BASIC INSTALLATION AND KEY TELEPHONE SYSTEM MANUAL

Performance Development Center ITT

BASIC INSTALLATION
AND
KEY TELEPHONE SYSTEM
MANUAL

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CONTENTS SECTION

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1. INTRODUCTION

Purpose of Manual

1.01 The purpose of this manual is to provide installation and maintenance personnel a technical reference relating to the general installation and maintenance of station apparatus and key service equipment. This manual includes information on special tools; standard and special station wire, cable, and hook-up wire; wiring diagrams and descriptions of various types of ITT station instruments, replacement parts and auxiliary devices; and MDF and IDF organization and arrangement.

1.02 The information in this manual is general in nature and relates primarily to those tasks (equipment mounting, wiring, cabling, etc.) common to the installation of most single line telephones and key system instruments. More detailed information on installation, maintenance, and modification of key system equipment and individual PABX systems will be found in other manuals and in the applicable manufacturer's documents and drawings.

2. SPECIAL TOOLS

CONTENTS PAGE

2.01 Some of the special tools in the installer's A-1 tool kit are described in this section. Instructions for using the tools are included.

Connecting Tool

2.02 The 714 automatic impact connecting tool is shown in figure 2.00. This tool is used to make wire terminations on "type 66" connecting blocks and similar "quick-connect" terminal blocks. The tool comes equipped with a replaceable blade. The blade can be reversed in its mounting so that the tool can be used to terminate and cut a wire, or to terminate a wire without cutting it so that the wire can be looped to another terminal.

FIGURE 2.00 Type 714 Automatic Impact Connecting Tool

2.03 To terminate and cut a wire,

a. Place the wire in the fanning strip and loop it over the hook in the terminal.

b. Place the connecting tool on the terminal with the cutting edge of the blade up or down depending on the location of the wire to be cut off. See figure 2.01.

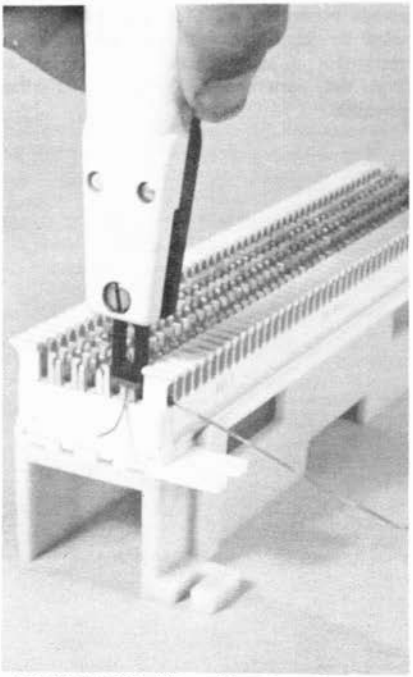


FIGURE 2.01 "Punching Down" Wire

c. Push the tool against the terminal until it cuts off the excess wire.

NOTE: On some tools, the force of of impact is controlled by an adjustment screw in the handle of the tool. It can be adjusted to compensate for too little or too much pressure. A pointer at the large end of the handle indicates the amount of pressure applied.

2.04 To terminate a wire without cutting it,

a. Loosen the screw in the small end of the connecting tool, rotate the blade to expose the opposite end, then retighten the screw. See figure 2.02.

b. Place the wire in the fanning strip and loop it over the hook in the terminal

c. Place the connecting tool on the terminal.

d. Push the tool against the terminal. The connecting tool will automatically trigger, resulting in a precise termination.

Push Drill

2.05 The Push Drill is shown in figure 2.03. It is an automatic push drill and comes equipped with bits capable of drilling wood or light metal. The handle is a holder for 10 bits.

To insert a bit, proceed as follows:

a. Loosen the magazine locking nut, remove the bit and close and secure the magazine.

b. Slide the chuck sleeve forward and insert the bit; release the chuck to the normal position.

c. The drill is now ready for use. The drill being pushed will create a rotary action.

CAUTION: Keep both hands behind the drill point during operation. Don't hold any equipment in your hands during operation.

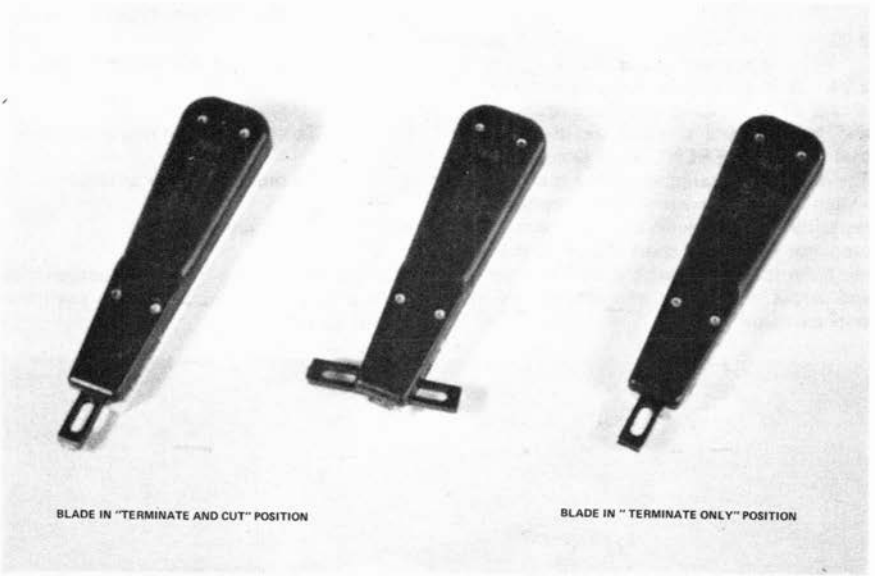


FIGURE 2.02 Changing The Cutting Blade

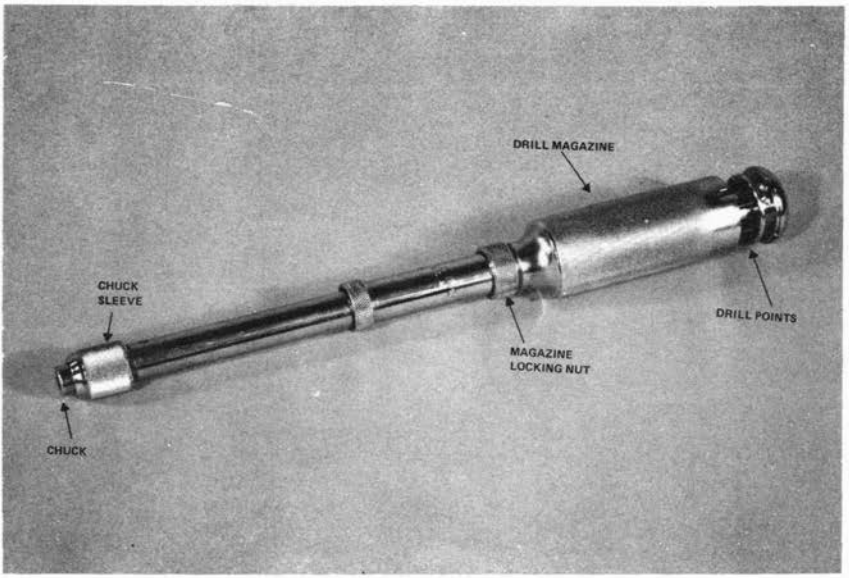


FIGURE 2.03 Push Drill

Installer's Test Set

2.06 The installer's test set or hand test telephone is shown in figure 2.04. It is a portable, hand-held unit consisting of a standard telephone transmitter and receiver, and a miniature dial such as that used in a TRENDLINE telephone set. The test set is equipped with a rocker type switch (monitor switch) which connects a capacitor in series with the line cords. The capacitor prevents a short circuit in the test set from interfering with a call in progress and allows monitoring of a line before any tests are made.

2.07 The hand test telephone is used for the following types of tests:

a. To test for a grounded, open, or short circuit.

b. To check tip and ring lead polarity.

c. To monitor a busy or idle line.

d. To initiate a test call.

The test set can also be used in conjunction with a tone generator to trace a particular pair of wires.

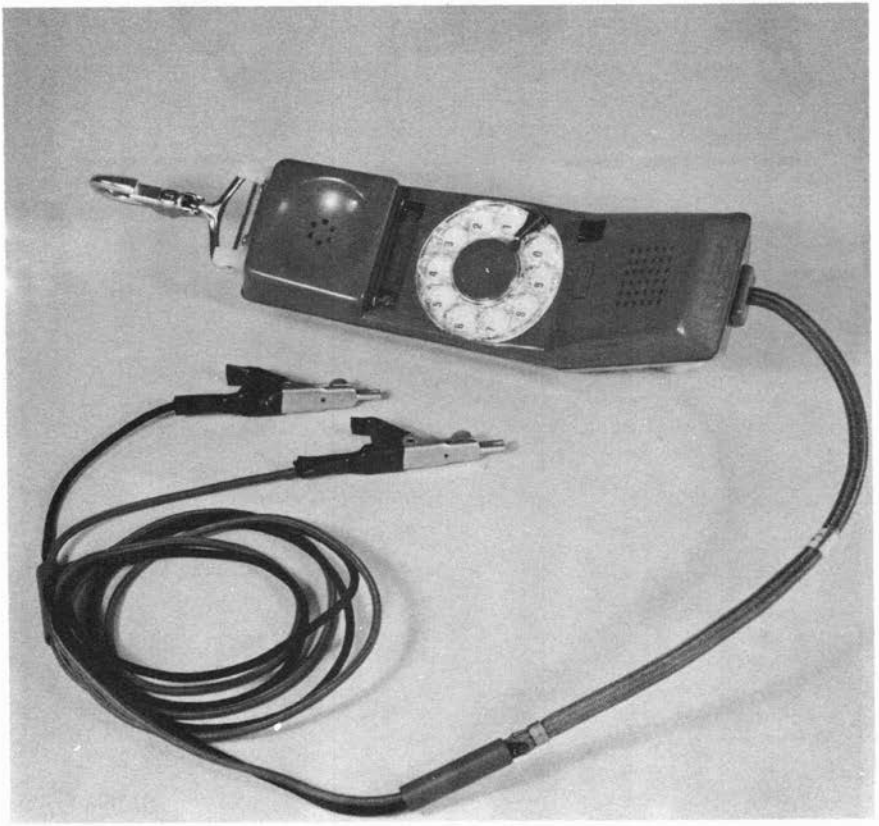


FIGURE 2.04 Installer's Test Set

2.08 Use the installer's test set as follows:

a. Tip and Ring lead identification. To identify the tip or ring side of a line, turn the monitor switch off and connect one of the test leads to ground. Then, listen to the test set receiver and momentarily touch the other test lead to the first connecting block terminal and then to the second connecting block terminal. The terminal touched when the loudest "click" is heard, is the ring side of the line. The ring terminal should be the right hand terminal on a horizontal block or the lower terminal on a vertical block.

b. Grounded circuit test. To test for a grounded circuit, open both sides of the line at the connecting block terminal and connect one test lead to a known source of battery such as the ring side of a working line. While listening to the test receiver, momentarily touch the other test lead first to one line lead and then to the other. If a "click" is heard on either wire, a ground is present.

c. Short circuit test. To test for a short circuit, open one side of the line only, and connect one test clip to the terminal from which the wire was removed. While listening to the test receiver, momentarily touch the other test clip to the loose wire. If a "click" is heard, a short circuit is indicated.

d. Open circuit test. To test for an open circuit, connect the test clips across the terminal lugs at various connecting blocks on which the line appears, while listening to the receiver. The open circuit is indicated when a "click" is heard at one set of terminals and nothing is heard at the next test point.

e. Crossed battery test. To test for crossed battery, open both sides of the line at the connecting block and connect one test clip to a known ground. While listening to the test receiver, momentarily touch the other test clip to one line lead and then to the other. If a "click" is heard, it is an indication that a foreign source of battery is present.

Type 140A Test Set

2.09 The model 140A test set is a battery operated, tone generator used to perform continuity tests and to locate broken wires or open pairs. It is powered by a 9 volt battery such as a 216 Eveready, VS323 RCA, or a 006P import. The test set generates two distinct audio signals; an alternating 500/1000 Hz tone or a continous 1000 Hz tone. The test set is shown in figure 2.05.

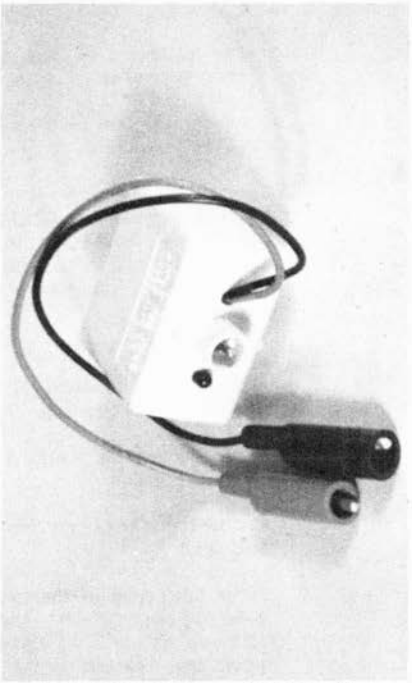


FIGURE 2.05 Type 140A Test Set

2.10 An external switch on the unit permits the user to turn the test set on or off and to arrange it for a tone output or for continuity testing. An internal switch permits operation as a continous or alternating tone source.

2.11 Procedures for using the 140A test set are outlined in the following paragraphs.

a. Locating broken pairs. To locate a broken pair,

1. Place the external switch in the TONE position.
2. Connect the red and black test leads to the pair.
3. Use the installer's test set to probe for the pair with tone present.

b. Continuity testing. To test a circuit for an open or short,

1. Place the external switch in the CONT position.
2. Connect the test set leads to the desired leads. The LED on the test set lights to indicate a short, it remains extinguished to indicate an open.

c. Tip and ring identification. To identify the ring side of a line,

1. Place the external switch in the OFF position.
2. Connect the black test lead to ground.
3. Probe both sides of the line with the red test clip. The LED on the test set lights when the red clip is connected to the ring lead.

NOTES:

1. Test c will only work when 48 volt battery is on the line.
2. If no ground is available, connect both leads to the wire pair. If indicator does not light, reverse the leads.

d. Line verification. The test set can be used as follows for line verification.

1. Make a call to the line to be tested. Do not answer the call.
2. When the line is ringing, connect the red test set lead to the ring side of the line, connect the black test lead to the tip side of the line. The LED on the test set will light each time ringing current is applied to the line.
3. To positively identify the line, move the test set switch from the OFF position to the CONT position, to trip the ring. If ringing ceases, the line is positively identified.

Staplers

2.12 Two types of staplers are commonly used for installation work; they are the T-25 and the T-75 staplers, shown in figure 2.06. They are used to attach station wire or cable to wood surfaces.

a. T-25 Stapler. The T-25 stapler is used to fasten 4 conductor station wire. It uses 1/4 inch wide staples 3/8 inches or 7/16 inches long.

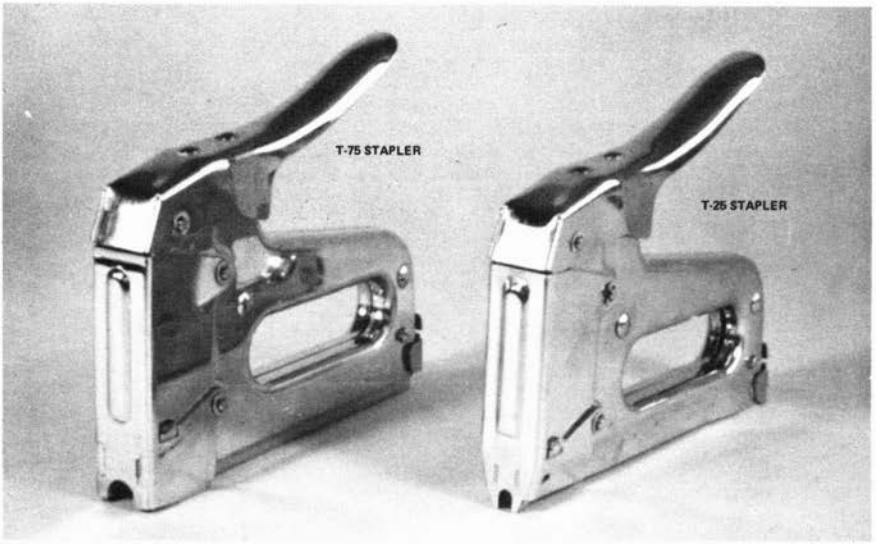
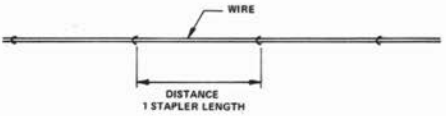


FIGURE 2.06 Staplers

b. T-75 Stapler. The T-75 stapler is used to fasten station cable. It uses 1/2 inch wide staples, 5/8 or 7/8 inches long.

NOTE: When fastening station wire or cable, staples should be placed the length of the stapler (about 7 inches) apart. See figure 2.07.



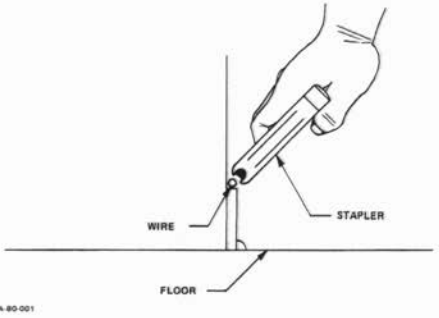


FIGURE 2.07 Using The Stapler

3. CABLE AND WIRING

CONTENTS PAGE

3.01 Some useful cable and wire information is provided in the following paragraphs. Types of cable and wire are described, and cable and wire color codes and ordering information are provided.

Definitions

3.02 The following definitions apply to the use of various types of cable and wire.

a. Feeder - A feeder cable is a large cable leaving a central office to serve a PABX or key system.

b. Riser - A riser cable is one which runs in a vertical direction in a large building or on a pole.

c. Station cable - The term station cable refers to the cable which extends from a wall outlet, connecting block, etc. to a multiline telephone set.

d. Station wire - The term station wire refers to the wire which extends from a wall outlet, connecting block, etc. to a single line telephone set.

e. Plug ended cable - A plug ended cable is one having a male connector attached to one end.

f. Connector-ended cable - A connector-ended cable is one having a female connector attached to one end.

Color Codes

3.03 Color codes for commonly used types of station wire, hook up wire, and inside cable are given in tables 3.00 through 3.03.

TABLE 3.00 Station Wire

TYPE	CIRCUIT NO.	TIP	RING
4 Conductor	1	Green	Red
	2	Black	Yellow

TABLE 3.01 Cross-Connecting Wire (Tinned)

TYPE	CIRCUIT NO.	TIP	RING
Single Conductor		Orange	
1 Pair	1	White	Blue
3 Pair	1	W-BL	BL-W
	2	W-O	O-W
	3	W-GN	GN-W

TABLE 3.02 Inside Wire Cable

TYPE	CIRCUIT NO.	TIP	RING
6 Pair	1	W-BL	BL-W
	2	W-O	O-W
	3	W-GN	GN-W
	4	W-BN	BN-W
	5	W-SL	SL-W
	6	R-BL	BL-R
8 Pair	1	W-BL	BL-W
	2	W-O	O-W
	3	W-GN	GN-W
	4	W-BN	BN-W
	5	W-SL	SL-W
	6	R-BL	BL-R
	7	R-O	O-R
	8	R-GN	GN-R
12 Pair	1	W-BL	BL-W
	2	W-O	O-W
	3	W-GN	GN-W
	4	W-BN	BN-W
	5	W-SL	SL-W
	6	R-BL	BL-R
	7	R-O	O-R
	8	R-GN	GN-R
	9	R-BN	BN-R
	10	R-SL	SL-R
	11	BK-BL	BL-BK
	12	BK-O	O-BK

TABLE 3.03 Inside Wire Cable

TYPE	CIRCUIT NO.	TIP	RING	BINDER
25 Pair	1	W-BL	BL-W	
	2	W-O	O-W	
	3	W-GN	GN-W	
	4	W-BN	BN-W	
	5	W-SL	SL-W	
	6	R-BL	BL-R	
	7	R-O	O-R	
	8	R-GN	GN-R	
	9	R-BN	BN-R	
	10	R-SL	SL-R	BL-W
	11	BK-BL	BL-BK	
	12	BK-O	O-BK	
	13	BK-GN	GN-BK	
	14	BK-BN	BN-BK	
	15	BK-SL	SL-BK	
	16	Y-BL	BL-Y	
	17	Y-O	O-Y	

TABLE 3.03 Inside Wire Cable (Cont.)

TYPE	CIRCUIT NO.	TIP	RING	BINDER
	18	Y-GN	GN-Y	
	19	Y-BN	BN-Y	
	20	Y-SL	SL-Y	
	21	V-BL	BL-V	BL-W
	22	V-O	O-V	
	23	V-GN	GN-V	
	24	V-BN	BN-V	
	25	V-SL	SL-V	
50 Pair	-26-50	Repeat first 25 colors		O-W
75 Pair	-51-75	Repeat first 25 colors		GN-W
100 Pair	-75-100	Repeat first 25 colors		BN-W

Ordering Information

3.04 Table 3.04 provides ordering information for commonly used cable and wire.

TABLE 3.04 Cable and Wire Ordering Information

STOCK NUMBER	DESCRIPTION
*	Single Tinned Wire
31163-00	1-Pair Cross-Connect Wire
31213-00	3-Pair Cross-Connect Wire
31165-00	2-Pair Station Wire
31001-00	6-Pair Inside Cable
*	8-Pair Inside Cable
31004-00	12-Pair Inside Cable
31005-00	25-Pair Inside Cable
31006-00	50-Pair Inside Cable
31007-00	75-Pair Inside Cable
31008-00	100-Pair Inside Cable

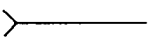
*Denotes no stock number, item not stocked.

Connectorized Cable

3.05 25 pair cable:

a. A cable with a female connector on one end is identified by a number such as A25 x 100, where "A" indicates a female connector, 25 denotes the number of pairs, and 100 indicates the cable length in feet. Table 3.05 lists stock numbers for such cables and shows the cable symbol.

TABLE 3.05 25 Pair Cables With One Female Connector

SYMBOL 

CODE	STOCK NO.
A25 x 15	31020
A25 x 25	31021
A25 x 50	31023
A25 x 75	31024
A25 x 100	31025
A25 x 125	31026
A25 x 150	31027
A25 x 175	31028
A25 x 200	31029
A25 x 250	31031

b. A cable with a female connector on both ends is identified by a number such as A25A50, where the first "A" indicates a female connector, 25 denotes 25 pair, the second "A" indicates a female connector, and 50 indicates the cable length in feet. Table 3.06 lists stock numbers for such cables and shows the cable symbol.

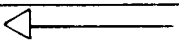
TABLE 3.06 25 Pair Cables With Two Female Connectors

SYMBOL 

CODE	STOCK NO.
A25 A50	31262
A25 A100	31263
A25 A200	31286

c. A cable with a male connector on one end is identified by a number such as B25 x 100, where "B" indicates a male connector, 25 denotes 25 pair and 100 indicates the cable length in feet. Table 3.07 lists the stock numbers for such cables and shows the cable symbol.

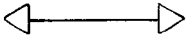
TABLE 3.07 25 Pair Cables with 1 Male Connector

SYMBOL 

CODE	STOCK NO.
B25 x 25	31062
B25 x 50	31063
B25 x 100	31065
B25 x 150	31067
B25 x 200	31296

d. A cable with a male connector on both ends is identified by a number such as B25B50, where the first "B" indicates a male connector, 25 denotes 25 pair, the second "B" indicates a male connector and 50 denotes the cable length in feet. Table 3.08 lists the stock numbers for such cables and shows the cable symbol.

TABLE 3.08 25 Pair Cables With 2 Male Connectors

SYMBOL 

CODE	STOCK NO.
B25 B25	31264
B25 B50	31265
B25 B100	31266

e. A cable with a male connector on one end and female on the other end is identified by a number such as A25B25, where "A" indicates a female connector, 25 denotes 25 pair, "B" indicates a male connector, and 25 denotes the cable length in feet. Table 3.09 lists the stock numbers for such cables and shows the cable symbol.

TABLE 3.09 25 Pair Cables With 1 Male and 1 Female Connector

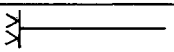
SYMBOL 

CODE	STOCK NO.
A25 B25	31106
A25 B50	31108
A25 B75	31109
A25 B100	31110
A25 B150	31112
A25 B175	31113
A25 B200	31114

3.06 50 pair cables.

a. A cable with two female connectors on one end is identified by a number such as A50 x 25 where "A" indicates a female connector, 50 denotes the number of pairs, and 25 indicates the cable length in feet. Table 3.10 lists the stock numbers for such cables and shows the cable symbol.

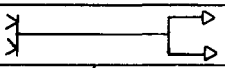
TABLE 3.10 50 Pair Cables With 2 Female Connectors

SYMBOL 

CODE	STOCK NO.
A50 x 25	31034
A50 x 50	31035
A50 x 75	31036
A50 x 100	31037
A50 x 200	31041

b. A cable with two female connectors on one end and two male connectors on the other end is identified by a number such as A50 B250. Table 3.11 lists stock numbers for such cables and shows the cable symbol.

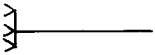
TABLE 3.11 50 Pair Cables With 2 Female and 2 Male Connectors

SYMBOL 

CODE	STOCK NO.
A50 B25	31271
A50 B50	31240
A50 B250	31237

3.07 75 pair cables: A cable with three female connectors on one end is identified by a number such as A75 x 50. Table 3.12 lists stock numbers for such cables and shows the cable symbol.

TABLE 3.12 75 Pair Cables With 3 Female Connectors

SYMBOL 

CODE	STOCK NO.
A75 x 25	31044
A75 x 50	31045
A75 x 75	31046
A75 x 100	31047
A75 x 150	31049
A75 x 200	31051

3.08 100 pair cables: A cable with 5 female connectors at one end is identified by a number such as A100 x 100. Table 3.13 lists stock numbers for such cables and shows the cable symbol.

TABLE 3.13 100 Pair Cables With 5 Female Connectors

SYMBOL 

CODE	STOCK NO.
A100 x 100	31233
A100 x 200	31234

4. AMP* 50 PIN INSERTION TOOL

4.01 The AMP model 229378-1 50 pin wire insertion tool is shown in figure 4.00. This device is used to insert the wires from a standard 25 pair (50 conductor) cable into a 50 pin AMP type cable connector. It can be used to connect either a male or female connector to a 25 pair cable.

Using the AMP Tool

4.02 Instructions for making standard cable connections using the AMP insertion tool are provided in the following paragraphs.

a. Place the AMP insertion tool on a flat surface with the color bar guide assemblies facing toward you. Open the handles so that they are parallel to the table surface. Unlatch the block holder and allow the left and right hand wire holders to fall away from the block holder. Pivot the block holder toward you and let it rest on the table. The insertion tool is now ready for use.

NOTE: Refer to figure 4.00 for names and locations of the various parts of the insertion tool.

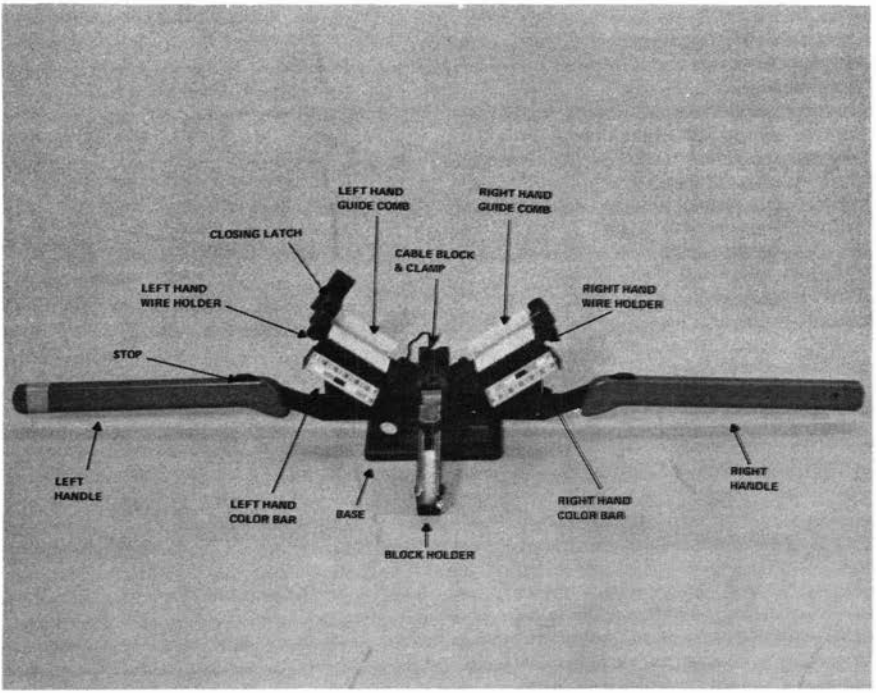


FIGURE 4.00 AMP 50-Position Insertion Tool

*TRADEMARK OF AMP INCORPORATED

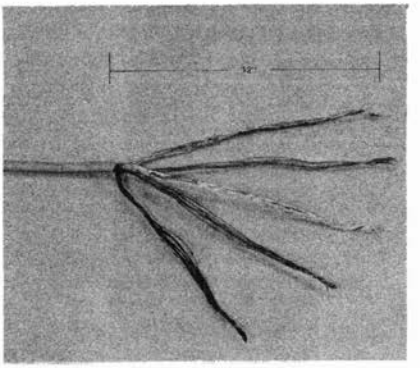


FIGURE 4.01 Preparation of Cable

b. Strip about 12 inches of sheath from the end of the cable. Then, fan the wires into 5 color groups; white, red, black, yellow, and violet. Twist the ends of the wires in each group together. See figure 4.01.

c. Open the cable clamp at the rear of the tool and lay the cable in the groove on the block. As shown in figure 4.02, position the cable so the sheath extends about ½ inch beyond the leading edge of the block, with the exposed wires extending toward you. Turn the cable so that the proper color group is on the bottom, nearest the block. For a male connector, the white color group should be on the bottom; for a female connector, the violet color group should be on the bottom. When the cable is in place, secure the cable clamp.

d. Rotate the left and right color bar guides to agree with the type of connector (male or female) to be attached to the cable.

e. Insert the cable connector into the block holder. Push the connector in firmly until it is fully bottomed. Make certain the cable side of the connector is up, and the connector terminals closest to the color bar guides correspond to the innermost numbers on the guides. (I.e., if a female connector is used, terminals 25 and 50 should be closest to the color bar guides; if a male connector is used, terminals 1 and 26 should be closest to the guides.) Refer to figure 4.03.

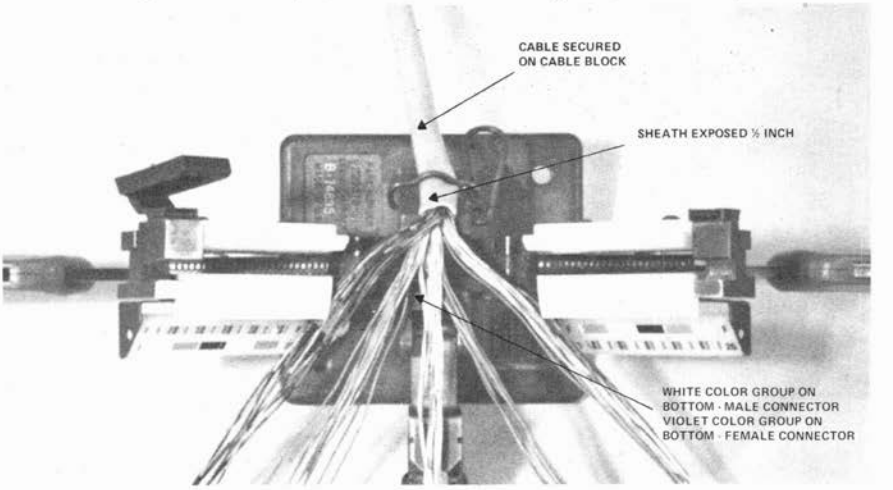


FIGURE 4.02 Placement of Cable in Tool

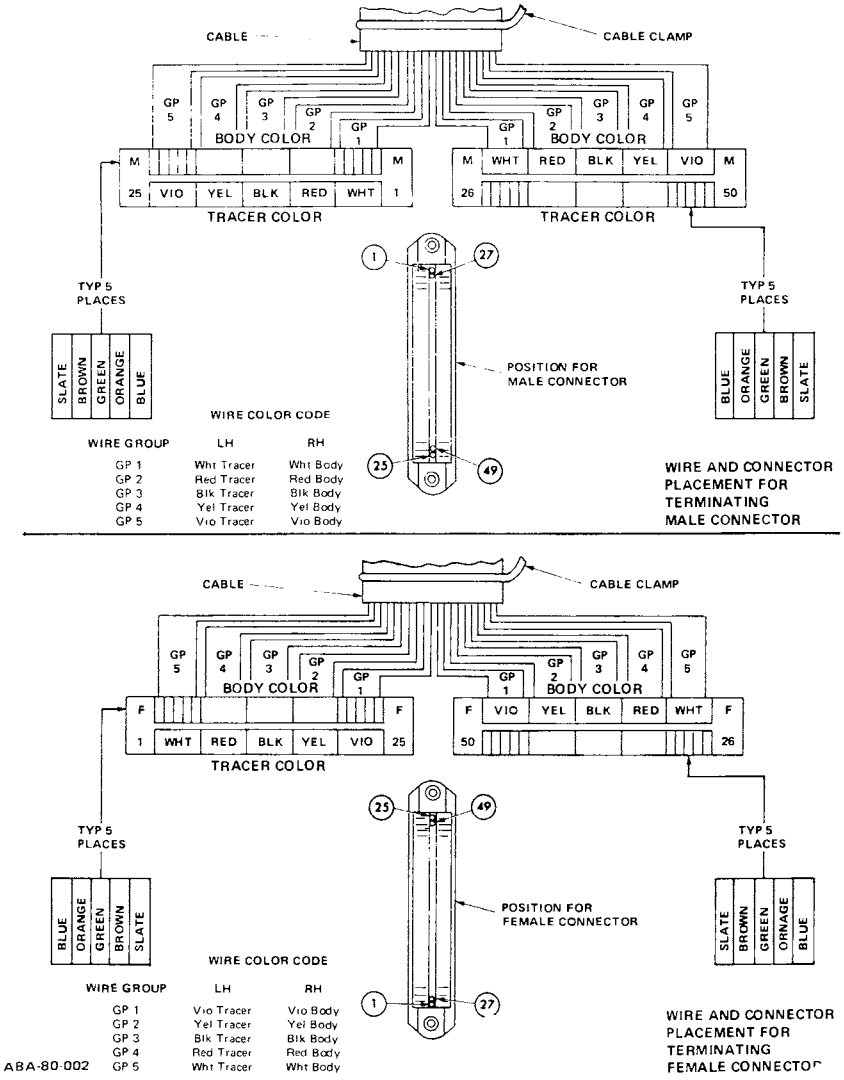


FIGURE 4.03 Wiring of Male and Female Connectors

f. Referring to the color code on the color bar guides, select the first group (white for male connector/ violet for female connector) to be inserted in the guide combs. Bend the remaining four groups back to keep them out of the way.

g. Untwist the wires in the first group to separate the pairs. Leave each pair twisted together to simplify identification. Select the first wire pair (white-blue/blue-white or violet-slate/slate-violet) and separate the wires. Insert the wire with the selected body color (white or violet) in the far left position of the combs on the right. Insert the wire with the tracer color in the far right position of the combs on the left. Pull each wire tight and fold the end forward over the color bar guide. Repeat this procedure for each pair in the first color group. Refer to figure 4.03 for the proper color code sequence.

h. Repeat step g for each color group of wires.

i. Make a final check to see that all wires are properly seated in the guide combs and that the wires are in the proper slots. Check the wires against the color code shown on the color bar guides.

j. Raise the block holder to the vertical position, then raise the left and right hand comb assemblies and latch the block holder. See figure 4.04.

k. Starting at the bottom on either the left or right side, pull each wire tight to eliminate any slack between the butt end of the cable and the cable connector. This will make it easier to later slip the cable cover over the connector. Pull the wires tight at each side of the tool.

l. From each side of the insertion tool, visually check the wires between the inner and outer combs. Make certain all wires are tight and in place.

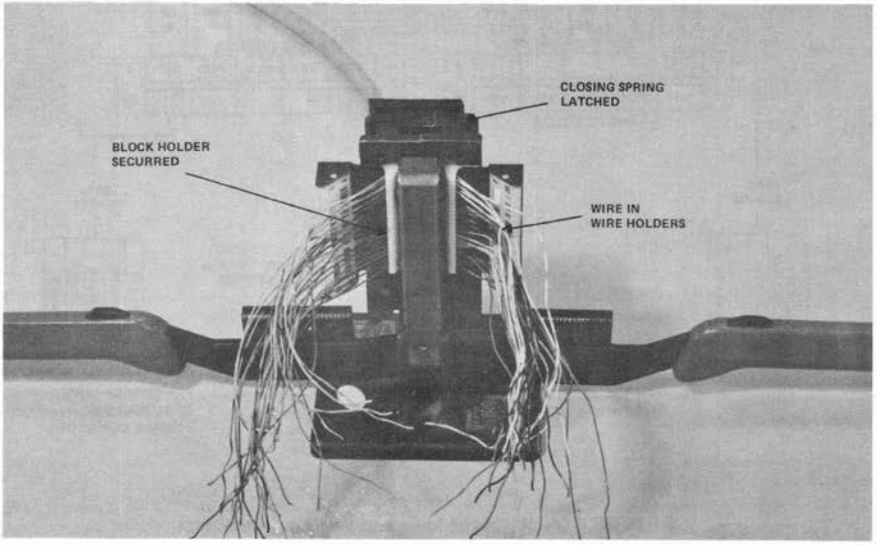


FIGURE 4.04 Tool Closed and Ready To Terminate Wire

m. Raise the handles to the vertical position until the inserters and stuffers enter the wire holders. See figure 4.05. Squeeze the the handles firmly together to insert the wires and to cut off the exposed ends. At this point the protruding wire ends should fall away from the tool. If the wire ends do not fall free, squeeze the handles again.

n. Open the handles, unlatch the block holders and allow the wire holders to fall away. Release the cable clamp and slide the connector upward out of the block.

o. Inspect the connector to see that each wire is properly terminated, then slip the cover over the connector until the screw hole in the cover lines up with the hole in the connector. Loosely insert and fasten the screw.

p. Place the cable clamp over the butt end of the cable. Lock it into place by firmly squeezing it. Finger pressure should be sufficient to snap the clamp into place.

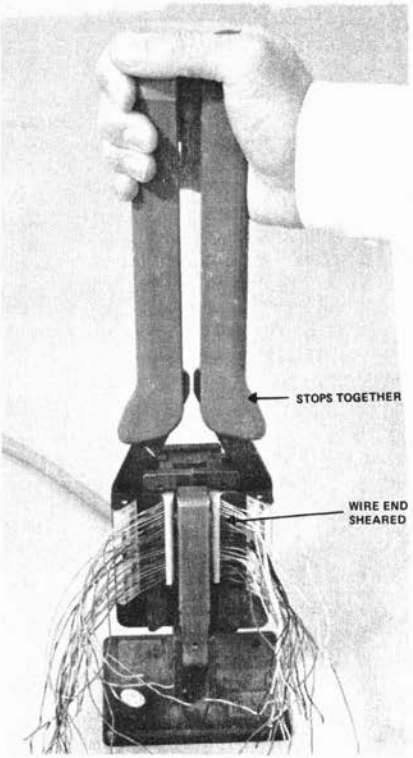


FIGURE 4.05 Handles Squeezed Together

5. CONNECTING BLOCKS AND MOUNTING HARDWARE

CONTENTS PAGE

5.01 Commonly used connecting blocks and their associated mounting hardware are described in the following paragraphs. Ordering information is provided in table 5.00.

TABLE 5.00 Connecting Block Ordering Information

CODE	DESCRIPTION	STOCK NO.
66B3-50	50-Pair Connecting Block	51004
66B4-25	25-Pair Connecting Block	51006
66M1-50	50-Pair Miniature Connecting Block	51013
66M1-25	25-Pair Miniature Connecting Block	51014
66E3-25	25-Pair Connecting Block	51019
42A	Connecting Block	51015
H3B5-HO	Standoff	91227
89B	Mounting Bracket	90810

Type 66B Connecting Block

5.02 The type 66B connecting block is a molded plastic terminal block equipped with horizontal rows of quick connect terminals. Blocks of this type are used in PABX and key system installations to terminate and cross-connect station, line, trunk and miscellaneous cables. Two variations of the type 66B block are shown in figure 5.00.

a. Type 66B3-50 block. The type 66B3-50 connecting block measures approximately 2-7/8 inches wide and 13-3/8 inches long. It consists of 50 horizontal rows of terminals, with each row split into two groups of 3 terminals. The terminals are arranged to form a 3 x 100 array. The block is used to terminate two 25 pair cables, one on either side.

b. Type 66B4-25 block. The type 66B4-25 connecting block is the same size as the 66B3-50 block. It consists of 50 horizontal rows of 6 terminals. The terminals form a 6 x 50 array. This block is used to terminate one 25 pair cable. The cable can be connected on either the right or left side.

Type 66M Connecting Block

5.03 The type 66M connecting block is a compact molded plastic terminal block assembly used to terminate line, trunk, and station cables in PABX and key system installations. It measures approximately 2¼ inches wide and 10 inches long. Two commonly used forms of the 66M block are the type 66M1-50 connecting block and the 66M1-25 connecting block.

a. Type 66M1-50 block. The type 66M1-50 connecting block consists of 50 split horizontal rows of quick connect terminals. Each horizontal row is split into 2 groups of 2 terminals. The block is arranged to terminate 50 wire pairs or 100 conductors.

b. Type 66M1-25. The type 66M1-25 connecting block consists of 50 horizontal rows of four terminals. It is arranged to terminate 25 pairs (50 conductors).

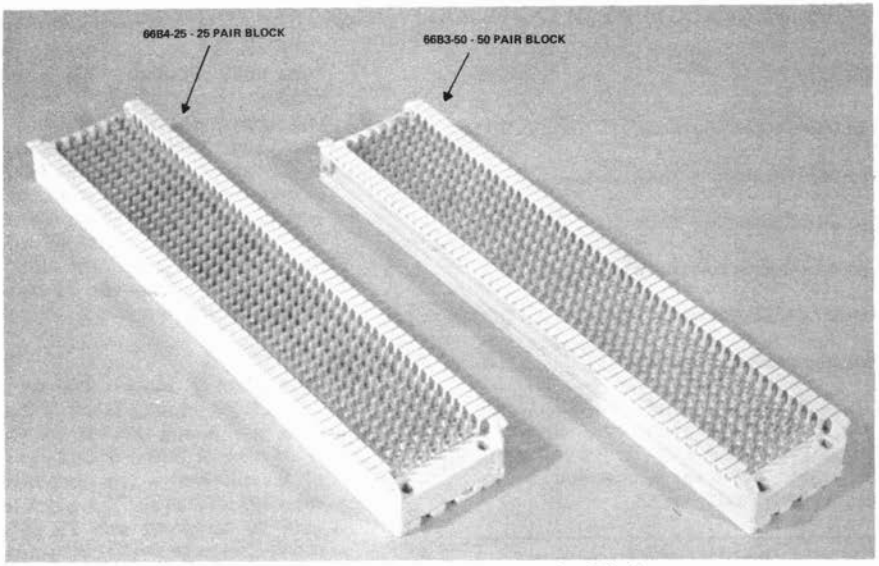


FIGURE 5.00 Type 66B Connecting Blocks

Type 66E Connecting Block

5.04 The type 66E connecting block is shown in figure 5.01. The block is for use in connecting a multi-line desk or wall-mounted telephone equipped with a plug-ended line cord. The basic block consists of a 50-pin female connector wired internally to 50 2-clip, quick-connect terminals. It includes a plastic base and a cover.

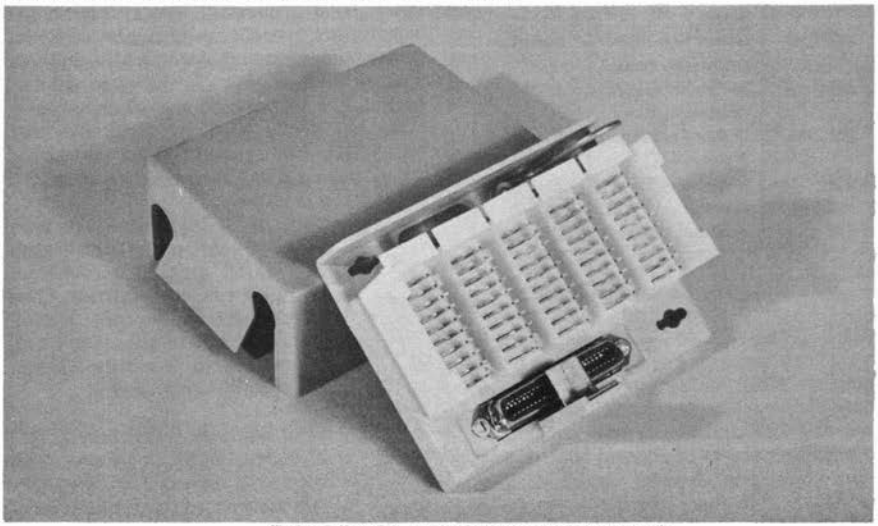


FIGURE 5.01 Type 66E Connecting Block

Type 42A Connecting Block

5.05 The type 42A connecting block (see figure 5.02) is used to connect the cord from a single line desk telephone to the 4-conductor station wire serving that telephone. It consists of a high impact molded plastic terminal block with 4 screw type terminals and a plastic cover which attaches to the block with one screw. Two holes are provided in the terminal block for securing it to the wall. The letters R, Y, G, and B adjacent to 4 screw terminals denote the color of the wire to be attached. I.e., R-red, Y-yellow, G-green, and B-black. Conductors in the station wire should be wrapped around the rear of the terminal block before connecting to the screw terminals.

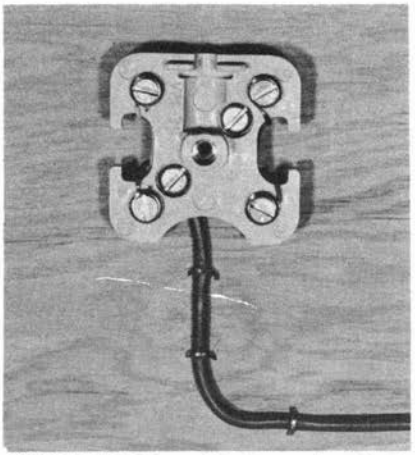


FIGURE 5.02 Type 42A Connecting Block

Standoff, H3B5-HO

5.06 The H3B5-HO standoff shown in figure 5.03 is used to mount type 66B connecting blocks. Three standoffs are required to mount each type 66B block. The connecting block attaches to the upper and lower standoffs; the center standoff is used only as a support. Two number 8 x 3/4 inch long screws are required to mount each standoff. Mounting instructions are provided in Section 20 of this manual.

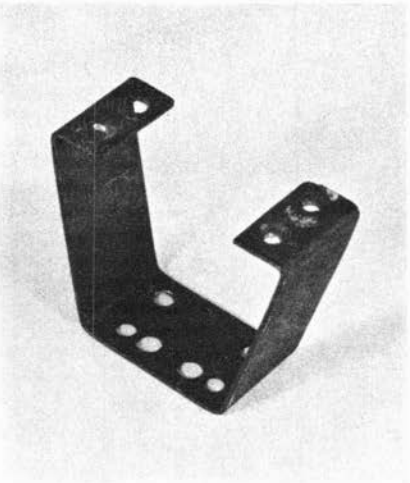


FIGURE 5.03 Type H3B5-H0 Standoff

Mounting Bracket, Type 89B

5.07 The type 89B mounting bracket is made of molded plastic. It is designed for mounting type 66M connecting blocks. Design of the bracket is such that the type 66M block can be easily snapped into place. As shown in figure 5.04, two slotted holes are provided for mounting the bracket.

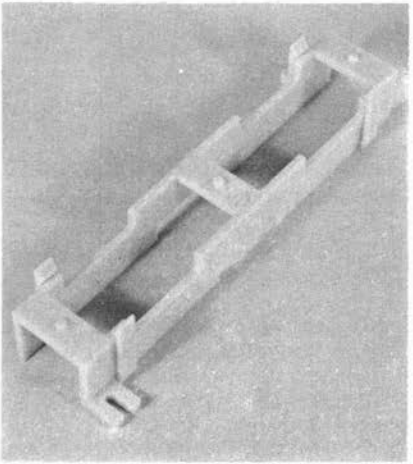


FIGURE 5.04 Type 89B Mounting Bracket

6. FASTENERS, CABLE CLAMPS, AND TIES

CONTENTS PAGE

6.01 This section describes various types of fasteners, cable clamps and ties.

Fasteners

6.02 Table 6.00 lists various types of fasteners and recommends the type of fasteners to be used with different types of wall construction. Some of the more commonly used types of fastening devices are shown in figure 6.00 and briefly described in the following paragraphs.

TABLE 6.00 Use of Various Types of Fasteners

	TYPE OF MATERIAL						
	CONCRETE	CEMENT BLOCK	MORTAR JOINTS	BRICK	STEEL	VITREOUS TILE	WOOD
RECOMMENDED TYPE FASTENERS				Expansion anchor with machine screw	Drill & Tap	Molly Bolt	Lag Screw
	Expansion anchor with machine screw	Expansion anchor with machine screw	Expansion anchor with machine screw			Toggle Bolt	Sheet Metal Screw
				Expansion shield with lag screw		Plastic expansion anchor with lag screw	Plastic expansion anchor with lag screw
	Expansion shield with lag screw	Expansion shield with lag screw Molly bolt Toggle bolt	Expansion shield with lag screw	Plastic expansion anchor with lag screw			

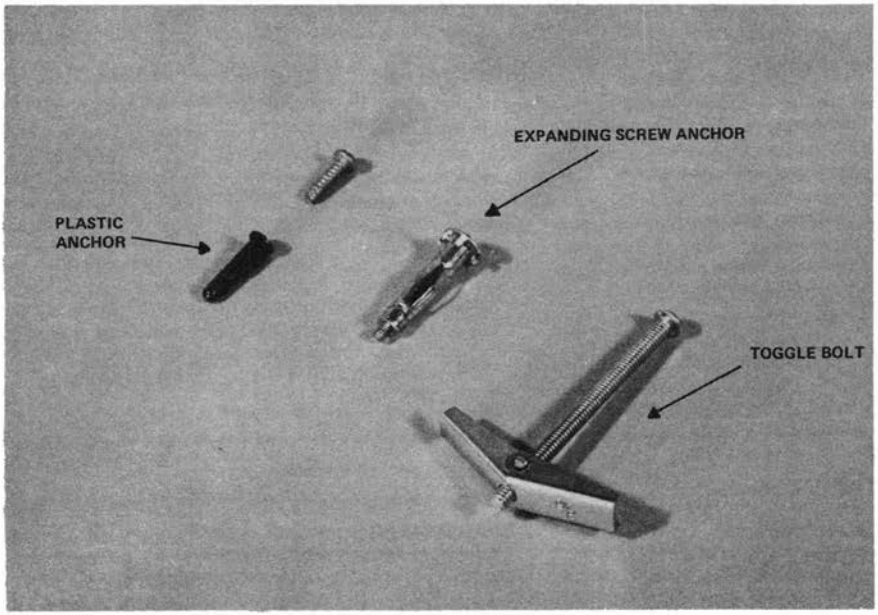


FIGURE 6.00 Fasteners

Expansion Anchors

6.03 Expansion anchors are suitable for use in concrete, brick, cement block and mortar joints. The diameter of the hole to be drilled for an expansion anchor is determined by the thread size of the machine screw to be inserted. See table 6.01.

TABLE 6.01 Expansion Anchor Holes

SCREW SIZE	HOLE SIZE REQUIRED
10 - 24	3/8"
1/4 - 20	1/2"
5/16 - 18	5/8"
3/8 - 16	3/4"
7/16 - 14	7/8"
1/2 - 13	7/8"
5/8 - 11	1"

Expansion Shields

6.04 Expansion shields are similar to anchors. Two types are generally available; the lag type for use with lag screws and the loxin type for use with machine screws. These are shown in figure 6.01.

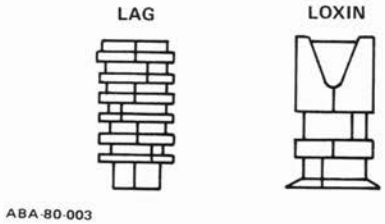


FIGURE 6.01 Expansion Shields

a. Lag screw anchors. Table 6.02 shows commonly used lag screw sizes, length of the expansion shield, and diameter of the hole to be drilled.

TABLE 6.02 Lag Screw Expansion Shields

SCREW DIAMETER	SHIELD LENGTH	HOLE SIZE REQUIRED
1/4"	1 - 1 1/2"	1/2"
5/16"	1 1/4 - 1 3/4"	1/2"
3/8"	1 3/4 - 2 1/4"	5/8"
7/16"	2 1/4"	5/8"
1/2"	2 - 3"	3/4"

b. Loxin expansion shields. Table 6.03 shows hole size and length of shield for two commonly used loxin expansion shields.

TABLE 6.03 Loxin Screw Expansion Shields

THREAD SIZE	SHIELD LENGTH	HOLE SIZE REQUIRED
1/4 - 20"	1 1/4"	1/2"
5/8 - 11"	3"	1"

Expanding Screw Anchors

6.05 Expanding screw anchors (see figure 6.00) are used to fasten equipment to thin walls made of plaster, tile, sheet rock, etc. Use should be limited to fairly light loads and to wall thickness of 1/8 inch to 1 1/4 inch. Table 6.04 gives the diameter of the hole to be drilled for screw anchors.

TABLE 6.04 Expanding Anchor Hole Sizes

SCREW SIZE	HOLE SIZE REQUIRED
#4	5/16"
#6	7/16"
#8	1/2"

Toggle Bolts

6.06 Toggle bolts are avilable in a variety of sizes ranging from 6-32 x 2 inches to 1/2 - 13 x 6 inches. Size of the hole for these fasteners is not critical.

Plastic Expansion Anchors

6.07 Plastic and/or nylon expansion anchors are useful in attaching light loads such as wall telephones to plaster or tile walls. Various types and sizes are available. Follow the manufacturers specifications for hole sizes.

Cable Clamps and Ties

6.08 Various types of cable clamps and ties are shown in figure 6.02. These are used as follows.

a. 739314 cable tie. The 739314 cable tie is a self-clinching cable tie made of flexible nylon. A hole in one end of the tie can be used to anchor the tie to a wall using a pan head screw. This cable tie is used to tie a group of wires or cables up to 3 1/2 inches in diameter into a neat bundle.

b. TY-527M cable tie. The TY-527M cable tie is similar to the 739314 tie except it does not have a hole for securing it to a wall. These ties are used to tie a group of wires or cables up to 3 1/2 inches in diameter into a neat bundle.

c. 739351 tie mounting plate. The 739351 tie mounting plate is a nylon fitting for use with cable ties up to 3/16 inches wide. It slips over the cable tie and is used to secure the tie to a wall. The hole in the mounting plate is used to fasten it to a wall using a number 8 flat head screw.

d. Adhesive cable clip. The type 706 adhesive cable clip is used to fasten station cable to smooth walls. It can be used on cable up to 1/8 inch in diameter. Adhesive on the back of the clip fastens it to the wall.

e. M3M-P1 cable clamp. The M3M-P1 cable clamp is a metal clamp used to fasten wire or cable up to 1/2 inch in diameter to a wall. It can be fastened to the wall using a pan head screw.

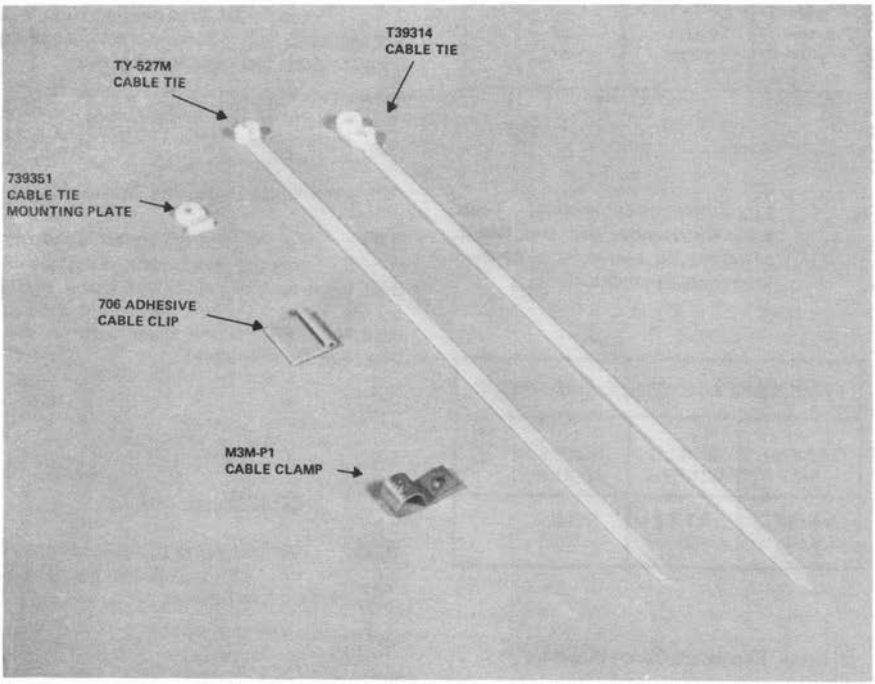


FIGURE 6.02 Cable Clamps and Ties

7. K-500 DESK TELEPHONE

CONTENTS PAGE

7.01 Series K500 desk telephones manufactured by ITT are described in the following paragraphs. Included are circuit diagrams for the sets most commonly installed.

General Description

7.02 The K500 series desk telephones (see figure 7.00) are single-line, rotary dial, anti-sidetone type units which operate efficiently over a wide range of loop resistances and line impedances. Each instrument consists of a pressed steel base plate with four protective rubber feet, on which all internal parts mount. A molded plastic housing covers the assembly and provides a cradle for the handset.

7.03 Six more commonly used models of the type K500 desk telephone are described in the following paragraphs.

FIGURE 7.00 K-500 Desk Telephone

Model K500 ( ) 20**

7.04 The model K500** ( ) 20 is a standard single-line, rotary dial, desk telephone. It provides no additional outstanding features. The wiring diagram for this model is shown in figure 7.01.

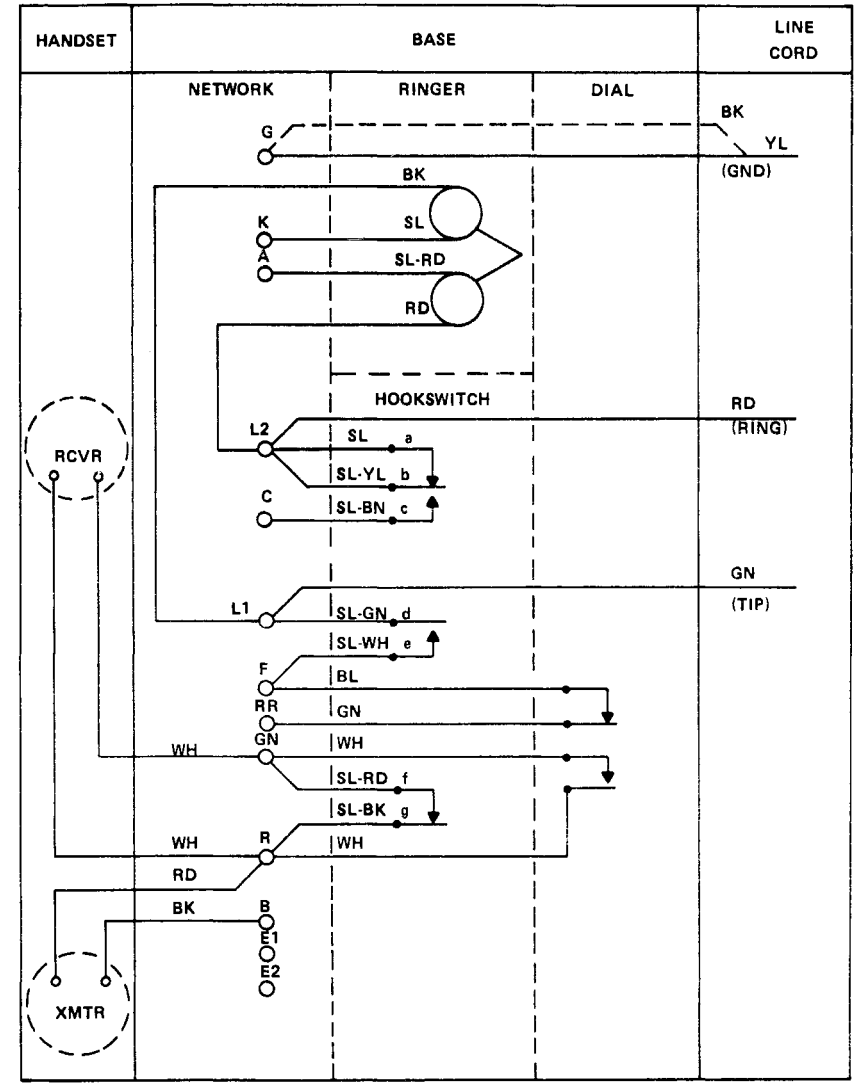


FIGURE 7.01 Circuit Diagram, Model K500 **( ) 20

Model K500** ( ) 24

7.05 The model K500**( ) 24 is a single line, rotary dial, desk telephone which includes a grounding push button. This button is required in some PABX applications. The model K500** ( ) 20 can be converted to a model K500** ( ) 24 by the addition of a grounding push-button switch. A wiring diagram is shown in figure 7.02.

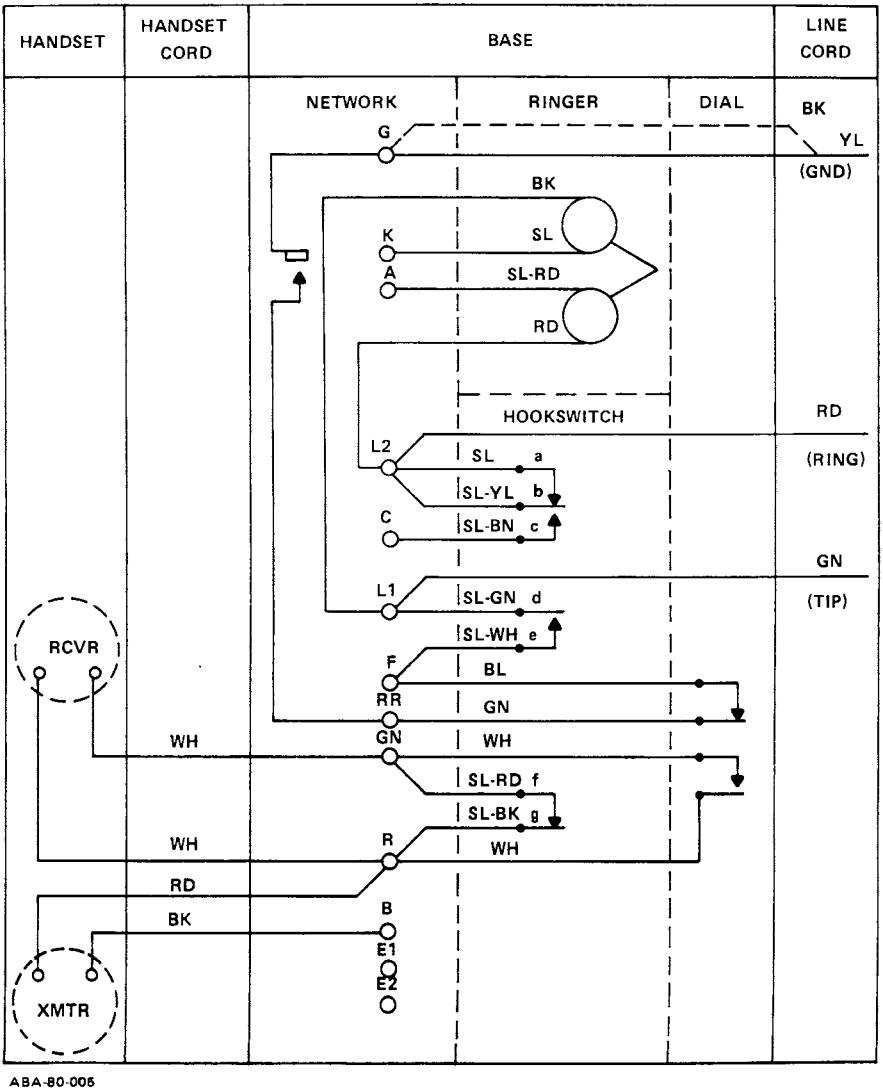


FIGURE 7.02 Circuit Diagram, Model K500 **( ) 24

Model K500**( ) 27/28

7.06 The models K500**( ) 27/28 are single line, rotary dial telephones equipped with a message waiting lamp. The lamp is for use in PABX applications where, under control of the attendant, it can be lit to indicate the station user should call the attendant for a waiting message. The model K500**( ) 27 is available with a lower power NE51 (90 volt) indicator; the model K500** ( ) 28 has a higher power NE51H (125 volt) indicator. The wiring diagram for these models is shown in figure 7.03.

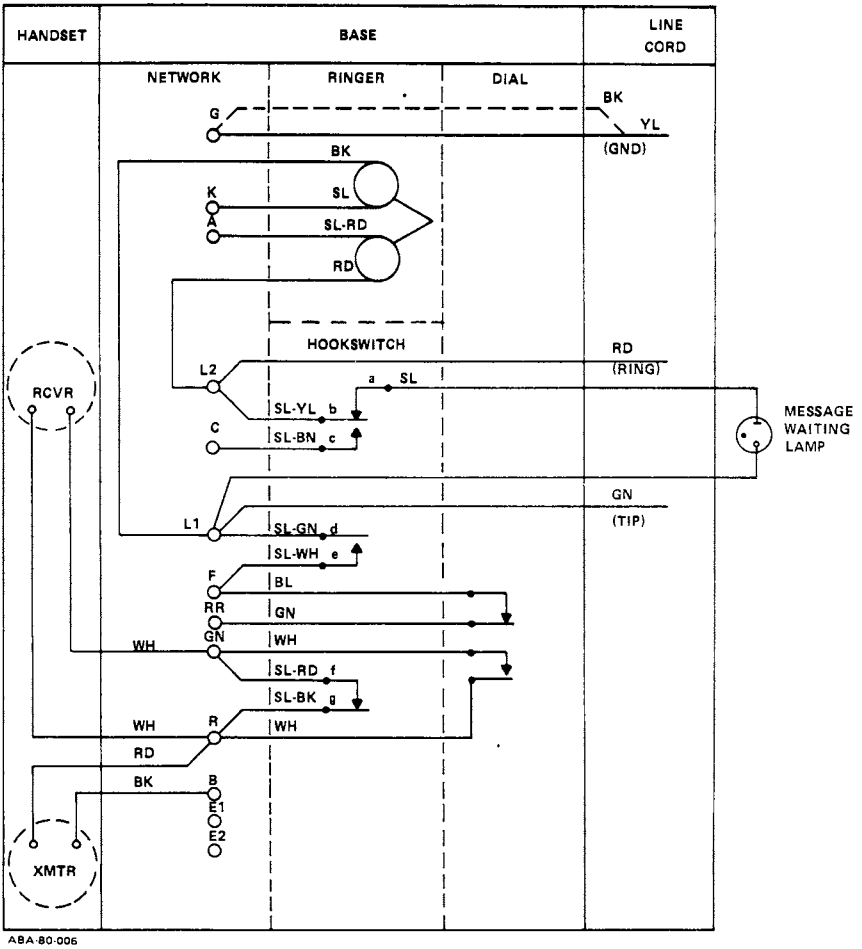


FIGURE 7.03 Circuit Diagram, Model K500 **( ) 27/28

Model K500** ( ) 39

7.07 The model K500**( ) 39 is a specially modified single line rotary dial, desk telephone arranged for hands-free applications. It is equipped with a 3500-00G type dial assembly which provides a contact closure to mute the loudspeaker during dialing. Its wiring diagram is shown in figure 7.04.

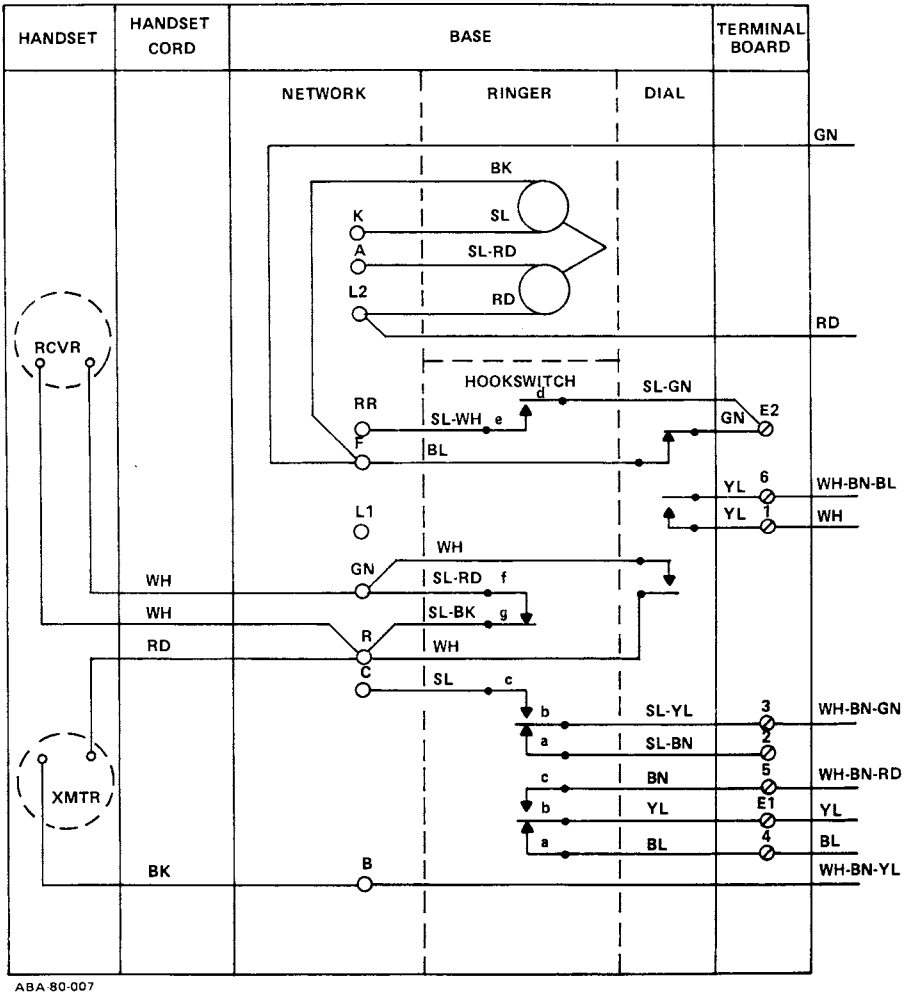


FIGURE 7.04 Circuit Diagram, Model K500 **( ) 39

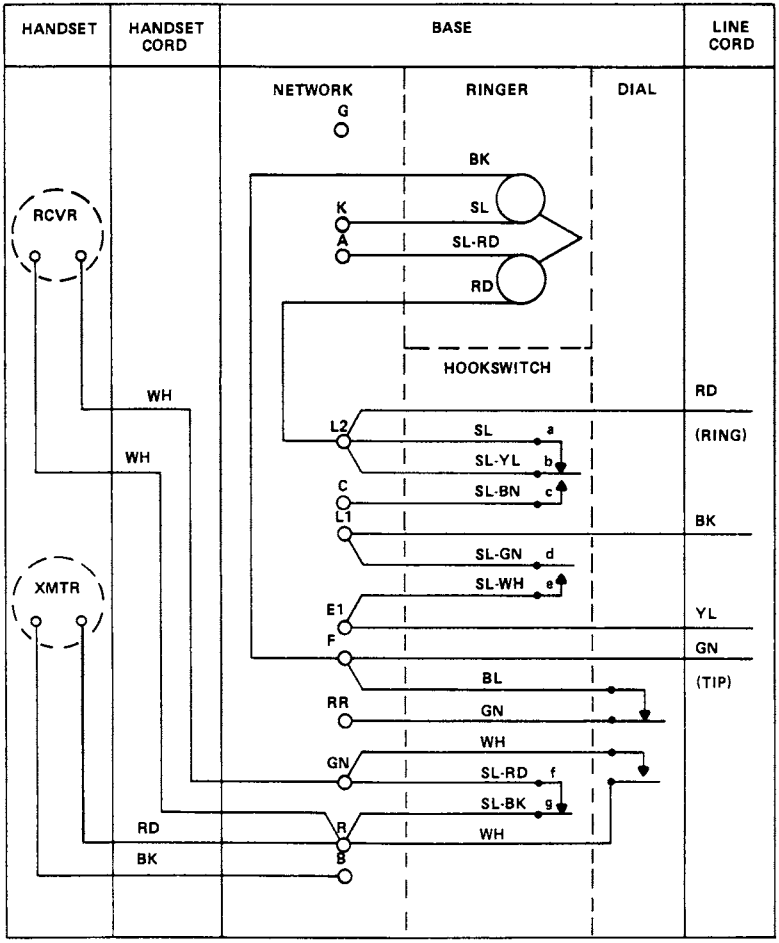
Model K500** ( ) 44

7.08 The model K500**( ) 44 is a single line, rotary dial, desk telephone arranged for "A" lead control. This telephone provides connections through the hookswitch which allows ground on lead A1 to be applied to key equipment via the A lead to trip ringing. The model K500**( ) 30 may be converted to a model K500**( ) 44 as shown in figure 7.05.

NOTE: K500 desk sets with special feature codes 30, 34, 37 and 38 have been superceded by sets with special codes 20, 24, 27, and 28 respectively.

Installation

7.09 Refer to the appropriate figures for the wiring diagrams for installing and connecting series K500 desk telephones.



ABA 80 008

FIGURE 7.05 Circuit Diagram, Model K500 **( ) 44

Testing

7.10 After the telephone set is installed, check for proper operation of the dial, transmitter, receiver, ringing loudness control, sidetone suppression circuit and any special features. Check for noise due to loose contacts when the set is gently bumped or shaken.

Ordering Information

7.11 Stock numbers for K500 series telephones are not listed in this manual due to the quantity of numbers necessitated by various combinations of colors and features. Instead, a guideline for ordering is included in table 7.00. The table provides alphabetic and numeric codes for determining dial, ringer, and color selection.

TABLE 7.00 K500 Desk Telephones

CODE	DESCRIPTION
K500**( ) 20 •	Telephone, desk, standard.
K500**( ) 24 •	Telephone, desk, push button ground.
K500**( ) 27 •	Telephone, desk, message waiting lamp, 90 volt.
K500**( ) 28 •	Telephone, desk, message waiting lamp, 125 volt.
K500**( ) 39 •	Telephone, desk, for hands free application.
K500**( ) 44 •	Telephone, desk, "A" lead control.
	• Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N - No dial - e/w dial blank ( ) Add Ringer Code (LR) Less Ringer (BA) Straight line biased ringer **Substitute Color Code 00 - Black 43 - Burnt Orange 05 - Green 44 - Light Ash 09 - Ivory 45 - Cocoa Brown 12 - Blue 46 - Harvest Gold 13 - Beige 47 - Cherry Red 15 - White

8. K-500 TYPE WALL TELEPHONE

CONTENTS PAGE

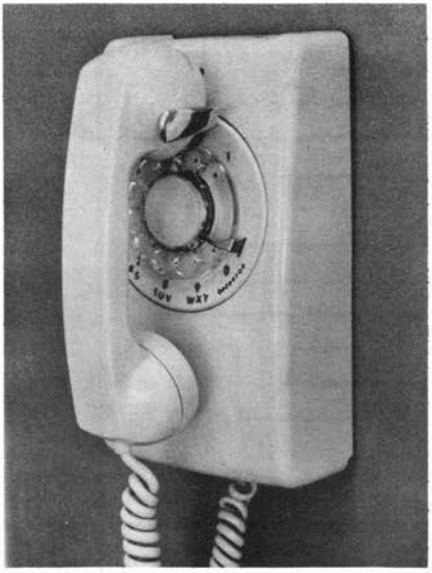


FIGURE 8.00 K-554 Wall Telephone

8.01 Series K500 wall telephones manufactured by ITT are described in the following paragraphs. Circuit diagrams for the most commonly used sets are included.

General Description

8.02 The K500 series wall telephones (see figure 8.00) are rotary dial, anti-sidetone units which operate over a wide range of loop resistances and line impedances. They are available in single-line or two-line versions.

Single-Line Telephones

8.03 Five single line variations of the series K500 wall telephone are briefly described below.

a. The model K554**( ) 30 is a standard single-line, rotary dial, wall telephone. A wiring diagram for this model is shown in figure 8.01.

b. The model K554**( ) 34 is a single-line, rotary dial, wall telephone which includes a grounding push button. The push button is required in some PABX applications. A model K554**( ) 30 can be converted to a model K554**( ) 34. The wiring diagram for this model is shown in figure 8.02.

c. The model K554**( ) 37/38 is a single line, rotary dial, set equipped with a message waiting lamp. This set is for use in PABX applications, where under control of the attendant, the lamp can be lit to indicate the station user should call the attendant for a waiting message. The model K554**( ) 37 is available with a low power NE51 (90 volt) indicator; the model K554** ( ) 38 has a higher power NE51H (125 volt) indicator.

d. The model K554**( ) 44 is a single line rotary dial, wall telephone arranged for "A" lead

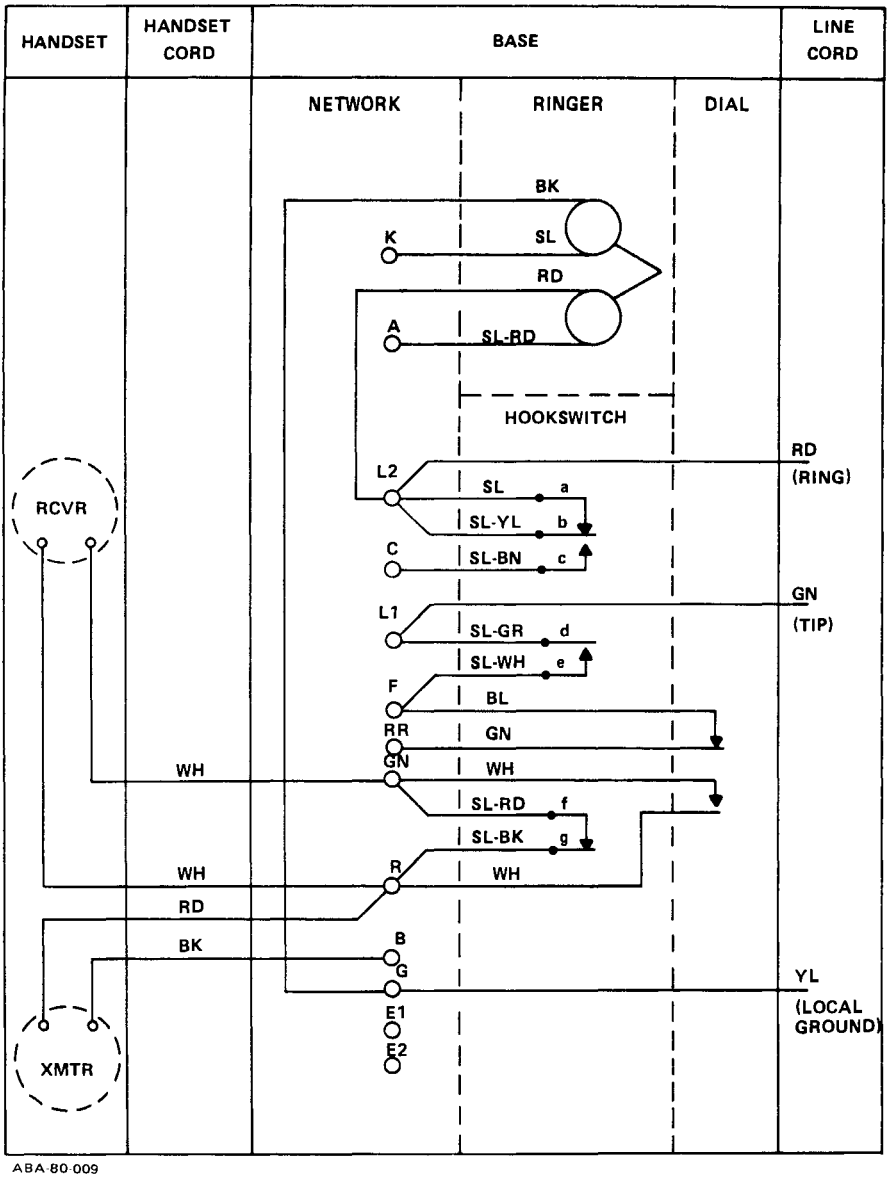


FIGURE 8.01 Circuit Diagram, Model K554**( ) 30

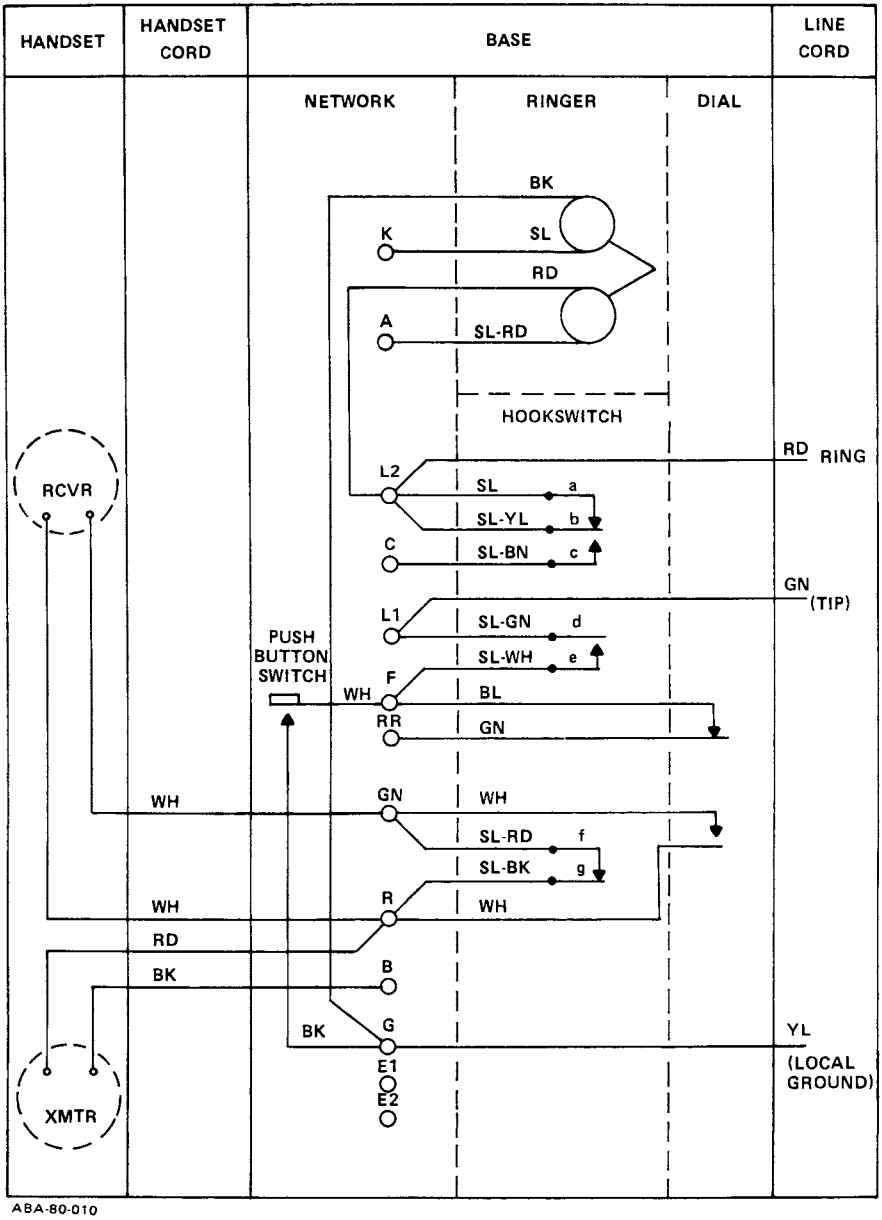


FIGURE 8.02 Circuit Diagram, Model K554 **( ) 34

control. This telephone provides connections through the hookswitch which allows ground on lead A1 to be applied to key equipment via the A lead, to trip ringing. The wiring diagram for this model is shown in figure 8.03. The model K554**( ) 30 can be converted to a model K554**( ) 44.

Two-Line Telephones

8.04 Two 2-line variations of the series K500 wall telephone, are described in the following paragraphs.

a. The model K558**( ) 30 is a rotary dial, wall telephone equipped with a turn and push key for selecting either of two lines. The push section of the key provides for signalling, if required. The ringer is permanently connected to line 1; a separate ringer must be provided for line 2. The wiring diagram for this model is shown in figure 8.04.

b. The model K555** ( ) 30 is similar to the above model except it is equipped with a plunger type switch which serves as a HOLD button. Depressing the plunger which protrudes from the top of the housing, places a holding loop across the opposite line to that selected by the turn and push key.

Installation

8.05 Wall telephones do not include a connecting block or mounting cord. Inside wire must be connected within the telephone. Refer to figures 8.01 through 8.04 for the connections. Installation wiring should enter the instrument through the left hand opening in the bottom of the housing. Concealed wiring may enter through any suitable hole in the base plate. Take care to dress all leads that could interfere with the ringer or hookswitch.

Testing

8.06 After the telephone set is installed, check for proper operation of the dial, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features.

Ordering Information

8.07 Due to the large number of stock numbers involved in various combinations of features and colors, stock numbers for the K500 series wall phones are not listed in this section. Instead a guideline for ordering is included in table 8.00. The table indicates the digits for determining dial, ringer, and color codes.

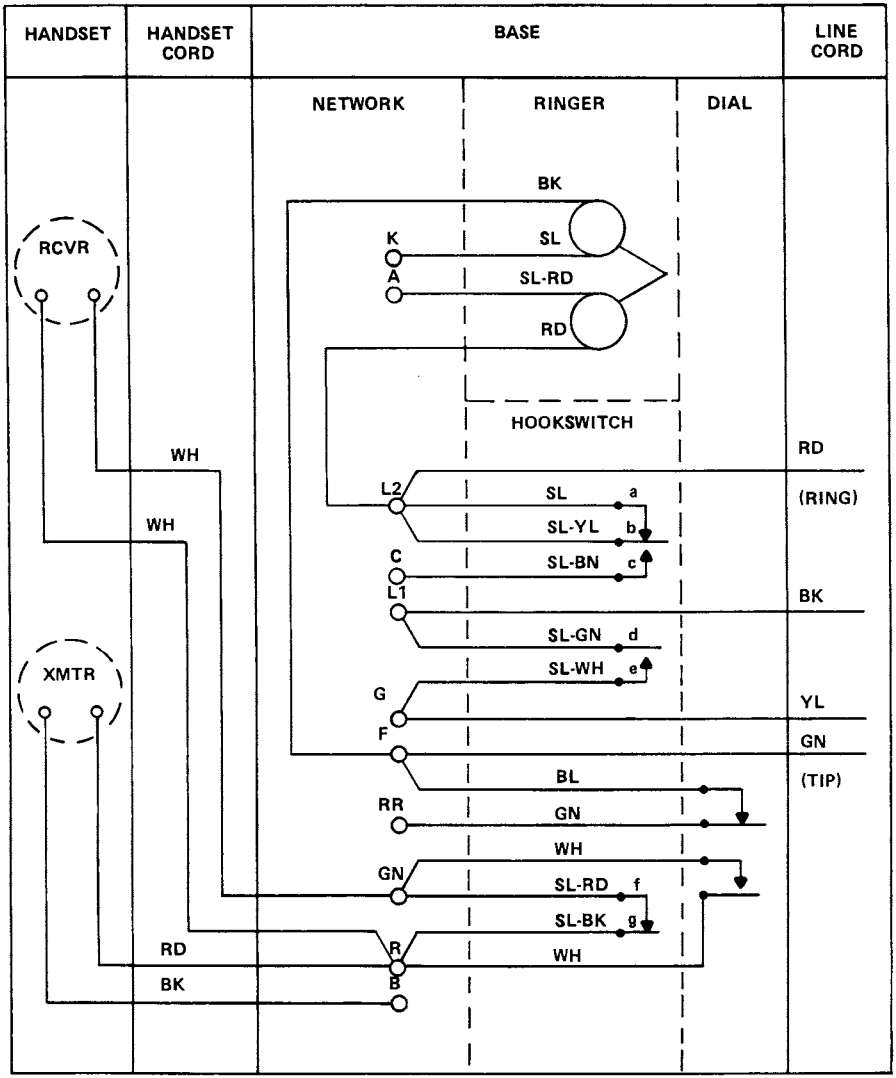


FIGURE 8.03 Circuit Diagram, Model K554 **( ) 44

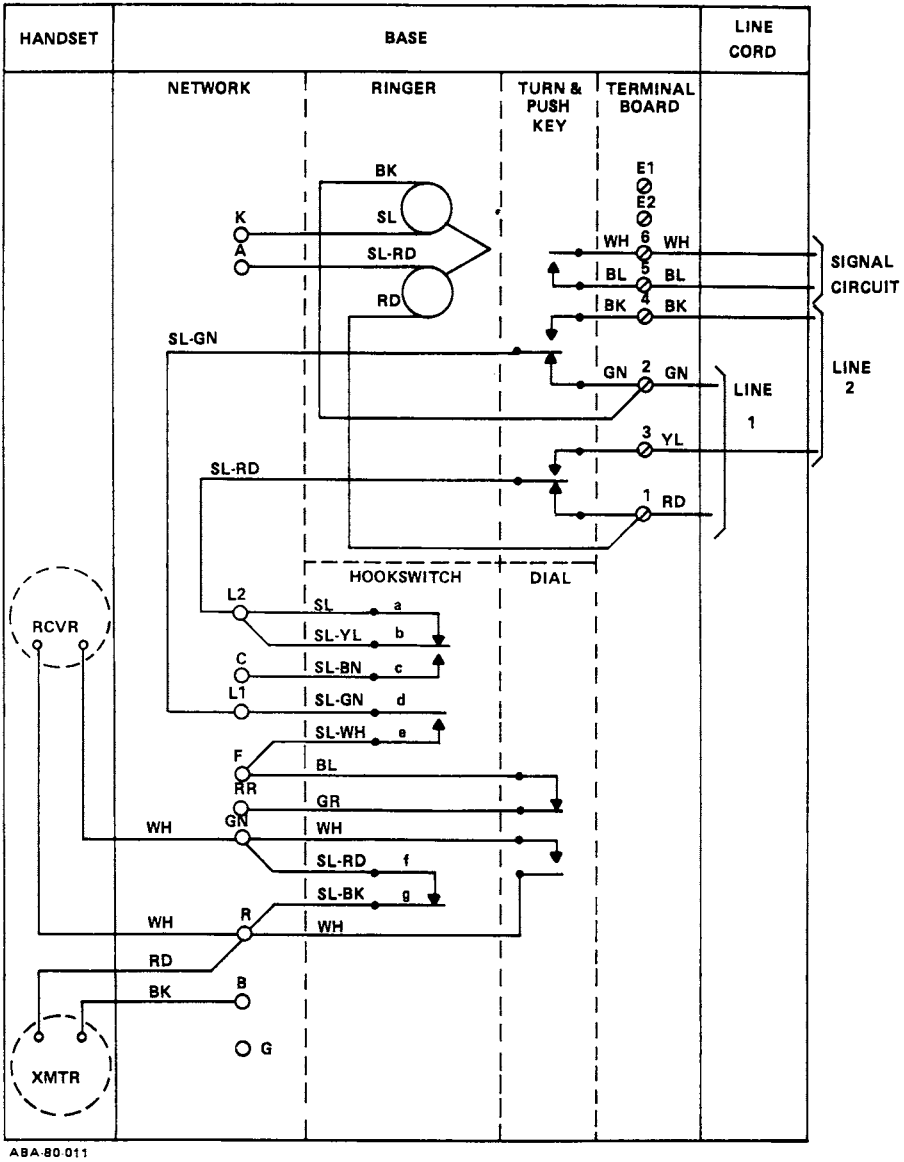


FIGURE 8.04 Circuit Diagram, Model K558 **( ) 30

TABLE 8.00 K500 Wall Telephones

CODE	DESCRIPTION
K554**( ) 30 •	Telephone, wall, standard.
K554**( ) 34 •	Telephone, wall, push button ground.
K554**( ) 37 •	Telephone, wall, message waiting lamp, 90 volt.
K554**( ) 38 •	Telephone, wall, message waiting lamp, 125 volt.
K554**( ) 44 •	Telephone, wall, "A" lead control.
K555**( ) 30 •	Telephone, wall, 2 line with HOLD.
K558**( ) 30 •	Telephone, wall, 2 line.
	•Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N - No dial - e/w dial blank ( ) Add Ringer Code (LR) Less ringer (LA) Straight line biased ringers **Substitute Color Code 00 - Black 43 - Burnt Orange 05 - Green 44 - Ash Brown 09 - Ivory 45 - Cocoa Brown 12 - Blue 46 - Harvest Gold 13 - Beige 47 - Cherry Red 15 - White

9. K-510 DESK TELEPHONE

CONTENTS PAGE

9.01 Series K510 desk telephones manufactured by ITT are described in the following paragraphs. Included are circuit diagrams for the two sets most commonly used.

General Description

9.02 The K510 series telephones are two line, rotary dial, desk units which operate efficiently over a wide range of loop resistances and line impedances. These instruments are equipped with a turn and push key which permits selection of either of two lines. The ringer is permanently connected to line 1; a separate ringer must be provided for line 2.

Model K510**( ) 30

9.03 The model K510**( ) 30 is a standard rotary dial, two line, desk telephone equipped with a six conductor mounting cord for pick up of two lines and push button signalling.

Model K510**( ) 36

9.04 The model K510**( ) 36 is the same as the type K510**( ) 30 except it is equipped with a four conductor mounting cord. A wiring diagram for both models is shown in figure 9.00.

Installation

9.05 Refer to figure 9.00 for the wiring diagram for connecting series K510 desk telephones.

Testing

9.06 After the telephone set is installed, check for proper operation of the dial, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features.

Ordering Information

9.07 Table 9.00 shows the different type K510 instruments and their identifying numbers. Because of the large number of stock numbers involved due to variations in colors and features, individual stock numbers are not shown. Instead, a guide for determining dial, ringer, and color codes is included in the table.

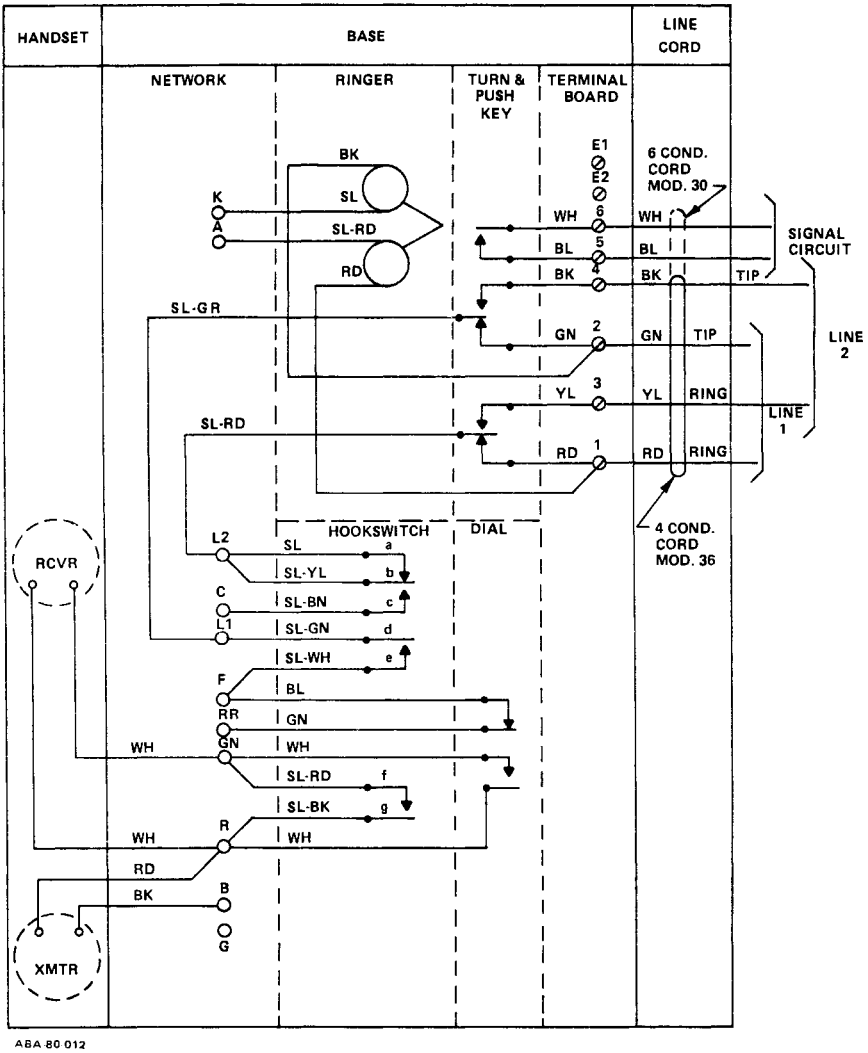


FIGURE 9.00 Circuit Diagram, Models K510**( ) 30/36

TABLE 9.00 K510 Desk Telephones

CODE	DESCRIPTION
K510**( ) 30 •	Telephone, 2 line, rotary dial, standard 6 conductor cord.
K510**( ) 36 •	Telephone, 2 line, rotary dial, 4 conductor cord.
	• Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N- No dial - e/w dial blank ( ) Add Ringer Code (LR) Less Ringer (BA) Straight line biased ringer **Substitute Color Code 00 - Black 13 - Beige 05 - Green 15 - White 09 - Ivory

10. K-564/K-565 KEY TELEPHONE

CONTENTS PAGE

FIGURE 10.00 K-564/K-565 Key Telephone

10.01 The series K564/K565 key telephones, manufactured by ITT, are described in the following paragraphs. Circuit diagrams are included for those sets most commonly installed.

General Description

10.02 The type K564/K565 desk telephones (see figure 10.00) are six button, rotary dial, anti-sidetone sets which operate efficiently over a wide range of loop resistances and line impedances. They are designed to be used with key telephone systems such as the ITT K1A2 system, where several telephones have access to the same lines, CO trunks, or intercom lines.

10.03 Five push button keys on the telephone are used for line, trunk, or intercom selection; one key is used to place a HOLD on any selected line or trunk. From left to right, the keys are used as follows. The first key is the HOLD key; the second, third, and fourth keys are used as line pick up keys; the remaining two keys may be wired as either line or intercom SIGNAL keys.

10.04 A signal lamp beneath each of the five pick up keys indicates status of the associated line. (See table 10.00.)

TABLE 10.00 Pick Up Key Signals

CONDITION	LAMP INDICATION
Idle	Lamp extinguished
Busy	Lamp Lit
Hold	Lamp Winking
Call Incoming	Lamp Flashing

10.05 Some of the more commonly installed variations of the K564/K565 series telephones are briefly described below.

Model K564**( ) 40

10.06 The model K564**( ) 40 is a standard 6-button rotary dial, desk type, key telephone. It is equipped with a 34 conductor mounting cord fitted with a 50 pin (25 pair) male connector. The wiring diagram for this model is shown in figure 10.01.

Model K564**( ) 41

10.07 The model K564**( ) 41 is identical to the above model except it includes a grounding push button switch. The grounding push button is required in some PABX applications for transferring calls, originating calls during a power failure, etc.

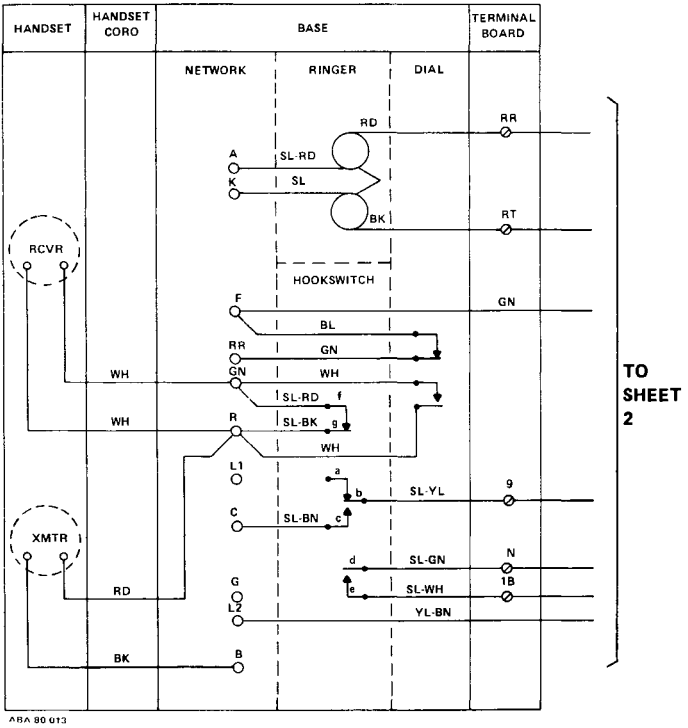


FIGURE 10.01 Circuit Diagram, Model K564 **( ) 30/40 (Sheet 1)

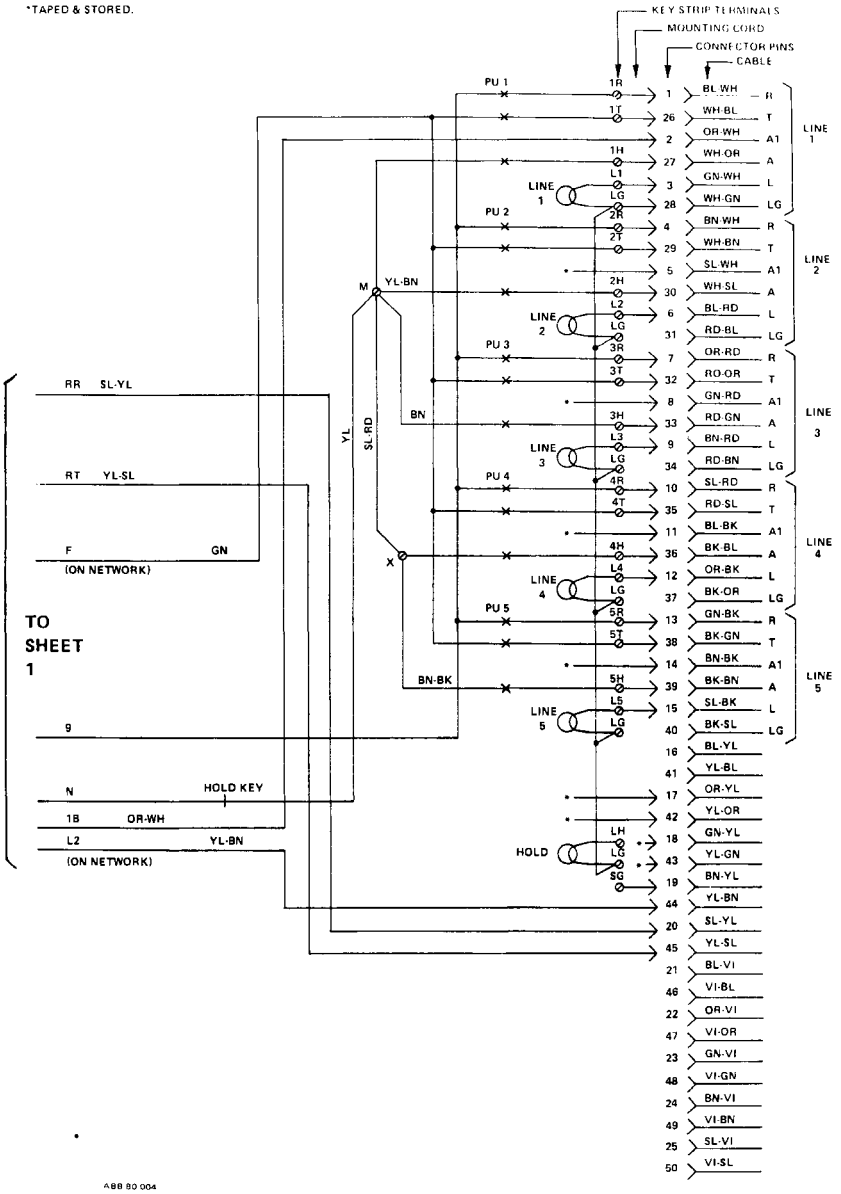


FIGURE 10.01 Circuit Diagram, Model K564 **( ) 30/40 (Sheet 2)

Model K565**( ) 40

10.08 The model K565**( ) 40 is a standard 6-button, rotary dial, desk type telephone equipped with a manual exclusion switch in the left hand cradle plunger. Lifting the plunger disconnects any multipled telephones from the first line circuit. This model is equipped with a 42 conductor mounting cord fitted with a 50 pin (25 pair) male connector. The wiring diagram for the model K565**( ) 40 telephone is shown in figure 10.02.

Model K565**( ) 41

10.09 The model K565**( ) 41 is identical to the model K565**( ) 40 telephone except it includes a grounding push button switch. The grounding push button is required in some PABX applications for transferring calls, originating calls during a power failure, etc.

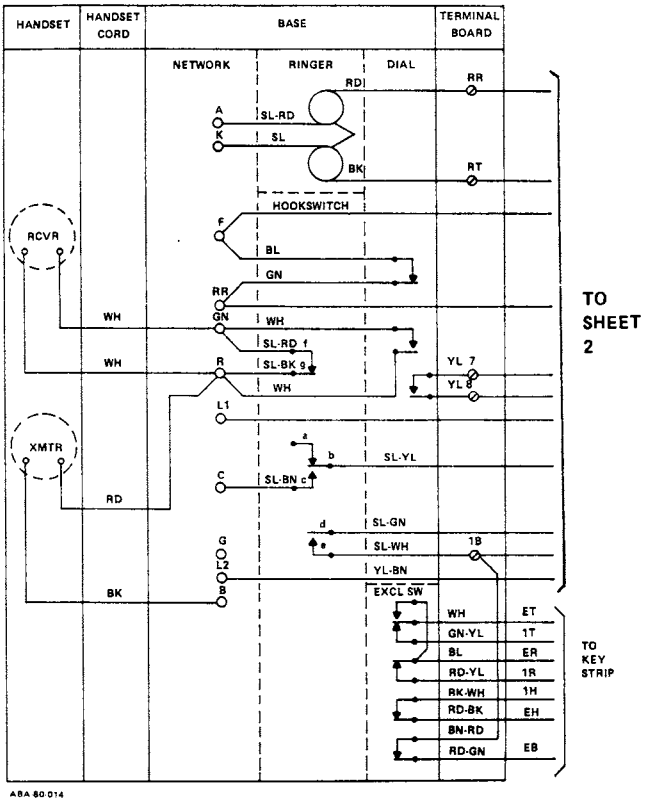


FIGURE 10.02 Circuit Diagram, Model K565 **( ) 30/40 (Sheet 1)

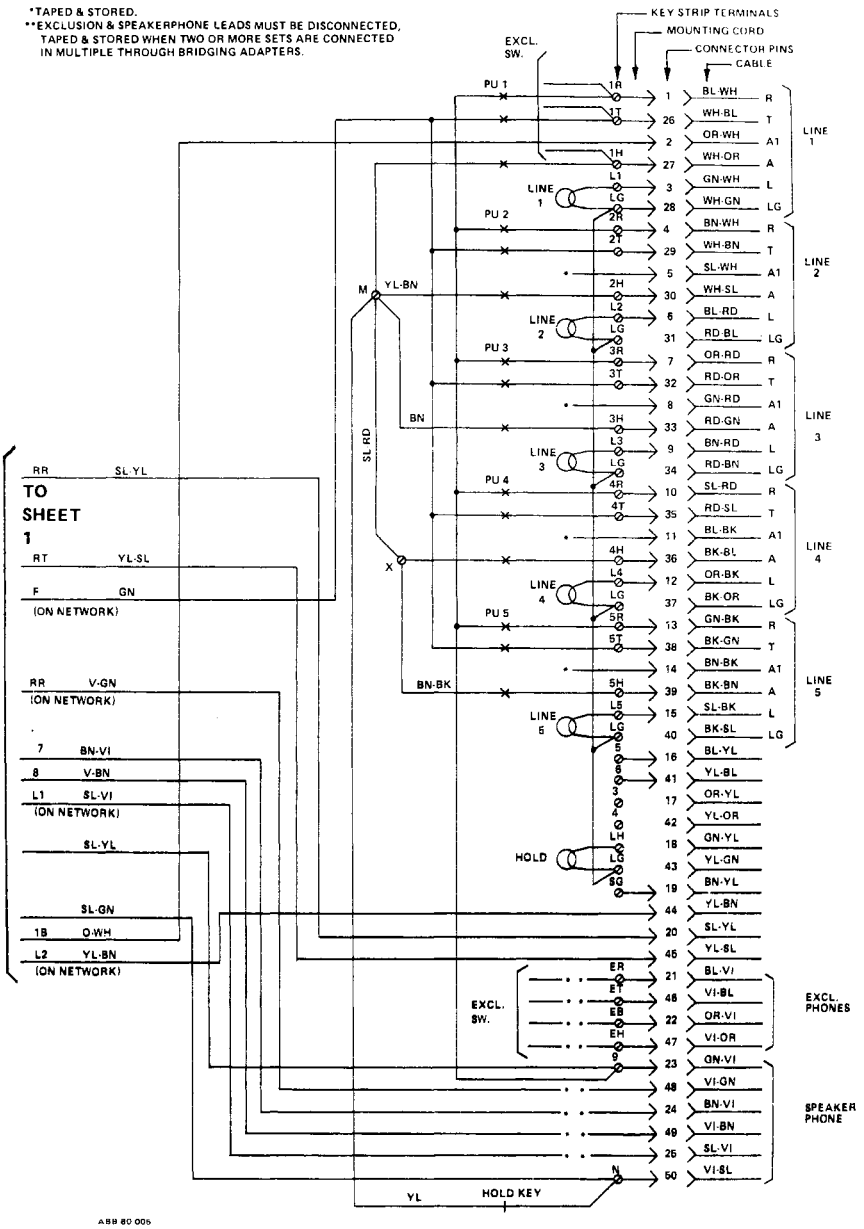


FIGURE 10.02 Circuit Diagram, Model K565 **( ) 30/40 (Sheet 2)

Model K565**( ) 42

10.10 The model K565**( ) 42 is a specially modified K565 series telephone arranged for hands-free application. It is equipped with a 3500-00G type dial assembly which provides a closure to mute the hands-free speaker during dialing, and an additional set of contacts in the hookswitch assembly for on/off control of the hands-free equipment. This model includes a manual exclusion switch. The model K565**( ) 42 is equipped with a 50 conductor mounting cord fitted with a 50 pin (25 pair) male connector. The wiring diagram for this model is shown in figure 10.03.

Model K566**( ) 40

10.11 The model K566**( ) 40 is the same as the model K564**( ) 40 except it includes a hookswitch restoration button which restores any operated line button when the hookswitch is depressed. In addition, this model includes an additional push button for recalling the attendant or for transferring a call in some PABX applications.

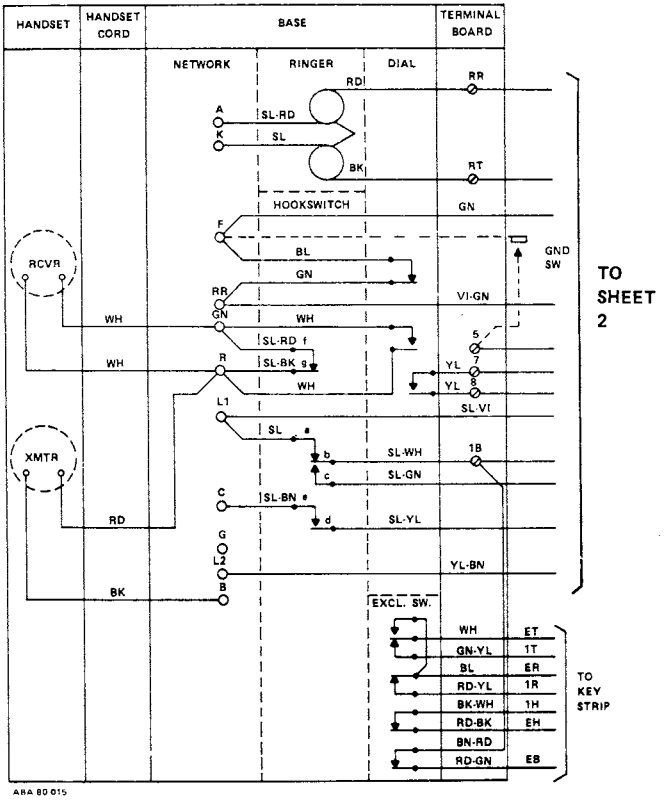


FIGURE 10.03 Circuit Diagram, Model K565 **( ) 39/42 (Sheet 1)

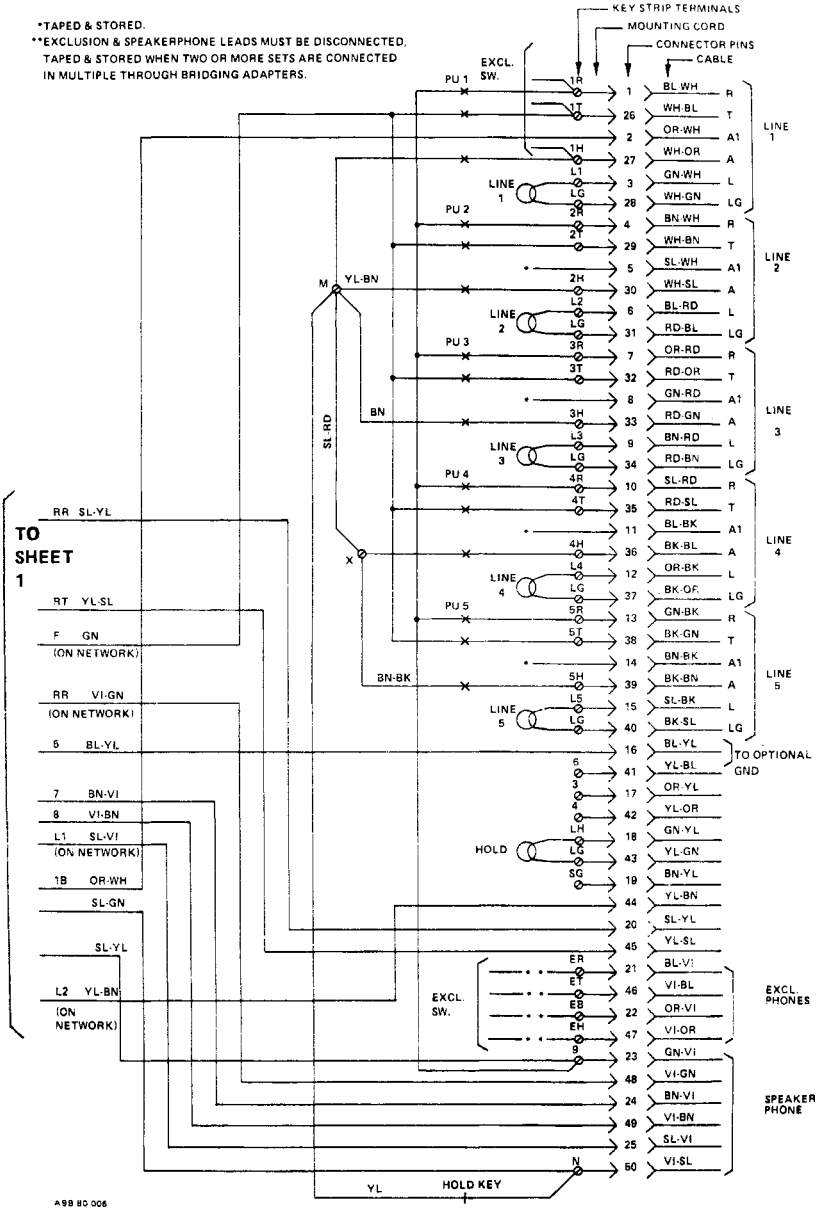


FIGURE 10.03 Circuit Diagram, Model K565 **( ) 39/42 (Sheet 2)

TABLE 10.01 Connection Chart, K-564 and K-565 Telephone Sets

CKT. FEAT.		TERMINAL IN SET		MOUNTING CORDS (a)			CONNECTING BLOCK TERMINAL NUMBER		CONNECTING CABLE	
				50-Cond.	42-Cond.	34-Cond.				
LINE	LEAD DESIG.	636 KEY	589 KEY	K565/39 /42 Phones	K565/30 /40 Phones	K564/30 /40 Phones	SCREW TYPE	AMPHENOL	50-Cond. (a)	40-Cond. (h)
	R	1R	1R	BL-WH	BL-WH	BL-WH	1-1	1	BL-WH	BL
	T	1T	1T	WH-BL	WH-BL	WH-BL	1-2	26	WH-BL	WH
1	A1	1B	1B	OR-WH	OR-WH	OR-WH	1-4	2	OR-WH	OR
	A	1H	1H	WH-OR	WH-OR	WH-OR	1-5	27	WH-OR	WH
LAMP	L	L1	1L	GR-WH	GR-WH	GR-WH	4-1	3	GR-WH	GR
	LG	LG	1LG	WH-GR	WH-GR	WH-GR	4-2	28	WH-GR	WH
	R	2R	2R	BR-WH	BR-WH	BR-WH	1-6	4	BR-WH	BR
	T	2T	2T	WH-BR	WH-BR	WH-BR	1-7	29	WH-BR	WH
2	---		---	SL-WH(b)	SL-WH(b)	SL-WH(b)	1-9	5	SL-WH	BR
	A	2H	2H	WH-SL	WH-SL	WH-SL	1-10	30	WH-SL	SL
LAMP	L	L2	2L	BL-RD	BL-RD	BL-RD	4-4	6	BL-RD	WH
	LG	LG	2LG	RD-BL	---	---	---	31	RD-BL	---
	R	3R	3R	OR-RD	OR-RD	OR-RD	1-3	7	OR-RD	BL
	T	3T	3T	RD-OR	RD-OR	RD-OR	1-8	32	RD-OR	RD
3	---		---	GR-RD(b)	GR-RD(b)	GR-RD(b)	2-1	8	GR-RD	YL
	A	3H	3H	RD-GR	RD-GR	RD-GR	2-2	33	RD-GR	OR
LAMP	L	L3	3L	BR-RD	BR-RD	BR-RD	4-6	9	BR-RD	RD
	LG	LG	3LG	RD-BR	---	---	---	34	RD-BR	---
	R	4R	4R	SL-RD	SL-RD	SL-RD	2-4	10	SL-RD	GR
	T	4T	4T	RD-SL	RD-SL	RD-SL	2-5	35	RD-SL	RD
4	---		---	BL-BK(b)	BL-BK(b)	BL-BK(b)	2-6	11	BL-BK	SL
	A	4H	4H	BK-BL	BK-BL	BK-BL	2-7	36	BK-BL	BR
LAMP	L	L4	4L	OR-BK	OR-BK	OR-BK	4-9	12	OR-BK	RD
	LG	LG	4LG	BK-OR	---	---	---	37	---	---
	R	5R	5R	GR-BK	GR-BK	GR-BK	2-9	13	GR-BK	SL
	T	5T	5T	BK-GR	BK-GR	BK-GR	2-10	38	BK-GR	RD
5	---		---	BR-BK(b)	BR-BK(b)	BR-BK(b)	2-3	14	BR-BK	YL
	A	5H	5H	BK-BR	BK-BR	BK-BR	2-8	39	BK-BR	BL
LAMP	L	L5	5L	SL-BK	SL-BK	SL-BK	4-3	15	SL-BK	BK
	LG	LG	5LG	BK-SL	---	---	---	40	BK-SL	---
AUX. SIGS.		5	1	BL-YL	BL-YL	---	---	16	BL-YL	---
		6	2 (d)	YL-BL	YL-BL	---	---	41	YL-BL	---
		3	3	OR-YL	---	OR-YL(b)	---	17	OR-YL	---
		4	4	YL-OR	---	YL-OR(b)	---	42	YL-OR	---
HOLD LAMP		LH	HL	GR-YL	---	GR-YL(b)	---	18	GR-YL	---
		LG	HLG	YL-GR	---	YL-GR(b)	---	43	YL-GR	---
PB SIG		SG	SG	BR-YL	BR-YL	BR-YL	3-1	19	BR-YL	OR
BZ LP		L2	L2(c)	YL-BR	YL-BR	YL-BR	3-2	44	YL-BR	BK
R-R1		RR	RR	SL-YL	SL-YL	SL-YL	3-4	20	SL-YL	GR
B-B1		RT	RT	YL-SL	YL-SL	YL-SL	3-5	45	YL-SL	BK
EXCL. CKT.	R	ER	ER	BL-VI(e)	BL-VI(e)	---	3-6	21	BL-VI	BR
	T	ET	ET	VI-BL(e)	VI-BL(e)	---	3-7	46	VI-BL	BK
	A1	EB	EB	OR-VI(e)	OR-VI(e)	---	3-9	22	OR-VI	SL
	A	EH	EH	VI-OR(e)	VI-OR(e)	---	3-10	47	VI-OR	BK
SPEAKER PHONE	R1	9	R	GR-VI(e)	GR-VI(e)	---	3-3	23	GR-VI	BL
	T1	RR	RR(c)	VI-GR(e)	VI-GR(e)	---	3-8	48	VI-GR	YL
	P3	7	ON	BR-VI(e)	BR-VI(e)	---	4-8	24	BR-VI	OR
	P4	8	ON1	VI-BR(e)	VI-BR(e)	---	4-10	49	VI-BR	YL
	LK	L1	L1(c)	SL-VI(e)	SL-VI(e)	---	4-5	25	SL-VI	GR
	AG	N	N	VI-SL(e)	VI-SL(e)	---	4-7	50	VI-SL	YL

pair

pair

NOTES:

a. Colors are designated, body first, stripe second.
b. Spare conductors, tape and store in telephone.
c. Terminal on telephone network.
d. Auxiliary terminal strip in telephone.
e. Exclusion and speakerphone leads not associated with these features must be disconnected, taped and stored in telephone set when two or more sets are connected in multiple through bridging adaptors.
f. Terminals 28, 31, 37, and 40 are strapped on the mounting cord connector.
g. These terminals are not used except when the telephone is modified to install an exclusion switch.
h. If Superior Cable Co. No. 25 x 24 ICRS "Ring Stripe" Cable is used, colors designated become a two-color combination, i.e. BL-WH, WH-BL; OR-WH, WH-OR; etc. The first color is the body and the second color the ring stripe.

Model K567**( ) 40

10.12 The model K567**( ) 40 is the same as the model K565**( ) 40 except it includes a hookswitch restoration button which restores any operated line button when the hookswitch is depressed. This model also includes an additional push button for recalling the attendant or for transferring a call in some PABX applications.

Model K567**( ) 42

10.13 The model K567**( ) 42 is the same as the model K565**( ) 42 except it includes a hookswitch restoration button which restores any operated line button when the hookswitch is depressed. This model also includes an additional push button for recalling the attendant or for transferring a call in some PABX applications.

Installation

10.14 As these telephones are equipped with quick-connect cable connectors, installation consists simply of plugging the prewired connectors into the station cables. Refer to the appropriate circuit diagram (figure 10.01 through 10.03) and to table 10.01 for connections.

Testing

10.15 After the telephone set is installed, check for proper operation of the line button, hold button, dial, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features. Check for noise due to loose contacts when the set is gently bumped or shaken.

Ordering Information

10.16 Table 10.02 shows some of the more common types of K564/K565 series instruments and their identifying numbers. Because of the large number of stock numbers involved due to variations in colors and features, individual stock numbers are not shown. Instead a guide for determining dial, ringer, and color codes is included in the table.

TABLE 10.02 K564/K565 Desk Telephones

CODE	DESCRIPTION
K564**( ) 40 •	Telephone, 6 button key, with common "HOLD": rotary dial e/w 34 conductor cord with plug.
K564**( ) 42 •	Telephone, 6 button key, with common "HOLD": rotary dial, push button ground, e/w 34 conductor cord with plug.
K565**( ) 40 •	Telephone, 6 button key, with common "HOLD": rotary dial, e/w manual exclusion switch and 42 conductor cord with plug.
K565** ( ) 41 •	Telephone, 6 button key, with common "HOLD": rotary dial, push button ground, e/w manual exclusion switch and 42 conductor cord with plug.
K565**( ) 42 •	Telephone, 6 button key, with common "HOLD": rotary dial, e/w manual exclusion switch and additional contacts for hands free operation. Equipped with 50 conductor cord with plug.
K566**( ) 40 •	Telephone, 6 button key, with common "HOLD": rotary dial, e/w 34 conductor cord with plug. Includes hookswitch button restoration.
K567**( ) 40 •	Telephone, 6 button key, with common "HOLD": rotary dial, e/w manual exclusion switch and 42 conductor cord with plug. Includes hookswitch restoration.
K567**( ) 42 •	Telephone, 6 button key, with common "HOLD": rotary dial, e/w manual exclusion switch and additional contacts for hands free operation. Equipped with 50 conductor cord with plug and hookswitch restoration.
	• Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N - No dial - e/w dial blank ( ) Add Dial Code (LR) Less Ringer (BA) Straight line biased ringers ** Substitute Color Code 00 - Black 15 - White 05 - Green 44 - Light Ash 09 - Ivory 45 - Cocoa Brown 13 - Beige

11. K-2500 DESK TELEPHONE

CONTENTS PAGE

General Description

11.01 Series K2500 desk telephones manufactured by ITT are described in the following paragraphs. Circuit diagrams for the most commonly used sets are included.

11.02 The K2500 series desk telephones (see figure 11.00) are single line, Tel-Touch, anti-sidetone type units which operate efficiently over a wide range of loop resistances and line impedances. Each instrument consists of a pressed steel base plate with four protective rubber feet. All internal parts mount on the base plate. A molded plastic housing covers the assembly and provides a cradle for the handset.

11.03 Six of the more commonly used models of the K2500 desk telephone are briefly described in the following paragraphs.

Model K2500**( ) 20

11.04 The model K2500**( ) 20 is a standard single line, Tel-Touch, desk telephone. It provides no additional outstanding features. The wiring diagrams for this model are shown in figures 11.01 and 11.02.

FIGURE 11.00 K-2500 Desk Telephone

Model K2500**( ) 24

11.05 The model K2500**( ) 24 is a single line, Tel-Touch, desk telephone which includes a grounding push button. The push button is required in some PABX applications. The model K2500 **( ) 20 can be converted to a model K2500**( ) 24 by the addition of a grounding push button switch. Wiring diagrams for the model K2500**( ) 24 are shown in figures 11.01 and 11.02.

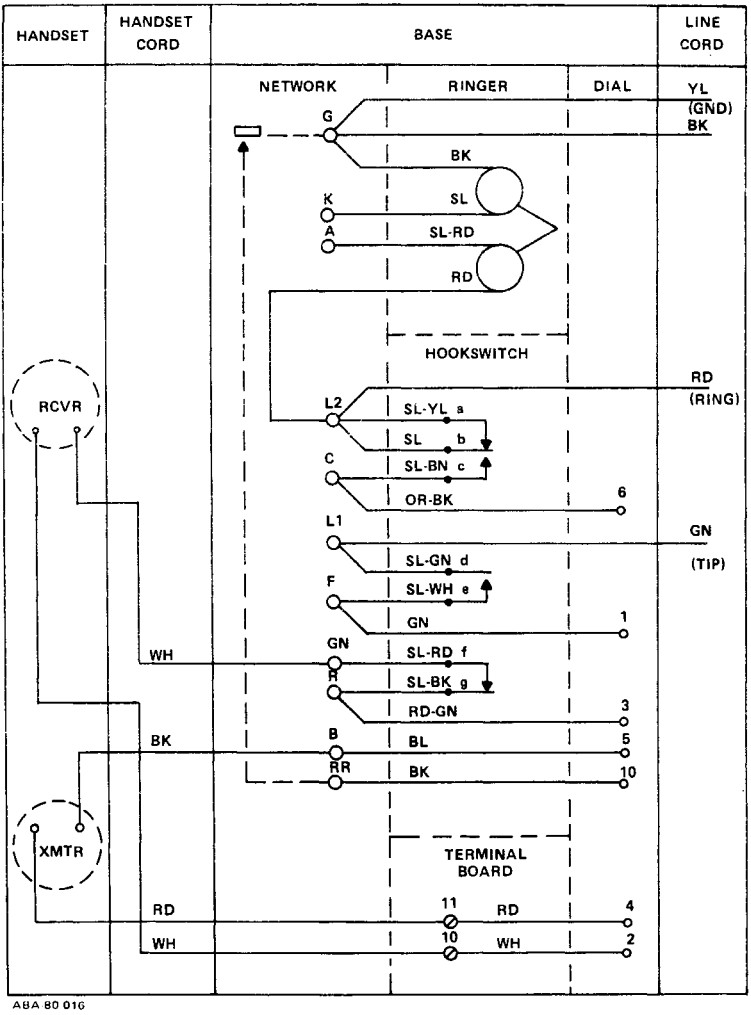


FIGURE 11.01 Circuit Diagram, Models K2500 **( ) 20/24

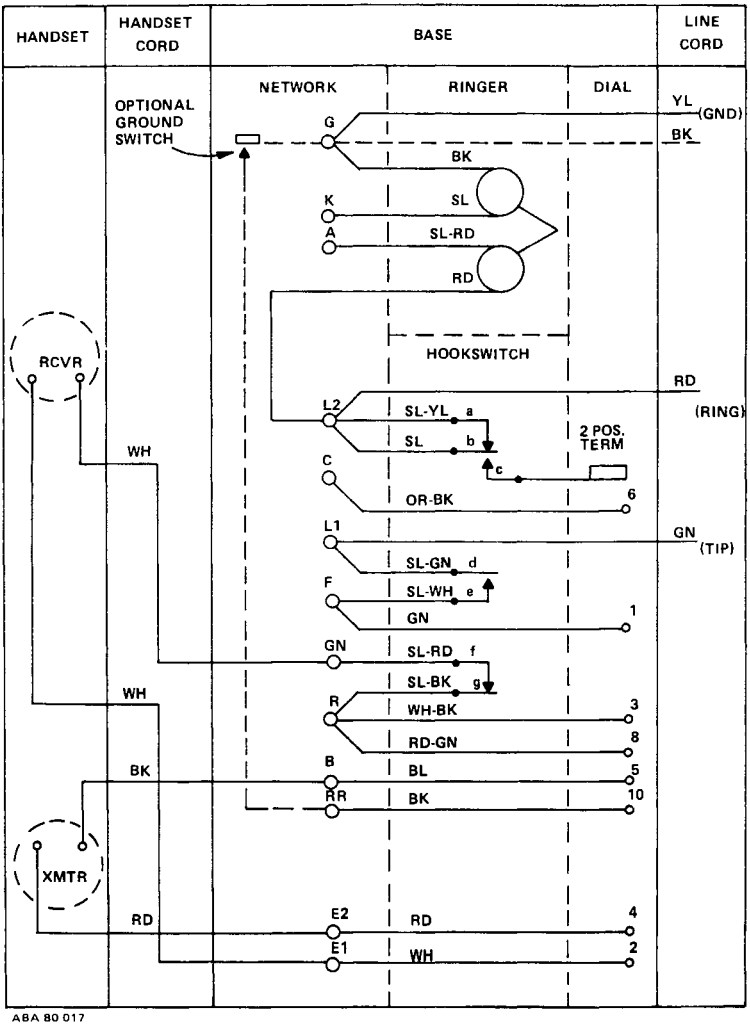


FIGURE 11.02 Circuit Diagram, Models K2500 **( ) 20/24 with Polarity Guard

Models K2500**( ) 27/28

11.06 The models K2500**( ) 27/28 are single line, Tel-Touch telephones with a message waiting lamp. The lamp is for use in PABX applications where under control of the attendant it can be lit to indicate the station user should call the attendant for a waiting message. The model K2500**( ) 27 is available with a lower power NE51 (90 volt) indicator; the model K2500**( ) 28 has a higher power NE51H (125 volt) indicator. The wiring diagram for these models is shown in figure 11.03.

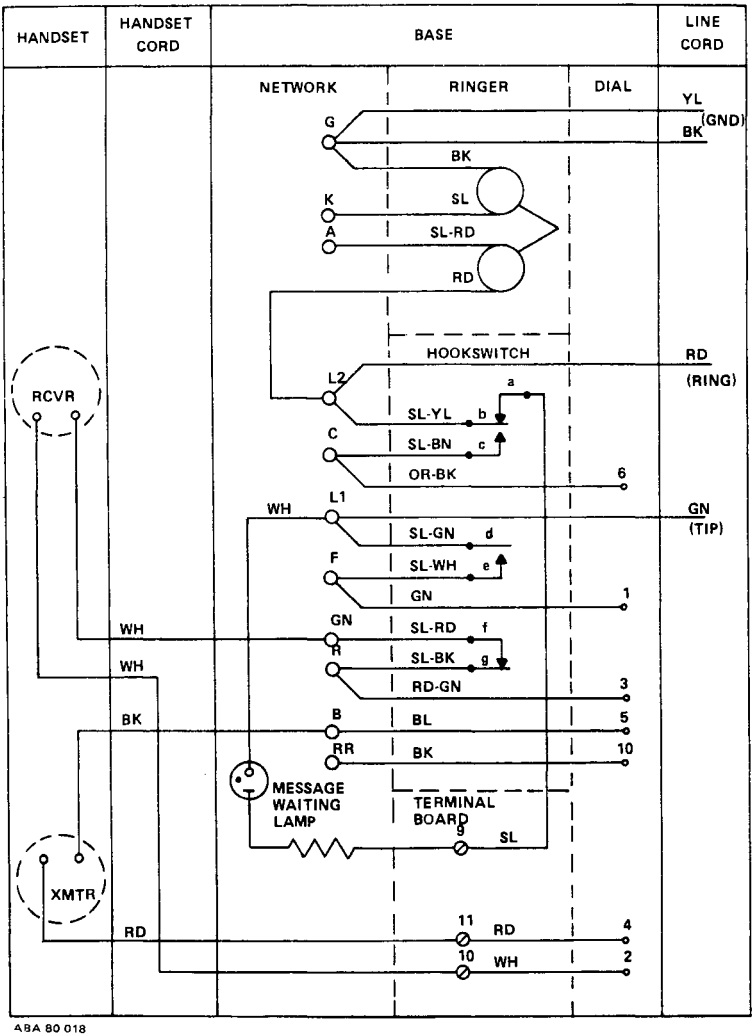


FIGURE 11.03 Circuit Diagram, Models K2500 **( ) 27/28

Model K2500**( ) 39

11.07 The model K2500**( ) 39 is a specially modified single line, Tel-Touch, desk telephone arranged for hands-free applications. It is equipped with a 36G-450 dial assembly which provides a closure to mute the hands-free loudspeaker during dialing. The wiring diagram for this model is shown in figure 11.04.

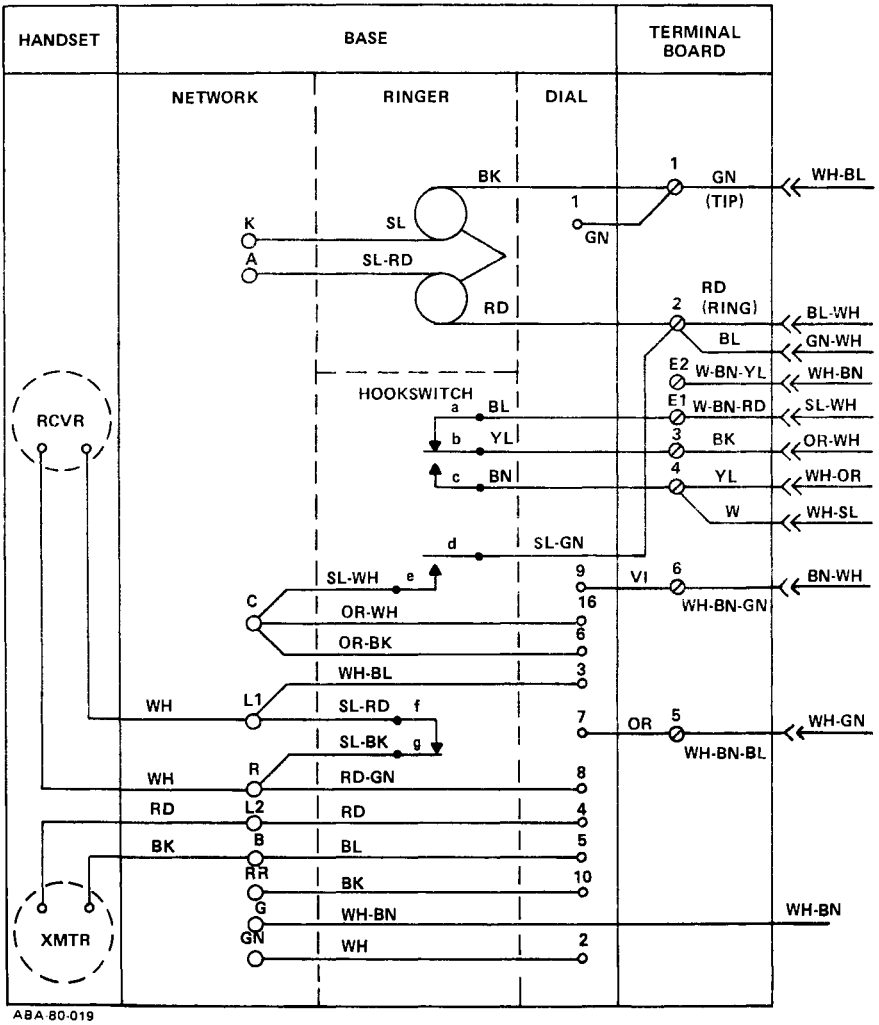


FIGURE 11.04 Circuit Diagram, Model K2500 **( ) 39

Model K2500**( ) 44

11.08 The model K2500**( ) 44 is a single line, Tel-Touch, desk telephone arranged for "A" lead control. This telephone provides connections through the hookswitch which allow ground on lead A1 to be applied to key equipment via the A lead, to trip ringing. The model K2500**( ) 20 can be converted to a model K2500**( ) 44. A wiring diagram for this model is shown in figure 11.05.

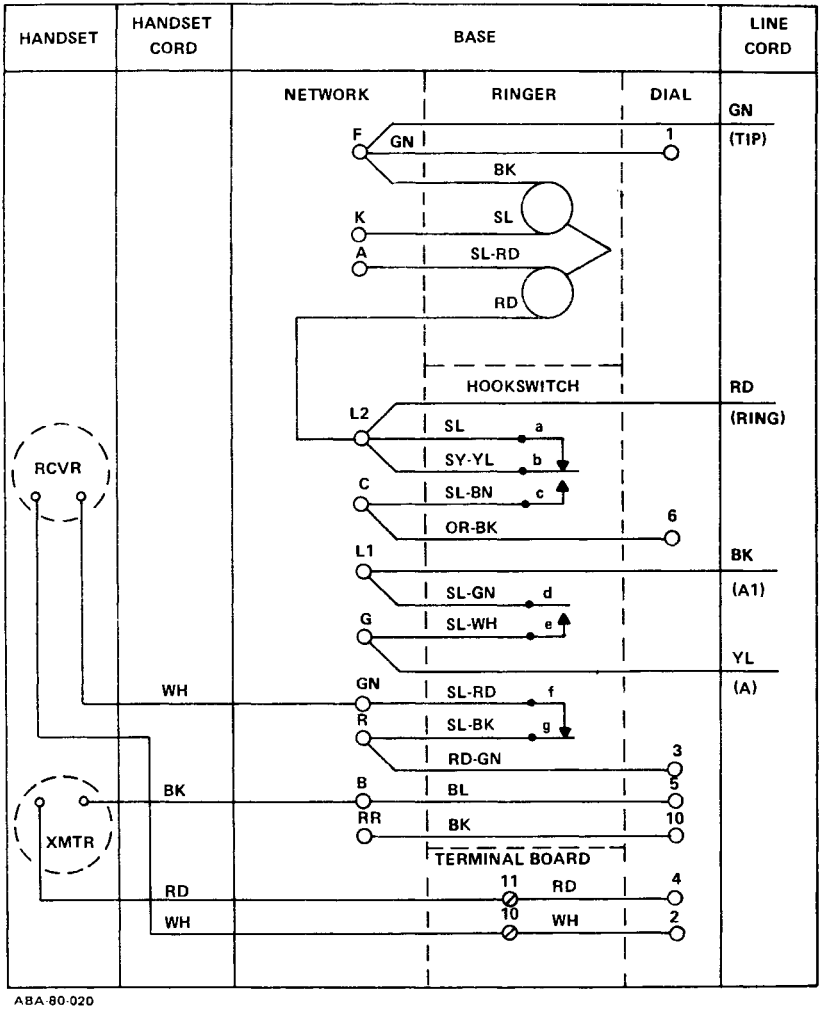


FIGURE 11.05 Circuit Diagram, Model K2500 **( ) 44

NOTE: K2500 desk sets with special feature codes 30, 34, 37 and 38 have been superceded by sets with special feature codes 20, 24, 27 and 28 respectively.

TABLE 11.00 K2500 Desk Telephones

CODE	DESCRIPTION
K2500**( ) 20 •	Telephone, desk, standard.
K2500**( ) 24 •	Telephone, desk, push button ground.
K2500**( ) 27 •	Telephone, desk, message waiting lamp, 90 volt.
K2500**( ) 28 •	Telephone, desk, message waiting lamp, 125 volt.
K2500**( ) 39 •	Telephone, desk, for hands free application.
K2500**( ) 44 •	Telephone, desk, "A" lead control.
	•Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N - No dial - e/w dial blank ( ) Add Ringer Code (LR) Less Ringer (BA) Straight line biased ringer **Substitute Color Code 00 - Black 43 - Burnt Orange 05 - Green 44 - Light Ash 09 - Ivory 45 - Cocoa Brown 12 - Blue 46 - Harvest Gold 13 - Beige 47 - Cherry Red 15 - White

Installation

11.09 Refer to the appropriate wiring diagrams for connecting series K2500 desk telephones.

Testing

11.10 After the telephone set is installed, check for proper operation of the Tel-Touch dial, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features. Check for noise due to loose contacts when the set is gently bumped or dropped.

Ordering Information

11.11 Because of the large number of stock numbers, due to variations in colors and features, individual stock numbers are not shown in table 11.00. Instead a guide for determining dial, ringer, and color codes is included in the table.

12. K-2510 DESK TELEPHONE

CONTENTS PAGE

12.01 Series K2510 desk telephones manfactured by ITT are described in the following paragraphs. Included are circuit diagrams for the two sets most commonly used.

General Description

12.02 The K2510 series telephones are two line, Tel-Touch, desk units which operate efficiently over a wide range of loop resistances and line impedances. These instruments are equipped with a turn and push key which permits selection of either of two lines. The ringer is permanently connected to line 1; a separate ringer must be provided for line 2.

Model K2510**( ) 30

12.03 The model K2510**( ) 30 is a standard, Tel-Touch, two line, desk telephone equipped with a six conductor mounting cord for pickup of two lines and push button signaling.

Model K2510**( ) 36

12.04 The model K2510**( ) 36 is the same as the type K2510**( ) 30 except it is equipped with a four conductor mounting cord. A wiring diagram for both models is shown in figure 12.00.

Installation

12.05 Refer to figure 12.00 for the wiring diagram for connecting Series K2510 desk telephones.

Testing

12.06 After the telephone set is installed, check for proper operation of the dial, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features.

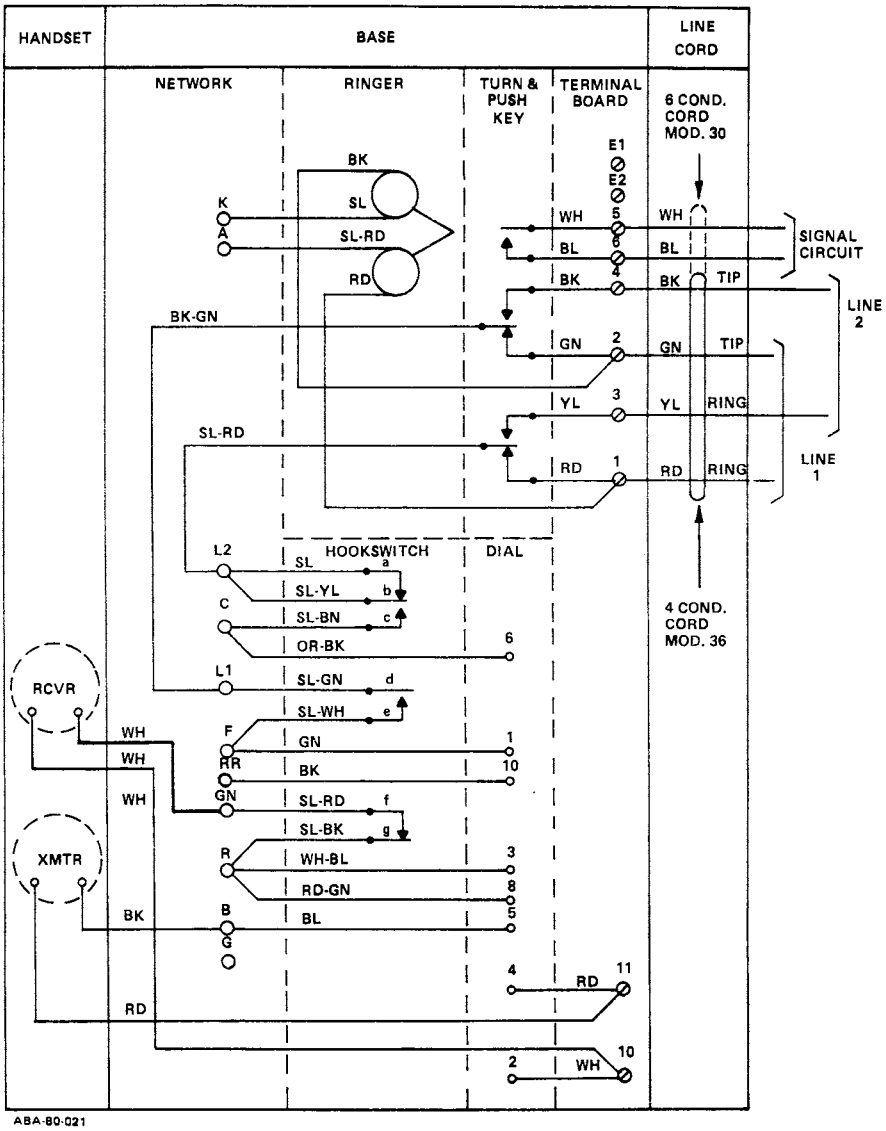


FIGURE 12.00 Circuit Diagram, Models K2510**( ) 30/36

Ordering Information

12.07 Table 12.00 shows the different type K2510 instruments and their identifying numbers. Because of the large number of stock numbers involved due to variations in colors and features, individual stock numbers are not shown. Instead, a guide for determining dial, ringer, and color codes is included in the table.

TABLE 12.00 K2510 Desk Telephones

CODE	DESCRIPTION
K2510**( ) 30 •	Telephone, 2 line, Tel-Touch dial, standard 6 conductor cord.
K2510**( ) 36 •	Telephone, 2 line, Tel-Touch dial, 4 conductor cord.
	•Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N - No dial - e/w dial blank ( ) Add Ringer Code (LA) Less Ringer (BA) Straight line biased ringer **Substitute Color Code 00 - Black 13 - Beige 05 - Green 15 - White 09 - Ivory

13. K-2554 WALL TELEPHONE

CONTENTS PAGE

13.01 Series K2554 wall telephones manufactured by ITT are described in the following paragraphs. A circuit diagram and descriptive material is provided for the models most commonly used.

General Description

13.02 The K2554 wall telephones (see figure 13.00) are single line, anti-sidetone units similar in design and performance to the series K500 wall telephones. Each unit is equipped with a 12-button Tel-Touch dial. The handset cradle is rigidly mounted and the hookswitch is activated by a plunger which protrudes through the cradle. Ringer loudness is externally adjustable by a loudness control wheel on the top of the set. Series K2554 wall telephones use a type 148 miniature single gong ringer and a standard K500 type handset.

13.03 Table 13.00 lists three variations of the series K2554 wall telephones. Included are the standard model, K2554** ( ) 30, the standard model with a grounding push button, K2554**( ) 34, and the standard model with "A" lead control, K2554**( ) 44.

Installation

13.04 The wiring diagrams for Series K2554 telephones are shown in figures 13.01, 13.02, and 13.03.

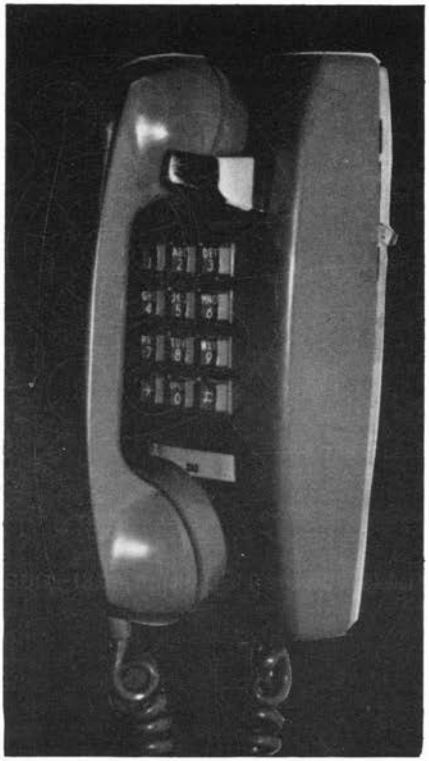


FIGURE 13.00 K-2554 Wall Telephone

13.05 Install the telephone as follows:

a. Remove the housing. Do so by first removing the number card retainer by inserting a straightened paper clip into the rounded slot at the right end and prying the retainer out of the housing. (See figure 13.04.) Hold two fingers over the retainer to prevent it from springing away. Next, remove the two screws and lift the housing assembly over the Tel-Touch pad and the handset cradle.

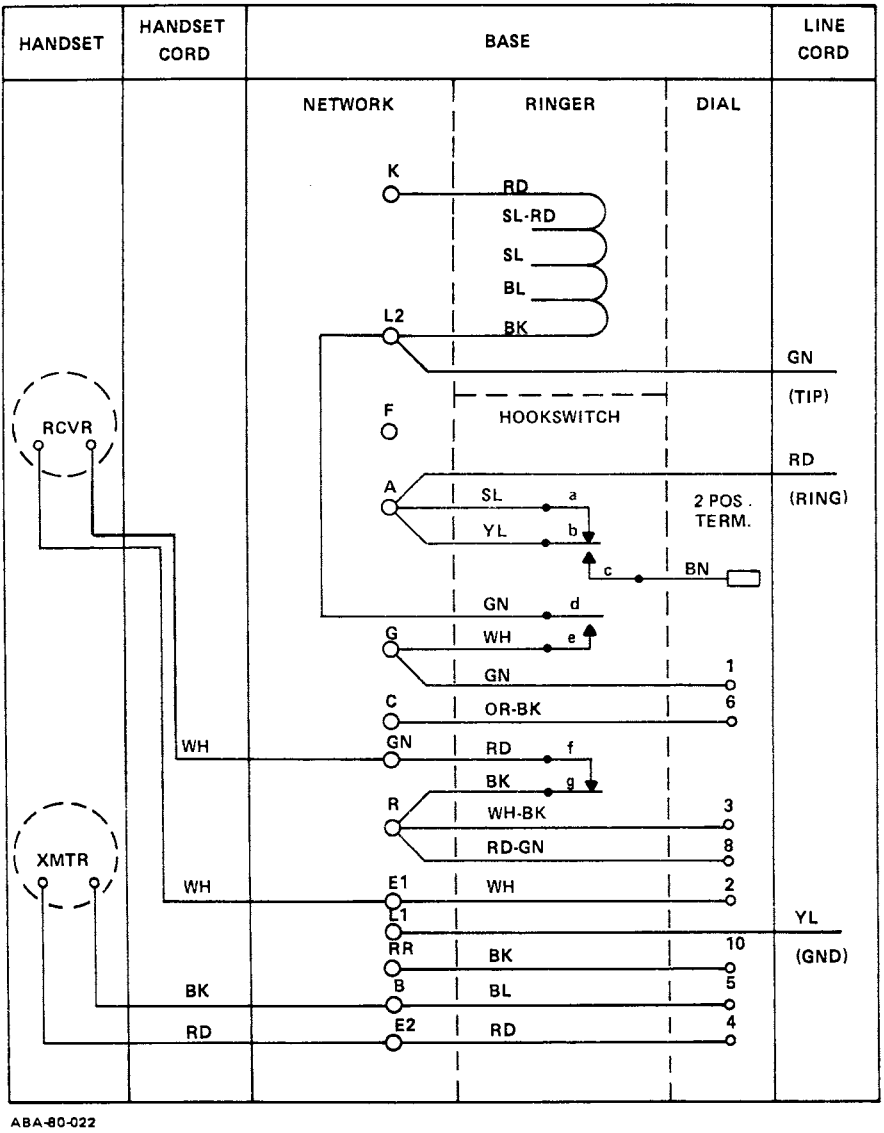


FIGURE 13.01 Circuit Diagram, Model K2554**( ) 30 with Polarity Guard Circuit

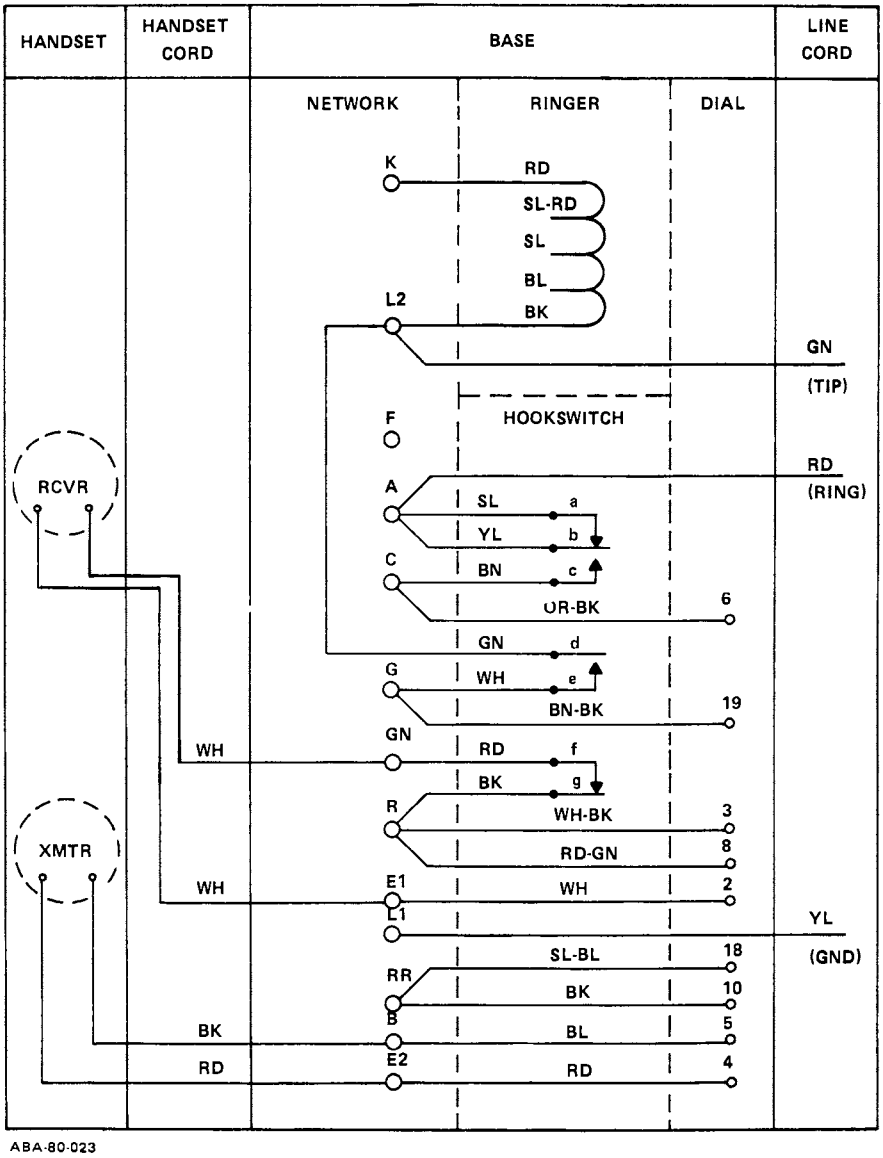
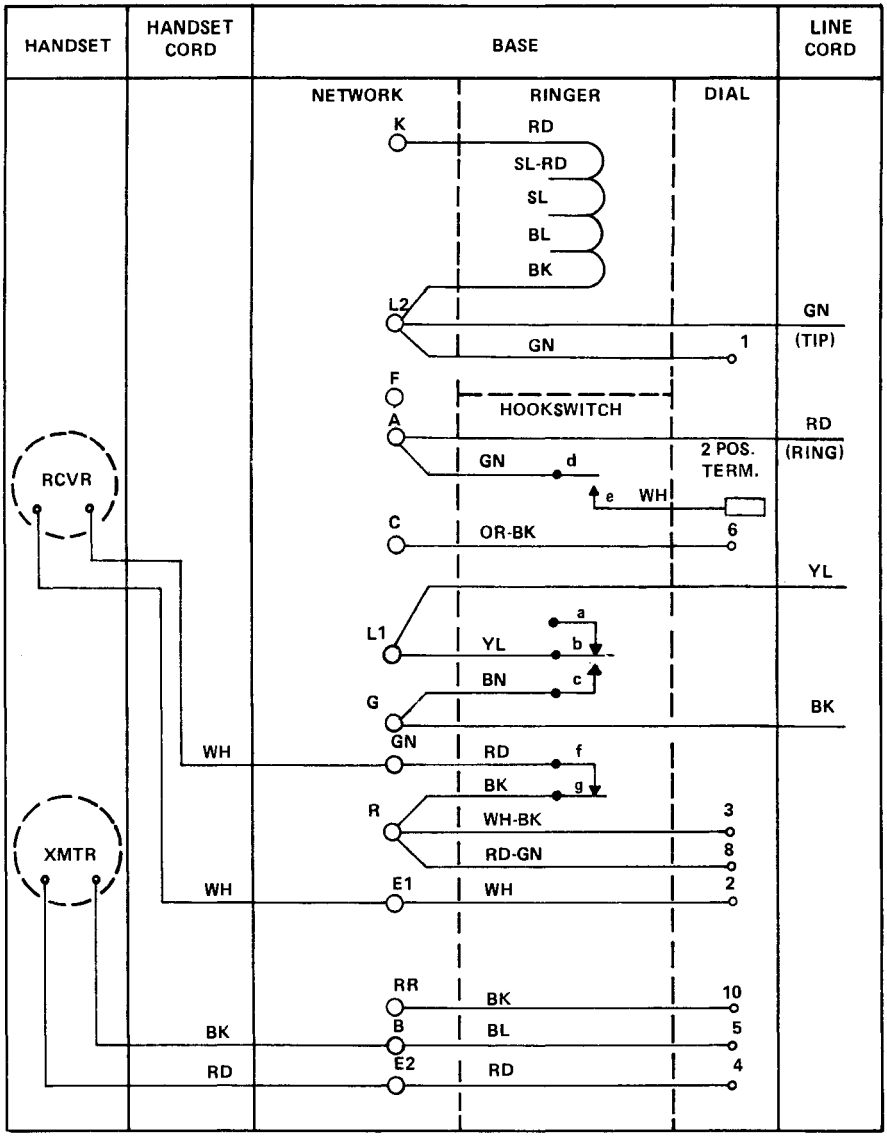


FIGURE 13.02 Circuit Diagram, Model K2554 **( ) 30 without Polarity Guard Circuit



ABA-81-005

FIGURE 13.03 Circuit Diagram, Model K-2554 **( ) 44

TABLE 13.00 K2554 Wall Telephone

CODE	DESCRIPTION
K2554**( ) 30 •	Telephone, Wall, Tel-Touch.
K2554**( ) 34 •	Telephone, Wall, Tel-Touch, Push button ground.
K2554**( ) 44 •	Telephone, Wall, Tel-Touch, "A" lead control.
	•Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) ( ) Add Ringer Code (LR) Less Ringer (BA) Straight line biased ringer **Substitute Color Code 00 - Black 43 - Burnt Orange 05 - Green 44 - Light Ash 09 - Ivory 45 - Cocoa Brown 12 - Blue 46 - Harvest Gold 13 - Beige 47 - Cherry Red 15 - White

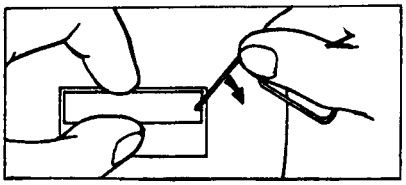


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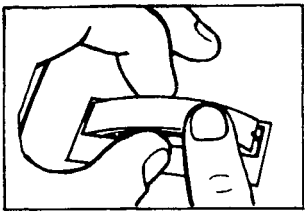
FIGURE 13.04 Removing Number Card Retainer

b. Mount the telephone. Attach the telephone to the wall using two mounting screws. One is in the upper left hand corner; the other is in the lower right hand corner, to the right of the network.

c. Connect the station wires. Connect the green lead to terminal #1 on the terminal board, connect the red lead to terminal #2 on the terminal board; connect the yellow lead to terminal #3 on the terminal board.

d. Install the housing. Hold the housing in place and insert and tighten the two retaining screws. Next, insert the number card retainer as shown in figure 13.05.



ABA-80-025

FIGURE 13.05 Installing Number Card Retainer

Grasp the number card retainer near the center by its edges, and insert one end in its recess in the housing. Finally, bend the opposite end down into place and release the retainer.

Testing

13.06 After the telephone set is installed, check for proper operation of the Tel-Touch key pad, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features.

Ordering Information

13.07 Because of the large number of stock numbers necessitated by various combinations of colors and features, stock numbers for the K2554 series telephones are not listed in this manual. Instead, table 13.00 includes a guide for determining dial, ringer, and color codes for series K2554 telephones.

14. K-2564/K2565 KEY TELEPHONES

CONTENTS PAGE

14.01 The series K2564/K2565 key telephones manufactured by ITT, are described in the following paragraphs. Circuit diagrams are included for those sets most commonly installed.

General Description

14.02 The type K2564/K2565 desk telephones are six button, Tel-Touch, anti-sidetone sets which operate efficiently over a wide range of loop resistances and line impedances. They are designed to be used with key telephone systems such as the ITT K1A2 system, where several telephones have access to the same lines, CO trunks, or intercom lines.

14.03 Five push-button keys on the telephone are used for line, trunk, or intercom selection; one key is used to place a HOLD on any selected line or trunk. From left to right, the keys are used as follows. The first key is the HOLD key; the second, third and fourth keys are used as line pick up keys, the remaining two keys may be wired as either line or intercom signal keys.

14.04 A signal lamp beneath each of the five pickup keys indicates status of the associated line. (See table 14.00).

TABLE 14.00 Pick Up Key Signals

CONDITION	LAMP INDICATION
Idle	Lamp Extinguished
Busy	Lamp Lit
Hold	Lamp Winking
Call Incoming	Lamp Flashing

14.05 Some of the more commonly installed variations of the K2564/K2565 series telephones are briefly described in the following paragraphs.

Model K2564**( ) 40

14.06 The model K2564**( ) 40 is a standard 6-button, Tel-Touch, desk type, key telephone. It is equipped with a 34 conductor mounting cord fitted with a 50 pin (25 pair) male connector. The wiring diagrams for this model are shown in figures 14.00 and 14.01.

Model K2564**( ) 41

14.07 The model K2564**( ) 41 is identical to the above model except it includes a grounding push button switch. The grounding push button is required in some PABX applications for transferring calls, originating calls during a power failure, etc.

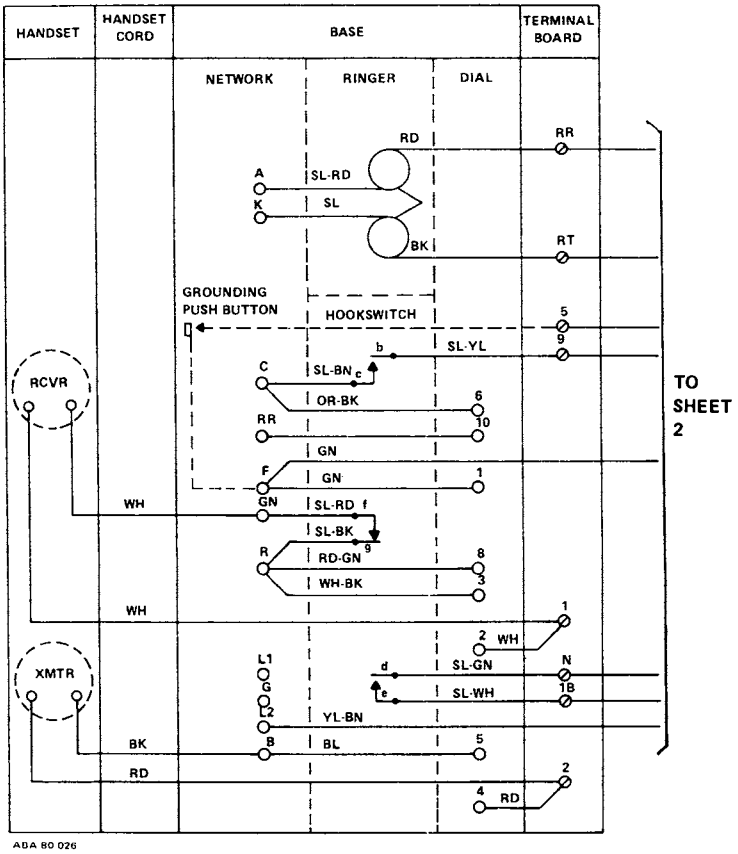


FIGURE 14.00 Circuit Diagram, Model K2564**( ) 40/41 (Sheet 1)

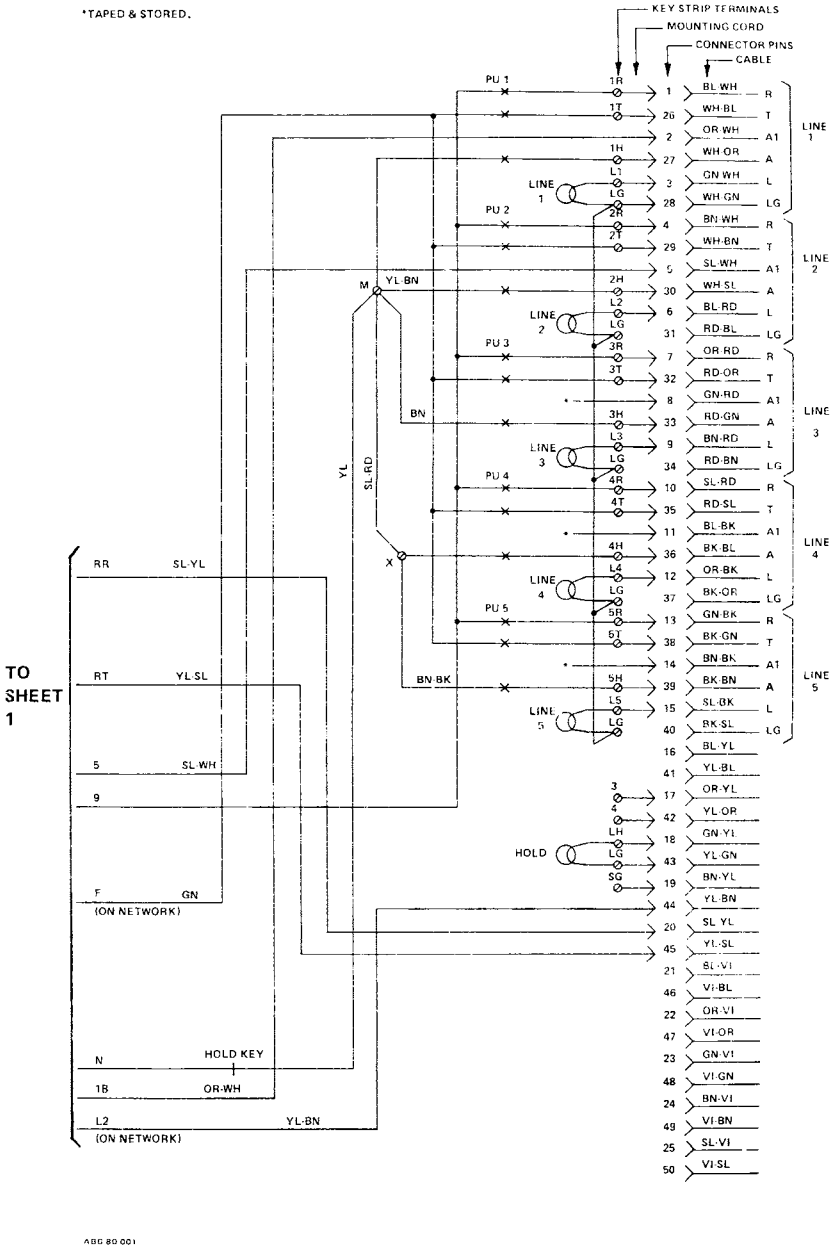


FIGURE 14.00 Circuit Diagram, Model K2564**( ) 40/41 (Sheet 2)

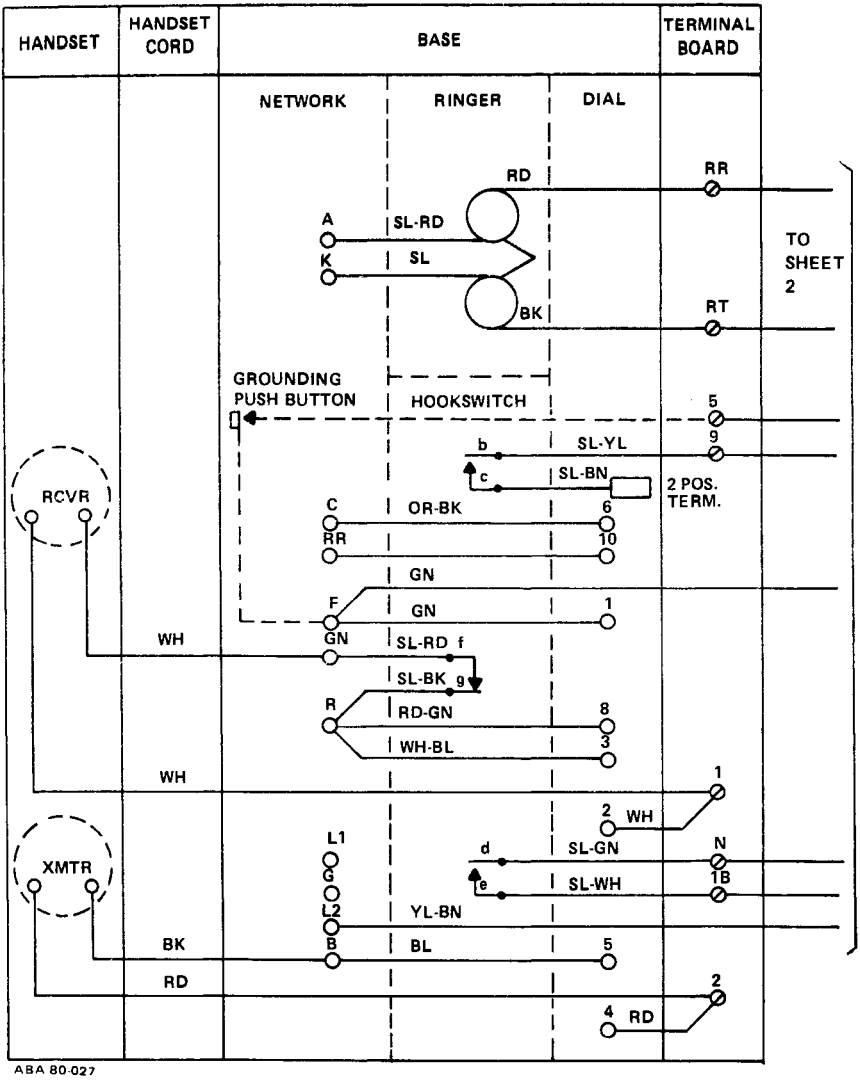


FIGURE 14.01 Circuit Diagram, Model K2564**( ) 40/41 with Polarity Guard (Sheet 1)

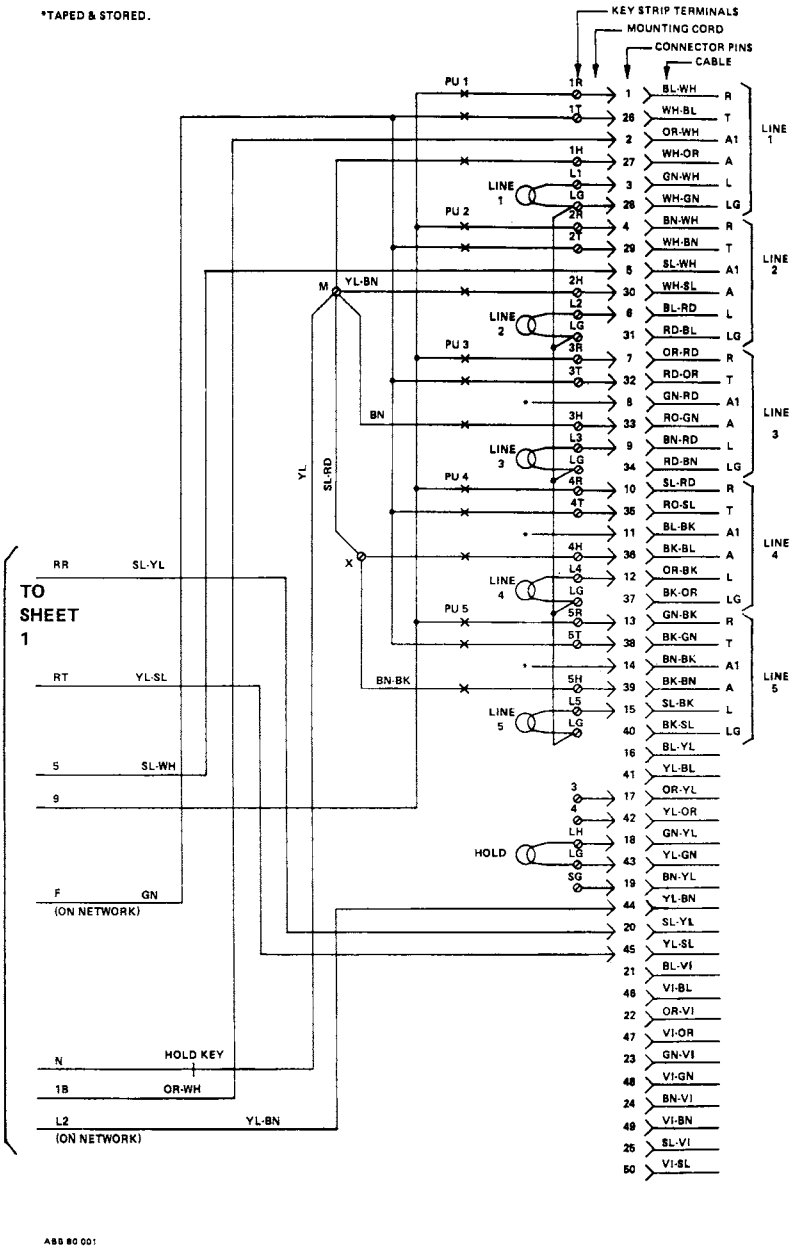


FIGURE 14.01 Circuit Diagram, Model K2564**( ) 40/41 with Polarity Guard (Sheet 2)

Model K2565**( ) 40

14.08 The model K2565**( ) 40 is a standard 6-button, Tel-Touch, desk type key telephone equipped with a manual exclusion switch in the left hand cradle plunger. Lifting the plunger disconnects any multipled telephones from the first line circuit. This model is equipped with a 42 conductor mounting cord fitted with a 50 pin (25 pair) male connector. The wiring diagrams for the model K2565**( ) 40 telephone are shown in figures 14.02 and 14.03.

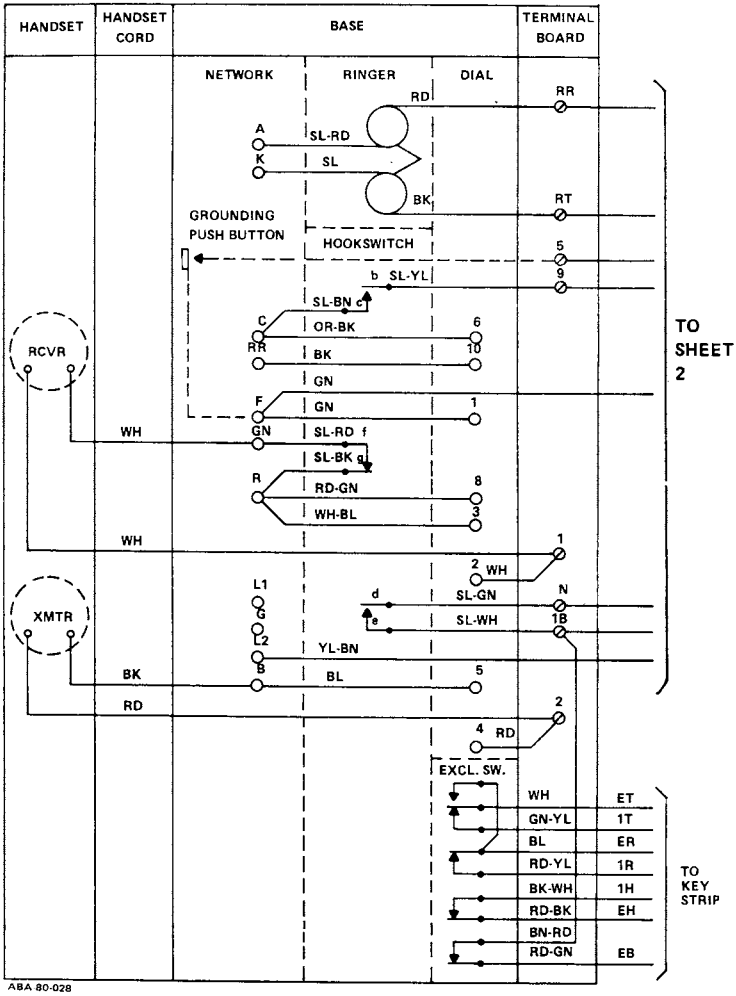


FIGURE 14.02 Circuit Diagram, Model K2565**( ) 40/41 (Sheet 1)

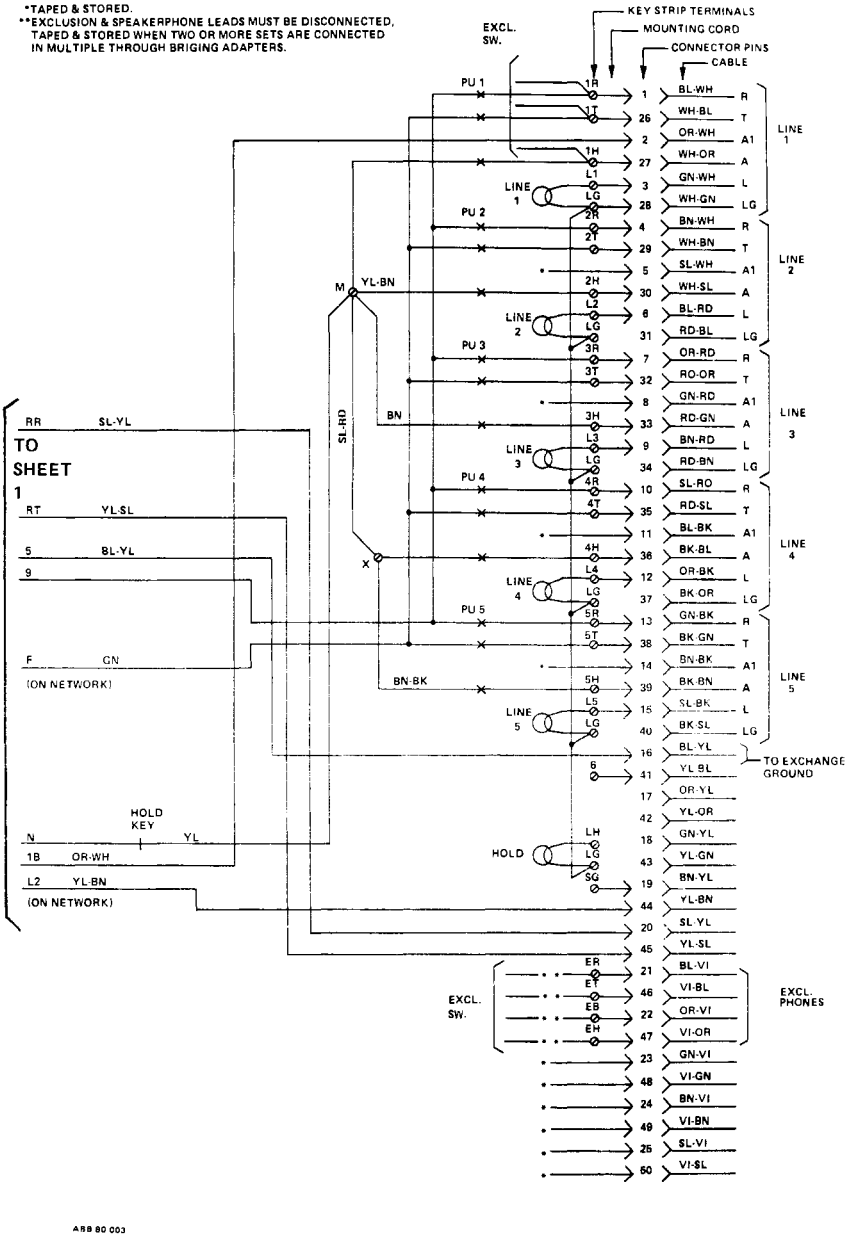


FIGURE 14.02 Circuit Diagram, Model K2565**( ) 40/41 (Sheet 2)

Model K2565**( ) 41

14.09 The model K2565**( ) 41 is identical to the model K2565** ( ) 40 telephone except it includes a grounding push button switch. The grounding push button is required in some PABX applications for transferring calls, originating calls during a power failure, etc.

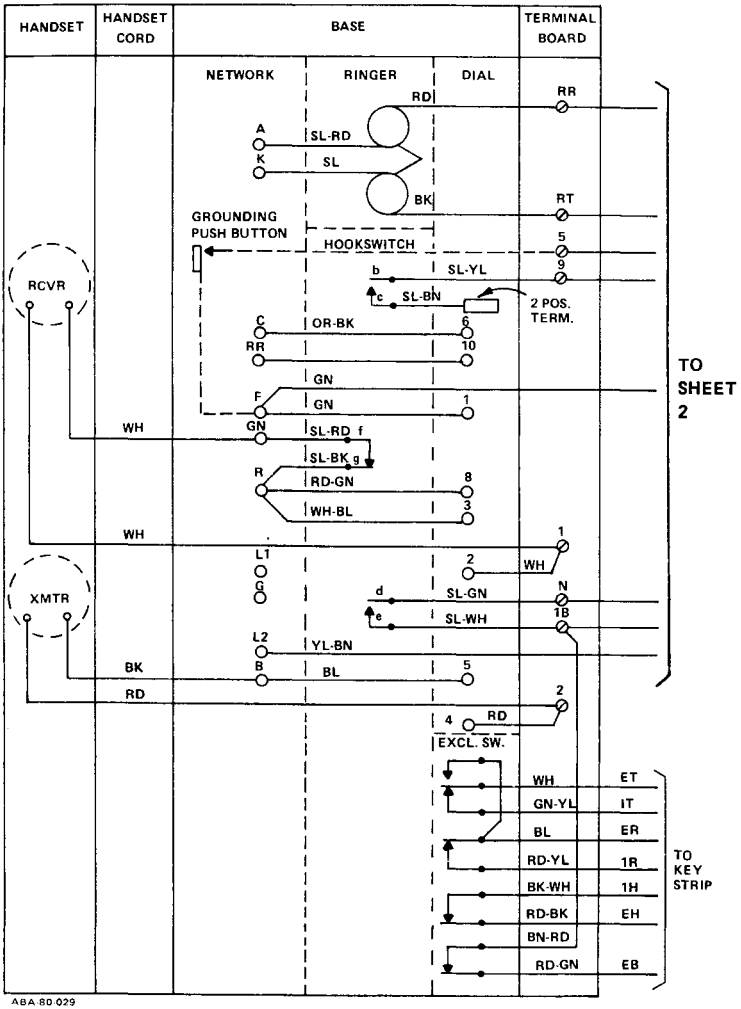


FIGURE 14.03 Circuit Diagram, Model K2565**( ) 40/41 with Polarity Guard (Sheet 1)

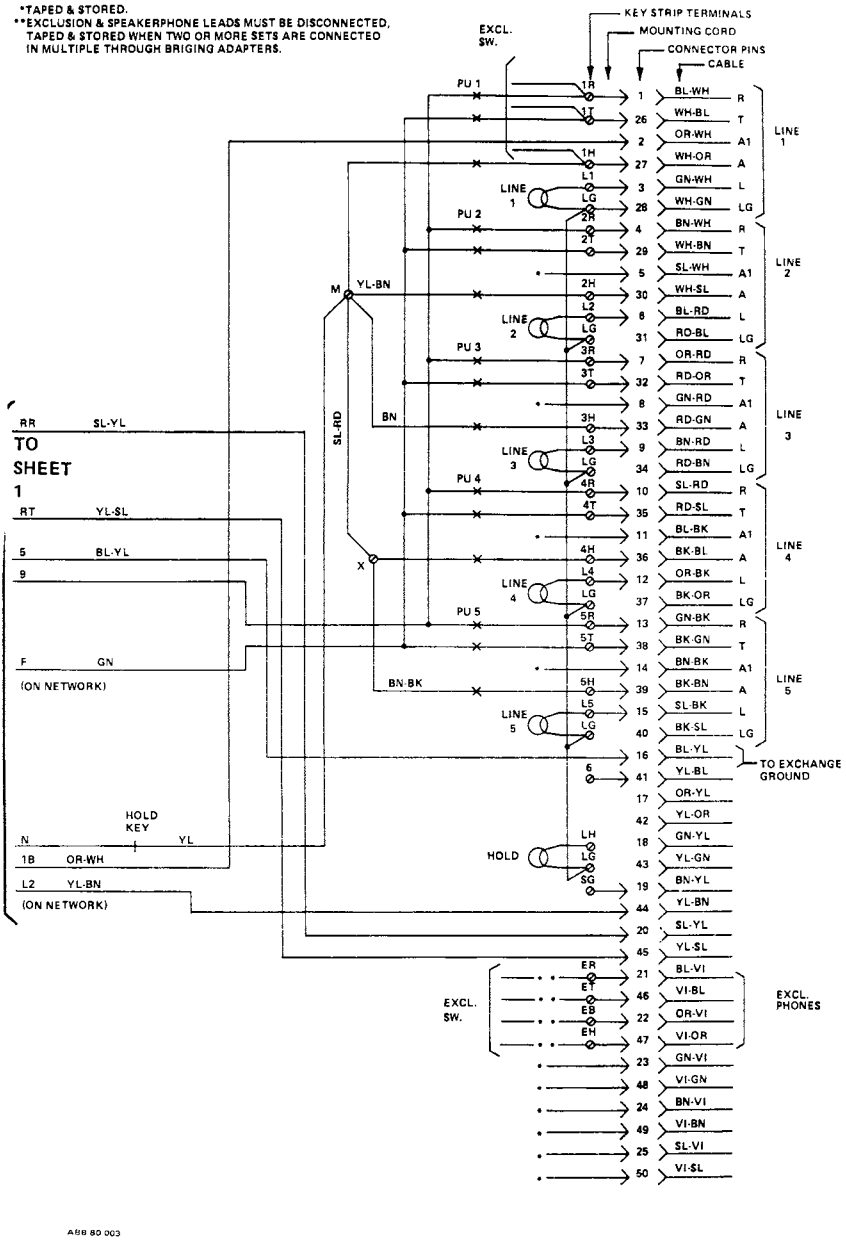


FIGURE 14.03 Circuit Diagram, Model K2565**( ) 40/41 with Polarity Guard (Sheet 2)

Model K2565**( ) 42

14.10 The model K2565**( ) 42 is a specially modified K2565 series elephone arranged for hands-free applications. It is equipped with a 2500-00G type Tel-Touch dial assembly which provides a closure to mute the hands-free speaker during dialing, and an additional set of contacts in the hookswitch assembly for on/off control of the hands-free equipment. This model includes a manual exclusion plunger but does not include the manual exclusion switch. The model K2565**( ) 42 is equipped with a 50 conductor mounting cord fitted with a 50 pin (25 pair) male connector. The wiring diagram for this model is shown in figure 14.04.

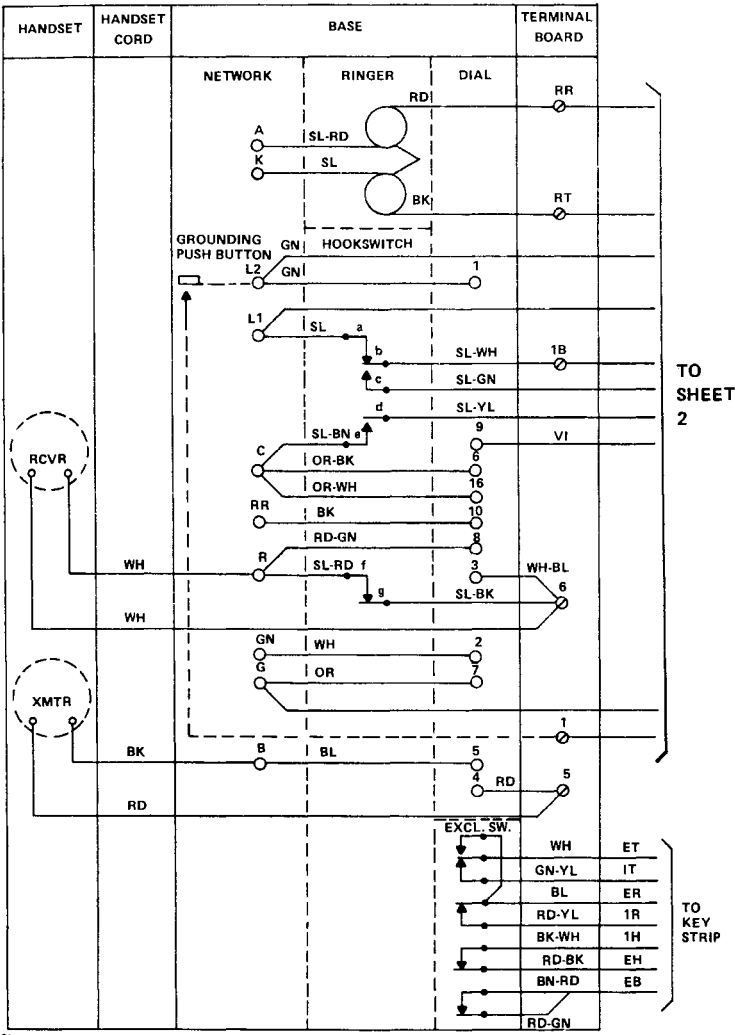


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FIGURE 14.04 Circuit Diagram, Model K2565**( ) 39/42 (Sheet 1)

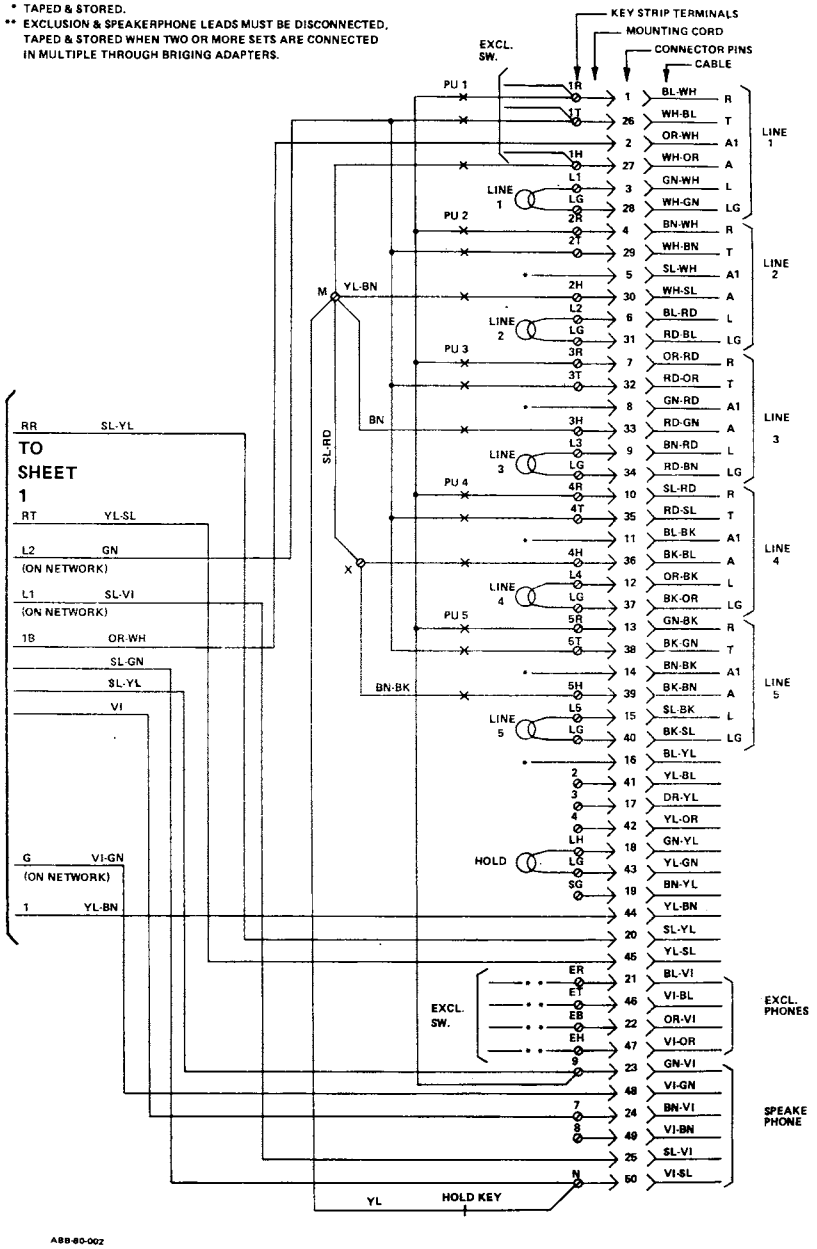


FIGURE 14.04 Circuit Diagram, Model K2565**( ) 39/42 (Sheet 2)

Model K2566**( ) 40

14.11 The model K2566**( ) 40 is the same as the model K2564**( ) 40 except it includes a hookswitch restoration button which restores any operated line button when the hookswitch is depressed. This model includes an additional push button for recalling the attendant and for transferring a call in some PABX applications.

Model K2567**( ) 40

14.12 The model K2567**( ) 40 is the same as the model K2565**( ) 40 except it includes a hookswitch restoration button which restores any operated line button when the hookswitch is depressed. This model also includes an additional push button for recalling the attendant or for transferring a call in some PABX applications.

Model K2567**( ) 42

14.13 The model K2567**( ) 42 is the same as the model K2565**( ) 42 except it includes a hookswitch restoration button which restores any operated line button when the hookswitch is depressed. This model also includes an additional push button for recalling the attendant or for transferring a call in some PABX applications.

Installation

14.14 As these telephones are equipped with quick-connect cable connectors, installation consists of simply plugging the pre-wired connectors into the station cables. Refer to the appropriate circuit diagram (figures 14.00 through 14.04) for connections.

Testing

14.15 After the telephone set is installed, check for proper operation of the line buttons, hold button, dial, transmitter, receiver, ringer loudness control, sidetone suppression circuit, and any special features. Check for noise due to loose contacts when the set is gently bumped or shaken.

Ordering Information

14.16 Table 14.01 shows some of the more common types of K2564/K2565 series instruments and their identifying numbers. Because of the large number of stock numbers involved due to variations in colors and features, individual stock numbers are not shown. Instead a guide for determining dial, ringer, and color codes is included in the table.

TABLE 14.01 K2564/K2565 Desk Telephones

CODE	DESCRIPTION
K2564**( ) 40 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial e/w 34 conductor cord with plug.
K2564**( ) 41 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial, push button ground, e/w 34 conductor cord with plug.
K2565**( ) 40 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial, e/w manual exclusion switch and 42 conductor cord with plug.
K2565**( ) 41 •	Telephone, 6 button key with common "HOLD": Tel-Touch dial, push button ground, e/w manual exclusion switch and 42 conductor cord with plug.
K2565**( ) 42 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial, e/w manual exclusion switch and additional contacts for hands free operation. Equipped with 50 conductor cord with plug.
K2566**( ) 40 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial, e/w 34 conductor cord with plug. Includes hookswitch button restoration.
K2567**( ) 40 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial, e/w manual exclusion switch and 42 conductor cord with plug. Includes hookswitch button restoration.
K2567**( ) 42 •	Telephone, 6 button key, with common "HOLD": Tel-Touch dial, e/w manual exclusion switch and additional contacts for hands free operation. Equipped with 50 conductor cord with plug and hookswitch button restoration.
	•Add Dial Code R - Regular (Numerals only) M - Metro (Letters and Numerals) N - No dial - e/w dial blank ( ) Add Ringer Code (LR) Less Ringer (BA) Straight line biased ringer **Substitute Color Code 00 - Black 15 - White 05 - Green 44 - Light Ash 09 - Ivory 45 - Cocoa Brown 13 - Beige

15. TEN AND TWENTY BUTTON KEY TELEPHONES

CONTENTS PAGE

15.01 The following paragraphs describe 10 and 20 button key telephones manfactured by ITT. Included are circuit diagrams and connecting drawings for those sets most commonly installed.

General Description

15.02 The 10 and 20 button key telephone sets are anti-sidetone units equipped with rotary or Tel-Touch dials and designed for desk or wall mounting. These telephones are for use with multi-line key telephone systems where individual stations must have pickup and hold capabilities for a number of CO and/or PABX lines.

15.03 The ten button sets have one HOLD button and nine convertible (pickup or signal) buttons; they are equipped with 50 conductor mounting cords and fitted with 50 pin (25 pair) male connectors. The twenty button sets have one HOLD button and nineteen convertible buttons; they are equipped with 100 conductor mounting cords, fitted with two 50-pin (25 pair) male connectors.

15.04 The red button on each unit serves as a HOLD key; it is used to place one or more lines on hold. The remaining buttons are used as line pickup keys; they may be converted to non-locking operation for manual signalling or control of semiautomatic exclusion. (Manual exclusion control is not offered.)

15.05 A signal lamp is provided beneath each pickup key to indicate the status of the associated line. Lamp signals are shown in table 15.00.

TABLE 15.00 Pick Up Key Signals

CONDITION	LAMP INDICATION
Idle	Extinguished
Busy	Lit Steady
On Hold	Winking
Incoming Call	Flashing

15.06 Designation tabs are individually installed under the cap of each button for convenience in changing or adding designations. All desk type models are equipped with a hookswitch restoration button. (This feature can be disabled by the installer.)

15.07 On both the ten and twenty button units, depressing the hookswitch will automatically restore any operated line button. This feature prevents a station user from inadvertently picking up a line that is in use by another party. In addition, a momentary push button switch is provided for attendant recall or call transfer in PABX applications.

10 Button Sets

15.08 Variations of the 10 button (9 line) units are described below.

a. The model K830**( ) 42 is a rotary dial, desk set arranged for hands-free applications. This set includes an additional set of contacts in the hookswitch for ON/OFF control of hands-free equipment. See figures 15.00 and 15.01 for wiring diagrams.

b. The model K830**( ) 46 is the same as the model K830**( ) 42 except it is equipped with a push button switch for operator recall.

c. The model K830**( ) 76 is the same as model K830**( ) 42 except it is also equipped with an automatic exclusion (privacy) circuit and a release button. Where this feature is required, all sets in the key system must provide the exclusion circuit and a release button. See figures 15.02 and 15.03 for wiring diagrams.

d. The model K854**( ) 42 is a rotary dial, wall mounting set arranged for hands-free applications. This set includes an additional set of contacts in the hookswitch for ON/ OFF control of hands-free equipment. See figures 15.01 and 15.04 for wiring diagrams.

e. The model K2830**( ) 42 is a Tel-Touch, desk telephone arranged for hands-free applications. This set includes an additional set of contacts in the hookswitch for on/off control of hands-free equipment. See figures 15.01 and 15.05 for wiring diagrams.

f. The model K2830**( ) 46 is the same as the model K2830**( ) 42 except it is equipped with a push button switch for operator recall. See figures 15.01 and 15.05 for wiring diagrams.

g. The model K2830**( ) 76 is the same as model K2830**( ) 42 except it is also equipped with an automatic exclusion (privacy) circuit and a release button. Where this feature is required, all sets in the key system must provide the exclusion circuit and a release button. See figures 15.03 and 15.06 for wiring diagrams.

h. The model K2854**( ) 42 is a Tel-Touch wall mounting telephone arranged for hands-free applications. This set includes an additional set of contacts in the hookswitch for ON/OFF control of hands-free equipment. See figures 15.01 and 15.07 for wiring diagrams.

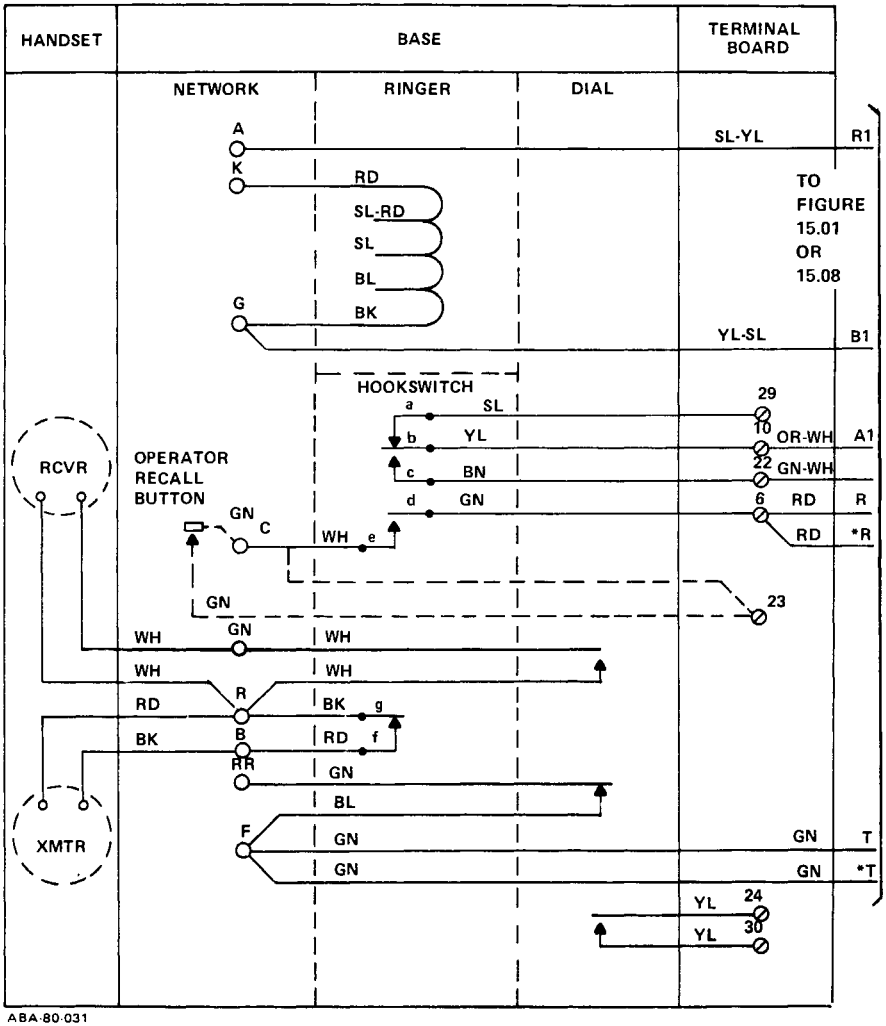
20 Button Sets

15.09 Variations of the 20 button (19 line) units are described below.

a. The model K831**( ) 42 is a rotary dial, desk type set arranged for hands-free applications. This set includes an additional set of contacts in the hookswitch for ON/OFF control of hands-free equipment. See figures 15.00 and 15.08 for wiring diagrams.

b. The model K831**( ) 46 is the same as the model K831**( ) 42 except it is equipped with a push button switch for operator recall. See figure 15.00 and 15.08 for wiring diagrams.

c. The model K831**( ) 76 is the same as model K831**( ) 42 except it is also equipped with an automatic exclusion (privacy) circuit and release button. Where this feature is required, all sets in the key system must provide the exclusion circuit and release button. See figures 15.02 and 15.09 for wiring diagrams.



*20 BUTTON SETS (K831) ONLY

FIGURE 15.00 Circuit Diagram, Models K830, K831, K835 (Except Code 76)

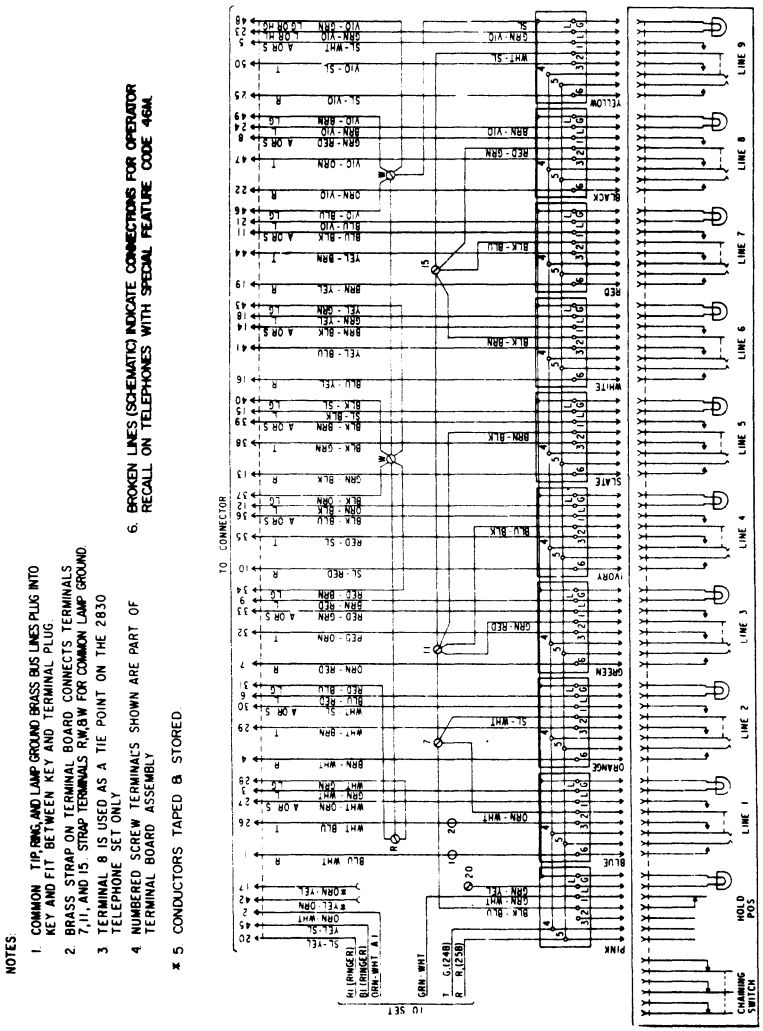
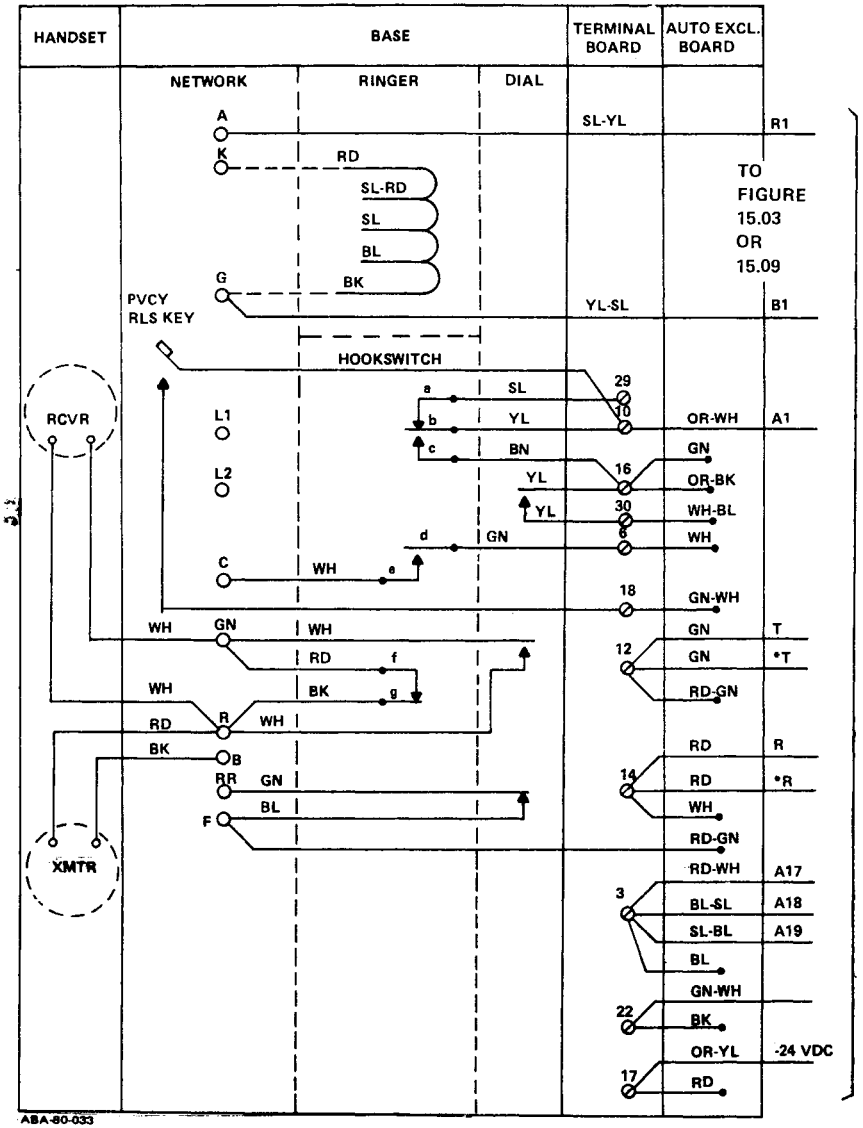


FIGURE 15.01 Key Wiring, 10-Button Sets (Except Code 76)



* 20 BUTTON SETS (K831) ONLY

FIGURE 15.02 Circuit Diagram, Models K830/76 and K831/76 Exclusion Sets

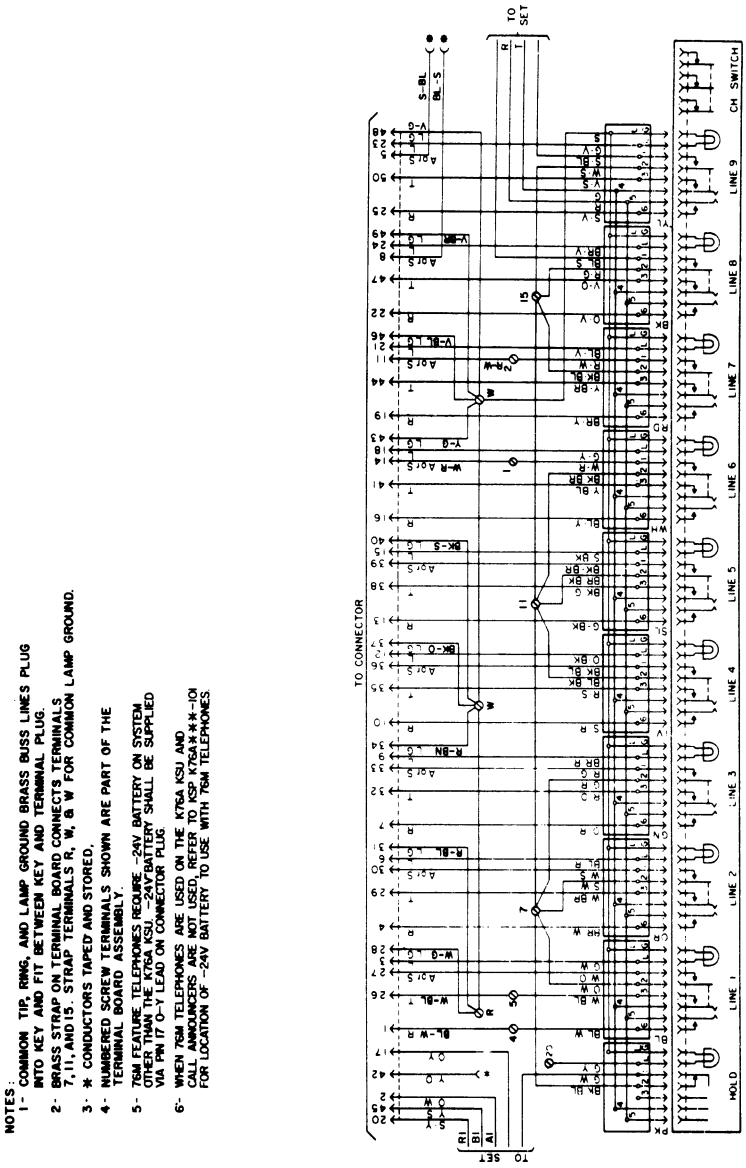


FIGURE 15.03 Key Wiring, 10-Button Exclusion Sets K830/76 and K2830/76

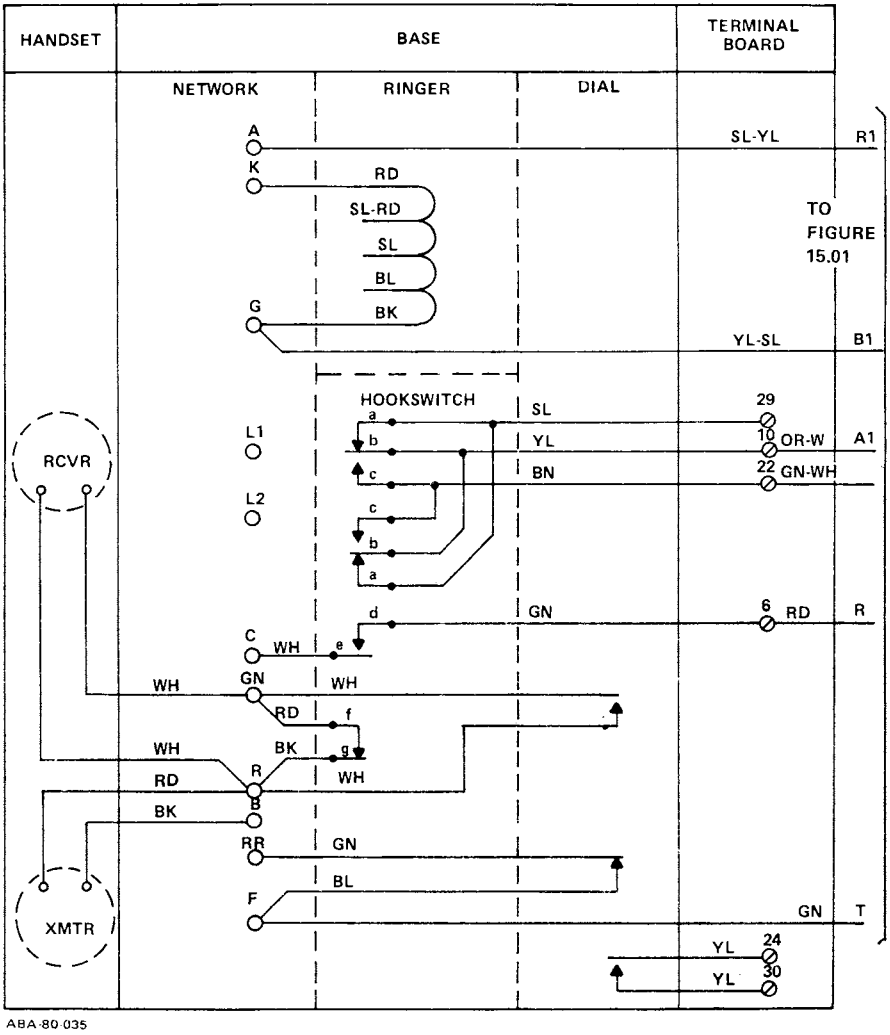


FIGURE 15.04 Circuit Diagram, Model K854

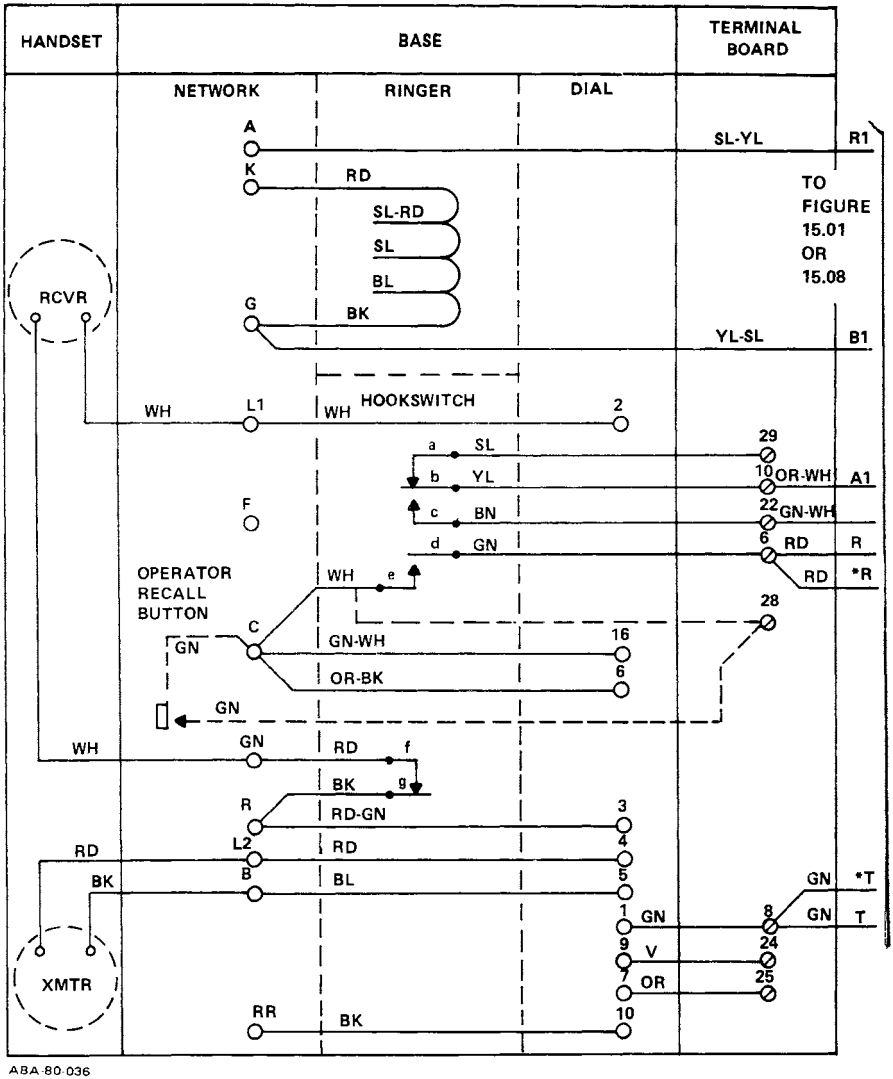


FIGURE 15.05 Circuit Diagram, Models K2830, K2831, K2835 (Except Code 76)

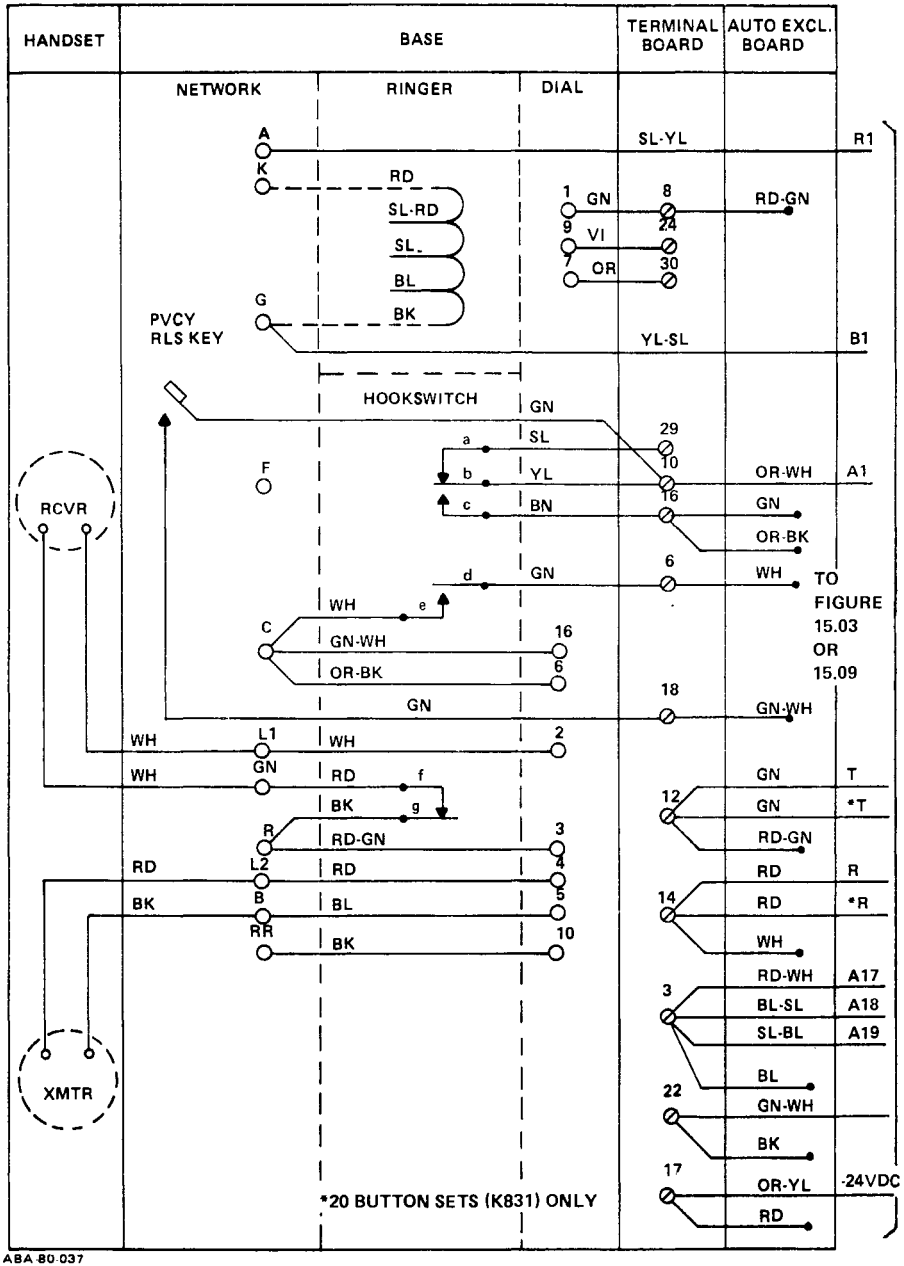


FIGURE 15.06 Circuit Diagram, Models K2830/76 and K2831/76 Exclusion Sets

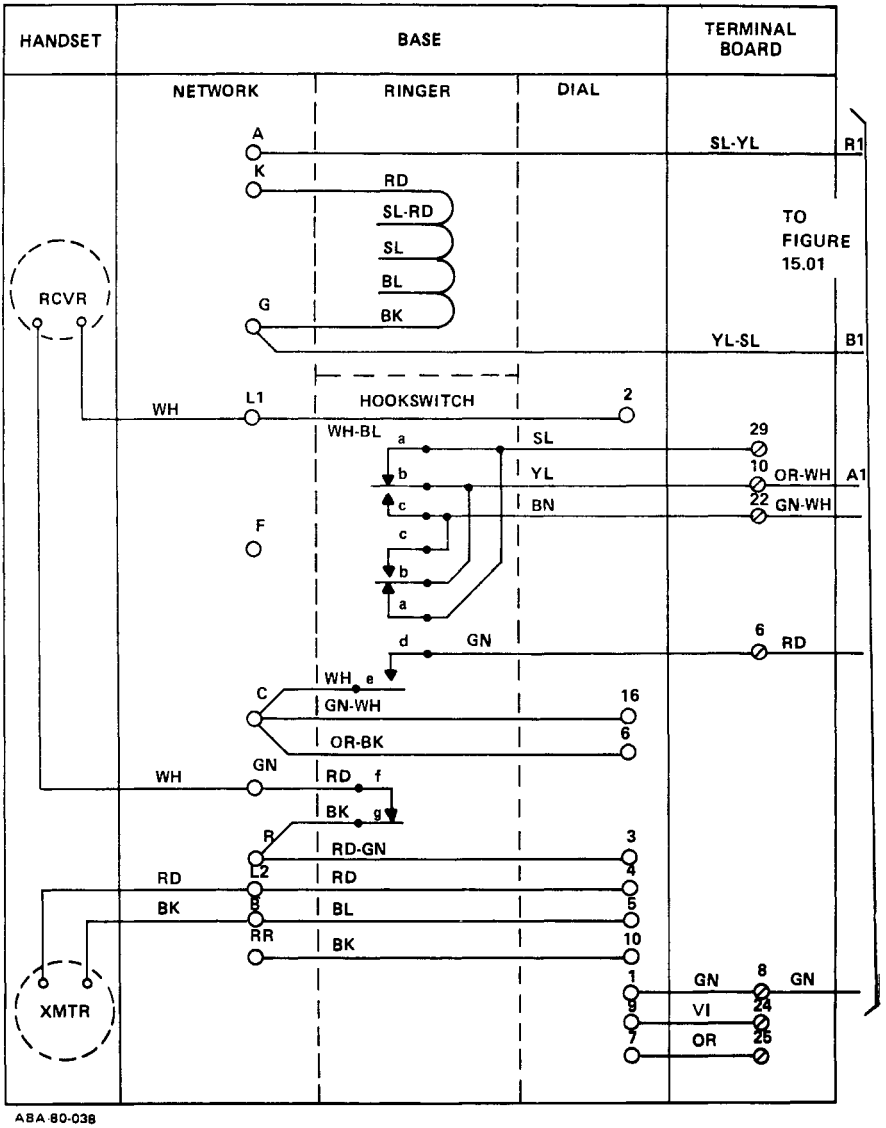


FIGURE 15.07 Circuit Diagram, Model K2854

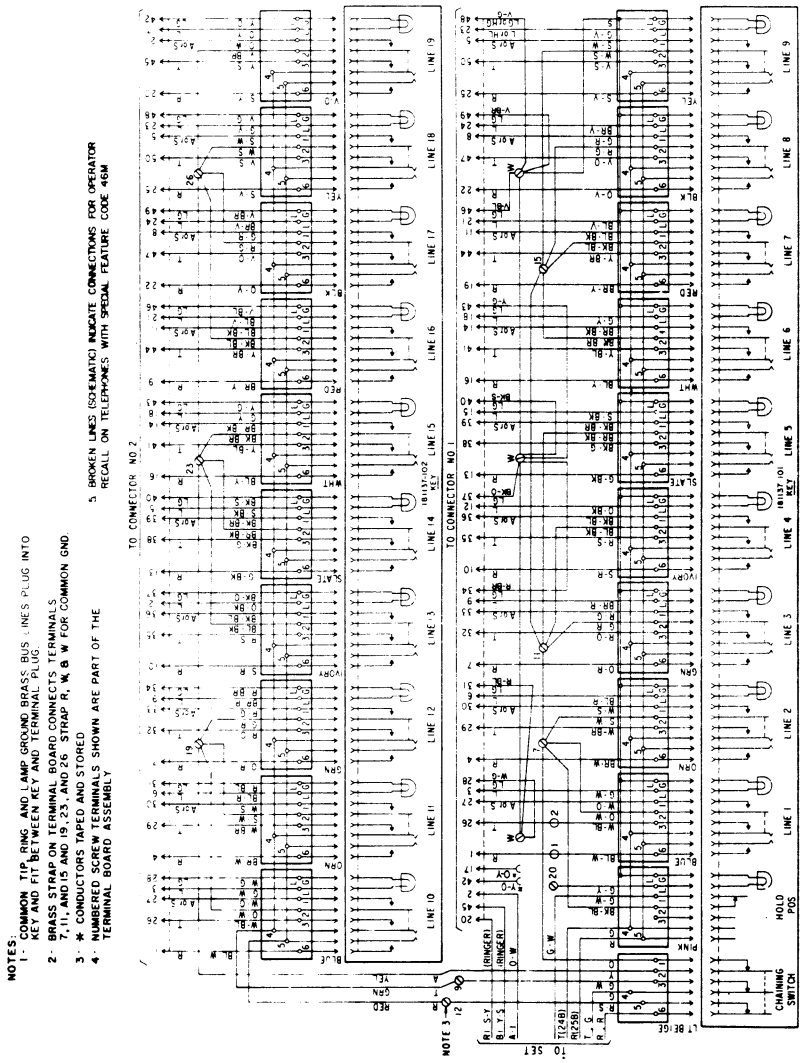


FIGURE 15.08 Key Wiring, 20-Button Sets (Except Code 76)

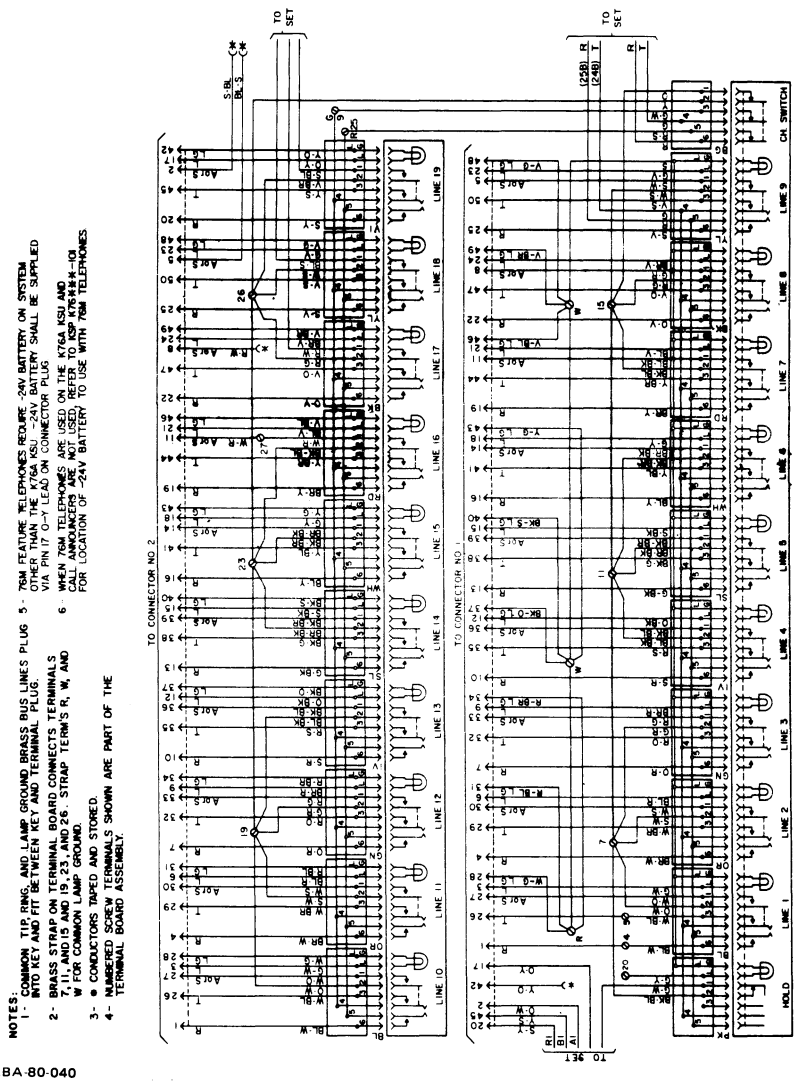


FIGURE 15.09 Key Wiring, 20-Button Exclusion Sets K831/76 and K2831/76

d. The model K2831**( ) 42 is a Tel-Touch, desk telephone arranged for hands-free applications. This set includes an additional set of contacts for ON/OFF control of hands-free equipment. See figures 15.05 and 15.08 for wiring diagrams.

e. The model K2831**( ) 46 is the same as the model K2831**( ) 42 except it is equipped with a push button switch for operator recall. See figures 15.05 and 15.08 for wiring diagrams.

f. The model K2831**( ) 76 is the same as model K2831**( ) 42 except it is equipped with an automatic exclusion (privacy) circuit and a release button. Where this feature is required, all sets in the key system must provide the exclusion circuit and a release button. See figures 15.06 and 15.09 for wiring diagrams.

10 Button Sets With Busy Lamp Field

15.10 Ten button sets with a busy lamp field are available only in desk models. These units are equipped with a busy lamp field with lamps to indicate the status of up to 24 lines. Ten button sets with the busy lamp field are equipped with a 100 conductor mounting cord fitted with two 50 pin male connectors. Four such sets are described below.

a. The model K835**( ) 42 is a ten button, rotary dial, desk telephone with a busy lamp field. It is arranged for hands-free applications. This unit provides an additional set of contacts in the hookswitch for ON/ OFF control of hands-free equipment. Circuit diagrams for the model K835** ( ) 42 are shown in figures 15.00, 15.01, and 15.10.

b. The model K835**( ) 46 is the same as the model K835**( ) 42 except it is equipped with a push button switch for operator recall.

c. The model K2835**( ) 42 is a ten button, Tel-Touch, desk telephone with a busy lamp field. It is arranged for hands-free applications. This unit provides an additional set of contacts in the hookswitch for ON/OFF control of hands-free equipment. Circuit diagrams for the model K2835** ( ) 42 are shown in figures 15.01, 15.05, and 15.10.

d. The model K2835**( ) 46 is the same as model K2835**( ) 42 except it is equipped with a push button switch for operator recall.

Installation

15.11 Install designation strips in the push buttons as follows:

a. Remove the cap from the push button by squeezing the top and bottom sides of the cap and lifting.

b. Insert the designation tab in the cap.

c. Replace the cap making certain that the ears on the inner surface of the cap line up with the holes on the left and right sides of the button.

15.12 Connect the ten and twenty button sets as follows:

a. Connect the 50 pin connectors on the mounting cord to the station cable connectors. Cord assembly, mounting cord and cable conductor assignments are listed in table 15. 01.

b. For speakerphone connections refer to table 15.02.

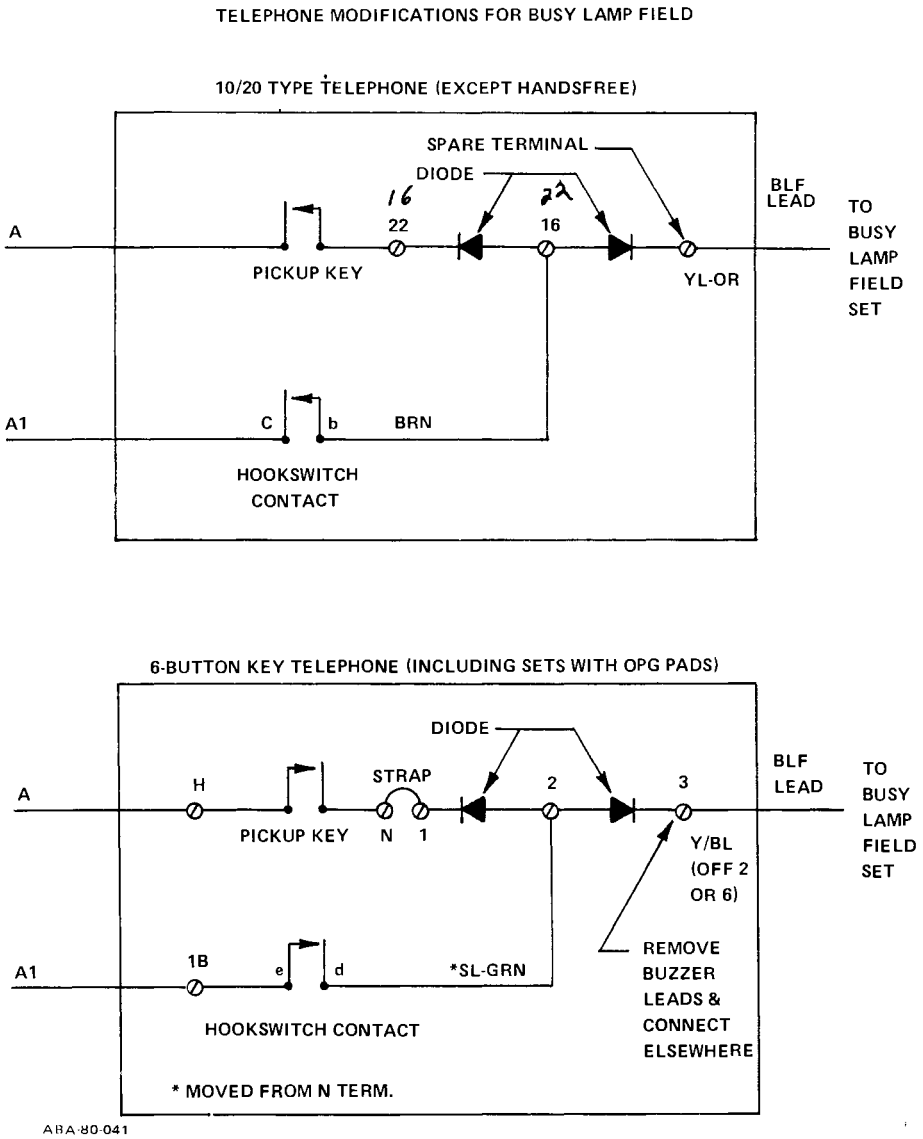


FIGURE 15.10 Typical Connections for Busy Lamp Field

TABLE 15.01 Cord Assembly, Mounting Cord, and Cable Conductor Assignments, 10/20 Line Telephone Sets.

LINES 1 THROUGH 9

TEL SET TERM	LEAD COLOR	LEAD DESIG	CONN OR PLUG TERM
Line 1 (Blue) Plug	BL-W W-BL W-O G-W W-G	R T A L LG*	1 26 27 3 28
Line 2 (Orange) Plug	BR-W W-BR W-S BL-R R-BL	R T A or S L LG*	4 29 30 6 31
Line 3 (Green) Plug	O-R R-O R-G BR-R R-BR	R T A or S L LG*	7 32 33 9 34
Line 4 (Brown) Plug	S-R R-S BK-BL O-BK BK-O	R T A or S L LG*	10 35 36 12 37
Line 5 (Slate) Plug	G-BK BK-G BK-BR S-BK BK-S	R T A or S L LG*	13 38 39 15 40
Line 6 (White) Plug	BL-Y Y-BL BR-BK G-Y Y-G	R T A or S L LG*	16 41 14 18 43
Line 7 (Red) Plug	BR-Y Y-BR BL-BK BL-V V-BL	R T A or S L LG*	19 44 11 21 46
Line 8 (Black) Plug 1 4	O-V V-O G-R BR-V V-BR	R T A or S L, P4, or 1T LG, P3 or 1R	22 47 8 24 49
Line 9 (Yellow) Plug 2 5	S-V V-S S-W G-V V-G	R T A or S L or R1 LG* or T1	25 50 5 23 48
10 8 15 A G	O-W O-Y Y-O S-Y Y-S	A1 SG, LK or Spare BL, AG or Spare R Or R1 B or B1	2 17 42 20 45

LINES 10 THROUGH 19

TEL SET TERM	LEAD COLOR	LEAD DESIG.	CONN OR TERM
Line 10 (Blue) Plug	BL-W W-BL W-O G-W W-G	R T A L LG	1 26 27 3 28
Line 11 or 21 (Orange) Plug	BR-W W-BR W-S BL-R R-BL	R T A or S L LG	4 29 30 6 31
Line 12 (Green) Plug	O-R R-O R-G BR-R R-BR	R T A or S L LG	7 32 33 9 34
Line 13 (Ivory) Plug	S-R R-S BK-BL O-BK BK-O	R T A or S L LG	10 35 36 12 37
Line 14 (Slate) Plug	G-BK BK-G BK-BR S-BK BK-S	R T A or S L LG	13 38 39 15 40
Line 15 (White) Plug	BL-Y Y-BL BR-BK G-Y Y-G	R T A or S L LG	16 41 14 18 43
Line 16 (Red) Plug	BR-Y Y-BR BL-BK BL-V V-BL	R T A or S L LG	19 44 11 21 46
Line 17 (Black) Plug	O-V V-O G-R BR-V V-BR	R T A or S L LG	22 47 8 24 49
Line 18 (Yellow) Plug	S-V V-S S-W G-V V-G	R T A or S L LG	25 50 5 23 48
Line 19 (Violet) Plug	S-Y Y-S O-W O-Y Y-O	R T A or S L LG	20 45 2 17 42

*All lamp grounds are common on the 10/20 sets.

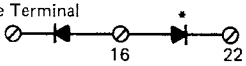
TABLE 15.02 External Speaker Phone Connections (Except Code 76)

SPEAKER-PHONE LEADS	LEAD COLOR	REMOVE FROM TERM.	CONNECT TO TERM
T1 (T1)	V-G	3	RR (25)
R1 (R1)	G-V	2	6 (6)
AG (AG)	Y-O	*	22 (22)
LK (LK)	O-Y	*	29 (29)
P3 (1R)	V-BR	4	24 (24)
P4 (1T)	BR-V	1	30 (30)
A1 (A1)	O-W	-	10 (10)

* Taped and Stored ( ) Tel-Touch Sets

c. For busy lamp connections refer to table 15.03.

TABLE 15.03 Station Busy Lamp Connections

LEAD	OPERATION
Line Switch, (BR)	Remove from Terminal 22 and Connect to 16 (except code 76)
Two Diodes (Order Separately)	Connect as shown
Spare Terminal	
Mtg. Cord (Y-O)	Connect to spare terminal shown above.

*Diode between terminals 16 and 22 not needed on Code 76 telephones.

d. Connect the polarity guard as indicated in table 15.04.

TABLE 15.04 Polarity Guard Connections (Except Code 76)

WIRE OR LEAD	COLOR	REMOVE FROM NETWORK	CONNECT TO	
			GUARD ASSY.	NET-WORK
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assy.	G			RR
	W			C

NOTE: (Order Polarity Guard Stock No. 91221)

e. Manual signalling connections for the ten button sets are shown in table 15.05. For twenty buttons sets refer to table 15.06.

f. For HOLD button illumination, connect the Y-O and O-Y spare conductors to terminals 20 and 21 and to the external circuit as required. Refer to the circuit diagrams and table 15.01.

g. For a grounding push button, make the following modifications to the line 9 push button.

1. Modify the button to non-locking operation by removing the interlock pin from the line 9 plunger.

2. Disconnect, insulate, and store all leads to the line 9 (yellow) plug except the white-slate and slate-white leads.

3. Move the white-slate lead from terminal 15 on the terminal board to terminal C on the network.

4. Connect the slate-white lead on pin 5 to ground.

TABLE 15.05 Pickup - Signal Key Conversion For 10-Button Sets

CONVERSION OPTION (NOTE)	181137-101 KEY LEADS								
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S
HPPPPPPPPP	7	7	7	11	11	11	15	15	15
HPPPPPPPPS	7	7	7	11	11	11	15	15	26
HPPPPPPPSS	7	7	7	11	11	11	15	26	26
HPPPPPPSSS	7	7	7	11	11	11	26	26	26
HPPPPPSSSS	7	7	7	11	11	26	26	26	26
HPPPPSSSSS	7	7	7	11	26	26	26	26	26

NOTE: Connect (O-Y) mounting cord lead to terminal 26.

TABLE 15.06 Pickup - Signal Key Conversion For 20-Button Sets

CONVERSION OPTION (NOTE)	181137-102 KEY LEADS									
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S	V-BR
PPPPPPPPPP	19	19	19	23	23	23	26	26	26	26
PPPPPPPPPS	19	19	19	23	23	23	26	26	26	27
PPPPPPPPSS	19	19	19	23	23	23	26	26	27	27
PPPPPPPSSS	19	19	19	23	23	23	26	27	27	27
PPPPPPSSSS	19	19	19	23	23	23	27	27	27	27
PPPPPSSSSS	19	19	19	23	23	27	27	27	27	27

NOTE: Connect (O-Y) mounting cord lead to terminal 27. Beyond five signal conversions strap terminal 27 to 28 and move the signal leads consecutively to terminal 28. Example: (BR-BK) lead from terminal 23 to 28, then (BL-BK) lead from 23 to 28, etc.

16. RINGERS

16. RINGERS

CONTENTS PAGE

16.01 Information for ordering and installing type 130, 136, 139, 148A, and 153A ringers manufactured by ITT is presented in the following paragraphs. Included are wiring diagrams for the various ringers. Ordering information is provided in table 16.00.

TABLE 16.00 Ringer Ordering Information

USE	CODE	STOCK NO.
Ringer for K500 & K2500 sets	130BA-470	91897
Ringer, Ext., 1 Gong	136BA-470	91898
Ringer, Ext., 2 Gongs	139BA-470	91916
Ringer for K200 & K2200 sets	148BA-470	91899
Ringer, Trendline	153BA-470	91909

16.02 All ringers described below are high impedance, straight line biased units. They are designed to function from an alternating current source. The sensitivity is such that satisfactory operation is obtained on the longest circuits; the high impedance prevents excessive bridging and unbalance loses. Most of these ringers include a mechanical volume control so that the user may adjust the sound output level.

Type 130 Ringer

16.03 The 130 ringer is a two gong, straight line, biased type of unit with a double-wound coil. It is equipped with a mechanical volume control and is built on an open die cast metal frame. These ringers are for use in standard size telephone sets and in type 139 ringer boxes where they serve as extension or external ringers. The type 130 ringer is factory adjusted to ring at 20 Hz and 30 Hz. All ringers are equipped with shock-mounting grommets and mounting screws. The wiring diagram for this ringer is shown in figure 16.00.

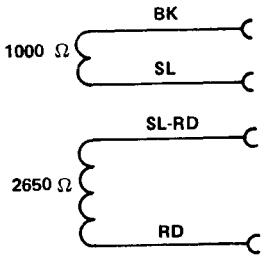


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FIGURE 16.00 Schematic for Type 130 Ringer

Type 136 Ringer

16.04 The 136 ringer is a single gong, straight line, biased type unit with a double-wound coil. It is a compact unit with a mechanical volume control, assembled on a die cast metal base. The unit is primarily for wall mounting. It comes with a molded beige-colored plastic cover. Screw terminals are provided for all lead connections and the base is fitted with four shock grommets through which the mounting screws are inserted. The wiring diagram for this unit and the 139 ringer described below is shown in figure 16.01.

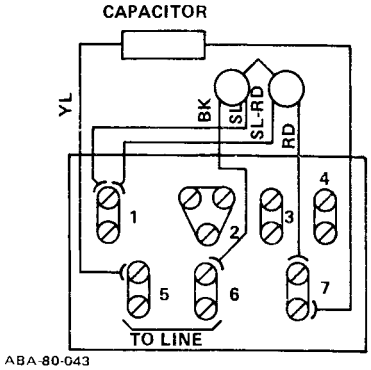

FIGURE 16.01 Wiring Diagram Type 136 and 139 Ringers

Type 139 Ringer

16.05 The 139 ringer is designed for use as an extension unit. It may be used as an external ringer or as the main ringer if the telephone is not equipped with an internal ringer. The assembly consists of a type 130 ringer mounted on a steel base plate and protected by a molded plastic housing. External connections are made to a terminal block enclosed in the unit. The assembly is equipped with a mechanical volume control.

Type 148A Ringer

16.06 The 148A ringer is designed for use in model K2554 wall telephone sets. It is a miniature, straight line, single gong, biased ringer, factory adjusted to ring at 20 Hz and 30 Hz. The unit is assembled on a die cast frame and is equipped with a mechanical, two position (high/low) volume control. The schematic for this ringer and the type 153A ringer described below is shown in figure 16.02.

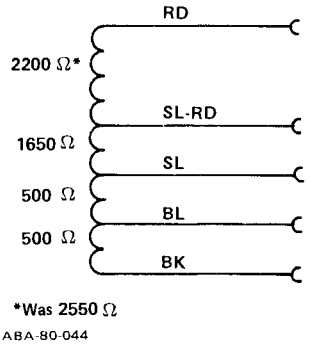

FIGURE 16.02 Schematic for Type 148A and 153A Ringers

Type 153A Ringer

16.07 The 153A ringer is identical to the type 148A ringer, except for location of the mounting holes. It is designed for use in TRENDLINE (dial-in-handset) type telephones. The type 153A ringer includes a .47 mf capacitor.

NOTE: Additional information on the above ringers can be found in the ITT TIMM-2, Telephone Instrument Maintenance Manual.

17. REMOTE SIGNAL DEVICES

CONTENTS PAGE

17.01 Remote signal devices such as the SE-400 chime ringer, the QCY-1A2 bell-chime ringer, and the type 75 loud ringing bell are described in the following paragraphs.

SE-400 Chime Ringer

17.02 The SE-400 chime ringer is shown in figure 17.00. It is designed for use as an external or auxiliary ringer for features such as UNA, code call, etc. The chime ringer assembly is enclosed in an ivory-colored plastic housing arranged for wall mounting using two fasteners. The unit measures 5 3/4 inches high, 7 1/4 inches wide, and 3 inches deep.

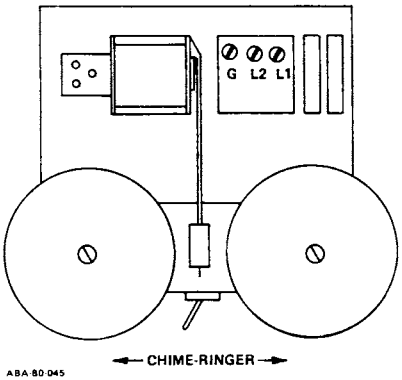

FIGURE 17.00 SE-400 Chime-Ringer (Cover Removed)

17.03 Two 3-inch polished gongs on the unit serve as the ringer or chime. Each gong produces a different tone. In the ringer mode, the gongs produce a ringing sound in response to the applied ringing signal. In the chime mode, the gongs produce a "chime-chime" signal. The first chime occurs at the start of each ring cycle; the second chime occurs at the end of each ring cycle.

17.04 The chime ringer unit should be installed at a location which gives maximum coverage for the audible signal. The selected location should be such that the chime-ringer switch is within reach, and enough clearance is provided to fasten the cover screws at the top of the unit. The method of connecting the chime ringer is shown in figure 17.01.

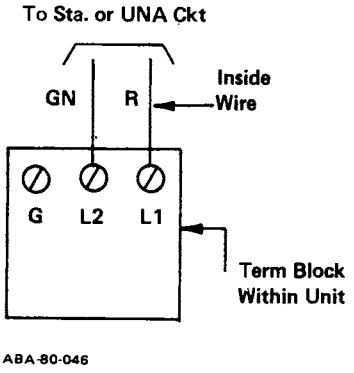

FIGURE 17.01 SE-400 Chime-Ringer Connections

17.05 Table 17.00 gives ordering information for the SE-400 Chime-Ringer.

TABLE 17.00 SE-400 Chime Ringer Ordering Information	
DESCRIPTION	STOCK NUMBER
SE-400 Chime Ringer Combination	61264
SE-400C Chime Only	61263

QCY-1A2 Bell-Chime Ringer

17.06 The QCY-1A2 bell-chime ringer is an external ringing device used as an extension ringer or for UNA service in low-noise office areas. It consists of a single-coil impedance ringer with a 2-position bias spring adjustment and a control lever and switch assembly for selecting either ringer or chime operation.

17.07 Both the bell-chime ringer and its cover must be ordered separately as shown in table 17.01.

TABLE 17.01 QCY-1A2 Bell-Chime Ringer Ordering Information	
DESCRIPTION	STOCK NUMBER
QCY-1A2 Ringer	61265
125AN-50 Cover (Ivory)	61266

17.08 The bell-chime ringer unit should be installed in a location which gives maximum coverage for the audible signal. The location should be such that the control lever is within reach and enough clearance is provided to tighten the top cover screws. The unit fastens directly to the wall with two fasteners of sufficient length to provide a solid mounting.

17.09 Figure 17.02 shows arrangement of the bias spring, bias spring bracket, and gongs. Correct bias spring tension has been set at the factory and should not be adjusted on-site. The unit is shipped with the bias spring in the position shown in figure 17.02. If a double tap occurs when the ringer is operated, place the bias spring in the low notch position. Never place the bias spring on the shoulder located to the right of the low notch.

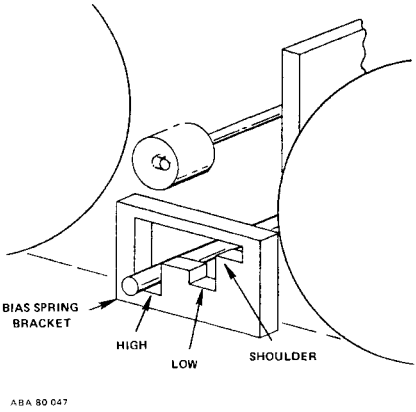

FIGURE 17.02 Bias Spring Adjustment QCY1A2 Bell Chime Ringer

17.10 Connect the bell-chime ringer as follows. Refer to figure 17.03.

a. Connect the tip lead from the station or UNA circuit to network terminal 4.

b. Connect the ring lead from the station or UNA circuit to network terminal 6.

c. Strap network terminal 4 to G, 7 to A, and 6 to B.

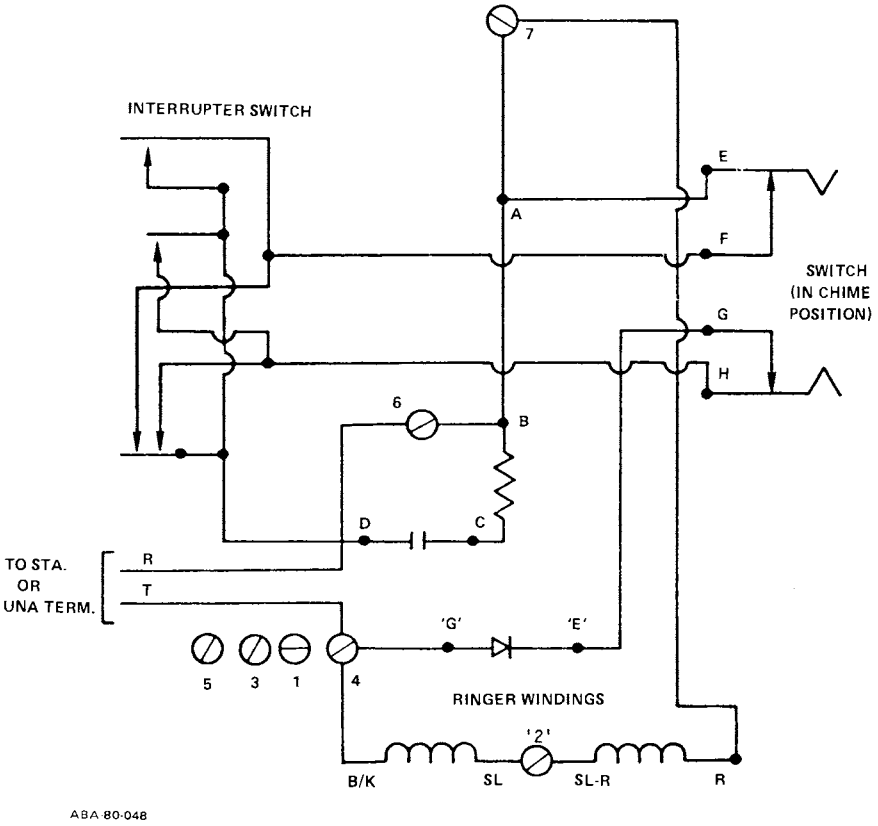

FIGURE 17.03 QCY1A2 Bell Chime Ringer Schematic

Type 75 Loud Ringing Bell

17.11 The 75-BA-301 loud ringing bell, part number 61252, is an external ringing device for indoor or outdoor use. It is designed for use in noisy locations.

17.12 The unit consists of a wall bracket which supports a horizontal base plate on which two 4-inch diameter gongs and a ringer mechanism are mounted. The gongs mount at the bottom of the base plate; the ringer mechanism mounts above the gongs. A rugged water tight plastic cover protects the ringer mechanism.

17.13 Two screws inserted through the wall bracket attach the assembly to the wall. The plastic cover over the ringer mechanism is attached by three cabinet lock screws on the bottom of the unit.

17.14 The wiring diagram for the type 75 loud ringing bell is shown in figure 17.04. For a listing of replaceable parts, refer to the ITT TIMM-2, Telephone Instrument Maintenance Manual.

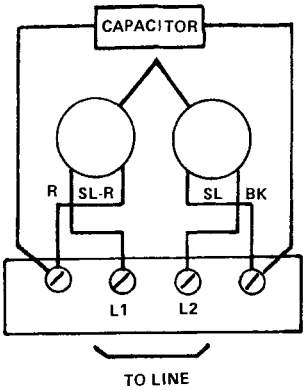

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FIGURE 17.04 Wiring Diagram, Type 75 Loud Ringing Bell

18. DIALS

CONTENTS PAGE

18.01 Standard rotary, Tel-Pulse and Tel-Touch dials manufactured by ITT are described in the following paragraphs. Instructions for removal and replacement of rotary dials, and for installation of Tel-Pulse dials are included.

Type 10A Rotary Dial

18.02 The ITT 10A rotary dial, part number 91160, is designed for use in dial-in-handset telephones. It is a miniature type dial with a 2 3/8 inch numeral ring and a movable finger stop.

18.03 The dial is adjusted to a speed of 10 pulses per second nominal, and a pulse ratio with a break period of 61.5% of the pulse duration. A governor on the assembly minimizes forcing of dial return, and thereby reduces pulse distortion.

18.04 The dial mechanism is actuated by the clear plastic finger wheel which, when wound up and released, causes a pair of pulsing contacts to interrupt the line circuit once for each unit of dialed digit. The movable finger stop moves clockwise approximately two hole spaces at the beginning of each dial wind-up until it reaches a fixed stop. Off-normal contacts are not provided and the dial is not equipped with leads. Instead, male tabs are provided to accept female snap-on terminals.

Series 30 Rotary Dial

18.05 Series 30 rotary dials are manufactured by ITT for use in standard ITT telephone sets. Ordering information for these dials is provided in table 18.00. For additional information refer to the ITT TIMM-2, Telephone Instrument Maintenance Manual.

18.06 Series 30 dials include type 30, 33, 35, and 38 units. Each dial consists of a rigid metal base on which are mounted the gear train, mainspring, contact spring assembly, numeral ring, clear plastic finger wheel and station numbering card. These dials are factory adjusted to a speed of 10 pulses per second, nominal, and a pulse ratio with a break period of 61.5% of pulse duration. A governor on the assembly minimizes forcing of dial return.

18.07 The dial mechanism is actuated by the clear plastic finger wheel, which, when wound up and released, causes a pair of pulsing contacts to interrupt the telephone line current once for each dial pulse of each digit.

18.08 Special characteristics of series 30 rotary dials are given in the following paragraphs.

a. The type 30 rotary dial is used in standard type telephone sets such as the model K500. It has one set of off-normal contacts which close to short circuit the telephone receiver during dial wind up and release. Equipped with a 4¼" inch diameter numeral ring, it is available in colors to match various telephone housing. Figure 18.00 illustrates wiring for contacts on type 30 and 33 dials.

TABLE 18.00 Ordering Information, Series 30 Rotary Dials

CODE	COLOR	STOCK NO.
TYPE 30G, 4¼"DIAMETER, METRO		
3000G-450	Black	91164
3005G-450	Moss Green	91965
3009G-450	Ivory	91647
3012G-450	Aqua Blue	91649
3013G-450	Beige	91163
3015G-450	White	91166
3043G-450	Burnt Orange	91650
3044G-450	Light Ash	91651
3045G-450	Cocoa Brown	91652
3046G-450	Harvest Gold	91653
3047G-450	Cherry Red	91654
TYPE 33G, 3" DIAMETER, METRO		
33**G-450	– –	91645
TYPE 35G, 4¼" DIAMETER, METRO		
35**G-450	– –	
TYPE 38G, 3" DIAMETER, METRO		
38**G-450	– –	91161

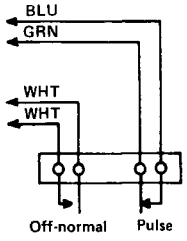

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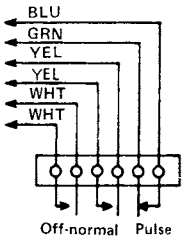
FIGURE 18.00 Contact Wiring
Type 30 & 33 Dials

b. The type 33 rotary dial is a miniature type for model K700 and similar sets which have a 3 inch diameter opening in the housing. It has one set of off-normal contacts to short circuit the telephone receiver during dial wind up and release.

c. The type 35 rotary dial is identical to the type 30, except it has an additional set of off-normal contacts. The dial is made for use with hands-free telephones; the additional contacts are used to short circuit the hands-free speaker phone during dial wind up and release. Figure 18.01 illustrates wiring for contacts on the type 35 and 38 dials.



ABA 80-051

FIGURE 18.01 Contact Wiring Type 35 & 38 Dials

d. The type 38 rotary dial is identical to the type 33 except it is made for use in telephone sets arranged for hands-free operation. An additional set of off-normal contacts in the dial assembly close to short circuit the hands-free speakerphone during dial wind up and release.

Rotary Dial Removal

18.09 To remove the dial, first remove the telephone housing by loosening two screws in the bottom of the set. Next, loosen the two dial mounting screws and remove the old dial from the mounting brackets. Disconnect the leads of the old dial, one at a time, and connect the leads to the new dial.

Rotary Dial Installation

18.10 To install the new dial, connect the leads, then place the dial in the mounting brackets and tighten the mounting screws. Be sure the punched bosses seat in the mating holes of each mounting bracket. Finally, replace the telephone housing and tighten the two screws in the bottom of the base plate.

Finger Wheel Removal

18.11 To remove the finger wheel, rotate the wheel clockwise as far as it will go. Hold it there and insert the straightened end of a paper clip or similar tool in the small hole located approximately ¼ inch to the left of the tip of the finger stop. Press down on the paper clip to spring the tab of the retainer clip. Rotate the finger wheel clockwise to release it. Work the finger wheel off the retaining clip and remove it from under the finger stop. See figure 18.02.

Finger Wheel Replacement

18.12 To install the finger wheel, position it gently under the finger stop and over the retaining ring. Make certain the number card is properly aligned. Position the finger wheel so that the "0" (Operator) finger hole is at position 9. Let the finger wheel drop into position over the retaining ring and press down while rotating the wheel counterclockwise until it clicks into place. Rotate the finger wheel clockwise to its maximum travel. Release it, the dial should return to the normal position.

Tel-Touch Dials

18.13 Two of the more common push-button dials used in ITT telephone sets are the type 32 and type 36 Tel-Touch dials. These dials are identical except that the type 36 dial is designed for use in telephones arranged for hands-free operation. Both are 12 button units. Ordering information for type 32 and 36 Tel-Touch dials with and without the optional polarity guard features are given in table 18.01.

18.14 Push buttons numbered "1" through "0" are used by subscribers to dial a desired number. The two buttons designated # and * are for special service functions.

NOTE: These dials can only be used when the associated central office equipment is arranged for DTMF (dual tone multifrequency) signaling.

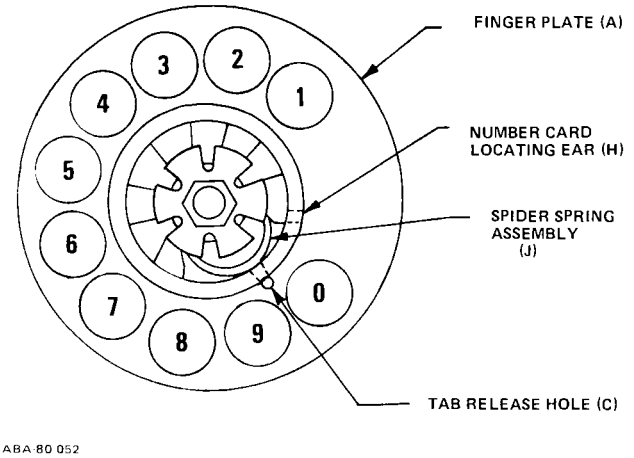


FIGURE 18.02 Rotary Dial Removal/Replacement

TABLE 18.01 Ordering Information, Tel-Touch Dials

CODE	DESCRIPTION	PART NO.
32 (G) 450	12 Button, Metro Style Tel-Touch Dial	61363
32 (G) -OPG	12 Button, Metro Style Tel-Touch Dial with Polarity Guard	61530
36 (G) 450	12 Button, Metro Style, Tel-Touch Dial, Hands-free	61320
36 (G) -OPG	12 Button, Metro Style, Tel-Touch Dial, Hands free, with Polarity Guard.	61531

18.15 Wiring diagrams for the type 32 dial and the type 36 dial with and without the polarity guard option are shown in figures 18.03, 18.04, and 18.05.

18.16 The Tel-Touch dial consists of two major subassemblies; the push button assembly and the tone generating printed circuit board assembly. Depressing one of the push buttons operates two cranks which combine to generate a specific frequency. Each time a push button is depressed, a common switch spring assembly operates. The switch spring assembly causes the following to occur.

a. Attenuates side tone in the receiver to a compatible level.

b. Applies power to the transistor.

c. Opens the transmitter circuit.

d. Initiates the signal.

e. Attenuates sidetone in the speaker in hands-free applications.

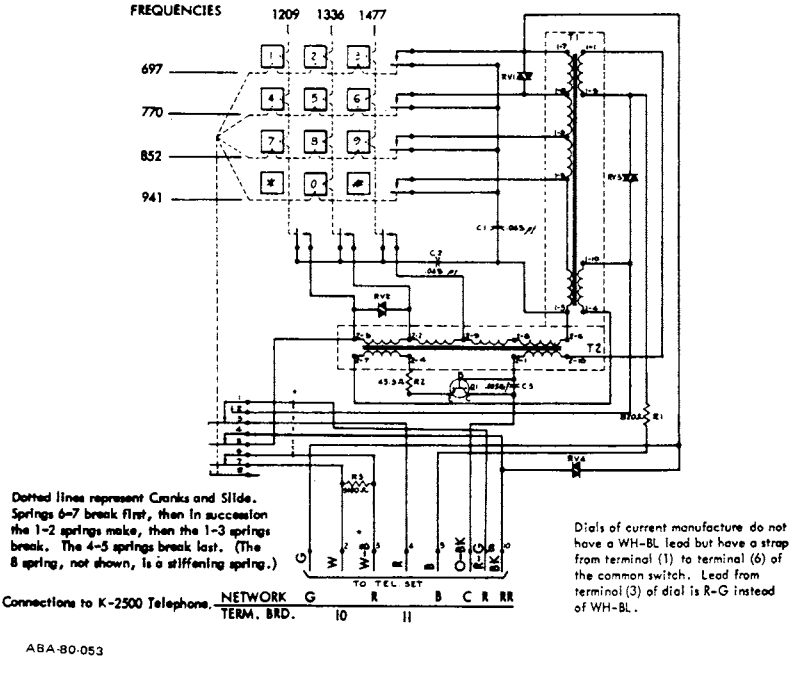


FIGURE 18.03 Wiring Diagram, Type 32 Tel-Touch Dial

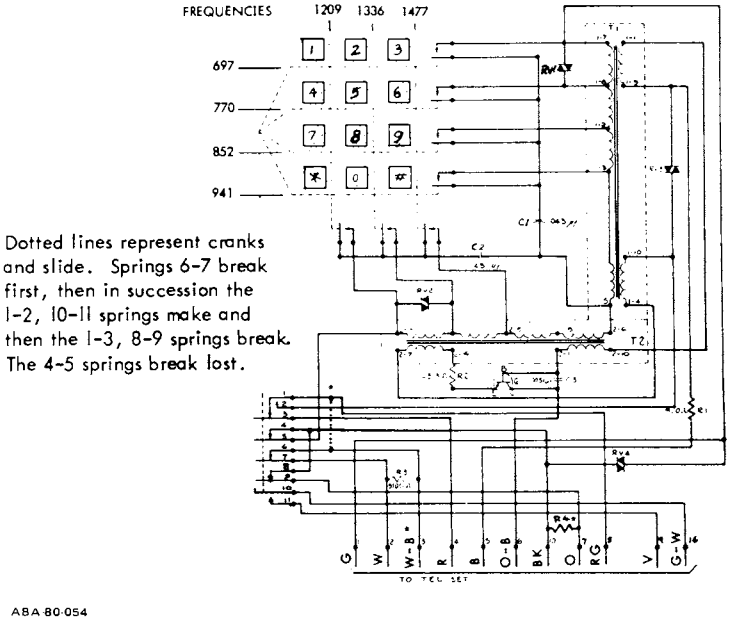


FIGURE 18.04 Wiring Diagram, Type 36 Tel-Touch Dial

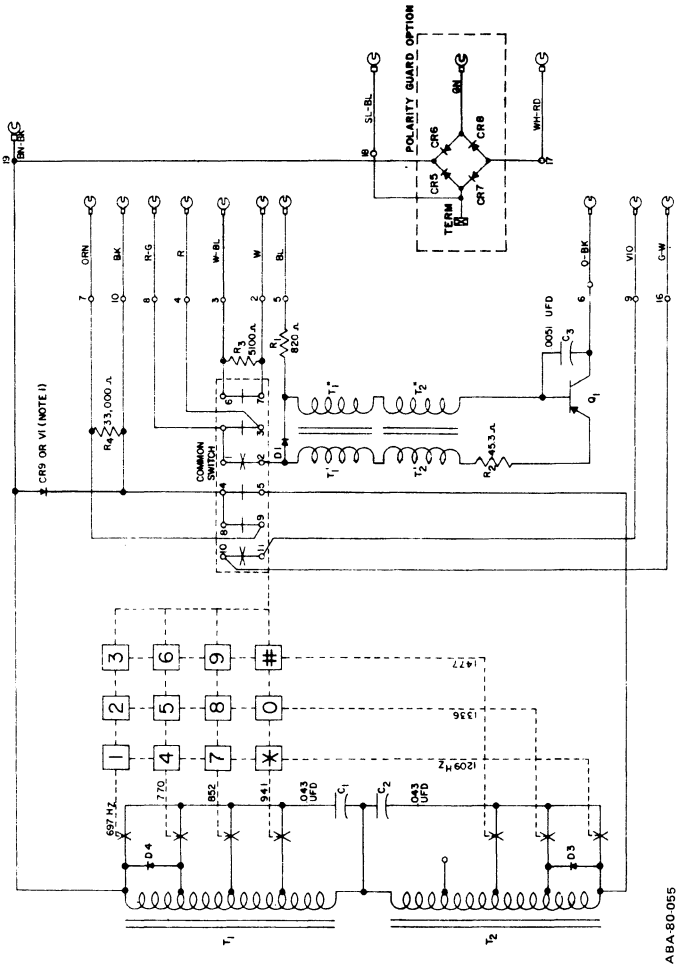


FIGURE 18.05 Wiring Diagram, Type 36 Tel-Touch Dial with Polarity Guard Circuit

Tel-Pulse Dial

18.17 The Tel-Pulse dial, ITT part number 6000-006, is made up of a 12 button assembly and a printed circuit board assembly with interconnecting wiring. This device is intended for use in type K2500, K2554, K2564, K2576 and K2530 telephone sets. The Tel-Pulse dial sends dial pulses to the central office. It offers the speed and convenience of push button dialing in areas where the central office is not equipped to accept DTMF (dual tone multifrequency) signals.

18.18 The Tel-Pulse dial is line powered. It draws current only during dialing and is not sensitive to line polarity reversals. It includes a memory with a storage capacity of 18 digits. Outpulsing begins upon receipt of the first digit.

18.19 The following types of telephones can be ordered from ITT with the Tel-Pulse dial installed:

a. K2500, single-line desk sets.

b. K2554, single-line wall sets.

c. K2564/K2565, 5-line desk sets.

d. K2576, 3-line desk sets.

e. K2830, 9-line desk sets.

NOTE: Sets which include a Tel-Pulse dial are designated by "T" in the telephone code number suffix. For example: K2830-0BA-40T.

18.20 For field installation, the mounting kits shown in table 18.02 must be ordered separately. These kits include all hardware required for mounting the Tel-Pulse PC board, the instructions, and the applicable circuit diagrams. The kits cannot be used to convert rotary dial telephones to Tel-Pulse telephones.

TABLE 18.02 Tel-Pulse Dial Field Conversion Kits

MODEL	KIT NUMBER
K2500	182419-101
K2554	182416-101
K2564	182418-101
K2566	182418-101
K2576	182417-101

18.21 The following limitations apply to use of the Tel-Pulse dial assembly.

a. The Tel-Pulse dial assembly can be installed in any set which will mount the push-button pad, if the printed circuit board can be accomodated.

b. A Tel-Pulse dial cannot be installed in a 6-button key set if the set is equipped with a ringer, as space is not available for mounting the printed circuit board.

c. The unit cannot be used in telephones arranged for hands-free (speaker phone) operation, since the Tel-Pulse dial does not provide shunting contacts.

Tel-Pulse Dial Installation

18.22 To install the unit, remove the Tel-Touch dial from the set to be modified. Install the printed circuit board as shown in figure 18.06, then install the Tel-Pulse key pad on the dial mounting brackets. Revise the set as indicated on the circuit label included in the mounting kit or as detailed in the following paragraphs.

a. K2500 Single line desk sets.

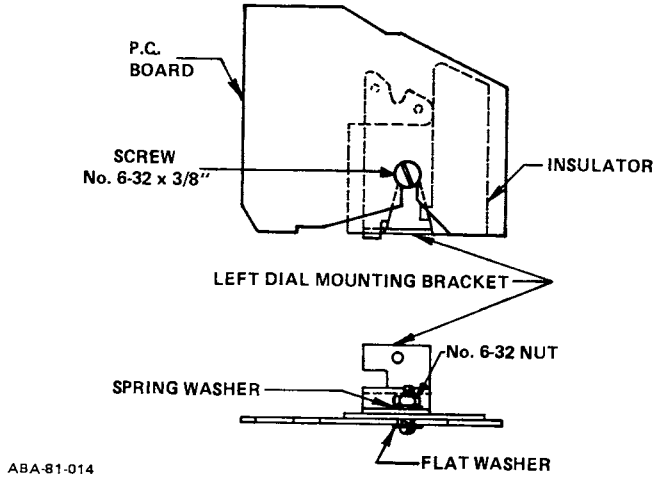
1. Remove the telephone face plate, housing and Tel-Touch dial.

2. Referring to figure 18.06a, use the 6-32 x 3/8 inch screw, nut, spring washer and flat washer to attach the printed circuit board and the insulator to the left dial mounting bracket.

3. Install the key pad on the dial brackets. Be careful to dress all wiring to avoid interference with the hookswitch action.

4. Connect the Tel-Pulse dial leads as follows: black to network terminal C; red to network terminal F; and white to network terminal RR.

5. Move the white and red handset cord leads from terminals 10 and 11 on the auxiliary terminal board to network terminal R. (Refer to circuit label 182651 included in the mounting kit.)



DETAIL A. K2500 TYPE SETS.

FIGURE 18.06 Mounting the Tel-Pulse Printed Circuit Board

b. K2554 single line wall sets.

1. Remove the telephone housing and Tel-Touch dial.

2. Referring to figure 18.06b, use the 6-32 x 5/16 inch screw and nut to attach the printed circuit board and insulator to the telephone base plate.

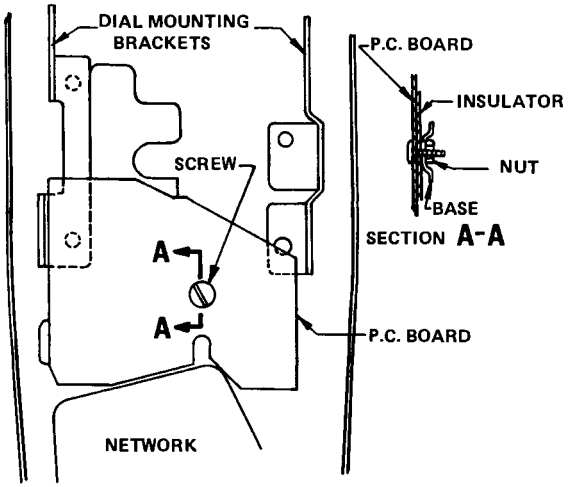
3. Install the key pad on the dial mounting brackets.

4. Connect the Tel-Pulse dial leads as follows: black to network terminal C; red to network terminal F; and white to network terminal RR.

5. Move the white and red handset cord leads from terminals 10 and 11 of the auxiliary terminal board to network terminal R. Move the white hookswitch lead from network terminal G to network terminal F. (Refer to circuit label 182652 included in the mounting kit.)

c. K2564/K2566, five line desk sets.

1. Remove the telephone face plate, housing, Tel-Touch dial and ringer if the set is so equipped.



ABA-81-015

DETAIL B. K2554 TYPE SETS

FIGURE 18.06 Mounting the Tel-Pulse Printed Circuit Board

2. Referring to figure 18.06c, use the 6-40 x 3/16 inch screw to attach the printed circuit board bracket to the base plate.

3. Use the 6-32 x 5/16 inch screw to attach the printed circuit board to the bracket.

4. Install the key pad on the dial mounting brackets. Be careful to dress all wiring to avoid interference with the hookswitch action.

5. Connect the Tel-Pulse dial leads as follows: black to network terminal C; and red to network terminal F.

6. Move the white handset cord lead from terminal 1 of the key terminal board to network terminal R. (Refer to circuit label 182653-101 included in the mounting kit.)

d. K2576 three line desk sets.

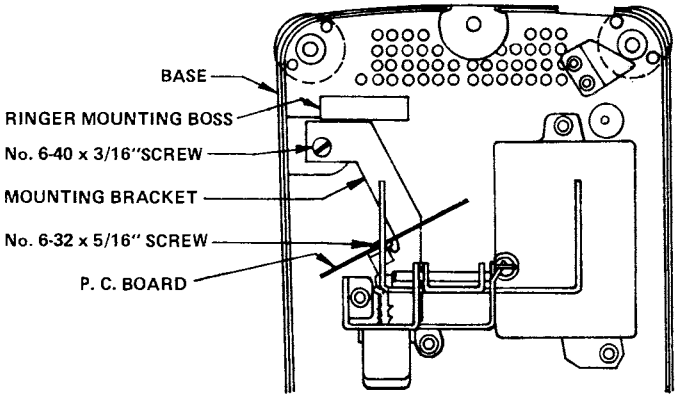
1. Remove the telephone face plate, housing, Tel-Touch dial and ringer if the set is so equipped.

2. Referring to figure 18.06c, use the 6-40 x 3/16 inch screw to attach the printed circuit board bracket to the base plate.

3. Use the 6-32 x 5/16 inch screw to attach the printed circuit board to the bracket.

4. Install the key pad on the dial mounting brackets. Be careful to dress all wiring to avoid interference with the hookswitch action.

5. Connect the Tel-Pulse dial leads as follows: black to network terminal C; and red to network terminal F.



ABA-81-014

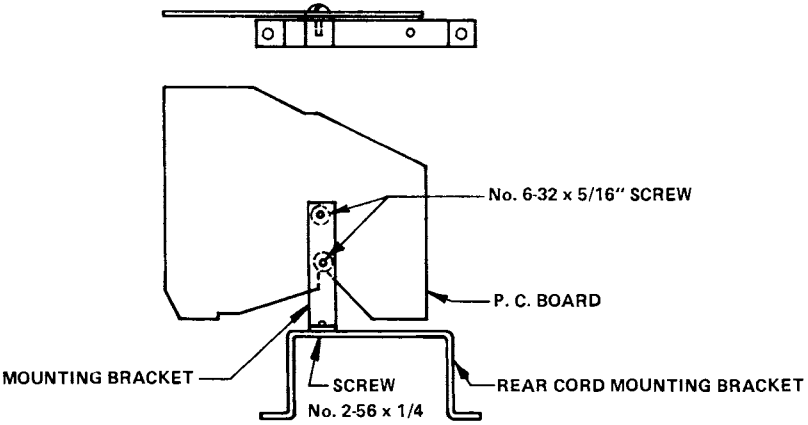
DETAIL C. 6-BUTTON KEYSETS

FIGURE 18.06 Mounting the Tel-Pulse Printed Circuit Board

6. Move the white handset cord lead from terminal Y of the key terminal board to network terminal R. Move the red handset cord lead from terminal X of the key terminal board to network terminal R. (Refer to circuit label 182655-101 included in the mounting kit.)

e. K2830, nine line desk set.

1. Remove the telephone face plate, housing, and Tel-Touch dial.
2. Referring to figure 18.06d, use the 2-56 x ¼ inch screw to attach the printed circuit board mounting bracket to the rear cord mounting bracket.
3. Install the key pad on the dial mounting brackets.
4. Install the printed circuit board under the 10-button key assembly. Secure it to the mounting bracket using the two 6-32 x 5/16 inch screws.
5. Connect the Tel-Pulse dial leads as follows: black to network terminal C; white to network terminal RR; and red to network terminal F.
6. Move the white and red handset leads from network terminals K and L2 to network terminal R. Move the green handset lead from terminal 8 of the auxiliary terminal board to network terminal F. (Refer to circuit label 182656-101 included in the mounting kit.)



ABA-81-015 DETAIL D. 10-BUTTON KEYSETS

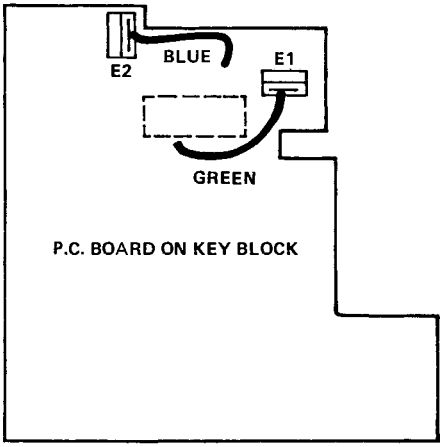
FIGURE 18.06 Mounting the Tel-Pulse Printed Circuit Board

f. Pulsing rate/interdigital timing. Refer to table 18.03 for strapping for pulse rate and interdigital timing. Terminal locations are shown in figure 18.07.

TABLE 18.03 Pulse Rate/Interdigital Timing Strapping

PULSE RATE
10PPS -- Green to E1 20PPS -- Green to E2
INTERDIGITAL INTERVAL AT 10PPS*
400MS -- Blue to E1 800MS -- Blue to E2

*Interval for 20PPS is 1/2 interval for 10PPS.



ABA-81-018

FIGURE 18.07 Location of Strapping Terminals

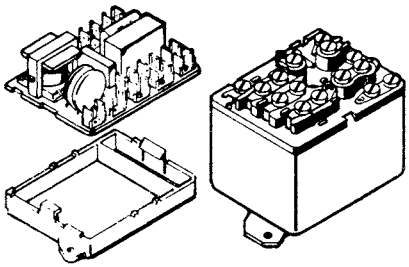
19. NETWORKS

CONTENTS PAGE

19.01 Two networks used in ITT telephone sets are the type 75335-1 and the type 183070. The networks are electrically similar. They provide the components necessary to connect and match the impedance of the type 65 handset transmitter and receiver units to a two-wire telephone circuit. Both units include an RF filter, sidetone balancing circuits, and a 0.5 mfd ringer capacitor.

Type 75335-1 Network

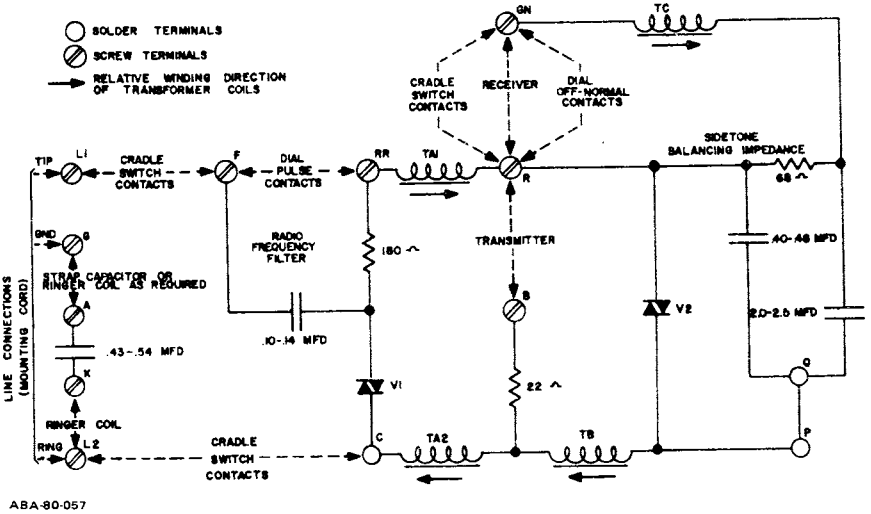
19.02 The type 75335-1 network is shown in figure 19.00. All components mount on the underside of the molded terminal board. The terminal board is clipped to the mounting container which is filled with sealing compound.



ABA-80-056

FIGURE 19.00 Type 75335-1 Network

19.03 The circuit diagram for the type 75335-1 network is shown in figure 19.01. Dashed lines in the illustration show typical connections to other components of a complete telephone set.



ABA-80-057

FIGURE 19.01 Wiring Diagram, Type 75335-1 Network

Type 183070 Network

19.04 The type 183070 network is a printed circuit type assembly. All components are assembled on a printed circuit board. This network is designed for field replacement; it fastens to a plastic holder by means of moveable clips. Arrangement of the printed circuit board is shown in figure 19.02.

19.05 Push-on and screw type terminals on the printed circuit board will accommodate up to four lugs per terminal. Additional connections can be made to terminals L1, L2, and G. Two extra terminals, E1 and E2, are provided as tie points. The schematic for the type 183070 network is shown in figure 19.03.

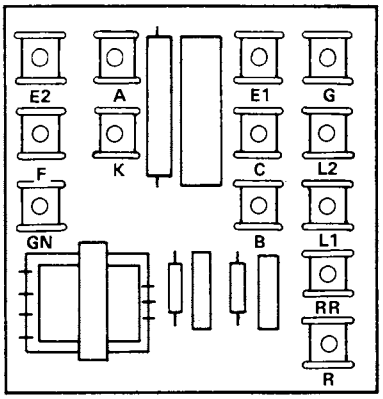


FIGURE 19.02 PCB Arrangement
Type 183070 Network

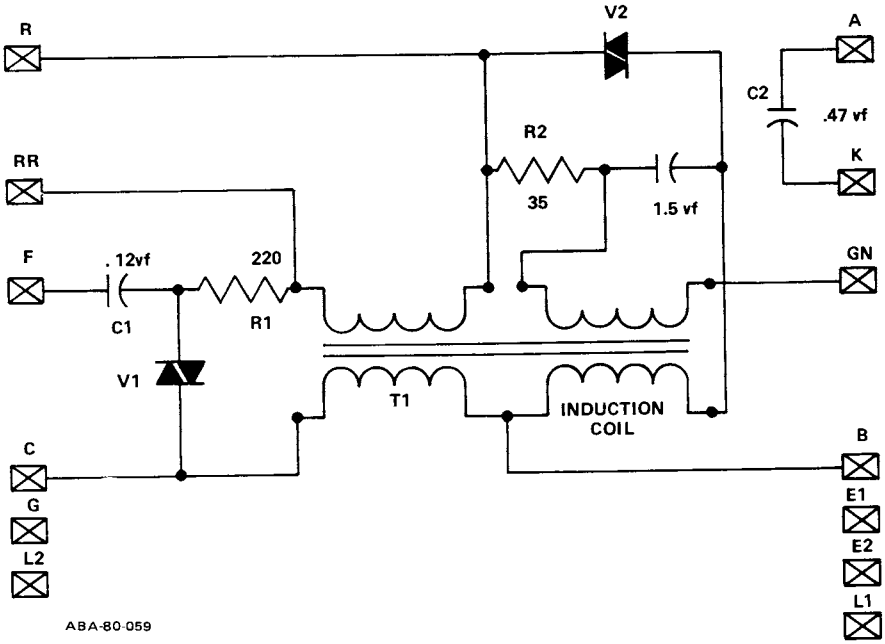


FIGURE 19.03 Schematic, Type 183070 Network

20. DISTRIBUTING FRAME

CONTENTS PAGE

20.01 The main distributing frame (MDF) is used to terminate the station and trunk cables coming into the EPABX or key system, and the line, trunk and miscellaneous cables which connect to the equipment cabinet. It generally consists of a 3/4 inch backboard on which connecting blocks and "D" rings are mounted. In some cases, the backboard is also used to mount key system equipment, auxiliary ringing devices, etc.

20.02 Station, line, trunk, and miscellaneous cables terminate on connecting blocks on the MDF. Position of the connecting blocks is dependent upon whether the cables enter the equipment room from above or below the backboard. Where cables enter from below, the blocks are usually mounted toward the bottom of the backboard. Where cables enter from above, the blocks are usually mounted toward the top of the backboard.

20.03 Jumper wires are used to interconnect the connecting blocks assigned to the station and line cables, the blocks assigned to the outside and inside trunk cables, and the blocks assigned to the miscellaneous cables. "D" rings, mounted above or below the connecting blocks are used to route the jumper wires from one connecting block to another. "D" rings are mounted at the bottom or top of the backboard, between the vertical rows of connecting blocks. A typical distributing frame is shown in figure 20.00.

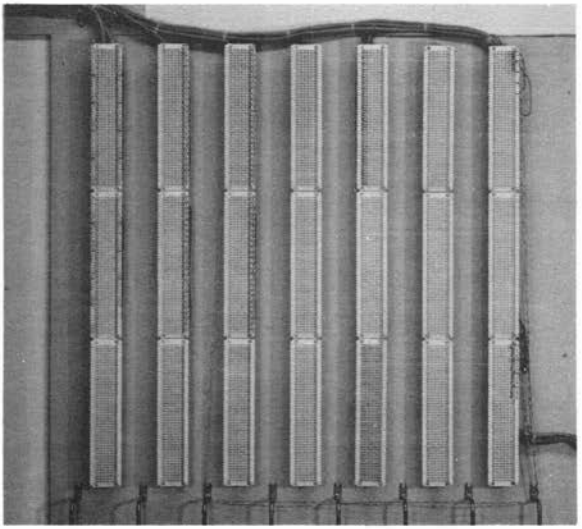


FIGURE 20.00 Typical Distributing Frame

Backboard

20.04 The backboard for a typical installation is generally made of 3/4 inch plywood. Its size is determined by the number of connecting blocks and miscellaneous equipment to be mounted. In estimating the size of the backboard for a particular installation, the engineer or installer must take into account the initial size of the installation as well as the growth potential.

20.05 Location of the backboard in the equipment room is shown in a floor plan drawing. Such a drawing is included in the installation package of drawings for each job site.

Connecting Blocks

20.06 Type 66B, 25 or 50 pair, connecting blocks are used on most EPABX or key system installations. Arrangement of the blocks on the backboard is shown on the MDF layout drawing in the installation drawing package. A typical MDF layout drawing is shown in figure 20.01. The blocks attach to the connecting block standoffs which in turn attach to the backboard. Screws for attaching the connecting blocks to the standoffs are contained in the standoff packages.

Connecting Block Standoffs

20.07 Each type 66B connecting block attaches to two H3B5-H0 standoffs, one at the top and one at the bottom. A third standoff mounted at the center of each block, is for support only. Where more than one block is mounted in a vertical row, one standoff is shared by two blocks. Therefore, three standoffs are required for 1 block, five standoffs for 2 blocks, seven for 3 blocks, etc.

20.08 Two number 8 x 3/4 inch long screws are required to attach each connecting block standoff to the backboard. These screws are not provided with the connecting blocks or standoffs they must be obtained locally.

"D" Rings

20.09 "D" rings mount at the top or bottom of the backboard, between each vertical row of connecting blocks. Two number 8 x 3/4 inch round head wood screws are required to attached each "D" ring to the backboard.

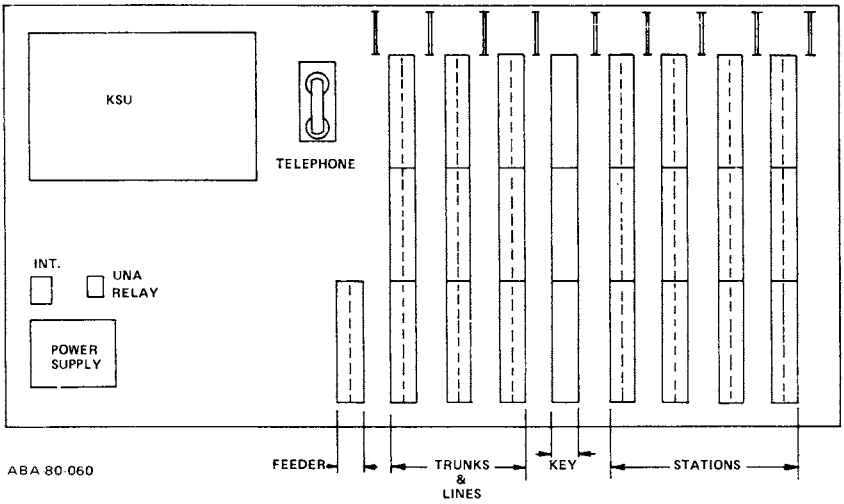


FIGURE 20.01 Typical MDF Layout Drawing

Installing the MDF

20.10 To install the MDF, proceed as follows:

a. The first step in installing an MDF is attaching the backboard to the wall. Location of the backboard in the equipment room is shown in the equipment room drawing. The method of attaching the board to the wall is determined by wall construction. See table 6.00 for the type of fastener to use. Try to locate the anchors or fasteners in the corners of the board where they will not interfere with mounting the "D" rings, connecting block standoffs, or key system equipment. Paint the backboard after it is mounted, if required.

b. When the backboard is mounted, use a tape measure and chalk line to mark holes for the standoffs. Figure 20.02 provides the dimensions to be used to mark the centers for each standoff mounting hole. Note that in the illustration the distance between the upper and lower standoffs for the top and bottom connecting blocks is different than the distance between the upper and lower standoffs for the middle connecting block. This difference is due to the fact that the upper and lower standoffs for the middle connecting blocks are shared by the top and bottom blocks.

c. When the centers have been marked for each standoff, check to see that all dimensions are correct, then drill each hold using a 1/8 inch drill bit. Either an electric drill or a push drill can be used. After drilling the holes, wipe off the chalk lines.

d. Use a common screwdriver and 2 number 8 x 3/4 inch long screws to attach each standoff. Use the 2 number 8 x 1 inch round head screws packaged with the standoffs to mount each connecting block.

e. Mark and drill pilot holes for the "D" rings. Center the "D" rings between the vertical rows of connecting blocks, at the top or bottom of the backboard. Use a 1/8 inch drill bit to drill the holes. Use 2 number 8 x 3/4 inch long screws to mount each "D" ring.

f. Follow the color code shown in table 3.03 when punching down each line, station, trunk and miscellaneous cable. Use the indelible, fiber-tipped, marking pen (Sharpie or equivalent) to mark each lead designation on the connecting blocks.

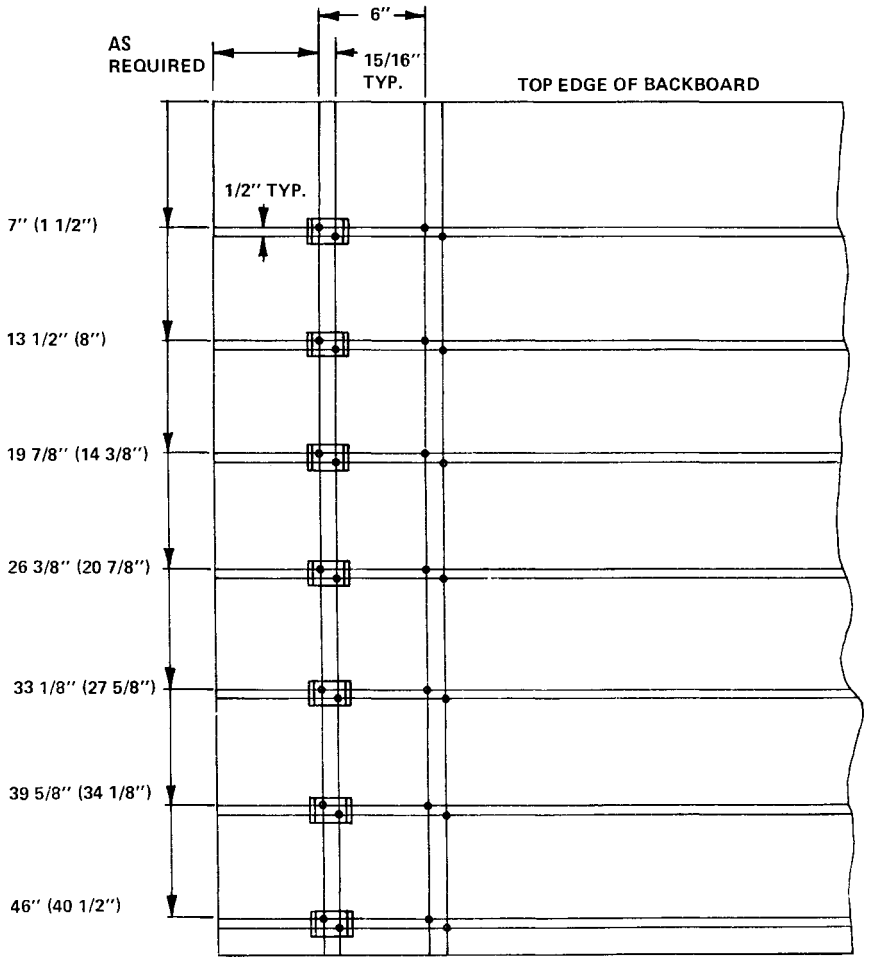


FIGURE 20.02 Backboard Layout, Typical Distributing Frame

21. TELEPHONE INSTRUMENT MODIFICATIONS

CONTENTS PAGE

21.01 Several common telephone instrument modifications are described in the following paragraphs. Included are illustrations, instructions, and material lists for each modification.

"A" Lead Control

21.02 All key telephone sets associated with a key system are factory wired for "A" lead control. An incoming call is answered by operating the pickup key associated with the line being rung and going off-hook. The station is connected across the line through the hookswitch and key contacts, and ringing is tripped. Ground via the common A1 lead is also connected through the hookswitch and key contacts to operate the associated key telephone unit. A busy line can be placed on hold by operating the HOLD key on the key telephone set. When the HOLD key is depressed, ground is disconnected from the "A" lead and a holding bridge is placed across the line by the key telephone unit. To release this holding bridge, any station that seizes the line by operating the associated pickup key and going "off-hook" places a ground on the "A" lead and causes the holding bridge to be removed.

21.03 When single line telephones are used in a key system, the telephones must be modified for "A" lead control to permit operation of the associated key telephone unit. The type 44 telephone, model K-500**( ) 44 or equivalent, is factory wired for such applications. If type 44 single line telephones are not available, type 20 or 30 telephones can be easily field modified. Instructions for modifying K-500 and K-2500 single line telephones are provided in the following paragraphs.

21.04 To modify a model K-500**( ) 20 or 30 telephone for "A" lead control, proceed as follows. Refer to figure 21.00.

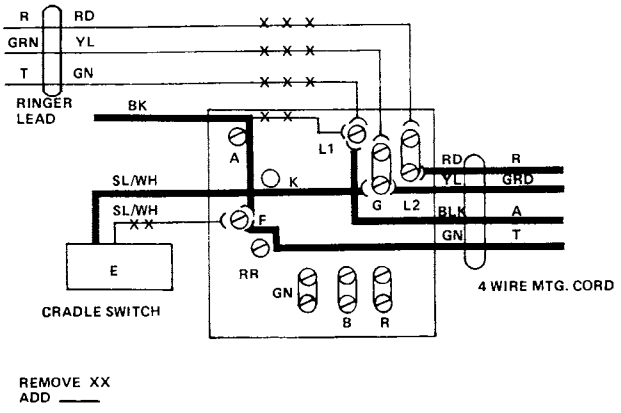


FIGURE 21.00 "A" Lead Control Wiring K500

a. Remove the line cord by disconnecting the leads from the network.

b. Connect a four conductor line cord as follows;

1. Connect the red (Ring) lead to network terminal L2.
2. Connect the green (Tip) lead to network terminal F.
3. Connect the black (A) lead to network terminal L1.
4. Connect the yellow (A1) lead to network terminal G.

c. Move the black ringer lead from network terminal L1 to terminal F.

d. Move the SL-WH hookswitch lead from network terminal F to terminal G.

21.05 To modify a model K-554 ** ( ) 30 or a model K-2500 ** ( ) 20 or 30 for A lead control, proceed as follows:

a. Remove the line cord by disconnecting the leads from network terminals L1, L2, and G.

b. Move the slate-white hookswitch lead from network terminal F to network terminal G.

c. Move the black ringer lead from network terminal G to network terminal F.

d. Connect a four conductor line cord as follows:

1. Connect the red (RING) lead to network terminal L2.
2. Connect the green (TIP) lead to network terminal F.
3. Connect the black (A1) lead to network terminal L1.
4. Connect the yellow (A) lead to network terminal G.

21.06 To modify a model K-2554 ** ( ) 30 with polarity guard circuit for A lead control, proceed as follows:

a. Remove the 3-conductor line cord by disconnecting the leads from network terminals L1, L2, and A.

b. Remove the slate and yellow hookswitch leads from network terminal A. Tape and store the slate lead; connect the yellow lead to network terminal L1.

c. Remove the brown hookswitch lead from the 2 POS terminal on the dial.

d. Remove the white hookswitch lead and the green dial lead from network terminal G. Connect the white hookswitch lead to the 2 POS terminal on the dial.

e. Connect the brown hookswitch lead to network terminal G.

f. Move the green hookswitch lead from network terminal L2 to network terminal A.

g. Connect the green dial lead to network terminal L2.

h. Connect a 4-conductor line cord as follows:

1. Connect the green (TIP) lead to network terminal L2.
2. Connect the red (RING) lead to network terminal A.
3. Connect the black (A1) lead to network terminal G.
4. Connect the yellow (A) lead to network terminal L1.

Signal Key

21.07 The signal key modification is used when it is necessary to provide a non-locking push button switch at one telephone to control a buzzer or similar device on a remote telephone. An unassigned line pick up key, an external switch, or a switch mounted on the telephone set housing can be used for this modification.

21.08 Details a through e of figure 21.01 show methods for modifying K-564, K-565, K-577, K-2830, and K-2831 telephones for signal key modification.

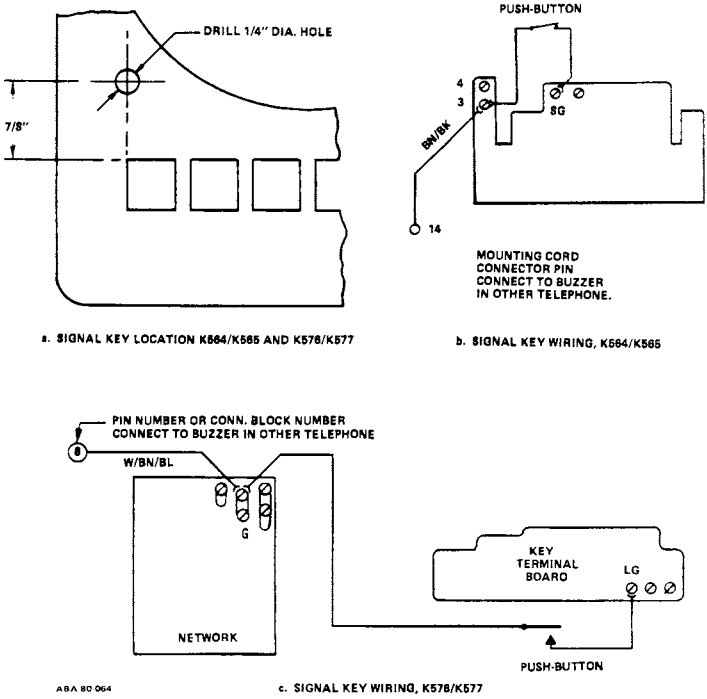
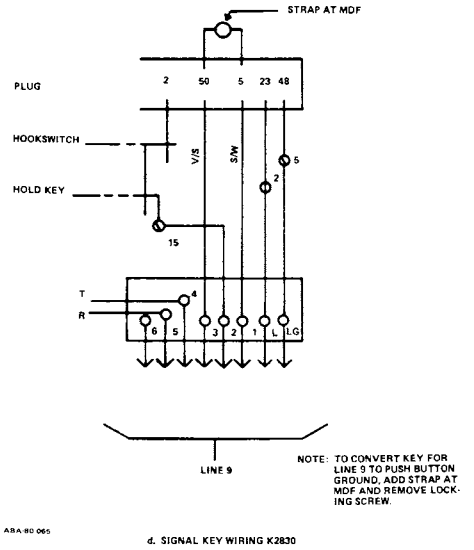
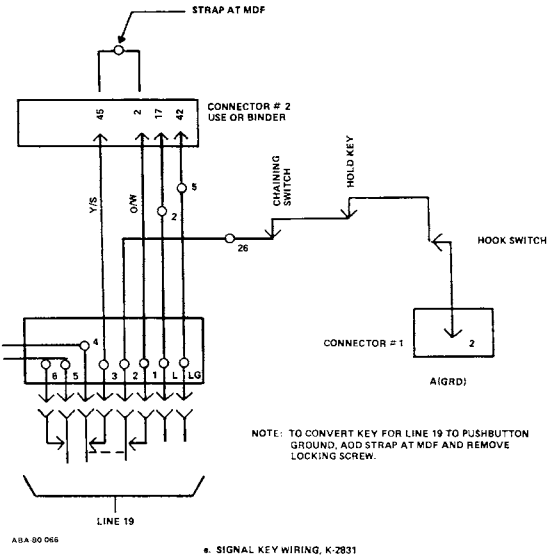


FIGURE 21.01 Signal Key Modification



d. SIGNAL KEY WIRING K2830

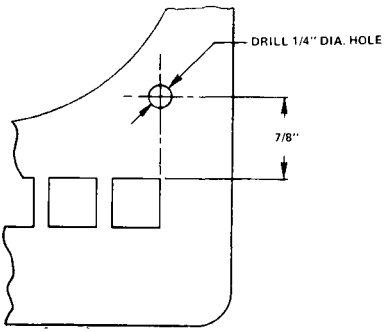


e. SIGNAL KEY WIRING, K-2831

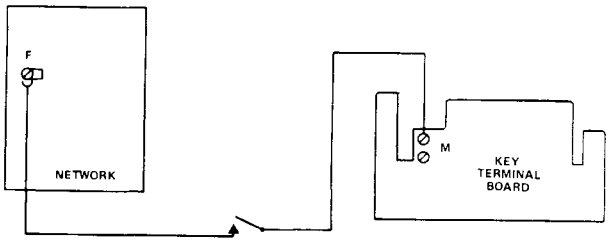
FIGURE 21.01 Signal Key Modification (Cont.)

Call Transfer Key

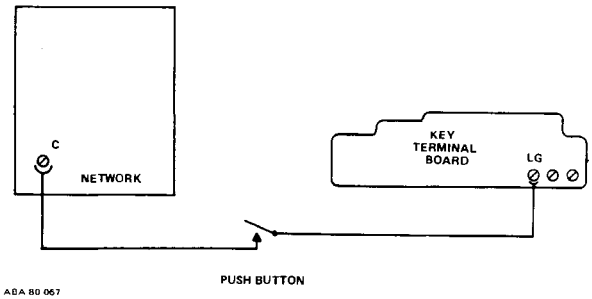
21.09 In some PABX or key system applications, station instruments must be equipped with a grounding push button switch to control station transfer. Details a-e of figure 21.02 show call transfer key modifications for various types of telephones.



a. TRANSFER KEY LOCATION, K564/K565

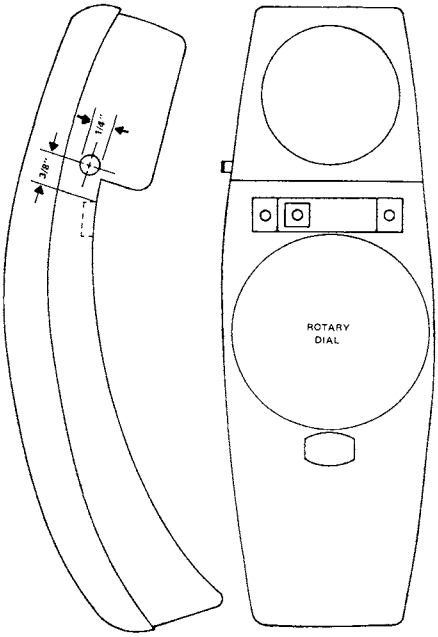


b. TRANSFER KEY WIRING K564/K565



c. TRANSFER KEY WIRING K576/K577

FIGURE 21.02 Call Transfer Key Modification



d. TRANSFER KEY LOCATION, K200/K254

Ringer Cut-Off Key

21.10 The ringer cut-off key is added to a station instrument to permit the user to enable or disable the station ringer. Details for installing and connecting the ringer cut off key are shown in figure 21.03.

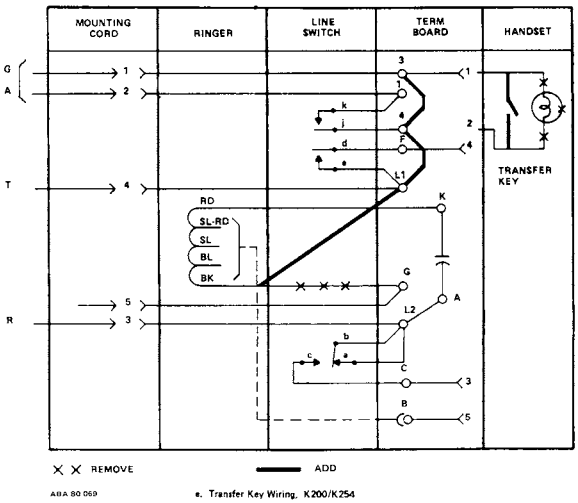
Installation Notes and Precautions

21.11 Observe the following notes and precautions when performing the above modifications:

a. Installation notes:

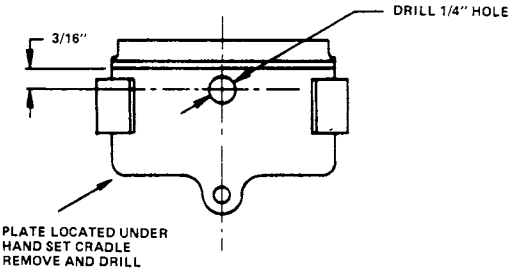
1. All holes for keys shall be 1/4 inch diameter.

2. Before drilling holes, remove the cover from the telephone set.

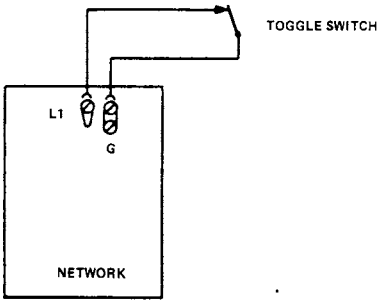


e. Transfer Key Wiring, K200/K254

FIGURE 21.02 Call Transfer Key Modification (Cont.)



a. RINGER-CUT-OFF KEY LOCATION



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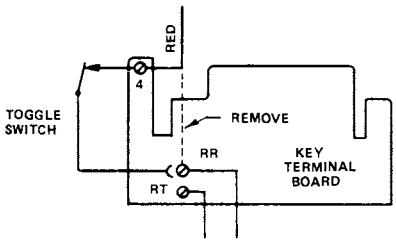
b. RINGER CUT-OFF KEY WIRING, K500



ABA 80 071

c. RINGER CUT-OFF KEY WIRING K564/K565

FIGURE 21.03 Ringer Cut-Off Key Modification

3. Use an electric drill at low speed to drill holes in the cover.

b. Precautions:

1. In PABX systems, the key system "A1" lead must always be connected to PABX ground.

2. Do not connect the yellow lead of the station cord to either line terminal on the connecting block.

3. When installing the ringer cut-off key, an external bell must be placed in another location to ensure that incoming calls will be answered. This guards against inadvertant operation of the switch or failure to restore the switch.

4. When installing all keys, dress the slack in the connecting wires to prevent wires from interferring with the hookswitch or ringer.

Material List

21.12 Table 21.00 lists the materials needed for the above modifications.

TABLE 21.00 Modification Materials List

MODIFICATION	MATERIAL	
	QTY.	DESCRIPTION
Signal Key	1	P/B Switch, Switchcraft 951
	2	Spade Terminals, AMP 33219
	18"	Wire, No. 22 AWG Single Conductor.
Call Transfer Key	1	P/B Switch, Switchcraft 961
	2	Spade Terminals, AMP 33219
	18"	Wire, No. 22 AWG Single Conductor.
Ringer Cut-Off Key	1	Toggle Switch, ALCO MST-105D
	1	On/Off Switch Plate, ALCO SP3
	2	Spade Terminals, AMP 33219
	18"	Wire, No. 22 AWG Single Conductor.
A Lead Control	1	4 Conductor Mounting Cord.

22. BUTTONS AND BUZZERS

CONTENTS PAGE

22.01 Buttons and buzzers are commonly used in key system installations for intercom service or simple signalling circuits. The following paragraphs describe various types of buttons and buzzers and provide ordering information and installation details.

Ordering Information

22.02 Stock numbers for ordering the buttons and buzzers described in this section are listed in table 22.00.

TABLE 22.00 Ordering Information, Buttons and Buzzers

CODE	DESCRIPTION	STOCK NO.
SE-554-60	Button Push 1 Button Beige	91900
SE-554-3	Button Push 1 Button Black	91906
SE-554-51	Button Push 1 Button Green	91669
SE-554-50	Button Push 1 Button Ivory	91917
SE-554-58	Button Push 1 Button White	91912
SE-559-60	Button Push 2 Button Beige	91901
SE-559-3	Button Push 2 Button Black	91907
SE-559-51	Button Push 2 Button Green	91670
SE-559-50	Button Push 2 Button Ivory	91915
SE-559-58	Button Push 2 Button White	91913
SE-561-60	Button Push 4 Button Beige	91902
SE-561-3	Button Push 4 Button Black	91908
SE-561-51	Button Push 4 Button Green	91671
SE-561-58	Button Push 4 Button Ivory	91915
SE-565-60	Button Push 8 Button Beige	91903
SE-565-3	Button Push 8 Button Black	91968
SE-565-49	Button Push 8 Button Gray	91947
SE-565-58	Button Push 8 Button White	91946
SE-77A	Bracket, Pushbutton 1 Button	61111
SE-76A	Bracket, Pushbutton 2 Button	61093
SE-75A	Bracket, Pushbutton 4 Button	61079
SE-74A	Bracket, Pushbutton 8 Button	91668
SE-8A	Buzzer, 6-10VAC 60 Hertz	61372
SE-8B	Buzzer, 10-40VAC 60 Hertz	61373
SE-8X	Buzzer, 90-140VAC 20/60 Hz.	91938
SE-7F	Buzzer, 20-60V AC/DC	81306

Buttons

22.03 Type SE-554, SE-559, SE-561 and SE-565 button assemblies are shown in figure 22.00. These signal pads or buttons are used in key telephone systems for button and buzzer circuits. They are available in one, two, four, and eight button arrangements. They are made of high impact plastic and are available in colors to match the telephone set.

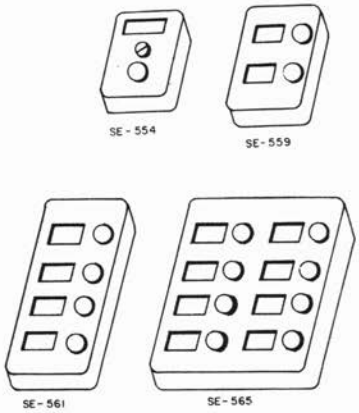


FIGURE 22.00 Button Assemblies, SE-554, SE-559, SE-561 and SE-565

22.04 Mounting brackets for the buttons are made of heavy guage steel with a yellow chromate finish. The brackets are designed to clip onto the base of the telephone instrument for secure mounting. The bottom of each bracket is covered with cork to prevent scratching. Mounting brackets must be ordered separately, as shown in table 22.00.

SE-7F Buzzer

22.05 The type SE-7F buzzer is shown in figure 22.01. It is equipped with a plastic cover and is designed for use as an external signal device. Including the cover, it measures approximately 1 1/8 inches high, 2 inches wide, and 2 11/16 inches long. The SE-7F buzzer is rated at 20 to 60 volts AC or DC.

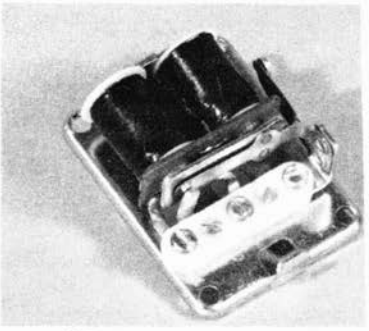


FIGURE 22.01 SE-7 Buzzer

SE-8 Buzzer

22.06 The SE-8 miniature buzzer shown in figure 22.02 is designed for mounting in a telephone set. It has 7 inch leads with spade tipped lugs and features a screw adjustment to regulate intensity of the audible output. The type SE-8 buzzer measures approximately 1/2 inch high, 3/4 inches wide, and 1 1/2 inches long.

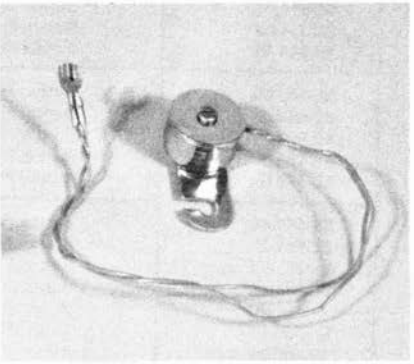


FIGURE 22.02 SE-8 Buzzer

22.07 Three variations of the type SE-8 buzzer are available for applications requiring different signaling voltages. They are listed below.

a. SE-8A. The SE-8A buzzer is used for low voltage signaling. It requires an input signal of 6 to 10 volts AC, 60 Hertz.

b. SE-8B. The SE-8B buzzer is used for intercom signaling. It requires an input signal of 10 to 40 volts AC, 60 Hertz.

c. SE-8X. The SE-8X buzzer is used as a subsitute for a telephone ringer. It requires an input signal of 90 to 140 volts AC, 20/60 Hertz.

Signaling Circuits

22.08 A typical button and buzzer signaling circuit is shown in figure 22.03. In the illustration, signaling buttons are represented by "make" contacts at each telephone set; the signaling buzzers are represented by the symbol Z. The circuit is wired so that the button at telephone set 1 activates the buzzer at set 2; the button at set 2 activates the buzzer at set 1. Signal ground and 18 VAC to activate the buzzers is provided by an external power supply.

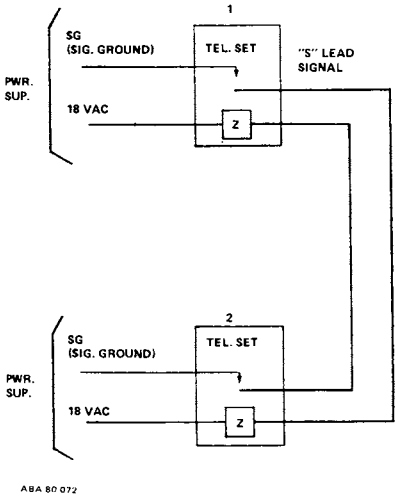
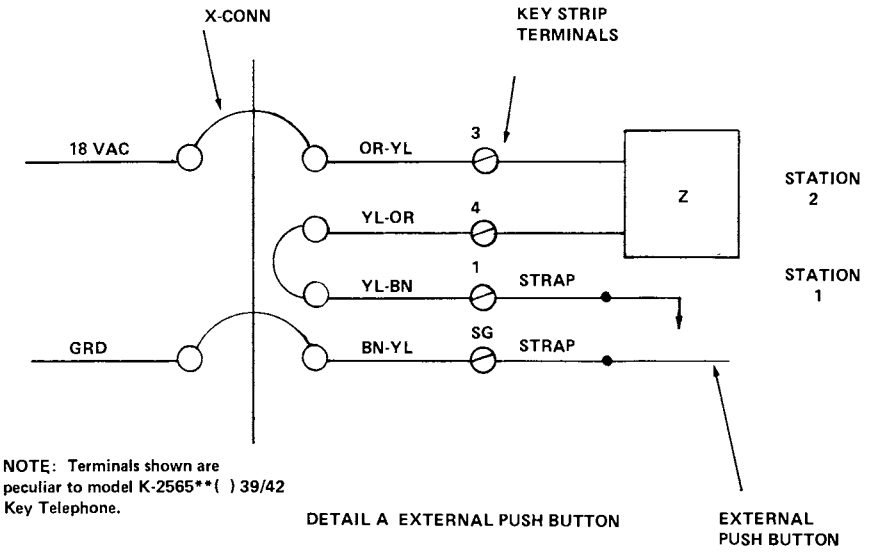


FIGURE 22.03 Typical Button and Buzzer Circuit

22.09 Detail A of figure 22.04 shows wiring of a button and buzzer circuit using an external push button for the signaling key. As noted, the terminals to which the button and buzzer are connected, are peculiar to the model K2565**( ) 39/42 key telephone. This same basic technique can be used to wire a button and buzzer circuit in most 6-button key sets. Only the key-strip terminal numbers may change due to variations in design. Refer to proper wiring diagram for associated key telephone set.

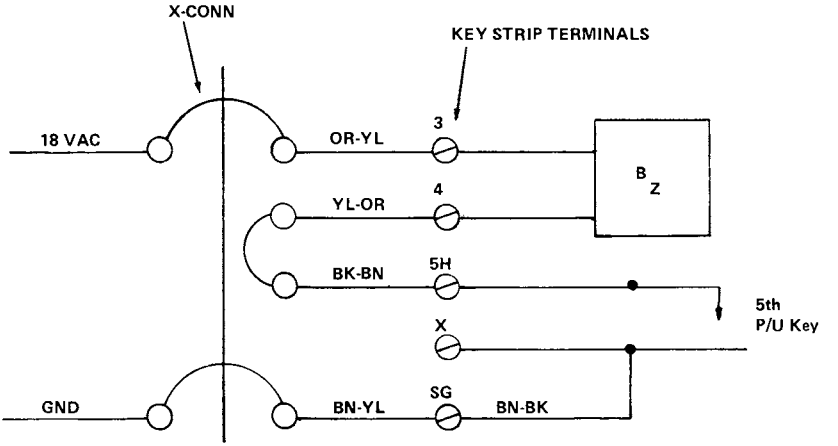
22.10 Detail B of figure 22.04 shows wiring of a button and buzzer circuit using an internal push button for the signaling key. For such applications, the fourth and/or fifth line pick up key on the telephone set is modified for non-locking operation.

22.11 Table 22.01 shows conversion data for 6 button key telephones. Tables 22.02 and 22.03 show conversion data for 10 and 20 button key telephones.



NOTE: Terminals shown are peculiar to model K-2565**( ) 39/42 Key Telephone.

DETAIL A EXTERNAL PUSH BUTTON



NOTES: 1. Move BK-BN lead from terminal X to SG.
2. Terminals shown are peculiar to Model K2565**( ) 39/42 Key Telephone.

ABA-80-073

DETAIL B INTERNAL PUSH BUTTON

FIGURE 22.04 Wiring Diagrams, Button and Buzzer Circuits

TABLE 22.01 Pickup-Signal Key Conversion For 6 Button Sets

NO. OF PICKUP KEYS	NO. OF SIG. KEYS CONVERTED FROM P.U. KEYS	NO. OF PRIVATE & INTERCOM LINES WITH COMMON SIG. KEY	KEY LEADS			
			YL-BN	BN	SL-RD	BN-BK
5			M	M	M	X
4	1		M	M	M	SG
3	2		M	M	SG	X
4	1	2	M	X	5H	SG
4	1	3	X	X	5H	SG

TABLE 22.02 Pickup - Signal Key Conversion For 10-Button Sets

CONVERSION OPTION (NOTE)	181137-101 KEY LEADS								
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S
HPPPPPPPPP	7	7	7	11	11	11	15	15	15
HPPPPPPPPS	7	7	7	11	11	11	15	15	26
HPPPPPPPSS	7	7	7	11	11	11	15	26	26
HPPPPPPSSS	7	7	7	11	11	11	26	26	26
HPPPPPSSSS	7	7	7	11	11	26	26	26	26
HPPPPSSSSS	7	7	7	11	26	26	26	26	26

NOTE: Connect (O-Y) mounting cord lead to terminal 26.

TABLE 22.03 Pickup - Signal Key Conversion For 20-Button Sets

CONVERSION OPTION (NOTE)	181137-102 KEY LEADS									
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S	V-BR
PPPPPPPPPP	19	19	19	23	23	23	26	26	26	26
PPPPPPPPPS	19	19	19	23	23	23	26	26	26	27
PPPPPPPPSS	19	19	19	23	23	23	26	26	27	27
PPPPPPPSSS	19	19	19	23	23	23	26	27	27	27
PPPPPPSSSS	19	19	19	23	23	23	27	27	27	27
PPPPPSSSSS	19	19	19	23	23	27	27	27	27	27

NOTE: Connect (O-Y) mounting cord lead to terminal 27. Beyond five signal conversions strap terminal 27 to 28 and move the signal leads consecutively to terminal 28. Example: (BR-BK) lead from terminal 23 to 28, then (BL-BK) lead from 23 to 28, etc.

23. LAMP ASSEMBLIES

CONTENTS PAGE

23.01 This section describes various types of lamp assemblies which can be used to provide visual indications of line or trunk usage.

General Purpose Lamps

23.02 Type SE-15, SE-17, and SE-18 general purpose lamp assemblies are shown in figure 23.00. These lamp assemblies are made of break-resistant plastic materials and are available in one, two, or three lamp configurations. Each assembly consists of a plastic base and a removable plastic housing with glass lamp caps. They are designed for surface placement or fixed mounting using wood or metal screws and may be used with exposed or concealed wiring.

23.03 Bases for type SE-15, SE-17, and SE-18 lamp assemblies will accept standard 6, 12, 24 or 48 volt switchboard lamps. The plastic housing may be equipped with white, green, red, or amber lamp caps.

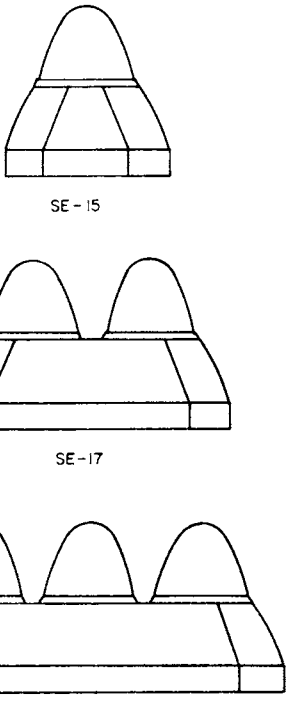


FIGURE 23.00 SE-15, SE-17, and SE-18 Lamp Assemblies

Type SE-20 Lamp Assembly

23.04 The type SE-20 lamp assembly is shown in figure 23.01. This four-lamp assembly consists of a plastic housing with four colored glass lamp caps and a plastic base arranged to accept standard 6, 12, 24, or 48 volt switchboard lamps. The assembly is designed for surface mounting and may be used with exposed or concealed wiring. Lamp caps are white, red, green, and amber.

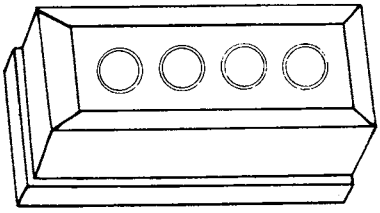


FIGURE 23.01 SE-20B Lamp Assembly

Type SE-21 Lamp Assembly

23.05 The type SE-21 lamp assembly (see figure 23.02) consists of a plastic housing, base and lens. It houses a neon lamp which lights in an alternating pattern from ringing current. Its primary use is as a substitute for a telephone ringer. In such applications it provides a visual indication of an incoming call. The lamp base is designed to accept a neon bulb with a standard switchboard mounting base. The lamp operates on 90 to 140 VAC.

FIGURE 23.02 SE-21 Indicator Lamp

Ordering Information

23.06 Ordering information for the lamp assemblies described in this section is provided in table 23.00.

TABLE 23.00 Ordering Information, Lamp Assemblies

CODE	DESCRIPTION	ITT-CS STOCK NO.
SE-15D	Single Lamp-White	91672
SE-15E	Single Lamp-Ruby	91673
SE-15F	Single Lamp-Green	91674
SE-15G	Single Lamp-Amber	91675
SE-17C	Double Lamp-Green, Ruby	91676
SE-17D	Double Lamp-White, Ruby	91905
SE-17E	Double Lamp-Ruby, Ruby	91677
SE-18A	Triple Lamp-White, Green, Ruby	91951
SE-20B	Quad Lamp-White, Green, Red, Amber	91952
SE-21B	Single Lamp-Neon-Clear	61271
SE-21C	Single Lamp-Neon-Amber	91904

24. TYPE 153A ADAPTER

24.01 The type 153A adapter, part number 51069, is used to connect a single-line telephone or a two-line telephone to a 25-pair station cable having a standard 50-pin connector. The adapter is shown in figure 24.00. It consists of a 50-pin male connector fitted with a terminal strip and covered with a molded plastic cover.

24.02 The terminal strip has 8 screw terminals which are pre-wired to the connector. Wires in the station mounting cord connect directly to the screw terminals. A slit or trough in the terminal strip accommodates the mounting cord.

24.03 The adapter comes prewired from the factory as shown in table 24.00.

TABLE 24.00 Type 153A Adapter Connections

CABLE PAIR	CONN. PIN	ADAPT. TERM.	USE
1	1 26	1R 1T	Tip & Ring Line 1
4	4 29	2R 2T	Tip & Ring Line 2
20	20 45	R B	Common Bell
25	25 50	X1 X2	Spare

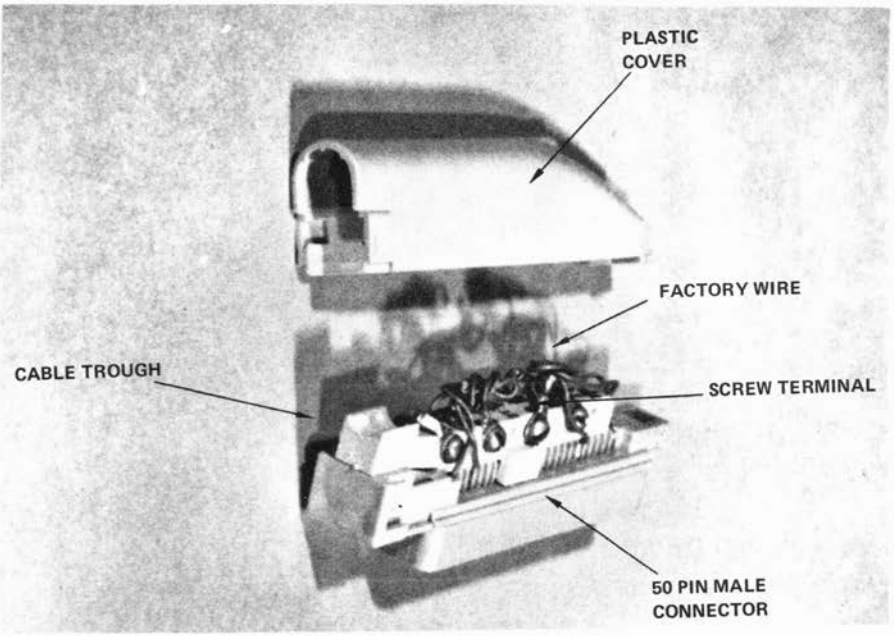


FIGURE 24.00 Type 153A Adapter

25. 6040 KEY

25.01 The 6040 key is a six button key assembly used to convert a single line wall telephone to multi-line service. It consists of a type 636 key assembly mounted on a steel plate and covered with a removable plastic housing. A 25-pair hang-off cable equipped with a standard 50-pin male connector is used to connect the 6040 key to the station cable serving the assigned single line telephone. The 6040 key is shown in figure 25.00.

25.02 A terminal strip mounted on the top of the key assembly is used to terminate the 25-pair hang-off cable. Screw terminals on the terminal strip are also used to terminate the wires which connect the key assembly to the assigned telephone. Arrangement of the terminals is shown in figure 25.01.

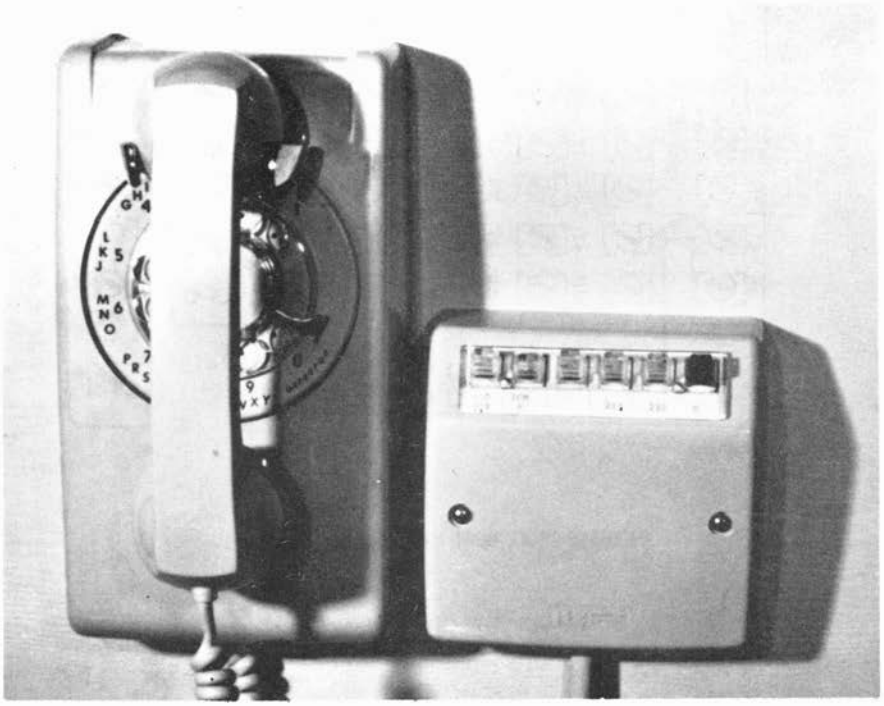


FIGURE 25.00 6040 Key

25.03 Table 25.00 shows the order in which the 25-pair/mounting cord hand-off cable is connected to the key strip terminals.

25.04 Figure 25.02 provides details for connecting the 6040 key to a model K554**( ) 30 wall telephone.

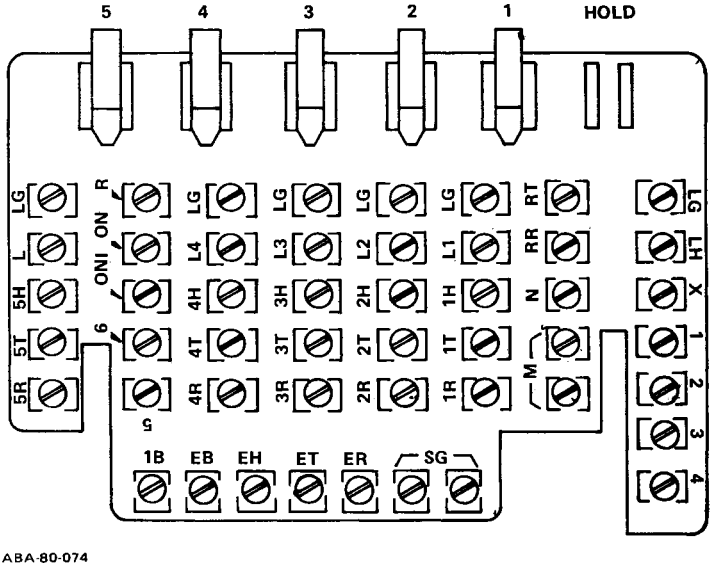
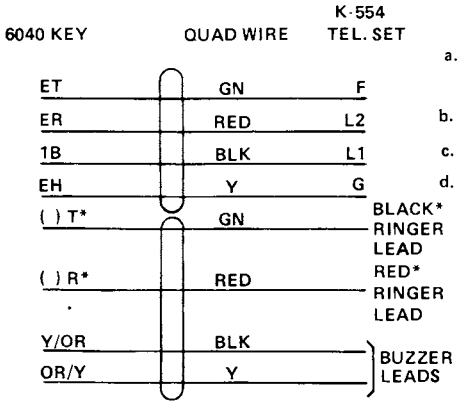


FIGURE 25.01 6040 Key, Key Strip Layout



a. Modify K554 for "A" lead control. (See paragraph 21.05)

b. Move RED ringer lead off L2*

c. Move BK ringer lead off G*

d. Connect 6040 key per drawing.

*Connect to common ringer circuit or to line tip and ring in 6040 key via pair in Quad Wire.

FIGURE 25.02 Telephone Set Connections, 6040 Key to K-554 Wall Set

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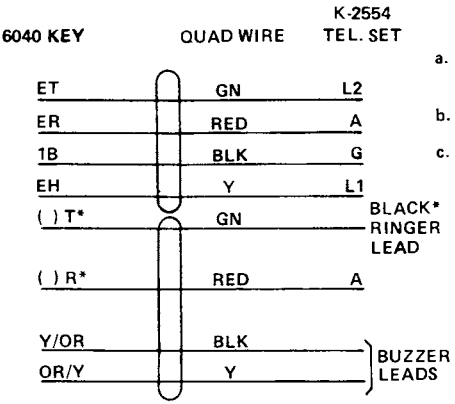


a. Modify K-2554 for "A" lead control. (See paragraph 21.06.)

b. Move the black ringer lead off network terminal L2.

c. Connect the 6040 key per drawing.

*Connect to common ringer circuit or to line tip and ring in 6040 key via pair in Quad Wire.

FIGURE 25.03 Telephone Set Connections, 6040 Key to K-2554 Wall Set with Polarity Guard Circuit.

ABA-81-013

TABLE 25.00 6040, Key Strip Terminal Connections

TERMINAL	CORD CONDUCTOR	TERMINAL	CORD CONDUCTOR
1R	BL-WH	LG	YL-GN
1T	WH-BL	LH	GN-YL
1H	WH-OR	X	–
L1	GN-WH	1	YL-BN
LG	WH-GN	2	BL-YL
		3	YL-BL
2R	BN-WH	4	OR-YL
2T	WH-BN		
2H	WH-SL	M	–
L2	BL-RD	N	–
LG	RD-BL	RR	SL-YL
		RT	YL-SL
3R	OR-RD	5	GN-VI
3T	RD-OR	6	VI-GN
3H	RD-GN	ONI	BN-VI
L3	BN-RD	ON	–
LG	RD-BN	R	–
4R	SL-RD		SL-WH*
4T	RD-SL		GN-RD*
4H	BK-BL		BL-BK*
L4	OR-BK		BN-BK*
LG	BK-OR		YL-OR*
			VI-BN*
5R	GN-BK		VI-SL*
5T	BK-GN		SL-VI*
5H	BK-BN		
L5	SL-BK		*Taped and Stored
LG	BK-SL		
1B	OR-WH		
EB	OR-VI		
EH	VI-OR		
ET	VI-BL		
ER	BL-VI		
SG	BN-YL		

26. PC-4A SPEAKERPHONE

CONTENTS PAGE

26.01 The PC4A speakerphone system is a hands-free, voice-switched system for use with single or multi-line telephones. The system consists of a transmitter, loudspeaker, transformer, and a connecting block or adapter. When connected to a telephone, it provides the following service:

a. Hands-free telephone operation.

b. On-hook dialing (when the dial is not restricted).

c. Automatic switching from speakerphone to handset operation.

d. Transmitter muting for private conversation.

e. Visual indication when system is in use.

f. Cutoff of common ringer or other signaling device when desired.

Ordering Information

26.02 The major components which make up the PC-4A speakerphone system are shown in figure 26.00. Part numbers for ordering the major components are listed in table 26.00. All components should be ordered separately.

Speakerphone Operation.

26.03 The PC-4A speakerphone incorporates a voice switching circuit which permits a substantial increase in receiving volume, eliminates singing, and essentially eliminates far-end talker echo. When there is no speech transmission, gain is automatically removed from the transmitter circuit and added to the loudspeaker circuit. This avoids singing condition while receiving. During speech transmission, the gain of the transmitter increases to normal. Simultaneously, gain of the loudspeaker circuit lowers to avoid singing as a result of the increased transmitter gain. The amount of gain change depends on the setting of the volume control.

26.04 A circuit referred to as the switchguard utilizes the voltage in the loudspeaker circuit to reduce the possibility that surrounding room noise will cause false operation of the switching circuit while receiving speech.

26.05 A predetermined voice level is necessary to switch from the receiving to the transmitting mode of operation. In the presence of steady room noise, a special circuit automatically raises the required threshold level to prevent operation of the switching control circuit by noise. Talkers will still switch satisfactorily because they increase their voice levels under noisy conditions.

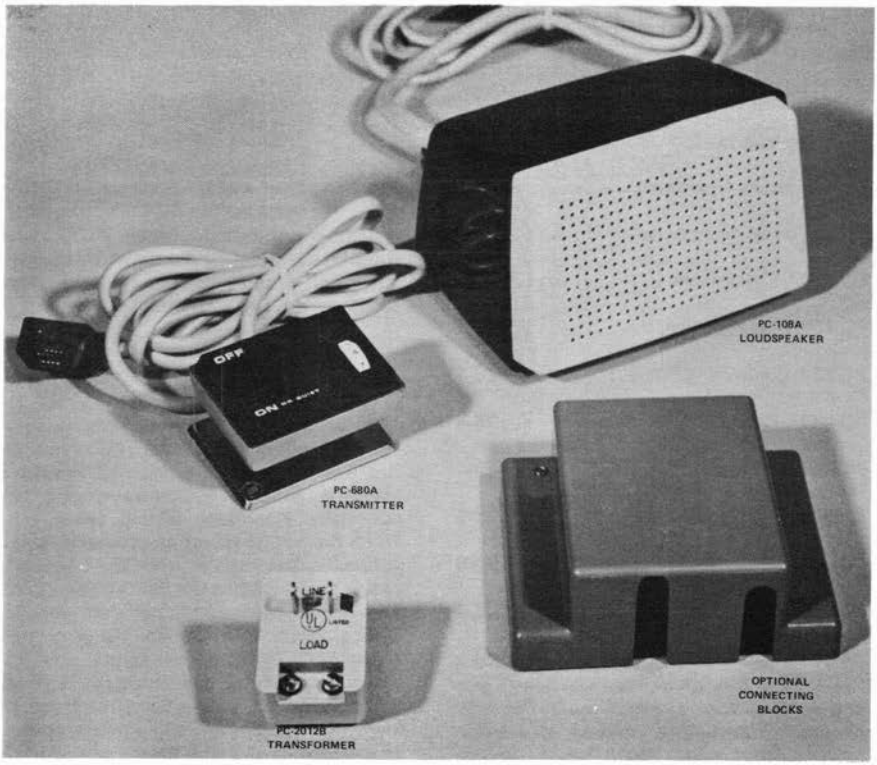


FIGURE 26.00 System - Components of PC-4A Speakerphone

TABLE 26.00 PC-4A Ordering Information

ITEM	STOCK NUMBER					
	WHITE	BLACK	GREEN	BEIGE	COCOA BRN.	ASH
LOUDSPEAKER, PC-108A	61462	61460	61461	61459	61528	61534
TRANSMITTER, PC-680A	61458	61456	61457	61455	61529	61533
TRANSFORMER, PC-2012B						
CONN. BLK., PC-82A	← 61463 →					
CONN. BLK., PC-182A	← 61464 →					
ADAPTER, PC-223A	← 61465 →					

Using the Speakerphone

26.06 Originating calls. To originate a call using the speakerphone,

a. Momentarily depress the transmitter ON or QUIET button. The ON lamp will light indicating the speakerphone is in the talking condition.

b. When dial tone is returned over the loudspeaker, use the telephone dial to dial the desired number.

NOTE: Except in cases where the handset covers the dial, it is not necessary to lift the handset during dialing.

c. If the handset was off-hook during dialing, depress and hold the ON or QUIET button after dialing the last digit. Hold the button depressed until the handset is restored.

d. When the called party answers, the transmitter and loudspeaker can be used to carry on a handsfree conversation. Adjust the volume level as desired. Best operational results are obtained at the lowest acceptable volume setting.

26.07 Answering calls. To answer a call using the speakerphone, momentarily depress the ON or QUIET button when the telephone rings. This will trip the ringing and automatically connect the speakerphone to the calling line, allowing you to communicate via the transmitter and loudspeaker.

26.08 Disable transmitter. To disable the transmitter during a call in order to not be heard by the distant party, depress and hold the ON or QUIET button. The transmitter will remain disabled for as long as the button is depressed. With the transmitter disabled, conversation will not be transmitted to the distant party; however, the distant party will still be heard over the loudspeaker. The ON lamp will extinguish and remain so for as long as transmission is disabled. Release the ON or QUIET button when you wish to again transmitt to the distant party. This will restore the system to hands-free operation and cause the ON lamp to again light.

26.09 Call transfer.

a. To transfer from handset to speakerphone operation, depress and hold the ON or QUIET button on the transmitter. Return the handset to the cradle, then release the ON or QUIET button. Adjust the volume control as required.

b. To transfer from speakerphone to handset operation, lift the handset. This will cause automatic transfer to handset operation.

26.10 Call termination. To terminate a speakerphone call, momentarily depress the OFF button on the transmitter. This will disable the speakerphone system and cause the ON lamp to extinguish.

PC-680A Transmitter

26.11 The transmitter, see figure 26.00, is a small unit incorporating the microphone, a preamplifier, an indicator lamp, and the operating controls for the speakerphone. The controls include the ON or QUIET button, the OFF button, and the volume control. The ON or QUIET button activates the system. If held depressed, it disables the microphone so that the user may conduct a private conversation without the party at the far end hearing. The OFF button simply turns the system off. The volume control is used to vary the received sound level. The indicator lamp lights when the system is on.

PC-108A Loudspeaker

26.12 The loudspeaker contains the electronic circuitry, the loudspeaker, and the relay and transformer necessary to couple the set to the telephone.

PC-82A Connecting Block

26.13 The PC-82A connecting block is shown in figure 26.01. The connecting block is used to interconnect the loudspeaker, transmitter, power unit, and telephone set. It is designed for use with plug-ended 6 button key telephones sets. The connecting block includes three 50-pin connectors, one for the telephone set, one for the station cable, and one that accepts the cables from the transmitter and loudspeaker and the reversible option plug. Also included are seven screw terminals for connections from the power unit and for other key system arrangements.

26.14 The reversible option plug provides two key system options; ringer cutoff or auxiliary relay operation. The arrow on the plug of the loudspeaker cable, should point to the option required on the option plug.

PC-182A Connecting Block

26.15 The PC-182A connecting block is used in place of the PC-82A connecting block. It is used to adapt a single line telephone for speakerphone operation. This connecting block provides two 50-pin connectors and a terminal strip. See figure 26.01. One connector accepts the transmitter and loudspeaker cables, the other accepts a 50-pin connector on the station cable. The terminal strip is used to terminate the station cable if it is not equipped with a 50-pin connector.

PC-2012B Transformer

26.16 The PC-2012B transformer changes 115 volt 60 Hz, power to the voltage required to operate the PC-4A speakerphone system. The transformer plugs into a conventional 110 VAC outlet. One transformer is required to power one speakerphone system.

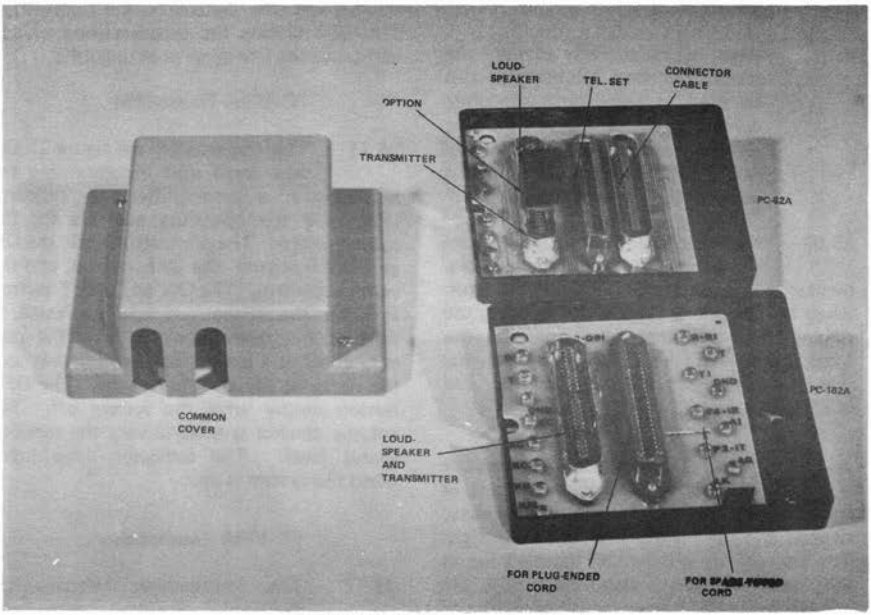


FIGURE 26.01 Connecting Blocks

Installation Planning

26.17 The following requirements should be observed when planning a speakerphone installation.

a. Avoid placing components with plastic covers or parts in locations where ambient temperatures may exceed 140°F (60°C).

b. Make certain the AC outlet for the PC-2012B transformer is not controlled by a switch.

c. The PC-2012B transformer should be located less than 125 feet from the loudspeaker when using 24 gauge hook-up wire.

d. Place the loudspeaker and transmitter within convenient reach of the user and a minimum of one foot apart.

e. The transmitter must be located at least two feet from the transformer or any other AC powered device.

f. There should be no obstructions between the user, loudspeaker, and transmitter.

26.18 In addition to the preceeding requirements, the telephone used in a PC-4A speakerphone installation should be an ITT model 39 or 42, such as the type K565**( ) 39 or 42. If another type of telephone instrument is used, it must meet the following requirements.

a. The telephone must provide a set of line switch transfer contacts to disconnect the speakerphone when the handset is lifted.

b. The dial in a rotary dial telephone must provide two sets of off-normal (make) contacts if the handset will be left on-hook during dialing. These contacts are required to mute the loudspeaker and receiver during dialing.

c. The dial common switch in a Tel-Touch telephone must provide a set of make contacts to connect line power from the loudspeaker to the tone oscillator if the handset will be left on-hook during dialing. If the Tel-Touch set is equipped with a polarity guard, these contacts must be isolated from the tone oscillator by the polarity guard circuit.

d. Certain wiring precautions must be observed when multipled sets are wired for speakerphone operation. The T1, R1, 1R (P4), 1T (P3), LK and AG leads should be disconnected at or as close as possible to any set in the group that is not arranged as a speakerphone. Failure to do so could result in one of the following troubles.

1. A tip and ring cross through the T1 and R1 leads.

2. False operation of an A relay through the AG lead.

3. Shorting of the receiver input to the 1T (P3) or 1R (P4) leads.

Installation

26.19 Two common methods of installing the speakerphone equipment are shown in figures 26.02 and 26.03. Figure 26.02 illustrates use of the PC-82A connecting block for connecting a multi-line key telephone to the speakerphone. Figure 26.03 shows use of the PC-182A connecting block for connecting a single line telephone to the speakerphone.

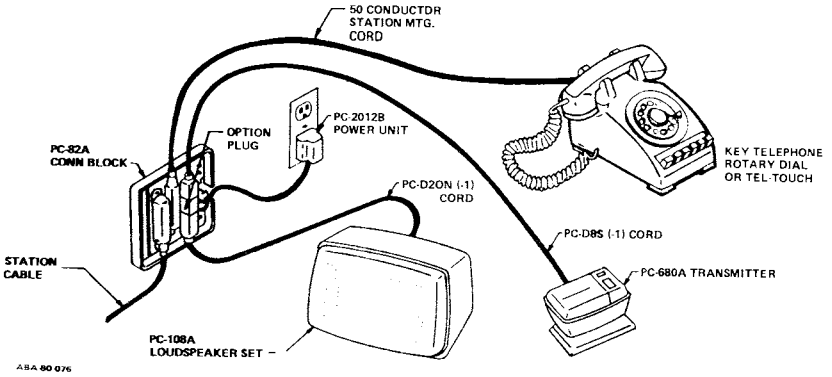


FIGURE 26.02 PC-4A Speakerphone Arrangement. Telephone Served by Connector Cable

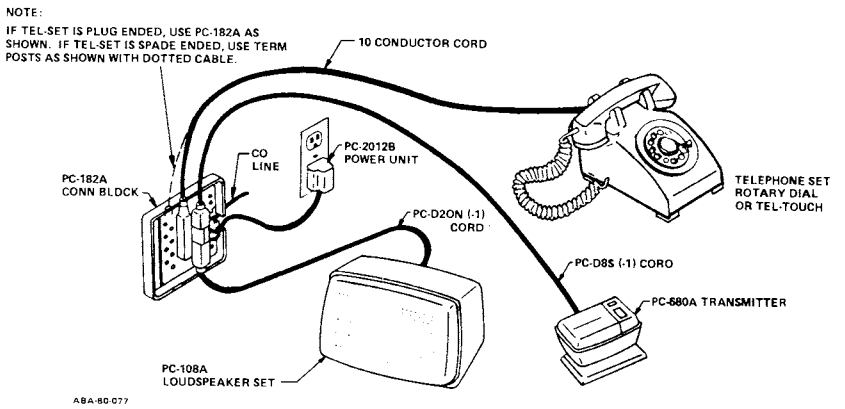


FIGURE 26.03 PC-4A Speakerphone Arrangement. Single Line Telephone

26.20 To connect a key telephone for speakerphone operation,

a. Unplug the key telephone from the station cable.

b. Mount the PC-82A connecting block in a convenient location, then plug the station, transmitter, loudspeaker, and telephone set cables into the connecting block, as shown in figure 26.02.

c. Install the option plug being certain to align the arrow on the loudspeaker plug with the desired option in the option plug, i.e., AUX RELAY or RING CUTOFF.

d. Use a 2 conductor 24 gauge wire to connect the terminals on the PC-2012B transformer to the terminals designated AC on the connecting block.

NOTE: Do not plug the transformer in until all cabling has been completed and you are ready to test the telephone.

26.21 To connect a single line telephone for speakerphone operation,

a. Mount the PC-182A connecting block in a convenient location, then plug the loudspeaker and transmitter cables into the connecting block as shown in figure 26.03.

b. Connect the telephone set to the connecting block. If the mounting cord is plug ended, plug in the connector as shown in figure 26.03. If the mounting cord has spade lugs, use the terminal posts on the connecting block.

c. Connect the station cable (CO line) to the terminal posts on the connecting block.

d. Install the option plug, being certain to align the arrow on the loudspeaker plug with the desired option on the option plug, i.e., AUX RELAY or RING CUTOFF.

e. Use a 2 conductor, 24 gauge wire to connect the terminals on the PC-2012B transformer to the terminals designated AC on the connecting block.

NOTE: Do not plug the transformer in until all cabling has been completed and you are ready to test the telephone.

Maintenance

26.22 Maintenance of the PC-4A speakerphone system should be limited to normal cleaning tasks. No attempt should ever be made to repair the transmitter or loudspeaker, or to replace component parts on the PCB's in either unit.

26.23 If a speakerphone fails to operate properly, refer to table 26.01 for trouble analysis.

TABLE 26.01 PC-4A Speakerphone System Trouble Analysis

TROUBLE INDICATION	PROBABLE CAUSE	CHECK
Speakerphone inoperative; indicator lamp does not light.	No power, or open wiring	Power supply outlet with a neon lamp voltage tester or equivalent, or check LK lead for open.
Lamp lights but does not stay lit when ON OR QUIET button is released.	Loose connection in local wiring.	Switchhook contacts or A1 and LK leads for open.
Rotary dial pulses heard over loudspeaker.	Dial wiring.	For proper dial P3 and P4 leads.
No dial tone heard when speaker-phone is ON, but heard when on handset.	Open wiring.	R1 and T1 leads from tele-phone set.
No dial tone heard on speaker-phone or handset.	Open wiring.	Tip or ring from line.
Dial tone cannot be broken with dial when on speakerphone.	Incorrect wiring.	Connection of tip and ring from telephone line to tele-phone set.
Tel-Touch dial inoperative when speakerphone is ON.	Dial wiring.	For proper IT and IR leads.

27. K107A LOUDSPEAKER

CONTENTS PAGE

27.01 The K107A loudspeaker or "Orator" (see figure 27.00) is used with a standard telephone set to permit a group of people to hear both sides of a telephone conversation. The unit is encased in a plastic housing and is available in six standard telephone colors. Ordering information for the K107A loudspeaker is given in table 27.00.

FIGURE 27.00 K107A Loudspeaker

TABLE 27.00 K107A Loudspeaker Ordering Information

CODE	COLOR	ITT-CS STOCK NO.
10700-A-319	Black	61280
10705-A-319	Moss Green	61281
10713-A-319	Beige	61282
10715-A-319	White	61283
10744-A-319	Light Ash	61499
10745-A-319	Cocoa Brown	61502

27.02 The unit measures approximately 4 inches high, 5 5/8 inches wide, and 3 3/4 inches deep. It is equipped with a combination ON/OFF switch and VOLUME control and is fitted with a 9 foot, 4-conductor cord.

Operation

27.03 The telephone instrument associated with the K107A loudspeaker is used in the normal manner; the handset must be off-hook to use the loudspeaker. The ON/OFF - VOLUME control on the front panel is rotated clockwise to turn the unit on and to increase the volume; it is rotated counter-clockwise to reduce the volume and turn the unit off. The loudspeaker should be turned off when not in use. With the speaker off, the associated telephone may be used in the normal manner.

Power Supply

27.04 The K107A loudspeaker is designed to use a K31(A)690 transformer which plugs into a conventional 105-125 VAC outlet. However, when incorporated in a key system, the loudspeaker can be powered by 18 VAC from the key system power supply.

Location

27.05 The loudspeaker should be located not more than 200-feet or less than 3-feet from the AC power source. In addition, a minimum separation of 3-feet should be maintained between the loudspeaker and the associated telephone set to prevent feedback. Greater separation between the telephone and loudspeaker will permit a higher volume adjustment without feedback. For maximum efficiency, the wire distance between the loudspeaker and telephone set should not exceed 100 feet.

Installation

27.06 The loudspeaker connects to the telephone set receiver and is under control of the hookwitch and dial off-normal contacts. Two spare conductors in the telephone set mounting cord or a separate 2 conductor mounting cord will be required to connect the loudspeaker.

27.07 Figures 27.01 and 27.02 show typical connections for the K-107A loudspeaker.

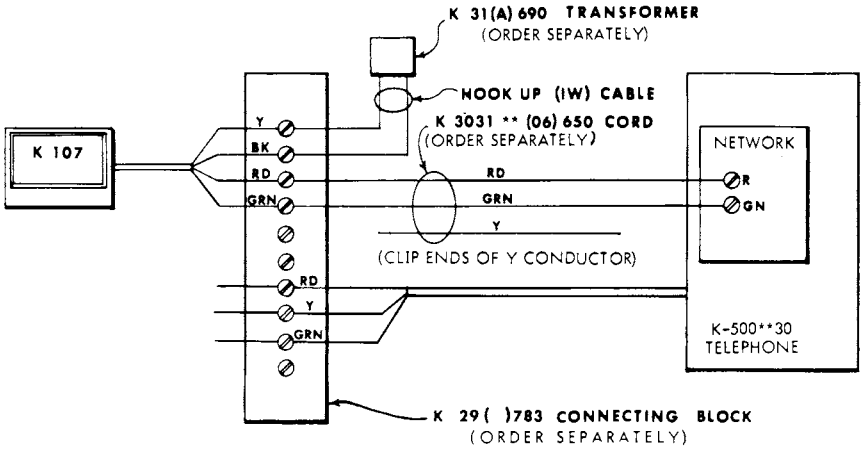
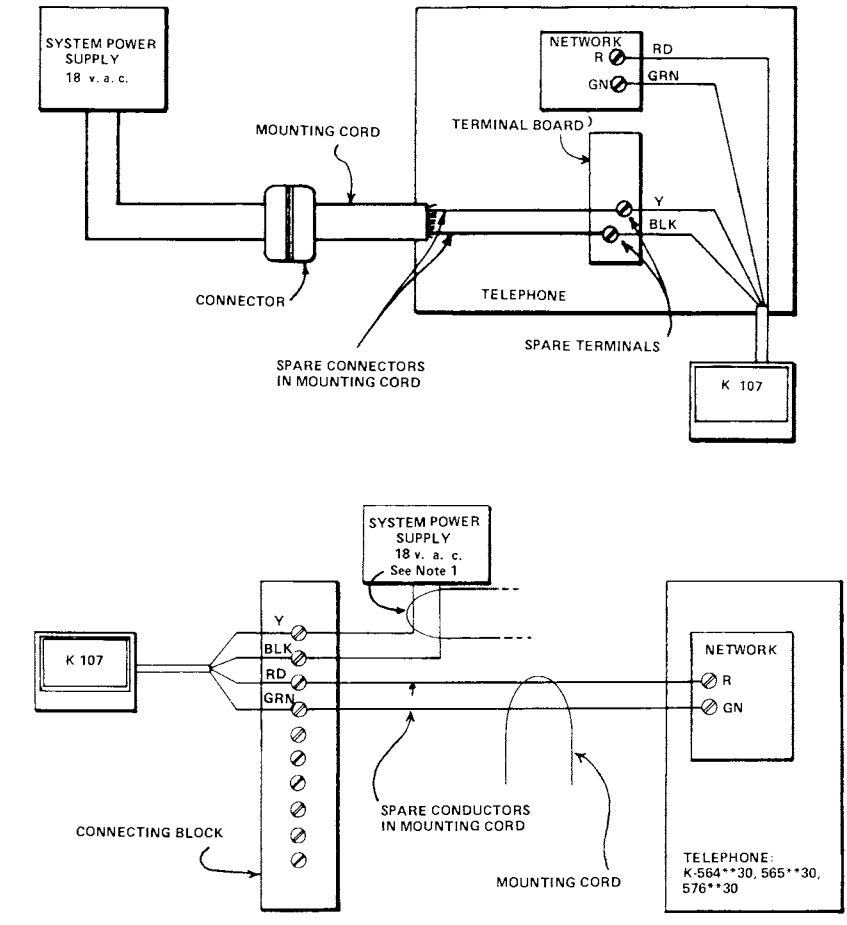


FIGURE 27.01 K 31(A) Transformer Connections



NOTE 1: In Key Systems, Use the Key System Power Supply and Spare Conductors in the Power Supply Cord. Otherwise Use K-31(A)690 Transformer and IW.

A8A 80 079

FIGURE 27.02 Key System Power Supply Connections

28. KEY SYSTEM EQUIPMENT

CONTENTS PAGE

28.01 A key telephone system provides an economical, convenient, and efficient arrangement for telephone installations. Such a system permits a number of telephones to share a number of CO and / or PABX lines without the need of a switchboard or attendant, and may include such features as intercom service, music-on-hold, paging, and conference service.

28.02 Key systems are made up of a number of interchangeable modular units which can be configured to meet the needs of any customer. Self contained systems are available for small 6 or 13 line installations; rack-mounting shelves which can be interconnected are available for larger installations. Some of the major components for key systems are described in the following paragraphs.

Power Supply

28.03 The choice of a power supply when installing a key telephone system is of primary importance. The selected supply must be sufficient to handle the current needs of the system as well as the future needs. In table 28.00 a com-

TABLE 28.00 Key System Power Supply Data

MANUFACTURER MODEL	TALK SUPPLY (A BATT)	RING SUPPLY	SIGNAL SUPPLY	REMARKS
Lorain RT2B	24-34 VDC, 4A	20 Hz, 75 VAC, 50 MA	20 VAC, .5A 10 VAC, 10A	
Lorain RT3B	24 VDC, 1A	20 Hz, 100 VAC, 50 MA	24 VDC, 2A* 20 VAC, .5A 10 VAC, 10A	
Lorain RT4B	24 VDC, 4A	30 Hz, 100 VAC, 50 MA	20 VAC, .5A 10 VAC, 10A	
Lorain RT4G	23/34 VDC, 4A	30 Hz, 100 VAC, 50 MA	24 VDC, 4A* 20 VAC, .5A 10 VAC, 10A	Comes with 6 ft. cord and grounded plug, and jumpers for optionally grounding one side of all inputs.
Lorain 12A3	24 VDC, 12A	20 Hz, 90 VAC, 1.5A	20 VAC, 4A 10 VAC, 30A	Relay Rack Mounting AC line 10A, DC output 20 A main fuse. Includes ammeter and voltmeter.
Elgin EAK-4	24 VDC, 1A	30 Hz, 100 VAC, 50 MA	24 VDC, 2A* 20 VAC, 1A 10 VAC, 8A	
Elgin EAK-6	24 VDC, 4A	30 Hz, 100 VAC, 50 MA	20 VAC, .5A 10 VAC, 10A	
Elgin EAK-8	24 VDC, 8A	30 Hz, 100 VAC, 50 MA	20 VAC, 1A 10 VAC, 10A	

*Indicates "B BATT" output: i.e., unfiltered DC output.

parision of some of the power supplies most frequently used by ITT is provided.

28.04 The following data may be used to determine current rating for power supply selection.

a. Average current drain for a key telephone lamp: 10 VAC, 40 MA.

b. Average electromechanical ringer current drain: 75-90 VAC, 13 MA.

c. Average electronic ringer current drain: 100 VAC, 1.5 MA.

d. H.V. Buzzer: 100 VAC, 125 MA.

e. L.V. Buzzer: 10 VAC, 125 MA.

f. Plug-in unit current drain: See table 28.01.

K-501 6-Line Key Service Unit

28.05 Two packaging arrangements are available for type K-501 Key Service Units, a wall unit and a floor stand unit. Either system is arranged to serve up to 6 CO/PABX lines and can be equipped with a 9 or 19 line rotary dial or push button dial intercom. Each KSU (Key Service Unit) consists of a backboard assembly, an equipment mounting frame, and a cover. The backboard assembly includes 2 quick-connect terminal blocks which provide convenient connecting points for incoming lines, station cables, power supply cable and KTU connections.

28.06 The equipment mounting frame is hinged to provide easy access to all connections. The frame is hinged to open from left to right, but can be modified to open from right to left.

28.07 The card mounting panel assembly located toward the top of the equipment frame includes six 18-contact card connectors that will accept most plug-in K400 type printed circuit KTU's. The panel is equipped with an electromechanical interrupter which controls timing for visual and audible signals.

TABLE 28.01 KTU Current Drain

KTU NUMBER	FUNCTION	CURRENT DRAIN	
		A BATT	B BATT
K-207	Dial Intercom	140 MA	600 MA
K-216A1	Transfer	–	100 MA
K-316A	Transfer	36 MA	–
K-347C	P/B Intercom	300 MA	–
K-400D	Line Card	–	53 MA
K-400E	Line Card	–	53 MA
K-401A1	Manual Intercom	90 MA	–
K-401DA	Paging	78 MA	–
K-403A	Music-On-Hold	75 MA	–
K-405A	Exclusion	90 MA	–
K-414A	Tie Line	50 MA	–
K-415A	Tie Line	80 MA	52 MA
K-416A	Tie Line	105 MA	36 MA

28.08 Both variations of the K-501 unit are self-contained. They are prewired between the connecting blocks, interrupter, and the printed circuit card connectors so that KTU's can be added to increase capacity as needed.

28.09 The wall unit shown in figure 28.00, measures 17 inches high, 14 inches wide, and 11 inches deep. It includes a fiberglass cover and can be ordered with or without a factory installed dial selective intercom. This model requires an external power supply.

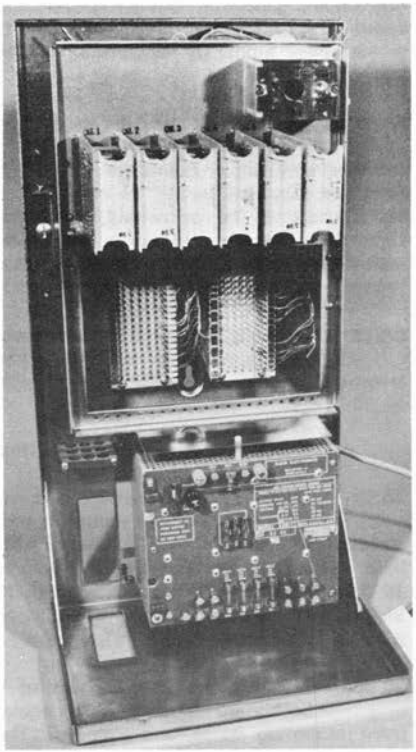


FIGURE 28.00 K-501 6-Line Key Service Wall Unit

28.10 The floorstand unit is furnished with a grey metal cover. It may be floor or wall mounted. Approximate dimensions are 28 inches high, 13 inches wide, and 11 inches deep. The cabinet will accept a maximum of six plug in KTU's, a power supply, and a dial selective intercom. It can be ordered with or without the intercom and with or without the power supply.

28.11 System capacity and features.

a. Maximum of 6 CO, PABX, or manual intercom lines.

b. Manual or dial selective (9 or 19 station) intercom.

c. Lamp signals.

1. Idle line - lamp extinguished.
2. Busy line - lamp lit.
3. Incoming call - lamp flashing.
4. Call on hold - lamp winking.

d. Maximum of 70 lamps with internal power supply.

e. Requires one K-400 type KTU for each CO or PABX line.

f. Requires one K-400 type KTU for each manual intercom line.

K-601A 5-Line Key Service Unit

28.12 The K-601A Key Service Unit (KSU) is a self contained unit arranged to provide standard key system features for a maximum of five lines and ten stations. It is designed for wall mounting and uses standard plug-in K-400 type printed circuit KTU'S. The unit is shown in figure 28.01.

28.13 The basic unit comes complete with a backboard and card frame assembly, power supply, interrupter, connecting block, and cover. Including the cover, the unit measures approximately 15¼ inches high, 8 inches wide and 7 inches deep. Fully equipped, it weighs less than 20 pounds.

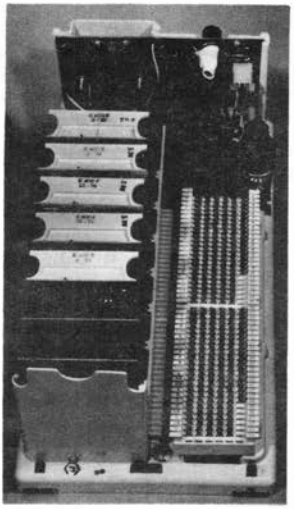


FIGURE 28.01 K-601A 5-Line Key Service Unit

28.14 The K-601A system can optionally be arranged for the following features:

a. Manual (push button) intercom service.

b. Dial intercom service.

c. Rotary dial or Tel-Touch operation.

d. Call announcing using either push button or dial access.

e. Voice paging using push button or dial access.

f. Music on hold.

28.15 The unit's backboard and card frame assembly is equipped with seven 18-contact card connectors, one 20-contact card connector, and one 44-contact card connector. Two 18 contact connectors accommodate the power supply PCB and the interrupter PCB; the remaining 5 connectors are wired to accept K-400 CO/PBX line cards. The 20-contact connector is used for an optional KTU assembly such as the manual intercom PCB, K-401, music-on-hold PCB, K-403, etc. Contacts on this connector are wired to the connecting block so that they may easily be changed according to the type of KTU used. The 44-contact card connector is provided for the optional dial intercom PCB.

28.16 The power supply for the K-601A operates from 115 VAC, 50/60 Hz, and is fused at 1.5 Amps. It provides all voltages required for a system using buzzer signalling or call announcing on an intercom. In systems where ringing current is required, a ringing generator is available. The ringing generator attaches to the back board by means of six screws; it connects to the power supply by means of a plug and jack arrangement.

28.17 The connecting block located on the right side of the K-601A unit provides termination points for 5 CO/PBX lines and 5 station cables. If more than 5 stations are to be connected, additional type 66 connecting blocks must be installed to provide the necessary termination points.

28.18 Ordering information and document numbers for the K-601A key telephone system are provided in table 28.02.

K-512A 13-Line Key Service Unit

28.19 The K-512A key service unit is a self-contained, wall-mounting unit arranged to serve up to 13 CO or PABX lines. This unit, see figure 28.02, measures 16 inches high, 26 inches wide, and 10 inches deep. It can optionally be equipped with a 9 or 19 line dial selective intercom.

28.20 The K-512A unit consists of a backboard assembly, an equipment mounting frame, and a cover. The backboard assembly includes 4 quick-connect terminal blocks for terminating incoming lines, station cables, power supply cable, and KTU connections. The equipment mounting frame is hinged to permit easy access to all connections. A panel assembly mounted on the equipment frame includes thirteen 18-contact connectors

TABLE 28.02 Ordering Information, K-601A Key Telephone System

ITEM	ORDERING #	DOCUMENT #
Basic K-601A KSU with power supply, interrupter, and cover.	601A00-0P0	KSP601-00A
Ringing Generator Kit	184162-101	184163-101
Rotary Dial Intercom	183977-101	184243-101
Call Announcing Card	183973-101	184246-101
Tel-Touch Adapter for Dial Intercom	183981-101	184247-101
CO/PBX Line KTU, K-400E	000400-00E	KSP400-00E
Manual Intercom KTU, K-401B	000401-00B	KSP401-00B-101
Paging Adapter KTU, K-410A	000410-00A	KSP410-00A
Music-on-Hold KTU, K-403A	000403-00A	KSP403-00A
Power Supply	183969-101	184245-101
Interrupter	183965-101	184244-101

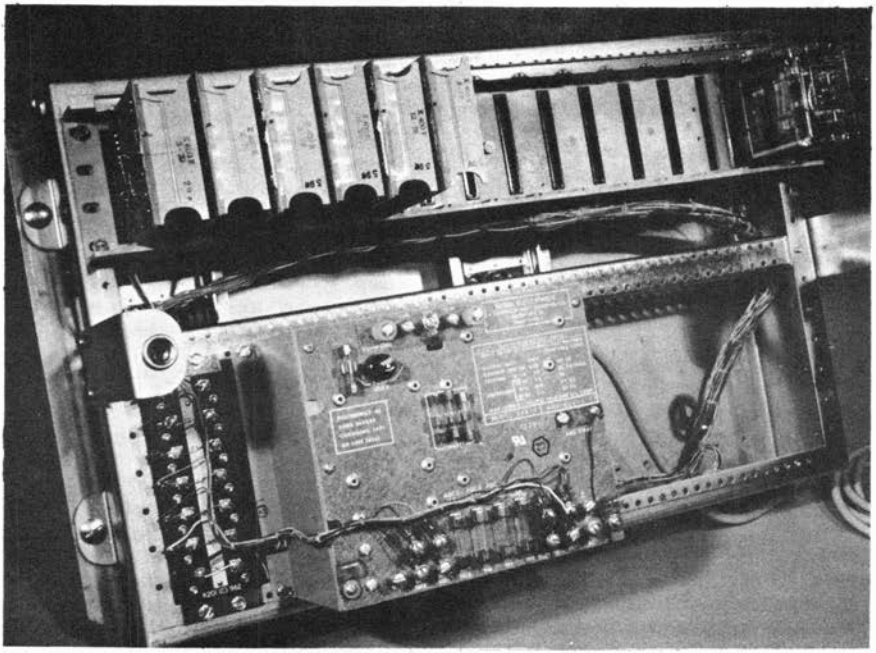


FIGURE 28.02 K-512A 13 Line Key Service Unit

which will accept most plug-in K-400 type printed circuit KTU's. The panel is equipped with an electromechanical interrupter which controls timing for visual and audible signals.

28.21 The KSU is completely prewired between the connecting blocks, interrupter, and 18 contact KSU connectors so that KTU's can be added to increase system capacity as required. The system can be ordered with or without a factory installed dial selective intercom, and with or without a factory installed power supply.

28.22 System capacity and features.

a. Maximum of 13 CO, PABX, or manual intercom lines.

b. Manual or dial selective (9 or 19 station) intercom.

c. Lamp signals.

1. Idle line - lamp extinguished.
2. Busy line - lamp lit.
3. Incoming call - lamp flashing.
4. Call on hold - lamp winking.

d. Maximum of 200 lamps with internal power supply.

e. Requires one K-400 type KTU for each CO or PABX line.

f. Requires one K-400 type KTU for each manual intercom line.

K-259B 2-Card Panel

28.23 The K-259B panel is designed to mount on most key system mounting frames. This unit, see figure 28.03, provides two 20 contact connectors which will accept all (either 18 or 20 contact) type K-400 printed circuit KTU's. The card mounting panel measures 3 7/8 inches wide, 7 inches high, and 2 5/8 inches deep. It is equipped with a card retainer secured to the top or bottom of the front panel with two machine screws.

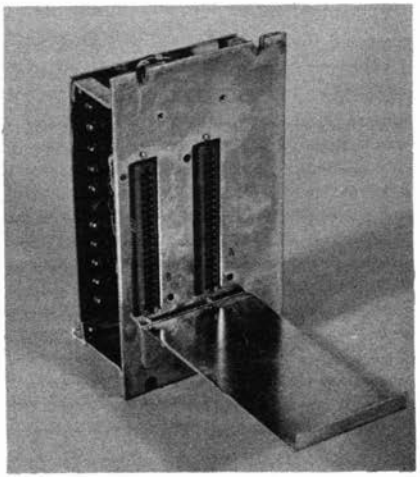


FIGURE 28.03 K-259B 2 Card Panel

28.24 The two card connectors on the front of the unit are designated A and B. They are factory wired to screw type terminal strips on the rear of the unit. Connector A is wired to a 20 lug terminal strip; connector B is wired to a 30 lug terminal strip. Wiring between the card connectors and terminals 1-20 on both strips is identical. The ten remaining terminals on the 30 lug terminal strip are for use as tie points; they may be used as required. The terminal lugs are used to terminate individual wires from the station, CO/PABX line, and key system power supply. They are wired in accordance with the type of card to be inserted in the associated KTU card connector. A fanning strip at the bottom rear of the panel is provided for dressing the incoming cables.

K-584C Card Panel

28.25 The K-584C card panel is shown in figure 28.04. The panel provides card connectors for 13 type 400 printed circuit KTU's and when fully equipped will provide key telephone service for 13 lines. The panel measures 23 inches wide, 4 inches high, and 4 1/2 inches deep. It is designed for mounting on a standard 23 inch relay rack or on the swing-out gate of a key system apparatus cabinet.

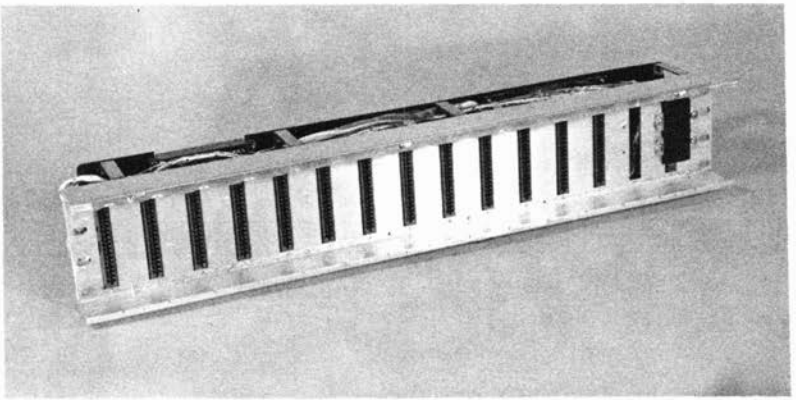


FIGURE 28.04 K-584C Card Panel

28.26 Printed circuit card connectors on the front of the card panel accommodate 13 eighteen contact KTU's. A 21 pin receptacle, also on the front of the unit, accommodates a plug-in type 190478 interrupter module which generates the necessary lamp flash, lamp wink, busy and ringing signals.

28.27 On the rear of the unit, screw terminals are provided for power, ringing, and lamp control connections, and three 50 pin cable connectors, designated 1, 2, and 3, are provided for terminating 25 pair cables from the associated lines or trunks. In addition, an eighteen contact printed circuit card connector is provided for a PROGRAM A/C PCB.

28.28 The 50 pin cable connectors are factory wired to the KTU connectors on the front of the panel. Connector 1 serves KTU connectors 1-5, connector 2 serves KTU connectors 6-10, and connector 3 serves KTU connectors 11-13.

28.29 Three standard 25 pair cables are used to connect the 50-pin cable connectors on the K-584C panel to type 66 connecting blocks. Connector 1 is cabled to key block A; connector 2 is cabled to key block B; and connector 3 to key block C. Arrangement of the key blocks is shown in figure 28.05.

28.30 The 18 contact connector on the rear of the panel accommodates a program PCB which provides two methods of distributing lamp signals from the interrupter module. When the program PCB is inserted so the message "PROGRAM A" can be read from the top of the panel, the assembly is arranged for standard 1 shelf operation wherein all interrupter signals are distributed to lines served by the panel. Under this arrangement, fusing is adequate for 17 lamps per line or a maximum of 50 lamps per interrupter contact. When the program PCB is inserted so the message "PROGRAM C" can be read from the top of the unit, the assembly is arranged for multiple panel operation wherein 1/2 of the lamp flash and wink signals from the in-

KEY BLOCK A

Circuit	Terminal	Wire
LINE 1 — CO or PBX	T	W-BL
	R	BL-W
LINE 1	T	W-O
	R	O-W
	A	W-G
	AI	G-W
	LG	W-BR
	L	BR-W
	BI	W-S
	RI	S-W
LINE 2 — CO or PBX	T	R-BL
	R	BL-R
LINE 2	T	R-O
	R	O-R
	A	R-G
	AI	G-R
	LG	R-BR
	L	BR-R
	BI	R-S
	RI	S-R
LINE 3 — CO or PBX	T	BK-BL
	R	BL-BK
LINE 3	T	BK-O
	R	O-BK
	A	BK-G
	AI	G-BK
	LG	BK-BR
	L	BR-BK
	BI	BK-S
	RI	S-BK
LINE 4 — CO or PBX	T	Y-BL
	R	BL-Y
LINE 4	T	Y-O
	R	O-Y
	A	Y-G
	AI	G-Y
	LG	Y-BR
	L	BR-Y
	BI	Y-S
	RI	S-Y
LINE 5 — CO or PBX	T	V-BL
	R	BL-V
LINE 5	T	V-O
	R	O-V
	A	V-G
	AI	G-V
	LG	V-BR
	L	BR-V
	BI	V-S
	RI	S-V

KEY BLOCK B

Circuit	Terminal	Wire
LINE 6 — CO or PBX	T	W-BL
	R	BL-W
LINE 6	T	W-O
	R	O-W
	A	W-G
	AI	G-W
	LG	W-BR
	L	BR-W
	BI	W-S
	RI	S-W
LINE 7 — CO or PBX	T	R-BL
	R	BL-R
LINE 7	T	R-O
	R	O-R
	A	R-G
	AI	G-R
	LG	R-BR
	L	BR-R
	BI	R-S
	RI	S-R
LINE 8 — CO or PBX	T	BK-BL
	R	BL-BK
LINE 8	T	BK-O
	R	O-BK
	A	BK-G
	AI	G-BK
	LG	BK-BR
	L	BR-BK
	BI	BK-S
	RI	S-BK
LINE 9 — CO or PBX	T	Y-BL
	R	BL-Y
LINE 9	T	Y-O
	R	O-Y
	A	Y-G
	AI	G-Y
	LG	Y-BR
	L	BR-Y
	BI	Y-S
	RI	S-Y
LINE 10 — CO or PBX	T	V-BL
	R	BL-V
LINE 10	T	V-O
	R	O-V
	A	V-G
	AI	G-V
	LG	V-BR
	L	BR-V
	BI	V-S
	RI	S-V

KEY BLOCK C

Circuit	Terminal	Wire
LINE 11 — CO or PBX	T	W-BL
	R	BL-W
LINE 11	T	W-O
	R	O-W
	A	W-G
	AI	G-W
	LG	W-BR
	L	BR-W
	BI	W-S
	RI	S-W
LINE 12 — CO or PBX	T	R-BL
	R	BL-R
LINE 12	T	R-O
	R	O-R
	A	R-G
	AI	G-R
	LG	R-BR
	L	BR-R
	BI	R-S
	RI	S-R
LINE 13 — CO or PBX	T	BK-BL
	R	BL-BK
LINE 13	T	BK-O
	R	O-BK
	A	BK-G
	AI	G-BK
	LG	BK-BR
	L	BR-BK
	BI	BK-S
	RI	S-BK
	18	Y-BL
	18	BL-Y
	18	Y-O
	18	O-Y
	18	Y-G
	18	G-Y
	18	Y-BR
	18	BR-Y
	18	Y-S
	18	S-Y
	18	V-BL
	18	BL-V
	18	V-O
	SP	O-V
	SP	V-G
	SP	G-V
	SP	V-BR
	SP	BR-V
	SP	V-S
	SP	S-V

FIGURE 28.05 Arrangement of Key System Connecting Blocks

terrupter are distributed to the main panel. The remaining signals are distributed to the additional K-584C panels. Under this arrangement, fusing is adequate for an average of 8 lamps per line on the main panel, and up to 100 lamps in succeeding panels not equipped with an interrupter.

28.31 Instructions for installing the K-584C panel are dependent upon application and the type of cabinet or relay rack selected for mounting. Information for strapping and interconnecting the panel and power supply is illustrated in figures 28.06 and 28.07.

K584C PANEL CONNECTIONS
(E/W INTERRUPTER, USED ALONE - PROGRAM "A")

POWER SUPPLY CONNECTIONS (See Notes Below)

	POWER SUPPLY	PANEL
(See Note 3)	A GND	5
	*A BATT (-24 VDC Filtered)	7
	B GND	3
	B BATT (-24 VDC)	1
	Ringing GND	40
	Ringing Voltage (105 VAC)	43
	GND	16
	10 VAC (Lamps)	14
	GND	20
	10 VAC (Lamps)	18
	Motor GND	26
	Motor BATT (10 VAC)	37

NOTES:

1. Confirm that factory straps are installed

FROM	TO
11	18
9	14
28	30
24	26
42	44

2. Always be certain that all power supply ground posts are bonded together and connected to a good cold water pipe ground.

3. On new model 584C panel "A BATT" is provided via appropriate lead on connecting block "C", not via screw terminal 7. "A ground" is still required on screw terminal 5 however.

ABA-80-084

FIGURE 28.06 K-584C Panel Connections, Program A

K584C PANEL CONNECTIONS
(2 PANELS WITH ONLY 1 INTERRUPTER - PROGRAM C)

POWER SUPPLY CONNECTIONS (See Notes Below)

	POWER SUPPLY	PANEL W/INTERRUPTER	PANEL W/O INTERRUPTER
(See Note 3)	A GND	5	5
	A BATT (-24 VDC Filtered)	7	7
	B GND	3	3
	B BATT (-24 VDC)	1	1
	Ringing GND	40	40
	Ringing Voltage (105 VAC)	43	
	GND	16	20
	10 VAC (Lamps)	9	18
	GND	20	
	10 VAC (Lamps)	18	
	Motor GND	26	26
	Motor BATT (10 VAC)	37	

STRAPPING BETWEEN PANELS

LEAD		
LW3	21	25
LW4	23	27
LW4	29	33
LF3	31	35
RN	28	28
ST	22	22

NOTES: 1. Confirm presence of factory installed straps

FROM	TO
42	44
28	30
24	26

2. Remove factory straps between 11 and 18 and between 9 and 14 on panel without Int.

3. On new model 584C panels "A BATT" is provided via the appropriate lead on connecting block "C", not via screw terminal 7. "A" ground is still required on screw terminal 5, however.

4. Always! Be certain that all power supply ground posts are bonded together and connected to a good water pipe ground.

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FIGURE 28.07 K-584C Panel Connections, Program C

K-400E Line Card

28.32 The K-400E line card (see figure 28.08) is a plug-in key telephone unit (KTU) designed to serve one CO or PABX line circuit in a key telephone system. It is interchangeable and compatible with K-400B and K-400D KTU's and can be used in all types of CO or PABX applications. A schematic of the K-400E KTU is provided in the rear of this section in figure 28.13.

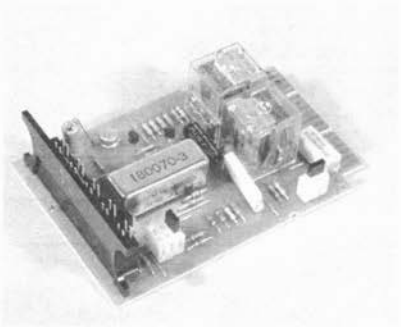

FIGURE 28.08 K-400E Line Card

28.33 The K-400E KTU features a light emitting diode (LED) which indicates the status (busy, idle, ringing, etc.) of the associated line. It provides the circuitry for control of the following visual and audible signals.

a. Lamp flash on incoming calls.

b. Lamp steady on answered or outgoing calls.

c. Lamp wink or optionally steady for calls on hold.

d. Intermittent or optionally continuous audible signal on incoming calls.

e. Bridged or divided ringing, ringing from a separate ring lead or tip lead, or direct ringing from a -24 VDC source.

f. Operation without visual signals during a power failure.

28.34 The K-400E KTU is designed to work in conjunction with a K-403A KTU and a low level music source to provide music-on-hold.

28.35 Optional strapping blocks and strapping terminals on the K-400E KTU allow for flexibility in application. Table 28.03 lists each option and indicates standard factory strapping as well as the special strapping needed to alter various card features.

K-401B Manual Intercom

28.36 The K-401B manual intercom unit is shown in figure 28.09. It is a plug in key telephone unit (KTU) which functions as a manual intercom talk circuit in a key service unit (KSU). It can be used to provide a common talking path for all stations in the key system, or to provide a private talking path between two stations. It can be plugged into any vacant KTU connector on the key service unit. A schematic of the K-401B KTU is provided in the rear of this section in figure 28.14.

TABLE 28.03 Wiring Options, K400E KTU

CODE	OPTION	OPTION BLOCK NO.	STRAPPING OR JUMPER (NOTE 1)	STRAPPING OR JUMPER (NOTE 2)
Z	Short time-out (Factory Strapping)	(1)	1-2	1-2
W	Interrupted ringing (Factory Strapping)	(1)	5-8	5-8
T	Steady ringing	(1)	6-8	6-8
V	Auxiliary Common Audible signal control	(1)	4-8	4-8
Y	Winking lamp on "hold" (Factory Strapping)	(1)	10-7	10-7
X	Steady lamp on "hold"	(1)	9-7	9-7
BR	Bridged ringing	(2), (4)	C-D, M-N	C-D, M-N
RG	Ringing from Ring side of line to Ground	(2), (4)	C-B, M-N	C-B, M-N
TU	Ringing from a separate lead to Tip side of line	(2), (4)	K-M, C-C	K-M, C-A
RU	Ringing from a separate lead to Ring side of line	(2), (4)	C-C, M-N	C-A, M-N
DR	Direct ringing (-24 V dc applied thru relay contact)	(2)	C-C	A-E
M	Music-on-Hold (Requires additional equipment)	(3)	H-H	F-H

NOTE 1: Use this strapping when (DR) or (RU) leads or (M) leads are plugged into the K400E KTU. Insert (RU) lead into terminal "C". Insert (DR) lead into "E". Insert (M) leads, (from K403A KTU), into "D" and "F".

NOTE 2: Use this strapping when (DR) or (RU) lead is connected to pin 3 via the card connector. (M) leads from K403A KTU must be permanently wired to pins 12 and 18 of K400E card connector. (Standard on K76A Key System).

NOTE 3: Use 22 AWG wire for strapping.

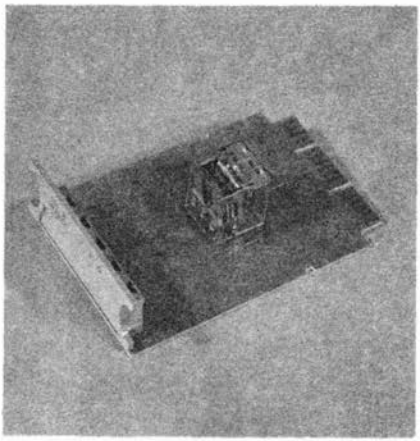

FIGURE 28.09 K-401B Manual Intercom KTU

28.37 The K-401B KTU uses a separate signaling circuit and requires a line pick-up button and a signaling button at each connected station. Usually the last (right hand) button on a key telephone is used for signaling and the adjacent button is connected to the manual intercom talk circuit.

28.38 The K-401B KTU can optionally be arranged as a paging access circuit. To arrange the circuit for paging access, connect terminal 12 of the KTU to the tip lead of the selected key telephone button. Connect terminal 13 of the KTU to the ring lead of the same button. Connect the tip and ring leads of the selected non-locking button to the input of the paging amplifier via 1 MFD capacitors. With the KTU connected in this manner, paging access will be provided for as long as the button is depressed.

K-403A Music On Hold

28.39 The K-403A KTU is used to provide music-on-hold service for a maximum of six key system lines. This unit is shown in figure 28.10. It is an eighteen contact assembly and can be plugged into an 18 or 20 pin KTU connector. The unit has one input to accept the output of a tape deck, tape player, or other low-level music source, and six isolated outputs for supplying music to as many line circuit KTU's. A schematic of the K-403A KTU is provided in the rear of this section in figure 28.15.

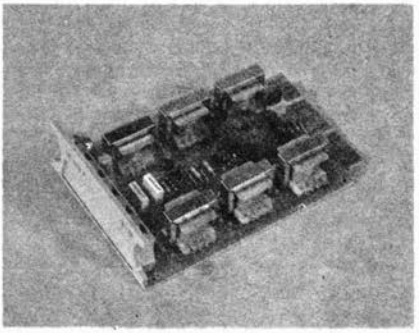

FIGURE 28.10 K-403A Music-on-Hold KTU

28.40 The music-on-hold assembly includes an option strapping block which can be strapped for an input impedance of 500 or 8,000 ohms, and a screwdriver control for adjusting output gain. Maximum overall gain of the unit is 10 to 1 for the 8,000 ohm input and 40 to 1 for the 500 ohm input.

28.41 When used in a key service unit with pre-wired KTU connectors, all wiring must be removed from the chosen connector. The connector must be rewired as shown in table 28.04.

NOTE: Do not install the K-403A KTU adjacent to an unshielded power transformer.

RT-1900 Dial Intercom

28.42 The RT-1900 dial intercom unit (see figure 28.11) is used to provide intercom service in a key system equipped with Tel-Touch and/or rotary dial telephones. The unit provides selective signaling capabilities for any common path intercom system using Tel-Touch or rotary dial telephones or a mixture of both. It is arranged to provide 19 output codes; 0, 1, 3-9, and 20-29.

TABLE 28.04 K-403A KTU Connections		
PIN NO.	LEAD DESIGNATION	CONNECT TO
1 2	First Output Pair	K-400E D or PIN 12 KTU F or PIN 18
3 4	Second Out put	K-400E D or PIN 12 KTU F or PIN 18
5 6	Third Output Pair	K-400E D or PIN 12 KTU F or PIN 18
7 8	Input Pair	Music Source
9 10 11 12	-24 Vdc – Ground –	Power Supply (Talk Battery)
13 14	Fourth Output Pair	K-400E D or PIN 12 KTU F or PIN 18
15 16	Fifth Out put Pair	K-400E D or PIN 12 KTU F or PIN 18
17 18	Sixth Output Pair	K-400E D or PIN 12 KTU F or PIN 18

NOTE: For low input impedance, (500 Ohms), jumper plugs into B and C of Option Block. For high input impedance, (8000 Ohms), jumper plugs into A and B of Option Block.

28.43 The RT-1900 is enclosed in a molded plastic housing on which complete installation instructions are attached. The housing is not removable, hence maintenance is limited to replacing the entire unit in the event of a failure. The RT-1900 dial intercom unit is designed for wall mounting or for standard KTS rack mounting. It measures approximately 6 inches high, 7 inches deep, and 1 5/8 inches wide.

28.44 The unit is equipped with a standard 25 pair male connector. All external connections are made via a 25 pair connecting block (type 66B4 or equivalent) which connects to the unit via a 25 pair cable equipped with a 25 pair female connector.

FIGURE 28.11 RT-1900 Dial Intercom

28.45 Technical specifications for the RT-1900 are as follows:

a. Voltage: -20 to -28 VDC.

b. Input current: Idle - 95 ma @ 24 VDC. Operate - 360 ma @ 24 VDC.

c. Output contact rating: 50 VA.

d. Signaling time: 1 second.

e. Maximum loop: 600 Ohms.

f. Input level: -10 to +8 dBM.

g. Bandwidth: ± 1.75% @ OdBM.

h. Detect time: 40 ms@ OdBM.

i. Pulse speed: 10 ± 3 PPS.

j. Pulse ratio: 60% break/40% make ± 10%.

k. Operating temperature: 0°C to 50°C.

28.46 Figure 28.12 illustrates installation cabling for the RT-1900 dial intercom. Step-by-step installation instruction are as follows:

a. Connect a 25 pair cable fitted with a 25 pair female connector to the rear of the unit. Secure the cable with the retainer brackets provided.

b. For KTS rack mounting, mount the unit using the two 12-24 screws provided.

c. For wall mounting, remove the 6-32 screw from each mounting bracket, rotate the brackets 90° to the desired side and replace the screws. Attach the unit to the wall using suitable screws.

d. Terminate the 25 pair cable on the connecting block. Mark the block according to the legend on the side of the unit.

e. Make the power supply connections shown in table 28.05.

f. Multiple the tip (T) and ring (R) leads of each station line and cross-connect to the TIP and RING terminals on the connecting block.

TABLE 28.05 RT1900 Power Supply Connections

CONN. BLK. TERMINAL	POWER SUPPLY TERMINAL	
B BAT	-24 VDC	Signal Bat.
B GND	GND	
A BAT	-24 VDC	Talk Bat.
A GND	GND	
LB	10 VAC	Lamp Bat.
LG	GND	
Aud Sup	18/110VAC 30Hz	Audible Supply
Aud Gnd	GND	

g. Multiple the L and LG leads of each station line and cross-connect to the L and LG terminals on the connecting block.

h. Cross-connect the buzzer pair from each station line to the respective B and R terminals on the connecting block.

i. Make certain that all ground connections at the power supply are connected in common.

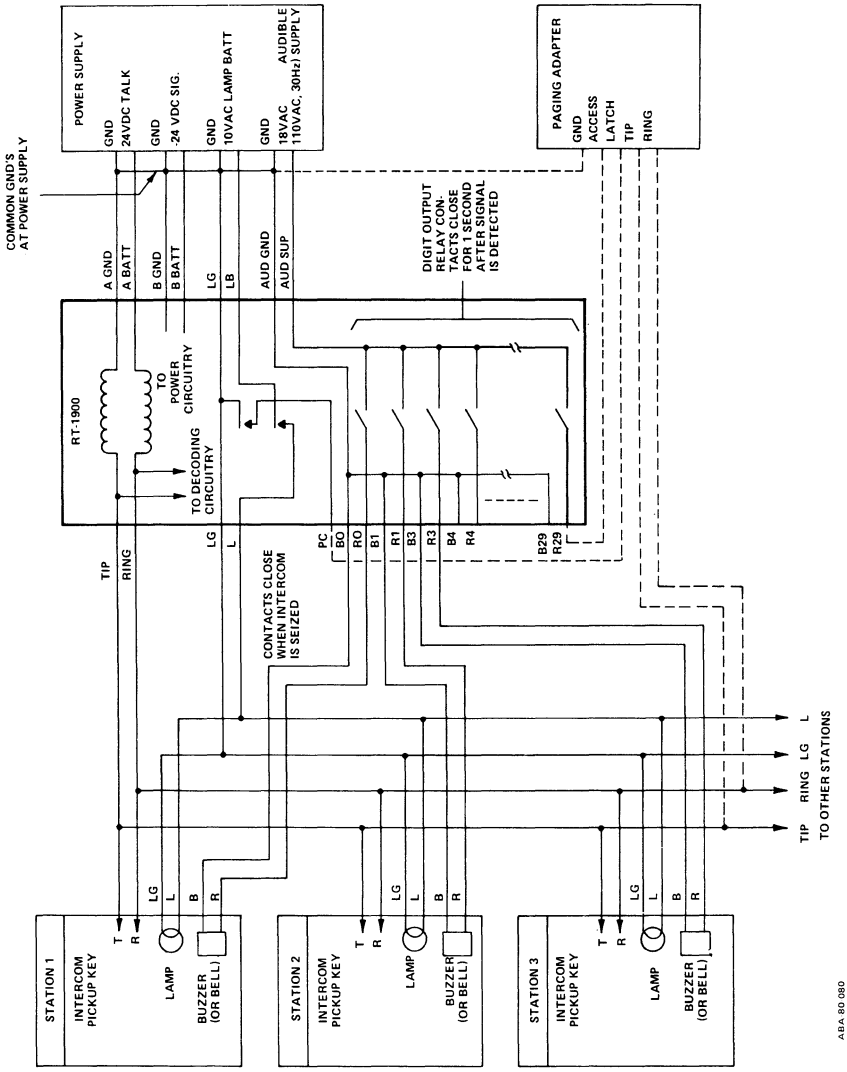

FIGURE 28.12 RT-1900 Intercom Installation Diagram

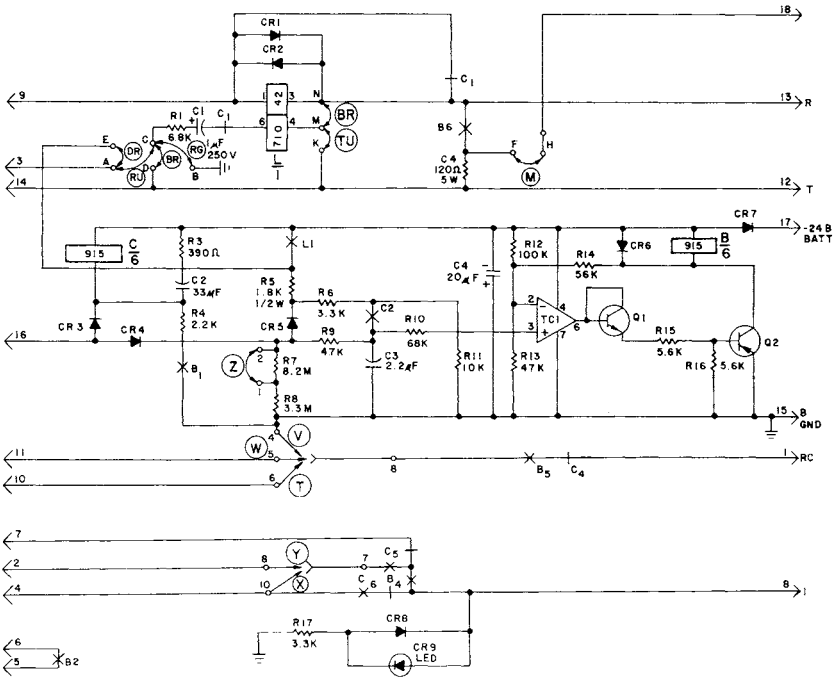

FIGURE 28.13 Circuit Schematic, K-400E KTU

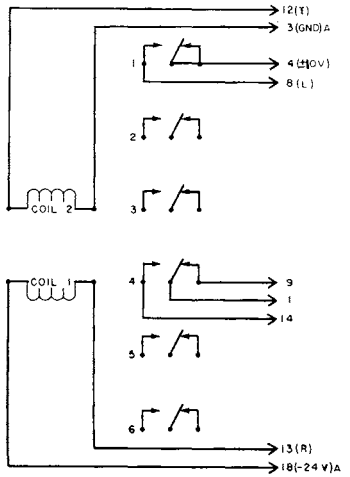

FIGURE 28.14 Circuit Schematic, K-401B KTU

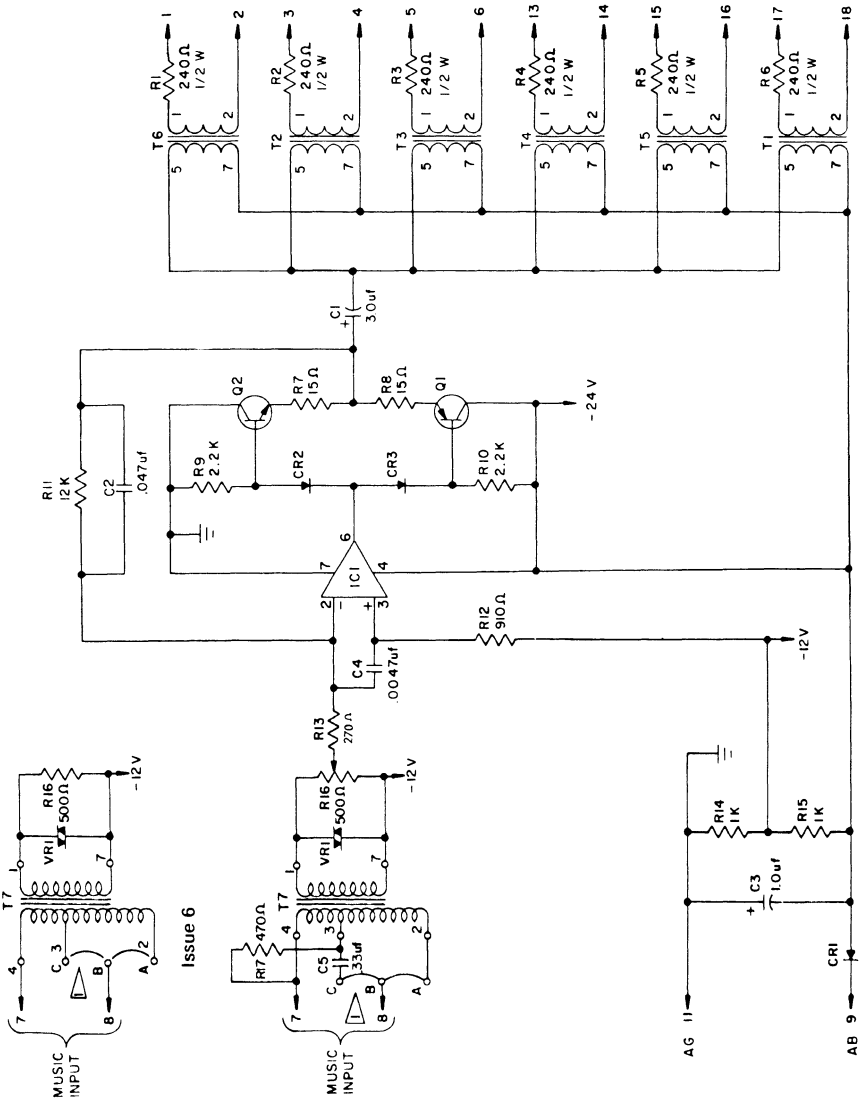

FIGURE 28.15 Circuit Schematic, K-403A KTU

29. DIODE MATRIX

CONTENTS PAGE

29.01 The diode matrix is used in key telephone systems when it is necessary to arrange two or more telephones serving the same line for selective and common ringing. With selective ringing, calls on a line common to two or more telephones will cause only selected telephones to ring. With common ringing, calls on a common line will cause ringing on all telephones on which the line appears. Without the diode matrix, telephones could only be arranged for common ringing.

Description

29.02 A diode matrix is made up of a series of diodes connected in the ring lead between the KTU line card and the associated telephone. The diodes are selectively connected in the station ringing leads to pass ringing current in one direction while blocking it in the opposite direction.

29.03 Two forms of the diode matrix are commonly employed in the field. The first uses a standard 50 pair (type 66B-50) or equivalent connecting block. The block accommodates diodes for the matrix and serves as a cross-connect point for the R1 and B1 leads between the key system connecting blocks and the station connecting blocks. See figure 29.00. As an alternative the matrix block assembly described in paragraph 29.08 can be used.

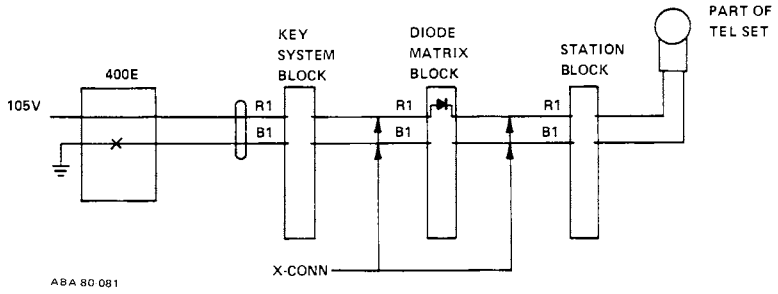

FIGURE 29.00 Typical Connecting Block Arrangement

Examples

29.04 Two examples of the diode matrix are shown in figures 29.01 and 29.02. Each figure includes a schematic diagram and a pictorial wiring diagram.

29.05 Example 1. The example shown in figure 29.01 involves 3 lines and 3 stations. In this illustration, diodes in the ring (R1) leads of lines 1, 2, and 3 permit selective ringing of stations 1 and 2 on calls from line 1; selective ringing of station 1 on calls from line 3; and common ringing of all stations on calls via line 2.

29.06 Example 2. The example shown in figure 29.02 includes 4 lines and 4 stations. In this arrangement, station 1 rings from a call on any line, station 2 rings from calls on lines 1 and 2, station 3 rings from calls on lines 2 and 4, and station 4 rings from calls on line 3.

Installation

29.07 General instructions for a diode matrix using a 50 pair connecting block are as follows:

a. Make a sketch of the desired line/station ringing scheme, similar to the schematics shown in figures 29.01 and 29.02.

b. If necessary, remove the associated R1 and B1 jumpers between the key system and station connecting blocks.

c. Referring to the sketch, use a twisted pair to connect the R1 and B1 leads of the first line from the key system connecting block to the diode matrix connecting block as follows:

1. Connect the R1 lead to the anode (+) side of the first diode. If necessary, multiple the lead to any other required diode(s). Where the line is to ring only one station, use one diode; where the line is to ring two stations, use two diodes; 3 stations, 3 diodes; etc.

2. Connect the B1 lead to an unassigned terminal toward the bottom of the matrix connecting block.

d. Repeat step c for each assigned line. Use the next diode on the diode matrix block for the R1 lead; use the next unassigned terminal at the bottom of the diode matrix block for the B1 lead.

e. At the diode matrix block, multiple the B1 (ring ground) leads of all associated lines.

f. At the diode matrix connecting block, use single conductor jumper wire to interconnect the cathode (-) side of all diodes serving the same stations. Refer to the sketch for diode assignments.

g. Referring again to the sketch, use a twisted pair to connect the R1 and B1 leads for the first station from the diode matrix connecting block to the station connecting block. Connect the leads as follows:

1. Connect the cathode (-) side of the first assigned diode to the R1 terminal of the desired station on the station connecting block.

2. Connect the common B1 terminal on the diode matrix connecting block to the B1 terminal of the desired station.

h. Repeat step g for each assigned diode.

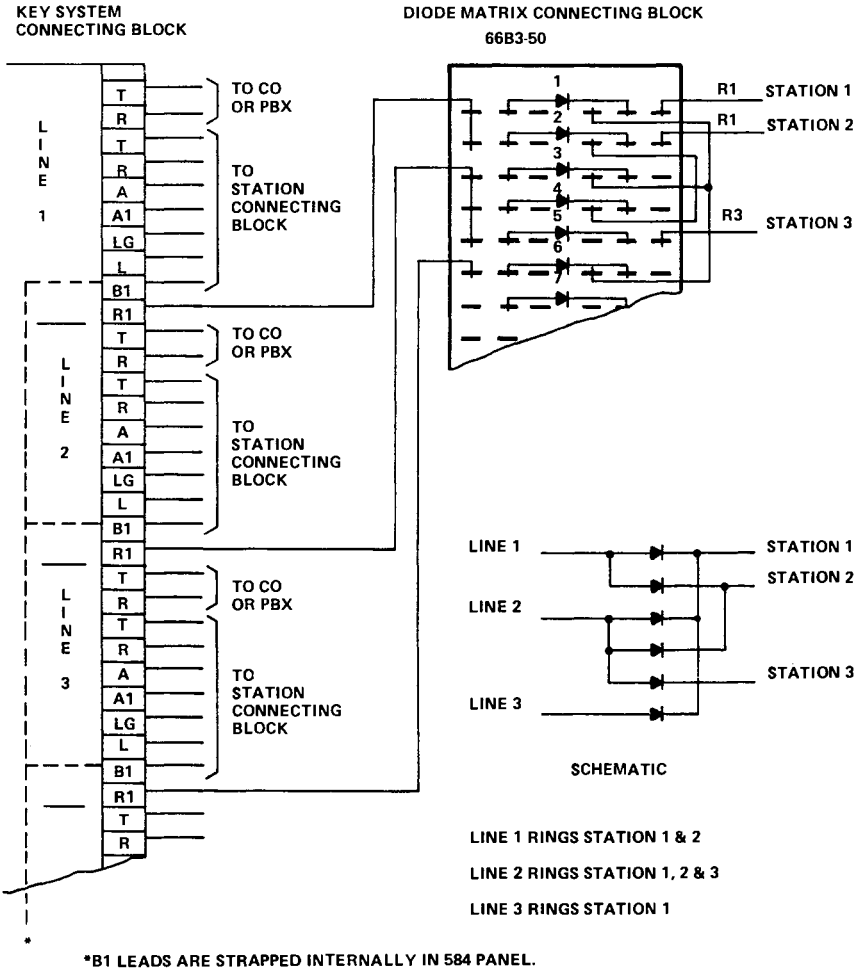

FIGURE 29.01 Example 1, Diode Matrix

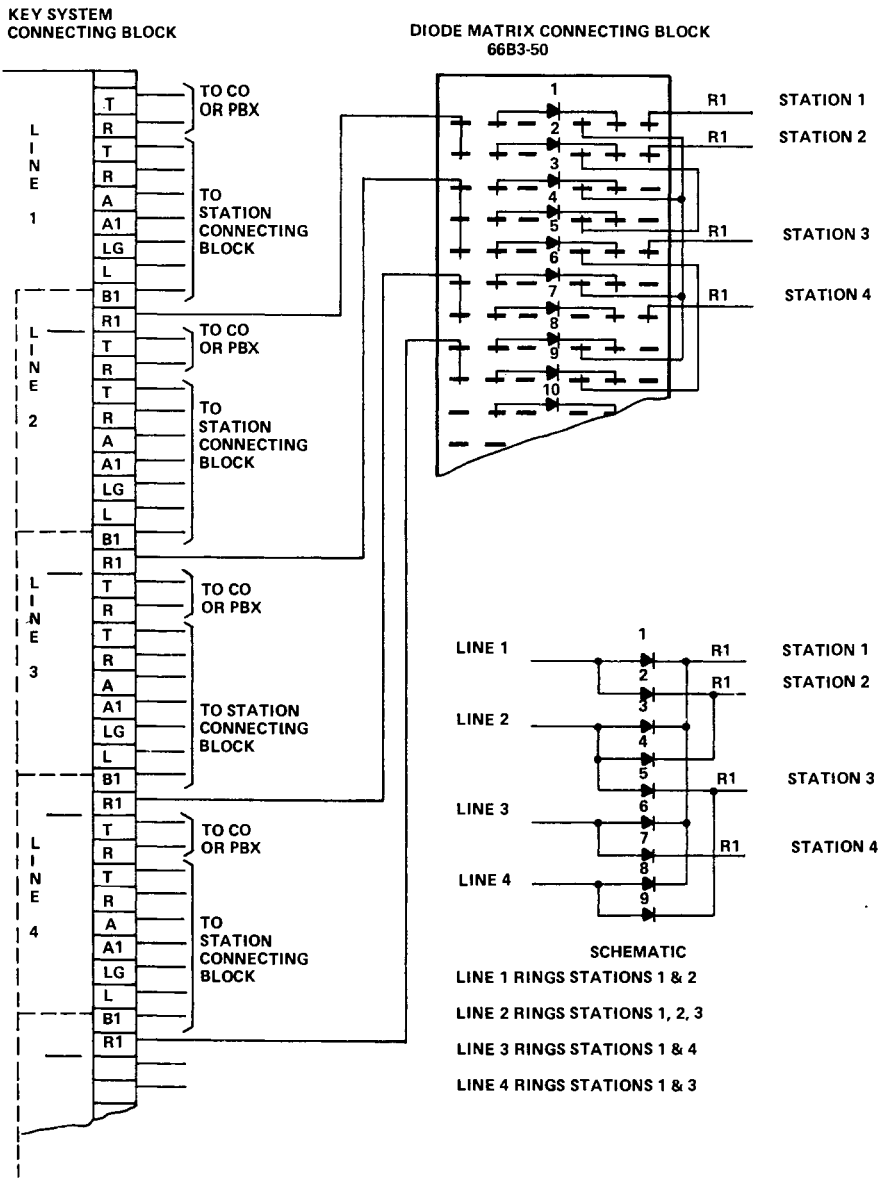

FIGURE 29.02 Example 2, Diode Matrix

i. When the diode matrix is completed, disconnect the ringing capacitor in each telephone set associated with the matrix. Disconnect the slate ringer lead from the network and connect it to network terminal A.

Matrix Block Assembly (5214-L5)

29.08 The matrix block assembly (see figure 29.03) is designed for use in key systems where the ringing scheme requires a diode matrix. This unit provides greater flexibility in making line to station ringing assignments; it can be easily changed whenever it becomes necessary to change assignments.

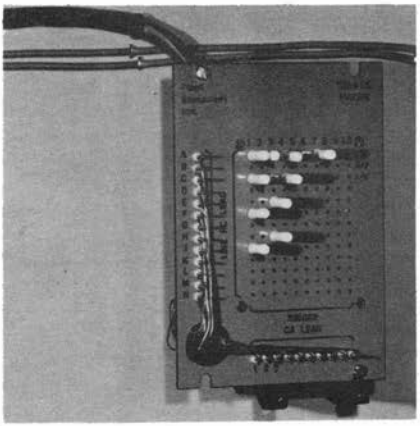

FIGURE 29.03 Matrix Block Assembly

29.09 The matrix block assembly is a 13 x 10 array through which any of 13 inputs (A-N) can be connected to any of 10 outputs (1-10). Connections are made by inserting pins into the block at selected locations. Two types of pins are available, a shorting pin (5214-L4) used for common ringing assignments, and a diode pin (5214-L3) used when selective ringing is required.

29.10 An example of the cabling scheme used with the matrix block assembly is shown in figure 29.04. In this example, a 25 pair cable and a 25 pair connecting block are used to connect the 13 RC (ring control) leads and the 10 CA (common audible ring) leads to the matrix block assembly. The RC leads serve as inputs to the matrix; the CA leads serve as outputs. The remaining 27 cable leads are bundled and left behind the panel for future use. In addition, the last 5 cable leads should not be punched down on the matrix connecting block. The associated terminals should be commoned and used for the B1 leads.

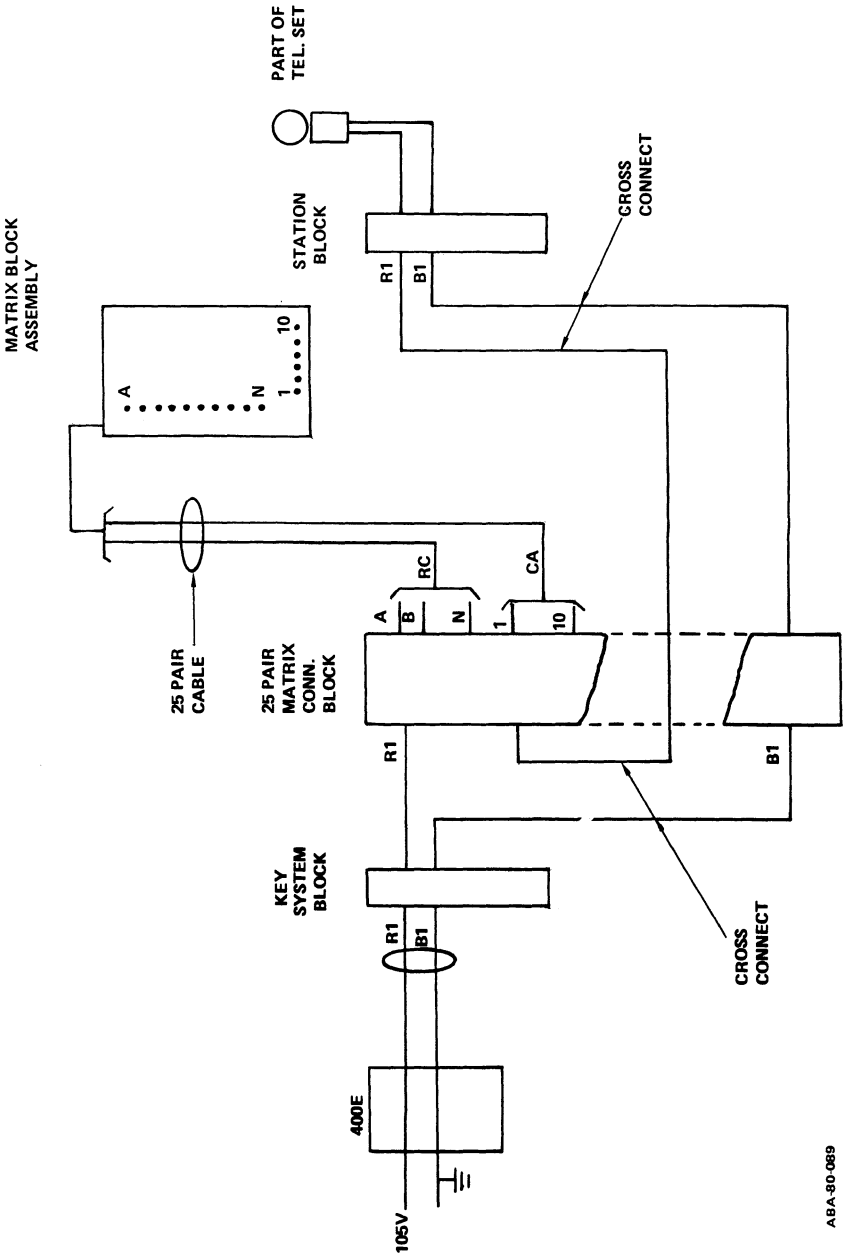

FIGURE 29.04 Cabling Scheme for Matrix Block Assembly

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