For 1A1 key systems, the NE-D4QC line cord is necessary.

NOTE 3: To help reduce induced line noise, the red ringer lead may be changed from L2 to L3. This will disconnect the ringer from the line when the handset is off-hook; however, the ringer will not operate when the recall switch is depressed.

* Ringer not supplied with QSK191C.

TABLE C. OSK2100A Connections Single-Line Telephone, Digitone Dial

CLASS OF SERVICE	CONNECTIONS AT CONNECTING BLOCK DESK TYPE ONLY						CONNECTIONS AT NETWORK & TERM STRIP DESK AND WALL											
	LINE			MTG. CORD			BASE CORD OR STATION WIRE						RINGER LEADS*			SWITCH LEADS		
	Ring	Tip	GND (A1)	A	LK	R	G	Y	BK	W	R	G	Y	BK	W	R	G	Y
Bridged	R	G	Y	—	—	R	G	G	—	—	L2	L1	G	—	—	L2	L1	X
Ring Party (See Note 3)	R	G	Y	—	—	R	G	Y	—	—	L2	L1	G	—	—	L2	L1	X
Tip Party Except Dial Message Rate (See Note 3)	R	G	Y	—	—	R	G	Y	—	—	L2	L1	G	—	—	L2	L1	X
Tip Party Dial Message Rate (See Note 1)	R	G	Y	—	—	R	G	Y	—	—	L2	L1	G	—	—	L2	L1	X
Tip Party Automatic Number Identification (See Note 1)	R	G	Y	—	—	R	G	Y	—	—	L2	L1	G	—	—	L2	L1	X
1A1 Key System (See Note 2)	R	G	Y	BK	—	R	G	Y	BK	—	X	L1	G	L2	—	X	L1	L2

NOTE 1: For these connections, the NE-H2QBX Handset and H6QA-cord are necessary for proper operation of recall switch and central office equipment. (See Table E.)

NOTE 2: For 1A1 key system, the NE-D4QC line cord is necessary.

NOTE 3: To help reduce included line noise, the red ringer lead may be changed from L2 to L3. This will disconnect the ringer from the line when the handset is off-hook; however, the ringer will not operate when the recall switch is depressed.

* Ringer not supplied with OSK2191.

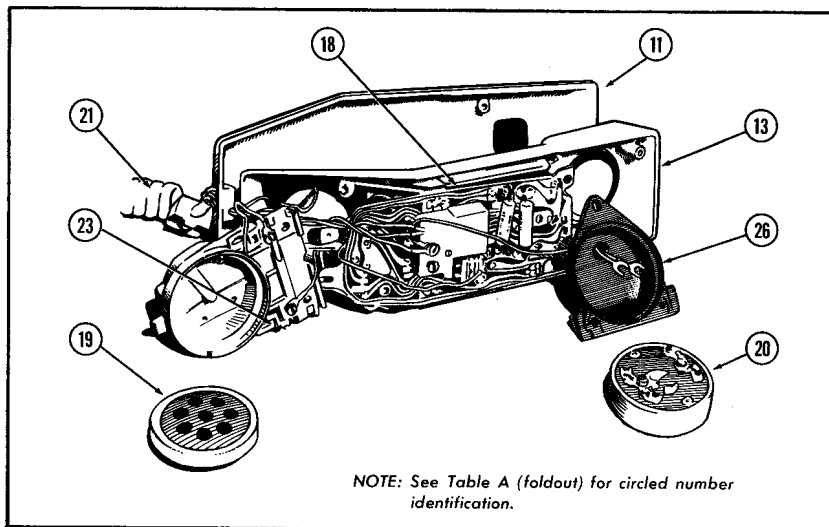


FIGURE 6. Parts of Handset Assembly NE-H2Q Type

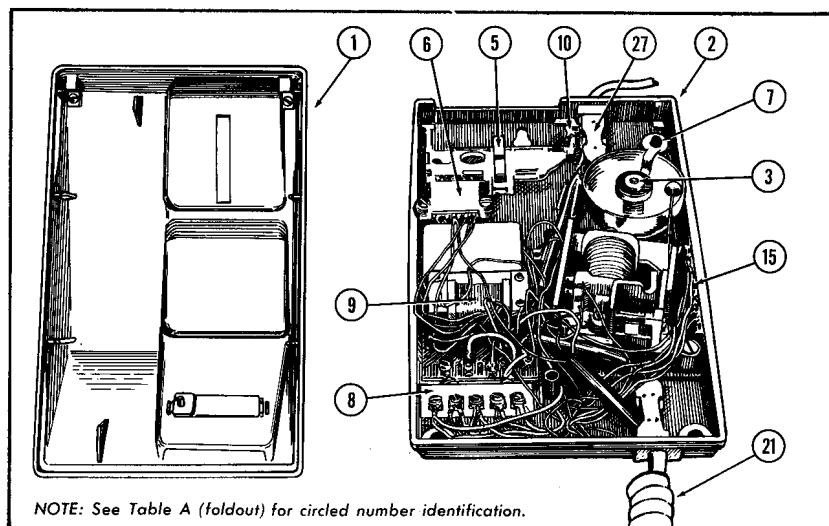


FIGURE 7. Components of Base Assembly

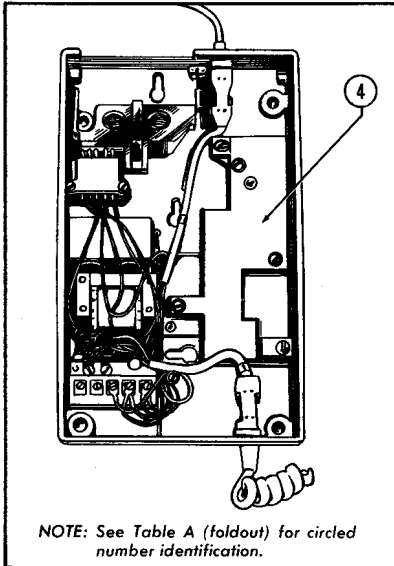


FIGURE 8. QSK191 Base Assembly—Showing Ringer Mounting Bracket

talking circuit of the telephone set to either of the two lines. The switch immediately behind the two-line slide switch and nearest to the ringer volume control is a "press-to-operate" switch which may be used as a grounding or signaling switch. The ringer is factory wired across Line 1.

3.05 The Contempra telephone sets contain a printed circuit type network of the QNB18 type, which is equipped with quick connect type terminals. Connections are made by pushing the spade tips into spring clips on either side of the terminal. (Each terminal holds two spade tips.) To avoid damage to the leads, use long-nose pliers to grasp the spade tip and use a slight sideways rocking motion while inserting or removing a spade tip. Use caution to ensure that the shank of the clip is not bent.

3.06 A recall button is located on the handset which can be used to disconnect for redialing, thus eliminating the need to operate the switchhook on each call. However, as the ringer is disconnected by the switchhook, incoming calls will not be received unless the receiver is on-hook (sets manufactured before January, 1970). **For sets manufactured after January, 1970, the ringer is not disconnected by switchhook when the receiver is off-hook.**

3.07 To adjust the ringer volume, a wheel that protrudes through the baseplate at the side of the set has been provided. (See Figure 9.) Moving a screw will allow this wheel to completely silence the

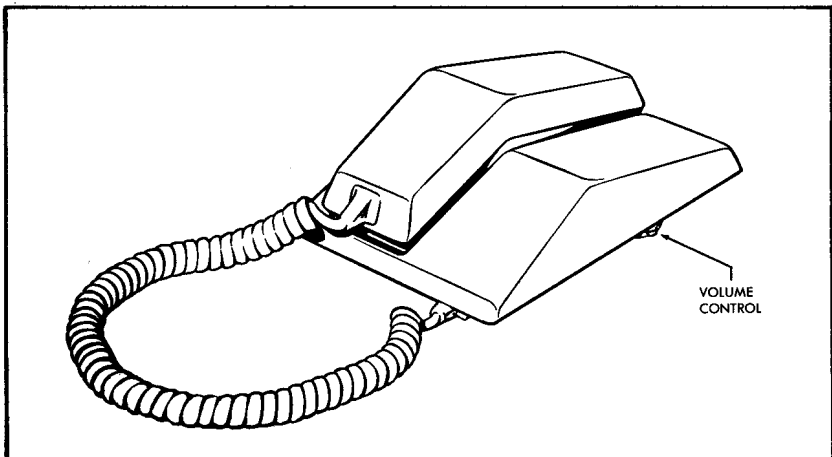


FIGURE 9: Location of Ringer Volume Control Wheel

ringer. However, ringer cut-off must not be provided unless authorized.

4. INSTALLATION

4.01 Disassembly:

a. To remove the molded housing from the base:

(1) Remove card retainer (or window) located near the front of the housing. To remove card retainer, insert the tip of the NS167050 List 3 releaser tool into the small slotted hole at the edge of transparent window. Ensure that the tip does not enter the hole by more than one-eighth of an inch as an underlying screw may hinder the lateral movement of the tool. Apply a slight pressure to the handle of the tool. (See Figure 10.) The housing projection provides a fulcrum. This will bow the window upward so that its edges may be grasped with the fingertips of the other hand to spring it out.

(2) Remove the number card, if present.

(3) Loosen the exposed captive screw sufficiently so that the front of the housing may be lifted free of the base.

(4) Continued lifting of the cover enables the housing latches to disengage and free the cover.

b. To open the handset:

(1) Remove the card retainer and the number card located above the dial.

(2) Remove the handset grommet by holding the handset with the back or smooth section in the palm of the hand. Insert about 1/16-inch of the tip of the NS16750 List 3 releaser tool into the small slot adjacent to the grommet. (See Figure 11.) Press the handle of the tool towards the grommet and push the shank into the slot as far as it will go. Push the handle of the releaser tool away from the grommet to release the returning spring and gently ease the grommet out of the handset shell.

(3) Once the grommet has been withdrawn, two screws are exposed. Loosen these two screws by about 3/16-inch only, as it is not desirable or necessary to remove them.

(4) Free (do not remove) the captive screws in the cord retainer well. Loosen sufficiently to separate the handset sections at the receiver end; then slide the smooth or back half of the handset housing towards the cord grommet to release this section from the slotted screw holes at the grommet.

c. Installation of base mounting cord (NE-D3Q5A):

(1) Enter the spade tipped leads at the grommets end of the line cord through the square hole in the edge of the base.

(2) Push the grommet through the opening so that the narrow section aligns with the square projections directly in front of the grommet entry.

(3) Push the grommet down firmly to engage between projections.

(4) Press the jacketed portion of the cord into the channel beside the NE-DIQA ringer and between the projections located about midpoint on the base. Dress the leads under the existing wiring; loop them around the right side of the housing screw stud and connect to the terminal block in accordance with Table B or D.

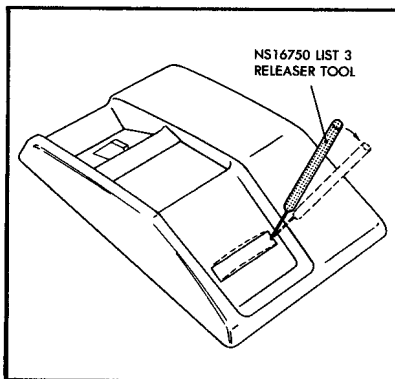


FIGURE 10. Removal of Card Retainer

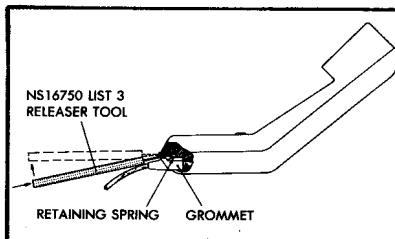


FIGURE 11. Removal of Handset Grommet

TABLE D. Base Cord Connections Single-Line Telephone

COLOR	NE-H5QE-Cord	
	BASE	HANDSET
G	F	GN
Y	RR	Y
BL	GN	BL
BK	B	BK
R	B	R
W*	A*	W*

* For Tip Party ANI Use NE-H1QBX Handset with NE-H6QA Cord

4.02 Wall Mounted (Figure 12):

a. Remove line cord. The center key opening in the base is normally used for the entry of the station wiring. The slots at the hookswitch end of the set and the one just below the ringer are used for normal wall mounting. For mounting on an outlet box, the key at the center of the set and the one just below the ringer are used. Additional space may be opened for the entrance of wire from the outlet box, when necessary, by placing the set on a flat surface, placing a screwdriver in the detent adjacent to the center key and giving the screwdriver a sharp knock downward. This action will shear out an additional opening leading into the center key. If a mounting screw fails to hold, knockouts can be made near the handset cord or under the switch plunger, as necessary, for the addition of another screw without having to move the complete installation. These knockouts should not be opened unnecessarily. If it is necessary to bring the station wire up the wall from the baseboard, an opening can be uncovered for wire entry by removing the handset cord grommet from the base, rotating it 180° and replacing it.

b. To provide the ringer cut-off feature (when authorized), change the position of the lever associated with the ringer volume control wheel. With housing of the base off, remove the screw that holds the lever in contact with the wheel, shift the lever to the opposite end of the slot, place the screw in the hole that was under the lever and tighten.

4.03 Reassembly:

a. Base:

(1) Dress line cord leads and other wiring away from the housing retaining screw post on the base of the telephone set.

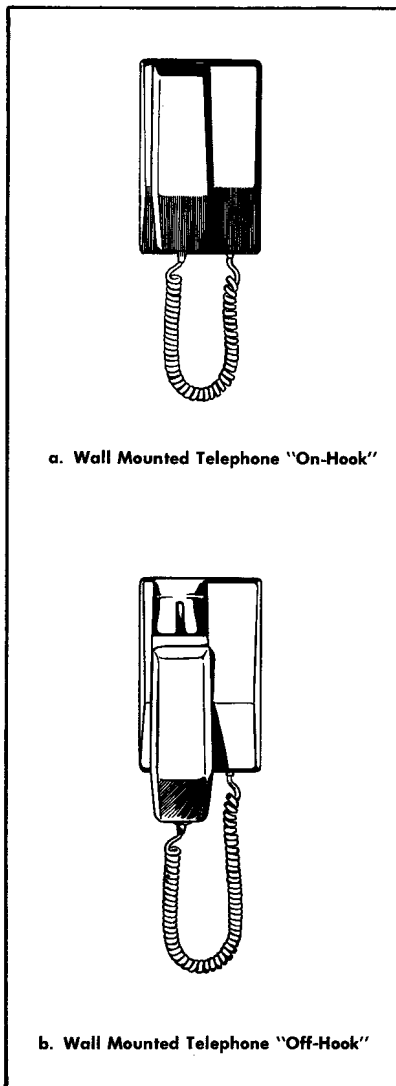


FIGURE 12.

(2) Locate housing at an angle to the base as shown in Figure 13.

(3) Press rear of housing down and toward the back of the base to engage the housing latches with the notches in the base.

(4) Push front of housing down, ensuring that latches remain in notches, so that the retaining screw enters the tapped post in the base.

(5) **Carefully tighten the screw snugly, without undue force.**

(6) Insert a station card number and the retainer window in the well in the base.

b. Handset:

(1) Align the jacketed portion of the handset cord which projects beyond the grommet and

into the handset, so that it will fit the channel in the transmitter cup assembly.

(2) Dress receiver leads through clip or dial cover wire retainer of rotary dials.

(3) Slide the two handset sections together so that the two slots at the grommet end slide under the heads of the screws in the apparatus section.

(4) Carefully align sections so that the two screws in the number plate slot will engage the tapped post holes in the other section.

(5) Tighten screws; two in the grommet cutout and two in the number plate well. Tighten the screws snugly without undue force.

(6) Slide the grommet into the square hole in the end of the handset housing with the

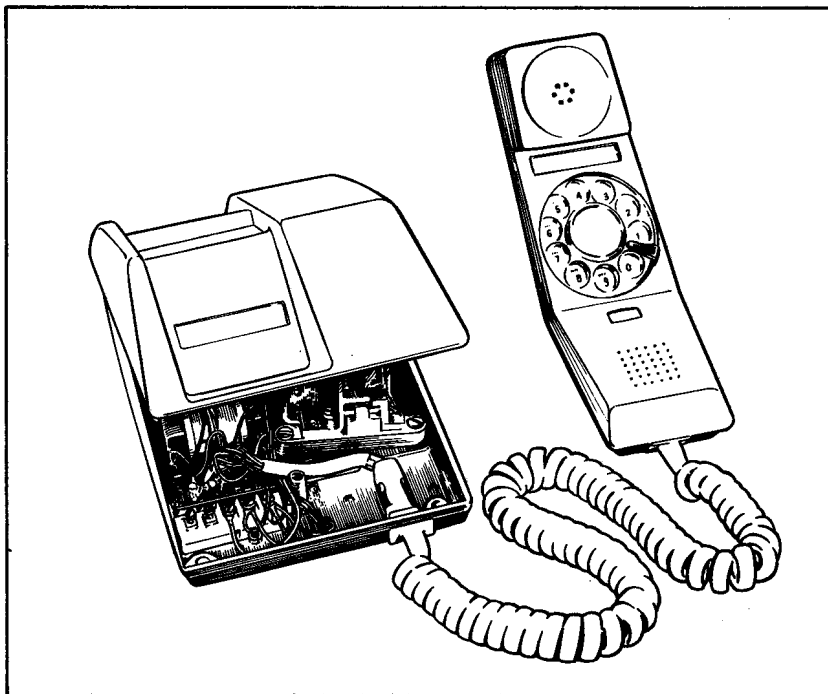


FIGURE 13. Reassembly of Housing

retaining clip facing the instrument section of the handset. Fully seat the grommet so that the clip will engage. The grommet shoulder should be flush with the surface of the housing.

(7) Insert a station number card and card holder window into the well on the handset.

5. MAINTENANCE

5.01 Normal maintenance may involve replacement of the following parts (see Table A, foldout, for identification of parts):

- a. Dial.
- b. Cords.
- c. Transmitter.
- d. Receiver.
- e. Ringer.
- f. Feet.
- g. Switchhook.
- h. Transmitter Cup.

NOTE: In case of a defective dial, replace; do not attempt repair in the field.

5.02 To replace Digitone dial:

- a. See paragraph 4.01 for instructions on opening of the handset.
- b. Loosen two screws and remove one screw attaching the circuit board to the transmitter cup.

c. Remove two mounting screws attaching dial and transmitter cup to instrument section.

d. Remove leads from terminal strip on back of dial.

e. Replace dial and assemble two mounting screws.

f. Reconnect lead colors to agree with terminal designations. (See Figure 14 for lead dressing.)

g. See paragraph 4.02 for instructions on reassembly of handset.

5.03 To replace transmitter, Digitone set:

- a. Open handset (see paragraph 4.01).
- b. Loosen two screws attaching dial and transmitter cup to the instrument section.
- c. Lift the dial and transmitter cup as a unit.
- d. Replace transmitter.
- e. Reassemble screws.
- f. Close handset (see paragraph 4.03).

5.04 To replace rotary dial:

- a. See paragraph 4.01 for instructions on opening handset.
- b. Remove dial leads from terminals located on transmitter cup.
- c. Remove four (4) mounting screws.
- d. Replace dial.

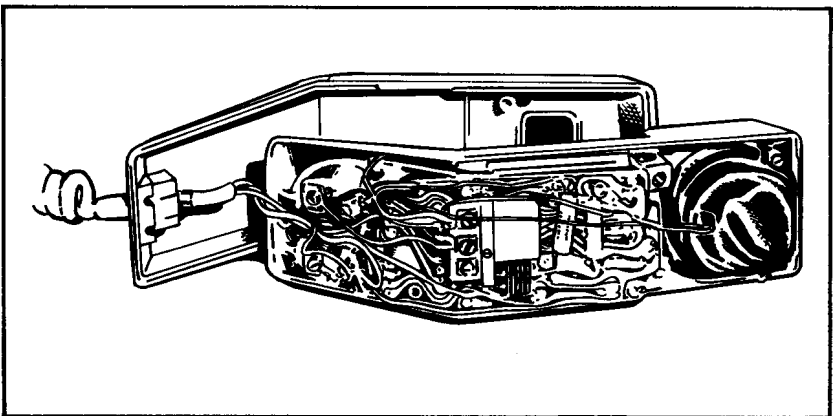


FIGURE 14. Digitone Handset Showing Lead Dressing

e. See paragraph 4.03 for reassembly instructions.

5.05 To replace transmitter, rotary set:

- a. Open handset (see paragraph 4.01).
- b. Loosen two (2) screws holding transmitter cup.
- c. Lift transmitter cup and replace transmitter.
- d. Close handset (see paragraph 4.03).

5.06 To replace receiver:

- a. Open handset (see paragraph 4.01).
- b. Loosen completely the three screws holding the receiver cup and remove the two end screws.
- c. Lift slightly by leads so that cup and receiver may be grasped as a unit and move back and upward.
- d. Slide cup along leads.
- e. Disconnect and replace receiver.
- f. Slide cup back along leads.
- g. Line up front screw (still in cup) with hole in post and run down.
- h. Replace two end screws.
- i. Reassemble handset (see paragraph 4.03).

5.07 Handset cord replacement:

- a. **Rotary:** See paragraphs 4.01 and 4.03.
- b. **Digitone:** The outer sheath of the handset cord must be cut back to within 1 inch of the handset grommet. (See Figures 15 and 16.) See Tables D and E for base and handset connections.

5.08 Rotary Dial Center Disc: Insert the NS16750 L3 releaser tool in the small hole adjacent to the number 5 hole and pry off disc.

5.09 Rotary Dial Fingerwheel: If replacement is necessary, replace complete dial.

5.10 Line cord replacement is covered in paragraphs 4.01 and 4.03.

5.11 Ringer:

- a. Open base (see paragraph 4.01).
- b. Loosen screw in volume control and mounting screws of ringer.
- c. Remove ringer leads.
- d. Replace ringer.
- e. Close base (see paragraph 4.03).

6. CONNECTIONS

6.01 The connections for single-line sets are shown in Tables B, D and E and Figure 17, 18 and 19 for

TABLE E. Digitone Handset Cord Connections

COLOR	NE-H5QE-Cord	
	BASE	HANDSET
G	X	GN
T	C	Y
BL	BN	BL
BK	R	BK
R	B	R
W*	A*	W*

** For Tip Party ANI Use NE-H2QB Handset with NE-H6QA Cord*

rotary dial sets. See Tables C, D and E and Figures 20 and 21 for Digitone dial sets.

6.02 Connections and options available for the two-line sets QSK110A and QSK2110A are shown in Table F and Figures 22 and 23.

6.03 Typical connections for the type 8A buzzer are shown in Figure 24.

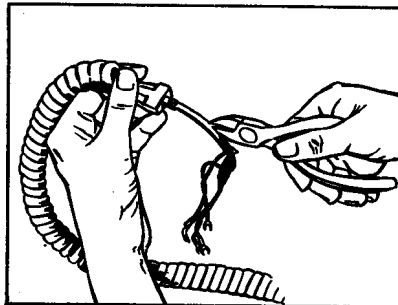


FIGURE 15. Slitting Sheath

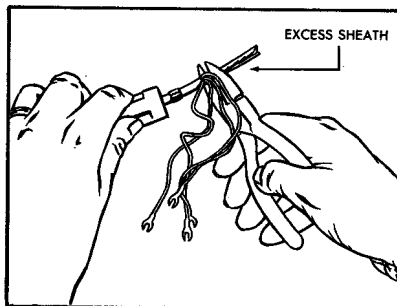


FIGURE 16. Cutting Sheath

OPTIONS			SELECTOR SWITCH USED TO CUT OFF:		CONNECTIONS IN TELEPHONE SET										EXTERNAL CONNECTIONS FOR MOUNTING CORD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
OPTION NUMBER	NO. OF LINES	"A" LEAD CONTROL	3 TYPE SPEAKERPHONE	BUZZER IN SET	SIGNALING	LINE RINGER	EXTENSION SET OR RINGER IN SET	AUXILIARY RECEIVER	RINGER FROM OPEN LINE	MOUNTING CORD SET ENDS SELECTOR SWITCH LEADS CONNECT TO:										BUZZER LEADS CONNECT TO:										LINE 1		LINE 2		SIGNAL		SPEAKER PHONE		"A" LEAD CONNECTION		CUTOFF CIRCUIT																																																																																																																																																																																																																																																																																																																																																																																																																																																														
										R	G	Y	KB	KL	W	S	P	G	Y	W	BK	Y	BL	R	BK	S	V	5	6	7	8	9	10	11	12	13	14	15	16		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462

+ Indicates connection to terminal strip.

DD Indicates dead dress.

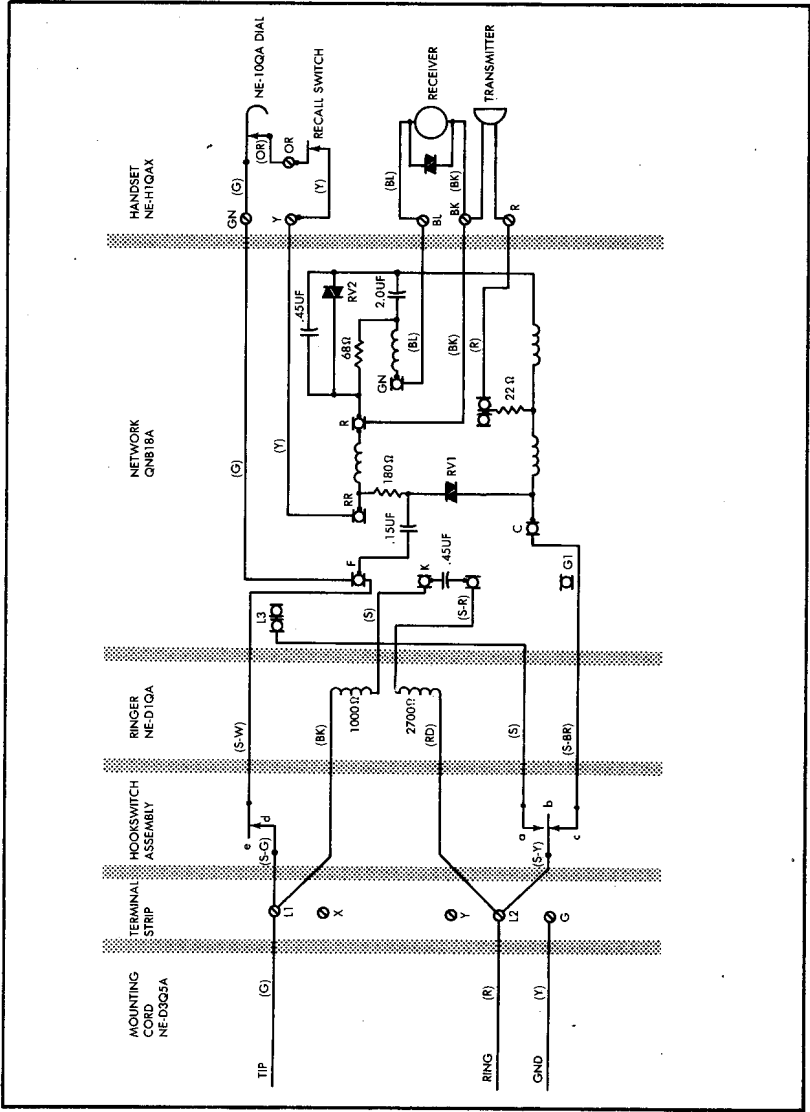


FIGURE 17. QSK100 and QSK191A Telephone Sets—Connections Single Line, Rotary Dial

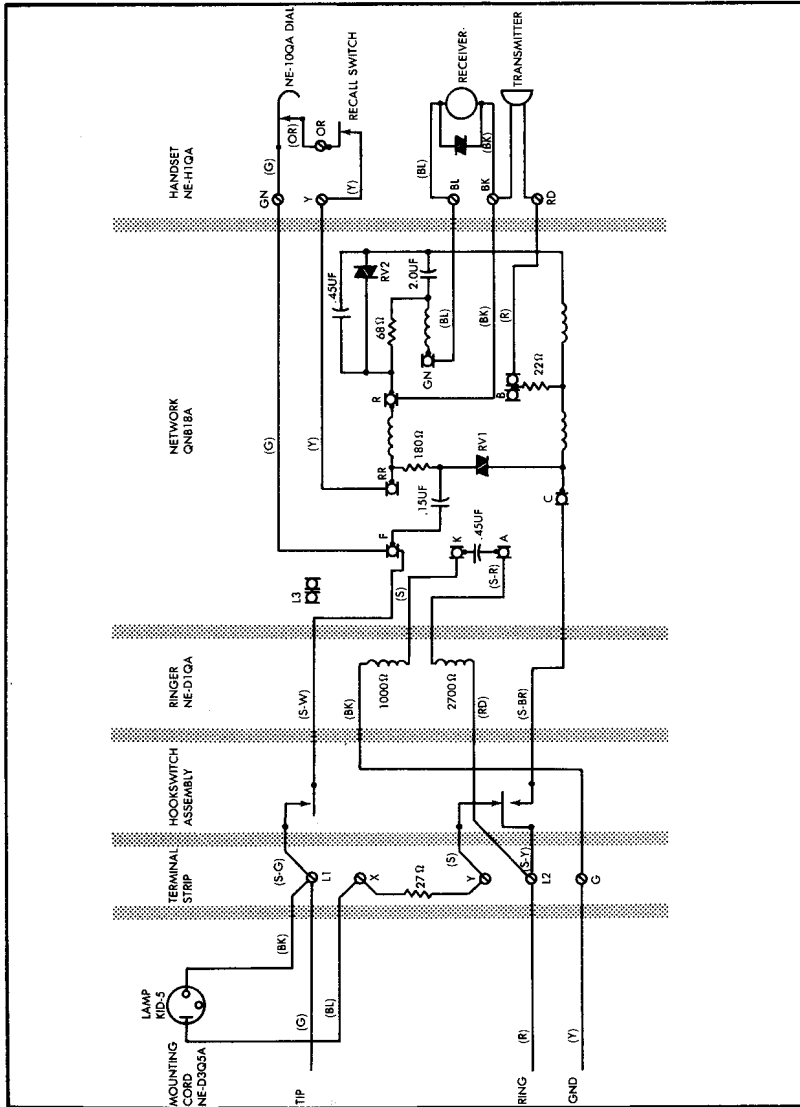


FIGURE 18. QSK1008 Telephone Set—Connections Message Waiting, Single Line, Rotary Dial

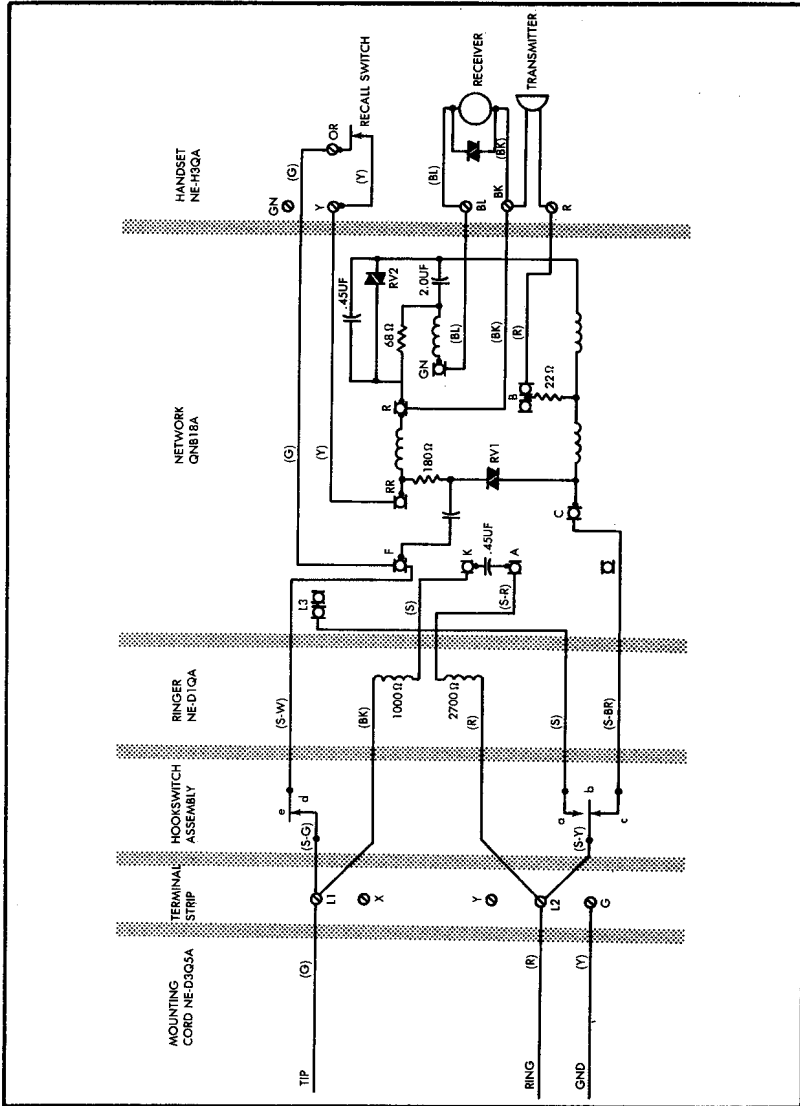


FIGURE 19. QSK100C Telephone Set—Connections Manual, Single Line, Rotary Dial

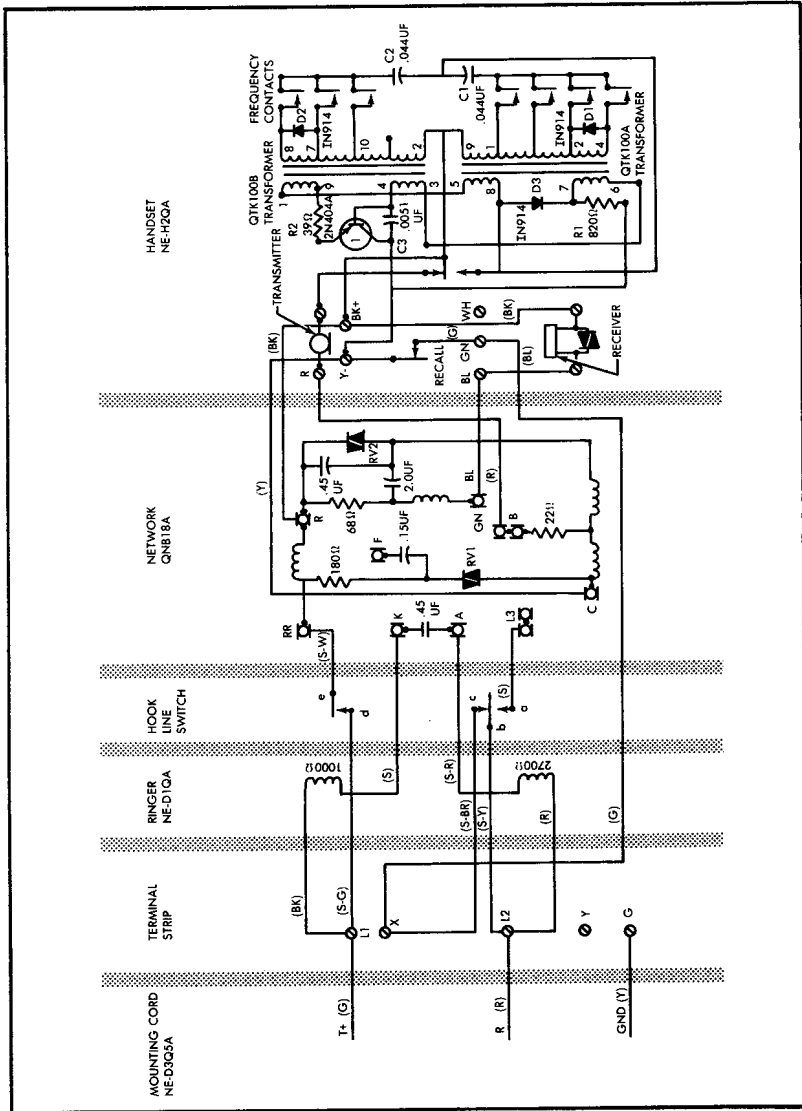


FIGURE 20. QSK2100A and QSK2191A Telephone Set—Connections Single Line, Digitone Dial

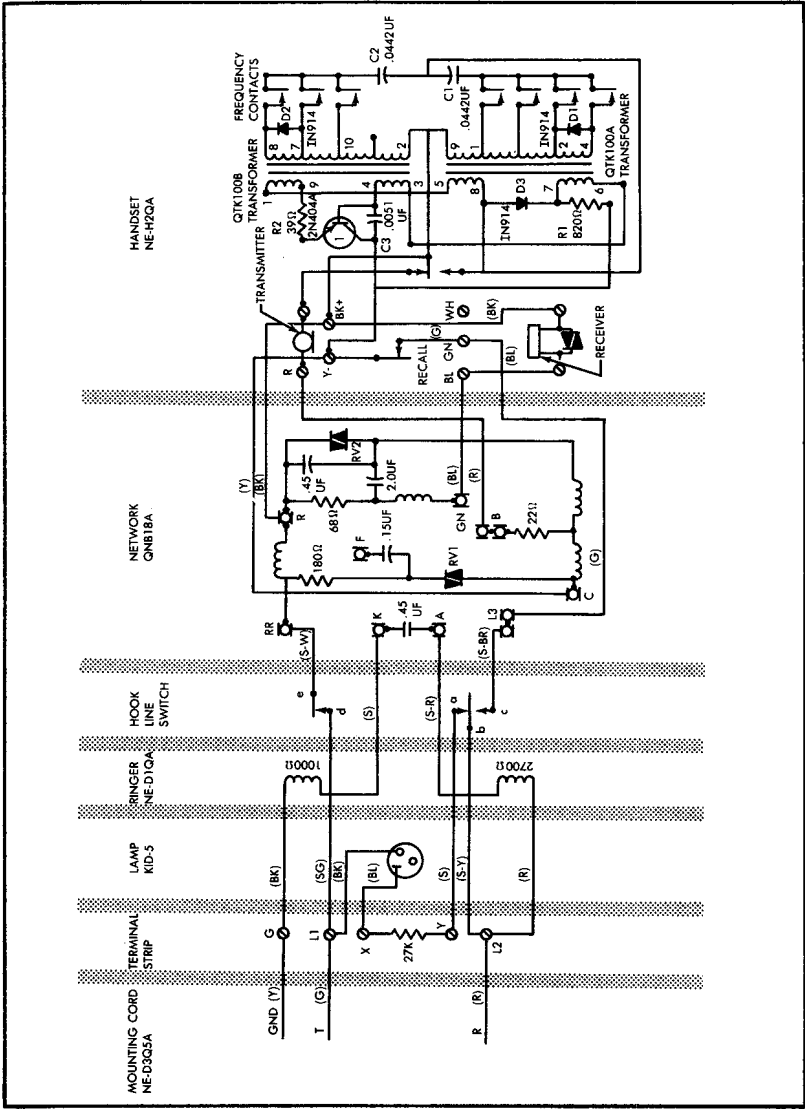


FIGURE 21. QSK2100B Telephone Set—Connections Message Waiting, Single Line, Digitone Dial

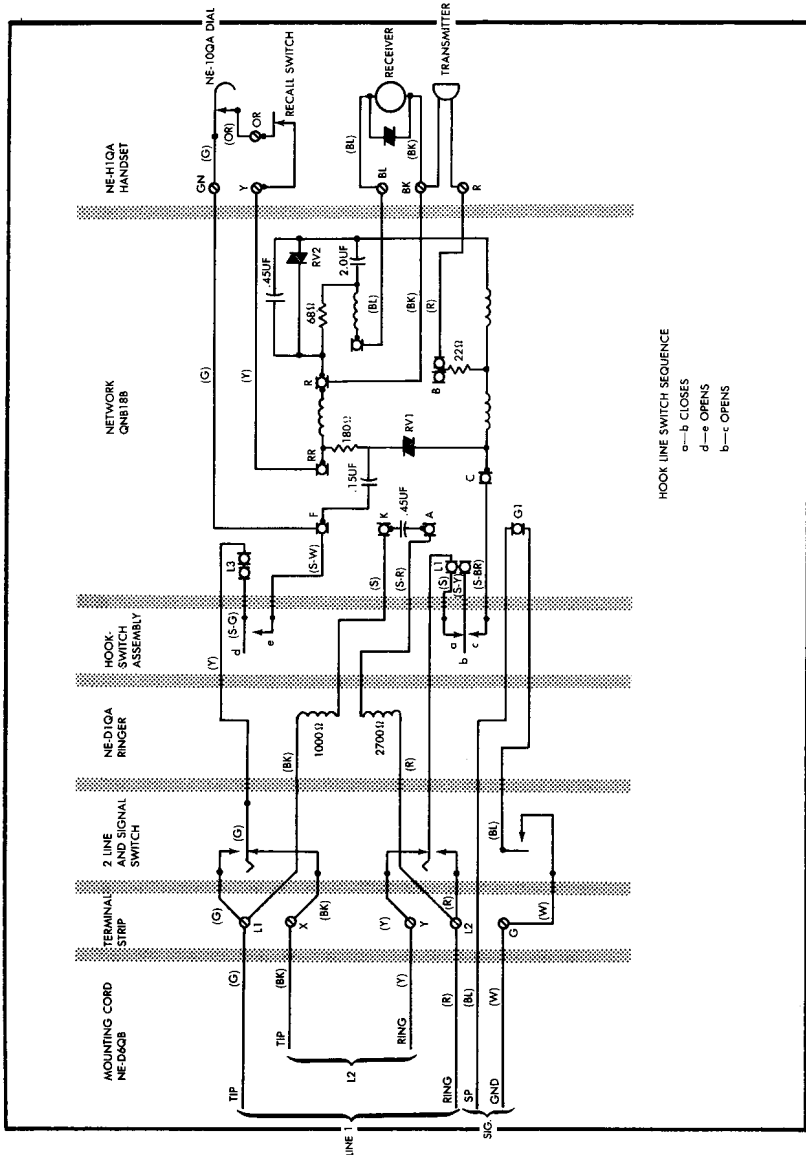


FIGURE 22. QSK110 Telephone Set—Connections Two Line, Rotary Dial

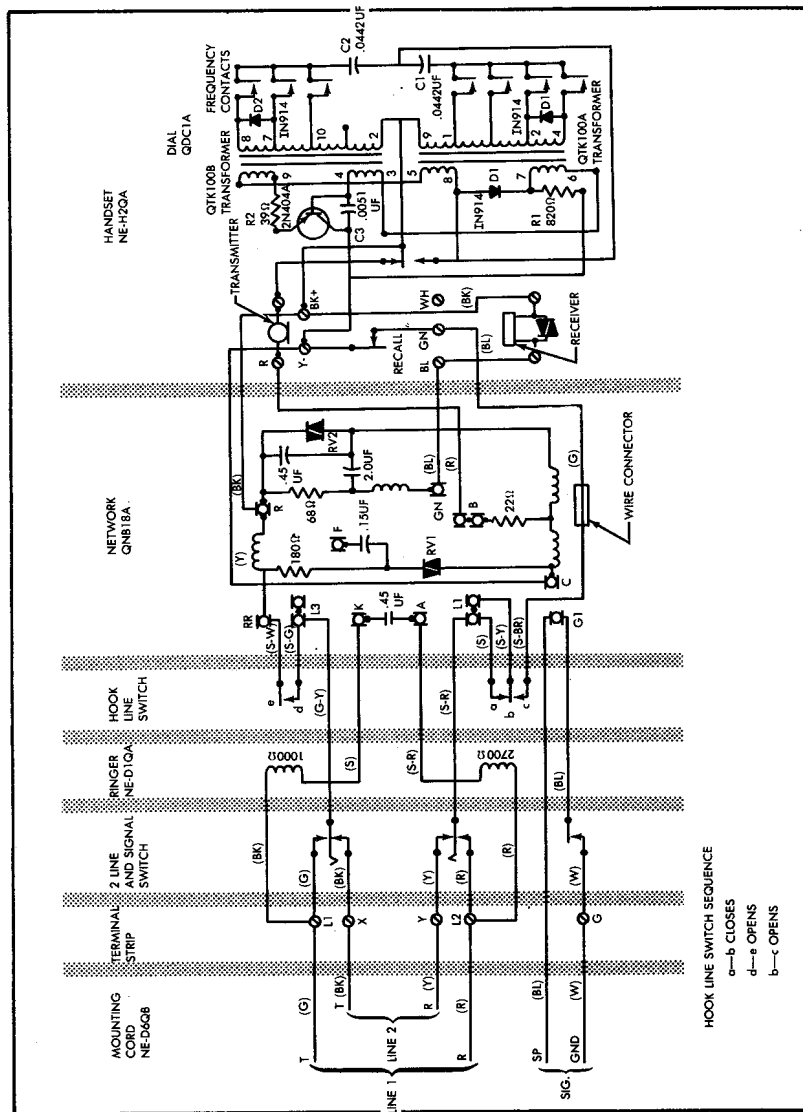


FIGURE 23. QSK2110A Telephone Set—Connections Two Line, Digitone Dial

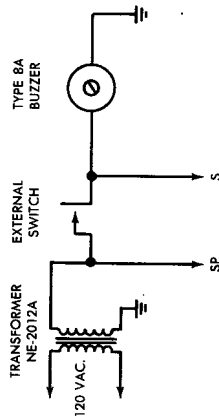


FIGURE 24. Typical Connections for Type 8A Buzzer

**TABLE A. Major Components of the QSK100
and QSK2100 Type Telephone Sets**

Item Number	Identification	Description	QSK 100A*	QSK 100B*	QSK 100C*	QSK 110A*	QSK 191A*	QSK 2100A*	QSK 2100B*	QSK 2110A*	QSK 2191A*	Shown On
1	P096D200-299* P0891200-299* P0891400-489*	Housing Assembly (Base) (Base)	1	1	1		1	1		1	1	Fig. 7 Fig. 7 Fig. 7
2	P096D314 P0897581	Baseplate Baseplate	1	1	1	1	1	1	1	1	1	Fig. 7 Fig. 7
3	NE-D1QA	Ringer	1	1	1	1		1	1	1		Fig. 7
4	P0897534	Ringer Mounting Bracket					1				1	Fig. 8
5	P096D337	Line Switch Operating Plunger Assy.	1	1	1	1	1	1	1	1	1	Fig. 7
6	P0894971	Line Switch Assy.	1	1	1	1	1	1	1	1	1	Fig. 7
7	P096D326	Foot	4	4	4	4	4	4	4	4	4	Fig. 7
8	P096D303	Terminal Strip Assembly										Fig. 7
9	QNB18A QNB18B	Network Network	1	1	1		1	1	1		1	Fig. 7 Fig. 7
10	P096D322	Spring	1	1	1	1	1	1	1	1	1	Fig. 7
11	P0892000-099*	Handset Cover Assy.	1	1	1	1	1	1	1	1	1	Fig. 5, 6
12	P0892100-199*	Handset Instrument	1	1		1	1					Fig. 5
13	P0892200-299*	Section Assembly			1			1	1	1	1	Fig. 6
14	P0896855	Inset Assembly			1							Fig. 4
15	P0897585	Switch Assembly				1				1		Fig. 7
17	NE-10QA	Dial (Rotary)	1	1		1	1					Fig. 5
18	QDC1A	Dial (DIGITONE)						1	1	1	1	Fig. 6
19	NE-T1	Transmitter Unit	1	1	1	1	1	1	1	1	1	Fig. 5, 6
20	NE-U1	Receiver Unit	1	1	1	1	1	1	1	1	1	Fig. 5, 6
21	NE-H5QE*	Handset Cord	1	1	1	1	1	1	1	1	1	Fig. 5, 6
22	P096D309	Transmitter Cup	1	1		1	1					Fig. 5
23	P0895021	Assembly			1			1	1	1	1	Fig. 6
24	P096E700-799*	Dial Center Disc	1	1		1	1					Fig. 1
25	P096D313	Card Holder Window			2	2	2	2	2	2	2	Fig. 1, 2
Not Shown	P0896532	Card Holder Group (Contents of 2-P-96D313)	2	2	2	2	2	2	2	2	2	Fig. 1, 2
26	P096D305 NE-D305A*	Receiver Cup 5 Ft. 6 In. Cord for Individual and 2-Party Line (Note 1)	1	1	1	1	1	1	1	1	1	Fig. 5, 6 Fig. 7
27	NE-D40C*	Cord for NE-1A1 Key System (Note 1) (Standard on QSK110 and QSK2110) (Note 1)	1	1	1		1	1	1			Fig. 7 Fig. 7
28	K1D-5	Lamp—Message Waiting		1		1			1			Fig. 7 Fig. 3

NOTE 1: The NE-D40C and the NE-D6QB cord is available in the standard 5 foot 6 inch length, while the NE-D40C is also available in a non-standard 13 foot length by special order. Both cords must be ordered separately except in the case of the QSK110 and QSK2110 which come equipped with an NE-D6QB cord, 5 foot 6 inches long.

* Replace the last two digits of piece part numbered items with color identification code, as listed in paragraph 3.03 e.g., P096D220—Housing Assy, warm white. For coded apparatus add the color identification code after the dash following the apparatus code number, e.g., QSK100A-20.

TELEPHONE SETS

**TRENDLINE (TRIM-LINE)
INSTALLATION AND CONNECTION**

1. GENERAL

- 1.01 This practice covers the installation, assembly, disassembly, and connection procedures for the Kellogg Trendline (Trim-Line) telephone set.
- 1.02 This practice is being reissued to include superimposed ringing information shown in paragraph 5.01 d. and Table C. The circuit modification consists of an addition of a diode (180640).
- 1.03 The Trendline does not come assembled. The handset, base, and cord are not connected and the ringer is in a separate container.

2. ASSEMBLY

- 2.01 To assemble the base housing (desk or wall model), proceed as follows:
 - a. Position the housing carefully on the base, making sure that the housing seats properly on the ears of the base.
 - b. When positioning the housing on a wall set, avoid damaging the switch hook by holding the plunger up as shown in Figure 1.
 - c. Tighten the housing screws.

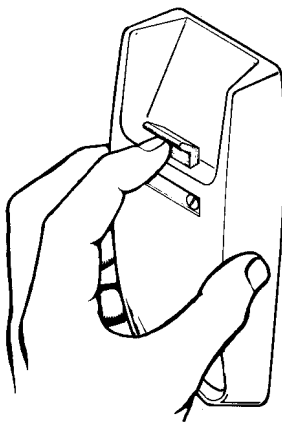


FIGURE 1. Switch Hook Plunger (up)

- 2.02 To install the name plate, hold the name plate by the outside edges near the center and insert one end in the housing recess. Bend the opposite end into place and release the center hold. See Figure 2.

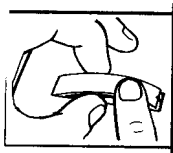


FIGURE 2.

- 2.03 To assemble the handset, proceed as follows:

- a. Hold the plugs of the handset cord side by side. Look at them from the end as shown in Figure 3.



FIGURE 3.

NOTE: Notice that the end of one plug is "T" shaped.

- b. Plug the "T" shaped plug into the handset and the rectangular plug into the base until the spring clip clicks into a locked position.
- 2.04 To assemble the desk stand cord, proceed as follows:
- a. Plug the cord in until the spring clip locks into place.
- b. Press the cord down into the channel and slide the cord retainer over until it snaps into its detent.

3. DISASSEMBLY

- 3.01 To remove the housing from the base, proceed as follows:

- a. Remove the card retainer (name plate) near the front of the housing by inserting the tip of the releaser tool into the small slotted hole at the edge of the card holder. Do not insert more than 1/8" into the card holder. See Figure 4.

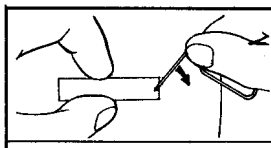


FIGURE 4.

- b. Apply slight pressure to the tool. This will bow the window upward so that the edges may be grasped with the free hand. Remove the number card if present.
 - c. Loosen the two housing screws so that the housing may be lifted free from the base.
- 3.02 To remove the handset cord, proceed as follows:

- a. Insert the releaser tool into the slot provided as shown in Figure 5a. Be sure that the tool is on top of the spring clip.
- b. Press the spring clip down and grasp the tool and plug as shown in Figure 5b., and pull out.

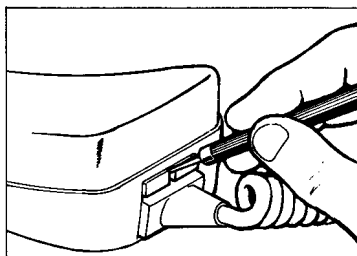


Figure 5A. Depress Spring Clip.

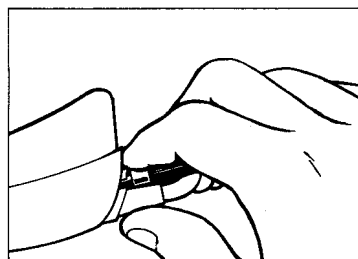


Figure 5B. Unplug Handset Cord.

FIGURE 5. Removal of Handset Cord.

NOTE: If the spring is difficult to depress, push in on the plug to relieve the tension.

- 3.03 To remove the desk stand cord, proceed as follows:
- a. Place the point of the releaser tool on the cord retainer as shown in Figure 6a. Press down lightly to free the retainer from its detent. Then move it to the left until the end clears the cord. Do not move the cord retainer farther than necessary.
 - b. Pull the cord up and out of its channel. Grasp the cord and wedge the second finger between it and the base. At the same time, use a releaser tool to release the spring clip as shown in Figure 6b.
 - c. Pull the plug out carefully as shown in Figure 6c.
- 3.04 To remove the ringer, proceed as follows:
- a. Disconnect the ringer leads as follows:
 - (1) BLACK lead from terminal "G" or "3" as applicable.
 - (2) RED lead from terminal "K".
 - (3) BLUE or SLATE lead from terminal "B" if connected. (For TIP party identification only.)

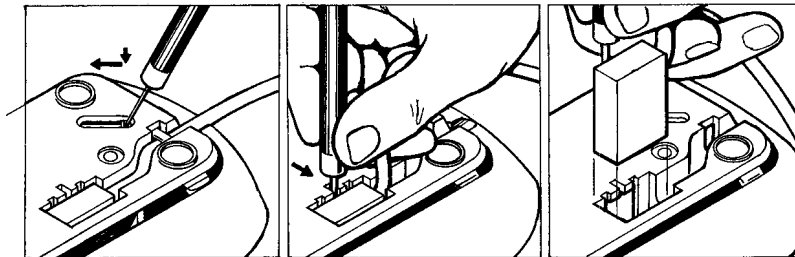


Figure 6A. Release the Cord Retainer.

Figure 6B. Depress Spring Clip.

Figure 6C. Pull Plug From Base.

FIGURE 6. Removal of Desk Stand Cord.

- (4) BLUE, SLATE, and SLATE-RED leads are normally insulated and stored. Pull these from beneath the switchhook bracket and out of the slots in the terminal board.

- b. Remove the two terminal board mounting screws and pull the terminal board up.
- c. Remove the two ringer mounting screws and remove the ringer.

3.05 When removing the terminal board, observe how the wires are dressed. Remove the two mounting screws and pull the terminal board up carefully.

4. INSTALLATION PROCEDURES

4.01 Trendline telephones are equipped with a dial lamp. If this feature is to be used, a transformer is required—31 () 690 or equivalent. Inside wire (IW) is used to connect the transformer to the telephone or connecting block. The maximum IW allowed is 15 feet; therefore, the phone should be installed conveniently located near a 110 volt AC outlet.

4.02 Installation of the capacitor, terminal board, and ringer are as follows:

- a. Place the capacitor (if required) under the terminal board and pull the leads through the slots at "A" and "K". Connect to "A" and "K" terminals. Cut off excess wire length.

NOTE: Allow 1/4" slack in the capacitor leads to permit movement of the capacitor so that it does not interfere with terminal screws.

- b. Place the ringer on the mounting bases and secure it with the two screws included with each ringer.
- c. Install the terminal board by securing it with two screws. If the leads have been disconnected from the terminal screws, refer to the appropriate circuit table to connect the leads.
- d. Dress the ringer leads through a notch in the terminal board. Insulate and store all spare leads by dressing them through notches in the terminal board. On desk models, connect the RED ringer lead to "K" and the BLACK ringer lead to "G".

NOTE: Be sure that the leads do not interfere with operation of the switchhook or ringer.

4.03 When the set is to be used as a desk set, proceed as follows:

- a. Connect the desk stand cord as explained in paragraph 2.04. Refer to Figure 7 when installing the telephone.
- b. Plug the handset cord into the *base* and *handset* as explained in paragraph 2.03.

4.04 When the set is to be used as a wall phone, the inside wire must be connected within the telephone. The inside wire will normally enter the instrument through the left-hand opening at the bottom of the base plate. Concealed wiring may enter through any suitable hole in the base plate but be sure that the wiring does not interfere with the ringer or switchhook. To install the set, proceed as follows:

- a. Remove the housing from the base assembly as explained in paragraph 3.01.
- b. Position the base assembly on the wall and center mark the small end of the "keyhole" shaped holes in the base. Remove the base assembly and start the mounting screws. Install the base assembly on the screws and tighten the screws.
- c. Connect the inside wire as shown in Figure 8.
- d. Install the housing as explained in paragraph 2.01 and Figure 1.
- e. Install the handset cord as explained in paragraph 2.03 and Figure 3.

5. WIRING CONNECTIONS

5.01 Wiring changes can be made to provide the following services:

- a. Use with 1A1, 1A2, and 6A KTS. See Table A.
- b. Two party flat-rate service.
- c. Tip party ANI identification.
- d. Connections for 4 party full selective or 8 party semiselective ringing (using 180640 diode).

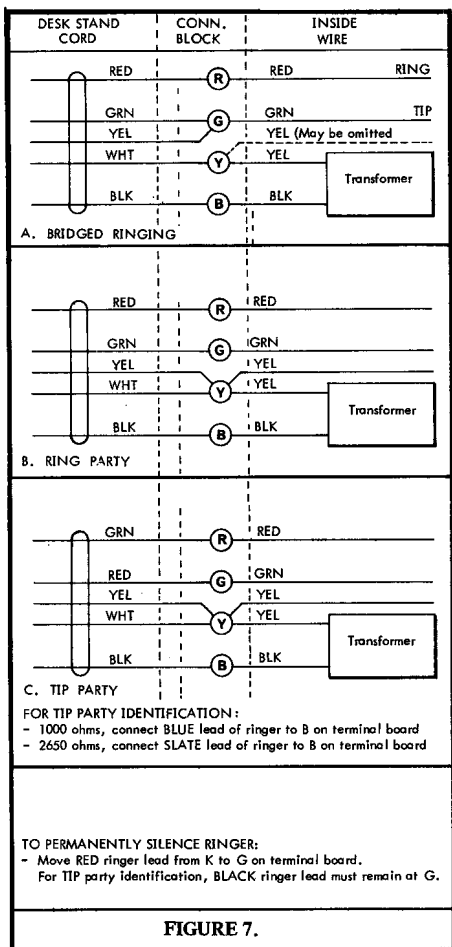
TABLE A. CONVERSION TO 1A1, 1A2, and 6A KTS MOVE LEADS AS FOLLOWS:			
LEAD AND COLOR		TERMINAL BOARD	
		From:	To:
LINE SWITCH	BR	C	G
	Y	L2	3
RINGER	AC1	BK	C
	AD1	BK	C
MTG CORD or IW	R	L2	C
CAPACITOR STRAP	BK	L2	L1 (Note 2)

Notes:

1. Disconnect (Y) lead from B, insulate and store.
2. Capacitor strap connects from A to L1.

5.02 See Figure 9 for a wiring diagram and circuit schematic of the desk type telephone, 220C.

5.03 See Figure 10 for a wiring diagram and circuit schematic of the wall type telephone, 220D.



CAUTION: When ringing or identification ground and dial lamp ground are common, there is a possibility of damage to the transformer. A good ground at the protector is essential or the protector ground should be bonded to the power ground.

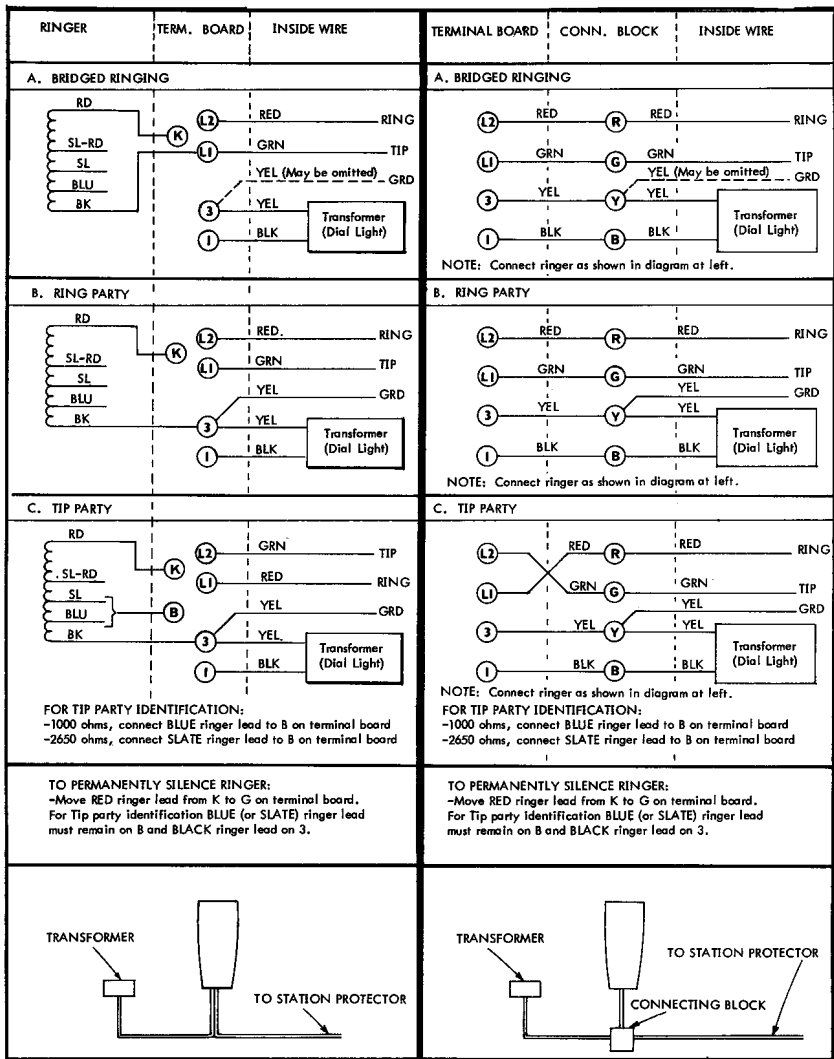


Figure 8A. Connections, wall Trendline telephone when not using a connecting block.

Figure 8B. Connections, wall Trendline telephone, using a connecting block as a common connecting point for inside wire and transformer leads.

FIGURE 8.

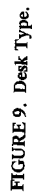


FIGURE 9. Desk Type.




FIGURE 10. Wall Type.

6. ORDERING INFORMATION

6.01 When ordering a telephone set or cord, complete the code number by adding the appropriate number denoting the desired color. For example, 220D02 denotes a wall phone in red. See Table B.

TABLE B ORDERING INFORMATION	
CODE	DESCRIPTION
COMPLETE TELEPHONES	
220D**() 30M 220C**() 30M	Telephone, Desk; Dial-in-Handset (Trendline) Telephone, Wall; Dial-in-Handset (Trendline)
	Insert Ringer Code as follows: (BA) - Straight line biased ringer (type 153) (LR) - Less ringer
	Substitute Color Code as follows: 00 - Black 12 - Blue 02 - Red 13 - Beige 04 - Yellow 14 - Gray 05 - Green 15 - White 09 - Ivory 30 - Turquoise 11 - Pink
COMPONENTS	
220A**-30M AC1**() AD1**()	Handset (Substitute color code for asterisks) Wall Base Assembly Desk Base Assembly () Insert ringer code above **Substitute color code above
HANDSET CORDS	
1027**-03 1027**-25 1027**-26	Handset Cord Assembly, 6-feet Handset Cord Assembly, 9-feet Handset Cord Assembly, 13-feet
	**Substitute Color Code
TRANSFORMER	
31 () 690	Transformer, for Dial Light Operation
DESK STAND (LINE) CORDS (Included with Desk Base)	
3060**013 3060**-25 3060**-26 3060**-24	Cord, Desk Stand, 68 Inches (Standard) Cord, Desk Stand, 9 feet Cord, Desk Stand, 13 feet Cord, Desk Stand, 25 feet
CIRCUIT LABELS	
180200 180201	Label, Circuit, Desk Trendline Telephone Label, Circuit, Wall Trendline Telephone

TABLE C
CONNECTIONS FOR 4-PARTY FULL SELECTIVE OR 8-PARTY SEMISELECTIVE RINGING USING 180640 DIODE

PARTY		LEADS OR COLOR	—RING	—TIP	+RING	+TIP		
LINE WIRE CONN AT CONN BLOCK	Ring	R	R	R	R	R		
	Tip	G	G	G	G	G		
	GRD	Y	Y	Y	Y	Y		
180640 Diode			L2	L2	3	3		
			G	G	G	G		
Mtg Cord at Conn Block		R	R	G	R	G		
		G	G	R	G	R		
		Y	Y	Y	Y	Y		
		W	Y	Y	Y	Y		
		BK	B	B	B	B		
Mtg Cord or Inside Wire at Term. Board		R	L2	L2	L1*	L2	L2	L1*
		G	L1	L1	L2*	L1	L1	L2*
		Y	3	3	3	3	3	
		W	3	3	3	3	3	
		BK	1	1	1	1	1	
Ringer Leads		BK	K	K	K	K		
		R	3	3	L2	L2		
		S	+	+	+	+		
		S-R	G	G	G	G		
		BL	B	B	B	B		
Dial Light Transformer Lds		1	Y	Y	Y	Y		
		2	B	B	B	B		
Strap from A		BK	3	3	L2	L2		
Line Switch		S	+	+	+	+		

* Connections for K254 base (Wall)

+ Insulate and store

• Denotes zener anode end

TELEPHONE SET
500 TYPE
DESCRIPTION

1. GENERAL

- 1.01 This practice describes the type 500 telephone set which is a standard common battery desk-style telephone. All of the type 500 instruments may be used for dial or manual common-battery services. High impedance ringers are standard for biased, harmonic, synchronomic and decimonic ringing requirements. See Figure 1.



FIGURE 1 THE 500 DESK TYPE TELEPHONE

2. COMPONENTS

- 2.01 The housing, which covers and protects the base assembly, has a cradle upon which the handset rests and an opening at the back for use as a handhold to conveniently carry the telephone set. The plunger assembly is a part of the cradle assembly and contains the two plungers for activating the switch hook contacts, in the base, when the handset is removed or replaced.
- 2.02 The handset consists of the receiver unit, transmitter unit, transmitter holder assembly, handset cord, and two removable caps, which hold the transmitter and receiver units in place.
- a. The transmitter unit has a wide frequency response and is stable in operation. Two springs in the transmitter holder assembly provide electrical connection to the transmitter.

- b. The receiver unit consists of a ring armature receiver assembly and a varistor. The ring armature receiver is a domed diaphragm that is actuated at its circumference by a ring-shaped armature. This type of construction increases the receiver efficiency and frequency range. The varistor is directly across the receiver to protect the user from peak acoustical outputs and the receiver from electro magnetization by abnormal transient electrical influences.
 - c. The short hand piece provides a means of getting the transmitter closer to the subscriber, and results in increased transmission.
 - d. The four (4) conductor handset cord has a jacket and is anchored to the handset by a cord strain relief band. At the base end of the cord a similar hook anchors the cord to the base plate.
- 2.03 The base plate is attached to the housing-plunger assembly by two removable lockscrews. The base assembly consists of a dial mounting bracket switch assembly, network, ringer, all of which are mounted on the steel base plate. Two holes are provided in the rim of the base plate for attaching cords.
- 2.04 The dial consists of the number card assembly, finger plate, numeral ring, finger stop, and the dust-cover to protect the cams and contact spring assembly. In cases of lucite finger plates, the card assembly is part of the finger plate. The characters on the numeral ring are outside the finger plate, providing greater visibility. The characters are white on a black background, or black on a light colored background, with a marker spot under each finger hole to facilitate dialing. The contact spring assemblies consist of a pair of off normal contacts and a pair of pulsing contacts. When closed, the off normal contacts shunt the receiver circuit. The dial is attached to its mounting bracket by the two removable screws.
- 2.05 The ringer used in the 500 type telephone set is of a single-coil design with a high impedance, allowing more ringers to be placed on the line with no increase in bridging loss, or increase in unbalance on divided ringing circuits.
- a. A volume control is provided by which the subscriber may adjust the sound output. The two gongs have harmonically related frequencies, the fundamentals of which are reinforced by resonant air chambers below the gongs.
 - b. A laminated soft iron core carries the single coil and is clamped to the soft iron yoke which is bolted to the cast non-magnetic alloy frame.
 - c. The armature and clapper are mounted to the frame to allow them to vibrate. Due to the magnetic field produced by the coil, increased sensitivity is provided by biasing the armature by means of a permanent magnet clamped in the frame.
 - d. The ringers are designed to function from an alternating current source and are equipped with flexible wire leads for connecting to other components in the telephone set.
- 3. TURN AND PUSH KEY ASSEMBLIES**
- 3.01 The turn and push keys are mounted to the base of either the desk or wall type telephones so that the lucite knob projects through the housing. Various types of contact assemblies are available to meet the requirements for the different types of telephone circuits.
- 3.02 Each of the contact springs is provided with a flexible, plastic insulated wire lead, with bare or spade terminal end, for connections to the other components in the telephone instrument.

- 3.03 Each of the various types of turn and push keys used in the key-phone versions of the type 500 telephone set consists of a bracket and plunger assembly in which the plunger is free to slide and rotate in a bushing on the upper part of the bracket. Either one or two spring nest assemblies may be independently mounted on the lower part of the bracket; one is actuated by depressing the plunger and the other by rotating the plunger one quarter turn. The rotary action is locking in both positions while the push action is non-locking. A lucite knob is fitted to the top of the plunger.

4. LOCATION OF THE CONNECTING BLOCK

- 4.01 The location of the connecting block will be affected by the location of the telephone set. However, the following considerations should be kept in mind:**

- a. Avoid locations that are hazardous to installers, repairmen, and subscribers.
- b. Locate the connecting block where it will be accessible for repair or maintenance; avoid closets.
- c. Do not locate the connecting block near radiators or steam pipes, the plastic base assembly may be damaged by heat.
- d. Mount the connecting block on a back board, when the wall location is damp or uneven.

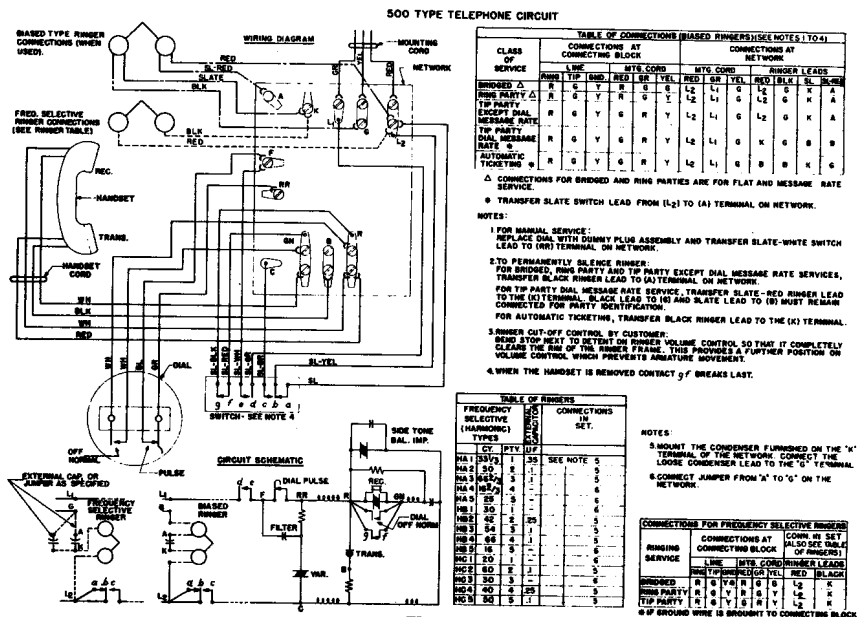


FIGURE 2

5. CONNECTIONS

- 5.01 The connections at the connecting block and terminal board of the network assembly will depend upon the type of ringing (biased or frequency selective) and the ringing service (See Figure 2 and 3).

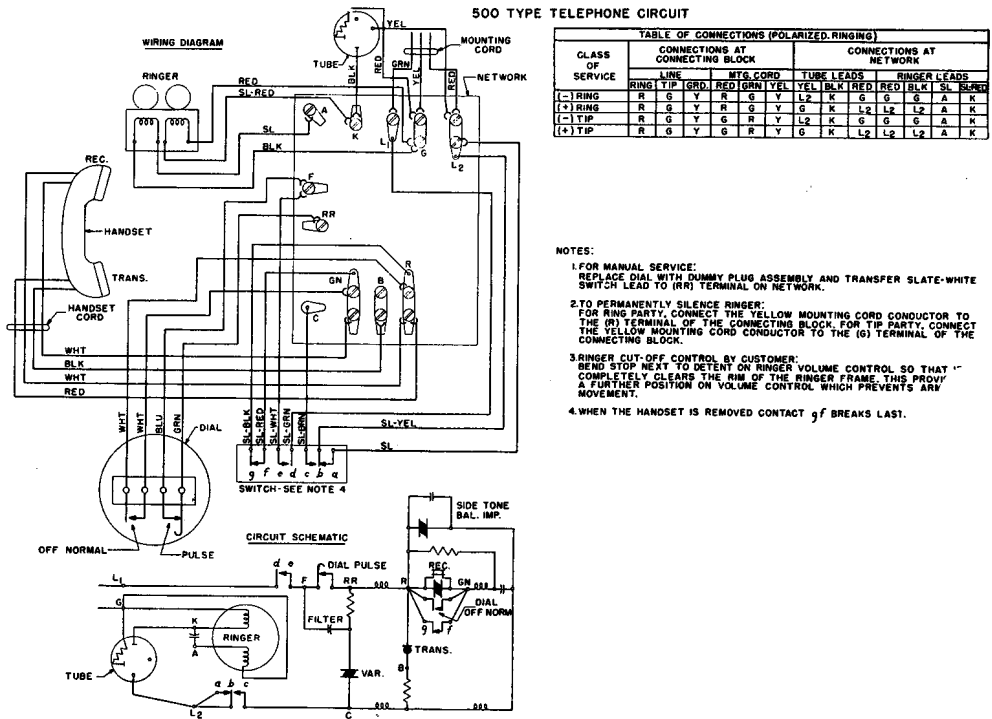


FIGURE 3

6. NETWORK TYPE 75335-1

- 6.01 The type 75335-1 network assembly provides all the components necessary to connect and match the impedance of the handset transmitter and receiver units to a two wire telephone circuit.
- 6.02 The unit incorporates radio frequency filter and side tone balancing circuits and a 0.5 MFD ringer capacitor in addition to the other circuits.
- 6.03 All the components are mounted on the underside of the molded terminal board, which is clipped to the sealing compound filled mounting container.

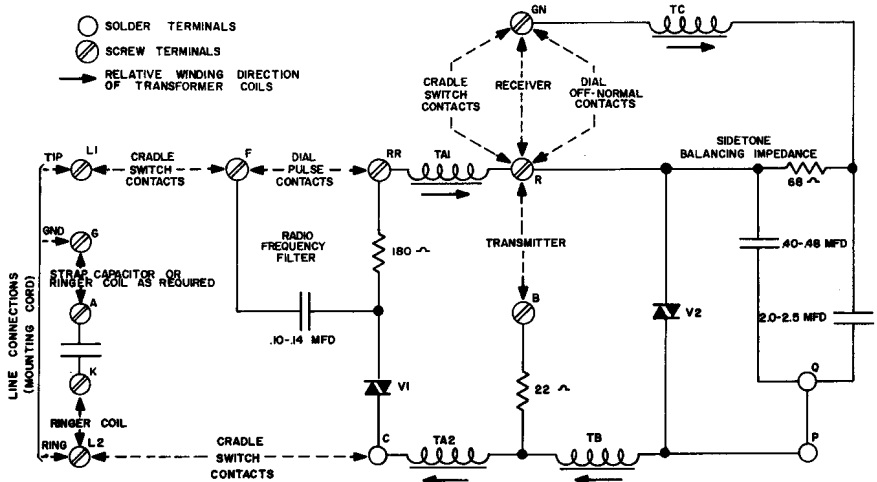


FIGURE 4. CIRCUIT DIAGRAM

- 6.04 The circuit shown in Figure 4 indicates by dashed lines the typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.
- 6.05 The basic network design provides an increase in transmission characteristics of some 10 db over previous circuits. It has therefore been possible to include the two shunt varistors in the circuit to produce increased losses on short loops and yet have negligible effect on long loops; the varistor effective resistances changing inversely to the current flowing through them.
- 6.06 The direction of winding of the four coils of the transformer is indicated by arrows in Figure 4. Received speech currents pass via windings TA₁, TB and TA₂, each of which produces an additive voltage in winding TC. The received currents also produce a voltage across the 68Ω resistor that opposes and is almost equal to that produced by the induced voltages in winding TC. There is very little power loss in the resistor and varistor and maximum power in the receiver. The low impedance of the transmitter is matched to the loop by the turns ratio of winding TB to windings TA₁ and TA₂.
- 6.07 The current variations due to the transmitter are in opposite phase in windings TA and TB. The induced voltages in winding TC are also in opposite phase and the resultant voltage is opposed by the voltage produced across the 68Ω resistor. The net effect is that very small signals are produced in the receiver due to transmitter current changes and sidetone is very low. Also, as there is little power loss in the receiver, maximum transmitting levels are attained. Both varistors contribute to this condition by automatically compensating for various loop conditions to provide close matching of the loop impedance and the balancing network impedance with the transmitter circuit.

- 6.08 The 180 Ω resistor and .10 MFD capacitor provide a filter network to suppress high frequency signal components of the dial pulses which might otherwise be radiated from the telephone line and cause local interference with broadcast radio reception.

7. TESTING OF THE NETWORK ASSEMBLY

- 7.01 Thorough testing of the network assembly can only be performed with elaborate test equipment. An adequate check on performance, for maintenance purposes, is to compare a suspected unit with a known good unit by substitution. Resistance and capacitance checks can be carried out between many of the terminals, as can be seen from Figure 4. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Figure 5 shows the layout of the terminal board of the assembly.

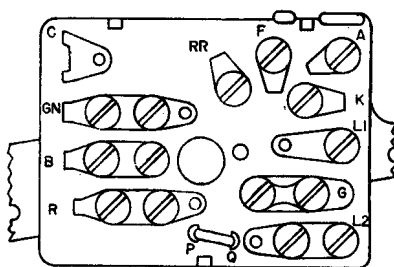


FIGURE 5 TERMINAL BOARD LAYOUT

- 7.02 To assist in testing network assemblies in the field, Table 1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

8. TYPE 502-30 DESK TELEPHONE SET

- 8.01 The 502-30 desk telephone is a standard desk type instrument with the addition of a switch that is actuated by raising the left hand plunger in the handset cradle. Raising the plunger opens the circuit to any extension telephones on the line and prevents overhearing of confidential conversations. Replacing the handset automatically resets the switch to the normal position. An external two wire circuit connection is provided that may be used to light a "busy" lamp at all extensions.

9. TYPE 510-30 AND TYPE-36 DESK TELEPHONES

- 9.01 The 510-30 and 510-40 telephones are standard desk type instruments with the addition of a turn and push key which permits the instrument to be switched to either one of two lines. The ringer is permanently connected to Line 1 and a separate ringer must be provided for Line 2.
- 9.02 Both units are available with biased or frequency selective ringers for bridged ringing service. The 510-30 unit may be wired for divided ringing service if the signalling circuit is not used or if one conductor of this circuit may be grounded.

- 9.03 The instruments are designed for service in small business establishments where a switchboard or key telephone system would be uneconomical. A 6-way cord and a 10-way terminal block are provided with the 510-30 unit and the push section of the key is wired for an interphone signalling circuit. A 4-way cord and terminal block are provided with the 510-36 unit and the push section of the key is ineffective.
10. **TYPE K-554 WALL TELEPHONE SET**
- 10.01 The K-554 series provides a range of compact, anti-sidetone type wall mounting telephones which operate efficiently over a wide range of loop resistance and loop impedance.
- 10.02 The instrument is available with its internal components and circuit arranged for any class of service on any type of automatic or manual telephone system. It can be supplied in a number of different versions with various special features, as required.
11. **TYPE 558-30 WALL TELEPHONE SET**
- 11.01 The 558-30 telephone is a standard wall type instrument with the addition of a turn and push key which permits the instrument to be switched to either one of two lines. The ringer is permanently connected to Line 1 and a separate ringer must be provided for Line 2.
- 11.02 This instrument is designed for service in small business establishments where a switchboard or key telephone system would be uneconomical.
- 11.03 The instrument is available with biased or frequency selective ringers for bridged or divided ringing.

TABLE 1: POINT TO POINT TEST VALUES (Fig. 5)

Terminals	Components	Test Value
F - RR	Filter Capacitor	.09 - .14
A - K	Ringer Capacitor	.43 - .54
R - Q	Network Capacitors	(4) 2.4 - 3.0
C - RR	V1 and filter resistor	(1) 4.7K min (2) 890-1070
C - P	TA ₂ and TB windings	28.8-35.2
B - C	TA ₂ winding and resistor	35.1-42.9
B - P	TB winding and resistor	33.3-40.7
R - GN	TC winding and resistor	74.3-90.7
R - RR	TA; winding	12.1-14.9
R - P	V2	(1) 1.6K min (3) 72-87

NOTES: All capacitance values in microfarads and all resistance values in ohms.

- (1) with 1 ma dc flowing through circuit.
- (2) with 10 ma dc flowing through circuit.
- (3) with 100 ma dc flowing through circuit.
- (4) with strap P-Q removed.

12. **TYPE 576-30 DESK TELEPHONE SET**

- 12.01 The 576-30 desk telephone is a six-button type of key instrument with the same transmission circuit as the 500 series of instruments. It is designed for use on either regular exchange lines or interphone circuits in small business offices, where up to three lines are required on the one telephone. A small push (recall) button is fitted in front of the handset cradle to provide a signal circuit for PBX operation.

- 12.02 The six keys are arranged in pairs. The right hand key of each pair is the LINE key and the left hand key is the HOLD key. All line keys are interlocked so that only one line may be picked up at any time, although one or more lines may be held at the same time. Optionally, the third HOLD key may be modified to provide an interphone signalling circuit. ALL operated HOLD keys are automatically released when the handset is replaced in the cradle.
13. TYPE 564-30 AND TYPE 564-40-DESK TELEPHONE SET
- 13.01 The 564-30 and 564-40 desk telephones are six-button types of key instruments with the same transmission circuit as the 500 series of instruments. They are designed for use on key telephone systems, which may be installed as branch exchanges or completely private systems, of either the automatic or manual type. The only difference between the two instruments is that the 564-40 telephone has its desk stand cord terminated in an amphenol plug. This feature allows the instrument to be changed quickly and easily should such action become necessary for maintenance purposes or system testing.
- 13.02 The six keys on the units are allocated for use, from left to right, as follows. The first key is a HOLD key which may be used to hold a call received on any line while another call is made on a second line. The second and third keys are individual LINE keys and the remaining three keys may each be optionally wired as either LINE or interphone SIGNAL keys. Thus a maximum of five lines may be accessed from the one instrument, with a common hold key, and up to three of these lines may be connected as private intercommunication lines to other instruments, one additional key being used for the common interphone signalling circuit.
14. TYPE 565-30 AND TYPE 565-40 DESK TELEPHONES
- 14.01 The 565-30 and 565-40 desk telephones are six-button types of key instruments with the same transmission circuit as the 500 series of instruments. They are designed for use on key telephone systems, which may be installed as branch exchanges or completely private systems, of either the automatic or manual type. The only difference between the two instruments is that the 565-40 telephone has its desk stand cord terminated in an amphenol plug. This feature allows the instrument to be changed quickly and easily should such action become necessary for maintenance purposes or system testing. These instruments incorporate an exclusion switch, operated by lifting the left hand plunger which is automatically reset when the handset is replaced, so that any other telephones on one of the lines may be disconnected for confidential conversations. See Figure 6.



Fig. 6 565-30/40 Telephone Set

The six keys on the units are allocated for use, from left to right, as follows. The first key is a HOLD key which may be used to hold a call received on any line while another call is made on a second line. The second and third keys are individual LINE keys and the remaining three keys may be optionally wired as either LINE or interphone SIGNAL keys. Thus a maximum of five lines may be accessed from the one instrument, with a common hold key, and up to three of these lines may be connected as private intercommunication lines to other instruments, one additional key being used for the common interphone signalling circuit.

15. TYPE 565-39 AND TYPE 565-42 DESK TELEPHONES

- 15.01 The 565-39 and 565-42 desk telephones are six-button types of key instruments with the same transmission circuit as the 500 series of instruments. They are designed for use on key telephone systems, which may be installed as branch exchanges or completely private systems, of either the automatic or manual type. The only difference between the two instruments is that the 565-42 telephone has its desk stand cord terminated in an amphenol plug. This feature allows the instrument to be changed quickly and easily should such action become necessary for maintenance purposes or system testing. These instruments incorporate an exclusion switch, operated by lifting the left hand plunger which is automatically reset when the handset is replaced, so that any other telephones on one of the lines may be disconnected for confidential conversations.
- 15.02 The instrument is also wired for use with speaker phone equipment. The six keys on the unit are allocated for use, from left to right, as follows. The first key is a HOLD key which may be used to hold a call received on any line while another call is made on a second line. The second and third keys are individual LINE keys and the remaining three keys may each be optionally wired as either LINE or interphone SIGNAL keys. Thus a maximum of five lines may be accessed from the one instrument, with a common hold key, and up to three of these lines may be connected as private intercommunication lines to other instruments, one additional key being used for the common interphone signalling circuit. Two wire circuits are provided for each signalling lamp thus allowing flexibility in lamp signal circuitry.

TELEPHONE SETS 510-30
AND 510-36 CONNECTIONS

1. GENERAL

- 1.01 This practice provides the connecting information necessary in the installation of the types 510-30 and 510-36 telephone sets.
- 1.02 Figure 1 shows a top view and parts identification while Figures 2 and 3 show the connections necessary for installation.

Item	Description
1	Base Assy. c/w items 2 through 7
2	Network Assembly
3	Cradle Switch Assembly
4	Bind. Hd. Mach. Screw
5	Spring Washer
6	Hex. Nut
7	Cabinet Lock Screw
8	Ringer Assy. Biased
9	Dial Assembly
10	Handset and Cord Assembly
11	Desk Stand Cord
12	Housing and Plunger Assembly
13	Turn and Push Key Assembly
14	Special Screw
15	Terminal Board Assembly
16	Mounting Plate
17	Bind. Hd. Mach. Screw

NOTE: Ringer, Dial and Dummy Plug Assemblies are all supplied complete with mounting screws.

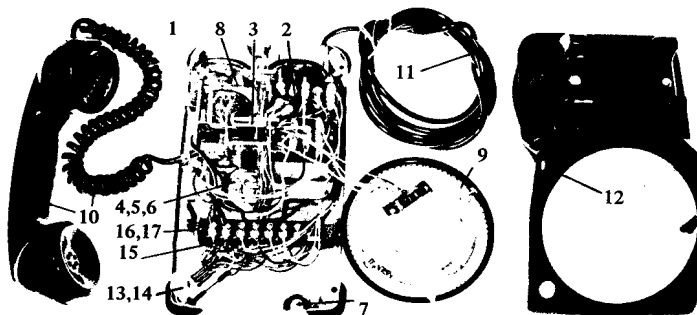
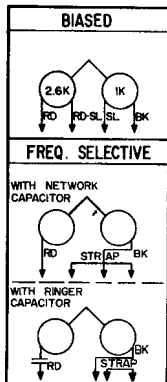


Fig. 1 TOP VIEW - HOUSING REMOVED

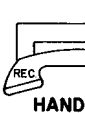
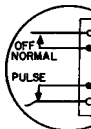
RINGER OPTIONS



NOTE:
Internal ringer
is permanently
connected to
Line 1. External
ringer must be
provided for
Line 2.

For Manual Service:
Replace dial with dummy
plug and transfer SL-WH
cradle switch lead from
F to RR on network.

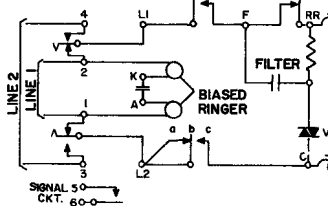
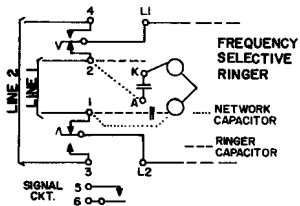
DIAL



HANDSET

HANDSET CORD

TYPICAL CIRCUIT DIAGRAMS

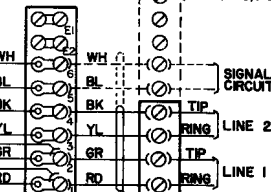


RINGER NOTES

- To Permanently Silence Ringer:
Class of Ringer Transfer From To
Biased Ringer TB2 K
Freq. Selective Lead TB1 K
on Network
- Ringer Cut-off Control by Customer:
Bend stop next to detent on volume
control so that it clears rim of
ringer frame. This provides extra
control position in which ringer
armature is locked.

CONNECTING BLOCK

(4 WAY FOR CODE 36)
(10 WAY FOR CODE 30)



TERMINAL BOARD

MOUNTING CORD
(4 COND. FOR CODE 36)
(6 COND. FOR CODE 30)

COMPOSITE WIRING DIAGRAM

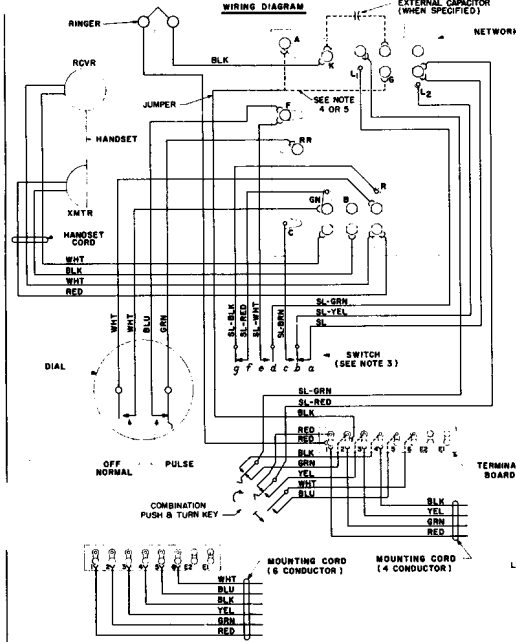
(BRIDGED RINGING ONLY)

CRADLE SWITCH

CONTACT f₉ OPERATES LAST
WHEN HANDSET IS LIFTED.

Fig. 2 DIAGRAMS 510-30- TELEPHONE
AND 510-36- TELEPHONE

510 TYPE TELEPHONE CIRCUIT



**TELEPHONE SET
502-30 CONNECTIONS**

1. GENERAL

1.01 This practice provides the connecting information necessary in the installation of the type 502-30 telephone set.

1.02 Figure 1 shows a top view and parts identification while Figures 2 and 3 show the connections necessary for installation.

Item	Description
1	Base Assy. c/w items 2 through 7
2	Network Assembly
3	Cradle Switch Assembly
4	Bind. Hd. Mach. Screw
5	Spring Washer
6	Hex. Nut
7	Cabinet Lock Screw
8	Ringer Assy. Biased
9	Dial Assembly
10	Handset and Cord Assembly
11	Desk Stand Cord (6 Cond.)
12	Housing and Plunger Assembly
13	Plunger Switch Assembly
14	Terminal Board Assembly
15	Mounting Plate
16	Bind Hd. Mach. Screw

NOTE: Ringer, Dial and Dummy Plug Assemblies are all supplied complete with mounting screws.

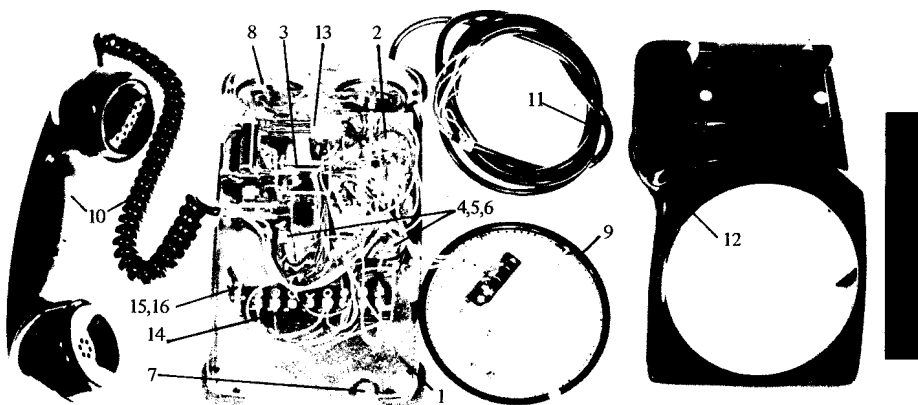


Fig. 1 TOP VIEW - HOUSING REMOVED

Distribution C D

TABLE A
GUARD ASSEMBLY CONNECTIONS

WIRE OR LEAD		REMOVE FROM	CONNECT TO
Dial	(BK)	RR Net.	T of Guard Assembly
Line Switch	(BR)	C Net.	S of Guard Assembly
Guard Assembly	(G)		Term. RR Net.
	(W)		Term. C Net.

TABLE B
LINE AND RINGER CONNECTIONS

WIRE OR LEAD			INDIV OR BRIDGED	RING PARTY	TIP PARTY		
					NO IDENT. GROUND	IDENT. GROUND	
						1000Ω	2650Ω
Mtg. Cord at Conn Block	Tip	G	G	G	G	R	R
	Gnd	Y	G	Y	Y	Y	Y
	Ring	R	R	R	R	G	G
Ringer Leads		R			L1	K	B
		S-R				B	G
		S				B	K
		BK				G	B
Line Switch Leads		S				A	A
		W				C	C
		BR				F	F

Note: To silence ringer permanently:

- For all classes except identification ground insulate and store (BK) ringer lead.
- For 1000Ω gnd — insulate and store (S-R) ringer lead.
- For 2650Ω gnd — insulate and store (BK) ringer lead.

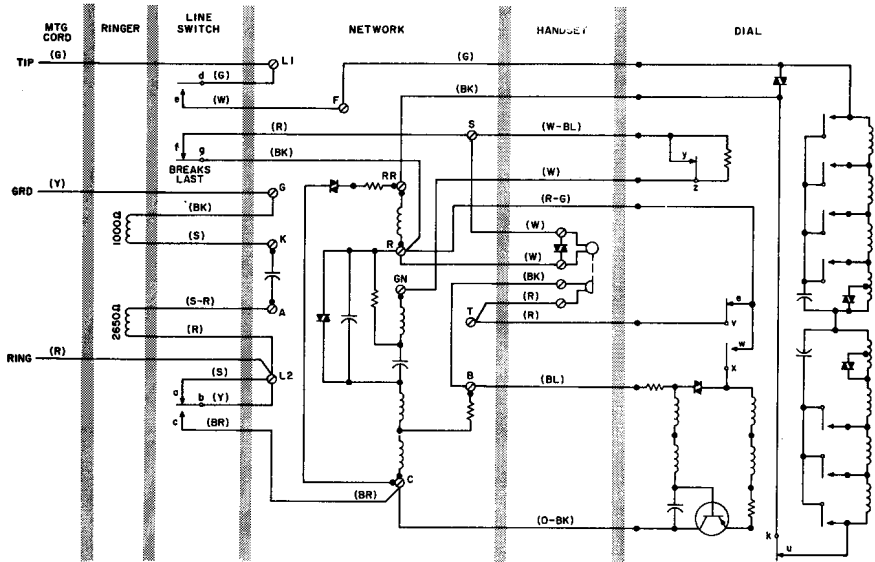


FIGURE 2. 2500*(BA) 33M Telephone Set Connections

K-554 TELEPHONE SET CONNECTIONS

1. GENERAL

1.01 This practice provides connecting information for the installation of the type **K-554 wall telephone set**.

1.02 This practice is reissued to correct CTSP 480-105-406, Issue 1, 1968, in its entirety, **all copies of which should be removed from the file and destroyed**.

1.03 Figure 1 shows the K-554 wall instrument, Figure 2 shows an exploded view of the components of the set and Figure 3 is the wiring diagram.

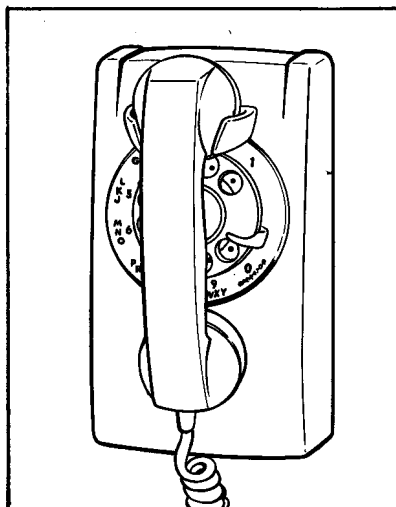


FIGURE 1. K-554 Wall Telephone

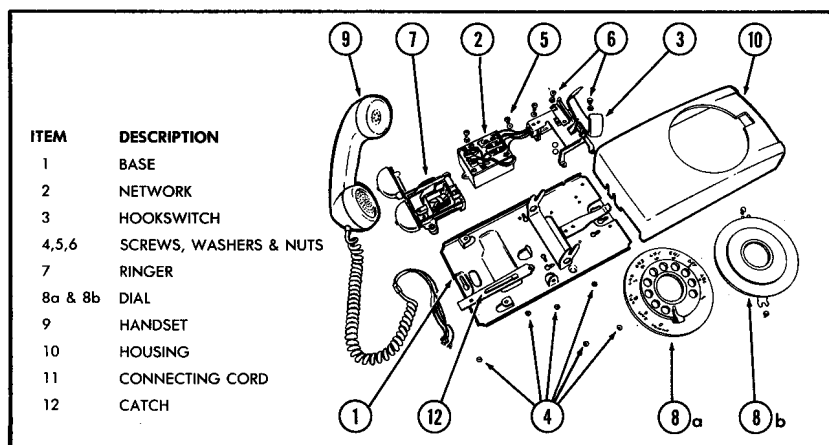


FIGURE 2. K-554 Component Parts—Exploded View

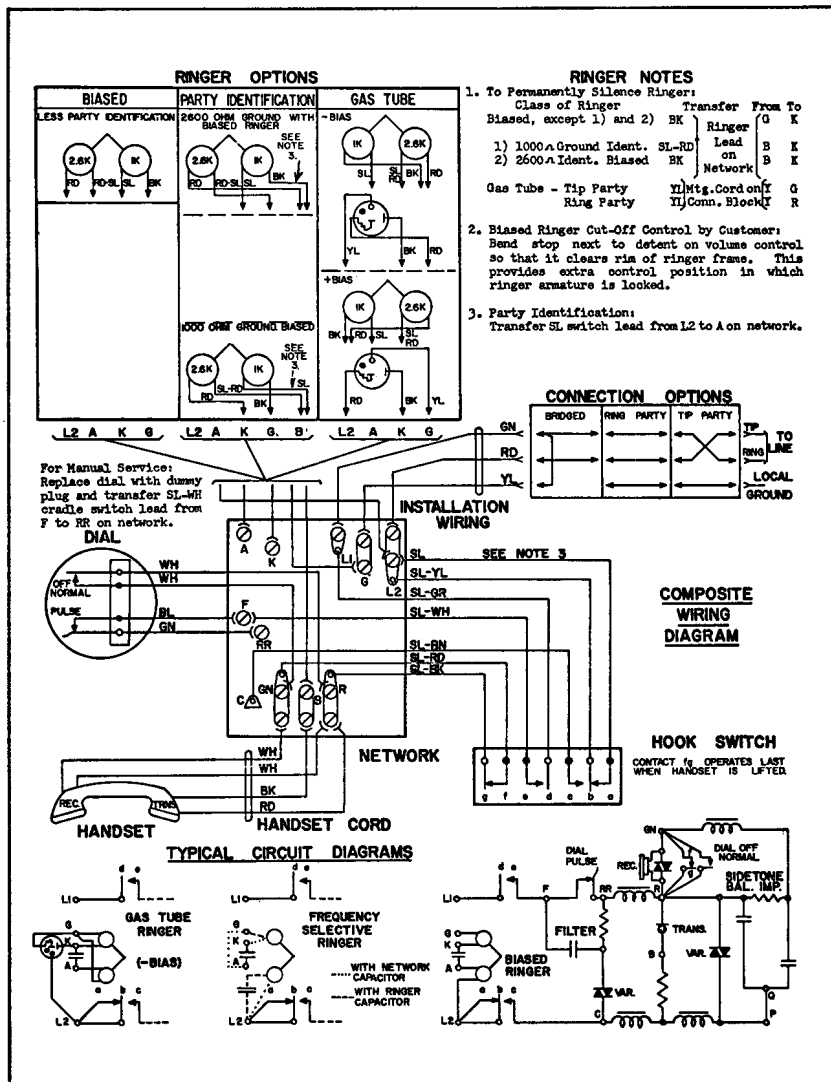
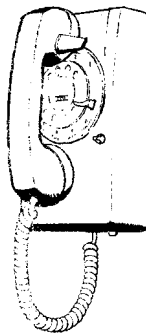


FIGURE 3. K-554 Wiring Diagram

TELEPHONE SET
558-30 CONNECTIONS

1. GENERAL

- 1.01 This practice provides the connecting information necessary in the installation of the type 558-30 telephone set.
- 1.02 Figure 1 shows the 558-30 type telephone while Figure 2 shows an exploded view of the set's components, Figures 3 and 4 are the wiring diagrams.



**558 Wall Phone with 2-line
Pickup Feature**

FIGURE 1

Item	Description
1	Base Assembly
2	Network Assembly
3	Hook Switch Assembly
4	Bind. Hd. Mach. Screw
5	Spring Washer
6	Hex. Nut
7	Ringer Assy. Biased
8	Dial Assembly
9	Handset and Cord Assembly
10	Housing Assembly
11	Fastener Stud
12	Turn and Push Key Assembly
13	Special Screw
14	Terminal Board Assembly
15	Mounting Plate
16	Bind. Hd. Mach. Screw
17	Bracket (Turn and Push Key)

NOTE: Ringer, Dial and Dummy Plug Assemblies are all supplied complete with mounting screws.

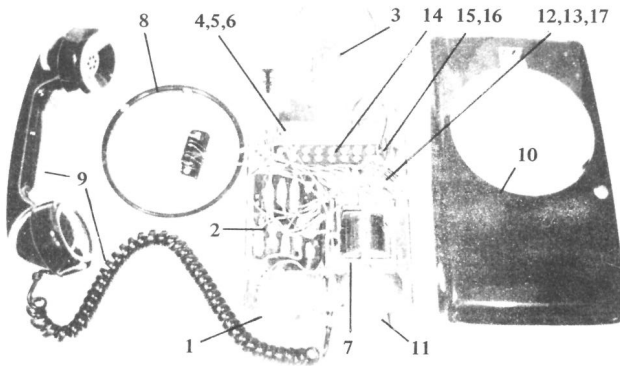


FIGURE 2. TOP VIEW - HOUSING REMOVED

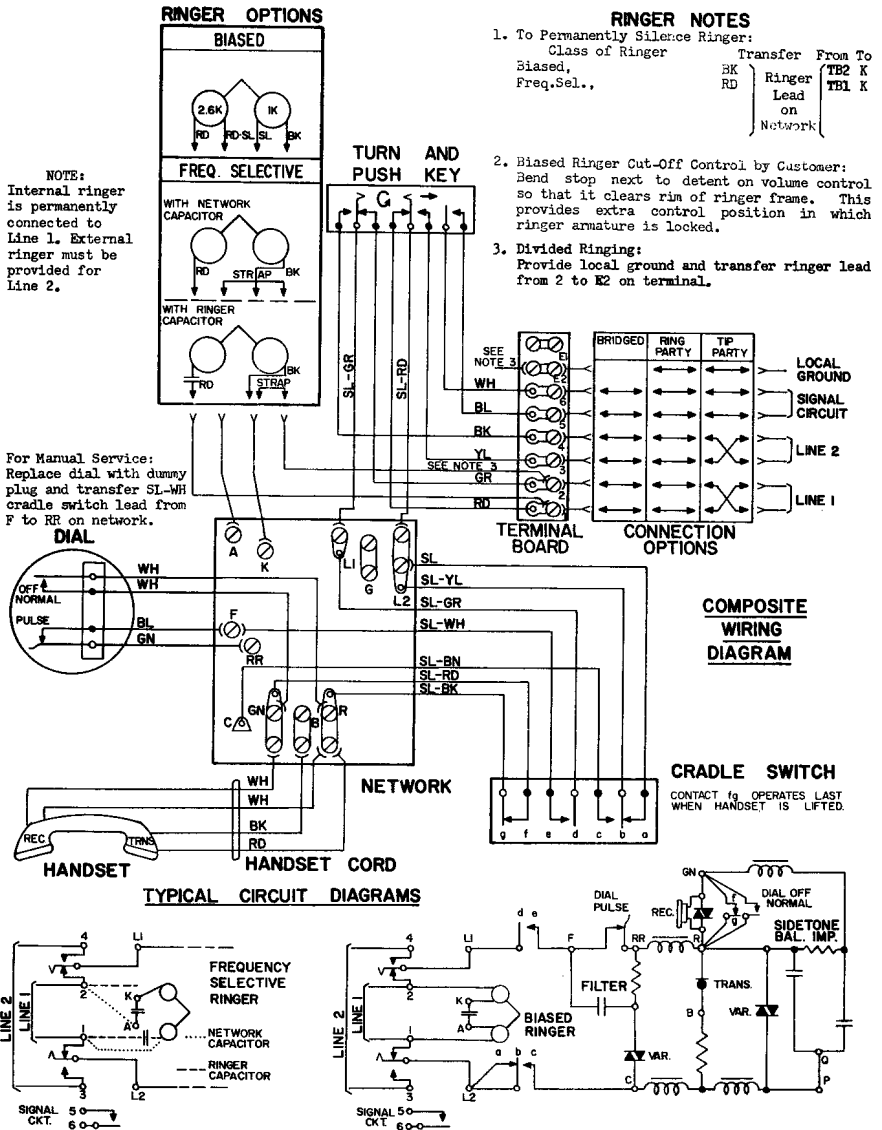


FIGURE 3. DIAGRAMS 558-30 TELEPHONE

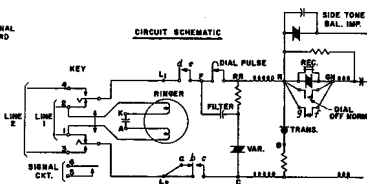


FIGURE 4.

TELEPHONE SETS

2500(BA)33M
CONNECTIONS**

1. GENERAL

- 1.01 This practice provides the connections for the 2500**(BA)33M type telephone set. This set is a desk type, lift to talk, touch-tone type of telephone instrument. See Figure 1.

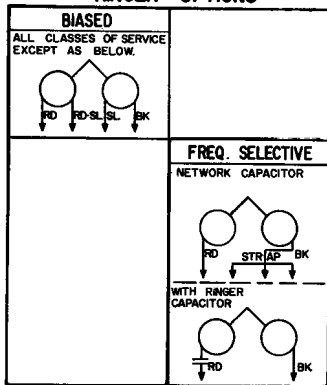


FIGURE 1.

2. CONNECTION INDEX

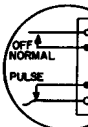
- 2.01 The following tables and figure provide connection information:
- a. Guard Assembly Connections—Table A.
 - b. Line and Ringer Connections—Table B.
 - c. 2500**(BA)33M Telephone Set Connections—Figure 2.

RINGER OPTIONS



TO TERMINAL BOARD
For Manual Service:
Replace dial with dummy
plug and transfer Green
lead from F to RR on
network.

DIAL



WH
WH
BL
GN

REC
TERM

WH
WH
BK
RD

NETWORK

HANDSET

HANDSET CORD

REC
TERM

WH
WH
BK
RD

NETWORK

HANDSET

HANDSET CORD

REC
TERM

WH
WH
BK
RD

NETWORK

HANDSET

HANDSET CORD

REC
TERM

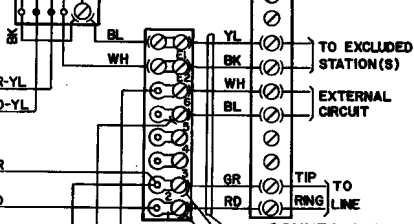
WH
WH
BK
RD

NETWORK

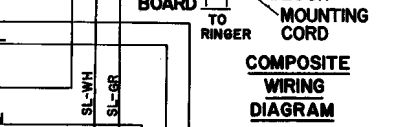
RINGER NOTES

1. To Permanently Silence Ringer:
Class of Ringer
Biased, Freq.Sel.,
Transfer From To
BK Ringer 2 K
RD Lead L2 K
on Network
2. Biased Ringer Cut-Off Control by Customer:
Bend stop next to detent on volume control
so that it clears rim of ringer frame. This
provides extra control position in which
ringer armature is locked.

PLUNGER SWITCH



TERMINAL BOARD



COMPOSITE WIRING DIAGRAM

(BRIDGED RINGING ONLY)

CRADLE SWITCH

CONTACT 1g OPERATES LAST WHEN HANDSET IS LIFTED.

TYPICAL CIRCUIT DIAGRAMS

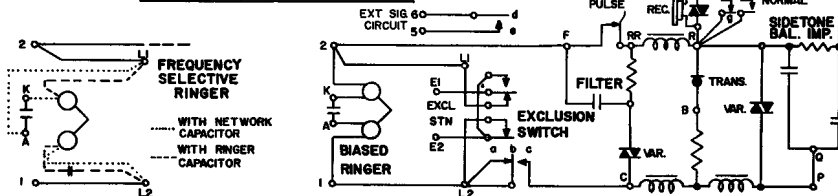
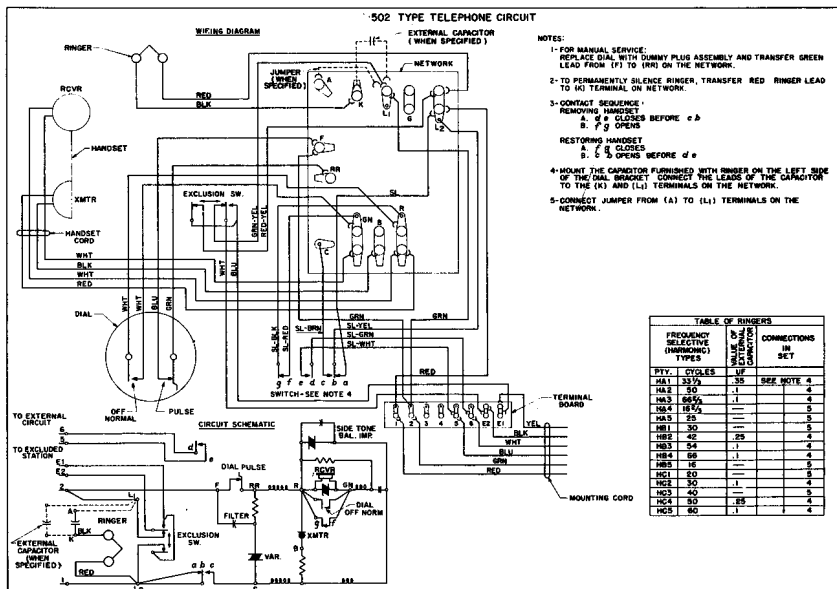


Fig. 2 DIAGRAMS 502-30 TELEPHONE



TELEPHONE SETS

2502**(BA)30M
CONNECTIONS

1. GENERAL

- 1.01 This practice provides the connections for the 2502**(BA)30M telephone set. This set is a desk type, touch-tone instrument equipped with an exclusion switch. See Figure 1.

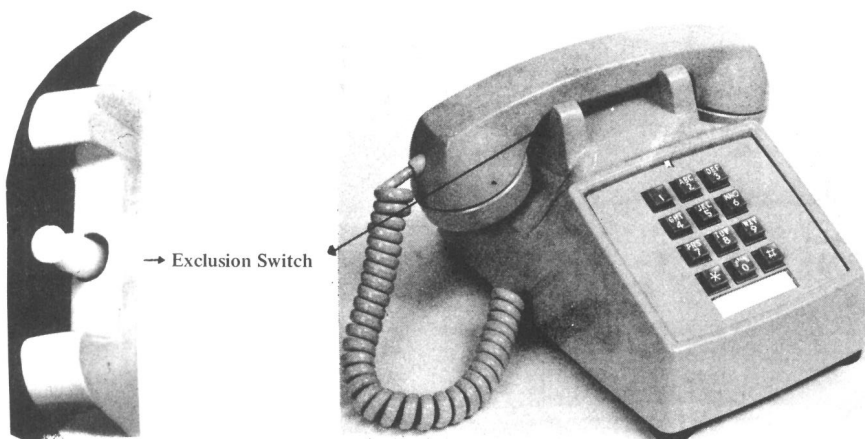


FIGURE 1. The Left Hand Cradle Plunger Serves as the Exclusion Switch

2. CONNECTION INDEX

- 2.01 The following table and figure provide connection information:

- a. Polarity Guard Connections—Table A.
- b. 2502**(BA)30M Telephone Set, Connections—Figure 2.

TABLE A
POLARITY GUARD CONNECTIONS

COMPONENT	LEAD	REMOVE FROM	CONNECT TO
Line Switch	W	C (Net.)	S*
Dial	BK	RR (Net.)	T*
Polarity Guard	W		C (Net.)
	G		RR (Net.)

* Terminal on polarity guard

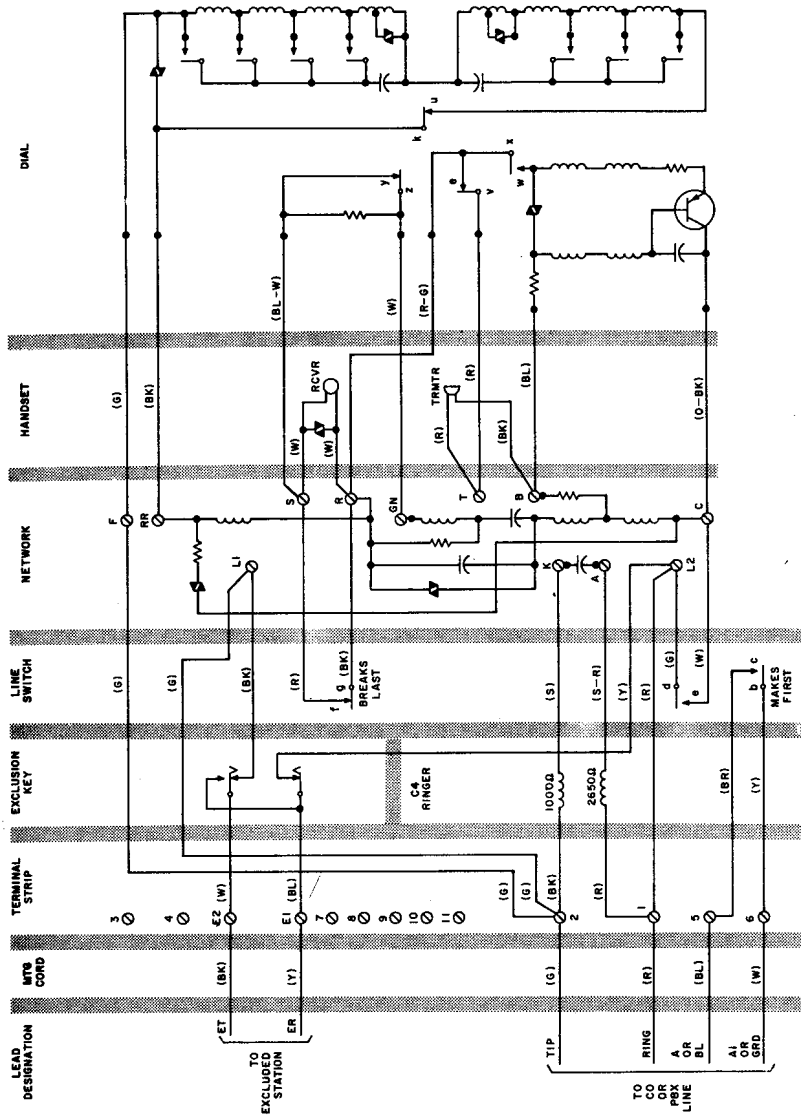


FIGURE 2. 2502** (BA) 30M Telephone Set, Connections

TELEPHONE SETS

2510(BA)30M
CONNECTIONS**

1. GENERAL

- 1.01 This practice provides the connections for the 2510**(BA)30M telephone set. This set is a desk type instrument, touch-tone dial equipped for 2 line pickup and signaling. See Figure 1.



FIGURE 1.

2. CONNECTION INDEX

- 2.01 The following tables and figures provide connection information:

- a. Polarity Guard Connections—Table A.
- b. Line and Ringer Connections—Table B.
- c. 2510**(BA)30M Telephone Set, 2 Line Pickup and Signaling—Figure 2.
- d. 2510**(BA)30M Telephone Set, 1 Line Pickup, Cutoff Extension Station or Extension Line Ringer—Figure 3.

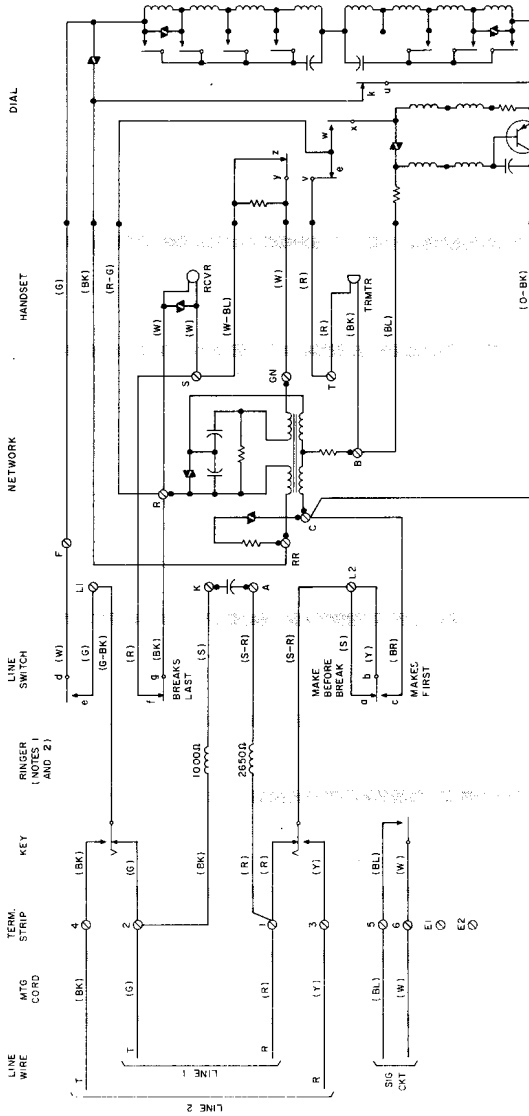
TABLE A
POLARITY GUARD CONNECTIONS

COMPONENT	LEAD	REMOVE FROM	CONNECT TO
Lane Switch	BR	C (Net.)	S*
Dial	BK	RR (Net.)	T*
Polarity Guard	W		C (Net.)
	G		RR (Net.)

* Terminals on polarity guard

TABLE B
LINE AND RINGER CONNECTIONS

FEATURES								CONNECTIONS TO TERMINALS INSIDE SET										EXTERNAL CONNECTIONS FOR MOUNTING CORD													
NUMBER OF LINES PICKED UP		SIGNALLING	RINGER IN SET USED AS		TURNKEY USED IN CUT OFF		AUX TCVR	MOUNTING CORD LEADS						TURN- KEY LEADS		RINGER LEADS NOTES 1 AND 2 FIG. 1				LINE 1		LINE 2		SIGNAL CIRCUIT		CUTOFF CIRCUIT		COM OR PVT LINE RINGER CIRCUIT			
			LINE RINGER	COM OR PVT LINE RINGER	PXT STA OR EXT LINE RINGER	RINGER IN SET		R	G	Y	BK	BL	W	S-R	G-BK	R	BK	S	S-R	RING	TIP	RING	TIP	S	GRD	RING	TIP	R	B		
1	•	•			•			L2	L1	3	4	5	6	L2	L1	L2	L1	K	A	R	G					BL	W	Y	BK		
1	•	•			•	•		L2	L1	3	4	5	6	L2	L1	1	2	K	A	R	G					BL	W	Y	BK		
1	•						•	L2	L1	3	4	5	6	G	R	L2	L1	K	A	R	G					BL	W	Y	BK		
2	•	•						1	2	3	4	5	6	L2	L1	1	2	K	A	R	G	Y	BK	BL	W						
2		•						1	2	3	4	E1	E2	L2	L1	E1	E2	A	A	R	G	Y	BK							BL	W



NOTES:

1. CONNECTIONS SHOWN ARE FOR RINGING ON LINE 1.
 TO RING ON LINE 2, MOVE (R) AND (BK) RINGER.
 LEADS TO TERMINALS 3 AND 4. TO SILENCE RINGER,
 CONNECT (BK) TO K TERMINAL.
2. WHERE COMMON OR PRIVATE LINE RINGER IS
 REQUIRED, CONNECT:
- (BL) AND (W) CORD LEADS TO EI AND E2
 - (R) AND (BK) RINGER LEADS TO EI AND E2
 - (S-R) RINGER LEAD TO K

FIGURE 2. 2510(BA) 30M Telephone Set, 2 Line Pickup and Signaling**

NOTE:
WHERE COMMON OR PRIVATE LINE RINGER IS
REQUIRED, CONNECT:
(BL) AND (W) CORD LEADS TO E1 AND E2.
(R) AND (BK) RINGER LEADS TO E1 AND E2.
(S-R) RINGER LEAD TO K.

FIGURE 3. 2510(BA) 30M Telephone Set, 1 Line Pickup, Cutoff Extension Station or Extension Line Ring**

TELEPHONE SETS

TYPE 2511
CONNECTIONS

1. GENERAL

- 1.01 This practice provides the connections for the type 2511 telephone sets. This set is a desk type instrument, equipped with a touchtone dial and 2 line pickup with exclusion features.
- 1.02 The two types of the 2511 (F or H) are identical except that one (F) is equipped with a D20J mounting cord (spade tipped conductors) and the other (H) is equipped with a D20K mounting cord (plug-ended).

2. CONNECTION INDEX

- 2.01 The following tables and figures provide connection information:

- a. Guard Assembly Connections—Table A.
- b. Wiring Changes to Provide 1 Line Pickup, Cutoff Extension Station or Extension Line Ringer—Table B.
- c. Wiring Changes to Provide 2 Line Pickup, Hold on Line 1, and Signaling (Used Without 1A1 or 1A2 KTS)—Table C.
- d. Wiring Changes to Provide 1 Line Pickup, Hold, and Secretarial Service—Table D.
- e. 2511F/H Telephone Set Connections, 2 Line Pickup With Exclusion on Line 1, Signaling, and 3 Type Speakerphone (Factory Wired)—Figure 1.
- f. 2511F/H Telephone Set Connections, 2 Line Pickup With Exclusion on Line 1, Signaling, Wired for 1A1 and 1A2 Key Telephone Systems—Figure 2.
- g. 2511F/H Telephone Set Connections, 1 Line Pickup, Cutoff Extension Station or Extension Line Ringer—Figure 3.
- h. 2511F/H Telephone Set Connections, 2 Line Pickup, Hold on Line 1 and Signaling (Used Without 1A1 or 1A2 Key Telephone Systems)—Figure 4.
- i. 2511F/H Telephone Set Connections, 1 Line Pickup, Hold and Secretarial Service—Figure 5.

3. POLARITY GUARD

- 3.01 Polarity guards should be installed only when instructed by local administrative procedures for end-to-end signaling purposes where battery/ground reversals are encountered.
- a. When a polarity guard is required, order separately as a P-90D052 guard assembly.
 - b. Refer to paragraph 4 for installation information.
 - c. Connect in accordance with Table A.

TABLE A
Guard Assembly Connections

WIRE OR LEAD		REMOVE FROM	CONNECT TO	
		NETWORK	GUARD ASSEMBLY	NETWORK
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C

4. POLARITY GUARD INSTALLATION

4.01 To install polarity guard assembly in desk type sets:

- a. Remove set housing and loosen right-hand dial mounting screw.
- b. Mount guard assembly to the dial upright with the component side of the board oriented to the rear of the set. The bracket is placed under the dial mounting screw with its lip over the top of the dial upright.
- c. Tighten dial mounting screw.
- d. Connect polarity guard in accordance with the appropriate connection practice.
- e. Replace set housing.

4.02 To install polarity guard assembly in wall type sets:

- a. Remove set housing. If set is mounted on wall surface, remove set to gain access to rear of baseplate.
- b. Remove dial but do not disconnect dial leads.
- c. From the rear of the baseplate, place two screws through the holes located below the ringer resonator. Place the guard assembly terminal board over the screws with its components facing the front of the set. Secure using two hex nuts furnished with the guard assembly.
- d. Connect polarity guard in accordance with the appropriate connection practice.
- e. Replace dial.
- f. Replace set (if removed from wall) and replace housing.



FIGURE 1. 2511F/H Telephone Set Connections, 2 Line Pickup With Exclusion on Line 1, Signaling, and 3 Type Speakerphone (Factory Wired)



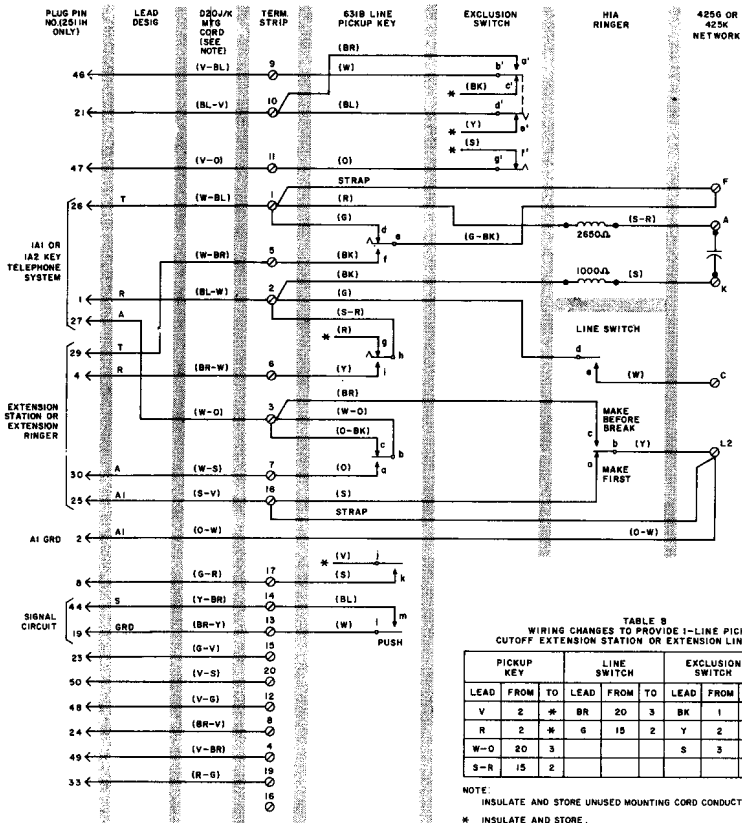


FIGURE 3. 2511F/H Telephone Set Connections, 1 Line Pickup, Cutoff Extension Station or Extension Line Ringer

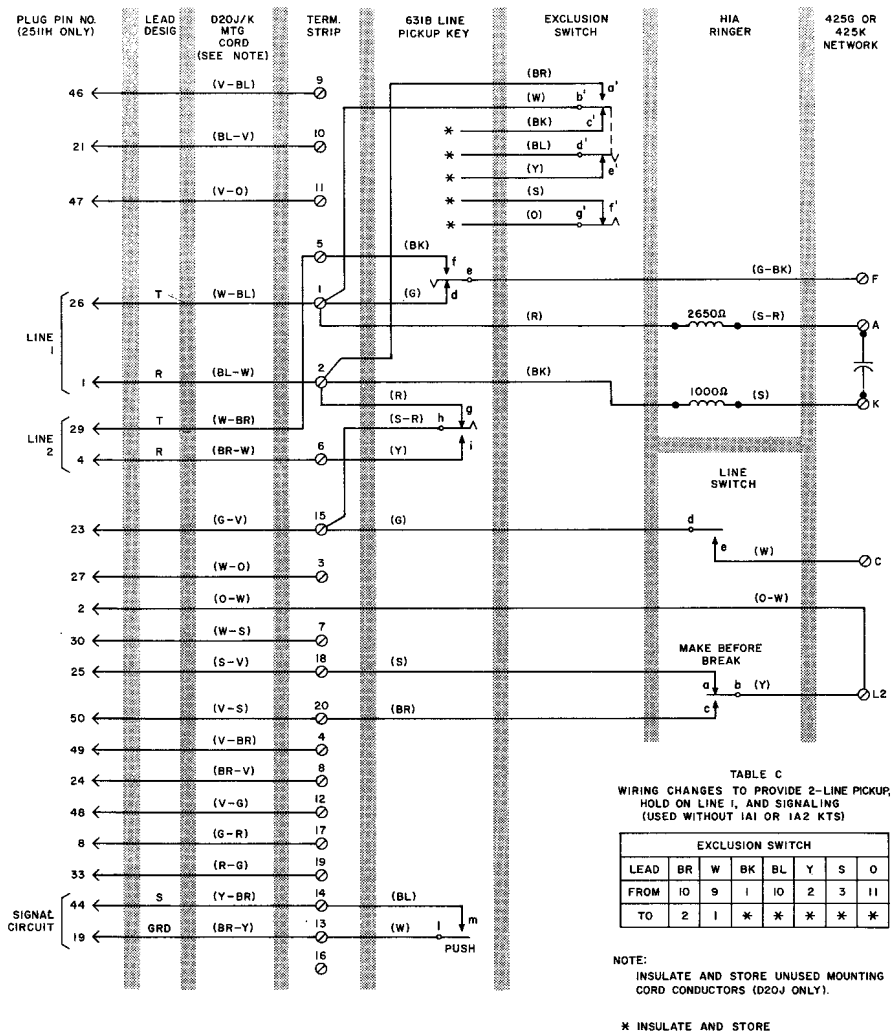


FIGURE 4. 2511F/H Telephone Set Connections, 2 Line Pickup, Hold on Line 1, and Signaling (Used Without 1A1 or 1A2 Key Telephone Systems)

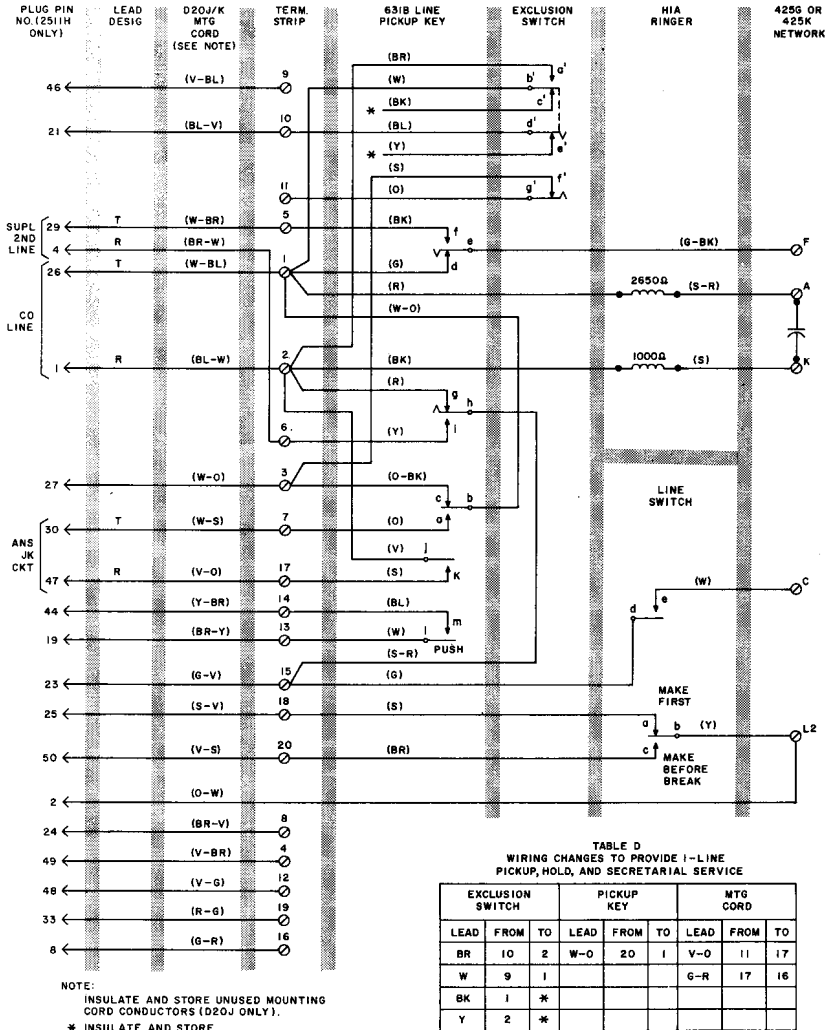


FIGURE 5. 2511F/H Telephone Set Connections, 1 Line Pickup, Hold, and Secretarial Service

TELEPHONE SETS

2554(BA)30M
CONNECTIONS**

1. GENERAL

- 1.01 This practice provides the connections for the 2554**(BA)30M type telephone set. This set is a standard wall type touch-tone instrument equipped with a straight line ringer. (See Figure 1).

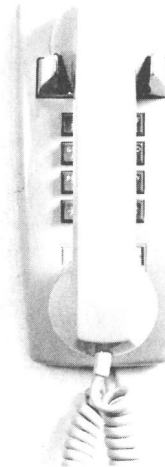


FIGURE 1.

2. CONNECTION INDEX

- 2.01 The following tables and figures provide connection information:
- a. Guard Assembly Connections—Table A.
 - b. Line and Ringer Connections—Table B.
 - c. Modification For Use With 1A1 or 1A2 Key Telephone System Line—Table C.
 - d. 2554**(BA)30M Telephone Set, Connections (Factory Wired)—Figure 2.
 - e. 2554**(BA)30M Telephone Set, Connections For 1A1 or 1A2 Key Telephone Systems—Figure 3.

TABLE A
GUARD ASSEMBLY CONNECTIONS

WIRE OR LEAD		REMOVE FROM	CONNECT TO
Dial	(BK)	RR net.	T of guard assembly
Line Switch	(BR)* (BL)†	C net.	S of guard assembly
M1W Cord‡			
Guard Assembly	(G)		Term. RR net.
	(W)		Term. C net.

NOTE: For use when specified by local instructions for end-to-end signaling installation.

* Factory-wired telephone set.

† Set wired for 1A1 or 1A2 KTS.

‡ Set not equipped with j-k line switch contacts and associated (O) and (BL) leads.

TABLE B
LINE AND RINGER CONNECTIONS

WIRE OR LEAD			INDIV. OR BRIDGED	RINGER PARTY	TIP PARTY		
					NO IDENT. GROUND	IDENT. GRD.	
						1000Ω	2650Ω
Inside Wire	Tip	(G)	1	1	2	2	2
	Ring	(R)	2	2	1	1	1
	Grd	(Y)		3	3	3	3
Ringer Leads		(BK)	1	3	3	3	3
		(BL)	*	*	*	*	*
		(S)	*	*	*	B	*
		(S-R)	*	*	*	*	B
		(R)	K	K	K	K	K
Line Switch		(W)	F	F	C	C	C
		(S)	A	A	A	A	A
		(BR)	C	C	F	F	F

* Insulate and store.

NOTES: To silence ringer permanently:

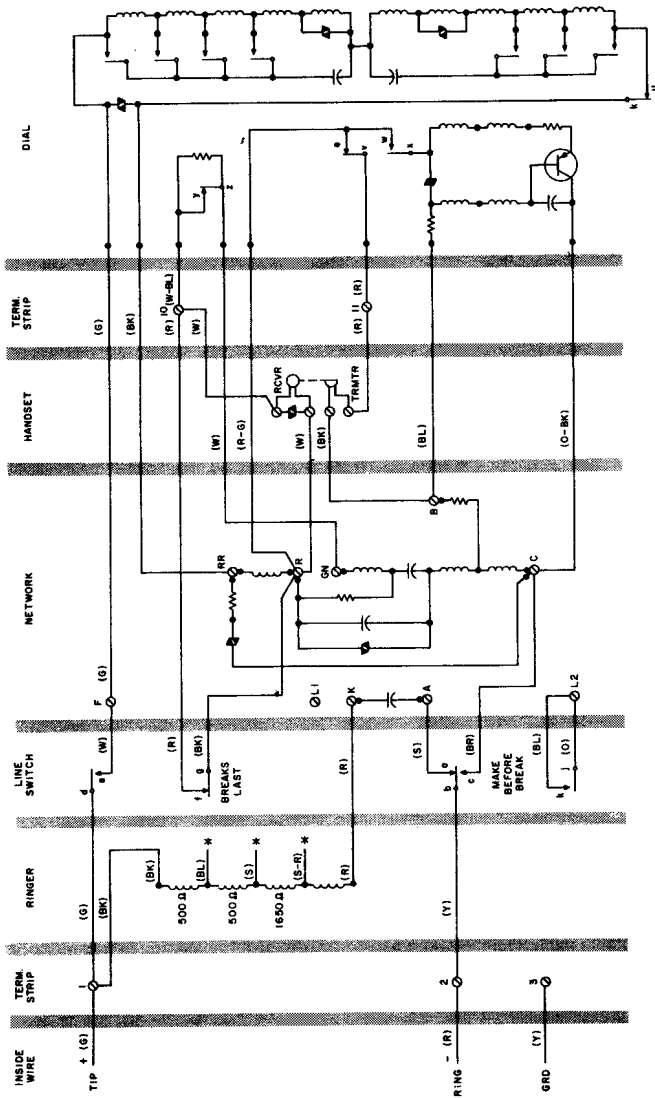
1. For all classes except identification ground insulate and store (BK) ringer lead.
2. For tip party with 1000Ω or 2650Ω identification ground remove, insulate, and store the (R) ringer lead at K of the network.

TABLE C
MODIFICATION FOR USE WITH 1A1 OR 1A2 KEY TELEPHONE SYSTEM LINE

WIRE OR LEAD		REMOVE FROM		CONNECT TO		INSULATE AND STORE
		TERM. STRIP	NET.	TERM. STRIP	NET.	
Line Switch	(S)		A			•
	(Y)	2			L2	
	(O)*		L2	2		
	(BR)		C	3		
	(BL)*		L2		C	
Place M1W Cord or Strap				2 ← → A		
P1A Ringer	(R)		K	R1	Ring lead using D-161488† connector	
	(BK)	1		B1		
Inside Wire	(G) Tip			1		
	(R) Ring			2		
	(BK) A				L2	
	(Y) A1			3		
	R1			(R)	Ringer lead using D-161488† connector	
	B1			(BK)		

* Connect these leads as shown in sets equipped with j-k line switch contacts, otherwise connect M1W cord from terminal 2 to C of network.

† See Note 2, Figure 3.



* INSULATED AND STORED.

FIGURE 2. 2554** (BA) 30M Telephone Set, Connections

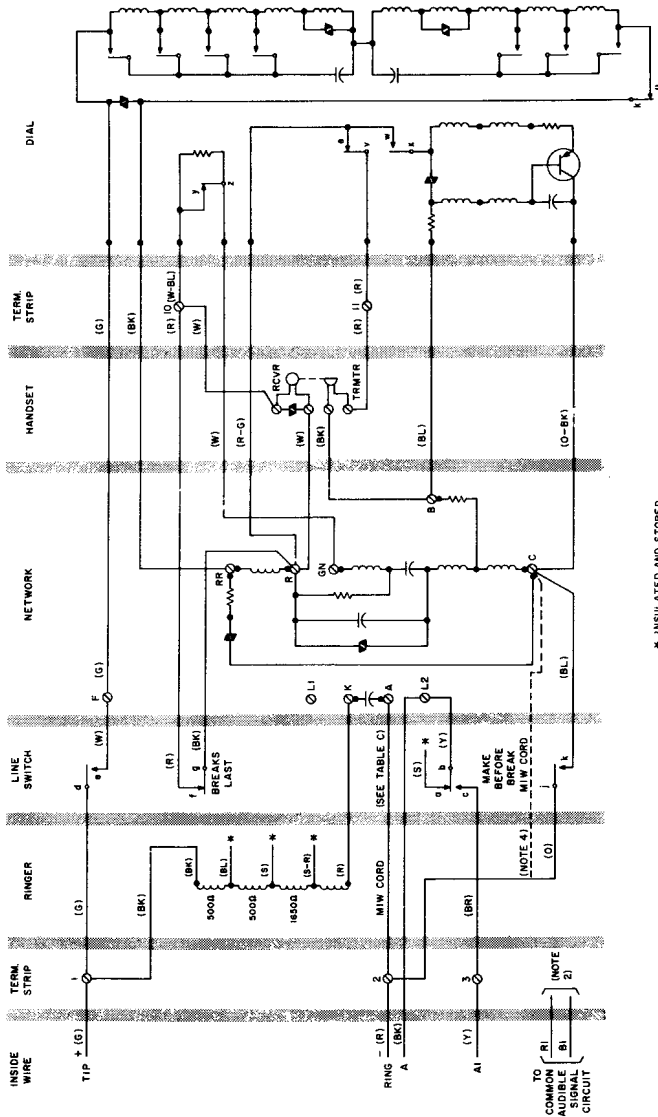


FIGURE 3. 2554** (BA) 30M Telephone Set, Connections for 1A1 or 1A2 Key Telephone Systems

TELEPHONE SETS—2558
CONNECTIONS

1. GENERAL

1.01 This practice provides the connections for the 2558 type telephone set. This set is a wall type instrument, tone dial equipped for 2 line pickup.

2. CONNECTION INDEX

2.01 The following tables and figures provide connection information:

- a. P-90D053 Guard Assembly Connections—Table A.
- b. Wiring Changes to Provide 1 Line Pickup, Cutoff Extension Station or Extension Ringer—Table B.
- c. Wiring Changes to Provide 2 Line Pickup, Hold on Line 1, Nonkey System Use—Table C.
- d. Wiring Changes to Provide Secretarial Service With Hold—Table D.
- e. 2558 Telephone Set Connections, 2 Line Pickup With Exclusion on Line 1, Signaling, Wired for 1A1 and 1A2 Key Telephone Systems—Figure 1.
- f. 2558 Telephone Set Connections, 1 Line Pickup, Cutoff Extension Station or Extension Line Ringer—Figure 2.
- g. 2558 Telephone Set Connections, 2 Line Pickup, Hold on Line 1, Nonkey System Use—Figure 3.
- h. 2558 Telephone Set Connections for Secretarial Service With Hold—Figure 4.

TABLE A
P-90D053 Guard Assembly Connections

WIRE OR LEAD		REMOVE FROM	CONNECT TO
Dial	(BK)	RR Net.	T of Guard Assembly
Line Switch	(W)	C Net.	S of Guard Assembly
Guard Assem- bly	(G)		Ter. RR Net.
	(W)		Ter. C Net.

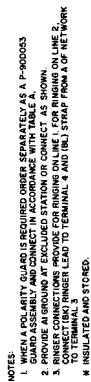


FIGURE 1. 2558 Telephone Set Connections, 2 Line Pickup With Exclusion on Line 1, Signaling, Wired for 1A1 or 1A2 Key Telephone Systems

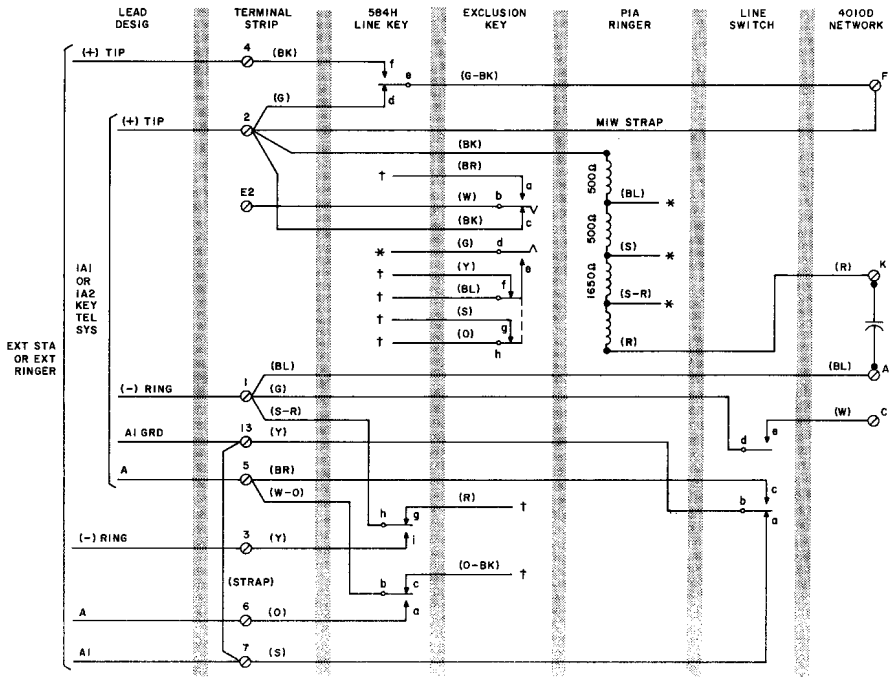


TABLE B
WIRING CHANGES TO PROVIDE 1-LINE PICKUP,
CUTOFF EXTENSION STATION OR EXTENSION RINGER

584H LINE KEY			EXCLUSION KEY			LINE SWITCH		
LEAD	FROM	TO	LEAD	FROM	TO	LEAD	FROM	TO
(R)	1	†	(BR)	E1	†	(G)	12	1
(S-R)	12	1	(Y)	E1	†	(Y)	7	13
(O-BK)	5	†	(BL)	1	†	(S)	14	7
(W-O)	6	5	(S)	13	†	(BR)	G	5
			(O)	5	†			
STRAP 7 TO 13 ON TERMINAL STRIP STRAP F OF NETWORK TO 2 ON TERMINAL STRIP								

FIGURE 2. 2558 Telephone Set Connections, 1 Line Pickup, Cutoff Extension Station or Extension Line Ringer

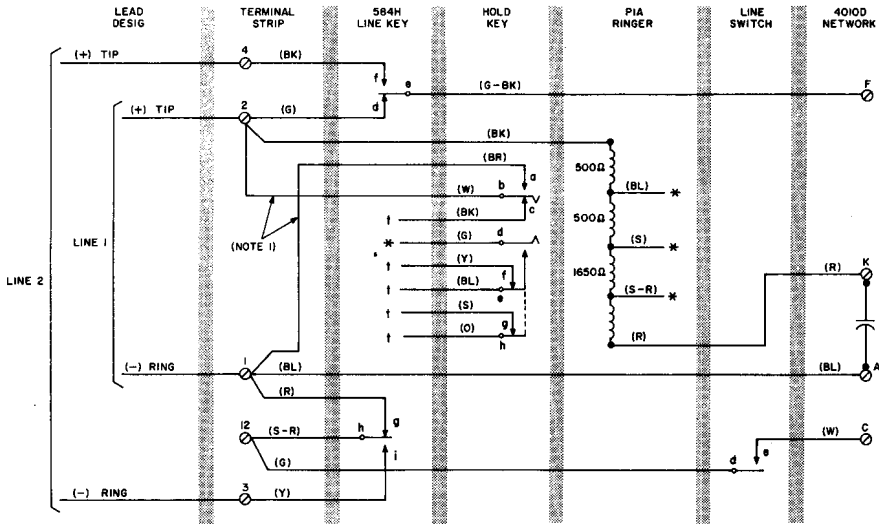


TABLE C
WIRING CHANGES TO PROVIDE 2-LINE PICKUP HOLD ON
LINE 1, NON-KEY SYSTEM USE

HOLD KEY (EXCLUSION KEY)							
LEAD	(BK)	(W)	(BR)	(Y)	(BL)	(S)	(O)
FROM	2	E2	E1	E1	1	13	5
TO	†	2	1	†	†	†	†

NOTES:

1. HOLD IS ON LINE 1: TO HOLD ON LINE 2, MOVE (W) AND (BR) HOLD KEY LEADS TO TERMS. 3 AND 4 RESPECTIVELY.
2. RINGER CONNECTIONS PROVIDE FOR RINGING ON LINE 1. FOR RINGING ON LINE 2, CONNECT (BK) RINGER LEAD TO TERM. 4 AND (BL) STRAP FROM A OF NETWORK TO TERM. 3.

* INSULATED AND STORED.
† INSULATE AND STORE.

FIGURE 3. 2558 Telephone Set Connections, 2 Line Pickup, Hold on Line 1, Nonkey System Use

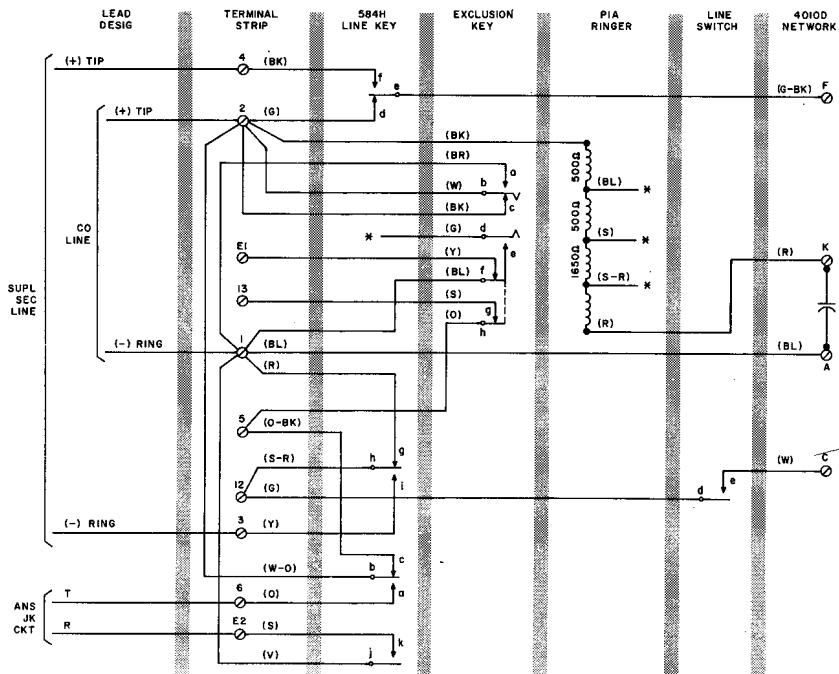


TABLE D
WIRING CHANGES TO PROVIDE
SECRETARIAL SERVICE WITH HOLD

* INSULATED AND STORED.

584H LINE KEY			EXCLUSION KEY		
LEAD	FROM	TO	LEAD	FROM	TO
(W-O)	G	2	(W)	E2	2
(S)	*	E2	(BR)	E1	1
(V)	*	1			

FIGURE 4. 2558 Telephone Set Connections for Secretarial Service With Hold

700 SERIES DESK TYPE TELEPHONES

1. GENERAL

- 1.01 This practice presents a description of the 700 series of desk telephones. The 700 series provides a group of compact, anti-sidetone type desk telephones which operate efficiently over a wide range of loop resistance and line impedance. The instruments are intended for use in special locations, such as bedrooms, or where desk space is at a premium. Each instrument consists of an oval pressed aluminum baseplate, with a non-skid rubber mat underneath, on which all internal parts are mounted. A molded plastic housing covers the assembly and provides a cradle for the handset, which is connected to the internal components by a flexible plastic covered cord (See Figure 1). A second plastic covered cord connects the instrument to a molded terminal block or wall-mounted ringer unit. *A separate ringer unit must always be fitted with these instruments*, except when they are used as extension units, as the extremely compact design does not include an internal ringer.

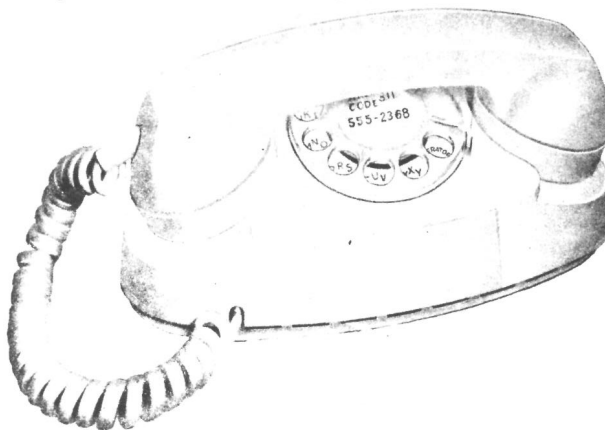


FIGURE 1 — 700-Type Telephone Set

- 1.02 The 700 telephone instrument is available for use on any class of service on any type of automatic or manual telephone system. It may be connected to its associated ringer to provide all necessary circuitry. Some special features may be provided with the instrument: specific details for each combination are given in individual C.T.S. practices.
- 1.03 Although any of the ~~ring~~ units (Figure 2) may be used with the 700 telephone, specific types have been designed with the requirements of this series of telephones in view. Each of these ringers provides adequate terminal block facilities for the external circuits of the instruments.
- 1.04 Instruments in the 700 series can be supplied in various colors.

2. TYPE 701 (LR) 30 DESK TYPE TELEPHONE

- 2.01 The 701 (LR) 30 desk telephone is a very compact desk type of instrument with a built-in combination dial and night light which illuminates the numeral ring. A switch, at the rear, may be set so that the light glows dimly or is off when the handset is in the cradle. With the

switch in either position the light glows brightly when the handset is lifted. A separate power source of 6-8 volts ac or dc at a current of about 1/4 amp. is required to supply the lamp. *A specially designed transformer, is available for use on 110V ac power circuits.*

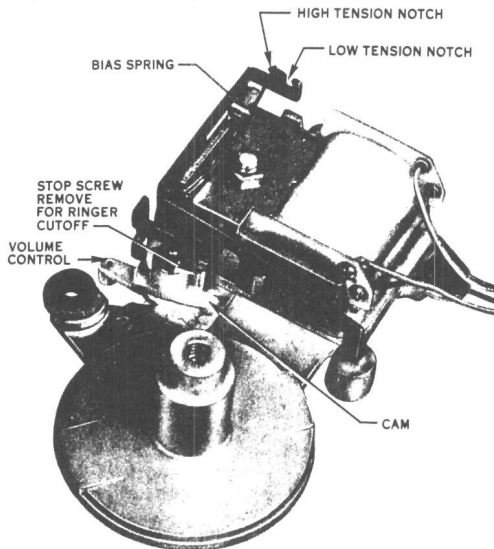


FIGURE 2 — M1A Ringer, Gong and Resonator Removed

3. TYPE 701 (LR) 37, 701 (LR) 38 TELEPHONES

- 3.01 The 701 (LR) 37 and 701 (LR) 38 telephone sets are very compact desk types of instruments with built-in combination dial and night lights, which illuminate the numeral rings, and separate indicator lamps. A small neon lamp, located in front of the handset, may be caused to glow by applying a dc potential of 90 volts across the line conductors at a remote point. The instruments are intended for use on PBX installations where the glowing lamp is used to indicate that a message has been left at the switchboard in the absence of the called party.
- 3.02 A switch at the rear of the instrument may be set so that the dial light glows dimly, for use as a night light, or is off when the handset is on the cradle. With the switch in either position the light glows brightly when the handset is lifted. A separate power source of 6-8 volts ac or dc at a current of about 1/4 amp. is required to supply the dial lamp. *A specially designed transformer is available for use on 110V ac power circuits.*
- 3.03 The 701 (LR) 37 instrument is provided with a 1/5 watt neon indicator lamp while the 701 (LR) 38 is provided with a lower power 1/15 watt indicator lamp. *The lamps must not be interchanged as the sockets have different built-in series resistors.*
- 3.04 The installed telephone must be provided with a separately mounted, external ringer. See CSP 480-100-402 for wiring diagram.

4. **TYPE 703 (LR) 30 DESK TYPE TELEPHONE**

- 4.01 The 703 (LR) 30 set is a very compact desk type of instrument. It is identical with the type 701 (LR) 30 telephone except that the built-in combination dial light/night light is omitted.
- 4.02 The installed telephone must be provided with a separately mounted external ringer. See CSP 480-110-403 for ringer wiring diagram.
- 4.03 The transmission circuit for the 701 and 703 type telephone sets is equivalent to the 500 type telephone set.

5. **TYPE 703 (LR) 37, 703 (LR) 38 TELEPHONE SETS**

- 5.01 The 703 (LR) 37 and 703 (LR) 38 telephones are very compact desk types of instruments with the addition of indicator lamps. A small neon lamp, located in front of the handset, may be caused to glow by applying a dc potential of 90 volts across the line at a remote point. The instruments are intended for use on PBX installations where the glowing lamp is used to indicate that a message has been left at the switchboard in the absence of the called party. (See Figure 3).
- 5.02 The 703 (LR) 37 instrument is provided with a 1/5 watt neon indicator lamp while the 703 (LR) 38 is provided with a lower power 1/15 watt indicator lamp. *The lamps must not be interchanged as the sockets have different built-in series resistors.*
- 5.03 The installed telephone must be provided with a separately mounted external ringer. See CSP 480-110-404 for ringer wiring diagram.

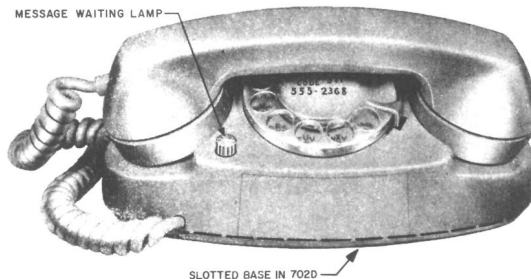


FIGURE 3 — 701D and 702D Telephone Sets Equipped With Message Waiting Lamp

6. **NETWORK**

- 6.01 The type 190107 network assembly provides all the components necessary to connect and match the impedance of the handset transmitter and receiver units to a two wire telephone circuit.
- 6.02 The unit incorporates radio frequency filter and side tone balancing circuits in addition to the impedance matching components.
- 6.03 All the components are mounted to the underside of the molded terminal board, which is clipped to the sealing compound filled mounting container.

7. CIRCUIT DESCRIPTION

7.01 The circuit is shown in Figure 4, the dash lines show typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.

- a. The basic network design provides an increase in transmission characteristics of some 10 db over previous circuits. It has therefore been possible to include the two shunt elements in the circuit to produce increased losses on short loops and yet have negligible effect on long loops, the varistor effective resistances changing inversely to the current flowing through them.

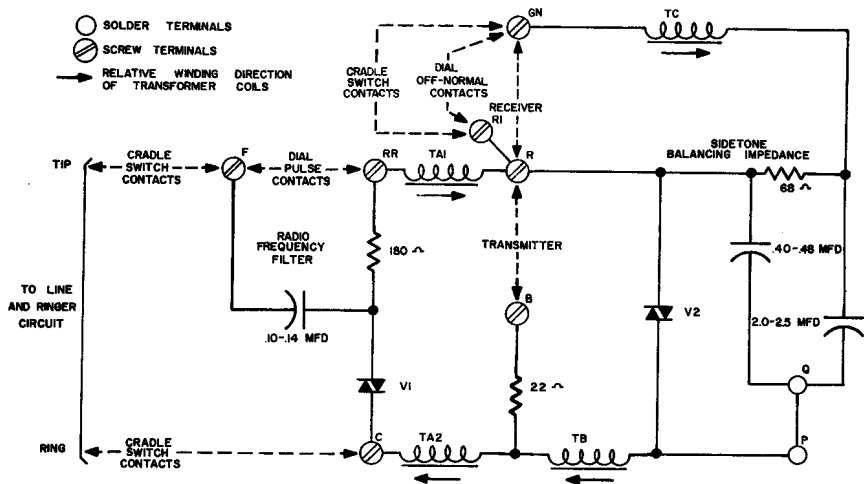


FIGURE 4 CIRCUIT DIAGRAM

- b. The direction of winding of the four coils of the transformer is indicated by arrows in Figure 4. Received speech currents pass via windings TA₁, TB and TA₂, each of which produces and additive voltage in winding TC. The received currents also produce a voltage across the 68Ω resistor that opposes and is almost equal to that produced by the induced voltages in winding TC. There is, therefore, very little power loss in the resistor and varistor and maximum power in the receiver. The low impedance of the transmitter is matched to the loop by the turn of winding TB to winding TA₁ and TA₂.
- c. The current variations due to the transmitter are in opposite phase in windings TA and TB. The induced voltages in winding TC are also in opposite phase and the resultant voltage is opposed by the voltage produced across the 68Ω resistor. The net effect is that very small signals are produced in the receiver due to transmitter current changes and sidetone is very low. Also there is little power loss in the receiver, maximum transmitting levels are attained. Both varistors contribute to this condition by automatically compensating for various loop conditions to provide close matching of the loop impedance and the balancing network impedance with the transmitter circuit.

- d. The 180Ω resistor and .10 MFD capacitor provide a filter network to suppress high frequency signal components of the dial pulses which might otherwise be radiated from the telephone line and cause local interference with broadcast radio reception.

8. TESTING

- 8.01 Thorough testing of the network assembly can only be performed with elaborate test equipment. An adequate check on performance, for maintenance purposes, is to compare a suspected unit with a known good unit by substitution. Resistance and capacitance checks can be carried out between many of the terminals, as can be seen from Figure 4. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Figure 5 shows the layout of the terminal board of the assembly.

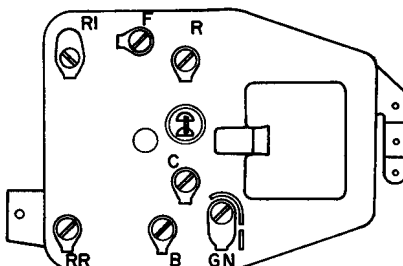


FIGURE 5 TERMINAL BOARD LAYOUT

- 8.02 To assist in testing network assemblies in the field, Table 1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

Table 1 POINT TO POINT TEST VALUES

Terminals	Components	Test Value
F - RR	Filter capacitor	.09 - .14
R - Q	Network capacitors	(4) 2.4 - 3.0
C - RR	V1 and filter resistor	(1) 4.7K min
		(2) 890-1070
C - P	TA ₂ and TB windings	28.8-35.2
B - C	TA ₂ winding	35.1-42.9
B - P	TB winding	33.3-40.7
R - GN	TC winding and resistor	74.3-90.7
R - RR	TA winding	12.1-14.9
R - P	V2	(1) 1.6K min

NOTES: All capacitance values in microfarads and all resistance values in ohms

- (1) with 1 ma dc flowing through circuit.
- (2) with 10 ma dc flowing through circuit.
- (3) with 100 ma dc flowing through circuit.
- (4) with strap P-Q removed.

TELEPHONE SET
TYPE 701 (LR) 30 DESK
CONNECTIONS

1. GENERAL

- 1.01 This practice provides the connecting information necessary in the installation of the 701 (LR) 30 desk type telephone set.
- 1.02 The installed telephone must be provided with a separately mounted external ringer.

2. INSTALLATION REQUIREMENTS

- 2.01 A 110-120 volt ac receptacle is required for the dial light transformer. This receptacle should be on a circuit that is not controlled by a switch. One transformer should be used for a single telephone set.
- 2.02 For proper illumination of the dial, the length of the wire between the transformer and the telephone set should not exceed 25 feet of standard inside wire. Do not use a 25-foot mounting cord because of added resistance.
- 2.03 When a ringer is required, any ringer including the specially designed ringers for this series of telephones may be used. See Figure 1 for ringer wiring diagram.

3. PORTABLE INSTALLATION

- 3.01 For portable installation of the Type 702 telephone set arrange as follows:
 - a. Cut off or insulate the unused conductors in the mounting cord when terminated in a wall plug.
 - b. Extend tip, ring, ground, and transformer leads to a wall jack. On 2 party tip stations requiring ground identification, be sure that jacks and plugs are installed in accordance with local practice.
- 3.02 Portable installation of Type 701 sets can be made if the service involved does not require more than 12 conductors in the mounting cord.
- 3.03 In portable installations where only one dial light set is installed, one transformer may be multiplied to two or more jacks.

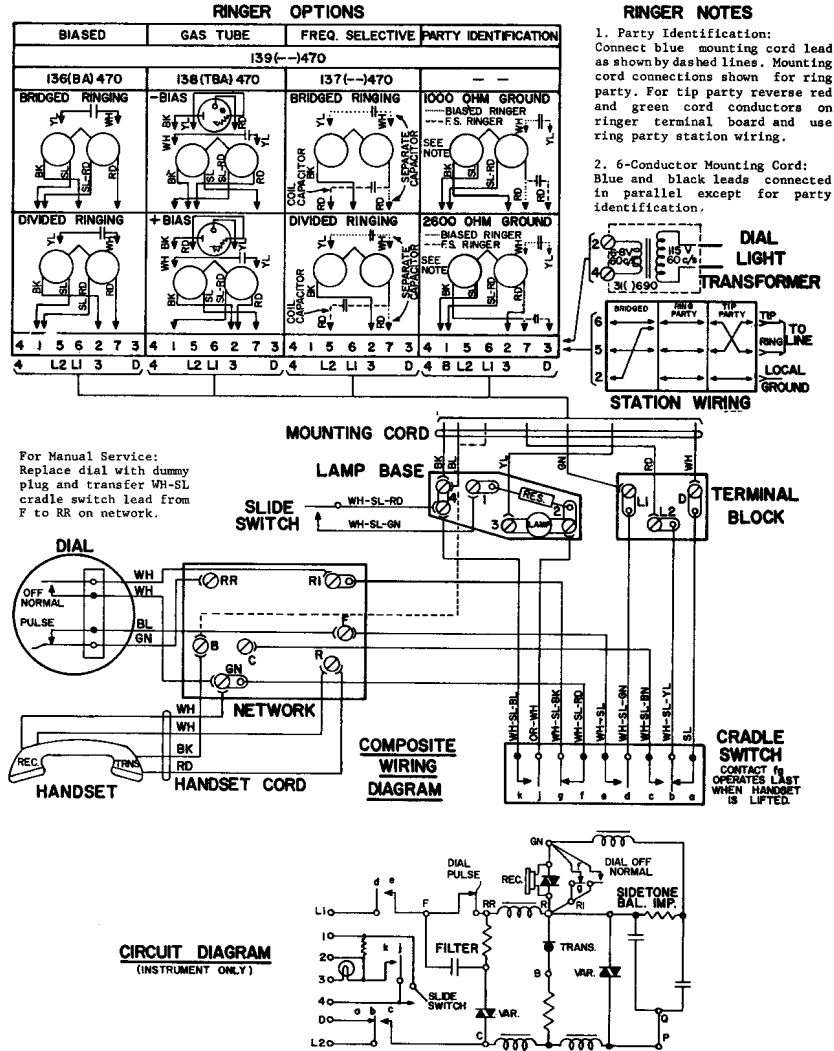


FIGURE 1 DIAGRAMS 701--(L)30- TELEPHONE

TELEPHONE SET
TYPE 701 (LR) 37 AND 38
CONNECTIONS

1. GENERAL

- 1.01 This practice provides the connecting information necessary in the installation of the 701 (LR) 37 and (LR) 38 type telephone sets.
- 1.02 The installed telephone must be provided with a separately mounted external ringer. See Figure 1 for a wiring diagram.

2. INSTALLATION REQUIREMENTS

- 2.01 A 110-120 volt ac receptacle is required for the dial light transformer. This receptacle should be on a circuit that is not controlled by a switch. One transformer should be used for a single telephone set.
- 2.02 For proper illumination of the dial, the length of the wire between the transformer and the telephone set should not exceed 25 feet of standard inside wire. Do not use a 25-foot mounting cord because of added resistance.
- 2.03 When a ringer is required, any ringer including the specially designed ringers for this series of telephone may be used. See Figure 1 for ringer wiring diagram. Types 136, 137, 138 and 139 are recommended.

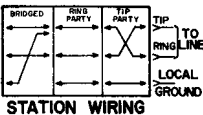
RINGER OPTIONS

BIASED	GAS TUBE	FREQ. SELECTIVE	PARTY IDENTIFICATION
139(-)-470			
136(BA) 470	136(TBA) 470	137(-)-470	---
BRIDGED RINGING	-BIAS	BRIDGED RINGING	1000 OHM GROUND ---BIASED RINGER ---F.S. RINGER
DIVIDED RINGING	+BIAS	DIVIDED RINGING	2600 OHM GROUND ---BIASED RINGER ---F.S. RINGER
4 1 5 6 2 7 3	4 1 5 6 2 7 3	4 1 5 6 2 7 3	4 1 5 6 2 7 3
L2 LI 3 D	L2 LI 3 D	L2 LI 3 D	B L2 LI 3 D

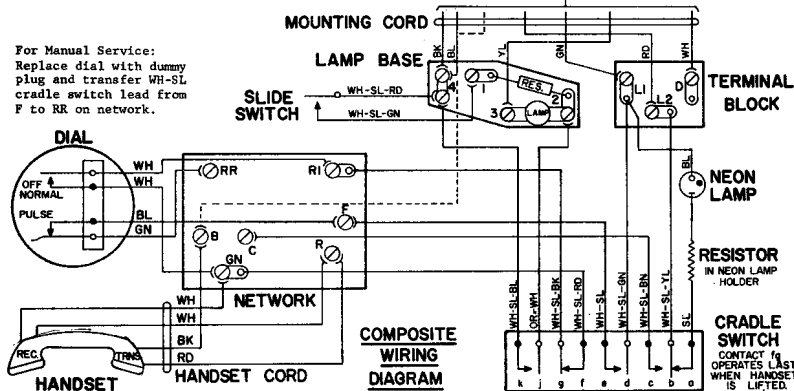
RINGER NOTES

1. Party Identification:
Connect blue mounting cord lead as shown by dashed lines. Mounting cord connections shown for ring party. For tip party reverse red and green cord conductors on ringer terminal board and use ring party station wiring.

2. 6-Conductor Mounting Cord:
Blue and black leads connected in parallel except for party identification.



For Manual Service:
Replace dial with dummy plug and transfer WH-SL cradle switch lead from F to RR on network.



CIRCUIT DIAGRAM (INSTRUMENT ONLY)

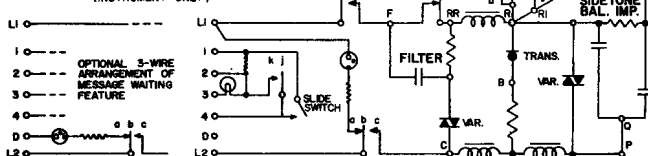


FIGURE 1. DIAGRAMS 701--(L)37- TELEPHONE AND
701--(L)38- TELEPHONE

TELEPHONE SET
TYPE 703 (LR) 30 DESK
CONNECTIONS

1. GENERAL

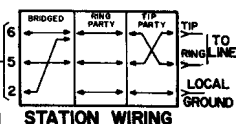
- 1.01 This practice provides the connecting information necessary in the installation of the 703 (LR) 30 desk type telephone set.
- 1.02 The installed telephone must be provided with a separately mounted, external ringer, types 136, 137, 138 and 139 are recommended. See Figure 1 for ringer wiring diagram.

RINGER OPTIONS

BIASED	GAS TUBE	FREQ. SELECTIVE	PARTY IDENTIFICATION
139(-)-470			
136(BA) 470 BRIDGED RINGING	138(TBA) 470 -BIAS	137(-)-470 BRIDGED RINGING	1000 OHM GROUND BIASED RINGER F.S. RINGER
DIVIDED RINGING	+BIAS	DIVIDED RINGING	2600 OHM GROUND BIASED RINGER F.S. RINGER
4 1 5 6 2 7 3 L2 LI D	4 1 5 6 2 7 3 L2 LI D	4 1 5 6 2 7 3 L2 LI D	4 1 5 6 2 7 3 B L2 LI D

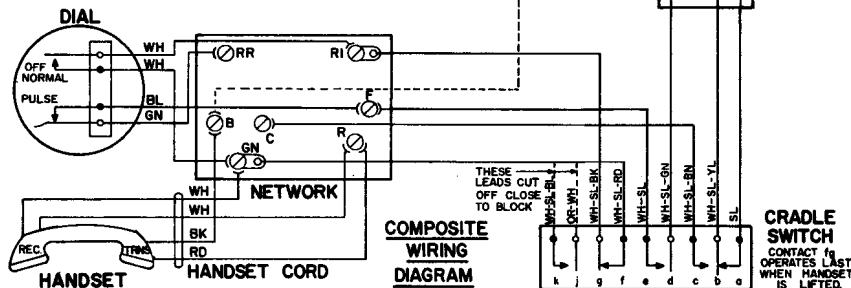
RINGER NOTES

1. Party Identification:
Connect yellow mounting cord lead as shown by dashed lines. Mounting cord connections shown for ring party. For tip party reverse red and green cord conductors on ringer terminal board and use ring party station wiring.
2. 6-Conductor Mounting Cord:
Yellow and black leads connected in parallel except for party identification.



MOUNTING CORD

For Manual Service:
Replace dial with dummy
plug and transfer WH-SL
cradle switch lead from
F to RR on network.



CIRCUIT DIAGRAM (INSTRUMENT ONLY)

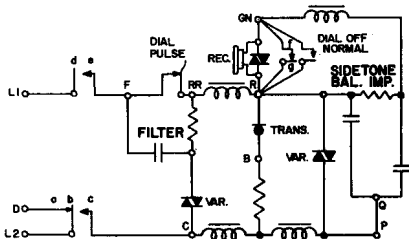


FIGURE 1. DIAGRAMS 703--(LR)30- TELEPHONE

TELEPHONE SET
TYPE 703-(LR) 37 AND 38
CONNECTIONS

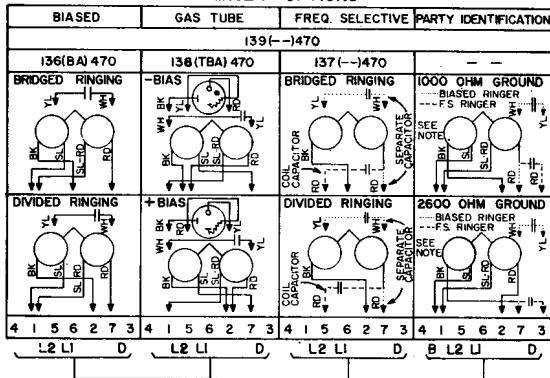
1. GENERAL

- 1.01 This practice provides the connecting information necessary in the installation of the 703-LR37 and LR38 type telephone sets.
- 1.02 The installed telephone must be provided with a separately mounted external ringer. See Figure 1.

2. INSTALLATION REQUIREMENTS

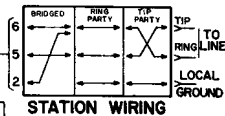
- 2.01 When a ringer is installed any ringer including the specially designed ringers for this series of telephones may be used. See Figure 1 for ringer wiring options.

RINGER OPTIONS

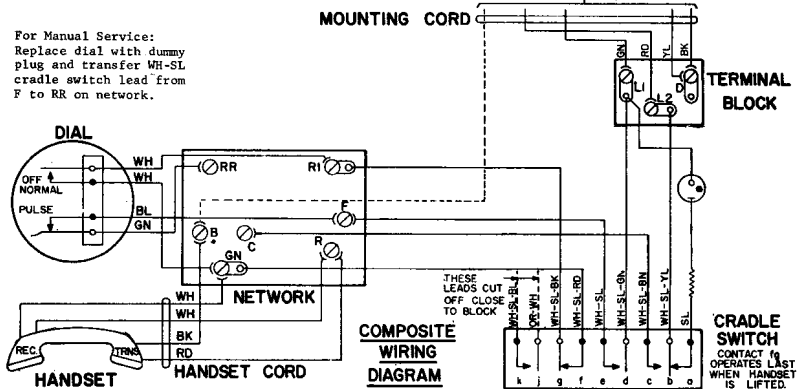


RINGER NOTES

1. Party Identification: Connect yellow mounting cord lead as shown by dashed lines. Mounting cord connections shown for ring party. For tip party reverse red and green cord conductors on ringer terminal board and use ring party station wiring.
2. 6-Conductor Mounting Cord: Yellow and black leads connected in parallel except for party identification



For Manual Service:
Replace dial with dummy plug and transfer WH-SL cradle switch lead from F to RR on network.



CIRCUIT DIAGRAM (INSTRUMENT ONLY)

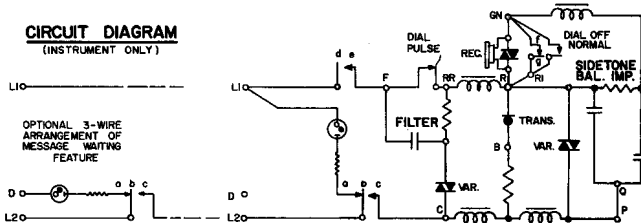


FIGURE 1. DIAGRAMS 703--(L)37- TELEPHONE AND
703--(L)38- TELEPHONE

TELEPHONE SETS
TYPES 701, 703 MAINTENANCE

1. GENERAL

- 1.01 This practice provides the maintenance requirements of the 701 and 703 type telephone sets.
- 1.02 Maintenance of the 700 series of telephone sets is limited to replacement of a few components and burnishing or adjustment of certain contacts.
- 1.03 A careful visual inspection may disclose broken, cracked, or worn components which should be replaced.

2. TRANSMISSION

- 2.01 The transmission quality of 701, 703 telephone sets is the same as that of the 500 type set.
- 2.02 If there is trouble in the telephone set, check the following points:
 - a. Worn, open or noisy cords.
 - b. Defective network.
 - c. Loose connections.
 - d. Dirty or improperly adjusted switchhook or dial contacts.
 - e. Defective transmitter or receiver unit.
- 2.03 With the exception of burnishing of switchhook or dial contacts, and slight adjustments of switchhook contacts, trouble should be cleared by substitution of affected part.

3. DIAL

- 3.01 Maintenance of the dial should be limited to fingerwheel or number plate replacement, contact burnishing, or cleaning of exposed surfaces.

4. DIAL LIGHT

- 4.01 Slide switch for night-light operation is located on rear of base. When handset is removed, dial light increases in brilliance for dialing purposes.
 - a. With switch operated to the left and handset in place, night light (reduced illumination) is obtained.
 - b. With switch operated to the right, lamp will light only when handset is removed.
- 4.02 If lamp fails to operate, check the following points:
 - a. Defective or unplugged transformer.
 - b. Loose connections.
 - c. Defective lamp.

- d. Dirty or improperly adjusted switchhook contacts.
- e. Defective slide switch.

4.03 If illumination is poor, be certain that the length of inside wire between the transformer and telephone does not exceed the length specified in CTS practice 480-110-401. Only one dial light is allowed for each transformer.

5. RINGER

5.01 When the ringer fails, be sure that the armature moves freely and that adjacent wires do not interfere with movable parts.

6. TEST AND ADJUSTMENT OF CRADLE SWITCH

6.01 The operating arm, and the insulated actuator strip mounted on it, must move freely between the sets of contact springs. The normal position of the assembly is with the operating arm fully released and the operated position is with the arm fully depressed.

6.02 Adjust the contact springs of the assembly to meet the requirements detailed in the following paragraphs:

- a. The spring pressures between each pair of closed contacts must be within the range of 10 to 20 grams. This is measured at each tip of the break springs on the side of the assembly where the springs are in contact with the actuator strip, and at each tip of the lever springs on the opposite side of the assembly when the operating arm is in the normal position. The same conditions must be satisfied when measuring at each tip of the lever springs on the side of the assembly where the springs are NOT in contact with the actuator strip when the operating arm is in the fully operated position. With the operating arm in either position, each spring not making electrical contact must be tensioned against a buffer spring or the central insulating block.
- b. The spring clearances between each pair of open contacts, in either the normal or operated condition, must be at least .020". There must be a perceptible clearance between any buffer spring and the contact spring which rests on it, in either position of the operating arm, when the contact spring is in electrical contact with another spring in the other position of the operating arm.
- c. The contacts in each assembly must operate in the sequence shown by the circled numbers in Figure 1 when the operating arm is moved from the normal position. Contacts marked with the same number should function at approximately the same time. The two contacts of each mating pair of springs must make and break simultaneously. The bar contacts must mate approximately on centers.

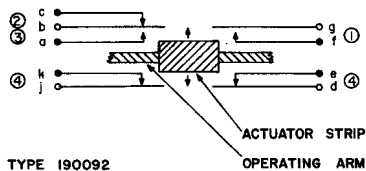


FIGURE 1 CONTACT ARRANGEMENTS

7. LUBRICATION

7.01 Any existing lubricant must be cleaned off with a good quality, non-filming commercial solvent. Using a small camel hair brush, apply a small amount of high quality lubricant to each of the two bearing points of the bearing pin. *Avoid excessive lubrication.*

Item	Description
1	Base Assy. c/w items 2 thru 20
2	Network Assembly
3	Spring Assembly (Cradle)
4	Insulator
5	Bracket (Dial)
6	Pracket (Housing Mtg. Screw)
7	Rivet
8	Lamp Base Assembly
9	Rivet
10	Switch
11	Rivet
12	Connecting Block Assembly
13	Insulator
14	(Lead) Weight
15	Screw

Item	Description
16	Hex Nut
17	Mat
18	Lockwasher Screw
19	Wire Assembly (WH-SL-GR)
20	Wire Assembly (WH-SL-RD)
21a	Dial Assembly
b	Dummy Plug Assembly
22	Handset and Cord Assembly
23	Desk Stand Cord
24	Cradle Switch Bracket Assy.
25	Spring
26	Lamp Socket Assembly
27	Lamp
28	Resistor
29	Housing and Plunger Assembly

NOTE: The 703 (LR) 30 is identical to Figure 1 except that the built-in combination dial light/night light is omitted. See Figure 1.

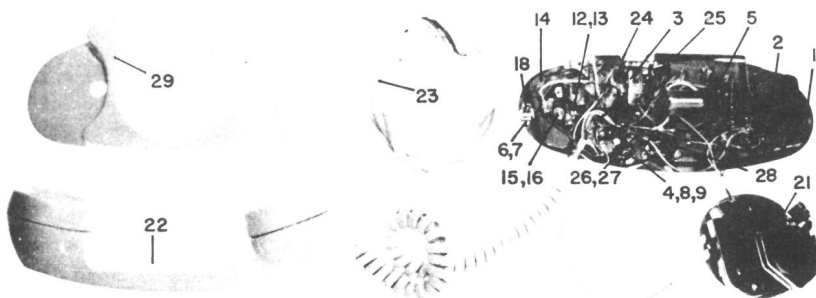


Fig. 1 TOP VIEW - HOUSING REMOVED

DISASSEMBLY AND ASSEMBLY 700 TYPE INSTRUMENT

1. GENERAL

- 1.01 This practice provides instructions for the disassembly and assembly of the basic type 700 telephone instrument. (Maintenance)
- 1.02 Tests and adjustments outlined in paragraph 7 shall be made on all assembled instruments.

2. DISASSEMBLY AND ASSEMBLY

- 2.01 The exploded view of Figure 1 shows all the component parts and sub-assemblies of the 700 basic instrument.

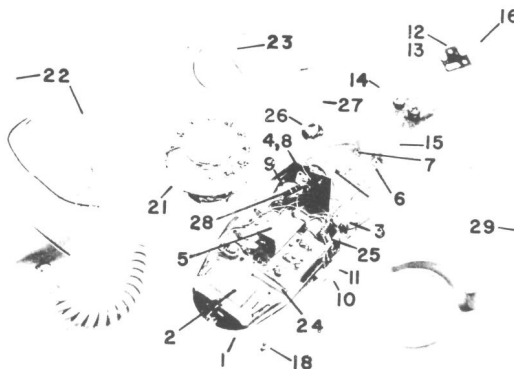


FIGURE 1. COMPONENT PARTS - EXPLODED VIEW

Procedures for disassembly and assembly are given in the following paragraphs. Additional parts which are included to provide special features should be removed and replaced in any convenient order. Note that the lamp of the message waiting light may be replaced by unscrewing the holder in the base of the instrument, then changing the lamp in the holder (Figure 2).

3. DISASSEMBLY OF THE BASIC INSTRUMENT

- 3.01 a. Loosen the lockwasher screws (18 of Figure 1) and remove the housing (29 of Figure 1).
- b. Loosen the clamping screws, lift out the dial (21), if fitted, and disconnect the leads.
- c. Disconnect the leads and remove the handset and cord assembly (22).
- d. Disconnect the leads and remove the desk stand cord (23).

- e. Remove the lamp (27) and socket assembly (26).
- f. Remove spring (25) and cradle switch bracket assembly (24).

The remaining major components of the complete instrument are riveted to the base plate. If it should become necessary to remove one of these components the rivets must be drilled out and the replacement component mounted with new rivets, if riveting equipment is available, or with suitable machine screws, spring washers and hexagonal nuts.

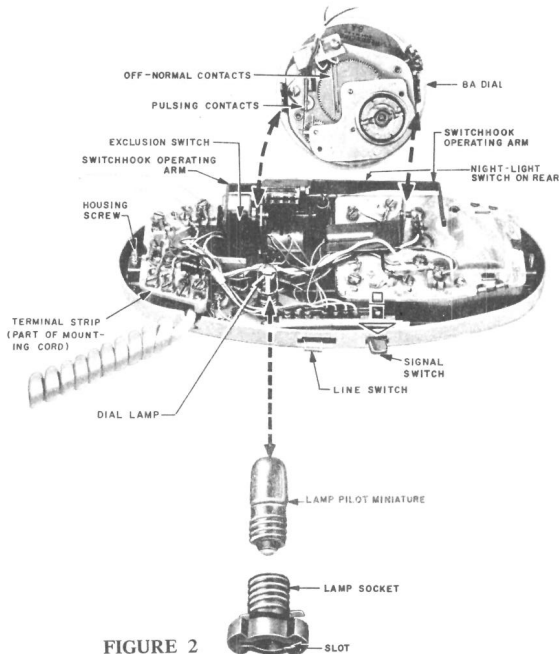


FIGURE 2

4. ASSEMBLY OF THE BASIC INSTRUMENT

- 4.01 Reassemble the instrument in the reverse order to that given for disassembly, noting the points listed below.
 - a. Refer to the appropriate wiring diagram to reconnect the various leads.
 - b. Make certain that the leads of the handset and mounting cords do not interfere with the operation of the cradle switch.
 - c. Make sure that the locating spots and holes mate correctly to locate the dial squarely in its mounting bracket.

- d. The housing must fit freely without binding on any part. Make sure that the dial gasket is in its correct position.
- e. Check that any screws, washers and nuts, used to replace rivets, do not interfere with any other parts of the instrument.
- f. Check the assembled unit as detailed in the paragraph on test and adjustment.

5. CRADLE SWITCH ASSEMBLIES

- 5.01 These cradle switch assemblies are used on the 700 Series of compact desk telephones. Each assembly consists of a spring loaded operating arm, pivoted on a bearing which is molded into the same plastic block as the contact springs, mounted with two sets of contacts on each side of the insulating actuator block which is riveted to the center part of the operating arm. The coiled spring holds the operating arm in a position which operates two of the sets of contacts when the arm is in the raised or off-hook position. These two sets of contacts are released and the opposite two sets are operated when the arm is moved to the on-hook position.
- 5.02 Separate flexible wire leads are provided for each contact spring to connect them to the other components in the telephone instrument. The leads are joined to the contact springs inside the molded portion of the assembly.
- 5.03 The complete assembly is mounted to the base of the telephone instrument by means of three rivets through its bracket, which is molded into the same block as the contact springs, so that placing the handset in the cradle depresses the plungers against the extremities of the operating arm to actuate the contact springs.

6. DISASSEMBLY AND ASSEMBLY

- 6.01 The various parts of the cradle switch are identified in Figure 3.

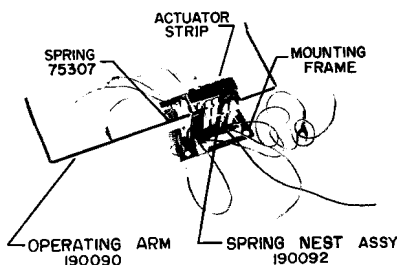


FIGURE 3. TYPICAL CRADLE SWITCH

- 6.02 To disassemble the unit, first remove the coil spring holding the operating arm in the raised position, then lift the arm carefully from between the sets of contact springs. Reassemble the parts by placing the operating arm over its pivot pin and between the sets of contact springs. Then hook the loops of the coiled spring over the lugs on the arm and the assembly mounting bracket. Make sure that the operating arm functions freely and is securely pivoted in the groove of the bearing pin.

6.03 *The spring nest assembly cannot be taken apart.* In the event of damage to the contacts, springs or leads the complete spring nest assembly must be replaced. Note that the 703 type telephone instruments do not require the use of one set of make contacts. It may be possible, therefore, to use certain damaged assemblies from 701 type instruments in 703 type instruments.

7. TEST AND ADJUSTMENT

7.01 The following checks must be made on the completely assembled instrument:

- a. Check that either plunger will fully operate the spring assembly of the cradle switch, before being depressed to a point $1/8''$ above the housing molding and that the plungers may be lifted slightly after the handset is removed. Using two pairs of pliers, bend the sidearms of the actuator to adjust, if necessary.
- b. Connect the telephone to a working line and check for correct operation of the following:
 1. Dial, if fitted.
 2. Transmitter and receiver.
 3. Cradle switch.
 4. Adequate suppression of side tone.
 5. Correct party identification, in conjunction with a suitable ringer, if applicable.
 6. Absence of noise due to loose contacts when the instrument is gently bumped or shaken.
 7. Special features, if installed.

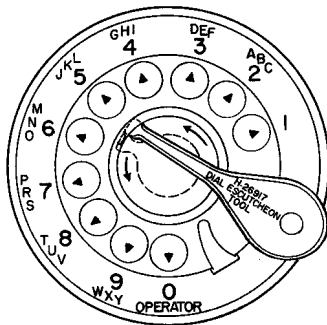
INSTALLATION AND REMOVAL TELEPHONE SET DIAL FINGERWHEELS

1. GENERAL

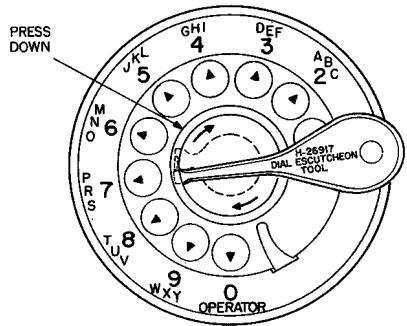
1.01 This practice covers the installation and removal of fingerwheels and number cards from various dials commonly used on telephone instruments, data sets, teletypewriters, testboards and tollboards.

2. A.E. CO. DIALS

2.01 To remove the escutcheon assembly from an A.E. Co. metal fingerwheel, use either a small screwdriver with a blade that is both narrow (about 1/8") and thin, or standard escutcheon tool. Hold the tool parallel to the fingerwheel and insert its tip between the escutcheon ring and the acetate disc which covers the number card, passing under the edge of the ring at a point even with the 5/JKL hole (see Figure 1). Taking care not to scratch the acetate disc, press the tip of the tool downward slightly and move it counter-clockwise toward the 6/MNO hole. It should engage the tab of the escutcheon lock, and further movement of the tool toward the 7/PRS hole will then force the escutcheon lock counter-clockwise so that it no longer holds down the tab of the escutcheon ring. Lifting the tip of the tool when it reaches the 7/PRS hole should raise the entire escutcheon assembly out of the depression in the center of the fingerwheel.



1a. Removal



1b. Installation

FIGURE 1. Escutcheon Installation and Removal, A.E. Co. Metal Fingerwheel.

2.02 To remove an A.E. Co. metal fingerwheel from the dial shaft, use a screwdriver with a blade that is both broad (about 1/2") and thin. Loosen the broad-head screw, remove it and the escutcheon lock, and lift the fingerwheel off the hub of the shaft.

2.03 To take apart the metal escutcheon assembly from an A.E. Co. fingerwheel in order to install or change the number card, hold the assembly, rear side up, with the fingers of both hands and press on the clamping plate with the thumbs adjacent to the semicircular indentations on its edge (see Figure 2). Rotate the plate counter-clockwise until the indentations clear the ridges formed into the edge of the escutcheon ring, at which time the locking tongue will also

Distribution C D

clear the channel similarly formed for it to engage. Push against the acetate disc with a finger to force the disc, number card and clamping plate out of the escutcheon ring, and slide these parts out from under the locking lug.

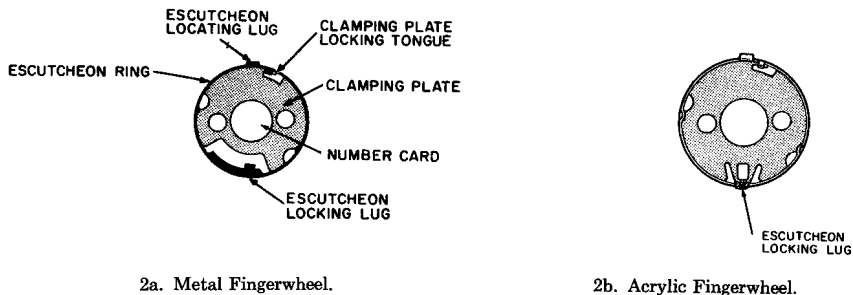


FIGURE 2. Escutcheon Disassembly, A.E. Co. Fingerwheels.

- 2.04 When installing a new number card in an A.E. Co. metal escutcheon assembly, wipe the acetate disc to remove dirt and fingermarks. If the disc is scratched or discolored, replace it. Hold the escutcheon ring with its rear side up, and insert the edge of the acetate disc under the locking lug of the ring at the point where the edge of the disc has a long indentation. Lay the narrow indentation or slot in the opposite edge of the disc over the channel formed inside the edge of the ring. With a blunt-ended object, such as the eraser end of a pencil, snap the disc over the two ridges formed in the edge of the ring, so that the disc is seated. Insert the number card in the same manner. Its edge has two semicircular indentations which allow it to clear the ridges in the ring. Insert the clamping plate with its concave side up, and push down its edges with the thumbs to flatten it. Once flat, rotate the plate clockwise until its edges are caught beneath the ridges in the wall of the escutcheon ring, and its locking tongue is seated in the channel formed inside the wall.
- 2.05 To install an A.E. Co. metal fingerwheel on the dial shaft, position its center hole on the shaft hub so that the finger holes are aligned with the designations on the number plate. Lay the escutcheon lock over the hub so that it sits between the two detents located at the 5/JKL and 7/PRS positions. Using a broad-bladed screwdriver with a thin edge, insert the broad-head screw in the hole in the hub and drive it part way. Center the circular portion of the escutcheon lock so that it rides free of the lip on the under surface of the screw head, then tighten the screw.
- 2.06 To install the escutcheon assembly on an A.E. Co. metal fingerwheel, move the escutcheon lock counter-clockwise until it strikes the detent, and insert the index tab on the escutcheon ring into the slot in the wall of the depression in the fingerwheel at a point just above the finger stop. Press the opposite edge of the escutcheon ring into the depression and insert a blade such as described in Paragraph 2.01 between the ring and the acetate disc. Keeping the tool parallel with the fingerwheel and taking care not to scratch the disc, insert the tip under the edge of the ring at a point even with the 7/PRS hole. Press the tip of the tool downward slightly and move it clockwise toward the 6/MNO hole. It should engage the tab of the escutcheon lock, and further movement of the tool toward the 5/JKL hole will then force the escutcheon lock clockwise so that it holds down the tab of the escutcheon ring.
- 2.07 To remove the chrome escutcheon assembly from an A.E. Co. acrylic fingerwheel, use a small screwdriver with a blade that is narrow (about 1/8"), and thin. Hold the blade parallel to the

fingerwheel and insert its tip between the escutcheon ring and the acetate disc which covers the number card, passing under the edge of the ring at a point midway between the 5/JKL and 6/MNO holes (see Figure 3). With the tip of the blade seated against the outer wall of the escutcheon ring, gently apply force upward and outward until the latch releases with a click. Then lift the escutcheon assembly clear of the fingerwheel with the screwdriver.

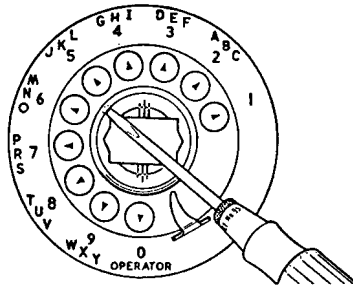


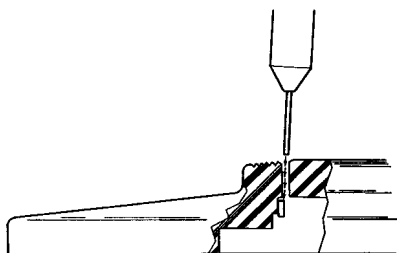
FIGURE 3. Escutcheon Removal

- 2.08 To remove an A.E. Co. acrylic fingerwheel from the dial shaft, select a screwdriver appropriate to the type of fastening used. Early production of these fingerwheels used a flat steel washer and a screw with an 11/16" diameter head. This appears similar to the screw used on metal fingerwheels, but has a longer thread and lacks any lip on the under surface of its head. In later production, a dished washer was used which has a depression in the center and is fastened by a conventional binding head screw. For the broad-head screw, use a screwdriver with a blade that is both broad (about 1/2") and thin. For the binding-head screw, a breadth of approximately 1/4" should suffice. Loosen the screw, remove it and the washer, and lift off the fingerwheel. Ordinarily, the escutcheon locking plate will remain in contact with the fingerwheel, because of the snug fit of their mating segments. Raise the fingerwheel until the center opening in the locking plate is free of the hub on the dial shaft, and slide both toward the upper left, away from the finger stop.
- 2.09 To disassemble the chrome escutcheon assembly from an A.E. Co. acrylic fingerwheel, follow the same procedure as specified in Paragraph 2.03. This is simplified somewhat, since the escutcheon locking lug is not in the way on the escutcheon ring, but protrudes from the clamping plate and makes the latter easier to rotate.
- 2.10 To install a new number card in the chrome escutcheon assembly from an A.E. Co. acrylic fingerwheel, follow the same procedure as specified in Paragraph 2.04. The escutcheon ring has no locking lug, and the long indentation in the edge of the acetate disc and number card serves no purpose in this assembly.
- 2.11 To install an A.E. Co. acrylic fingerwheel on the dial shaft, insert the escutcheon locking plate into the openings in the rear of the fingerwheel. Ordinarily, the snug fit of the segments of the plate in the mating depressions in the fingerwheel is sufficient to keep the two in contact. With the locking plate and fingerwheel held together, slide the assembly over the pawl plate and under the finger stop, align the finger holes with the designations on the number plate, and position the center opening in the locking plate over the hub of the dial shaft. Install the proper screw through the large washer into the hub of the dial shaft, and drive the screw until firmly seated, but not so tightly as to stress the plastic and crack it. When using the flat style of washer, be sure to install it with the stamped circle, denoting the slightly convex surface,

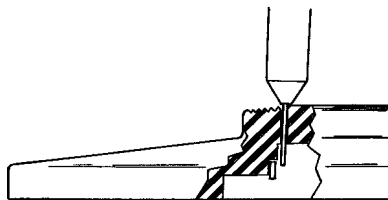
on the upper side (away from the fingerwheel), and to use a broad-head screw. Only the type which has no lip or shoulder on the under surface of its head will be found long enough to fasten the assembly. When using the dished style of washer, be sure to use a binding head screw with a conventional-sized head, as a broad-head screw will protrude too far above the dished washer to permit installing the escutcheon.

2.12 To install the chrome escutcheon assembly on an A.E. Co. acrylic fingerwheel, insert the index tab on the escutcheon ring into the slot in the formed ear of the locking plate which protrudes through the fingerwheel adjacent to the finger stop. Placing a thumb just inside the escutcheon ring on the opposite side, between the 5/JKL and 6/MNO finger holes, press down firmly against the acetate disc and number card until the latching tab on the clamping plate engages the protruding lug of the escutcheon locking plate with a click. In some cases it may be necessary to use a small screwdriver to apply the proper force to engage the latch. Wipe the acetate disc free of finger marks.

2.13 To remove an A.E. Co. acrylic fingerwheel from the dial shaft, either for replacement or to install the number card, use a standard escutcheon tool, and insert the end into the small hole located in the ribbed area of the fingerwheel surrounding the number card, adjacent to the 6/MNO finger hole. As may be seen in Figure 4, the end of the tool must engage the narrow edge of the latching lug on the clamping disc. To insure this, insert the tool in the hole at a slight angle, so that the end below the surface of the fingerwheel is aimed in the direction of the 6/MNO finger hole. Once the end is seated against the latching lug, push gently downward on the tool. This should force the lug down and out of its latching detent, where it is held under tension, and allow it to spring free along a shoulder molded into the under surface of the fingerwheel. Once this is done, the lug will be clear of the small hole, and even if the wire be reinserted, it will not again engage the lug. Insert a finger in the zero hole, wind the dial in the usual manner, and with another finger turn the wheel farther in the clockwise direction, until the zero hole again reaches, and goes slightly beyond, the zero position on the number plate. Release the fingerwheel and allow it to return to rest, at which point the zero hole will be found between the 8/TUV and 9/WXY positions on the number plate. Lift the fingerwheel slightly, until it clears the projections on the clamping disc, and slide it toward the upper left, away from the finger stop.



4. Insertion. End of Standard Escutcheon Tool Engages Edge of Latching Tab and Forces it Downward.



4b. Withdrawal. Latching Tab has Snapped into Recess Molded in Fingerwheel, out of Reach of Tool.

FIGURE 4. Use of Standard Escutcheon Tool

NOTE: If the latching lug on the clamping disc fails to spring out of its detent when pushed down by the wire, the zero finger hole will not pass beyond the finger stop when the dial is wound. In this case, hold the fingerwheel in the fully-wound position, insert the tool, and press against the lug, while turning the fingerwheel farther in the clockwise direction.

- 2.14 To remove the clamping disc from an older A.E. Co. dial which has been equipped with an acrylic fingerwheel, use a screwdriver with a blade that is both broad (about 1/2") and thin to loosen the broad-head screw which fastens the clamping disc to the hub on the dial shaft. On most dials manufactured after May, 1964, a clamping disc is welded in place to accommodate this fingerwheel. If such a disc has been damaged, the entire pawl plate assembly must be replaced. Since the hub is not drilled to accept a screw, it is not possible to pry off the damaged disc and install a removable disc or a metal fingerwheel.
- 2.15 Before installing a new number card in an A.E. Co. acrylic fingerwheel, wipe the window area in the center to remove dirt and fingermarks. If this area has been scratched or defaced, the entire fingerwheel must be replaced.
- 2.16 To install a clamping disc on an older A.E. Co. dial in order to adapt it to the acrylic fingerwheel, position the center hole of the disc over the hub of the dial shaft so that the latching tab lies in the upper left quadrant, adjacent to the 5/JKL and 6/MNO designations on the number plate (see Figure 5). Using a broad-bladed screwdriver with a thin edge, fasten the clamping plate to the shaft with the broad-head screw provided with the clamping disc.

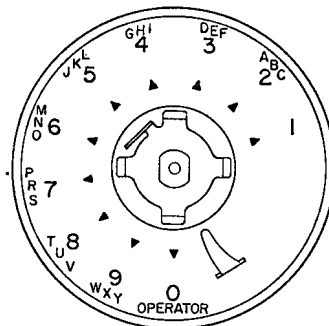
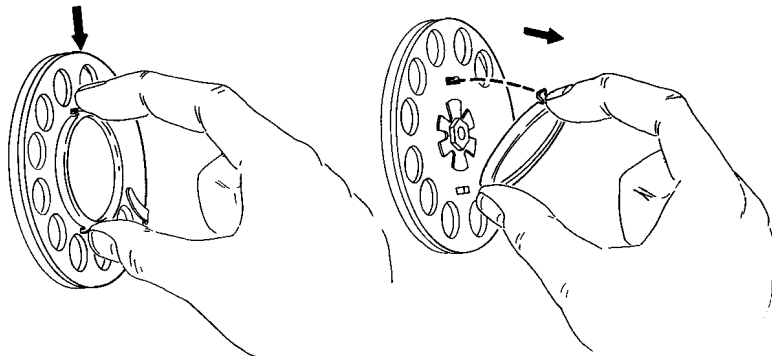


FIGURE 5. Proper Position of Clamping Disc When
Installing A.E. Co. Acrylic Fingerwheel.

- 2.17 To install an A.E. Co. acrylic fingerwheel on a dial equipped with the accompanying clamping disc, hold the fingerwheel parallel to the number plate, with its zero hole positioned between the 8/TUV and 9/WXY designations. Move the fingerwheel toward the upper left, then tip it so that the lower right edge slides under the finger stop, and guide it back into its previous position. With the center portion resting on the projections of the clamping disc, rotate the fingerwheel counterclockwise, parallel to the number plate, as the zero hole passes the 9/WXY position. When the zero position is reached, the latching lug on the clamping disc should engage its detent in the fingerwheel with a click.

3. W.E. CO. DIALS

- 3.01 To remove the card holder assembly from a W.E. Co. metal fingerwheel, press against the upper edge of the card holder frame, between the 2/ABC and 3/DEF finger holes, with a forefinger, while stabilizing the lower edge of the frame with a thumb. With the frame thus pinched slightly out of round, the upper locking tab will clear the edge of its slot in the fingerwheel, and may be withdrawn from the slot (see Figure 6). Then tilt the card holder assembly forward and disengage the lower locking tab from its slot. Except in unusually stubborn cases, avoid the use of metal tools, such as a screwdriver or knife blade, to pry off the card holder assembly, since the finish on both it and the fingerwheel is very easily scratched.



6a. Depressing Upper Locking Tab.

6b. Tilting Card Holder Forward and Out.

FIGURE 6. Removal of Card Holder Assembly from W.E.Co. Metal Fingerwheel.

- 3.02 To remove a W.E. Co. metal fingerwheel from the dial shaft, use a $7/16$ " nut driver to loosen the fingerwheel clamping nut. Separate the nut and lock washer from the shaft stud, and lift the fingerwheel off the hub of the shaft.
- 3.03 To take apart the card holder assembly from a W.E. Co. metal fingerwheel in order to install or change the number card, grasp the two protruding prongs of the card retainer spring between the thumb and forefinger, pinch them together and withdraw the spring from the frame. Push against the acetate window with a finger to force the window, number card and card retainer out of the card holder frame. On more recent assemblies which lack the card retainer and spring, a card support with a serrated edge is used, and is considerably more difficult to remove. Insert the tips of a pair of long nose pliers in the serrations which lie second from the top on each side, and gently compress the card support while drawing it out of the card holder frame (see Figure 7).

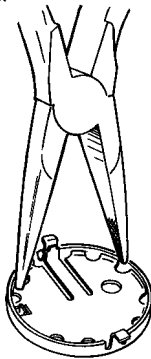


FIGURE 7. Removal of Card Support from W.E.Co. Card Holder Frame.

- 3.04 When installing a new number card in a W.E. Co. card holder assembly, wipe the acetate window to remove dirt and fingermarks. If the window is scratched or discolored, replace it. Hold the card holder frame with its rear side up, and lay the notch in the acetate window over the locating tab in the frame. Insert the number card in the same manner, followed by the card retainer and card retainer spring. Each part is notched to fit over the locating tab. On more recent assemblies which lack the card retainer and spring, press the serrated edge of the card support into the frame until the lip on the edge is flush with or below the edge of the frame.
- 3.05 To install a W.E. Co. metal fingerwheel on the dial shaft, position its center hole on the shaft hub so that the chamfered or beveled side of the finger holes is facing out, and the holes are aligned with their respective designations on the number plate. Lay the lock washer over the stud of the dial shaft, start the fingerwheel clamping nut on the stud by hand, and tighten it with a 7/16" nut driver.
- 3.06 To install the card holder assembly on a W.E. Co. metal fingerwheel, engage the lower locking tab of the card holder frame in the larger of the two slots in the fingerwheel, between the 8/TUV and 9/WXY positions. While stabilizing this lower edge with a thumb, press against the upper locking tab with a forefinger, so that the frame is pinched slightly out of round and the upper locking tab can be inserted in its slot in the fingerwheel.
- 3.07 To remove a W.E. Co. acrylic fingerwheel from the dial shaft, either for replacement or to install the number card, use standard escutcheon tool and insert the end into the small hole in the raised rim around the number card, between the 9/WXY and zero finger holes. Insert a finger in the zero hole, wind the dial in the usual manner, and with another finger turn the wheel farther in the clockwise direction while pressing the wire of the tool into the small hole. As may be seen in Figure 8, the end of the wire presses against the broad surface of the latching lug on the clamp plate, forcing it out of its latching detent so that the fingerwheel can be turned on the clamp plate until the zero hole passes the finger stop and goes slightly beyond the zero position on the number plate. Remove the wire, release the fingerwheel and allow it to return to rest, at which point the zero hole will be found at about the 9/WXY position on the number plate. Lift the fingerwheel slightly, until it clears the projections on the clamp plate, rotate it clockwise until the zero hole is above the 8/TUV position, and slide it toward the upper left, away from the finger stop.

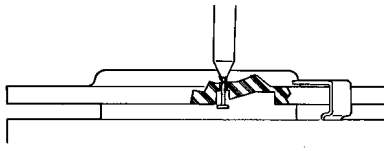
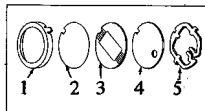


FIGURE 8. Use of Standard Escutcheon Tool
to Unlatch W.E.Co. Acrylic Fingerwheel.

- 3.08 To remove the clamp plate from a W.E. Co. Number 5, 6, or 7 dial equipped with an acrylic fingerwheel, use a 7/16" nut driver to loosen the fingerwheel clamping nut. Separate the nut and lock washer from the shaft stud, and lift the clamp plate off the hub of the shaft.
- 3.09 To remove the number card from a W.E. Co. acrylic fingerwheel, hold the assembly rear side up and rotate the card support about 60° in a clockwise direction to free its projections from the grooves in the inner wall of the window retaining portion.

- 3.10 Before installing a new number card in a W.E. Co. acrylic fingerwheel, wipe the acetate window, or the window area in the center of the fingerwheel, to remove dirt and fingermarks. If an acetate window is scratched or discolored, replace it. If the window area on a fingerwheel has been scratched or defaced, the entire fingerwheel must be replaced. For use on an acrylic fingerwheel, the card must have not only the notch used with metal card holder assemblies, but a nick in the edge adjacent to the 5/JKL finger hole, for locating purposes. On a fingerwheel, insert the acetate window and the number card from the rear, followed by the card support with its projections facing away from the window. Rotate the card support about 60° in a counter-clockwise direction until its projections are seated in the grooves in the inner wall of the window retaining portion of the fingerwheel. On a fingerwheel used on a Number 6L dial, follow the same procedure, but eliminate the acetate window, since a window is molded integrally with the wheel. In this case the narrow projection of the card support must be engaged in the short groove to the right (as viewed from the rear) of the cut-out portion of the wall, in order for the other two wider projections to reach the ends of their longer grooves. On a fingerwheel used on a Number 8 dial, it is necessary only to insert the number card, since the clamp plate on the shaft assembly also serves as a card support.
- 3.11 To install the clamp plate on a W.E. Co. Number 5, 6 or 7 dial in order to adapt the latter to an acrylic fingerwheel, position its center hole on the shaft hub so that the locking tab lies between the 9/WXY and zero positions on the number plate. Lay the lock washer over the stud of the dial shaft, start the fingerwheel clamping nut on the stud by hand, and tighten it with a 7/16" nut driver.
- 3.12 To install a W.E. Co. acrylic fingerwheel on a dial equipped with the accompanying clamp plate, hold the fingerwheel parallel to the number plate, with its zero hole positioned above the 8/TUV designation. Move the fingerwheel toward the upper left, then tip it so that its lower right edge slides under the finger stop, and guide it back into its previous position. With the center portion resting on the serrations of the clamp plate, rotate the fingerwheel counter-clockwise, parallel to the number plate, as the zero hole moves beyond the 9/WXY position. When the zero position is reached, the latching lug on the clamp plate should engage its detent in the fingerwheel with a click.
4. **KELLOGG DIAL**
- 4.01 To install the number card on a dial-type set, remove and disassemble the number card assembly. Place the number card between the protector and the retainer disc. Reassemble and remount the number card assembly on the dial.
- 4.02 To install the number card on a manual-type set, if the dummy plug assembly is already installed, mount the number card in the same manner as explained for the dial-type set. However, if a dial set is to be converted for manual service, remove the dial and mount the dummy plug assembly. Then, mount the number card in the number card assembly. See Figure 9.



1. Retaining Ring
2. Protector
3. Number Card
4. Retaining Disc
5. Retaining Spring

FIGURE 9

5. LUCITE FINGER PLATE AND NUMBER CARD

- 5.01 Revolve the finger plate (A) in a clockwise direction as far as it will go. Then insert one end of an opened paper clip (B) into the tab release hole (C) and depress the tab approximately $1/8"$. With the locking tab depressed, continue to turn the finger plate in a clockwise direction until a second stop is reached. Remove the paper clip (B) and lift the finger plate from the dial. (See Figure 10).

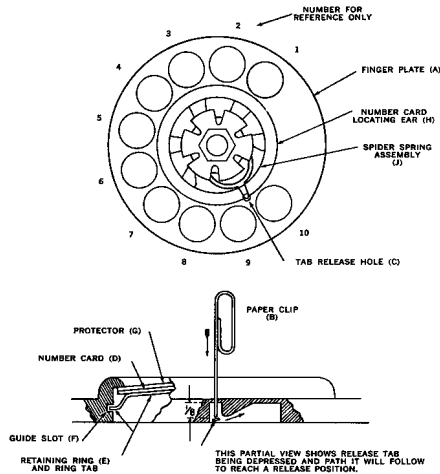


FIGURE 10

- 5.02 To remove the number card, the finger plate must first be removed as outlined in paragraph 3.02. Then turn the finger plate assembly over and revolve the retaining ring (E) until the three tabs of the ring are clear of the guide slots (F). Then lift the ring, card (D) and protector (G) out of the finger plate.
- 5.03 For assembly of protector, number card and retaining ring, place the protector (G) and number card (D) in the finger plate (A). Note that the notches of these parts fit into a locating ear (H) of the finger plate (A). Then place the ring tabs (E) in the guide slots (F) of the finger plate (A) and turn until the ring (E) is properly seated.
- 5.04 To assemble the finger plate (See Note), place the finger plate (A) squarely over the spider spring assembly (J) on the dial with the Number 10 hole of the finger plate (A) directly over the center of the Number 9 dot on the numeral ring. Turn the finger plate (A) firmly in a counter-clockwise direction until the finger plate (A) locks in place.

NOTE: Before assembling the finger plate on the dial, the number card, protector and retaining ring must be assembled.

TELEPHONE RINGERS

1. GENERAL

- 1.01 This practice provides general information on all types of single-gong and two-gong ringers. Specific information and special adjustments are given in the individual practices.
- 1.02 Each ringer consists of a cast, non-magnetic, alloy frame on which all the component parts are mounted. A typical ringer is illustrated in Figure 1. A laminated soft-iron core carries the single coil and is clamped to the soft-iron yoke which is bolted to the frame. The armature and clapper assembly is spring mounted to the frame so that the clapper may be vibrated by the armature, due to the magnetic field produced by the coil and yoke, to strike the gong(s). Increased sensitivity is provided by biasing the armature by means of a small permanent magnet clamped in the frame. A mechanical volume control is fitted on most types of ringer so that the user may adjust the sound output level. The coil is provided with flexible wire leads for connection to the other components in the telephone.
- 1.03 The ringers are designed to function from an alternating current source. Units are available for all the standard ringing frequencies from 16 to 66-2/3 cycles per second. The sensitivity is such that satisfactory operation is obtained on the longest circuits, and the high impedance prevents excessive bridging and unbalance losses on multi-party lines. A three point, anti-vibration mounting to the telephone base is provided.

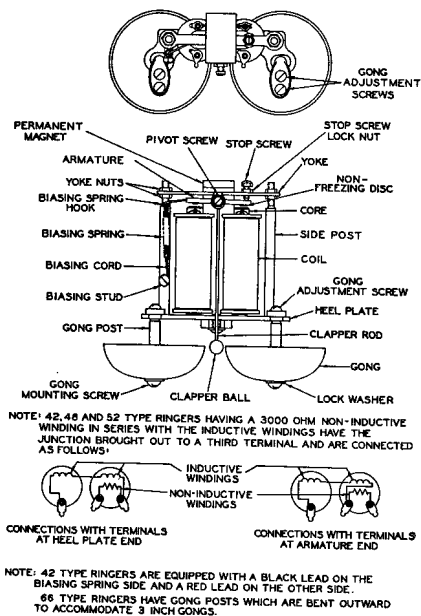


Fig. 1 - Typical Numbered Ringers

Distribution D

2. DISASSEMBLY AND ASSEMBLY

- 2.01 The gongs and resonators, if fitted, are removed by unscrewing their lockwasher mounting screws. Note that earlier models of some ringers had the resonators riveted to the frame. The gong mounting control wheels of the frequency selective ringers are removed by unscrewing the hexagonal head, lockwasher screws.

CAUTION: The strength of the permanent magnet is adjusted after assembly of the ringer. Disassembly of any of the parts of the magnetic circuit may adversely affect the performance of the ringer. Special equipment is necessary to remagnetize and adjust the strength of the magnet in order to obtain optimum performance.

- 2.02 In order to remove the magnet from a BA type ringer, first remove the armature and clapper assembly then slide the magnet out of the frame. Do not strain the tab of the frame holding the magnet, as it may break off. The magnet of a frequency selective type ringer may be lifted out after the screws and clamping plate are removed.
- 2.03 The coil is removed from a BA type ringer by unscrewing the lamination clamping screws, and from a frequency selective type ringer by loosening the shunt bar and slide plate clamping screws.
- 2.04 Reassembly is a reversal of the procedures given for disassembly. The following points must be noted:
- a. All Ringers
 - (1) The end of the magnet nearest the armature must repel the north seeking pole of a compass and the opposite end of the magnet must be tight against the pole piece assembly.
 - (2) When facing the gong end of a two-gong ringer and with the frame facing downwards, gong "B" is on the left and gong "A" is on the right.
 - b. BA Type Ringers
 - (1) When replacing the armature, the end of the bias spring must be located in its adjusting slot in the bracket on the frame.
 - (2) When replacing the coil, the number of core laminations used should result in the coil core being comfortably filled but not force fitted. A minimum weight of 16 grams of laminations must be used.

3. LUBRICATION

- 3.01 Ringers without volume controls do not require lubrication.
- 3.02 First clean away all existing lubricant from the volume control mechanism then apply a light film of Lubriplate or similar non-drying lubricant to all rubbing surfaces of the volume control parts. Take care to avoid excessive lubrication.

4. TEST AND ADJUSTMENT

- 4.01 Thorough checking of ringers requires the use of specialized test equipment which will not always be available in the field. These steps may be omitted at the cost of a reduction in the overall performance of the ringer. *Note that the strength of the permanent magnet will only be reduced by a small amount if care is taken not to disturb the armature, magnet and shunt bar or pole piece when changing a faulty coil.*

- 4.02 The ringer under test must be firmly mounted in a test fixture, such as a telephone base plate which has been weighted to the normal weight of a complete instrument, in order to carry out the tests and adjustments correctly.
- 4.03 For test and adjustment purposes, telephone ringers may be conveniently divided into the two general classifications of straight line and frequency selective types. The generalized test and adjustment procedures for these two groups are given in the following paragraphs. Reference must also be made to the individual practices for each type of ringer where specific sensitivity values and test and adjustment figures are quoted.

5. STRAIGHT LINE RINGERS

- 5.01 First check the individual practice in which the specific ringer is described, for details of any special tests or adjustments, then proceed as outlined below.

5.02 Mechanical Adjustments:

- a. The residual plate must lie flat on the rear face of the armature. Reshape the plate if necessary.
 - b. With the bias spring set in the low notch, nearest the coil, the armature must be firmly tensioned against the rear pole face. Bend the bias spring near its base to adjust.
 - c. The clapper stem must be straight and in line with the armature. Reshape the clapper stem if necessary.
 - d. There must be a clearance of about 1/16" between the clapper and the "B", or single, gong when the armature is held against the rear pole face. Slightly bend the rear pole face to obtain this clearance. Note that on two gong ringers the identifying letter on the "B" gong must be positioned directly above the mounting screw before making this adjustment which should result in the clapper stem being approximately in line with the notch in the frame bridge piece.
 - e. With the armature resting against the rear pole face there must be a clearance of .045" to .050" between the armature stud and the front pole face. Slightly bend the front pole face, at the portion parallel to the length of the magnet, to obtain the required clearance.
 - f. If the ringer is fitted with a volume control check the stop rod, single gong ringer, two gong ringer, or rubber cam adjustment as detailed in the individual ringer subsection.
 - g. Slight readjustment of the "B" gong and/or clapper set may be required in order to obtain an even, good quality ring during the electrical tests. The final adjustments, however, must meet the requirements outlined above.
- 5.03 Electrical Tests: The objective of the electrical tests is to obtain optimum balance between the forces, acting on the armature, from the bias spring and the permanent magnet. Take care to avoid demagnetization of the magnet if magnetization equipment is not available.

6. FREQUENCY SELECTIVE RINGERS

- 6.01 First check the individual practice in which the specific ringer is described, for details of any special tests or adjustments. Then proceed as outlined below.

6.02 Mechanical Adjustments:

- a. Slightly loosen the hexagonal head mounting screws and rotate the gongs away from the clapper, using a screwdriver through the slot in the control wheel, with its tip in one of the slots in the casting, as a lever.
- b. The tuning stem must be parallel to the frame edge and the weight must be centered between the gongs of a two-gong ringer. Carefully adjust the stem near its base, if necessary.
- c. If a separate clapper unit is fitted the ball must be centered between the gongs and be in line with their mounting screws on the two gong ringer or must rest $1/16''$ to $3/32''$ away from the gong and strike it within $1/8''$ of its edge on a single gong ringer. Slightly bend the clapper stem, forward of the angled section, to obtain these settings. Check that the clapper ball and stem are clear of the tuning weight by about $1/32''$. The clapper stem must rest against the rubber tubing on the tuning stem with a pressure within the range given in the individual ringer subsection. Slightly bend the clapper stem near its base to obtain this adjustment.
- d. Check that the two arms of the armature are straight and parallel to the frame; and the gaps between the armature and laminations are about equal. Damaged armatures should be replaced and not readjusted.
- e. Loosen the slide plate clamping screw and adjust the eccentric screw to about the mid-point of its range. Tighten the clamping screw.

6.03 Electrical Tests: The objective of the electrical tests is to adjust the ringer mechanism for mechanical resonance and to set the electrical sensitivity.

RINGERS-B-TYPE MAINTENANCE

1. GENERAL

1.01 This practice covers maintenance, adjustment procedures, and requirements for B-type ringers, including 301-type loud ringing bells.

1.02 Figure 1 shows a typical B-type ringer and its component parts. Figure 2 illustrates a typical 301 subscriber set (loud ringing bell).

Item	Description
1	Mounting Frame
2	Control Wheel (B)
3	Control Wheel (A)
4	Washer
5	Hex. Hd. Lockwasher Screw
6	Gong (A)
7	Gong (B)
8	Resonator
9	Rd. Hd. Lockwasher Screw
10	Eccentric Washer
11	Slide Plate & Lamination Assy.
12	Coil
13	Rind. Hd. Flat Washer Screw
14	Shunt bar
15	Rd. Hd. Lockwasher Screw
16	Magnet
17	Clamping Plate
18	Rnd. Hd. Lockwasher Screw
19	Armature
20	Weight
21	Clapper Assy.
22	Rnd. Hd. Lockwasher Screw
23	Rubber Foot
24	Mounting Screw
25	Wire Assy.(With Coil 75582 Only)
26	Damper Spring (Type 131 Only)
27	Rubber Tubing (For Tuning Stem)
28	Headless Set Screw (For Weight)

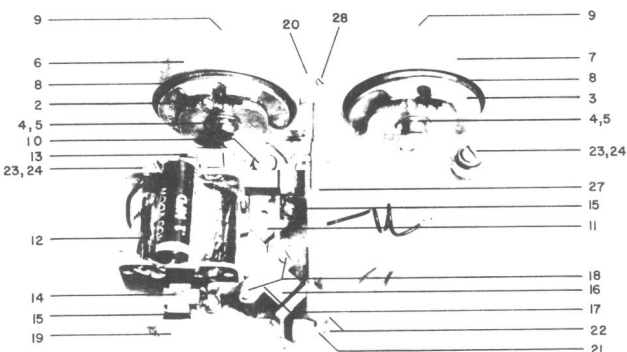


FIGURE 1 TOP VIEW

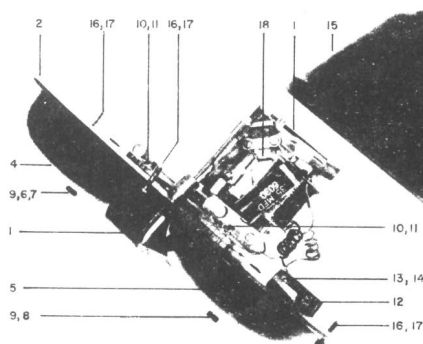


FIGURE 2 FRONT VIEW - COVER REMOVED

Illustration shows type 133(-) 1170 ringer installed in housing.

Item	Description
1	Bracket
2	Baseplate
3	Hex. Hd. Lockwasher Screw
4	Gong (B)
5	Gong (A)
6	Bushing (Gong B)
7	Washer (Gong B)
8	Washer (Gong A)
9	Hex. Hd. Lockwasher Screw
10	Washer
11	Hex. Hd. Lockwasher Screw
12	Terminal Strip
13	Lockwasher - internal teeth
14	Rd. Hd. Mach. Screw
15	Cover
16	Spring Washer
17	Cabinet Lock Screw
18	Ringer
19	Capacitor
20	Tubing (for item 19 leads)

Distribution C D

- 1.03 The 131 ringer is a single coil, two gong, frequency selective type of unit equipped with a mechanical volume control and assembled on an open, die-cast metal frame. The 133 ringer is identical except that the volume control is omitted. The 141 and 142 ringers are similar units in all respects except that they are provided with split winding coils for party identification on toll ticketing systems. Flexible wire leads are provided for the coil connections of the ringer which is mounted on the telephone base by a locating stud and two screws, each with a shock absorbing rubber bushing.

2. MECHANICAL REQUIREMENTS

- 2.01 If the armature pin of a B-type ringer does not function properly, replace ringer. Check by feel and visual inspection for binding, excessive wear, or end play.
- 2.02 The pressure of the clapper stem against the rubber sleeve on the tuning stem must be set within the following ranges:

Ringer Frequency	Pressure
16, 16-2/3, 20, 25 cps	0-2 ozs 0-60 grams
30, 33-1/3 cps	1-3 ozs 20-90 grams
40, 42 cps	2-3 ozs 60-90 grams
50, 54 cps	3-4 ozs 90-120 grams
60, 66, 66-2/3 cps	3-5 ozs 90-150 grams

The pressure must be measured at the top of the angled portion of the clapper stem.

- 2.03 In the high volume control (damper) position both snubbers must be clear of the gongs.

In the middle position the snubber must rest firmly on gong "B".

In the low position both snubbers must rest firmly against their respective gongs.

Bend the spring arms carrying the snubbers to effect the adjustments.

- 2.04 Sensitivity (using moving coil meter and ERG source). The ringer should function strongly with the maximum voltages, steadily with the minimum voltages and just tinkle with the ultimate voltages applied across the coil only for the 16 through 25 cycle ringers and across the coil and capacitor for the 30 through 66-2/3 cycle ringers.
- 2.05 If a buzzer tone is desired with the B-type ringer, spread gongs as far apart as possible. Reduce armature stroke as in 3.02, until clapper will not strike gongs. If this adjustment cannot be made, gongs may be removed.

3. SPECIAL ASSEMBLIES

- 3.01 The 75-301 ringer is only supplied with either the 79938 or 79939 ringer installed or less ringer unit. It is possible to mount the following ringer types in the type 75 housing, however, the desired ringer and housing must be ordered separately:

131-470	141-470
133-470	142-470

These ringers are mounted on the baseplate in the same manner as types 79938 and 79939 after the gongs, resonators and control wheels have been removed.

3.02 It is not possible to mount ringers type 130–470 in the type 75 housing without considerable modification to the ringer frame.

4. BIAS SPRING POSITION

4.01 B-type ringers, sent to the field in instruments or shipped separately, have the bias spring located in the high notch (see Figure 3).

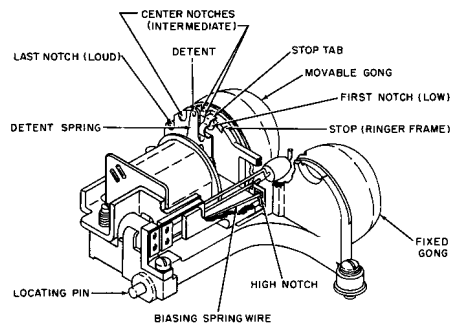


FIGURE 3
Code 130(BA)470 Ringer

4.02 Table A illustrates proper notch for bias spring to prevent bell tap and cross ring, and to provide proper ringing margin. Where the conductor loop resistance is about 1000Ω ring may be unsatisfactory. To correct, place bias spring in next lower notch.

TABLE A

Class of Service	Bias Spring Notch
Bridged Ringing	
Individual Line and PBX Stations*	High
Nonselective Party Lines†	Medium
Grounded Ringing	
2-party Flat and Message Rate	High
4-party Semiselective‡	High
4-party Selective and 8-party Semiselective	Low
Divided Code†	Medium

4.03 Obtain a ring for ringing test in accordance with local instructions. Ringing should be clear and steady. Observe during dialing that bell does not tap.

- 4.04 If bell tap is encountered with bias spring in medium notch and ringer is poled properly, move bias spring to high notch. Repeat ringer test and, if ringer fails to operate properly, change ringer.

NOTE: Make certain line and ringer are poled correctly. Correct bias spring tension has been set at the factory. Do not bend bias spring.

When three or more ringers are bridged across the line and ringer operation is unsatisfactory, placing bias spring in medium notch on all ringers may clear the trouble.

If ringer buzzes on short loop installations, when the party of opposite polarity is being called, place bias spring in high notch. If ringer still buzzes or fails to ring properly, replace ringer.

Where four ringers are connected between one side of line and ground, and ringer operation is unsatisfactory, placing bias spring in medium notch on all ringers on that side of line may clear the trouble.

5. TEST AND ADJUSTMENTS—BELL TAP

- 5.01 To test for bell tap—manual ring—capacitor-type bridge, operate switchhook rapidly with talking battery on the line. Bell should not ring or tap.
- 5.02 To test for bell tap—machine ring—dial system—capacitor-type bridge, dial any digit over 5 which is not a special code, such as long distance, operator, etc. Repeat test as many times as required. Dial tone should be heard on the line before each test.
- 5.03 To test for bell tap—ground identification, some specific classes of service require a ground identification from the subscriber set (e.g. tip-party). On this type, connect hand test set across terminals L1 and L2. To test, use dial of test set.
- 5.04 In an adjustment to stop bell tap, test polarity of ringers and line. If correct, turn biasing stud clockwise 1/16 turn at a time, until bell tap is stopped. When station or ringer cutoff key is provided, test for tapping with key in all positions. Prepay coin collector stations must be tested with coin trigger operated (circuit grounded).
- 5.05 To test for cross ring—manual ring—party line common battery stations, notify customer of opposite polarity that tests are being made. After tests are complete, notify customer again. Request operator to give a series of rings of the opposite polarity and proceed as follows:
- With receiver on switchhook, bridge hand test set across terminals L1 and R of subscriber set.
 - During a silent interval, short-circuit terminals L2 and R with a suitable test cord.
 - On next ring (as indicated by audible ringing sound in test set receiver) bell should not ring or tap.

6. TEST AND ADJUSTMENT—CROSS RING

- 6.01 To test for cross ring—machine ring—manual and dial party line stations, reverse line wire at subscriber set terminals and proceed as follows:
- Bridge hand test set across terminals L1 and L2 of the subscriber set, and monitor the line.

- b. Obtain ring at the station. During a ringing interval, short-circuit terminals L1 and L2 as indicated by the audible signal in receiver of hand test set. If bell rings or taps, proceed as in 5.02. If bell does not ring or tap, restore original line connections.
- 6.02 An adjustment to stop cross ring, increase biasing spring tension by turning biasing stud not more than 1/16 turn at a time in a clockwise direction, testing for cross ringing each time, until bell is silent (see 6.01).
- 6.03 Final adjustment and margin test: After completing tests and adjustments to prevent tapping and cross ringing of bell, obtain a ring and increase biasing spring tension 1/2 turn of biasing spring stud. Ringing should start after a silent interval and continue clearly and steadily while the extra tension is being applied. If this test is met satisfactorily, reduce tension 1/4 turn of biasing spring stud. If ringer fails to pass test, replace ringer and repeat all tests and adjustments.

7. GONG ADJUSTMENTS

- 7.01 Operate armature from side to side (by means of biasing hook, if present) holding it momentarily in extreme positions of its travel. Do not grasp clapper rod to operate armature. See that clapper ball strikes each gong to produce a single clear tone, but does not rest against either gong, except in the case of 301-type loud ringing bells, where it is permissible to have clapper ball just touch the gongs at the end of each stroke. On ringers where the airgaps are changed from 0.035 inch and 0.012 inch to 0.060 inch and 0.012 inch, or vice versa, it may be necessary to bend clapper rod slightly to meet this requirement. If this is the case, a pair of long-nosed pliers should be used to bend rod close to armature. If clapper rod strikes coil or other part of ringer or, the side of the hole through which the rod protrudes, the rod may be straightened or slightly bent, as required.
- 7.02 Operate armature and see that clapper strikes each gong to produce a single clear tone. On the B-type ringer and 301 loud ringing bell, clapper must not rest against either gong.
- 7.03 To reduce the loudness of B-type ringers, make these adjustments. Reduce stroke by bending stroke limiting arm against yoke until stop pin on other side strikes pole piece. Then back off arm until proper volume is obtained. Use long-nose pliers for bending. Place pliers about 1/8 inch from the point where it enters the armature. Make final adjustment by bending arm near the middle, and readjust gongs to meet requirements in 6.03.

8. DISTINCTIVE TONES

- 8.01 For reduced loudness, reduce the stroke (travel) of the armature by reducing the airgap on the stop screw side and readjusting the gongs. Never reduce the airgap below 0.004 inch, the blade may enter with slight looseness or slight friction.

CAUTION: If ringer is to be silenced, do not use the above method. Disconnect ringer and see that connections for remaining ringers are in accordance with the connection paragraphs of individual descriptive practices.

- 8.02 For increased loudness, adjust ringer for maximum stroke (travel) according to airgap requirements in 8.01 and gong adjustments in 7.01.
- 8.03 If there is a complaint of low ringer volume, the B-type ringers may be adjusted to have louder volume by setting the gap at 0.060 inch on the biasing spring side and 0.024 inch on the other side. After the airgaps have been set, readjust gongs. If bell taps or cross-rings, see 5.02 and 6.01.

RINGERS – C TYPE MAINTENANCE

1. GENERAL

1.01 This practice contains procedures, methods and requirements recommended for maintenance of C-type Ringers.

1.02 The 79938 ringer mechanism is a double wound coil, straight line, biased type of unit without gongs. (See Figure 1.) It is assembled on an open die-cast metal frame. In combination with type 79939 frequency selective ringer mechanism (See Figure 2) it provides a range of telephone line ringer mechanisms for use with separately mounted gongs. Flexible wire leads are provided for the coil connections of the mechanism and the frame is provided with a number of alternative mounting holes.

Item	Description
1	Mounting Frame
2	Coil
3	Magnet
4	Pole Piece Assembly
5	Core Lamination
6	Rd. Hd. Lockwasher Screw
7	Flat Fil. Hd. Mach. Screw
8	Clapper Assembly

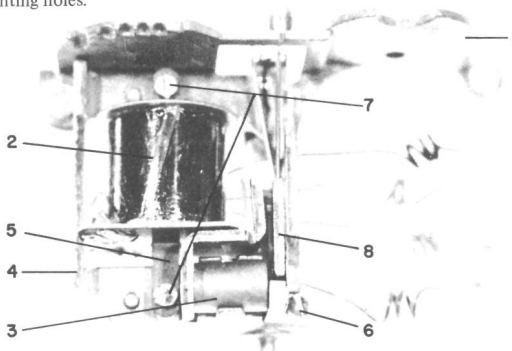


FIGURE 1. TOP VIEW

Item	Description
1	Mounting Frame
2	Coil
3	Magnet
4	Clamping Plate
5	Slide Plate & Lamination Assy.
6	Rd. Hd. Lockwasher Screw
7	Rnd. Hd. Lockwasher Screw
8	Clapper Assembly
9	Armature
10	Weight
11	Rnd. Hd. Lockwasher Screw
12	Shunt Bar
13	Washer
14	Eccentric Washer
15	Rubber Tubing (for Tuning Stem)
16	Headless Set Screw (for Weight)

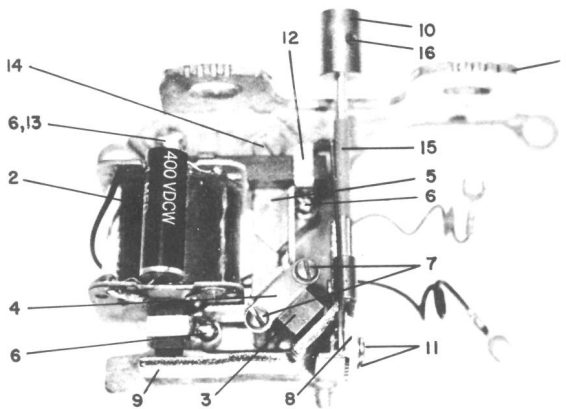


FIGURE 2. TOP VIEW

Distribution C D

- 1.03 The 79939 Ringer mechanism is a single wound coil, frequency selective type of unit without gongs. It is assembled on an open die-cast metal frame. In combination with type 79938 straight line ringer mechanism, it provides a range of telephone line ringer mechanisms for use with separately mounted gongs. Flexible wire leads are provided for the coil connections of the mechanism and the frame is provided with a number of alternative mounting holes.
- 1.04 The 130 ringer is a double wound coil, two gong, straight line, biased type of unit equipped with a mechanical volume control and assembled on an open, die-cast metal frame. (See Figure 3.) In combination with types 131, 133, 141 and 142 frequency selective ringers, it provides a complete range of units which meets the requirements of every class of telephone line ringer. (See Figure 4.) Flexible wire leads are provided for the coil connections of the ringer. The unit is mounted to the telephone instrument base by a locating stud and two screws, each with a shock absorbing rubber bushing.

2. MECHANICAL REQUIREMENTS

- 2.01 The armature of C-type ringers, when manually displaced, shall restore to non-operate side of airgap, with bias spring in LOW notch and volume control wheel in high position. Should armature fail to restore, replace ringer.

CAUTION: Never bend bias spring or stop rod or adjust armature clearance.

- 2.02 With ringer lying flat (as mounted in 500-type set) or mounted vertically (gongs down, as in 700-type subscriber set mounted on wall), armature in nonoperate position, and volume control wheel in low position, the clapper shall clear movable gong by a minimum 1/64 inch, maximum 1/32 inch. If this requirement is outside its limits, ringer should be replaced. Clearance between clapper and fixed gong shall be 1/64 inch. Fixed gong may be repositioned to meet this clearance. Both these clearances may be gauged visually.

3. VOLUME CONTROL

- 3.01 The volume control wheel may be adjusted for ringer cut off when requested by customer or in accordance with local instructions.

NOTE: When ringer cut off feature is requested, bend stop tab up and out to just clear stop on ringer frame.

- 3.02 The volume control wheel shall operate smoothly over entire range. Detent spring shall have a positive detent action at each position of wheel. Lubricate detent spring by rubbing graphite from a soft lead pencil onto bearing surface.
- 3.03 The adjusted ringer must function in such a manner that both gongs are equally audible in the three loudest positions of the volume control when the maximum voltages specified are applied. This same condition is desirable, but not essential, in the lowest volume position of the control.
- 3.04 Rotate the "A" gong to the minimum loudness position. The stop rod must line up with the reference mark on the eccentric cam and, with the armature operated, must strike the rim of the cam in all volume positions except maximum loudness so that the clapper is held 1/16" away from the "A" gong. Bend the rod near its base to obtain these adjustments. Check that the stop rod does not touch the bias spring bracket or the "A" gong.
- 3.05 With the stop tab on the detent spring bent away from the frame and the control wheel rotated to the cut-off position check that the stop rod rests on the eccentric cam and prevents movement of the armature assembly.

- | Item | Description |
|------|---------------------------|
| 1 | Mounting Frame Assy. |
| 2 | Gong (A) |
| 3 | Gong (B) |
| 4 | Resonator |
| 5 | Rd. Hd. Lockwasher Screw |
| 6 | Support Pole Piece Assy. |
| 7 | Core Lamination |
| 8 | Coil |
| 9 | Flat Fil. Hd. Mach. Screw |
| 10 | Magnet |
| 11 | Armature & Clapper Assy. |
| 12 | Rubber Foot |
| 13 | Mounting Screw |

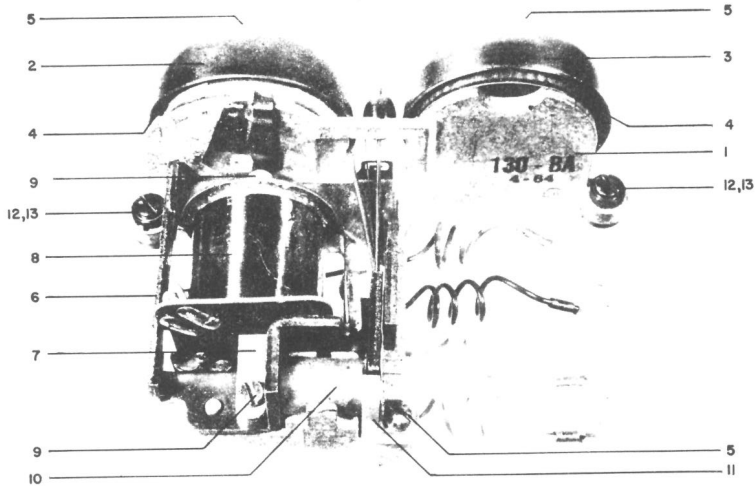


FIGURE 3. TOP VIEW

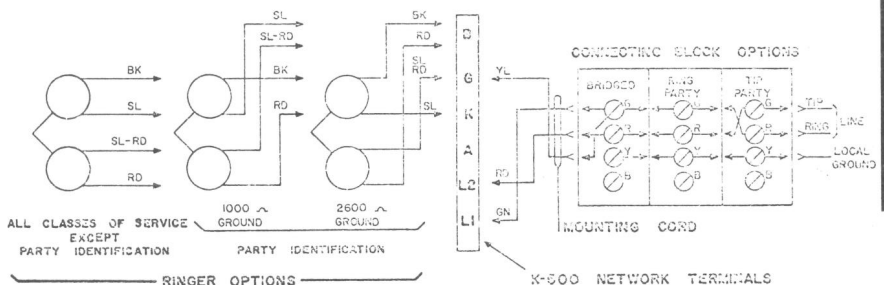


FIGURE 4. TYPICAL WIRING DIAGRAMS

- 3.06 Sensitivity (using moving coil meter and ERG source) the ringer should function strongly with the maximum voltages, steadily with the minimum voltages and just tinkle with the ultimate voltages applied across the coil and capacitor.

Condition	Frequency	Max. V	Min. V.	Ult. V
Low Bias	16 cps	44	36	26
	20 cps	63	48	37
	30 cps	88	56	40
High Bias	16 cps	67	58	47
	20 cps	87	77	61
	30 cps	120	107	81

4. BIAS SPRING POSITION

- 4.01 Bias spring settings for class of service and number of ringing bridges are shown in Table A. High tension notch of bias bracket is adjacent to fixed gong. The low notch is adjacent to movable gong.

NOTE: Correct bias spring tension has been set at factory. *Do not bend bias spring.* Do not use tools when relocating bias spring.

5. INSPECTION

- 5.01 Table B is a guide for requirements, tests, and procedures for C-type ringers when they are placed in service and on maintenance visits.
- 5.02 After completing work, obtain a ring for ringing tests according to local instructions. Check for bell tap while dialing.
- 5.03 If bell taps with bias spring in low notch and ringer properly poled, move bias spring to high notch. Repeat ringer test. If ringer fails to operate properly, change ringer.
- 5.04 When replacing C-type ringer, see that locating pin is inserted into rubber grommet before captive mounting screws are tightened. Check that ringer lead connections are tight.

TABLE A
BIAS SPRING POSITION

Class of Service	Bias Spring Notch
Bridge Ringing Services	
Individual Line and PBX Stations*	High
Nonselective Party Lines	Low
Grounded Ringing Services	
2-party Flat and Message Rate	High
4-party Semiselective†	High
4-party Selective	{ High, C3A Ringer
8-party Semiselective }	
Divided Code	{ Low, C4A Ringer
	Low

* When three or more ringers are bridged across line and operation is not satisfactory, bias spring may be placed in low notch on all ringers. If condition is not corrected, change ringer.

† Where five ringers are connected between same side of line and ground and operation is not satisfactory, bias spring may be placed in low notch on all ringers on that side of line. If condition is not corrected, change ringer.

TABLE B
C-TYPE RINGER TESTS AND REQUIREMENTS

Subject	Remarks
Volume Control Wheel	See 4.01, 4.02 and 4.03.
Bias Spring	See 5.00 and Table A.
Ringer	<ol style="list-style-type: none"> 1. Leads dressed properly and connections tight. 2. Positioned properly; mounting screws tight. 3. Clean (see section entitled Ringers, General Maintenance and Ringing Tests). 4. Gong mounting screws tight and clapper to gong clearance in accordance with 3.03. 5. Ringer shall produce a steady ring on at least one gong when volume control wheel is in low notch and on both gongs as wheel is advanced to high notch.
Airgap	With volume control wheel in high notch, displace armature manually toward inner pole piece; check for stop pins and see that they make contact with adjacent pole pieces. If stop pins are missing, replace ringer (C4A ringer has only one stop pin). If stop pins are present but fail to make contact, determine cause. Remove dirt if found (see section entitled Ringers, General Maintenance and Ringing Tests). If stop rod is deformed, replace ringer.

RINGERS—D TYPE
MAINTENANCE

1. GENERAL

1.01 This practice contains information and maintenance procedures of the D-type ringers.

1.02 The 136 compact ringer is a double wound coil, single gong, straight line, biased type of unit equipped with a mechanical volume control and assembled on a die-cast metal base with a molded plastic cover. (See Figure 1) The 138 ringer is identical except for the addition of a gas tube and the use of a large cover. In combination with the type 137 frequency selective ringer these units provide a complete range which meet the requirements of every need for a compact telephone line main or extension ringer. Screw terminals are provided for all lead connections. (See Figure 3) The base casting is fitted with four shock absorbing rubber feet through which the mounting screws are inserted.

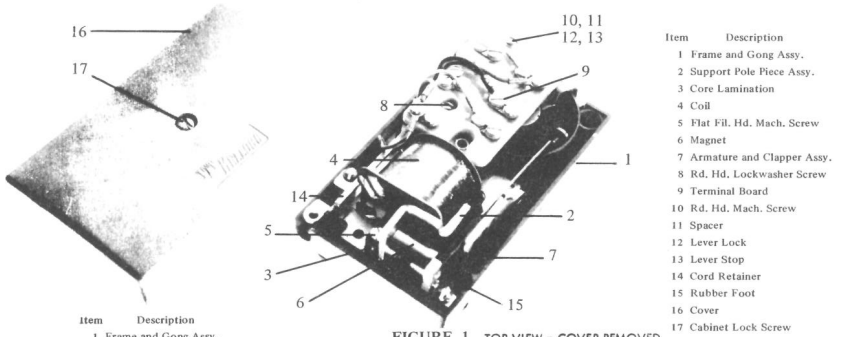


FIGURE 1 TOP VIEW - COVER REMOVED

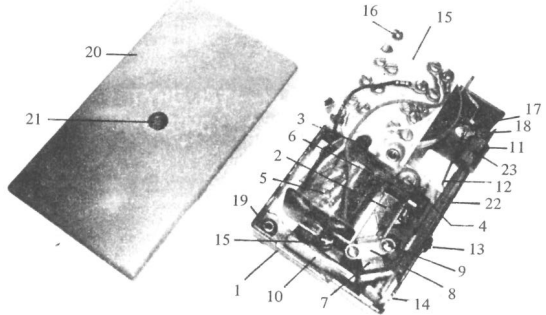


FIGURE 2 TOP VIEW - COVER REMOVED

Distribution D

- 1.03 The 137 compact ringer is a single coil, single gong, frequency selective type of unit, with a volume control, assembled on a die-cast metal base and fitted with a molded plastic protective cover. (See Figure 2) In combination with types 136 and 138 it provides a complete range of units which meet the requirements of every class of service for compact telephone line main or extension ringers. Screw terminals are provided for all lead connections (see Figure 3A) and the base casting is fitted with shock absorbing rubber feet.

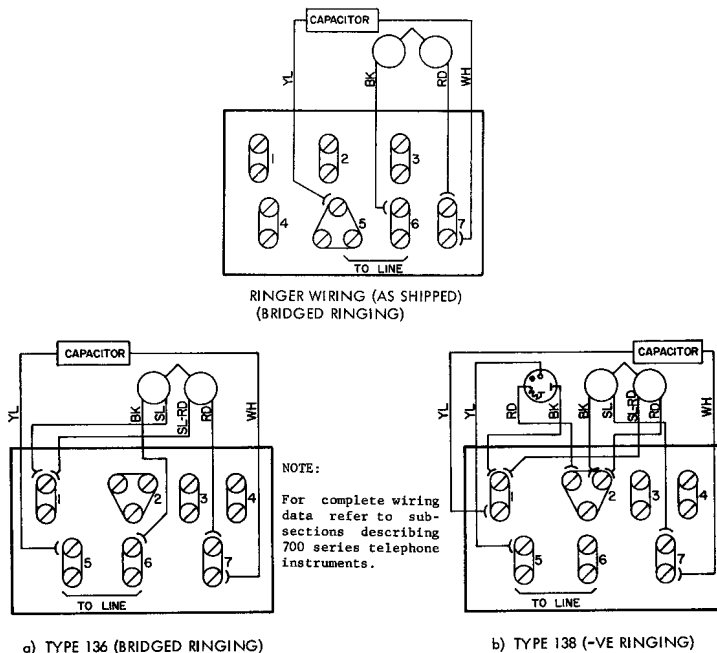


FIGURE 3 RINGER WIRING (AS SHIPPED)

2. MAINTENANCE

- 2.01 When ringer fails to operate properly, check first that customer is familiar with volume control operation. If volume control is set correctly and ringer still fails, proceed as follows:
- Check airgap at armature for dirt or foreign material and clean if necessary.
 - Be sure all connections are tight and correct.
 - Check that leads do not interfere with operation of the ringer.
 - Check mechanical requirements and bias spring position.

- 2.02 Replace ringer if requirements are not met. Do not disassemble, adjust, or replace armature, coil, or permanent magnet, since these are factory aligned.
- 2.03 With the control lever in the lowest volume position there must be a clearance of 1/16" between the tip of the rubber cam and the bushing of the clapper. Rotate the rubber cam on the shaft to obtain the required clearance. The top surface of the bushing of the clapper must be set between, level with and 1/32" below the top surface of the rubber cam. Bend the stem of the clapper near its base to effect this adjustment.
- 2.04 The lever lock may be set to prevent the volume control being moved from the loud position, if desired. The lever stop may be set to prevent the volume control lever from being lifted over the step of the frame into the cut-off position. No free movement of the clapper is permissible in the cut-off position.
- 2.05 Moving the volume control from the highest to the lowest position should result in a reduction in sound output of 10 db. This may be measured on a sound output meter. Slight repositioning of the rubber cam or clapper may be necessary to achieve this variation.
- 2.06 Sensitivity (using moving coil meter and ERG source) the ringer should function strongly with the maximum voltages, steadily with the minimum voltages and just tinkle with the ultimate voltages applied across the coil and capacitor.

Condition	Frequency	Max. V	Min.V	Ult. V
Low Bias	16 cps	44	36	26
	20 cps	63	48	37
	30 cps	88	56	40
High Bias	16 cps	67	58	47
	20 cps	87	77	61
	30 cps	120	107	81

- 2.07 The type 138 gas ringer tube must first be checked, and adjusted if necessary, in the same manner as the type 136 ringer. Then connect the gas tube and apply the ringing signals in series with a 45 to 48 volt battery.

With the bias spring in the low tension position and the gas tube biased to conduction the ringer must function strongly with a series resistance of 10,000Ω in circuit at frequencies of 16, 20 and 30 cps. When the gas tube is reverse biased the ringer must not function, or may tinkle very slightly, with no series resistance in circuit. It will probably be necessary to set the bias spring in the high notch in order to obtain these conditions.

3. MECHANICAL REQUIREMENTS

- 3.01 The armature will restore to nonoperate side of airgap when manually operated.
- 3.02 Clearance between clapper and gong should be a minimum of 1/64 inch. The pressure of the clapper stem against the rubber sleeve on the tuning stem must be set within the following ranges:

Ringer Frequency	Pressure	
16, 16-2/3, 20, 25 cps	0-1 ozs	0-30 grams
30, 33-1/3 cps	0-3 ozs	0-90 grams
40, 42, 50, 54, 60, 66, 66-2/3 cps]	3-5 ozs	90-150 grams

The pressure must be measured at the top of the angled portion of the clapper stem.

- 3.03 Volume-control lever should operate smoothly over entire range. The sleeve on the volume control lever must rest tightly against the gong in the quiet position and must be clear of the gong in the loud position. Reshape the tip of the lever if necessary.

4. BIAS SPRING POSITION

- 4.01 The ringer is shipped with bias spring in the high (outside) notch. Table A indicates proper position for various classes of service.

TABLE A
BIAS SPRING POSITION

Class of Service		Bias Spring Notch	Remarks
Bridged Ringing Service	Individual Line and PBX Stations	High	If three or more ringers are bridged across line and operation is not satisfactory, place bias spring in low notch on all ringers. If condition still exists, replace ringer.
	Nonselective Party Lines	Low	
Grounded Ringing Service	2-Party Flat and Message Rate	High	
	4-Party Semiselective	High	If five ringers are connected between same side of line and ground, and operation is not satisfactory, place bias spring in low notch on all ringers on that side of line. If condition still exists, replace ringer.
	4-Party Selective 8-Party Semiselective Divided Code	Low	If ringer buzzes on short-loop installations when the party of opposite polarity on same side of line is being called, place bias spring in high-tension notch. If ringer still buzzes or fails to ring, replace ringer.

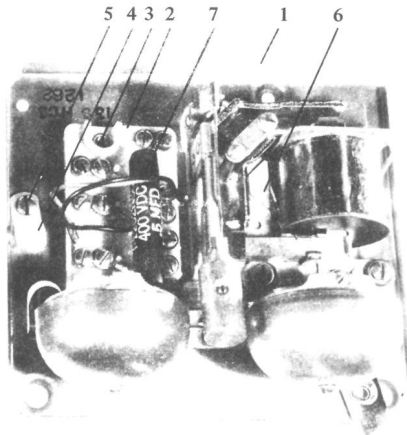
NOTE: Do not bend bias spring. Correct bias spring tension has been set at factory. Do not use tools when relocating bias spring.

- 4.02 Obtain a ringing test after completing work. Check for bell taps while dialing.
- 4.03 If bell taps with bias spring in low notch and with ringer properly connected, move bias spring to high notch. Repeat ringing test. If ringer still fails to operate properly, replace ringer.

EXTENSION RINGER
TYPE 139

1. GENERAL

- 1.01 The Type 139 Ringer is designed for use as an extension unit. It may be used as the main ringer if the telephone is not equipped with an internal ringer.
- 1.02 The assembly consists of a type 130, 131 or 133 ringer mounted on a steel baseplate and protected by a molded, snap-on plastic housing. See Figure 1.



Item	Description
1	Baseplate
2	Terminal Board
3	Rd. Hd. Mach. Screw
4	Cable Hanger
5	Bind. Hd. Mach. Screw
6	Ringer
7	Capacitor Assembly

Fig. 1 TOP VIEW - COVER REMOVED

- 1.03 External connections are made to a terminal block mounted on the baseplate which is provided with mounting holes. Units fitted with type 130 or 131 ringer assemblies are equipped with volume controls. See Figures 2 and 3.
- 1.04 The cover of the assembly is removed by loosening the screw on the top edge of the cover, pulling the bottom of the cover away from the base, then lifting the cover clear of the baseplate.
2. RINGERS AND CAPACITORS
- 2.01 Refer to the appropriate descriptive practices for specific details of each of the ringer units which may be fitted in the type 139 extension ringer housing. See Table 1.

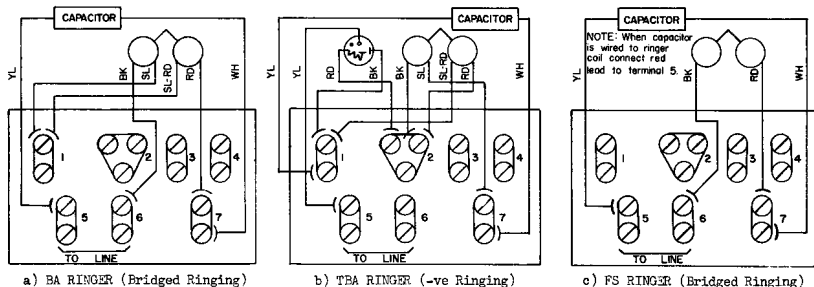


FIGURE 2 RINGER WIRING (AS SHIPPED)

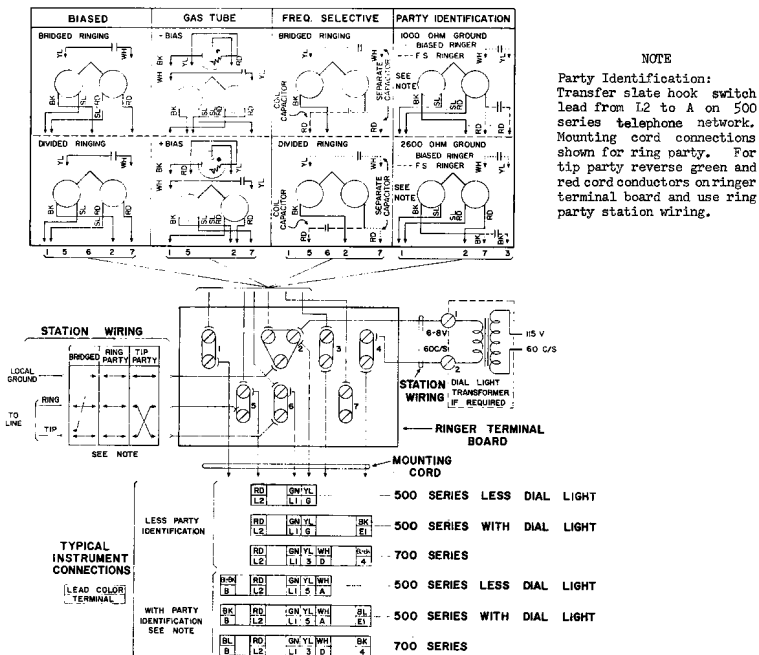


FIGURE 3 RINGER INSTALLATION WIRING

TABLE 1 RINGERS AND CAPACITORS

Code	Frequency	Ringer	Capacitor
LR	-	None	190440-6
BA	20	130(BA)470	190440-7
TBA	20	130(BA)470	190440-7
*A1	33-1/3	***(HA1)470	None
*A2	50	*** (HA2)470	None
*A3	66-2/3	*** (HA3)470	None
*A4	99-1/3	*** (HA4)470	190440-6
*A5	21	*** (HA5)470	190440-6
*B1	30	*** (HB1)470	190440-6
*B2	42	*** (HB2)470	* None
*B3	54	*** (HB3)470	None
*B4	66	*** (HB4)470	None
*B5	16	*** (HB5)470	190440-6
*C1	20	*** (HC1)470	190440-6
*C2	60	*** (HC2)470	None
*C3	30	*** (HC3)470	190440-6
*C4	40	*** (HC4)470	None
*C5	50	*** (HC5)470	None

F1A RINGER

1. GENERAL

- 1.01 This practice covers the description, installation and maintenance procedures of the BELL-CHIME F1A ringer. Three types of signal operation are available. By operating a control lever as shown in Fig. 1, the customer selects either a CHIME, a LOUD ring, or a LOW ring.

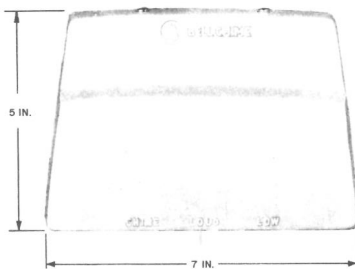


FIGURE 1. F1A Ringer with 125A Cover in Place

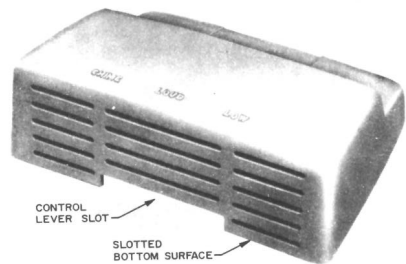


FIGURE 2. 125A Cover

- 1.02 The plastic cover (Fig. 2) is not supplied with the F1A ringer. Order separately as follows:

- a. Cover 125A-50 (Ivory)
- b. Cover 125A-63 (Gold)

2. INSTALLATION REQUIREMENTS

- 2.01 The F1A ringer is installed when covered by a contact memo (see Fig. 3). Typical installations include:

- a. Centrally located BELL-CHIME ringer
- b. Extension ringer
- c. Ringer for Cinderella telephone set
- d. Loud ringer

- 2.02 This ringer may be connected with the following classes of service:

- a. Individual flat and message rate
- b. 2-party flat and message rate
- c. Regular PBX stations.

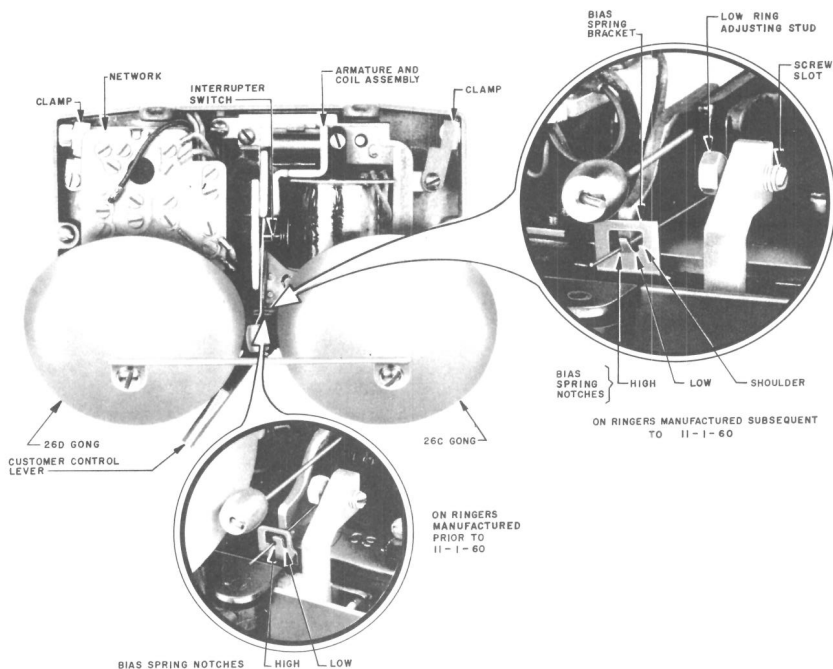


FIGURE 3. F1A Ringer, Components

- 2.03 This ringer is *not to be used* with cold cathode tube-type ringing bridges for the following classes of service:
- 4-party selective
 - 8-party semiselective
- 2.04 In areas where inductive interference requires cold cathode tube-type ringing bridges, this ringer may be connected as shown in Figures 4 and 5.
- 2.05 Since the customer may experience difficulty distinguishing rings in the CHIME position, do not use with these code ringing services:
- Nonselective party lines
 - Divided code ringing

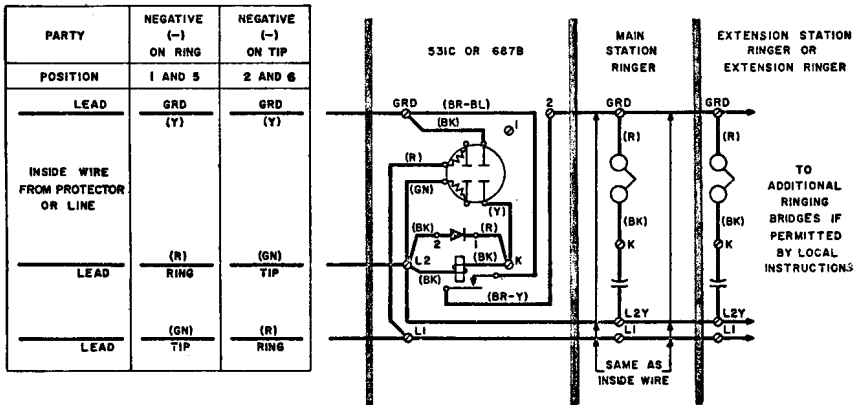


FIGURE 4. Modified 500 Subscriber Set Connections
Negative Parties - Severe Induction

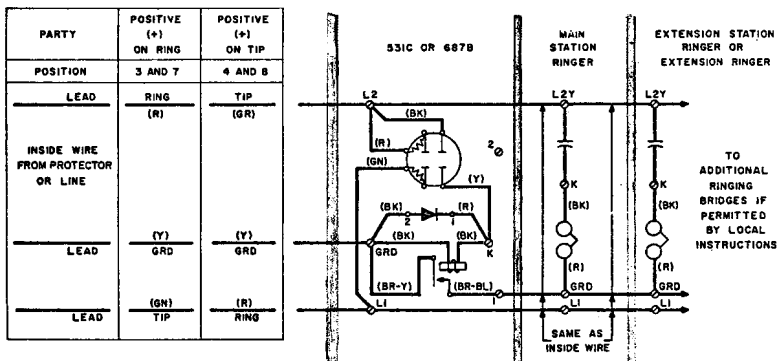


FIGURE 5. Modified 500 Subscriber Set Connections
Positive Parties - Average to Severe Induction

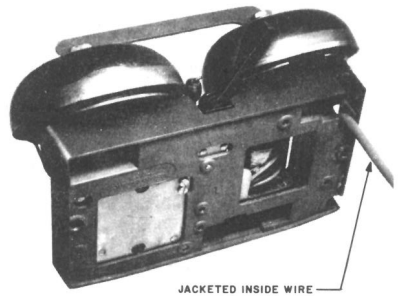
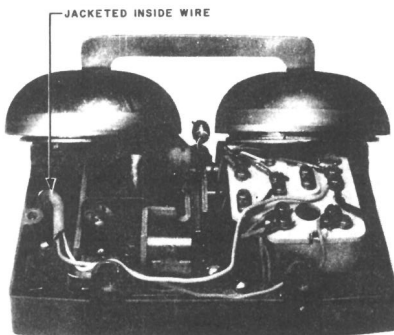
- 2.06 When tip party identification is required, it must be obtained through the ringer associated with each station. The connections are shown in the practice for particular telephone set used.
- 2.07 If tip party identification is required and the customer does not wish the telephone set associated with F1A ringer to ring:
 - a. F1A ringer should not be used for tip party identification.
 - b. F1A ringer should be connected as normal tip party ringer
 - c. Telephone set should be connected for tip party identification with the ringer silenced as described in the practice related to set.

3. DESCRIPTION

- 3.01 The F1A is a single coil, high impedance ringer with 2-position bias spring. The component parts, shown in Fig. 3, are:
 - a. Die-cast base for mounting components; it also provides cord clamps for telephone set mounting cord.
 - b. Armature and coil assembly similar to C-type ringers.
 - c. Network (498A) containing necessary electrical circuit elements which provide a 7-terminal connecting block.
 - d. Customer switch assembly for changing from bell to chime.
 - e. Interrupter switch assembly operated by movement of clapper rod to control chime operation. (Earlier model ringers have a 4-leaf spring assembly; later models have 3-leaf spring assembly.) (See Fig. 6.)
 - f. Stop bar to position cover away from gong assemblies.

4. INSTALLATION

- 4.01 Standard ringing bridge limitations apply to the use of this high impedance ringer.
- 4.02 Suggest a location so the customer can hear the chime or low ring in largest area of residence. The F1A will usually provide satisfactory coverage when centrally located on an inside partition about 5 feet above floor with control lever accessible to customer.
- 4.03 Ringer location shall allow space for tightening cover screws on top and adjusting low ring stud on right side.
- 4.04 Fasten directly to wall surface with two fasteners. Select length of fastener to provide secure mounting to particular wall material.
 - a. Use No. 8 RH wood screws when fastening to wood, wood studs.
 - b. Use toggle bolt (or similar) on wall surfaces of hollow construction.
- 4.05 Inside wire may enter ringer from back, bottom, or either side. (See Fig. 7 and 8.)



- 4.06 When inside wire enters ringer from bottom or back, mounting cord from telephone set may be brought into either end of the ringer. When inside wire enters from one end and set cord enters from opposite end, secure set cord to ringer with clamps provided.

CAUTION: *On earlier models of the F1A ringer, the interrupter switch assembly was not mounted separately. Loosening the left clamp screw may allow the component plate to shift, changing the position of the interrupter switch. On later models of the F1A ringer (Fig.3), the rack arm may become displaced from under the 26C gong plate preventing movement of the ringer control lever to the LOUD or CHIME position. Use care to prevent these conditions when loosening the left clamp screw and fully tighten clamp screw when the set cord is installed.*

- 4.07 Adjust volume of low ring by moving adjusting stud (Fig. 3) right or left; use a small screwdriver in slotted end located beneath right gong. Be sure that rack arm does not snag on gong plate.

NOTE: *The installer should be sure to acquaint customer with location and use of ringer control lever.*

TABLE 1 .
BIAS SPRING POSITION

Class of Service		Bias Spring Notch	Remarks
Bridged Ringing Service	Individual Flat, Message Rate and PBX Stations	High	The bias spring may be placed in low notch when double tap is experienced in CHIME position or when operation is not satisfactory with bias spring in high notch. If repositioning bias spring results in dial tap or poor operation, check ringer as outlined in 6.00.
Grounded Ringing Service	2-party Flat and Message Rates	High	

5. BIAS SPRING POSITION

- 5.01 The ringer is shipped with bias spring in loud (left) notch. Table 1 indicates proper position of bias spring for various classes of service. (See Fig. 3.)

NOTE: *Correct bias spring tension has been set at factory. Do not bend bias spring.*

- 5.02 After completing installation work, obtain a ringing test in all three positions of subscriber switch. Obtain tests according to local instructions. Check for bell taps while dialing.

CAUTION: *Proper poling of the F1A ringer is very important to avoid double-tap in the CHIME position and bell taps while dialing.*

- 5.03 The biasing spring bracket has been changed on later models of the F1A ringer. (See Fig. 3.)

NOTE: *On later type brackets, bias spring must never be placed on shoulder located to right of low notch.*

6. MAINTENANCE

6.01 On a maintenance visit where ringer fails to operate properly, proceed as follows:

- a. Check airgap at armature for dirt or foreign material and clean if necessary.
- b. Make sure all connections are tight and *correct*.
- c. See that all wires are dressed so that they do not interfere with operation of the ringer.
- d. Clean interrupter switch assembly contacts when required, by carefully burnishing with a 265C tool.

NOTE: *Care must be taken to avoid changing adjustment of spring gap and spring tension of interrupter switch.*

6.02 If ringer rings properly but armature sticks in operated position when subscriber switch is in CHIME position, replace ringer.

6.03 If ringer rings with customer control lever in CHIME position, proceed as follows:

- a. Shift network mounting plate until interrupter switch stud just touches clapper rod.
- b. If Step a. results in double-tap, shift component plate *back* slightly toward original position.
- c. If Step a. and b. does not correct trouble, replace ringer.

NOTE: On earlier models of the F1A ringer the interrupter switch was mounted to the network mounting bracket. On later models the interrupter switch is mounted separately to the ringer base and steps a., b. and c. will not apply.

7. CONNECTIONS

7.01 Table 2 gives connections for F1A ringer and circuit drawing is provided in Fig. 6.

TABLE 2.
LINE AND RINGER CONNECTIONS FOR F1A RINGER

Wire or Lead			Individual or Bridged	Ring Party	Tip Party
Inside Wire	Ring	R	6	6	1
	Tip	G	4	1	6
	GRD	Y	-	4	4
Ringer		R	7	7	7
		S-R	2	2	2
		S	2	2	2
		BK	4	4	4
Network Straps	G	BL	4	4	4
	A	R	7	7	7
	B	G	6	6	6

STATION APPARATUS TROUBLE LOCATING

1. GENERAL

1.01 This addendum is issued to change a CTSP reference in regard to radio interference.

1.02 With red ink or pencil, change existing practice to read as stated in paragraph 2 of this addendum.

1.03 File this addendum directly in front of practice 480-120-700.

1.04 All holders of Station Installation Manuals should make changes as stated in paragraph 2 of this addendum and paste this addendum in front of practice located in Part III of the Station Installation Manual.

2. CHANGE

2.01 Change page 3, Table I, Transmission Troubles, Radio Interference, to read as follows:

Radio Interference	Pick up of local radio station in receiver.	Refer to CTSP 480-122-401.
--------------------	---	----------------------------

STATION APPARATUS
TROUBLE LOCATING

1. GENERAL

- 1.01 This practice provides a station apparatus and trouble locating guide for installation, maintenance and repair.
- 1.02 The tests described in the following paragraphs and tables should be performed upon completion of all installation procedures and used as a guide during inspections, checks and adjustments, removal and replacement of parts, and trouble shooting.

2. TESTS WITH TROUBLE DESK – COMMON BATTERY STATIONS

- 2.01 The test should be made with the aid of a test desk man on the dial set or the manual set in accordance with local procedures. For tests at P.B.X. stations, check for the following conditions:
- a. Dial the proper test code or call the test desk man to make the telephone set ring. If the ringer does not ring or the bell taps, refer to Table I for remedial measures.
 - b. Lift the handset off hook and hold it in a vertical position. Contact and talk to the test desk man. Talk directly into the transmitter in a normal conversational tone. The lips should be almost touching the transmitter cap. Check for normal sidetone during this test. Check for difficult reception. Ask the test desk man if transmission is clear. If trouble is encountered in either case, refer to Table I for corrective procedures.
 - c. Perform the dial speed test with the test desk man or in accordance with other local procedures.
 - d. With the handset held firmly at the ear and mouth, shake the mounting cord and then the handset cord. If excessive noise is heard and it changes in magnitude as a cord is shaken, check the cord and replace it if necessary. Test the transmitter for excessive noise by blowing gently into it. If the noise changes in magnitude during the test, then the transmitter unit is defective and should be replaced. If either a cord or the transmitter is replaced, repeat tests a through c.

3. AUTOMATIC NUMBER IDENTIFICATION

- 3.01 Where automatic number identification is used, make all tests in accordance with local procedures.

4. SUBSCRIBER INSTRUCTION

- 4.01 The installer shall instruct the subscriber in the proper manner of using the telephone set, before leaving the premises, and shall thoroughly acquaint the customer in the services available as a telephone subscriber.

TABLE 1

DIALING TROUBLES		
TROUBLE		CORRECTIVE ACTION
No Dial Tone	<p>Open in mounting or handset cord.</p> <p>Open or shorted receiver unit.</p> <p>Dial pulse contacts open or off-normal contacts closed.</p> <p>Open winding in network coils.</p> <p>Cradle switch contacts not functioning correctly.</p>	<p>Replace cord.</p> <p>Replace receiver unit.</p> <p>Adjust or replace dial.</p> <p>Replace network.</p> <p>Check for misplaced plastic cover. Adjust contacts or replace switch assembly.</p>
Can't Break Dial Tone	<p>Dial pulse contacts not opening.</p> <p>Filter or ringer capacitor shorted.</p>	<p>Adjust or replace dial.</p> <p>Replace network or ringer capacitor.</p>
Reaching Wrong Numbers	<p>Dial pulse contacts wrongly functioning.</p> <p>Incorrect dial speed (For most conditions, dial speed must be considerably in error to cause trouble).</p> <p>Leaky filter or ringer capacitor.</p>	<p>Adjust contacts or replace dial.</p> <p>Adjust dial speed or replace dial.</p> <p>Replace network or ringer capacitor.</p>
Dial Clicks In Receiver	Dial off-normal contacts not closing.	Adjust contacts or replace dial.
TRANSMISSION TROUBLES		
TROUBLE		CORRECTIVE ACTION
Cannot Hear	<p>Open receiver unit or handset cord.</p> <p>Dial off-normal contacts not opening.</p> <p>Open winding in network coils.</p>	<p>Replace receiver unit or handset cord.</p> <p>Adjust contacts or replace dial.</p> <p>Replace network.</p>

TRANSMISSION TROUBLES		
TROUBLE		CORRECTIVE ACTION
Cannot Hear	Cradle switch contacts not opening correctly.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
	Shorted receiver or receiver varistor.	Replace receiver unit.
Other Party Cannot Hear	Shorted transmitter unit or handset cord.	Replace transmitter unit or handset cord.
	Shorted varistor in network.	Replace network.
High Sidetone Level	Defective balancing in network.	Replace network.
Distortion and/or Clicks	Faulty receiver unit or receiver-varistor.	Replace receiver unit.
	Faulty transmitter unit.	Replace transmitter unit.
	Loose connections.	Retighten connections as necessary.
Radio interference	Pick up of local radio station in receiver.	Refer to CSP 410-600-404 480-122-401
RINGING TROUBLES		
TROUBLE		CORRECTIVE ACTION
Rings When Other Party Called	Wrong ringer.	Replace with correct type.
	Wrong ringer or line connections.	Check connections and rewire as necessary.
	Incorrect ringing frequency	Check ringing generator frequency.
	Frequency selective ringer incorrectly tuned.	Retune or replace ringer.
	Wrong capacitor for frequency selective ringer.	Replace capacitor or complete ringer assembly.
Unable to Trip Ringing	Open dial pulse contacts.	Adjust contacts or replace dial.

RINGING TROUBLES		
TROUBLE		CORRECTIVE ACTION
Unable to Trip Ringing	Open coil winding or varistor in network.	Replace network.
	Loose or open connection.	Check connections and remake as necessary.
	Cradle switch contacts not making.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
Trips Ring, Cannot Converse	Open handset cord, transmitter or receiver unit.	Replace faulty item.
	Dial off-normal contacts not open.	Readjust dial contacts or replace dial.
	Receiver 'shorting' contacts of cradle switch not open.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
	Faulty coil winding or open capacitors in network.	Replace network.
No Ring	Wrong ringer type. (Most likely to be observed on new installation).	Check ringer type and replace if incorrect.
	Ringer disconnected or wrongly wired.	Check ringer wiring. Correct as necessary.
	Ringer wired for silencing.	Rewire for ringer operation.
	No ground (party line) connection.	Connect ground per local practices.
	Control wheel (biased ringer) in cut-off position.	Reset wheel to ring position and disable cut-off position if desired.
	Obstruction between magnet and armature or gongs and clapper.	Remove obstruction and readjust ringer if necessary.
	Open ringer coil.	Replace ringer.
	Open ringer capacitor.	Replace network or ringer capacitor.

RINGING TROUBLES		
TROUBLE		CORRECTIVE ACTION
Volume Too High Or. Too Low	Control wheel in wrong position.	Reset wheel. Instruct customer if required.
	One or both gongs loose.	Tighten mounting screws and readjust.
	Obstruction between gongs and clapper or against armature or clapper stem.	Remove obstruction and readjust ringer if necessary.
	Telephone or extension ringer on sound absorbing material.	Relocate telephone or extension ringer in accordance with wishes of customer.
Bell Taps While Dialing	Wrongly connected ringer.	Check and reconnect as necessary.
	Bias spring in low notch (biased ringer).	Check ringer and set bias spring in high notch if necessary.

AUXILIARY SIGNAL—TELEHORN

110 DB, 120 VAC HORN

INSTALLATION

CONTENTS	PARAGRAPH
GENERAL	1
INSTALLATION	2
HORN ADJUSTMENT	3

1. GENERAL

1.01 The Telehorn, CTS #80-55-082-7, is a loud signaling device that can be activated by telephone ringing current or 10-20 VAC signal battery, see Figure 1. It operates from 120 VAC line current.

1.02 The Telehorn can be used on one-party lines with bridged ringing and on one-party or two-party lines with divided ringing.

NOTE: Do not use the Telehorn on multifrequency ringing lines.

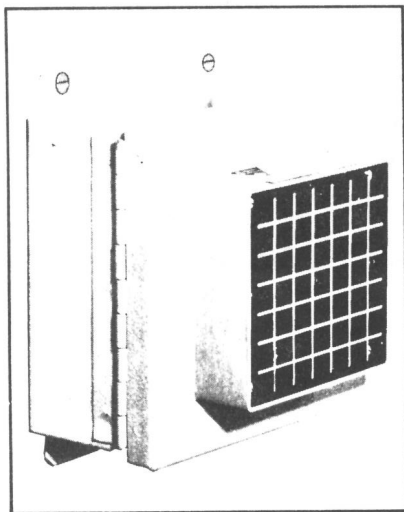


FIGURE 1. The Telehorn

1.03 10-20 VAC signaling battery, such as used in key telephone systems, can be used to activate the horn either manually or from a 207 C KTU.

1.04 A 5 foot, three conductor line cord equipped with a three-pronged plug comes with the Telehorn.

1.05 All components are contained inside the unit. The horn itself is located in the hinged cover.

2. INSTALLATION

2.01 The Telehorn can be mounted inside or outside. If mounted outside, be sure that it is not directly exposed to the elements but protected by a roof or overhang.

2.02 Locate the Telehorn within 5 feet of an electrical outlet.

NOTE: Do not use an extension cord or splice the line cord.

2.03 After securing the unit to a solid surface, run the inside wire to the right side of the unit. The wire should enter through the opening provided on the right side. Connect wiring as shown in Table A and Figure 2.

CAUTION: Do not plug the line cord into the receptacle until all inside wiring has been completed and cover has been secured.

2.04 Do not connect inside wire to the line side of the protector. The inside wire should come from the protected side of the protector.

2.05 When all the wires have been terminated in the Telehorn, close and secure the cover, then plug cord into 120 VAC supply receptacle.

CAUTION: If a three-way receptacle is not available, a No. 14 ground wire must be terminated on the terminal designated green and the other end must be terminated on an appropriate ground medium using a station ground clamp. The receptacle selected for supply should be one that is hot at all times.

3. HORN ADJUSTMENT

3.01 An Allen wrench (included with the Telehorn) is used to adjust the sound level. Adjust as desired by turning Allen screw located in front of the horn.

TABLE A

TERMINAL STRIP	GREEN	BLACK	WHITE	SPARE	3	2	1
Bridged Ringing One-Party						Ring (red)	Tip (Grn)
Divided Ringing				Tip (Grn)		Ring (red)	Grd
				Ring (red)		Tip (Grn)	Grd
10-20 VAC Signal Battery					10-20 VAC		Grd

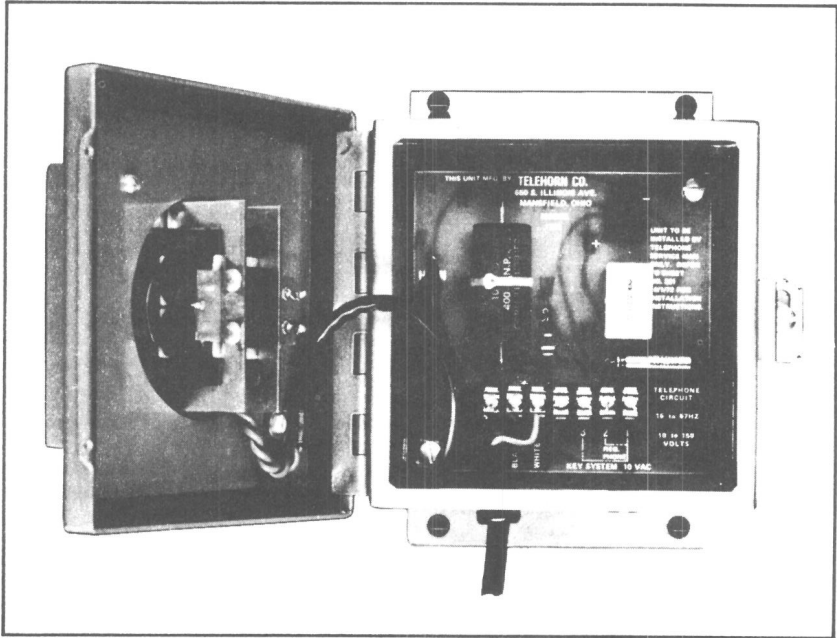


FIGURE 2. The Telehorn Showing Interior and Terminal Strip

RADIO FREQUENCY DEMODULATION SUPPRESSORS FOR TELEPHONE SETS

1. GENERAL

- 1.01 This practice provides information on how to *identify*, *select*, and *install* devices for the reduction of radio frequency interference (RFI) and covers both *inside* and *outside* plant conditions of radio frequency interference.
- 1.02 This practice replaces CTSP 410-600-404.

2. DESCRIPTION

- 2.01 Radio interference on customer's telephone set is generally caused by a radio station being too close to the customer's telephone facility or telephone instrument.
- 2.02 Some of the major causes of RFI has been found to be:
- a. Corroded connections.
 - b. Loose wire terminations.
 - c. Abandoned drop wire still connected to the line.
 - d. Inside wire connected but not used.
 - e. Foreign attachments.
- 2.03 The following telephone set components may also act as effective demodulators:
- a. Speech equalization varistors in networks.
 - b. Transistors in amplifiers of some networks or handsets.
 - c. Varistors and transistors such as in Touch-Tone dials.
 - d. Diodes in polarity guards.
 - e. Click suppression varistors across the receiver units.
 - f. Bad carbon transmitters.
- 2.04 In some cases, *high frequency potentials* of appreciable magnitude to ground may be present on cables or wires. It is possible for high frequency induction to cause arcing to ground across open space protectors, resulting in a sputtering or crackling noise in the receiver. Should it appear that an abnormal level of high frequency energy is present on a customer's line, refer the matter to your supervisor.

3. TEST PROCEDURE

- 3.01 A hand test telephone, with the transmitter shunted out, is required for the following test procedure. If the transmitter is not shunted out, it may demodulate the radio signal and render the test invalid. The following procedure is used to determine whether the source of RFI is within the telephone set, in a component, or in a line connection external to the set. The same procedure should also be used for interference testing on electronic equipment.

Distribution C D

- a. Place all telephone sets in the circuit to be tested on hook.
- b. Bridge the modified (*transmitter shunted out*) hand test telephone across the line.
- c. If radio interference is heard, it indicates that the source of the RFI is external to the telephone sets. In this case, perform corrective action as described in paragraph 4.
- d. If radio interference is not heard, it indicates that the source of RFI is internal to one or more of the telephone sets. In this case, perform corrective action as described in paragraph 5.

3.02 Because of the numerous possible sources of such interference and the unpredictable level of RFI energy which might prevail, it is impossible to prescribe a specific series of instructions which may be uniformly applied in correcting all RFI trouble. Each case of RFI trouble must be investigated and a solution determined based on those conditions which are peculiar to the location involved. Therefore, one or more of the following corrective measures may be required to correct a given case of RFI.

3.03 If the methods outlined in this practice do not eliminate RFI, refer the problem to your supervisor.

4. RFI CORRECTIVE MEASURES—EXTERNAL

4.01 In those instances where RFI is determined to be external to the telephone set, it will first be necessary to check all line connections between the cable terminal and the telephone set connecting block. This check should also include an inspection of station protector and protected cable terminal carbons, where found. All corroded connections should be cleaned and defective carbon blocks should be replaced. If RFI problem is still evident, proceed as outlined in the following paragraphs.

NOTE: RFI energy may go to ground and be demodulated through the carbon in a protector with no apparent damage being done to the carbon. If this condition exists, remove the carbons and make proper tests.

4.02 Small ceramic disk type capacitors of ± 20 percent tolerance and a 500 volt rating installed at the station protector should alleviate RFI. Capacitors of the following values should be obtained for RFI application:

0.01 μ f

0.02 μ f

0.03 μ f

4.03 Two capacitors are required for RFI suppression at the station protector (see Figure 1). It may be necessary to substitute capacitors of various values until interference is eliminated. It is desirable to employ the minimum capacitance necessary to eliminate the trouble. Thus, 0.03 μ f units would not be used if 0.01 μ f capacitors would clear the line and in no event would 0.01 μ f and 0.02 μ f or similar unequal combinations be employed. Install capacitors as follows:

- a. Insulate capacitor leads with standard tubing. Keep leads as short as possible. See Figure 2a.
- b. Terminate the other lead of each capacitor on the ground post of the protector. See Figure 2b.

- c. Terminate one lead of the first capacitor on the tip and one lead of the second capacitor on the ring terminal on the station side of the protector. See Figure 2c.

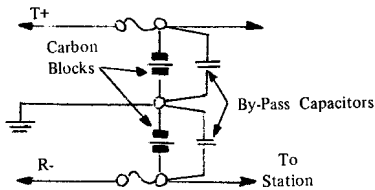


FIGURE 1. Capacitor Installation on Station Protector

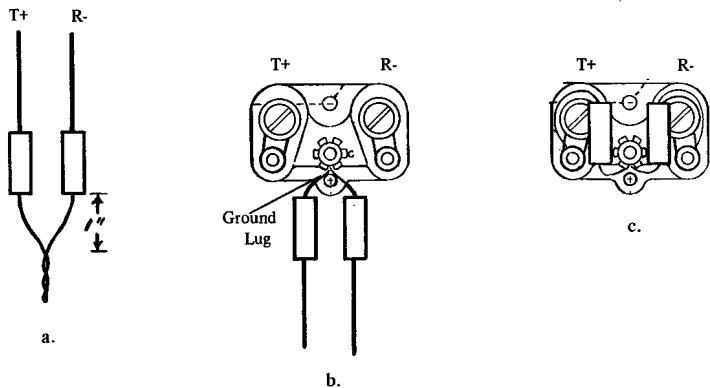


FIGURE 2. Capacitors Mounted on Station Protector

- 4.04 In some severe cases of RFI, it may be necessary to place bypass capacitors at the serving terminal in addition to those placed within the telephone set or protector. These additional capacitors shall be mounted outside the terminal in a one pair line arrestor (either cable or open wire type is acceptable). Mount the arrestor as close to the terminal as possible, keeping in mind the need to *avoid climbing area infractions* while maintaining easy access to the cable terminal. Remove carbon blocks before installing capacitors. Carbon blocks are not to be used in this application of the line arrestor. Refer to Figure 3 and proceed as follows:

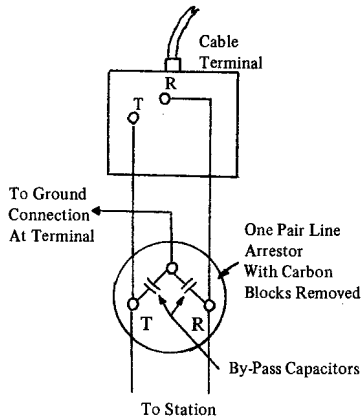


FIGURE 3. Capacitor Installation at Cable Terminal

- a. Insulate capacitor leads with standard tubing. Keep leads as short as possible.
- b. Terminate one lead of the first capacitor on the *tip* and one lead of the second capacitor on the *ring* terminal of the arrestor.
- c. Terminate the other lead of each capacitor on the *ground* terminal of the line arrestor.
- d. Connect short lengths of drop wire between tip terminals and between ring terminals of cable terminal and line arrestor.
- e. Place a short length of wire between a dependable ground connection on the cable terminal and the ground terminal of the line arrestor.

5. RFI CORRECTIVE MEASURES—INTERNAL SUPPRESSION DEVICES

- 5.01 In those instances where RFI is determined to be internal to the telephone sets, it will first be necessary to check for *loose* or *corroded* line connections. This check should also include an inspection for defective *telephone cord sets*. Sometimes replacement of the *transmitter* and *receiver capsules* will eliminate an RFI problem. If the RFI problem is still evident after the above inspections and appropriate corrective measures, install drainage capacitors.
- 5.02 A CAC1542A *inductor* can be effectively used as a radio frequency suppression coil. The *inductor* should be installed as close as possible to the telephone set. The mounting block is designed to be mounted on a wall in place of the usual telephone connecting block. Inductor mounting block installation procedures are similar to connecting block installation procedures (see Figures 4 and 5). If the inductor is used with an instrument that does not require a connecting block, the inductor should be connected across the line as close as possible to the subset of the instrument.

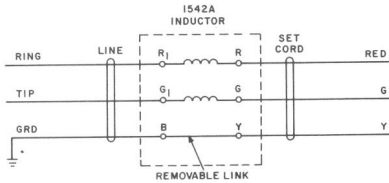


FIGURE 4. 1542A Inductor Schematic

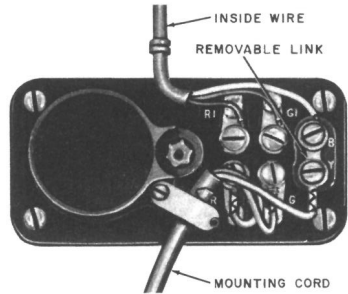


FIGURE 5. Cording Diagram, 1542A Inductor

5.03 A W.E. Co. 425J *network* eliminates the speech equalization varistors and adds *resistors* to remove radio interference (see Figures 6a. and b.). The 425J can be used for rotary or Touch-Tone dial applications. The 425J also contains an equalization network for Touch-Tone dials by using the X terminal (see Figure 6a.).

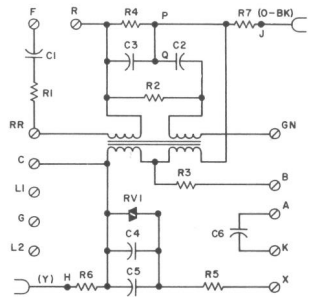
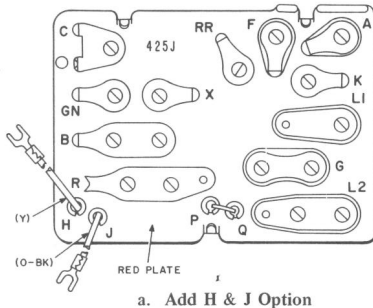


FIGURE 6. 425J Network and Schematic

5.04 The W.E. Co. 4010E *network* operates the same way as the 425 except that there is a difference in wiring options (see Figures 7a. and 7b.).

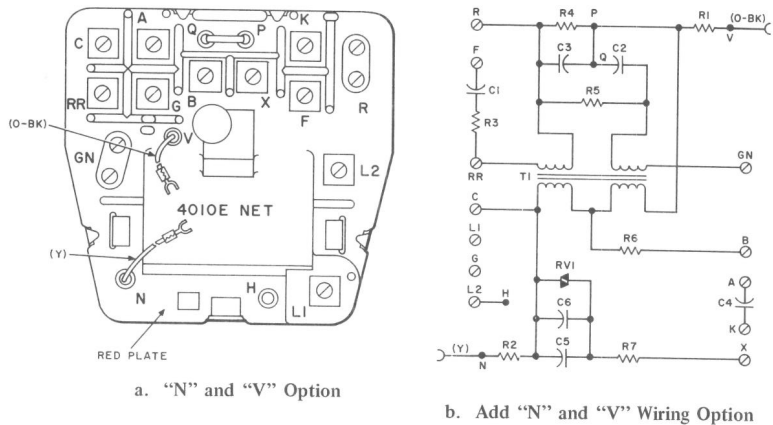


FIGURE 7. 4010E Network and Schematic

5.05 The W.E. Co. 40BA capacitor should be located at the protector to bypass radio frequency signals to ground. Bypass capacitors should be installed across all other components of the telephone set that may act as a demodulator, such as a transmitter unit, receiver unit, transistors in amplifiers, polarity guards, etc. (see Figures 8a. and b.).

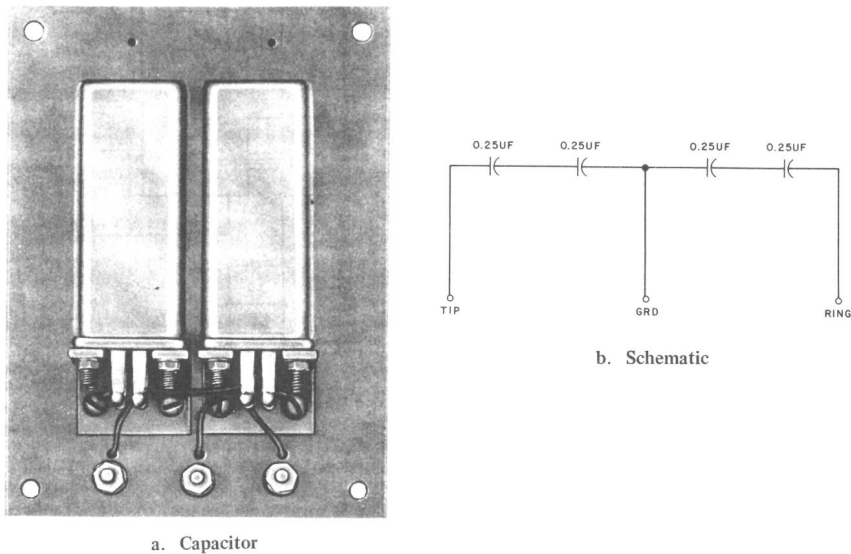


FIGURE 8. 40BA Capacitor and Schematic

6. INSTALLATION OF A PROTECTOR WITH THE 40BA CAPACITOR

- 6.01 The 40BA capacitor should be installed near and connected to the protector with as short a piece of inside wire as possible (see Figure 9).

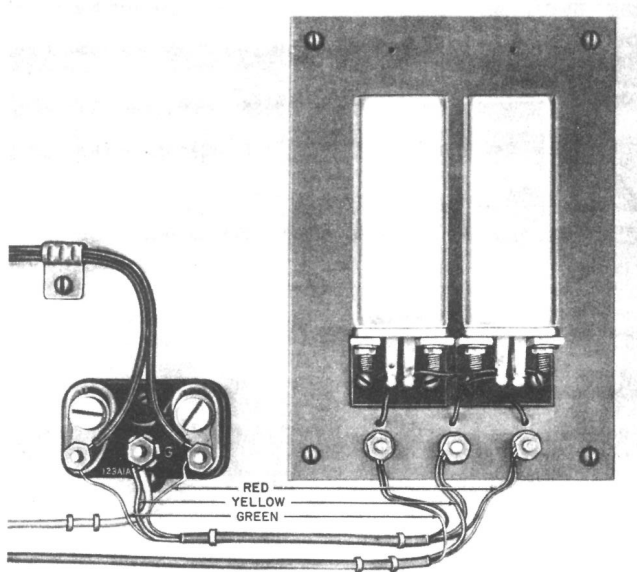


FIGURE 9. 123A1A Protector with 40BA Capacitor Installed

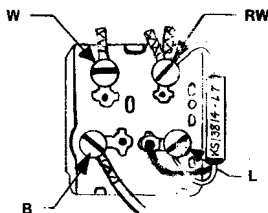
7. W.E. CO. KS-13814, LIST 7 CAPACITOR

- 7.01 The W.E. Co. KS-13814, List 7 capacitor or equivalent may be the most effective device for eliminating radio interference in 500 and 700 type telephone sets (see Figure 10).



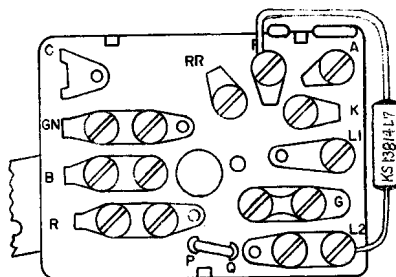
FIGURE 10. KS-13814, List 7 Capacitor

- 7.02 The KS-13814, List 7 *capacitor* is installed in the 500 type telephone sets as shown in Figure 11. It is connected across the L and RW terminals of the 311A equalizers. Place the capacitor against the equalizer as shown. Cover the exposed portions of the leads with tubular insulation.



**FIGURE 11. 500A, B or 501A, B Telephone Set,
KS-13814, List 7 Capacitor Installed**

- 7.03 The KS-13814, List 7 *capacitor* is installed in the 500 and 554 telephone sets as shown in Figure 12. It is connected across the F and L2 terminals of the 425 network. If the set is used as the tip station on two party message rate service, the capacitor should be connected across L1 and L2 of the 425 network. Cover the exposed portions of the capacitor leads with tubular insulation. For low frequency interference, another KS-13814, List 7 capacitor may be needed across terminals R and RR on the 425 network.



**FIGURE 12. 500 and 554 Telephone Set,
KS-13814, List 7 Capacitor Installed**

- 7.04 The KS-13814, List 7 *capacitor* is installed in the 500 and 554 type telephone sets as shown in Figure 13. It is connected across the L2 and GN terminals of the 425 network as shown. Place the capacitor against the side of the network nearest the ringer. Cover the exposed portions of the capacitor leads with tubular insulation.

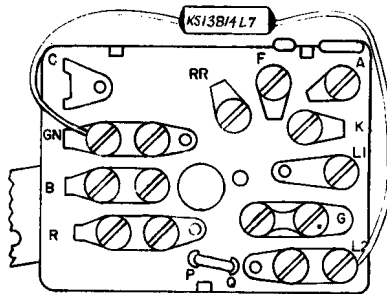


FIGURE 13. 500 and 554 Type Telephone Set,
KS-13814, List 7 Capacitor Installed

- 7.05 The KS-13814, List 7 *capacitor* is installed in the 701 type telephone sets as shown in Figure 14. It is connected between the F and C terminals of the 495 network. Cover the exposed portions of the capacitor leads with tubular insulation.

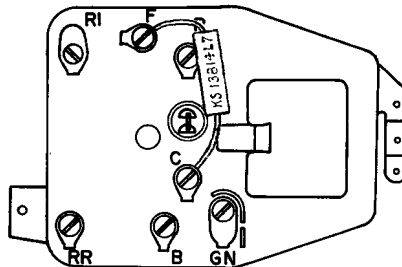


FIGURE 14. 701 Telephone Set, KS-13814, List 7
Capacitor Installed. Dial Removed
for Clarity

- 7.06 The KS-13814, List 7 *capacitor* may be placed inside the G type handset to bypass the transmitter unit as shown in Figure 15. Place the capacitor against the transmitter cup, keeping the capacitor leads as short as possible.

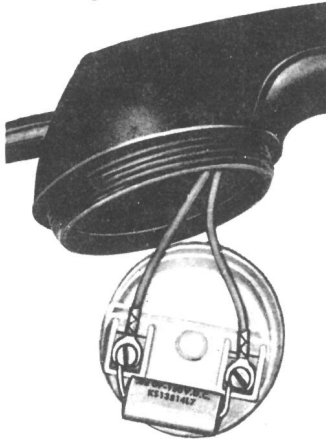


FIGURE 15. KS-13814, List 7 Capacitor, Handset Transmitter Cup

- 7.07 The KS-13814, List 7 *capacitor* may be used to bypass the 44A varistor on a U1 receiver unit as shown in Figure 16. Place the capacitor against the varistor, keeping the capacitor leads as short as possible.

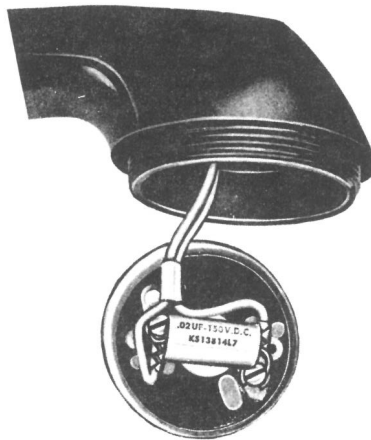


FIGURE 16. KS-13814, List 7 Capacitor, Handset Receiver Unit

MODULAR TELEPHONE APPARATUS DESCRIPTION AND INSTALLATION

CONTENTS	PARAGRAPH
GENERAL	1
DESCRIPTION OF MODULAR CONNECTING APPARATUS	2
INSTALLATION	3
CONNECTION OF MODULAR EQUIPMENT	4

1. GENERAL

1.01 This practice provides the description and installation instructions for modular telephone apparatus.

1.02 Modular telephone apparatus provides the ability to accommodate telephones and other terminal equipment with plug and jack portability. Telephones and other terminal equipment are now being equipped with a miniature plug that is compatible with miniature jack apparatus.

1.03 Desk type apparatus is equipped with a plug-ended, flat silver satin line cord. Wall type instruments are fitted in the field with adapters that enable a plug and jack installation on modular type wall hardware.

1.04 The modular concept relies on a miniature plastic plug and jack arrangement. The plug is shaped to be inserted in one position only which guarantees polarity. The plug contacts are recessed in a comblike configuration and are precious metal covered. The plug has an integral snap lock that secures the plug into the jack. The jack has flexible wire spring contacts that are precious metal covered. When the jack receives the plug, the comb on the plug separates and insulates the contacts from one another. The design of the plug and jack allows for wire spring travel, ensuring good contact. See Figure 1.

1.05 The plug is removed by depressing the tab on the snap lock and at the same time pulling the plug out of the jack. The snap lock tab protrudes out of the jack allowing removal without the aid of any tools.

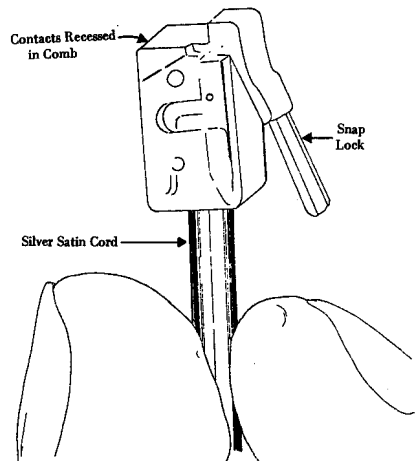


FIGURE 1. Miniature Plug

2. DESCRIPTION OF MODULAR CONNECTING APPARATUS

2.01 The following modular items are described in this practice.

- a. Silver Satin Line Cord: 7 feet, CSS No. 30-54-627-3; 14 feet, CSS No. 30-54-628-0; and 25 feet, CSS No. 30-54-629-0.
- b. (1) 625A Surface Mounted Jack, CSS No. 30-51-273-5.
(2) NT-625QA4 Surface Mounted Jack, CSS No. 30-51-273-5.
- c. 625C Conversion Cover for 42A Connecting Block, CSS No. 30-51-255-7.

Distribution IV (C D)

- d. 625F Flush Mounted Jack, CSS No. 30-51-256-5.
- e. 630A Wall Telephone Jack Mounting, 6-Term, CSS No. 30-59-248-8 and 4-Term, CSS No. 30-59-247-0.
- f. 228A Wall Adapter for 554 type telephones, CSS No. 30-59-460-0.
- g. 229A Wall Adapter for 2554 type miniwall telephone, CSS No. 30-59-462-6.
- h. 230A Wall Adapter for Trendline type telephone, CSS No. 30-59-461-8.
- i. 191B Backboard for wall telephone, ash, CSS No. 30-90-006-9.
- j. Spacer for surface wiring of wall telephones, CSS No. 30-97-240-0.

2.02 Additionally, the following hardware is discussed. For convenience, CSS numbers are provided.

- a. 42A Connecting Block, CSS No. 30-51-251-4.
- b. 43A Bracket, CSS No. 30-51-210-3.
- c. 19A Faceplate, CSS No. 30-59-474-0.
- d. 63A Junction Box, CSS No. 62-33-043-8.
- e. 60 Type Mounting Ring, CSS No. 30-62-161-5.
- f. 16A Faceplate, CSS No. 30-59-470-7.
- g. Weatherproof Cover Assembly, CSS No. 30-59-122-8.

2.03 Some of the new modular hardware has been designed to be used with existing connecting apparatus described in the applicable paragraphs.

2.04 **Modular Silver Satin Line Cords (Figure 2):** Modular silver satin line cords are flat four-conductor cords with spade tips on one end and a miniature plug on the other end. In modular installations, the terminal apparatus will be hardwired by the spade tipped end. The miniature plug will mate with the miniature jack. Silver satin line cords are available in 7, 14, and 25 foot lengths.

2.05 **625A or NT-625QA4 Surface Mounted Baseboard Jack (Figure 3):** These jacks are designed to replace existing baseboard mounted connecting blocks. It is used for desk telephone applications.

2.06 **625C Conversion Cover for 42A Connecting Block (Figure 4):** This jack consists of a cover and jack assembly which fits over an existing 42A connector block, making it compatible with the modular system. The jack has spade-tipped leads which are connected to the existing screw terminals on the 42A block.

2.07 **625F Flush-Mounted Jack (Figure 5):** This flush-mounted jack is designed to accommodate plug-ended mounting cords used in modular installations. It can be mounted in any standard electrical outlet box by using a 43A bracket and 19A faceplate. This jack can also be used in prewired installations in conjunction with a 63A junction box, 60 ring, and a 16A faceplate.

2.08 **630A Wall Telephone Jack Mounting (Figure 6):** These jacks are designed for use with all wall-mounted telephone sets which have been equipped with the appropriate adapters. The metal cover assembly of the jack has two lugs which mate with corresponding keyholed slots in the telephone set adapter and permit installation or removal of the set for portability. These jacks can be mounted to a standard electrical outlet box for prewired installations, or directly to a wall surface using the optional spacer and the appropriate mounting hardware. See paragraph 2.11.



FIGURE 2. Modular Silver Satin Line Cord

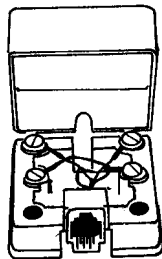
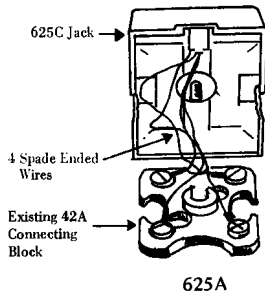


FIGURE 3. Surface Mounted Modular Jacks

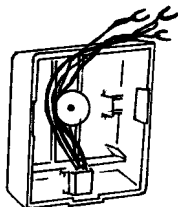


FIGURE 4. 625C Connecting Block Conversion

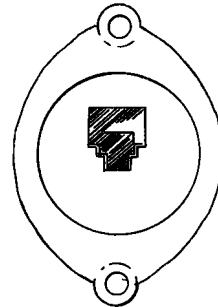


FIGURE 5. 625F Modular Jack

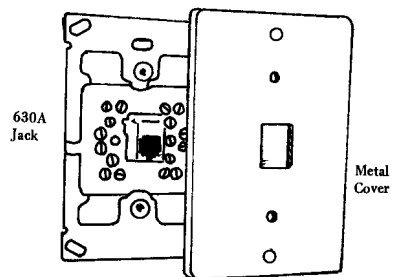


FIGURE 6. 630A Wall Telephone Modular Jack

2.09 Wall Telephone Adapters (Figure 7): Wall telephone adapters mount on the baseplate of standard wall-type telephone sets to adapt them for use with the miniature jack. All adapters have a self-aligning plug with four spade-tipped leads from each plug terminal to connect the plug to the telephone set circuitry. The adapters also have two keyholed slots which correspond to the mounting lugs on the jack cover assembly to permit installation or removal of the set.

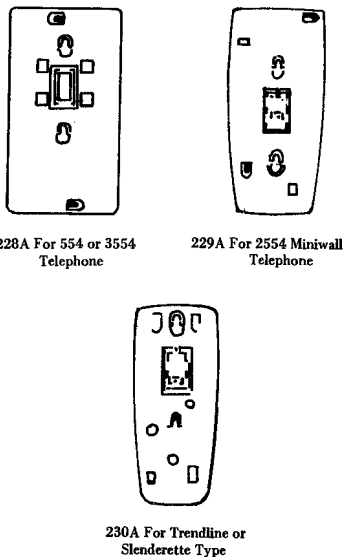


FIGURE 7. Adapters for Wall Telephones

2.10 191B Backboard (Figure 8): This backboard is designed to act as a frame around the 630A jack. It is used to cover up wall imperfections adjacent to the jack. It is held in place by a self-adhesive backing.

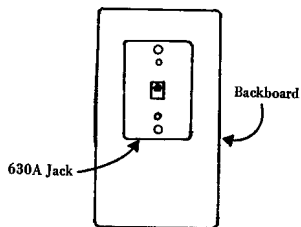


FIGURE 8. 191B Backboard

2.11 Spacer (Figure 9): The spacer adapts the 630A type jacks to wall surface mounting with surface wiring or concealed wiring. The 630A jack mounts on top of the spacer.

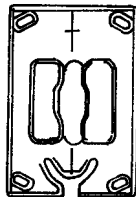


FIGURE 9. Spacer

3. INSTALLATION

3.01 Generally, instrument installation procedures are:

- a. Install appropriate jack for a desk and/or wall set.
- b. Plug telephone set into jack and test for proper operation.

NOTE: When mounting a modular wall set, the first thing that must be done is to guide the plug into the receptacle. It must remain

slightly engaged while the studs are being located. This is necessary to prevent damage to the plug caused by bumping against the jack. While mounting, it is helpful to view the wall set from the side. See paragraphs 3.06 and 3.07 for detailed information on installation of wall telephones.

c. Stamp Station Number Card "Q" to identify modular installation. See Figure 10.

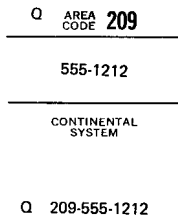


FIGURE 10. Station Number Cards

d. Test for proper operation.

3.02 Installation of Jacks: The 625A or NT-625QA4 jack provides a termination for station wire and the mounting cord as follows:

a. These jacks are intended for new installations of modular desk sets using a surface mounted jack. See Figure 11.

(1) The jacks are mounted on a baseboard or similar mounting surface with the jack opening facing downward or to the left or right.

NOTE: The plug entrances of the jacks should be positioned facing downward if at all possible or to the right or left, never facing upward, to prevent foreign matter and cleaning fluids from entering the jack.

(2) Inside wiring is routed through the desired slot and connected to the appropriate terminals.

(3) The NT-625QA4 cover has knockouts to permit alternate wiring entries. The cover snaps over the jack base. To remove cover, insert a screwdriver in the slot on either side of the rear wire entry hole and twist screwdriver.

(4) The cover of the 625A (625C) is secured by a center screw.

b. The 625C is to convert existing 42A connecting blocks to accept plug-ended mounting cords. Remove the cover from the 42A block. Connect the leads from the 625C jack to the matching colors designated on the 42A block. Mount the jack on the connecting block with the screw provided. See Figure 12.

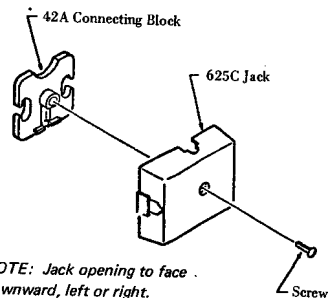


FIGURE 12. Conversion of 42A Connecting Block Using 625C Jack

c. The 625F (Figure 13) is intended for new or existing installations requiring flush-type connections. For an electrical box installation, use a 43A bracket (CSS No. 30-51-310-3) and a 19A faceplate (CSS No. 30-59-474-0). See Figure 14.

d. The 625F jack may be flush-mounted on a baseboard or wall panel as follows (Figure 15):

(1) Drill a 1 1/4-inch hole in the baseboard.

(2) Connect the inside wire to the R, G, Y, B terminals of the jack.

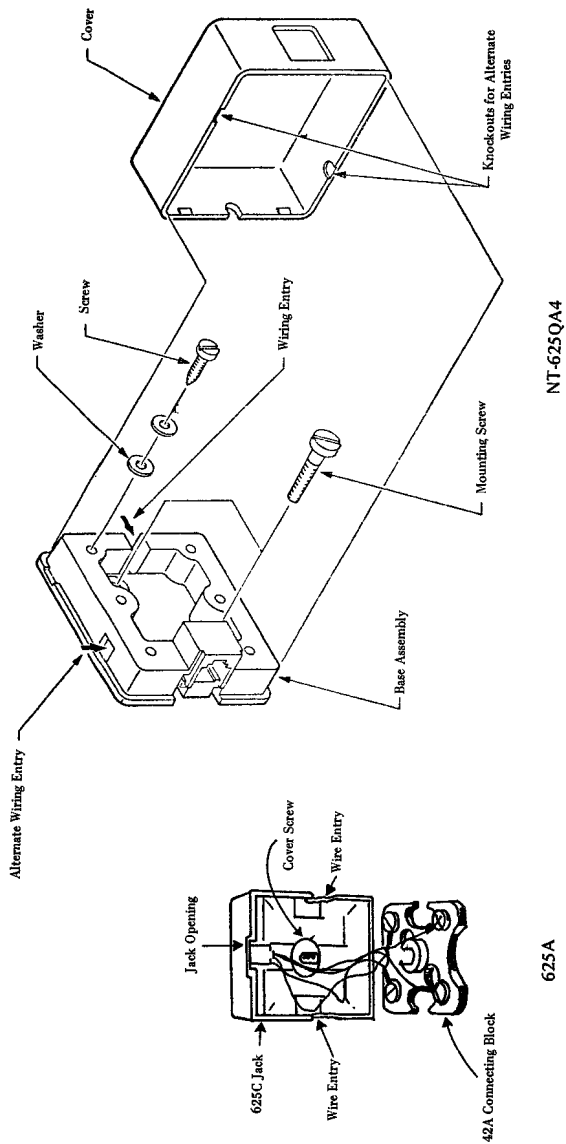
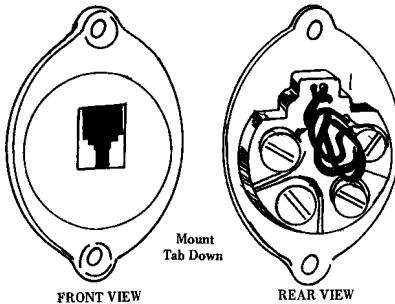


FIGURE 11. Baseboard Jacks



Flush-mounted jack for use in:

- a. Standard Electrical Box using 43A bracket and 19A faceplate.
- b. Prewired installation using 63A junction box and 16A faceplate.
- c. Flush-mounted to baseboard or wall using 1 1/4-inch hole.

FIGURE 13. 625F Miniature Jack

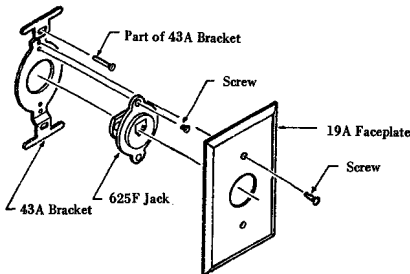


FIGURE 14. Installation of 625F in Flush Electrical Box

- (3) Insert the jack in the hole and fasten with 2 screws provided.

- e. For prewired installation, a 63A junction

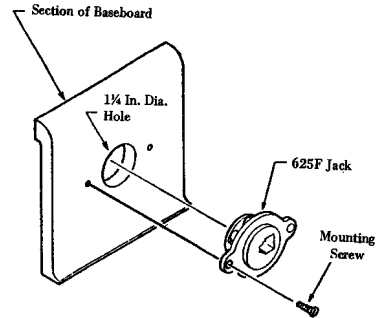


FIGURE 15. Baseboard Mounted 625F Miniature Jack

tion box (CSS No. 62-33-043-8), 60 type mounting ring (CSS No. 30-62-161-5), the 625 jack and a 16A faceplate (CSS No. 30-59-470-7) should be used. See Figure 16.

- f. Outdoor installation can be accomplished using the 625F jack with a weatherproof cover assembly (CSS No. 30-59-122-8) installed in a weatherproof electrical box.

3.03 630A Wall Telephone Jack: This jack mounts on a standard electrical outlet box as described in the following steps:

- a. Route the inside wire from the outlet box through one of the holes in the jack.
- b. Fasten the jack to the outlet box with the two screws provided. See Table A.
- c. Connect the inside wire to the appropriate terminals. Plumb jack. Tighten screws. In some cases, such as when mounting hardware is underflush, the jack will distort if screws are too tight. In such cases, tighten screws until just tight enough to make the assembly tight on the wall once mounting plate is attached.

TABLE A. Fasteners for 630A Jack (Note 1)

To Fasten Jack To:	USE TWO (2) EACH OF FASTENERS INDICATED			
	Flat Head No. 6-32 Machine Screw 3/4-Inch	Hollow Wall Anchor or Toggle Bolts	Plastic Screw Anchor	No. 8-15 By 1 Inch Flat Head Tapping Screw Type AB (Note 2)
63A Bracket, Device Box, Plaster Ring	X			
Stucco or Plaster on Wood Lath				X
Plaster on Metal Lath, Paneling on Furring Strips, or Plaster- board on Studs		*		X
Hollow Masonry		X		
Solid Masonry			X	X

* Alternate Fasteners

NOTES:

1. If jack is not securely fastened to the wall with the recommended number of fasteners, additional fasteners should be used.
2. Or other available screw of equivalent (or greater) size, and thread engagement.

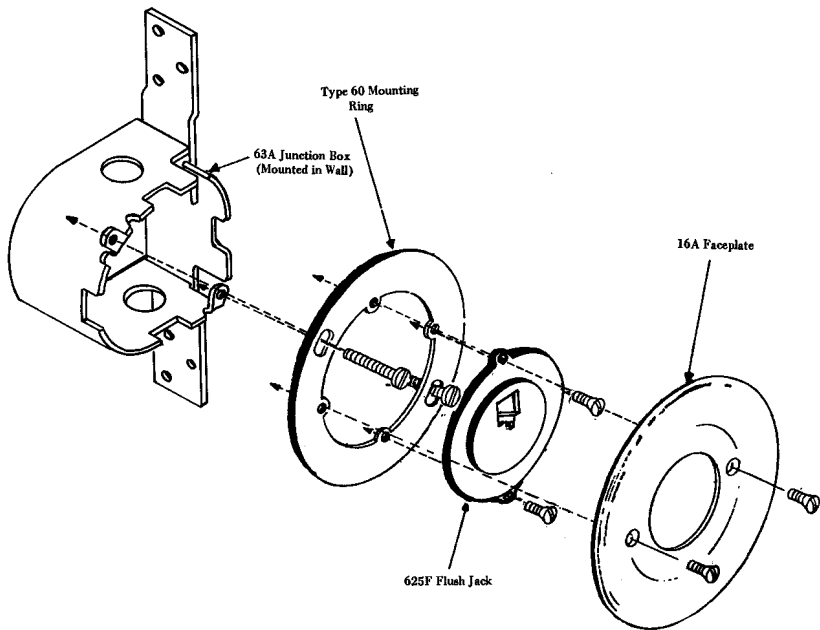


FIGURE 16. Installation of 625F Jack Using 63A Junction Box, 60 Ring and 16A Faceplate

d. Install the wall telephone mounting cover using the screws provided. See Figure 17.

3.04 If no outlet box is provided, the 630A can be mounted on a spacer (CSS No. 30-97-240-0). Provision is made in the spacer for entry of concealed wiring through the back or for surface wiring through the bottom. Install as follows:

a. Using the spacer as a template, drill

the required mounting holes.

b. Route the inside wire through the spacer and through one of the holes in the jack.

c. Align the jack with the spacer and fasten both to the wall using four screws (not provided).

d. Connect the wires to the appropriate terminals.

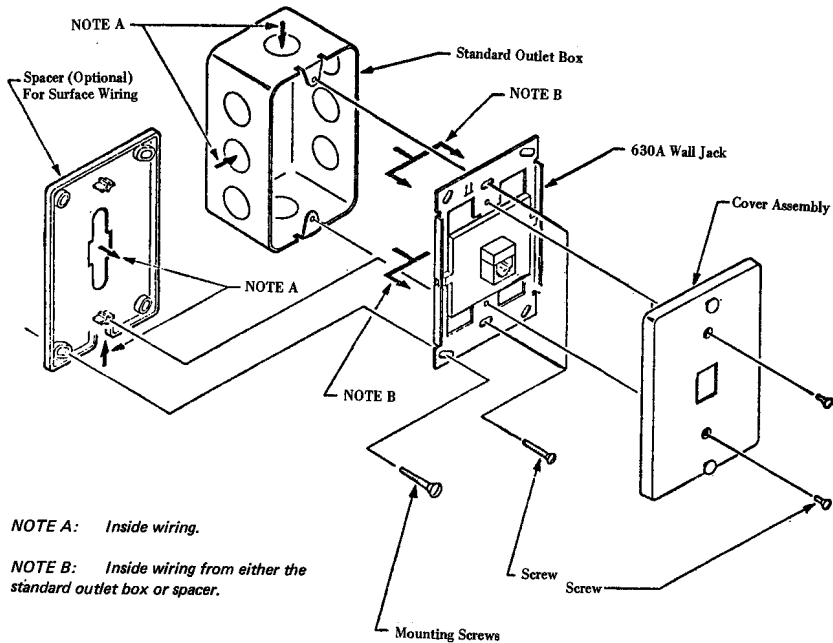


FIGURE 17. 630A Miniature Wall Jack

e. Install the cover plate using the two screws provided. See Figure 17.

NOTE: Care must be taken when mounting this wall jack to allow sufficient space to mount the telephone set when locating the set adjacent to door frames or cupboards, above moldings or counter tops.

3.05 191B Backboard: This backboard is used to cover an unpainted or damaged area surrounding the wall telephone jack. The backboard fits around the cover plate of the wall jack and is fastened to the wall using self-adhesive tape. See Figure 18.

3.06 Installation of 228, 229 or 230 Wall Telephone Adapters: The 228A adapter is used with 554 and 3554 type wall telephones. The 229A adapter is used with the 2554 type miniwall telephone. The 230A adapter is used with Trendline type wall telephones. Install all adapters as follows:

- Remove the telephone set housing.
- Route the wiring from the adapter through the hole in the back of the set. See Figures 19 and 20.
- Fasten the adapter to the baseplate using the screws supplied.

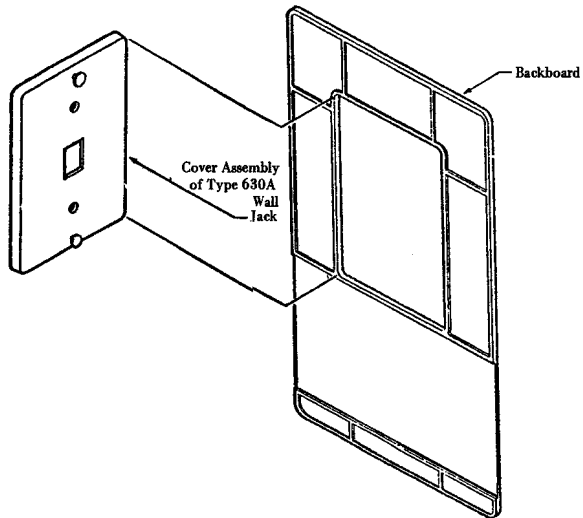


FIGURE 18. Backboard Installation Around a 630A Wall Jack

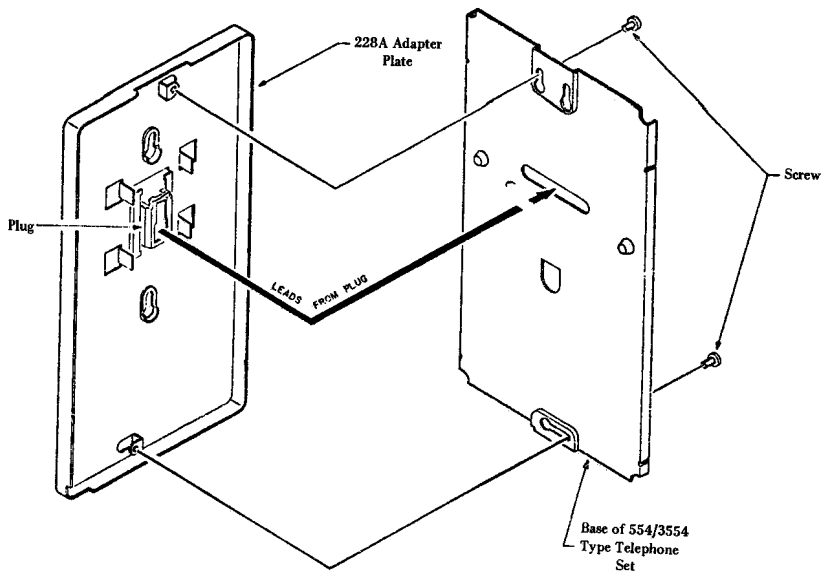


FIGURE 19. 228A Adapter Plate

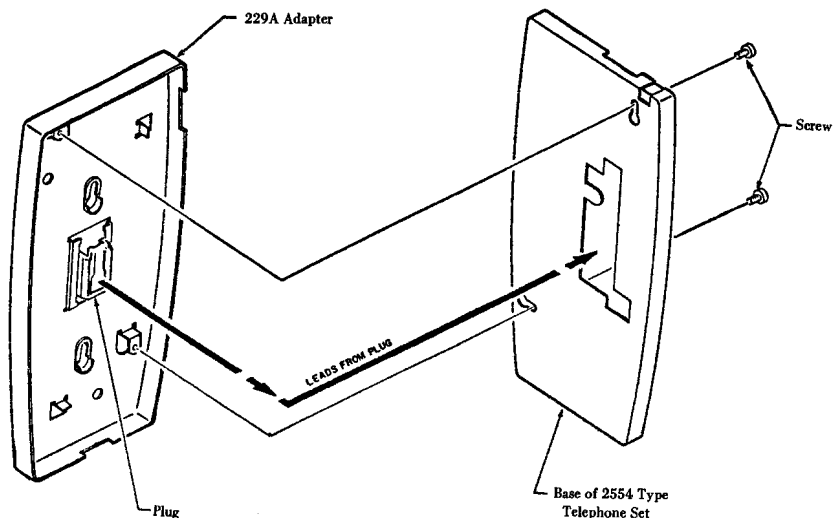


FIGURE 20. 229A Adapter Plate

d. Connect the adapter leads to the telephone as instructed in paragraph 4.

3.07 Installation of Adapter Equipped Wall Set Telephone:

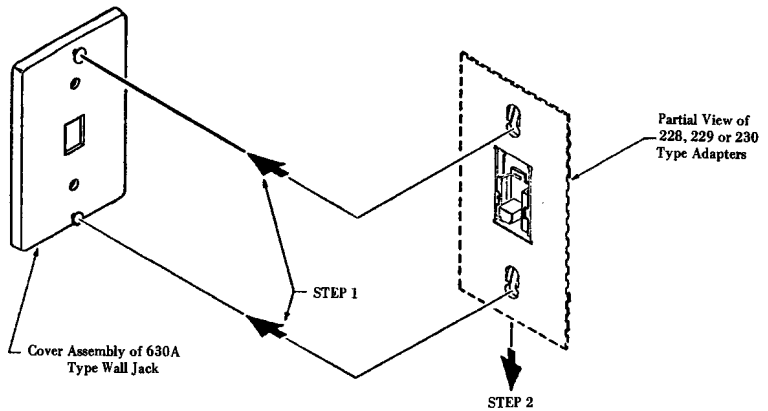
a. Move the adapter plug down as far as it will go toward the bottom of the telephone.

b. Align the plug with the jack and the

keyholed slots with the studs on the adapter.

c. Raise the telephone with plug slightly engaged and push toward wall to engage studs in corresponding slots of wall telephone adapter.

d. Pull set downward until firmly seated. See Figures 21 and 22.



NOTES:

1. *Begin with slight engagement of plug in receptacle.*
2. *Raise set (with plug slightly engaged) and push toward wall to engage studs in corresponding slots of wall set adapter. (The plug will slide up and down in the back of the wall set.)*
3. *Pull set downward until firmly seated.*

FIGURE 21. Mounting Wall Set With Adapter on 230A Wall Jack

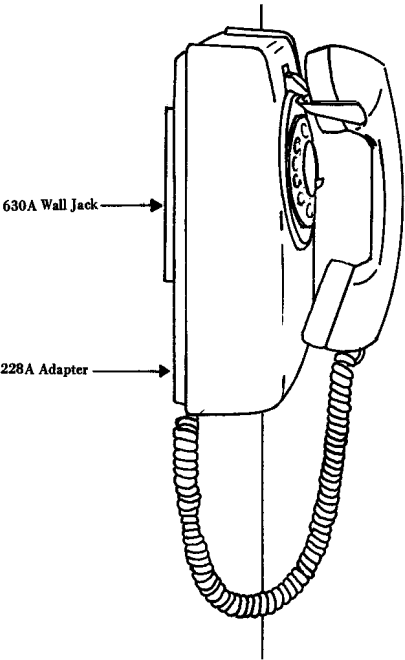


FIGURE 22. 554 Wall Telephone Mounted on 630A Wall Jack

4. CONNECTION OF MODULAR EQUIPMENT

the same manner to be compatible with all modular telephones. Connect as shown in Table B.

4.01 All modular equipment must be wired in ,

TABLE B. Modular Jack Connections

INSIDE WIRE					CONNECTING BLOCK	
ONE-LINE SERVICE			TWO-LINE SERVICE	WIRE OR LEAD COLOR	TERMINAL	
NO DIAL LIGHT	DIAL LIGHT	1A1, 1A2 KTS			625-TYPE	630A4
Tip	Tip	Tip	Line 1 (T)	Green	G	T
Ring	Ring	Ring	Line 1 (R)	Red	R	R
	TRNSF	A	Line 2 (T)	Black	B	Aux
Ground*	TRNSF	A1	Line 2 (R)	Yellow	Y	Ground

*Supply ground for all one-line installations