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TIMM-2, TELEPHONE INSTRUMENT MAINTAINANCE MANUAL, 1977

A maintenance and installation manual for all the telephone instruments currently manufactured by ITT, last updated in March 1977.

INDEX USER NOTE: to use the index furnished in the document, ascertain the page number needed and then select that page from the PDF bookmark. This book is not page numbered in the conventional way but rather by using a decimal subject system. Because of this the page numbers are not in consecutive order and might appear that some pages are missing, they are not.

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TELEPHONE INSTRUMENT MAINTENANCE MANUAL

Telecommunications Division ITT

TABLE OF CONTENTS

ORDERING INFORMATION - TELEPHONES

CODE NUMBERS

Telephone Code Numbers are formed in five steps as follows:

500 13 OBA 30 M

(1) Type of instrument (See Table I)
(2) Color (See Table II)
(3) Ringer (See Table III)
(4) Special Feature (See Table IV)
(5) Dial (See Table V)

TABLE 1. TYPES OF INSTRUMENTS

CODE	DESCRIPTION	COLORS OFFERED
200	Trendline, desk, R-D	00,05,09,12 13,15,43,44 45,46,47
254	Trendline, wall, R-D	
2200	Trendline, desk, T-T	
2254	Trendline, wall, T-T	
500	Desk, R-D (Except 500/39)	
554	Wall, R-D	
2500	Desk, T-T (Except 2500/39)	
2554	Wall, T-T, miniature type	
3554	Wall, T-T, standard type	
502	Desk, R-D, exclusion	00,05,09,13 15,43,44,45
555	Wall, R-D, 2-line w/HOLD	
575	Desk, R-D, 2-line w/HOLD	
2502	Desk, T-T, exclusion	
2575	Desk, T-T, 2-line w/HOLD	
500/39	Desk, R-D, for handsfree use	00,05,09,13 15,44,45
564	Key, R-D desk, 6-button, standard	
565	Key, R-D desk, 6-button, special	
566	Same as 564 with button restoration	
567	Same as 565 with button restoration	
2500/39	Desk, T-T, for handsfree use	
2564	Key, T-T desk, 6-button, standard	
2565	Key, T-T desk, 6-button, special	
2566	Same as 2564 with button restoration	
2567	Same as 2565 with button restoration	
576	Desk, R-D, 3-line w/HOLD	
577	Same w/exclusion	
2576	Desk, T-T, 3-line w/HOLD	
2577	Same w/exclusion	
830	Key, 10-button desk, R-D	00,05,13 15,44,45
831	Key, 20-button desk, R-D	
832	Key, 10-button desk, R-D, handsfree	
833	Key, 20-button desk, R-D, handsfree	
834	Single-line, R-D, handsfree	
835	Key, 10-button, w/busy lamp field, R-D	
854	Key, 10-button wall, R-D	
861	Key, 30-button desk, R-D	
2830	Key, 10-button desk, T-T	
2831	Key, 20-button desk, T-T	
2832	Key, 10-button desk, T-T, handsfree	
2833	Key, 20-button desk, T-T, handsfree	
2834	Single-line, T-T, handsfree	
2835	Key, 10-button w/busy lampfield, T-T	
2854	Key, 10-button wall, T-T	
2861	Key, 30-button desk, T-T	

TABLE II. COLORS

CODE	COLOR
00	Black
05	Moss Green
09	Ivory
12	Aqua Blue
13	Beige
15	White
43	Burnt Orange
44	Light Ash
45	Cocoa Brown
46	Harvest Gold
47	Cherry Red

NOTE:

The 69 type handset (push-to-talk) is available in the following colors only: Black, Moss Green, Beige, and White.

TABLE III. RINGERS

CODE	RINGERS	AVAILABILITY
OLR	Less Ringer	All.
OBA	Straight Line-130	500,502,554,555,564,565,566,567,575,576, 577, 2500,2502,2564,2565,2566,2576,2577, 3554
	Straight Line-148	2554
	Straight Line-148E	10/20 Series
	Straight Line-153	Trendline
(---)	FREQUENCY RINGERS	500,554,2500,3554 (Double Gong) 2554, TRENDLINE (Single Gong)
	HARMONIC	
WA1	33 1/3 cps	
WA2	50 cps	
WA3	66 2/3 cps	
WA4	16 2/3 cps	
WA5	25 cps	
	SYNCHROMONIC	
WB1	30 cps	
WB2	42 cps	
WB3	54 cps	
WB4	66 cps	
WB5	16 cps	
	DECIMONIC	
WC1	20 cps	
WC2	60 cps	
WC3	30 cps	
WC4	40 cps	
WC5	50 cps	

"W" indicates "with volume control". For 2-gong ringer "less volume control", replace "W" with "L". (All single-gong ringers have volume control.)

TABLE IV. SPECIAL FEATURE

CODE	SPECIAL FEATURE	AVAILABILITY
30	None	Special Features are not available in all series. Refer to specific codes in price list for availability of unit required.
34	Pushbutton for grounding	
37	Message-Waiting, 90-volt	
38	Message-Waiting, 125-volt	
39	Equipped for "Handsfree" operation	
40	Mounting cord equipped with plug	
41	Combination of codes 34 and 40	
42	Combination of codes 39 and 40	
44	A-lead control for operation with key systems. (Single line telephones.)	
46	Code 42 plus Operator Recall Button	
56	Same with headset jack	
76	Automatic Exclusion (Privacy) circuit, Equipped with plug(s).	

If 4-conductor line cord is desired instead of the standard 3-conductor line cord, use special feature code 20, 24, 27, or 28 in lieu of code 30, 34, 37, or 38 respectively.

TABLE V. DIALS

CODE	DIAL
M	Metropolitan, (Letters and numerals)
R	Regular, (Numerals only)
N	No dial

NOTE: Trendline sets are offered with Metro dial only.

INSTALLATION INFORMATION

CONTENTS

1 GENERAL CONSIDERATIONS

1.1 Precise installation procedures will depend upon each company's local policies. This section is intended as a general guide and to provide some indication of the possibilities of adapting regular instruments for special applications.

1.2 The installation of a telephone instrument at a customer's premises is essentially the provision of a service and, for complete satisfaction of the customer, must be treated as such. Neat work and prompt and courteous attention to complaints are essential for good customer relations.

1.3 The major aspects to be considered for each installation are:

a) Safety for the customer, installer and repair personnel.
b) Convenience of location, in accordance with the customer's wishes and local practices.
c) Availability of an AC power outlet with adequate current capacity, if required.
d) Accessibility of all wiring and equipment for maintenance purposes.

1.4 The following points should be verified after the installation is completed:

a) Proper operation of all equipment installed, in conjunction with all existing equipment if extra equipment has been added.
b) Customer's understanding of the use and operation of all equipment controls.
c) Correct telephone number and number card.
d) Over-all appearance of the installation and the tidiness of the work area.

2 PORTABLE INSTALLATIONS

2.1 There are many cases where the customer desires that one, or more, telephone(s) be made portable so that it (they) may be used in more than one location in the same building. This is accomplished by fitting a plug to the instrument mounting cord and terminating the station wiring in a mating, wall mounted socket. Portable installations should only be made in the following situations:

a) Single line service where the ringer is mounted externally to the telephone and may be wired permanently to the line.
b) Extension instruments where the main instrument ringer is permanently connected to the line.
c) Manual switchboard extensions where the operator may be notified when the instrument is moved.
d) Special installations, such as those where the customer wishes to make, but not receive, calls on a particular line.

2.2 In addition to the foregoing conditions there may be technical reasons why a particular type of instrument can not be used for portable service. These include:

a) Message waiting instruments where this special feature should not be rendered inoperative.
b) Exclusion type telephones where the excluded stations would also be disconnected when the plug was disconnected.
c) Any type of instrument which requires more than some six or eight external connections. The usual plug and socket used for portable service has a capacity of four connections.
d) Emergency telephones where the service could be accidentally disconnected.

2.3 The illustration of Fig. 2-1 shows the method of connecting a portable telephone using a 602()755 plug and a 602()735 jack. It should be noted that the original instrument mounting cord may have to be changed to a four conductor type in some cases.

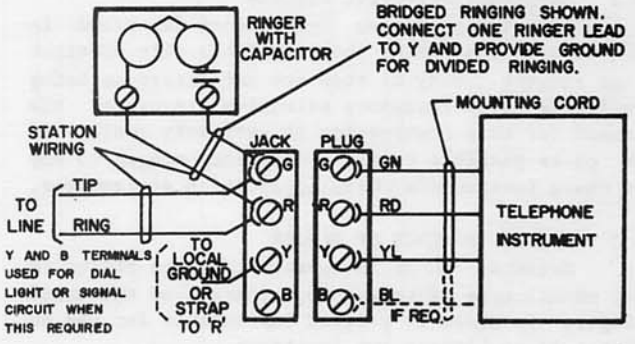

Fig. 2-1 PORTABLE INSTALLATION WIRING

3 DIAL LIGHT/NIGHT LIGHT INSTALLATIONS

3.1 The installation of a dial light/night light telephone requires the provision of a source of AC or DC power (6-8 volts at a current of 0.3 amps). In order to avoid the necessity of making wired connections to the electrical power circuits, which must be done by a licenced electrical contractor, a plug-in, current limiting type of transformer is available.

3.2 The type 31( )690 transformer is designed to provide the AC power required to operate the lamp of one dial light type telephone instrument. It consists of a completely molded unit with two flat pins spaced to fit the standard utility outlet. Two terminals on the wall side of the case provide connections for the low voltage output and can not be touched when the unit is plugged into an outlet.

3.3 Typical installation arrangements for a dial light type of telephone are shown in Fig. 3-1. Due to the low voltage operation of the dial light it is essential that the resistance of the wiring between the transformer and the telephone instrument is kept as low as possible to avoid excessive power loss. It is recommended that the length of station wiring between the transformer and the telephone should not be more than 150 feet. Also, mounting cords longer than six feet should not be used. Wherever possible the transformer should be located close to the ringer or terminal block.

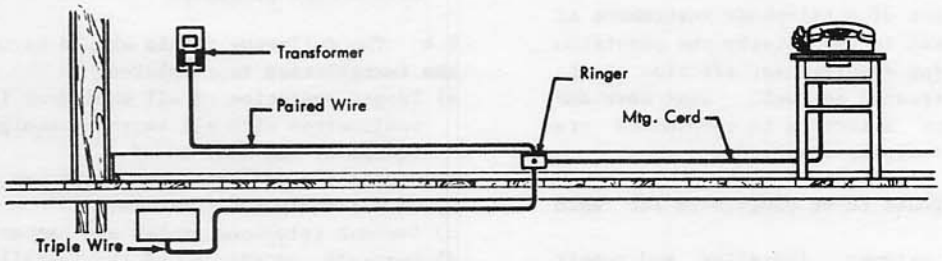

Fig. 3-1 DIAL LIGHT TRANSFORMER WIRING

4 INSTRUMENT MODIFICATIONS

4.1 The majority of requirements for telephone instruments are fulfilled by one of the units from the standard manufactured range. However, occasions arise when an instrument is required for a special application. When a reasonable number of units of the same type are required it may be economical to have these manufactured to specification. In most cases, however, the requirement is only for one or two units; these are most economically produced by modifying standard units in the field. A number of typical modifications are given in the following paragraphs.

4.2 FREQUENCY SELECTIVE RINGERS

All the telephone instruments described in chapter 3 of the manual are available with straight line ringers. Many of them are not listed as being available with frequency selective ringers as the demand for this combination is extremely small. It is quite possible to fit a frequency ringer to any of these instruments if the application so requires.

4.3 BUZZER IN PLACE OF RINGER

Buzzers, AC or DC operated, may be fitted to any manual type of telephone, instead of the usual ringer, in order to provide instruments for use on direct lines between two locations.

4.4 PUSH BUTTON

The 500--(--)34- telephone is provided with a push button which is wired for the specific purpose of grounding one side of the line (required on some types of PABX equipment). The wiring of this button may be modified to provide an interphone signalling circuit. It may also be necessary to replace the mounting cord with a four conductor type, dependant upon the circuitry used, and replace the ringer by a buzzer, see paragraph 4.3.

4.5 KEY TELEPHONE PUSH BUTTONS

The method of converting pick-up keys for use as signalling keys is given in sub-section M2H-KYS-1. The customer may desire that any unused keys are rendered inoperative. This is accomplished by removing the telephone housing and then the plunger and retainer assembly of the key. A bushing, part number 79409, is then placed under each plunger to be made inoperative and the plunger and retainer assembly is replaced. The modified keys can not now be depressed.

Note: One bushing, type 79409, is supplied loose with each key telephone.

4.6 RECORD OF MODIFICATIONS

It is suggested that each company maintains a record of the modifications applied to telephone instruments for special applications. A copy of an amended circuit label should be provided to all the maintenance personnel.

4.7 TECHNICAL ASSISTANCE

The Engineering Department of ITT-Telecom is always ready to assist in the application of telephone equipment to special conditions.

LUBRICATION AND CLEANING

CONTENTS

1 INTRODUCTION

1.1 This sub-section is intended as a guide to the general principles of, and materials used in, the cleaning and lubrication of the component parts of telephone instruments.

1.2 The recommended lubricant, and the method of application, for each component part of the various telephone instruments is noted in the appropriate paragraph of the descriptive sub-section for the individual parts.

1.3 The method to be used to clean contaminated instrument parts must depend upon the cause of the contamination. The information given below assumes that the contamination is of the more usual form of dirt or grease. If other forms of contamination are present, care must be taken that the cleaning method used does not harm the parts in any way. Corroded parts should be replaced and not cleaned as it is extremely difficult to clean such parts satisfactorily without specialized equipment.

2 LUBRICANTS AND APPLICATION

2.1 ITTK DIAL LUBRICANT 79946

This is the most widely used lubricant for telephone instrument parts. The compound contains a proportion of silicone fluid and has excellent high and low temperature stability. It is non-corrosive to the metals and plastics used in the instruments.

2.2 MOLYKOTE TYPE Z

This is a dry type of graphited lubricant which finds application where a wet type would tend to collect excessive dirt or be objectionable to users of the instrument. Lubrication of the coin chutes of paystation instruments and the cradle switch plungers of desk type instruments are some typical applications.

2.3 ALTERNATIVE TYPES

2.3.1 Mineral Oil Types

High quality mineral oil lubricants are generally satisfactory for most applications where a liquid type is required, such as shaft bearings. Make certain that the compound used has adequate temperature stability and is non-corrosive to the parts to which it is applied.

2.3.2 Grease Types

Lubriplate is a grease type of lubricant that has excellent stability and is recommended for use on either metals or plastics, especially where parts have a rubbing action (such as key switch slide plates).

2.3.3 Stick Types

These "dry" type lubricants are generally stated as suitable for use on door latches or parts that may come into contact with clothing. They can be used on parts with which the user may, directly or indirectly, come into contact, such as coin chutes and cradle switch plungers.

2.4 APPLICATION OF LUBRICANTS

All lubricants must be applied sparingly in order to avoid splash or creep into areas where their presence would cause trouble. Liquid types are best applied with a small camel hair brush and grease or stick types with an orange stick or the tip of the finger.

3 CLEANING SOLUTIONS AND USES

3.1 There are many commercially available cleaning preparations for electronic types of equipment. It is recommended that a high quality non-filming type, with a mineral spirits base, is selected. Be certain that the preparation does not contain any additives which may be corrosive to the metal parts or solvent to the plastic parts of the telephone instruments. If in doubt, make a test on a few discarded parts or inquire from the manufacturers. Carbon Tetrachloride preparations are to be avoided as they produce a film which can cause trouble with dirty electrical contacts.

3.2 Exterior plastic parts can be cleaned and polished with many of the regular household types of products. It is, however, suggested that a test be made to check that the product does not react on the plastic, causing etching or discoloring, and is not susceptible to marking when handled.

3.3 In locations where exceptional humidity may cause trouble the use of a protective spray, made expressly to combat these conditions, can provide almost complete protection. These preparations may also contain fungicides and some lubricant.

TROUBLE SHOOTING

This sub-section is intended as a guide to assist in trouble shooting installed instruments. Listed below are some of the many faulty conditions, which may be experienced in a telephone instrument, and their possible causes and remedies.

Whether faulty instruments are repaired on site or replaced and returned to the shop for repair, will depend upon the individual company practice. In the latter case it is recommended that each removed instrument be tagged to indicate the symptoms of the trouble.

Instruments repaired in the shop should be given a thorough check for other possible faults before they are returned to stock or re-installed. It is not an uncommon situation for an instrument to develop more than one fault at a time, especially if the trouble is due to a lightning surge or severe mechanical shock.

1 DIALING TROUBLES

POSSIBLE TROUBLE	CORRECTIVE ACTION
1.1 NO DIAL TONE	
a: Open in mounting or handset cord.	Replace cord.
b: Open or shorted receiver unit.	Replace receiver unit.
c: Dial pulse contacts open or off-normal contacts closed.	Adjust or replace dial.
d: Open winding in network coils.	Replace network.
e: Cradle switch contacts not functioning correctly.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
1.2 CANNOT BREAK DIAL TONE	
a: Dial pulse contacts not opening.	Adjust or replace dial.
b: Filter or ringer capacitor shorted.	Replace network or ringer capacitor.
C: Reversed polarity on T-T dial (new installation)	Check connections against telephone circuit label
1.3 RECEIVING WRONG NUMBERS	
a: Dial pulse contacts wrongly functioning.	Adjust contacts or replace dial.
b: Incorrect dial speed (For most conditions, dial speed must be considerably in error to cause trouble).	Adjust dial speed or replace dial.
c: Leaky filter or ringer capacitor.	Replace network or ringer capacitor.
1.4 DIAL CLICKS IN RECEIVER	
a: Dial off-normal contacts not closing.	Adjust contacts or replace dial.

2 TRANSMISSION TROUBLES

POSSIBLE TROUBLE	CORRECTIVE ACTION
2.1 CANNOT HEAR	
a: Open receiver unit or handset cord.	Replace receiver unit or handset cord.
b: Dial off-normal contacts not opening.	Adjust contacts or replace dial.
c: Open winding in network coils.	Replace network.
d: Cradle switch contacts not opening correctly.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
e: Shorted receiver or receiver varistor.	Replace receiver unit.
2.2 OTHER PARTY CANNOT HEAR	
a: Shorted transmitter unit or handset cord.	Replace transmitter unit or handset cord.
b: Shorted varistor in network.	Replace network.
2.3 HIGH SIDETONE LEVEL	
a: Defective balancing in network.	Replace network.
2.4 DISTORTION AND/OR CLICKS	
a: Faulty receiver unit or receiver varistor.	Replace receiver unit.
b: Faulty transmitter unit.	Replace transmitter unit.
c: Loose connections.	Retighten connections as necessary.
2.5 RADIO INTERFERENCE	
a: Pick up of local radio station in receiver.	Install 0.02 mfd., suppression capacitor (type 75559) between network terminals L2 and F.

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3 RINGING TROUBLES

POSSIBLE TROUBLE	CORRECTIVE ACTION
3.1 NO RING	
a: Wrong ringer type. (Most likely to be observed on new installation).	Check ringer type and replace if incorrect.
b: Ringer disconnected or wrongly wired.	Check ringer wiring. Correct as necessary.
c: Ringer wired for silencing.	Rewire for ringer operation.
d: No ground (party line) connection.	Connect ground per local practices.
e: Control wheel (biased ringer) in cut-off position.	Reset wheel to ring position and disable cut-off position if desired.
f: Obstruction between magnet and armature or gongs and clapper.	Remove obstruction and readjust ringer if necessary.
g: Open ringer coil.	Replace ringer.
h: Open ringer capacitor.	Replace network or ringer capacitor or bridge from A to K on network with .047 mfd capacitor.
3.2 VOLUME TOO HIGH OR TOO LOW	
a: Control wheel in wrong position.	Reset wheel. Instruct customer if required.
b: One or both gongs loose.	Tighten mounting screws and readjust.
c: Obstruction between gongs and clapper or against armature or clapper stem.	Remove obstruction and readjust ringer if necessary
d: Telephone or extension ringer on sound absorbing material.	Relocate telephone or extension ringer in accordance with wishes of customer.
3.3 BELL TAPS WHILE DIALING	
a: Wrongly connected ringer.	Check and reconnect as necessary.
b: Bias spring in low notch (biased ringer).	Check ringer and set bias spring in high notch if necessary. Refer to Section M2C.

POSSIBLE TROUBLE	CORRECTIVE ACTION
3.4 RINGS WHEN OTHER PARTY CALLED	
a: Wrong ringer.	Replace with correct type.
b: Wrong ringer or line connections.	Check connections and remake as necessary.
c: Incorrect ringing frequency.	Check ringing generator frequency.
d: Frequency selective ringer incorrectly tuned.	Retune or replace ringer.
e: Wrong capacitor for frequency selective ringer.	Replace capacitor or complete ringer assembly.
3.5 UNABLE TO TRIP RINGING	
a: Open dial pulse contacts.	Adjust contacts or replace dial.
b: Open coil winding or varistor in network.	Replace network.
c: Loose or open connection.	Check connections and remake as necessary.
d: Cradle switch contacts not making.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
3.6 TRIPS RING, CANNOT CONVERSE	
a: Open handset cord, transmitter or receiver unit.	Replace faulty item.
b: Dial off-normal contacts not open.	Readjust dial contacts or replace dial.
c: Receiver 'shorting' contacts of cradle switch not open.	Check for misplaced plastic cover. Adjust contacts or replace switch assembly.
d: Faulty coil winding or open capacitors in network.	Replace network.

TOOLS AND TEST EQUIPMENT FOR TELEPHONE INSTRUMENT MAINTENANCE

CONTENTS

1 INTRODUCTION

1.1 The number and types of tools and items of test equipment supplied to either mobile or shop maintenance personnel will depend upon the extent of the work to be performed by each of these two groups. This sub-section is intended as a guide to the minimum tools and test equipment required to provide adequate facilities for the field repair and maintenance of telephone instruments.

1.2 The following sections detail the various items recommended for use by the maintenance staff of the categories noted above. The lists are split into groups showing how the requirements vary with the complexity of the work to be performed by each category. The listing of a specific manufacturer or type of any item is for illustrative purposes only and is not intended as a recommendation.

2 RECOMMENDED TOOLS

2.1 Table 2-1 lists the recommended tools for the replacement of faulty component parts of telephone instruments, at the subscriber's premises, without the use of a soldering instrument. In the event that maintenance on the subscriber's premises is restricted to changing the complete instrument, only the items marked with an asterisk (*) may be necessary.

2.2 The additional tools required to permit the normal field adjustments to be made on an installed telephone are listed in Table 2-2. The additional tools required for shop maintenance purposes are listed in Table 2-3.

2.3 Most telephone companies will extend these lists of tools depending upon their own preferences and requirements. In many cases the lists will be combined with those for line maintenance and also installation tools.

2.4 A small quantity of consumable supplies will be required in addition to the tools listed. These will include Rosin Core Solder, Electrical Tape, Lubricant, Cleaning Fluid, etc. It is recommended that a separate tool box is provided to carry the tools and supplies required for the maintenance of telephone instruments, when this involves more than changing of the complete instrument. Some small consumable items, such as lamps, fuses, terminal screws, etc., may be conveniently carried in the small compartments of this box.

Table 2-1 BASIC TOOLS REQUIRED

Item	Description	Size
1	Screwdriver, Instrument type	3" x 1/8"
2*	Screwdriver, Instrument type	6" x 3/16"
3*	Screwdriver, Cabinet type	8" x 1/4"
4*	Pliers, Long Nose Wiring type	6"
5*	Pliers, Sidecutting	5"
6	Pliers, Slip Joint or Pipe Grip	6"
7	Wrenches, Combination type	3/16" - 3/8"
8	Contact Cleaner or Burnisher	3/16" Blade
9	Dust or Cheese Cloth	as requ'd.

Table 2-2 TOOLS FOR ADJUSTMENTS

Item	Description	Size
1	Adjuster, Spring, Straight Tips	.020" Slots
2	Adjuster, Spring, Angled Tips	.020" Slots
3	Pliers, Flat Nose, Straight	5"
4	Tension Gauge (2 gram divisions)	0-50 grams
5	Tension Gauge (20 gram divisions)	0-500 grams
6	Tension Gauge (4 ozs. divisions)	0-5 lbs.
7	Thickness Gauges	.002" - .040"

Table 2-3 SHOP TOOLS

Item	Description	Size
1	Wrenches, Socket	3/16" - 3/8"
2	Wrench, Adjustable	4"
3	Soldering Pencil or Gun	30w - 65w
4	Drill, Hand or Power	1/4" Cap.
5	Twist Drills	1/16" - 1/4"
6	Small anvil or Steel Block	-
7	Hammer, Ball-Pein type	1/2 lb.
8	Punch, Riveting type	6"
9	Punch, Center	4"

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3 RECOMMENDED TEST EQUIPMENT

3.1 Table 3-1 lists the recommended basic test equipment required for the shop maintenance and repair of faulty telephone instruments. Two of these items, the continuity tester and the multi-range meter, will also be found useful for trouble shooting installation wiring in the subscriber's premises. Consideration should be given to the advantages of equipping the mobile maintenance crews with one or both of these items.

3.2 Correct shop adjustment of ringers requires the use of a ringer test set-up. Where more than the occasional ringer is adjusted it will be found that a ringer test set (see sub-section M1C-TST/RIN for details of an easily assembled unit) saves a considerable amount of time.

3.3 Refer to sub-section M1C-TST/DLS for details of dial test sets and dial testing.

3.4 Table 3.2 lists more comprehensive test equipment which is more likely to be of value to the larger operating companies requiring extensive test and adjustment facilities. For the smaller companies it is usually more economical to return some component parts to the factory, for repair. rather than invest in this type of equipment.

Table 3-1 BASIC TEST EQUIPMENT REQUIRED

Item	Description	Type
1	Continuity Tester	- Battery operated buzzer or test lamp.
2	Multi-range Meter	- Simpson model 260 or similar high resistance.
3	Ringer Test Set	- See Paragraph 3.2.
4	Dial Speed Tester	- See Paragraph 3.3 and
5	Dial Pulse Counter	- Sub-section
6	Pulse Ratio Tester	- M1C-TST/DLS.

Table 3-2 ADVANCED TEST EQUIPMENT

Item	Description	Type or Use
1	Ringer Magnetizing Set	- See Sub-section
2	Ringer Demagnetizing Set	- M2C-RIN/GEN.
3	Audio Generator	- General testing
4	AC Vacuum Tube Voltmeter	- and also used
5	Calibrated Attenuator	- with items 6 & 7.
6	Artificial Mouth	- Testing of
7	Artificial Ear	- transmitter and receiver units.
8	Impedance Bridge	- CRL type for general testing.
9	Wire Chief's Test Set	- General testing. Commercial item.

4 JIGS, FIXTURES AND ADAPTERS

4.1 The test and adjustment of some of the parts of telephone instruments is greatly facilitated by the use of test jigs, fixtures and adapters. Many of these items are very easily made up, as required, by the individual operating company - very few of them are available ready made commercially. The following paragraphs detail a number of the more useful and commonly needed items.

4.2 RINGER TEST JIG

For correct adjustment of ringer mechanisms it is essential that they are mounted on a proper, or simulated, telephone baseplate. The test jig is made from a discarded telephone baseplate with the bottom portion of a cradle switch bracket mounted in position to hold the ringer frame. This assembly must then be weighted to represent the total weight of a typical telephone instrument, it MUST NOT be mounted solidly to the work bench. Terminals may be fitted to enable the ringer leads to be connected easily and quickly.

4.3 DIAL TEST JIG

This item will be found to save appreciable time where a reasonable number of dials are tested and adjusted in the shop. It is simply a U-shaped bracket formed to hold the dial upside down so that adjustments may be made on the mechanism without the need to hold the dial in the hand. Any required digits can be dialed by feeling for the appropriate finger hole, or a mirror can be mounted under the dial face to enable the finger plate to be seen. Terminals may be fitted to the side of the bracket for connection of the dial leads, if necessary.

4.4 COIN CHUTE GAUGES

These are available commercially and consist of a set of metal disks in standard, undersize and oversize ranges representing 5¢, 10¢ and 25¢ coins. They are used to check the coin rejection settings of the paystation telephone mechanisms.

4.5 TEST ADAPTERS

The actual types of test adapters required by any maintenance shop will depend upon the type and volume of equipment to be tested and repaired. Some of the more commonly required adapters are detailed below:

a) Test Line from exchange - terminated on binding posts and extension telephone socket; with switches to connect ringer, convert to four wire circuit (500--(--)35- telephone), or other function as required.

b) Amphenol Socket - wired via switches to connect any desired circuit of a key type telephone to the test line.

c) Amphenol Plug wired out to terminal strip - this item may be plugged into the socket of item b) so that key telephones without plugs may be connected and tested. This arrangement is also useful for connecting other telephones requiring multi-conductor circuits - such as those for use with 3A speakerphone systems and two or three line instruments.

d) Artificial Line(s) - either switched into the test line circuit or wired in with test leads when required. This item is useful when testing ringers or dials for functioning over long loop circuits. (See also sub-section M1C-TST/DLS).

DIAL TESTING AND TEST SETS (ROTARY DIALS)

CONTENTS

1 INTRODUCTION

1.1 Correct testing of telephone instrument dials requires that at least two, and preferably three, electrical tests are made after the preliminary mechanical adjustments have been completed. These tests are for dial speed (number of impulses per second), pulse ratio (ratio of make, or break, period to total time of one pulse) and number of pulses when dial is fully wound up and released. The last of these tests is not essential; it is recommended, however, as cases have been reported where the dial has been incorrectly assembled and has delivered an incorrect number of pulses.

1.2 During the electrical tests, appropriate mechanical adjustments are made to correct any discrepancies in the measured parameters. The full method of adjustment is given in sub-section M2A-DLS/GEN and the specific data for each individual type of dial is given in the appropriate descriptive sub-section.

1.3 There are a number of instruments available, commercially, which are specifically made for the purpose of testing dials. The following sections detail various ways of making the required tests.

2 DIAL SPEED TESTING

2.1 The simpler forms of dial speed test set operate on the electromechanical principle. They consist of a spring, or synchronous motor, driven shaft which is normally prevented from rotating by a detent. The first dial break pulse is arranged to trip the detent and the shaft commences to turn. A second, normally disengaged, detent or clutch is arranged to stop the shaft when the dial pulses cease or the off-normal contacts open. The amount of rotation of the shaft is indicated by a pointer against a scale which is calibrated in fractions of a second. This form of tester must be calibrated for use with a specific type of dial. Once it is set it provides more than adequate accuracy for the adjustment of telephone instrument dials.

2.2 A more refined version of the type of tester described above also contains a pulse counter which is mechanically coupled to the speed tester. The speed tester drives off-scale if less than ten impulses are received. All the electromechanical types of dial speed tester are reset manually.

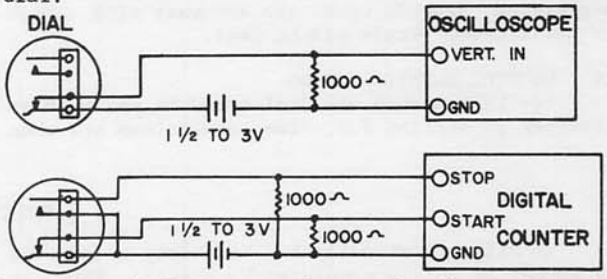
2.3 There are a number of all-electronic methods of dial speed testing; many of them have been used in the design of commercially available instruments. The remainder of this section describes a number of methods of making dial speed tests with various items of equipment. It should be noted that the speed of rotation of the dial is not constant during the return motion. This is due to the fact that a definite amount of time is taken for the mechanism to start from the rest position and reach the maximum speed allowed by the governor. The amount of speed variation during the pulsing period is only slight but it must be allowed for with some forms of measurement. Refer also to section 3.

2.4 OSCILLOSCOPE METHOD (see Fig. 2-1)

The instrument should have a medium to long persistance screen and the time base capable of providing a sweep of one second duration. Connect the impulse springs of the dial in series with a battery (1.1/2 to 3 Volts) and a 1,000 Ohm resistor. Then connect the oscilloscope vertical terminals across the resistor. Adjust the trigger control to cause the sweep to start at the beginning of the first break pulse. The number of pulses will be displayed on the trace and the dial speed should be adjusted so that the tenth pulse is completed just before completion of the horizontal sweep period; by an amount of 1/26 of the sweep time in the case of standard 10 IPS telephone dials (the last make period).

2.5 DIGITAL COUNTER METHOD (see Fig. 2-1)

If a digital counter is available this may be used to measure the dial speed. The set-up is very similar to that described for the oscilloscope in the previous paragraph. In this case, however, the dial off-normal springs must be wired in series with a second resistor and then to the stop or gate terminal of the counter. The counter is set to trigger on the first break pulse and stop when the gate signal is removed by the off-normal contacts. The time indicated is the total pulsing time of the dial.



Note: Circuit for stop and gate signals may have to be modified for some types of digital counter.

Fig. 2-1 OSCILLOSCOPE AND COUNTER CONNECTIONS

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2.6 SIMPLE DIAL SPEED TESTER (see Fig. 2-2)

This easy to assemble arrangement provides more than adequate accuracy, using the 60 c/s power line frequency as a standard, for testing the speed of telephone dials. The final shaft of the motor is geared to make one revolution every two seconds and carries a pointer which may be set manually. Relay A operates when the dial is connected. Relay B operates as soon as the dial is rotated from the normal position and disconnects the operate circuit of relay A, which remains held over its own contact. Relay A releases at the start of the first break pulse and connects the power to the motor. The off-normal contacts open at the end of the dial rotation and release relay B, which disconnects the power from the motor. The amount of rotation of the pointer measures the speed of the dial when the digit '0' is dialled. A scale may be fitted to the unit so that dial speed may be read off directly.

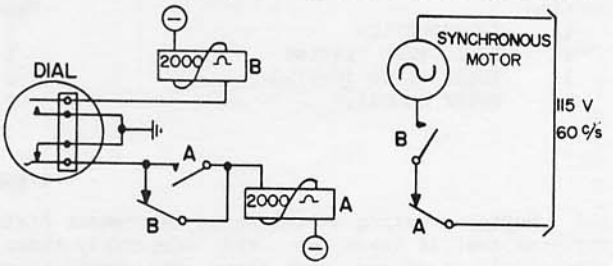


Fig. 2-2 SIMPLE DIAL SPEED TESTER

3 PULSE RATIO TESTING

3.1 Accurate measurement of the pulse ratio of a dial necessitates the use of reasonably complex test equipment. A number of pulse ratio test sets are available commercially, some of which measure the pulse ratio on a specific pulse in the train and some of which measure the average ratio over all the pulses in the train. At least one test set is available in which there are facilities for making measurements on any single pulse in the train.

3.2 A number of methods of making pulse ratio tests with standard items of test equipment are given below. As stated in section 2, the dial speed varies slightly during the pulsing period -- the first few pulses being longer than the remainder -- making compensation necessary with the more refined methods of measurement.

3.3 OSCILLOSCOPE METHOD

The connections for this test are the same as for the speed test (shown in Fig. 2-1). The time base is set to provide a recurrent sweep of one fifth of a second duration: the trigger control is then set to cause the sweep to reset at the start of the first pulse. Two complete pulses will occur during each sweep of the time base and this will repeat five times when the digit '0' is dialed. The consecutive traces will not be superimposed perfectly, due to the variation in dial speed (see para. 3.2), but it will be possible to measure the relative durations of the make and break periods of the average of alternate pulses. The accuracy to be expected depends upon the accuracy with which the oscilloscope scale can be read.

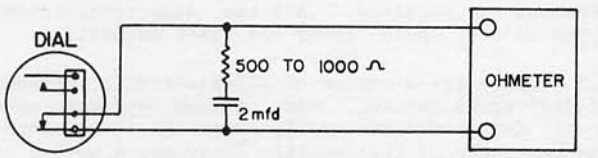
3.4 DIGITAL COUNTER METHOD

For this method the dial speed is measured as described in section 2.5. The connections are then changed so that the counter only functions when the pulse springs are open. The ratio of the second measurement to the first will be the break pulse ratio of the dial.

3.5 CAPACITOR-OHMETER METHOD

The equipment used for this method must first be calibrated with a known accurate dial. The set-up is shown in Fig. 3-1. With the accurate dial connected and the digit '0' dialled, it will be noted that the meter needle falls to the same low point each time the dial is operated. Once this point is established, the pulse ratio of any other dial may be checked. If the break pulse period of the unknown dial is too long then the meter needle will fall below the established reference point and if the break pulse period is too short then the needle will not fall to the reference point.

This method is capable of quite accurate comparisons. The meter scale could be marked with high and low limit points if calibration facilities are available. The actual percentage drop of the meter needle with respect to a given break pulse ratio depends upon the values of resistance and capacitance in the circuit and the damping of the meter movement. Hence it is not possible to pre-calibrate the meter.



NOTE: OHMETER POWER SUPPLY SHOULD BE 15 TO 80 VOLTS DC.

Fig. 3-1 CAPACITOR-OHMETER PULSE RATIO TESTER

4 PULSE COUNTING

4.1 It will occasionally be necessary to measure the number of pulses generated by a dial. This can be done simply by connecting it to any type of stepping switch, with a suitable spark suppression circuit across the pulsing contacts, and checking the action of the switch against the digit dialled.

4.2 The oscilloscope can be used as detailed in section 2.4, where the display shows each of the pulses in the train. The digital counter can also be used by setting the trigger so that one count is obtained at the start of each pulse, using the connections given in section 3.4.

RINGER TEST EQUIPMENT

CONTENTS

1 INTRODUCTION

1.1 In order to obtain maximum performance from ringer mechanisms it is essential that the proper test equipment is used. As with many other types of similar mechanisms, in which permanent magnets are used, the magnets are magnetized, adjusted to strength and stabilized after the mechanism is assembled. Disassembly of the magnetic components reduces the strength of the magnet and consequently affects the sensitivity of the ringers.

1.2 The equipment required to magnetize and adjust the strength of the permanent magnet is detailed in section 2. It is available from companies which specialize in magnetic equipment and is usually built to order.

1.3 The ringer test set described in section 3 is designed for simple assembly and to perform all the functions required for thorough testing of ringers.

2 MAGNETIZATION AND DEMAGNETIZATION

2.1 MAGNETIZING EQUIPMENT

This equipment consists of an adjustable DC power supply connected to a large solenoid with two pole pieces which are shaped to fit close to the ends of the magnet in the assembled ringer. Note that biased and frequency selective ringers require different shapes of pole pieces. In operation, the current through the solenoid is set so that when the magnet of an assembled ringer is placed between the pole pieces, and the current is switched on, the magnet is saturated.

2.2 DEMAGNETIZATION EQUIPMENT

This equipment is only required when biased type ringers are to be adjusted. It is similar to the magnetizing equipment described in the previous paragraph except that the solenoid is much smaller. The pole pieces are conveniently placed around the magnet of the assembled ringer while it is wired to to the test set (section 3) and in position in the test jig (sub-section M1C-TEQ). In operation, the current through the solenoid is adjusted to provide the required amount of demagnetization of the ringer magnet and obtain optimum performance.

2.3 OPERATIONAL PROCEDURE

The method of applying the magnetizing and demagnetizing equipment to the adjustment of the strength of the ringer magnets is detailed in sub-section M2C-RIN/GEN.

3 RINGER TEST SET

3.1 SPECIFICATIONS

The test set provides the following features:

a) Selection of any one of up to five externally generated ringing frequencies.
b) Adjustable series resistance from 0 to 80,000 Ω.
c) Four values of ringer series capacitor.
d) Optional load, representing five frequency selective ringers (one of each frequency in the series) in parallel.
e) Meter to read voltage across ringer under test.
f) Facilities to bias gas tube type ringers.
g) Facilities to check the ringer under test for dial pulse rejection.

The test set is completely self-contained except for the connections to the externally generated ringing supplies.

3.2 CONSTRUCTIONAL DATA

The test set may be assembled either as a case or panel mounted unit. The circuitry may be varied to suit individual needs - such as omitting the gas tube biasing arrangements, if they are not required, or substituting a single push button for the five ringing supply buttons when only biased type ringers are to be serviced.

All the component parts are either standard telephone equipment items or are readily available from radio/electronic supply houses.

Calibration of the test set is not required. The meter provides the necessary standard for test purposes. Terminals may be provided and an external meter used, if desired.

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Table 3-1 RINGER TEST SET - PARTS LIST

Item	Description	Qty
1	Push Button, Single Pole, Double Throw	5
2	Push Button, Single Pole, Normally Open	1
3	Key or Switch, Single Pole, Two Way, Center Off, Normally Closed	6
4	Key or Switch, Two Pole, Two Way, Center Off, Transfer Contacts	1
5	Key or Switch, Two Pole, Double Throw, Transfer Contacts	1
6	Key or Switch, Single Pole, Single Throw, Normally Closed	
7	Key or Switch, Single Pole, Two Way	1
8	Resistor, 22 Ohms, 1/2 Watt, 5%	2
9	Resistor, 1,000 Ohms, 40 Watt, 5%	1
10	Resistor, 2,000 Ohms, 20 Watt, 5%	1
11	Resistor, 3,000 Ohms, 20 Watt, 5%	1
12	Resistor, 6,000 Ohms, 10 Watt, 5%	2
13	Resistor, 9,000 Ohms, 5 Watt, 5%	1
14	Resistor, 18,000 Ohms, 5 Watt, 5%	1
15	Resistor, 27,000 Ohms, 2 Watt, 5%	1
16	Resistor, 54,000 Ohms, 1 Watt, 5%	1
17	Resistor, 750,000 Ohms, 1/2 Watt, 1%	1
18	Capacitor, 4 mfd, 300 Volt, 10%	1
19	Capacitor, 0.1 mfd, 400 Volt, 10%	1
20	Capacitor, 0.27 mfd, 400 Volt, 10%	1
21	Capacitor, 0.35 mfd, 400 Volt, 10%	1
22	Capacitor, 0.47 mfd, 400 Volt, 10%	1
23	Capacitor, 1.5 mfd, 400 Volt, 10%	1
24	Meter, 0-50 VAC, 5,000 Ohms/Volt	1
25	Terminals	9
26	Battery, 45 Volt 'B' type	1
27	Dial, Standard Telephone Type	1
28	Dial Mount	1
29	Relay, Standard Impulsing Type, 200 Ohm, Dual Coils	1
30	Case or Panel, c/w battery bracket	1
31	Battery Connector	1
32	Wire, Hardware, etc.	as req.

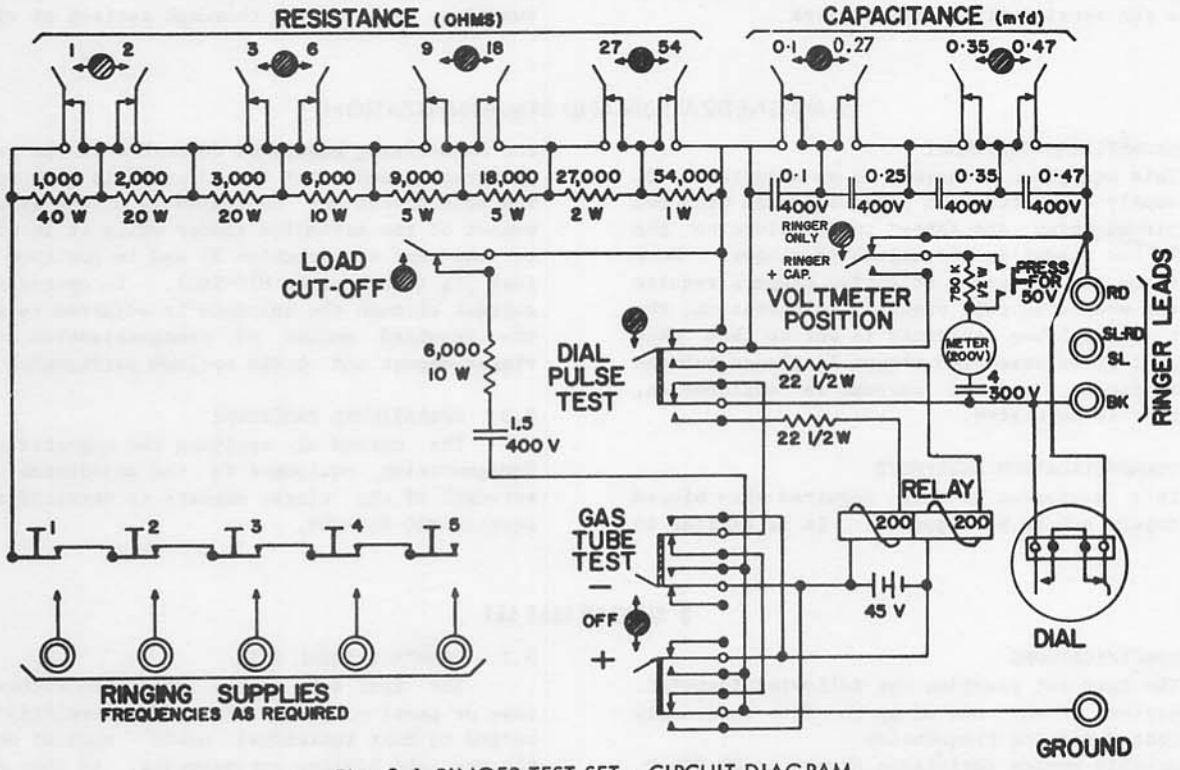

Fig. 3-1 RINGER TEST SET - CIRCUIT DIAGRAM

3.3 OPERATIONAL DATA

The complete method of testing ringer units is detailed in sub-section M2C-RIN/GEN. A brief explanation of the circuit features of the test set follows.

The ringing source selected by one of the push buttons is connected through the variable resistance to the ringer under test; through the selected capacitor, if required. The load network, which may be switched out as necessary, is shunted across the ringer and capacitor.

The meter may be switched to measure the voltage across the ringer coil only or across the ringer and capacitor, in series, as specified in the test data for the particular ringer under test.

The normal meter sensitivity is 200 volts FSD. This may be increased to 50 volts FSD by pressing the meter button, permitting more accurate readings for small deflections.

Negative or positive bias may be selected for the gas tube type ringer tests. The bias battery is connected in series with the ringer.

The battery connection for the dial pulse rejection tests is made through the dial off-normal contacts. This prevents accidental discharge of the battery in the event that the dial key is left in the test position.

CHAPTER 2

COMPONENTS

TYPE 65--(--)410 HANDSET

CONTENTS

1 GENERAL DESCRIPTION

1.1 The type 65 handset consists of a molded housing, comprising a handle and two screw-on caps, which contains a high quality carbon granule type transmitter at one end and a ring armature receiver at the other. A four wire cord is used to provide separate electrical circuits for the hermetically sealed transmitter and receiver units.

1.2 The molded housing is designed so that the transmitter unit, which operates efficiently in any position, is correctly located close to the mouth of the user when the receiver is placed to the ear.

1.3 The handset is available molded in black bakelite, with either a coiled or straight cord, or in black or colored plastic, with a matching color of coiled cord, in the same range of colors as the various telephone housings.

2 TECHNICAL DESCRIPTION

2.1 The carbon granule transmitter unit has a rising response, relative to the 1000 cps nominal level of 53 db above 1 millivolt with a sound input pressure of 28 dynes/sq.cm. from -3 db at 200 cps to +3 db at 4000 cps. The peak thermal noise output is 12.7 millivolts for an aged unit. The operating current is 30 to 75 milliamperes dc and the nominal dc resistance is 45 ohms. Pressure type electrical connections are used.

2.2 The ring armature receiver has a response of ± 3 db, relative to the 1000 cps nominal level of 73 db above the sound output reference pressure of $(1 \text{ dyne/sq.cm.})^2$ per watt of electrical power, over the range of 400 to 2000 cps and +3 to -5 db over the range of 2000 to 3200 cps. An input power of 1 milliwatt at any frequency between 500 and 2500 cps will not produce any distortion or rattling. The nominal impedance is 150 ohms at 1000 cps. Screw connector terminals are fitted and a varistor shunt across them protects users from high level acoustic shocks and the magnet from abnormal line surges.

2.3 The plastic type of handset handle has an acoustic baffle in the form of a ball of cotton inserted through the receiver cavity into the stem. Its purpose is to reduce the acoustic coupling from the receiver to the transmitter, which are both vented to the handle cavity, that would otherwise impare the clarity of reception.

3 TESTING

3.1 Thorough testing of both the transmitter and receiver units requires the use of special test equipment. However, a suspected faulty unit can be adequately checked for maintenance purposes by direct comparison with, or substitution by, a known good unit.

3.2 Faulty transmitter units will usually show up by causing noise in the circuit or low transmission levels. A dc ohmeter test is not a reliable check on the condition of a carbon type transmitter.

3.3 Faulty receiver units will usually show up by causing distortion due to a loose or damaged diaphragm or faulty varistor, or having no output due to an open circuit coil or shorted varistor.

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4 DISASSEMBLY AND ASSEMBLY

4.1 The exploded view of Fig. 4-1 shows all the component parts of the handset. Diasssembly and assembly procedures are given in the following paragraphs. Note that the cord holder is part of the handle molding in the bakelite type of handset and the cotton ball (9) is not required.

4.2 DISASSEMBLY

a: Unscrew the receiver cap (1) from the handle (10) in an anticlockwise direction.
b: Tilt the receiver unit (2) out of the handle then loosen the two terminal screws (3) and disconnect the wires.
c: Remove the cotton ball (9) from inside the stem of the handle.
d: Unscrew the transmitter cap (4) from the handle and remove the transmitter unit (5).
e: Lift the transmitter holder (6) out of the handle then loosen the two terminal screws (7) and disconnect the wires.

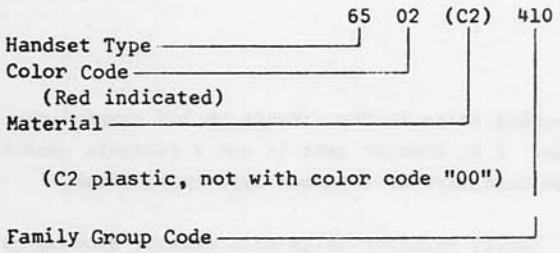
4.3 ASSEMBLY

a: Insert the handset cord (8) through the small hole in the end of the handle (10) feeding the two white wires through the stem. Fit the cord holder (11) into the grooves in the side of the transmitter cavity and press the bush of the cord into the slot of the holder.
b: Connect the red wire to the outer contact terminal and the black wire to the center contact terminal of the transmitter holder (6) and tighten the screws (7). Locate the transmitter holder in the handle cavity with the tab on the holder in one of the smaller notches in the cavity wall.
c: Place the transmitter unit (5) inside the transmitter cap (4) then screw the cap onto the handle in a clockwise direction.
d: Insert the cotton ball (9) into the stem of the handle through the receiver cavity.
e: Connect one white wire to each terminal on the receiver unit (2), tighten the terminal screws (3) then place the unit in its cavity and screw the receiver cap (2) onto the handle in a clockwise direction.

Fig. 4-1 COMPONENT PARTS - EXPLODED VIEW

5 PART NUMBERS

5.1 The complete code number required to specify a particular handset assembly consists of four parts. The method of forming this number is shown below. Refer to section M1A-COL of the manual for complete listing of colors and corresponding code identifying numbers.



5.2 The various component parts of the handset are listed in Table 5-1. The item numbers shown in the list correspond with those used to identify the various parts in the exploded view of Fig. 4-1.

Table 5-1 REPLACEABLE PARTS

Item	Description	Number	Use Qty
1	Receiver Cap	79289-*	1
2	Receiver Unit c/w item 3	75547	1
3&7	Terminal Screw	75386	4
4	Transmitter Cap	79290-*	1
5	Transmitter Unit	75555	1
6	Transmitter Holder c/w it.7	75384-2	1
8	Handset Cord (Coiled)	1005**(7)650	1
9	Cotton Ball	79545	1
10	Handle	79250-*	1

* Replace by color code

TYPE 69--(--)410 HANDSET

CONTENTS

1 GENERAL DESCRIPTION

1.1 The type 69 handset consists of a molded housing, comprising a handle and two screw-on caps, which contains a high quality carbon granule type transmitter at one end and a ring armature receiver at the other. A push button switch is mounted in the stem of the housing. Either a five or six conductor coiled cord may be provided with the unit.

1.2 The molded housing is designed so that the transmitter unit, which operates efficiently in any position, is correctly located close to the mouth of the user when the receiver is placed to the ear.

1.3 The handset and cord are available in the same range of colors as the telephone housings.

2 TECHNICAL DESCRIPTION

2.1 The carbon granule transmitter unit has a rising response, relative to the 1000 cps nominal level of 53 db above 1 millivolt with a sound input pressure of 28 dynes/sq.cm. from -3 db at 200 cps to +3 db at 4000 cps. The peak thermal noise output is 12.7 millivolts for an aged unit. The operating dc resistance is 45 ohms. Pressure type electrical connections are used.

2.2 The ring armature receiver has a response of ± 3 db, relative to the 1000 cps nominal level of 73 db above the sound output reference pressure of $(1 \text{ dyne/sq.cm.})^2$ per watt of electrical power, over the range of 400 to 2000 cps and +3 to -5 db over the range of 2000 to 3200 cps. An input power of 1 milliwatt at any frequency between 500 and 2500 cps will not produce any distortion or rattling. The nominal impedance is 150 ohms at 1000 cps. Screw connector terminals are fitted and a varistor shunt across them protects users from high level acoustic shocks and the magnet from abnormal line surges.

2.3 The push button switch is wired to separate cord conductors from the transmitter and receiver units for independent connection to the external circuits.

2.4 A ball of cotton, inserted into the stem of the handle through the receiver cavity, forms an acoustic baffle. Its purpose is to reduce the acoustic coupling from the receiver to the transmitter, which are both vented to the handle cavity, that would otherwise impare the quality of reception.

3 TESTING

3.1 Thorough testing of both the transmitter and receiver units requires the use of special test equipment. However, a suspected faulty unit can be adequately checked for maintenance purposes by direct comparison with, or substitution by, a known good unit.

3.2 Faulty transmitter units will usually show up by causing noise in the circuit or low transmission levels. A dc ohmeter test is not a reliable check on the condition of a carbon type transmitter.

3.3 Faulty receiver units will usually show up by causing distortion due to a loose or damaged diaphragm or faulty varistor, or having no output due to an open circuit coil or shorted varistor.

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4 DISASSEMBLY AND ASSEMBLY

4.1 The exploded view of Fig. 4-1 shows all the component parts of the handset. Disassembly and assembly procedures are given below.

4.2 DISASSEMBLY

a: Unscrew the receiver cap (1) from the handle (10) in an anticlockwise direction.
b: Tilt the receiver unit (2) out of the handle then loosen the two terminal screws (3) and disconnect the wires.
c: Remove the cotton ball (9) from inside the stem of the handle.
d: Unscrew the transmitter cap (4) from the handle and remove the transmitter unit (5).
e: Lift the transmitter holder (6) out of the handle then loosen the two terminal screws (7) and disconnect the wires.
f: Remove the two cap screws (16) and remove the escutcheon (14), plunger bar (17), membrane (13) and restoring spring (15).
g: Lift the switch assembly (12) out of the handle then loosen the two terminal screws and disconnect the wires.

Fig. 4-1 COMPONENT PARTS - EXPLODED VIEW

4.3 ASSEMBLY

The parts of the handset may be conveniently re-assembled in the reverse order from that given for disassembly. The following points should be specially noted.

a: The cord conductors must be reconnected as shown in the wiring diagrams of Fig. 4-2.
b: The transmitter holder must be replaced in its cavity with the tab on the holder in one of the smaller notches in the cavity wall.
c: The parts of the push button switch must be replaced in the following order:
1) Switch Assembly
2) Membrane Assembly
3) Restoring Spring - Tips resting on membrane
4) Plunger Bar
5) Escutcheon
6) Cap Screws

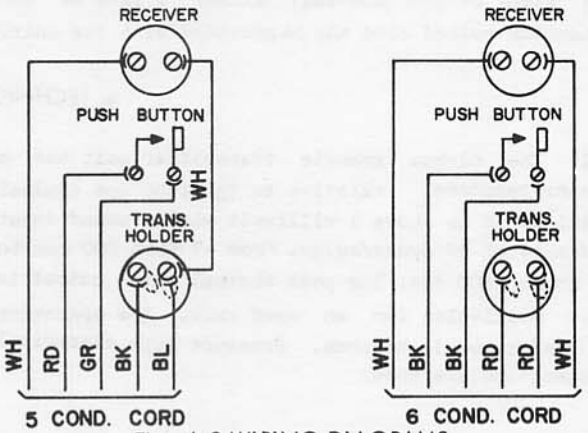

Fig. 4-2 WIRING DIAGRAMS

5 PART NUMBERS

5.1 The complete code number required to specify a particular handset assembly consists of four parts. The method of forming this number is shown below. Refer to section M1A-COL of the manual for complete listing of colors and corresponding code identifying numbers.

69 02 (C1) 410

Handset Type
Color Code
(Red indicated)
Assembly Type
(C1 5 cond. cord standard plunger bar
C2 5 cond. cord engraved plunger bar
C3 6 cond. cord standard plunger bar
C4 6 cond. cord engraved plunger bar)
Family Group Code

5.2 The various component parts of the handset are listed in Table 5-1. The item numbers shown in the list correspond with those used to identify the various parts in the exploded view of Fig. 4-1.

Note: Standard plunger bar is engraved "ITT-KELLOGG" Special engraving may occupy 1" long by 9/32" high.

Table 5-1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Receiver Cap	79289-*	1
2	Receiver Unit c/w item 3	75547	1
3&7	Terminal Screw	75386	4
4	Transmitter Cap	79290-*	1
5	Transmitter Unit	75555	1
6	Transmitter Holder c/w item 7	75384	1
8a	Handset Cord (5 Cond.)	1018**( )650	1
b	Handset Cord (6 Cond.)	1019**( )650	
9	Cotton Ball	79545	1
10	Handle	84495-*	1
12	Switch Assembly	80032	1
13	Membrane Assembly	80036	1
14	Escutcheon	80033-2	1
15	Restoring Spring	80035	1
16	Fl. Hd. Cap Screw	80040	2
17a	Plunger Bar - Standard	84498-*	1

* Replace by color code

ROTARY DIALS, 30-SERIES
(Numbers 30, 33, 35 and 38)

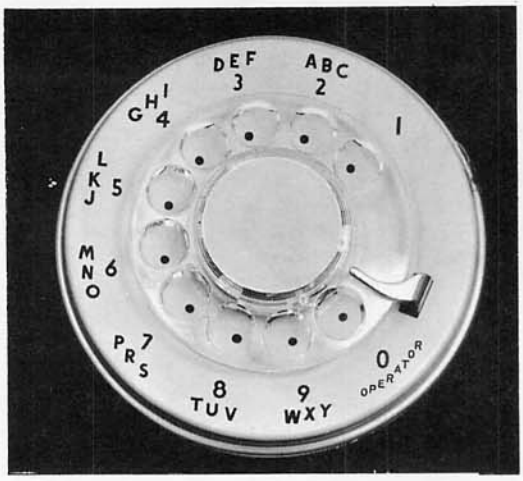

Figure 1A. Rotary Dial, Type 30 and 35

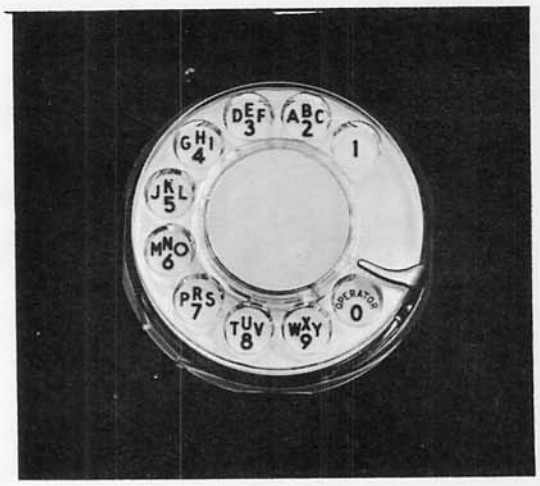

Figure 1B. Rotary Dial, Type 33 and 38

1. SCOPE

Section 227 covers general information, ordering information, replaceable parts list, description, repair, lubrication and adjustment of the 30 series of rotary dials.

2. GENERAL

The 30-series of rotary dials includes four basic models of similar construction and characteristics, numbers 30, 33, 35 and 38. Each model is available with a regular type numeral ring, (numerals only), coded "D" or a metropolitan type numeral ring, (letters and numerals), coded "G". The 38 dial is also available with "Dots Only", coded "H". Each dial consists of a rigid metal bracket on which are mounted the gear train, contact spring assembly, numeral ring, mainspring and spider assembly, finger plate and miscellaneous parts. The gear train is protected by a plastic dust cover which snaps into place.

3. OPERATION

The mechanism is actuated by the clear plastic finger plate which, when wound up and released, causes a pair of pulsing contacts to interrupt the telephone line current once for each unit of the dialed digit, (i.e. once for 1, twice for 2, etc.). Telephone switching equipment is operated in accordance with the number of impulses received. The dials are adjusted to 10 impulses per second, nominal and a pulse ratio with a break period of 61.5% of the pulse duration.

4. IDENTIFICATION

An identifying code is stamped in ink on the back of the mounting bracket. See tables I and II for explanation of each code.

5. DESCRIPTION

5.1 Number 30

The number 30 rotary dial is designed for use with K-500 and similar type telephones. It has one set of off-normal contacts which close to short circuit the telephone receiver during dial windup and release. It replaces the type 19 dial.

5.2 Number 33

The number 33 dial is designed for use with K-700 series and similar type telephones having a 3-inch diameter opening in the telephone housing. It has one set of off-normal contacts which close to short circuit the telephone receiver during dial windup and release. Replaces type 24 dial.

5.3 Number 35

Same as number 30 dial, but has an additional set of off-normal contacts which close to short circuit the loudspeaker associated with hands-free telephones during dial windup and release. Replaces number 28 dial.

5.4 Number 38

Same as number 33 dial, but has an additional set of off-normal contacts which close to short circuit the loudspeaker associated with hands-free telephones during dial windup and release. Replaces number 24 (_R).

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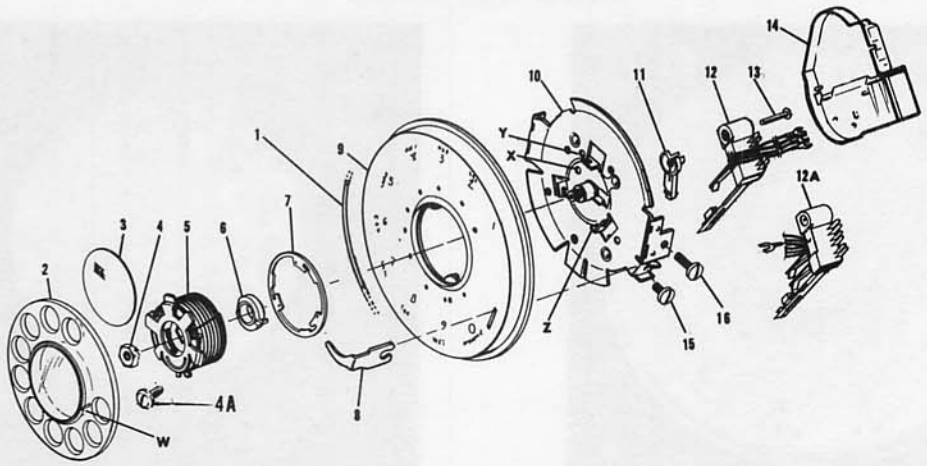

Figure 2A. Dials Number 30 and 35, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
TABLE I. ORDERING INFORMATION AND REPLACEABLE PARTS LIST, No. 30 AND 35 DIALS				30D	30G	35D	35G		
		30**(D)450	DIAL ASSEMBLY, Regular Style, (Numerals Only)	X	-	-	-		
		30**(G)450	DIAL ASSEMBLY, Metro Style, (Letters and Numerals)	-	X	-	-		
		35**(D)450	DIAL ASSEMBLY, Regular Style, (Numerals Only)-(Hands Free Use)	-	-	X	-		
		35**(G)450	DIAL ASSEMBLY, Metro Style, (Letters and Numerals)-(Hands Free Use)	-	-	-	X		
2A	1	75474-2	. GASKET, Dial	1	1	1	1		
	2	79284-1	. FINGERPLATE	1	1	1	1		
	3	75415-1	. CARD, Number	1	1	1	1		
	4	64433	. NUT, Hex (Early dials)	1	1	1	1		
	4A	180723-101	. SCREW (Current dials)	1	1	1	1		
	5	88438-1	. SPRING AND SPIDER ASSEMBLY	1	1	1	1		
		88439-1	. . SPIDER	1	1	1	1		
		190258-1	. . SPRING, Main	1	1	1	1		
	6	88416-1	. BUSHING	1	1	1	1		
	7	88418-1	. RING, Retaining	1	1	1	1		
	8	88417-1	. FINGER STOP	1	1	1	1		
	9	181457-0**	. RING, Numeral, Regular Style, (Numerals only)	1	-	1	-		
	9	88403-0**	. RING, Numeral, Metro Style, (Letters and Numerals)	-	1	-	1		
	10	88421-1	. GEAR TRAIN AND BRACKET ASSEMBLY	1	1	1	1		
	11	88400-1	. ACTUATOR	1	1	1	1		
	12	88419-1	. CONTACT SPRING ASSEMBLY	1	1	-	-		
	12A	88419-2	. CONTACT SPRING ASSEMBLY	-	-	1	1		
	13	75576-8	. SCREW	1	1	1	1		
	14	88402-1	. COVER, Dust	1	1	1	1		
	15	190262-2	. SCREW, Finger Stop	1	1	1	1		
	16	75487-2	. SCREW, Mounting	2	2	2	2		
		0**	Substitute color code						

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

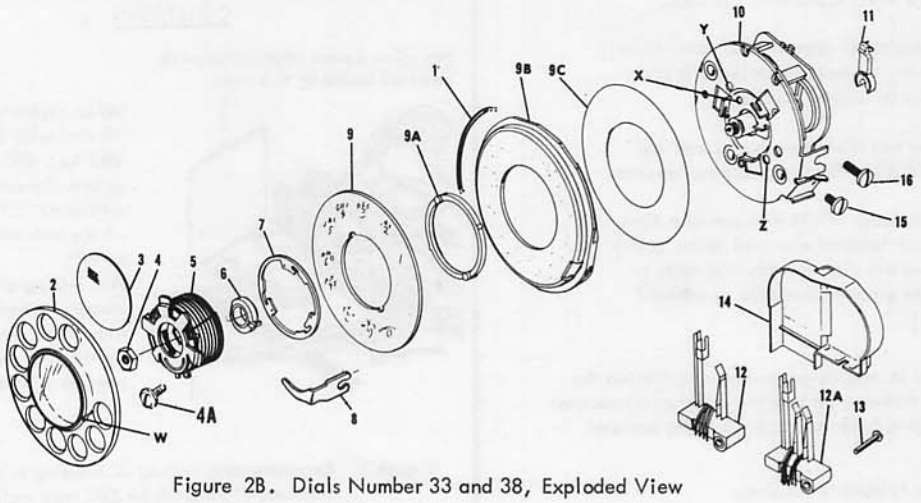

Figure 2B. Dials Number 33 and 38, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
TABLE II. ORDERING INFORMATION AND REPLACEABLE PARTS LIST, NUMBER 33 AND 38 DIALS				33(D) 450	33(G) 450	38(D) 450	38(G) 450	38(H) 450	
		33(D)450	DIAL ASSEMBLY, Regular Style, (Numerals Only)	X	-	-	-	-	
		33(G)450	DIAL ASSEMBLY, Metro Style, (Letters and Numerals)	-	X	-	-	-	
		38(D)450	DIAL ASSEMBLY, Regular Style, Hands Free	-	-	X	-	-	
		38(G)450	DIAL ASSEMBLY, Metro Style, Hands Free	-	-	-	X	-	
		38(H)450	DIAL ASSEMBLY, Dots Only	-	-	-	-	X	
2B	1	190261-1	. GASKET, Dial	1	1	1	1	1	
	2	79284-1	. FINGERPLATE	1	1	1	1	1	
	3	75415-1	. CARD, Number	1	1	1	1	1	
	4	64433	. NUT, Hex (Early dials)	1	1	1	1	1	
	4A	180723-101	. SCREW (Current dials)	1	1	1	1	1	
	5	190235-1	. SPRING AND SPIDER ASSEMBLY	1	1	1	1	1	
		190238-1	. . SPIDER	1	1	1	1	1	
		190258-1	. . SPRING, Main	1	1	1	1	1	
	6	88416-1	. BUSHING	1	1	1	1	1	
	7	88418-1	. RING, Retaining	1	1	1	1	1	
	8	190209-1	. FINGER STOP	1	1	1	1	1	
	9	190367-1	. RING, Numeral, Regular Style (Numerals only)	1	-	1	-	-	
	9	190204-1	. RING, Numeral, Metro Style (Letters and Numerals)	-	1	-	1	-	
	9	190649-1	. RING, Numeral, Dots Only	-	-	-	-	1	
	9A	86387-1	. RING, Positioning	1	1	1	1	1	
	9B	190203-1	. RING, Reflector	1	1	1	1	1	
	9C	190213-1	. RING, White Plastic	1	1	1	1	1	
	10	88881-1	. GEAR TRAIN AND BRACKET ASSEMBLY	1	1	1	1	1	
	11	88400-1	. ACTUATOR	1	1	1	1	1	
	12	88419-1	. CONTACT SPRING ASSEMBLY	1	1	-	-	-	
	12A	88419-2	. CONTACT SPRING ASSEMBLY, Hands Free	-	-	1	1	1	
	13	75576-8	. SCREW	1	1	1	1	1	
	14	88402-1	. COVER, Dust	1	1	1	1	1	
	15	190262-2	. SCREW, Finger Stop	1	1	1	1	1	
	16	75392-2	. SCREW, Dial Mounting	2	2	2	2	2	

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

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6. INSTALLATION AND REMOVAL OF DIAL

(a) Refer to section of manual in chapter three which covers the specific telephone and remove the telephone housing.

(b) Loosen the two dial mounting screws and remove old dial from the mounting brackets.

(c) Disconnect leads of old dial one at a time and connect leads of new dial (same color) (Or remove old dial entirely and refer to appropriate circuit schematic to connect new dial.)

(d) Place dial in mounting brackets and tighten the mounting screws. Be sure the punched bosses seat in the mating holes at each mounting bracket.

(e) Install the telephone housing.

CAUTION

No wires across edge of network terminal board in this area.

When replacing a number 19 dial with a number 30 dial in a 500 type wall phone, be sure to dress wiring at "C" terminal of the network as shown at left.
Any wiring crossing the terminal board in this area might be grounded by the rear plate of the number 30 dial.

Figure 3. Recommended method of dressing wiring at "C" terminal of network on 500 type wall phones.

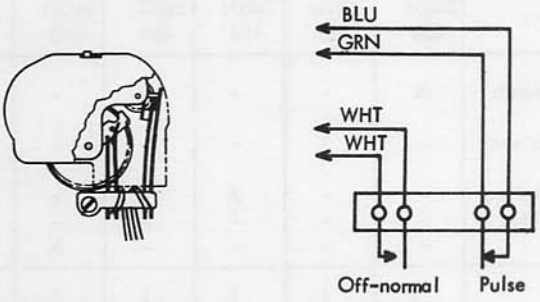

Figure 4A. Contact and lead arrangement, Type 30 and 33 dials

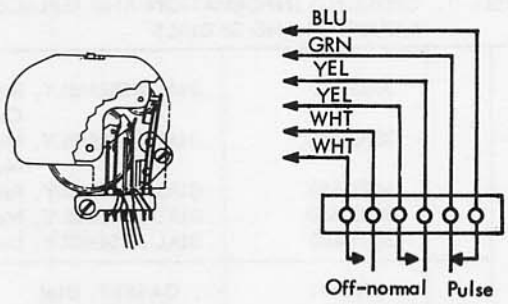

Figure 4B. Contact and lead arrangement, Type 35 and 38 dials

7. CLEANING AND LUBRICATION"

(a) CLEANING
Use a dry brush or compressed air and remove dust. Be sure compressed air is not contaminated with oil. Solvents are not recommended as they may damage the nylatron bearings.

(b) LUBRICATION
Any time the dial is cleaned or adjusted, apply a light film of lubricant to the teeth of the main gear. Use a small brush and ITT K 79946-2 Dial Lubricant or equivalent. Operate the dial a few times to distribute the lubricant, then wipe off excess with a clean lint-free cloth.

Lubricate Nylatron bearings with ITT K 79946-3 Dial Lubricant, W.E. KS 19589-L 1 or equivalent.

CAUTION
Do not allow lubricant to enter the governor drum, as dial speed will be affected.

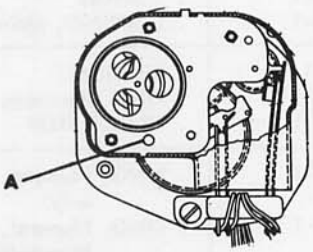

Figure 5 Alignment of parts for assembly.

(Align hole in main gear with hole "A" in the rear plate of dial.)

8. DISASSEMBLY

8.1 FINGER PLATE

(a) REMOVAL (FIGURE 2)

(1) Rotate finger plate clockwise as far as it will go. Hold there gently.

(2) Insert the straightened end of a paper clip or similar tool in the hole "W" which is now about 1/4 inch to the left of the tip of the finger stop (8).

(3) Press down on the paper clip to spring the tab of the spider, (5, figure 2), and rotate the finger plate clockwise to release. Work finger plate off of spider and from under the finger stop.

(b) INSTALLATION

(1) Be sure number card is in place and position the finger plate gently under the finger stop and over the spider.

(2) Position the finger plate so that the "O" or "OPERATOR" finger hole is at position "9". Let the finger plate drop into position over the spider and rotate finger plate counter-clockwise until it clicks into place.

Figure 6. Relative position of Spider after assembly

8.2 SPRING AND SPIDER ASSEMBLY (5) AND BUSHING (6).

(a) REMOVAL

(1) Remove finger plate as directed in previous step.

(2) While holding the spider firmly, use a suitable tool and remove the hex nut, (4, figure 2). Work the spring out of the ring (7) and bracket (10).

(3) Lift out bushing (6).

(4) Remove spring from spider if necessary.

(b) INSTALLATION

(1) Install the bushing (6) with the protruding end of the inner bushing toward the bracket (10) and so the slot fits over the tab of the bracket.

(2) Rotate the main gear until the round hole lines up with hole "A" in figure 5.

(3) Place the hooked end of the spring in hole "X", figure 2. Rotate the spider clockwise two complete turns then seat it on the flattened shoulder of the mainshaft.

(4) Install the hex nut and tighten to 20 inch-pounds torque minimum while holding the spider to prevent unwinding.

NOTE:
The spring has a larger diameter when free than when wound up. Usually it will be found that some coils of the spring lie outside of one of the three locking tabs on the mounting bracket. Use a smooth tool, such as a screwdriver, and work the coils back inside the locking tab.

8.3 FINGER STOP

(a) Removal, Loosen screw (15) and slide finger stop out.

(b) Installation, slide finger stop into position and tighten screw. Bend if necessary to clear finger plate.

8.4 NUMERAL RING GROUP

NOTE
The numeral ring can be removed without removing the spring and spider assembly. However it will be much simpler if the spring and spider assembly are removed first.

(a) REMOVAL

(1) Rotate the retaining ring (7) counter-clockwise to clear the loacking slots of the mounting bracket.

(2) Lift off retaining ring and numeral ring.

(3) Types 33 and 38 only: Lift off the reflector ring (9B), positioning ring (9A) and white plastic ring (9C).

(b) INSTALLATION

(1) Types 33 and 38 only: Place the positioning ring on the bracket so the larger studs fit into holes "Y" and "Z". Place reflector ring around positioning ring.

(2) Install the numeral ring. On dials 30 and 35, seat the two studs of the numeral ring in holes "Y" and "Z" of the bracket. On dials 33 and 38, position the numeral ring so the circular cutouts seat around the studs of the positioning ring.

(3) Place the retaining ring on the numeral ring so the locking tabs of the retaining ring point toward the locking slots of the mounting bracket. Rotate the retaining ring clockwise until it tightens securely.

8.5 CONTACT SPRING ASSEMBLY

(a) REMOVAL

Remove attaching screw (13) and remove contact spring assembly.

(b) INSTALLATION

(1) Dress leads around and under the plastic base of the spring assembly. Install the spring assembly so the locating studs seat in the two holes provided in the base. Secure the assembly with screw (13).

NOTE
Be sure leads do not interfere with the contact springs nor with the main gear teeth.

The inner stud of the actuator (11) must rest against the lever spring of the off-normal (shunt) switch and the contacts must be open. (See table 3). (This applies only if mainspring and spider are in place so that tension is applied to the actuator.)

The tab at the end of the pulsing lever spring must rest on the surface of the impulse cam

Refer to figure 4 for illustration of assembly.

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8.6 ACTUATOR

(a) REMOVAL

(1) Remove contact spring assembly (12 or 12A)

(2) Grasp the actuator and pull. The actuator will spring off the mainshaft.

(b) INSTALLATION

(1) Slip the actuator on the mainshaft, with flat side to surface of maingear, and rotate counterclockwise to the stop on the maingear (See figure 5).

(2) Install contact spring assembly

8.7 GEAR TRAIN ASSEMBLY

The Gear Train Assembly is a staked unit, and repair is not recommended. Replace the Gear Train and Bracket Assembly, (item 10 on figure 2A and 2B), as a unit.

9. TEST AND ADJUSTMENT (Figure 4)

> NOTE
> Adjustment of the 30 Series Rotary Dials is limited to dial speed adjustment and adjustment of contact springs.

9.1 DIAL SPEED ADJUSTMENT

Check dial speed on a reliable pulse speed tester. Maximum tolerance is 9.0 to 11.0 pulse per second. If necessary, adjust to 9.5 to 10.5 pulses per second.

Dial speed is controlled by the end-to-end tension of the governor spring. Adjust the spring tension by curving to increase speed or flattening to decrease speed. Use a pair of tweezers with flat jaws and curve or flatten the spring at the center of the loop. After adjustment, the loop of the spring must be approximately parallel with the bottom of the governor housing and should have a clearance of about 1/64" from all other parts of the governor mechanism, except for the tips of the spring connecting to the weights.

9.2 CONTACT SPRINGS

Each of the springs must be approximately straight and the contacts must make approximately on center. Bend the springs at the base to obtain the specified tension and position adjustments.

(a) OFF-NORMAL, (SHUNT), SPRINGS (TableIII)
With the dial at normal each make spring must be straight, have the correct minimum contact separation from its mating lever spring and be approximately perpendicular to the mounting block. With the dial rotated from the normal position each lever spring must provide the required contact pressure against its make spring.

(b) PULSING SPRINGS (Table III)
During the return motion of the dial the pulsing contacts must have the correct minimum contact separation (See Table III) on each pulse. With the contacts fully parted the lever spring must bear against the pulsing cam with the correct pressure, measured at the tip of the spring. Rotate the dial FROM the normal position until the lever spring rests against the low part of the cam. In this condition the break spring must provide the correct contact pressure against the lever spring, measured at the tip of the break spring. Note that there must be a slight clearance between the tip of the break spring and the trigger locking cam with the dial at normal.

9.3 PULSE RATIO (Table III)

Check the break period of the dial pulses on a reliable pulse ratio tester. If the pulse ratio is outside the range given under the test heading in Table III, readjust it to be within the range given under the heading of READJUST. The adjustment is effected by slight bending of the tab of the pulsing lever spring at the point just below the pulsing cam. Bending the tab away from the cam increases the break time and bending it towards the cam reduces the break time. Refer also to the last sentence of paragraph 9.2(b).

TABLE III. ADJUSTMENT DATA

Dial Speed		
Test:	9.0 to 11.0 pulses/second.	
Readjust:	9.5 to 10.5 pulses/second.	
Spring Pressures		
Shunt lever spring to make spring; 20 grams min.		
Pulsing lever spring against cam; 12 ± 7 grams.		
Pulsing break spring to lever spring, with pawl away and cam in low position; 30 ± 7 grams.		
Spring Clearances		
Between the contacts of the open shunt springs; .015" min.		
Between the contacts of the open pulsing springs; .010" min.		
Note that there must be a slight clearance between the tip of the pulsing break spring and the tip of the pawl with the dial at normal.		
Pulse Ratio		
	Percent Make	Percent Break
Test:	38.5±4	61.5±4
Readjust;	38.5±2	61.5±2

TYPE 10A DIAL

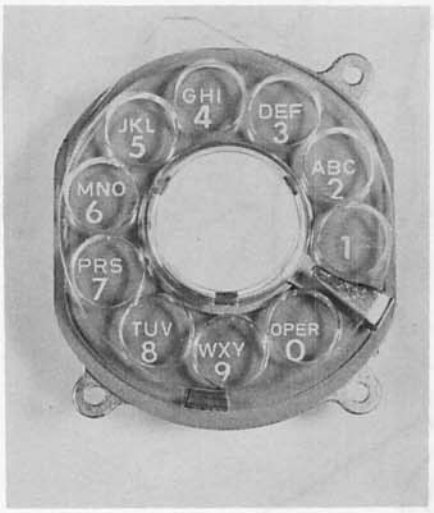

Figure 1. Type 10A Dial

1. GENERAL

Designed for use in dial-in-handset telephones. Overall diameter is approximately 2-3/4", fingerplate diameter is 2-3/8".

The moveable fingerstop moves clockwise approximately two hole spaces at the beginning of each dial windup until it contacts a fixed stop.

Off-normal contacts are not provided.

2. OPERATION

The mechanism is actuated by the clear plastic fingerplate which, when wound up and released, causes a pair of pulsing contacts to interrupt the line current once for each unit of the dialed digit. Telephone switching equipment is operated in accordance with the number of impulses received. The dials are adjusted to 10 impulses per second, nominal, and a pulse ratio with a break period of 61.5% of the pulse duration.

3. IDENTIFICATION

An identifying code and date of manufacture are stamped in ink on the back of the baseplate.

4. CLEANING AND LUBRICATION

(a) CLEANING. Use a dry brush or compressed air to remove dust. Do not use a solvent, as the bearings might be damaged. Be sure compressed air is not contaminated with oil or water.

(b) LUBRICATION. Any time dial is repaired, use a No. 4 artist's round sable brush and lubricate all bearing points lightly with ITT - 79946-3 Dial Lubricant, or W. E. KS 19589-L2 lubricant or equivalent.

CAUTION

Do not allow lubricant to enter the governor drum, as dial speed will be affected.

5. DISASSEMBLY AND REASSEMBLY

(a) CONTACT SPRING. Remove clip (17) and dust cover (18). Remove screw (13) washer (14) and contact spring (15). Assemble in reverse order of disassembly.

(b) FINGERPLATE AND NUMERAL RING GROUPS
Insert point of release tool in hole "A" and pry cover (1) out. Slide E-Ring (3) from groove in mainshaft and lift off washer (4), fingerplate(5) and fingerstop (6). Rotate retainer ring (9) counterclockwise until its tabs are free of slots in base. Lift off retainer ring, numeral ring (10) and background card (11). NOTE: If spring assembly (15) has been removed, be careful not to lose nut (16). Assemble in reverse order of disassembly.

NOTE
Removal of items 7 and 8 is not recommended.

6. TEST AND ADJUSTMENT

NOTE: Adjustments are limited to dial speed, contact spring pressure and clearances, and percent make.

6.1 DIAL SPEED ADJUSTMENT

Dial speed is controlled by the end-to-end tension of the governor spring. Adjust the spring tension by curving to increase speed or flattening to decrease speed. After adjustment, the loop of the spring must be approximately parallel with the dial base plate and have a clearance of about 1/64" from all parts of the governor mechanism except for the tips of the springs connecting to the weights.

6.2 CONTACT SPRING PRESSURE AND CLEARANCES.
Contacts must make approximately on center. Bend the springs at the base to obtain the specified spring pressure and clearance adjustments. Measure spring pressures at tips of springs.

(a) DIAL IN NORMAL POSITION
(1) Clearance between the trigger-locking cam and the tip of the break spring should be approximately .006 inch.
(2) Pressure of the break spring to lever spring must be 22 to 30 grams.

(b) DIAL ROTATED FROM NORMAL POSITION
(1) Clearance between open spring contacts must be .010" minimum.
(2) Pressure of lever spring against cam with contacts open, 2 to 10 grams.

6.3 DIAL PULSE RATIO
Adjustment for pulse ratio is made by slightly bending the tab of the lever spring which rides upon the impulse cam. Bending the tab away from the cam increases the break period. Bending the tab toward the cam decreases the break period.

The break period should be 61.5 + 4%;

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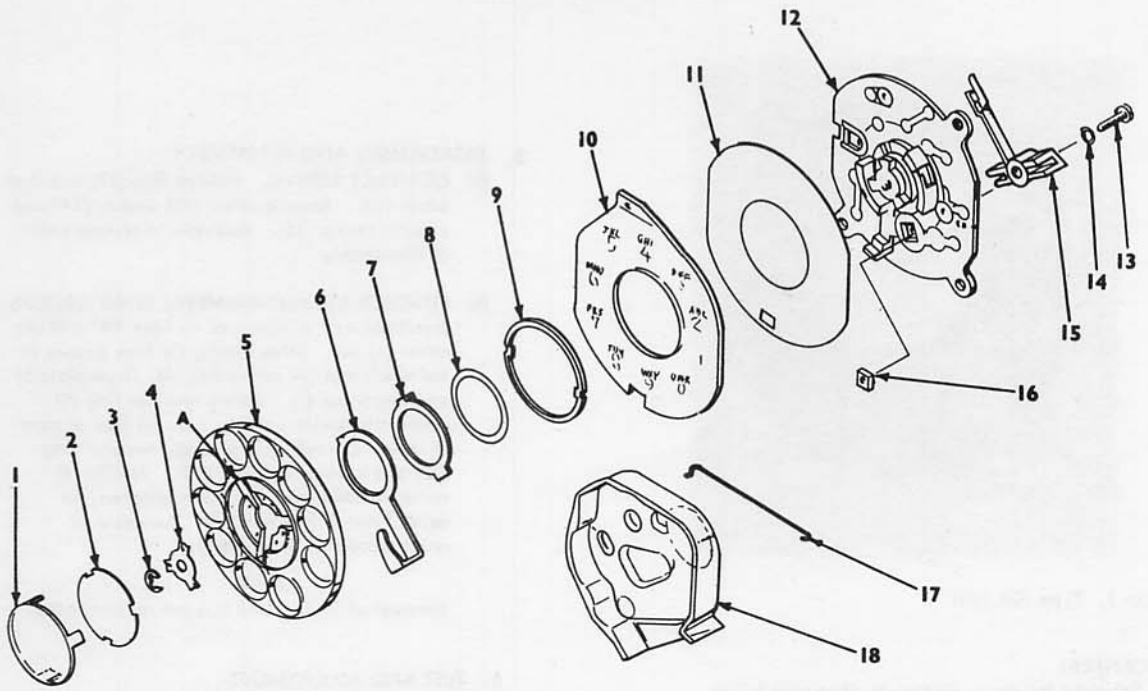

Figure 2. Type 10A Dial, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 10A G					
TABLE I. REPLACEABLE PARTS LIST, TYPE 10A ROTARY DIAL									
		10A(G)450	Dial Assembly, Metro (95991-1)	X					
2	1	180314 -101	Cover, Fingerplate	1					
	2	180308 -***	Insert, Fingerplate Cover	1					
	3	181027 -101	E-Ring	1					
	4	181028 -101	Spider Washer	1					
	5	180313-101	Fingerplate	1					
	6	181029 -101	Fingerstop, Moveable	1					
	7	181033 -101	Washer, Stop	1					
	8	181034 -101	Washer, Wave	1					
	9	181030 -101	Ring, Retainer	1					
	10	181031 -101	Ring, Numeral, Metro	1					
	11	181032 -101	Card, Background	1					
	12	181039 -101	Mechanism, Dial	1					
	13	181036 -101	Screw	1					
	14	181037 -101	Washer	1					
	15	181035 -101	Contact Spring Assembly	1					
	16	181038 -101	Nut	1					
	17	180316-101	Clip, Spring; Dust Cover	1					
	18	180315-101	Cover, Dust	1					
		***	SUBSTITUTE COLOR CODE						

"TEL-TOUCH" PUSHBUTTON DIALS, No. 27, 32, and 36

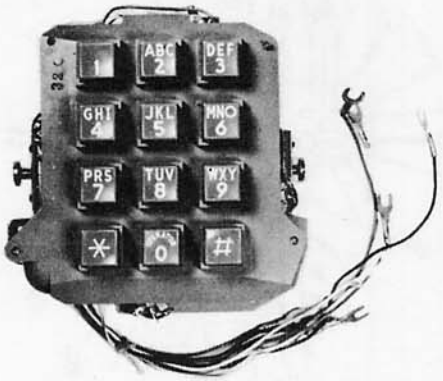

Figure 1A. "TEL-TOUCH" Pushbutton Dial, Front View

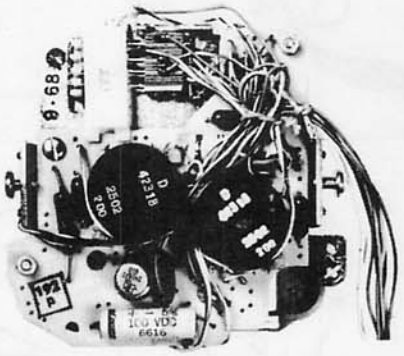

Figure 1B. "TEL-TOUCH" Pushbutton Dial, Rear View

1. IDENTIFICATION

The "TEL-TOUCH" pushbutton dials have been manufactured in three basic models, numbers 27, 32, and 36.

NUMBER 27

The number 27 Dial is a 10-pushbutton unit which has been superseded by number 32 12-pushbutton dial.

NUMBER 32

The number 32 Dial is a 12-pushbutton unit and is the standard dial used in ITT "TEL-TOUCH" telephones. Ten of the buttons are numbered 1 through 9 and 0. The remaining two buttons have symbols * and #.

NUMBER 36

Similar to number 32, but designed for use with hands free equipment.

2. PURPOSE OF THE "TEL-TOUCH" DIAL

The pushbuttons numbered 1 through 0 are used by the subscriber to "dial" the desired number. (The central office must be equipped to accept the signals.) The additional two buttons are used for specific applications which are beyond the scope of this publication.

3. DESCRIPTION AND OPERATION

The "TEL-TOUCH" dial consists chiefly of two major sub-assemblies; the Pushbutton Assembly (1, figure 2) and the tone generating Circuit Board Assembly (35). An insulator (30) is assembled between the two sub-assemblies.

3.1 CIRCUIT BOARD ASSEMBLY (35, Figure 2)

The Circuit Board Assembly includes two tuning coils and two capacitors. The tuning coils have several taps - each tap representing a tuned circuit when it is connected to its associated capacitor. Leads from the coil-taps and from the capacitors are soldered to individual contact springs mounted on the Pushbutton Assembly (1).

3.2 PUSHBUTTON ASSEMBLY (1, Figure 2)

The Pushbutton Assembly consists of the Cover Plate (2); Pushbuttons (3); four Horizontal (Row) Cranks (4 and 5); three Vertical (Column) Cranks (6 and 7); ten Pushbutton Return Springs (8); the Frame (9); the Actuator Slide (10); the Mounting Plate Assembly (11); and the Spring Switch Assembly (28).

Four groups of spring contacts are mounted on the Mounting Plate (24) to make up the Mounting Plate Assembly (11). The tuned circuits of the Circuit Board Assembly are connected to individual contact springs of the sets.

The Spring Switch Assembly (28) is mounted on the rear side of the Mounting Plate and its springs mesh with the teeth of the actuator slide (10).

Depressing a Pushbutton rotates one of the Horizontal Cranks and one of the Vertical Cranks. In the early part of the downstroke, each crank operates a specific spring contact to connect a tuning capacitor to a specific coil tap. (In brief, each crank represents a specific frequency.) Later in the downstroke, the horizontal crank contacts and moves the slide (10) which operates a common switch (28). The Vertical (column) Cranks operate switches connected to the high band coil, and the horizontal (row) cranks operate switches connected to the low band coil. (See figure 3.)

The common switch (Spring Assembly; item 28) performs the following functions:

(1) Attenuates the side tone in the telephone receiver to a comfortable level.
(2) Applies power to transistor.
(3) Opens the transmitter circuit.
(4) Initiates the signal.
(5) Attenuates the sidetone in the speaker in "hands free" application. (36 Dial)

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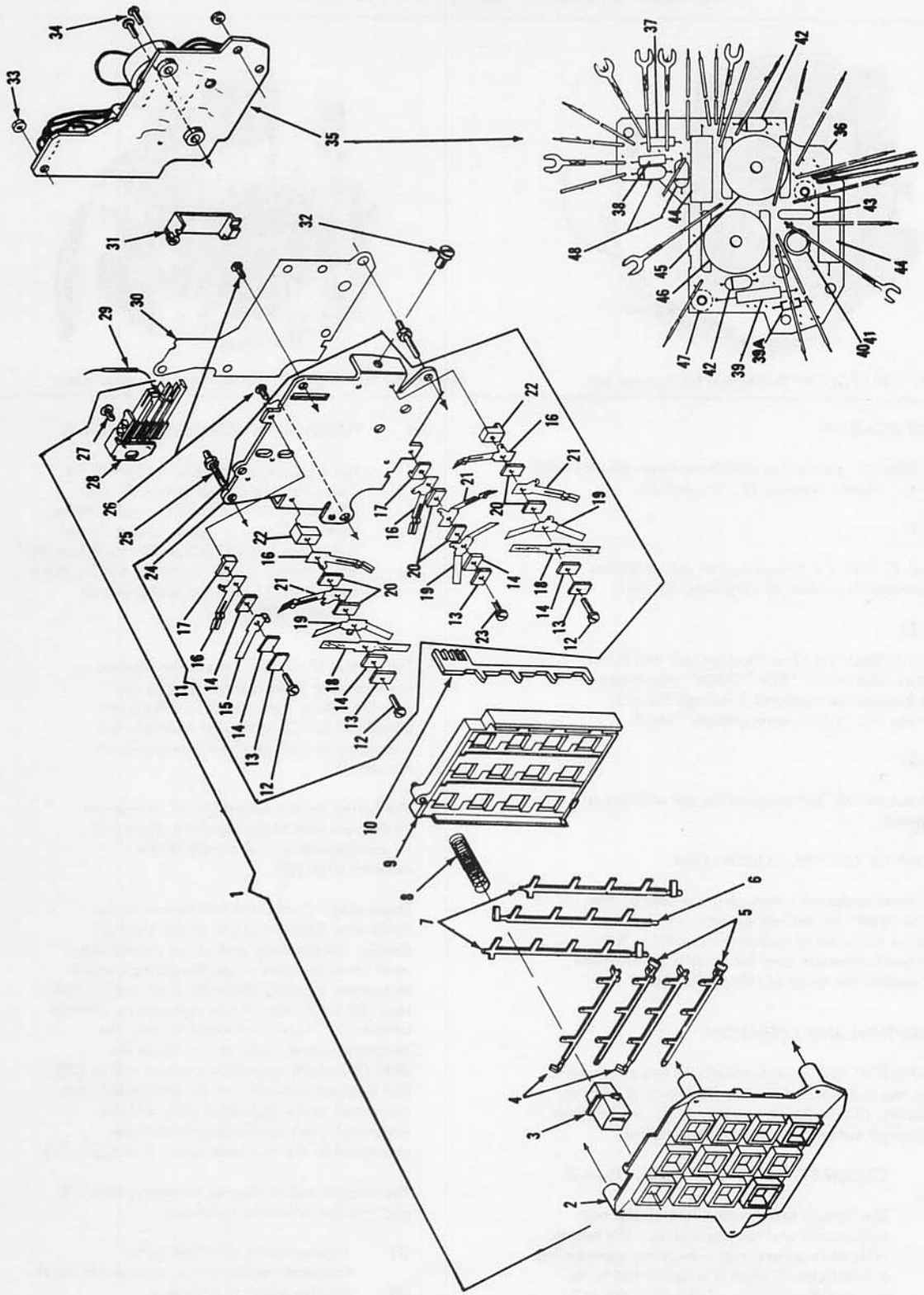

Figure 2. "TEL-TOUCH" Pushbutton Dials, Exploded View, (No. 27, 32, and 36)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description	QUANTITY USED ON					
TABLE I. REPLACEABLE PARTS LIST, "TEL-TOUCH" (PUSHBUTTON) DIAL				27D	27G	32D	32G	36D	36G
		27(D)450	DIAL ASSEMBLY, "TEL-TOUCH" 10-Pushbutton, Regular Style (Obsolete)	X	-	-	-	-	-
		27(G)450	DIAL ASSEMBLY, "TEL-TOUCH" 10-Pushbutton, Metro Style (Obsolete)	-	X	-	-	-	-
		32(D)450	DIAL ASSEMBLY, "TEL-TOUCH" 12-Pushbutton, Regular Style	-	-	X	-	-	-
		32(G)450	DIAL ASSEMBLY, "TEL-TOUCH" 12-Pushbutton, Metro Style	-	-	-	X	-	-
		36(D)450	DIAL ASSEMBLY, "TEL-TOUCH" 12-Pushbutton, Regular Style, Handsfree	-	-	-	-	X	-
		36(G)450	DIAL ASSEMBLY, "TEL-TOUCH" 12-Pushbutton, Metro Style, Handsfree	-	-	-	-	-	X
	1	86134-1	PUSHBUTTON ASSEMBLY, 10-Button Metro	-	1	-	-	-	-
	1	86134-2	PUSHBUTTON ASSEMBLY, 10-Button Regular	1	-	-	-	-	-
	1	86134-3	PUSHBUTTON ASSEMBLY, 12-Button Metro	-	-	-	1	-	-
	1	86134-4	PUSHBUTTON ASSEMBLY, 12-Button Regular	-	-	1	-	-	-
	1	86134-5	PUSHBUTTON ASSEMBLY, 12-Button Metro	-	-	-	-	-	1
	1	86134-6	PUSHBUTTON ASSEMBLY, 12-Button Regular	-	-	-	-	1	-
	2	86101-1	PLATE, Pushbutton Cover (10-button)	1	1	-	-	-	-
	2	86101-4	PLATE, Pushbutton Cover (12-button)	-	-	1	1	1	1
	3	181452-101	BUTTON, Push; #1 (Metropolitan) (Was 86100-1)	-	1	-	1	-	1
		181452-102	BUTTON, Push; #2, ABC (Was 86100-2)	-	1	-	1	-	1
		181452-103	BUTTON, Push #3, DEF (Was 86100-3)	-	1	-	1	-	1
		181452-104	BUTTON, Push #4, GHI (Was 86100-4)	-	1	-	1	-	1
		181452-105	BUTTON, Push #5, JKL (Was 86100-5)	-	1	-	1	-	1
		181452-106	BUTTON, Push #6, MNO (Was 86100-6)	-	1	-	1	-	1
		181452-107	BUTTON, Push #7, PRS (Was 86100-7)	-	1	-	1	-	1
		181452-108	BUTTON, Push #8, TUV (Was 86100-8)	-	1	-	1	-	1
		181452-109	BUTTON, Push #9, WXY (Was 86100-9)	-	1	-	1	-	1
		181452-110	BUTTON, Push #0, OPERATOR (Was 86100-10)	-	1	-	1	-	1
		181452-111	BUTTON, Push #1 (Regular) (Was 86100-11)	1	-	1	-	1	-
		181452-112	BUTTON, Push #2 (Was 86100-12)	1	-	1	-	1	-
		181452-113	BUTTON, Push #3 (Was 86100-13)	1	-	1	-	1	-
		181452-114	BUTTON, Push #4 (Was 86100-14)	1	-	1	-	1	-
		181452-115	BUTTON, Push #5 (Was 86100-15)	1	-	1	-	1	-
		181452-116	BUTTON, Push #6 (Was 86100-16)	1	-	1	-	1	-
		181452-117	BUTTON, Push #7 (Was 86100-17)	1	-	1	-	1	-
		181452-118	BUTTON, Push #8 (Was 86100-18)	1	-	1	-	1	-
		181452-119	BUTTON, Push #9 (Was 86100-19)	1	-	1	-	1	-
		181452-120	BUTTON, Push #10 (Was 86100-20)	1	-	1	-	1	-
		181452-131	BUTTON, Push * (Was 86100-31)	-	-	1	1	1	1
		181452-132	BUTTON, Push # (Was 86100-32)	-	-	1	1	1	1
	4	86108-1	CRANK, Horizontal (1 and 3 from top)	2	2	2	2	2	2
	5	86109-1	CRANK, Horizontal (2 and 4 from top)	2	2	2	2	2	2
	6	86110-1	CRANK, Vertical (Center Position)	1	1	1	1	1	1
	7	86111-1	CRANK, Vertical (Side Positions)	2	2	2	2	2	2
	8	86112-1	SPRING, Push Button	10	10	10	10	10	10
	9	86102-1	FRAME, Push Button	1	1	1	1	1	1
	10	86113-1	SLIDE	1	1	1	1	1	1
	11	86107-1	MOUNTING PLATE ASSEMBLY	1	1	1	1	1	1
	12	86135-4	SCREW,	3	3	3	3	3	3
	13	86119-1	PLATE, Clamp	4	4	4	4	4	4
	14	86121-2	INSULATOR, 1/32-inch thick	5	5	5	5	5	5
	15	86118-1	SPRING	1	1	1	1	1	1
	16	86115-2	SPRING	4	4	4	4	4	4
	17	86116-1	SPACER	2	2	2	2	2	2
	18	180026	INSULATOR	2	2	2	2	2	2
	19	86114-1	SPRING	3	3	3	3	3	3
	20	86121-1	INSULATOR, 1/64-inch thick	6	6	6	6	6	6
	21	86115-1	SPRING	3	3	3	3	3	3
	22	86116-2	SPACER	2	2	2	2	2	2
	23	86135-2	SCREW	1	1	1	1	1	1
	24	86105-2	PLATE, Mounting	1	1	1	1	1	1
	25	86149-1	SCREW, Special (Order 76787-102)	2	2	2	2	2	2
	26	76787-2	SCREW, Self-Tapping	2	2	2	2	2	2
			NOTE: Parts Breakdown of Push button Assembly (Item 1) is continued on next page.						

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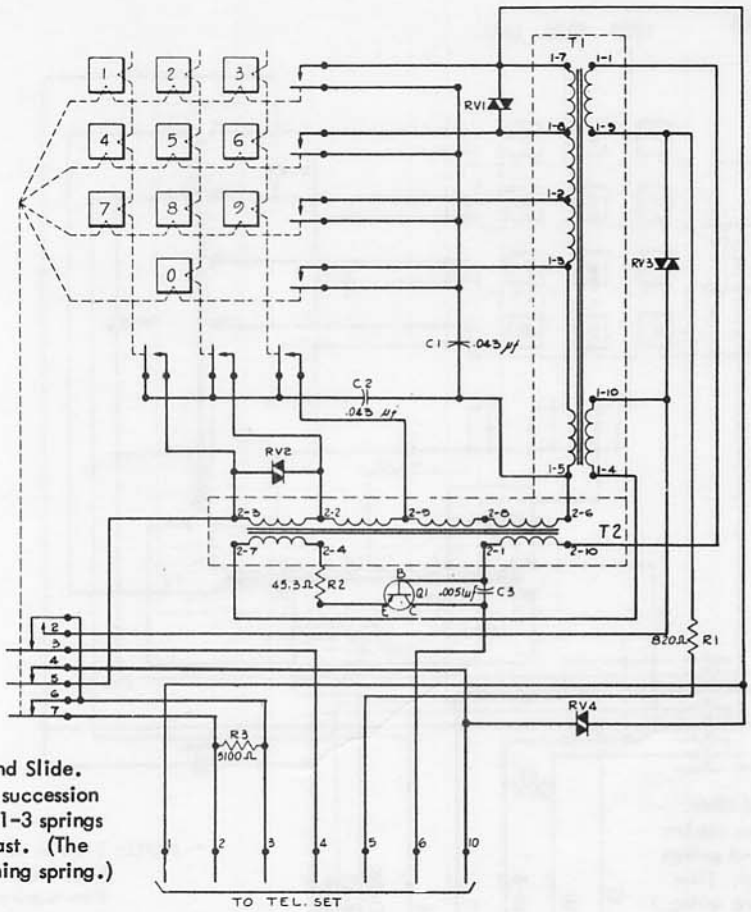
TABLE I. REPLACEABLE PARTS LIST, "TEL-TOUCH" (PUSH BUTTON) DIAL

(Indented items are included in the part under which they are indented)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description	QUANTITY USED ON: 27D 450	27G 450	32D	32G	36D	36G
			PUSHBUTTON ASSEMBLY, (Item 1), continued (Consists of items 2 through 28)						
	27	71660	SCREW (Spring Assembly Attaching)	1	1	1	1	1	1
	28	86133-1	SPRING ASSEMBLY (Includes following 12 parts)	1	1	1	1	-	-
		86135-6	SCREW	2	2	2	2	-	-
		86130-1	BUSHING	2	2	2	2	-	-
			(ORDER OF ASSEMBLY IS SHOWN IN PARENTHESES FOR FOLLOWING PARTS)						
		86132-1	BRACKET, Spring Assembly (1)	1	1	1	1	-	-
		86131-2	INSULATOR, 3/64-inch thick (2)	1	1	1	1	-	-
		86131-1	INSULATOR, 1/32-inch thick (3, 5, 7, 8, 10, 11, 13, 15, 16, 18, 20, 21, 22)	13	13	13	13	-	-
		86129-1	SPRING, (4)	1	1	1	1	-	-
		86128-1	SPRING, (6)	1	1	1	1	-	-
		86127-1	SPRING, (8)	1	1	1	1	-	-
		86126-1	SPRING, (12, 17)	2	2	2	2	-	-
		86124-1	SPRING, (14, 19)	2	2	2	2	-	-
		86117-1	SPRING, (23)	1	1	1	1	-	-
		86120-1	NUT PLATE, (24)	1	1	1	1	-	-
	28	88891-1	SPRING ASSEMBLY (Includes following parts)	-	-	-	-	1	1
		86135-8	SCREW	-	-	-	-	2	2
		86130-2	BUSHING	-	-	-	-	2	2
			(Order of Assembly is shown in parentheses for following parts)						
		86132-1	BRACKET, Spring Assembly (1)	-	-	-	-	1	1
		86131-2	INSULATOR, 3/64-inch thick, (2, 32)	-	-	-	-	2	2
		86131-1	INSULATOR, 1/32-inch thick, (3, 5, 7, 9, 10, 11, 13, 15, 16, 18, 20, 21, 23, 25, 26, 28, 29)	-	-	-	-	17	17
		86129-1	SPRING, (4)	-	-	-	-	1	1
		86128-1	SPRING, (6, 30)	-	-	-	-	2	2
		86127-1	SPRING, (8)	-	-	-	-	1	1
		86126-1	SPRING, (12, 17, 22)	-	-	-	-	3	3
		86124-1	SPRING, (14, 19, 24)	-	-	-	-	3	3
		88892-1	SPRING (27)	-	-	-	-	1	1
		88893-1	SPRING, (31)	-	-	-	-	1	1
		86120-1	NUT PLATE, (33)	-	-	-	-	1	1
	29	190106-85	WIRE (White-Blue-Green)	1	1	-	-	-	-
	29	190106-351	WIRE (White- Yellow- Violet)	-	-	-	-	1	1
	30	86106-1	INSULATOR, Circuit Board to Mounting Plate	1	1	1	1	1	1
	31	86104-1	COVER, Spring Assembly	1	1	1	1	1	1
	32	180219	SCREW, Dial Mounting	2	2	2	2	2	2
	33	86150-1	LOCKNUT, (Goes on Item 25) (Not required with 76787-102)	2	2	2	2	2	2
	34	79485-2	SCREW, Circuit Board to Mounting Plate	2	2	2	2	2	2
	35	86140-1	CIRCUIT BOARD ASSEMBLY, Tone Generator	1	1	-	-	-	-
	35	180142-1	CIRCUIT BOARD ASSEMBLY, Tone Generator	-	-	1	1	-	-
	35	89561-1	CIRCUIT BOARD ASSEMBLY, Tone Generator	-	-	-	-	1	1
	36	86141-1	BOARD, Printed circuit	1	1	1	1	1	1
	37	62948-20	RESISTOR, (R3) 5,100 Ohm	1	1	1	1	1	1
	38	62948-29	RESISTOR (R1) 820 Ohm	1	1	1	1	1	1
	39	95535-18	RESISTOR (R2) 45.3 Ohm	1	1	1	1	1	1
	39A	62948-93	RESISTOR (R4) 33,000 Ohm	-	-	-	-	1	1
	40	95830-1	TRANSISTOR	1	1	1	1	1	1
	41	95749-1	SPACER, Transistor	1	1	1	1	1	1
	42	95655-101	DIODE; D1, D2	2	2	2	2	2	2
	43	95854-1	CAPACITOR	1	1	1	1	1	1
	44	95862-1	CAPACITOR	2	2	2	2	2	2
	45	86125-1	TRANSFORMER (T1)	1	1	1	1	1	1
	46	86125-2	TRANSFORMER (T2)	1	1	1	1	1	1
	47	86148-1	SPACER	2	2	2	2	2	2
	48	180658-101	DIODE; D3, D4	2	2	2	2	2	2



Dotted lines represent Cranks and Slide. Springs 6-7 break first, then in succession the 1-2 springs make, then the 1-3 springs break. The 4-5 springs break last. (The 8 spring, not shown, is a stiffening spring.)

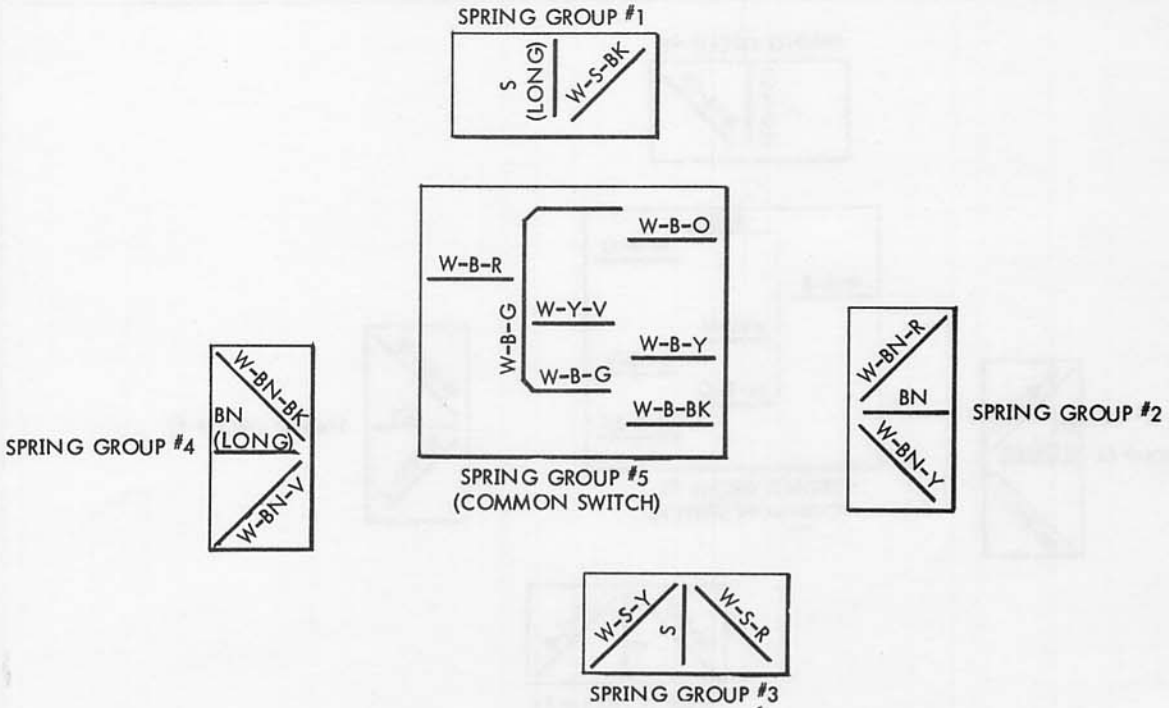


Figure 3A. Dial circuit and wiring diagram, No. 27 dial.

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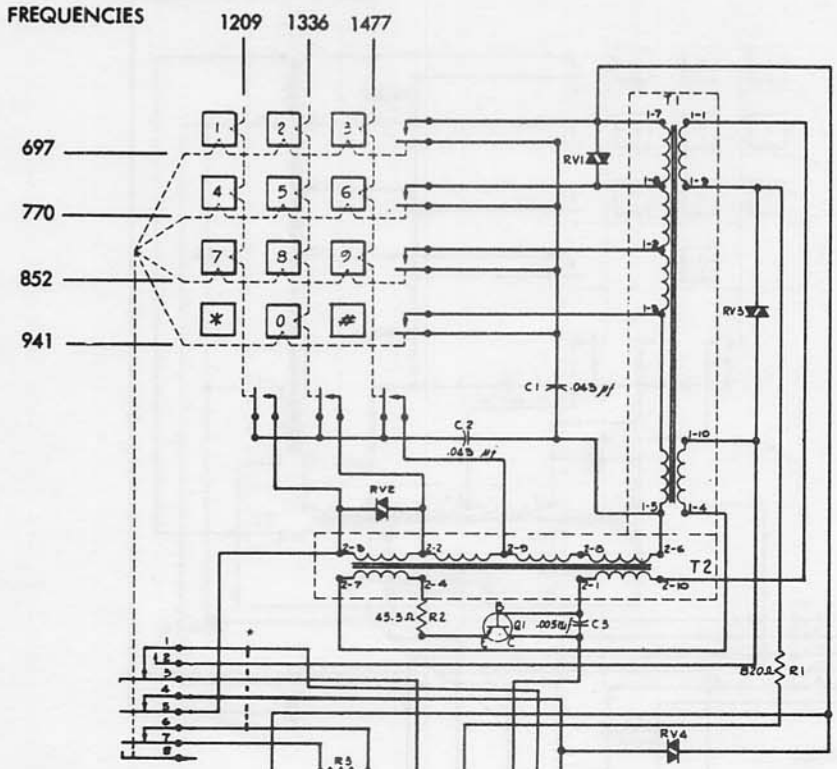


Dotted lines represent Cranks and Slide. Springs 6-7 break first, then in succession the 1-2 springs make, then the 1-3 springs break. The 4-5 springs break last. (The 8 spring, not shown, is a stiffening spring.)

Connections to K-2500 Telephone.

NETWORK	G		R		B	C	R	RR
TERM. BRD.		10		11				

* NOTE: Dials of current manufacture do not have a WH-BL lead but have a strap from terminal (1) to terminal (6) of the common switch. Lead from terminal (3) of dial is R-G instead of WH-BL.

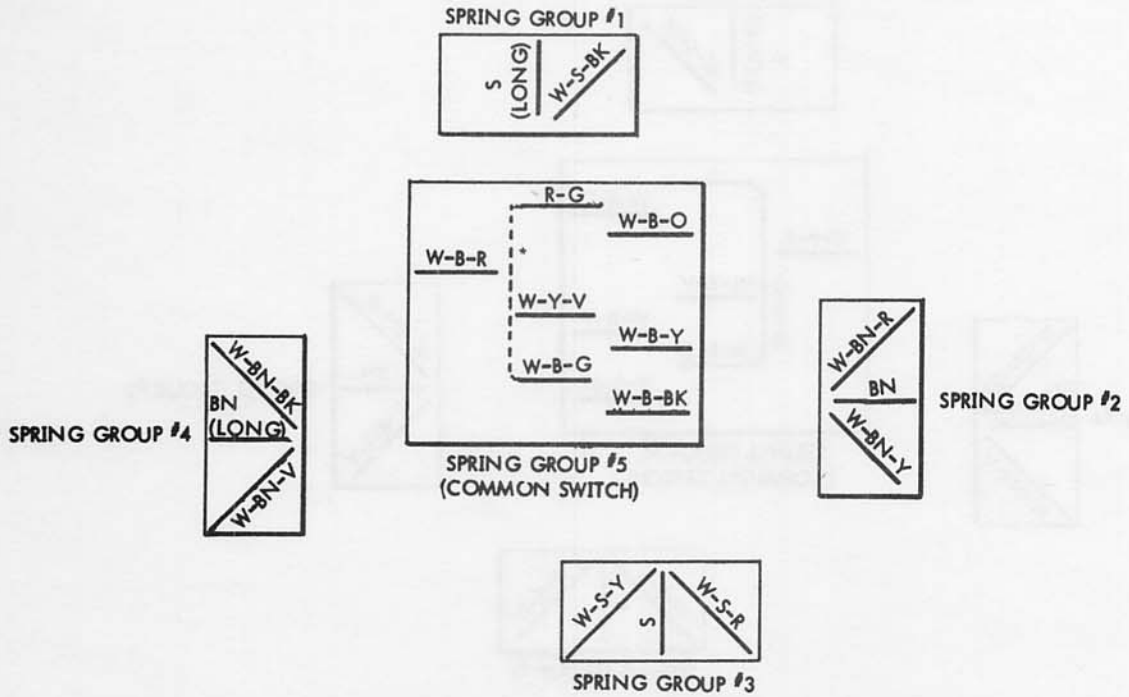
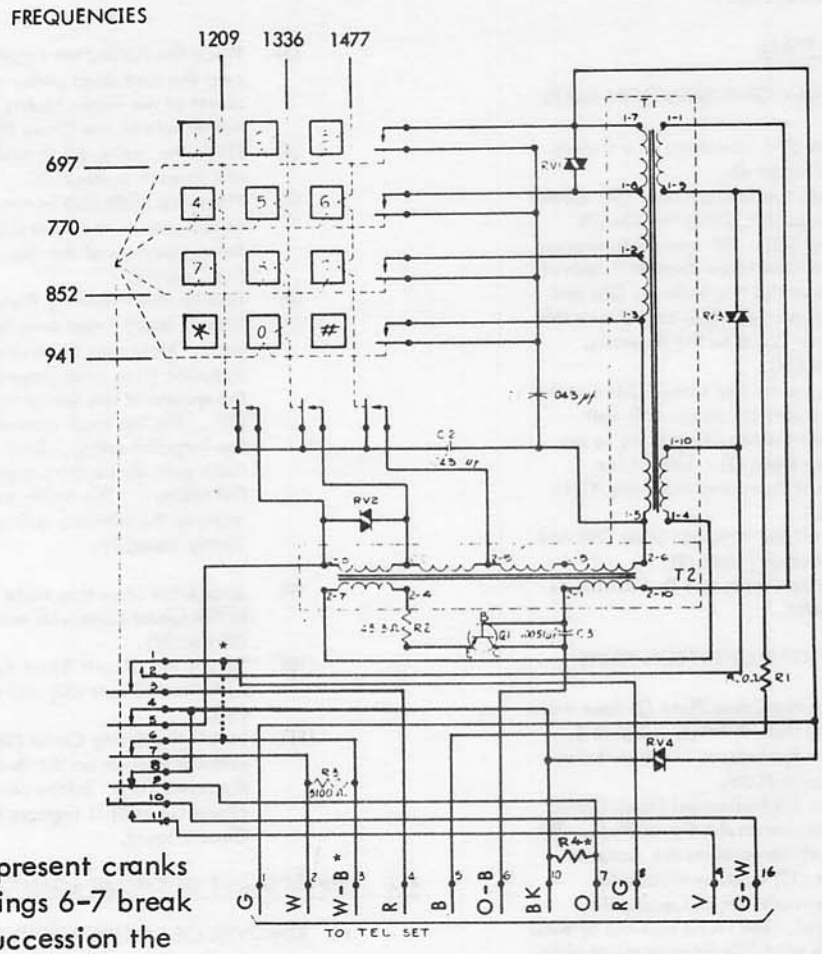
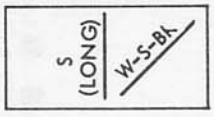


Figure 3B. Dial circuit and wiring diagram, No. 32 dial.

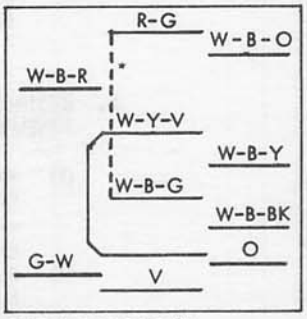


Dotted lines represent cranks and slide. Springs 6-7 break first, then in succession the 1-2, 10-11 springs make and then the 1-3, 8-9 springs break. The 4-5 springs break last.

SPRING GROUP #1



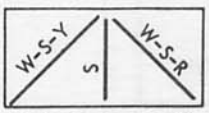
* NOTE: Dials of current manufacture do not have a WH-BL lead but have a strap from terminal (1) to terminal (6) of the common switch. Lead from terminal (3) of dial is R-G instead of WH-BL.



SPRING GROUP #5
(Common Switch)

SPRING GROUP #4

SPRING GROUP #2



SPRING GROUP #3

Figure 3C. Dial circuit and wiring diagram, No 36 dial.

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4. DISASSEMBLY AND REASSEMBLY

4.1 PUSHBUTTON PARTS

a. DISASSEMBLY OF PUSHBUTTON PARTS

(1) Place dial face down in a fixture. (See figure 4).
(2) Rotate the Spring Cover (31) clockwise until it clears the Circuit Board (35). Lift upward to remove it from the screw threads if desired.
(3) Remove the two locknuts (35) and the two screws (34) that secure the Circuit Board to the Mounting Plate (24).
(4) Remove the two screws (26) and the two stud-type screws (25) that secure the Mounting Plate to the Cover Plate (2). Lift off the Circuit Board and Mounting Plate group.
(5) Lift off the Actuator Slide (10) and Pushbutton Frame (9).
(6) Remove Cranks and Pushbuttons as required.

b. ASSEMBLY OF PUSHBUTTON PARTS

(1) Place the Cover Plate (2) face down on the fixture shown in figure 4.
(2) Place Pushbuttons in proper holes in Cover Plate.
(3) Place the Horizontal (Row) Cranks in position in the Cover Plate. The arm which contacts the Actuator Slide (10) must be toward the assembler's left and must point upward. The round sections of each crank must ride in appropriate slots.
(4) Place the Vertical (Column) Cranks in position.
The arms of the cranks point toward the assembler's left and ride on the flanges of the pushbuttons.

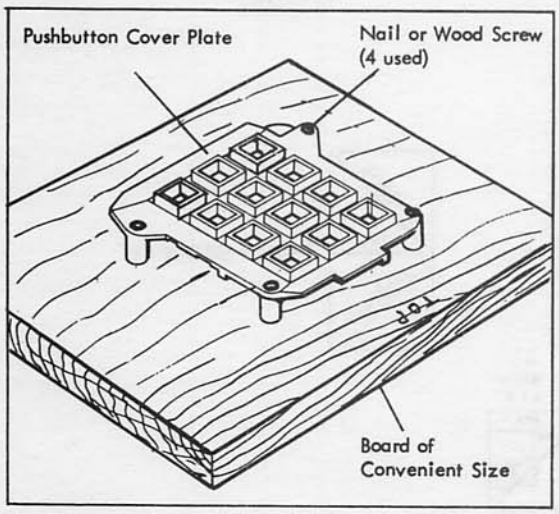

Figure 4. Holding fixture

(5) Place the Pushbutton Frame (9) over the assembled parts, so the dowel of the Frame inserts into the dowel hole of the Cover Plate.
(6) Place the Spring (8) in position, one in each pushbutton.
(7) Place the Slide (10) in the Frame so the arms on the front side mesh below the arms of the four vertical (row) cranks.
(8) Position the Mounting Plate and Circuit Board group over the assembled parts. Note that the teeth of the Actuator Slide mesh properly with the springs of the Spring Assembly (28). The top tooth goes above the top long flat spring. Each successive tooth goes above the subsequent long flat spring . The fourth tooth engages the stiffener spring of the Spring Assembly.
(9) Secure the Mounting Plate Assembly to the Cover Plate with screws (25 and 26).
(10) Secure the Circuit Board Assembly with the two nuts (33) and screws (34).
(11) Install the Spring Cover (31) by pressing it down on the threads of the screw (12). Rotate counterclockwise until it engages the Circuit Board.

4.2 REPLACEMENT OF CIRCUIT BOARD ASSEMBLY

a. REMOVAL OF CIRCUIT BOARD ASSEMBLY

(1) Remove the waxed twine from the wire and pull kinks out of wire.
(2) Remove the two nuts (33) and the two screws (34) that secure the Circuit Board to the Mounting Plate.
(3) Rotate the Spring Cover (31) until it clears the Circuit Board.
(4) Use a soldering iron and de-solder the leads of the Circuit Board from the spring contacts on the Mounting Plate.

b. INSTALLATION OF CIRCUIT BOARD ASSEMBLY.

(1) Place Circuit Board in position on the Mounting Plate and secure with the two nuts (33) and screws (34).
(2) Refer to figure 3 and solder leads to the Spring Contacts on the Mounting Plate.
(3) Pull the wiring together and bind with twine. (Figure 1A)
(4) Pull the wires equipped with terminals to the top right hand corner (as viewed from rear of dial) and bind with twine.

5. REPLACEMENT OF COMPONENTS ON CIRCUIT BOARD (With Circuit Board Assembly Removed)

5.1 TRANSFORMERS

a. REMOVAL OF TRANSFORMERS

(1) Remove Circuit Board Assembly as directed in paragraph 4.2.
(2) Locate the solder joints associated with the transformer to be removed. Using a soldering iron, apply heat and pressure directly into the joints, pushing the Transformer terminals out of the Circuit Board.

b. INSTALLATION OF TRANSFORMERS

(1) Place the Transformer in position with the terminals extending through the appropriate holes in the Circuit Board.
(2) Hold the Transformer in position and apply solder as required.

5.2 CAPACITORS, RESISTORS, VARISTORS

a. REMOVAL OF CAPACITORS, RESISTORS AND VARISTORS

(1) Use side cutters and clip leads of unit to be replaced.
(2) Apply hot soldering iron to associated solder joint on printed side of Circuit Board. When solder is melted away, rap the Circuit Board lightly; the part of lead wire in solder joint will fall out.

b. INSTALLATION OF CAPACITORS, RESISTORS AND VARISTORS

(1) Insert leads into appropriate holes in Circuit Board and bend leads down closely to hold unit in place.

(2) Solder unit in place and clip excess length from leads.

6. INSPECTION TEST AND ADJUSTMENT

6.1 VISUAL INSPECTION

Inspect to be sure all nuts and screws are properly tightened. During assembly, be sure all plated parts have a good finish. Check all solder joints to be sure they are intact.

6.2 TEMPERATURE REQUIREMENTS

Dials must be stored in a room at 75°F for at least four hours immediately to testing so they will stabilize at 75° F.

6.3 MECHANICAL REQUIREMENTS

a. Down travel of button shall be between .012" to .018" before the slide switch motion will start. Minimum of 0.015" pre-travel of the slide-switch motion is required, before any sequence of switching occurs. Slide switch travel in sliding motion is to be between .080" to .110".

b. The contact springs of the dial shall be so adjusted that no contact shall be made during the initial .014" travel of button. Signalling shall start when a force of 150 to 275 grams is applied to any of the buttons. Cranks shall not touch one another when a button is depressed with any side-way pressure applied to the button.

c. Contact Spring Adjustment

(1) All contact spring adjustment shall be made at the base of the springs. The alignment of the contact springs shall be such as to mate all springs approximately on center.
(2) The contact spring separation shall in no case be less than 0.012"
(3) Contact pressure of the adjusted springs in the operated position shall be a minimum of 15 grams.

6.4 TEST CIRCUIT DESCRIPTION

a. The normal circuitry of the K-2500 type telephone, less dial, with a selected network having average characteristics and with seven Rapid Test Clips, or equivalent, so as to provide ready access to the test circuit.

b. A mechanical arrangement for holding the dial such that the dial may be rotated to provide ready access to the threaded cores.

c. A battery feed circuit consisting of a 48VDC power supply, a WE Co. 94E repeat coil or equivalent, a 1000 ohm - 3 watt wirewound resistor, a 2500 ohm- 2 watt wirewound potentiometer, a 2MF capacitor and a SPST switch "S1".

d. A 47 ohm ± 5% one watt resistor to replace the transmitter, a 150 ohm ± 5% 1/2 watt resistor to replace the receiver and a 900 ohm ± 1% load resistor.

e. A 0-50 DC milliameter, accuracy at 20 MA to be within 1%.

f. A Ballantine 310A voltmeter or equivalent; a frequency counter; a Tektronix Model RM 561 oscilloscope or equivalent.

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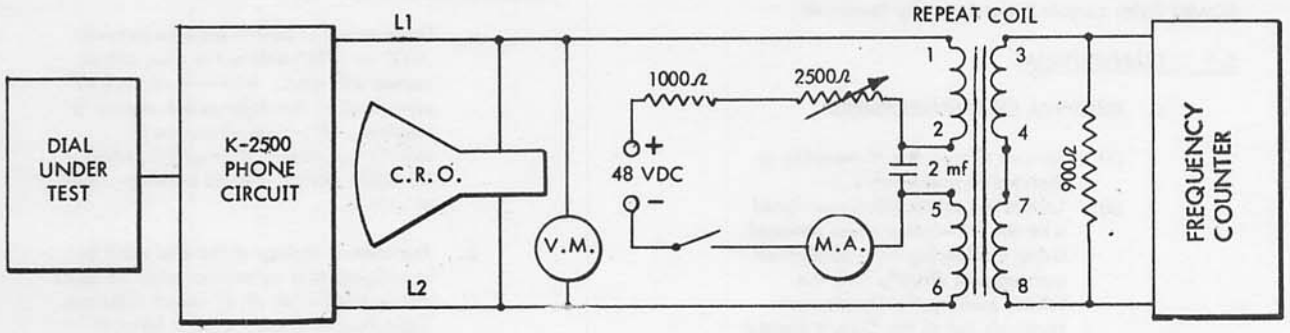

Figure 5. Test Circuit Schematic

6.5. TEST AND ADJUSTMENT

a. The oscillator circuit generates two frequencies when any one button of the dial is depressed, however, it will generate only one frequency when any two buttons in one row or one column are depressed. Adjustments, frequency measurements, and signal amplitude measurements are made on the basis of one frequency being generated at a time.

b. Insert dial in test fixture.

c. Close switch S1 and adjust line current to 20 MA.

d. After dial has been connected to circuit for 30 seconds, depress buttons 4 and 5 simultaneously and adjust threaded core of transformer assembly 86125-1 to obtain a reading of 770 Hz. Release buttons 4 and 5, then depress buttons 8 and 0 simultaneously and adjust transformer 86125-2 to obtain a reading of 1336 Hz.

e. Observe readings for each of the frequencies available. Readings must be within 1.5% of nominal frequencies shown.

f. Dual Frequency Output Test

(1) The dual frequency output shall be observed at the L1-L2 terminals using a Tektronix Model RM 561 oscilloscope or equivalent.

(2) Depress each button in turn and, while button is depressed, tilt each button side-way through an arc of 360 degrees using a rubber-tipped pencil or the index finger. Both frequencies should be present at all times a button is depressed.

g. Rise Time

(1) Rise time is defined as being that time from the opening of the common switch contact that initiates oscillator action to the time at which the oscillator signal reaches maximum amplitude.

(2) Rise time shall be observed at the L1-L2 terminals of the test set using a Tektronix Model RM 561 oscilloscope or equivalent and shall not exceed 15 milli-seconds.

(3) Rise time shall be observed during tests as outlined 6.5.e.

h. Parasitic Suppression

(1) A parasitic oscillation is herein defined as an undesired high frequency signal superimposed on the desired signal.

(2) Parasitic suppression shall be observed at the L1-L2 terminals of the test set using a Tektronix Model RM 561 oscilloscope or equivalent.

(3) Observation of parasitic suppression shall be made during tests as outlined in 6.5.e.

(4) There shall be no evidence of parasitic oscillations. An open .0051 MF feedback capacitor will cause parasitic oscillations.

i. Voltage Breakdown

> CAUTION
> To prevent possibility of breakdown of .043 mf capacitors, this test should be made with no. 1 button depressed.

Completed dials shall withstand the application of 500 volts RMS 60 CPS from each of the seven lugged dial leads to the dial mounting frame. Voltage shall be increased from zero to 500 volts in a period of not less than one second, maintained for thirty seconds and decreased to zero in a period of not less than one second.

TEST STANDARDS

NOTE: Single frequencies are obtained by depressing two buttons in the same row for low frequencies or two buttons in the same column for high frequencies. Readings should be within 1.5% of the nominal readings shown

ROW	NOMINAL FREQUENCY
1,2,3	697 Hz
4,5,6	770 Hz
7,8,9	852 Hz
*,0,#	941 Hz

COLUMN	NOMINAL FREQUENCY
1,4,7,*	1209 Hz
2,5,8,0	1336 Hz
3,6,9,#	1477 Hz

TYPE 3700 PUSHBUTTON DIAL

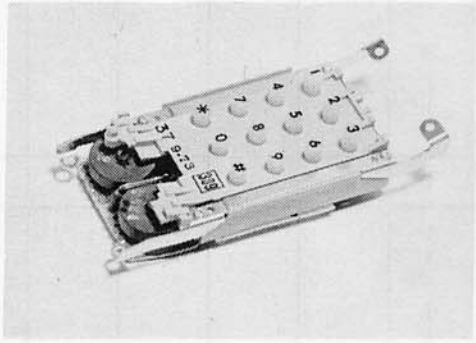

Figure 1. Type 3700 Dial

1. IDENTIFICATION

The type 3700 Dial is identified by the number 37 stamped in ink on the Cover Plate.

2. PURPOSE OF UNIT

Designed for use in ITT dial-in-handset telephones, (K-2200 desk telephones, K-2254 wall telephones). The pushbuttons numbered 1 through 0 are used by the subscriber to "dial" the desired number. (The central office must be equipped to accept the tone signals.) The additional two buttons are used for special applications which are not covered in this publication. Has seven screw terminals for 180346-101 screws, (not included)

3. DESCRIPTION

Consists of three basic subassemblies; the Pushbutton assembly; the Base Plate assembly; and the Circuit assembly; plus miscellaneous parts.

3.1 PUSHBUTTON ASSEMBLY

Consists of Cover Plate, Pushbuttons, Cranks, (for operating the frequency switch spring pile-ups), Frame, and securing screw. The pushbuttons are an off-white translucent plastic and are illuminated by a light guide in the telephone handset.

3.2 BASE PLATE ASSEMBLY

Consists of Base Plate and seven spring Pile-Ups. (Frequency switches)

3.3 CIRCUIT ASSEMBLY (OSCILLATOR)

Consists of Transformers, Varistors, Capacitors, Resistors, Transistors, Flexible Printed Circuit Board, and rigid Printed Circuit Board with screw terminals.

3.4 MISCELLANEOUS PARTS GROUP

Includes Dial Mounting Brackets, Dust Shield, Pushbutton Return Springs, Operating Slide for the Common Switch, Common Switch assembly, Common Switch Cover, Spacers and various screws.

4. OPERATION

Depressing a button rotates one vertical crank and one horizontal crank and also operates the common switch. Each rotated crank operates a contact spring to connect a capacitor to a specific coil tap. In brief, each crank represents a specific frequency. The common switch serves to attenuate side tone, applies power to the transistor, opens the transmitter circuit, and initiates the signal. If two adjacent buttons are depressed at the same time, only one frequency is generated.

5. SIGNALING FREQUENCIES

Signaling frequencies should be within ± 1.5% of nominal values shown below.

Digit	Frequency Combinations (Hz)*
1	697 + 1209
2	697 + 1336
3	697 + 1477
4	770 + 1209
5	770 + 1336
6	770 + 1477
7	852 + 1209
8	852 + 1336
9	852 + 1477
0	941 + 1209
*	941 + 1336
#	941 + 1477

* NOMINAL SIGNAL FREQUENCY

Single frequency operation is obtained by depressing two buttons in a horizontal row for low frequencies (697, 770, 852 and 941 Hz) or two buttons in a vertical column for high frequencies (1209, 1336 and 1477 Hz).

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FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
			Figure 2. 3700 DIAL, EXPLODED VIEW	3700					
	1	180432-101	BRACKET, Dial; R.H.	1					
		180343-101	SCREW, Dial Bracket Attaching	2					
	2	180432-102	BRACKET, Dial; L.H.	1					
		180343-101	SCREW, Dial Bracket Attaching	2					
	3	180433-101	SHIELD	1					
	4	180449-101	PUSHBUTTON ASSEMBLY	1					
	5	180453-101	- COVER PLATE	1					
	6	180355-101	- BUTTON, 1	1					
		180355-102	- BUTTON, 2	1					
		180355-103	- BUTTON, 3	1					
		180355-104	- BUTTON, 4	1					
		180355-105	- BUTTON, 5	1					
		180355-106	- BUTTON, 6	1					
		180355-107	- BUTTON, 7	1					
		180355-108	- BUTTON, 8	1					
		180355-109	- BUTTON, 9	1					
		180355-110	- BUTTON, 0	1					
		180355-111	- BUTTON, *	1					
		180355-112	- BUTTON, #	1					
	7	180439-101	- CRANK, Vertical; R.H. and Center	2					
	8	180440-101	- CRANK, Vertical; L.H.	1					
	9	180438-101	- CRANK, Horizontal; 2nd & 4th	2					
	10	180437-101	- CRANK, Horizontal; 1st & 3rd	2					
	11	180454-101	- FRAME	1					
	12	180466-101	- SCREW	1					
	13	180354-101	SPRING	12					
	14	180408-101	SLIDE	1					
	15	180450-101	BASE PLATE ASSEMBLY	1					
	16	180353-101	- NUT PLATE	7					
	17	180337-101	- INSULATOR	14					
	18	180411-101	- SPRING, Top and Bottom Pile Ups	3					
	19	180410-101	- SPRING, Side Pile Ups	4					
	20	180412-101	- SPRING, Top and Bottom Pile Ups	3					
	21	180409-101	- SPRING, Side Pile Ups	4					
	22	180369-101	- SPACER, Top and Bottom Pile Ups	3					
	23	180367-101	- SPACER, Side Pile Ups	4					
	24	180451-101	- PLATE, Base	1					
	25	180348-101	- SCREW, Spring Pile Ups	7					
		180343-101	SCREW, Base Plate to Pushbutton Assembly	4					
	26	180448-101	CIRCUIT ASSEMBLY	1					
	27	180416-101	- TRANSFORMER; T1	1					
	28	180416-102	- TRANSFORMER; T2	1					
	29	180352-101	- VARISTOR ASSEMBLY	1					
	30	180456-101	- CAPACITOR; C1, .054 mfd	1					
	31	180456-102	- CAPACITOR; C2, .044 mfd	1					
	32	180474-101	- CAPACITOR; C3 and C4, 4700 mfd	2					
	33	180463-114	- RESISTOR; R1, 68 Ohm	1					
	34	180463-118	- RESISTOR; R2, 75 Ohm	1					
	35	181647-245	- RESISTOR; R3, 820 Ohm	1					
	36	180461-148	- RESISTOR; R4, 8200 Ohm	1					
	37	180488-101	- TRANSISTOR; Q1 and Q2	2					
	38	95853-2	- VARISTOR; RV3 and RV4	2					

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
			Figure 2. 3700 DIAL, EXPLODED VIEW, Continued						
	39	180413-101	COMMON SWITCH ASSEMBLY	1					
		180345-101	SCREW, Common Switch Attaching	1					
	40	180407-101	COVER, Common Switch	1					
	41	180344-101	SCREW	3					
	42	180339-101	SPACER	3					

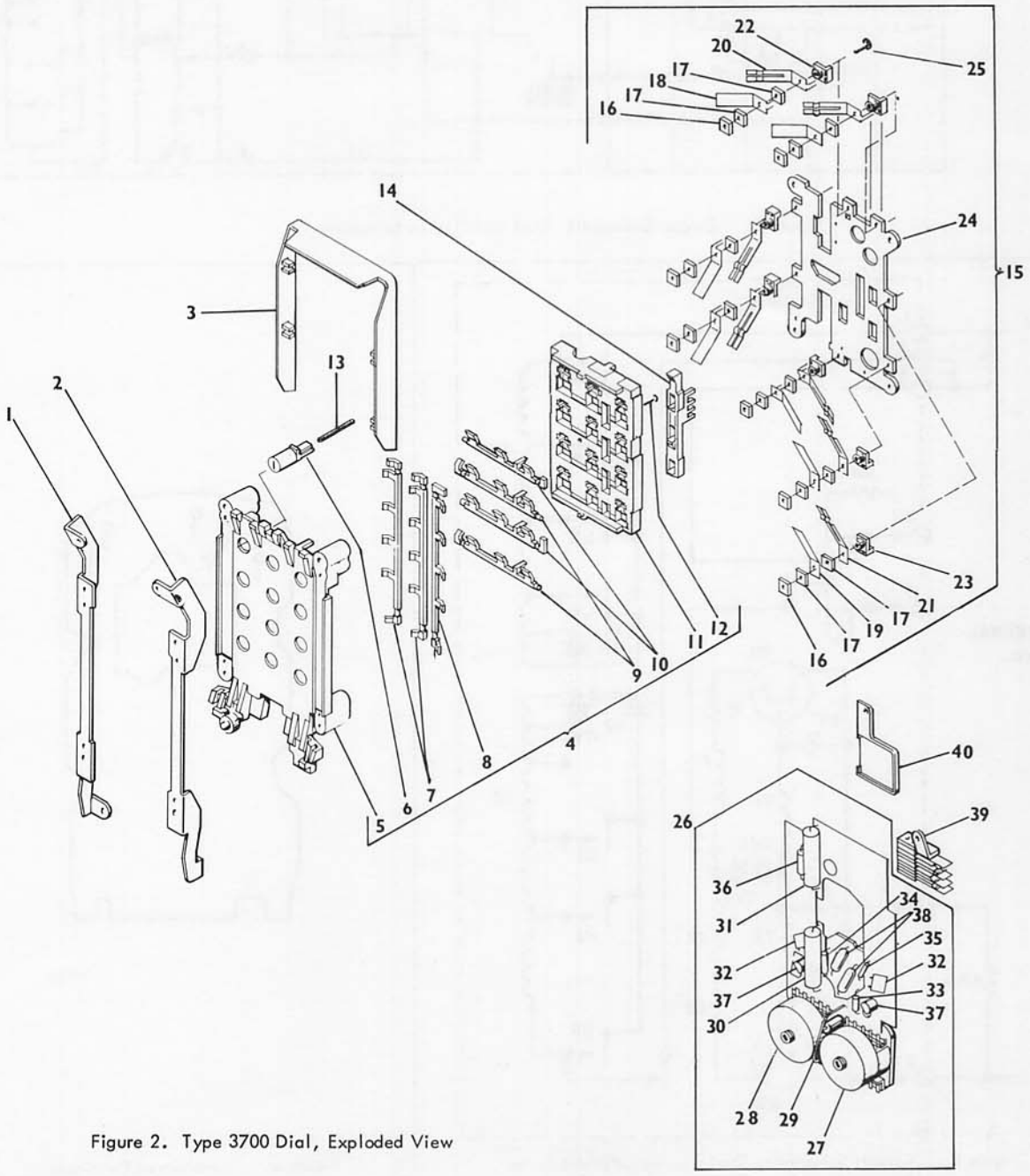

Figure 2. Type 3700 Dial, Exploded View

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

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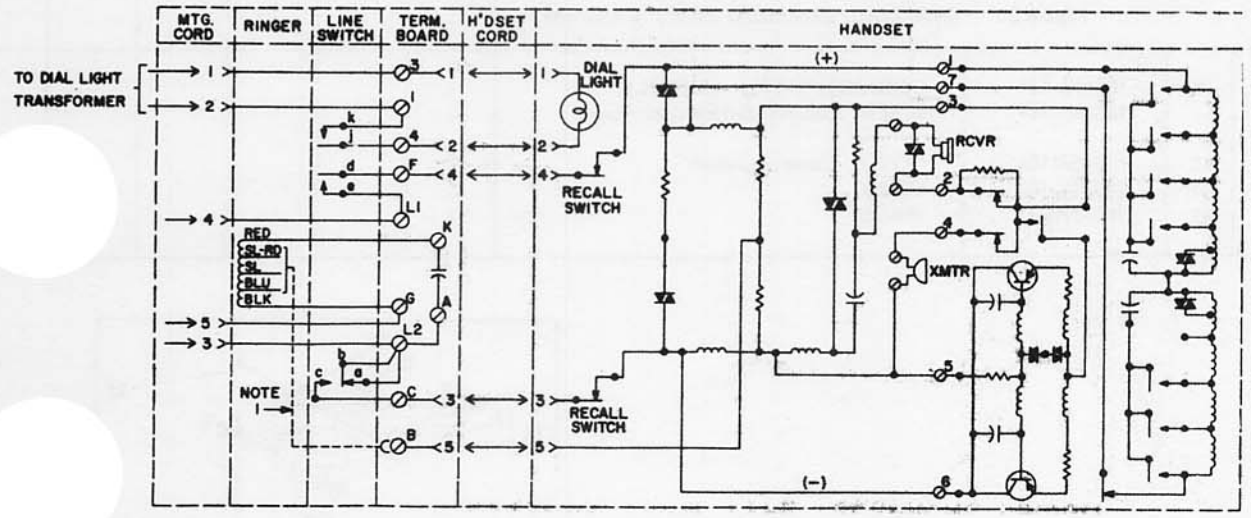

Figure 3. Circuit Schematic, Dial Installed in Telephone

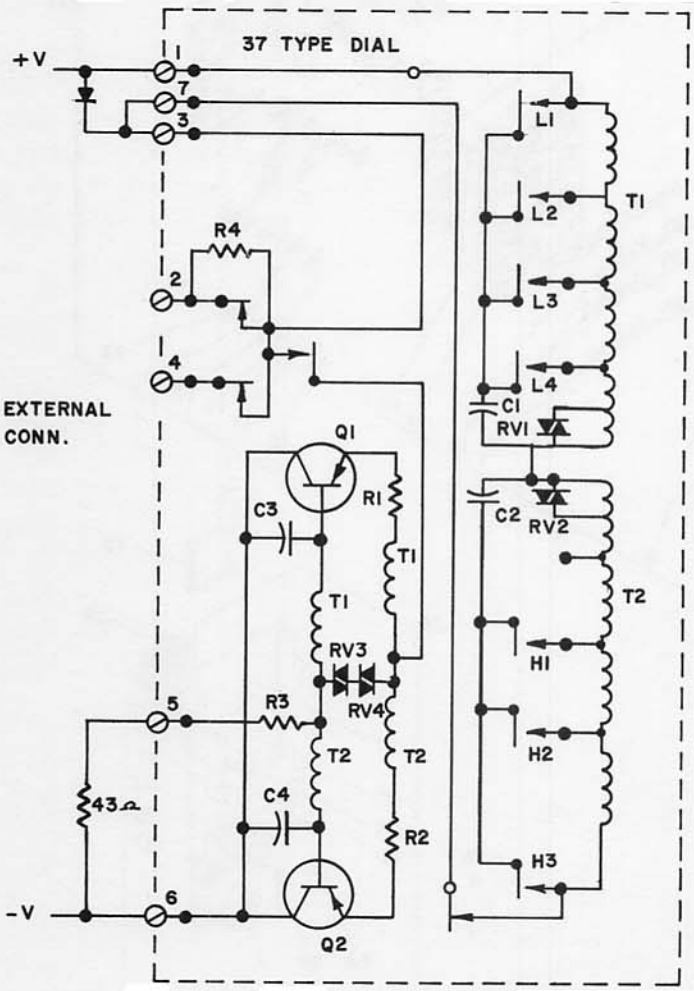

Figure 4. Circuit Schematic, Dial Connected Directly to Transmission Line

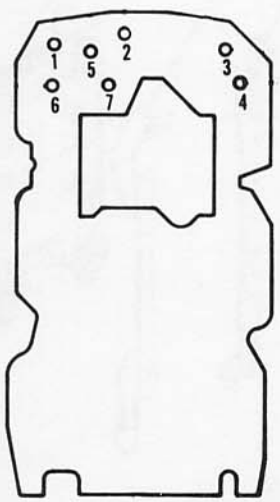

Figure 5. Location of Terminals

TYPE 190107 NETWORK

CONTENTS

1 GENERAL DESCRIPTION

1.1 The type 190107 network assembly provides all the components necessary to connect and match the impedance of the type 65 handset transmitter and receiver units to a two wire telephone circuit.

1.2 The unit incorporates radio frequency filter and side tone balancing circuits in addition to the impedance matching components.

1.3 All the components are mounted to the underside of the molded terminal board which is clipped to the sealing compound filled mounting container.

2 TECHNICAL DESCRIPTION

2.1 The circuit is shown in Fig. 2-1; the dashed lines show typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.

2.2 EQUALIZATION

The basic network design provides an increase in transmission characteristics of some 10 db over previous circuits. It has therefore been possible to include the two shunt elements in the circuit

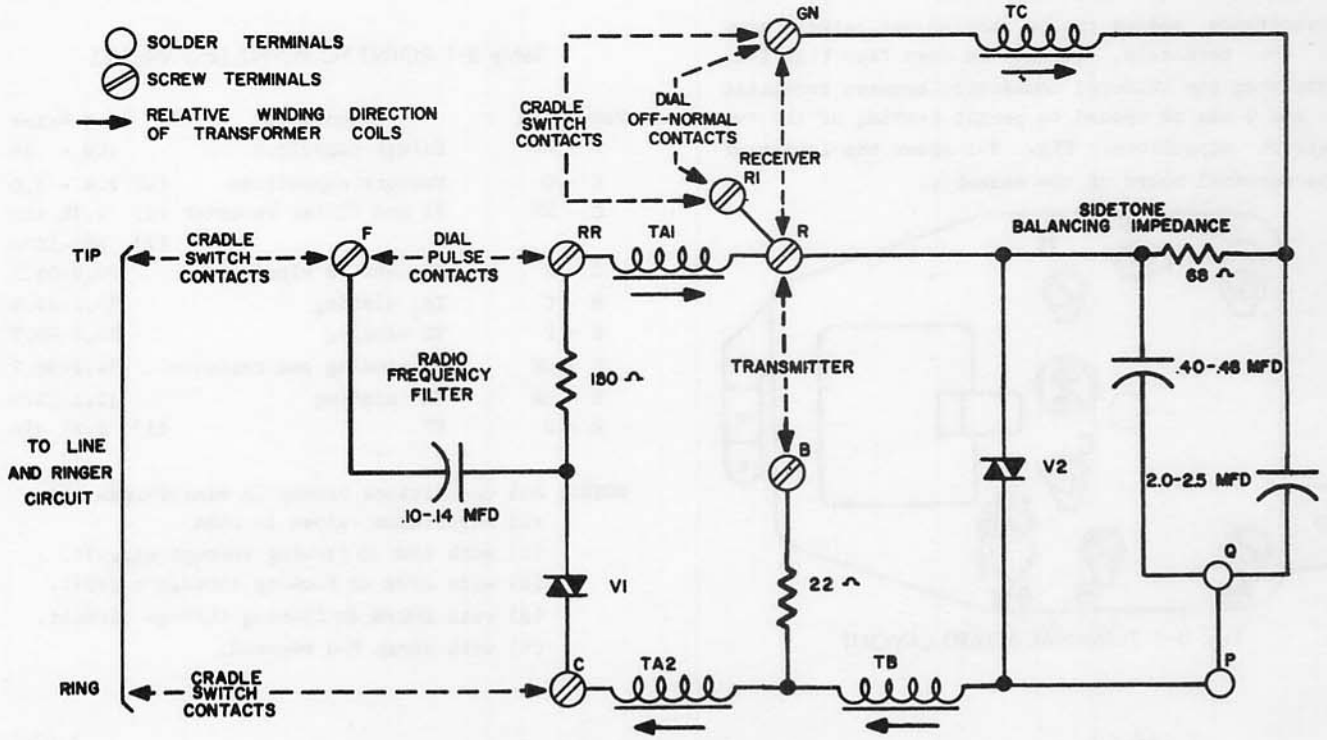

Fig. 2-1 CIRCUIT DIAGRAM

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to produce increased losses on short loops and yet have negligible effect on long loops; the varistor effective resistances changing inversely to the current flowing through them.

2.3 TRANSMISSION

The direction of winding of the four coils of the transformer is indicated by arrows in Fig. 2-1. Received speech currents pass via windings TA_1, TB and TA_2, each of which produces an additive voltage in winding TC. The received currents also produce a voltage across the 68 ohms resistor that opposes and is almost equal to that produced by the induced voltages in winding TC. There is, therefore, very little power loss in the resistor and varistor and maximum power in the receiver. The low impedance of the transmitter is matched to the loop by the turns ratio of winding TB to windings TA_1 and TA_2.

2.4 SIDETONE BALANCING

The current variations due to the transmitter are in opposite phase in windings TA and TB. The induced voltages in winding TC are also in opposite phase and the resultant voltage is opposed by the voltage produced across the 68 ohms resistor. The net effect is that very small signals are produced in the receiver due to transmitter current changes and sidetone is very low. Also, as there is little power loss in the receiver, maximum transmitting levels are attained. Both varistors contribute to this condition by automatically compensating for various loop conditions to provide close matching of the loop impedance and the balancing network impedance with the transmitter circuit.

2.5 RADIO FREQUENCY FILTERING

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

3 TESTING

3.1 Thorough testing of the network assembly can only be performed with elaborate test equipment. An adequate check on performance, for maintenance purposes, is to compare a suspected unit with a known good unit by substitution. Resistance and capacitance checks can be carried out between many of the terminals, as can be seen from Fig. 2-1. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Fig. 3-1 shows the layout of the terminal board of the assembly.

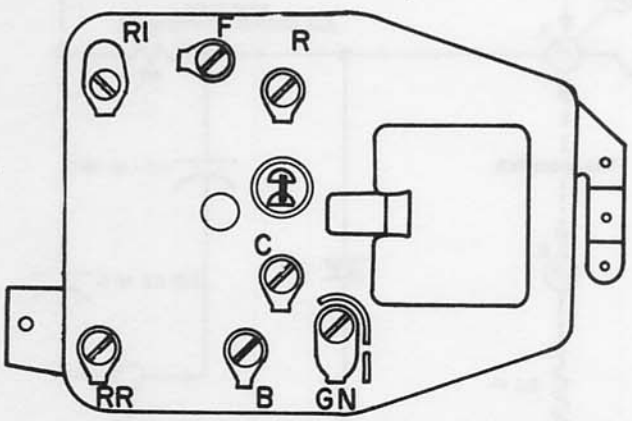

Fig. 3-1 TERMINAL BOARD LAYOUT

3.2 To assist in testing network assemblies in the field, Table 3-1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

Table 3-1 POINT TO POINT TEST VALUES

Terminals	Components		Test Value
F - RR	Filter capacitor		.09 - .14
R - Q	Network capacitors	(4)	2.4 - 3.0
C - RR	V1 and filter resistor	(1)	4.7K min
		(2)	890-1070
C - P	TA_2 and TB windings		28.8-35.2
B - C	TA_2 winding		35.1-42.9
B - P	TB winding		33.3-40.7
R - GN	TC winding and resistor		74.3-90.7
R - RR	TA winding		12.1-14.9
R - P	V2	(1)	1.6K min

NOTES: All capacitance values in microfarads and all resistance values in ohms
(1) with 1 ma dc flowing through circuit.
(2) with 10 ma dc flowing through circuit.
(3) with 100 ma dc flowing through circuit.
(4) with strap P-Q removed.

TYPE 75335-1 NETWORK

CONTENTS

1 GENERAL DESCRIPTION

1.1 The type 75335-1 network assembly provides all the components necessary to connect and match the impedance of the type 65 handset transmitter and receiver units to a two wire telephone circuit.

1.2 The unit incorporates radio frequency filter and side tone balancing circuits and a 0.5 mfd. ringer capacitor in addition to the other circuits.

1.3 All the components are mounted on the underside of the molded terminal board which is clipped to the sealing compound filled mounting container.

2 TECHNICAL DESCRIPTION

2.1 The circuit is shown in Fig. 2-1; the dashed lines show typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.

2.2 EQUALIZATION

The basic network design provides an increase in transmission characteristics of some 10 db over previous circuits. It has therefore been possible to include the two shunt varistors in the circuit

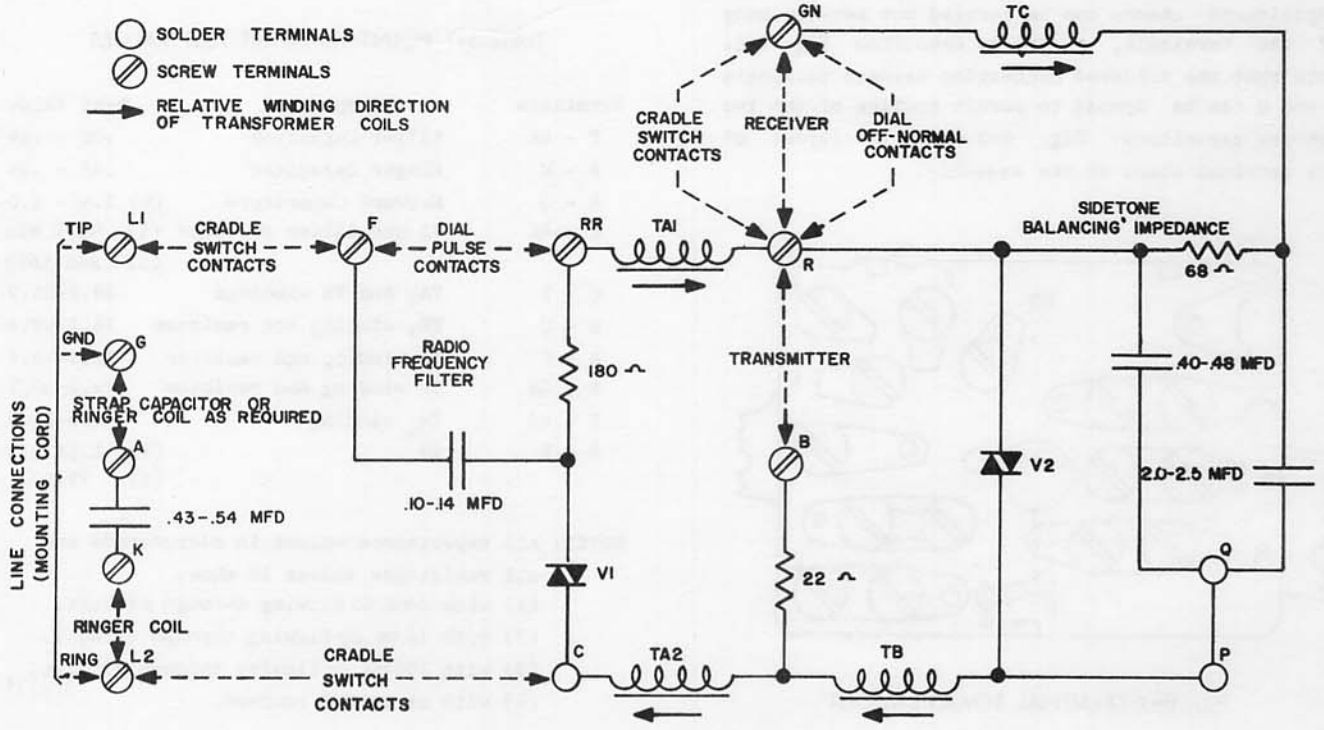

Fig. 2-1 CIRCUIT DIAGRAM

to produce increased losses on short loops and yet have negligible effect on long loops; the varistor effective resistances changing inversely to the current flowing through them.

2.3 TRANSMISSION

The direction of winding of the four coils of the transformer is indicated by arrows in Fig. 2-1. Received speech currents pass via windings TA_1, TB and TA_2, each of which produces an additive voltage in winding TC. The received currents also produce a voltage across the 68 ohms resistor that opposes and is almost equal to that produced by the induced voltages in winding TC. There is, therefore, very little power loss in the resistor and varistor and maximum power in the receiver. The low impedance of the transmitter is matched to the loop by the turns ratio of winding TB to windings TA_1 and TA_2.

2.4 SIDETONE BALANCING

The current variations due to the transmitter are in opposite phase in windings TA and TB. The induced voltages in winding TC are also in opposite phase and the resultant voltage is opposed by the voltage produced across the 68 ohms resistor. The net effect is that very small signals are produced in the receiver due to transmitter current changes and sidetone is very low. Also, as there is little power loss in the receiver, maximum transmitting levels are attained. Both varistors contribute to this condition by automatically compensating for various loop conditions to provide close matching of the loop impedance and the balancing network impedance with the transmitter circuit.

2.5 RADIO FREQUENCY FILTERING

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

3 TESTING

3.1 Thorough testing of the network assembly can only be performed with elaborate test equipment. An adequate check on performance, for maintenance purposes, is to compare a suspected unit with a known good unit by substitution. Resistance and capacitance checks can be carried out between many of the terminals, as can be seen from Fig. 2-1. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Fig. 3-1 shows the layout of the terminal board of the assembly.

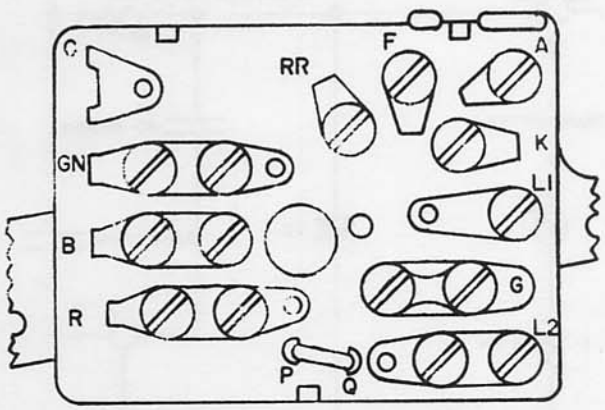

Fig. 3-1 TERMINAL BOARD LAYOUT

3.2 To assist in testing network assemblies in the field, Table 3-1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

Table 3-1 POINT TO POINT TEST VALUES

Terminals	Components	Test Value
F - RR	Filter Capacitor	.09 - .14
A - K	Ringer Capacitor	.43 - .54
R - Q	Network Capacitors (4)	2.4 - 3.0
C - RR	V1 and filter resistor (1)	4.7K min
	(2)	890-1070
C - P	TA_2 and TB windings	28.8-35.2
B - C	TA_2 winding and resistor	35.1-42.9
B - P	TB winding and resistor	33.3-40.7
R - GN	TC winding and resistor	74.3-90.7
R - RR	TA_1 winding	12.1-14.9
R - P	V2 (1)	1.6K min
	(3)	72-87

NOTES: All capacitance values in microfarads and all resistance values in ohms.
(1) with 1 ma dc flowing through circuit.
(2) with 10 ma dc flowing through circuit.
(3) with 100 ma dc flowing through circuit.
(4) with strap P-Q removed.

TELEPHONE SERVICE RINGERS

CONTENTS

1 GENERAL DESCRIPTION

1.1 This sub-section provides general information on all types of single-gong and two-gong ringers. Specific information, parts lists and special adjustments are given in the individual descriptive sub-sections.

1.2 Each ringer consists of a cast, non-magnetic, alloy frame on which all the component parts are mounted. A typical ringer is illustrated in Fig. 1-1. A laminated soft-iron core carries the single coil and is clamped to the soft-iron yoke which is bolted to the frame. The armature and clapper assembly is spring mounted to the frame so that the clapper may be vibrated by the armature, due to the magnetic field produced by the coil and yoke, to strike the gong(s). Increased sensitivity is provided by biasing the armature by means of a small permanent magnet clamped in the frame. A mechanical volume control is fitted on most types of ringer so that the user may adjust the sound output level. The coil is provided with flexible wire leads for connection to the other components in the telephone.

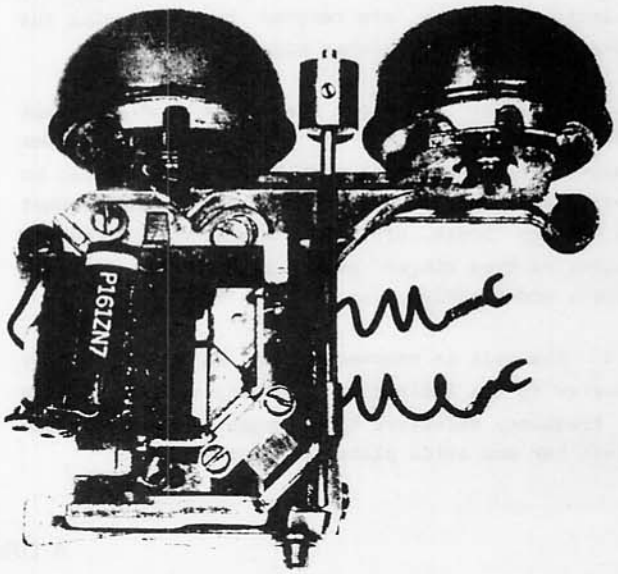

Fig. 1-1 TYPICAL RINGER

1.3 The ringers are designed to function from an alternating current source. Units are available for all the standard ringing frequencies from 16 to 66-2/3 cycles per second. The sensitivity is such that satisfactory operation is obtained on the longest circuits and the high impedance prevents excessive bridging and unbalance losses on multi-party lines. A three point, anti-vibration mounting to the telephone base is provided.

2 ASSOCIATED PUBLICATIONS

2.1 Specific details of each type of ringer are given in individual sub-sections in this section of the manual, each indexed by the type number of the ringer to which it applies. The information given in this sub-section is of a general nature and applies to all the telephone ringers.

2.2 The types of ringer which can be used with each type of telephone are noted in the sub-section in which the instrument is described. Extension ringers of similar type may also be used.

2.3 A list of ringer classification code numbers is given in sub-section 242.31. For any ringer unit without housing, the asterisk shown in the frequency selective ringer code numbers is always replaced by the letter "H".

2.4 The full code number for each type of ringer is given in the title of the individual descriptive sub-section. The classification code, noted above, must be inserted in place of the two dashes shown in each title in order to complete the code number.

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3 DISASSEMBLY AND ASSEMBLY

CAUTION

THE STRENGTH OF THE PERMANENT MAGNET IS ADJUSTED AFTER ASSEMBLY OF THE RINGER. DISASSEMBLY OF ANY OF THE PARTS OF THE MAGNETIC CIRCUIT MAY ADVERSELY AFFECT THE PERFORMANCE OF THE RINGER. SPECIAL EQUIPMENT IS NECESSARY TO REMAGNETIZE AND ADJUST THE STRENGTH OF THE MAGNET IN ORDER TO OBTAIN OPTIMUM PERFORMANCE.

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

3.2 In order to remove the magnet from a BA type ringer, first remove the armature and clapper assembly then slide the magnet out of the frame. Do not strain the tab of the frame holding the magnet as it may break off. The magnet of a frequency selective type ringer may be lifted out after the screws and clamping plate are removed.

3.3 The coil is removed from a BA type ringer by unscrewing the lamination clamping screws and from a frequency selective type ringer by loosening the shunt bar and slide plate clamping screws.

3.4 Reassembly is a reversal of the procedures given for disassembly. The following points must be noted:

3.4.1 All Ringers

a) The end of the magnet nearest the armature must repel the north seeking pole of a compass and the opposite end of the magnet must be tight against the pole piece assembly.
b) When facing the gong end of a two-gong ringer and with the frame facing downwards, gong "B" is on the left and gong "A" is on the right.

3.4.2 BA Type Ringers

a) When replacing the armature, the end of the bias spring must be located in its adjusting slot in the bracket on the frame.
b) When replacing the coil, the number of core laminations used should result in the coil core being comfortably filled but not force fitted. A minimum weight of 16 grams of laminations must be used.

4 LUBRICATION

4.1 Ringers without volume controls do not require lubrication.

4.2 First clean away all existing lubricant from the volume control mechanism then apply a light film of Lubriplate or similar non-drying lubricant to all rubbing surfaces of the volume control parts. Take care to avoid excessive lubrication.

5 TEST AND ADJUSTMENT

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

5.2 The ringer under test must be firmly mounted in a test fixture, such as a telephone base plate which has been weighted to the normal weight of a complete instrument, in order to carry out the tests and adjustments correctly.

5.3 For test and adjustment purposes, telephone ringers may be conveniently divided into the two general classifications of straight line and frequency selective types. The generalized test and adjustment procedures for these two groups are given in the following paragraphs. Reference must also be made to the individual sub-section for each type of ringer where specific sensitivity values and test and adjustments figures are quoted.

5.4 An easily assembled test board for ringer testing is described in sub-section 152.

5.5 STRAIGHT LINE RINGERS

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

5.5.1 Mechanical Adjustments

a: The residual plate must lie flat on the rear face of the armature. Reshape the plate if necessary.

b: With the bias spring set in the low notch, nearest the coil, the armature must be firmly tensioned against the rear pole face. Bend the bias spring near its base to adjust.

c: The clapper stem must be straight and in line with the armature. Reshape the clapper stem if necessary.

d: There must be a clearance of about 1/16" between the clapper and the "B", or single, gong when the armature is held against the rear pole face. Slightly bend the rear pole face to obtain this clearance. Note that on two gong ringers the identifying letter on the "B" gong must be positioned directly above the mounting screw before making this adjustment which should result in the clapper stem being approximately in line with the notch in the frame bridge piece.

e: With the armature resting against the rear pole face there must be a clearance of .045" to .050" between the armature stud and the front pole face. Slightly bend the front pole face, at the portion parallel to the length of the magnet, to obtain the required clearance.

f: Check the stop rod, two gong ringer, or rubber cam, single gong ringer, adjustment as detailed in the individual ringer sub-section if the ringer is fitted with a volume control.

g: Slight readjustment of the "B" gong and/or clapper stem may be required in order to obtain an even, good quality ring during the electrical tests. The final adjustments, however, must meet the requirements outlined above.

5.5.2 Electrical Tests

The objective of the electrical tests is to obtain optimum balance between the forces, acting on the armature, from the bias spring and the permanent magnet. Take care to avoid demagnetization of the magnet if magnetization equipment is not available.

a: PLACE THE RINGER IN THE MAGNETIZING FIXTURE AND SATURATE THE MAGNET

b: Place the ringer in the test fixture and connect the leads to the test board, or equivalent circuitry. Switch in the 0.5 mf capacitor and switch out the resistive load.

c: Adjust the value of the series resistance to produce the specified (see individual ringer sub-section) voltages across the ringer coil and capacitor, in series, at each ringing frequency in turn. The ringer must function well withthe voltages given under the heading of "Maximum" and must ring steadily, with the clapper hitting both gongs, with the voltages given under the heading of "Minimum". With the voltages given under the heading of "Ultimate" the ringer should just tinkle with the volume control, if fitted, in the maximum loudness position. If the magnetic circuit has not been broken and the ringer has not been re-magnetized, adjustment of the bias spring tension will normally be all that is required to obtain the specified performance. If the ringer has been remagnetized it will be necessary to follow steps "d" through "e" below.

d: SWITCH THE DEMAGNETIZER TO "CHARGE" AND ADJUST THE VOLTAGE TO 60V.

e: SWITCH TO "DEMAGNETIZE" THEN RECHECK THE RINGER AS IN STEP "C". REPEAT THESE TWO STEPS, AS NECESSARY,, WITH DEMAGNETIZING VOLTAGE UP TO 70V.

f: Switch to "Dial Pulse Test" and dial a series of "0" pulses. If tinkling occurs increase the bias spring tension then recheck the sensitivity, as detailed above.

g: Set the bias spring in the high tension notch, away from the coil, then check the operation using the voltages given, in the individual ringer sub-section, for the high bias setting. If additional demagnetization is applied in order to meet the requirements with high bias recheck the sensitivity and rejection of dial pulses with the low bias setting.

h: Extreme difficulty in obtaining the correct functioning, as detailed above, is usually caused by incorrect mechanical adjustment or a coil with shorted turns. A coil mounted in a ringer should show an inductance of about 33 Henries with a dissipation factor of about 0.05 (Q about 20).

5.6 FREQUENCY SELECTIVE RINGERS

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

5.5.1 Mechanical Adjustments

a: Slightly loosen the hexagonal head mounting screws and rotate the gongs away from the clapper, using a screwdriver through the slot in the control wheel, with its tip in one of the slots in the casting, as a lever.

b: The tuning stem must be parallel to the frame edge and the weight must be centered between the gongs of a two-gong ringer. Carefully adjust the stem near its base, if necessary.

c: If a separate clapper unit is fitted the ball must be centered between the gongs and be in line with their mounting screws on the two gong ringer or must rest 1/16" to 3/32" away from the gong and strike it within 1/8" of its edge on a single gong ringer. Slightly bend the clapper stem, forward of the angled section, to obtain these settings. Check that the clapper ball and stem are clear of the tuning weight by about 1/32". The clapper stem must rest against the rubber tubing on the tuning stem with a pressure within the range given in the individual ringer sub-section. Slightly bend the clapper stem near its base to obtain this adjustment.

d: Check that the two arms of the armature are straight and parallel to the frame; and the gaps between the armature and laminations are about equal. Damaged armatures should be replaced and not readjusted.

e: Loosen the slide plate clamping screw and adjust the eccentric screw to about the mid-point of its range. Tighten the clamping screw.

5.5.2 Electrical Tests

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

a: PLACE THE RINGER IN THE MAGNETIZING FIXTURE AND SATURATE THE MAGNET.

b: Place the ringer in the test fixture and connect the leads to the test board, or equivalent circuitry. Switch in the required capacitor value, if the ringer does not have its own capacitor, as listed in Table 5-1. Switch in a series resistance of 6,000 ohms.

c: Momentarily apply ringing current at the highest frequency in the series in order to stabilize the magnet.

d: Connect ringing current at the correct frequency and adjust the tuning weight for maximum swing of the tuning stem and clapper. The range of weights commonly used on each type of ringer are given in Table 5-2. The weight must not extend more than 1/8" beyond the end of the tuning stem and must not strike the corner of the network assembly when the ringer is mounted in a telephone.

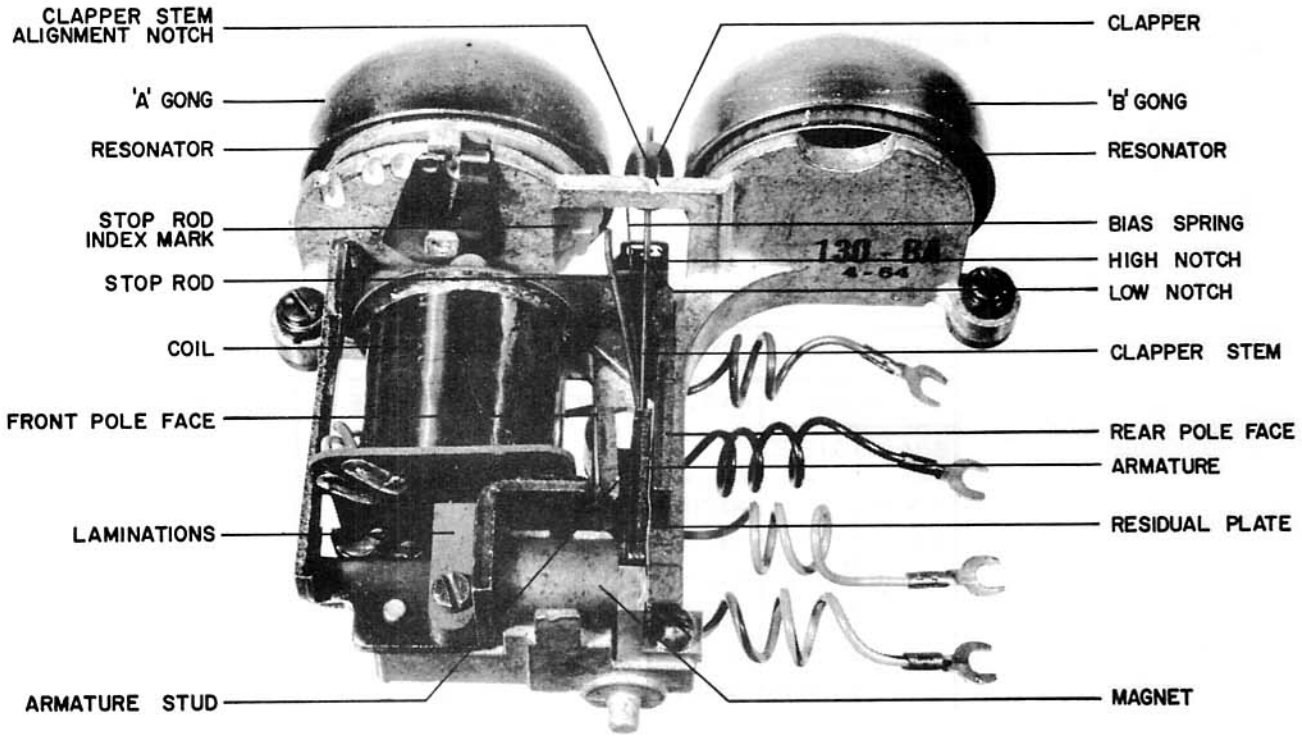
e: Switch in the resistive load. Adjust the value of the series resistance to produce the specified (see individual ringer sub-section) voltages across the ringer coil, or coil and capacitor if so stated, at the correct ringing frequency. The ringer must function well with the voltages given under the heading of "Maximum" and must ring steadily, with the clapper hitting both gongs, with the voltages given under the heading of "Minimum". With the voltages given under the heading of "Ultimate" the ringer should just tinkle with the volume control, if fitted, in the maximum loudness position. To effect the adjustments first connect ringing current to obtain the specified maximum voltage. Then rotate the gongs (see paragraph 5.5.1a for the method used) on two gong ringers, one at a time, so that the clapper strikes them uniformly. Then adjust the eccentric screw to set the sensitivity so that the ringer functions correctly at the other values of voltage. Slight readjustment of the gongs, clapper pressure, tuning weight and sensitivity may be made to obtain optimum performance. Take care not to increase the sensitivity too much as the armature will clatter when the unit is operated with zero series resistance.

f: Apply each of the other four ringing signals in the series with zero series resistance and check that cross-ringing is not present. If necessary reduce the sensitivity and re-check as detailed in step "e".

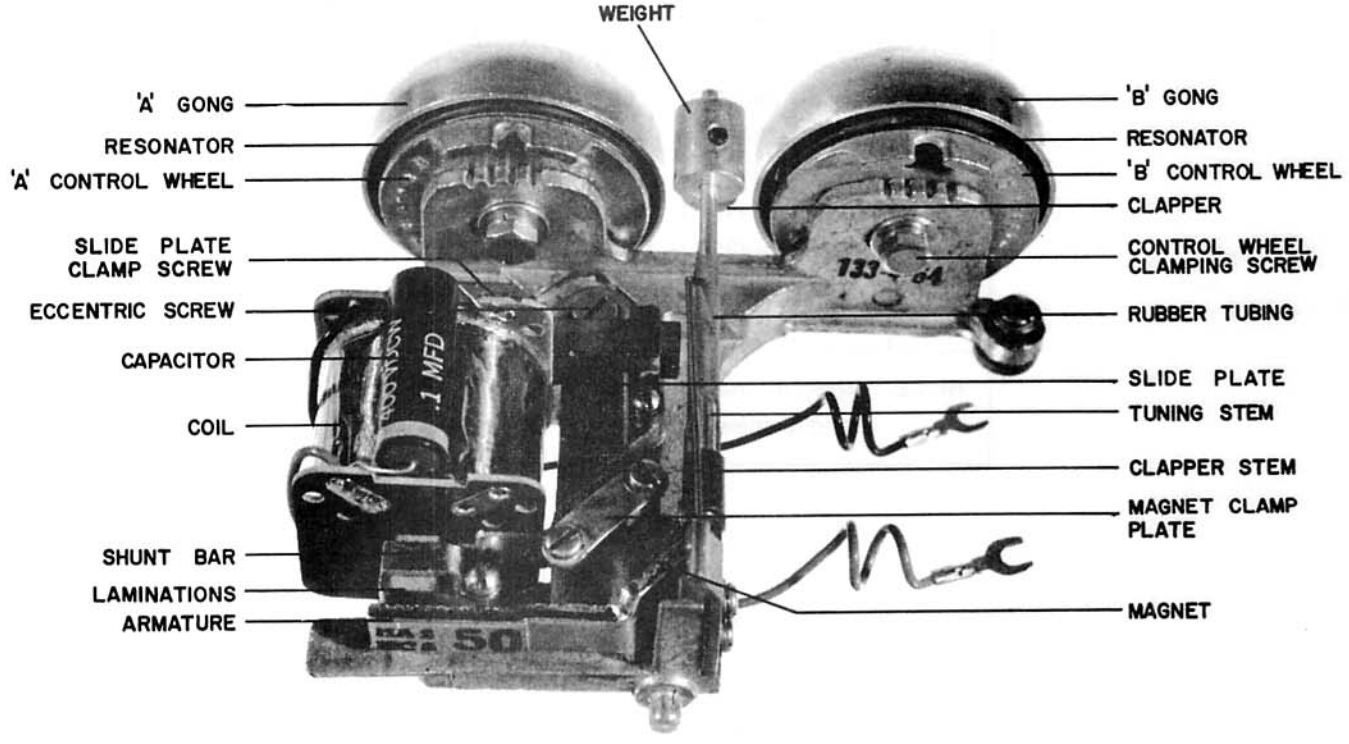
g: Switch to the dial pulse position and check that the ringer will not tinkle or bell tap while dialing a series of "0" digits.

h: Check the operation of the volume control, if fitted. See individual ringer sub-section.

i: Extreme difficulty in obtaining the correct functioning, as detailed above, is usually caused by incorrect adjustments or a coil with shorted turns. A coil mounted in a ringer should show an inductance of about 33 Henries with a dissipation factor of about 0.05 (Q about 20).



a) Straight Line Ringer



b) Frequency Selective Ringer

Fig. 5-1 IDENTIFICATION OF RINGER PARTS

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TABLE 5-1 FREQUENCY SELECTIVE RINGER CAPACITORS

Capacitor Value	Ringer Frequencies
0.1 mf	50,54,60,66 2/3 Hz
0.20 mf	40,42, Hz
0.27 mf	30,33 1/3 Hz
.47 mf	16,16 2/3, 20,25 Hz

TABLE 5-2 FREQUENCY SELECTIVE RINGER WEIGHTS

LENGTH		PART NO.	FREQUENCY RANGE
BRASS	STEEL		
1 5/16	-	84211-1	16 + 16⅔ Hz
1 1/4	-	84211-2	" "
1 3/16	-	84211-3	16 thru 25 Hz
-	1 1/4	88495-16	16 thru 20 Hz
-	1 1/8	88495-1	" "
-	1 1/16	88495-2	16 thru 30 Hz
-	1	88495-3	" "
-	15/16	88495-4	16 thru 42 Hz
-	7/8	88495-5	20 thru 42 Hz
-	13/16	88495-6	30 thru 42 Hz
-	3/4	88495-7	30 thru 50 Hz
-	11/16	88495-8	33⅓ thru 60 Hz
-	5/8	88495-9	60 thru 66⅔ + 33⅓ Hz
-	9/16	88495-10	50 thru 66⅔ Hz
-	1/2	88495-11	" "
-	7/16	88495-12	" "
-	3/8	88495-13	" "
-	11/32	88495-15	60 thru 66⅔ Hz
-	5/16	88495-14	" "

NOTE: Weights may be used slightly beyond the ranges shown.

TYPE 136(--)470 AND TYPE 138(--)470 COMPACT STRAIGHT LINE RINGERS

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

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty	Item	Description	Number	Qty
1	Frame and Gong Assy.	190146	1	10	Terminal Board	190148-1	1
2	Support Pole Piece Assy.	75398	1	11	Rd. Hd. Mach. Screw	69778	1
3	Core Lamination	75395	* 18	12	Spacer	190141-1	1
4	Coil	180206-5	1	13	Lever Lock	190142-1	1
5a	Flat Fil. Hd. Mach. Screw	Ø 75409-4	2	14	Lever Stop	190143-1	1
				15	Cord Retainer	190144-1	2
6	Magnet	75369	1	16	Rubber Foot	75371	4
7	Armature and Clapper Assy.	190066-1	1	17a	Cover (Type 136)	190192-1	1
8a	Rd. Hd. Lockwasher Screw	# 75408-2	4	b	Cover (Type 138)	190577-1	1
b	Rd. Hd. Lockwasher Screw	Ø 75408-4	1	18	Cabinet Lock Screw	190178-2	1
c	Rd. Hd. Mach. Screw	Ø 64127	3	19	Tube (Type 138 only)	75599	1
9	Capacitor	190440-1	1	20	Bracket (Type 138 only)	190576-1	1

NOTES: * Minimum weight of 16 grams of laminations must be used.
Items 5a and 8a used on type 136 assembly only.
Ø Items 5b, 8b and 8c used on type 138 assembly only.

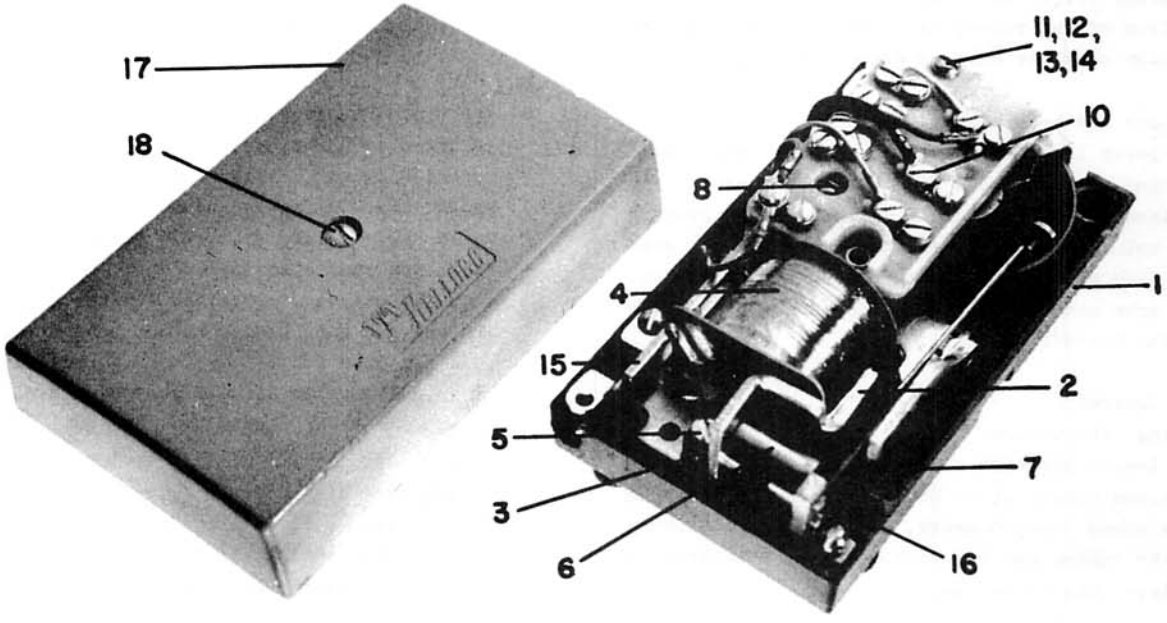

Fig. 1 TOP VIEW - COVER REMOVED

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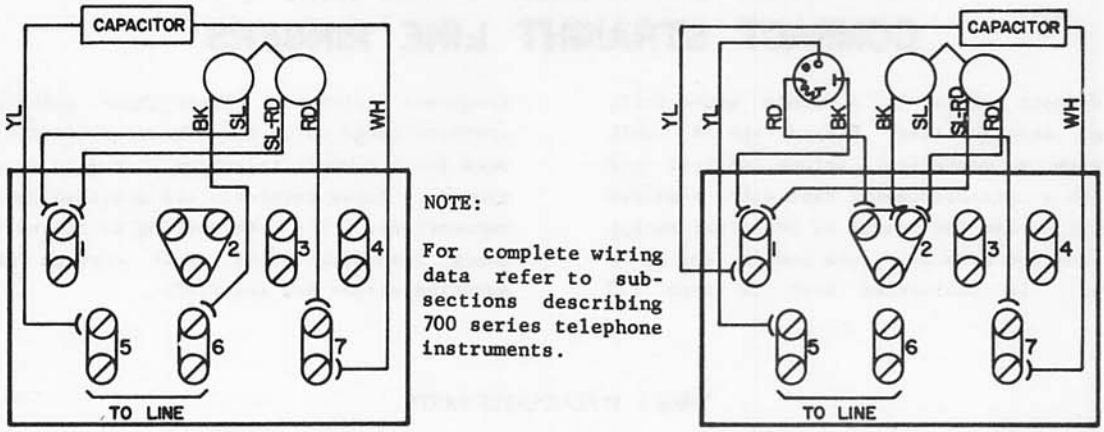

a) TYPE 136 (BRIDGED RINGING)

b) TYPE 138 (-VE RINGING)

Fig. 2 RINGER WIRING (AS SHIPPED)

SPECIFIC TEST AND ADJUSTMENT DATA

Refer to sub-section M2C-RIN/GEN for complete test and adjustment-procedure.

Rubber Cam

With the control lever in the lowest volume position there must be a clearance of 1/16" between the tip of the rubber cam and the bushing of the clapper. Rotate the rubber cam on the shaft to obtain the required clearance. The top surface of the bushing of the clapper must be set between, level with and 1/32" below the top surface of the rubber cam. Bend the stem of the clapper near its base to effect this adjustment.

Lever Lock and Lever Stop

The lever lock may be set to prevent the volume control being moved from the loud position, if desired. The lever stop may be set to prevent the volume control lever from being lifted over the step of the frame into the cut-off position. No free movement of the clapper is permissible in the cut-off position.

Volume Control

Moving the volume control from the highest to the lowest position should result in a reduction in sound output of 10 db. This may be measured on a sound output meter. Slight repositioning of the rubber cam or clapper may be necessary to achieve this variation.

Sensitivity (using moving coil meter and ERG source)

The ringer should function strongly with the maximum voltages, steadily with the minimum voltages and just tinkle with the ultimate voltages applied across the coil and capacitor.

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

Gas Tube

The type 138 ringer must first be checked, and adjusted if necessary, in the same manner as the type 136 ringer. Then connect the gas tube and apply the ringing signals in series with a 45 to 48 volt battery (refer to sub-section M1C-TST /RIN, for test circuit).

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

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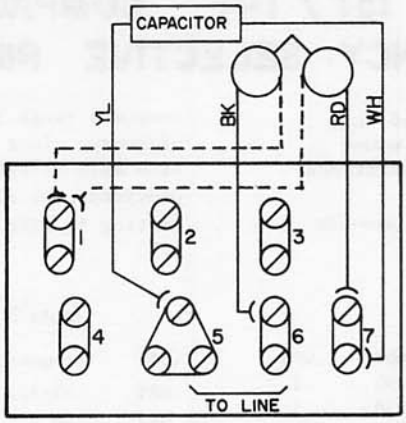

Broken lines apply to 147 only

NOTE: For complete wiring data refer to sub-sections describing 700 series telephone instruments.

Fig. 2 RINGER WIRING (AS SHIPPED)
(BRIDGED RINGING)

SPECIFIC TEST AND ADJUSTMENT DATA

Refer to sub-section M2C-RIN/GEN for complete test and adjustment procedure.

Clapper Pressure

The pressure of the clapper stem against the rubber sleeve on the tuning stem must be set within the following ranges:

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

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

Volume Control (Damper)

The sleeve on the volume control lever must rest tightly against the gong in the quiet position and must be clear of the gong in the loud position. Reshape the tip of the lever if necessary.

SENSITIVITY (Minimum Ringing Voltage)

16 thru 40 Hz, 35 volts rms
42 thru 66 2/3 Hz, 45 volts rms

TYPE 139(--)470 EXTENSION RINGER

The 139 ringer is designed for use as an extension unit, it may be used as the main ringer if the telephone is not equipped with an internal ringer. The assembly consists of a type 156 or 157 ringer mounted on a steel baseplate and protected by a molded plastic housing. External connections are made to a terminal block mounted on the baseplate which is provided with mounting holes. Units fitted with type 156 ringer assemblies are equipped with volume controls.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Baseplate	84362-1	1
2	Terminal Board	190148-2	1
3	Rd. Hd. Mach. Screw	61906	2
4	Cable Hanger	78825-3	1
5	Bind. Hd. Mach. Screw	75392-3	1
6	Fastener Stud	79753-2	1
7	Link (only with freq. sel. rin.)	79754	1
8	Fastener Stud (for item 7)	79753-1	1
9	Gas Tube (only with TBA ringer)	75599	1
10	Ringer	See Table 2	1
11	Capacitor Assembly	See Table 2	1
12	Cover	84259-1	1
13	Binding H. M. Screw	182607-1	1
14	Grommet	75303	1
15	Circuit Label	21619	1

Table 2 RINGERS AND CAPACITORS

Code	Frequency	Ringer	Capacitor
LR	-	None	190440-4
BA	20	130(BA)470	190440-4
TBA	20	130(BA)470	190440-4
*A1	33⅓	**(HA1)470	None
*A2	50	**(HA2)470	None
*A3	66⅔	**(HA3)470	None
*A4	16⅔	**(HA4)470	190440-4
*A5	25	**(HA5)470	190440-4
*B1	30	**(HB1)470	None
*B2	42	**(HB2)470	None
*B3	54	**(HB3)470	None
*B4	66	**(HB4)470	None
*B5	16	**(HB5)470	190440-4
*C1	20	**(HV1)470	190440-4
*C2	60	**(HC2)470	None
*C3	30	**(HC3)470	None
*C4	40	**(HC4)470	None
*C5	50	**(HC5)470	None

Notes for Table 2

1. For ringer with volume control replace * by "W" and ** by "156".

2. For ringer less volume control replace * by "L" and ** by "157".

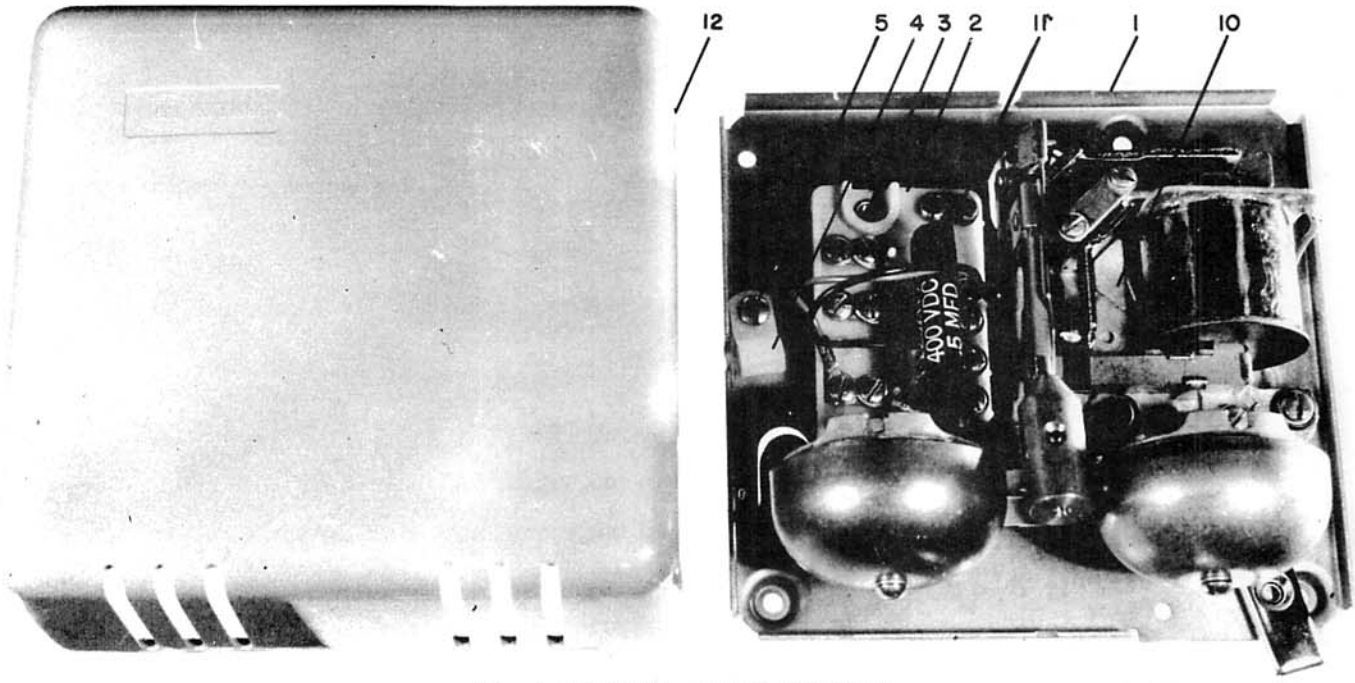

Fig. 1 TOP VIEW - COVER REMOVED

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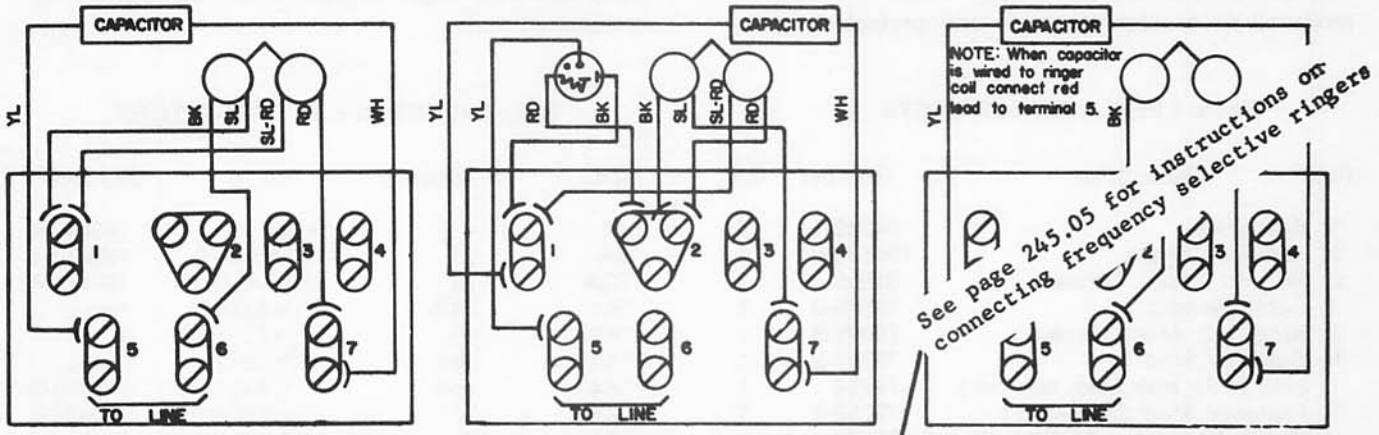
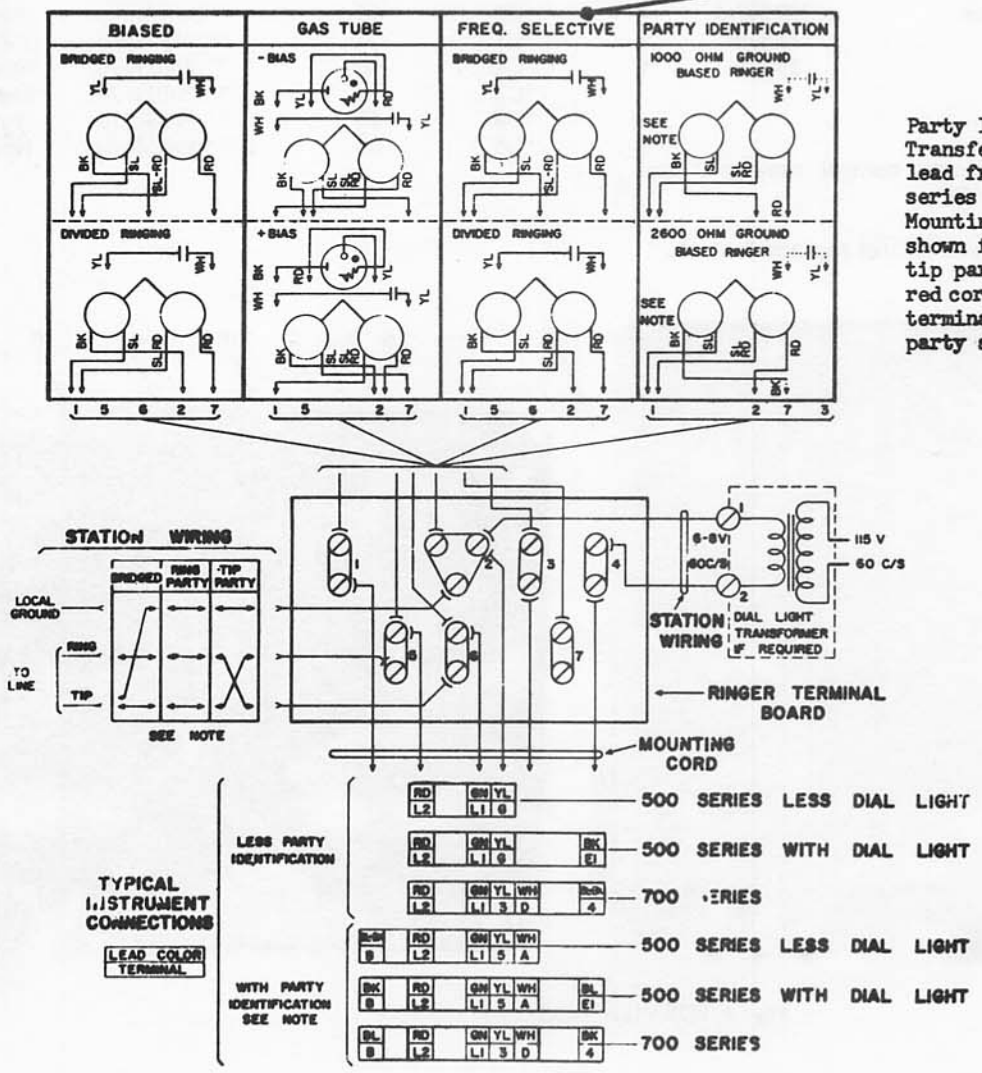
The cover of the assembly is removed by loosening the screw on the top edge of the cover, pulling the bottom of the cover away from the base then lifting the cover clear of the baseplate.

Refer to the appropriate descriptive sub-section for specific details of each of the ringer units which may be fitted in the type 139 extension ringer housing.



a) BA RINGER (Bridged Ringing) b) TBA RINGER (-ve Ringing) c) FS RINGER (Bridged Ringing)

Fig. 2 RINGER WIRING (AS SHIPPED)



NOTE

Party Identification: Transfer slate hook switch lead from L2 to A on 500 series telephone network. Mounting cord connections shown for ring party. For tip party reverse green and red cord conductors on ringer terminal board and use ring party station wiring.

Fig. 3 RINGER INSTALLATION WIRING

TYPE 137 / 147 COMPACT FREQUENCY SELECTIVE RINGER

Type 137 is equipped with a single wound coil and type 147 is equipped with a double wound coil to provide 1000 ohm or 2650-ohm resistance for tip party identification.

In combination with types 136 and 138 provide a complete range of units which meet the requirements of every class of service for compact telephone line main or extension ringers. Screw terminals are provided for all lead connections and the base casting is fitted with shock absorbing rubber feet.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Frame and Gong Assy.	190194	1
2	Slide Plate & Lamination Assy.	75578	1
3	Binding Hd. Flat Washer Screw	84366-2	1
4	Eccentric Washer	75560	1
5	Coil (Double-Wound)	180206-5*	1
6	Shunt Bar	75566	1
7	Magnet	75562	1
8	Clamping Plate	75563	1
9	Rnd. Hd. Lockwasher Screw	79259-2	2
10	Capacitor	See Table 2	1
11	Retaining Clip	190472-1	1
12	Armature	See Table 2	1
13	Weight	See Table 2	1
14	Clapper Assy.	88499-3	1
15	Grommet	81958	1
16	Rnd. Hd. Lockwasher Screw	79259-2	4
17	Terminal Board	190188-1	1
18	Rd. Hd. Mach. Screw	75408-2	2
19	Cord Retainer	190181-1	1
20	Flat Fil. Hd. Mach. Screw	75409-2	1
21	Rubber Foot	75371	3
22	Cover	190197-2	1
23	Cabinet Lock Screw	190178-2	1
24	Binding Hd. Machine Screw	75576-2	1
25	Rubber Tubing (For Tuning Stem)	84217	1
26	Headless Set Screw	58687	1

Table 2 FREQUENCY SELECTIVE PARTS

Code	Frequency	Armature	Weight	Capacitor
HA1	33-1/3	75584-15		190440-3
HA2	50	75584-16		190440-5
HA3	66-2/3	75584-17		190440-5
HA4	16-2/3	75584-13		190440-4
HA5	25	75584-18		190440-4
HB1	30	75584-15		190440-4
HB2	42	75584-16		190440-2
HB3	54	75584-16		190440-5
HB4	66	75584-17		190440-5
HB5	16	75584-13		190440-4
HC1	20	75584-14		190440-4
HC2	60	75584-17		190440-5
HC3	30	75584-15		190440-4
HC4	40	75584-16		190440-2
HC5	50	75584-16		190440-5

NOTE: Refer to section 245 for detailed information on weight sizes and type numbers.

* Single-wound coil is no longer manufactured

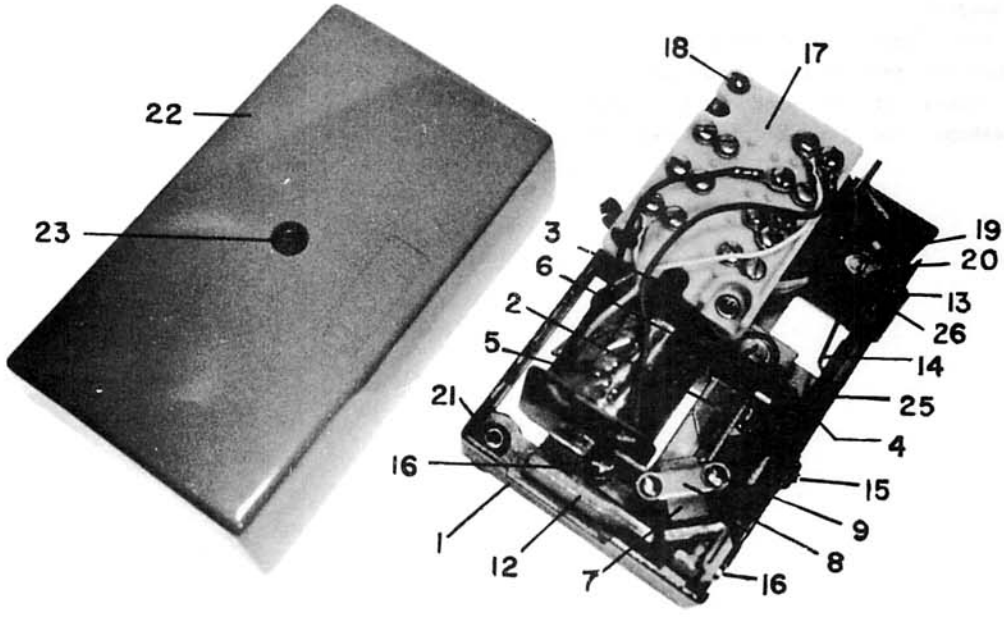


Fig. TOP VIEW - COVER REMOVED

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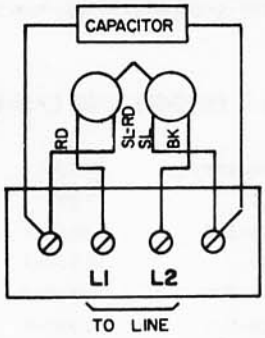
The cover of the ringer assembly may be lifted off after the three cabinet lock screws are loosened. If it is necessary to disassemble a ringer unit, take care to replace the gongs and mounting washers correctly (see Fig. 1 and Table 1).

Complete adjustments for the ringer mechanisms are given in the sub-sections indexed by the mechanism type number. It is necessary, however, for the mechanism to be mounted in a housing, complete with gongs, before it can be adjusted.



a) BA Ringer

See Page 245.05 for connection instructions for frequency selective ringer mechanisms.

b) FS Ringer

Fig. 2 WIRING DIAGRAMS

SPECIAL ASSEMBLIES

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

131	141	145	156
133	142	146	157

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

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

TYPE 79938 STRAIGHT LINE RINGER MECHANISM

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

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Mounting Frame	79931	1
2	Coil	180206-1	1
3	Magnet	75369	1
4	Pole Piece Assembly	75398	1
5	Core Lamination	75395	*18
6	Rd. Hd. Lockwasher Screw	75408-2	1
7	Flat Fil. Hd. Mach. Screw	75409-2	2
8	Clapper Assembly	75393	1

* Minimum weight of 16 grams of laminations must be used.

SPECIFIC TEST AND ADJUSTMENT DATA

Refer to section 240 for test and adjustment procedure.

Sensitivity (Using moving coil meter and ERG source)

The ringer should function strongly with the maximum voltages, steadily with the minimum voltages and just tinkle with the ultimate voltages applied across the coil and capacitor.

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

NOTE: The ringer mechanism must be assembled on a suitable base, complete with gongs, in order to carry out the adjustment procedure.

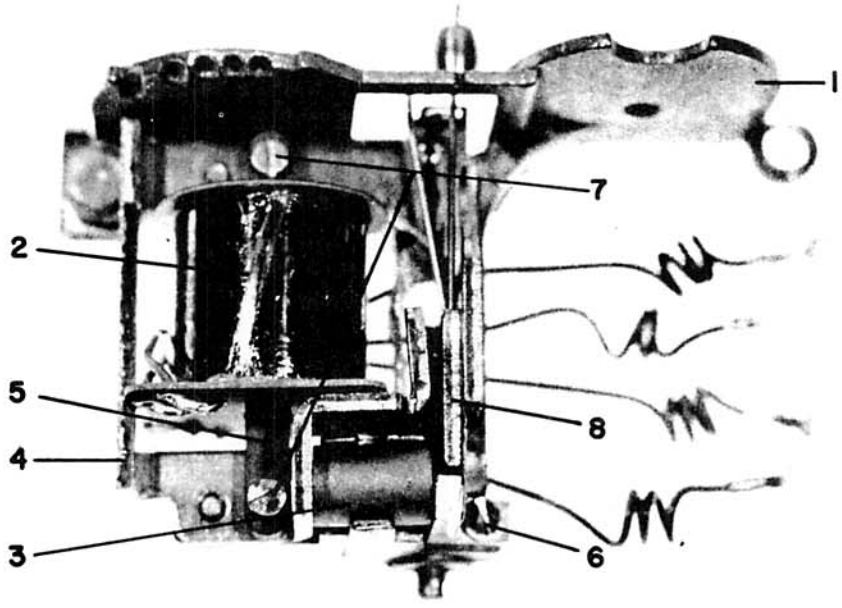


Fig. 1 TOP VIEW

TYPE 130(--)470 STRAIGHT LINE RINGER

The 130 ringer is a double wound coil, two gong, straight line, biased type of unit equipped with a mechanical volume control and assembled on an open, die-cast metal frame. In combination with types 131, 133, 141 and 142 frequency selective ringers it provides a complete range of units which meet the requirements of every class of telephone line ringer. Flexible wire leads are provided for the coil connections of the ringer. The unit is mounted to the telephone instrument base by a locating stud and two screws, each with a shock absorbing rubber bush.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Mounting Frame Assy.	75388	1
2	Gong (A)	75396	1
3	Gong (B)	75397	1
4	Resonator	75372	2
5	Rd. Hd. Lockwasher Screw	75408-2	3
6	Support Pole Piece Assy.	75398	1
7	Core Lamination	75395	* 18
8	Coil	180206-1	1
9	Flat Fil. Hd. Mach. Screw	75409-4	2
10	Magnet	75369	1
11	Armature & Clapper Assy.	75393	1
12	Rubber Foot	75371	2
13	Mounting Screw	75366	2

* Minimum weight of 16 grams of laminations must be used.

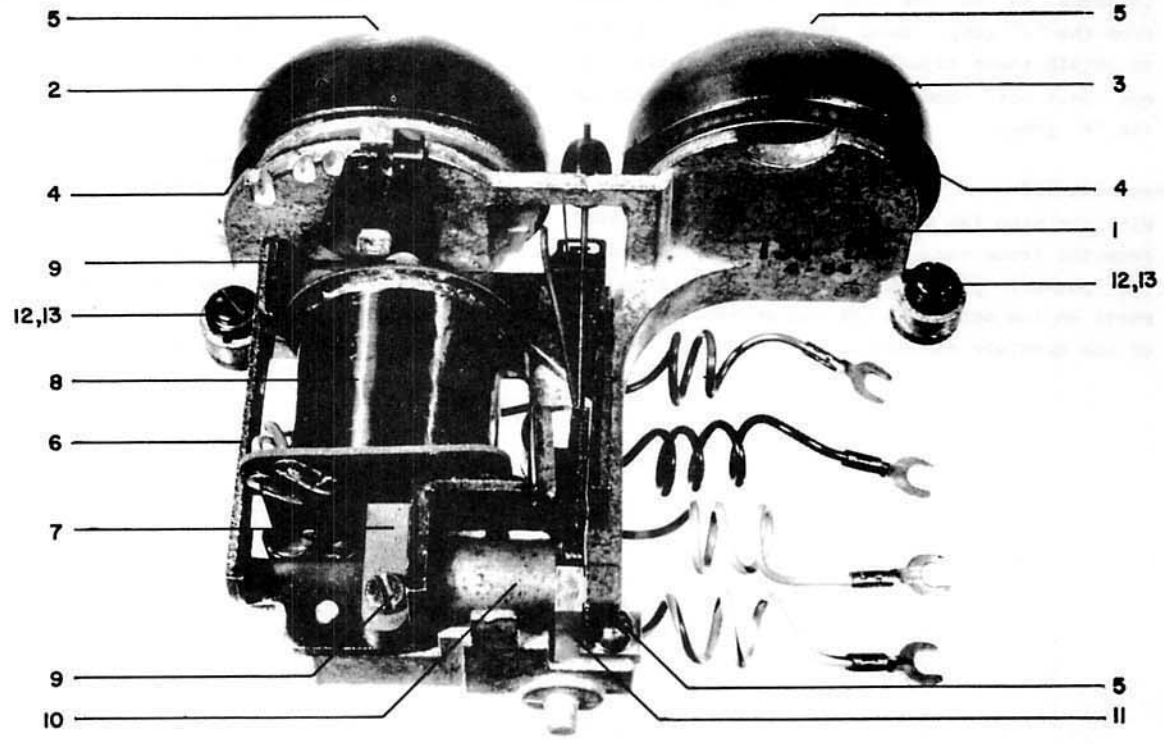


Fig. 1 TOP VIEW

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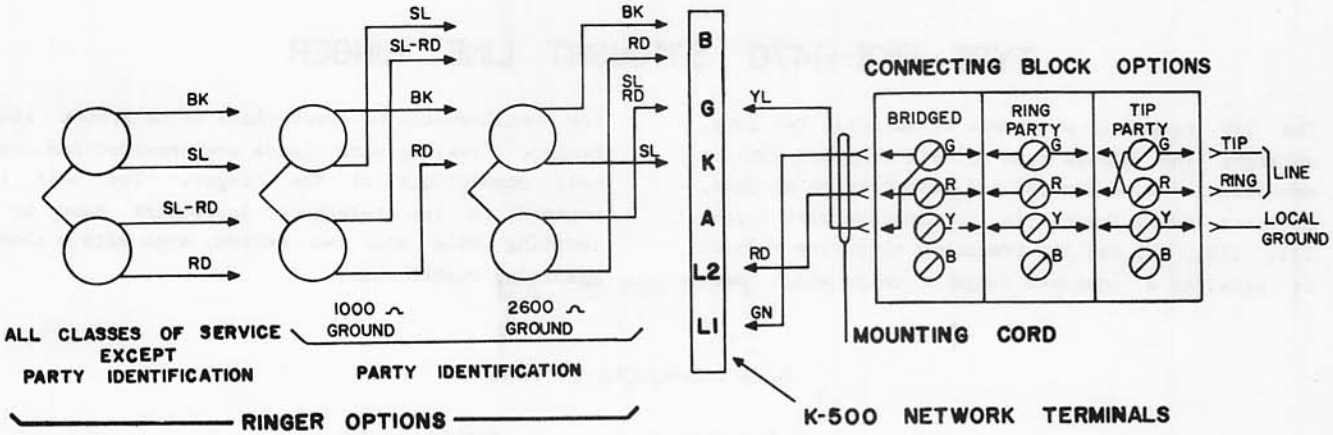

Fig. 2 TYPICAL WIRING DIAGRAMS

SPECIFIC TEST AND ADJUSTMENT DATA

Refer to sub-section M2C-RIN/GEN for complete test and adjustment procedure.

Stop Rod

Rotate the "A" gong to the minimum loudness position. The stop rod must line up with the reference mark on the eccentric cam and, with the armature operated, must strike the rim of the cam in all volume positions except maximum loudness so that the clapper is held 1/16" away from the "A" gong. Bend the rod near its base to obtain these adjustments. Check that the stop rod does not touch the bias spring bracket or the "A" gong.

Ringer Cut-off

With the stop tab on the detent spring bent away from the frame and the control wheel rotated to the cut-off position check that the stop rod rests on the eccentric cam and prevents movement of the armature assembly.

Sensitivity(Using moving coil meter and ERG source)

The ringer should function strongly with the maximum voltages, steadily with the minimum voltages and just tinkle with the ultimate voltages applied across the coil and capacitor.

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

Volume Positions

The adjusted ringer must function in such a manner that both gongs are equally audible in the three loudest positions of the volume control when the maximum voltages specified above are applied. This same condition is desirable, but not essential, in the lowest volume position of the control.

TWO-GONG FREQUENCY SELECTIVE RINGERS (TYPES 131, 133; 141, 142; 145, 146; 156, 157) and no. 79939 FREQUENCY SELECTIVE MECHANISM

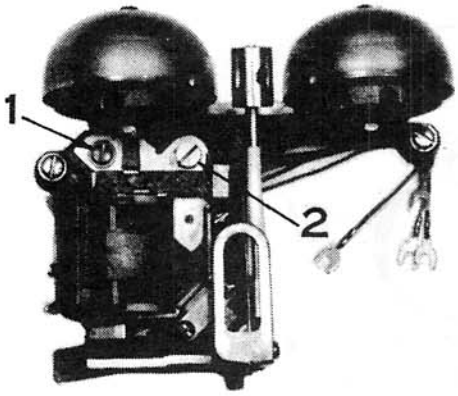

Figure 1. Type 156 Ringer
(1) Lockscrew
(2) Adjusting Cam

1. GENERAL

Ringers are two-gong, high-impedance, frequency selective type units with all components assembled on an open die-cast metal frame. Adjustment for sensitivity is facilitated by a slotted adjusting cam washer and locked by a separate lock screw. Provided with shock mounting grommets and mounting screws.

The 79939 frequency selective mechanism is identical to the ringers less gongs, resonators, wheels, volume control, mounting grommets and screws. Attaching hardware is included.

2. IDENTIFICATION

Each unit is identified by a code number and a frequency stamped in ink on the frame.

Type 131. Has single wound coil and volume control. No identifying ground. Manufacture discontinued; superseded by type 156.

Type 133. Same as type 131 except less volume control. Manufacture discontinued; superseded by type 157.

Type 141. Has double wound coil and volume control. Provides 1,000-ohm resistance to ground when required for TIP party identification. Manufacture discontinued; superseded by type 156.

Type 142. Same as type 141 except less volume control. Manufacture discontinued; superseded by type 157.

Type 145. Has double-wound coil and volume control. Provides 2650-ohm resistance to ground when required for TIP party identification. Manufacture discontinued; superseded by type 156.

Type 146. Same as type 145 except less volume control. Manufacture discontinued; superseded by type 157.

Type 156. Has double wound coil and volume control. Provides 1,000-ohm or 2,650-ohm resistance to ground, (at installer's option), when required for TIP party identification.

Type 157. Same as type 156 except less volume control.

No. 79939 FREQUENCY SELECTIVE MECHANISM. Designed for use in type 75 loud ringing bell. Units with 2-lead coil have been superseded by units with 4-lead coil.

NOTE: Types 131, 141 and 145 can be modified to type 156, and types 133, 142 and 146 can be modified to type 157 by installing the appropriate 180206-series coil. See Table II.

TABLE I. ORDERING INFORMATION

CODE	DESCRIPTION/FREQUENCY	
156( )470	Ringer (See description above)	
157( )470	Ringer (See description above)	
	HARMONIC	MECHANISM ONLY
(HA1)	33 1/3 Hz	79939-1
(HA2)	50 Hz (Same as HC5)	79939-2 or -15
(HA3)	66 2/3 Hz	79939-3
(HA4)	16 2/3 Hz	79939-4
(HA5)	25 Hz	79939-5
	SYNCHROMONIC	
(HB1)	30 Hz (Same as HC3)	79939-6 or -13
(HB2)	42 Hz	79939-7
(HB3)	54 Hz	79939-8
(HB4)	66 Hz	79939-9
(HB5)	16 Hz	79939-10
	DECIMONIC	
(HC1)	20 Hz	79939-11
(HC2)	60 Hz	79939-12
(HC3)	30 Hz (Same as HB1)	79939-13 or -6
(HC4)	40 Hz	79939-14
(HC5)	50 Hz (Same as HA2)	79939-15 or -2

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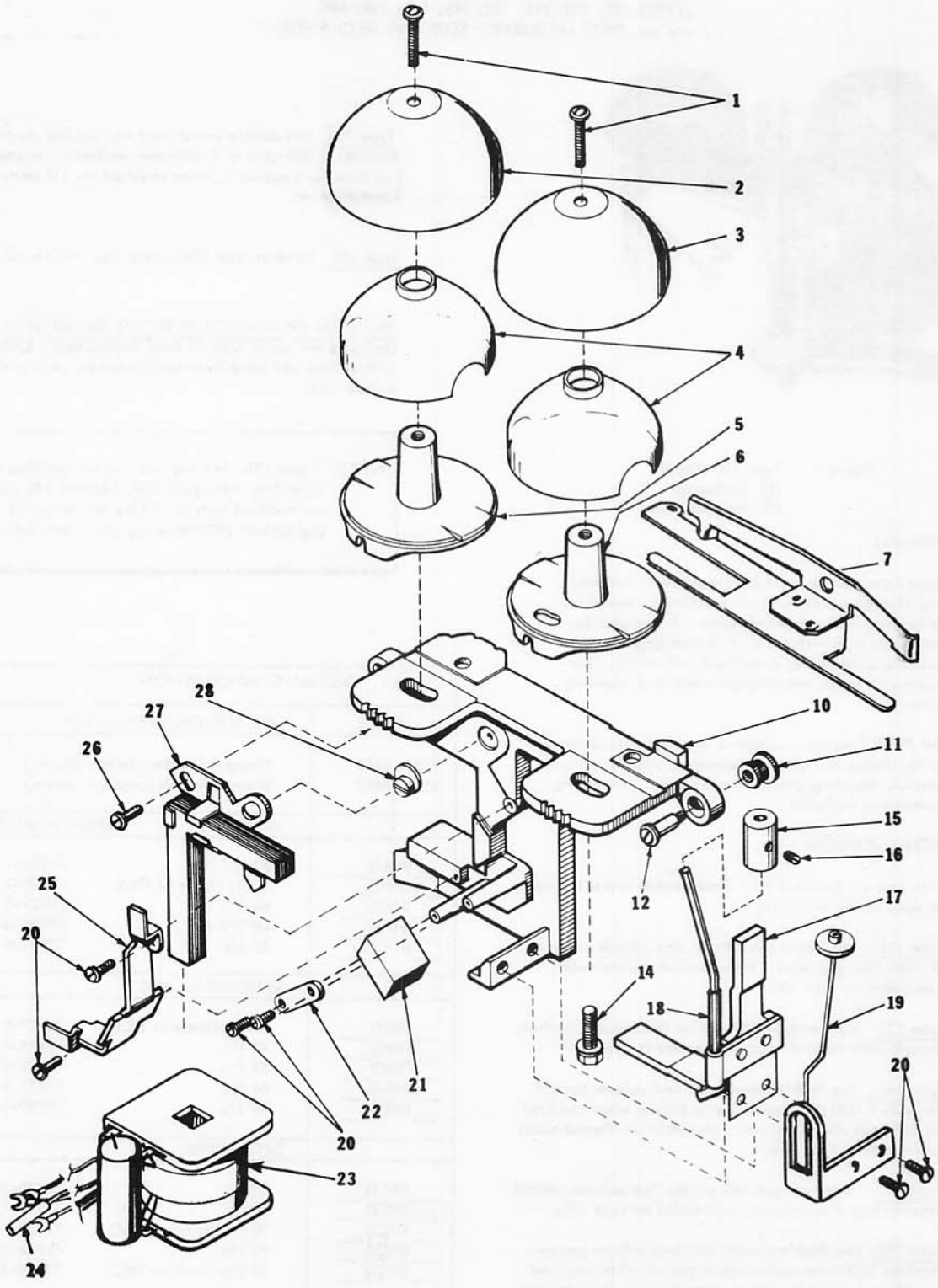

Figure 2. Two-Gong Frequency Selective Ringers-Exploded View
(Types 131, 133, 156, and 157)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME DESCRIPTION	QUANTITY USED ON					
			TABLE II. REPLACEABLE PARTS LIST	79939	131	133	156	157	
2	1	075408-2	SCREW AND WASHER ASSEMBLY	-	2	2	2	2	
	2	075396-	A-GONG	-	1	1	1	1	
	3	075397	B-GONG	-	1	1	1	1	
	4	075372	RESONATOR	-	2	2	2	2	
	5	075570-2	WHEEL, A-Gong Control	-	1	1	1	1	
	6	075570-1	WHEEL, B-Gong Control	-	1	1	1	1	
	7	181682-101	DAMPER SPRING ASSEMBLY	-	1	-	1	-	
	10	88501-101	FRAME, Ringer	1	1	1	1	1	
	11	075371	FOOT, Mounting (Rubber)	-	2	2	2	2	
	12	075366	SCREW, Mounting	-	2	2	2	2	
	14	180523-1	HEX WASHERHEAD SCREW	2	2	2	2	2	
	15	------	WEIGHT, Ringer (See Page 245.06)	1	1	1	1	1	
	16	058687	SETSCREW	1	1	1	1	1	
	17		ARMATURE ASSEMBLY, (One Required)	1	1	1	1	1	
		75584-7	For 16 thru 20 Hz ringers						
		75584-8	For 25 Hz ringers						
		75584-9	For 30 thru 42 Hz ringers						
		75584-10	For 50 thru 54 Hz ringers						
		75584-11	For 60 thru 66⅔ Hz ringers						
		75584-13	For 16 and 16⅔ Hz ringers						
	18	84217-1	TUBING, Rubber	1	1	1	1	1	
	24	88213-1	TUBING, Plastic	2	2	2	2	2	
	19		CLAPPER ASSEMBLY, (One Required)	1	1	1	1	1	
		88499-1	For 60 thru 66⅔ Hz ringers						
		88499-2	For 16, 16⅔, 30, and 33⅓ Hz ringers						
		88499-4	For 20 and 25 Hz ringers						
		88499-5	For 40 thru 54 Hz ringers						
	20	180221-1	SCREW	6	6	6	6	6	
	21	75562	MAGNET, Permanent	1	1	1	1	1	
	22	75563	CLAMP PLATE, Magnet	1	1	1	1	1	
	23		COIL ASSEMBLY, (One Required)	1	1	1	1	1	
		180206-1	For 16 thru 25 Hz and 130(0BA)470 ringers						
		180206-2#	For 50 thru 66⅔ Hz ringers						
		180206-3###	For 30 and 33⅓ Hz ringers						
		180206-6##	For 40 and 42 Hz ringers						
	25	88492-1	BAR, Shunt	1	1	1	1	1	
	26	180221-1	SCREW (Sames as item 20)	1	1	1	1	1	
	27	75578	LAMINATION ASSEMBLY	1	1	1	1	1	
	28	75560	ECCENTRIC WASHER	1	1	1	1	1	

\# Includes 75593-1 Capacitor, (0.1 mf)
Includes 75593-6 Capacitor, (0.20 mf)
Includes 75593-2 Capacitor, (0.27 mf)

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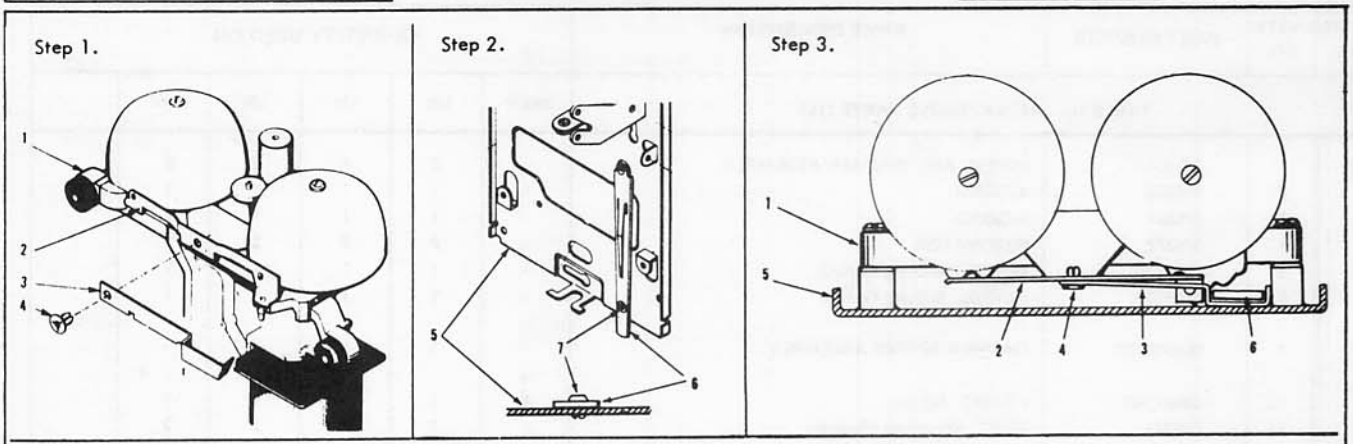


Figure 3. Installation of frequency selective ringer with volume control in 500 type wall telephone., (Paragraph 3.4)

(1) Ringer frame (2) Damper spring (3) Link (4) Stud (5) Base assembly (6) Volume control arm (7) Stud

3. INSTALLATION

NOTE: Dress the ringer leads under the ringer frame and to the telephone network.

3.1 GENERAL

A locating stud is provided on the ringer frame. Insert this stud into the rubber grommet in the telephone base assembly. Secure ringer with the two mounting screws provided. If installing a ringer with volume control in a wall phone, refer to paragraph 3.4.

3.2 CONNECTIONS (500 Type Telephone) See Figure 4

Any of the frequency selective ringers may be wired for bridged or divided ringing except for TIP party stations where automatic number identification (ANI) is required.

For ANI, the TIP party must be wired with resistance to ground and the ringer coil is normally used to provide this required resistance. (The 131 and 133 ringers cannot be used in this application.) 1,000-ohm resistance to ground is provided by ringers number 141 and 142. 2,650-ohm resistance to ground is provided by ringers number 145 and 146. All ringers with a 4-lead coil and without a coil-mounted capacitor and all 156 and 157 ringers can be connected to provide either 1,000-ohm or 2,650-ohm resistance to ground at the option of the installer.

3.3 ADJUSTMENT (Figure 1)

Adjust ringer for sensitivity by loosening lockscrew (1) and rotating the adjusting cam (2) clockwise to increase sensitivity and counter-clockwise to decrease sensitivity. Tighten the lockscrew when desired adjustment is reached.

CAUTION

Over-adjustment (very loud ring) can introduce cross ring.

3.4 VOLUME CONTROL RINGER IN WALL TELEPHONE

a. OLD STYLE VOLUME CONTROL (Fig. 3)

1. Attach link (3) to the damper spring (2) with the stud (4). (These items are packed with ringer.)
2. Unlock the volume control arm (6) from the base (5) by removing stud (7). (Phones of current manufacture do not have this stud.) 3. Install ringer in telephone with the volume control arm (6) cradled in the link as shown in step 3, figure 3.

b. NEW STYLE VOLUME CONTROL (Fig.4)

Install ringer in phone with hole, (in volume control extension over prong of the volume control arm as shown in figure 4.

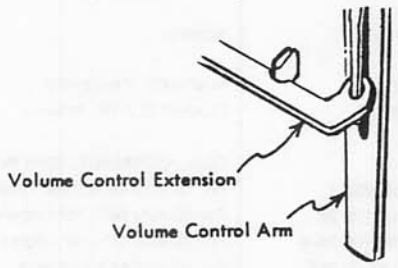


Figure 4. Detail of assembling new style volume control to volume control arm of wall set.

3.5 DISABLING RINGER VOLUME CONTROL

(a) DESK TELEPHONE

(1) Move the damper spring to full "off" position volume control is not effective.

(2) Align the hole in the damper spring with the nearest small hole in the telephone base and secure with a small screw and nut.

(b) WALL TELEPHONE

Move the damper spring to full off position. Do not attach link (3, figure 3). Volume control arm will be ineffective .

Figure 5. Ringer Connections, 500 Type Telephone

	Ringers with 2 leads								Ringers with 4 leads							
	16 thru 30 Hz				33 1/3 - 66 2/3 Hz				16 thru 25 Hz				30 thru 66 2/3 Hz			
													156, 157			
Ringer Coil Schematics →	A B Strap				A B				A B				A B			
Color of Ringer Lead	R			Bk	R	-	-	Bk	R	S-R	S	Bk	R	S-R	S	Bk
Bridged* or Divided	L2	G	A	K	L2	-	-	G	L2	A	K	G	L2	**	**	G
TIP Party 1000 ohm ANI#									K	B	B	G	A	**	B	G
TIP Party 2650 ohm ANI#									G	B	B	K	G	B	**	A

* For bridged ringing, connect YELLOW lead of mounting cord to "G" terminal at connecting block
** Insulate and store lead
# Move SLATE hookswitch lead from "L2" to "A" terminal of telephone network
A - 2650-ohm winding (DC resistance)
B - 1000-ohm winding (DC resistance)

{ Refer to appropriate telephone circuit label for connecting inside wire and telephone mounting cord.

Figure 6. Ringer Connections in 139 Type Ringer Box

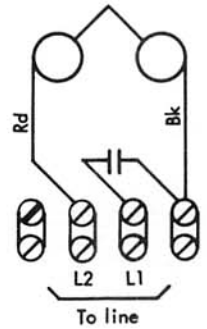
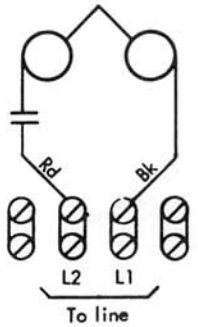
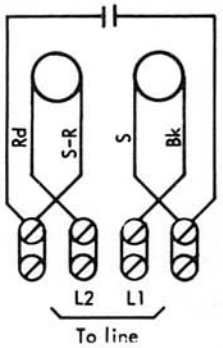
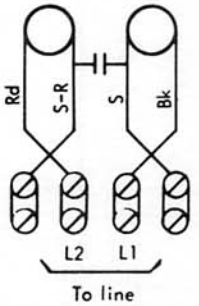
	Ringers with 2 leads								Ringers with 4 leads							
	16 thru 30 Hz				33 1/3 thru 66 2/3 Hz				16 thru 30 Hz				30 thru 66 2/3 Hz			
													156, 157			
Ringer Coil Schematics →	A B				A B				A B				A B			
Color of Leads	R	W	Y	Bk	R	-	-	Bk	R	S-R	S	Bk	W	Y		
Bridged Ringing	7	7	5	6	5	-	-	6	7	1	1	6	7	5		
Divided Ringing	7	7	5	2	5	-	-	2	7	1	1	2	7	5		
TIP Party 1000 ohm ANI**									7	1	1	2	7	3		
TIP Party 2650 ohm ANI**									2	1	1	7	7	3		

													R	S-R	S	Bk
Bridged Ringing													5	*	*	6
Divided Ringing													5	*	*	2
TIP Party 1000 ohm ANI**													3	*	1	2
TIP Party 2650 ohm ANI**													2	1	*	3

* Insulate and store lead
** For TIP party identification, transfer SLATE hookswitch lead from L2 to A on 500 type telephone network - Terminal 1 must be connected to "B" terminal of 500 type telephone network
A - 2650 ohm winding (DC resistance)
B - 1000 ohm winding (DC resistance)

NOTE: Refer to page 242.32 or circuit label No. 21619 for connecting inside wire and telephone mounting cord.

Figure 7. Ringer Mechanism Connections in 75 Type Loud Ringing Bell.

Mechanism with 2 leads		Mechanism with 4 leads	
16 thru 30 Hz	33 1/3 - 66 2/3 Hz	16 thru 25 Hz	33 1/3 - 66 2/3 Hz
			

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4. REPLACING RINGER COIL (Figure 2)

(a) Removal of Coil

(1) Note position of adjusting cam (28) for purpose of reassembly.

(2) Remove lockscrew (26).

(3) Loosen the two screws (20) that secure the shunt bar (25) and loosen the shunt bar.

> CAUTION
> Do not remove the shunt bar as the magnet will be weakened

(4) Remove the lamination assembly (27) and coil assembly (23).

(b) Installation of Coil

(1) Select proper coil and install on lamination assembly with RED and SLATE-RED lead terminals toward gongs.

(2) Install adjusting cam if displaced in coil removal operation.

(3) Insert lamination assembly under shunt bar ends.

(4) Replace lockscrew (26) but do not tighten.

(5) Rotate adjusting cam several times to assure proper seating of slide plate assembly, then position it to approximate position previously noted.

(6) Tighten slide plate lockscrew (26) and shunt bar screws (20).

(7) When ringer is installed in a telephone in the field, the ringer may need readjusting for optimum performance. This adjustment is made with the adjusting cam. Loosen lockscrew (26) and shunt bar screws (20) slightly. Rotate the cam clockwise to increase sensitivity and counterclockwise to decrease sensitivity. Tighten the lockscrew and shunt bar screws after adjustment.

TABLE III. RINGER WEIGHTS

LENGTH		PART NO.	FREQUENCY RANGE
BRASS	STEEL		
1 5/16	-	84211-1	16 + 16⅔ Hz
1 1/4	-	84211-2	" "
1 3/16	-	84211-3	16 thru 25 Hz
-	1 1/4	88495-16	16 thru 20 Hz
-	1 1/8	88495-1	" "
-	1 1/16	88495-2	16 thru 30 Hz
-	1	88495-3	" "
-	15/16	88495-4	16 thru 42 Hz
-	7/8	88495-5	20 thru 42 Hz
-	13/16	88495-6	30 thru 42 Hz
-	3/4	88495-7	30 thru 50 Hz
-	11/16	88495-8	33⅓ thru 60 Hz
-	5/8	88495-9	60 thru 66⅔ + 33⅓ Hz
-	9/16	88495-10	50 thru 66⅔ Hz
-	1/2	88495-11	" "
-	7/16	88495-12	" "
-	3/8	88495-13	" "
-	11/32	88495-15	60 thru 66⅔ Hz
-	5/16	88495-14	" "

NOTE: Weights may be used slightly beyond the ranges shown.

5. SPECIFIC TEST AND ADJUSTMENT DATA

NOTE: Refer to section 240 for complete test and adjustment procedure.

Clapper Pressure

The pressure of the clapper stem against the rubber sleeve on the tuning stem must be set within the following ranges:

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

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

Volume Control (Damper)

In the high position both damper springs must be clear of the gongs.
In the middle position the damper springs must rest firmly on gong "B".
In the low position both damper springs must rest firmly against their respective gongs.
Bend the spring to effect the adjustment.

RINGING GENERATOR VOLTAGES

Freq. Hz.	Open Circuit Ringing Voltage
16	105
16 2/3	105
20	105
25	110
30	110
33 1/3	115
40	115
42	115
50	125
54	125
60	140
66	140
66 2/3	140

RINGER SENSITIVITY

Freq. Hz.	Volts RMS
16 thru 40	35
42 thru 66 2/3	45

These are minimum voltages recommended to produce an acceptable sound level. These are voltages measured across the black and the red ringer leads, capacitor in series with the ringer coil, ringer sensitivity set to maximum.

6. RINGER ADJUSTMENT

To adjust ringer for a maximum loop condition:

(1) Bridge five ringer across ringer on test

(2) Add external resistance in series with one side of line to approach voltages specified in ringer sensitivity table.

(3) Set ringer sensitivity adjustment to maximum.

7. CROSS RING CHECK

A frequency selective ringer adjusted to ring at a given frequency shall ring only at the design frequency. It shall not produce an audible sound output at any other ringing frequency when frequency and open circuit ringing voltages are in accordance with the table above.

NOTE: All cross ring checks are made with reduced ringer sensitivity with ringing voltage applied to ringer on test, reduce value of series (load) resistance by approximately half. Loosen the slide plate clamping screw and adjust eccentric screw reducing ringer sound output to an acceptable volume.

TYPES 148 AND 153 STRAIGHT LINE RINGERS

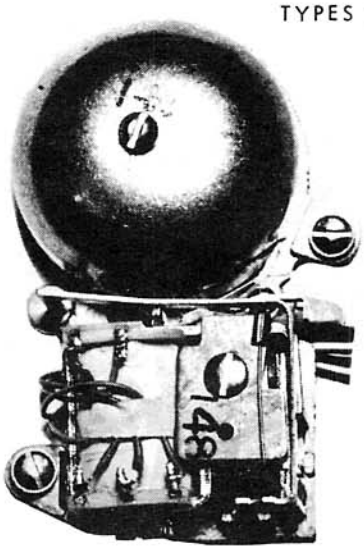

Figure 1. Type 148 Ringer

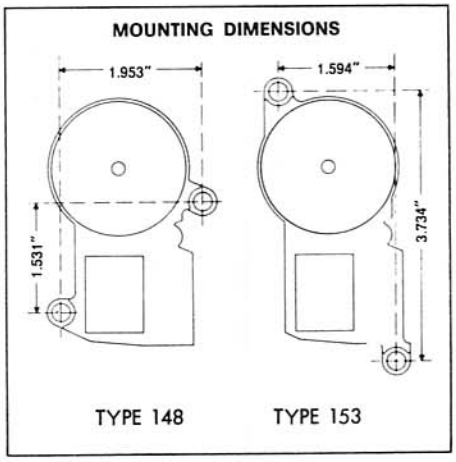

Figure 2. Location of mounting holes

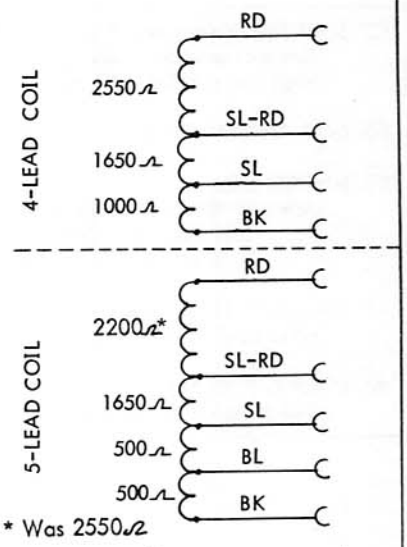

Figure 3. Schematics of ringer coils

1. GENERAL

The 148 and 153 ringers are single gong biased type units of miniature design, assembled on a die cast frame and equipped with mechanical volume control. The ringer coil is single wound and multi-tapped for party identification.. The 148 and 153 ringers are identical except for location of mounting holes. They are used in series with a. 47 mf. capacitor. (The capacitor is included with all 153 ringers but not with 148 ringers as the K-2554 and "Corinthian" phones include the capacitor).

1.1. VOLUME CONTROL

The volume control has been manufactured in two styles. The old style uses a wire spring mounted on the volume control lever. The current styles uses a flat spring which is staked to the ringer frame.

1.2. RINGER COIL

The ringer coil has been manufactured in two styles. The old style coil has four leads with 1000-ohm and 2650-ohm taps. The current style coil has five leads with 500-ohm, 1000-ohm, and 2650-ohm taps. The 5-lead coil is standard.

1.3. LAMINATION ASSEMBLY

Early models of the 148 and 153 ringers used two push nuts (7, figure 2) to hold the lamination assembly in place. Current models use L-shaped retainers, (7A, figure 4) for this purpose. The L-shaped retainers are recommended for any replacement purposes.

2. IDENTIFICATION

Each ringer is identified by a code number stamped in ink on the retaining plate.

Type 148 ringer is designed for use in the K-1554 and K-2554 "Tel-Touch" telephones

Type 148 E ringer is designed for use in the Corinthian multi-key telephones

Type 153 ringer is designed for use in the Trendline, (dial-in-handset), telephones

3. INSTALLATION

Two tapped blocks are provided on the telephone bases to accept the ringer mounting screws. When installing a ringer in a wall phone, (K-2554 or Trendline wall phone), be sure the stud of the volume control lever on the ringer rests in the slot of the volume control arm on the base.

4. CONNECTIONS

Connect the ringer leads as shown on the wiring diagram for the specific telephone and the specific application.

5. ADJUSTMENT

5.1. BIAS SPRING ADJUSTMENT

The ringer is shipped with the bias spring in the high bias position. (Notch "A" in figure 2). The ringer should be used in this position on very short loops. On longer loops, move the bias spring to low bias position, (notch "B" in figure 2). (Bias spring floats in low bias position.)

5.2. VOLUME CONTROL ADJUSTMENT

There are two positions on the volume control, High and Low.

6. MAINTENANCE

6.1. INSPECTION

If ringer fails, check that all leads are properly connected; air gap between armature and magnet is free of foreign material; bias spring is correctly positioned; gong is not obstructed; ringer coil is not open or shorted; and clapper to gong clearance is .010 to .020 inch, (adjust by rotating gong).

6.2 COIL REPLACEMENT (Figure 4)

Be sure to have an adequate supply of Retainers (7A) before proceeding as they may be damaged during removal. Index gong by marking gong and frame. Remove screw (8), gong (9), spacer washer, and resonator (10). Use a screwdriver and work retainers (7A) out. Remove laminations, roll coil out and roll new coil in, install laminations. Use slip-joint pliers or similar tool and install retainers (7A) one at a time. Install resonator, washer, gong and screw. Rotate to align index marks and tighten gong mounting screw.

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TABLE I. RINGER CHARACTERISTICS

(1) SENSITIVITY (Minimum Ringing Voltage):
Low bias position - **60v rms**
High bias position - **90v rms**

(2) COIL RESISTANCE, DC: - 5200 ohms

(3) IMPEDANCE:
Audio @ 400 hz - 90,000 ohms min.
@ 1,000 - hz - 200,000 ohms min.
@ Ringing Frequency - 8,000 ohms min.

(4) SOUND OUTPUT, (Measured at one meter)
60 to 65 db, relative to .0002 dy/cm^2

(5) LOOP CAPABILITY,
Two bridged, low bias position - 3,000 ohm

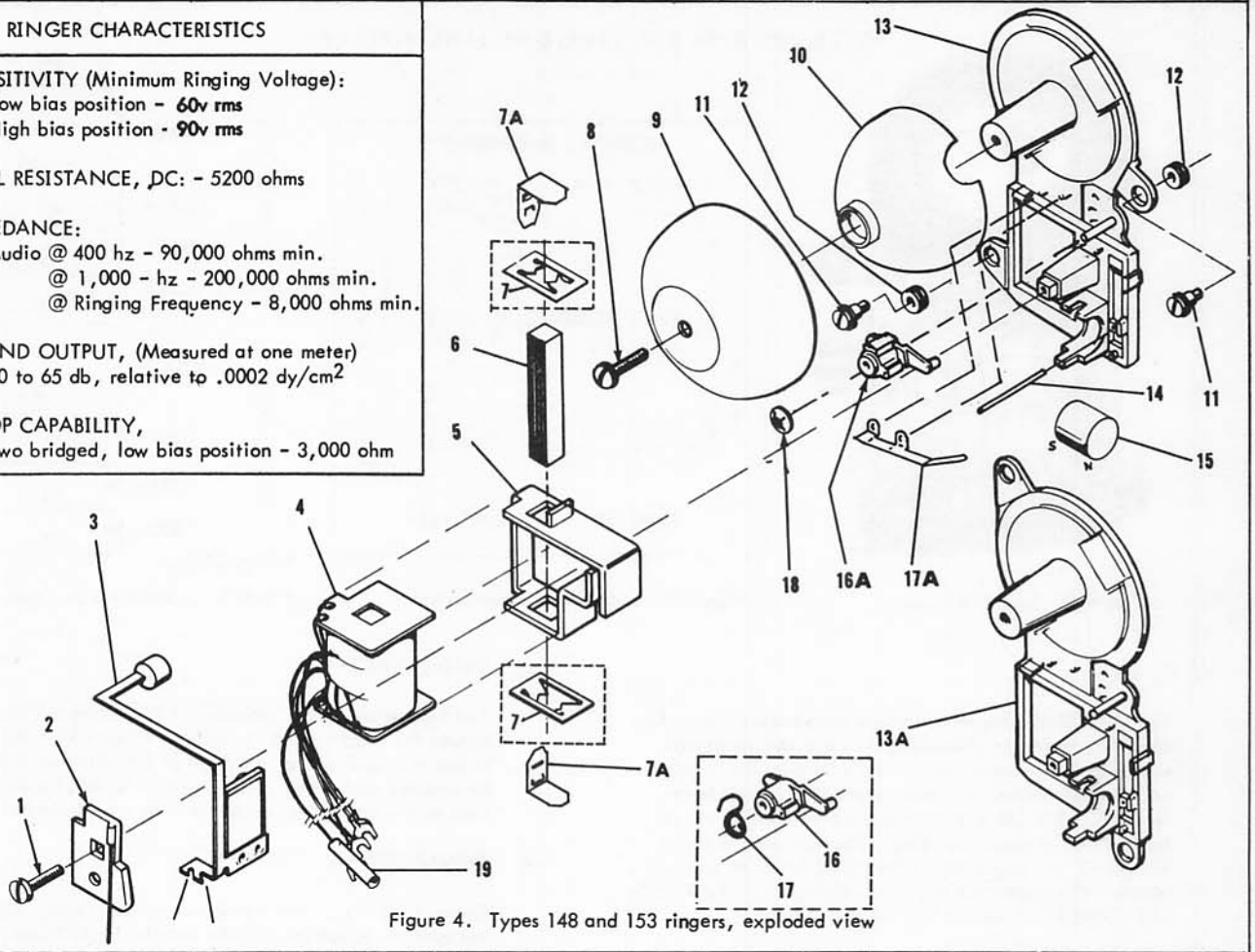

Figure 4. Types 148 and 153 ringers, exploded view

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 148	148E	153			
TABLE II. ORDERING INFORMATION AND REPLACEABLE PARTS LIST									
		148 (BA) 470	Ringer, straight line biased, (For K-2554 telephones)						
		148E (BA) 470	Ringer, straight line biased, (For Corinthian multi-key phones)						
		153 (BA) 470	Ringer, straight line biased, (For Trendline telephones)						
		95995-003	Capacitor, (Not Shown)	1	1	1			
		180300-1	Dust Cover, (Not Shown)	1	1	1			
	1	63786 - 1	Screw, BHM	1	1	1			
	2	88214-1	Retaining Plate Assembly	1	1	1			
	3	88186-1	Armature and Clapper Assembly	1	-	1			
	3	88186-2	Armature and Clapper Assembly	-	1	-			
	4	180208 - 1	Coil Assembly (Has 5 leads)	1	1	1			
	5	88174-1	Support Pole Piece	1	1	1			
	6	88208-1	Lamination (Min. weight 9 3/4 grams)	18	18	18			
	7	-	Nut, Push (Superseded by item 7A)	2	2	2			
	7A	95969-1	Retainer, Lamination	2	2	2			
	8	75408-2	Screw, Round Head Lockwasher	1	1	1			
	9	75396-001	Gong	1	1	1			
		60629 - 1	Washer	1	1	1			
	10	75372 - 1	Resonator	1	1	1			
	11	95966-2	Screw, special; (Ringer Mounting)	2	2	2			
	12	88209-1	Grommet	2	2	2			
	13	88177-2	Frame, 148 ringer	1	1	-			
	13A	88177-3	Frame, 153 ringer	-	-	1			
	14	88217-1	Pin	1	1	1			
	15	88197-1	Magnet, (Not Magnetized)	1	1	1			
	16	88173-1	Lever, Ringer Tone, (Old Style)	-	-	-			
	16A	88885-1	Lever, Ringer Tone, (New Style)	1	1	1			
	17	88184-1	Spring, Volume Control, (Old Style)	1	1	1			
	17A	88884-1	Spring, Volume Control, (New Style), Staked to Frame	1	1	1			
	18	95972-1	Nut, Push	1	1	1			
	19	88213-1	Sleeve, Insulating	1	1	1			

TYPES 148A, 148D, AND 153A STRAIGHT LINE BIASED RINGERS
(Supersede Types 148, 148E, and 153 - Manufacture Discontinued.)

Figure 1. Type 153A Ringer

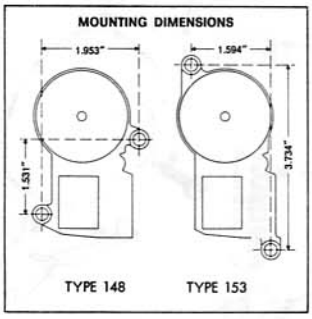

Figure 2. Location of Mounting Holes

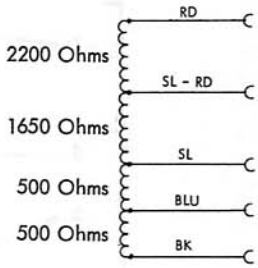

Figure 3. Schematic of Ringer Coil

1.00 GENERAL

1.01 The 148A, 148D, and 153A ringers are single-gong biased type units of miniature design assembled on a die cast frame. The coil is single-wound and multi-tapped for party identification. The 148 and 153 types are identical except for location of mounting holes. The ringers are used in series with a .47mf capacitor.

2.00 IDENTIFICATION

2.01 Each ringer is identified by a label adhered to the ringer gong.

3.00 APPLICATION

3.01 Type 148A Ringer is designed for use in K-1554 and K2554 "Tel-Touch" wall telephones and supersedes Type 148.

3.02 Type 148D Ringer is designed for use in multi-key telephones and supersedes Type 148E.

3.03 Type 153A Ringer is designed for use in the "TRENDLINE", (Dial-in-Handset), telephones and supersedes Type 153.

4.00 INSTALLATION

4.01 Each ringer is equipped with mounting screws and matching capacitor.

4.02 When installing a ringer in a wall phone, be sure the stud of the volume control lever on the ringer rests in the slot of the volume control arm on the base of the telephone.

4.03 Connect the ringer leads as shown on the wiring diagram for the specific telephone and the specific application.

4.04 Connect the capacitor in series with the ringer as indicated on the telephone wiring diagram.

6.00 MAINTENANCE

6.01 If ringer fails, check that all leads are properly connected; air gap between armature and magnet is free of foreign material; gong is not obstructed; ringer coil is not open or shorted; and clapper to gong clearance is .015 to .030 inch, (adjust by rotating gong).

5.00 VOLUME CONTROL

5.01 The volume control provides to positions as follows:

Types 148A and 153A - - - High and Low
Type 148D - - - - - - - - - On and Off

6.02 TO REPLACE COIL. Be sure to have spare Retainers, (item 7, figure 4), on hand as they may be damaged during removal. Index the Gong with the Frame by marking both with matching marks. Remove the Gong Mounting Screw, Gong, and Resonator. Use a screwdriver and work Retainers out. Remove Laminations (6), roll coil (4) out and roll new coil in. Install Laminations and Retainers.

TABLE I. RINGER CHARACTERISTICS

SENSITIVITY, (Minimum Ringing Voltage) - 70 v rms
COIL RESISTANCE, dc: 4850 Ohms
IMPEDANCE: Audio at 400 Hz - 90,000 Ohms, Min. Audio at 1000 Hz - 200,000 Ohms, Min. Audio at Ringing Frequency - 8000 Ohms Min.
SOUND OUTPUT, Measured at one Meter: 60 to 65 dB, Relative to .0002 dy/cm^2
LOOP CAPABILITY Two Bridged Ringers - 3,000 Ohms

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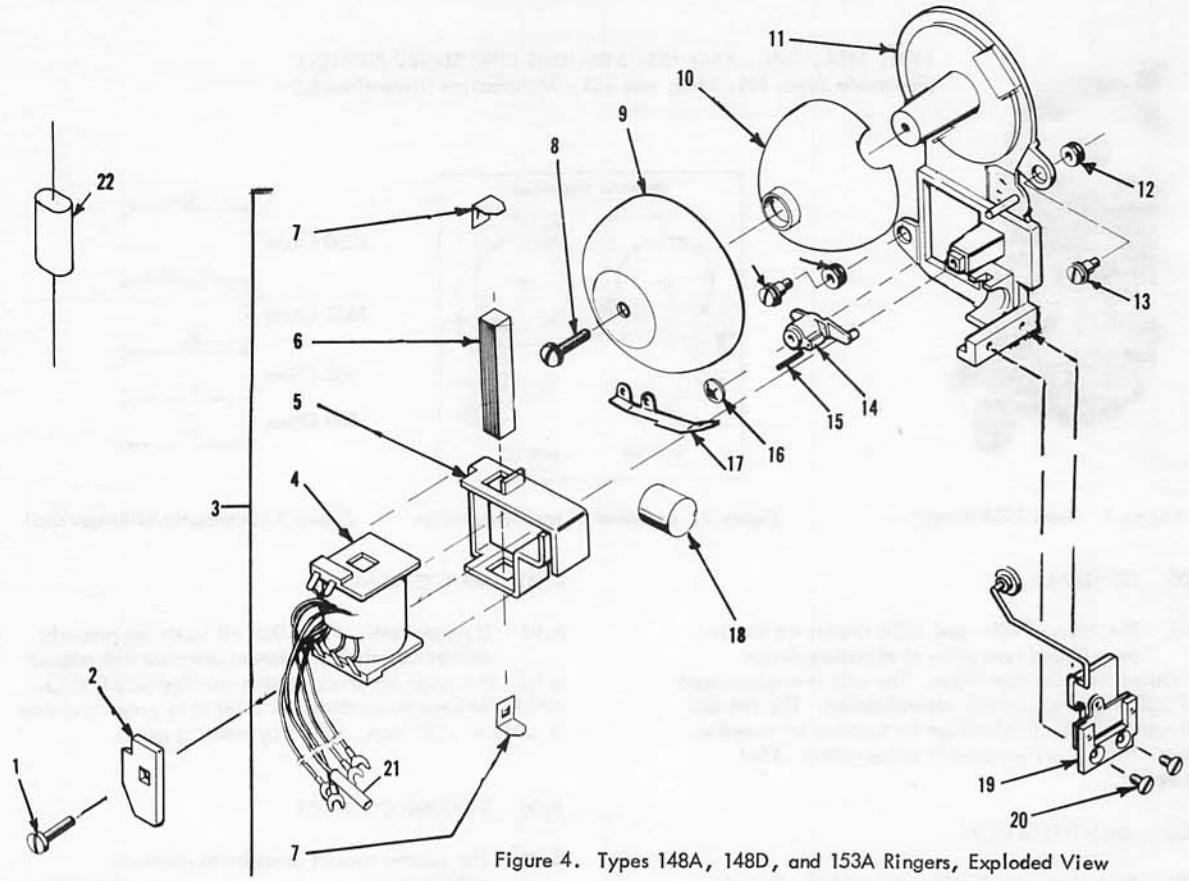


Figure 4. Types 148A, 148D, and 153A Ringers, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
		TABLE II.	REPLACEABLE PARTS LIST	148A	148D	153A			
4		000148-ABA	RINGER, (For K1554 or K2554 Telephone)	X	-	-			
		000148-DBA	RINGER, (For Multi-Key Telephones)	-	X	-			
		000153-ABA	RINGER, (For TRENDLINE Telephones)	-	-	X			
	1	075487-104	SCREW	1	1	1			
	2	088483-101	PLATE, Retaining	1	1	1			
	3	088481-102	POLE PIECE ASSEMBLY	1	1	1			
	4	180208-101	COIL ASSEMBLY	1	1	1			
	5	088174-103	POLE PIECE	1	1	1			
	6	088208-101	LAMINATION	18	18	18			
	7	095969-101	RETAINER, Lamination	2	2	2			
	8	075408-102	SCREW	1	1	1			
	9	075396-101	GONG	1	1	1			
	10	075372-101	RESONATOR	1	1	1			
	11	088480-102	FRAME, (148)	1	1	-			
	11	088480-103	FRAME, (153)	-	-	1			
	12	095966-102	SCREW, (Special), Ringer Mounting	2	2	2			
	13	088209-101	GROMMET	2	2	2			
	14	180122-101	LEVER, Volume Control	1	1	1			
	15	182739-101	ROD, Stop	-	1	-			
	16	095972-101	NUT, Push	1	1	1			
	17	088884-101	SPRING, Volume Control	1	1	1			
	18	088197-101	MAGNET, (Not Magnetized)	1	1	1			
	19	182734-101	ARMATURE	1	1	1			
	20	063975-101	SCREW, Armature Attaching	2	2	2			
	21	095995-103	CAPACITOR, .47 mf	1	1	1			

TYPES 151 AND 152 FREQUENCY SELECTIVE RINGERS

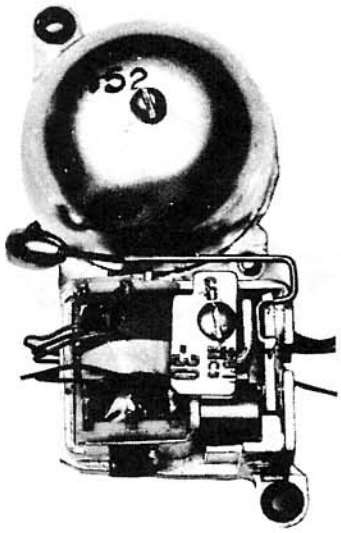


Figure 1. Type 152 Ringer

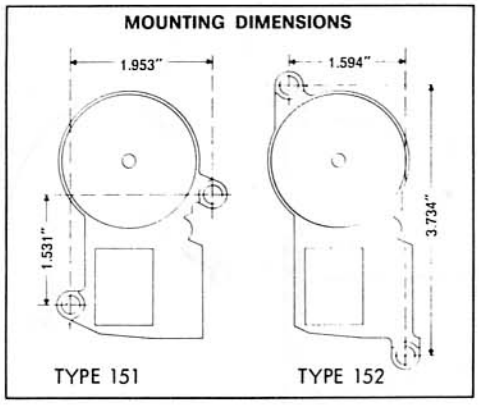
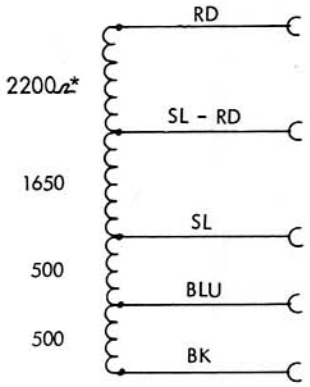


Figure 2. Location of mounting holes



* Was 1770Ω

Figure 3. Schematic of ringer coil

1. GENERAL

The 151 and 152 ringers are single gong frequency selective units of miniature design, assembled on a die cast frame and equipped with mechanical volume control. The ringer coil is single wound and multi-tapped for party identification. The 151 and 152 ringers are identical except for location of mounting holes. They are used in series with a matching capacitor. (The capacitor is packed with each ringer when required.

1.1 RINGER COIL

The ringer coil has been manufactured in two styles. The old style coil has four leads with 1000-ohm and 2650-ohm taps. The current style coil has five leads with 500-ohm, 1000-ohm, and 2650-ohm taps. The 5-lead coil is standard.

2. IDENTIFICATION

Each ringer is identified by a code number stamped in ink on the gong with frequency shown on the retaining plate.

TYPE 151

The type 151 ringer is designed for use in K-1554 and K-2554 "TEL-TOUCH" wall telephones.

TYPE 152

The type 152 ringer is designed for use in the TRENDLINE* (dial in handset), telephones.

3. INSTALLATION

Two tapped blocks are provided on the telephone base to accept the ringer mounting screw. When installing a ringer in a wall phone, (K-2554 or TRENDLINE wall phone), be sure the stud of the volume control lever on the ringer rests in the slot of the volume control arm on the base.

4. CONNECTIONS

Refer to appropriate telephone circuit label.

5. ADJUSTMENTS

5.1 VOLUME CONTROL ADJUSTMENT

There are two positions on the volume control, High and Low.

5.2 WEIGHT TO GONG CLEARANCE ADJUSTMENT

Clearance varies with frequency but should be 0.030 to 0.10 inch. Coarse adjustment is made by bending clapper stem. Fine adjustment is made by rotating gong.

6. MAINTENANCE

If ringer is defective, check to see that:

(1) All leads are tight and secured to the proper terminals.

(2) Air gap between armature and magnet is free of dirt or foreign material.

(3) Gong is not obstructed.

(4) Ringer coil is not open or shorted.

(5) Clapper to gong clearance is 0.030 to 0.10 inch.

If ringer still fails to operate, replace ringer.

6.2 COIL REPLACEMENT (Figure 4)

Be sure to have an adequate supply of Retainers (12) before proceeding as they may be damaged during removal. Index gong by marking gong and frame. Remove screw (13), gong (14), spacer washer (15), and resonator (16). Use a screwdriver and work retainers (12) out. Remove laminations (11), roll coil (9), out and roll new coil in, install laminations. Use slip-joint pliers or similar tool and install retainers (7A) one at a time. Install resonator, washer, gong and screw. Rotate to align index marks and tighten gong mounting screw.

*Trademark of ITT

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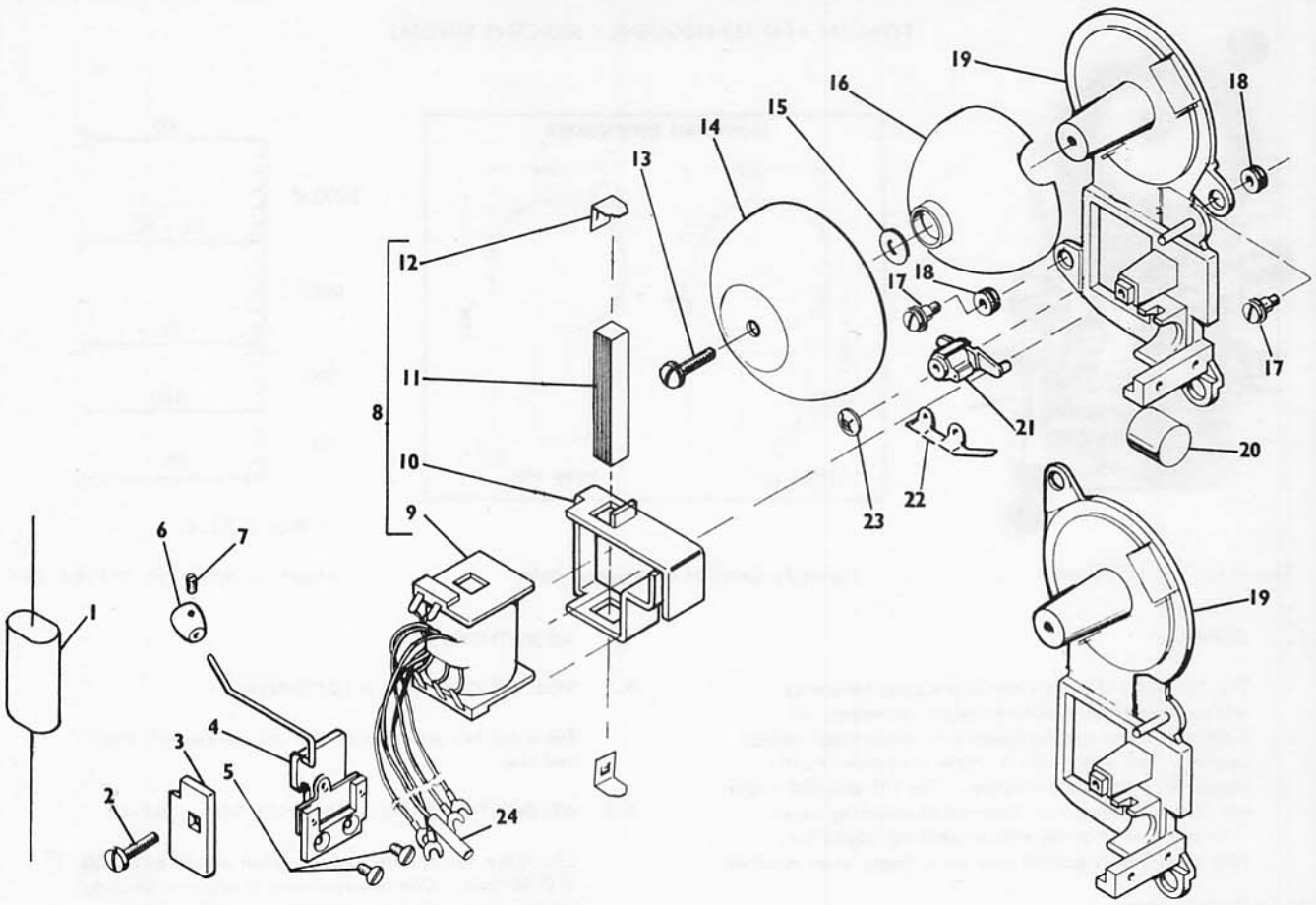

FIGURE NO.	INDEX NO.	PART NUMBER	(Indented items are included in the NAME, Description part under which they are indented)	QUANTITY USED ON: 151	152				
		TABLE II.	ORDERING INFORMATION AND REPLACEABLE PARTS LIST	151	152				
		151 ( ) 470	Ringer, Frequency Selective, (For 2554 Telephone)	X	-				
		152 ( ) 470	Ringer, Frequency Selective, (For Trendline Telephones)	-	X				
			SUBSTITUTE FREQUENCY CODE AS FOLLOWS:						

HARMONIC		SYNCHROMONIC		DECIMONIC	
Code	Frequency	Code	Frequency	Code	Frequency
HA1	33 1/3cps	HB1	30 cps	HC1	20 cps
HA2	50 cps	HB2	42 cps	HC2	60 cps
HA3	66 2/3cps	HB3	54 cps	HC3	30 cps
HA4	16 2/3cps	HB4	66 cps	HC4	40 cps
HA5	25 cps	HB5	16 cps	HC5	50 cps

NOTE: HA2 is same as HC5; HB1 is same as HC3

	1	- - - - - - - -	Capacitor (included with each ringer when required)						
		95995 - 3	.47 mf, for frequencies 16, 16 2/3, 20 and 25 cps	1	1				
		95995 - 4	.25 mf, for frequencies 30 and 33 cps	1	1				
		95995 - 5	.15 mf, for frequencies 40 and 42 cps	1	1				
		95995 - 6	.08 mf, for frequencies 50, 54, 60, 66 and 66 2/3 cps	1	1				

TABLE II. ORDERING INFORMATION AND REPLACEMENT PARTS LIST, CONTINUED

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 151	152				
	2	63786 - 1	SCREW	1	1				
	3	88483 - 1	PLATE, Retaining	1	1				
	4	--------	ARMATURE ASSEMBLY	1	1				
		180608 - 1	For Frequencies 16 and 16 2/3 cps						
		180608 - 2	For Frequencies 20 and 25 cps						
		180608 - 3	For Frequencies 30 and 33 1/3 cps						
		180608 - 4	For Frequencies 40 and 42 cps						
		180608 - 5	For Frequencies 50 and 54 cps						
		180608 - 6	For Frequencies 60, 66 and 66 2/3 cps						
	5	63975 - 1	SCREW, Armature Attaching	2	2				
	6	--------	WEIGHT (See Table Below)	1	1				

	FREQUENCIES						
	16, 16 2/3, 20	25, 30, 33 1/3	40, 42	50, 54	60	66	66 2/3
88508 - 1							X
88508 - 2						X	X
88508 - 3					X	X	X
88508 - 4				X	X	X	X
88508 - 5				X	X	X	
88508 - 6			X	X	X		
88508 - 7		X	X	X			
88508 - 8		X	X				
88508 - 9	X	X	X				
88508 - 10	X	X					
88508 - 11	X						
88508 - 12	X						

	7	58687 - 1	SETSCREW	1	1				
	8	88481 - 1	POLE PIECE ASSEMBLY, Frequencies 16 thru 33 1/3 cps	1	1				
	8	88481 - 2	POLE PIECE ASSEMBLY, Frequencies 40 thru 66 2/3 cps	1	1				
	9	180208-1011	COIL ASSEMBLY (Was 180209-101)	1	1				
	10	88174 - 1	POLE PIECE, Frequencies 40 thru 66 2/3 cps	1	1				
	10	88174 - 2	POLE PIECE, Frequencies 16 thru 33 1/3 cps	1	1				
	11	88208 - 1	LAMINATION	18	18				
	12	95969 - 1	RETAINER, Lamination	2	2				
	13	75408 - 2	SCREW	1	1				
	14	75396-001	GONG	1	1				
	15	60629 - 1	WASHER	1	1				
	16	75372 - 1	RESONATOR	1	1				
	17	95966 - 2	SCREW, Special (Ringer Mounting)	2	2				
	18	88209 - 1	GROMMET	2	2				
	19	88480 - 2	FRAME, (151 Ringer)	1	-				
	19A	88480 - 3	FRAME, (152 Ringer)	-	1				
	20	88197 - 1	MAGNET, (Not Magnetized)	1	1				
	21	88885 - 1	LEVER, Volume Control	-	1				
	21	180122 - 1	LEVER, Volume Control	1	-				
	22	88884 - 1	SPRING, Volume Control	1	1				
	23	88972 - 1	NUT, Push	1	1				
	24	88213 - 1	SLEEVE, Insulating	3	3				

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TABLE III. RINGER CHARACTERISTICS

1. COIL RESISTANCE, D.C.: 4850 Ohm

2. IMPEDANCE, AUDIO:	Single Ringer	5 Bridged Ringers
@ 400 hz	90,000 ohms	14,500 ohms
@ 1000 hz	150,000 ohms	28,000 ohms
@ Ringing Frequency	(See Table)	3,000 ohms, min

3. SOUND OUTPUT (Measured at one meter):
60 to 66 db relative to .0002 dy/cm^2.

4. SENSITIVITY: *

Code	Freq. Hz	Minimum Voltage across Ringer, rms	Open Circuit Voltage, rms	Ringing Impedance (ohms)
HA1	33 1/3	40	125	13,000
HA2	50	50	140	22,000
HA3	66 2/3	55	140	11,500
HA4	16 2/3	45	105	12,000
HA5	25	40	110	8,000
HB1	30	40	125	12,000
HB2	42	40	135	13,000
HB3	54	50	140	22,000
HB4	66	55	140	11,500
HB5	16	45	105	12,000
HC1	20	45	105	10,500
HC2	60	55	140	15,000
HC3	30	40	125	12,000
HC4	40	40	135	12,000
HC5	50	50	140	22,000

*Ringer sensitivity varies slightly depending upon ringer position, horizontal or vertical

TYPE 144( )470 COMMON AUDIBLE SIGNAL UNIT

The 144 Common Audible Signal Unit is designed to provide a common buzzer signal from ringing signals on any one of up to three individual telephone exchange lines. The unit is intended to be used in conjunction with the type 576 three line and hold key telephone. A separate neon indicator lamp underneath each pick-up key on the telephone glows whenever a ringing signal is received on its own line, thus providing a definite indication of the calling line.

Simultaneous ringing signals on more than one line may cause the audible buzzer signal to vary from that normally heard with a single line signal, dependent upon the relative phase of the multiple ringing signals.

The complete unit is mounted in the telephone instrument in the position occupied by the usual mechanical type of ringer. No additional power supplies are required to operate the unit.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Mounting Bracket	86396	1
2	Socket	95649	3
3	Terminal Strip	95653	1
4	Rivet	60025	7
5	Resistor	62948-99	3
6	Tubing	50551-3	6
7	Resistor	64342-179	1
8	Capacitor	80678-3	1
9	Capacitor	75517-2	1
10	Tubing	71613	6
11	Capacitor	95286	1
12	Tubing	50551	2
13	Resistor	64342-181	1
14	Tubing (wire strap insulation)	50551-5	3
15	Wire Assembly (RD)	75326-11	1
16	Wire Assembly (BK) (Buzzer leads)	75326-70	2
17	Wire Assembly (BL)	75326-88	1
18	Wire Assembly (GR)	75326-91	1
19	Wire Assembly (BK)	75326-114	1
20	Tube (Type 5823)	95648	3
21	Rd. Hd. Mach. Screw	61906	2
22	Buzzer	95654	1
23	Bind. Hd. Mach. Screw	72594-3	2
24	Lock Washer	73949	2

NOTE:
Buzzer is shipped mounted on end of bracket. To install in telephone, dismount buzzer and insert screws through two of vent holes in baseplate to locate buzzer approximately as shown with respect to mounting bracket.

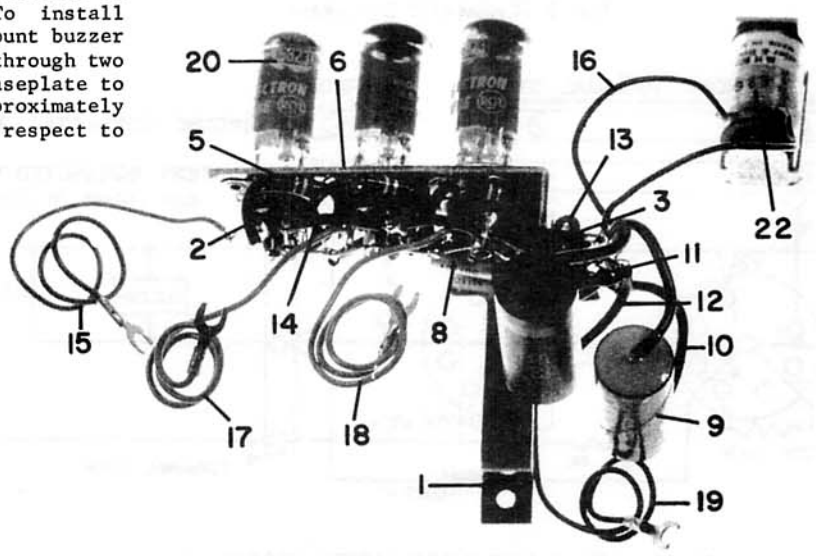

Fig. 1 TOP VIEW

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TEST DATA

Testing of the common audible signal units requires a sine wave source of ringing voltage at a frequency of 30±1 cps., with a distortion of not more than 5%. at a level of 75 volts under load. This voltage is applied through a 1 watt, 47 ohms ±10% resistor to each section of the signal unit in turn, connecting the common (black) lead to one side of the source and each of the red, blue and green leads, in turn, to the other side of the source.

The sound output from the buzzer must be vigorous and uniform in each case, without undue chatter.

If desired, the action of the gas tubes can be checked with a battery connected generator source. In this case the 'X' straps (see diagrams) must be cut and the common black lead must be connected to the positive (ground) side of the source. Reversal of the connections will reverse bias the gas tubes and prevent operation. The source voltage required in this case will be 95 volts.

Table 2 MINIMUM RINGING GENERATOR OUTPUT FOR VARIOUS LINE LOOP RESISTANCES

TYPE OF GENERATOR CONNECTION	LINE LOOP RESISTANCE (OHMS)	VOLTAGE REQUIRED FOR NUMBER OF UNITS ON LINE 1	2	3
BATTERY	0	95V	100V	115V
	600	105V	110V	120V
	1000	110V	115V	125V
	1200	112V	118V	128V
GROUND	0	75V	75V	75V
	600	77V	80V	82V
	1000	77V	81V	88V
	1200	78V	82V	90V

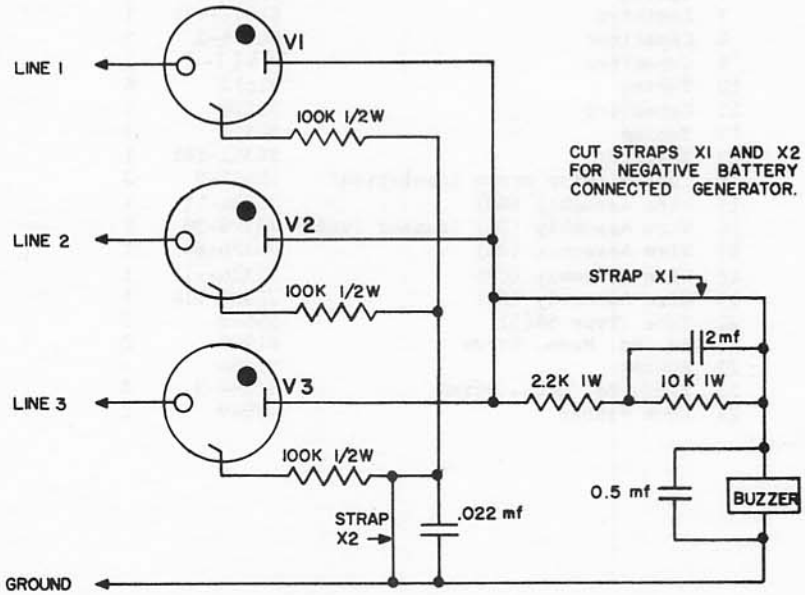


Fig. 2 SCHEMATIC DIAGRAM

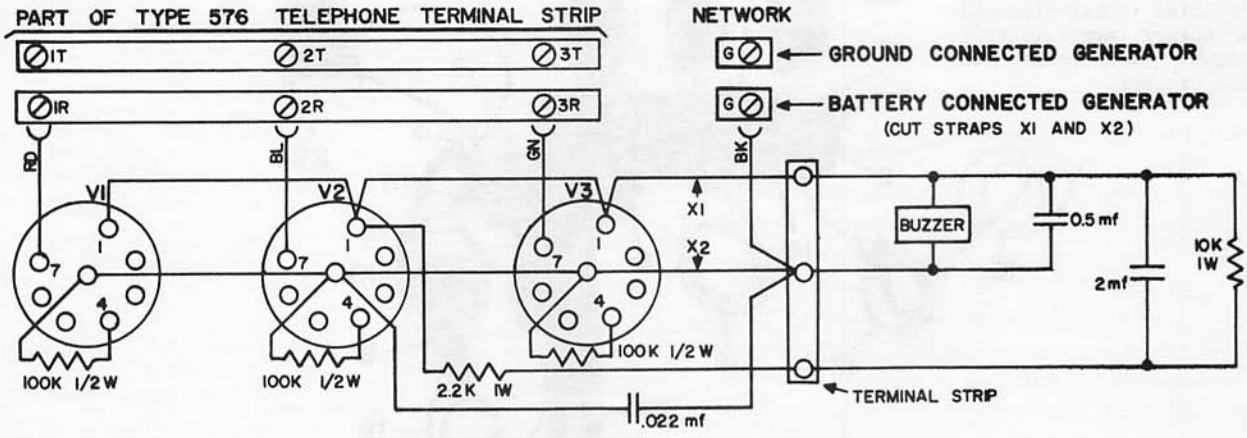
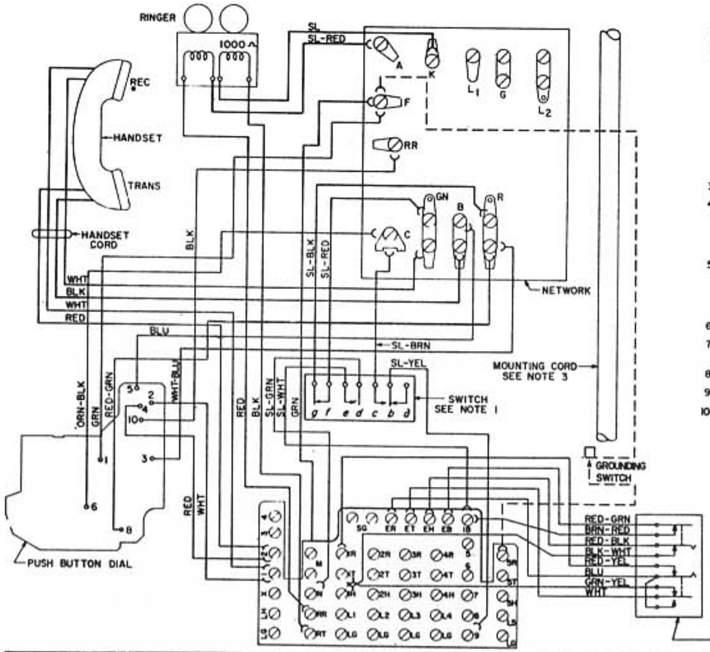


Fig. 3 WIRING AND INSTALLATION DIAGRAMS

2565 TYPE TELEPHONE CIRCUIT



NOTES:

1-CONTACT SEQUENCE
REMOVING HANDSET
A. *de* CLOSES BEFORE *cb*
B. *fg* OPENS
RESTORING HANDSET
A. *fg* CLOSES
B. *cb* OPENS BEFORE *de*

3-SEE TABLE FOR CONNECTIONS.

4-FOR RINGER CUT-OFF CONTROL BY CUSTOMER BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

5-KEY FEATURE DESIGNATIONS:
H-HOLD
P-PICK-UP
S-SIGNAL
P^S CONVERTIBLE, PICK-UP OR SIGNAL

6-DD * CONDUCTORS ARE TAPED AND STORED IN TELEPHONE.

7-PROVIDE "M" WIRING WHEN THE BUZZER IS TO OPERATE ON 60 CYCLES AC, AND PROVIDE "N" WIRING WHEN THE BUZZER IS TO OPERATE ON DC.

8-NUMBERS SHOWN INDICATE TERMINAL NO. ON MOUNTING CORD CONNECTOR.

9-CONDUCTOR COLORS: BODY FIRST, TRACER SECOND.

10-BROKEN LINES INDICATE GROUNDING CIRCUIT FOR TELEPHONES WITH SPECIAL FEATURE CODE 34 OR 4L

TABLE A

KIA1/KIA2 BUSY LAMP CONVERSION							
	LEADS					STRAP	DIODE 83777-2- IN 2070
	SWITCH			HOLDKEY			
	SL-WHT	SL-GRN	SL-YEL	YEL	ORN-BLK		
NO STATION BUSY LAMP	1B	N •	9	M	N		
WITH STATION BUSY LAMP	1B	L_2 #	9	M	N	G# TO N	G# TO L_2#

TERMINAL ON NETWORK

TABLE B

RINGER CONNECTIONS						
			RINGER OR BUZZER LEAD			
			SL-RED	SL	BLK	RED
SET RINGER OR BUZZER NOT TO BE CUT OFF IN SET	WHEN USED AS BRIDGED RINGER ON ANY LINE		A	K	T	R
	WHEN USED AS PRIVATE LINE COMMON SIG. OR OTHER USE	WITH CAPACITOR	A	K	RT	RR
		WITHOUT CAPACITOR	A	A		

TABLE C

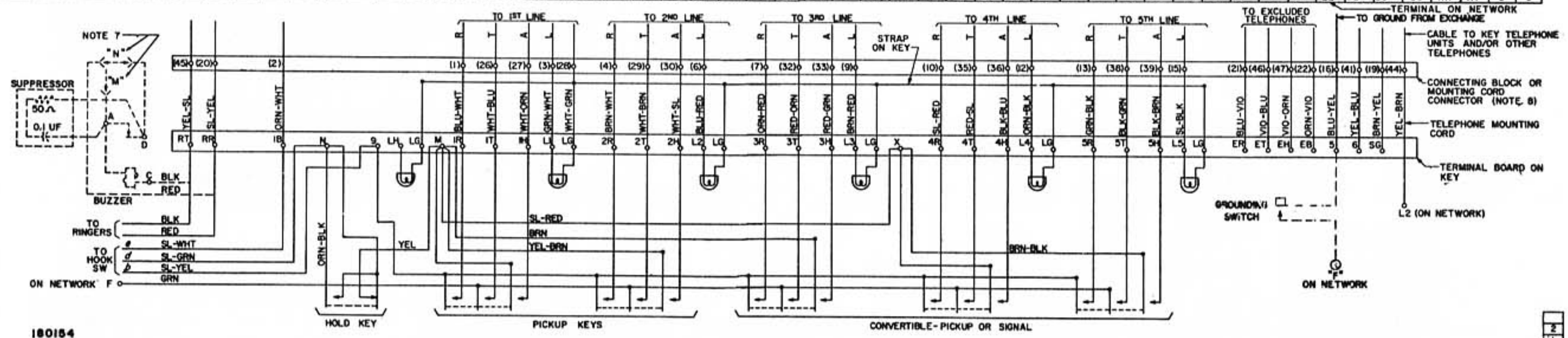
PICKUP-SIGNALLING CONVERSION CONVERT FROM LOCKING TO NON-LOCKING OR VICE-VERSA AND CHANGE LEADS AS FOLLOWS:							
	NO. OF PICKUP KEYS	NO. OF SIG. KEYS CONVERTED FROM P.U. KEYS	NO. OF PRIVATE AND INTERCOMMUNICATING LINES WITH COMMON SIG. KEY	KEY LEADS			
				YEL-BRN	BRN	SL-RED	BRN-BLK
6 BUTTON SET	5			M	M	M	X
	4	1		M	M	M	SG
	3	2		M	M	SG	X
	2	3		M	X	SG	X
	4	1	2	M	X	5H	SG
	4	1	3	X	X	5H	SG

COLOR OF MOUNTING CORD CONDUCTORS TO TERMINALS ON KEY AND LAMP TERMINAL STRIP (NOTE 9)

TEL CODE	KEY FEATURES SEE NOTE 5	BLU-WHT	WHT-BLU	ORN-WHT	WHT-ORN	GRN-WHT	WHT-GRN	BRN-WHT	WHT-BRN	SL-WHT	WHT-SL	BLU-RED		ORN-RED	RED-ORN	GRN-RED	RED-GRN	BRN-RED
2565 **(BA) 30/40 M	HPPP^sP^sP^s	1R	1T	1B	1H	L1	LG	2R	2T	DD *	2H	L2	LG	3R	3T	DD *	3H	L3

TEL CODE		SL-RED	RED-SL	BLU-BLK	BLK-BLU	ORN-BLK		GRN-BLK	BLK GRN	BRN-BLK	BLK-BRN	SL-BLK		BLU-VIO	VIO-BLU	ORN-VIO	VIO-ORN
2565 **(BA) 30/40 M	LG	4R	4T	DD *	4H	L4	LG	5R	5T	DD *	5H	L5	LG	ER	ET	EB	EH

TEL CODE					BRN-VIO	VIO-BRN	GRN-VIO	VIO-GRN	YEL-BRN	SL-VIO	VIO-SL	BRN-YEL	SL-YEL	YEL-SL	BLU-YEL	YEL-BLU
2565 **(BA) 30/40 M	LH	LG	3	4	DD *	DD *	DD *	DD	L2	DD *	DD *	SG	RR	RT	5	6



180164

NOTE: Current sets do not have the WHT-BLU lead between terminal (3) of dial and terminal (R) of network. The RED-GRN lead is moved from terminal (8) of dial to terminal (3).

CRADLE SWITCH ASSEMBLIES

CONTENTS

1 GENERAL DESCRIPTION

1.1 These cradle switch assemblies are used on the 700 Series of compact desk telephones. Each assembly consists of a spring loaded operating arm, pivoted on a bearing which is molded into the same plastic block as the contact springs, mounted with two sets of contacts on each side of the insulating actuator block which is riveted to the center part of the operating arm. The coiled spring holds the operating arm in a position which operates two of the sets of contacts when the arm is in the raised or off-hook position. These two sets of contacts are released and the opposite two sets are operated when the arm is moved to the on-hook position.

1.2 Separate flexible wire leads are provided for each contact spring to connect them to the other components in the telephone instrument. The leads are joined to the contact springs inside the molded portion of the assembly.

1.3 The complete assembly is mounted to the base of the telephone instrument by means of three rivets through its bracket, which is molded into the same block as the contact springs, so that placing the handset in the cradle depresses the plungers against the extremities of the operating arm to actuate the contact springs.

2 DISASSEMBLY AND ASSEMBLY

2.1 The various parts of the cradle switch are identified in Fig. 2-1.

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

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

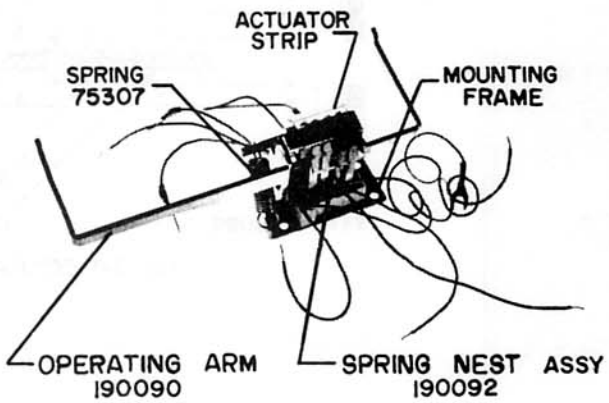


Fig. 2-1 TYPICAL CRADLE SWITCH

3 TEST AND ADJUSTMENT

3.1 The operating arm, and the insulated actuator strip mounted on it, must move freely between the sets of contact springs.

3.2 The normal position of the assembly is with the operating arm fully released and the operated position is with the arm fully depressed.

3.3 SPRING ADJUSTMENTS

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

3.3.1 Spring Pressures

The pressure between each pair of closed contacts must be within the range of 10 to 20 grams. This is measured at each tip of the break springs on the side of the assembly where the springs are in contact with the actuator strip and at each tip of the lever springs on the opposite side of the assembly, when the operating arm is in the normal position. The same conditions must be satisfied when measuring at each tip of the lever springs on the side of the assembly where the springs are NOT in contact with the actuator strip, when the operating arm is in the fully operated position. With the operating arm in either position, each spring not making electrical contact must be tensioned against a buffer spring or the central insulating block.

3.3.2 Spring Clearances

The clearance between each pair of open contacts, in either the normal or operated condition, must be at least .020".

There must be a perceptible clearance between any buffer spring and the contact spring which rests on it, in either position of the operating arm, when the contact spring is in electrical contact with another spring, in the other position of the operating arm.

3.3.3 Contact Sequence and Alignment

The contacts in each assembly must operate in the sequence shown by the circled numbers in Fig. 3-1 when the operating arm is moved from the normal position. Contacts marked with the same number should function at approximately the same time.

The two contacts of each mating pair of springs must make and break simultaneously.

The bar contacts must mate approximately on centers.

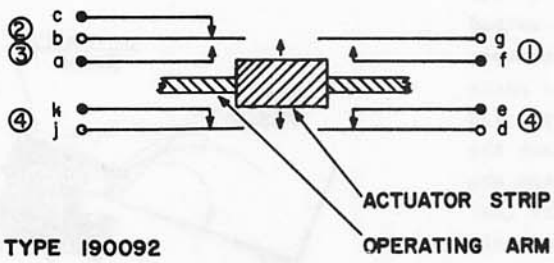


Fig. 3-1 CONTACT ARRANGEMENTS

4 LUBRICATION

4.1 Any existing lubricant must be cleaned off with a good quality, non-filming commercial solvent. Using a small camel hair brush, apply a small amount of high quality lubricant, such as ITTK dial lubricant 79946, to each of the two bearing points of the bearing pin. Avoid excessive lubrication.

CRADLE SWITCH ASSEMBLIES

CONTENTS

1 GENERAL DESCRIPTION

1.1 Each cradle switch assembly consists of a spring loaded operating arm pivoted on a frame so that movement of the arm is imparted to the lever springs of a spring nest assembly which is mounted on the lower part of the same frame. Each contact spring is provided with a flexible wire lead to connect to the other components in the telephone instrument.

1.2 The cradle switch assembly is mounted in the telephone so that placing the handset in the cradle presses the plungers against the extremities of the operating arm to actuate the contact springs.

1.3 Several different contact arrangements are available to meet the requirements of the various telephone instrument circuits (see paras. 3 and 5).

2 DISASSEMBLY AND ASSEMBLY

2.1 The various parts of a typical cradle switch assembly are identified in Fig. 2-1.

2.2 To disassemble the unit, first remove the coil spring holding the operating arm in the raised position, then slide out the pivot pin. Disengage the end of the operating bar from the slot in the operating arm and remove the arm. Reassemble the parts in the reverse order. Make sure that the grooves in the pivot pin rest in the elongated holes of the operating arm and mounting frame.

2.3 The spring nest assembly should only be removed from the mounting frame if it is necessary to replace a contact spring or lead. The cover is removed by squeezing the sides, to clear the lugs on its rear edge through the locking slots in the frame, and lifting. Removal of the operating and positioning bars is accomplished by disengaging the keying section from one of the springs, rotating the bar one quarter turn and lifting it out. Reassembly is a reversal of these procedures. Refer to Table 5-1 for the order of assembly of the parts of the spring nest.

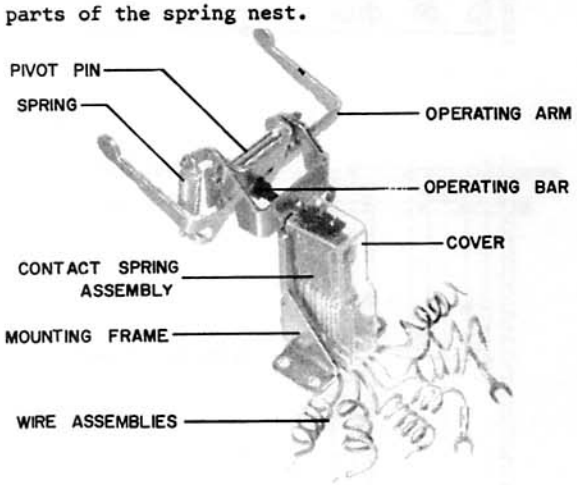


Fig. 2-1 TYPICAL CRADLE SWITCH

3 TEST AND ADJUSTMENT

3.1 The operating and positioning bars must move through the springs without binding. Realign the spring nest as necessary to obtain this condition.

3.2 The normal position of the assembly is with the operating arm fully released and the operated position is with the arm fully depressed.

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3.3 SPRING ADJUSTMENTS

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

3.3.1 Spring Pressures

The pressure between each pair of closed contacts must be within the range of 20 to 35 grams. This is measured at each tip of the break springs with the operating arm in the normal position and at each tip of the lever springs with the arm in the fully operated position. With the operating arm in either position, each spring not making electrical contact must be tensioned against a shoulder of the operating or positioning bar.

3.3.2 Spring Clearances

The clearance between each pair of open contacts, in either the normal or operated condition, must be at least .020".

There must be a perceptible clearance between any break or lever spring, when it is in electrical contact with another spring, and the shoulder of the bar on which it rests in the other position of the operating arm.

There must be a clearance of at least 1/32" between springs not designed to make electrical contact when the assembly is normal or operated.

3.3.3 Contact Sequence and Alignment

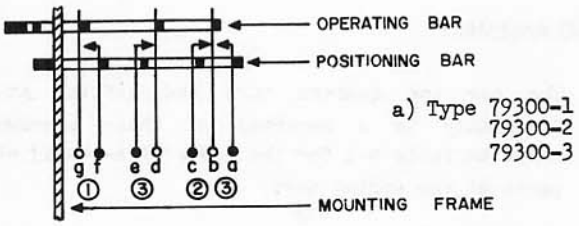
The contacts in each assembly must operate in the sequence shown by the circled numbers in Fig. 3-1 when the operating arm is moved from the normal position. Contacts marked with the same number should function at approximately the same time.

The two contacts of each mating pair of springs must make and break simultaneously.

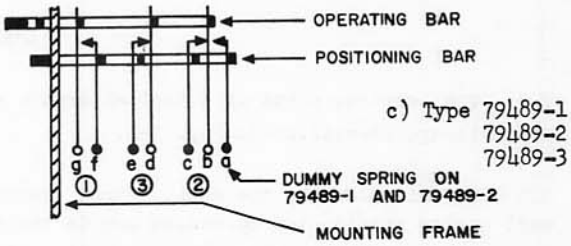
The bar contacts must mate approximately on centers.

3.4 OPERATING FORCE

With the cradle switch assembly mounted so that the contact springs are vertical, a force between 7 and 9 ounces must fully actuate the operating arm when it is applied to either tip of the arm in a direction parallel to the length of the contact springs.

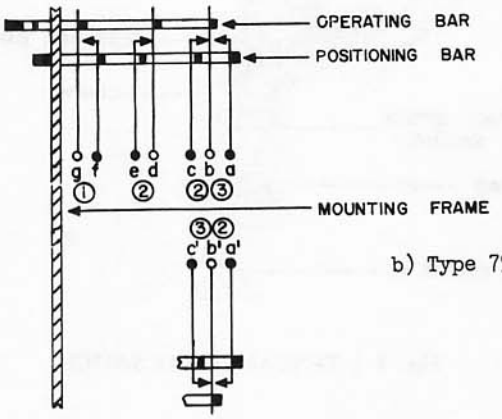


a) Type 79300-1
79300-2
79300-3



c) Type 79489-1
79489-2
79489-3

(All contacts shown with operating arm raised)



b) Type 79300-4

Fig. 3-1 CONTACT ARRANGEMENTS

4 LUBRICATION

4.1 Any existing lubricant must be cleaned off with a good quality, non-filming commercial solvent. Using a small camel hair brush, apply a small amount of high quality lubricant, such as ITTK dial lubricant 79946, to each of the four bearing points of the pivot pin.

5 REPLACEABLE PARTS

5.1 The component parts of the various cradle switch assemblies are listed in Table 5-1. The position numbers (noted in brackets) show the order of assembly, starting from the mounting frame, of the parts of the spring nest for each type of cradle switch.

Table 5-1 REPLACEABLE PARTS

Item	Description	Number	Quantity per Assembly						
			75300-1	75300-2	75300-3	75300-4	79489-1	79489-2	79489-3
1a	Mounting Frame	75301	1	1		1			
b	Mounting Frame	75301-2			1				
c	Mounting Frame	79484					1		
d	Mounting Frame	79484-2							1
e	Mounting Frame	190172-1						1	
2a	Operating Arm	75302	1		1	1			
b	Operating Arm	79602		1					
c	Operating Arm	79491					1		1
d	Operating Arm	190173-1						1	
3	Grommet	75303	1	1	1	1	1	1	1
4	Pivot Pin	75308	1	1	1	1	1	1	1
5	Spring	75307	1	1	1	1	1	1	1
6	Cover	75306	1	1	1	1	1	1	1
7	Operating Bar	75305	1	1	1	1	1	1	1
8	Positioning Bar	75304	1	1	1	1	1	1	1
9a	Bushing	75322	2	2	2		2	2	
b	Bushing	75322-3				2			
c	Bushing	75322-5							2
10a	Rd. Hd. Mach. Screw	59031	2	2	2		2	2	2
b	Rd. Hd. Mach. Screw	84796-1				2			
11	Nut	75323	1(24)	1(24)	1(24)	1(24)	1(23)	1(23)	1(24)
12	Insulator	75321	6(1,5,11, 17,20,23)	6(1,5,11, 17,20,23)	6(1,5,11, 17,20,23)	4(5,11, 14,33)	6(1,5,11, 17,20,22)	6(1,5,11, 17,20,22)	6(1,5,11, 17,20,23)
13	Insulator	75321-3	3(2,8,14)	3(2,8,14)	3(2,8,14)	2(1,8)	3(2,8,14)	3(2,8,14)	3(2,8,14)
14	Insulator	75321-4				5(2,17,20,26,29)			
15	Insulator	84778-1				1(23)			
16	Contact Spring Assy.	75315	1(21)	1(21)	1(21)				1(21)
17	Contact Spring Assy.	75316	1(18)	1(18)	1(18)				
18	Contact Spring Assy.	75317	1(3)	1(3)	1(3)		1(3)	1(3)	
19	Contact Spring Assy.	75318	2(9,15)	2(9,15)	2(9,15)	1(13)	2(10,16)	2(10,16)	1(15)
20	Contact Spring Assy.	75319	1(12)	1(12)	1(12)	1(7)	2(13,19)	2(13,19)	1(12)
21	Contact Spring Assy.	75320	1(6)	1(6)	1(6)		1(7)	1(7)	1(6)
22	Contact Spring Assy.	84788-1				1(24)			
23	Contact Spring Assy.	84789-1				1(4)			1(3)
24	Contact Spring Assy.	84790-1				1(22)			
25	Contact Spring Assy.	84791-1				1(10)			1(9)
26	Contact Spring Assy.	84792-1				1(19)			
27	Contact Spring Assy.	84793-1				1(16)			
28	Contact Spring Assy.	84794-1				1(28)			
29	Contact Spring Assy.	84795-1				1(32)			
30	Contact Spring Assy.	86373-1							1(18)
31	Spring	75310					1(22)	1(22)	
32	Spring	84786-1				1(30)			
33	Wire Assembly (SL)	75326-1	1(22)	1(22)	1(22)				1(22)
34	Wire Assembly (SL-YL)	75326-2	1(19)	1(19)	1(19)				
35	Wire Assembly (SL-GR)	75326-3	1(13)	1(13)	1(13)				
36	Wire Assembly (SL-WH)	75326-4	1(10)	1(10)	1(10)	1(9)	1(11)	1(11)	1(19)
37	Wire Assembly (SL-BK)	75326-5	1(4)	1(4)	1(4)	1(3)	1(4)	1(4)	1(4)
38	Wire Assembly (SL-BN)	75326-6	1(16)	1(16)	1(16)		1(17)	1(17)	1(10)
39	Wire Assembly (SL-RD)	75326-7	1(7)	1(7)	1(7)	1(6)	1(8)	1(8)	1(7)
40	Wire Assembly (SL-YL)	75326-74					1(20)	1(20)	1(13)
41	Wire Assembly (SL-GR)	75326-75				1(12)	1(14)	1(14)	1(16)
42	Wire Assembly (BN)	75326-148				1(15)			
43	Wire Assembly (SL)	75326-149				1(18)			
44	Wire Assembly (YL)	75326-150				1(21)			
45	Wire Assembly (SL-YL)	75326-151				1(25)			
46	Wire Assembly (SL-BN)	75326-152				1(27)			
47	Wire Assembly (BL)	75326-153				1(31)			

HOOK SWITCH ASSEMBLIES

CONTENTS

1 GENERAL DESCRIPTION

1.1 Each hook switch assembly consists of a cast metal hook and a spring loaded operating arm which are interlocked and pivoted on a common frame. Movement of the hook and arm is imparted to the lever springs of a spring nest assembly mounted on the lower part of the frame. Each contact spring is provided with a flexible wire lead to connect to the other components in the telephone instrument.

1.2 The hook switch assembly is mounted in a wall type telephone so that hanging the handset in the hook causes the contact springs to be actuated.

1.3 Several different contact and mechanical arrangements are available to meet the requirements of the various telephone instrument circuits (see paragraphs 3 and 5).

2 DISASSEMBLY AND ASSEMBLY

2.1 The various parts of a typical hook switch assembly are identified in Fig. 2-1.

2.2 To disassemble the unit, first remove the coil spring(s) holding the operating arm and cradle hook in the raised position then slide out the pivot pin and remove the cradle hook. Note that the lift-to-talk version of the assembly has two flat washers between the right hand side of the cradle hook and the mounting frame. Disengage the end of the operating bar from the slot in the operating arm and remove the arm. Reassemble the parts in the reverse order; make sure that the grooves in the pivot pin rest in the elongated holes of the operating arm and mounting frame.

2.3 The spring nest assembly should only be removed from the mounting frame if it is necessary to replace a contact spring or lead. The cover is removed by squeezing the sides, to clear the lugs on its rear edge through the locking slots in the frame, and lifting. Removal of the operating and positioning bars is accomplished by disengaging the keying section from one of the springs, rotating the bar one quarter turn and lifting it out. Reassembly is a reversal of these procedures. Refer to Table 5-1 for the order of assembly of the parts of the spring nest.

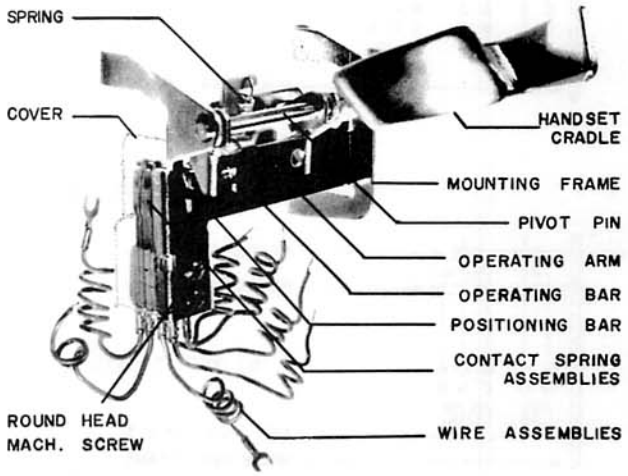


Fig. 2-1 TYPICAL HOOK SWITCH

3 TEST AND ADJUSTMENT

3.1 The operating and positioning bars must move through the springs without binding. Realign the spring nest as necessary to obtain this condition.

3.2 The normal position of the assembly is with the operating arm fully released and the operated position is with the arm fully depressed.

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3.3 SPRING ADJUSTMENTS

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

3.3.1 Spring Pressures

The pressure between each pair of closed contacts must be within the range of 20 to 35 grams. This is measured at each tip of the break springs with the operating arm in the normal position and at each tip of the lever springs with the arm in the fully operated position. With the operating arm in either position, each spring not making electrical contact must be tensioned against a shoulder of the operating or positioning bar.

3.3.2 Spring Clearances

The clearance between each pair of open contacts, in either the normal or operated condition, must be at least .020".

There must be a perceptible clearance between any break or lever spring, when it is in electrical contact with another spring, and the shoulder of the bar on which it rests in the other position of the operating arm.

There must be a clearance of at least 1/32" between springs not designed to make electrical contact when the assembly is normal or operated.

3.3.3 Contact Sequence and Alignment

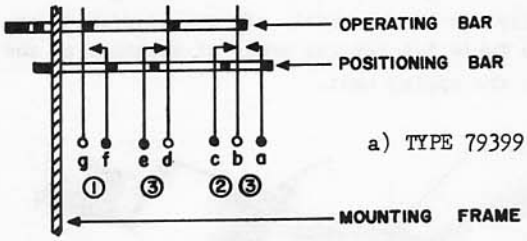
The contacts in each assembly must operate in the sequence shown by the circled numbers in Fig. 3-1 when the operating arm is moved from the normal position. Contacts marked with the same number should function approximately at the same time. On the "lift-to-talk" type assembly, the contact marked with a number in a double circle must operate before the arm of the cradle hook comes to rest against the stop on the frame. Moving the cradle hook to the side must then allow it to rise completely and operate the remaining contacts in the order shown.

The two contacts of each mating pair of springs must make and break simultaneously.

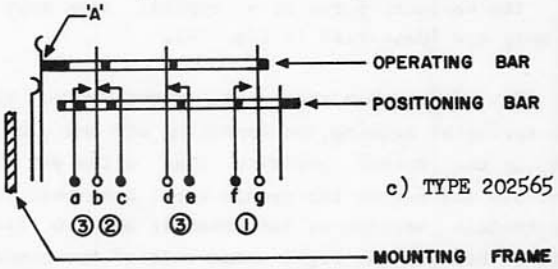
The bar contacts must mate approximately on centers.

3.4 OPERATING FORCE

With the hook switch assembly mounted so that the contact springs are vertical, a force of 4 ounces must not fully depress the cradle hook and a force of 8 ounces must fully depress the hook. The forces should be applied by using type 65-C handset shells which have been weighted at the transmitter end. The cradle hook of the "lift-to-talk" assembly must slide freely on the pivot pin.



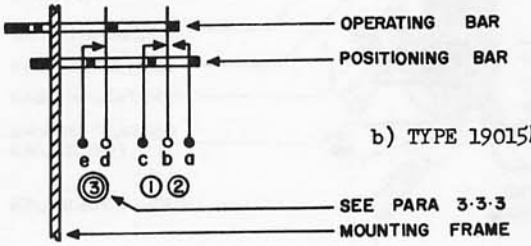
a) TYPE 79399



c) TYPE 202565

Insertion of .025" shim between spring and operating bar at point "A" with cradle hook depressed must not operate any contacts.

(ALL CONTACTS SHOWN WITH CRADLE HOOK RAISED)



b) TYPE 190154

Fig. 3-1 CONTACT ARRANGEMENTS

4 LUBRICATION

4.1 Any existing lubricant must be cleaned off with a good quality, non-filming commercial solvent. Using a small camel hair brush, apply a small amount of high quality lubricant, such as ITTK dial lubricant 79946, to each of the bearing points of the pivot pin, to the bearings of the cradle hook and to the rubbing surfaces of the arms at the rear of the cradle hook.

5 REPLACEABLE PARTS

5.1 The component parts of the various hook switch assemblies are listed in Table 5-1. The position numbers (noted in brackets) show the order of assembly, starting from the mounting frame, of the parts of the spring nest for each type of hook switch.

Table 5-1 REPLACEABLE PARTS

Item	Description	Number	Quantity per Assembly		
			79399	190154	202565
1a	Mounting Frame	79297	1		
b	Mounting Frame	190152		1	
c	Mounting Frame	26899-3			1
2	Operating Arm	79307	1	1	
3a	Handset Cradle	79417	1		
b	Handset Cradle	190153		1	
c	Handset Cradle	81564			1
4	Pivot Pin	79304	1	1	
5	Spring	75307	1	1	
6	Cover	181256-101	1	1	
7a	Operating Bar	75305	1	1	
b	Operating Bar	81566			1
8	Positioning Bar	75304	1	1	1
9a	Bushing	75322	2	2	
b	Bushing	75322-4			2
10a	Rd. Hd. Mach. Screw	59031	2	2	
b	Rd. Hd. Mach. Screw	81584-2			2
11	Spring	190155		1	
12	Spring	46029-2			1(3)
13	Spring	75310-2			1(29)
14	Spring	81565			1(5)
15	Flat Washer	37445		2	
16a	Nut	75323	1(24)	1(22)	
b	Clamping Plate	79750-2			1(30)
17	Insulator	75321	6(1,5,11,17,20,23)	5(1,9,15,18,21)	6(4,6,10,13,19,25)
18	Insulator	75321-2		2(4,5)	
19	Insulator	75321-3	3(2,8,14)	4(2,3,6,12)	6(1,2,7,16,22,28)
20	Contact Spring Assy.	75315	1(21)	1(19)	1(9)
21	Contact Spring Assy.	75316	1(18)	1(16)	
22	Contact Spring Assy.	75317	1(3)		1(27)
23	Contact Spring Assy.	75318	2(9,15)	2(7,13)	2(15,21)
24	Contact Spring Assy.	75319	1(12)	1(10)	1(18)
25	Contact Spring Assy.	75320	1(6)		1(24)
26	Contact Spring Assy.	81567			1(12)
27	Wire Assembly (SL)	75326-1	1(22)	1(20)	1(8)
28	Wire Assembly (SL-YL)	75326-2	1(19)	1(17)	1(11)
29	Wire Assembly (SL-GR)	75326-3	1(13)	1(11)	1(17)
30	Wire Assembly (SL-WH)	75326-4	1(10)	1(8)	1(20)
31	Wire Assembly (SL-BK)	75326-5	1(4)		1(26)
32	Wire Assembly (SL-BN)	75326-6	1(16)	1(14)	1(14)
33	Wire Assembly (SL-RD)	75326-7	1(7)		1(23)

PLUNGER SWITCH ASSEMBLIES

CONTENTS

1 GENERAL DESCRIPTION

1.1 Each plunger switch assembly consists of a spring nest mounted on a bracket which is loosely held to a second bracket by a spring. The assembly is mounted in a desk type telephone by a clamping screw which holds the second bracket to the cradle switch bracket of the instrument.

1.2 The spring mounting bracket has two locating tabs at each end. These engage a web inside the telephone housing and correctly locate the spring nest assembly with respect to the left hand plunger in the housing. This plunger is of special design such that it operates normally when the handset is lifted but may then be raised further in order to operate the plunger switch spring assembly. When the handset is replaced, the plunger automatically depresses completely to release the switch contacts.

1.3 The contact springs are provided with wire leads, terminal lugs or screw terminals, as needed.

2 DISASSEMBLY AND ASSEMBLY

2.1 The various parts of a typical plunger switch are identified in Fig. 2-1.

2.2 Loosen the clamping screw in the mounting bracket and lift the locating tabs out of the slot in the cradle switch bracket in order to remove the assembly from the telephone. Unhook the retaining spring to allow the spring and bracket assembly to be lifted off the lugs of the mounting bracket. Reassembly is simply a reversal of these processes.

2.3 The contact spring assembly should only be disassembled from its mounting bracket, by removing the two round head screws, if it is necessary to replace a part of the assembly. Refer to Table 4-1 for the order of assembly of the various parts of the spring assembly.

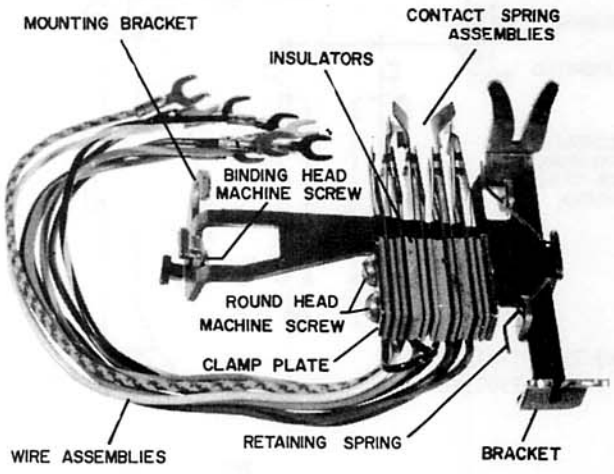


Fig. 2-1 TYPICAL PLUNGER SWITCH

3 TEST AND ADJUSTMENT

3.1 The special plunger in the housing assembly must pass between the innermost lever springs of the assembly and operate all contacts correctly. This may be checked by removing the spring and bracket assembly (Section 2.2) and placing it in position inside the inverted housing. Take care in replacing the housing over the telephone as the end of the plunger must pass between the lever springs of the assembly. See also Section 3.3.

3.2 The normal position of the spring assembly is with the plunger NOT lifted.

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3.3 SPRING ADJUSTMENTS

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

3.3.1 Spring Pressures

The pressure between each pair of closed contacts must be within the range noted in Fig. 3-1. This is measured at each tip of the make springs with the spring nest operated (see also paragraph 3.3.2) and at each tip of the break springs with the spring nest normal.

3.3.2 Spring Clearances and Alignment

The clearance between each pair of open contacts, in either the normal or operated condition, must be at least .025".

There must be a clearance of not more than .005" between the tip of each buffer spring and its associated make or break spring when the latter is in electrical contact with a lever spring.

There must be a clearance of at least 1/32" between springs not designed to make electrical contact when the assembly is normal or operated.

While adjusting the spring pressures and clearances, the dimensions shown in Fig. 3-1, between the tips of the innermost lever springs and between the center lines of the spring nest assembly and the notches in the mounting bracket, must be obtained.

It will be helpful to place a small block, .430± .005" thick, between the lever springs, in order to simulate the plunger operation of the spring nest, while adjusting the make contacts. The tips of the lever springs must spread equally about the center line of the spring nest in the operated condition.

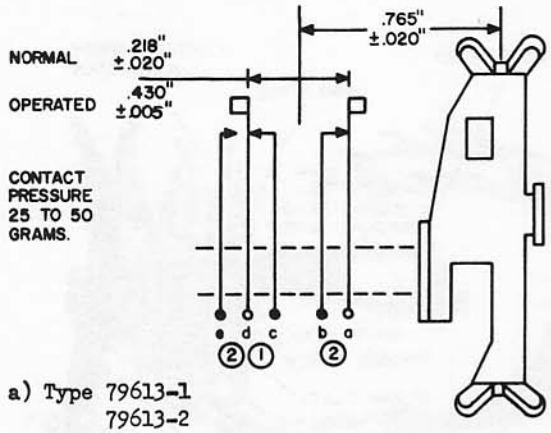
3.3.3 Contact Sequence and Alignment

The contacts on each assembly must operate in the sequence shown by the circled numbers in Fig. 3-1 when the plunger is lifted. Contacts marked with the same number should function at approximately the same time.

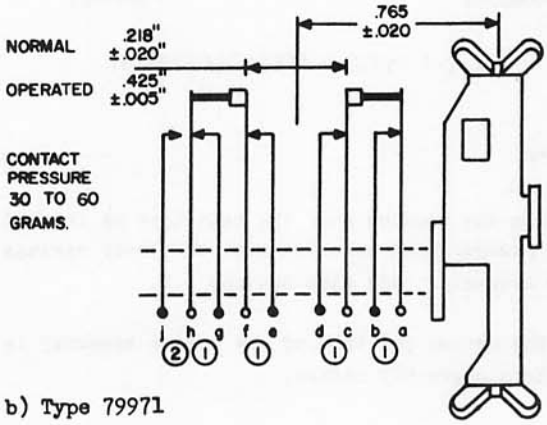
The two contacts of each mating pair of springs must make and break simultaneously.

The bar contacts must mate approximately on centers.

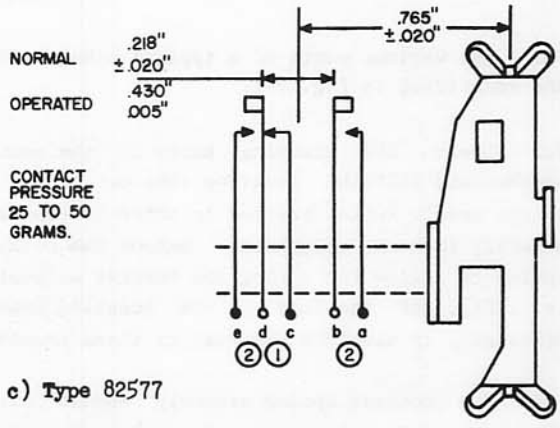
All make and break springs must follow the lever springs for a distance of at least .010" before the contacts open.



a) Type 79613-1
79613-2



b) Type 79971



c) Type 82577

Fig. 3-1 CONTACT ARRANGEMENTS

5 REPLACEABLE PARTS

5.1 The component parts of the various plunger switch assemblies are listed in Table 5-1. The position numbers (noted in brackets) show the order of assembly, starting with the clamp plate, of the parts of the spring nest for each type of plunger switch.

Table 5-1 REPLACEABLE PARTS

Item	Description	Number	Quantity per Assembly			
			79613-1	79613-2	79971	82577
1	Mounting Bracket	79605	1	1	1	1
2	Bind. Hd. Mach. Screw	69020-3	1	1	1	1
3	Retaining Spring	79624	1	1	1	1
4a	Bracket	79604	1	1		1
b	Bracket	79969			1	
5a	Bushing	75322-2	2	2		2
b	Bushing	75322-3			2	
6a	Rd. Hd. Mach. Screw	66849	2	2		2
b	Rd. Hd. Mach. Screw	79980-2			2	
7a	Clamp Plate	79615	1(1)	1(1)	1(1)	1(1)
8	Insulator	75321	6(2,5,7, 10,14,16)	6(2,5,7 10,14,16)	8(2,5,7,12 15,19,24,26)	4(2,5,7,13)
9	Insulator	75321-2				1(16)
10	Insulator	75321-3	1(11)	1(11)	3(9,15,20)	2(10,11)
11	Buffer Spring	79620	2(8,13)	2(8,13)	5(4,8,13 18,23)	2(8,14)
12	Contact Spring Assy.	79618	3(3,9,12)	3(3,9,12)	5(3,9,14 17,22)	3(3,9,15)
13	Contact Spring Assy.	79621-1	1(6)	1(6)	1(11)	1(6)
14	Contact Spring Assy.	79621-2	1(15)	1(15)	1(20)	
15	Contact Spring Assy.	79621-3				1(12)
16	Contact Spring Assy.	79968-1			1(6)	
17	Contact Spring Assy.	79968-2			1(25)	
18	Terminal Spring	79617	1(4)	1(4)		1(4)
19	Bind. Hd. Mach. Screw	69020-3	1	1		1
20	Wire Assy. (RD-YL)	75326-85	1			
21	Wire Assy. (GR-YL)	75326-86	1		1	
22	Wire Assy. (WH)	75326-87	1	1	1	
23	Wire Assy. (BL)	75326-88	1		1	
24	Wire Assy. (BK)	75326-89	1			
25	Wire Assy. (BK)	75326-97			1	
26	Wire Assy. (GR-RD)	75326-98			1	
27	Wire Assy. (BK-WH)	75326-99			1	
28	Wire Assy. (BK-RD)	75326-100			1	
29	Wire Assy. (BN-RD)	75326-101			1	
30	Wire Assy. (BL)	75326-106				1
31	Wire Assy. (RD-YL)	75326-107				1
32	Wire Assy. (WH)	75326-108				1
33	Wire Assy. (BK)	75326-109				1

TURN AND PUSH KEY ASSEMBLIES

CONTENTS

1 GENERAL DESCRIPTION

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

1.2 The turn and push keys are mounted to the base of either the desk or wall type telephones so that the lucite knob projects through the housing. Various types of contact assemblies are available to meet the requirements of the various types of telephone circuits.

2 DISASSEMBLY AND ASSEMBLY

2.1 The various parts of a typical assembly are identified in Fig. 2-1.

2.2 Disassembly of the turn and push key will not normally be required unless it is necessary to replace the plunger. First remove the small screw holding the knob in place and then the knob. Remove the turn spring nest assembly, the push spring nest assembly and then the plunger.

2.3 Reassemble the unit in the reverse order to that described above. If the spring nests have been taken apart refer to Table 4-1 for the order of assembly of the various items. Note that the knob must be fitted to the plunger so that the top thin portion is in line with the stop tab on the plunger for all types except 79453-2 where the top of the knob must be at right angles to the stop tab. Replace the plunger if binding is observed.

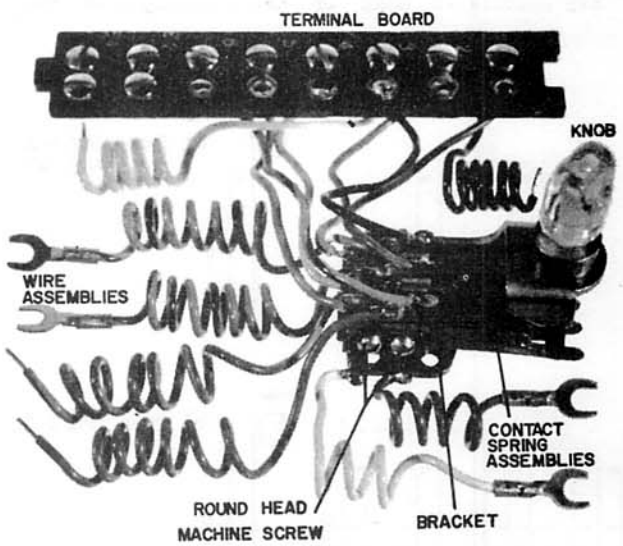


Fig. 2-1 TYPICAL TURN AND PUSH KEY

3 TEST AND ADJUSTMENT

3.1 When the assembly is installed on a telephone base, the housing of the instrument must pass over the stem of the turn and push key without binding. The shoulder mounting screws allow slight lateral movement of the assembly for alignment purposes.

3.2 The normal position of the turn key is with the narrow dimension of the end of the plunger in line with the length of the contact springs. The normal position of the push button is with the plunger in the raised position.

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3.3 SPRING ADJUSTMENTS

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

3.3.1 Spring Pressures

The pressure of the lever springs of the turn key, against the broad, flat faces of the plunger, must be within the range of 100 to 200 grams, measured at the tips of the springs.

The pressure of the lever spring of the push key, against the end of the plunger, must be such that the plunger will be fully depressed by a force within the range of 1.1/4 to 2.1/4 pounds applied to the knob.

The pressure between each pair of closed contacts must be within the range of 35 to 65 grams. This is measured at each tip of the make springs with the turn or push key operated and at each tip of the break springs with the key in the normal position.

3.3.2 Spring Clearances

The clearance between each pair of open contacts, in either the normal or operated condition, must be at least .020" for the turn key spring nest and at least .035" for the push key spring nest.

There must be a clearance of not more than .005" between the tip of each buffer spring and its associated make or break spring when the latter is in electrical contact with a lever spring.

There must be a clearance of at least 1/32" between springs not designed to make electrical contact when the assembly is normal or operated.

3.3.3 Contact Sequence and Alignment

The contacts in each assembly must operate in the sequence shown by the circled numbers in Fig. 3-1 when the plunger is operated from the normal position. Contacts marked with the same number should function at approximately the same time.

The two contacts of each mating pair of springs must make and break simultaneously.

The bar contacts must mate approximately on centers.

All make and break springs must follow the lever springs for a distance of at least .010" before the contacts open.

3.4 PLUNGER

The plunger must operate freely and return fully to the normal position when released slowly from the rotated and depressed positions.

A side pressure against the flat end of the plunger, in either the normal or operated condition of the turn key, must not cause any open contacts to close or any closed contacts to open.

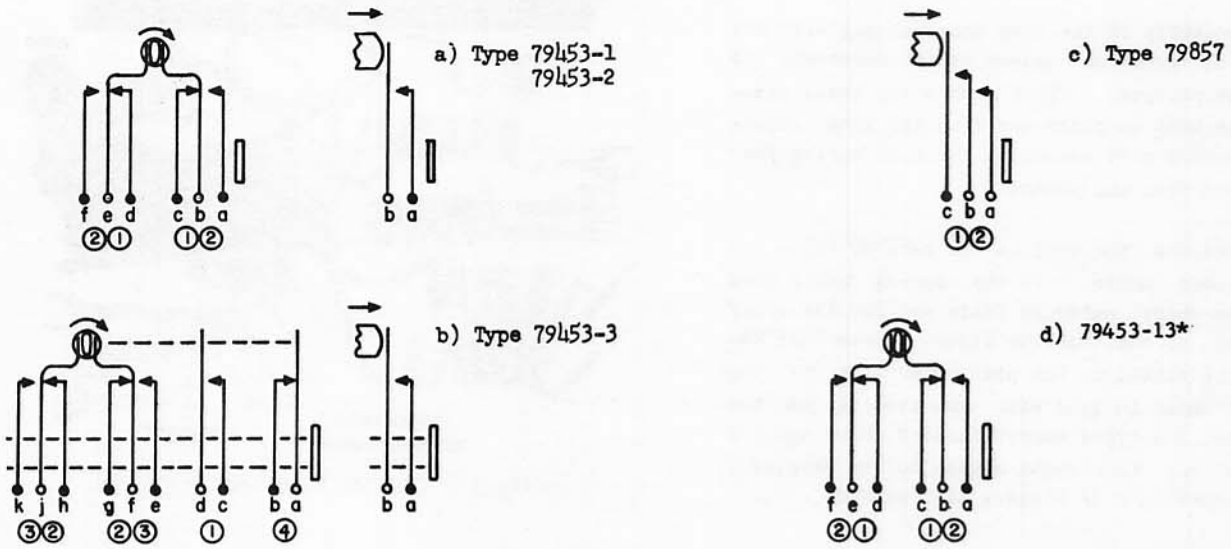

Fig. 3-1 CONTACT ARRANGEMENTS

*was 82870-1

4 REPLACEABLE PARTS

4.1 The component parts of the various turn and push key assemblies are listed in Table 4-1. The position numbers (noted in brackets) show the order of assembly, starting with the clamp washer, of the parts of the spring nest for each type of turn and push key.

Table 4-1 REPLACEABLE PARTS

Item	Description	Number	Quantity per Assembly			
			79453-1	79453-3	79857	79453-13*
1	Bracket	79446	1	1	1	1
2	Plunger	79449	1	1	1	1
3	Knob	79452	1	1	1	1
4	Flat Fil. Hd. Mach. Screw	79451	1	1	1	1
5	Bind. Hd. Mach. Screw	190332-2	2			2
6	Rd. Hd. Mach. Screw	82580-3		2		
7	Clamping Washer	79426	2(1,19)	2(1,29)		2(1,19)
8	Bushing	29219	2			2
9	Bushing	47008		2		
10	Insulator	79422	7(2,5,7,10 13,15,18)	11(2,4,7,10,12,15 17,20,23,25,28)		7(2,5,7,10 13,15,18)
11	Contact Spring Assy.	79425-3	1(6)			1(6)
12	Contact Spring Assy.	79425-2	1(14)	1(24)		1(14)
13	Contact Spring Assy.	79425-3		1(16)		
14	Contact Spring Assy.	79428	2(9,17)	3(6,19,27)		2(9,17)
15	Contact Spring Assy.	79430	2(3,11)	3(8,13,21)		2(3,11)
16	Contact Spring Assy.	83211-1		1(3)		
17	Contact Spring Assy.	83211-2		1(11)		
18	Buffer Spring	79423	4(4,8,12,16)	6(5,9,14,18,22,26)		4(4,8,12,16)
19	Bind. Hd. Mach. Screw	79437-2	2			
20	Bind. Hd. Mach. Screw	79868-2			2	
21	Clamping Washer	79426	1(1)		1(1)	
22	Bushing	47004-3	2			
23	Bushing	47004-4			2	
24	Insulator	79431	2(2,4)		2(2,4)	
25	Insulator	79431-2			1(6)	
26	Insulator	79454	1(6)		1(8)	
27	Contact Spring Assy.	79433	1(5)			
28	Contact Spring Assy.	79435	1(3)			
29	Contact Spring Assy.	79435-2			1(3)	
30	Contact Spring Assy.	79435-3			1(7)	
31	Contact Spring Assy.	79859			1(5)	

NOTE: **Items 5 thru 18 are turn key spring nest parts and items 19 thru 31 are push key spring nest parts.**

Note: 79453-6 includes 79453-1 plus terminal board and wiring.
Note: Parts required to adapt turn and push key for use in K-2500 Tel-Touch Desk Telephones:

88474-1	Spacer -1
79451-1	Screw -1
88475-1	Bracket -1

*was 82870-1

KEY SWITCH ASSEMBLY

CONTENTS

1 GENERAL DESCRIPTION

1.1 Each key switch assembly consists of a diecast frame, containing the plungers, restoring springs and interlocking and restoring slides, mounted on a bracket which carries the contact spring assemblies below a common terminal board. Mounting holes are provided on each assembly for the separate lamp strip, and plunger and retainer assemblies. The contact springs are wired to the terminals of the terminal board or provided with flexible wire leads for connection to other components in the telephone.

1.2 The assemblies are mounted to the base of the 500 type key telephones, by means of three screws, so that the terminal board locates directly underneath the dial and the plungers project through the holes at the front of the housing assembly.

1.3 Several different versions of key switch assemblies are available to meet the requirements of the different types of key telephone instrument circuits (see sections 3 and 5).

2 DISASSEMBLY AND ASSEMBLY

2.1 The various parts of a typical key switch assembly are identified in Fig. 2-1.

2.2 Disassembly of the key switch units should not normally be required unless dirt or dried lubricant is causing the key mechanism to stick. The plunger housing assembly is removed from the bracket assembly by removing the two round head screws and spring washers from underneath the items. The various plungers and slide plates may then be lifted out of the plunger housing. TAKE CAREFUL NOTE OF THE POSITIONS OF THE VARIOUS ITEMS SO THAT REASSEMBLY WILL BE FACILITATED. Reassemble the items in the reverse order, placing the plungers in position first, then the restoring springs (if fitted) and finally the various slide plates. Replace the plunger housing on the bracket and then insert the mounting screws and spring washers.

2.3 The contact spring assemblies should only be removed from the bracket when it is necessary to replace damaged contacts. First remove the two screws holding the terminal board so that it may be moved up, to allow access to the spring assembly mounting screws, then remove the two screws holding the assembly it is desired to remove. Reassemble the parts in the reverse order, referring to Fig. 3-1 to reconnect the various leads.

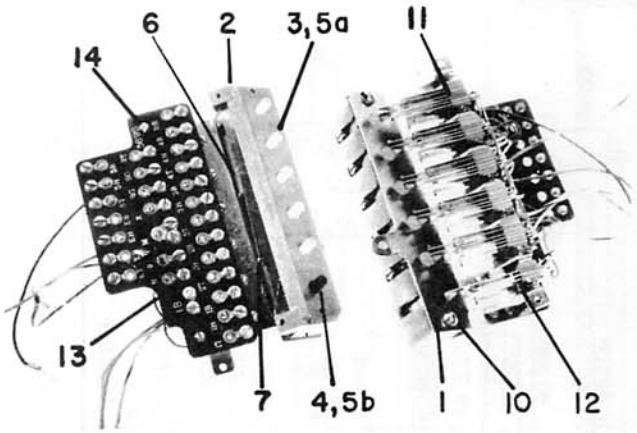

Fig. 2-1 TYPICAL KEY SWITCH

3 TEST AND ADJUSTMENT

3.1 The normal position of the individual contact spring assemblies is with the respective plungers in the raised position and the operated position is with the plunger depressed. The normal position of the complete key switch assembly is with all the plungers in the raised position.

3.2 The interlocking arrangements between the plungers varies with the different assemblies. The arrangements are shown for each type in Fig. 3-1. Key switch assemblies 589(B)740 and 589(H)740 only differ in the type of terminal board fitted and are identical in contact and wiring arrangement.

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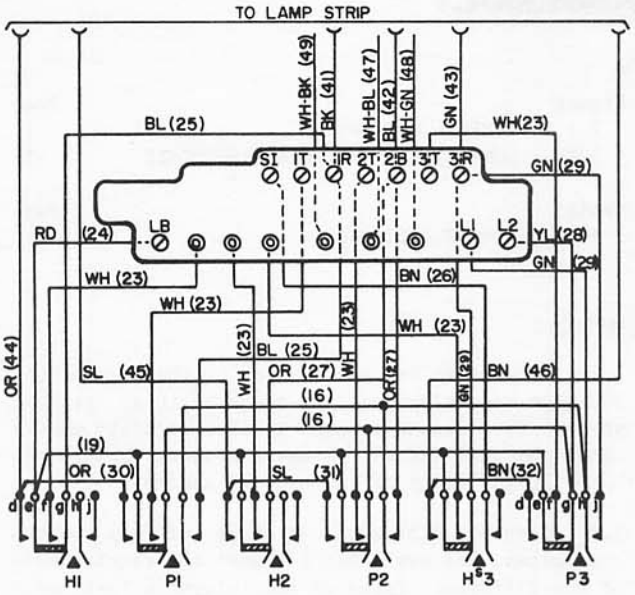
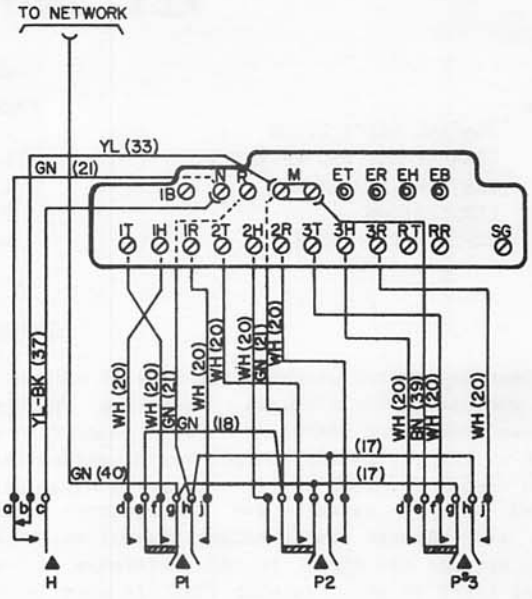


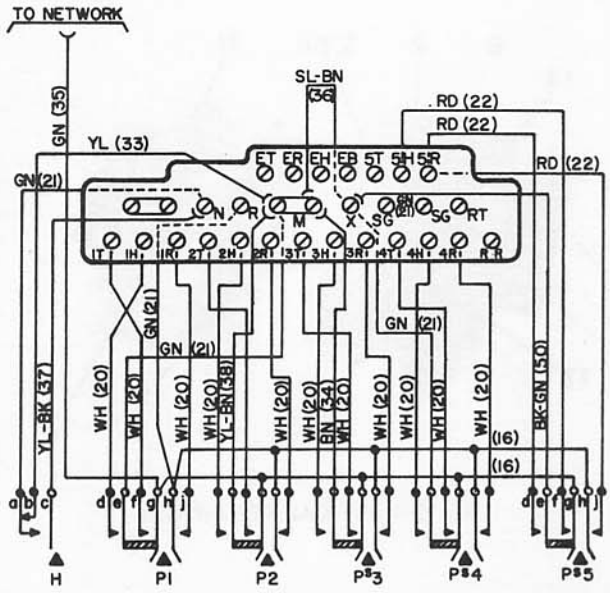
Keys interlocked in pairs. Operation of HOLD key releases interlocked PICK-UP key and vice versa. All PICK-UP keys interlocked to allow only one to be in operated position at any time. Any operated hold keys are automatically released when the handset is replaced in the cradle. Interlocking may be disabled on key HS3 to convert it to a non-locking interphone signalling key.

a) Type 508( )740



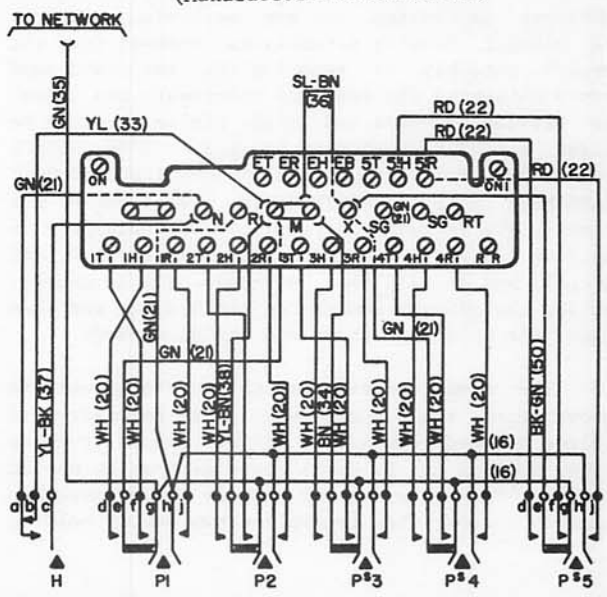
All PICK-UP keys interlocked to allow only one to be in operated position at any time. Operation and release of (non-locking) HOLD key releases any operated PICK-UP key. Interlocking may be disabled on key PS3 to convert it to a non-locking interphone signalling key.

b) Type 588(B)740
(Manufacture Discontinued)



All PICK-UP keys interlocked to allow only one to be in operated position at any time. Operation and release of (non-locking) HOLD key releases any operated PICK-UP key. Interlocking may be disabled on any or all of keys PS3, PS4 and PS5 to convert them to non-locking interphone signalling keys.

c) Type 589(B)740
(Manufacture Discontinued Superseded by 636)



All PICK-UP keys interlocked to allow only one to be in operated position at any time. Operation and release of (non-locking) HOLD key releases any operated PICK-UP key. Interlocking may be disabled on any or all of keys PS3, PS4 and PS5 to convert them to non-locking interphone signalling keys.

d) Type 589(H)740
(Manufacture Discontinued Superseded by 636)

Fig. 3-1 CONTACT AND WIRING ARRANGEMENTS

3.3 PUSH BUTTON ASSEMBLIES

The various slide assemblies in each plunger housing must operate freely, without binding, at any point. Replace any worn or damaged items and lubricate (Section 4) the assembly before making any adjustments to the complete unit.

3.3.1 Plunger Operating Pressures

The pressures, applied to the tip of the plunger and in line with the direction of travel, required to fully depress each plunger must be within the limits given in the following table. Check for dirty, worn or damaged parts if these pressures are not met.

Switch Type:	508( )740	588(B)740 589(B)740 589(H)740
Pick-up Key:		
Must Operate:	24 Ozs.	30 Ozs.
Non Operate:	6 Ozs.	8 Ozs.
Hold Key; with any Pick-up Key Operated:		
Must Operate:	24 Ozs.	68 Ozs.
Non Operate:	6 Ozs.	40 Ozs.

Note: Pick-up key must release when Hold key:
Depressed Released

When any operated plunger is released it must return to its normal position with a snap.

3.3.2 Release Strip

Operation of the release strip must meet the conditions specified below, when the stated pressures are applied to the outside edge of the strip.

Switch Type:	508( )740	588(B)740 589(B)740 589(H)740
Condition:	With all hold keys depressed.	All keys normal.
Action to be obtained:	Release all hold keys.	Move strip to opposite stop.
Must Operate:	6 Ozs.	170 Grams.
Non Operate:	2 Ozs.	120 Grams.

3.4 SPRING ADJUSTMENTS

Adjust the contact springs of each individual spring assembly to meet the requirements detailed in the following paragraphs.

3.4.1 Spring Pressures

The pressure between each pair of closed contacts must be at least 15 grams. This is measured at each tip of the make springs with the assembly in the operated position. The pressure between the break contacts of the make-before-break units is measured at each tip of the make springs with the assembly in the normal position.

3.4.2 Spring Clearances

The clearance between each pair of open contacts, in either the normal or operated condition, must be at least 1/64".

There must be a clearance of at least 1/64" between springs not designed to make electrical contact, when the assembly is normal or operated, and between all springs and the frame assembly.

3.4.3 Contact Sequence

All the make contacts of each individual multi-contact spring assembly must make at approximately the same time.

Release of any operated pick-up key by the operation of the hold key must not take place until the contacts of the hold key are fully operated and, in the case of all assemblies except the type 508( )740, the hold key is allowed to rise.

3.4.4 Plunger Operation

The tip of each fully depressed plunger must overlap the ends of the lever springs by a distance of at least 5/32" but not more than 3/16".

3.5 CONVERSION TO SIGNALLING KEYS

Any of the convertible keys, noted in the diagrams of Fig. 3-1, may be arranged to be used as signalling keys instead of for their designated more usual function. First unscrew the special guide screw by 8 to 10 turns from the shank of the desired plunger. This prevents the plunger from operating the slides in the plunger housing. Then make the appropriate wiring changes as indicated on the circuit diagrams for the instrument. In the case of instruments using the 508( )740 type key assemblies it is also necessary to add a special spring, type 86374, between the telephone baseplate and the loosened guide screw. This spring provides the necessary force to restore the plunger after it is operated.

4 LUBRICATION

4.1 For lasting, trouble-free operation it is essential that all dirty or caked lubricant is removed before fresh lubricant is added. When necessary, disassemble the plunger housing assembly and thoroughly clean all the parts with a good quality, non-filming commercial solvent, using a small brush with stiff bristles.

4.2 Lubricate the assembly, using a small camel hair brush, with a small amount of high quality lubricant, such as ITTK dial lubricant 79946, to each of the rubbing surfaces of the slides, release strip, bracket, plungers and plunger guide screws. AVOID EXCESSIVE LUBRICATION. Operate all the keys for a number of times to spread the lubricant.

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5 REPLACEABLE PARTS

5.1 The component parts of the various key switch assemblies are listed in Table 5-1. The positions of the various wire assemblies may be determined from the diagrams of Fig. 3-1 where each lead is identified by the appropriate item number, from the table below, as well as its color.

Table 5-1 REPLACEABLE PARTS

Item	Description	Number	Quantity per Assembly			
			508( )740	588(B)740	589(B)740	589(H)740
1	Bracket Assembly	79464	1			
2	Plunger Housing Assembly	79520-3	1			
3	Plunger Assembly	79420-2	6			
6	Release Strip	190161	1			
8	Lockout Slide	190165	2			
9	Lockout Slide	79413-2	3			
10	Rd. Hd. Lockwasher Screw	95777-1	2	2	2	2
11	Spring Assembly	79505	6	3	5	5
13	Terminal Board Assembly	190184	1			
14	Rd. Hd. Mach. Screw	71660	14	10	14	14
15	Wire Strap	3697-2	2		2	2
18	Wire Strap	3697-5	1			
22	Wire (WH)	190189-1	6			
23	Wire (RD)	190189-2	1			
24	Wire (BL)	190189-3	2			
25	Wire (BN)	190189-4	1			
26	Wire (OR)	190189-5	2			
27	Wire (YL)	190189-6	1			
28	Wire (GN)	190189-7	3			
29	Wire (OR)	190189-8	1			
30	Wire (SL)	190189-9	1			
31	Wire (BN)	190189-10	1			
40	Wire Assembly (BK)	75326-117	1			
41	Wire Assembly (BL)	75326-118	1			
42	Wire Assembly (GN)	75326-119	1			
43	Wire Assembly (OR)	75326-120	1			
44	Wire Assembly (SL)	75326-121	1			
45	Wire Assembly (BN)	75326-122	1			
46	Wire Assembly (WH-BL)	75326-132	1			
47	Wire Assembly (WH-GN)	75326-133	1			
48	Wire Assembly (WH-BK)	75326-134	1			

TYPE 636 KEY ASSEMBLY

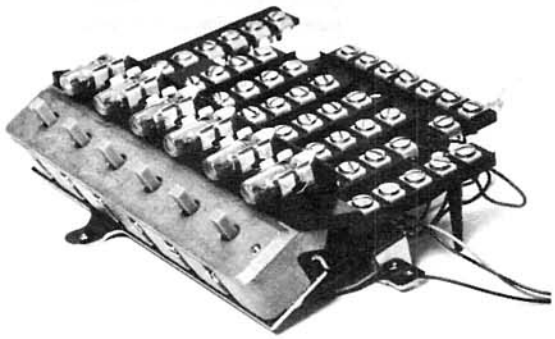

Figure IA. Type 636 Key Assembly, Top View

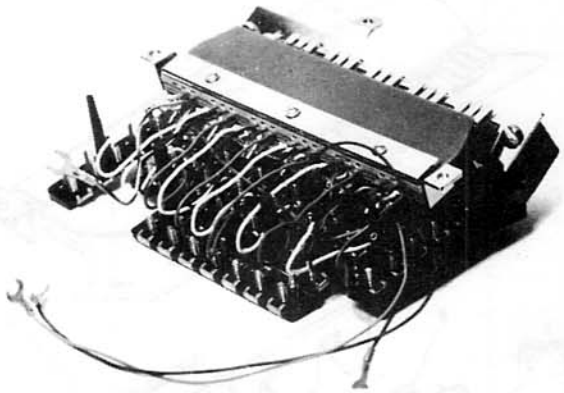

Figure IB. Type 636 Key Assembly, Bottom View

1. GENERAL INFORMATION

The 636 (A)740 Key assembly is used in all current production K-564 and K-565 Key telephones, and in all K-1564, K-2564, and K-2565 Key telephones.

The 636 Key replaces either the 589(B)740 Key or the 589(H)740 Key, and also replaces the Lamp Strip Assembly and the Auxiliary Terminal Board Assembly used with the 589 keys.

2. IDENTIFICATION

The 636 Key is readily identified by the square plungers and the large terminal board assembly which includes the lamp strip. The Spring Bank Assembly (7, figure 2) is of secure one-piece construction. The design eliminates loose pile-up condition and reduces vibration of spring contacts. Most connections beneath the key are made by wire wrap method.

3. DESCRIPTION AND OPERATION

3.1 The key is equipped with one hold key and five pick-up, (line), keys. Three of the pick-up keys may be converted for signalling purposes, (PS3, PS4, and PS5). To convert key from locking to non-locking unscrew the plunger screw (2, figure 2) six or eight turns to clear the Lockout Slides, (12), and change key leads as shown on the circuit diagram of the instrument.

3.2 Any depressed pick-up plunger restores automatically when any other pick-up plunger is depressed. Any depressed pick-up plunger will remain depressed when the HOLD plunger is depressed and will restore when the HOLD plunger is released.

4. PLUNGER AND RELEASE STRIP OPERATING DATA

4.1 GENERAL

(a) When any plunger is released from operated position, it should return to normal with a snap.

(b) When the HOLD plunger is pressed slowly to its bottom position, the toggle pin, (in the plunger housing assembly), must return freely to top of its curved guide slot.

4.2 OPERATING PRESSURES, IN OUNCES

	MAX.	MIN.
Hold Plunger	68	40
Pick-up Plungers	30	8
Release Strip*	170	120

*Force required to move the Release Strip to its opposite stop when no plungers are in operated position.

5. CONTACT SPRING DATA

5.1 CLEARANCES AND CONTACT PRESSURE

(a) Between contact spring and any frame member or between adjacent contact springs insulated from each other, minimum clearance is 1/64 inch.

(b) Between all normally open contacts, contact separation should be 1/32 inch. Normally open contacts should have perceptible follow between "make" and plunger locking.

(c) Pressure between closed contacts should be 15 grams, Minimum.

5.2 CONTACT SEQUENCE (Figure 3)

(a) When HOLD plunger is depressed, contacts a and b should make before contacts c and d break.

(b) Release of a locked pick-up plunger by operation of the HOLD plunger must not occur until contacts a and b make, and contacts c and d break. Normally open contacts of the released pick-up plunger must open before contacts c and d reclose.

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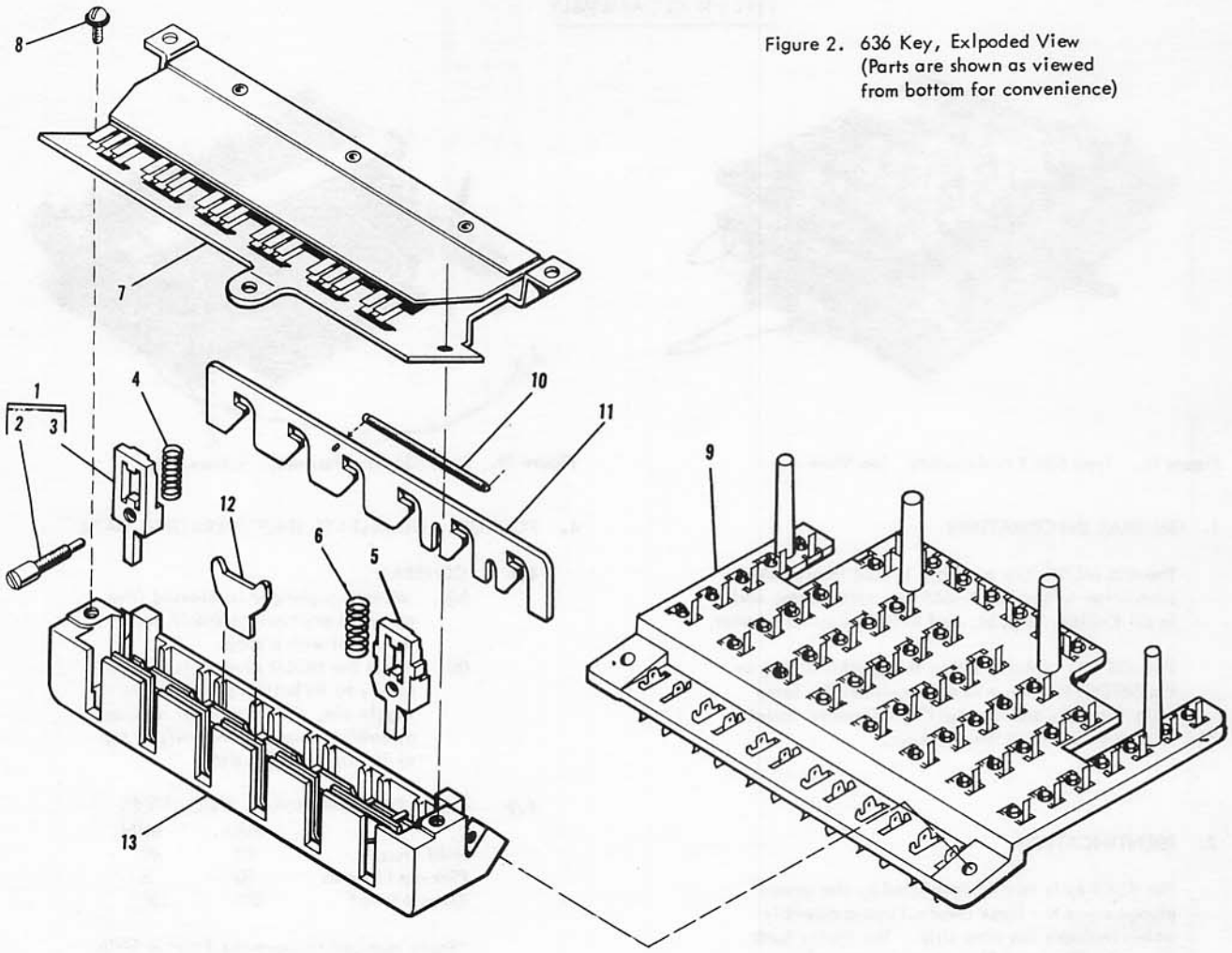

Figure 2. 636 Key, Exlpoded View
(Parts are shown as viewed from bottom for convenience)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 636					
TABLE I, REPLACEABLE PARTS LIST, 636(A)740 KEY ASSEMBLY									
2		636(A)740	KEY ASSEMBLY	1					
	1	88236-1	Plunger Assembly, (Line)	5					
	2	88220-1	Screw	1					
	3	88219-1	Plunger	1					
	4	95984-1	Spring, (Line Plunger)	5					
	5	88218-1	Plunger, (Hold)	1					
	6	95984-2	Spring, (Hold Plunger)	1					
	7	88234-1	Spring Bank Assembly	1					
	8	68200-1	Screw, (Spring Bank Assembly to Plunger Housing	2					
	9	88292-1	Terminal Board Assembly, (Does not include screws)	1					
		79485-2	Screws, (Terminal)	49					
		66559-2	Screw, (Terminal Board to Plunger Housing)	2					
	10	95985-1	Spring, (Release Strip Return)	1					
	11	88296-1	Strip, Plunger Release	1					
	12	79413-1	Slide, Lockout, (Serves as Interlock Pawl)	4					
	13	79520-1	Plunger Housing Assembly	1					

Figure 3. 636 Key, Wiring Diagram
(As Viewed from Rear of Key)

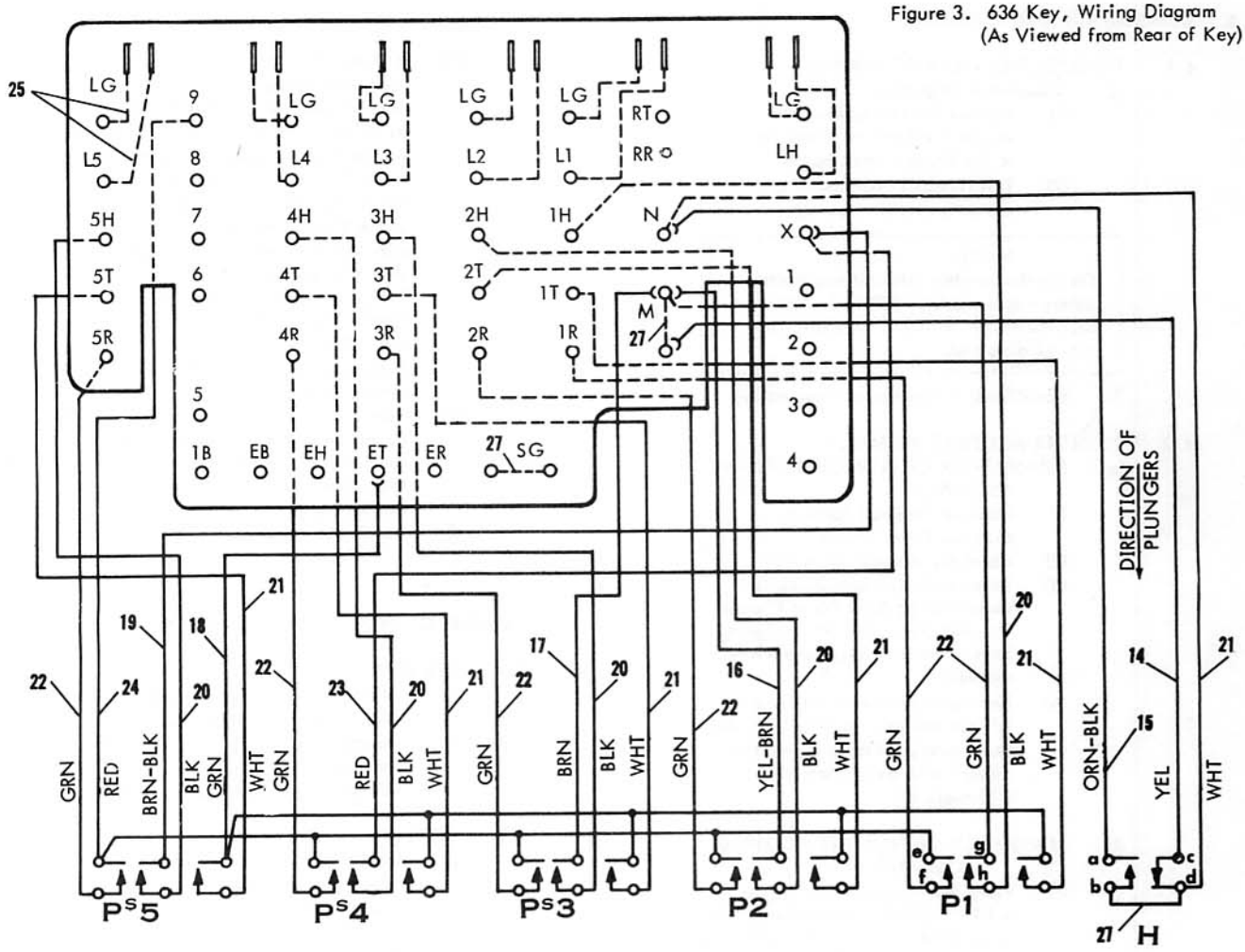

FIGURE NO.	INDEX NO.	PART NUMBER	(Indented items are included in the NAME, Description part under which they are indented)	QUANTITY USED ON: 636					
TABLE I. REPLACEABLE PARTS LIST, 636(A)740 KEY ASSEMBLY, (Continued)									
			636 Key Assembly, Continued						
3	14	190106-151	Wire Assembly, Yellow	1					
	15	190106-152	Wire Assembly, Orange - Black	1					
	16	190106-153	Wire Assembly, Yellow-Brown	1					
	17	190106-154	Wire Assembly, Brown	1					
	18	190106-155	Wire Assembly, Green	1					
	19	190106-156	Wire Assembly, Brown - Black	1					
	20	190189-15	Wire, Black	5					
	21	190189-16	Wire, White	6					
	22	190189-17	Wire, Green	6					
	23	190189-18	Wire, Red	1					
	24	190189-19	Wire, Red	1					
	25	190189-20	Wire, Red (Lamp)	12					
	26	180056	Strap, Ground	1					
	27		Wire, 24 AWG, (.0201), Tinned Copper	As Required					

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6. DISASSEMBLY AND REASSEMBLY

6.1 TO EXPOSE CONCEALED WIRING

(a) Disassembly (Figure 2)

(1) Remove the two screws that secure the Terminal Board (9) to the Plunger Housing (3).

(2) Pull terminal board back to expose concealed wiring.

> NOTE:
> Do not disassemble this unit any further unless a spare spring, 95985-1, (item 10, figure 2) is on hand, as this spring may be distorted.

(b) REASSEMBLY (Reverse of disassembly)

6.2 PLUNGER HOUSING ASSEMBLY

(a) DISASSEMBLY OF PLUNGER HOUSING ASSEMBLY

(1) (Remove Terminal Board as directed in "a" above.

(2) Carefully remove spring (10)

(3) Remove the two screws (8) that secure Spring Bank (7) to Plunger Housing (13). Lift off the Spring Bank, Terminal Board and wiring assembly.

(4) Note positions of all parts and lift out the Release Strip (11), the four Lockout Slides (12) and the plunger and spring assemblies (1 through 5).

(b) REASSEMBLY OF PLUNGER HOUSING ASSEMBLY

(1) Place the Plunger Housing (13) on a FA-190686-2 fixture assembly or on a suitable surface that will allow the square shanks of the plungers (1 and 5) to extend through their respective holes in the housing.

(2) Refer to figure 2, and place each plunger and its captive spring in place in the housing.

(3) Place the four Lockout Slides (12) in position between the screws (2).

(4) Place the Release Strip behind the Plungers and observe that the Plunger Screws and the HOLD Plunger Toggle Pin are in place in their guides in the Release Strip.

(5) If fixture No. FA-90686-2 is not used, the Spring Bank must be worked over the rectangular plungers as follows: Place the Spring Bank on the Plunger Housing and start one screw (8). Hold the assembly in the hands and grasping the square shank of the Plunger nearest the screw, work the parts until the Plunger slips through the rectangular hole in the Spring Bank. Work each Plunger into place in turn until the Spring Bank seats on the Plunger Housing. Install the two screws (8) and tighten.

(6) Carefully install the Spring (10). (Insert one hook of the Spring into the hole in the Release Strip. Insert the opposite hook into the hole in the Spring Bank).

(7) Install the Terminal Board as directed in 6.1 above.

7. CLEANING, INSPECTION AND REPAIR

7.1 CLEANING

(a) When the key is disassembled, clean all parts of the Plunger Housing Assembly with a commercial solvent and wipe dry with a clean cloth. Be sure any caked lubricant is removed.

7.2 INSPECTION AND REPAIR

(a) Inspect all springs for distortion - replace as required.

(b) Inspect the Toggle Pin in the Plunger Housing. The Toggle Pin should remain at its uppermost (vertical) position in the curved guide slot. (Remember that you are observing from the bottom of the Plunger Housing.)

(c) Be sure all caked lubricant is removed from all parts.

(d) Be sure all sliding parts are free of burrs and are not warped.

(e) Replace or repair any defective parts.

8. LUBRICATION

Before reassembly, lubricate each part lightly with ITT K-79946 Dial Lubricant. Wipe off any excess lubricant with a clean cloth.

9. CONVERSION FOR SIGNALLING

To convert Ps3, Ps4, or Ps5 to a non-locking signal button, unscrew the plunger screw (2, figure 2) 6 or 8 turns until it is free of the interlocking mechanism. Make wiring changes according to the appropriate telephone circuit label.

TYPES 598 AND 599 KEY ASSEMBLIES

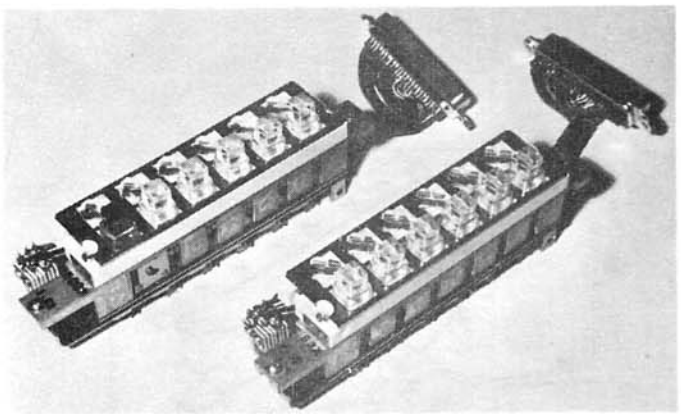

Figure 1. Type 599(X)740 Key Assembly. (Left)
Type 598(X)740 Key Assembly. (Right)

1. GENERAL INFORMATION

The 598 and 599 keys are designed for use in various multi-key telephone subsets.

The 598(A) key has six pick-up buttons, (no "hold" button) , and is equipped with a rigidly mounted quick-connect plug. Designed for use in conjunction with a 599(A) key in multi-key telephone subsets requiring the rigid plug.

The 598(X) key is identical to the 598(A) key except it is equipped with a flexibly connected quick-connect plug. Designed for use in conjunction with a 599(X) key in ITT Corinthian multi-key telephone subsets.

The 599(A) key has five pick-up buttons and one "hold" button. Otherwise similar to 598(A) above.

The 599(X) key has five pick-up buttons and one "hold" button. Otherwise similar to 598(X) above.

These keys have been manufactured with a light shield (29, figure 2). Keys of current manufacture do not include light shield. If light shield is desired, it must be ordered separately.

2. IDENTIFICATION

The 598 and 599 keys are identified by the code which is stamped in ink on the die cast frame. The 598 key has six clear buttons whereas the 599 key has five clear buttons and one red button.

3. OPERATION

Any depressed pick-up button will restore when any other pick-up button is depressed. When any two pick-up buttons are depressed simultaneously, neither will lock in nor operate the contacts of both keys at the same time. Any depressed pick-up button will remain depressed when the hold button is fully depressed and will restore when the hold button is released. When the 598 and 599 keys are installed together, connecting linkage must be provided so that both keys operate as a unit. In ITT "Corinthian" multi-key telephones, a pivot bar assembly (180565-1), return spring (190329-1) and shoulder screw (190354-1) are used to interlink the two assemblies. The coil spring (16, figure 2) and pin (18) are discarded from both keys in this type installation.

4. TECHNICAL DATA

4.1 PLUNGER AND LATCH BAR OPERATING DATA

(a) When any button (or plunger) is released from its operated position, it should return to normal with a snap.

(b) When the hold button (or plunger) is pushed slowly to its bottom position, its toggle pin (A, figure 2) must return freely to the vertical portion of its guide slot.

(c) Operating Forces

	Max.	Min.
Hold Button	88 oz.	40 oz.
Pick-up Buttons	30 oz.	8 oz.
Latch Bar *	375 g.	325 g.

* Force required to move the latch bar (19, figure 2) to its opposite stop when no buttons are in operated position.

4.2 CONTACT SPRING DATA

(a) CLEARANCES AND CONTACT PRESSURE

(1) Between contact spring and any frame member, or between adjacent contact springs insulated from each other, minimum clearance is 1/64 inch.

(2) Between normally-open contacts, minimum contact separation is .01 inch. Normally-open contacts should have perceptible follow between "make" and plunger locking.

(3) Force between closed contact should be 15 grams, minimum.

4.3 CONTACT SEQUENCE (Figure 3)

(a) When the hold-key plunger is depressed, the contacts of springs "a" and "c" shall make before contacts of springs "a" and "b" break and contacts "e" and "f" shall break before contacts "d" and "e" make.

(b) Release of a locked plunger by operation of the hold plunger shall not occur until the normally made contacts of the hold combination have opened and the normally opened contacts have closed.

(c) Release of a locked plunger by operation of the hold plunger shall open the normally open contacts of the locking combination before the normally closed contacts of the hold combination are closed.

(d) When the plunger of any pick-up key is depressed, contacts of springs "g" and "h", "j" and "k" and "l" and "m" shall close simultaneously.

(e) Chaining Switch

The normally closed contacts of the chaining pileup shall break when a pickup key plunger is depressed and before the "make" contacts of the pick-up spring combination have made.

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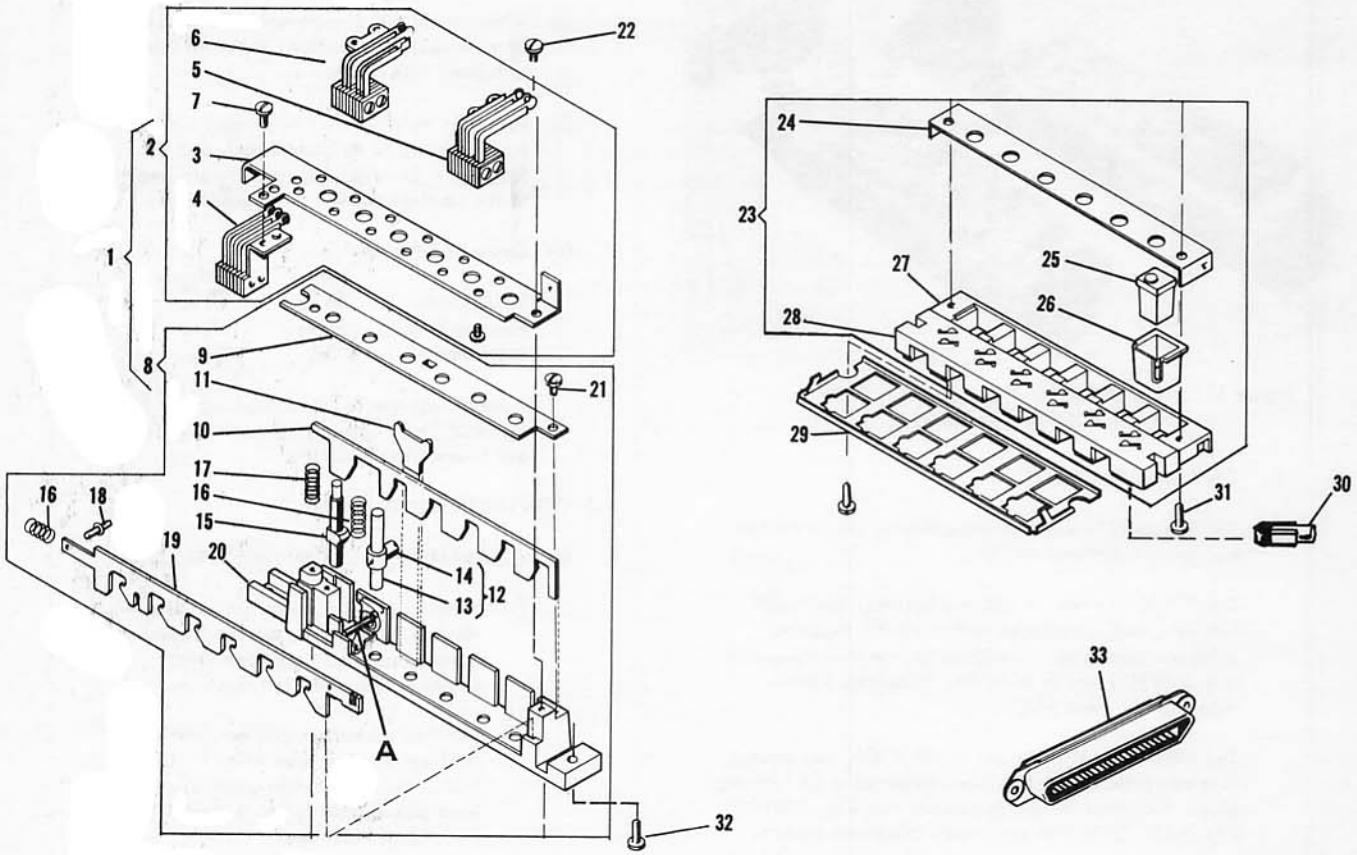

Figure 2. 598 and 599 Keys, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 598 (A)	598 (X)	599 (A)	599 (X)		
		TABLE I.	REPLACEABLE PARTS LIST K-598 and K-599 KEY ASSEMBLIES						
		598 (A) 740	KEY ASSEMBLY, 6-Line, (Rigid Connector)						
		598 (X) 740	KEY ASSEMBLY, 6-Line, (Flexible Connector)						
		599 (A) 740	KEY ASSEMBLY, 5-line with hold, (Rigid Connector)						
		599 (X) 740	KEY ASSEMBLY, 5-line with hold, (Flexible Connector)						
	1	190420-1	PLUNGER AND SPRING ASSEMBLY, (Has hold plunger) (Includes items 2 thru 21)	-	-	1	1		
	1	190452-1	PLUNGER AND SPRING ASSEMBLY, (6 line plungers) (Includes items 2 thru 21 except items 6, 15, and 17)	1	1	-	-		
	2	190386-1	BASE PLATE AND SPRING ASSEMBLY	-	-	1	1		
	2	190451-1	BASE PLATE AND SPRING ASSEMBLY	1	1	-	-		
	3	190387-1	PLATE, Spring Base						
	4	190390-1	SPRING ASSEMBLY, Position 1 (Chaining Switch) (Order of Assembly is shown in parenthesis)	1	1	1	1		
		190411-1	BRACKET, Spring, (1)	1	1	1	1		
		190417-2	INSULATOR, (3,5,7,9,11,13,15)	7	7	7	7		
		79426-1	WASHER, Metal (16)	1	1	1	1		
		190393-1	CONTACT SPRING ASSEMBLY, (14)	1	1	1	1		
		190403-1	CONTACT SPRING ASSEMBLY, (4,8,12)	3	3	3	3		
		190407-1	CONTACT SPRING ASSEMBLY, (10)	1	1	1	1		
		190408-1	CONTACT SPRING ASSEMBLY, (6)	1	1	1	1		
		32475-1	BUSHING (2)	2	2	2	2		
		190485-2	SCREW (17)	2	2	2	2		

FIGURE NO.	INDEX NO.	PART NUMBER	(Indented items are included in the NAME, Description part under which they are indented)	QUANTITY USED ON: 598 (A)	598 (X)	599 (A)	599 (X)		
	TABLE I.		REPLACEABLE PARTS LIST, K-598 and K-599 KEY ASSEMBLIES (Cont'd)						
			BASE PLATE AND SPRING ASSEMBLY (Cont'd)						
	5	190389-1	SPRING ASSEMBLY, (Line Pickup) (Order of assembly is shown in parenthesis)	6	6	5	5		
		190412-1	BRACKET, Spring, (1)	1	1	1	1		
		190417-1	INSULATOR, (3,5,7,9,14)	5	5	5	5		
		190417-3	INSULATOR, (11,12,16)	3	3	3	3		
		79426-1	WASHER, Metal (17)	1	1	1	1		
		190415-1	PLUNGER SPRING ASSEMBLY, (10)	1	1	1	1		
		190416-1	PLUNGER SPRING ASSEMBLY, (13)	1	1	1	1		
		190403-1	CONTACT SPRING ASSEMBLY, (15)	1	1	1	1		
		190404-1	CONTACT SPRING ASSEMBLY, (4 and 8)	2	2	2	2		
		190405-1	CONTACT SPRING ASSEMBLY, (6)	1	1	1	1		
		29220-1	BUSHING (2)	2	2	2	2		
		190485-4	SCREW (18)	2	2	2	2		
	6	190388-1	SPRING ASSEMBLY, "Hold" (Order of assembly is shown in parenthesis)	-	-	1	1		
		190412-1	BRACKET, Spring, (1)	-	-	1	1		
		190417-1	INSULATOR, (16, 18)	-	-	2	2		
		190417-2	INSULATOR, (5,7,9,11,12,14)	-	-	6	6		
		79426-1	WASHER, Metal; Thin (3, 19)	-	-	2	2		
		79426-3	WASHER, Metal; Thick (4)	-	-	1	1		
		190391-2	CONTACT SPRING ASSEMBLY, (15)	-	-	1	1		
		190392-1	CONTACT SPRING ASSEMBLY, (17)	-	-	1	1		
		190393-1	CONTACT SPRING ASSEMBLY, (6)	-	-	1	1		
		190394-1	CONTACT SPRING ASSEMBLY, (8)	-	-	1	1		
		190395-1	PLUNGER SPRING ASSEMBLY, (10)	-	-	1	1		
		190396-1	PLUNGER SPRING ASSEMBLY, (13)	-	-	1	1		
		29219-1	BUSHING (2)	-	-	2	2		
		190485-6	SCREW (20)	-	-	2	2		
	7	69020-3	SCREW, SPRING ATTACHING	7	7	7	7		
	8	190419-1	FRAME AND PLUNGER ASSEMBLY, (Has hold plunger)	-	-	1	1		
	8	190453-1	FRAME AND PLUNGER ASSEMBLY	1	1	-	-		
	9	190431-1	PLATE	1	1	1	1		
	10	190432-1	BAR, Chaining	1	1	1	1		
	11	79413-1	SLIDE, Lockout	5	5	4	4		
	12	190495-1	PLUNGER ASSEMBLY, (Line Pickup)	6	6	5	5		
	13	190434-1	PLUNGER	6	6	5	5		
	14	190439-1	SCREW, Special	6	6	5	5		
	15	190438-1	PLUNGER, Hold	-	-	1	1		
	16	190433-1	SPRING, Line pickup plunger and latch bar	7	7	6	6		
	17	190433-2	SPRING, Hold plunger	-	-	1	1		
	18	190414-1	PIN, Latch Bar	1	1	1	1		
	19	190435-1	BAR, Latch	1	1	1	1		
	20	190426-1	FRAME, Bracket, Hairspring and Toggle pin assembly	1	1	1	1		
	21	79485-2	SCREW	2	2	2	2		
	22	79485-2	SCREW, (Same as Item 21)	2	2	2	2		
	23	190376-3	LAMP BLOCK ASSEMBLY	-	-	1	1		
	23	190376-4	LAMP BLOCK ASSEMBLY	1	1	-	-		
	24	190381-1	RETAINER, Plunger	1	1	1	1		
	25	190379-1	BUTTON, Clear	6	6	5	5		
	25	190379-2	BUTTON, Red	-	-	1	1		
	26	190378-1	COLLAR	6	6	6	6		
	27	190382-1	TERMINAL	12	12	12	12		
	28	190377-1	BLOCK, Lamp	1	1	1	1		
	29	190380-1	SHIELD, Light (Not Required)	1	1	1	1		
	30	51 (A) 745	LAMP	6	6	6	6		
	31	74909-2	SCREW, Lamp Block to Frame	2	2	2	2		
	32	95992-2	SCREW, Cabinet Lock, (Key Mounting)	2	2	2	2		
	33	190473	CONNECTOR	1	1	1	1		
		67042-3	SCREW, Connector Mounting	2	2	2	2		
	34	190384-1	BRACKET, Key Mounting (Not Shown)	1	-	1	-		
		63261-3	SCREW, Bracket to Key	1	-	1	-		

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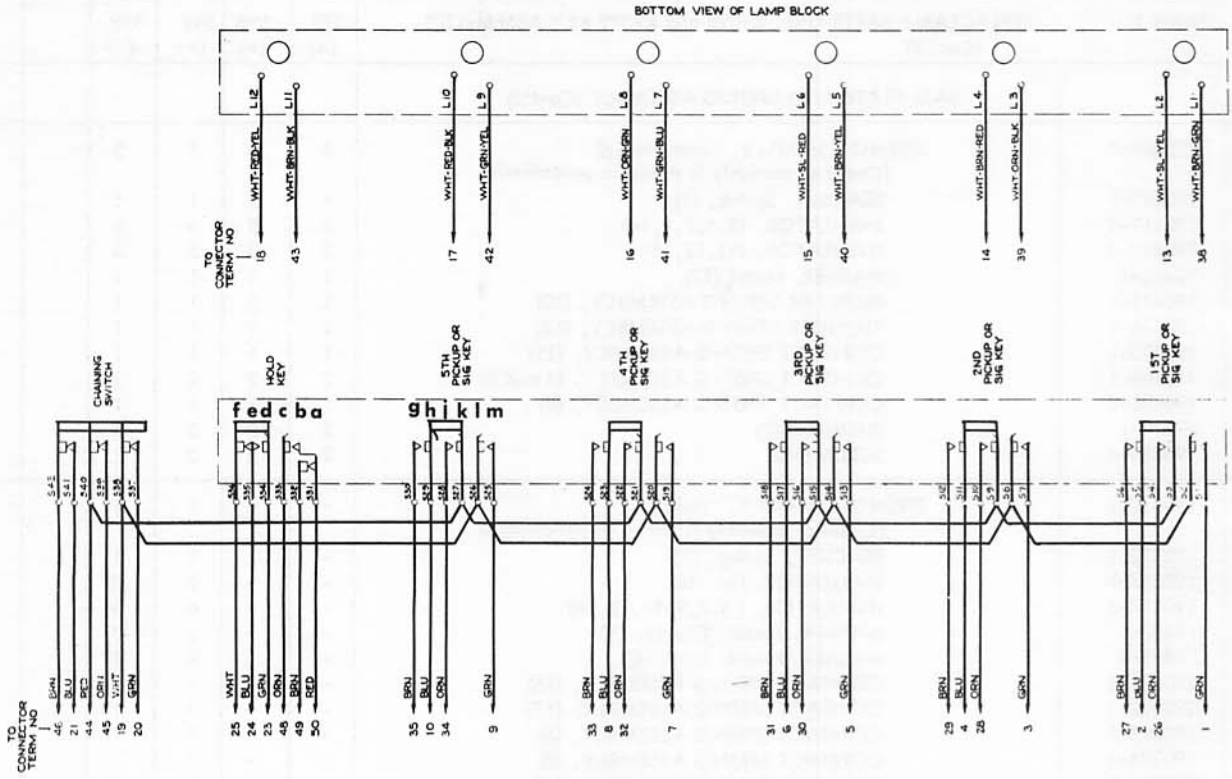

Figure 3. Schematic, 599 Key

To convert key to non-locking operation, remove the plunger screw from the key position involved and make wiring changes as shown on telephone circuit label.

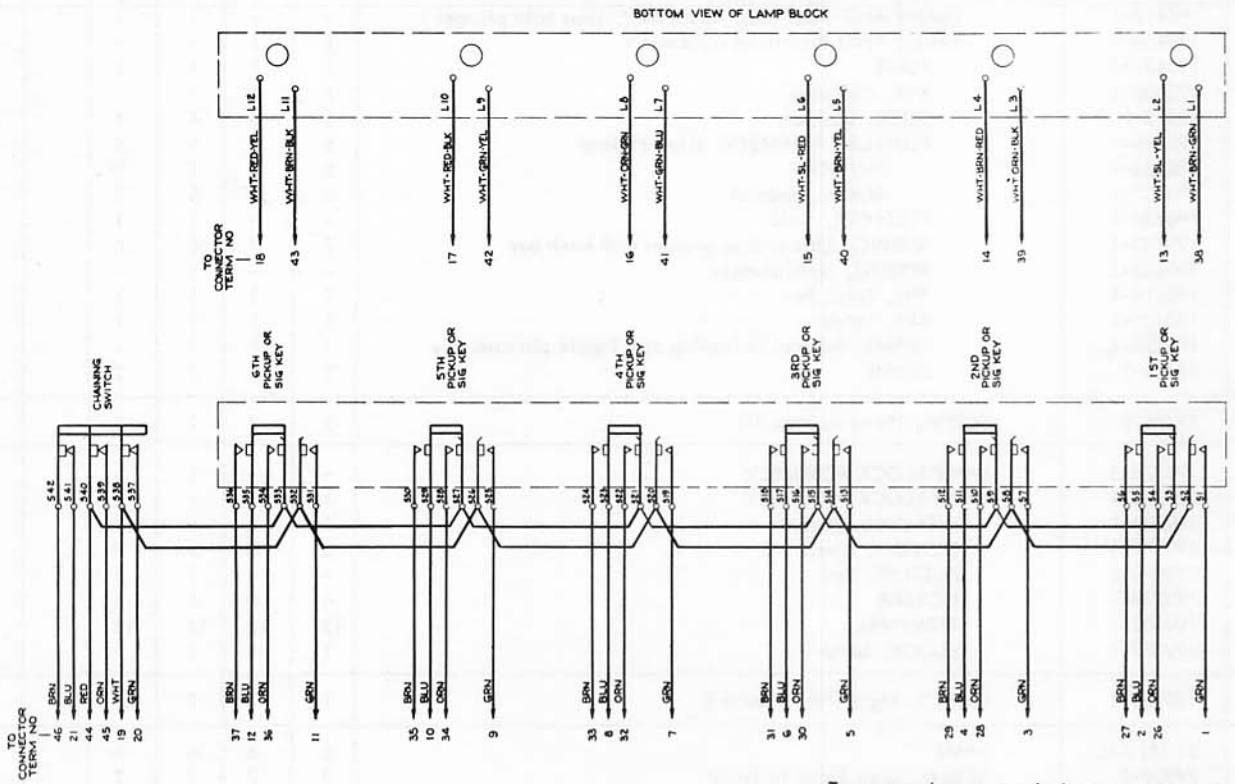

Figure 4. Schematic, 598 Key

To convert key to non-locking operation, remove the plunger screw from the key position involved and make wiring changes as shown on telephone circuit label.

Chapter 3

INSTRUMENTS AND RELATED UNITS

THE K107A TELEPHONE LOUDSPEAKER

The K-107A loudspeaker is designed for use with a standard telephone set, permitting a group of people to overhear both sides of a telephone conversation. A combination volume control and on-off switch is provided on the front panel. The loudspeaker is encased in a plastic housing available in color and equipped with a 4-conductor 9-foot cord also in color.
An external power supply of 18 to 22 volts AC or DC is required. Height, 4 inches; width, 5 5/8 inches; depth, 3 3/4 inches.

Figure 1. K-107(A) Telephone Loudspeaker

GENERAL INSTRUCTIONS

POWER SUPPLY.

The K-107A loudspeaker is designed to use a K-31(A)690 transformer, which requires a 105- to 125- volt ac receptacle (see figure 2). When incorporated in a key-phone system, the system power supply (18-volt ac) can be used (see figures 3 and 4). The maximum length of inside wire (IW) cable should not exceed 200 feet from the power supply to the K-107A speaker. Other power supplies may be used, such as the 18-volt ac terminals of a power plant.

CONNECTIONS.

The loudspeaker is connected to the telephone set receiver circuit and is under control of the switchhook and off-normal dial contacts. (Two spare conductors in the telephone set mounting cord or a separate 2-conductor mounting cord will be required.) Figure 2 illustrates the loudspeaker connections employing the K-31(A)690 transformer as a power supply and using a separate 2-conductor mounting cord. In this type installation, the 2-conductor cord, part No. 3031**(06)650, the transformer, and the 29( )783 connecting block must be ordered separately. If a single mounting cord is desired and the present telephone mounting cord does not have two spare conductors, a 6-conductor cord must be ordered separately in lieu of the 2-conductor cord.

LOCATION.

A minimum separation of 3 feet should be maintained between the loudspeaker and the associated telephone instrument to prevent feedback. Greater separation will permit a higher volume adjustment without feedback, for maximum efficiency, the wire distance between the loud speaker and the associated telephone set should not exceed 100 feet of IW cable.

OPERATION.

The telephone instrument used in conjunction with the K-107A loudspeaker is used in the normal manner. The handset of the telephone instrument must be off hook to use the speaker. Turn the on-off switch on the front panel clockwise to connect the power supply and adjust the volume to a satisfactory level. Turn the loudspeaker off when not in use. The telephone may be used in the normal manner with the loudspeaker turned off.

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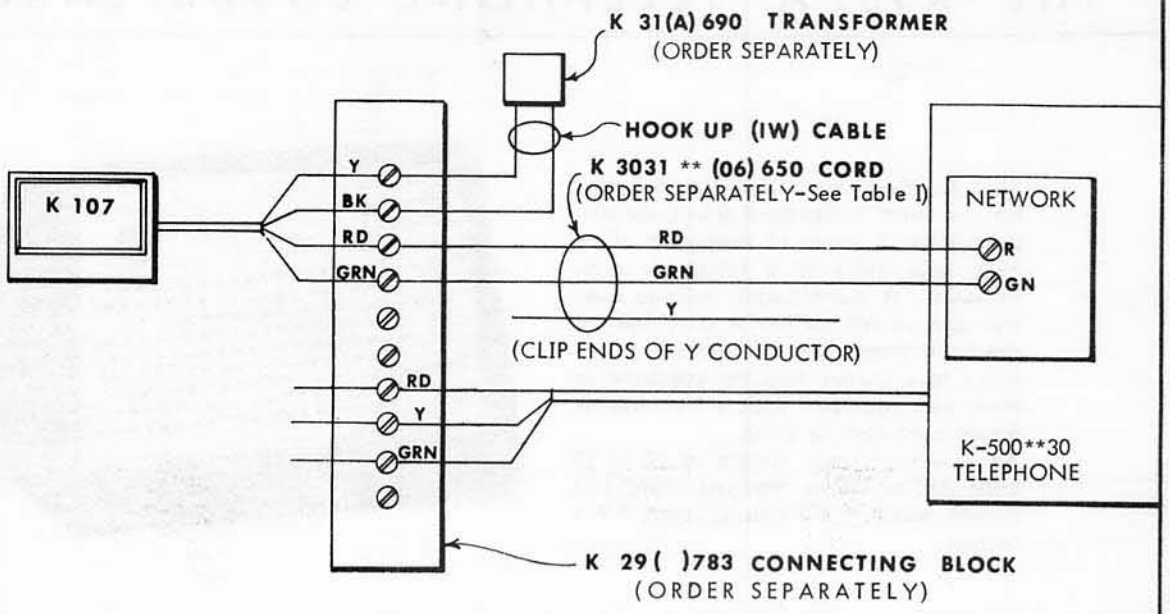
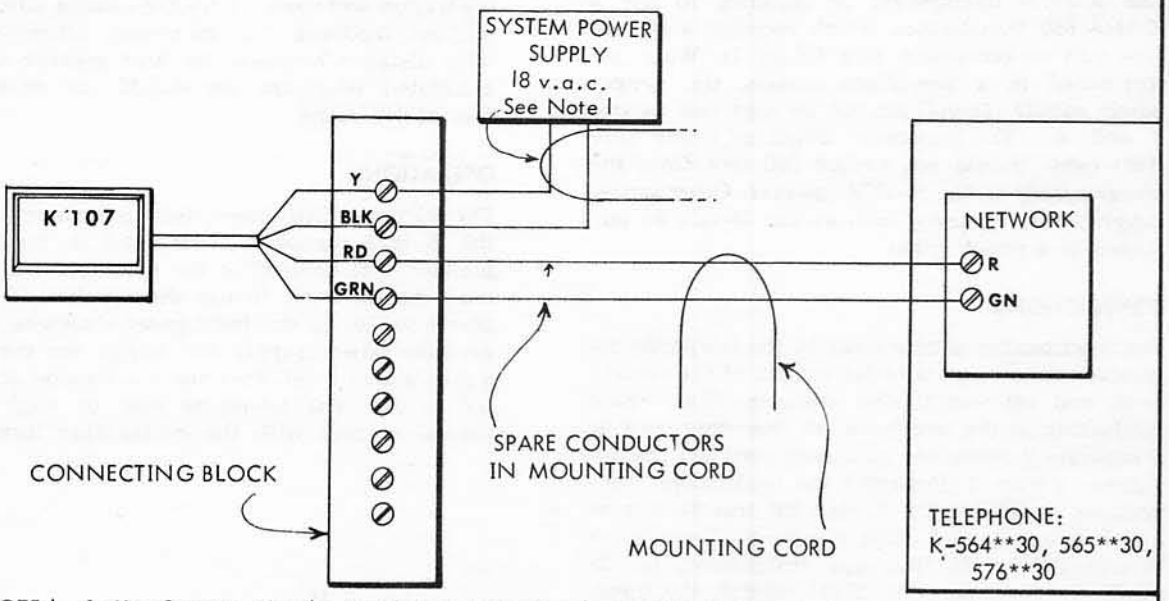


Figure 2. Loudspeaker Connections for K-500**30 Telephone. Transformer, Telephone Connecting Cord, and 10-Point Connecting Block Must be Ordered Separately.

A 6-Conductor Cord Can be Used in Place of the Original Telephone Mounting Cord and K-3031**(06)650 Cord.



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.

Figure 3. Loudspeaker Connections for K-564**30, K-565**30, and K-576**30 Telephones.

** Substitute Color Code Number

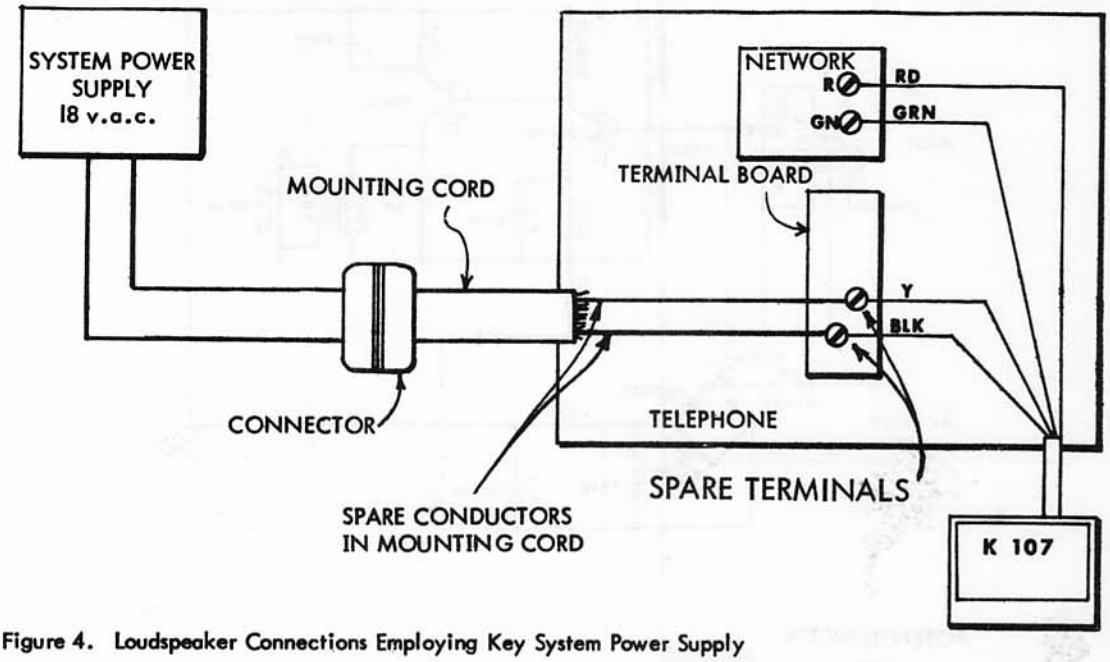


Figure 4. Loudspeaker Connections Employing Key System Power Supply

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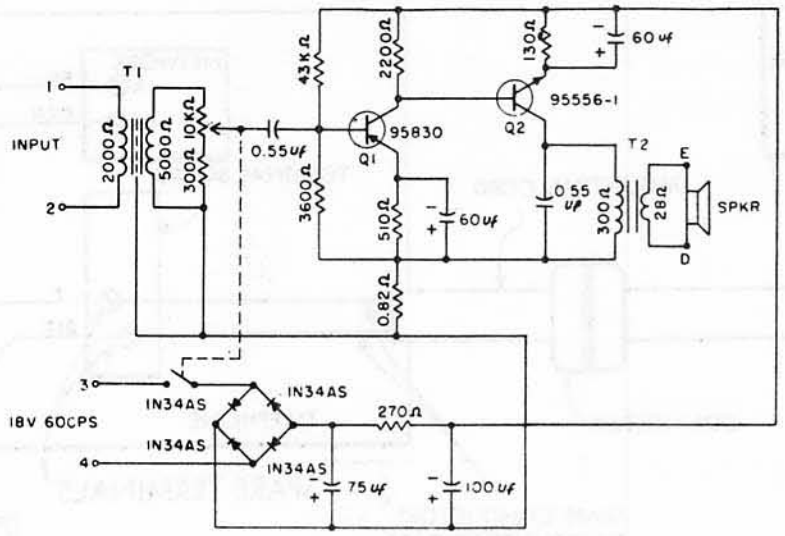
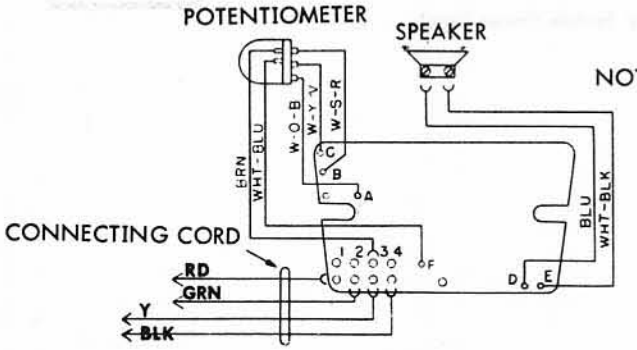


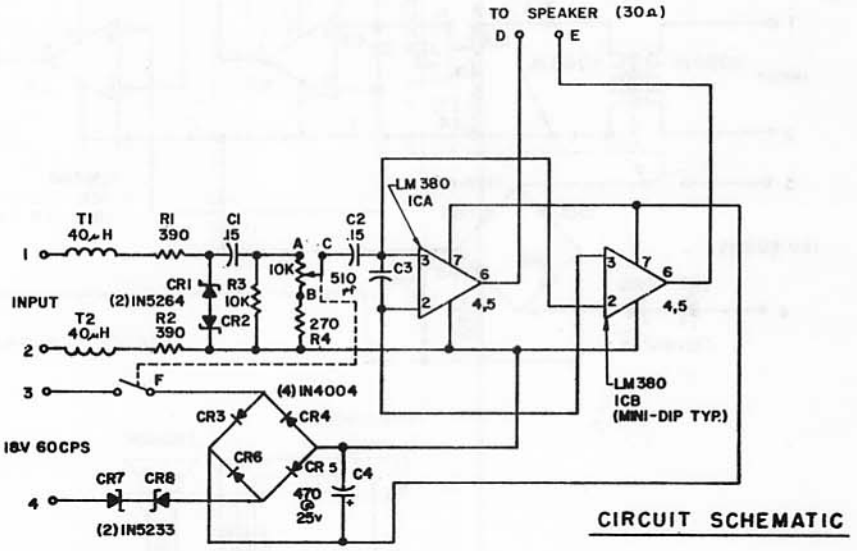


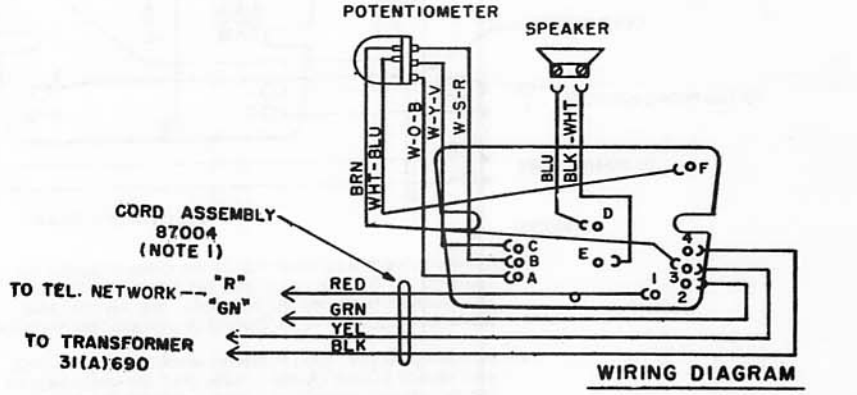
NOTE: Connect the red conductor of the connecting cord to terminal (R) and the green conductor to terminal (GN) on the network. Connect the yellow and black conductors to the 18v output of 31(A)690 transformer or key system power supply.

Figure 5. Circuit Schematic, (Issue 1)

NOTICE

THIS K107A MUST BE USED ONLY WITH 31A TRANSFORMER.





NOTES:

1 - CONNECT THE RED CONDUCTOR OF THE CORD ASSEMBLY TO TERMINAL (R) ON THE NETWORK, THE GREEN CONDUCTOR TO TERMINAL (GN) ON THE NETWORK, THE YELLOW AND BLACK CONDUCTORS TO THE 18V OUTPUT OF 31(A) 690 TRANSFORMER.

2 - TO TURN UNIT ON, TURN POTENTIOMETER KNOB CLOCKWISE AND ADJUST SOUND OUTPUT. TURN UNIT OFF WHEN NOT IN USE BY TURNING KNOB TO EXTREME COUNTER-CLOCKWISE POSITION.

21629, Issue 3

Figure 6. Circuit Schematic, (Issue 3)

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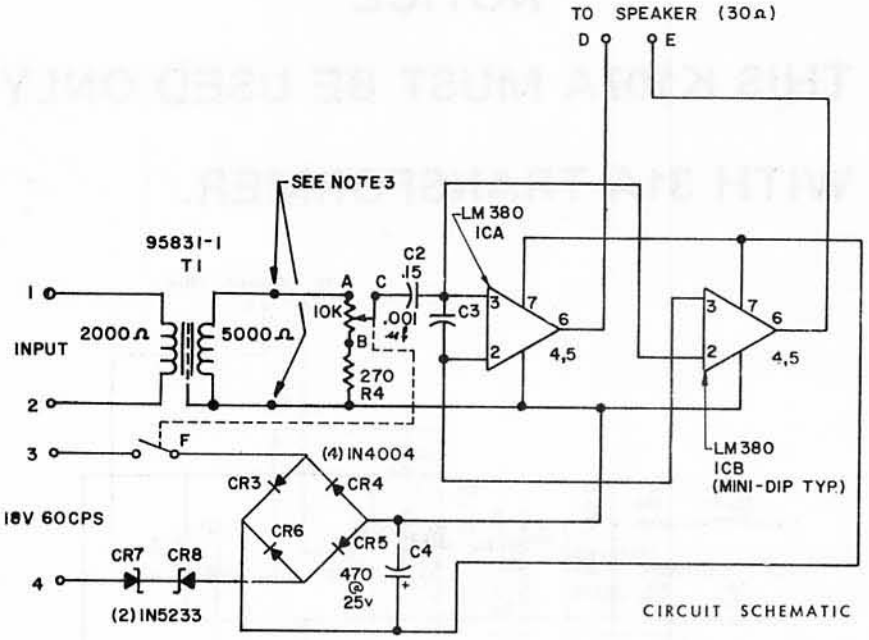
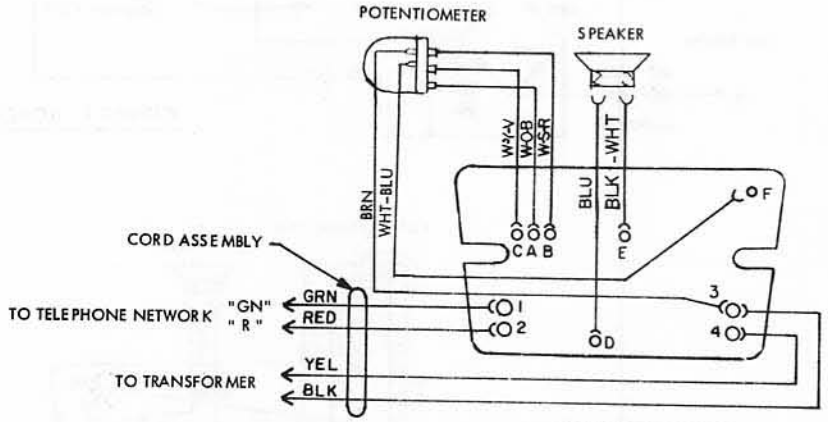


CIRCUIT SCHEMATIC



WIRING DIAGRAM

NOTES:

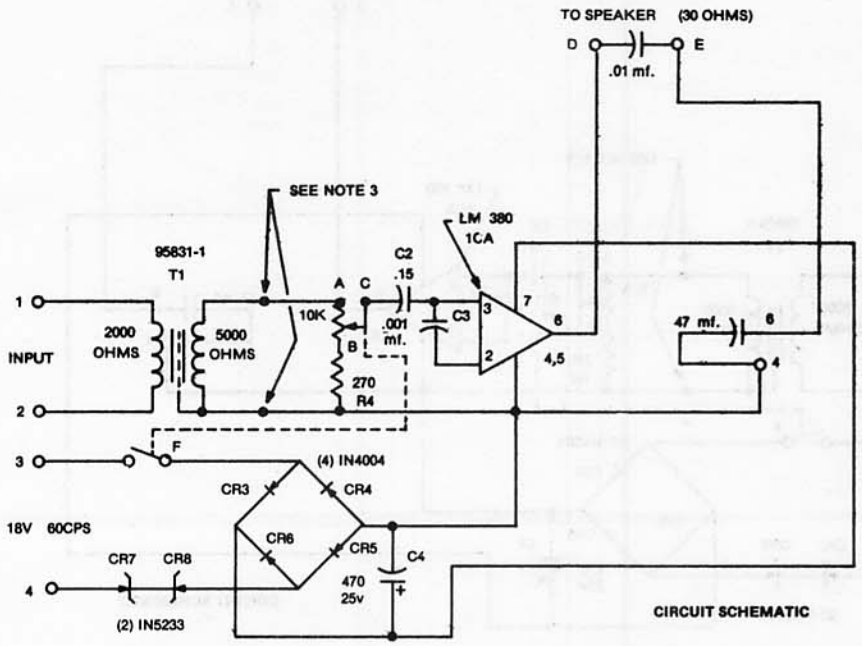
1 - CONNECT THE RED CONDUCTOR OF THE CORD ASSEMBLY TO TERMINAL (R) ON THE NETWORK, THE GREEN CONDUCTOR TO TERMINAL (GN) ON THE NETWORK, THE YELLOW AND BLACK CONDUCTORS TO 18V OUTPUT OF 31(A)690 TRANSFORMER.

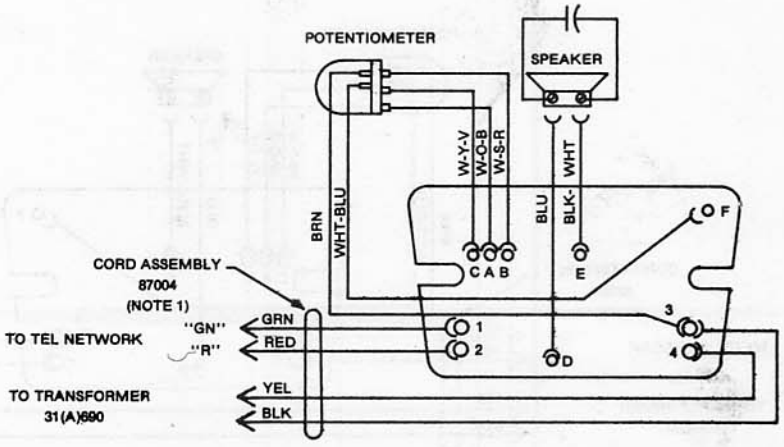
2 - TO TURN UNIT ON, TURN POTENTIOMETER KNOB CLOCKWISE AND ADJUST SOUND OUTPUT. TURN UNIT OFF WHEN NOT IN USE BY TURNING KNOB TO EXTREME COUNTER-CLOCKWISE POSITION.

3 - TWO EXTRA CIRCUITS RUNS AND PADS HAVE BEEN PLACED ON THE CIRCUIT BOARD. THEY ORIGINATE FROM THE TWO POINTS SHOWN ON THE SCHEMATIC. A COMPONENT MAY BE PLACED ACROSS THESE PADS, AS THE NEED ARISES, BECAUSE OF REQUIREMENTS FOR ADDED LIGHTNING PROTECTION, FREQUENCY COMPENSATION, ETC.

21629, Issue 4

Figure 7. Circuit Schematic, (Issue 4)





NOTES:

1 - CONNECT THE RED CONDUCTOR OF THE CORD ASSEMBLY TO TERMINAL (R) ON THE NETWORK, THE GREEN CONDUCTOR TO TERMINAL (GN) ON THE NETWORK, THE YELLOW AND BLACK CONDUCTORS TO 18V OUTPUT OF 31(A)690 TRANSFORMER.

2 - TO TURN UNIT ON, TURN POTENTIOMETER KNOB CLOCKWISE AND ADJUST SOUND OUTPUT. TURN UNIT OFF WHEN NOT IN USE BY TURNING KNOB TO EXTREME COUNTER-CLOCKWISE POSITION.

3 - TWO EXTRA CIRCUITS RUNS AND PADS HAVE BEEN PLACED ON THE CIRCUIT BOARD. THEY ORIGINATE FROM THE TWO POINTS SHOWN ON THE SCHEMATIC. A COMPONENT MAY BE PLACED ACROSS THESE PADS, AS THE NEED ARISES, BECAUSE OF REQUIREMENTS FOR ADDED LIGHTNING PROTECTION, FREQUENCY COMPENSATION, ETC.

Figure 8. Circuit Schematic, (Issue 5)

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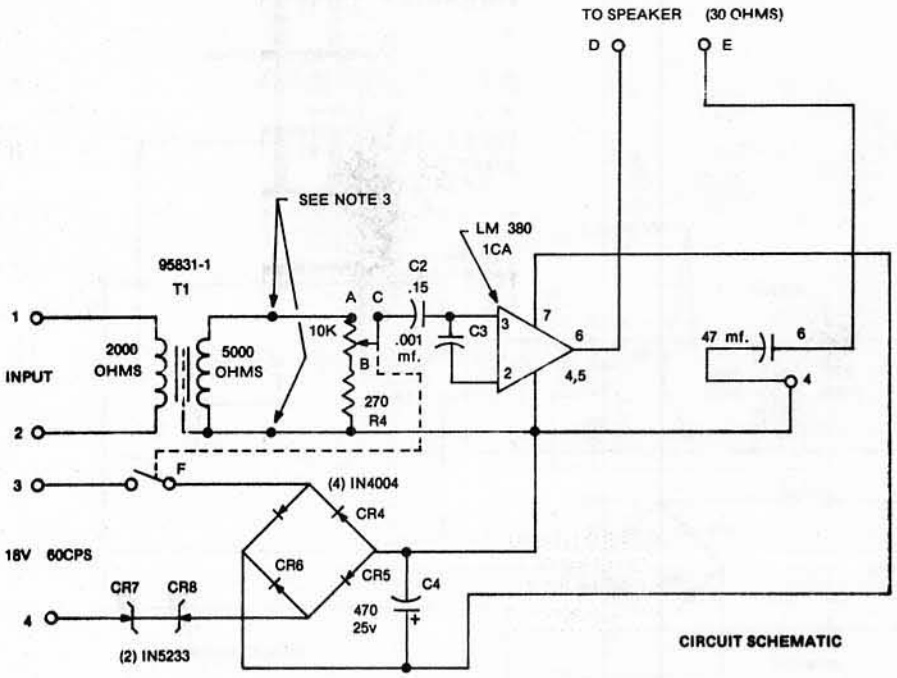

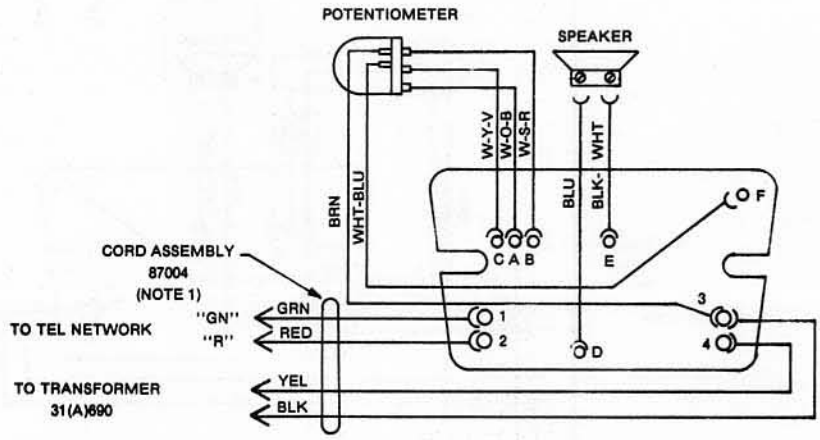

NOTES:

1. Connect the red conductor of the cord assembly to terminal (R) on the network, the green conductor to terminal (GN) on the network, the yellow and black conductors to 18V output of 31(A)690 Transformer.

2. To turn unit on, turn potentiometer knob clockwise and adjust sound output. Turn unit off when not in use by turning knob to extreme counter-clockwise position.

3. Two extra circuit runs and pads have been placed on the circuit board. They originate from the two points shown on the schematic. A component may be placed across these pads, as the need arises, because of requirements for added lightning protection, frequency compensation, etc.

Figure 9. Circuit Schematic, (Issue 6)

K-500 SERIES WALL TELEPHONES

Figure 1. K-500 Series Wall Telephone

1. SCOPE

Section 332 covers general information, parts lists and circuit diagrams for all K-500 series wall mounting telephones - single line and two-line.

2. IDENTIFICATION

Each telephone is identified by a code number stamped in ink on the base. See Table I, Ordering Information, for explanation of each code number.

3. DESCRIPTION AND OPERATION

The K-500 series wall mounting telephones are anti-sidetone, rotary dial type units which will operate efficiently over a wide range of loop resistance and line impedance. They are available in single-line and two-line versions.

3.1 SINGLE-LINE TELEPHONES

The single-line wall telephone is available with any of four special feature options: 30 indicates no special feature; 33 indicates "lift-to-talk" feature; 34 indicates pushbutton ground; 35 indicates separate ring and talk circuits.

K-554**( )30. STANDARD WALL TELEPHONE.

Standard rotary dial wall telephone. Options in the instrument provide for any class of service on any type of automatic or manual central office or private exchange equipment. (Some types of PABX equipment require grounding button - special feature 34.)

K-554**( )33. LIFT-TO-TALK WALL TELEPHONE
Fitted with special detent type hookswitch. Lifting the handset allows the cradle hook to rise only to the detent position. A capacitor in series with the line prevents dialing or talking, but allows reception. A party line subscriber can thus check for a busy line without disturbing a call in progress. Moving the cradle hook to the left allows it to go to full off-hook position to permit dialing and talking. Replacing the handset returns the cradle hook to full on-hook position - resetting the detent mechanism.

K-554**( )34. TELEPHONE WITH GROUNDING BUTTON

A pushbutton switch provides a signaling (grounding) circuit required on some PABX equipment. The K-554**( )30 may be converted to K-554**( )34 by installing 79095-1 pushbutton assembly and connecting as shown in circuit for K-554**( )34.

K-554**( )35. TELEPHONE WITH SEPARATE RING AND TALK CIRCUITS

Ringing and talking are accomplished over separate two-wire circuits. May be equipped with a 20 cps biased ringer or a buzzer may be installed in the instrument if direct current is to be used for signaling.

3.2 TWO-LINE TELEPHONES

Two versions are available, the standard 2-line wall telephone (K-558) or the 2-line wall telephone with HOLD feature (K-555).

K-558**( )30. TWO-LINE WALL TELEPHONE

A turn and push key permits selecting either of two lines. The push section of the key is provided for signaling if required. The ringer is permanently connected to line 1 and a separate ringer must be provided for line 2.

K-555**( )30. TWO-LINE WALL TELEPHONE WITH "HOLD"

Similar to the K-558 except equipped with HOLD feature. 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.

TABLE I. ORDERING INFORMATION

CODE	DESCRIPTION
K-554**( )30__	TELEPHONE, Wall, Standard
K-554**( )33__	TELEPHONE, Wall, Lift-to-talk
K-554**( )34__	TELEPHONE, Wall, Pushbutton ground.
K-554**( )35__	TELEPHONE, Wall, Separate Ring and Talk
K-555**( )30__	TELEPHONE, Wall, 2-line with HOLD
K-558**( )30__	TELEPHONE, Wall, 2-Line

Add dial code:

R - Regular (Numerals only)
M-Metro (Letters and numerals)
N-No dial - has dial blank

Add Ringer Code:

(LR) - Less Ringer
(BA) - Straight Line Biased Ringer
(TBA) - Straight Line Biased Ringer, with gas tube for superimposed signaling.
(---) - Frequency Selective Ringer (Specify ringer, see page 332.04)

Substitute Color Code:

00 - Black 09 - Ivory 14 - Gray
02 - Red 11 - Pink 15 - White
04 - Yellow 12 - Blue 16 - Sea Green
05 - Green 13 - Beige

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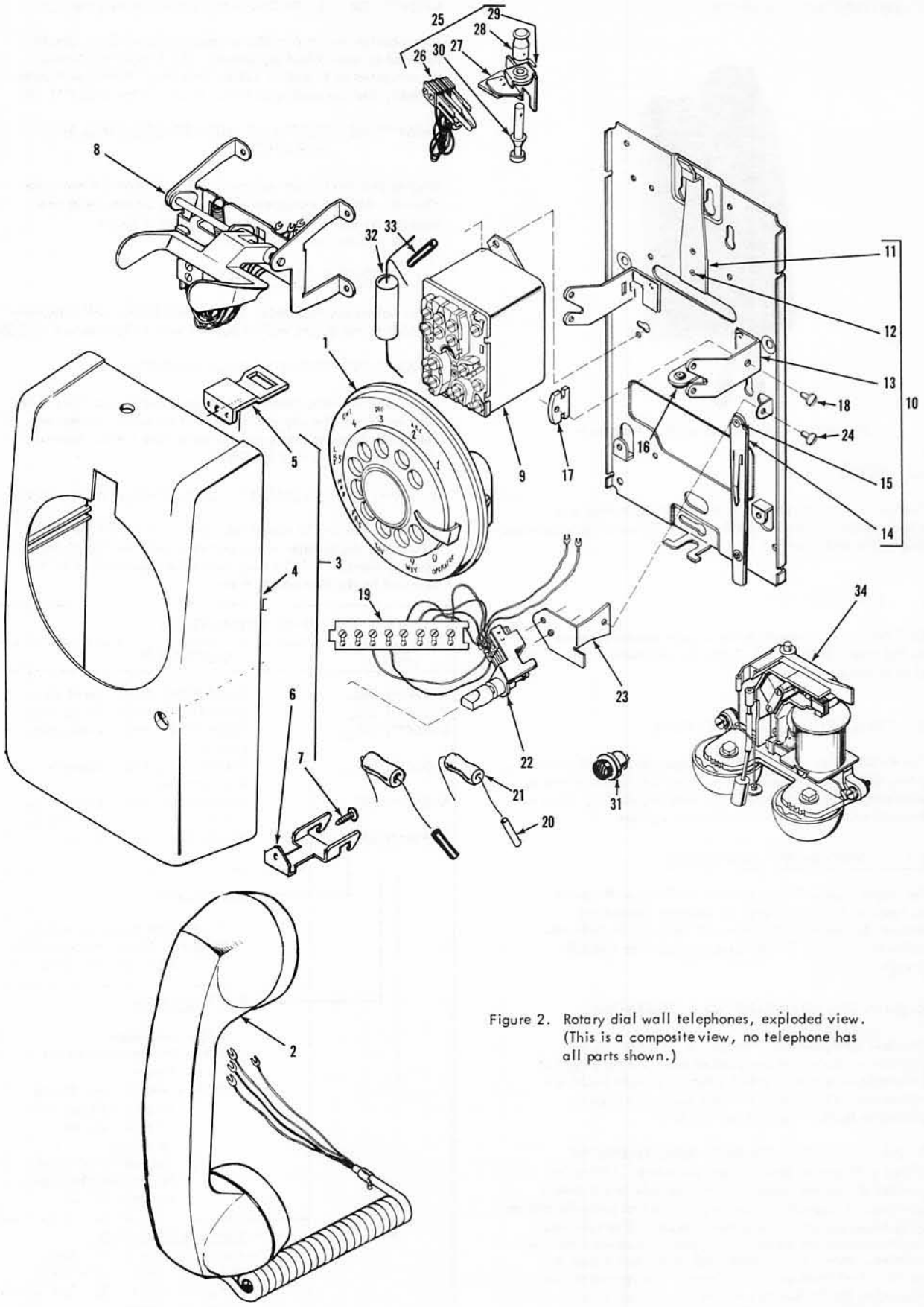

Figure 2. Rotary dial wall telephones, exploded view. (This is a composite view, no telephone has all parts shown.)

TABLE II. REPLACEABLE PARTS LIST, ROTARY DIAL WALL TELEPHONES

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 554 30	554 33	554 34	554 35	555 30	558 30
2	1	30**(D)450	DIAL ASSEMBLY, Regular, (Numerals Only)						
	1	30**(G)450	DIAL ASSEMBLY, Metro, (Letters and Numerals)						
	1	181448-0**	DUMMY PLUG ASSEMBLY, (Replaces Dial for Manual Operation)						
	2	65**(C2)410	HANDSET ASSEMBLY, Complete	1	1	1	1	1	1
	3	79406-**	HOUSING ASSEMBLY, (Includes items 4 and 5 thru 7)	1	-	-	1	-	-
	3	190151-**	HOUSING ASSEMBLY, (Includes items 4A and 5 thru 7)	-	1	-	-	-	-
	3	180248-**	HOUSING ASSEMBLY, (Includes items 4B and 5 thru 7)	-	-	1	-	-	-
	3	79877-**	HOUSING ASSEMBLY, (Includes items 4C and 5 thru 7)	-	-	-	-	-	1
	3	180665-**	HOUSING ASSEMBLY, (Includes items 4D and 5 thru 7)	-	-	-	-	1	-
	4	79500-**	HOUSING, (Standard)	1	-	-	1	-	-
	4A	190150-**	HOUSING, (Push-to-Talk)	-	1	-	-	-	-
		86371-1	LABEL, (Push-to-Talk, Black Letters)	-	X	-	-	-	-
		86371-2	LABEL, (Push-to-Talk, White Letters)	-	X	-	-	-	-
	4B	180247-**	HOUSING	-	-	1	-	-	-
	4C	79876-**	HOUSING	-	-	-	-	-	1
	4D	84521-**	HOUSING	-	-	-	-	1	-
	5	79305-1	BRACKET, Latch	1	1	1	1	1	1
	6	79397-1	CATCH, Housing	1	1	1	1	1	1
	7	75407-2	SCREW, Latch Bracket and Catch	2	2	2	2	2	2
	8	79399-1	HOOKSWITCH ASSEMBLY, Complete	1	-	1	1	1	1
		79399-2	HOOKSWITCH; Less Cradle, Pivot Bracket, Pin, and Return Spring	1	-	1	1	1	1
		79417-1	CRADLE, Handset	1	-	1	1	1	1
		79307-1	PIVOT BRACKET	1		1	1	1	1
		79304-1	PIN, Pivot	1	1	1	1	1	1
		75307-1	SPRING, Cradle Return	1	1	1	1	1	1
	8	190154-1	HOOKSWITCH ASSEMBLY, Complete (Push-to-Talk)	-	1	-	-	-	-
		32199-1	RIVET, (Hookswitch Attaching) (Same as Network Rivets)	4	4	4	4	4	4
	9	75335-1	NETWORK	1	1	1	1	1	1
		32199-1	RIVET, (Network Attaching) (Same as Hookswitch Rivets)	2	2	2	2	2	2
	10	79398-1	BASE ASSEMBLY (Includes items 11 through 16)	1	1	1	1	1	1
	11	79306-1	LATCH HOOK	1	1	1	1	1	1
	12	31944-2	RIVET	6	6	6	6	6	6
	13	87055-1	BRACKET, Dial; LH	1	1	1	1	1	1
	13	87055-2	BRACKET, Dial; RH	1	1	1	1	1	1
	14	79308-1	ARM, Volume Control	1	1	1	1	1	1
	15	75544-1	WASHER	1	1	1	1	1	1
	16	75303-1	GROMMET, Ringer Mounting	1	1	1	1	1	1
	17	79468-1	PLATE, Terminal Board Mounting	1	1	1	1	1	1
	18	180219-1	SCREW, Terminal Board Mounting (Replaces 75392-2 Screw)	1	1	1	1	1	1
	19	79467-1	BOARD, Terminal (10 Terminal Screws)	-	-	-	-	1	1
	19	79467-2	BOARD, Terminal (4 Terminal Screws)	-	-	-	1	-	-
	20	50551-3	TUBING, Resistor	-	-	-	-	4	-
	21	73609-13	RESISTOR	-	-	-	-	1	-
	22	79453-6	KEY ASSEMBLY, Turn-and-Push (Includes Terminal Board and Wiring)	-	-	-	-	-	1
	22	79453-1	KEY ASSEMBLY, Turn-and-Push. (Does Not Include Wiring)	-	-	-	-	-	1
	22	79453-3	KEY ASSEMBLY, Turn-and-Push. (Does Not Include Wiring)	-	-	-	-	1	-
		79474-1	SCREW, Key Mounting	-	-	-	-	2	2
	23	79920-1	BRACKET, Turn-and-Push Key	-	-	-	-	1	1
	24	180219-1	SCREW, Bracket Mounting (Same as item 18)	-	-	-	-	1	1
	25	84522-1	HOLD KEY ASSEMBLY (Includes Wiring)	-	-	-	-	-	1
	26	84524-1	SPRING ASSEMBLY (Does Not Include Wiring)	-	-	-	-	-	1
	27	84523-1	BRACKET ASSEMBLY, Hold Key	-	-	-	-	-	1
	28	84528-1	HANDLE	-	-	-	-	-	1
	29	95209-1	PIN, Roll	-	-	-	-	-	1
	30	84527-1	PLUNGER	-	-	-	-	-	1
		79474-1	SCREW, (Hold Key Attaching)	-	-	-	-	-	2

** Substitute color code (See Table I)

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FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 554/30	554/33	554/34	554/35	555/30	558/30
			TABLE II. REPLACEABLE PARTS LIST, ROTARY DIAL WALL PHONES, (Continued)						
	31	181971-102	PUSHBUTTON ASSEMBLY	-	-	1	-	-	-
	32	78405-4	CAPACITOR	-	1	-	-	-	-
	33	75488	TUBING, Capacitor	-	2	-	-	-	-
2		75326-54	WIRE, Turn-and-Push-Key, White	-	-	-	-	1	-
		75326-66	WIRE, Turn-and-Push-Key, Slate-Red	-	-	-	-		-
		75326-68	WIRE, Turn-and-Push-Key, Red	-	-	-	-	1	-
		75326-69	WIRE, Turn-and-Push-Key, Green(3")	-	-	-	-	1	-
		75326-70	WIRE, Turn-and-Push-Key, Black	-	-	-	-	1	-
		75326-71	WIRE, Turn-and-Push-Key, Yellow	-	-	-	-	1	-
		75326-111	WIRE, Turn-and-Push-Key, Blue	-	-	-	-	1	-
		75326-113	WIRE, Turn-and-Push-Key, Green (3-1/2")	-	-	-	-	1	-
	34	130(BA)470	RINGER, Straight Line Biased	X	X	X	X	X	X
		75599	TUBE, Gas (Used with TBA Ringer) (Not Shown)	X	X	X	-	X	X
	34	---------	RINGER, Frequency Selective	X	X	X	-	X	X
		156( )470	-With Volume Control, (Replaces 131, 141 or 145)						
		157( )470	-Less Volume Control, (Replaces 133, 142 or 146)						
			Note: 156 and 157 ringers are connected differently than are the 131, 133, 141, 142, 145 or 146 ringers. Refer to appropriate circuit label for proper connections.						
			HARMONIC						
		---(HA1)---	33-1/3 cps						
		---(HA2)---	50 cps						
		---(HA3)---	66-2/3 cps						
		---(HA4)---	16-2/3 cps						
		---(HA5)---	25 cps						
			SYNCHROMONIC						
		---(HB1)---	30 cps						
		---(HB2)---	42 cps						
		---(HB3)---	54 cps						
		---(HB4)---	66 cps						
		---(HB5)---	16 cps						
			DECIMONIC						
		---(HC1)---	20 cps						
		---(HC2)---	60 cps						
		---(HC3)---	30 cps						
		---(HC4)---	40 cps						
		---(HC5)---	50 cps						
		79754-1	LINK, Used with Volume Control Ringers (Not Shown)						
		79753-1	STUD, Used with Volume Control Ringers (Not Shown)						
			** COLOR CODES						
			00 - Black						
			02 - Red						
			04 - Yellow						
			05 - Green						
			09 - Ivory						
			11 - Pink						
			12 - Blue						
			13 - Beige						
			14 - Gray						
			15 - White						
			16 - Sea Green						

4. INSTALLATION

Wall telephones do not include a connecting block or mounting cord. Inside wire must be connected within the telephone. Refer to the appropriate circuit label for connection instructions.

The installation wiring will normally enter the instrument through the left hand opening in the bottom of the housing. Concealed wiring may enter through any suitable hole in the baseplate. Be sure that the leads do not foul the ringer or hookswitch.

5. TEST AND ADJUSTMENT

After phone is installed, check for proper operation of dial, transmitter, receiver, ringer and volume control, hookswitch, sidetone suppression, and any special features.

Check for correct party identification.

Check for noise due to loose contacts when the phone is gently bumped or shaken.

6. DISASSEMBLY AND ASSEMBLY (Figure 2)

> NOTE:
> The exploded view of figure 2 is composite of all rotary dial wall telephones. All parts shown are not included in all phones.

6.1 HOUSING ASSEMBLY

A. REMOVAL OF HOUSING ASSEMBLY
Telephone)

(1) Remove Handset from cradle and allow to hang free.
(2) Press bottom of Housing toward the Base and push the Catch (6) upward, then pull bottom of Housing outward. Release the Catch.
(3) Work the Housing up and over the Handset Cradle and the Latch Hook (11).

> Note:
> To remove housing from manual telephone remove the Dummy Plug first. Press down on the number card assembly and remove. Remove the center screw and the Dummy Plug. Remove Housing as described above.

B. INSTALLATION OF HOUSING ASSEMBLY

(1) Remove Handset from cradle and allow to hang free.
(2) Tilt top of Housing back and install the Latch Bracket (5) over the Latch Hook (11).
(3) Swing the Housing down and press inward until it latches in position. (Be sure installation cord and handset cord are in their respective recesses in the Housing.

> NOTE:
> On manual telephones, install the Dummy Plug assembly and the number card assembly. On 2-line phones, work the housing over the HOLD plunger (555 phone) and over the turn and push key. Use the finger or a small tool to hold the turn-and push key in position while installing the housing.

6.2 DIAL ASSEMBLY

A. REMOVAL OF DIAL
Remove Housing.
Disconnect leads, loosen the mounting screws and lift off dial.

B. INSTALLATION OF DIAL
Connect leads, (refer to appropriate wiring diagram). Insert Dial in mounting brackets so the locating pips seat in the holes in the brackets. Tighten mounting screws. Install housing.

6.3 RINGER

A. REMOVAL OF RINGER
Remove housing. Disconnect ringer leads, remove the two mounting screws and work ringer out.

B. INSTALLATION OF RINGER
Insert the stud of the Ringer into the grommet in the Hookswitch Bracket. Install the two mounting screws and connect leads. (Refer to appropriate wiring diagram.) Install Housing.

6.4 HANDSET

A. REMOVAL OF HANDSET
Remove Housing. Disconnect the handset leads, unhook the cord strain relief from the base and remove Handset and Cord assembly.

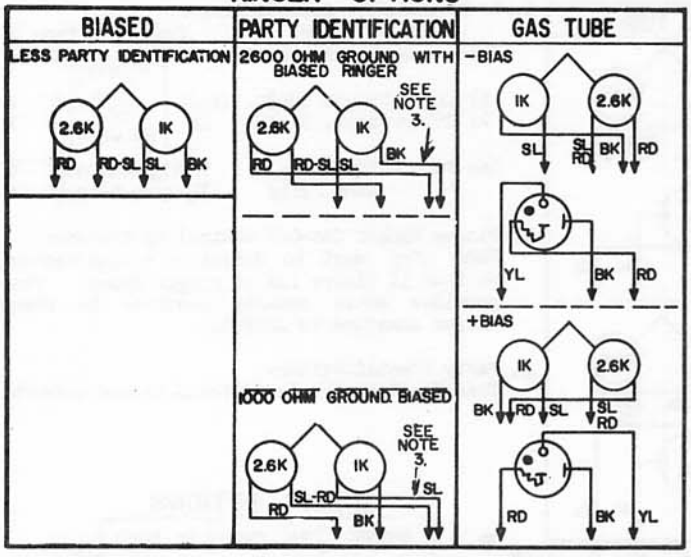
B. INSTALLATION ON HANDSET
Insert cord strain relief in the base and connect leads. (Refer to appropriate wiring diagram.) Install Housing.

6.5 NETWORK AND HOOKSWITCH

A. REMOVAL OF NETWORK OR HOOKSWITCH
Remove Housing. Disconnect leads to network or hookswitch. Remove screws and nuts that secure network or hookswitch to base.

B. INSTALLATION OF NETWORK OR HOOKSWITCH
Attach unit to base with nuts and screws. Connect leads, (refer to appropriate wiring diagram.) Install Housing.

RINGER OPTIONS



RINGER NOTES

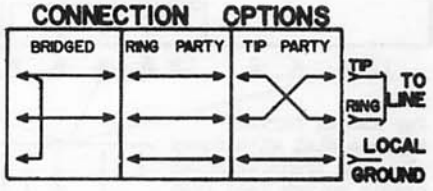
1. To Permanently Silence Ringer:

Class of Ringer	Transfer	From	To
Biased, except 1) and 2)	BK	Ringer Lead on Network	G	K
1) 1000Ω Ground Ident.	SL-RD		B	K
2) 2600Ω Ident. Biased	BK		B	K
Gas Tube - Tip Party	YL	Mtg. Cord on Conn. Block	Y	G
Ring Party	YL		Y	R

2. Biased Ringer Cut-Off Control by Customer: Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

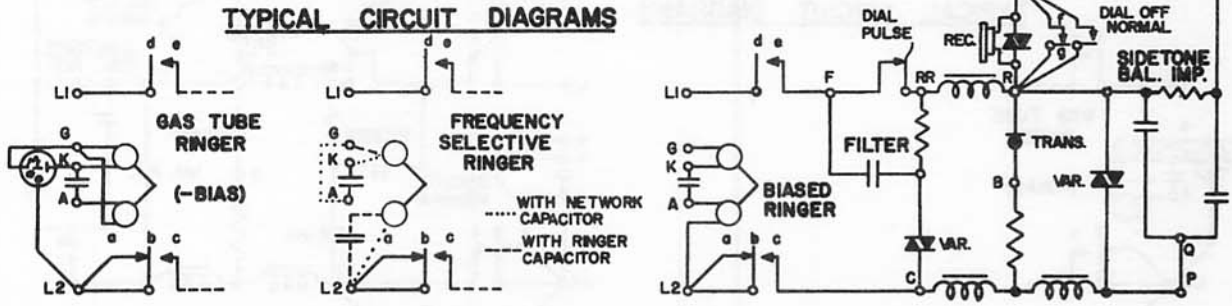
3. Party Identification: Transfer SL switch lead from L2 to A on network.

CONNECTION OPTIONS



COMPOSITE WIRING DIAGRAM

TYPICAL CIRCUIT DIAGRAMS



DIAGRAMS, K-554**( )30

See page 245.05 for instructions on connecting frequency selective ringers.

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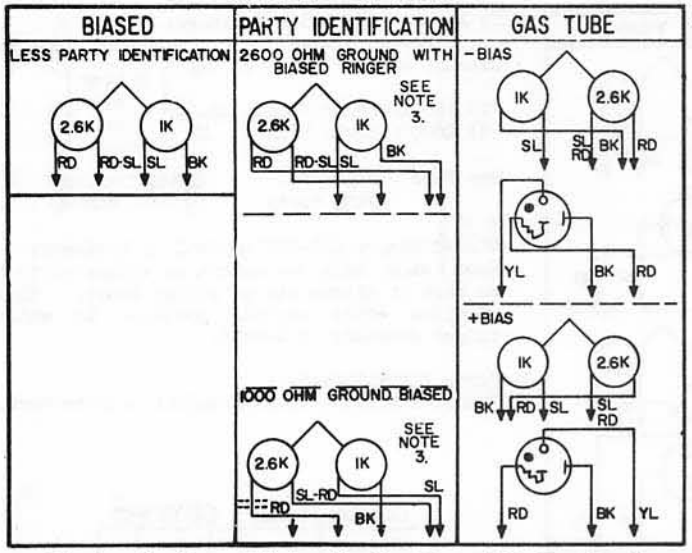
RINGER OPTIONS



RINGER NOTES

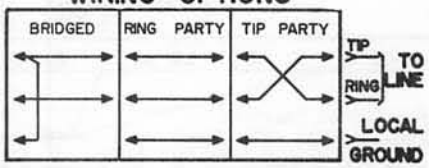
1. To Permanently Silence Ringer:

Class of Ringer	Transfer	From	To
Biased, except 1) and 2)	BK	Ringer Lead on Network	G	K
1) 1000Ω Ground Ident.	SL-RD		B	K
2) 2600Ω Ident. Biased	BK		B	K
Gas Tube - Tip Party	YL	Mtg. Cord on Conn. Block	Y	G
Ring Party	YL		Y	R

2. Biased Ringer Cut-Off Control by Customer: Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

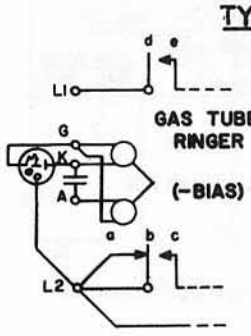
3. Party Identification: Transfer SL switch lead from L2 to A on network.

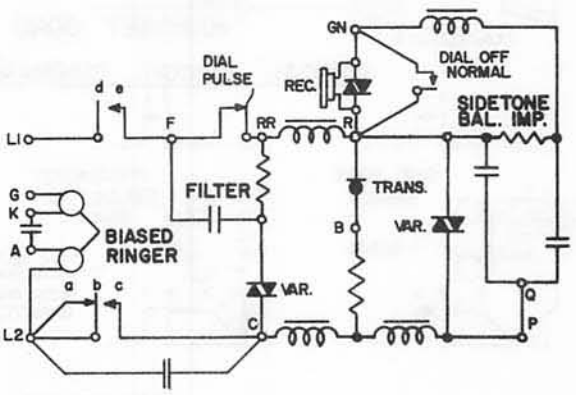
WIRING OPTIONS



COMPOSITE WIRING DIAGRAM

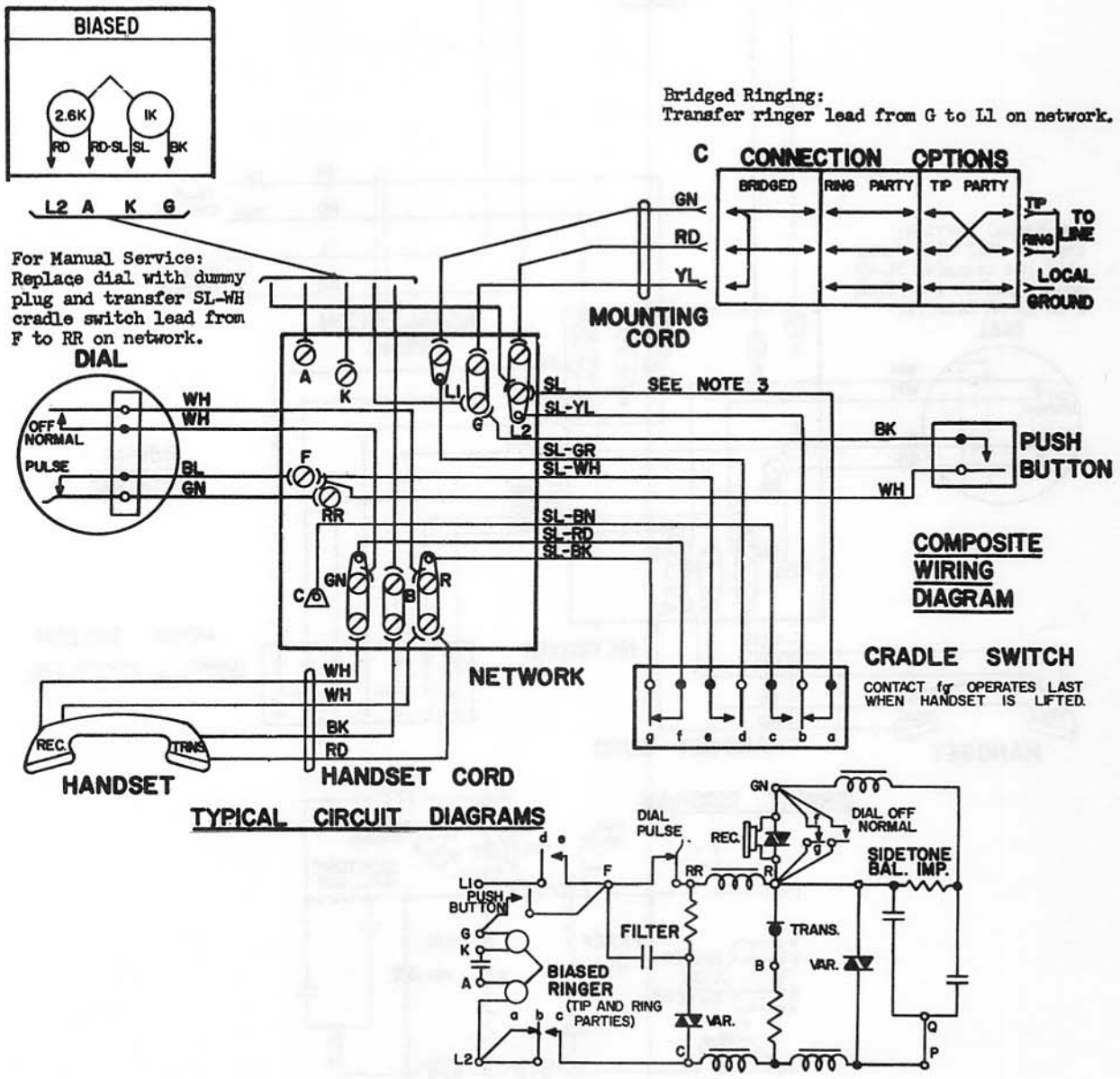
TYPICAL CIRCUIT DIAGRAMS





DIAGRAMS. K-554**( )33

See page 245.05 for instructions on connecting frequency selective ringers.



DIAGRAMS. K-554**( )34

See page 245.05 for instructions on connecting frequency selective ringers.

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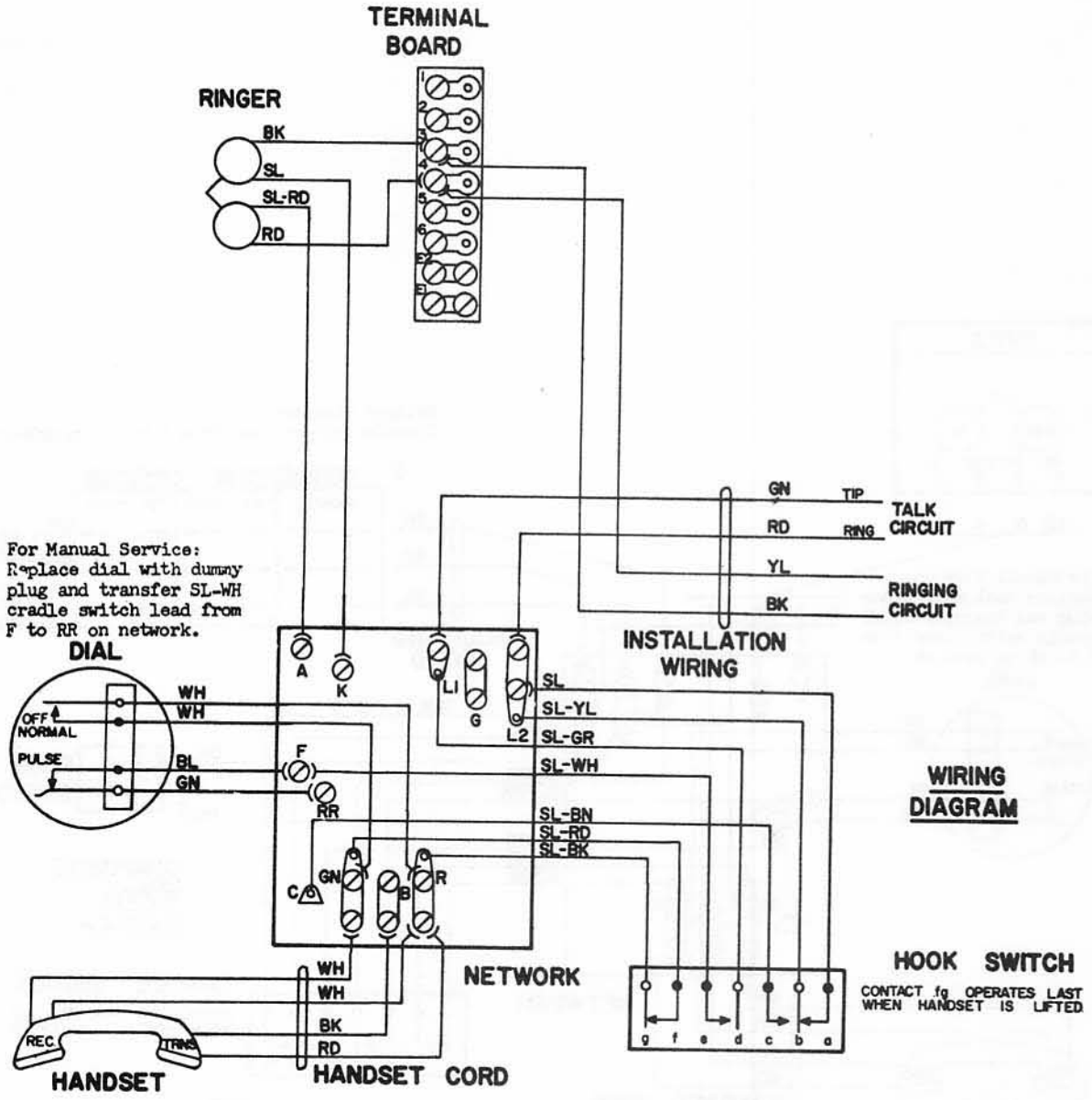
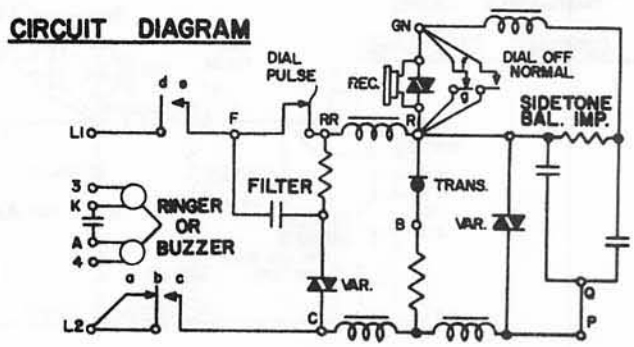




DIAGRAMS. K-554**( )35

RINGER NOTES

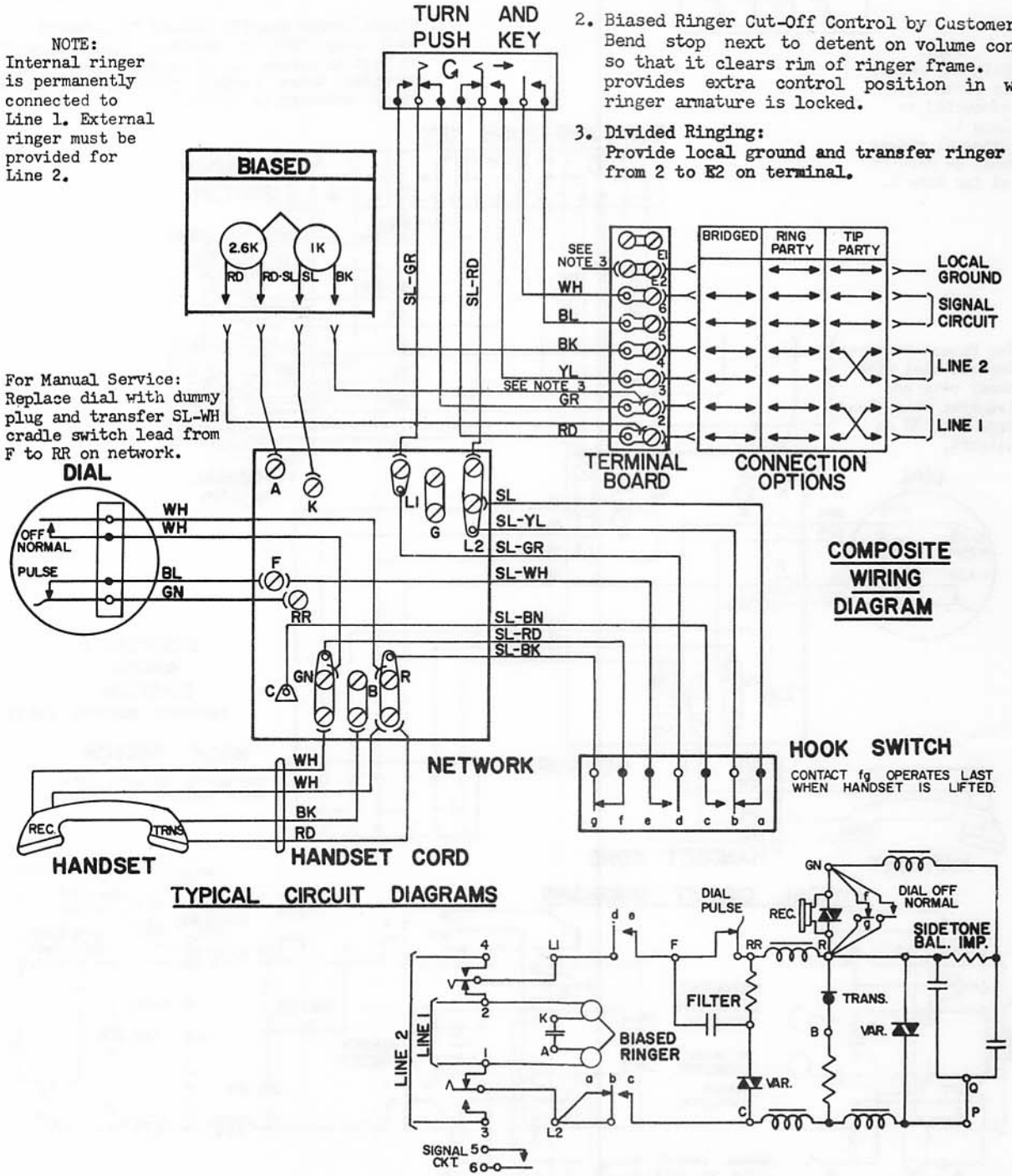
1. To Permanently Silence Ringer:
   Class of Ringer Biased,
   Transfer BK — Ringer Lead on Network — From To TB2 K

2. Biased Ringer Cut-Off Control by Customer:
   Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

3. Divided Ringing:
   Provide local ground and transfer ringer lead from 2 to E2 on terminal.

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

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



TYPICAL CIRCUIT DIAGRAMS

DIAGRAMS. K-558**( )30

See page 245.05 for instructions on connecting frequency selective ringers.

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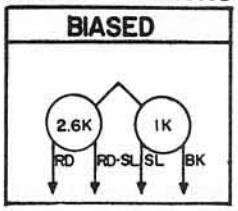
RINGER OPTIONS

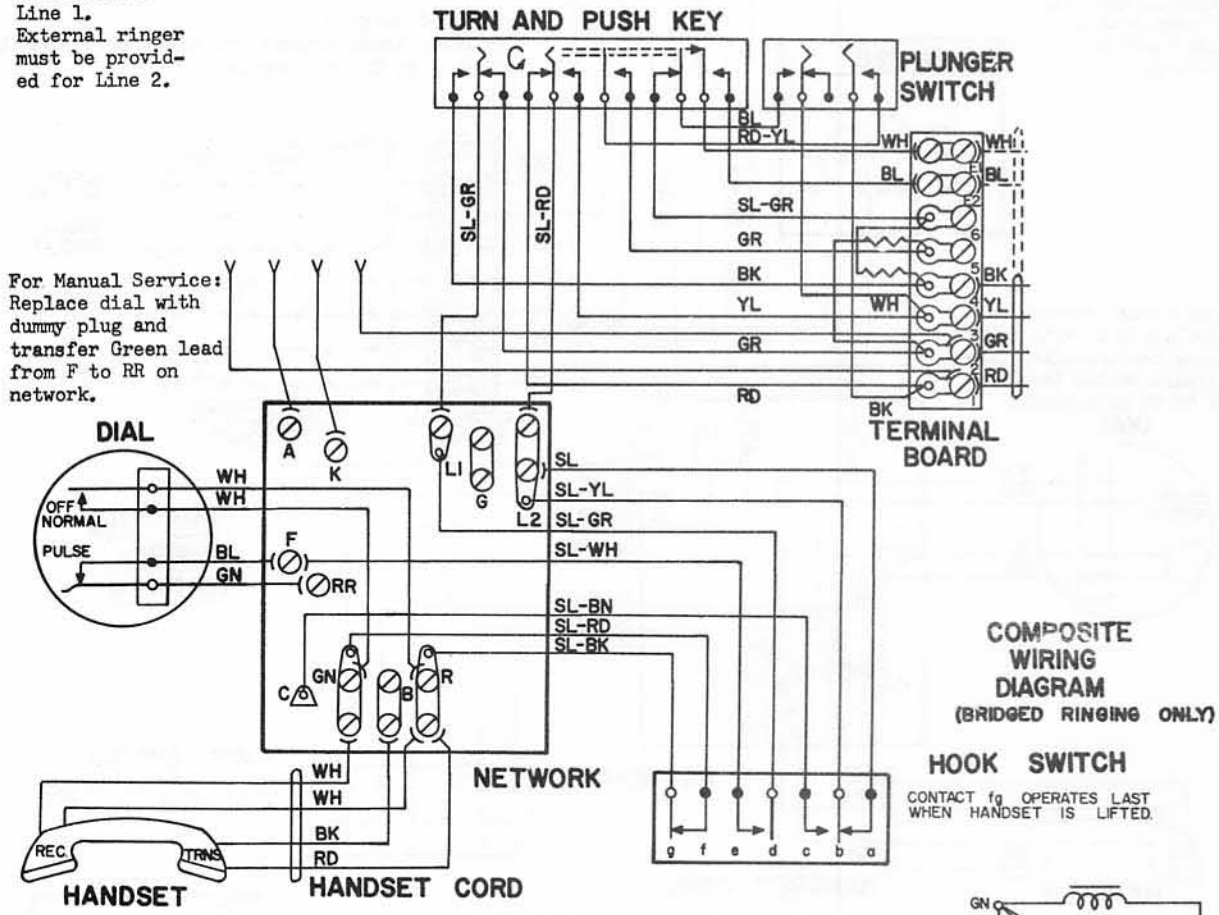


NOTE:
Internal ringer is permanently connected to Line 1.
External ringer must be provided for Line 2.

RINGER NOTES

1. To Permanently Silence Ringer:
   Class of Ringer Biased,
   Transfer BK — Ringer Lead on Network — From G To K

2. Biased Ringer Cut-Off Control by Customer:
   Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

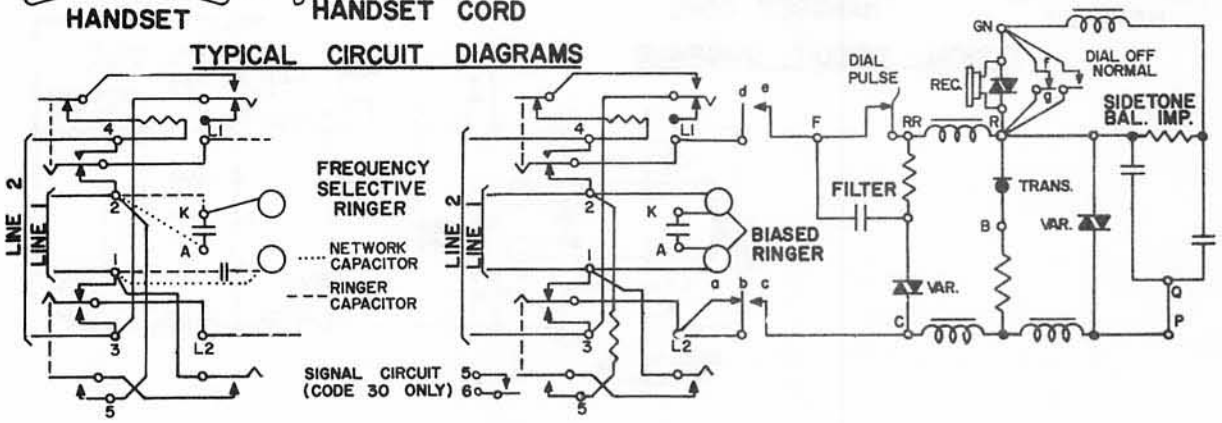


COMPOSITE WIRING DIAGRAM
(BRIDGED RINGING ONLY)

HOOK SWITCH

CONTACT fg OPERATES LAST WHEN HANDSET IS LIFTED.

TYPICAL CIRCUIT DIAGRAMS



DIAGRAMS. K-555**( )30

Figure 1. K-2554 "TEL-TOUCH" Wall Telephone

TABLE I. ORDERING INFORMATION

CODE	DESCRIPTION
K-2554**( )30	TELEPHONE, WALL, "TEL-TOUCH" (Supersedes K-1554)
	(Add Dial Code as follows:) M - Metropolitan (Letters and Numerals) R - Regular (Numerals only)
	(Insert Ringer Code as follows:) (LR) - Less Ringer (BA) - Straight Line Biased Ringer (--) - Frequency Selective Ringer (See below)

CODE	FREQUENCY
	HARMONIC
(WA1)	33-1/3 cps
(WA2)	50 cps
(WA3)	66-2/3 cps
(WA4)	16-2/3 cps
(WA5)	25 cps
	SYNCHROMONIC
(WB1)	30 cps
(WB2)	42 cps
(WB3)	54 cps
(WB4)	66 cps
(WB5)	16 cps
	DECIMONIC
(WC1)	20 cps
(WC2)	60 cps
(WC3)	30 cps
(WC4)	40 cps
(WC5)	50 cps

(Substitute Color Code as follows:)

	11 - Rose Pink
00 - Black	12 - Aqua Blue
04 - Yellow	13 - Light Beige
05 - Green	15 - White
09 - Ivory	16 - Sea Green

THE K-1554 AND K-2554 "TEL-TOUCH" (PUSH-BUTTON DIAL) WALL TELEPHONE

1. GENERAL INFORMATION

The K-1554 Telephone is a compact, anti-sidetone, wall-mounting telephone with 10-pushbutton dial. The K-2554 is identical to the K-1554 except it is equipped with 12-pushbutton dial. The K-2554 supersedes the K-1554.

All internal parts are mounted to the base. The Handset Cradle, (11, figure 2), is rigidly mounted to the Base Assembly and the Cradle (hook) Switch is actuated by a hinged plunger (15) which protrudes through the Cradle. A standard Handset is used.

Ordering Information is given in Table I.

Replaceable Parts are listed in Table II.

2. INSTALLATION

2.1 MOUNTING TO WALL

a. Remove Housing. Loosen the two housing screws (5, figure 2) and lift Housing off over the Dial Buttons and the Handset Cradle.

b. MOUNT BASE ASSEMBLY TO WALL.

NOTE: The Base Assembly has two mounting holes (in shape of keyholes). One hole is at the upper left-hand corner; the other near the lower right-hand corner - just to the right of the Network. Temporarily position the Base on the wall and center mark the small end of the "keyholes". Drill guide holes and install mounting screws. Install telephone on the mounting screws.

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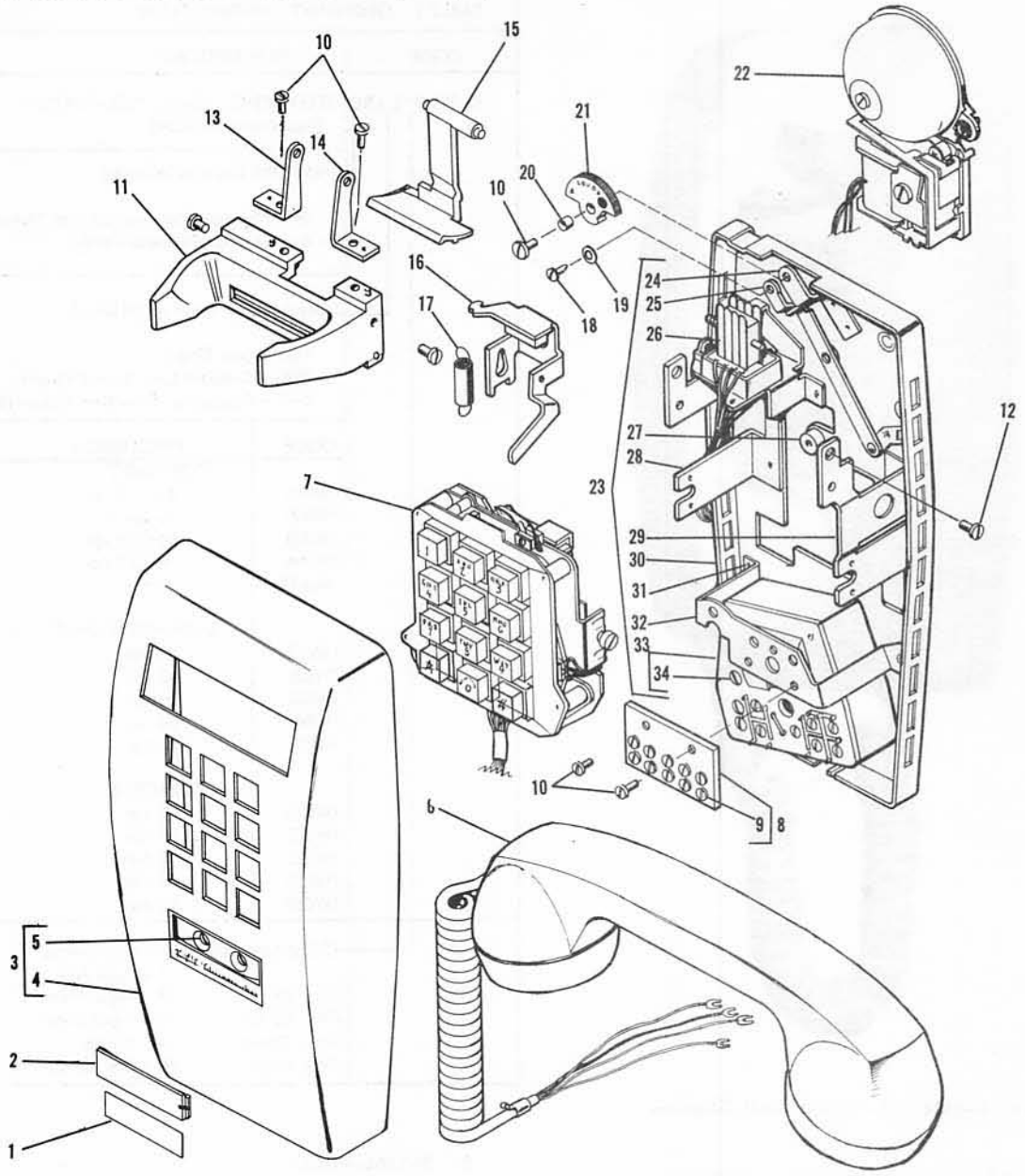
Figure 2. K-1554 and K-2554 "TEL-TOUCH" Wall Telephone, Exploded View



2.2 CONNECTIONS

a. BRIDGED OR INDIVIDUAL RINGING
Connect the Inside Wire leads as follows:
Green - #1 terminal on terminal board
Red - #2 terminal on terminal board
Yellow - #3 terminal on terminal board

b. RING PARTY. Connect the inside wire leads as instructed in (a) above and move black lead of Ringer from #1 to #3 terminal of terminal board.

c. TIP PARTY (NO IDENTIFYING GROUND)

(1) Move white lead of Hookswitch from "G" to "C" on Network.
(2) Move brown lead of Hookswitch from "C" to "G" on Network.
(3) Move black lead of Ringer from #1 to #3 terminal on terminal board.
(4) Connect inside wire leads as follows:
GREEN- #2 terminal on terminal board
RED - #1 terminal on terminal board
YELLOW - #3 terminal on terminal board.

d. TIP PARTY, (1000 - OHM IDENTIFYING GROUND)
Same as "C" above, and move slate lead of Ringer from "L2" to "B" terminal of Network.

e. TIP PARTY, (2650 - OHM IDENTIFYING GROUND)
Same as "C" above, except remove slate lead of Ringer from "L2" of Network and connect Slate-Red lead of Ringer to "B" of Network. Insulate and store the Slate lead of Ringer.

TABLE II. REPLACEABLE PARTS LIST, K-1554 and K-2554 "TEL-TOUCH" Telephones

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 1554/30	2554/30
2	1	87513-1	CARD, Number	1	1
	2	87514-1	RETAINER, Number Card	1	1
	3	88152-**	HOUSING ASSEMBLY, (For 10-Pushbutton Dial)	1	-
	3	180145-**	HOUSING ASSEMBLY, (For 12-Pushbutton Dial)	-	1
	4	88150-**	HOUSING, (For 10-Pushbutton Dial)	1	-
	4	180144-**	HOUSING, (For 12-Pushbutton Dial)	-	1
	5	190139-1	SCREW, Housing	2	2
	6	65**(C2)410	HANDSET ASSEMBLY (See Section 212 for Parts Breakdown)	1	1
	7	27(G)450	DIAL ASSEMBLY, (10-Pushbutton) (Order 32(G)450 and 180144-** Housing	1	-
	7	32(D)450	DIAL ASSEMBLY, (12-Pushbutton), Regular	-	1
	7	32(G)450	DIAL ASSEMBLY, (12-Pushbutton), Metropolitan See Section 220 for Parts Breakdown	-	1
	8	88205-1	TERMINAL BOARD ASSEMBLY	1	1
	9	79485-2	SCREW, Terminal, (Same as item 10)	10	10
	10	79485-2	SCREW, (Same as Item 9) (2 used to attach Terminal Board) (2 used to attach Cradle Plunger Brackets) (1 used to attach Volume Control Wheel)	5	5
	11	88172-1	CRADLE, Handset	1	1
	12	95973-2	SCREW, Cradle Attaching	2	2
	13	88159-1	BRACKET, Cradle Plunger, (L.H.)	1	1
	14	88159-2	BRACKET, Cradle Plunger, (R.H.)	1	1
	15	88154-1	PLUNGER, Cradle Switch	1	1
	16	88163-1	BRACKET, Cradle Switch	1	1
	17	75307-4	SPRING, Cradle Switch Bracket	1	1
	18	95971-2	SCREW, (Attaches Link to Volume Control Wheel)	1	1
	19	58750-1	WASHER	1	1
	20	88171-1	BUSHING, Volume Control Wheel	1	1
	21	88176-1	WHEEL, Volume Control	1	1
	22	148 (BA)470	RINGER ASSEMBLY, Straight Line Biased	1	1
		95966-2	SCREWS, Ringer Mounting	2	2
	22	151(---)470	RINGER, Frequency Selective	1	1
			SCREWS, Ringer Mounting	2	2

HARMONIC		SYNCHROMONIC		DECIMONIC	
(HA1)	33-1/3 cps	(HB1)	30 cps	(HC1)	20 cps
(HA2)	50 cps	(HB2)	42 cps	(HC2)	60 cps
(HA3)	66-2/3 cps	(HB3)	54 cps	(HC3)	30 cps
(HA4)	16-2/3 cps	(HB4)	66 cps	(HC4)	40 cps
(HA5)	25 cps	(HB5)	16 cps	(HC5)	50 cps

	23	88153	BASE ASSEMBLY	1	1
	24	88168-1	BRACKET, Volume Control	1	1
	25	88169-1	LINK ASSEMBLY, Volume Control	1	1
	26	88175-1	SPRING ASSEMBLY, Cradle Switch (Includes one 88162-1 Bracket and two 190137-8 Rivets)	1	1
	27	95965-1	FASTENER (For Ringer Screws)	1	1
	28	88157-1	BRACKET, Dial (L.H.)	1	1
	29	88158-1	BRACKET, Dial (R.H.)	1	1
	30	NSS	BASE (88151-1), (Not Serviced Separately)	-	-
	31	190137-10	RIVET	8	8
	32	88156-1	BRACKET, Terminal Board	1	1
	33	180620-101	NETWORK ASSEMBLY	1	1
	34	79485-2	SCREW, Terminal	13	13
		180697-102	Polarity Guard Kit		

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2.3 TO PERMANENTLY SILENCE RINGER.

a. For all classes of service except tip party with identifying ground. Change black lead of Ringer from #1 (or #3) terminal of terminal board to "K" terminal of Network.

b. For tip party with 1000-ohm identifying ground. Connect Ringer leads as follows:

RED - Insulate and Store.
BLACK - Connect to #3 terminal of terminal board
SLATE - Connect to "B" terminal of Network.
SLATE-RED - Insulate and Store

c. For tip party with 2650-ohm identifying ground. Connect Ringer leads as follows:

RED - Insulate and Store
BLACK - Connect to #3 terminal of terminal board.
SLATE - Insulate and Store
SLATE-RED - Connect to "B" terminal of Network.

2.4 RINGER CUT-OFF CONTROL BY CUSTOMER

Refer to figure 2 . Use long nose pliers and bend volume control bracket (item 24) down so it will allow volume control link (item 25) to move Ringer tone lever to maximum cut-off position.

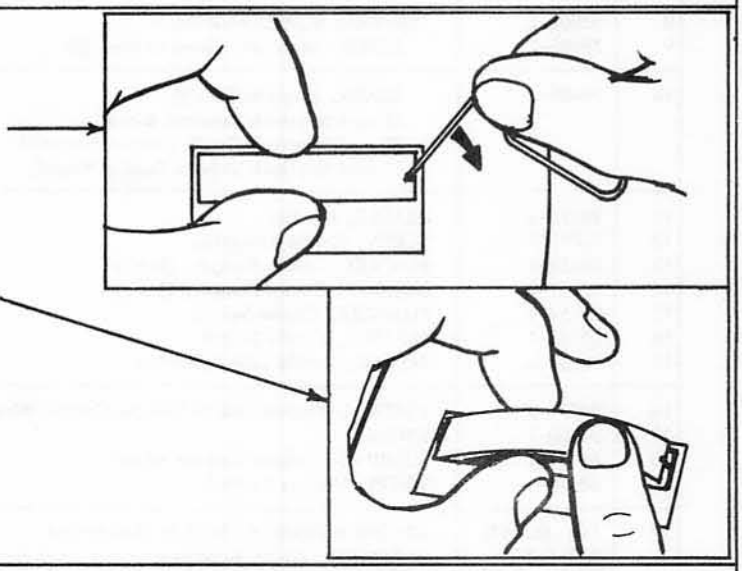
3. NUMBER CARD GROUP. (See figure 2)

a. REMOVAL OF NUMBER CARD GROUP. Use a partially straightened paper clip or similar device. Insert the straightened end into the rounded slot at the right end of the Number Card Retainer (item 2) and pry the Retainer out of the Housing - holding two fingers over the Retainer to prevent its springing away.

b. INSTALLATION OF NUMBER CARD GROUP.

(1) Place the number card (item 1) in the Retainer (item 2) and crease the ends of the card in place with the thumbnail.

(2) Grasp the Retainer by its edges, near center, and insert one end in its recess in the Housing. Bend the opposite end down into place and release the center hold.



4. DISASSEMBLY AND REASSEMBLY. (Refer to Figure 2)

4.1 HOUSING GROUP

a. REMOVAL OF HOUSING GROUP

(1) Remove the Number Card Retainer (1) as directed in 3.a.
(2) Loosen the two screws (5) and lift off Housing Assembly (3).

b. INSTALLATION OF HOUSING GROUP

(1) Hold Housing Assembly in place and tighten the two screws (5).
(2) Install Number Card group as directed in 3.b. above.

4.2 DIAL

a. REMOVAL OF DIAL. Disconnect dial leads from Network and from terminal board. Loosen dial mounting screws and remove dial.

b. INSTALLATION OF DIAL. Refer to appropriate circuit label and connect dial leads. Seat dial on the mounting brackets and tighten mounting screws.

4.3 CRADLE GROUP (Items 11 thru 17)

a. DISASSEMBLY OF CRADLE GROUP

(1) Remove the two screws (12) that secure the cradle (11) to its brackets. Remove the cradle assembly consisting of items (11) thru (15).

(2) Use round-nose pliers and remove Spring (17).

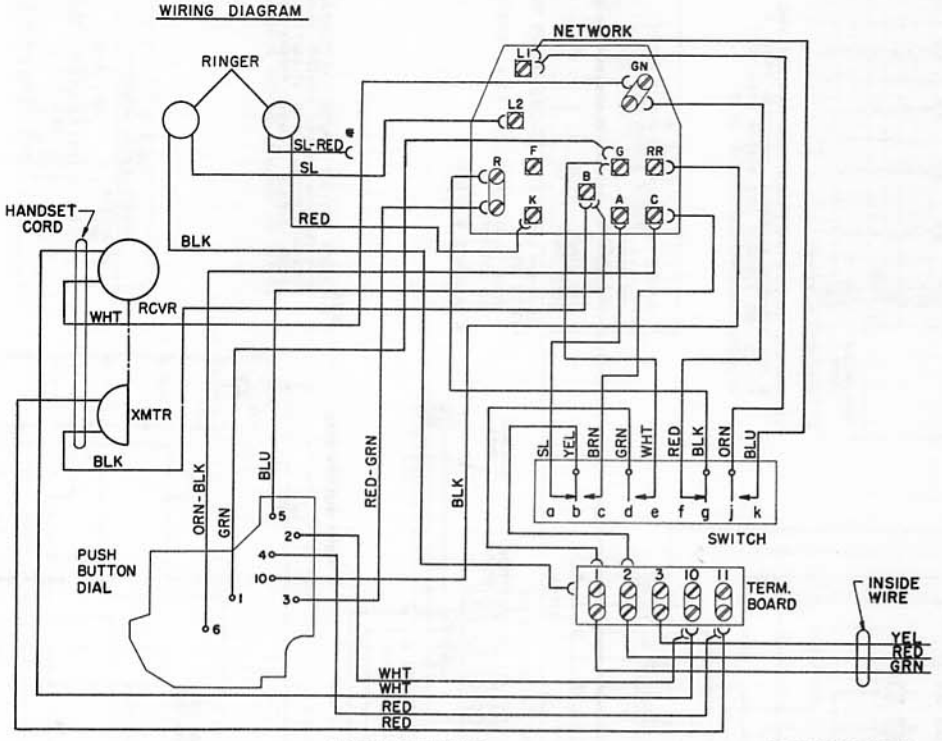
(3) Work the outer end of the cradle switch bracket (16) upward then move the bracket inward until it clears the stud of the spring assembly (26).

(4) To remove plunger (15), remove one of the plunger barckets (13 or 14) by removing its attaching screw (10).

b. ASSEMBLY OF CRADLE GROUP

Assemble the cradle group in reverse order of disassembly

WIRING DIAGRAM



* INSULATE & STORE

CIRCUIT SCHEMATIC

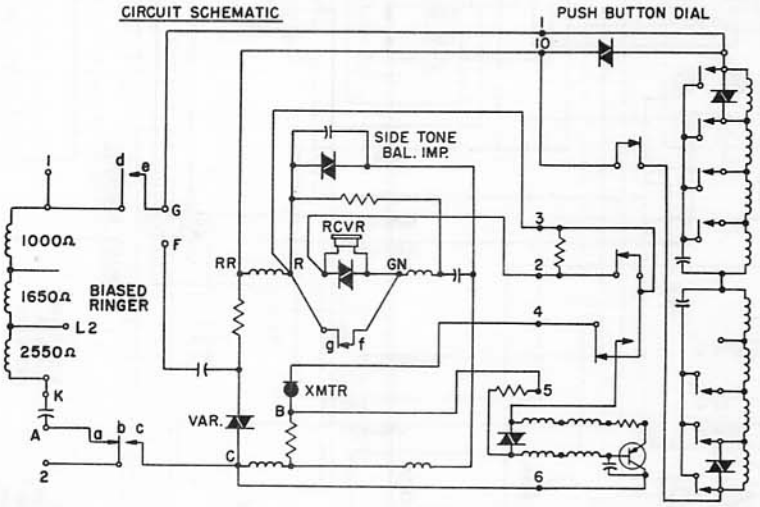


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TABLE A
LINE & RINGER CONNECTIONS

WIRE OR LEAD			INDIV. OR BRDG.	RING PARTY	TIP PARTY		
					NO IDENT. GRD.	IDENT. GRD. 1000 OHMS	IDENT. GRD. 2650 OHMS
INSIDE WIRE	RING	R	2	2	1	1	1
	TIP	G	1	1	2	2	2
	GRD	Y	3	3	3	3	3
RINGER LEADS	RED		K	K	K	K	K
	BLK		1	3	3	3	3
	SL		L2	L2	L2	B	*
	SL-RED		*	*	*	*	B
HOOKSWITCH LEADS	SL		A	A	A	A	A
	WHT		G	G	C	C	C
	BRN		C	C	G	G	G

* INSULATED & STORED

TABLE B
RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY

TIP PARTY IDENTIFYING GRD	RINGER LEADS			
	RED	BLACK	SLATE	SLATE RED
1000 OHMS	*	3	B	*
2650 OHMS	*	3	*	B

ALL OTHER CLASSES OF SERVICE EXCEPT THOSE LISTED ABOVE:

MOVE (BLK) RINGER LEAD TO "K" TERMINAL OF NETWORK.

* INSULATE & STORE

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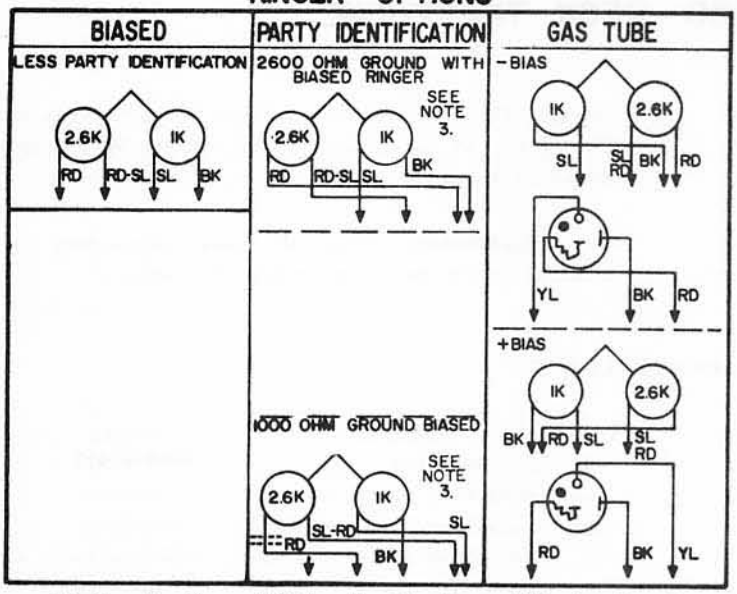
October 1970

RINGER OPTIONS



RINGER NOTES

1. To Permanently Silence Ringer:

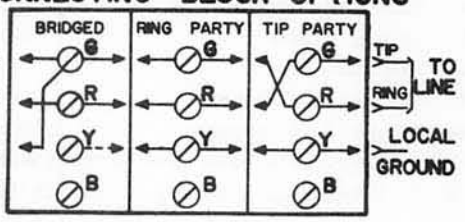
Class of Ringer	Transfer	From	To
Biased, except 1) and 2)	BK	Ringer Lead on Network	G	K
1) 1000Ω Ground Ident.	SL-RD		B	K
2) 2600Ω Ident. Biased	BK		B	K
Gas Tube - Tip Party	YL	Mtg. Cord on Conn. Block	Y	G
Ring Party	YL		Y	R

2. Biased Ringer Cut-Off Control by Customer: Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

3. Party Identification: Transfer SL switch lead from L2 to A on network.

See page 245.05 for instructions on connecting frequency selective ringers.

CONNECTING BLOCK OPTIONS



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

COMPOSITE WIRING DIAGRAM

TYPICAL CIRCUIT DIAGRAMS

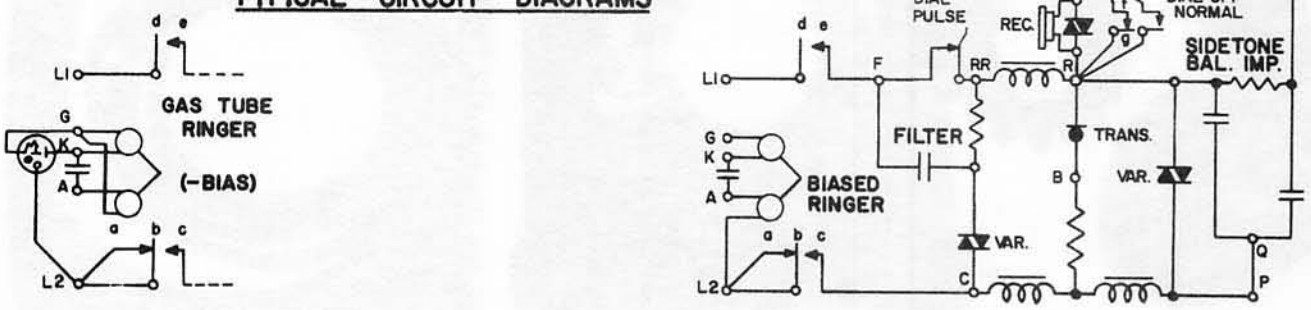


Fig. 2 DIAGRAMS 500--(--)30- TELEPHONE

2554 TYPE TELEPHONE CIRCUIT

(151 FREQ. SEL.–148 BA RINGER)

WIRING DIAGRAM

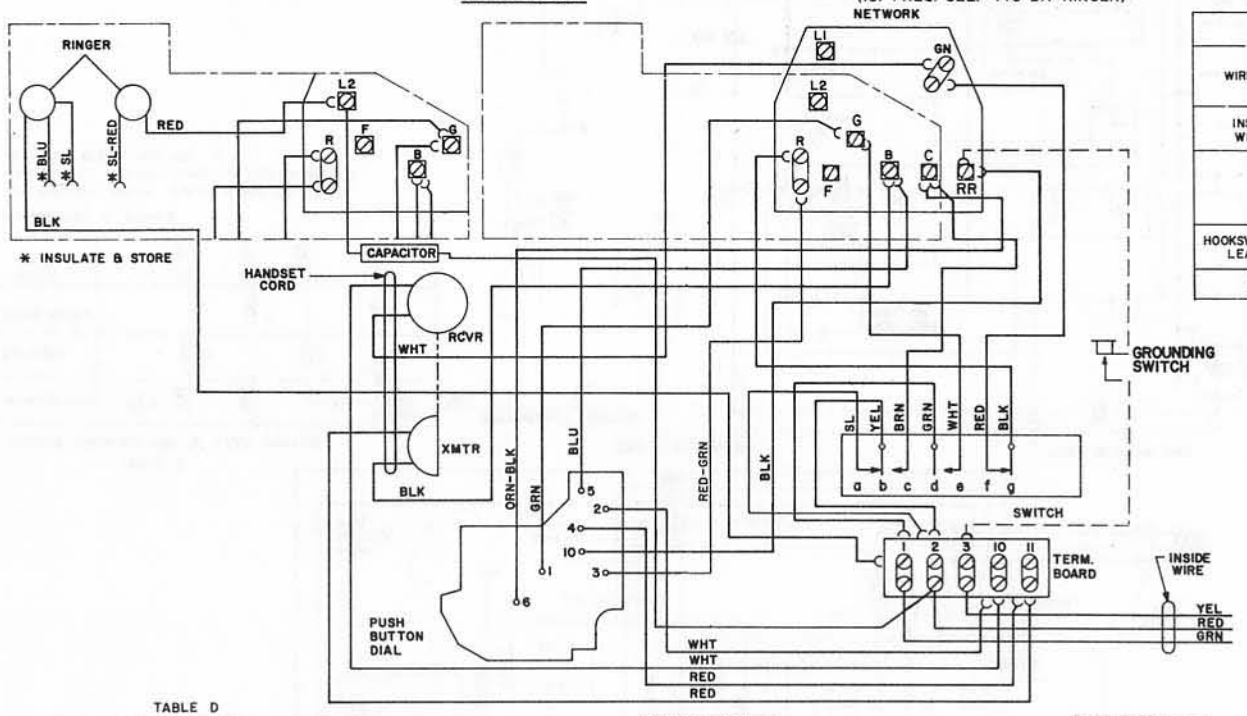


TABLE A
LINE AND RINGER CONNECTIONS

WIRE OR LEAD			INDIV. OR BRDG.	RING PARTY	TIP PARTY: NO IDENT. GRD.	TIP PARTY: IDENT. GRD. 1000 OHMS	TIP PARTY: IDENT. GRD. 2650 OHMS
INSIDE WIRE	RING	R	2	2	1	1	1
	TIP	G	1	1	2	2	2
	GRD1	Y	3	3	3	3	3
	RED		L2	L2	L2	L2	L2
	BLK		1	3	3	3	3
	BLU		*	*	*	*	*
	SL		*	*	*	B	*
	SL-RED		*	*	*	*	B
HOOKSWITCH LEADS	SL		2	2	2	LI	LI
	WHT		G	G	C	C	C
	BRN		C	C	G	G	G
RINGER			2	2	2	LI	LI
CAPACITOR			L2	L2	L2	L2	L2

* INSULATED & STORED

TABLE B
RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY

TIP PARTY IDENTIFYING GRD.	RINGER LEADS: RED	BLACK	SLATE	SLATE-RED
1000 OHMS	*	3	B	*
2650 OHMS	*	3	*	B

* INSULATED & STORED

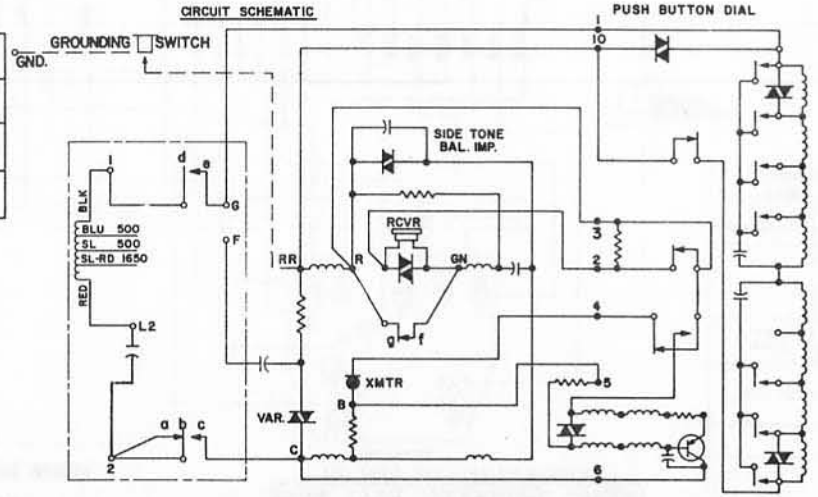
TABLE D
CIRCUIT CHANGES FOR "A" LEAD CONTROL

HOOKSWITCH	SL *	YEL	BRN	RINGER CAP.
NETWORK		LI	C	L2
TERM. BOARD		3		1
INSIDE WIRE	YEL(A)	BLK(A)	RED	GRN

* INSULATED & STORED

TO PREVENT FALSE HOLD CONDITION WHEN HANDSET IS RESTORED, HOOKSWITCH CONTACTS de MUST BREAK BEFORE bc.

CIRCUIT SCHEMATIC



NOTE:
1– RINGER CUT-OFF CONTROL BY CUSTOMER: BEND TANG ON VOLUME CONTROL BRACKET FORWARD (TOWARD FRONT OF UNIT) TO ALLOW LINKAGE TO MOVE RINGER TONE LEVER TO MAXIMUM CUT-OFF POSITION.
2– DOTTED LINES INDICATE CONNECTIONS FOR SPECIAL FEATURE 34 (GROUND BUTTON)

TABLE C
RINGER SERIES CAPACITOR

CAPACITOR MFD.	CODE SERIES
.47	HA4, HA5, HB5, HC1, BA,
.25	HA1, HB1, HC3
.15	HB2, HC4
.08	HA2, HA3, HB3, HB4, HC2, HC5

ISSUE NO.
9
8
7
6
5
4
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1

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K-500 SERIES DESK TYPE TELEPHONES

CONTENTS

1 GENERAL DESCRIPTION

1.1 The K-500 series provides a full range of compact, anti-sidetone type desk telephones which operate efficiently over a wide range of loop resistance and line impedance. Each instrument consists of a pressed steel baseplate, with four protective rubber feet, on which all internal parts are mounted. A molded plastic housing covers the assembly and provides a cradle for the handset, which is connected to the internal components by a flexible plastic covered cord. A second plastic covered cord connects the instrument to a molded terminal block.

1.2 The K-500 telephone instrument is available with its internal components and circuit arranged for any class of service on any type of automatic or manual telephone system. It can be supplied in a number of different versions with various special features, as required. Specific details for each combination are given in individual sub-sections, each indexed by the instrument/special feature code (ie 500/33). A list of all the special features available is given in sub-section M1A-NUM.

1.3 All instruments in the series can be supplied in any of the colors listed in sub-section M1A-COL.

Fig. 1-1 K-500 SERIES TELEPHONE

2 ASSOCIATED PUBLICATIONS

2.1 General information on ordering, installation and maintenance is given in part 1 of the manual.

2.2 The various components and sub-assemblies used in each instrument are described in part 2 of the manual.

2.3 Specific descriptions, parts lists, wiring diagrams and circuit diagrams for each of the different assemblies in the K-500 series are given in individual sub-sections in part 3 of the manual. Each sub-section is indexed by the instrument and special feature code numbers.

3 DISASSEMBLY AND ASSEMBLY

3.1 The exploded view of Fig. 3-1 shows all the component parts and sub-assemblies of the K-500 basic instrument. Procedures for disassembly and assembly are given below. Additional parts which are included to provide special features should be removed and replaced in any convenient order. Note that the lamp of the dial or message waiting lights may be replaced by unscrewing the lamp cap.

3.2 DISASSEMBLY - BASIC INSTRUMENT

a: Loosen the cabinet lock screws (7) and remove the housing (13).
b: Disconnect the leads, loosen the clamping screws and lift out the dial (9a), if fitted.
c: Disconnect the leads, remove the mounting screws then remove the ringer (8).
d: Disconnect the leads and remove the handset and cord assembly (10).
e: Disconnect the leads and remove the desk stand cord (11).
f: Remove the screws, washers and nuts (4,5,6) then lift out network (2) and cradle switch (3). Unsolder leads from network, if needed.

3.3 ASSEMBLY - BASIC INSTRUMENT

Reassemble the instrument in the reverse order to that given for disassembly, noting the points listed below.

a: Refer to the appropriate wiring diagram to reconnect the various leads.
b: Run the cradle switch leads through the guide hook on the right hand side of the bracket.
c: Place the desk stand cord under the tab in the rear right hand corner of the baseplate.
d: Place the handset cord under the flange of the ringer frame, in front of the cradle switch and underneath the dial.
e: Locate the ringer coil leads underneath, but not trapped by, the ringer frame.
f: Make sure that the locating pips on the dial casting locate in the holes in the tips of the bracket and that the leads do not foul the cradle switch assembly.
g: The housing should fit freely without binding on any part.
h: Check the reassembled unit as detailed in Section 4.

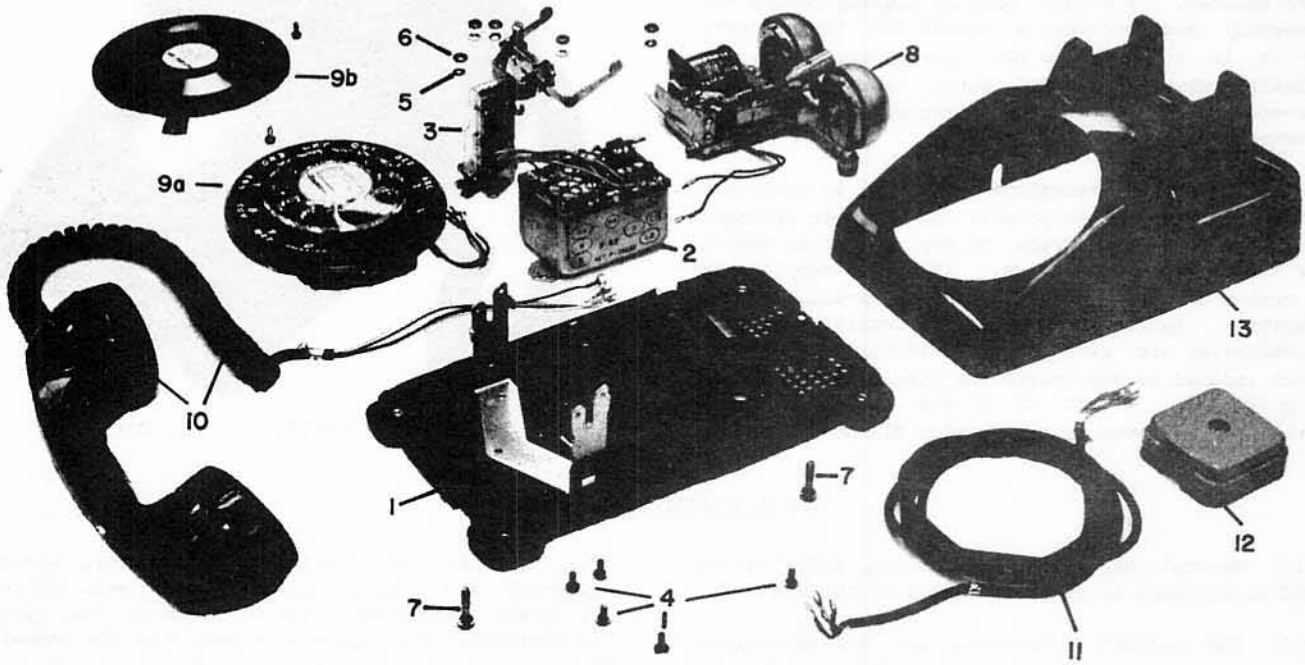

Fig. 3-1 COMPONENT PARTS - EXPLODED VIEW

4 TEST AND ADJUSTMENT

4.1 Tests and adjustments on the sub-assemblies are detailed in their respective sub-sections. The following checks must be made on the completely assembled instrument.

4.2 CRADLE SWITCH

Check that either plunger will fully operate the spring assembly before being depressed to a point 1/8" above the cradle molding and that the plungers may be lifted slightly after the handset is removed. Bend the side arms of the actuator, using two pairs of pliers, to adjust, if necessary.

4.3 FUNCTIONAL TESTS

Connect the telephone to a working line and check for correct operation of the following:

a: Dial, if fitted.
b: Transmitter and receiver.
c: Ringer and volume control, if fitted.
d: Cradle switch.
e: Adequate suppression of sidetone.
f: Correct party identification, if applicable.
g: Absence of noise due to loose contacts when the instrument is gently bumped or shaken.
h: Special features, if fitted.

TYPE 500--(--)30- DESK TELEPHONE

The 500--(--)30- telephone is the basic type of desk instrument in the K-500 series of telephones. Options in the instrument provide for any class of service on any type of automatic or manual central office equipment. General details of the K-500 series desk instruments are given in sub-section M3A-500/SER while specific details of each version are given in the sub-sections indexed by the type number of the instruments.

The complementary range of wall telephones is detailed in sub-sections in the 554 series.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex Nut	67093	5
7	Cabinet Lock Screw	75486	2
8a	Ringer Assy. Biased	130(BA)470	1
b	Freq. Sel. with Vol. Cont.	156(Ø)470	
c	Freq. Sel. less Vol. Cont.	157(Ø)470	
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	
10	Handset and Cord Assembly	65**(Ø)410	1
11	Desk Stand Cord (3 Cond.)	3031**(06)650	1
12	Connecting Block (4 Term.)	32( )783	1
13	Housing and Plunger Assembly	75401-*	1
14	Gas Tube (only with TBA ringer)	75599	1

Ø Replace by class code number for type required.
* Replace by color code
** Replace by color code

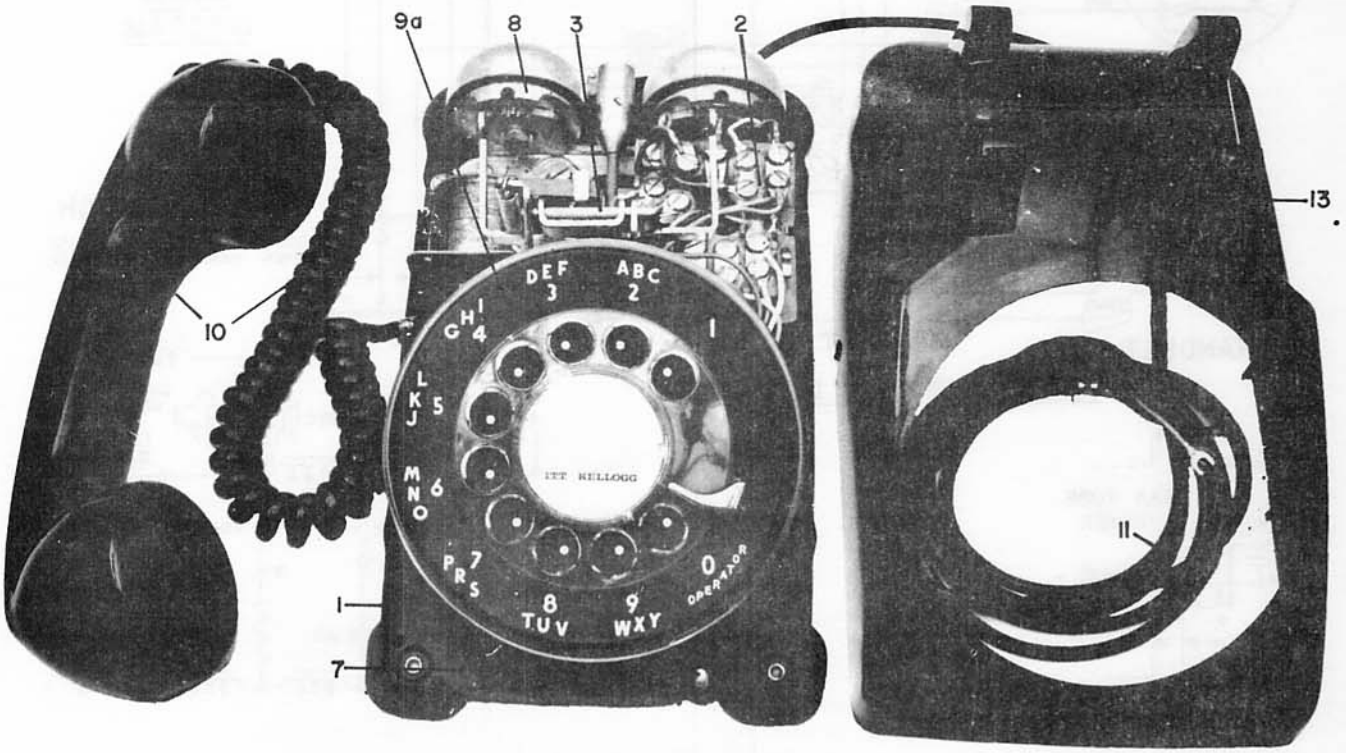

Fig. 1 TOP VIEW - HOUSING REMOVED

TYPE 500--(--)34- DESK TELEPHONE

The 500--(--)34- telephone is a standard desk type of instrument with the addition of a push button. The push button is wired so that it will, when depressed, connect one side of the line to a local ground at the telephone. This feature is required with certain types of PABX equipment.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex. Nut	67093	5
7	Cabinet Lock Screw	75486	2
8	Ringer Assy. Biased	130(BA)470	1
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	
10	Handset and Cord Assembly	65**(Ø)410	1
11	Desk Stand Cord (3 Cond.)	3031**(06)650	1
12	Connecting Block (4 Term.)	32( )783	1
13	Housing and Plunger Assembly	79094-*	1
14	Push Button	79095	1
15	Cord Assembly	180119	1

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

Ø Replace by class code number for type required.
* Replace by color code
** Replace by color code

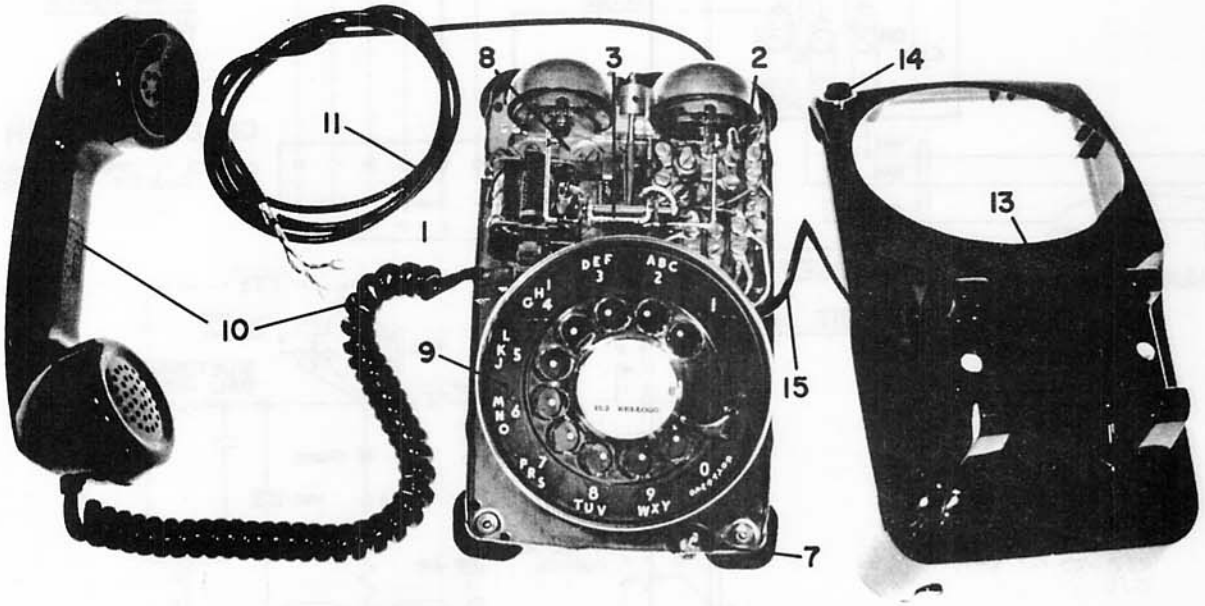

Fig. 1 TOP VIEW - HOUSING REMOVED

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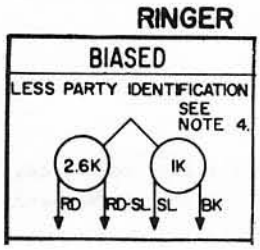
October 1970



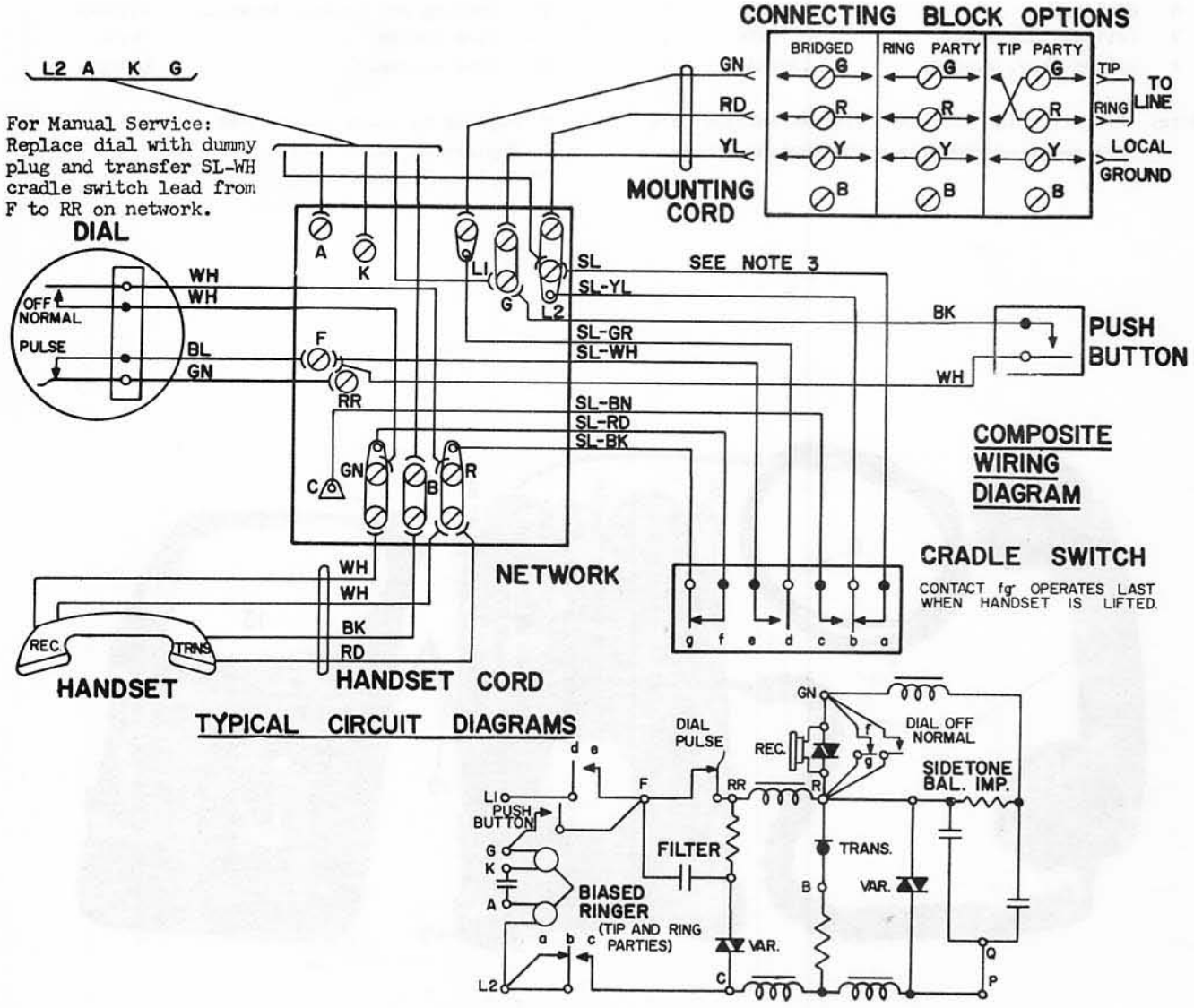


Fig. 2 DIAGRAMS 500--(--)34- TELEPHONE

TYPE 500--(--)35- DESK TELEPHONE

The 500--(--)35- telephone is a standard desk type of instrument arranged so that ringing and talking are carried out over separate two wire circuits. A biased, 20 cps, ringer is normally fitted but this can be omitted and a buzzer installed if direct current is to be used for signaling. Equipped with four-conductor cord.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex. Nut	67093	5
7	Cabinet Lock Screw	75486	2
8a	Ringer Assy. Biased	130(BA)470	1
b	Buzzer Kit (Ordered separately)	202( )904	

Item	Description	Number	Qty
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	
10	Handset and Cord Assembly	65**(Ø)410	1
11	Desk Stand Cord (4 Cond.)	3038**(13)650	1
12	Connecting Block (4 Term.)	32( )783	1
13	Housing and Plunger Assembly	75401-*	1
14	Terminal Board Assembly	79467	1
15	Mounting Plate	79468	1
16	Bind. Hd. Mach. Screw	75392-2	1

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

Ø Replace by class code number for type required.
* Replace by color code
** Replace by color code

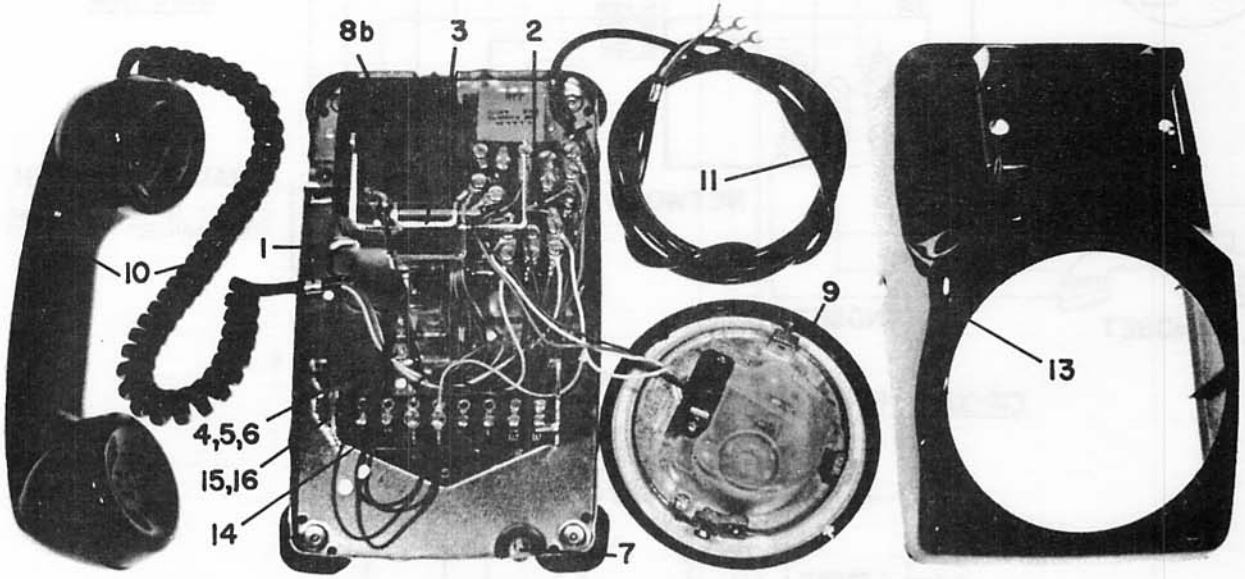


Fig. 1 TOP VIEW - HOUSING REMOVED

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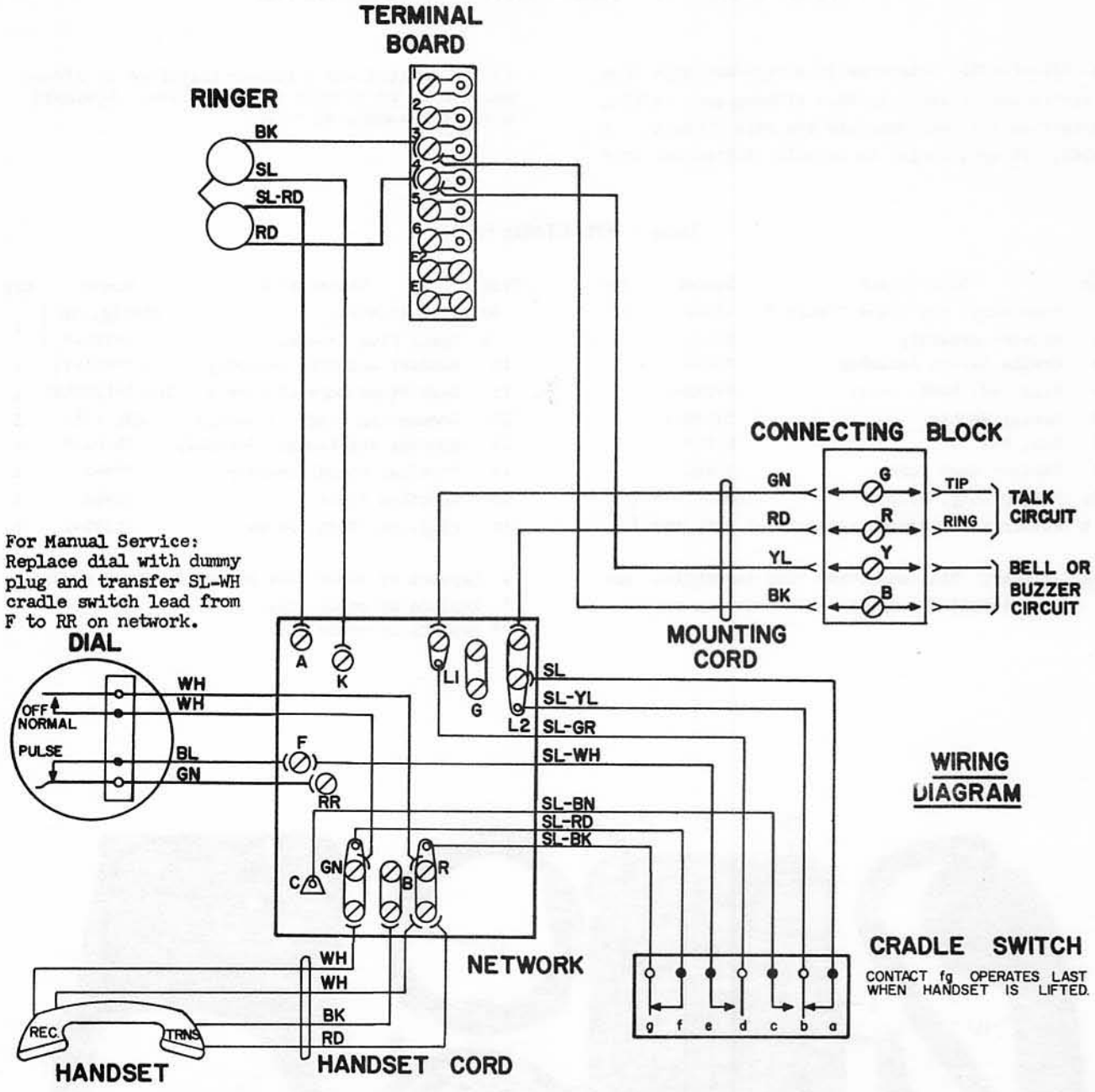

Fig. 2 DIAGRAMS 500--(--)35- TELEPHONE

TYPE 500--(--)37- AND TYPE 500--(--)38- DESK TELEPHONES

The 500--(--)37- and 500--(--)38- telephones are standard desk type instruments with the addition of an indicator lamp. A small neon lamp, located to the upper left of the dial, may be caused to glow by applying a DC potential of 90 volts across the line conductors at a remote point. The instruments are intended for use on PBX installations where the glowing lamp is used to indicate that a message has been left at the switchboard in the absence of the called party.

The 500--(--)37- instrument is only available with a low power NE51 indicator and a biased ringer. The 500--(--)38- instrument has a higher power NE51H indicator and may be supplied with either a biased or frequency selective ringer.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338-7	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300-3	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex. Nut	67093	5
7	Cabinet Lock Screw	75486	2
8a	Ringer Assy. Biased	130(BA)470	1
b	Freq. Sel. with Vol. Cont.	156(Ø)470	
c	Freq. Sel. less Vol. Cont.	157(Ø)470	
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	
10	Handset and Cord Assembly	65**(Ø)410	1
11	Desk Stand Cord (3 Cond.)	3031**(06)650	1

Item	Description	Number	Qty
12	Connecting Block (4 Term.)	32( )783	1
13	Housing and Plunger Assembly	79799-#	1
14	Lamp Socket	95130-1	1
15	Lamp Cap	77734	1
16a	Lamp - Code 37 instruments	79367	1
b	Lamp - Code 38 instruments	79367-2	
17	Bracket	79801	1
18	Rd. Hd. Mach. Screw	63590	2
19	Lockwasher	46936	2
20a	Resistor - Code 37 instruments	62948-8	1
b	Resistor - Code 38 instruments	62948-91	
21	Wire Assembly	75326-88	1

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

Ø Replace by class code number for type required.
* Replace by color code
\# Replace by color code
** Replace by color code

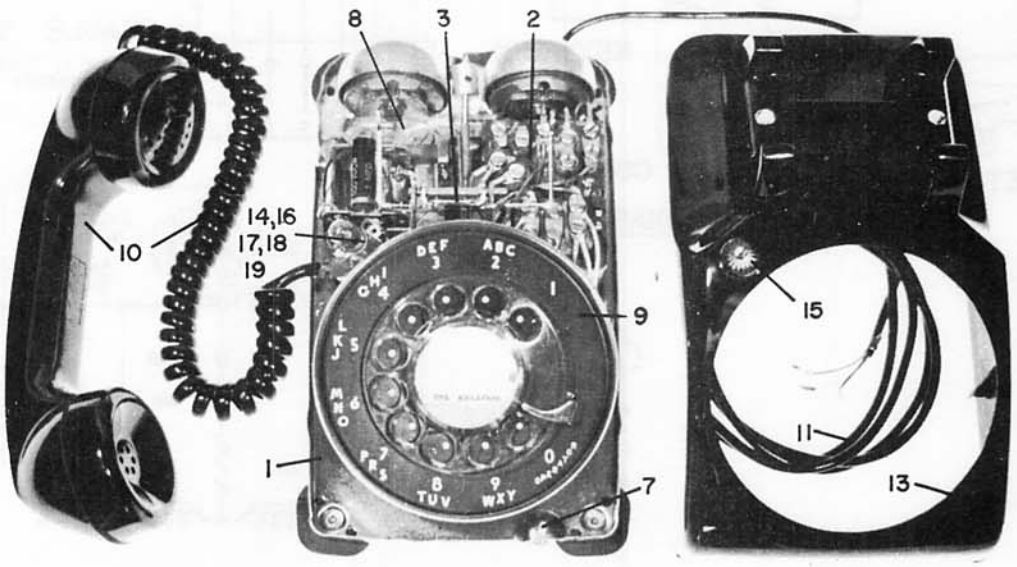

Fig. 1 TOP VIEW - HOUSING REMOVED

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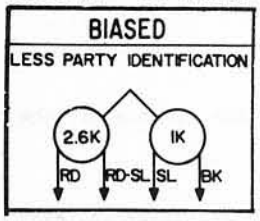
RINGER OPTIONS



See page 245.05 for instructions on connecting frequency selective ringers.

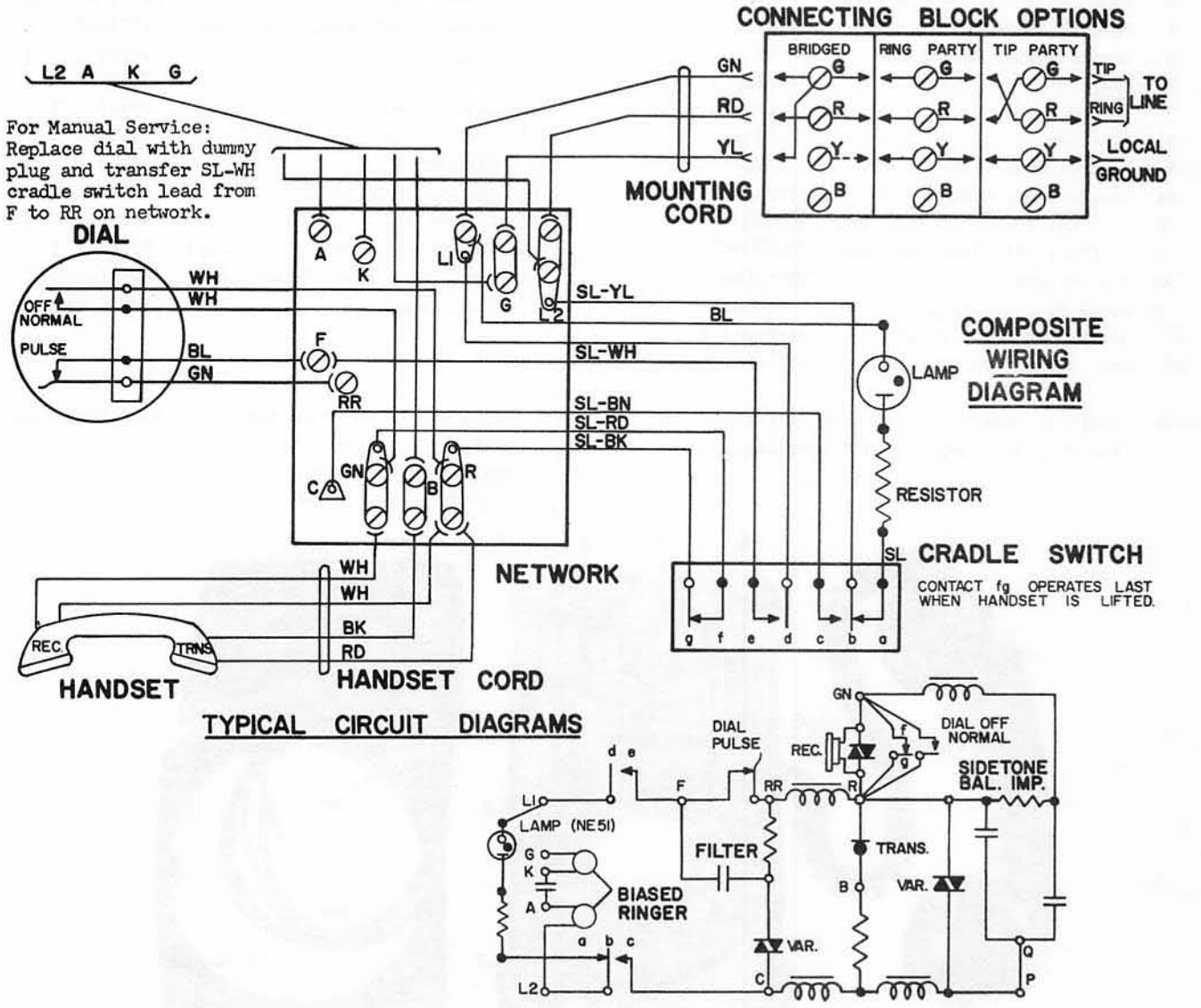


Fig. 2 DIAGRAMS 500--(--)37- TELEPHONE
AND 500--(--)38- TELEPHONE

TYPE 502--(--)30- TELEPHONE

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

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338-5	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300-2	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex. Nut	67093	5
7	Cabinet Lock Screw	75486	2
8a	Ringer Assy. Biased	130(BA)470	1
b	Freq. Sel. with Vol. Cont.	156(Ø)470	
c	Freq. Sel. less Vol. Cont.	157(Ø)470	
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	

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

Item	Description	Number	Qty
10	Handset and Cord Assembly	65**( )410	1
11	Desk Stand Cord (6 Cond.)	3044**(14)650	1
12	Connecting Block (10 Term.)	29( )783	1
13	Housing and Plunger Assembly	79607-*	1
14	Plunger Switch Assembly	79613-1	1
15	Wire Assembly	75326-90	1
16	Wire Assembly	75326-91	2
17	Terminal Board Assembly	79467	1
18	Mounting Plate	79468	1
19	Bind. Hd. Mach. Screw	75392-2	1

Ø Replace by class code number for type required.
* Replace by color code
** Replace by color code

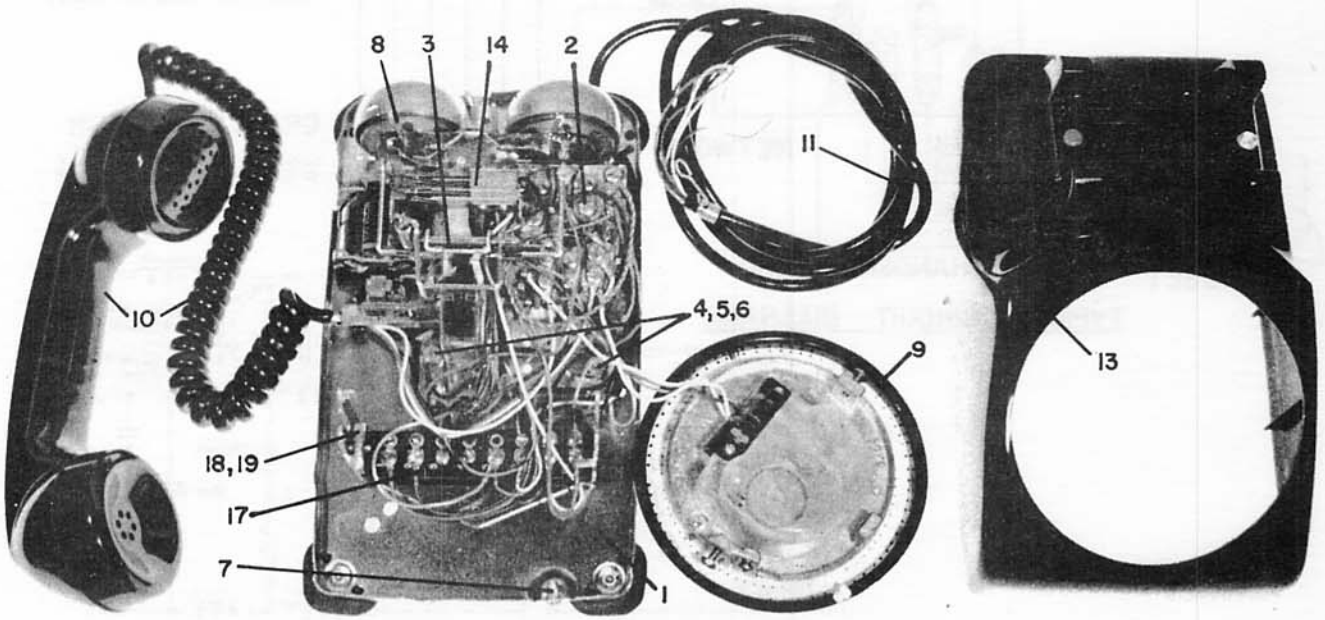


Fig. 1 TOP VIEW - HOUSING REMOVED

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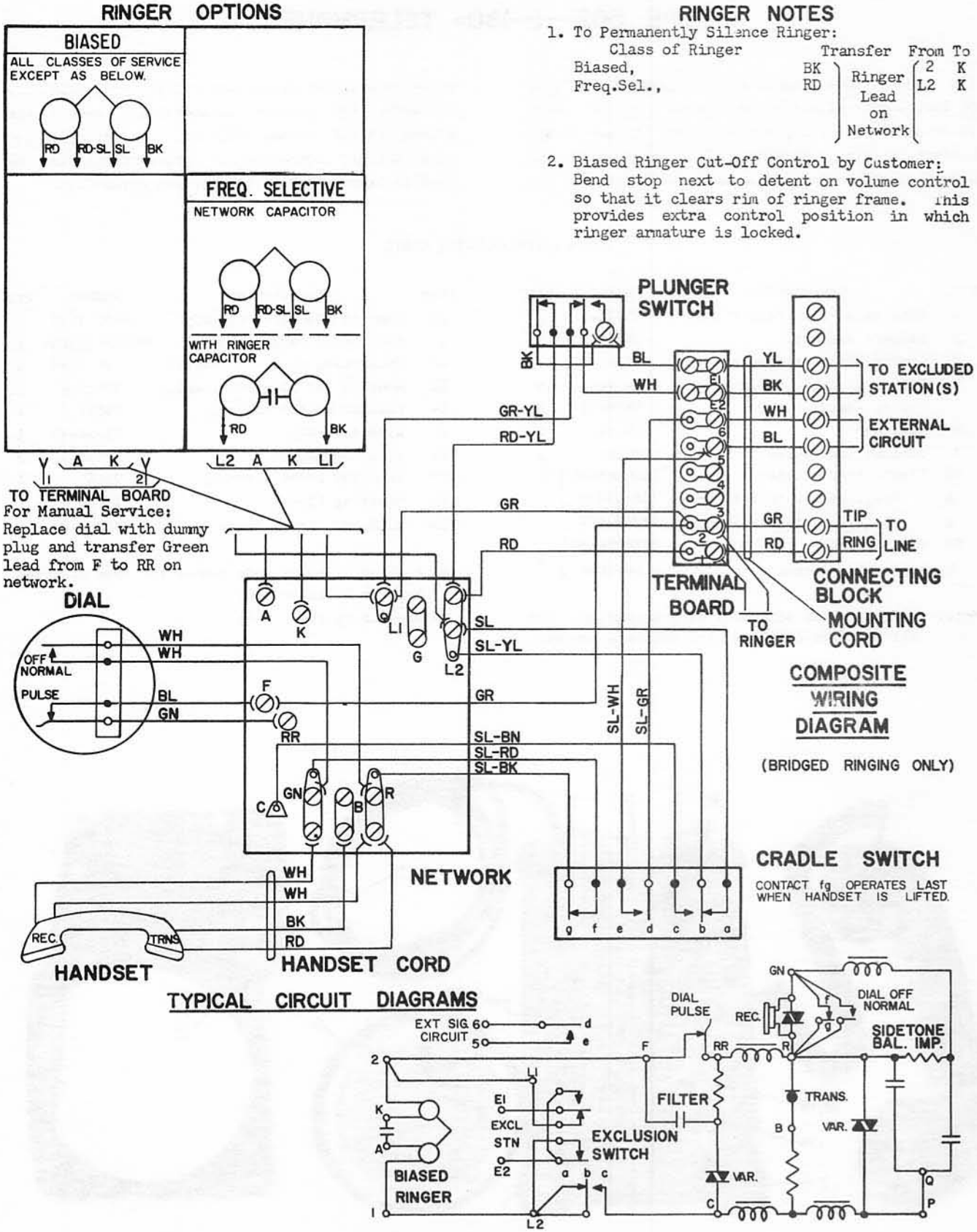

Fig. 2 DIAGRAMS 502--(--)30- TELEPHONE

"TEL-TOUCH" DESK TELEPHONES: K-1500; K-2500

Figure 1. "TEL-TOUCH' Desk Telephone

1. GENERAL INFORMATION

The "TEL-TOUCH' desk telephones are similar to the K-500 series of telephones except for the pushbutton dial and related parts. Early phones, (K-1500), have a 10-pushbutton dial; current phones (K-2500), have a 12-pushbutton dial. To replace the 10-pushbutton dial, order a 12-pushbutton dial, type 32; one 180147-** Face plate; one 87513-1 number card, and one 87514-1 number card retainer. Refer to appropriate circuit diagram to connect dial leads.

Ordering information is shown in Table I.

Replaceable parts are listed in Table II.

2. INSTALLATION

An appropriate circuit label is packed with each telephone. It includes all necessary instructions for telephone installation and ringer connections.

3. ADDITIONAL INFORMATION

The "TEL-TOUCH" dial is covered in Section 228.

4. DISASSEMBLY AND ASSEMBLY

4.1 HOUSING GROUP

(a) Removal of Housing (Ref to Figure 2)
Loosen the two cabinet lock screws (26), and lift off the housing and face plate group, (3, 11, 12 and 13).

(b) Installation of Housing
Work the housing over the dial push-buttons and secure with the two cabinet lock screws.

4.2 FACE PLATE GROUP (Refer to figure 2)

NOTE: Two styles of 10-button face plates are in use. The early style is shown in the inset and numbered 11, 12, and 13. This face plate is molded of transparent plastic and the underside painted black with the exception of the clear window for the number card. The number card (13) is held in by a brass retainer (12).

The later style face plate (11A) is molded of colored plastic and uses a snap-in number card window (12A) which serves as number card retainer.

(a) REMOVAL OF FACE PLATE GROUP

Use the straightened end of a paper clip and insert in the slot of the Face Plate Mounting Clip (9). Pry the clip back until the face plate is released.

(b) INSTALLATION OF FACE PLATE GROUP

Insert lower edge of Face Plate in matching slot in Housing. Press upper edge inward while holding Mounting Clip (9) in with straightened end of paper clip.

(c) INSTALLING NUMBER CARD

To replace the Number Card in the early style Face Plate, remove the Face Plate as directed in (a) above. Remove Retainer (12) and Number Card (13). Install the Number Card, Retainer and Face Plate.

To replace the Number Card in the later style Face Plate, remove the Retainer (12A) by inserting the straightened end of a paper clip in the slot at the right end of the Retainer and prying upward. Place the number card in the recess and snap in the Retainer as follows: Insert the left end of the Retainer in the recess, holding the Retainer near center, bend the right end down into the recess and release the Retainer.

4.3 REPLACING COMPONENTS

In replacing components, refer to Table II for correct part numbers. The telephone identifying code is stamped in ink on the bottom of the telephone base. Replace the Ringer by substitution - each Ringer is identified by a code stamped in ink on the ringer frame. Refer to the appropriate circuit label to connect leads.

TABLE 1. ORDERING INFORMATION

CODE	DESCRIPTION
K-2500**( )30_	TELEPHONE, "TEL-TOUCH", Standard
K-2500**( )33_	TELEPHONE, "TEL-TOUCH", Lift-to-talk
K-2500**( )39_	TELEPHONE, "TEL-TOUCH", for Hands Free Application
K-2502**( )30_	TELEPHONE, "TEL-TOUCH", Exclusion
	Add Dial Code as Follows: R-Regular M-Metro
	Insert Ringer Code As Follows: LR-Less Ringer BA-Straight Line Biased Ringer (---)-Frequency Selective Ringer (specify Exact Ringer - See Page 343.04)
	**Substitute Color Code as Follows: 00-Black 05-Green 09-Ivory 12-Aqua Blue 13-Light Beige 15-White 16-Sea Green

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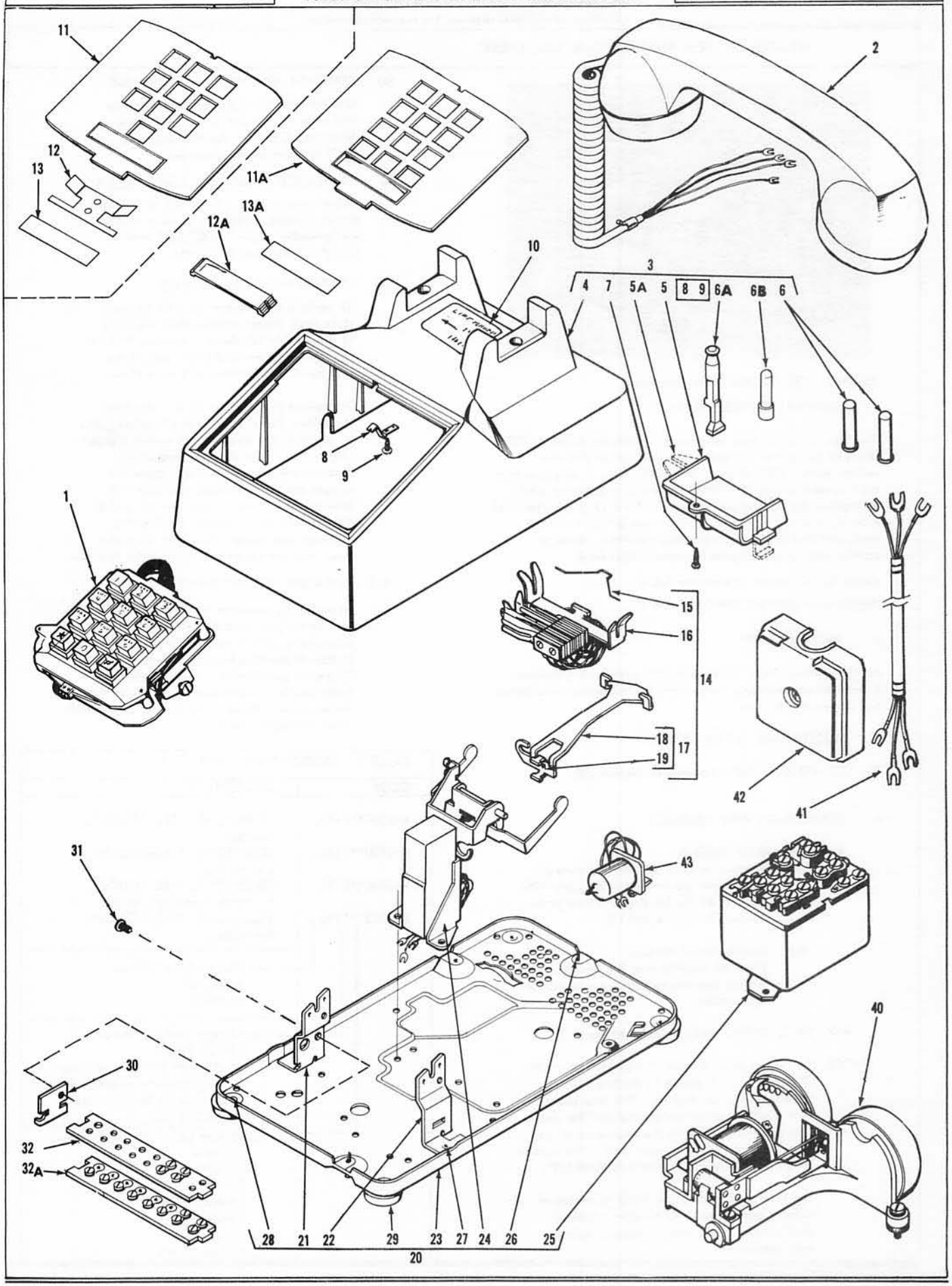

Figure 2. Single line "TEL-TOUCH" desk telephones, exploded view.

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 1500 /30	2500 /30	2500 /33	2500 /39	2502 /30
			TABLE II. REPLACEABLE PARTS LIST, "TEL-TOUCH" DESK TELEPHONES (Single Line)					
2	1	27(D)450	DIAL ASSEMBLY, 10-Pushbutton, Regular *	1	-	-	-	-
	1	27(G)450	DIAL ASSEMBLY, 10-Pushbutton, Metro *	1	-	-	-	-
	1	32(D)450	DIAL ASSEMBLY, 12-Pushbutton, Regular	-	1	1	-	1
	1	32(G)450	DIAL ASSEMBLY, 12-Pushbutton, Metro	-	1	1	-	1
	1	36(D)450	DIAL ASSEMBLY, 12-Pushbutton, Regular - (Hands - Free)	-	-	-	1	-
	1	36(G)450	DIAL ASSEMBLY, 12-Pushbutton, Metro - (Hands - Free)	-	-	-	1	-
	2	65**(C2)410	HANDSET ASSEMBLY, (See Section 212)	1	1	1	1	1
	3	86138-**	HOUSING AND PLUNGER ASSEMBLY (Standard Plungers)	1	1	-	1	-
	3	88490-**	HOUSING AND PLUNGER ASSEMBLY (One Lift Plunger)	-	-	1	-	1
	4	86137-**	HOUSING	1	1	1	1	1
	5	75405-**	RETAINER, Plunger (for Standard Plungers)	1	1	-	1	-
	5A	79606-**	RETAINER, Plunger (Used with Lift Plunger)	-	-	1	-	1
	6	75406-2	PLUNGER, Cradle Switch, Standard	2	2	-	2	-
	6A	79603-2	PLUNGER, Cradle Switch, Lift Type	-	-	1	-	1
	6B	79101-2	PLUNGER, Cradle Switch (Used with Lift - Type Plunger)	-	-	1	-	1
	7	75407-2	SCREW, (Plunger Retainer)	1	1	1	1	1
	8	86143-1	CLIP, Face Plate Mounting	1	1	1	1	1
	9	95884-2	SCREW, Face Plate Clip	1	1	1	1	1
	10	86370-1	LABEL, Lift-to-Talk, Black Letters			X		
	10	86370-2	LABEL, Lift-to-Talk, White Letters			X		
	11	86147-1	FACE PLATE, Old Style (Clear Plastic, Painted Black) 10-Button	1	-	-	-	-
	11A	86147-00	FACE PLATE, New Style (Molded of Black Plastic) - 10-Button	1	-	-	-	-
	11A	180147-**	FACE PLATE, for 12-Pushbutton Dial	-	1	1	1	1
	12	86144-1	RETAINER, Number Card, Old Style (Metal)	1	-	-	-	-
	12A	87514-1	RETAINER, Number Card, New Style (Clear Plastic)	-	1	1	1	1
	13	88443-1	CARD, Number (For Old Style Face Plate)	1	-	-	-	-
	13A	87513-1	CARD, Number (For New Style Face Plate)	-	1	1	1	1
	14	79613-1	SWITCH ASSEMBLY, Exclusion	-	-	-	-	1
	14	79613-2	SWITCH ASSEMBLY, Lift-To-Talk	-	-	1	-	-
	15	79624-1	RETAINER, Spring Assembly	-	-	1	-	1
	16	79614-1	SPRING ASSEMBLY, Exclusion	-	-	-	-	1
	16	79614-2	SPRING ASSEMBLY, Lift-To-Talk	-	-	1	-	-
	17	7962501	BRACKET ASSEMBLY, Switch	-	-	1	-	1
	18	79605-1	BRACKET, Switch	-	-	1	-	1
	19	69020-3	SCREW	-	-	1	-	1
	20	75338-13	BASE ASSEMBLY	1	1	-	-	-
	20	75338-20	BASE ASSEMBLY	-	-	-	1	-
	20	75338-16	BASE ASSEMBLY	-	-	1	-	1
	21	86146-1	BRACKET, Dial; L.H.	1	1	1	1	1
	22	86145-1	BRACKET, Dial; R.H.	1	1	1	1	1
	23	NSS	BASE (Not Serviced Separately)	1	1	1	1	1
	24	75300-1	CRADLE SWITCH ASSEMBLY, (See Section 250)	1	1	-	-	-
	24	75300-2	CRADLE SWITCH ASSEMBLY, (See Section 250)	-	-	1	-	1
	24	75300-4	CRADLE SWITCH ASSEMBLY, (See Section 250)	-	-	-	1	-
			(Attaching Parts)					
		32199-1	RIVET	3	3	3	3	3
	25	75335-1	NETWORK ASSEMBLY	1	1	1	1	1
			(Attaching Parts)					
		32199-1	RIVET	2	2	2	2	2
	26	75486-1	SCREW, Cabinet Lock	2	2	2	2	2
	27	31944-2	RIVET, (Dial Brackets)	2	2	2	2	2
	28	82486-2	RIVET, (Foot)	4	4	4	4	4
	29	82400-1	FOOT	4	4	4	4	4
	30	86103-1	PLATE, Terminal Board Mounting	1	1	1	1	1
	31	75392-2	SCREW, Terminal Board Mounting	1	1	1	1	1
	32	79467-2	TERMINAL BOARD ASSEMBLY, (4 Terminal Screws)	1	1	-	-	-
	32A	79467-1	TERMINAL BOARD ASSEMBLY, (10 Terminal Screws)	-	-	1	1	1

(Note: Index numbers 33 through 39 not used.)

* To replace type 27, (10-button), dial, order type 32, (12-button) dial, one 180147-** Face Plate, one 87513-1 Number Card, and one 87514-1 Number Card Retainer.

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TABLE II. REPLACEABLE PARTS LIST, "TEL-TOUCH" DESK TELEPHONES (Single Line)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	1500 /30	2500 /30	2500 /33	2500 /39	2502 /30
				QUANTITY USED ON:				
2			RINGERS (See Section 244)					
	40	130(BA)470	RINGER, Straight Line Biased	X	X	X	X	X
	40	------	RINGER, Frequency Selective					
		156( )470	-With Volume Control	X	X	X	X	X
		157( )470	-Less Volume Control	X	X	X	X	X
			HARMONIC					
		(HA1)	33-1/3 cps					
		(HA2)	50 cps (Same as HC5)					
		(HA3)	66-2/3 cps					
		(HA4)	16-2/3 cps					
		(HA5)	25 cps					
			SYNCHROMONIC					
		(HB1)	30 cps (Same as HC3)					
		(HB2)	42 cps					
		(HB3)	54 cps					
		(HB4)	66 cps					
		(HB5)	16 cps					
			DECIMONIC					
		(HC1)	20 cps					
		(HC2)	60 cps					
		(HC3)	30 cps (Sames as HB1)					
		(HC4)	40 cps					
		(HC5)	50 cps (Same as HA2)					
	41	3031**(06)650	CORD, Desk Stand, 3-conductor	1	1	1	-	-
	41	3044**(14)650	CORD, Desk Stand, 6-conductor	-	-	-	-	1
		3052**(27)650	CORD, Desk Stand, 11-conductor	-	-	-	1	-
	42	29( )783	BLOCK, Connecting, 10-terminals	-	-	-	1	1
	42	32( )783	BLOCK, Connecting, 4-terminals	1	1	1	-	-
	43	75599-1	TUBE, Ringer. (Used with BA Ringer for superimposed signaling.)	X	X	X	X	X

**## - COLORS

**	##	
00	21	Black
02	22	Red
04	24	Yellow
05	25	Green
09	29	Ivory
11	31	Rose Pink
12	32	Aqua Blue
13	33	Light Beige
14	34	Light Gray
15	35	White
16	36	Sea Green

CIRCUIT LABELS					
21628	X	-	-	-	-
180132	-	-	-	X	-
180134	-	-	X	-	-
180135	-	X	-	-	-
180139	-	-	-	-	X

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NOTES:
1- CONNECT YELLOW MOUNTING CORD LEAD TO SAME TERMINAL AS RED MOUNTING CORD LEAD AT CONNECTING BLOCK FOR ALL CLASSES OF SERVICE EXCEPT THOSE LISTED IN TABLE "A"
2- FOR TIP-PARTY WITH NO IDENTIFYING GROUND MOVE RED RINGER LEAD FROM L_2 TO L_1 ON NETWORK AS SHOWN IN TABLE "B"

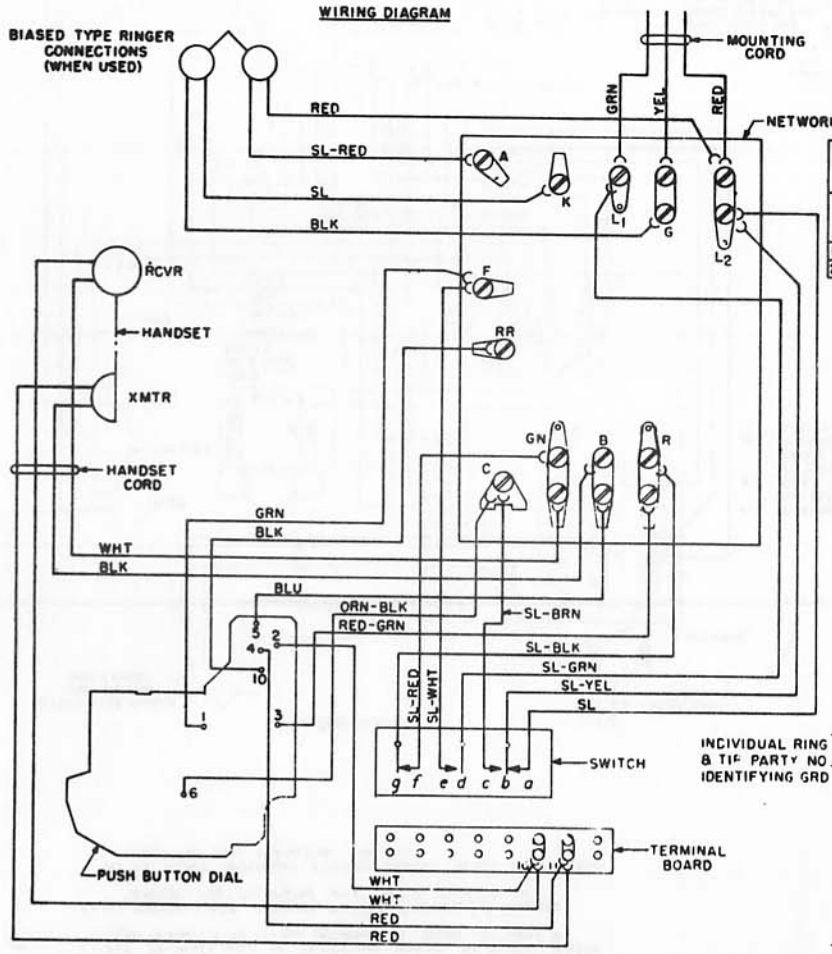

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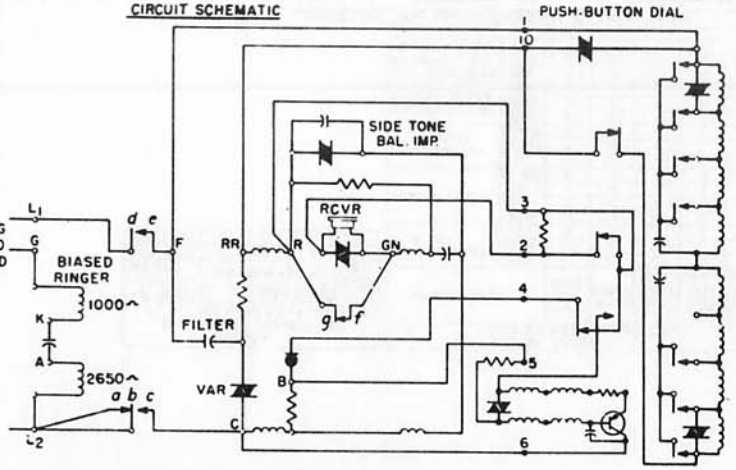
TABLE "A"
RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY

TIP PARTY IDENTIFYING GRD.	RINGER LEADS			
	RED	BLACK	SLATE	SLATE-RED
1000 OHMS	K	G	B	K
2650 OHMS	B	K	K	G

TABLE "B"
LINE & RINGER CONNECTIONS

WIRE OR LEAD		INDIV. OR BRDG.	RING PARTY	TIP PARTY		
				NO IDENT. GRD.	IDENT. GRD. 1000 OHMS	IDENT. GRD. 2650 OHMS
MOUNTING CORD IN SET	RED	L_2	L_2	L_2	L_2	L_2
	GRN	L_1	L_1	L_1	L_1	L_1
	YEL	G	G	G	G	G
RINGER LEADS	RED	L_2	L_2	L_1	K	B
	BLK	G	G	G	G	B
	SL	K	K	K	B	K
	SL-RED	A	A	A	B	G
HOOKSWITCH LEADS	SL	L_2	L_2	L_2	A	A
	SL-WHT	F	F	F	C	C
	SL-BRN	C	C	C	F	F
MOUNTING CORD AT CONN. BLOCK	RED	R	R	R	G	G
	GRN	G	G	G	R	R
	YEL	G	Y	Y	Y	Y
LINE WIRE AT CONN. BLOCK	RING	RED	R	R	R	R	R
	TIP	GRN	G	G	G	G	G
	GRD.	YEL	Y	Y	Y	Y	Y



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2500 TYPE TELEPHONE CIRCUIT

NOTES:

1 - FOR TIP-PARTY WITH NO IDENTIFYING GROUND MOVE RED RINGER LEAD FROM L2 TO LI ON NETWORK AS SHOWN IN TABLE *.

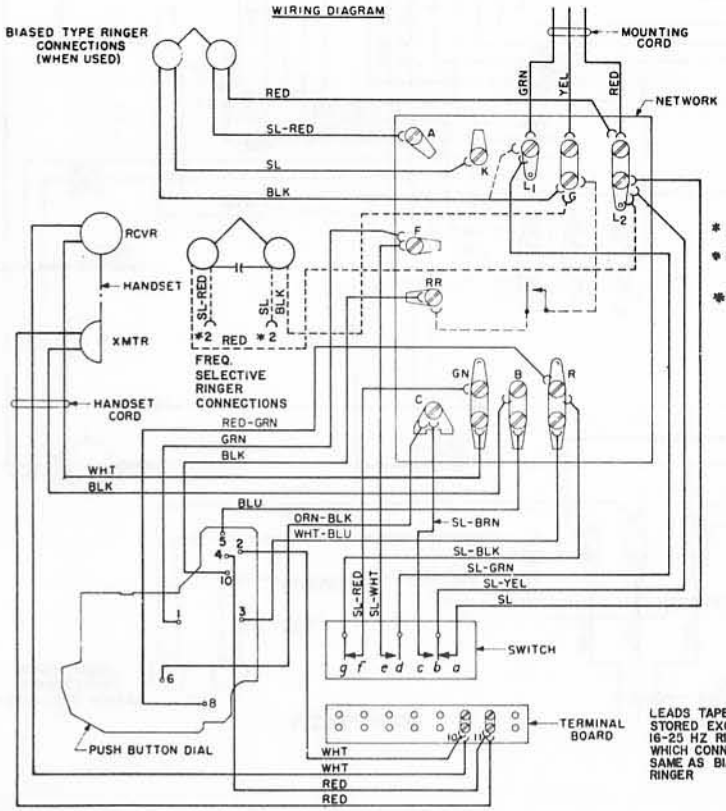
2-(a) BROKEN LINES BETWEEN TERMINAL "RR" AND "G" INDICATE CIRCUIT FOR TELEPHONE WITH SPECIAL FEATURE 34.

(b) TO PROVID GROUNDING FEATURE, REMOVE BLACK RINGER LEAD FROM "G" AND REPOSITION TO "LI".

130 BA RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY				
TIP PARTY IDENTIFYING GRD.	RINGER LEADS			
	RED	BLACK	SLATE	SLATE-RED
1000 OHMS	K	G	B	K
2650 OHMS	B	K	K	G

* 130 BA RINGER LINE & RINGER CONNECTIONS						
WIRE OR LEAD		INDIV. OR BRDG.	RING PARTY	TIP PARTY NO IDENT. GRD	TIP PARTY IDENT GRD. 1000 OHMS	TIP PARTY IDENT GRD. 2650 OHMS
MOUNTING CORD IN SET	RED	L2	L2	L2	L2	L2
	GRN	LI	LI	LI	LI	LI
	YEL	G	G	G	G	G
RINGER LEADS	RED	L2	L2	LI	K	B
	BLK	G	G	G	G	B
	SL	K	K	K	B	K
	SL-RED	A	A	A	B	G
HOOKSWITCH LEADS	SL	L2	L2	L2	A	A
	SL-WHT	F	F	F	C	C
	SL-BRN	C	C	C	F	F
MOUNTING CORD AT CONN. BLOCK	RED	R	R	R	G	G
	GRN	G	G	G	R	R
	YEL	G	Y	Y	Y	Y
LINE WIRE AT CONN. BLOCK	RING	RED	R	R	R	R	R
	TIP	GRN	G	G	G	G	G
	GRD	YEL	Y	Y	Y	Y	Y

WIRING DIAGRAM



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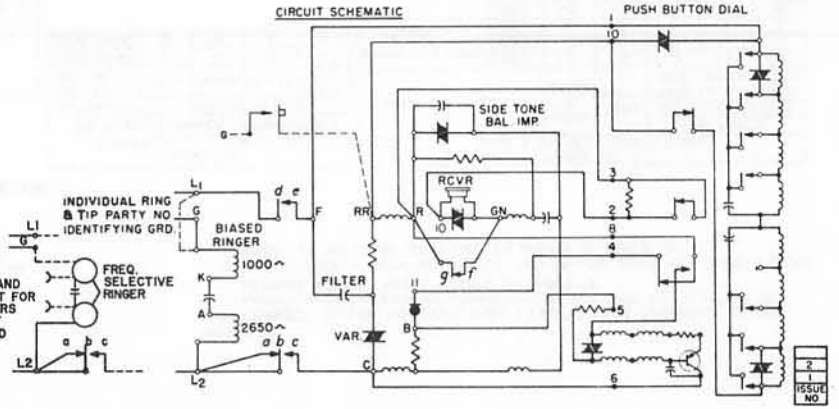
* 1 IF GROUND IS BROUGHT TO CONNECTING BLOCK.

* 2 TAPED AND STORED EXCEPT FOR 16-25 HZ RINGERS WHICH CONNECT SAME AS BIASED RINGER.

*3 TRANSFER SLATE SWITCH LEAD FROM (L2) TO (A) TERMINAL ON NETWORK.

CONNECTIONS FOR 156-157 FREQUENCY SELECTIVE RINGER										
CLASS OF SERVICE	CONNECTIONS AT CONNECTING BLOCK						CONNECTIONS IN SET			
	LINE			MTG. CORD			RINGER LEADS			
	RING	TIP	GND	RED	GRN	YEL	RED	BLK	SL	SL-RED
BRIDGED	R	G	Y *1	R	G	G	L2	G	*2	*2
RING PARTY	R	G	Y	R	G	Y	L2	G	*2	*2
TIP PARTY	R	G	Y	G	R	Y	L2	G	*2	*2
TIP PARTY DIAL MESSAGE RATE *3 1000 OHM	R	G	Y	G	R	Y	A	G	B	*2
TIP PARTY DIAL MESSAGE RATE *3	R	G	Y	G	R	Y	G	A	*2	B

CIRCUIT SCHEMATIC



2
1
ISSUE NO.

2500 TYPE TELEPHONE CIRCUIT

NOTES:

1 - FOR TIP-PARTY WITH NO IDENTIFYING GROUND MOVE RED RINGER LEAD FROM L2 TO LI ON NETWORK AS SHOWN IN TABLE *.

2-(a) BROKEN LINES BETWEEN TERMINAL "RR" AND "G" INDICATE CIRCUIT FOR TELEPHONE WITH SPECIAL FEATURE 34.

(b) TO PROVID GROUNDING FEATURE, REMOVE BLACK RINGER LEAD FROM "G" AND REPOSITION TO "LI".

3- WHEN 4 CONDUCTORS ARE FURN-SHED WITH MOUNTING CORD, TERMINATE BLACK CONDUCTOR WITH YELLOW CONDUCTOR AT CONNECTING BLOCK EXCEPT WHERE USED FOR SPECIAL APPLICATIONS.

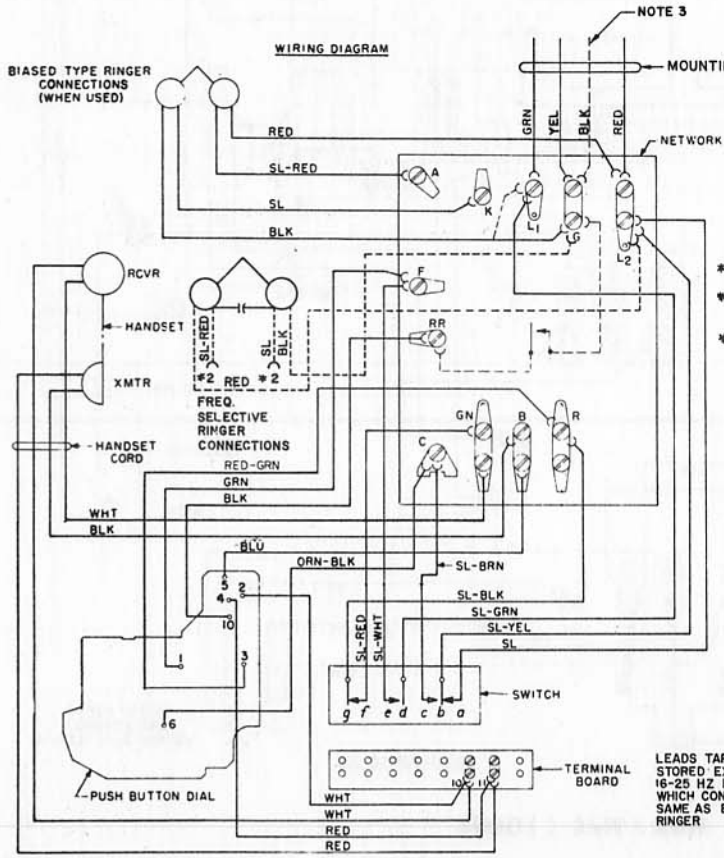
130 BA RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY				
TIP PARTY IDENTIFY-ING GRD.	RINGER LEADS			
	RED	BLACK	SLATE	SLATE -RED
1000 OHMS	K	G	B	K
2650 OHMS	B	K	K	G

* 130 BA RINGER LINE & RINGER CONNECTIONS						
WIRE OR LEAD		INDIV. OR BRDG.	RING PARTY	TIP PARTY		
				NO IDENT GRD	IDENT GRD 1000 OHMS	IDENT GRD 2650 OHMS
MOUNTING CORD IN SET	RED	L2	L2	L2	L2	L2
	GRN	LI	LI	LI	LI	LI
	YEL	G	G	G	G	G
RINGER LEADS	RED	L2	L2	LI	K	B
	BLK	G	G	G	G	B
	SL	K	K	K	B	K
	SL-RED	A	A	A	B	G
HOOKSWITCH LEADS	SL	L2	L2	L2	A	A
	SL-WHT	F	F	F	C	C
	SL-BRN	C	C	C	F	F
MOUNTING CORD A1 CONN. BLOCK	RED	R	R	R	G	G
	GRN	G	G	G	R	R
	YEL	G	Y	Y	Y	Y
LINE WIRE AT CONN. BLOCK	RING	RED	R	R	R	R	R
	TIP	GRN	G	G	G	G	G
	GRD	YEL	Y	Y	Y	Y	Y

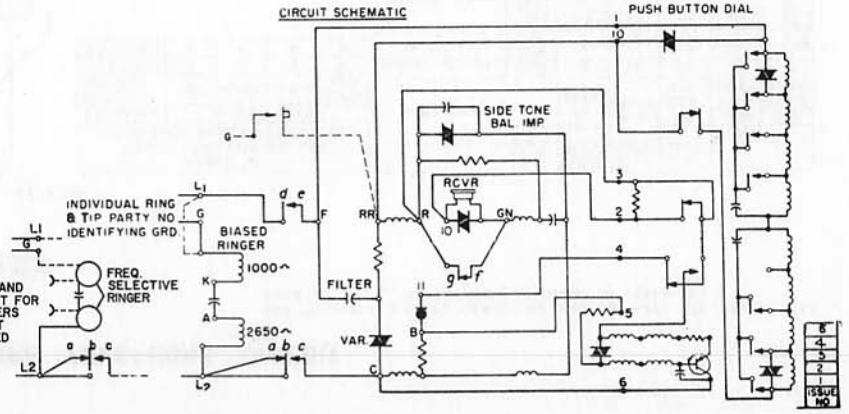
CONNECTIONS FOR 156-157 FREQUENCY SELECTIVE RINGER										
CLASS OF SERVICE	CONNECTIONS AT CONNECTING BLOCK						CONNECTIONS IN SET			
	LINE			MTG. CORD			RINGER LEADS			
	RING	TIP	GND	RED	GRN	YEL	RED	BLK	SL	SL-RED
BRIDGED	R	G	Y*1	R	G	G	L2	G	*2	*2
RING PARTY	R	G	Y	R	G	Y	L2	G	*2	*2
TIP PARTY	R	G	Y	G	R	Y	L2	G	*2	*2
TIP PARTY DIAL MESSAGE RATE *3 1000 OHM	R	G	Y	G	R	Y	A	G	B	*2
TIP PARTY DIAL MESSAGE RATE *3	R	G	Y	G	R	Y	G	A	*2	B

*1 IF GROUND IS BROUGHT TO CONNECTING BLOCK.
*2 TAPED AND STORED EXCEPT FOR 16-25 HZ RINGERS WHICH CONNECT SAME AS BIASED RINGER.
*3 TRANSFER SLATE SWITCH LEAD FROM (L2) TO 'A) TERMINAL ON NETWORK.

WIRING DIAGRAM



CIRCUIT SCHEMATIC



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2500( ) 37M / 38M TYPE TELEPHONE CIRCUIT

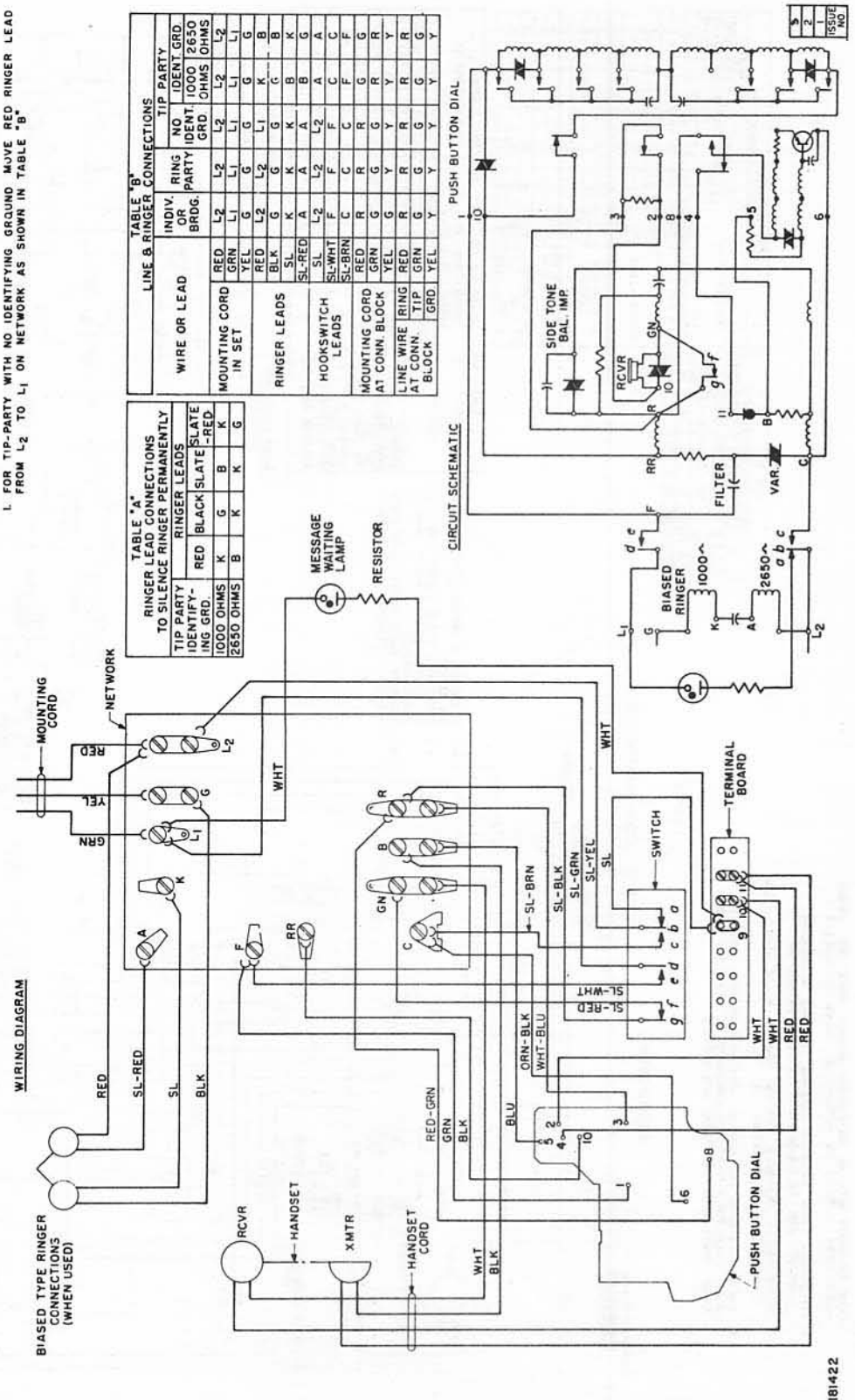
NOTES:
1. FOR TIP-PARTY WITH NO IDENTIFYING GROUND MOVE RED RINGER LEAD FROM L_2 TO L_1 ON NETWORK AS SHOWN IN TABLE "B"

TABLE "A"
RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY

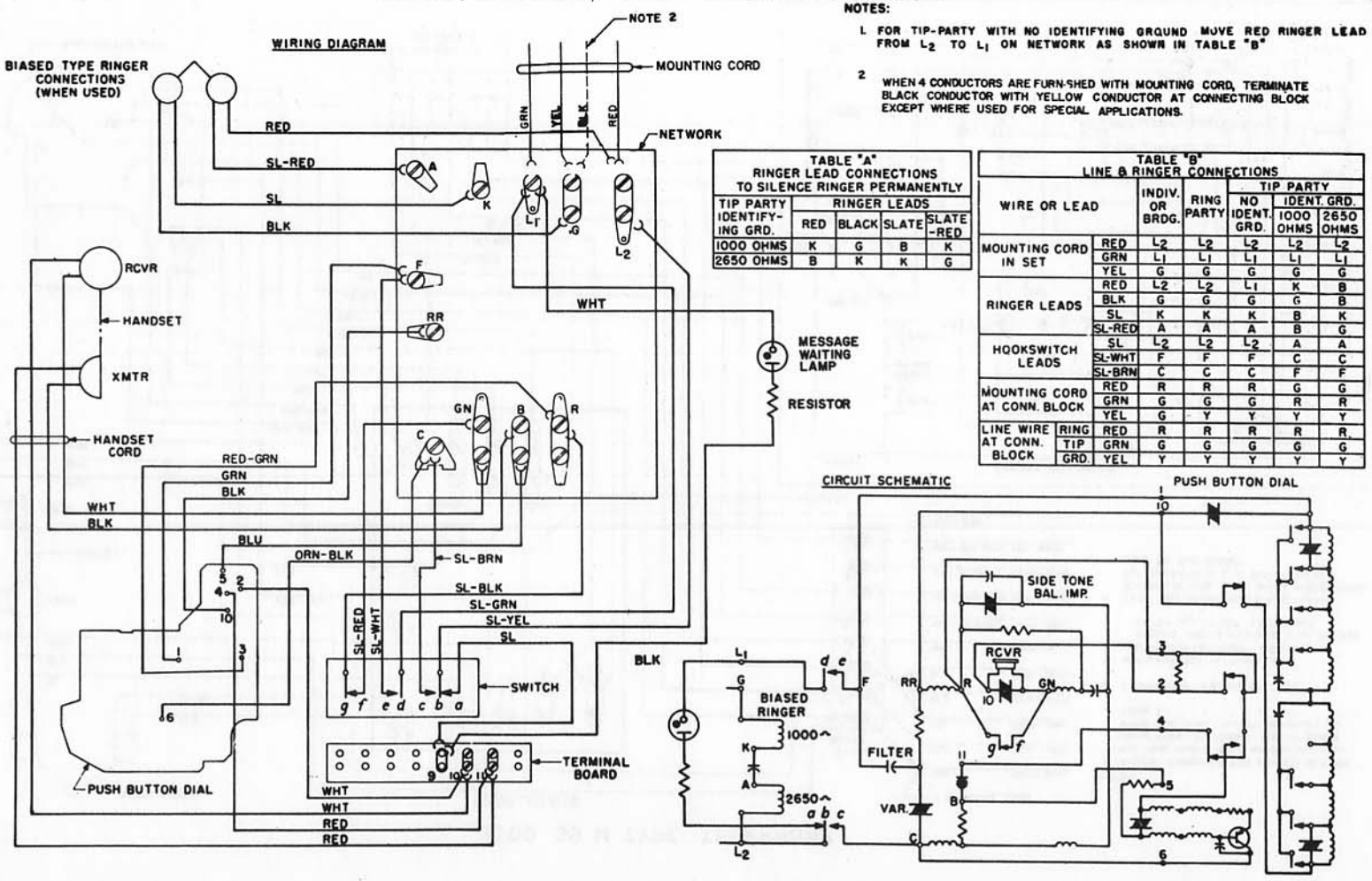
TIP PARTY IDENTIFYING GRD.	RINGER LEADS			
	RED	BLACK	SLATE	SLATE-RED
1000 OHMS	K	G	B	K
2650 OHMS	B	K	K	G

TABLE "B"
LINE & RINGER CONNECTIONS

WIRE OR LEAD		INDIV. OR BRDG.	RING PARTY	TIP PARTY NO IDENT. GRD	TIP PARTY IDENT GRD 1000 OHMS	TIP PARTY IDENT GRD 2650 OHMS
MOUNTING CORD IN SET	RED	L_2	L_2	L_2	L_2	L_2
	GRN	L_1	L_1	L_1	L_1	L_1
	YEL	G	G	G	G	G
RINGER LEADS	RED	L_2	L_2	L_1	K	B
	BLK	G	G	G	G	B
	SL	K	K	K	B	K
	SL-RED	A	A	A	B	G
HOOKSWITCH LEADS	SL	L_2	L_2	L_2	A	A
	SL-WHT	F	F	F	C	C
	SL-BRN	C	C	C	F	F
MOUNTING CORD AT CONN. BLOCK	RED	R	R	R	G	G
	GRN	G	G	G	R	R
	YEL	G	Y	Y	Y	Y
LINE WIRE AT CONN. BLOCK	RING	RED	R	R	R	R
	TIP	GRN	G	G	G	G
	GRD	YEL	Y	Y	Y	Y



2500( ) 37M / 38M TYPE TELEPHONE CIRCUIT



NOTES:

1. FOR TIP-PARTY WITH NO IDENTIFYING GROUND MOVE RED RINGER LEAD FROM L_2 TO L_1 ON NETWORK AS SHOWN IN TABLE "B"
2. WHEN 4 CONDUCTORS ARE FURNISHED WITH MOUNTING CORD, TERMINATE BLACK CONDUCTOR WITH YELLOW CONDUCTOR AT CONNECTING BLOCK EXCEPT WHERE USED FOR SPECIAL APPLICATIONS.

TABLE "A"
RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY

TIP PARTY IDENTIFYING GRD.	RINGER LEADS			
	RED	BLACK	SLATE	SLATE-RED
1000 OHMS	K	G	B	K
2650 OHMS	B	K	K	G

TABLE "B"
LINE & RINGER CONNECTIONS

WIRE OR LEAD		INDIV. OR BRDG.	RING PARTY	TIP PARTY		
				NO IDENT. GRD.	IDENT. GRD. 1000 OHMS	IDENT. GRD. 2650 OHMS
MOUNTING CORD IN SET	RED	L_2	L_2	L_2	L_2	L_2
	GRN	L_1	L_1	L_1	L_1	L_1
	YEL	G	G	G	G	G
RINGER LEADS	RED	L_2	L_2	L_1	K	B
	BLK	G	G	G	G	B
	SL	K	K	K	B	K
	SL-RED	A	A	A	B	G
HOOKSWITCH LEADS	SL	L_2	L_2	L_2	A	A
	SL-WHT	F	F	F	C	C
	SL-BRN	C	C	C	F	F
MOUNTING CORD AT CONN. BLOCK	RED	R	R	R	G	G
	GRN	G	G	G	R	R
	YEL	G	Y	Y	Y	Y
LINE WIRE AT CONN. BLOCK	RING	RED	R	R	R	R
	TIP	GRN	G	G	G	G
	GRD.	YEL	Y	Y	Y	Y

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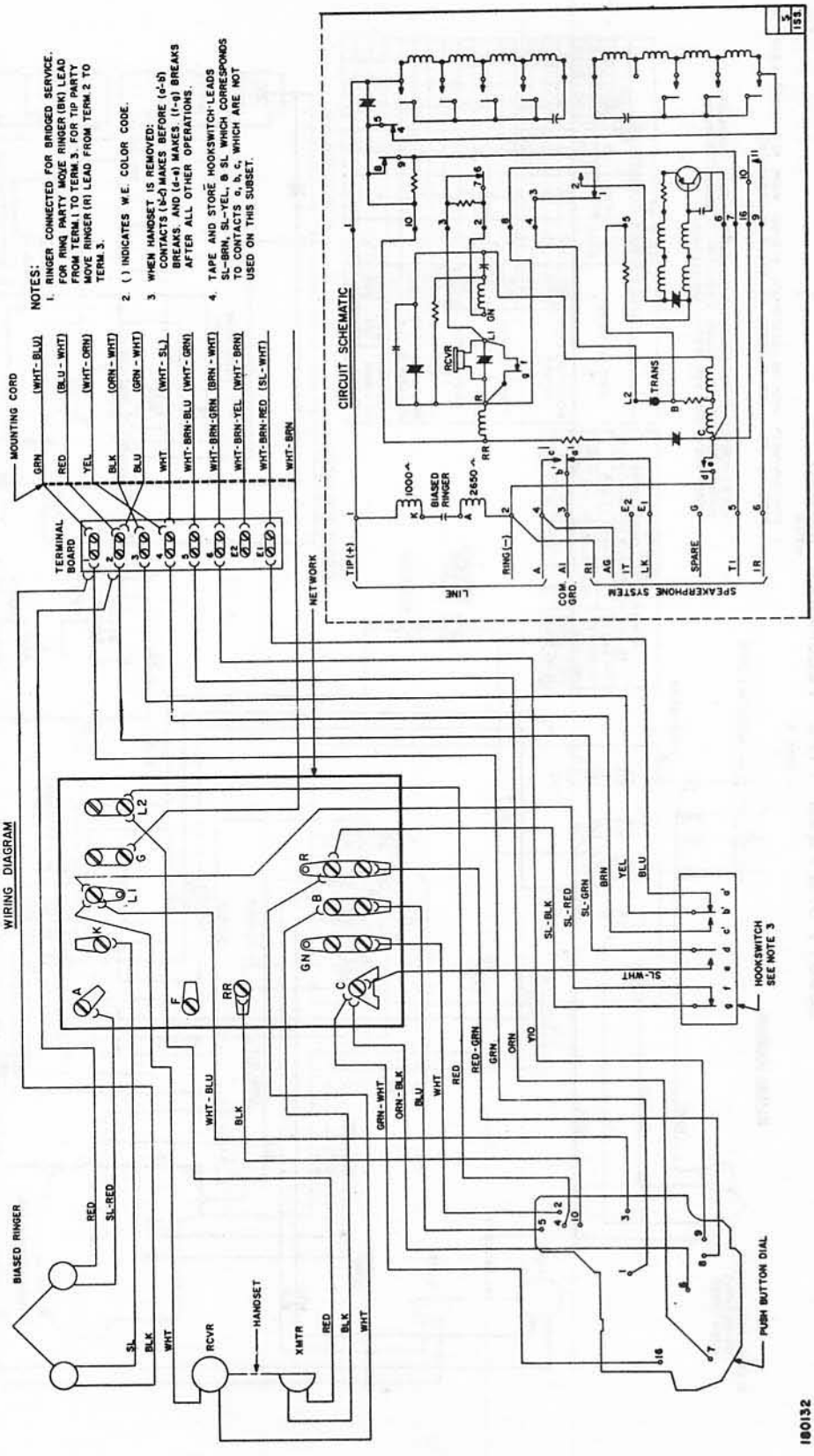
2500 39 M TYPE TELEPHONE

WIRING DIAGRAM



2502 TYPE TELEPHONE CIRCUIT

NOTES:

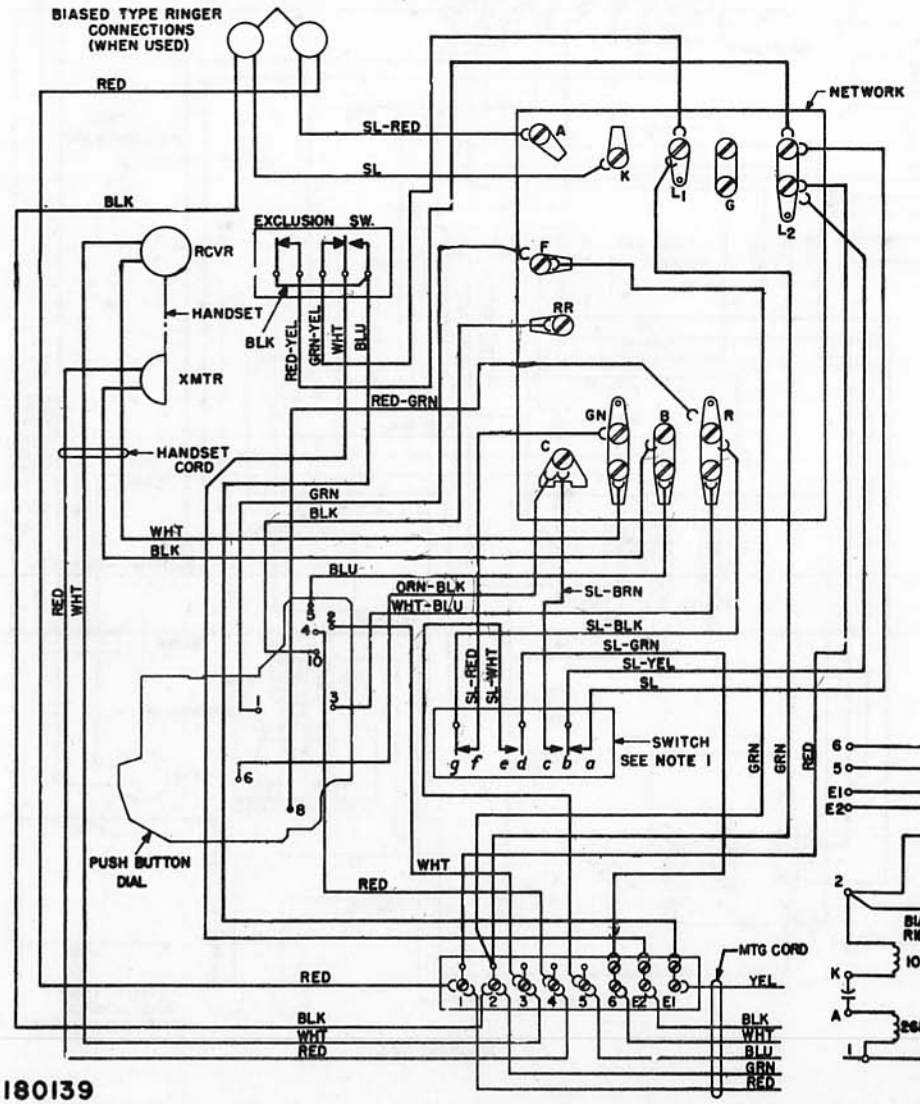
1- CONTACT SEQUENCE

REMOVING HANDSET		RESTORING HANDSET	
A. *de*	CLOSES BEFORE *cb*	A. *fg*	CLOSES
B. *fg*	OPENS	B. *cb*	OPENS BEFORE *de*

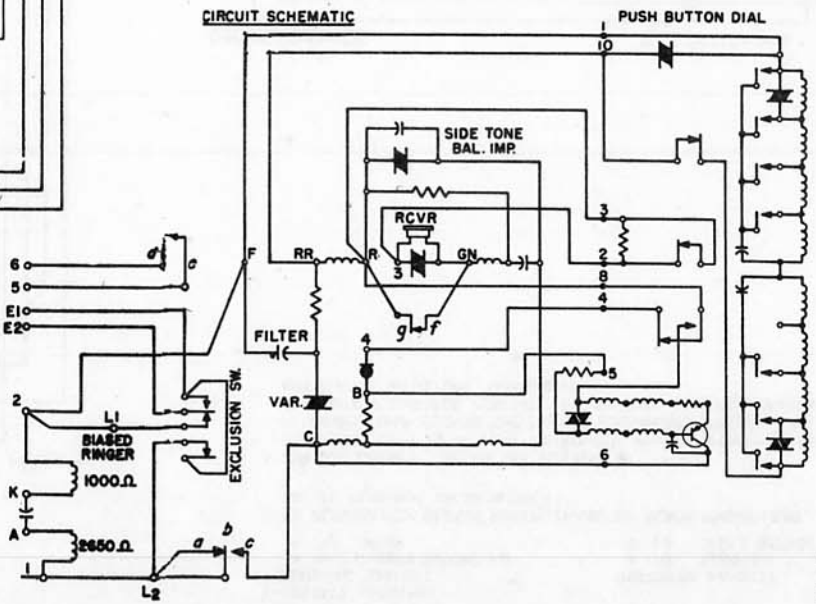
2- TO PERMANENTLY SILENCE RINGER, TRANSFER BLACK RINGER LEAD TO (K) TERMINAL ON NETWORK.

3- RINGER CUTOFF CONTROL BY CUSTOMER BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT

WIRING DIAGRAM



CIRCUIT SCHEMATIC



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2502 TYPE TELEPHONE CIRCUIT

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NOTES:

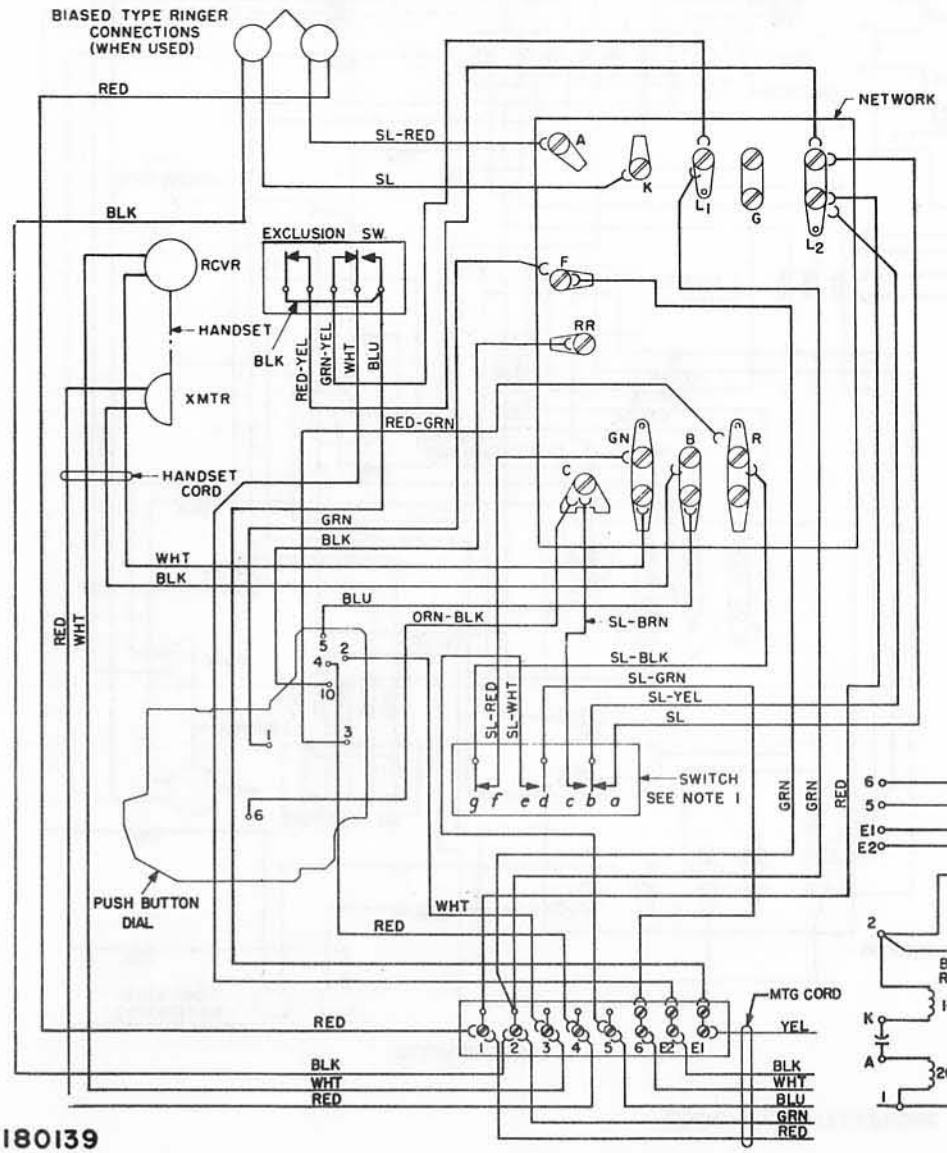
1- CONTACT SEQUENCE

REMOVING HANDSET		RESTORING HANDSET	
A. *de*	CLOSES BEFORE *cb*	A. *fg*	CLOSES
B. *fg*	OPENS	B. *cb*	OPENS BEFORE *de*

2- TO PERMANENTLY SILENCE RINGER, TRANSFER BLACK RINGER LEAD TO (K) TERMINAL ON NETWORK.

3- RINGER CUTOFF CONTROL BY CUSTOMER
BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTRCL SO THA IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT

WIRING DIAGRAM



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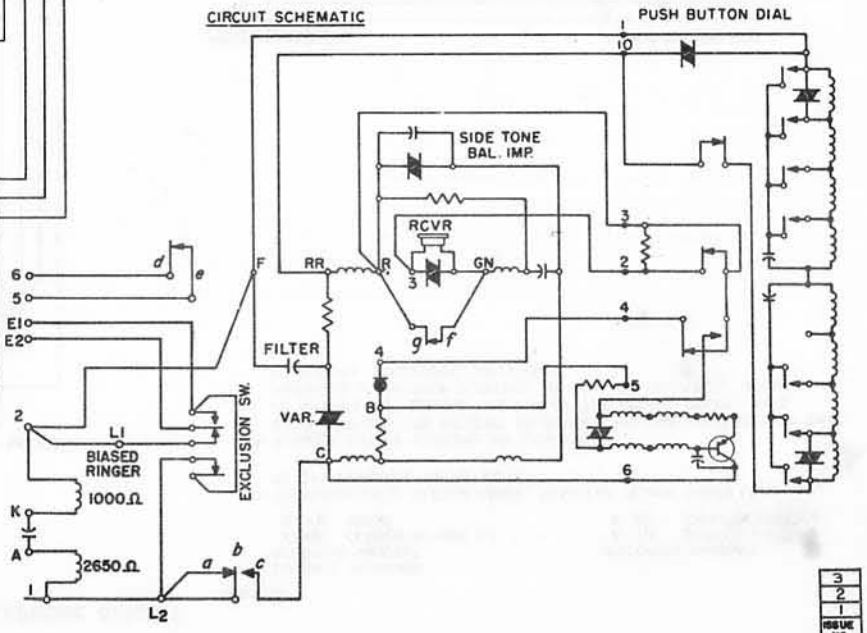

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TYPE 510--(--)30- AND TYPE 510--(--)36- DESK TELEPHONES

The 510--(--)30- and 510--(--)36- telephones are standard desk type instruments with the addition of a turn and push key which permits the instrument to be switched to either one of two lines. The ringer is permanently connected to line 1 and a separate ringer must be provided for line 2.

Both units are available with biased or frequency selective ringers for bridged ringing service. The 510--(--)30- unit may be wired for divided ringing service if the signalling circuit is not used or if one conductor of this circuit may be grounded.

The instruments are designed for service in small business establishments where a switchboard or key telephone system would be uneconomical. A 6-way cord and 10-way terminal block are provided with the 510--(--)30- unit and the push section of the key is wired for an interphone signalling circuit. A 4-way cord and terminal block are provided with the 510--(--)36- unit and the push section of the key is ineffective.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex. Nut	67093	5
7	Cabinet Lock Screw	75486	2
8	Ringer Assy. Biased	130(BA)470	
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	
10	Handset and Cord Assembly	65**(Ø)410	1
11a	Desk Stand Cord (6 Cond.)	3044**(14)650	1
b	Desk Stand Cord (4 Cond.)	3038**(13)650	
12a	Connecting Block (10 Term.)	29( )783	1
b	Connecting Block (4 Term.)	32( )783	

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

Item	Description	Number	Qty
13	Housing and Plunger Assembly	79510-*	1
14	Turn and Push Key Assembly	79453	1
15	Special Screw	79474	2
16	Terminal Board Assembly	79467	1
17	Mounting Plate	79468	1
18	Bind. Hd. Mach. Screw	75392-2	1
19	Wire Assembly (Not used with 8a)	75326-65	1
20	Wire Assembly	75326-66	1
21	Wire Assembly	75326-67	1
22	Wire Assembly	75326-68	1
23	Wire Assembly	75326-69	1
24	Wire Assembly	75326-70	1
25	Wire Assembly	75326-71	1
26	Wire Assembly	75326-72	1
27	Wire Assembly	75326-73	1

Ø Replace by class code number for type required.
* Replace by color code
** Replace by color code

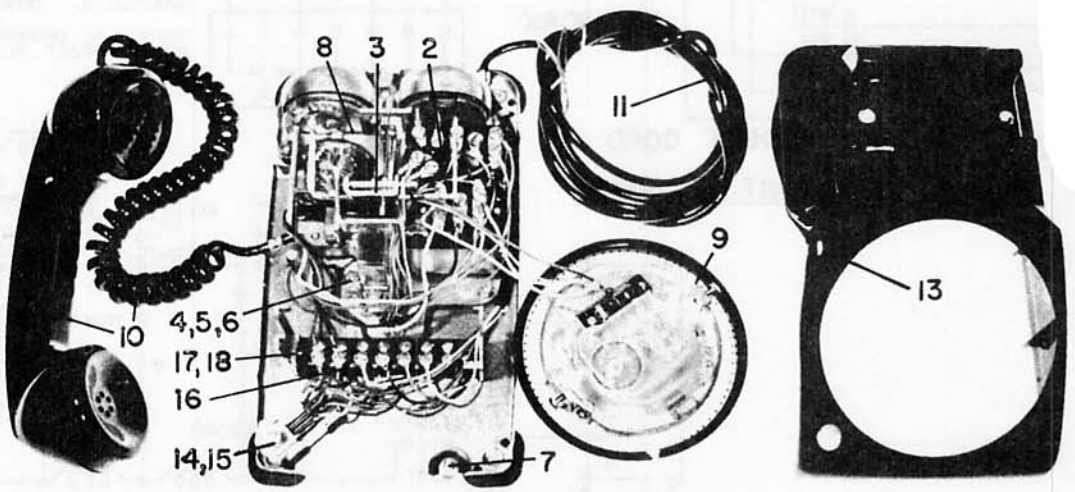

Fig. 1 TOP VIEW - HOUSING REMOVED

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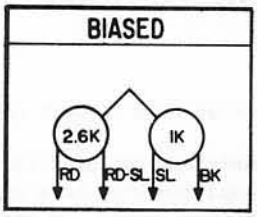
RINGER OPTIONS



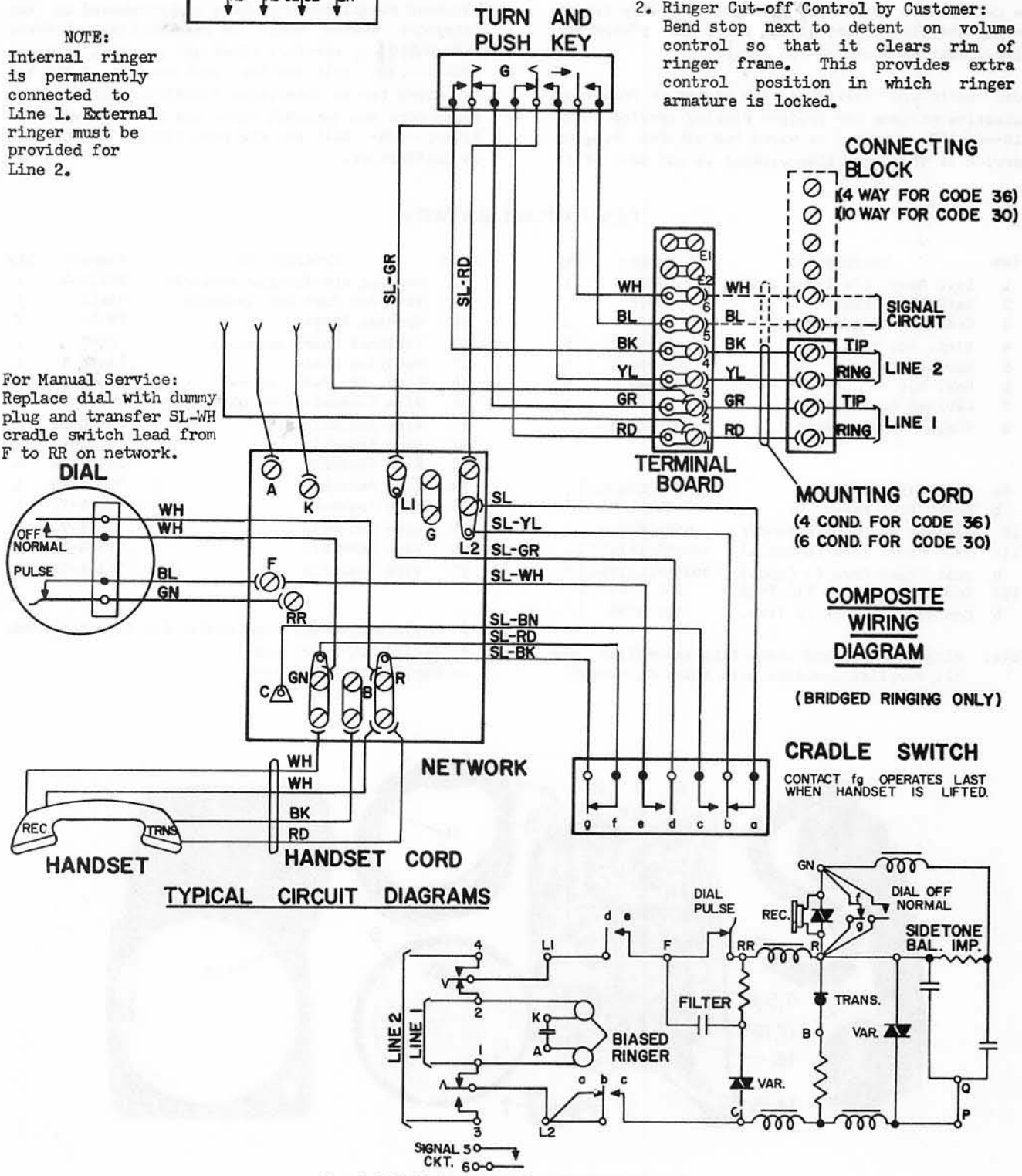
RINGER NOTES

1. To Permanently Silence Ringer:

Class of Ringer	Transfer Ringer Lead on Network	From	To
Biased		TB2	K

2. Ringer Cut-off Control by Customer: Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

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



COMPOSITE WIRING DIAGRAM

(BRIDGED RINGING ONLY)

TYPICAL CIRCUIT DIAGRAMS

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

TYPE 575--(--)30- AND TYPE 575--(--)36- DESK TELEPHONES

The 575--(--)30- and 575--(--)36- telephones are standard desk type instruments with the addition of a turn and push key, which permits the instrument to be switched to either one of two lines, and a plunger switch, which permits a holding loop to be placed across the opposite line to that selected by the turn and push key. The ringer is permanently connected to line 1 and a separate ringer must be provided for line 2. Both units are available with biased or frequency selective ringers for bridged ringing service. The 575--(--)30- unit may be wired for divided ringing service if the signalling circuit is not used or if one conductor may be grounded.

The instruments are designed for service in small business establishments where a switchboard or key telephone system would be uneconomical. A 6-way cord and 10-way terminal block are provided with the 575--(--)30- unit and the push section of the key is wired for an interphone signalling circuit. A 4-way cord and terminal block are provided with the 575--(--)36- unit and the push section of the key is ineffective.

Table 1 REPLACEABLE PARTS

Item	Description	Number	Qty
1	Base Assy. c/w items 2 thru 7	75338-5	1
2	Network Assembly	75335	1
3	Cradle Switch Assembly	75300-2	1
4	Bind. Hd. Mach. Screw	69116-3	5
5	Spring Washer	54336-5	5
6	Hex. Nut	67093	5
7	Cabinet Lock Screw	75486	2
8	Ringer Assy. Biased	130(BA)470	
9a	Dial Assembly	30**(Ø)450	1
b	Dummy Plug Assembly	79456-*	
10	Handset and Cord Assembly	65**(Ø)410	1
11a	Desk Stand Cord (6 Cond.)	3044**(14)650	1
b	Desk Stand Cord (4 Cond.)	3038**(13)650	
12a	Connecting Block (10 Term.)	29( )873	1
b	Connecting Block (4 Term.)	32( )873	
13	Housing and Plunger Assembly	82576-*	1

Item	Description	Number	Qty
14	Turn and Push Key Assembly	79453-3	1
15	Special Screw	79474	2
16	Terminal Board Assembly	79467	1
17	Mounting Plate	79468	1
18	Bind. Hd. Mach. Screw	75392-2	1
19	Plunger Switch Assembly	82577-1	1
20	Resistor	73609-13	2
21	Tubing (for resistor)	50551-3	4
22	Wire Assembly	75326-54	1
23	Wire Assembly	75326-66	1
24	Wire Assembly	75326-67	1
25	Wire Assembly	75326-68	1
26	Wire Assembly	75326-69	1
27	Wire Assembly	75326-70	1
28	Wire Assembly	75326-71	1
29	Wire Assembly	75326-111	1
30	Wire Assembly	75326-112	1
31	Wire Assembly	75326-113	1

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

Ø Replace by class code number for type required.
* Replace by color code
** Replace by color code

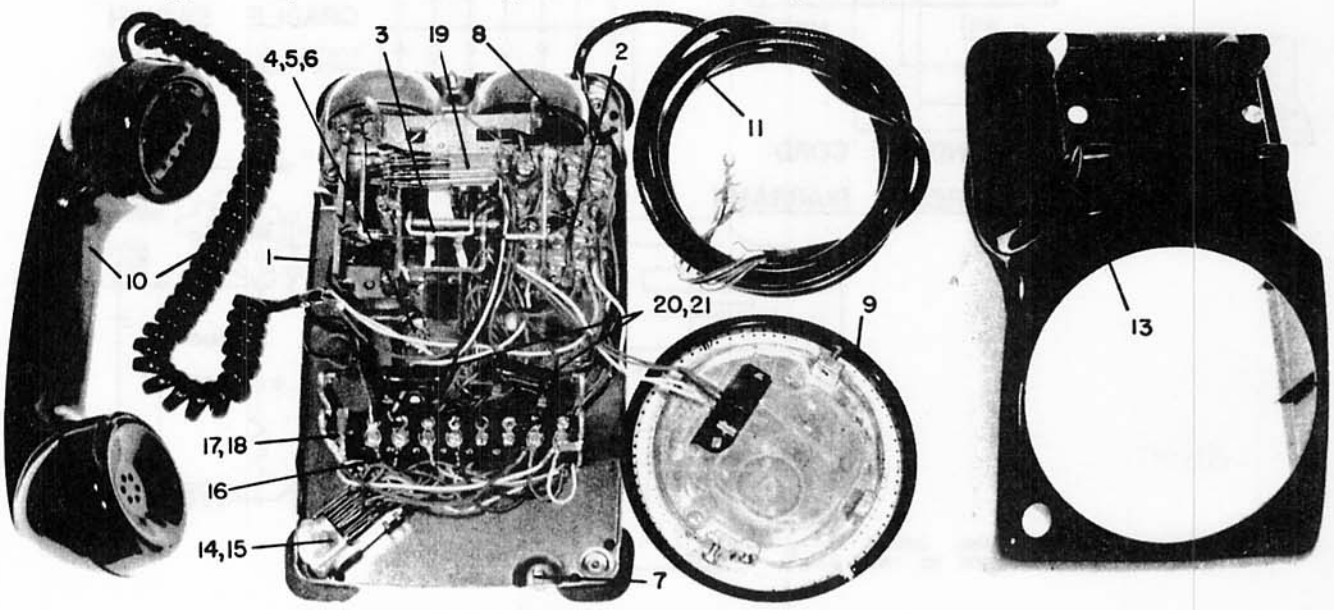


Fig. 1 TOP VIEW - HOUSING REMOVED

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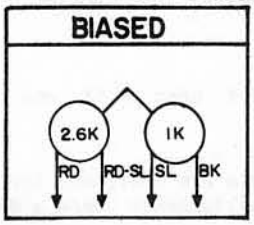
RINGER OPTIONS



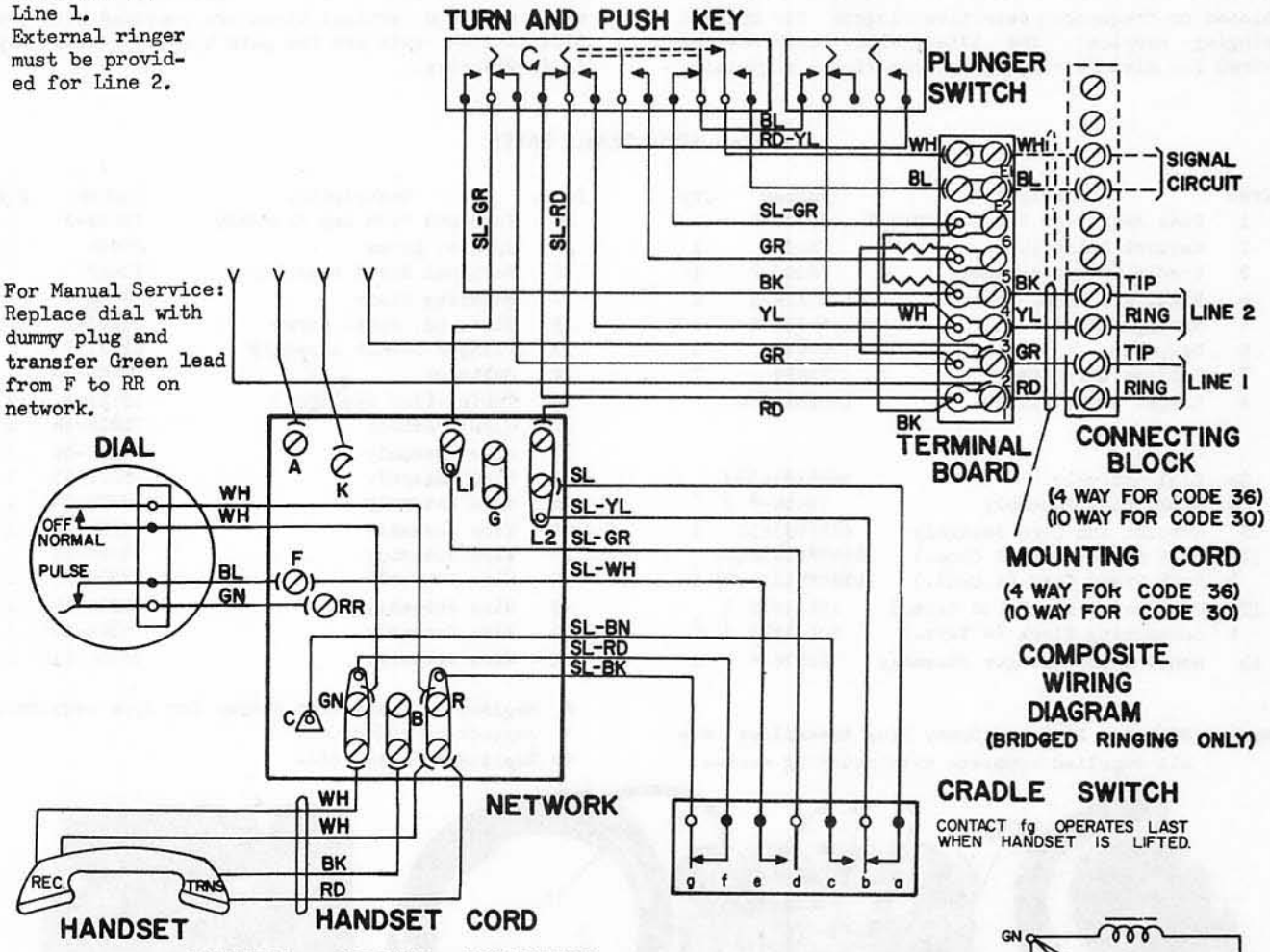
NOTE:
Internal ringer is permanently connected to Line 1. External ringer must be provided for Line 2.

RINGER NOTES

1. To Permanently Silence Ringer:
   Class of Ringer — Transfer From To
   Biased, BK — Ringer Lead on Network — G K

2. Biased Ringer Cut-Off Control by Customer: Bend stop next to detent on volume control so that it clears rim of ringer frame. This provides extra control position in which ringer armature is locked.

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



TYPICAL CIRCUIT DIAGRAMS

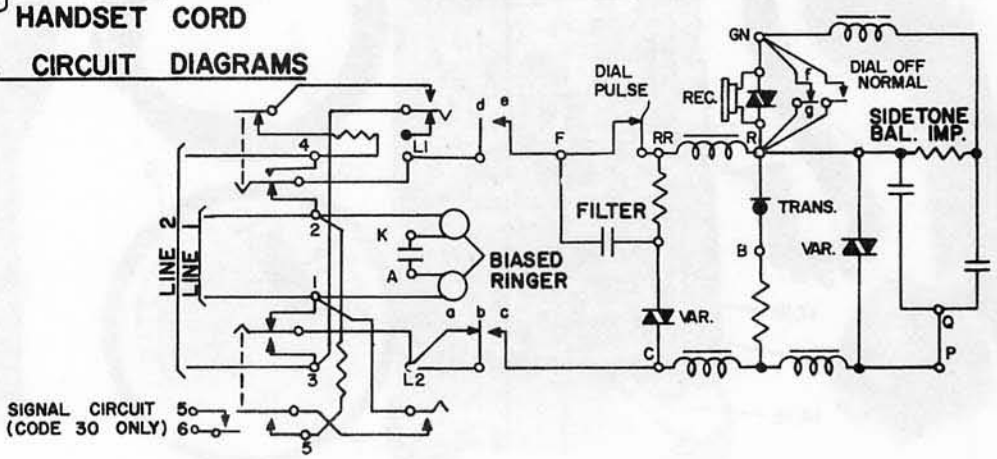


Fig. 2 DIAGRAMS 575--(--)30- TELEPHONE AND 575--(--)36- TELEPHONE

K-2500 SERIES 2-LINE DESK TELEPHONES (PUSHBUTTON DIAL)

Figure 1. K-2510 2-line telephone

1.0 GENERAL INFORMATION

Two-line telephones are standard type instruments with the addition of a turn-and-push key which permits the instrument to be switched to either one of two lines. The ringer is permanently connected to line 1 and a separate external ringer must be provided for line 2 or if two phones are located in the same area, the internal ringer of one of the phones can be connected to line 2.

The Push section of the key can be used for manual signaling or for operating some other external circuit.

Models of 2-line phones are as follows:

K-2510/30 Standard 2-line pushbutton dial desk telephone. Includes 6-conductor desk stand cord and 10-point connecting block.

K-2510/36 Same as K-2510/30 except equipped with a 4-conductor desk stand cord and a 4-point connecting block. The push section of the key is ineffective.

K-2511/30 Similar to K-2510/30 except equipped with a manual "exclusion" switch. Lifting the left hand cradle plunger about 1/4 inch disconnects other telephones from one line. When the handset is replaced, the connection is restored to other phones. Includes 11-conductor cord and 10-point connecting block.

K-2575/30 Similar to K-2510/30 except equipped with a "hold switch. Lifting the left hand cradle plunger about 1/4 inch places a hold on the non-connected line. When the handset is replaced, the hold is released. Equipped with 6-conductor desk stand cord and 10-point connecting block.

K-2575/36 Same as K-2575/30 except equipped with a 4-conductor desk stand cord and a 4-point connecting block. The push section of the key is ineffective.

TABLE I. IDENTIFICATION

CODE	DESCRIPTION
2510**( )___	Telephone, 2-line, pushbutton dial; Standard
2511**( )___	Telephone, 2-line, pushbutton dial; Exclusion
2575**( )___	Telephone, 2-line, pushbutton dial; W/Hold

ADD DIAL CODE AS FOLLOWS:

M - Metro Dial (Letters and Numerals)

R - Regular Dial (Numerals Only)

ADD SPECIAL FEATURE CODE AS FOLLOWS:

30 - No Special Feature

36 - Four-Conductor Desk Stand Cord and 4-point connecting block (6-cond. cord and 10-point block is standard)

ADD RINGER CODE AS FOLLOWS:

BA - Equipped with Straight Line Ringer (130 type)

LR - Less Ringer

** SUBSTITUTE COLOR CODE AS FOLLOWS:

00 - Black	13 - Lt. Beige
05 - Green	14 - Lt. Gray
09 - Ivory	15 - White

CIRCUIT LABELS (Packed with Phone)

180233	Ckt Label, 2510
180259	Ckt Label, 2511
180232	Ckt Label, 2575

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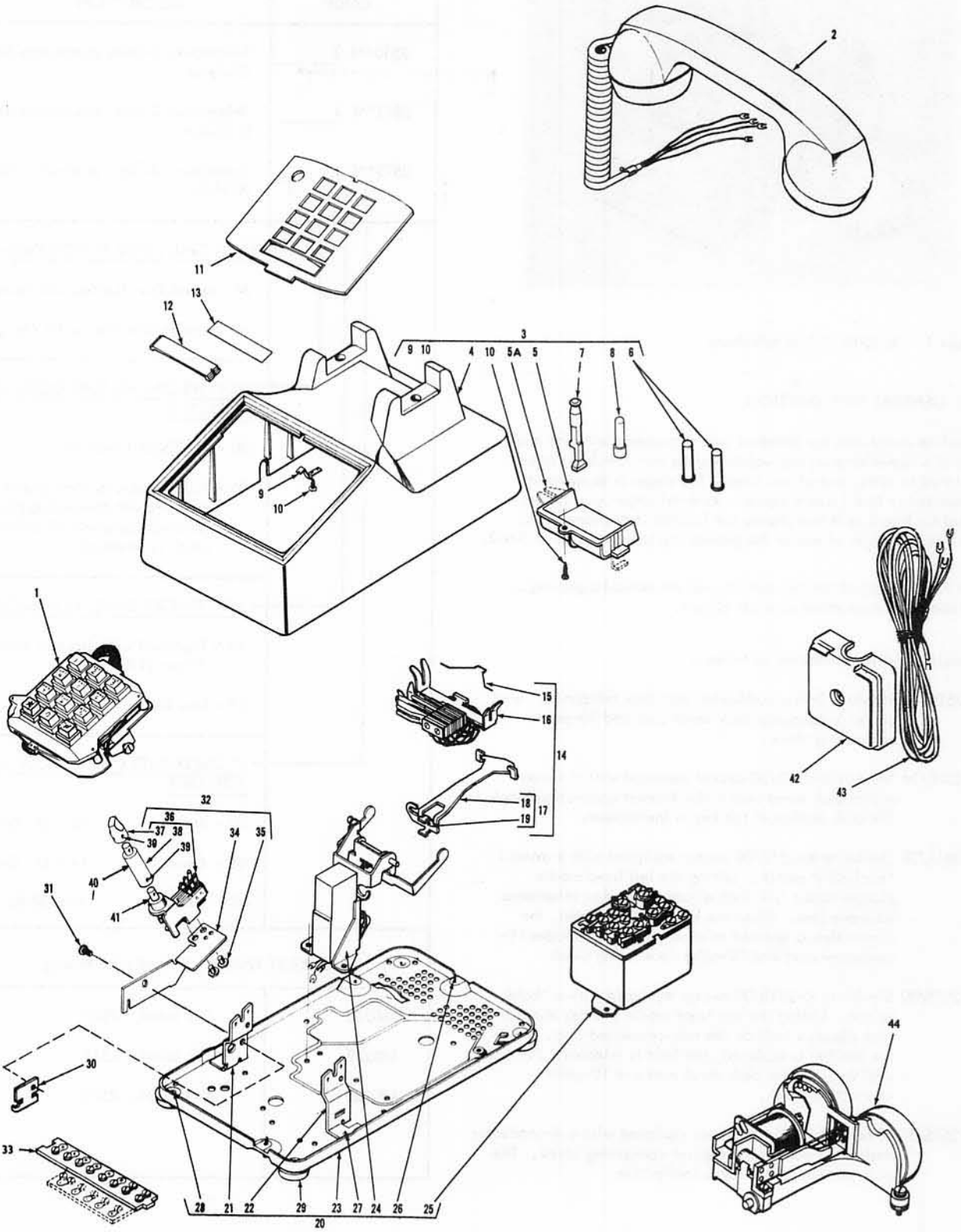

Figure 2. K-2510, K-2511 and K-2575 Telephones, Exploded View

TABLE II. REPLACEABLE PARTS LIST, 2500 SERIES 2-LINE DESK TELEPHONES

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 2510 /30	2510 /36	2511 /30	2575 /30	2575 /36
	1	3200 (D) 450	DIAL, REGULAR (Numerals only) (See Section 228)	X	X	X	X	X
	1	3200 (G) 450	DIAL, METRO (Letters and Numerals) (See Section 228)	X	X	X	X	X
	2	65** (C2) 410	HANDSET ASSEMBLY, (See Section 212)	1	1	1	1	1
	3	86138-**	HOUSING AND PLUNGER ASSEMBLY (Standard Plungers)	1	1	-	-	-
	3	88490-**	HOUSING AND PLUNGER ASSEMBLY (One Lift Plunger)	-	-	1	1	1
	4	86137-**	HOUSING	1	1	1	1	1
	5	75405-**	RETAINER, PLUNGER (For Standard Plungers)	1	1	-	-	-
	5A	79606-**	RETAINER, PLUNGER (Used with lift plunger)	-	-	1	1	1
	6	75406-2	PLUNGER, STANDARD	2	2	-	-	-
	7	79603-2	PLUNGER, LIFT TYPE	-	-	1	1	1
	8	79101-2	PLUNGER, (Used opposite of liftplunger)	-	-	1	1	1
	9	86143-1	CLIP, FACE PLATE MOUNTING	1	1	1	1	1
	10	75407-2	SCREW	2	2	2	2	2
	11	180854-**	FACEPLATE	1	1	1	1	1
	12	87514-1	RETAINER, NUMBER CARD	1	1	1	1	1
	13	87513-1	CARD, NUMBER	1	1	1	1	1
	13	87513-2	CARD, NUMBER (Strip of 6)	-	-	-	-	-
	14	79613-1	SWITCH ASSEMBLY, "EXCLUSION"	-	-	1	-	-
	14	82577-1	SWITCH ASSEMBLY, "HOLD"	-	-	-	1	1
	15	79624-1	RETAINER, SPRING ASSEMBLY	-	-	1	1	1
	16	79614-1	SPRING ASSEMBLY, "EXCLUSION"	-	-	1	-	-
	16	82581-1	SPRING ASSEMBLY, "HOLD"	-	-	-	1	1
	17	79625-1	BRACKET ASSEMBLY, SWITCH	-	-	1	1	1
	18	NSS	BRACKET, SWITCH	-	-	1	1	1
	19	69020-3	SCREW	-	-	1	1	1
	20	75338-13	BASE ASSEMBLY	1	1	-	-	-
	20	75338-16	BASE ASSEMBLY	-	-	-	1	1
	20	75338-17	BASE ASSEMBLY	-	-	1	-	-
	21	86146-1	BRACKET, DIAL; LH	1	1	1	1	1
	22	86145-A1	BRACKET, DIAL; RH	1	1	1	1	1
	23	75327	BASE PLATE	1	1	1	1	1
	24	75300-1	CRADLE SWITCH ASSEMBLY	1	1	-	-	-
	24	75300-2	CRADLE SWITCH ASSEMBLY	-	-		1	1
		32199-1	RIVET, CRADLE SWITCH ATTACHING	3	3	3	3	3
	25	75335-1	NETWORK ASSEMBLY	1	1	1	1	1
		32199-1	RIVET, NETWORK ATTACHING	2	2	2	2	2
	26	75486-1	SCREW, HOUSING (Cabinet Lock)	2	2	2	2	2
	27	32199-1	RIVET (Dial Brackets)	2	2	2	2	2
	28	82486-2	RIVET (Foot)	4	4	4	4	4
	29	82400-1	FOOT	4	4	4	4	4
	30	86103-1	PLATE, TERMINAL BOARD MOUNTING	1	1	1	1	1
	31	75392-2	SCREW, TERMINAL BOARD MOUNTING PLATE (Also secures 88475-1 bracket) (Item 34)	1	1	1	1	1
	32	79453-9	KEY ASSEMBLY, TURN-AND-PUSH; WITH TERMINAL BOARD AND LEADS	1	1	-	-	-
	32	79453-10	KEY ASSEMBLY, TURN-AND-PUSH; WITH TERMINAL BOARD AND LEADS	-	-	1	-	-
	32	79453-11	KEY ASSEMBLY, TURN-AND-PUSH; WITH TERMINAL BOARD AND LEADS	-	-	-	1	1
	33	79467-1	TERMINAL BOARD ASSEMBLY, (10 Terminal Screws)	1	1	-	-	-
		88478-1	TERMINAL BOARD ASSEMBLY, (16 Terminal Screws)	-	-	1	1	1
	34	88475-1	BRACKET, TURN-AND-PUSH KEY	1	1	1	1	1
	35	79474-1	SCREW, SPECIAL	2	2	2	2	2
	36	79453-1	KEY, TURN-AND-PUSH	1	1	1	-	-
	36	79453-3	KEY, TURN-AND-PUSH	1	1	1	-	-
	37	79452-1	KNOB	-	-	-	1	1
	38	NSS	SPRING ASSEMBLY, (not Serviced Separately)	-	-	-	-	-
	39	79451-1	SETSCREW (Same as item 41)	1	1	1	1	1

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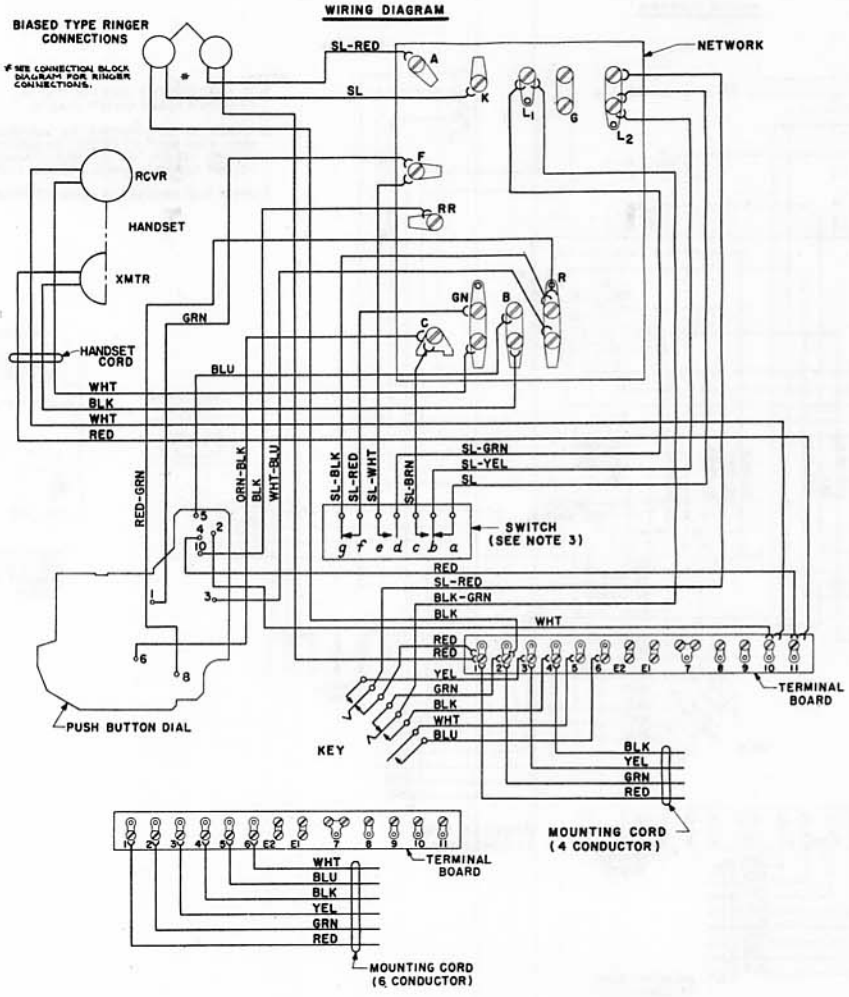
FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 2510 /30	2510 /36	2511 /30	2575 /30	2575 /36
			TABLE II, REPLACEABLE PARTS LIST, K-2500 SERIES 2-LINE DESK TELEPHONES					
	40	88474-1	SPACER, TURN-AND-PUSH KEY	1	1	1	1	1
	41	79451-1	SETSCREW, (Same as item 39)	1	1	1	1	1
	42	2900 ( ) 783	CONNECTING BLOCK ASSEMBLY, (10-point)	1	-	1	1	-
	42	3200 ( ) 783	CONNECTING BLOCK ASSEMBLY (4-point)	-	1	-	-	1
	43	3038**(13)650	CORD, MOUNTING (4-conductor)	-	1	-	-	1
	43	3044**(14)650	CORD, MOUNTING (6-conductor)	1	-	-	1	-
	43	3052**(27)650	CORD, MOUNTING (11-conductor)	-	-	1	-	-
	44	130(BA) 470	RINGER, STRAIGHT LINE BIASED	1	1	1	1	1

NOTE: See section 245 to order frequency selective ringers

WIRING DIAGRAM



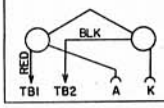
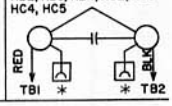
NOTES:

1-TO PERMANENTLY SILENCE RINGER:
TRANSFER BLACK RINGER LEAD TO (K) TERMINAL ON NETWORK.

2-RINGER CUT-OFF CONTROL BY CUSTOMER:
BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

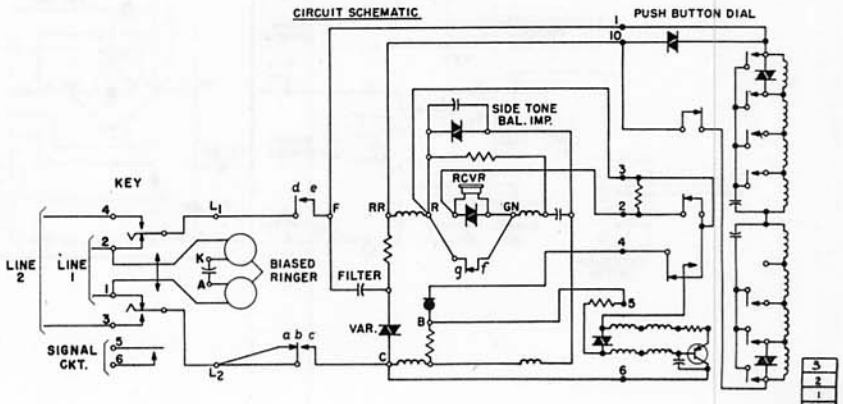
3-WHEN THE HANDSET IS REMOVED FROM CRADLE CONTACT gf BREAKS LAST.

FREQUENCY SELECTIVE RINGER OPTIONS
TYPES 156 & 157

16 THRU 25 HZ NETWORK CAPACITOR	30 THRU 66 2/3 HZ RINGER CAPACITOR
CODES HA4, HA5, HB5, HC1	CODES HA1, HA2, HA3, HB1, HB2, HB3, HB4, HC2, HC3 HC4, HC5
	

* LEADS TAPED & STORED EXCEPT FOR 16-48 HZ RINGERS WHICH CONNECT SAME AS BIASED RINGER.

CIRCUIT SCHEMATIC



3
2
1
ISSUE NO

Circuit Diagram, K-2510 Telephone

180233

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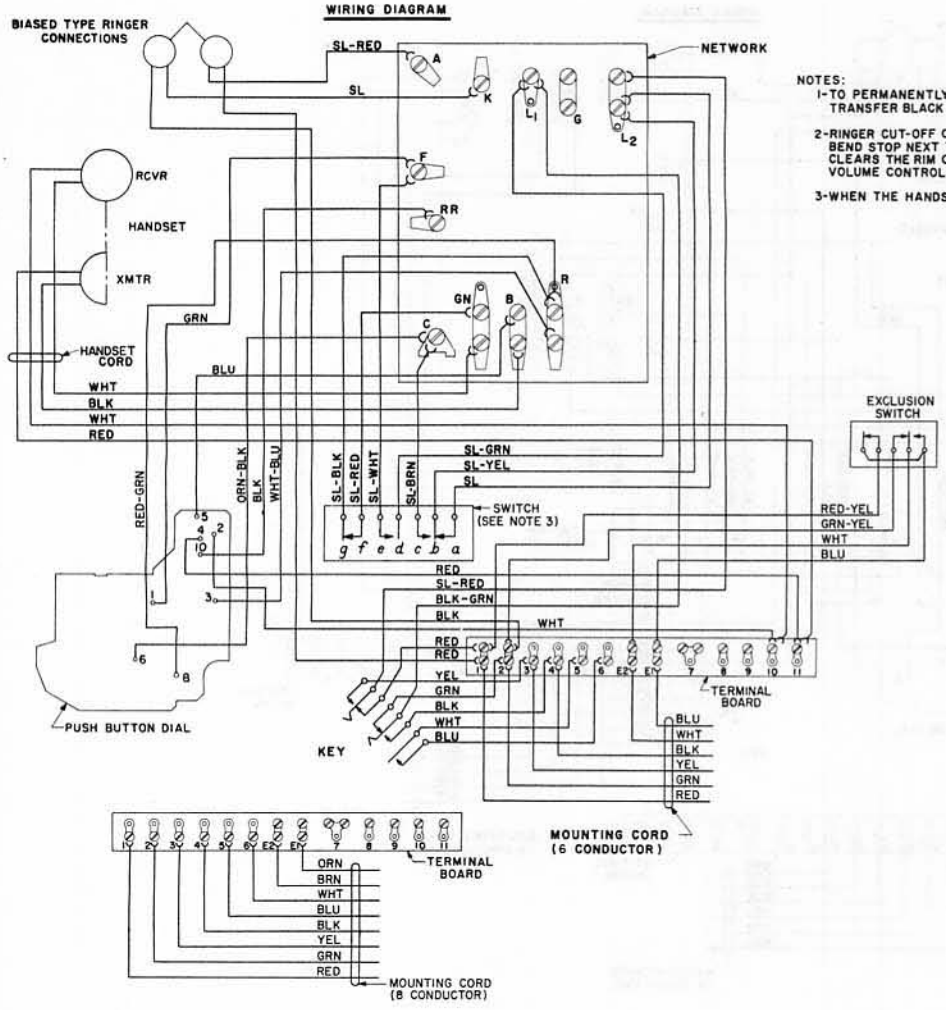
WIRING DIAGRAM



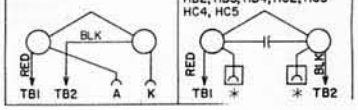
NOTES:
1-TO PERMANENTLY SILENCE RINGER:
TRANSFER BLACK RINGER LEAD TO (K) TERMINAL ON NETWORK.

2-RINGER CUT-OFF CONTROL BY CUSTOMER:
BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

3-WHEN THE HANDSET IS REMOVED FROM CRADLE CONTACT *gf* BREAKS LAST.

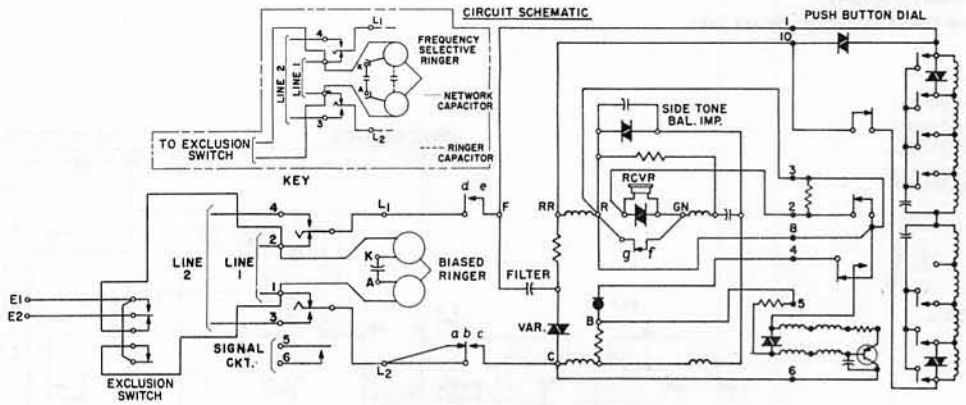
FREQUENCY SELECTIVE RINGER OPTIONS
TYPES 156 & 157

16 THRU 25 HZ NETWORK CAPACITOR	30 THRU 66⅔ HZ RINGER CAPACITOR
CODES HA4, HA5, HB5, HC1	CODES HA1, HA2, HA3, HB1, HB2, HB3, HB4, HC2, HC3 HC4, HC5



* TAPED AND STORED EXCEPT FOR 16-30 Hz RINGER WHICH CONNECT SAME AS BIASED RINGER

CIRCUIT SCHEMATIC

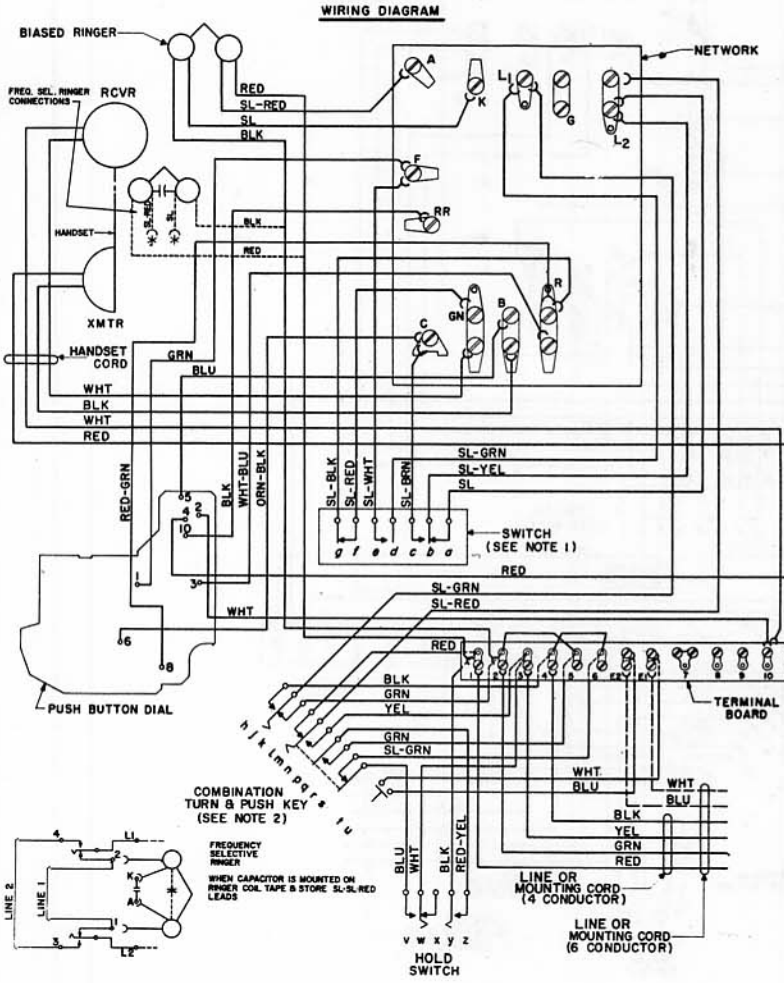


Circuit Diagram, K-2511 Telephone

3
2
1
ISSUE NO.

180259

WIRING DIAGRAM



NOTES

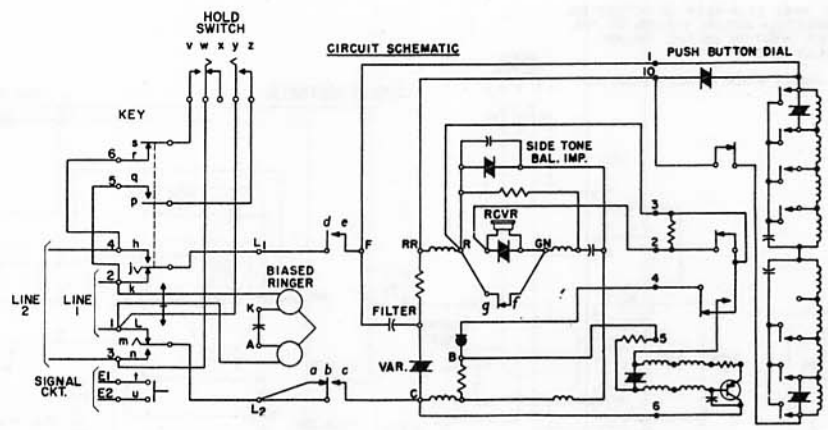
1-WHEN THE HANDSET IS REMOVED FROM CRADLE CONTACT gf BREAKS LAST

2-WHEN TURN SPRING ASSY IS OPERATED, CONTACTS pq SHALL MAKE BEFORE CONTACTS jk AND lm BREAK FOLLOWING THIS, CONTACTS hj AND mn SHALL MAKE BEFORE CONTACTS rs BREAK.

3-TO PERMANENTLY SILENCE RINGER: TRANSFER RED RINGER LEAD TO (K) TERMINAL ON NETWORK.

4-RINGER CUT-OFF CONTROL BY CUSTOMER: BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON THE VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

5-* TAPE AND STORE EXCEPT FOR 16-25 HZ RINGER WHICH CONNECT SAME AS BIASED RINGER.



Circuit Diagram, K-2575 Telephone

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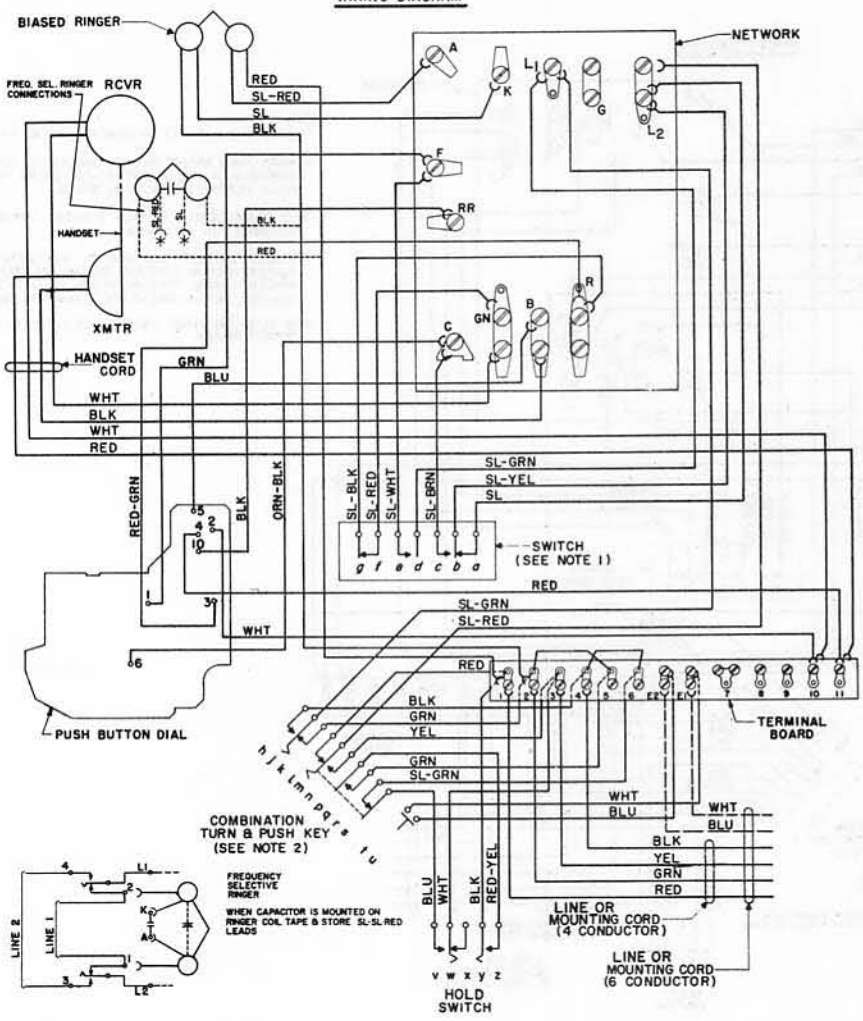
5 ISSUE NO.

WIRING DIAGRAM



180232

NOTES

1-WHEN THE HANDSET IS REMOVED FROM CRADLE CONTACT gf BREAKS LAST.

2-WHEN TURN SPRING ASSY IS OPERATED, CONTACTS pq SHALL MAKE BEFORE CONTACTS jk AND lm BREAK. FOLLOWING THIS, CONTACTS hi AND mn SHALL MAKE BEFORE CONTACTS rs BREAK.

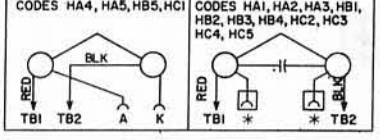
3-TO PERMANENTLY SILENCE RINGER: TRANSFER RED RINGER LEAD TO (K) TERMINAL ON NETWORK.

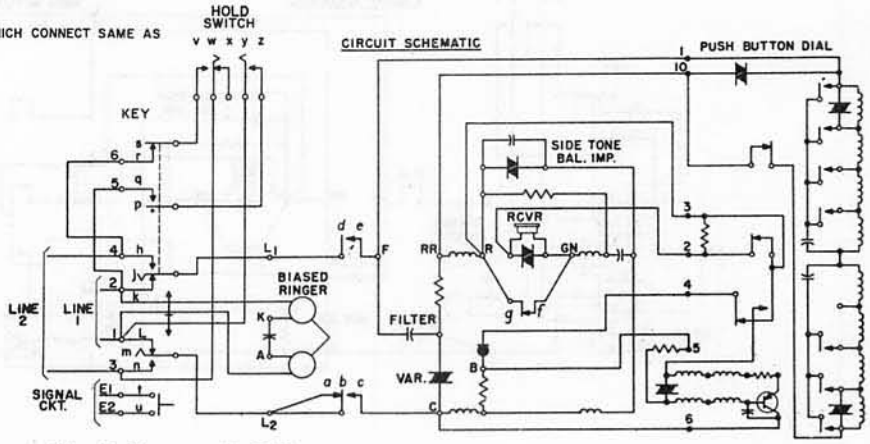
4-RINGER CUT-OFF CONTROL BY CUSTOMER: BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON THE VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

5-* TAPE AND STORE EXCEPT FOR 16-25 HZ RINGER WHICH CONNECT SAME AS BIASED RINGER.

FREQUENCY SELECTIVE RINGER OPTIONS
TYPES 156 & 157

16 THRU 25 HZ NETWORK CAPACITOR	30 THRU 66⅔ HZ RINGER CAPACITOR
CODES HA4, HA5, HB5, HC1	CODES HA1, HA2, HA3, HB1, HB2, HB3, HB4, HC2, HC3 HC4, HC5





Circuit Diagram, K-2575

TYPES K-576 AND K-577 DESK TELEPHONES (3-LINE)

Figure 1. Type K-576 Three-line desk telephone

1. GENERAL INFORMATION

The 576 and 577 telephones are 6-button key units designed to provide access to three lines without the use of external switching equipment. The phones are similar except the 577 includes an Exclusion Feature. An identifying code is stamped in ink on the Base. Refer to Table I, "ORDERING INFORMATION" for explanation of each code number.

These phones have been manufactured with round buttons and with the current square buttons. Round-button phones may be converted to square-button phones by installing kit number 11323-**.

2. DESCRIPTION

2.1 KEY PUSHBUTTONS

The six buttons of the key are arranged in pairs, one pair for each line. The right hand button of each pair is the LINE (or pick-up) button; the left hand button is the HOLD button.

The three LINE buttons are interlocking so only one line may be picked up at one time. However, one or more lines may be held at one time.

Each pair of buttons is interlocking with each other. Any operated HOLD button will be released when its LINE button is depressed. (Restoring the Handset will also release any operated HOLD button.)

The right hand pair of buttons can be adapted for manual intercom. For this modification, the HOLD button is converted for signaling by unscrewing its interlock screw 8 or 10 turns and inserting the conical spring, (included in phone carton), between the screw head and the telephone Base. (Figure 2.)

2.2 OPERATOR RECALL BUTTON

Since the cradle plungers cannot always be used for operator signaling, (they will release any operated HOLD button when depressed), a special pushbutton switch is installed for this purpose. This pushbutton, just forward of the Handset cradle, is also used to obtain dial tone by momentarily depressing it.

2.3 VISUAL SIGNALS (LAMPS)

A neon lamp under each line button indicates an incoming call. An incandescent lamp under each hold button indicates a held or busy line.

3. OPERATION

Incoming Call.

During the ringing cycle, the lamp associated with the called line will flash and the ringer (if provided) will audibly signal that a call is to be answered on that line. To answer the call, the handset is removed from the cradle and the appropriate pickup button is depressed.

Outgoing Call

To make an outgoing call it is necessary to remove the handset from the cardle and depress the appropriate pickup button, dial the prescribed telephone number, or in the case of manual operation, provide the operator with the desired number.

Holding a Line

Any line picked up for an incoming or outgoing call may be held by simply depressing its associated HOLD button. To return to a held line, the subscriber simply depresses the pickup button for that line at which time its hold button will be released and any other line picked up will be released. Any depressed hold buttons will automatically be released when the handset is replaced in the cradle.

TABLE I. ORDERING INFORMATION

CODE	DESCRIPTION
576**( )30__	TELEPHONE, 3-Line with HOLD on each line. Mounting Cord terminated with Spade Terminals.
576**( )34__	Same, with Pushbutton Ground
576**( )40__	TELEPHONE, 3-Line with HOLD on each line. Mounting Cord Terminated with Plug.
577**( )30__	TELEPHONE, 3-Line with HOLD on each line. Mounting Cord terminated with Spade Terminals. Equipped with Exclusion Feature.
577**( )40__	TELEPHONE, 3-Line with HOLD on each line. Mounting Cord terminated with Plug. Equipped with Exclusion Feature.

ADD DIAL CODE AS FOLLOWS:

M - Metropolitan Type (Letters and numerals)
R - Regular Type (Numerals only)
N - No Dial. Equipped with Dial Blank.

ADD RINGER CODE AS FOLLOWS:

(BA) - Straight Line Ringer
(CA) - Common Audible Signal
(LR) - Less Ringer

** SUBSTITUTE COLOR CODE AS FOLLOWS:

00- Black
05- Green
09- Ivory
13- Beige
14- Gray
15- White

CIRCUIT LABELS: (Packed with Phone)

576/30 and 40 -21578
576/34 - 180218
577/30 and 40 -21623

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4. INSTALLATION OF 576 TELEPHONE

Telephones equipped with plugs are installed by plugging into appropriately prewired connectors of the connecting cable. For telephones with mounting cords terminated in spade terminals, use 31( )783 Connecting Block Assembly and connect as directed in table below.

TABLE II. CONNECTIONS, 576 TYPE TELEPHONE

MOUNTING CORD E/W PLUG	MOUNTING CORD E/W SPADE TERMINALS			Designations	
Terminal Number	Block No.	Connecting Block Term.	Cord Conductors	Telephone Ckt.	CO or PBX Lines
1		1	Red	1R(e) (f)	R-Line 1
26		2	Grn	1T(e) (f)	T-Line 1
2		4	Yel (g)		
27		5	Blk (g)		
4	1(a)	6	Blu	2R(e)	R-Line 2
29		7	Wht	2T(e)	T-Line 2
		9(b)			
30		10	Wht-Brn-Grn	LB1(e)	Lamp Supply Voltage*
7		3	Wht-Brn-Yel	3R(e)	R-Line 3 (c)
32		8	Wht-Brn-Blk	3T(e)	T-Line 3 (c)
3		1	Wht-Slt-Yel	1L(e)	Line 1 - Lamp Multiple (e)
28		2	Wht-Slt-Blk	LG-SG(e)	Lamp or Sig. Gnd. (e)
6		4	Wht-Slt-Blu	2L(e)	Line 2 - Lamp Multiple (e)
9	2	6	Wht-Slt	3L(e)	Line 3 - Lamp Multiple (e)
		7			
		9			
		10			
33		3	Wht-Brn	SI(e)	(d)
		8			
5			Wht-Brn-Red (g)		
8			Wht-Brn-Blu(g)		
19			Wht-Grn(g)	GG	Grounding Circuit
20			Wht-Yel-Blu(g)		
45			Wht-Yel(g)		* No. 190169 power supply may be used.

NOTES:

(a) Block nearest butt end of mounting cord.

(b) Remove screw and washers from terminal 9 of block 1 and use to anchor the mounting cord strain relief to the center stud of the block.

(c) Intercom line, if required, connects here.

(d) To manual intercom station or common audible signal.

(e) If more than one 576 telephone is to have access to the same CO, PBX or Intercom Lines, multiple connections between telephones to these terminals is required. A 19-conductor, 24 AWG, vinyl insulated, plastic jacketed cable may be used.

(f) The self contained ringer is normally connected to 1R and 1T of Line 1. It may be connected to another line as desired by moving the red and black ringer leads from 1R and 1T to 2R and 2T or 3R and 3T. Externally mounted Straight Line or Biased Type ringers (having a 0.50 Mfd. 400 V. paper capacitor connected in series with one lead) may be connected to other lines as required.

Also optional and available is a Common Audible Signal Unit Code 144( )470 which can be installed inside the telephone in place of a ringer. This unit provides an audible signal for all 3 lines of the telephone.

(g) Spare conductors of mounting cord, to be individually taped and stored within the connecting block.

5. INSTALLATION OF 577 (EXCLUSION TYPE) TELEPHONE

(a) GENERAL.
Installing an exclusion phone will necessitate changes in the connection of any excluded phones ... either within the telephone or within its connecting block assembly.

The exclusion switch in the 577 phone is normally connected to line 1, and the following instructions pertain to installing a phone with line 1 excluded from other phones when the exclusion switch is operated.

(b) INSTALLATION OF EXCLUSION TELEPHONE WHEN MOUNTING CORD IS TERMINATED IN A QUICK-CONNECT PLUG.

(1) Connect all phones in the normal manner.
(2) On all phones to be excluded, remove Housing and disconnect Red and Green leads of mounting cord from terminals 1R and 1T of key terminal board. Individually tape and store these leads. Connect the yellow and Black leads of the Mounting Cord to terminals 1R and 1T respectively.

(c) INSTALLATION OF EXCLUSION TELEPHONE WHEN MOUNTING CORD IS TERMINATED WITH SPADE TERMINALS.

(1) Connect the 577 (exclusion type) phone to the Connecting Block Assembly as shown in Table II. In addition, connect the yellow and black leads of the Mounting Cord to #4 and #5 terminals (respectively) of #1 Block of the Connecting Block Assembly.
(2) Connect the excluded phones to the Connecting Block Assembly as shown in Table II, and move Red and Green leads of the Mounting Cord from #1 and #2 terminals to #4 and #5 terminals respectively of #1 Block of the Connecting Block Assembly.

(d) TO EXCLUDE LINE 2 OR LINE 3 INSTEAD OF LINE 1.

(1) Move Red-Yellow and Green-Yellow leads of Exclusion Switch respectively from "1R" and "1T" to "R" and "T" of line to be excluded.
(2) On all phones to be excluded, disconnect leads of mounting cord from "R" and "T" of excluded line and connect yellow and black leads of Mounting Cord to "R" and "T" respectively.

6. TYPE 576 and 577 PHONES USED IN INTERCOM APPLICATIONS

6.1 MANUAL INTERCOM

Line 3, (terminals 3T and 3R on key terminal board), is used for manual intercom. The HOLD key of line 3 may be used for signaling. The signal circuit is connected at S1 and LG terminals of the key terminal board. A power supply providing TALK and SIGNAL power must be provided in the respective circuits. To convert the number 3 HOLD key to signal, unscrew the interlock screw from the HOLD plunger approximately 8 turns until it clears the interlock slides. Insert the conical spring, (provided with the phone) under the head of the interlock screw as shown in figure 2.

6.2 DIAL SELECTIVE INTERCOM

Line 3 is generally used as the intercom line and figure 2A illustrates this arrangement. A K-207-C KTU Selector unit and a power supply are connected to the system at one of the connecting blocks. A buzzer must be provided at each phone.

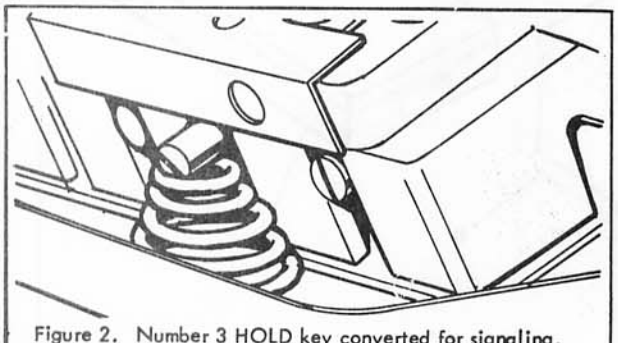
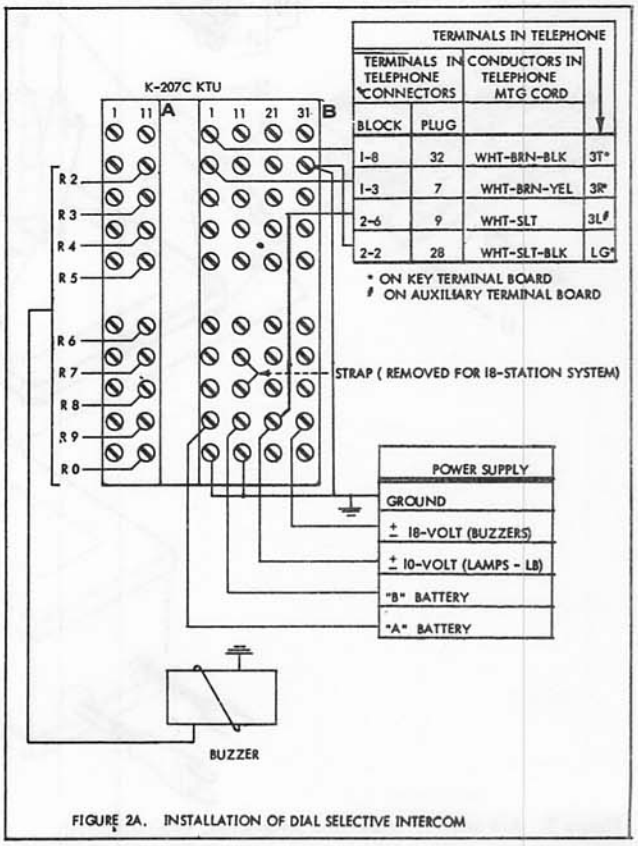


Figure 2. Number 3 HOLD key converted for signaling.



TERMINALS IN TELEPHONE			
TERMINALS IN TELEPHONE *CONNECTORS		CONDUCTORS IN TELEPHONE MTG CORD	
BLOCK	PLUG		
1-8	32	WHT-BRN-BLK	3T*
1-3	7	WHT-BRN-YEL	3R*
2-6	9	WHT-SLT	3L#
2-2	28	WHT-SLT-BLK	LG*

* ON KEY TERMINAL BOARD
# ON AUXILIARY TERMINAL BOARD

FIGURE 2A. INSTALLATION OF DIAL SELECTIVE INTERCOM

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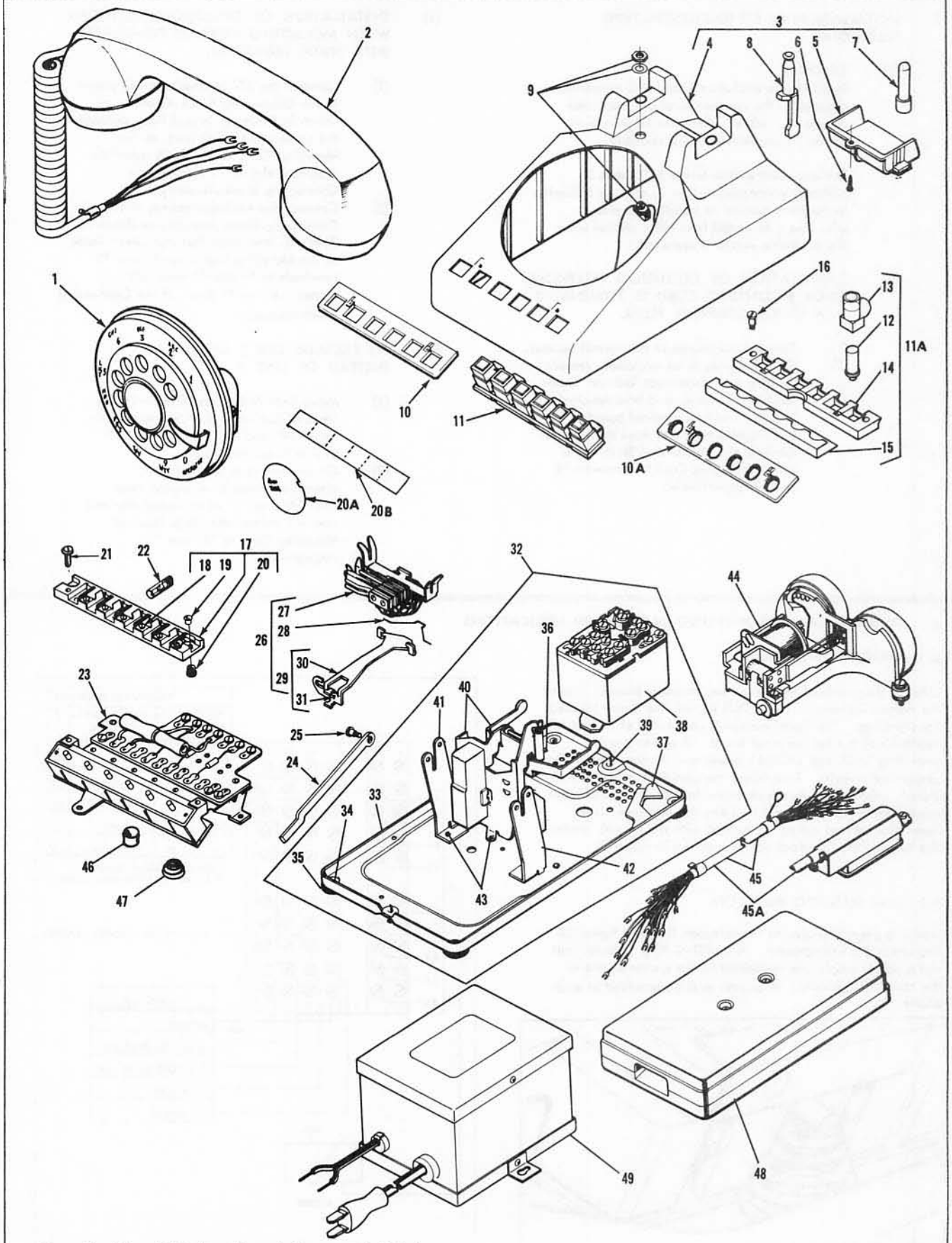

Figure 3. 576 and 577 three-line telephones, exploded view.

TABLE II., REPLACEABLE PARTS LIST, K-576 AND K-577 TELEPHONES

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 576 30	576 34	576 40	577 30	577 40
3	1	30**(D)450	DIAL ASSEMBLY, Regular, (Numerals Only)					
	1	30**(G)450	DIAL ASSEMBLY, Metropolitan, (Letters and Numerals) (See Section 227 for Parts Breakdown of Dials.)					
	1	79456-**	DUMMY PLUG ASSEMBLY, (Replaces Dial for Manual Operation)	*				
	2	65**(C2)410	HANDSET ASSEMBLY (See Section 212 for Parts Breakdown of Handsets)					
	3	87489-**	HOUSING ASSEMBLY, Square Button (180606 will work)	1	-	1	-	-
	3	180217-**	HOUSING ASSEMBLY, Square Button	-	1	-	-	-
	3	180606-**	HOUSING ASSEMBLY, Square Button (Has Exclusion Plunger - will work for 87489-**)	(1)	-	(1)	1	1
	4	87488-**	HOUSING	1	-	1	1	1
	4	180216-**	HOUSING	-	1	-	-	-
	5	79097-**	RETAINER, Cradle Plungers	1	1	1	1	1
	6	75407-2	SCREW, Plunger Retainer	1	1	1	1	1
	7	79101-2	PLUNGER, Cradle Switch	2	2	2	1	1
	8	79982-2	PLUNGER, Exclusion	-	-	-	1	1
			Note: Round Button Housings are obsolete. To replace a round button housing, order Kit no. 11323-**. This Kit includes 1 - 87488 - ** square button housing, 1 - 87472-3 button strip assembly and 1 - 87474-1 escutcheon.					
		**	SUBSTITUTE COLOR CODE AS FOLLOWS: 00 - Black; 05 - Green; 09 - Ivory; 13 - Beige; 14 - Gray; 15 - White					
	9	190193	PUSHBUTTON ASSEMBLY, (Recall Button)	1	1	1	1	1
	10	87474	ESCUTCHEON, Square Button	1	1	1	1	1
	10A	79099	ESCUTCHEON, Round Button (Obsolete)					
	11	87472-3	BUTTON STRIP ASSEMBLY	1	1	1	1	1
		87470-1	BUTTON, Clear, Square	3	3	3	3	3
		87470-2	BUTTON, Red, Square	3	3	3	3	3
		87469-1	STRIP, Button, Plastic	1	1	1	1	1
		87471-1	RETAINER, Button, Metal	1	1	1	1	1
	11A	79441	BUTTON STRIP ASSEMBLY (Round Button) (Obsolete - See "NOTE" above)					
	12	79416	BUTTON, Round (Obsolete)					
	13	79440	HOLDER, Button (Obsolete)					
	14	79421	STRIP, Button (Obsolete)					
	15	79414	RETAINER, Button (Obsolete)					
	16	79521	SCREW (Not used with 87472-3 Button Strip Assembly)	2	2	2	2	2
	17	190196	LAMP STRIP ASSEMBLY	1	1	1	1	1
	18	79485-2	SCREW, Terminal	7	7	7	7	7
	19	180196	PUSHBUTTON, Grounding	-	1	-	-	-
	20	75326-117	WIRE ASSEMBLY	-	2	-	-	-

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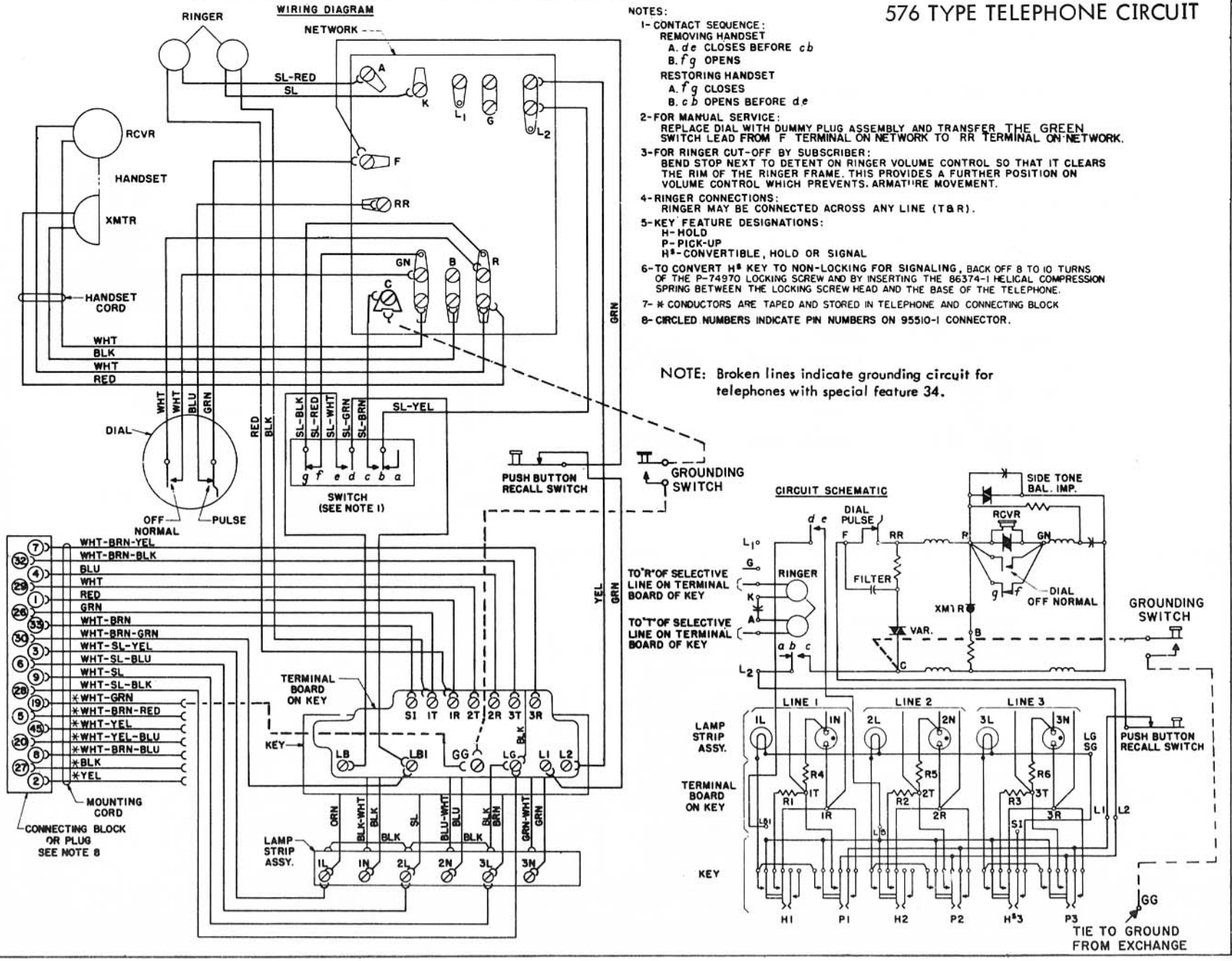
TABLE III. REPLACEABLE PARTS LIST, K-576 and K-577 TELEPHONES

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 576 30	576 34	576 40	577 30	577 40
3	21	74909-2	SCREW	2	2	2	2	2
	22	190191	LAMP (Neon - NE84)	3	3	3	3	3
	22	51(A)745	LAMP (Incandescent)	3	3	3	3	3
	23	508(B)740	KEY ASSEMBLY	-	1	-	-	-
	23	508 ( )740	KEY ASSEMBLY	1	-	1	1	1
		75392-2	SCREW, (Key Attaching)	3	3	3	3	3
	24	190167-1	LINK, "Hold" Release	1	1	1	1	1
	25	190179-1	SCREW, Shoulder	1	1	1	1	1
	26	79971-1	EXCLUSION SWITCH ASSEMBLY	-	-	-	1	1
	27	79970-1	SPRING ASSEMBLY, Exclusion Switch	-	-	-	1	1
	28	79624-1	RETAINER, Spring Assembly	-	-	-	1	1
	29	79625-1	BRACKET ASSEMBLY, Exclusion	-	-	-	1	1
	30	79605-1	BRACKET	-	-	-	1	1
	31	69020-3	SCREW	-	-	-	1	1
	32	79525-4	BASE ASSEMBLY	1	1	1	1	1
	33	79411-1	PLATE, Base	1	1	1	1	1
	34	82400-1	FOOT	4	4	4	4	4
	35	82486-2	RIVET, Foot	4	4	4	4	4
	36	-	BRACKET, Ringer Mounting (No Longer Used)	1	1	1	1	1
	37	88473-1	CLIP, Cord (And Ringer Mounting Bracket)	1	1	1	1	1
	38	75335-1	NETWORK ASSEMBLY	1	1	1	1	1
			(ATTACHING PARTS, Network)					
		32199-1	RIVET	2	2	2	2	2
	39	75486-1	SCREW, Cabinet Lock	2	2	2	2	2
	40	79489-2	CRADLE SWITCH ASSEMBLY	1	1	1	1	1
	41	87052-1	BRACKET, Dial, L.H.	1	1	1	1	1
	42	87052-2	BRACKET, Dial, R. H.	1	1	1	1	1
	43	31944-2	RIVET	7	7	7	7	7
	44	130(BA)470	RINGER (Optional)	1	1	1	1	1
	44	144( )470	COMMON AUDIBLE SIGNAL (Optional) (Not Illustrated)	1	1	1	1	1
	45	839**(09)650	CORD, Mounting; E/W Terminals	1	1	-	1	-
	45A	861**(09)650	CORD, Mounting; E/W Plug	-	-	1	-	1
	46	79409-1	BUSHING, Pushbutton Lockout (Shipped Loose)	1	1	1	1	1
	47	86374-1	SPRING, Conical (For converting pushbutton for signaling)	1	1	1	1	1
	48	31( )783	CONNECTING BLOCK, (Order Separately)	1	1	-	1	-
	49	190169-1	TRANSFORMER (Order Separately) (Order quantity as required - One Transformer will provide power for seven telephones.)	X	X	X	X	X

(Indented parts are included in the part under which they are indented.)

576 TYPE TELEPHONE CIRCUIT



NOTES:

1- CONTACT SEQUENCE:
REMOVING HANDSET
A. *de* CLOSES BEFORE *cb*
B. *fg* OPENS
RESTORING HANDSET
A. *fg* CLOSES
B. *cb* OPENS BEFORE *de*

2- FOR MANUAL SERVICE:
REPLACE DIAL WITH DUMMY PLUG ASSEMBLY AND TRANSFER THE GREEN SWITCH LEAD FROM F TERMINAL ON NETWORK TO RR TERMINAL ON NETWORK.

3- FOR RINGER CUT-OFF BY SUBSCRIBER:
BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

4- RINGER CONNECTIONS:
RINGER MAY BE CONNECTED ACROSS ANY LINE (T&R).

5- KEY FEATURE DESIGNATIONS:
H- HOLD
P- PICK-UP
H^S- CONVERTIBLE, HOLD OR SIGNAL

6- TO CONVERT H^S KEY TO NON-LOCKING FOR SIGNALING, BACK OFF 8 TO 10 TURNS OF THE P-74970 LOCKING SCREW AND BY INSERTING THE 86374-1 HELICAL COMPRESSION SPRING BETWEEN THE LOCKING SCREW HEAD AND THE BASE OF THE TELEPHONE.

7- * CONDUCTORS ARE TAPED AND STORED IN TELEPHONE AND CONNECTING BLOCK

8- CIRCLED NUMBERS INDICATE PIN NUMBERS ON 95510-1 CONNECTOR.

NOTE: Broken lines indicate grounding circuit for telephones with special feature 34.

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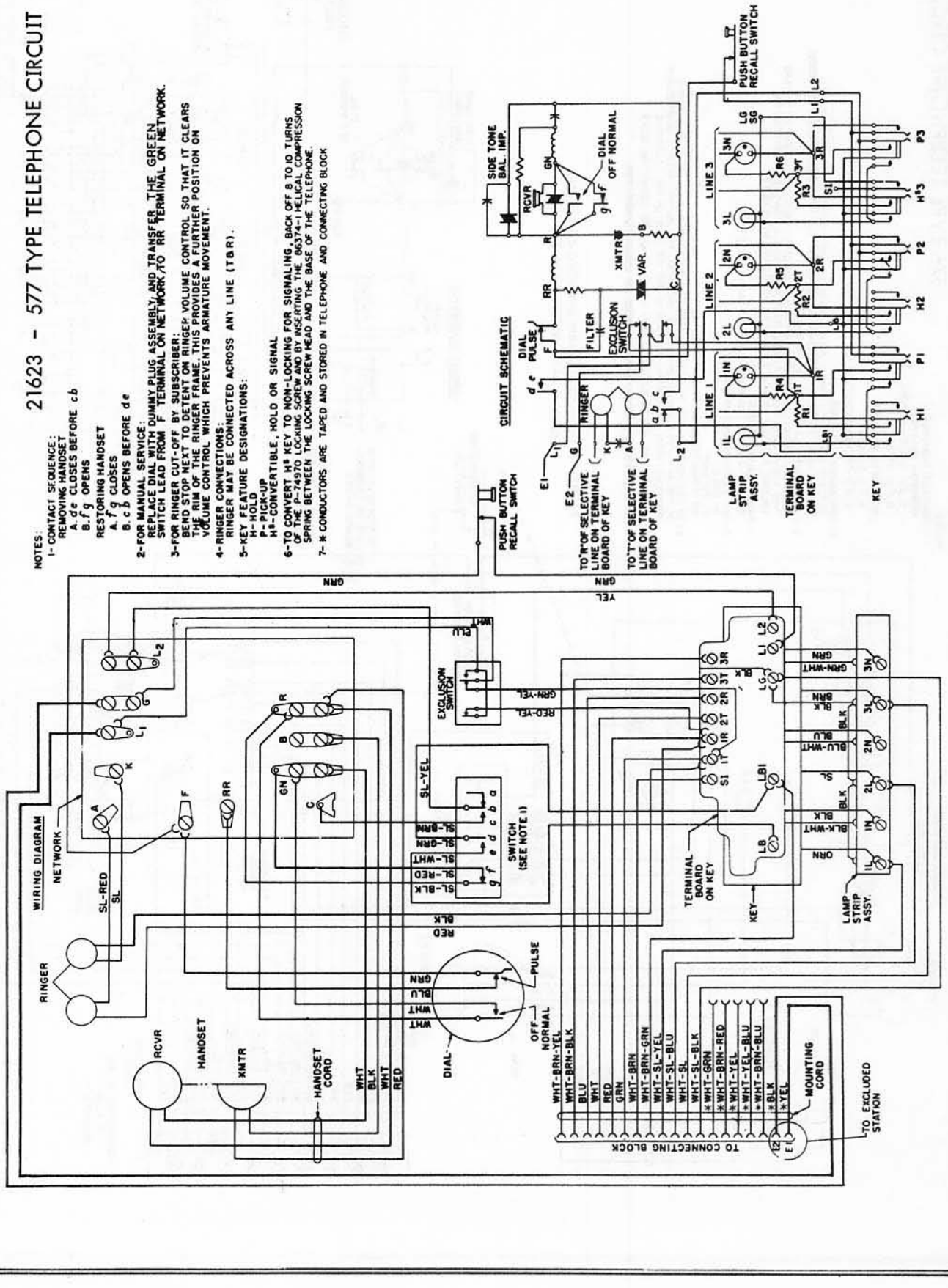
21623 - 577 TYPE TELEPHONE CIRCUIT

NOTES:
1- CONTACT SEQUENCE:
REMOVING HANDSET
A. *d e* CLOSES BEFORE *c b*
B. *f g* OPENS
RESTORING HANDSET
A. *f g* CLOSES
B. *c b* OPENS BEFORE *d e*
2- FOR MANUAL SERVICE:
REPLACE DIAL WITH DUMMY PLUG ASSEMBLY AND TRANSFER THE GREEN SWITCH LEAD FROM F TERMINAL ON NETWORK TO RR TERMINAL ON NETWORK.
3- FOR RINGER CUT-OFF BY SUBSCRIBER:
BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.
4- RINGER CONNECTIONS:
RINGER MAY BE CONNECTED ACROSS ANY LINE (T&R).
5- KEY FEATURE DESIGNATIONS:
H- HOLD
P- PICK-UP
H&P- CONVERTIBLE, HOLD OR SIGNAL
6- TO CONVERT H& KEY TO NON-LOCKING FOR SIGNALING, BACK OFF 8 TO 10 TURNS OF THE P-74970 LOCKING SCREW AND BY INSERTING THE 86374-1 HELICAL COMPRESSION SPRING BETWEEN THE LOCKING SCREW HEAD AND THE BASE OF THE TELEPHONE.
7- * CONDUCTORS ARE TAPED AND STORED IN TELEPHONE AND CONNECTING BLOCK



K-2576 AND K-2577 3-LINE TEL-TOUCH TELEPHONES

Figure 1. Type 2576 Three-line telephone

1. GENERAL INFORMATION

The 2576 and 2577 telephones are 6-button key units designed to provide access to three lines without the use of external switching equipment. The phones are similar except the 2577 includes an Exclusion Feature. An identifying code is stamped in ink on the Base. Refer to Table I,"ORDERING INFORMATION" for explanation of each code number.

2. DESCRIPTION

2.1 KEY PUSHBUTTONS

The six buttons of the key are arranged in pairs, one pair for each line. The right hand button of each pair is the LINE (or pick-up) button; the left hand button is the HOLD button.

The three LINE buttons are interlocking so only one line may be picked up at one time. However one or more lines may be held at one time.

Each pair of buttons is interlocking with each other. Any operated HOLD button will be released when its LINE button is depressed. (Restoring the Handset will also release any operated HOLD button.)

The right hand pair of buttons can be adapted for manual intercom. For this modification, the HOLD button is converted for signaling by unscrewing its interlock screw 8 or 10 turns and inserting the conical spring, (included in phone carton), between the screw head and the telephone Base. (Figure 2.)

2.2 OPERATOR RECALL BUTTON

Since the cradle plungers cannot always be used for operator signaling, (they will release any operated HOLD button when depressed), a special pushbutton switch is installed for this purpose. This pushbutton, just forward of the Handset cradle, is also used to obtain dial tone by momentarily depressing it.

2.3 VISUAL SIGNALS

A neon lamp under each line button flashes with ringing voltage to indicate an incoming call. An incandescent lamp under each HOLD button indicates line-busy condition of the associated line. A power supply is required for busy lamp operation.

3. OPERATION

Incoming Call.

During the ringing cycle, the neon lamp associated with the called line will flash and the ringer (if provided) will audibly signal that a call is to be answered on that line. To answer the call, the handset is removed from the cradle and the appropriate pickup button is depressed.

Outgoing Call

To make an outgoing call it is necessary to remove the handset from the cradle and depress the appropriate pickup button, dial the prescribed telephone number, or in the case of manual operation, provide the operator with the desired number.

Holding a Line

Any line picked up for an incoming or outgoing call may be held by simply depressing its associated hold button. To return to a held line, the subscriber simply depresses the pickup button for that line at which time its hold button will be released and any other line picked up will be released. Any depressed hold buttons will automatically be released when the handset is replaced in the cradle.

TABLE I. ORDERING INFORMATION

CODE	DESCRIPTION
2576**( )30__	TELEPHONE, 3-Line T-T with HOLD on each line. Mounting Cord terminated with Spade Terminals.
2576**( )40__	TELEPHONE, 3-Line T-T with HOLD on each line. Mounting Cord terminated with Plug.
2577**( )30__	TELEPHONE, 3-Line T-T with HOLD on each line. Mounting Cord terminated with Spade Terminals. Equipped with Exclusion Feature.
2577**( )40__	TELEPHONE, 3-Line T-T with HOLD on each line. Mounting Cord terminated with Plug. Equipped with Exclusion Feature.
	ADD DIAL CODE AS FOLLOWS: M-Metropolitan Type (Letters and numerals) R-Regular Type (Numerals only)
	ADD RINGER CODE AS FOLLOWS: (BA) - Straight Line Ringer (CA) - Common Audible Signal (LR) - Less Ringer
	** SUBSTITUTE COLOR CODE AS FOLLOWS: 00 - Black 13 - Beige 05 - Green 14 - Gray 09 - Ivory 15 - White
	190169 TRANSFORMER, for Busy Lamp Operation.
	CIRCUIT LABELS: (Packed with Phone) 2576 180155 2577 180312

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4. INSTALLATION OF 2576 TELEPHONE

Telephones equipped with plugs are installed by plugging into appropriately prewired connectors of the connecting cable. For telephones with mounting cords terminated in spade terminals, use 31( )783 Connecting Block Assembly and connect as directed in table below.

TABLE II. CONNECTIONS, 2576 TYPE TELEPHONE

MOUNTING CORD E/W PLUG	MOUNTING CORD E/W SPADE TERMINALS			Designations	
Terminal Number	Block No.	Connecting Block Term.	Cord Conductors	Telephone Ckt.	CO or PBX Lines
1		1	Red	1R(e) (f)	R-Line 1
26		2	Grn	1T(e) (f)	T-Line 1
2		4	Yel (g)		
27		5	Blk (g)		
4	1(a)	6	Blu	2R(e)	R-Line 2
29		7	Wht	2T(e)	T-Line 2
		9(b)			
30		10	Wht-Brn-Grn	LB1(e)	Lamp Supply Voltage*
7		3	Wht-Brn-Yel	3R(e)	R-Line 3 (c)
32		8	Wht-Brn-Blk	3T(e)	T-Line 3 (c)
3		1	Wht-Slt-Yel	1L(e)	Line 1 - Lamp Multiple (e)
28		2	Wht-Slt-Blk	LG-SG(e)	Lamp or Sig. Gnd. (e)
6		4	Wht-Slt-Blu	2L(e)	Line 2 - Lamp Multiple (e)
9	2	6	Wht-Slt	3L(e)	Line 3 - Lamp Multiple (e)
		7			
		9			
		10			
33		3	Wht-Brn	SI(e)	(d)
		8			
5			Wht-Brn-Red (g)		
8			Wht-Brn-Blu(g)		
19			Wht-Grn(g)		
20			Wht-Yel-Blu(g)		
45			Wht-Yel(g)		*No. 190169 power supply may be used.

NOTES:

(a) Block nearest butt end of mounting cord.

(b) Remove screw and washers from terminal 9 of block 1 and use to anchor the mounting cord strain relief to the center stud of the block.

(c) Intercom line, if required, connects here.

(d) To manual intercom station or common audible signal.

(e) If more than one 2576 telephone is to have access to the same CO, PBX or Intercom Lines, multiple connections between telephones to these terminals is required. A 19-conductor, 24 AWG, vinyl insulated, plastic jacketed cable may be used.

(f) The self contained ringer is normally connected to 1R and 1T of Line 1. It may be connected to another line as desired by moving the red and black ringer leads from 1R and 1T to 2R and 2T or 3R and 3T. Externally mounted Straight Line or Biased Type ringers (having a 0.50 Mfd. 400 V. paper capacitor connected in series with one lead) may be connected to other lines as required.

Also optional and available is a Common Audible Signal Unit Code 144( )470 which can be installed inside the telephone in place of a ringer. This unit provides an audible signal for all 3 lines of the telephone.

(g) Spare conductors of mounting cord, to be individually taped and stored within the connecting block.

5. INSTALLATION OF 2577 (EXCLUSION TYPE) TELEPHONE

(a) GENERAL

Installing an exclusion phone will necessitate changes in the connection of any excluded phones ... either within the telephone or within its connecting block assembly.

The exclusion switch in the 2577 phone is normally connected to line 1, and the following instructions pertain to installing a phone with line 1 excluded from other phones when the exclusion switch is operated.

(b) INSTALLATION OF EXCLUSION TELEPHONE WHEN MOUNTING CORD IS TERMINATED IN A QUICK-CONNECT PLUG.

(1) Connect all phones in the normal manner.
(2) On all phones to be excluded, remove Housing and disconnect Red and Green leads of mounting cord from terminals 1R and 1T of key terminal board. Individually tape and store these leads. Connect the Yellow and Black leads of the Mounting Cord to terminals 1R and 1T respectively.

(c) INSTALLATION OF EXCLUSION TELEPHONE WHEN MOUNTING CORD IS TERMINATED WITH SPADE TERMINALS.

(1) Connect the 2577 (exclusion type) phone to the Connecting Block Assembly as shown in Table II. In addition, connect the Yellow and Black leads of the Mounting Cord to #4 and #5 terminals (respectively) of #1 Block of the Connecting Block Assembly.

(2) Connect the excluded phones to the Connecting Block Assembly as shown in Table II, and move Red and Green leads of the Mounting Cord from #1 and #2 terminals to #4 and #5 terminals respectively of #1 Block of the Connecting Block Assembly.

(d) TO EXCLUDE LINE 2 OR LINE 3 INSTEAD OF LINE 1.

(1) Move Red-Yellow and Green-Yellow leads of Exclusion Switch respectively from "1R" and "1T" to "R" and "T" of line to be excluded.

(2) On all phones to be excluded, disconnect leads of mounting cord from "R" and "T" of excluded line and connect Yellow and Black leads of Mounting Cord to "R" and "T" respectively.

6. TYPE 2576 and 2577 PHONES USED IN INTERCOM APPLICATIONS

Line 3, (terminals 3T and 3R on key terminal board), is used for manual intercom. The HOLD key of line 3 may be used for signaling. The signal circuit is connected at S1 and LG terminals of the key terminal board. A power supply providing TALK and SIGNAL power must be provided in the respective circuits. To convert the number 3 HOLD key to signal, unscrew the interlock screw from the HOLD plunger approximately 8 turns until it clears the interlock slides. Insert the conical spring, (provided with the phone) under the head of the interlock screw as shown in figure 2.

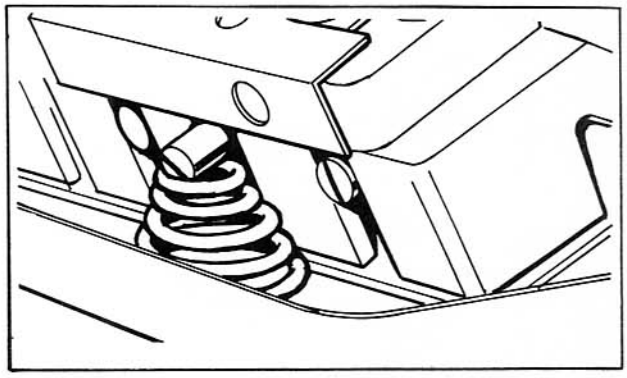

Figure 2. Number 3 HOLD key converted for signaling.

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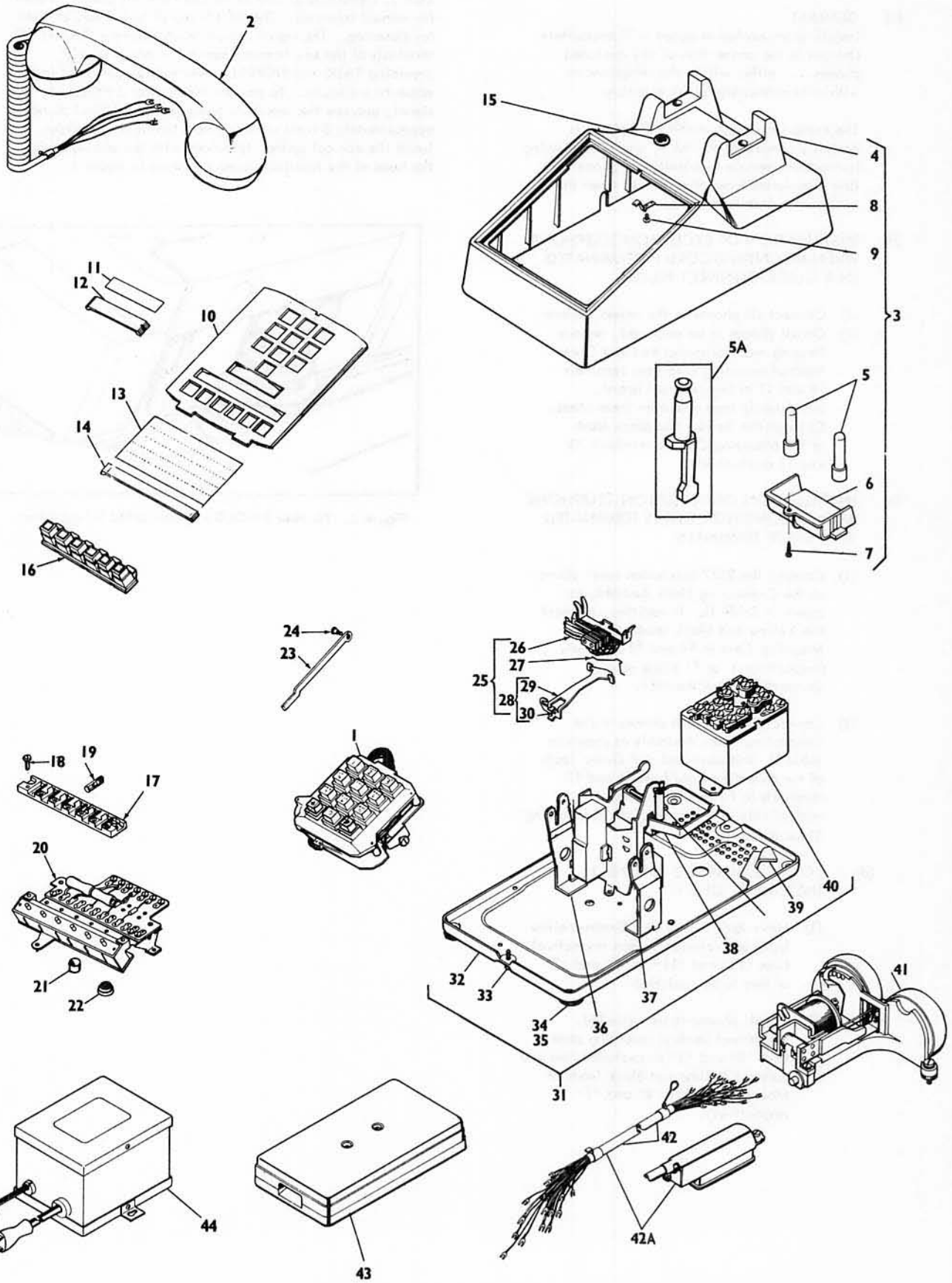
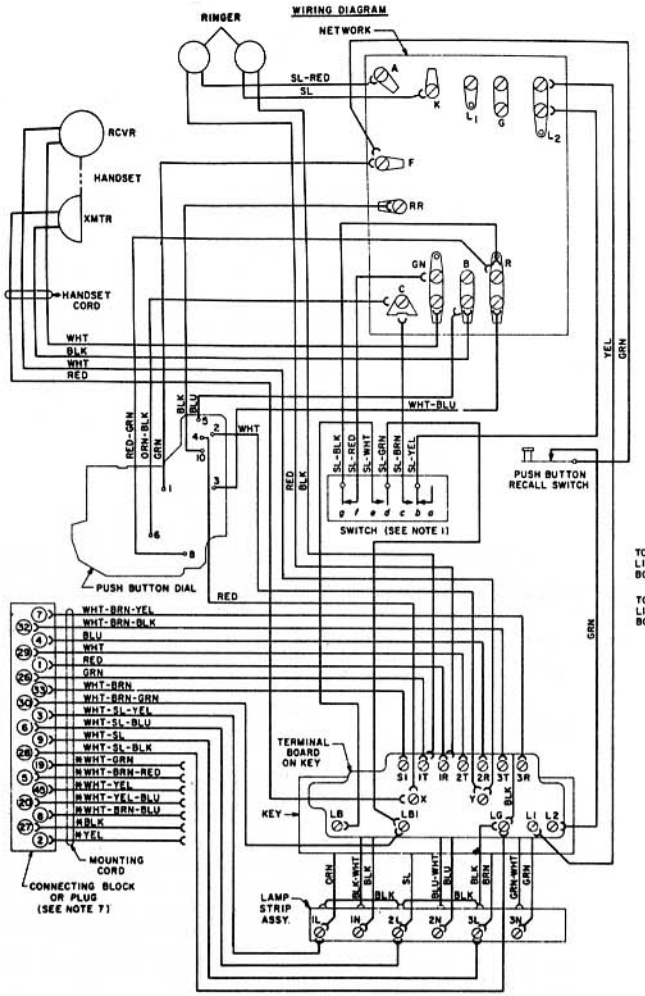


Figure 3, Type 2576 and 2577 Telephones, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 2576 30	2576 40	2577 30	2577 40		
			TABLE II. REPLACEABLE PARTS LIST						
2	1	32 (D) 450	DIAL ASSEMBLY, 12 Pushbutton, Regular. (Was 32(D)450)	X	X	X	X		
	1	32 (G) 450	DIAL ASSEMBLY, 12 Pushbutton, Metro. (Was 32(G)450) (See Section 228 for parts breakdown of dial)	X	X	X	X		
	2	65** - C2	HANDSET ASSEMBLY, Complete. (Was 65**(C2)410) (See Section 212 for parts breakdown of handset)	1	1	1	1		
	3	180158 - **	HOUSING AND PLUNGER ASSEMBLY	1	1	-	-		
	3	180607 - **	HOUSING AND PLUNGER ASSEMBLY	-	-	1	1		
	4	180156 - **	HOUSING	1	1	1	1		
	5	79101 - 2	PLUNGER, Cradle Switch	2	2	1	1		
	5A	79982 - 2	PLUNGER, Lift - Type	-	-	1	1		
	6	79097 - **	RETAINER, Plunger	1	1	1	1		
	7	75407 - 2	SCREW, Plunger Retainer	1	1	1	1		
	8	86143 - 1	CLIP, Face Plate Retaining	1	1	1	1		
	9	95884 - 2	SCREW, Face Plate Clip	1	1	1	1		
	10	180148 - **	FACE PLATE	1	1	1	1		
	11	87513 - 1	CARD, Number	1	1	1	1		
	12	87514 - 1	RETAINER, Number Card	1	1	1	1		
	13	82028 - 1	CARD, Designation	1	1	1	1		
	14	88522 - 1	RETAINER, Designation Card	1	1	1	1		
	15	190193 - 1	PUSHBUTTON ASSEMBLY, (Recall Button)	1	1	1	1		
	16	87472 - 3	KEY STRIP ASSEMBLY, (Pushbutton and Retainer Assembly)	1	1	1	1		
		87470 - 1	BUTTON, Square; Clear	3	3	3	3		
		87470 - 2	BUTTON, Square; Red	3	3	3	3		
		87469 - 1	RETAINER, Button - Plastic	1	1	1	1		
		87471 - 1	STRIP, Button Retainer - Metal	1	1	1	1		
	17	190196 - 1	LAMP STRIP ASSEMBLY	1	1	1	1		
	18	74909 - 2	SCREW, (Lamp Strip Retaining)	2	2	2	2		
	19	190191 - 1	LAMP, Neon; NE - 84 (Under Clear Buttons)	3	3	3	3		
	19	51 (A) 745	LAMP, Incandescent; (Under Red Buttons)	3	3	3	3		
	20	508 - C	KEY ASSEMBLY, 3-Line-and-Hold (Was 508-C-740)	1	1	1	1		
		75392 - 2	SCREW, (Key Attaching)	3	3	3	3		
	21	79409 - 1	RING, Pushbutton Lockout (Shipped loose in carton)	1	1	1	1		
	22	86374 - 1	SPRING, Conical	1	1	1	1		
	23	190167 - 1	LINK, "Hold" Release	1	1	1	1		
	24	190179 - 1	SCREW, Shoulder	1	1	1	1		
	25	79971 - 1	EXCLUSION SWITCH ASSEMBLY	-	-	1	1		
	26	79970 - 1	SPRING ASSEMBLY, Exclusion Switch	-	-	1	1		
	27	79624 - 1	RETAINER, Spring Assembly	-	-	1	1		
	28	79625 - 1	BRACKET ASSEMBLY, Exclusion Switch	-	-	1	1		
	29	79605 - 1	BRACKET	-	-	1	1		
	30	69020 - 3	SCREW	-	-	1	1		
	31	79525 - 10	BASE ASSEMBLY, (Includes Items 32 through 40)	1	1	1	1		
	32	79411 - 1	PLATE, Base	1	1	1	1		
	33	75486 - 1	SCREW, Cabinet Lock	2	2	2	2		
	34	82400 - 1	FOOT	4	4	4	4		
	35	82486 - 2	RIVET; (Foot Attaching)	1	1	1	1		
	36	87511 - 2	BRACKET, Dial, L. H.	1	1	1	1		
	37	87511 - 1	BRACKET, Dial, R. H.	1	1	1	1		
	38	79489 - 2	CRADLE SWITCH ASSEMBLY	1	1	1	1		
	39	79404 - 1	CLIP, Cord; (And Ringer Mounting Bracket)	1	1	1	1		
	40	75335 - 1	NETWORK	1	1	1	1		
		32199 - 1	RIVET; (Network Attaching)	2	2	2	2		
		31944 - 2	RIVET; (Dial Brackets, Hookswitch and Cord Clip Attaching)	7	7	7	7		
	41	130	RINGER	X	X	X	X		
	41	144	COMMON AUDIBLE SIGNAL	X	X	X	X		
	42	839**(09)650	MOUNTING CORD, 19-Conductor w/Spade Terminals	1	-	1	-		
	42A	861**(09)650	MOUNTING CORD, 19-Conductor w/Plug	-	1	-	1		
	43	31( )783	CONNECTING BLOCK ASSEMBLY	1	-	1	-		
	44	190169 - 1	POWER TRANSFORMER, (Busy Lamp)	1	1	1	1		

2576 TYPE TELEPHONE CIRCUIT



180155

NOTES:

1- CONTACT SEQUENCE:
   REMOVING HANDSET
   A. *de* CLOSES BEFORE *cb*
   B. *fg* OPENS
   RESTORING HANDSET
   A. *fg* CLOSES
   B. *cb* OPENS BEFORE *de*

2- FOR RINGER CUT-OFF BY SUBSCRIBER:
   BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

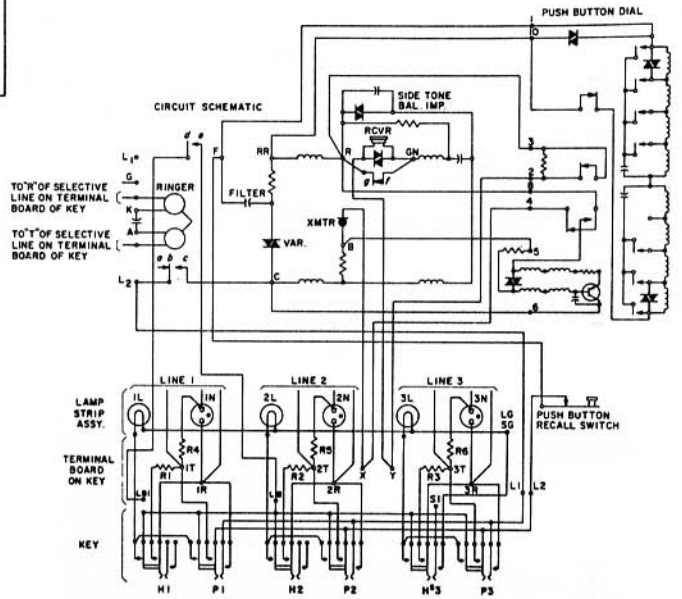
3- RINGER CONNECTIONS:
   RINGER MAY BE CONNECTED ACROSS ANY LINE (T&R).

4- KEY FEATURE DESIGNATIONS:
   H-HOLD
   P-PICK-UP
   H^{S}-CONVERTIBLE, HOLD OR SIGNAL

5- TO CONVERT H KEY TO NON-LOCKING FOR SIGNALING, BACK OFF 8 TO 10 TURNS OF THE P-74970 LOCKING SCREW AND BY INSERTING THE 86374-1 HELICAL COMPRESSION SPRING BETWEEN THE LOCKING SCREW HEAD AND THE BASE OF THE TELEPHONE.

6- * CONDUCTORS ARE TAPED AND STORED IN TELEPHONE AND CONNECTING BLOCK.

7- CIRCLED NUMBERS INDICATE PIN NUMBERS ON 95510-1 CONNECTOR.



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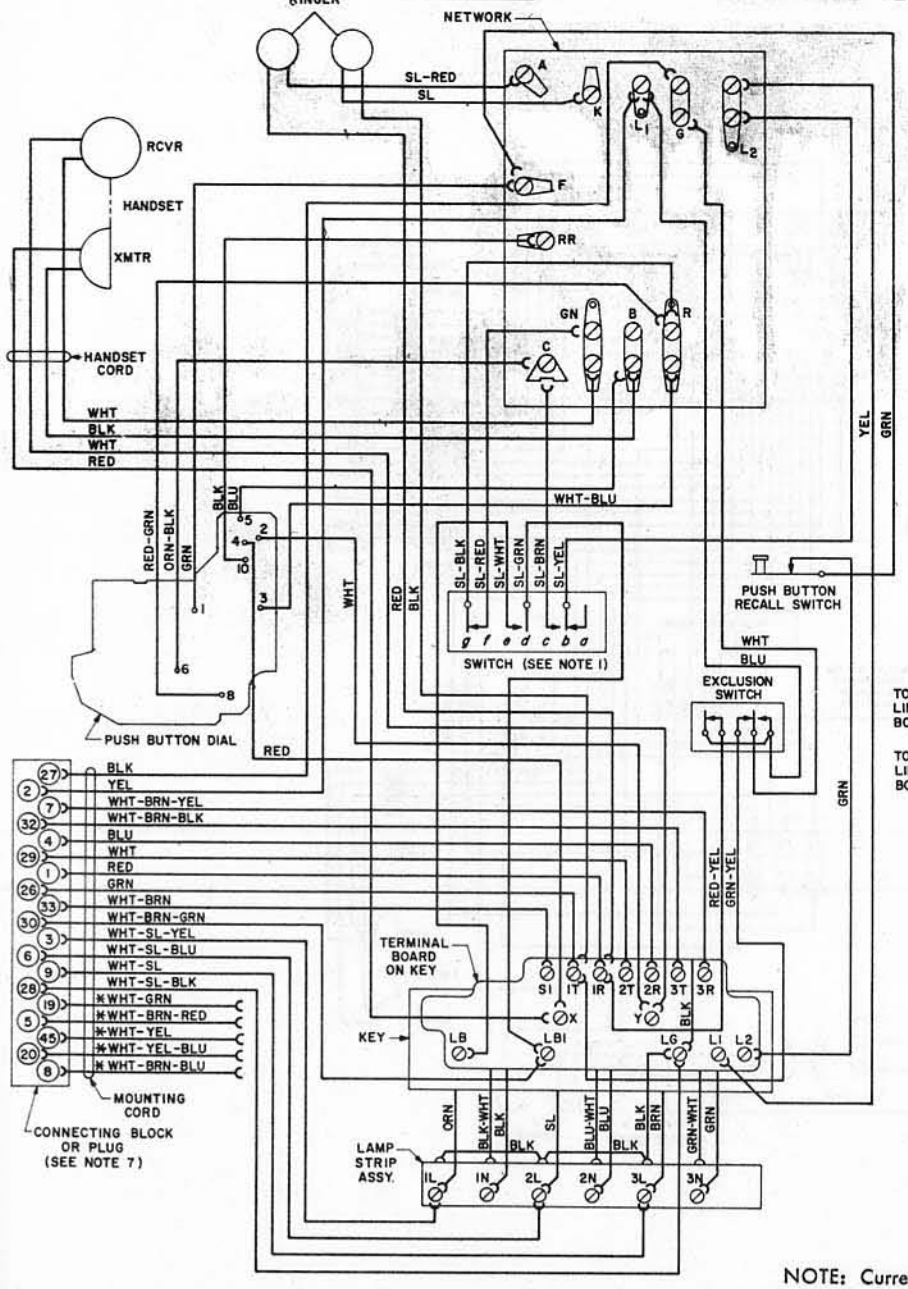
2577 TYPE TELEPHONE CIRCUIT

WIRING DIAGRAM



NOTES:

1-CONTACT SEQUENCE:
REMOVING HANDSET
A. *de* CLOSES BEFORE *cb*
B. *fg* OPENS
RESTORING HANDSET
A. *fg* CLOSES
B. *cb* OPENS BEFORE *de*

2-FOR RINGER CUT-OFF BY SUBSCRIBER:
BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

3-RINGER CONNECTIONS:
RINGER MAY BE CONNECTED ACROSS ANY LINE (T & R).

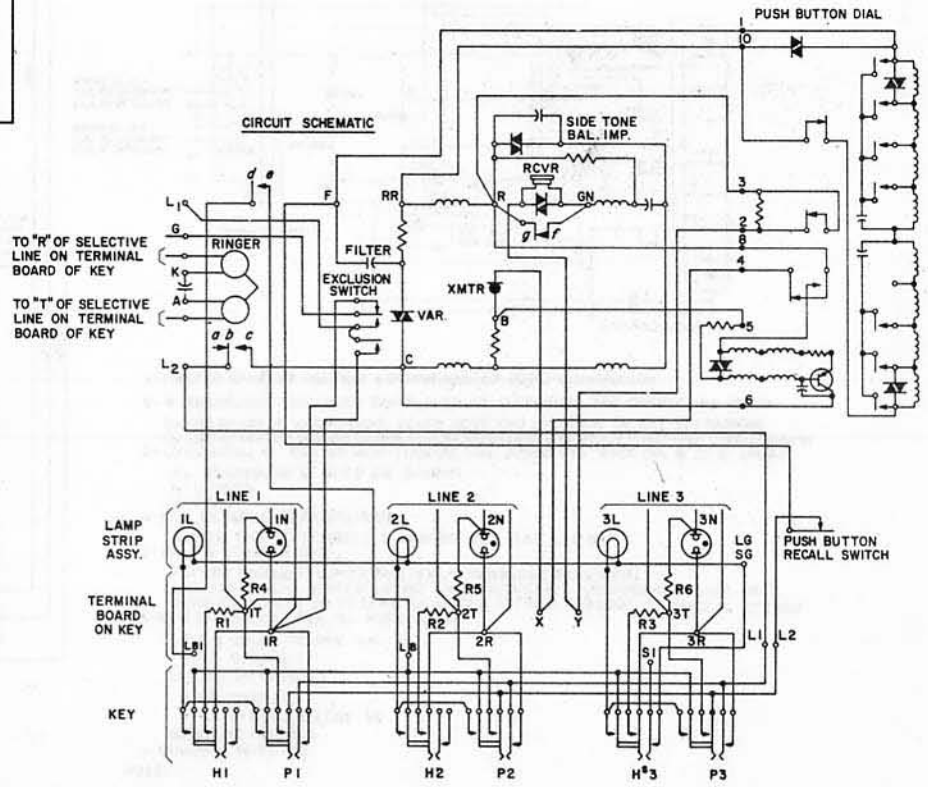
4-KEY FEATURE DESIGNATIONS:
H-HOLD
P-PICK-UP
H^S-CONVERTIBLE, HOLD OR SIGNAL

5-TO CONVERT H KEY TO NON-LOCKING FOR SIGNALING, BACK OFF 8 TO 10 TURNS OF THE P-74970 LOCKING SCREW AND BY INSERTING THE 86374-1 HELICAL COMPRESSION SPRING BETWEEN THE LOCKING SCREW HEAD AND THE BASE OF THE TELEPHONE.

6-* CONDUCTORS ARE TAPED AND STORED IN TELEPHONE AND CONNECTING BLOCK.

7-CIRCLED NUMBERS INDICATE PIN NUMBERS ON 95510-1 CONNECTOR.

CIRCUIT SCHEMATIC



NOTE: Current sets do not have the WHT-BLU lead between terminal (3) of dial and terminal (R) of network. The RED-GRN lead is moved from terminal (8) of dial to terminal (3).

180312

ISSUE NO. 1

Figure 1. Key Telephone (564, 565)

TYPES 564 AND 565 KEY TELEPHONES

1. IDENTIFICATION

The types 564 and 565 Key Telephones are identified by a code number stamped in ink on the bottom of the Base Plate. Refer to Table I, "ORDERING INFORMATION" for explanation of each code number.

Type 564 and 565 telephones have been manufactured with round-button housings and with the current square-button housings. Telephones with round-buttons may be converted to square-button telephones by installation of kit number 11286**79. (See Table I.)

564 and 565 telephones have been manufactured with 589(B), 589(H) and the current 636 Key Assemblies. Generally, all telephones manufactured after April, 1967 are equipped with the 636 key. To identify the Key Assembly, remove the telephone housing.

2. PURPOSE OF TYPE 564 AND 565 KEY TELEPHONES

The 564 and 565 Key Telephones are designed to be used with a Key Telephone System, (such as ITT-K1A2). Such a system provides several telephones access to several lines, which may include central office, private exchange, or intercom lines. The buttons of the key telephone are used to select lines and to place a "HOLD" on any line.

3. DESCRIPTION AND OPERATION

The Key Telephones are anti-sidetone and operate efficiently over a wide range of loop resistance and line impedance.

The six keys are allocated for use, from left to right, as follows. The first key is a HOLD key which is used to hold a call received on any line while another call is made on another line. The second and third keys are individual LINE (or pick-up) keys and the remaining three keys may each be wired as either LINE or interphone SIGNAL keys. A maximum of five lines may be accessed from one telephone, with a common HOLD key, and up to three of these lines may be connected as private intercom lines, one key being used for the common interphone signalling circuit.

The 565**( )30 and 565**( )40 telephones have an exclusion switch. Pulling up the left hand cradle plunger disconnects any other telephone on one of the lines for confidential conversations.

The 565**( )39 and 565*( )42 telephones have the exclusion plunger but do not have an exclusion switch. To add the exclusion feature to these telephones, install #79971, EXCLUSION SWITCH.

4. INSTALLATION

Telephones equipped with quick-connect plugs are installed by plugging into appropriately prewired connectors of the key system. Refer to circuit label packed with telephone for connecting leads of Mounting Cord not equipped with plug to the Connecting Block. The circuit label also gives instructions for making modifications to the telephone.

The Connecting Block Assembly (46, figure 2) is not included with the telephone and must be ordered separately when required.

When used in a K-1A1 or K-1A2 Key System, additional wiring, including the diode (47, figure 2) is required for a station busy lamp. This must also be ordered separately.

Appropriate circuit labels are listed in Table I.

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5. DISASSEMBLY AND REASSEMBLY

5.1 HOUSING GROUP, REMOVAL AND INSTALLATION

(a) REMOVAL. Loosen Cabinet Lock Screws (33, figure 2) and remove Housing.

(b) INSTALLATION. Install Housing over dial and pushbuttons of key strip. Tighten Cabinet Lock Screws.

5.2 DIAL ASSEMBLY, REMOVAL AND INSTALLATION

(a) REMOVAL. Disconnect leads of Dial, loosen mounting screws and lift out dial.

(b) INSTALLATION. Refer to appropriate circuit label (see Table I) and connect leads of Dial. Seat dial in mounting brackets and tighten mounting screws.

5.3 HANDSET ASSEMBLY, REMOVAL AND INSTALLATION.

(a) REMOVAL. Disconnect leads, release cord hook from telephone Base Plate.

(b) INSTALLATION. Connect leads, attach cord hook to telephone Base Plate.

5.4 KEY GROUP, REMOVAL AND INSTALLATION (Items 9 thru 23)

(a) REMOVAL. Disconnect leads and remove the three screws that secure Key Assembly (22 or 23) to Base. Remove group as a unit.

(b) INSTALLATION. Secure Key Assembly to Base with the three attaching screws. Refer to appropriate circuit label and connect leads.

5.5 KEY GROUP, DISASSEMBLY INTO COMPONENTS AND ASSEMBLY.

(a) DISASSEMBLY OF KEY GROUP.

(1) Remove square button Key Strip (10) by lifting it off the Key Assembly. Remove round button Key Strip (10A) by removing the two screws (15).

(2) To disassemble Key Strips (10 or 10A) remove the metal Retainer (14).

(3) Remove Lamp Strip (17) by removing the two screws (21). (589 Keys only.)

(b) REASSEMBLY OF KEY GROUP

(1) Secure Lamp Strip with the two mounting screws (21). (589 Keys only.)

(2) To assembly Pushbuttons into Key Strip, place buttons in holder. Place Holders in Key Strip (Round Button only). Work metal Retainer into place.

(3) Secure Round Button Key Strip to Key Assembly with two screws (15). Work square button Key Strip into position on Key Assembly.

5.6 EXCLUSION SWITCH, REMOVAL AND INSTALLATION.

(a) REMOVAL OF EXCLUSION SWITCH ASSEMBLY

(1) Disconnect leads.

(2) To remove Exclusion Switch Assembly (25) as a group, loosen Screw (30) and work out of Cradle Switch Bracket. To remove the Spring Assembly (26) only, remove Retainer (27).

(b) INSTALLATION OF EXCLUSION SWITCH ASSEMBLY

(1) Work Bracket (29) into slots of the Cradle Switch Bracket. Tighten Screw (30).

(2) Place Spring Assembly (26) on the Bracket so that the left hand "L" shaped lug of the Bracket protrudes through the rectangular slot in the Spring Assembly. Place the center of the Retainer (27) around the "T" shaped lug of the Spring Assembly and the ends of the Retainer under the "L" shaped lugs of the Bracket.

(3) Refer to appropriate circuit label and connect leads.

5.7. MOUNTING CORD, REMOVAL AND INSTALLATION.

NOTE: In replacing Mounting Cords refer to parts list (Table II) and check Key Assembly to see if it is 589 or 636.

(a) REMOVAL OF MOUNTING CORD. Disconnect leads, release cord hook from telephone base.

(b) INSTALLATION OF MOUNTING CORD. Refer to appropriate circuit label and connect leads. Secure Cord to Base with cord hook. Position Cord under the Cord Clip (40).

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 564/30	564/40	565/30	565/39	565/40	565/42
TABLE I. ORDERING INFORMATION, K-564 AND K-565 TELEPHONES									
			TELEPHONE, 6-Button Key, 5-Lines with Common "HOLD":						
		564**( )30-	With 34 - Conductor Cord w/terminals	X	-	-	-	-	-
		564**( )40-	With 34-Conductor Cord w/connector	-	X	-	-	-	-
		565**( )30-	With Exclusion Switch, 42-Conductor Cord, Terminals	-	-	X	-	-	-
		565**( )40-	With Exclusion Switch, 42-Conductor Cord, Connector	-	-	-	-	X	-
		565**( )39-	With Exclusion Plunger, Less Exclusion Switch, 50-Conductor Cord w/terminals, (For "Hands Free" Operation)	-	-	-	X	-	-
		565**( )42-	With Exclusion Plunger, Less Exclusion Switch, 50-Conductor Cord w/connector (For "Hands Free" Operation)	-	-	-	-	-	X
			ADD DIAL CODE AS FOLLOWS: "M" - Metropolitan Dial (Numerals and Letters) "R" - Regular Dial (Numerals Only) "N" - No Dial (For Manual Operation)						
			ADD RINGER CODE AS FOLLOWS: (LR) - Less Ringer (BA) - Straight Line Ringer						
			** SUBSTITUTE COLOR CODE AS FOLLOWS: 00 - Black 05 - Green 09 - Ivory 13 - Light Beige 14 - Light Gray 15 - White						
			CIRCUIT LABELS (PACKED WITH PHONE)						
			564/30 and 564/40 (589 Key: 21545; 636 Key: 21655)	X	X	-	-	-	-
			565/30 and 565/40 (589 Key: 21554; 636 Key: 21656)	-	-	X	-	X	-
			565/39 (589 Key: 21615; 636 Key: 21657)	-	-	-	X	-	-
			565/42 (589 Key: 21614; 636 Key: 21657)	-	-	-	-	-	X
			COLOR CONVERSION COMPONENTS (Square Button Only)						
	A	11289(**)79	COLOR CONVERSION KIT (Square Button) (Consists of the Following Eight Items)	1	1	1	1	1	1
		87491**	HOUSING AND PLUNGER ASSEMBLY (Includes Exclusion Plunger)	1	1	1	1	1	1
		79293	HOLDER, Cord	1	1	1	1	1	1
		79250**	HANDLE, Handset	1	1	1	1	1	1
		79290**	CAP, Transmitter	1	1	1	1	1	1
		79289**	CAP, Receiver	1	1	1	1	1	1
		75482**	RING, Numeral, (Dial)	1	1	1	1	1	1
		75474-2	GASKET, Dial	1	1	1	1	1	1
		1005**(07)650	CORD, Handset, (Coiled) NOTE: Does Not Include Mounting Cord which Must Be Ordered Separately.	1	1	1	1	1	1
	B		CORD, Mounting (See Listing Under Item 44 to Obtain Desired Mounting Cord.)	1	1	1	1	1	1
			NOTE: If Color-Converting a Round Button Key Phone, Order the Following Two Parts in Addition to "A" and "B" Above:						
	C		87472 KEY STRIP ASSEMBLY	1	1	1	1	1	1
	D		87474 ESCUTCHEON	1	1	1	1	1	1
		11286**79	CONVERSION KIT, Round Button Housing to Square Button Housing, Consists of the Following Three Items:	1	1	1	1	1	1
		87490-**	HOUSING AND PLUNGER ASSEMBLY	1	1	1	1	1	1
		87474	ESCUTCHEON	1	1	1	1	1	1
		87472	KEY STRIP ASSEMBLY	1	1	1	1	1	1

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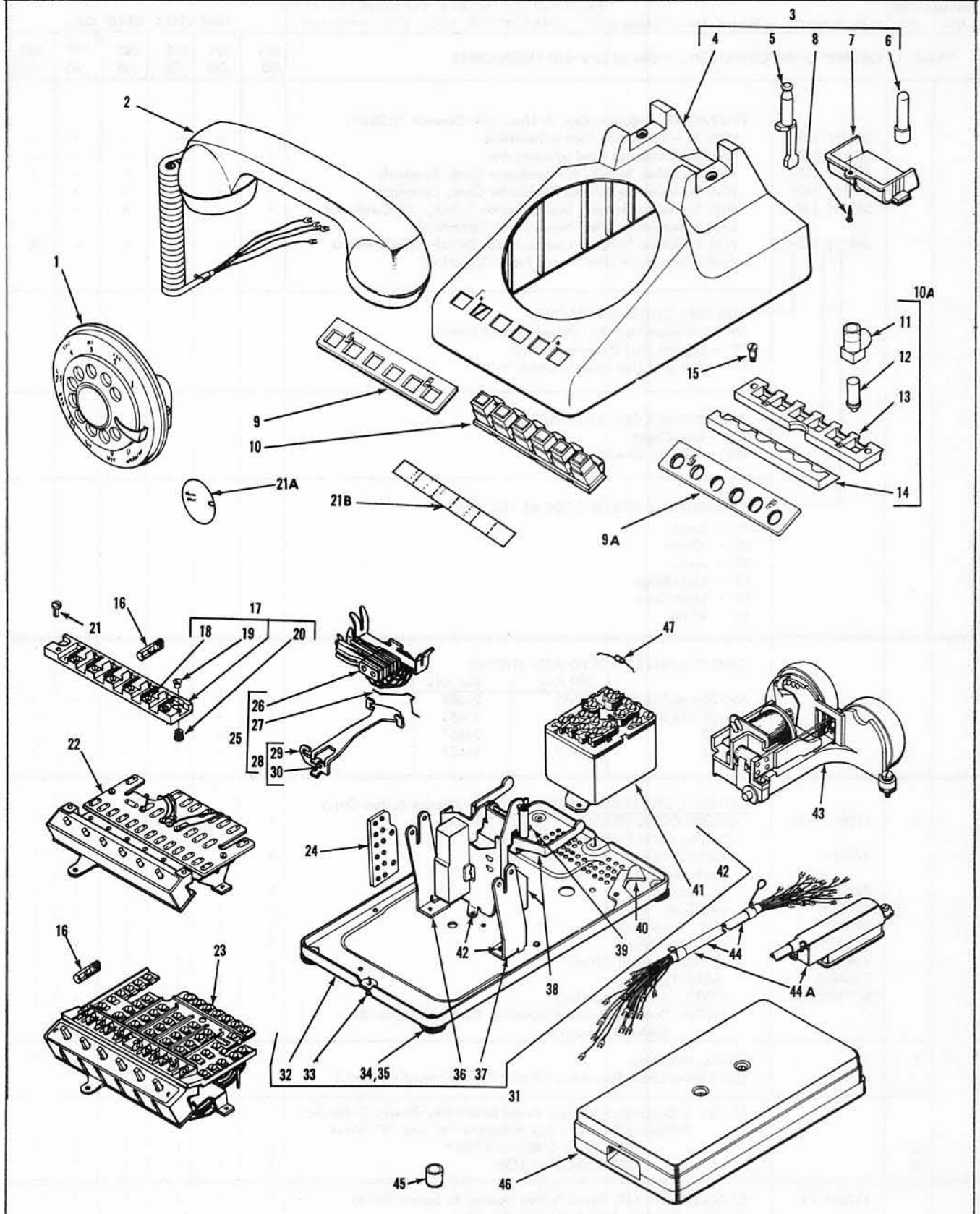

Figure 2. K-564/K-565 Key Telephones, Exploded View

TABLE II. REPLACEABLE PARTS LIST, K-564 AND K-565 TELEPHONES

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 564/30	564/40	565/30	565/39	565/40	565/42
		-------	TELEPHONE, 6-Button Key, 5-Lines w/common Hold						
2	1	30**(D)450	DIAL ASSEMBLY, Regular (Numerals Only)	1	1	1	-	1	-
	1	30**(G)450	DIAL ASSEMBLY, Metropolitan (letters and numerals) (See Section 224 for parts breakdown on Type 19 Dial)	1	1	1	-	1	-
	1	35**(D)450	DIAL ASSEMBLY, for "HANDS FREE" Operation Regular (Numerals Only)	-	-	-	1	-	1
	1	35**(G)450	DIAL ASSEMBLY, For "HANDS FREE" Operation Metropolitan (Letters and Numerals) (See Section 226 for parts breakdown on Type 28 Dial)	-	-	-	1	-	1
	1	79456**	DUMMY PLUG ASSEMBLY (Replaces Dial for (Manual Operation) (See Section 221 for Parts Breakdown)	1	1	1	1	1	1
	2	65**(C2)410	HANDSET ASSEMBLY (Complete) (See Section 212 for Parts Breakdown)	1	1	1	1	1	1
	3	79405**	HOUSING AND PLUNGER ASSEMBLY, Round Button (MD)						
	3	79987**	HOUSING AND PLUNGER ASSEMBLY, Round Button (MD)						
	3	87490**	HOUSING AND PLUNGER ASSEMBLY, Square Button (87491** may be used)	1	1	-	-	-	-
	3	87491**	HOUSING AND PLUNGER ASSEMBLY, Square Button (will work for 87490**)	-	-	1	1	1	1
	4	79403**	HOUSING, Round Button (Manufacture Discontinued)						
	4	87475**	HOUSING, Square Button	1	1	1	1	1	1
	5	79982-2	PLUNGER, Exclusion	-	-	1	1	1	1
	6	79101-2	PLUNGER, Cradle Switch	2	2	1	1	1	1
	7	79097**	RETAINER, Plunger	1	1	1	1	1	1
	8	75407-2	SCREW, Plunger Retainer	1	1	1	1	1	1
	9	87474	ESCUTCHEON, For Square Buttons	1	1	1	1	1	1
	9A	79099	ESCUTCHEON, For Round Buttons (Manufacture Discontinued)						
	10	87472-1	KEY STRIP ASSEMBLY, Square Buttons	1	1	1	1	1	1
		87470-2	BUTTON, Red (Square)	1	1	1	1	1	1
		87470-1	BUTTON, Clear (Square)	5	5	5	5	5	5
		87469-1	STRIP, Key (Square Button) (Plastic)	1	1	1	1	1	1
		87471-1	RETAINER, Button (Square Button) (Metal)	1	1	1	1	1	1
	10A	79441							
	11	79440							
	12	79416							
	13	79421							
	14	79414	(Manufacture Discontinued)						
	15	79521							
	16	51(A)745	LAMP	5	5	5	5	5	5
	17	79524							
	17	86403							
	18	79485-2	(Manufacture Discontinued)						
	19	63252-2							
	20	79475							
	21	74909-2							
	21A	75415	CARD, Number, (Circular)	1	1	1	1	1	1
	21B	82028	CARD, Designation, (Strip)	1	1	1	1	1	1

(MD) - Manufacture Discontinued

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FIGURE NO.	INDEX NO.	PART NUMBER	(Indented items are included in the NAME, Description part under which they are indented)	QUANTITY USED ON: 564/30	564/40	565/30	565/39	565/40	565/42
TABLE II. REPLACEABLE PARTS LIST, K-564 AND K-565 TELEPHONES									
			TELEPHONE, 6-Button Key, 5-Lines w/hold (cont'd)						
2	22	589(B)740	KEY ASSEMBLY (Old Style, Standard) (Includes Terminal Screws) (Order 636(A)740)						
	22	589(H)740	KEY ASSEMBLY (Old Style, "Hands Free") (Includes Terminal Screws) (Order 636(A)740)						
	23	636(A)740	KEY ASSEMBLY	1	1	1	1	1	1
		75392-2	SCREW, (Key Assembly Attaching)	3	3	3	3	3	3
			NOTE: 636(A)740 Key Assembly Replaces 589(B)740 or 589(H)740 Key Assembly and 79524 or 86403 Lamp Strip Assembly.						
			(See Section 258 for parts breakdown on Key Assemblies)						
	24	86405	TERMINAL BOARD ASSEMBLY, Auxiliary	-	-	-	1	-	1
		79485-2	SCREW, Terminal	-	-	-	12	-	12
		36378	SCREW, (Terminal Board Attaching)	-	-	-	2	-	2
	25	79971	EXCLUSION SWITCH ASSEMBLY	-	-	1	-	1	-
	26	79970	SPRING ASSEMBLY, Exclusion Switch (See Section 253 for Parts Breakdown)	-	-	1	-	1	-
	27	79624	RETAINER, Spring Assembly to Bracket	-	-	1	-	1	-
	28	79625	BRACKET ASSEMBLY, Exclusion Switch	-	-	1	-	1	-
	29	79605	BRACKET, Exclusion Switch	-	-	1	-	1	-
	30	69020-3	SCREW, B.H.M.	-	-	1	-	1	-
	31	79525-1	BASE ASSEMBLY (Includes Items 2 thru 12)	1	1	1	-	1	-
	31	79525-5	BASE ASSEMBLY (Includes Items 2 thru 12)	-	-	-	1	-	1
	32	NSS	PLATE, Base (79411) Not Serviced Separately	-	-	-	-	-	-
	33	75486	SCREW, Cabinet Lock	2	2	2	2	2	2
	34	82400	FOOT	4	4	4	4	4	4
	35	82486-2	RIVET, Foot Attaching	4	4	4	4	4	4
	36	87052-1	BRACKET, Dial, L. H.	1	1	1	1	1	1
	37	87052-2	BRACKET, Dial, R. H.	1	1	1	1	1	1
	38	79489-1	CRADLE SWITCH ASSEMBLY (See Section 251 for parts breakdown)	1	1	1	-	1	-
	38	79489-3	CRADLE SWITCH ASSEMBLY (Hands Free) (See Section 251 for Parts Breakdown)	-	-	-	1	-	1
	39	75333	BRACKET, Ringer Mounting	1	1	1	1	1	1
	40	79404	CLIP, Cord; (And Ringer Mounting Bracket)	1	1	1	1	1	1
	41	75335	NETWORK ASSEMBLY (ATTACHING PARTS)	1	1	1	1	1	1
		69116-3	SCREW	2	2	2	2	2	2
		67093	NUT	2	2	2	2	2	2
	42	31944-2	RIVET	9	9	9	9	9	9
	43	130(BA)470	RINGER	1	1	1	1	1	1
			MOUNTING CORDS FOR 589 KEYS						
	44	840**(09)650	CORD, Mounting; 34-Conductor w/terminals (Order 9001**(09)650)	1	-	1	-	-	-
	44A	858**(09)650	CORD, Mounting; 34-Conductor w/connector (Order 9000**(09)650)	-	1	-	-	1	-
	44	860**(09)650	CORD, Mounting; 50-Conductor w/terminals	-	-	-	1	-	-
	44A	857**(09)650	CORD, Mounting; 50-Conductor w/connector	-	-	-	-	-	1
			MOUNTING CORDS FOR 636 KEY						
	44	867**(09)650	CORD, Mounting; 34-Conductor w/terminals	1	-	-	-	-	-
	44A	863**(09)650	CORD, Mounting; 34-Conductor w/connector	-	1	-	-	-	-
	44	866**(09)650	CORD, Mounting; 42-Conductor w/terminals	-	-	1	-	-	-
	44A	868**(09)650	CORD, Mounting; 42-Conductor w/connector	-	-	-	-	1	-
	44	865**(09)650	CORD, Mounting; 50-Conductor w/terminals	-	-	-	1	-	-
	44A	864**(09)650	CORD, Mounting; 50-Conductor w/connector	-	-	-	-	-	1
	45	79409	BUSHING, Push-Button Lockout	1	1	1	1	1	1
	46	30( )783	CONNECTING BLOCK ASSEMBLY (Order Separately)	1	-	1	1	-	-
	47	83777-2	DIODE, (1N2070), for Station Busy Lamp Circuit (Order Separately)						

TABLE III. CONNECTION CHART, K-564 AND K-565 TELEPHONE SETS, (2-COLOR CONDUCTORS)

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	K-565/39 /42 phones	K-565/30 /40 phones	K-564/30 /40 phones	SCREW TYPE	AMPHENOL	50-Cond.(a)	40-Cond.(h)
1	R	1R	1R	BLU-WHT	BLU-WHT	BLU-WHT	1-1	1	BLU-WHT	BLU
	T	1T	1T	WHT-BLU	WHT-BLU	WHT-BLU	1-2	26	WHT-BLU	WHT
	A1	1B	1B	ORN-WHT	ORN-WHT	ORN-WHT	1-4	2	ORN-WHT	ORN
	A	1H	1H	WHT-ORN	WHT-ORN	WHT-ORN	1-5	27	WHT-ORN	WHT
LAMP	L	L1	1L	GRN-WHT	GRN-WHT	GRN-WHT	4-1	3	GRN-WHT	GRN
	LG	LG	1LG	WHT-GRN	WHT-GRN	WHT-GRN	4-2	28	WHT-GRN	WHT
2	R	2R	2R	BRN-WHT	BRN-WHT	BRN-WHT	1-6	4	BRN-WHT	BRN
	T	2T	2T	WHT-BRN	WHT-BRN	WHT-BRN	1-7	29	WHT-BRN	WHT
	---		---	SLT-WHT(b)	SLT-WHT(b)	SLT-WHT(b)	1-9	5	SLT-WHT	BRN
	A	2H	2H	WHT-SLT	WHT-SLT	WHT-SLT	1-10	30	WHT-SLT	SL
LAMP	L	L2	2L	BLU-RED	BLU-RED	BLU-RED	4-4	6	BLU-RED	WHT
	LG	LG	2LG	RED-BLU	---	---	---	31	RED-BLU	---
3	R	3R	3R	ORN-RED	ORN-RED	ORN-RED	1-3	7	ORN-RED	BLU
	T	3T	3T	RED-ORN	RED-ORN	RED-ORN	1-8	32	RED-ORN	RED
	---		---	GRN-RED(b)	GRN-RED(b)	GRN-RED(b)	2-1	8	GRN-RED	YEL
	A	3H	3H	RED-GRN	RED-GRN	RED-GRN	2-2	33	RED-GRN	ORN
LAMP	L	L3	3L	BRN-RED	BRN-RED	BRN-RED	4-6	9	BRN-RED	RED
	LG	LG	3LG	RED-BRN	---	---	---	34	RED-BRN	---
4	R	4R	4R	SLT-RED	SLT-RED	SLT-RED	2-4	10	SLT-RED	GRN
	T	4T	4T	RED-SLT	RED-SLT	RED-SLT	2-5	35	RED-SLT	RED
	---		---	BLU-BLK(b)	BLU-BLK(b)	BLU-BLK(b)	2-6	11	BLU-BLK	SLT
	A	4H	4H	BLK-BLU	BLK-BLU	BLK-BLU	2-7	36	BLK-BLU	BRN
LAMP	L	L4	4L	ORN-BLK	ORN-BLK	ORN-BLK	4-9	12	ORN-BLK	RED
	LG	LG	4LG	BLK-ORN	---	---	---	37	---	---
5	R	5R	5R	GRN-BLK	GRN-BLK	GRN-BLK	2-9	13	GRN-BLK	SLT
	T	5T	5T	BLK-GRN	BLK-GRN	BLK-GRN	2-10	38	BLK-GRN	RED
	---		---	BRN-BLK(b)	BRN-BLK(b)	BRN-BLK(b)	2-3	14	BRN-BLK	YEL
	A	5H	5H	BLK-BRN	BLK-BRN	BLK-BRN	2-8	39	BLK-BRN	BLU
LAMP	L	L5	5L	SLT-BLK	SLT-BLK	SLT-BLK	4-3	15	SLT-BLK	BLK
	LG	LG	5LG	BLK-SLT	---	---	---	40	BLK-SLT	---
AUX. SIGS.		5	1	BLU-YEL	BLU-YEL	---	---	16	BLU-YEL	---
		6	2 (d)	YEL-BLU	YEL-BLU	---	---	41	YEL-BLU	---
		3	3	ORN-YEL	---	ORN-YEL(b)	---	17	ORN-YEL	---
		4	4	YEL-ORN	---	YEL-ORN(b)	---	42	YEL-ORN	---
HOLD LAMP		LH	HL	GRN-YEL	---	GRN-YEL(b)	---	18	GRN-YEL	---
		LG	HLG	YEL-GRN	---	YEL-GRN(b)	---	43	YEL-GRN	---
PB SIG		SG	SG	BRN-YEL	BRN-YEL	BRN-YEL	3-1	19	BRN-YEL	ORN
BZ LP		L2	L2(c)	YEL-BRN	YEL-BRN	YEL-BRN	3-2	44	YEL-BRN	BLK
R-R1		RR	RR	SLT-YEL	SLT-YEL	SLT-YEL	3-4	20	SLT-YEL	GRN
B-B1		RT	RT	YEL-SLT	YEL-SLT	YEL-SLT	3-5	45	YEL-SLT	BLK
EXCLUDED CIRCUIT	R	ER	ER	BLU-VIO(e)	BLU-VIO(e)	---	3-6	21	BLU-VIO	BRN
	T	ET	ET	VIO-BLU(e)	VIO-BLU(e)	---	3-7	46	VIO-BLU	BLK
	A1	EB	EB	ORN-VIO(e)	ORN-VIO(e)	---	3-9	22	ORN-VIO	SLT
	A	EH	EH	VIO-ORN(e)	VIO-ORN(e)	---	3-10	47	VIO-ORN	BLK
SPEAKER PHONE	R1	9	R	GRN-VIO(e)	GRN-VIO(e)	---	3-3	23	GRN-VIO	BLU
	T1	RR	RR(c)	VIO-GRN(e)	VIO-GRN(e)	---	3-8	48	VIO-GRN	YEL
	P3	7	ON	BRN-VIO(e)	BRN-VIO(e)	---	4-8	24	BRN-VIO	ORN
	P4	8	ON1	VIO-BRN(e)	VIO-BRN(e)	---	4-10	49	VIO-BRN	YEL
	LK	L1	L1(c)	SLT-VIO(e)	SLT-VIO(e)	---	4-5	25	SLT-VIO	GRN
	AG	N	N	VIO-SLT(e)	VIO-SLT(e)	---	4-7	50	VIO-SLT	YEL

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, 34, 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. BLU-WHT, WHT-BLU; ORN-WHT, WHT-ORN; etc. The first color is the body and the second color the ring stripe.

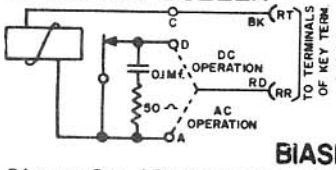
NOTES:

1. Spare conductors of mounting cord have ends taped and stored inside telephone. Circled numbers on connecting block are Amphenol pin numbers.
2. CONVERTIBLE KEYS. Pickup keys Ps5, Ps4, and Ps3 may be converted for signalling by unscrewing the slotted head pin from the plunger shank about 6 turns, then changing "Key Leads" as shown in the following table. The table also shows wiring for intercom using Ps5 as a common signalling key.

CONVERTIBLE KEY OPTIONS	KEY LEADS			
	YL-BR	BR	SL-BR	BK-GN
HPPPPP	M	M	M	X
HPPPPS	M	M	M	SG
HPPPSS	M	M	SG	X
HPPSSS	M	X	SG	X
HPP*P*S*	M	X	5H	SG
HPP*P*P*S*	X	X	5H	SG

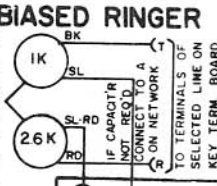
H=HOLD; P=PICKUP; S=SIGNAL
P*=INTERCOM; S*= INTERCOM COMMON SIGNAL

OPTIONAL BUZZER

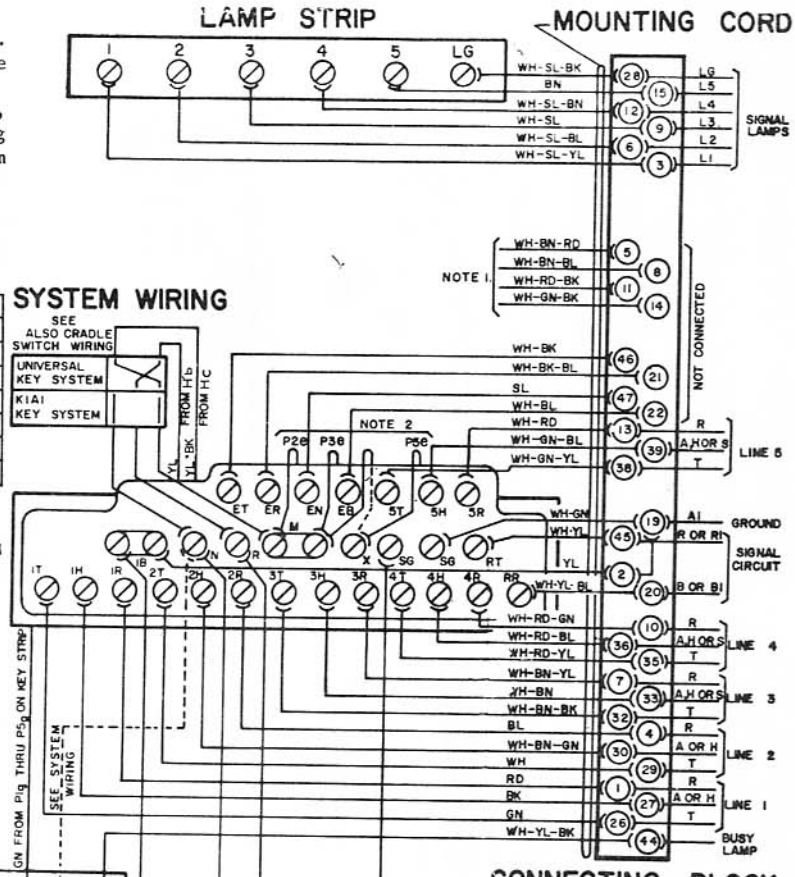


BIASED RINGER

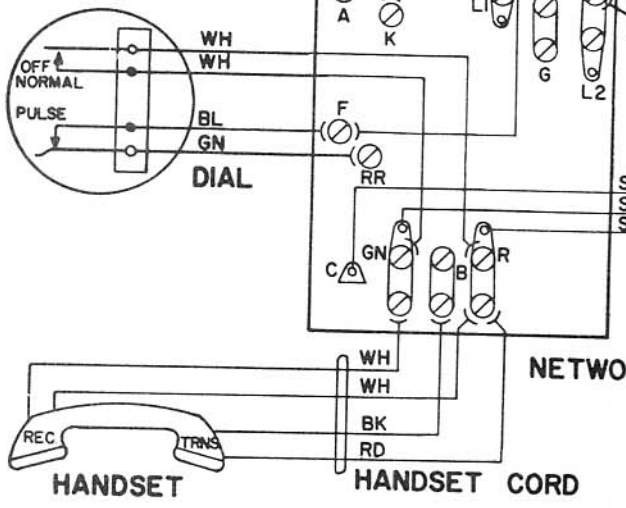
Ringer Cut-Off Control: Bend stop beside detent on volume control to clear rim of ringer frame. This provides extra control position to lock ringer armature.



KEY & TERM. BOARD



CONNECTING BLOCK OR PLUG - NOTE 1

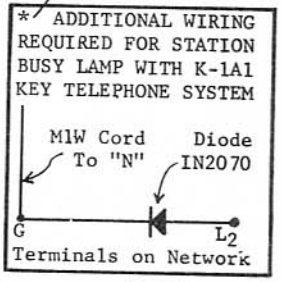


SYSTEM WIRING

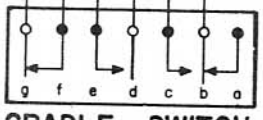
SEE ALSO KEY AND TERMINAL BOARD WIRING

WITH STATION BUSY LAMP	UNIVERSAL KEY SYSTEM
LESS STATION BUSY LAMP	
WITH STATION BUSY LAMP *	KIAI KEY SYSTEM
LESS STATION BUSY LAMP	

* ADDITIONAL WIRING REQUIRED FOR STATION BUSY LAMP WITH K-1A1 KEY TELEPHONE SYSTEM

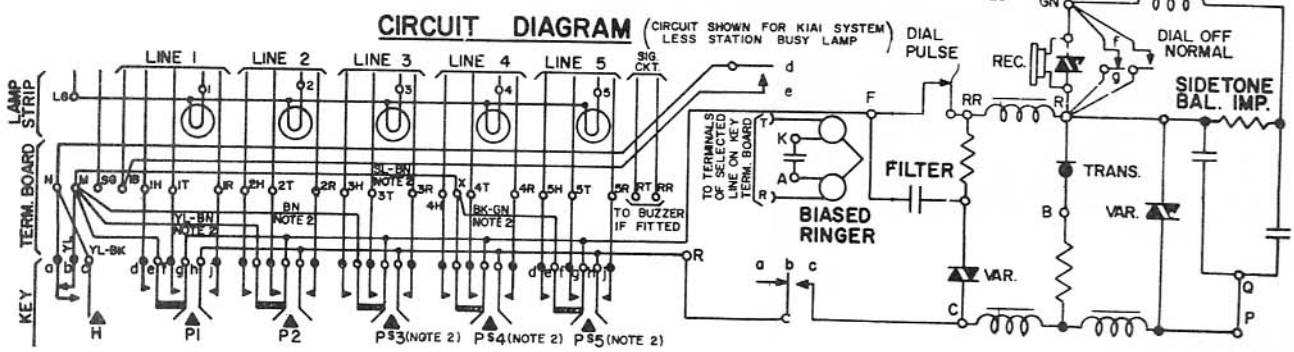


CRADLE SWITCH



CONTACT fg OPERATES LAST WHEN HANDSET IS LIFTED

CIRCUIT DIAGRAM (CIRCUIT SHOWN FOR KIAI SYSTEM LESS STATION BUSY LAMP)



DIAGRAM, 564--(-)30- and 564--(-)40 Telephones with 3-Color-Conductor Mounting Cord, 589 Key
(See Page 348.07 for Connecting 2-Color-Conductor Mounting Cord)

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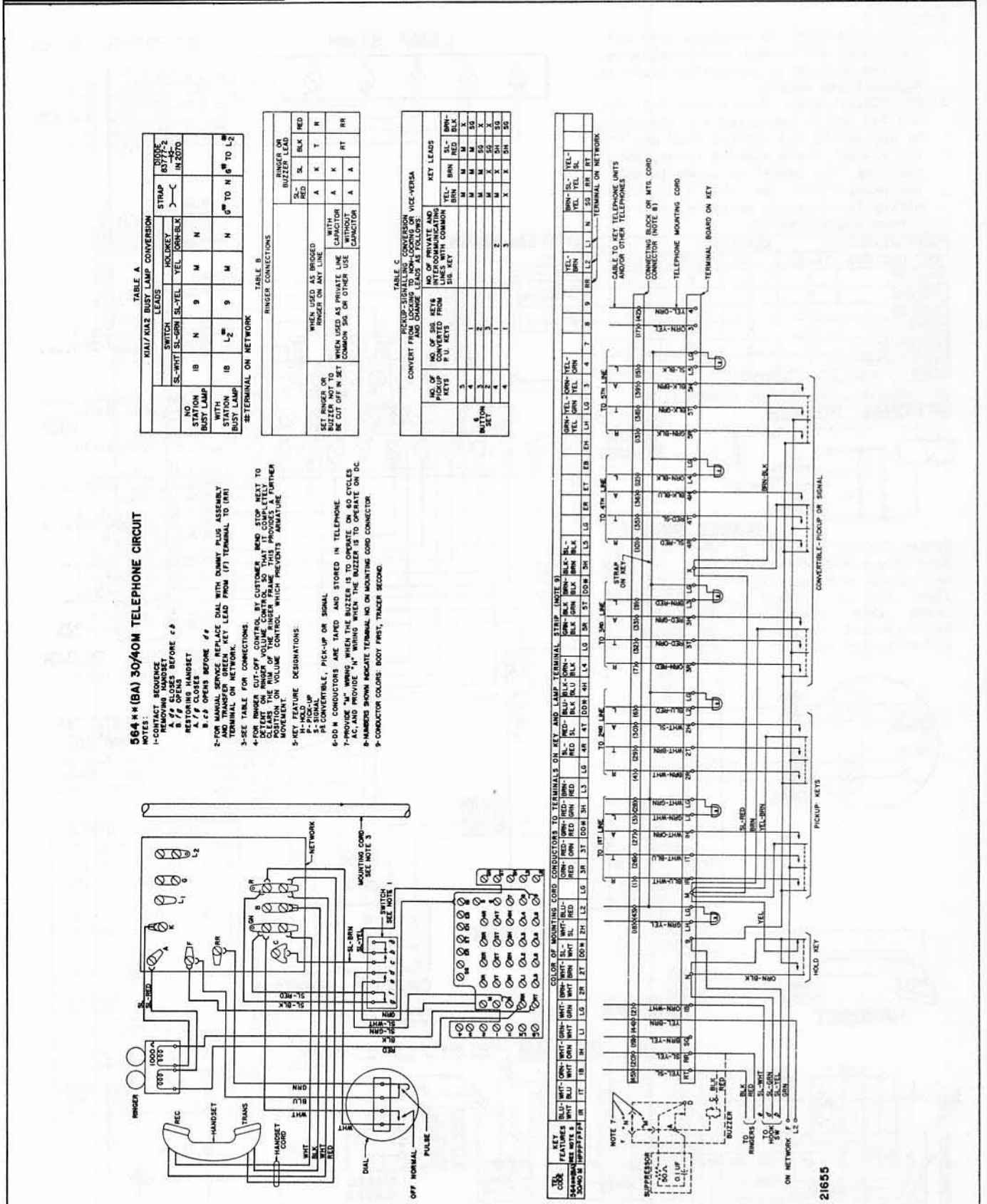
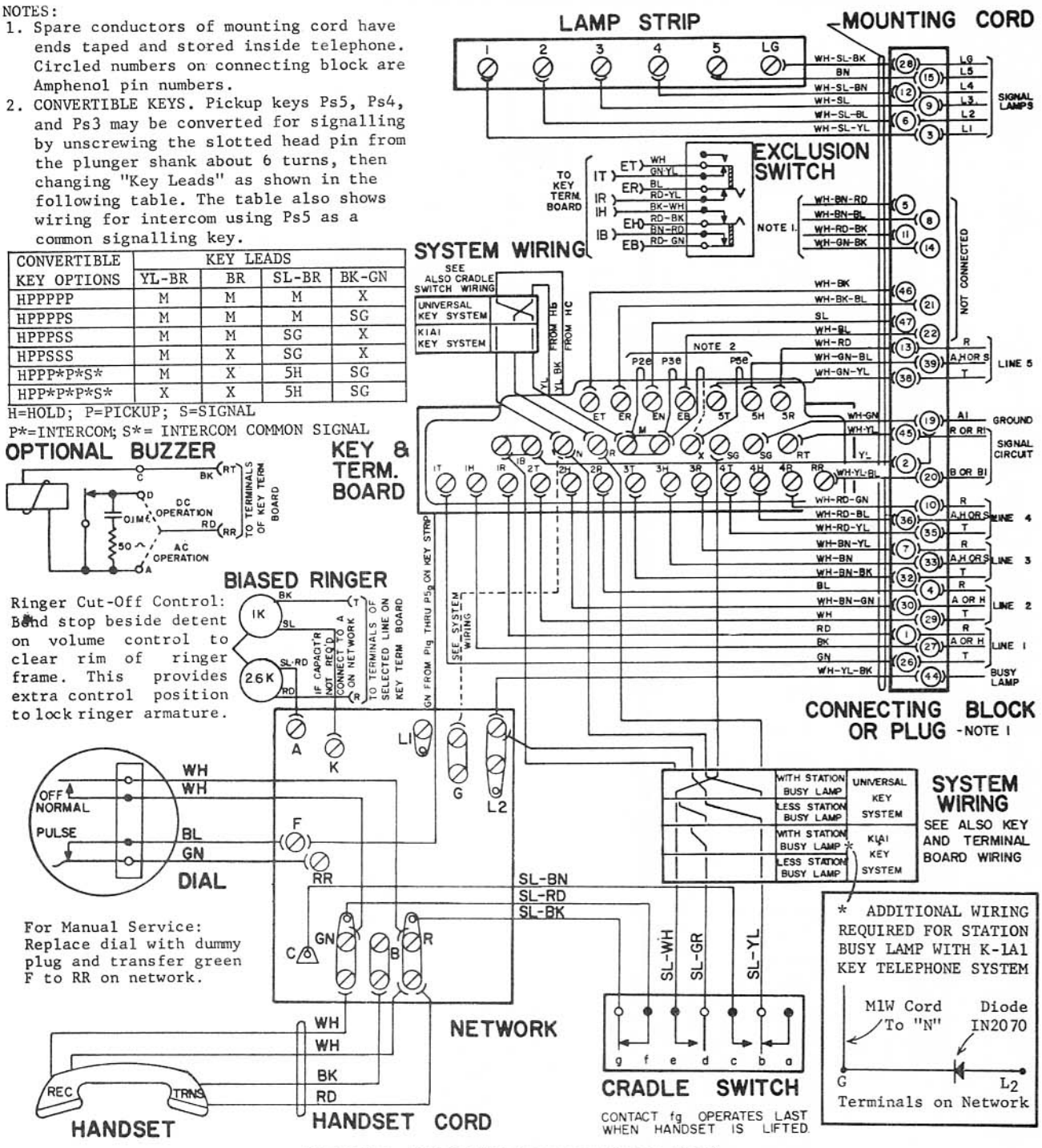


DIAGRAM, 564--(-)30- and 564--(-)40- Telephones with 2-Color Conductor Cord, 636 Key

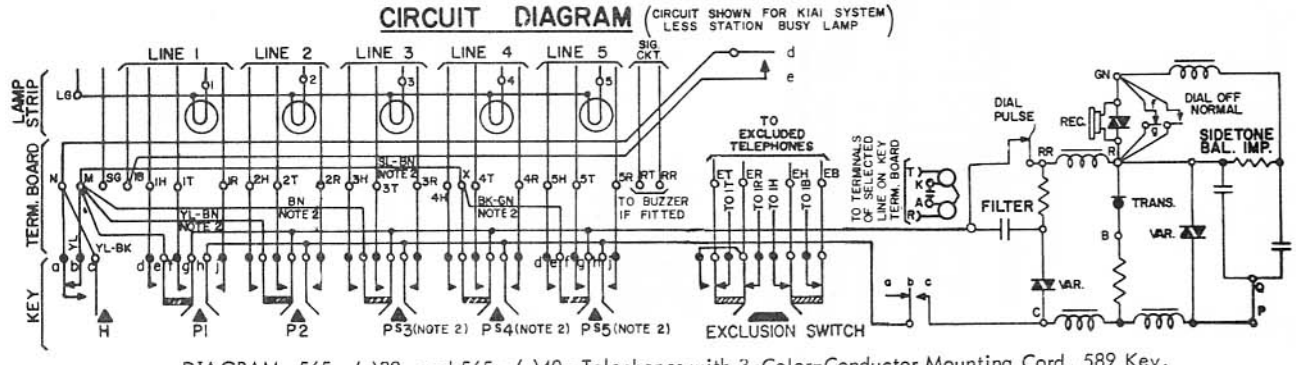
NOTES:
1. Spare conductors of mounting cord have ends taped and stored inside telephone. Circled numbers on connecting block are Amphenol pin numbers.
2. CONVERTIBLE KEYS. Pickup keys Ps5, Ps4, and Ps3 may be converted for signalling by unscrewing the slotted head pin from the plunger shank about 6 turns, then changing "Key Leads" as shown in the following table. The table also shows wiring for intercom using Ps5 as a common signalling key.

CONVERTIBLE KEY OPTIONS	KEY LEADS			
	YL-BR	BR	SL-BR	BK-GN
HPPPPP	M	M	M	X
HPPPPS	M	M	M	SG
HPPPSS	M	M	SG	X
HPPSSS	M	X	SG	X
HPPP*P*S*	M	X	5H	SG
HPP*P*P*S*	X	X	5H	SG

H=HOLD; P=PICKUP; S=SIGNAL
P*=INTERCOM; S*= INTERCOM COMMON SIGNAL



CIRCUIT DIAGRAM (CIRCUIT SHOWN FOR KIAI SYSTEM LESS STATION BUSY LAMP)



DIAGRAM, 565--(-)30- and 565--(-)40- Telephones with 3-Color-Conductor Mounting Cord, 589 Key.
(See Page 348.07 for Connecting 2-Color-Conductor Mounting Cord)

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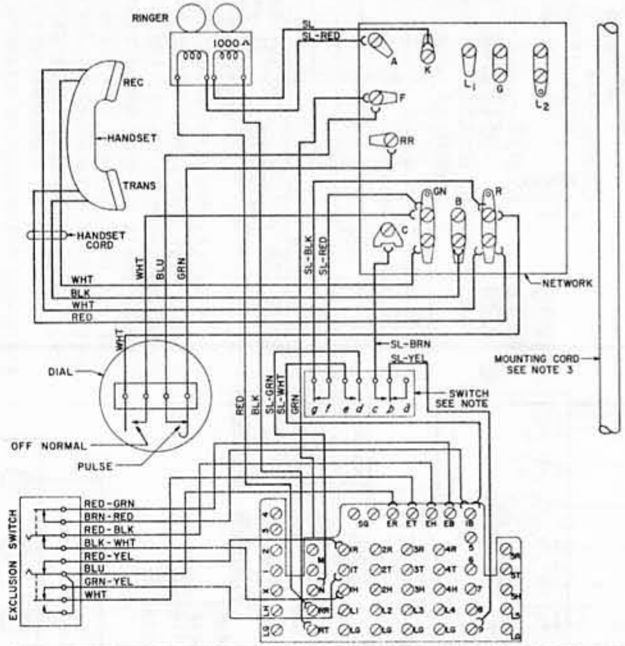


565**(BA) 30/40M TELEPHONE CIRCUIT

NOTES:

1-CONTACT SEQUENCE
 REMOVING HANDSET
 A. *de* CLOSES BEFORE *cb*
 B. *fg* OPENS
 RESTORING HANDSET
 A. *fg* CLOSES
 B. *cb* OPENS BEFORE *de*

2-FOR MANUAL SERVICE REPLACE DIAL WITH DUMMY PLUG ASSEMBLY AND TRANSFER GREEN KEY LEAD FROM (F) TERMINAL TO (RR) TERMINAL ON NETWORK.

3-SEE TABLE FOR CONNECTIONS.

4-FOR RINGER CUT-OFF CONTROL BY CUSTOMER BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

5-KEY FEATURE DESIGNATIONS:
 H-HOLD
 P-PICK-UP
 S-SIGNAL
 P^S CONVERTIBLE, PICK-UP OR SIGNAL

6-DD* CONDUCTORS ARE TAPED AND STORED IN TELEPHONE.

7-PROVIDE "M" WIRING WHEN THE BUZZER IS TO OPERATE ON 60 CYCLES AC, AND PROVIDE "N" WIRING WHEN THE BUZZER IS TO OPERATE ON DC.

8-NUMBERS SHOWN INDICATE TERMINAL NO ON MOUNTING CORD CONNECTOR

9-CONDUCTOR COLORS: BODY FIRST, TRACER SECOND.

TABLE A

KIA1/KIA2 BUSY LAMP CONVERSION							
	LEADS					STRAP	DIODE 83777-2 IN 2070
	SWITCH			HOLDKEY			
	SL-WHT	SL-GRN	SL-YEL	YEL	ORN-BLK		
NO STATION BUSY LAMP	1B	N	9	M	N		
WITH STATION BUSY LAMP	1B	L_2*	9	M	N	G* TO N	G* TO L_2*

* TERMINAL ON NETWORK

TABLE B

RINGER CONNECTIONS						
			RINGER OR BUZZER LEAD			
			SL-RED	SL	BLK	RED
SET RINGER OR BUZZER NOT TO BE CUT OFF IN SET	WHEN USED AS BRIDGED RINGER ON ANY LINE		A	K	T	R
	WHEN USED AS PRIVATE LINE COMMON SIG. OR OTHER USE	WITH CAPACITOR	A	K	RT	RR
		WITHOUT CAPACITOR	A	A		

TABLE C

PICKUP-SIGNALLING CONVERSION CONVERT FROM LOCKING TO NON-LOCKING OR VICE-VERSA AND CHANGE LEADS AS FOLLOWS:							
	NO. OF PICKUP KEYS	NO. OF SIG. KEYS CONVERTED FROM P.U. KEYS	NO. OF PRIVATE AND INTERCOMMUNICATING LINES WITH COMMON SIG. KEY	KEY LEADS			
				YEL-BRN	BRN	SL-RED	BRN-BLK
6 BUTTON SET	5			M	M	M	X
	4	1		M	M	M	SG
	3	2		M	M	SG	X
	2	3		M	X	SG	X
	4	1	2	M	X	SH	SG
	4	1	3	X	X	SH	SG

COLOR OF MOUNTING CORD CONDUCTORS TO TERMINALS ON KEY AND LAMP TERMINAL STRIP (NOTE 9)

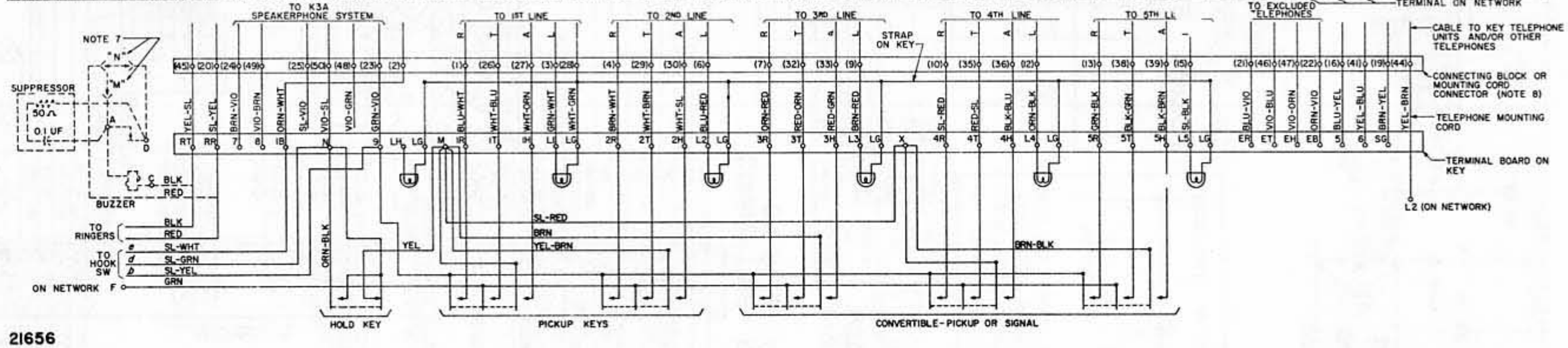
TEL CODE	KEY FEATURES SEE NOTE 5	BLU-WHT	WHT-BLU	ORN-WHT	WHT-ORN	GRN-WHT	WHT-GRN	BRN-WHT	WHT-BRN	SL-WHT	WHT-SL
565**(BA) 30/40 M	HPPP^{S}P^{S}P^S	1R	1T	1B	1H	L1	LG	2R	2T	DD*	2H

TEL CODE	BLU-RED		ORN-RED	RED-ORN	GRN-RED	RED-GRN	BRN-RED		SL-RED	RED-SL
565**(BA) 30/40 M	L2	LG	3R	3T	DD*	3H	L3	LG	4R	4T

TEL CODE	BLU-BLK	BLK-BLU	ORN-BLK		GRN-BLK	BLK GRN	BRN-BLK	BLK-BRN	SL-BLK	
565**(BA) 30/40 M	DD*	4H	L4	LG	5R	5T	DD*	5H	L5	LG

TEL CODE	BLU-VIO	VIO-BLU	ORN-VIO	VIO-ORN					BRN-VIO	VIO-BRN
565**(BA) 30/40 M	ER	ET	EB	EH	LH	LG	3	4	7	8

TEL CODE	GRN-VIO	VIO-GRN	YEL-BRN	SL-VIO	VIO-SL	BRN-YEL	SL-YEL	YEL-SL	BLU-YEL	YEL-BLU
565**(BA) 30/40 M	9	RR	L2	L1	N	SG	RR	RT	5	6



21656

DIAGRAM, 565--(-)30- and 565--(-)40- Telephones with 2-Color Conductor Cord, 636 Key

COMPOSITE WIRING DIAGRAM

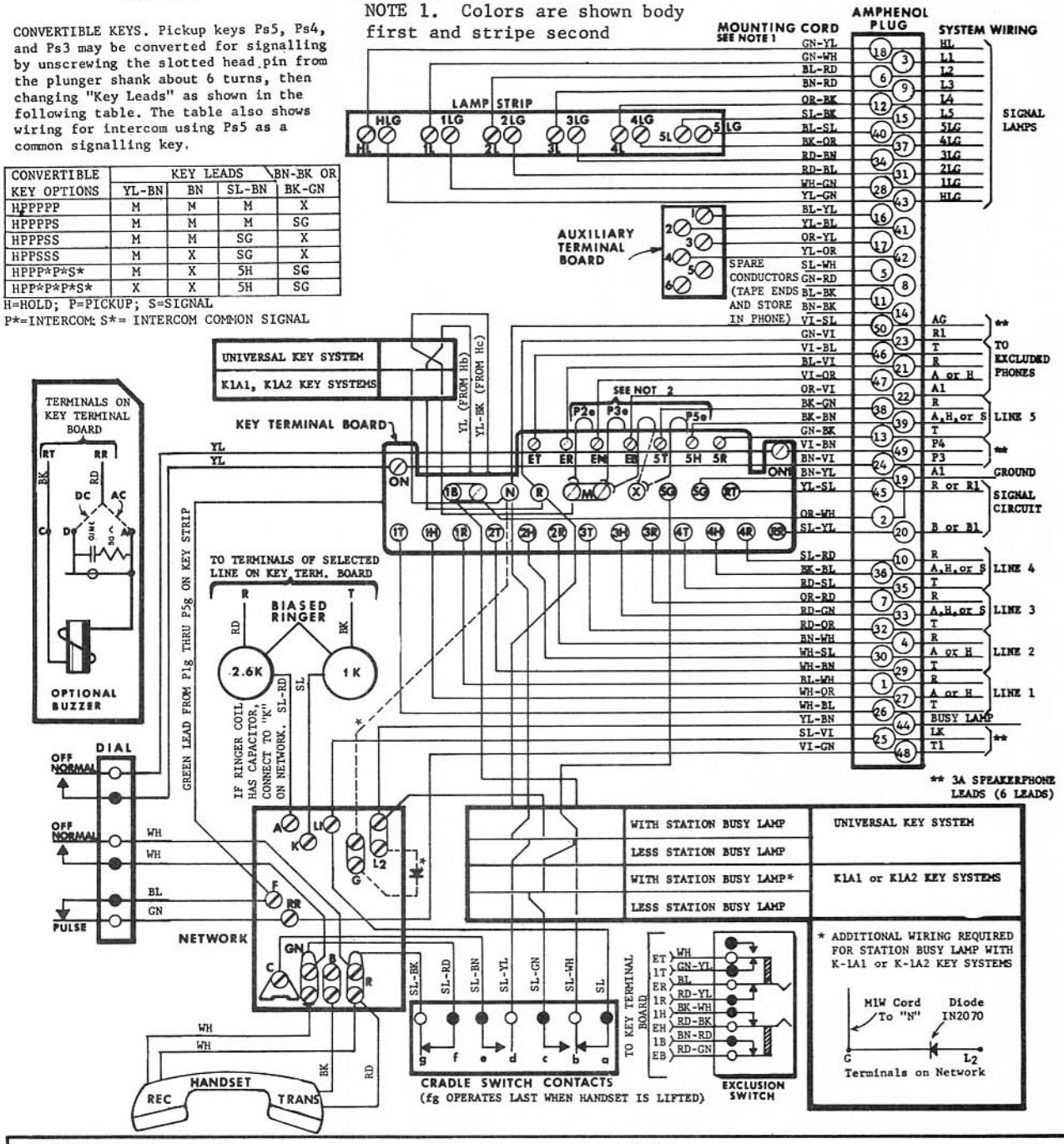
NOTE 1. Colors are shown body first and stripe second

NOTE 2.

CONVERTIBLE KEYS. Pickup keys Ps5, Ps4, and Ps3 may be converted for signalling by unscrewing the slotted head pin from the plunger shank about 6 turns, then changing "Key Leads" as shown in the following table. The table also shows wiring for intercom using Ps5 as a common signalling key.

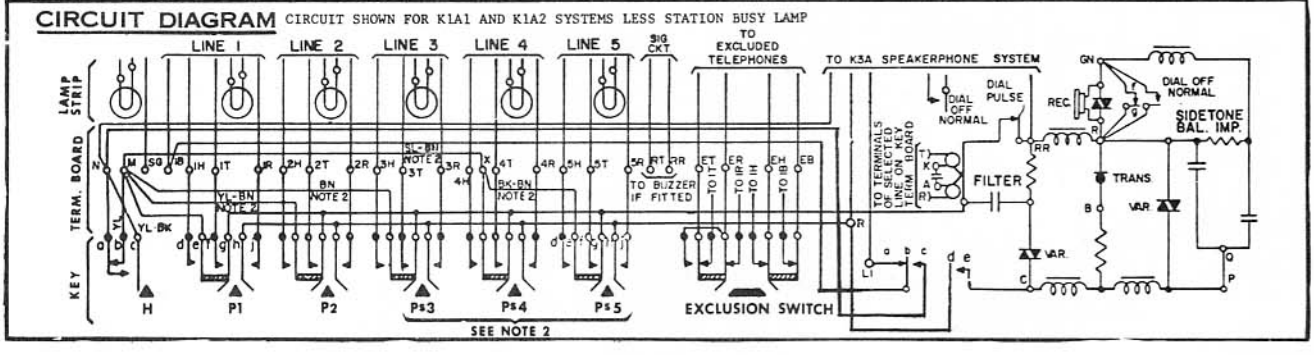
CONVERTIBLE KEY OPTIONS	KEY LEADS YL-BN	BN	SL-BN	BN-BK OR BK-GN
HPPPPP	M	M	M	X
HPPPPS	M	M	M	SG
HPPPSS	M	M	SG	X
HPPSSS	M	X	SG	X
HPPP*P*S*	M	X	5H	SG
HPP*P*P*S*	X	X	5H	SG

H=HOLD; P=PICKUP; S=SIGNAL
P*=INTERCOM; S*= INTERCOM COMMON SIGNAL



CIRCUIT DIAGRAM

CIRCUIT SHOWN FOR K1A1 AND K1A2 SYSTEMS LESS STATION BUSY LAMP



DIAGRAM, 565--(-)39- and 565--(-)42- Telephones with 589 Key

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565 **(BA) 39/42M TELEPHONE CIRCUIT

NOTES:
1-CONTACT SEQUENCE
REMOVING HANDSET
A. *cb* CLOSES BEFORE *de*
B. *da* OPENS BEFORE *fg*
RESTORING HANDSET
A. *fg* CLOSES BEFORE *ab*
B. *de* OPENS BEFORE *cb*

2-FOR MANUAL SERVICE REPLACE DIAL WITH DUMMY PLUG ASSEMBLY AND TRANSFER GREEN KEY LEAD FROM (F) TERMINAL TO (RR) TERMINAL ON NETWORK.

3-SEE TABLE FOR CONNECTIONS.

4-FOR RINGER CUT-OFF, CONTROL BY CUSTOMER, BEND STOP NEXT TO RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

5-KEY FEATURE DESIGNATIONS:
H-HOLD
P-PICK-UP
S-SIGNAL
PS CONVERTIBLE, PICK-UP OR SIGNAL

6-DD # CONDUCTORS ARE TAPED AND STORED IN TELEPHONE.

7-PROVIDE "M" WIRING WHEN THE BUZZER IS TO OPERATE ON 60 CYCLES AC, AND PROVIDE "N" WIRING WHEN THE BUZZER IS TO OPERATE ON DC

8-NUMBERS SHOWN INDICATE TERMINAL NO ON MOUNTING CORD CONNECTOR

9-CONDUCTOR COLORS BODY FIRST, TRACER SECOND

10-EXCLUSION AND SPEAKERPHONE LEADS NOT ASSOCIATED WITH THESE FEATURES MUST BE DISCONNECTED, INDIVIDUALLY TAPED AND STORED IN THE TELEPHONE. THESE LEADS ARE CONNECTED IN MULTIPLE THROUGH CONNECTING BLOCKS OR BRIDGING ADAPTERS.

TABLE A
KIAI/KIA2 BUSY LAMP CONVERSION

	LEADS						DIODE 857-2 OR IN2070
	SWITCH			HOLDKEY		STRAP	
	SL-WHT	SL-GRN	SL-YEL	YEL	ORN-BLK		
NO STATION BUSY LAMP	IB	N	9	M	N		
WITH STATION BUSY LAMP	IB	L_2 #	9	M	N	G# TO N	# TO L_2

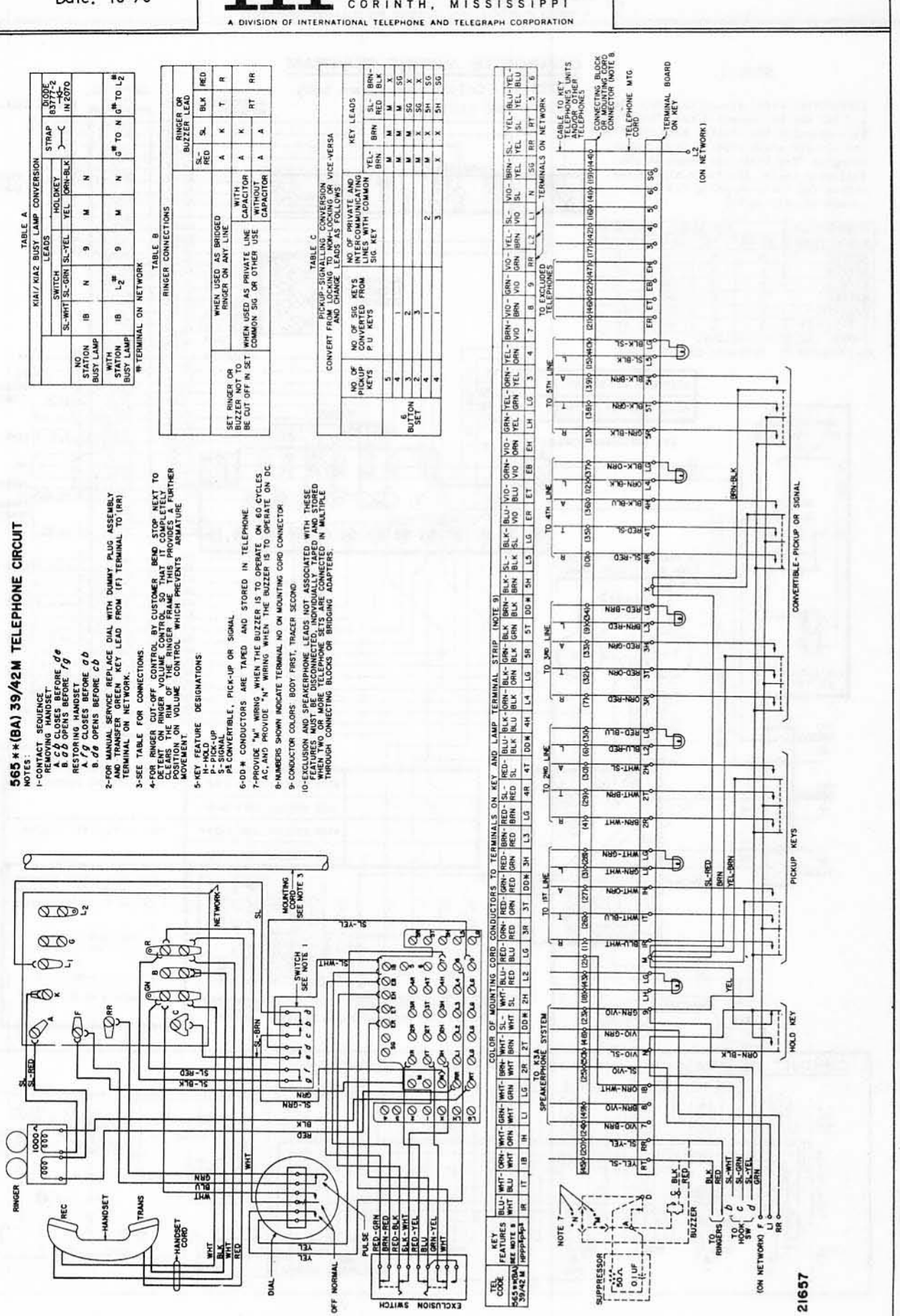
TERMINAL ON NETWORK

TABLE B
RINGER CONNECTIONS

		RINGER OR BUZZER LEAD		
		SL-RED	SL	BLK	RED
SET RINGER OR BUZZER NOT TO BE CUT OFF IN SET	WHEN USED AS BRIDGED RINGER ON ANY LINE	A	K	T	R
	WHEN USED AS PRIVATE LINE COMMON SIG OR OTHER USE — WITH CAPACITOR	A	K	RT	RR
	WHEN USED AS PRIVATE LINE COMMON SIG OR OTHER USE — WITHOUT CAPACITOR	A	A		

TABLE C
PICKUP-SIGNALLING CONVERSION
CONVERT FROM LOCKING TO NON-LOCKING OR VICE-VERSA AND CHANGE LEADS AS FOLLOWS

	NO. OF PICK-UP KEYS	NO. OF SIG KEYS CONVERTED FROM P/U KEYS	NO. OF PRIVATE AND INTERCOMMUNICATING LINES WITH COMMON SIG KEY	KEY LEADS		
				YEL-BRN	BRN	SL-RED	BRN-BLK
6 BUTTON SET	5	1		M	M	M	X
	4	1		M	M	M	SG
	3	2		M	M	SG	X
	2	3		M	X	SG	X
	4	1	2	M	X	SH	SG
	4	1	3	X	X	SH	SG



21657

DIAGRAM, 565--(-)39- and 565--(-)42- Telephones with 636 Key

Figure 1A. K-1564 "TEL-TOUCH" Key Telephone (Superseded by K-2564)

Figure 1B. K-2564 "TEL-TOUCH" Key Telephone

K-1564 and K-2564 "TEL-TOUCH" KEY TELEPHONES

1. GENERAL INFORMATION

The types K-1564 and K-2564 Key Telephones are identified by a code number stamped in ink on the bottom of the Base Plate. Refer to Table I, "ORDERING INFORMATION" for explanation of each code number. The K-2564 supersedes the K-1564.

The K-1564 incorporates a type 27, 10-pushbutton Dial. The K-2564 incorporates a type 32, 12-pushbutton Dial. The two telephones are otherwise identical except for the Face Plate and the Dial leads. To replace the 10-pushbutton dial order the 12-pushbutton dial, type 32, and the 180148-** Face Plate.

2. PURPOSE OF KEY TELEPHONES

The K-1564 and K-2564 telephones are designed to be used with a Key Telephone System, such as the K1A2. Such a system provides several telephones access to several lines which may include central office, private exchange, or intercom lines. The five clear buttons are used to select a line, and the red button is used to place a "HOLD" on any line.

3. DESCRIPTION AND OPERATION

The Key Telephones are anti-sidetone and operate efficiently over a wide range of loop resistance and line impedance.

The six keys are allocated for use, from left to right, as follows: The first key, (red button), is a HOLD key which is used to hold a call received on any line while another call is made on another line. The second and third keys are individual LINE (or pick-up) keys and, the remaining three keys may each be wired as either LINE or interphone SIGNAL keys. A maximum of five lines may be accessed from one telephone, with a common HOLD key, and up to three of these lines may be connected as private intercom lines, one key being used for the common interphone signaling circuit.

4. INSTALLATION

Telephones equipped with quick-connect plugs are installed by plugging into appropriately prewired connectors of the key system. Refer to circuit label packed with each phone for connecting leads of Mounting Cord not equipped with plug. The circuit label also gives instructions for making modifications to the telephone.

The Connecting Block Assembly, (item 32, figure 2), is not included with the telephone and must be ordered separately when required.

When used in a K-1A1 or a K-1A2 Key System, additional wiring, including the diode (83777-2) is required for a station busy lamp. The diode must also be ordered separately.

TABLE 1. ORDERING INFORMATION

CODE	DESCRIPTION
K-2564**( )30_	TELEPHONE, Key, "TEL-TOUCH" 12-Button Dial, Mounting Cord Terminated with Spade Terminals.
K-2564**( )40_	TELEPHONE, Key, "TEL-TOUCH", 12-Button Dial, Mounting Cord Terminated with Plug
	Add Dial Code as follows: R-Regular, Numerals only M-Metro, Letters and Numerals
	Insert Ringer Option as follows: (LR) - Less Ringer (BA) - Straight Line Biased Ringer
	** Substitute Color Code as follows: 00 - Black 05 - Green 09 - Ivory 13 - Light Beige 14 - Light Gray 15 - White

CIRCUIT LABELS

K-1564 - 21653
K-2564 - 180151

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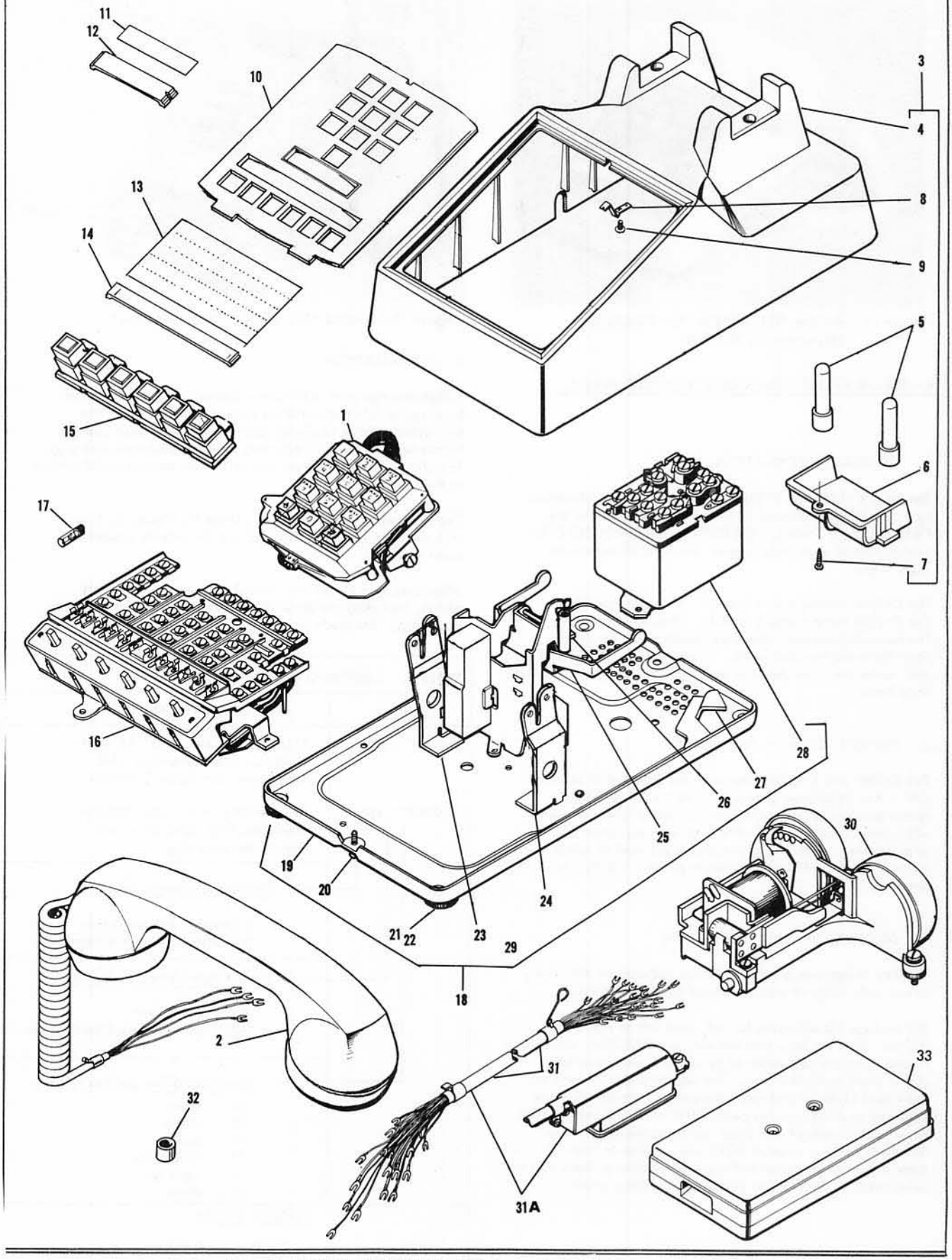


Figure 2. K-1564 and K-2564 Key Telephones, Exploded view.

TABLE II. REPLACEABLE PARTS LIST, "TEL-TOUCH" KEY TELEPHONES

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: 1564 /30	1564 /40	2564 /30	2564 /40		
	1	27(D)450	DIAL ASSEMBLY, 10-Pushbutton, Regular	X	X	-	-		
	1	27(G)450	DIAL ASSEMBLY, 10-Pushbutton, Metropolitan	X	X	-	-		
			NOTE: To replace the Type 27 Dial, order Type 32 Dial and 180148-** Face Plate						
	1	32(D)450	DIAL ASSEMBLY, 12-Pushbutton, Regular	-	-	X	X		
	1	32(G)450	DIAL ASSEMBLY, 12-Pushbutton, Metropolitan (See Section 228)	-	-	X	X		
	2	65**(C2)410	HANDSET ASSEMBLY, (Complete) (See Section 212)	1	1	1	1		
	3	87509-**	HOUSING AND PLUNGER ASSEMBLY	1	1	1	1		
	4	87510-**	HOUSING	1	1	1	1		
	5	79101-2	PLUNGER, Cradle Switch	2	2	2	2		
	6	79097-**	RETAINER, Plunger	1	1	1	1		
	7	75407-2	SCREW, Plunger Retainer	1	1	1	1		
	8	86143-1	CLIP, Face Plate Retaining	1	1	1	1		
	9	95884-2	SCREW, Face Plate Clip	1	1	1	1		
	10	87507-**	FACE PLATE, for 10-Pushbutton Dial	1	1	-	-		
	10A	180148-**	FACE PLATE, for 12-Pushbutton Dial	-	-	1	1		
	11	87513-1	CARD, Number	1	1	1	1		
	12	87514-1	RETAINER, Number Card	1	1	1	1		
	13	82028-1	CARD Designation	1	1	1	1		
	14	88522-1	RETAINER, Designation Card	1	1	1	1		
	15	87472-1	KEY STRIP ASSEMBLY, (Square Buttons)	1	1	1	1		
		87470-2	BUTTON, Red	1	1	1	1		
		87470-1	BUTTON, Clear	5	5	5	5		
		87469-1	STRIP, Pushbutton, (Plastic)	1	1	1	1		
		87471-1	RETAINER, Pushbutton, (Metal)	1	1	1	1		
		95966-1	SCREW, Shoulder	2	2	2	2		
	16	636(A)740	KEY ASSEMBLY, (See Section 258)	1	1	1	1		
		75392-2	SCREW, (Key Attaching)	3	3	3	3		
	17	51(A)745	LAMP	6	6	6	6		
	18	79525-7	BASE ASSEMBLY (Includes items 18 through 29.)	1	1	1	1		
	19	NSS	PLATE, Base, (79411), Not Serviced Separately	-	-	-	-		
	20	75486-1	SCREW, Cabinet Lock	4	4	4	4		
	21	82400-1	FOOT	4	4	4	4		
	22	82486-2	RIVET, (Foot Attaching)	1	1	1	1		
	23	87511-2	BRACKET, Dial, L. H.	1	1	1	1		
	24	87511-1	BRACKET, Dial, R. H.	1	1	1	1		
	25	79489-1	CRADLE SWITCH ASSEMBLY	1	1	1	1		
	26	75333-1	BRACKET, Ringer Mounting	1	1	1	1		
	27	79404-1	CLIP, Cord; (And Ringer Mounting Bracket)	1	1	1	1		
	28	75335-1	NETWORK	1	1	1	1		
			(Attaching Parts)						
		69116-3	SCREW	2	2	2	2		
		67093-1	NUT	2	2	2	2		
	29	31944-2	RIVET	9	9	9	9		
	30	130(BA)470	RINGER	1	1	1	1		
	31	867**(09)650	MOUNTING CORD, 34-Conductor w/spade terminals	1	-	1	-		
	31A	863**(09)650	MOUNTING CORD, 34-Conductor w/connector	-	1	-	1		
	32	79409-1	BUSHING, Pushbutton Lockout, (Packed Loose)	1	1	1	1		
	33	30( )783	CONNECTING BLOCK ASSEMBLY, (Order Separately)	1	-	1	-		
		**	Substitute Color Code as Follows: 00-Black; 05-Green; 13-Beige; 14-Gray; 15-White.						
			CIRCUIT LABELS: K-1564 - 21653; K-2564 - 180151						

Additional wiring required for station busy lamp with K-1A1 or K-1A2 system.

I W from G to N on key terminal board ◄---- IN 2070 Diode from L2 to G

TABLE A
KIA1/KIA2 BUSY LAMP CONVERSION

	LEADS					
	SWITCH			HOLDKEY		STRAP
	SL-WHT	SL-GRN	SL-YEL	YEL	ORN-BLK	DIODE 83777-2 IN 2070
NO STATION BUSY LAMP	IB	N	9	M	N	
WITH STATION BUSY LAMP	IB	$L_2^{\#}$	9	M	N	$G^{\#}$ TO N $G^{\#}$ TO $L_2^{\#}$

#TERMINAL ON NETWORK

TABLE B
RINGER CONNECTIONS

		RINGER OR BUZZER LEAD			
		SL-RED	SL	BLK	RED
WHEN USED AS BRIDGED RINGER ON ANY LINE		A	K	T	R
SET RINGER OR BUZZER NOT TO BE CUT OFF IN SET	WHEN USED AS PRIVATE LINE COMMON SIG. OR OTHER USE WITH CAPACITOR	A	K	RT	RR
	WITHOUT CAPACITOR	A	A		

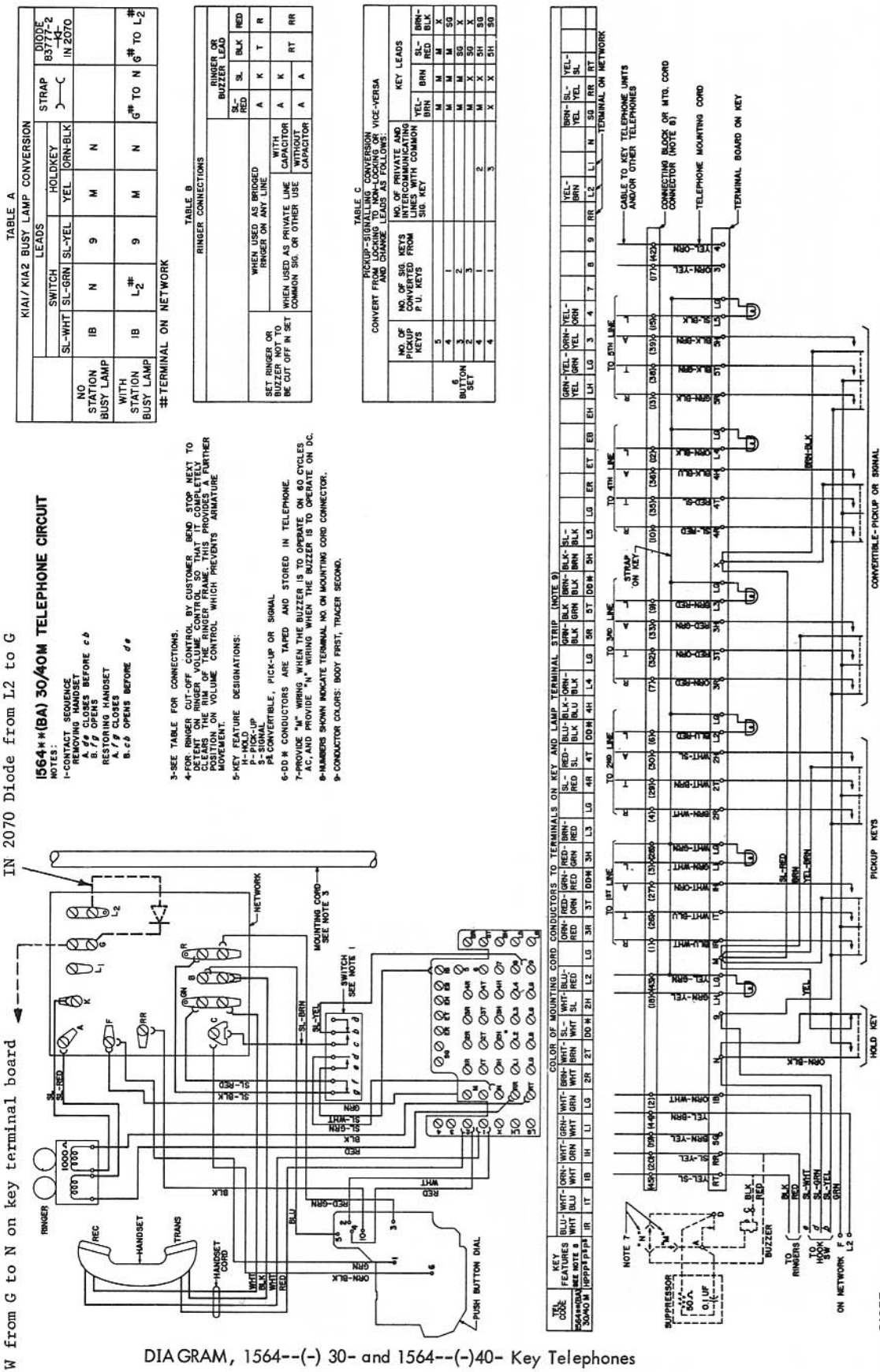
TABLE C
PICKUP-SIGNALLING CONVERSION
CONVERT FROM LOCKING TO NON-LOCKING OR VICE-VERSA AND CHANGE LEADS AS FOLLOWS:

	NO. OF PICKUP KEYS	NO. OF SIG. KEYS CONVERTED FROM P.U. KEYS	NO. OF PRIVATE AND INTERCOMMUNICATING LINES WITH COMMON SIG. KEY	KEY LEADS			
				YEL-BRN	BRN	SL-RED	BRN-BLK
6 BUTTON SET	5	1		M	M	M	X
	4	2		M	M	SG	X
	3	3		M	M	SG	X
	2	1	2	M	X	5H	SG
	1	1	3	X	X	5H	SG

1564**(BA) 30/40M TELEPHONE CIRCUIT

NOTES:
1-CONTACT SEQUENCE
REMOVING HANDSET
A. cd CLOSES BEFORE cb
B. ef OPENS
RESTORING HANDSET
A. ef CLOSES
B. cb OPENS BEFORE cd

3-SEE TABLE FOR CONNECTIONS.
4-FOR RINGER CUT-OFF CONTROL BY CUSTOMER BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RINGER FRAME THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.
5-KEY FEATURE DESIGNATIONS:
H-HOLD
P-PICK-UP
PS CONVERTIBLE, PICK-UP OR SIGNAL
6-DD# CONDUCTORS ARE TAPED AND STORED IN TELEPHONE.
7-PROVIDE "M" WIRING WHEN THE BUZZER IS TO OPERATE ON 60 CYCLES AC, AND PROVIDE "N" WIRING WHEN THE BUZZER IS TO OPERATE ON DC.
8-NUMBERS SHOWN INDICATE TERMINAL NO. ON MOUNTING CORD CONNECTOR.
9-CONDUCTOR COLORS: BODY FIRST, TRACER SECOND.



DIAGRAM, 1564--(-) 30- and 1564--(-)40- Key Telephones

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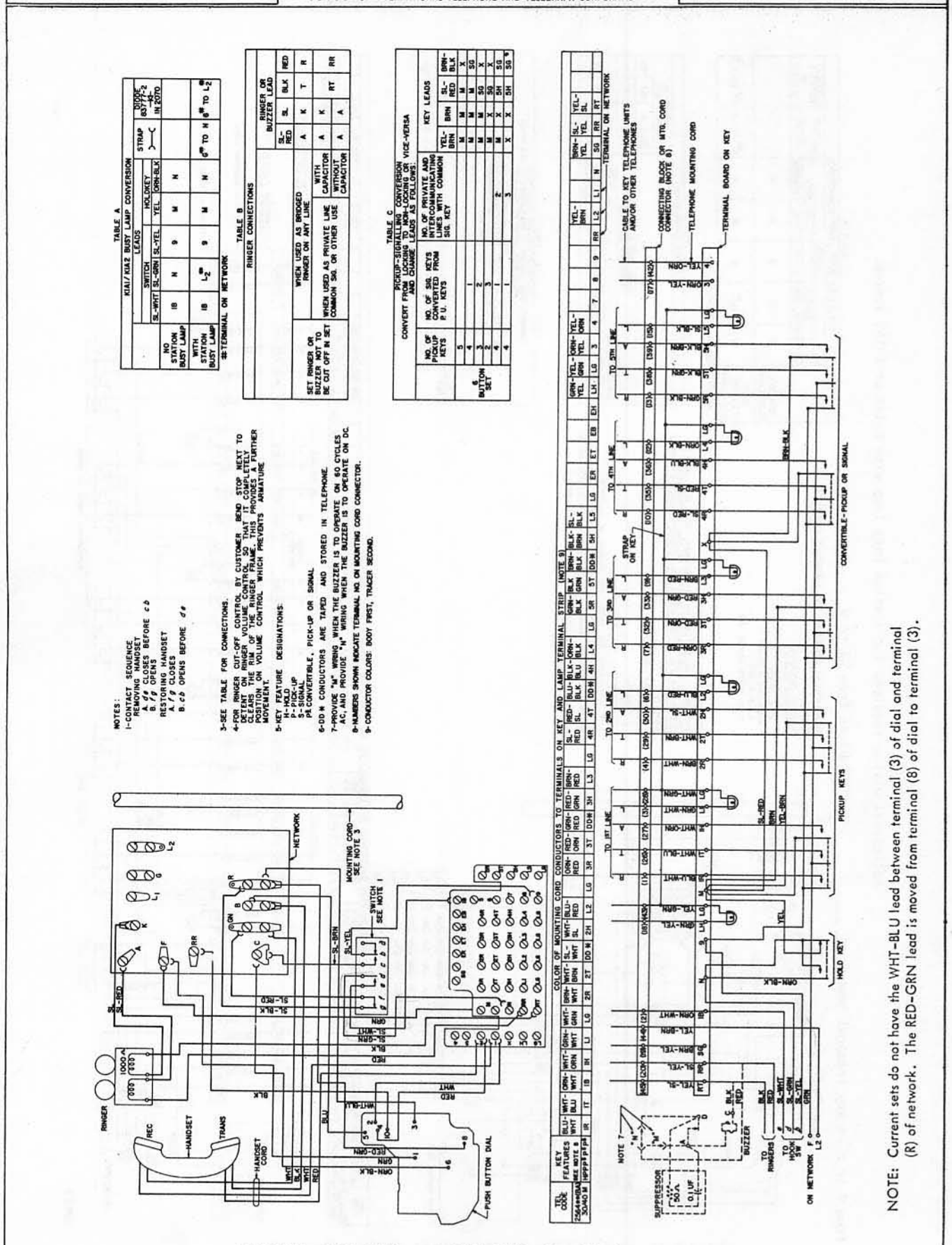

DIAGRAM, 2564--(-)30- and 2564--(-)40- Key Telephones

NOTE: Current sets do not have the WHT-BLU lead between terminal (3) of dial and terminal (R) of network. The RED-GRN lead is moved from terminal (8) of dial to terminal (3).

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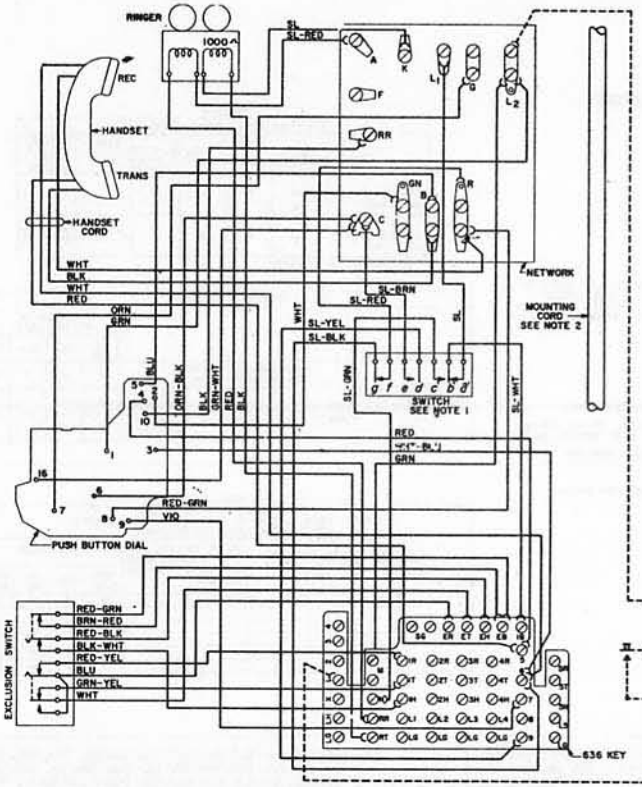


2565 **(BA) 39/42 OR 46 TELEPHONE CIRCUIT

NOTES:

1- WHEN HANDSET IS REMOVED: CONTACTS (b'-c') MAKES BEFORE (a'-b') BREAKS, AND (d-e) MAKES (f-g) BREAK AFTER ALL OTHER OPERATIONS.

2- SEE TABLE FOR CONNECTIONS.

3- FOR RINGER CUT-OFF CONTROL BY CUSTOMER BEND STOP NEXT TO DETENT ON RINGER VOLUME CONTROL SO THAT IT COMPLETELY CLEARS THE RIM OF THE RINGER FRAME. THIS PROVIDES A FURTHER POSITION ON VOLUME CONTROL WHICH PREVENTS ARMATURE MOVEMENT.

4- KEY FEATURE DESIGNATIONS:
H- HOLD
P- PICK-UP
S- SIGNAL
P - CONVERTIBLE, PICK-UP OR SIGNAL

5- DD N CONDUCTORS ARE TAPED AND STORED IN TELEPHONE.

6- PROVIDE "M" WIRING WHEN THE BUZZER IS TO OPERATE ON 60 CYCLES AC, AND PROVIDE "N" WIRING WHEN THE BUZZER IS TO OPERATE ON DC.

7- NUMBERS SHOWN INDICATE TERMINAL NO. ON MOUNTING CORD CONNECTOR.

8- CONDUCTOR COLORS: BODY FIRST, TRACER SECOND.

9- EXCLUSION AND SPEAKERPHONE LEADS NOT ASSOCIATED WITH THESE FEATURES MUST BE DISCONNECTED, INDIVIDUALLY TAPED AND STORED WHEN TWO OR MORE TELEPHONE SETS ARE CONNECTED IN MULTIPLE THROUGH CONNECTING BLOCKS OR BRIDGING ADAPTERS.

10- TAPE AND STORE HOOKSWITCH LEADS SL-BRN, SL-YEL, & SL, WHICH CORRESPONDS TO CONTACTS a, b, c, WHICH ARE NOT USED ON THIS SUBSET.

11- BROKEN LINE INDICATES GROUNDING CIRCUIT FOR TELEPHONES WITH 46 FEATURE. (GROUNDING BUTTON PLUS HANDSFREE)

TABLE A

KIA1/KIA2 BUSY LAMP CONVERSION						
	LEADS					DIODE 83777-2 IN 2070
	SWITCH			HOLDKEY		
	SL-WHT	SL-GRN	SL-YEL	YEL	ORN-BLK	
NO STATION BUSY LAMP	1B	N	9	M	N	
WITH STATION BUSY LAMP	1B	1	9	M	N	N TC 1

TABLE B

RINGER CONNECTIONS						
			RINGER OR BUZZER LEAD			
			SL-RED	SL	BLK	RED
SET RINGER OR BUZZER NOT TO BE CUT OFF IN SET	WHEN USED AS BRIDGED RINGER ON ANY LINE		A	K	T	R
	WHEN USED AS PRIVATE LINE COMMON SIG. OR OTHER USE	WITH CAPACITOR	A	K	RT	RR
		WITHOUT CAPACITOR	A	A		

TABLE C

PICKUP-SIGNALLING CONVERSION CONVERT FROM LOCKING TO NON-LOCKING OR VICE-VERSA AND CHANGE LEADS AS FOLLOWS:							
	NO. OF PICKUP KEYS	NO. OF SIG. KEYS CONVERTED FROM P.U. KEYS	NO. OF PRIVATE AND INTERCOMMUNICATING LINES WITH COMMON SIG. KEY	KEY LEADS			
				YEL-BRN	BRN	SL-RED	BRN-BLK
6 BUTTON SET	5			M	M	M	X
	4	1		M	M	M	SG
	3	2		M	M	SG	X
	2	3		M	X	SG	X
	4	1	2	M	X	SH	SG
	4	1	3	X	X	SH	SG

COLOR OF MOUNTING CORD CONDUCTORS TO TERMINALS ON KEY AND LAMP TERMINAL STRIP (NOTE 8)

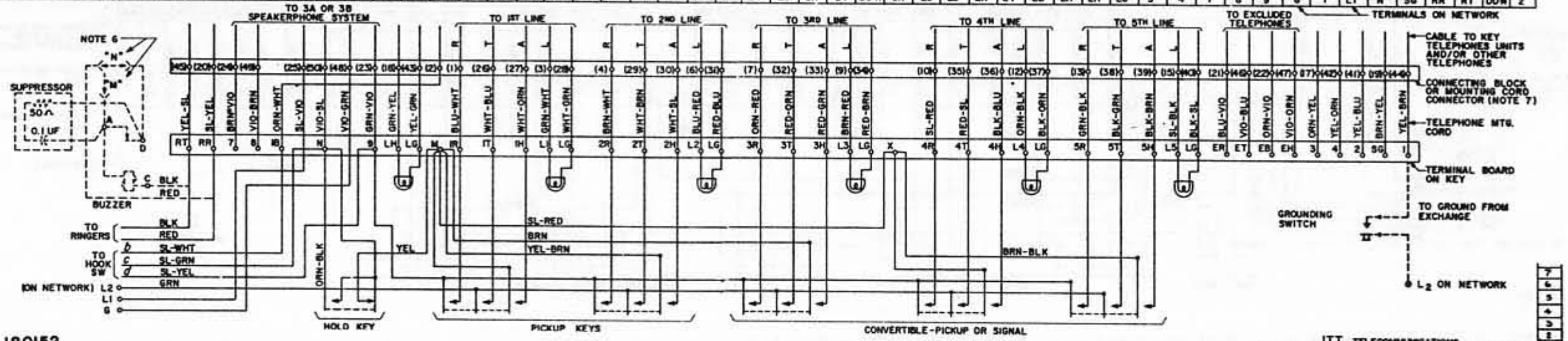
TEL CODE	KEY FEATURES SEE NOTE 4	BLU-WHT	WHT-BLU	ORN-WHT	WHT-ORN	GRN-WHT	WHT-GRN	BRN-WHT	WHT-BRN	SL-WHT	WHT-SL
2565 **(BA) 39/42 M	HPPP[illegible]	1R	1T	1B	1H	L1	LG	2R	2T	DD N	2H

TEL CODE	BLU-RED	RED-BLU	ORN-RED	RED-ORN	GRN-RED	RED-GRN	BRN-RED	RED-BRN	SL-RED	RED-SL
2565 **(BA) 39/42 M	L2	LG	3R	3T	DD N	3H	L3	LG	4R	4T

TEL CODE	BLU-BLK	BLK-BLU	ORN-BLK	BLK-ORN	GRN-BLK	BLK-GRN	BRN-BLK	BLK-BRN	SL-BLK	BLK-SL
2565 **(BA) 39/42 M	DD N	4H	L4	LG	5R	5T	DD N	5H	L5	LG

TEL CODE	BLU-VIO	VIO-BLU	ORN-VIO	VIO-ORN	GRN-YEL	YEL-GRN	ORN-YEL	YEL-ORN	BRN-VIO	VIO-BRN
2565 **(BA) 39/42 M	ER	ET	EB	EH	LH	LG	3	4	7	8

TEL CODE	GRN-VIO	VIO-GRN	YEL-BRN	SL-VIO	VIO-SL	BRN-YEL	SL-YEL	YEL-SL	BLU-YEL	YEL-BLU
2565 **(BA) 39/42 M	9	G	1	L1	N	SG	RR	RT	DD N	2



180152

NOTE: Current sets do not have the WHT-BLU lead between terminal (3) of dial and terminal (R) of network. The RED-GRN lead is moved from terminal (8) of dial to terminal (3).

10/20 MULTILINE KEY TELEPHONE SETS

Revisions: Page 351.04, index number 33, part numbers for Dial Brackets corrected.

K830, K831, K835, K836, K837, K840, K854
K2830, K2831, K2835, K2836, K2837, K2850, K2854

Figure 1. K-830, 10-button Rotary Dial Telephone

1. GENERAL INFORMATION

(a) PURPOSE

For use with multiline key telephone systems to provide pickup and HOLD of a number of CO/PBX lines and other key system features. The 10-button sets have one HOLD and nine convertible (pickup or signaling) buttons. The 20-button sets have one HOLD and nineteen convertible buttons.

(b) APPLICATION

The 10-button units employ a 50-conductor mounting cord and can be used where 6-button key sets would otherwise be used.
The 20-button units employ a 100 conductor mounting cord and can be used where 12-button key sets would otherwise be used.

(c) IDENTIFICATION

MODELS WITH EXCLUSION FEATURE

Sets which include special feature code 76 are equipped with an Automatic Exclusion (privacy) Circuit and an Exclusion Release Button. To insure privacy on outside calls, all sets in the key telephone system should be equipped with the Automatic Exclusion Circuit and Exclusion Release Button. When a line is picked up at one of these sets, all other sets in the key telephone system are automatically excluded. To add on another station to a call, the party at the station to be added on picks up the appropriate line in the usual manner, and the party at the first station presses and releases the Exclusion Release Button located at the lower left corner of his telephone faceplate. Both parties can then talk on the line, and all other stations are again excluded, (after the button is released). Other stations can be added to a call in the same manner, however parties at all exclusion stations already on the line must press and release the Exclusion Release Button after the station(s) to be added have picked up the line.

MODELS WITH HOOKSWITCH BUTTON RESTORATION

Current models of 10/20 type sets are equipped with a mechanical Hookswitch-Button-Restoration feature. Depressing the Handset Cradle releases any operated line button. This feature can be disabled by the installer if desired.

To permit operator recall, some sets are equipped with a special button. On sets equipped with Hookswitch-Button-Restoration and not equipped with the Operator Recall Button, the operator can be recalled by operating the hookswitch cradle two or three times while holding down the operated line button.

TABLE A. IDENTIFICATION OF SETS COVERED IN THIS PUBLICATION

CODE		DESCRIPTION	Instruction Sheet No.
Rotary Dial (R-D)	Pushbutton Dial (T-T)		(Circuit Label No.)
(1) 830**-0BA-42M	2830**-0BA-42M	PHONE, 10-button desk	182289-101 (181301)
(2) 830**-0BA-46M	2830**-0BA-46M	PHONE, 10-button desk, E/W Operator Recall Button	182289-101 (181301)
(3) 830**-0BA-76M	2830**-0BA-76M	PHONE, 10-button desk, E/W Automatic Exclusion	182421(RD), 182423(TT)
(4) 831**-0BA-42M	2831**-0BA-42M	PHONE, 20-button desk	182290-101 (181302)
(5) 831**-0BA-46M	2831**-0BA-46M	PHONE, 20-button desk, E/W Operator Recall Button	182290-101 (181302)
(6) 831**-0BA-76M	2831**-0BA-76M	PHONE, 20-button desk, E/W Automatic Exclusion	182422(RD), 182424(TT)
(7) 835**-0BA-42M	2835**-0BA-42M	PHONE, 10-button desk, BLF *	182323-101 (181756)
(8) 835**-0BA-46M	2835**-0BA-46M	PHONE, 10-button desk, BLF *, E/W Operator Recall Btn	182323-101 (181756)
(9) 836**-0BA-42M	2836**-0BA-42M	Obsolete Codes - Superseded by codes on line (2) above	Use 182289-101 (181301)
(10) 837**-0BA-42M	2837**-0BA-46M	Obsolete Codes - Superseded by codes on line (5) above	Use 182290-101 (181302)
(11) 840**-0BA-42M	2840**-0BA-42M	Obsolete Codes - Superseded by codes on line (8) above	Use 182323-101 (181756)
(12) 854**-0BA-42M	2854**-0BA-42M	PHONE, 10-button wall	182291-101 (181551)

* BLF - Busy Lamp Field, ** - Insert color code, see Table C. E/W - Equipped With
RD - Rotary Dial, T-T - Pushbutton Dial

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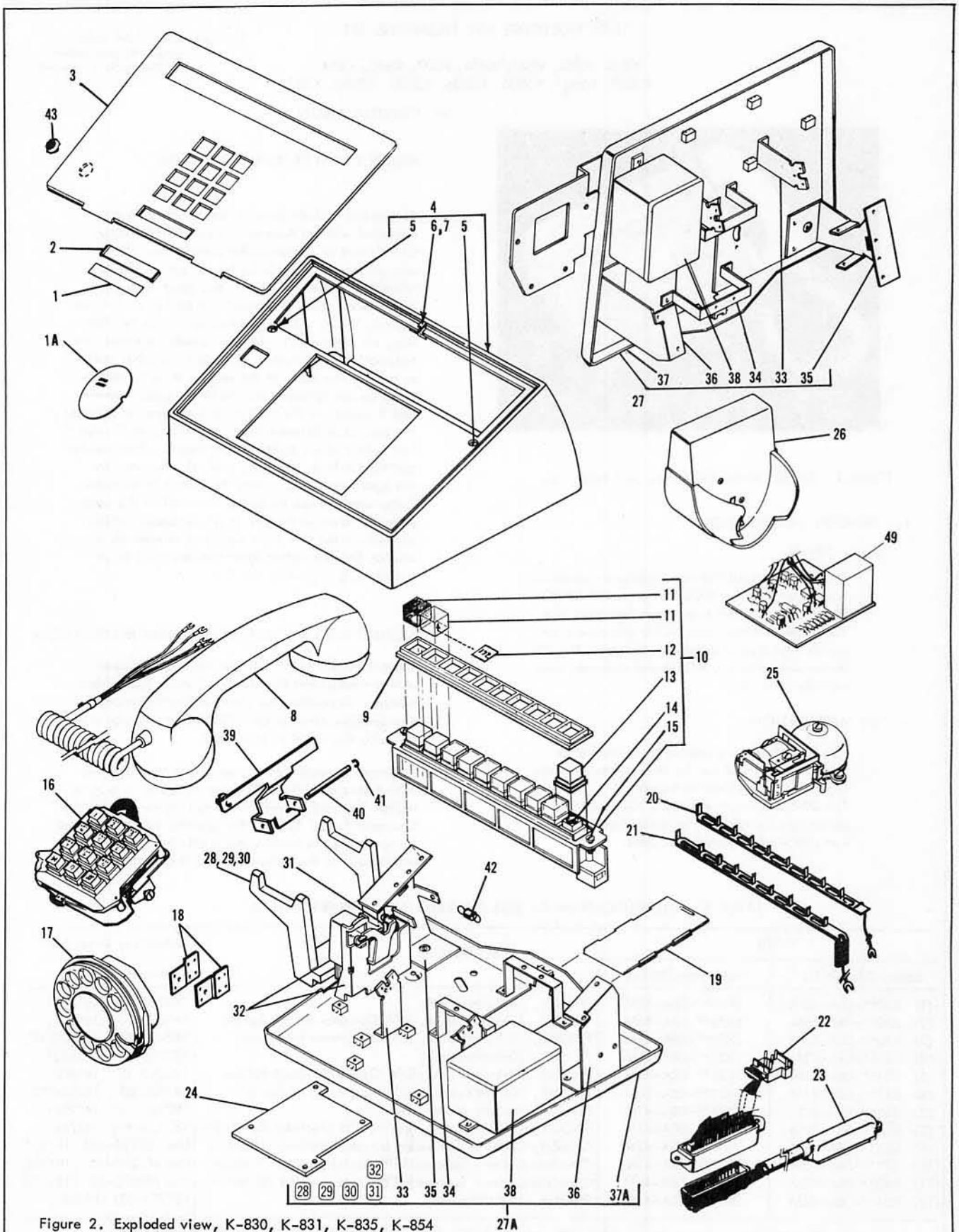

Figure 2. Exploded view, K-830, K-831, K-835, K-854 K-2830, K-2831, K-2835, and K-2854 sets.

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON								
			TABLE B. REPLACEABLE PARTS	830	831	835	854		2830	2831	2835	2854
2	1	87513-101	CARD, number, T-T	-	-	-	-		1	1	1	1
	1A	75415-101	CARD, number, R-D	1	1	1	1		-	-	-	-
	2	87514-101	RETAINER, number card	-	-	-	-		1	1	1	1
	3	181144-###	FACEPLATE, (830/42M)	1	-	-	-		-	-	-	-
		181689-###	FACEPLATE, (830/46M, 836/42M)	1	-	-	-		-	-	-	-
		181143-###	FACEPLATE, (831/42M, 835/42M)	-	1	1	-		-	-	-	-
		181688-###	FACEPLATE, (831/46M, 835/46M, 837/42M, 840/42M)	-	1	1	-		-	-	-	-
		181132-###	FACEPLATE, (854)	-	-	-	1		-	-	-	-
	3	181142-###	FACEPLATE, (2830/42M, 2854)	-	-	-	-		1	-	-	1
		181687-###	FACEPLATE, (2830/46M, 2836/42M)	-	-	-	-		1	-	-	-
		181103-###	FACEPLATE, (2831/42M, 2835/42M)	-	-	-	-		-	1	1	-
		181686-###	FACEPLATE, (2831/46M, 2835/46M, 2837/42M, 2840/42M)	-	-	-	-		-	1	1	-
	4	181102-***	HOUSING ASSEMBLY, 10/20 desk	1	1	1	-		1	1	1	-
		181246-***	HOUSING ASSEMBLY, 10/20 wall	-	-	-	1		-	-	-	1
	5	95992-102	SCREW, captive	2	2	2	2		2	2	2	2
	6	181100-101	SPRING, latch	1	1	1	1		1	1	1	1
	7	181289-101	SCREW, spring latch	1	1	1	1		1	1	1	1
	8	65***-0C2-410	HANDSET ASSEMBLY (See Section 212.)	1	1	1	1		1	1	1	1
	9	181287-101	COLLAR	1	2	1	1		1	2	1	1
	10	181137-101	KEY ASSEMBLY, 9-lines and HOLD	1	1	1	1		1	1	1	1
	10	181137-102	KEY ASSEMBLY, 10-lines	-	1	-	-		-	1	-	-
	11	181131-101	CAP, clear (Total per phone)	9	19	9	9		9	19	9	9
	11	181131-102	CAP, clear red (Total per phone)	1	1	1	1		1	1	1	1
	11	181550-101	CAP SET, 1 red, 10 clear caps	1	2	1	1		1	2	1	1
	12	181281-101	TAB, designation (strip of 12)	1	2	1	1		1	2	1	1
	13	181122-101	BUTTON, (Cloudy),(Qty per phone)	10	20	10	10		10	20	10	10
	14	51A-745	LAMP, (Total per phone)	9	19	9	9		9	19	9	9
	15	95992-102	SCREW, (Total per phone)	2	4	2	2		2	4	2	2
	16	3600-00G	DIAL ASSEMBLY, T-T	-	-	-	-		1	1	1	1
	17	3800-00H	DIAL ASSEMBLY, R-D	1	1	1	1		-	-	-	-
	18	181146-101	ADAPTER, rotary dial	2	2	2	2		-	-	-	-
		181145-101	SCREW, dial attaching	4	4	4	4		2	2	2	2
	19	181290-101	SLIDE	1	1	1	1		1	1	1	1
	20	181292-101	CONTACT STRIP ASSEMBLY, Upper	1	2	1	1		1	2	1	1
	21	181292-102	CONTACT STRIP ASSEMBLY, Lower	1	2	1	1		1	2	1	1
	22	181154-101	CORD, internal	1	1	1	1		1	1	1	1
	22	181155-101	CORD, internal (20-button sets only)	-	1	-	-		-	1	-	-
	23	9002**-102	CORD, mounting, 25-pair	1	-	1	1		1	-	1	1
	23	9003**-102	CORD, mounting, 50-pair	-	1	-	-		-	1	-	-
	24	181298-101	TERMINAL BOARD ASSEMBLY	1	-	1	1		1	-	1	1
	24	181298-102	TERMINAL BOARD ASSEMBLY	-	1	-	-		-	1	-	-
		181145-101	SCREW, terminal board mounting	4	4	4	4		4	4	4	4
	25	148-EBA	RINGER	1	1	1	1		1	1	1	1
		95966-102	SCREW, ringer attaching	2	2	2	2		2	2	2	2
	26	181247-***	HOOKSWITCH ASSEMBLY, wall	-	-	-	1		-	-	-	1

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

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FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON								
			TABLE B. REPLACEABLE PARTS (Cont'd.)	830	831	835	854		2830	2831	2835	2854
2	27	181249-101	BASE ASSEMBLY, T-T wall	-	-	-	-		-	-	-	1
	27	181249-102	BASE ASSEMBLY, R-D wall	-	-	-	1		-	-	-	-
	27A	181250-101	BASE ASSEMBLY	1	-	-	-		1	-	-	-
	27A	181250-102	BASE ASSEMBLY	-	1	1	-		-	1	1	-
	28	181295-101	HOOK, cradle	1	1	1	-		1	1	1	-
	29	181282-101	SHAFT, hookswitch	1	1	1	-		1	1	1	-
	30	73538-108	RING, retaining (Same as item 41)	1	1	1	-		1	1	1	-
	31	181280-101	SPRING, cradle hook return	1	1	1	-		1	1	1	-
	32	181260-101	HOOKSWITCH ASSEMBLY	1	1	1	-		1	1	1	-
	33	181254-101	BRACKET, dial	2	2	2	2		2	2	2	-
	33	181258-101	BRACKET, dial	-	-	-	-		-	-	-	2
	34	181255-101	BRACKET, plug	2	2	2	2		2	2	2	2
	35	181150-101	BRACKET, key	1	1	1	1		1	1	1	1
	36	181251-101	BRACKET, key	1	-	-	1		1	-	-	1
	36	181253-101	BRACKET, key	-	1	1	-		-	1	1	-
	37A	181141-101	BASE	1	1	1	-		1	1	1	-
	37	181141-102	BASE	-	-	-	1		-	-	-	1
		82400-101	FOOT	4	4	4	-		4	4	4	-
		82486-102	RIVET, foot	4	4	4	-		4	4	4	-
	38	75335-101	NETWORK	1	1	1	-		1	1	1	-
		31944-108	RIVET	15	17	17	13		15	17	17	13
	39	181286-101	LATCH ARM	1	1	1	1		1	1	1	1
	40	181152-101	PIN, Latch arm	1	1	1	1		1	1	1	1
	41	73538-108	RING, retaining (Same as item 30)	1	1	1	1		1	1	1	1
	42	181151-102	SPRING, Latch arm	1	1	1	1		1	1	1	1
	43	181973-101	PUSHBUTTON ASSEMBLY	1	1	1	-		1	1	1	-
3	44	181767-101	PLATE, tinted, BLF (Mounts in faceplate)	-	-	1	-		-	-	1	-
	45	182159-101	TEMPLATE, BLF (Numbered 20-47)	-	-	X	-		-	-	X	-
	45	182160-101	TEMPLATE, BLF (Numbered 0-9, 20-34)	-	-	X	-		-	-	X	-
	45	182161-101	TEMPLATE, BLF (Numbered 1-24)	-	-	X	-		-	-	X	-
	45	182757-101	TEMPLATE, BLF (Blank)	-	-	X			-	-	X	-
	46	181754-101	SEPARATOR, BLF	-	-	1	-		-	-	1	-
	47	181750-101	BUSY LAMP FIELD ASSEMBLY	-	-	1	-		-	-	1	-
	48	181748-101	LAMP	-	-	24	-		-	-	24	-
2	49	182386-101	EXCLUSION CIRCUIT ASSEMBLY (Code 76)	1	1	-	-		1	1	-	-
		181145-101	SCREW	2	2	-	-		2	2	-	-

Figure 3. Busy Lamp Field components.

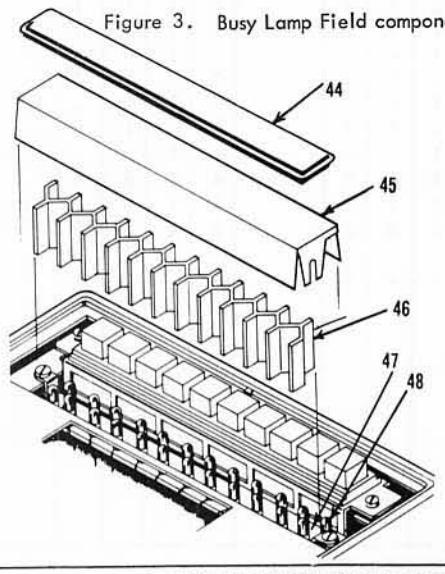


TABLE C. COLORS

** Sets/Mounting Cord		*** Housings		### Faceplate	
00	Black	000	Black	101	Charcoal
05	Moss Green	005	Moss Green	102	Light Green
13	Beige	013	Beige	103	Muted Beige
15	White	015	White	104	Light Gray
44	Light Ash	044	Light Ash	107	Cocoa Brown
45	Cocoa Brown	045	Cocoa Brown	106	Light Ash
				105	Burnt Orange
				108	Harvest Gold
				109	Cherry Red
				110	Clear
				111	Woodgrain

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

2. INSTALLATION

(a) MOUNTING

The mounting cord is terminated in one or two plugs, depending upon whether the set has 10 buttons or 20 buttons. The set is installed by plugging the cord into system connecting cable or connecting block.

(b) DESIGNATION TABS. (Included with each set)

Remove the cap from each button by squeezing top and bottom sides of the cap and lifting. Insert designation tab in cap and install cap. Note that locking surfaces are located on left and right sides of the caps and buttons.

3. CONNECTIONS

IMPORTANT

IF ONE OF THESE SETS IS USED TO REPLACE A PREVIOUSLY INSTALLED KEY SET, SUCH AS A K565, K2565, S-C 1700, W.E. "CALL DIRECTOR" ETC., SEVERAL CONDUCTORS OF THE CONNECTING CABLE WILL HAVE TO BE RE-TERMINATED AT THE KEY SERVICE UNIT. (See Table J.)

(a) STANDARD. (See Table J)

(b) OPTIONAL FEATURES

(1) BUZZERS: If buzzer is to be used instead of ringer, use ringer leads for connection. Two spare leads (O-Y and Y-O) are available for connecting a second buzzer, if the Station Busy Lamp feature is not used.

(2) SPEAKERPHONE: (See Table D.)

(3) STATION BUSY LAMP: (See Table E.)

(4) POLARITY GUARD: (See Table F.)

(5) MANUAL SIGNALING: (See Table G for 10-button sets and Table H for 20-button sets.)

(6) ILLUMINATED HOLD BUTTON: Connect the two spare conductors Y-O and O-Y to terminals 20 and 21 and to external circuit as required. (Refer to circuit diagrams and to Table J.)

(7) PUSHBUTTON GROUND: Make following modifications to line 9 position:

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

NOTE

Early 10/20 sets have interlock pins with right-hand threads. Later units have interlock pins with left-hand threads.

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

c. Move white-slate lead from terminal 15 on terminal board to terminal "C" on network.

d. Tie slate-white lead (pin no. 5) to ground from exchange.

TABLE D

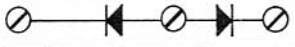
External Speakerphone Connections (Except Code 76)

Speakerphone Leads	Lead Color	Remove From Term.	Connect To Term.
T1 (T1)	V-G	5	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.

TABLE E

Station Busy Lamp Connections

LEAD	OPERATION
Line Switch, (BR)	Remove from terminal 22 and connect to 16 (except code 76)
Two 180658-101 Diodes (Ordered Separately)	Connect as shown Spare Terminal 16 * 22 
Mtg. Cord, (Y-O)	Connect to spare terminal shown above.

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

TABLE F

Polarity Guard Connections (Except Code 76)
(Order Polarity Guard No. 180697-102 Separately)

Wire or Lead	Color	Remove From	Connect To	
		Net.	Guard Assy	Net.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard Assembly	G			RR
	W			C

Note: For use when specified by local conditions or for end-to-end signaling installations.

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TABLE G. Pickup-Signal Key Conversion, 10-Button Sets

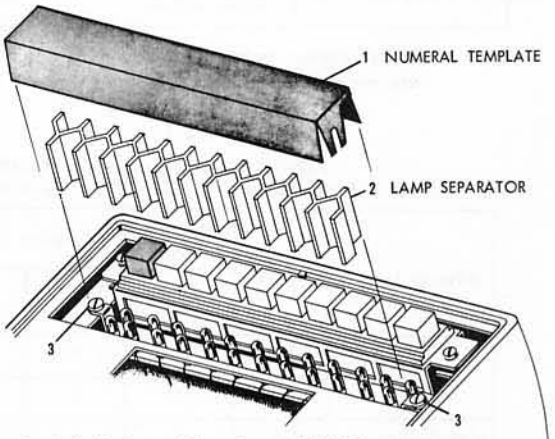
Conversion Option	181137-101 Key Leads								
	O-W	S-W	G-R	BL-BK	BR-BK	BK-BR	BK-BL	R-G	W-S
HPPPPPPPPP	7	7	7	11	11	11	15	15	15
HPPPPPPPPS	7	7	7	11	11	11	15	15	26
HPPPPPPPSS	7	7	7	11	11	11	15	26	26
HPPPPPPSSS	7	7	7	11	11	11	26	26	26
HPPPPPSSSS	7	7	7	11	11	26	26	26	26
HPPPPSSSSS	7	7	7	11	26	26	26	26	26

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

TABLE H. Pickup-Signal Key Conversion, 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.



View A. Exploded view of Busy Lamp Field Components.

View B. Position of Lamp Separator in relation to Lamps.

Figure 4. Assembly of Busy Lamp Field Components

Three components of the Busy Lamp Field telephones are packed separately - the Lamp Separator (aluminum), the Numeral Template, and the Tinted Plate - and must be assembled as follows:

(1) Remove the telephone Faceplate.
(2) Position the aluminum Lamp Separator as shown in view B.
(3) Loosen the two screws (3) slightly.
(4) Select the appropriate Numeral Template, three provided, and fold along dotted lines.
(5) Install the Numeral Template over the lamps and the Lamp Separator inserting
the the slotted ends under the two screws (3) and tighten screws.
(6) Install the telephone Faceplate. (Not illustrated.)
(7) Insert the Tinted Plate in the display slot of the Faceplate. (Not illustrated.)

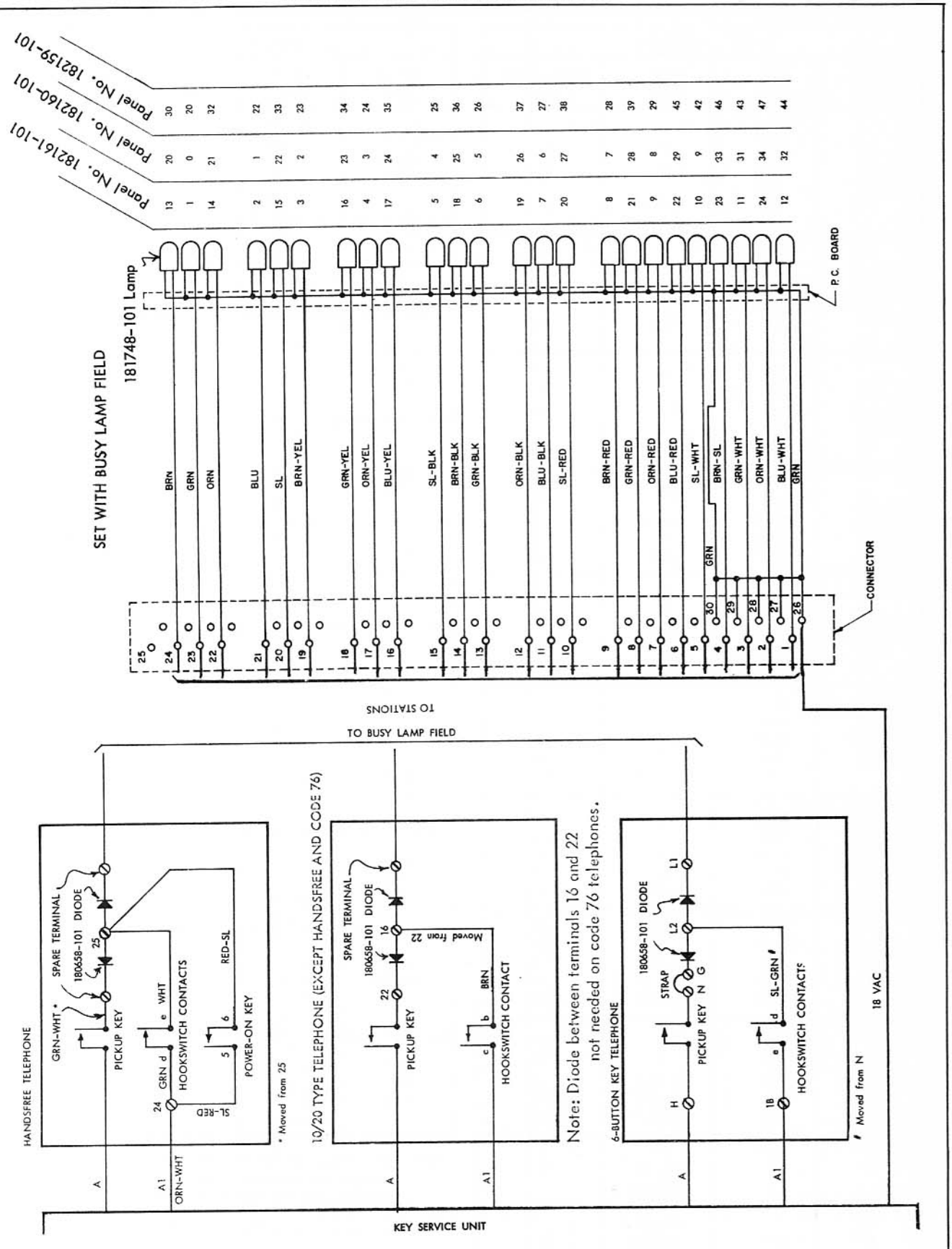


Figure 5. Typical Connections to Busy Lamp Field

TABLE J
CORD ASSEMBLY, MOUNTING CORD, AND CABLE CONDUCTOR ASSIGNMENT

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

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

Note: Lead colors, lead designations, and plug/connector terminals are consistent through internal cords, mounting cord and connecting cable.

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

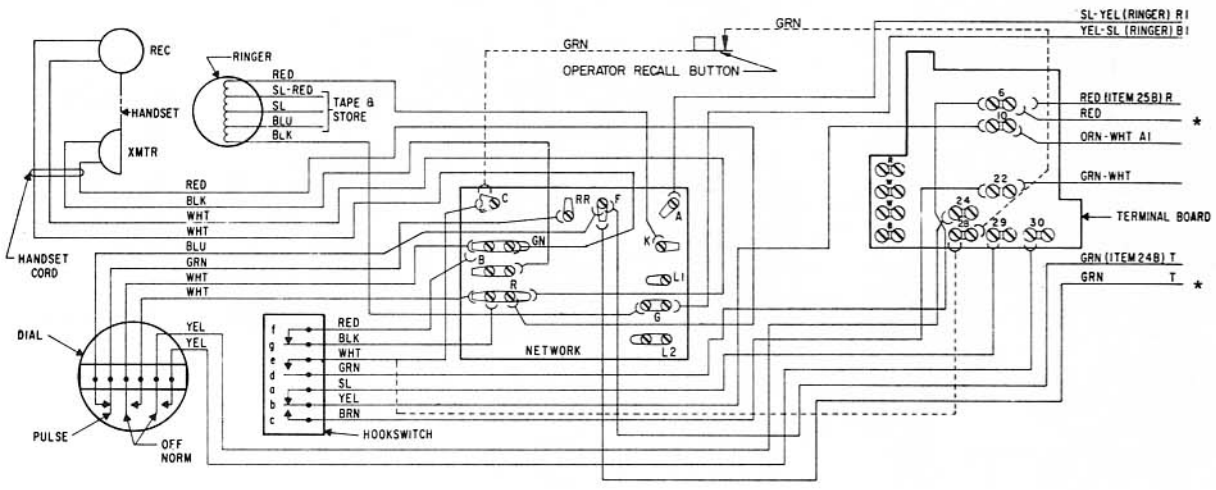


Figure 6. Set Wiring, K-830, 831, 835, 836, 837, 840. (Except Code 76)
* 20-Button Sets Only.

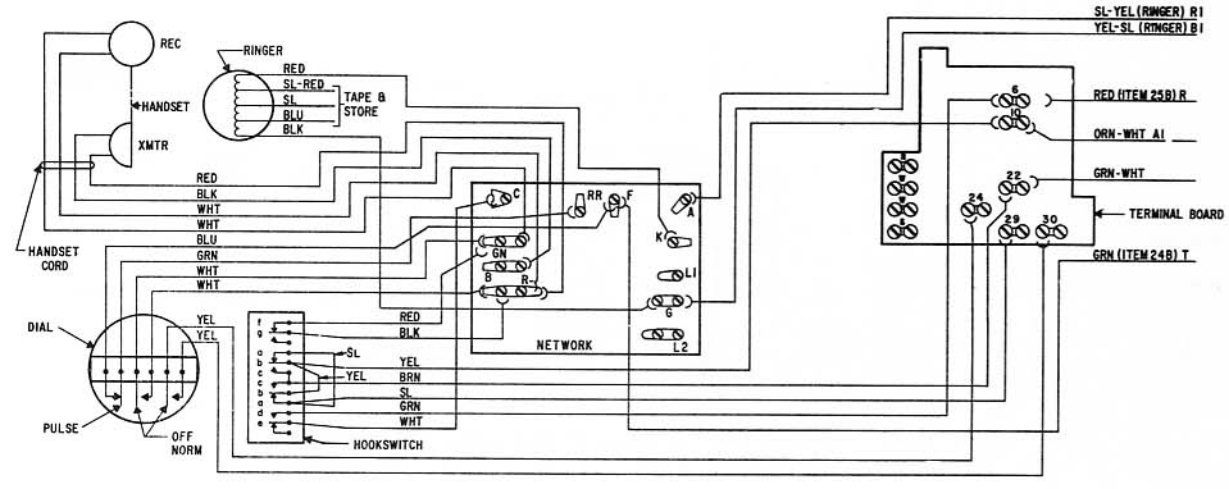


Figure 7. Set Wiring, K-854

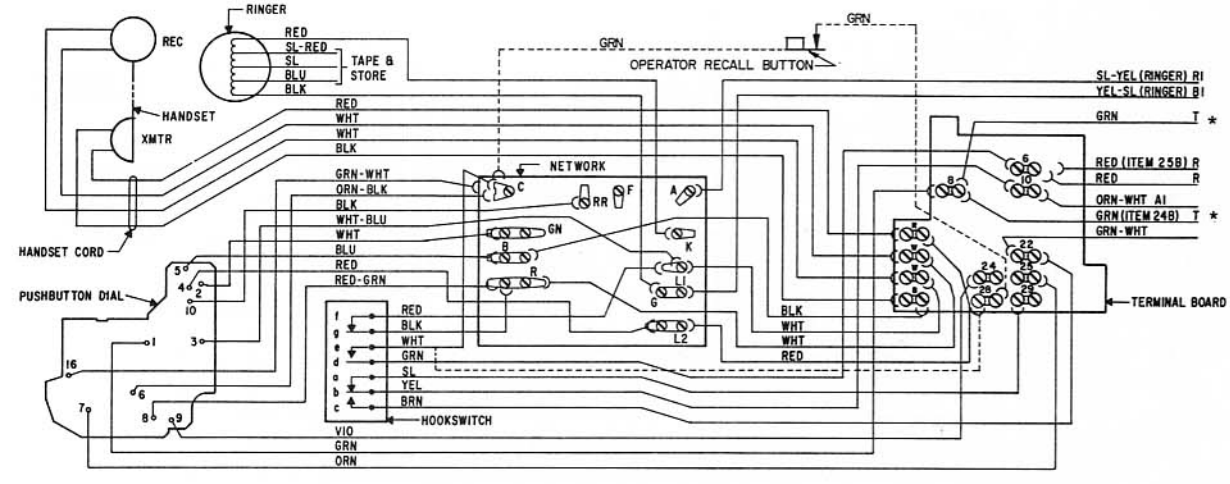


Figure 8. Set Wiring, K-2830, 2831, 2835, 2836, 2837, 2840, (Except Code 76)
Equipped with Dial with Eleven (11) leads MD
* 20-Button Sets Only.

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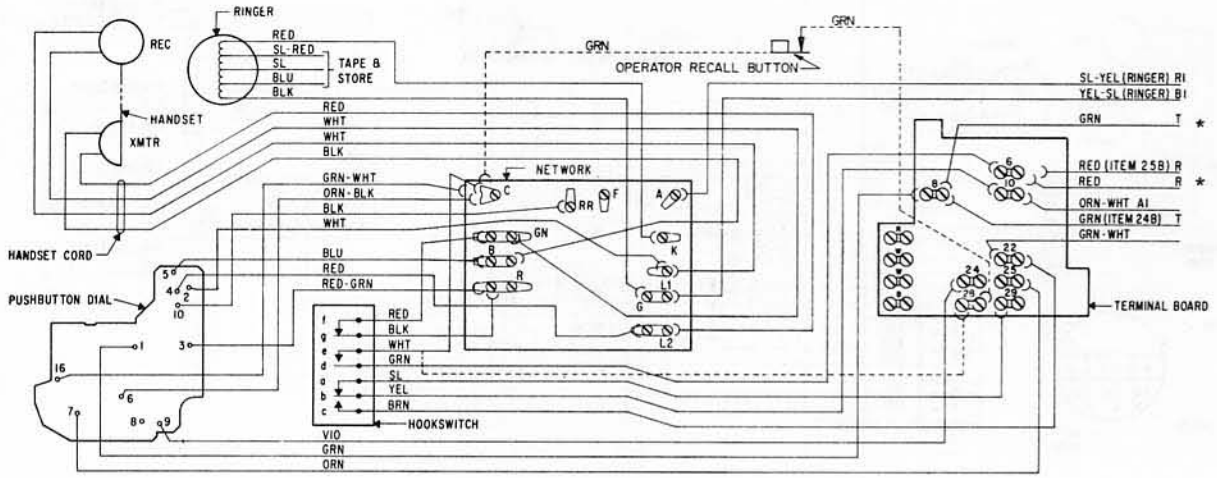


Figure 9. Set Wiring, K-2830, 2831, 2835, Equipped with Dial with Ten (10) Leads. (Except Code 76)

* 20-Button Sets Only.

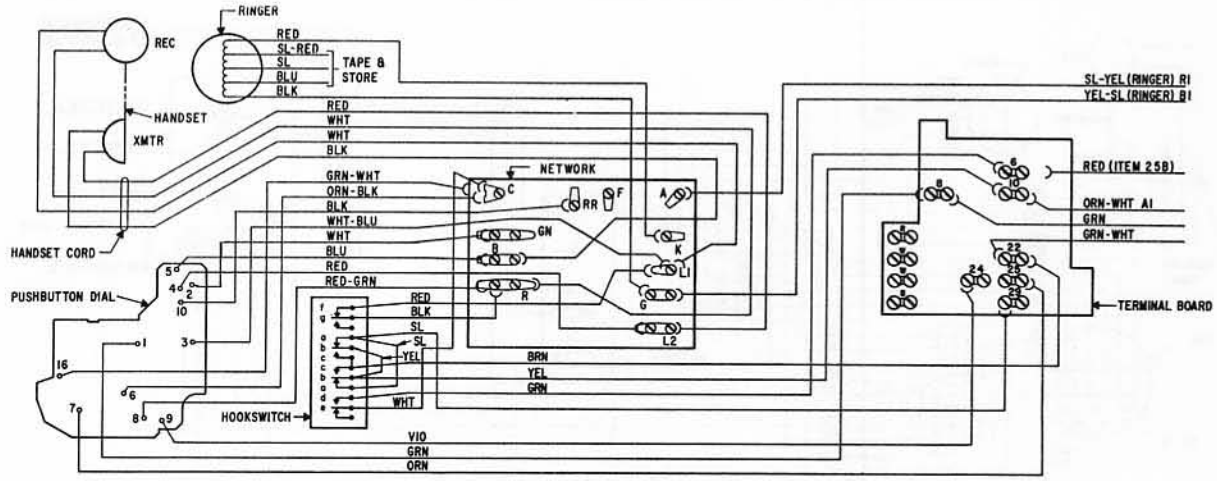


Figure 10. Set Wiring, K-2854 Equipped with Dial with Eleven (11) Leads. MD

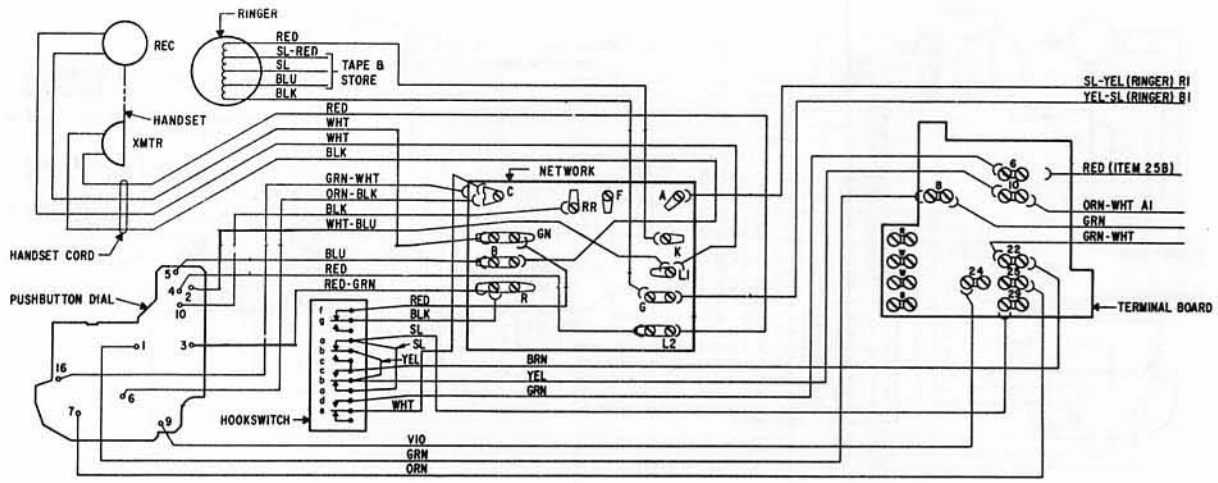


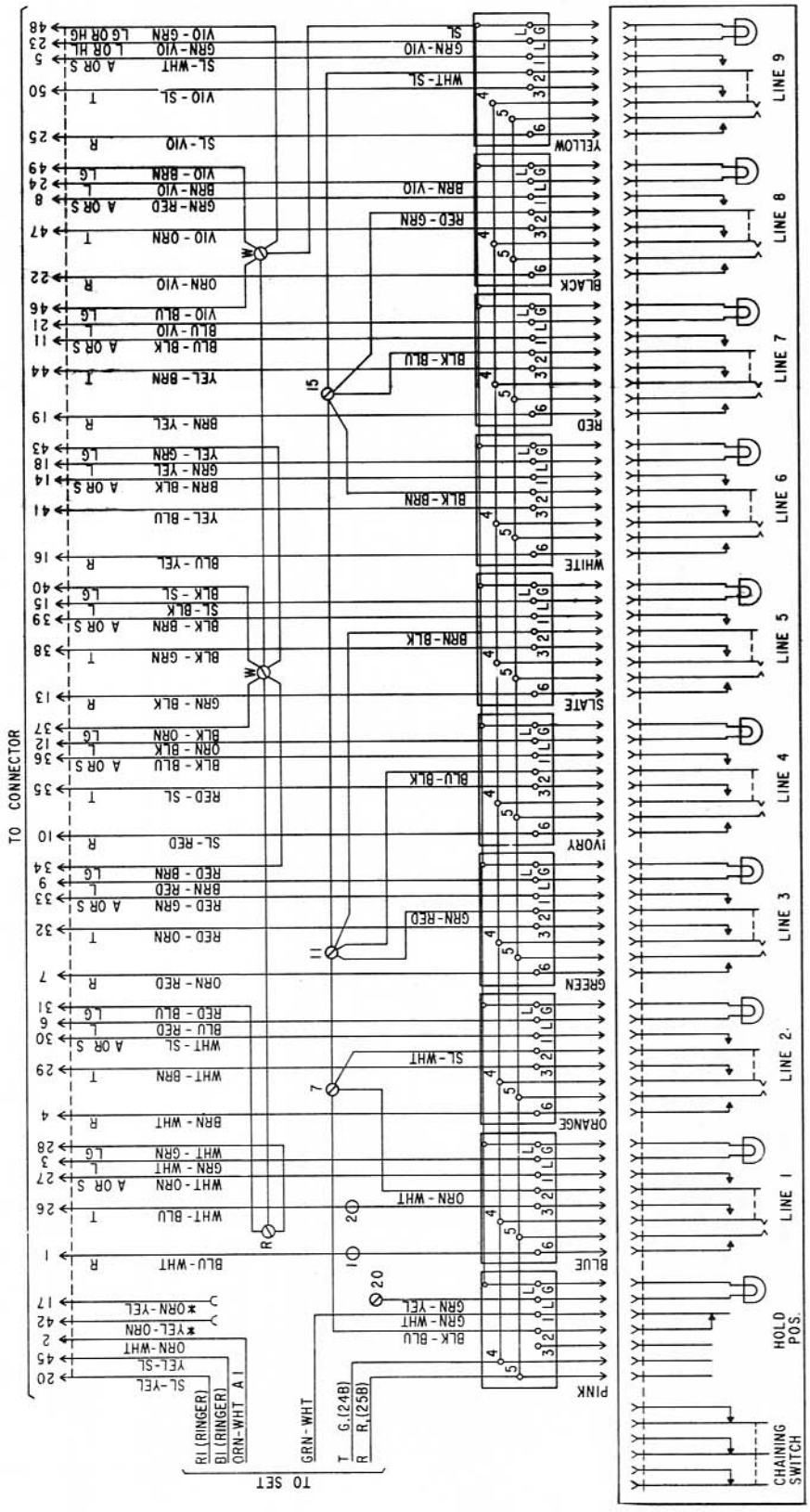
Figure 11. Set Wiring, K-2854 Equipped with Dial with Ten (10) Leads.

NOTES:

1. COMMON TIP, RING, AND LAMP GROUND BRASS BUS LINES PLUG INTO KEY AND FIT BETWEEN KEY AND TERMINAL PLUG.
2. BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 7, 11, AND 15. STRAP TERMINALS R, W, & W FOR COMMON LAMP GROUND.
3. TERMINAL 8 IS USED AS A TIE POINT ON THE 2830 TELEPHONE SET ONLY.
4. NUMBERED SCREW TERMINALS SHOWN ARE PART OF TERMINAL BOARD ASSEMBLY.

* 5. CONDUCTORS TAPED & STORED.

6. BROKEN LINES (SCHEMATIC) INDICATE CONNECTIONS FOR OPERATOR RECALL ON TELEPHONES WITH SPECIAL FEATURE CODE 46M.



* Taped and stored

Figure 12. Key Wiring, 10-Button Sets. (Except Code 76)

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NOTES:
1- COMMON TIP, RING AND LAMP GROUND BRASS BUS LINES PLUG INTO KEY AND FIT BETWEEN KEY AND TERMINAL PLUG.
2- BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 7, 11, AND 15 AND 19, 23, AND 26. STRAP R, W, & W FOR COMMON GND.
3- * CONDUCTORS TAPED AND STORED.
4- NUMBERED SCREW TERMINALS SHOWN ARE PART OF THE TERMINAL BOARD ASSEMBLY.
5. BROKEN LINES (SCHEMATIC) INDICATE CONNECTIONS FOR OPERATOR RECALL ON TELEPHONES WITH SPECIAL FEATURE CODE 46M.

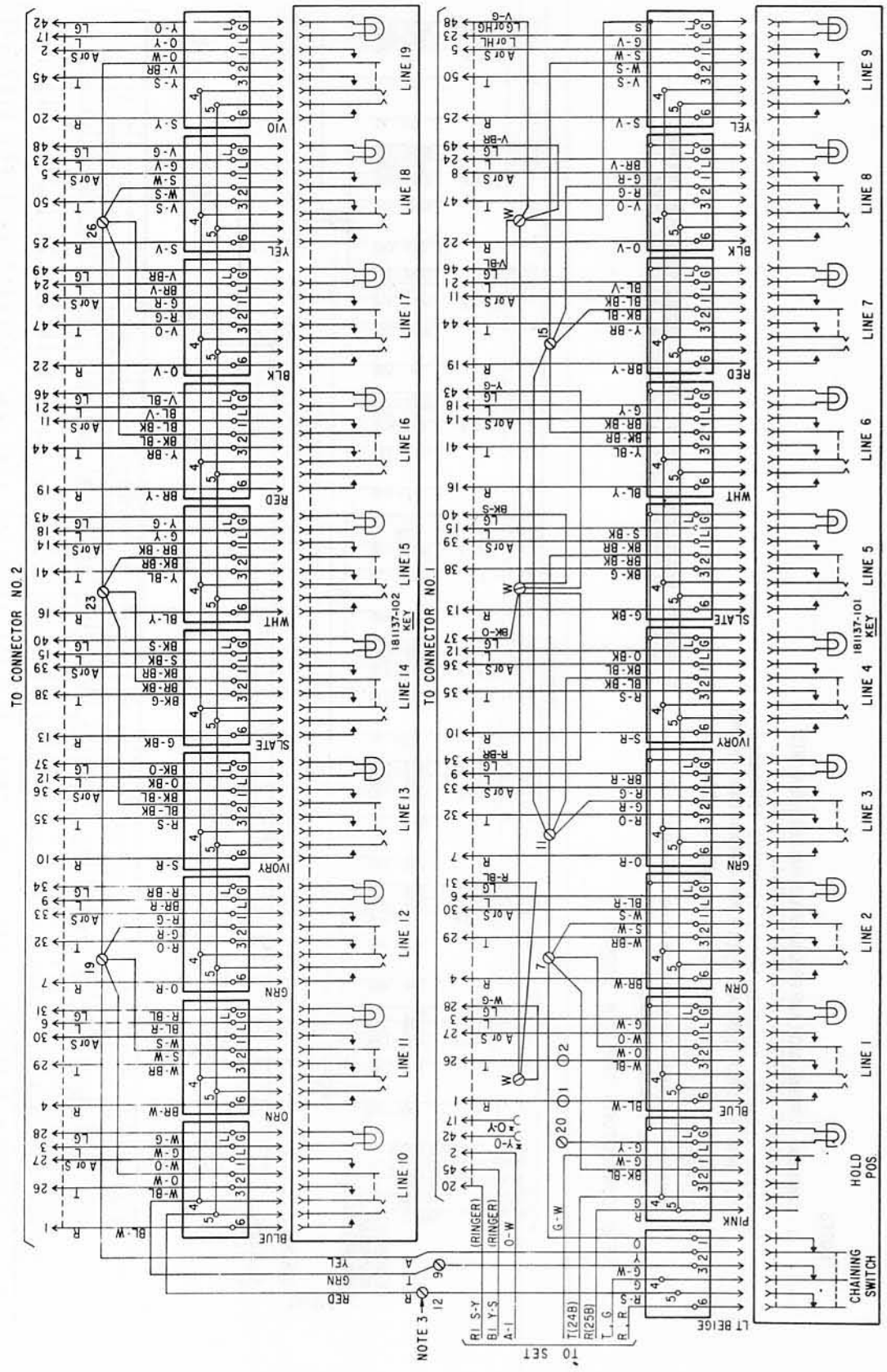
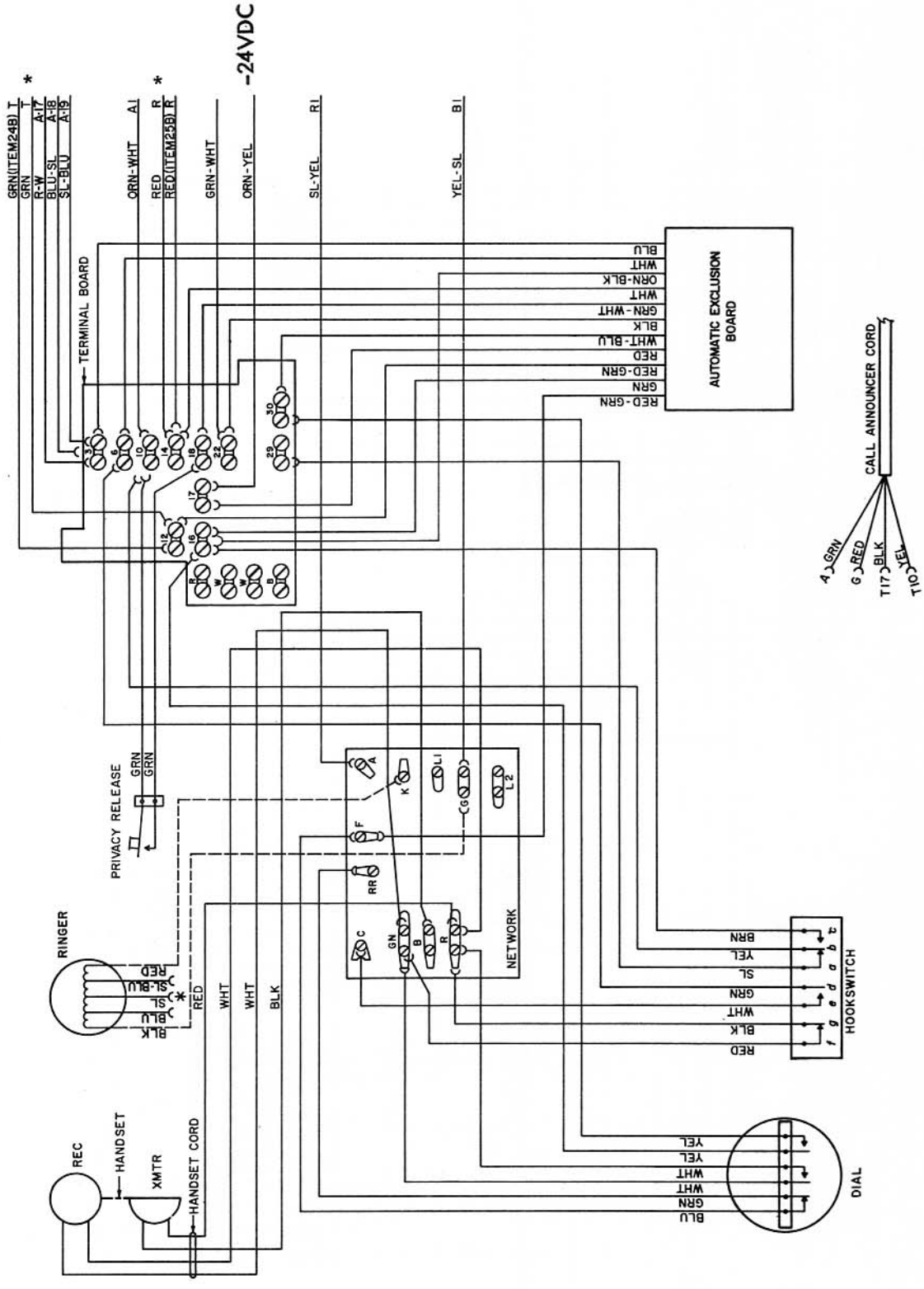


Figure 13. Key Wiring, 20-Button Sets. (Except Code 76)



* 20-button sets only

Figure 14. Set Wiring, K-830/76M and 831/76M Exclusion Sets

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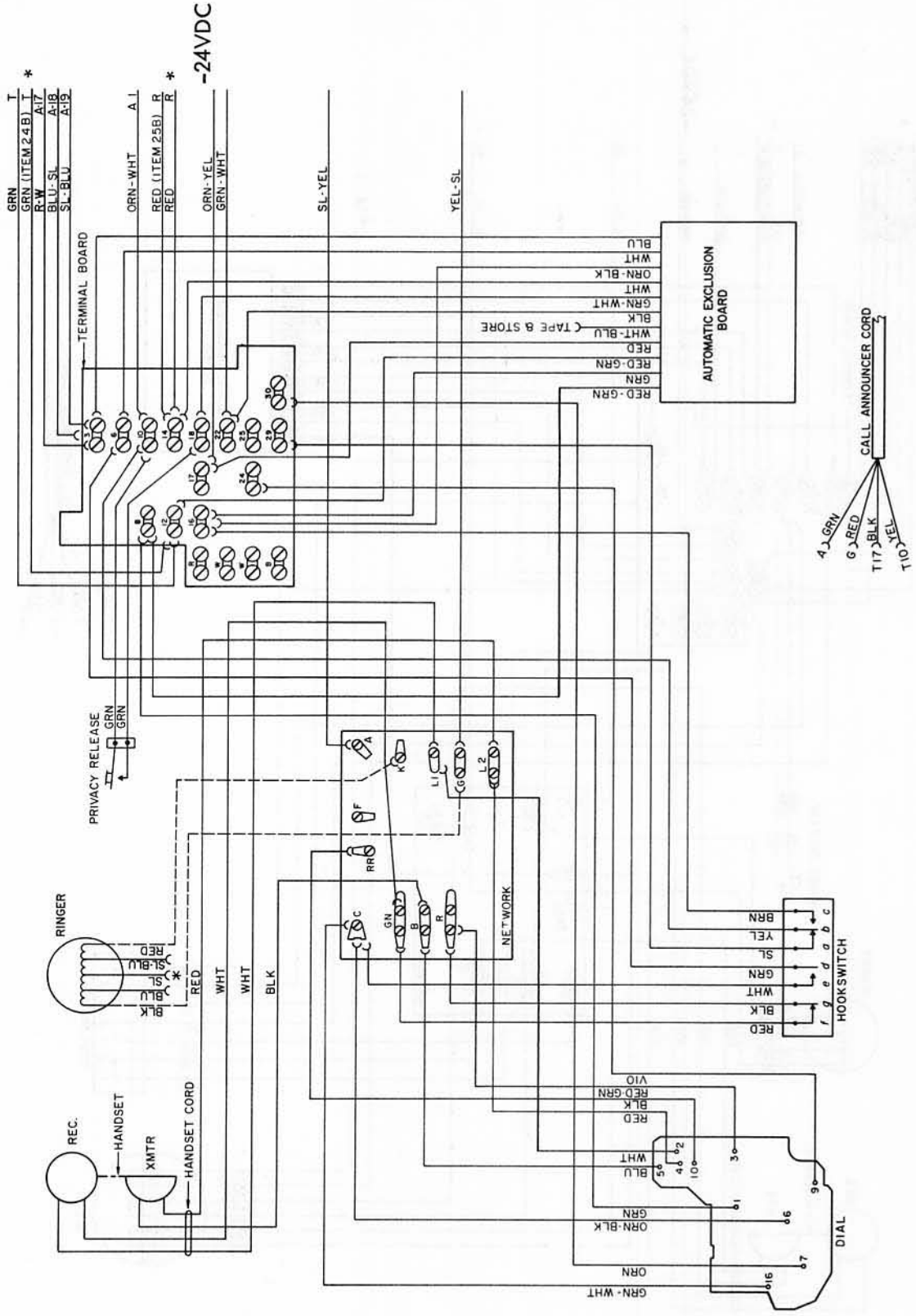

Figure 15. Set Wiring, K2830/76M and K2831/76M Exclusion Sets

* 20-button sets only

NOTES:
1- COMMON TIP, RING, AND LAMP GROUND BRASS BUSS LINES PLUG INTO KEY AND FIT BETWEEN KEY AND TERMINAL PLUG.
2- BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 7, 11, AND 15. STRAP TERMINALS R, W, & W FOR COMMON LAMP GROUND.
3- * CONDUCTORS TAPED AND STORED.
4- NUMBERED SCREW TERMINALS SHOWN ARE PART OF THE TERMINAL BOARD ASSEMBLY.
5- 76M FEATURE TELEPHONES REQUIRE -24V BATTERY ON SYSTEM OTHER THAN THE K76A KSU. -24V BATTERY SHALL BE SUPPLIED VIA PIN 17 O-Y LEAD ON CONNECTOR PLUG.
6- WHEN 76M TELEPHONES ARE USED ON THE K76A KSU AND CALL ANNOUNCERS ARE NOT USED, REFER TO KSP K76A***-101 FOR LOCATION OF -24V BATTERY TO USE WITH 76M TELEPHONES.

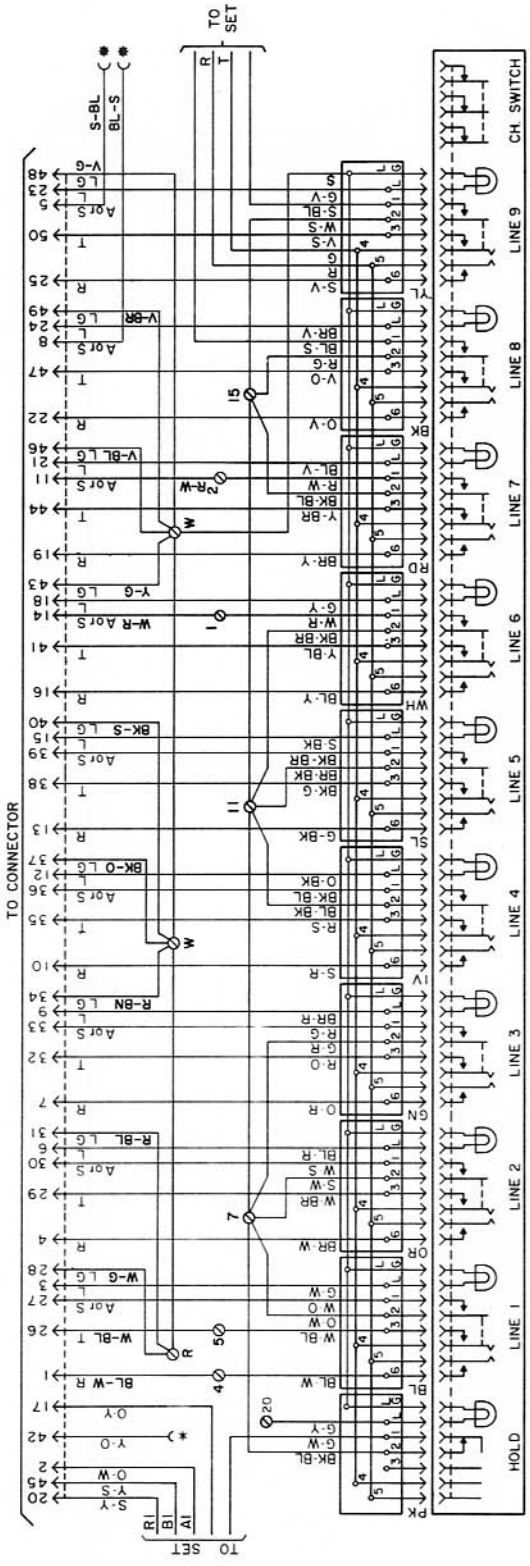

Figure 16. Key Wiring, 10-button Exclusion Sets (K-830/76, 2830/76)

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NOTES:
1- COMMON TIP, RING, AND LAMP GROUND BRASS BUS LINES PLUG INTO KEY AND FIT BETWEEN KEY AND TERMINAL PLUG.
2- BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 7, 11, AND 15 AND 19, 23, AND 26. STRAP TERM'S R, W, AND W FOR COMMON LAMP GROUND.
3- * CONDUCTORS TAPED AND STORED.
4- NUMBERED SCREW TERMINALS SHOWN ARE PART OF THE TERMINAL BOARD ASSEMBLY.
5- 76M FEATURE TELEPHONES REQUIRE -24V BATTERY ON SYSTEM OTHER THAN THE K76A KSU. -24V BATTERY SHALL BE SUPPLIED VIA PIN 17 O-Y LEAD ON CONNECTOR PLUG.
6- WHEN 76M TELEPHONES ARE USED ON THE K76A KSU AND CALL ANNOUNCERS ARE NOT USED, REFER TO KSP K76***-101 FOR LOCATION OF -24V BATTERY TO USE WITH 76M TELEPHONES.

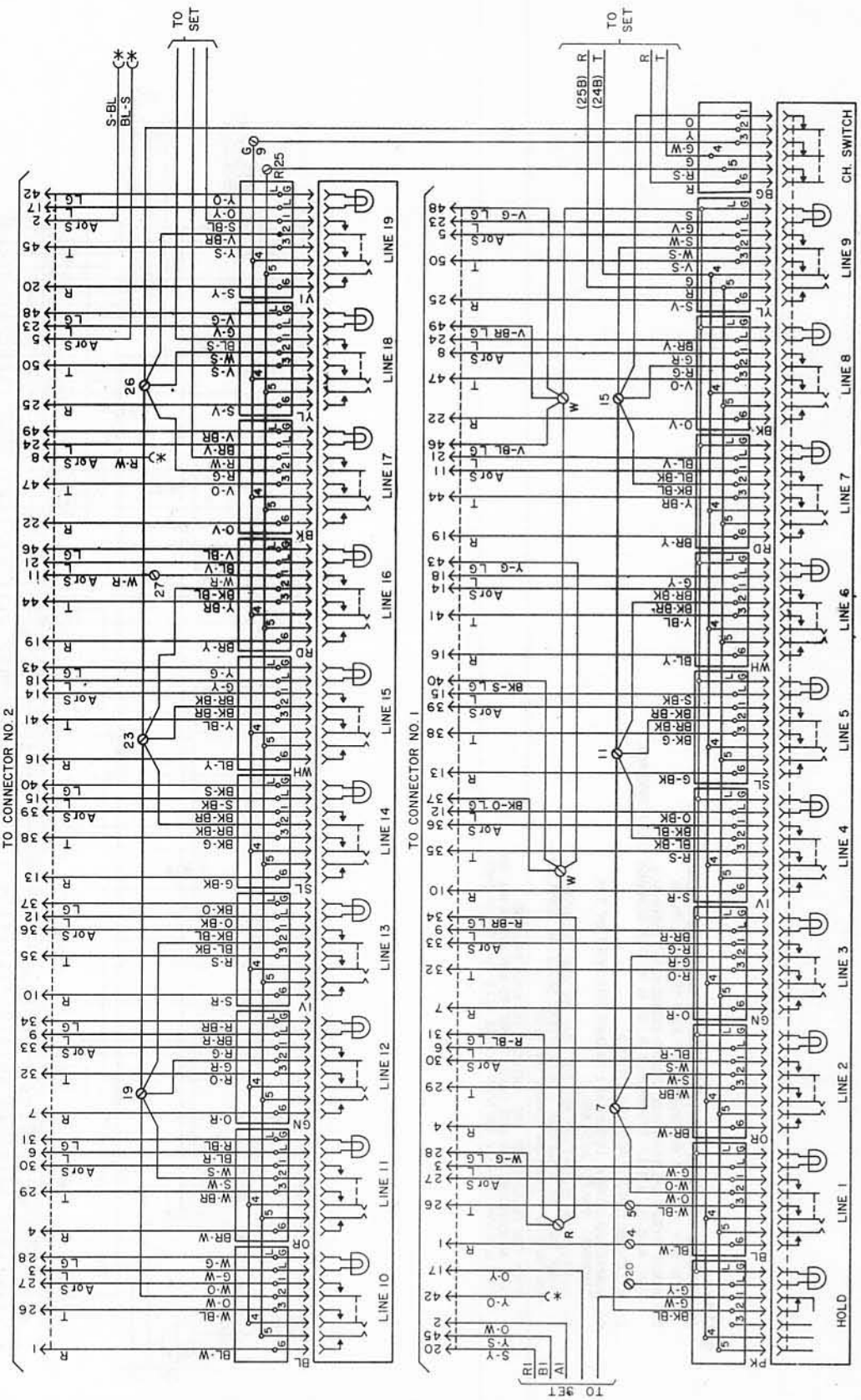

Figure 17. Key Wiring, 20-button Exclusion Sets (K-831/76, 2831/76)

30-BUTTON MULTILINE KEY TELEPHONES
K-861, ROTARY DIAL; K-2861 PUSHBUTTON DIAL

Figure 1. 30-button rotary dial set, K-861

Figure 2. 30-button pushbutton dial set, K-2861

1.0 GENERAL INFORMATION

The 30-button key sets are designed for use with multiline key telephone systems to provide pickup and HOLD of a maximum of 29 CO/PBX lines and other key system features. The sets have one HOLD button and 29 convertible (pickup or signaling) buttons and are equipped with a 150-conductor cord terminated in three plugs.

The telephones include an operator headset jack with an ON-OFF switch.

Automatic button restoration is a standard feature but can be readily disabled if desired. (It is necessary to disable this feature when an operator headset is used.) An operator recall button is provided for use with automatic button restoration since operating the cradle hook will restore any operated buttons.

OPTIONAL FEATURES

Buzzers. A buzzer can be mounted internally and connected to ringer leads or to two spare leads if station busy lamp feature is not required.

Speakerphone. Each set is equipped for operation with external speakerphone. Use of speakerphone will reduce line capacity by two lines.

Station Busy Lamp. Sets can be modified to control a station-busy lamp. (Table E.)

Polarity Guard. A polarity guard (No. 180697-102) for pushbutton dial sets can be installed internally if required by operating conditions.

Busy Lamp Field Kit. A kit (PN 182354-101) for adding a 24-point busy lamp field may be installed in place of one of the keys.

Illuminated Hold Button. A lamp may be installed under the hold button and controlled by an external circuit. (Example: To indicate that another station is busy.)

IMPORTANT

IF ONE OF THESE SETS IS USED TO REPLACE A PREVIOUSLY INSTALLED KEY SET, SUCH AS A W.E. "CALL DIRECTOR" SEVERAL CONDUCTORS OF THE CONNECTING CABLE WILL HAVE TO BE RE-TERMINATED AT THE KEY SERVICE UNIT.

TABLE A. IDENTIFICATION OF SETS COVERED IN THIS PUBLICATION

CODE		DESCRIPTION	Circuit Label No.
Rotary Dial	Pushbutton Dial		
861**-0BA-56M	2861**-0BA-56M	PHONE, 30-Button Desk equipped with headset jack	182149-101

** Insert Color Code, see Table C.

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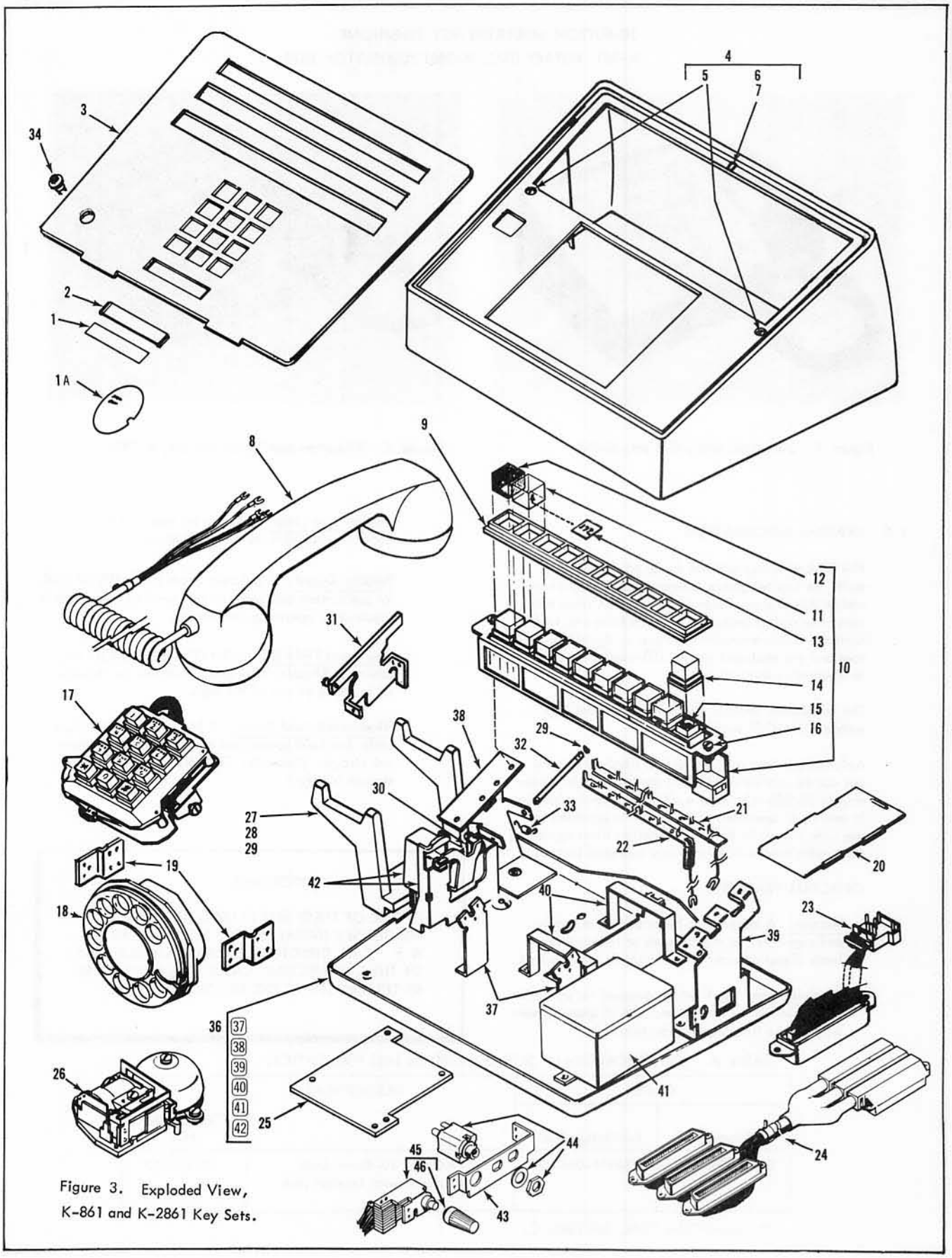

Figure 3. Exploded View, K-861 and K-2861 Key Sets.

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
			TABLE B. REPLACEABLE PARTS LIST.	861	2861				
3	1	87513-101	CARD, Number, T-T	-	1				
	1A	75415-101	CARD, Number, R-D	1	-				
	2	87514-101	RETAINER, Number Card, T-T	-	1				
	3	182154-###	FACEPLATE, R-D	1	-				
	3	182155-###	FACEPLATE, T-T	-	1				
	4	182153-***	HOUSING ASSEMBLY	1	1				
	5	95992-102	SCREW, Housing	2	2				
	6	181100-101	SPRING, Latch	1	1				
	7	181289-101	SCREW, Latch Spring	1	1				
	8	65**-0C2-410	HANDSET ASSEMBLY (See Section 212 for parts list)	1	1				
	9	181287-101	COLLAR	3	3				
	10	181137-103	KEY ASSEMBLY, 10 PU Buttons	1	1				
	10	181137-101	KEY ASSEMBLY, 9 PU and 1 HOLD button	1	1				
	10	181137-102	KEY ASSEMBLY, 10 PU buttons	1	1				
	11	181131-101	CAP, button - clear	29	29				
	12	181131-102	CAP, button - clear red	1	1				
		181550-101	CAP SET, (1 red, 10 clear caps)	3	3				
	13	181281-101	TAB, designation, (Strip of 12)	3	3				
	14	181122-101	BUTTON, Key	30	30				
	15	51-A-745	LAMP	29	29				
	16	95992-102	SCREW (Same as item 5)	6	6				
	17	3600-00G	DIAL ASSEMBLY, T-T (See section 228)	-	1				
	18	3800-00H	DIAL ASSEMBLY, R-D (See section 227)	1	-				
	19	181146-101	ADAPTER, rotary dial	2	-				
		181145-101	SCREW, dial attaching	4	2				
	20	181997-101	SLIDE	1	1				
	21	181292-101	CONTACT STRIP, Upper	3	3				
	22	181292-102	CONTACT STRIP, Lower	1	1				
	23	181154-101	CORD ASSEMBLY, Internal	1	1				
	23	181155-101	CORD ASSEMBLY, Internal	2	2				
	24	9009**-102	CORD ASSEMBLY, Mounting	1	1				
	25	181986-101	TERMINAL BOARD	1	1				
		181145-101	SCREW, T.B. attaching (Same as dial attaching screw)	4	4				
	26	148-EBA	RINGER	1	1				
		95996-102	SCREW, ringer attaching	2	2				
	27	181295-101	HOOK, Cradle	1	1				
	28	181282-101	SHAFT, Cradle Hook	1	1				
	29	73538-108	RING, Retaining	3	3				
	30	181280-101	SPRING, Cradle Return	1	1				
	31	182151-101	LATCH ARM ASSEMBLY	1	1				
	32	181995-101	PIN, Latch Arm	1	1				
	33	181151-102	SPRING, Latch Arm Return	1	1				
	34	181973-101	PUSHBUTTON ASSEMBLY	1	1				
	35	182146-101	BASE ASSEMBLY	1	1				
	36	181991-101	BASE	1	1				
	37	181254-101	BRACKET, Dial	2	2				
	38	181992-101	BRACKET, Key; LH	1	1				
	39	181993-101	BRACKET, Key; RH	1	1				
	40	181989-101	BRACKET, Plug	2	2				
		95965-101	FASTENER, (for ringer screws)	2	2				
		82400-101	FOOT	4	4				
		82486-102	RIVET, Foot	4	4				
		31944-108	RIVET	19	19				

(Continued)

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

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FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON					
			TABLE B. REPLACEABLE PARTS LIST. (Continued)	861	2861				
	36	182146-101	BASE ASSEMBLY (Continued)		-				
	41	75335-101	NETWORK	1	1				
	42	181260-101	HOOKSWITCH ASSEMBLY	1	1				
	43	181979-101	BRACKET, Headset Jack	1	1				
	44	181996-101	JACK, Headset	2	2				
	45	182144-101	SWITCH ASSEMBLY, Headset Jack	1	1				
		79452-101	KNOB, Control	1	1				

TABLE C. COLORS

** Mounting Cord		*** Set		### Faceplate	
00	Black	000	Black	101	Charcoal
05	Moss Green	005	Moss Green	102	Light Green
13	Beige	013	Beige	103	Muted Beige
15	White	015	White	104	Light Gray
44	Light Ash	044	Light Ash	107	Cocoa Brown
45	Cocoa Brown	045	Cocoa Brown	106	Light Ash

2. INSTALLATION

(a) MOUNTING

The mounting cord is terminated in three plugs. The set is installed by plugging the cord into system connecting cable or connecting block.

(b) STATION NUMBER CARD. (Included with each set)

Install station number card in normal manner. The number card can be installed in the pushbutton dial faceplate with the card retainer in place. Insert one end of the number card in one of the slots in back side of faceplate and slide number card into proper position.

(c) DESIGNATION TABS

Note: Designation tabs are furnished in strips for convenience of typist. The tabs are easily broken out of the strips for installation.

Remove the cap from each button by squeezing top and bottom sides of the cap and lifting. Insert designation tab in cap and install cap. Note that locking surfaces are located on left and right sides of the caps and buttons.

3. CONNECTIONS

CAUTION: Follow connection tables. Wiring does not follow standard wiring arrangements due to limited number of conductors used.

(a) STANDARD. (See Table G and circuit diagrams.)

(b) OPTIONAL FEATURES

(1) BUZZERS: If buzzer is to be used instead of ringer, use ringer leads for connection. Two spare leads (O-Y and Y-O) are available for connecting a second buzzer, if the Station Busy Lamp feature is not used.

(2) SPEAKERPHONE: (See Table D.)

(3) STATION BUSY LAMP: (See Table E.)

(4) POLARITY GUARD: (See Table F.)

(5) MANUAL SIGNALING: (See Table G.)

(6) ILLUMINATED HOLD BUTTON: Connect the two spare conductors Y-O and O-Y to terminals 24 and 25 and to external circuit as required. (Refer to circuit diagrams and to Table G.)

(7) PUSHBUTTON GROUND: Make following modifications to line 9 position:

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

NOTE: Interlock Pins have left-hand threads.

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

c. Move white-slate lead from terminal 22 on terminal board to terminal "C" on network.

d. Tie slate-white lead (pin no. 5) to ground from exchange.

TABLE D.

External Speakerphone Connections

Speakerphone Leads	Lead Color	Remove From Term.	Connect To Term.
T1 (T1)	V-G	13	RR (32)
R1 (R1)	G-V	17	1 (1)
AG (AG)	Y-O	*	15 (15)
LK (LK)	O-Y	*	36 (36)
P3 (1R)	V-BR	19	29 (29)
P4 (1T)	BR-V	20	32 (26)
A1 (A1)	O-W	-	11 (11)

* Taped and stored
( ) TEL-TOUCH sets.

TABLE E.

Station Busy Lamp Connections

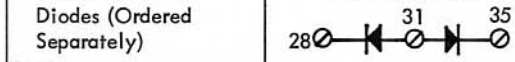
LEAD	OPERATION
HOOK and ON-OFF Switch, (BR)	Remove from terminal 15 and connect to 31
Two 180658-101 Diodes (Ordered Separately)	Connect as shown 
Mtg. Cord, (Y-O)	Connect to terminal 28
Mtg. Cord, (GN-W)	Remove from Terminal 15 and connect to 35

TABLE F.

Polarity Guard Connections
(Order Polarity Guard No. 180697-102 Separately)

Wire or Lead	Color	Remove From Net.	Connect To	
			Guard Assy	Net.
Dial	BK	RR	T	
	G-W	C	S	
Line Switch	W	C	S	
Guard	G			RR
Assembly	W			C

Note: For use when specified by local conditions or for end-to-end signaling installations.

TABLE G.

PICKUP-SIGNAL KEY CONVERSION
30-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	4	4	4	6	6	6	10	10	10	10
PPPPPPPPPS	4	4	4	6	6	6	10	10	10	28
PPPPPPPPSS	4	4	4	6	6	6	10	10	28	28
PPPPPPPSSS	4	4	4	6	6	6	10	28	28	28
PPPPPPSSSS	4	4	4	6	6	6	28	28	28	28
PPPPPSSSSS	4	4	4	6	6	28	28	28	28	28

Note: Connect (O-Y) mounting cord lead to terminal 28. (If 28 is used, any spare terminal is acceptable.) Beyond five signal conversions strap terminal 28 to 31 and move the signal leads consectively to terminal 31. Example: (BR-BK) lead from terminal 6 to 31, then (BL-BK) lead from 6 to 31, etc.

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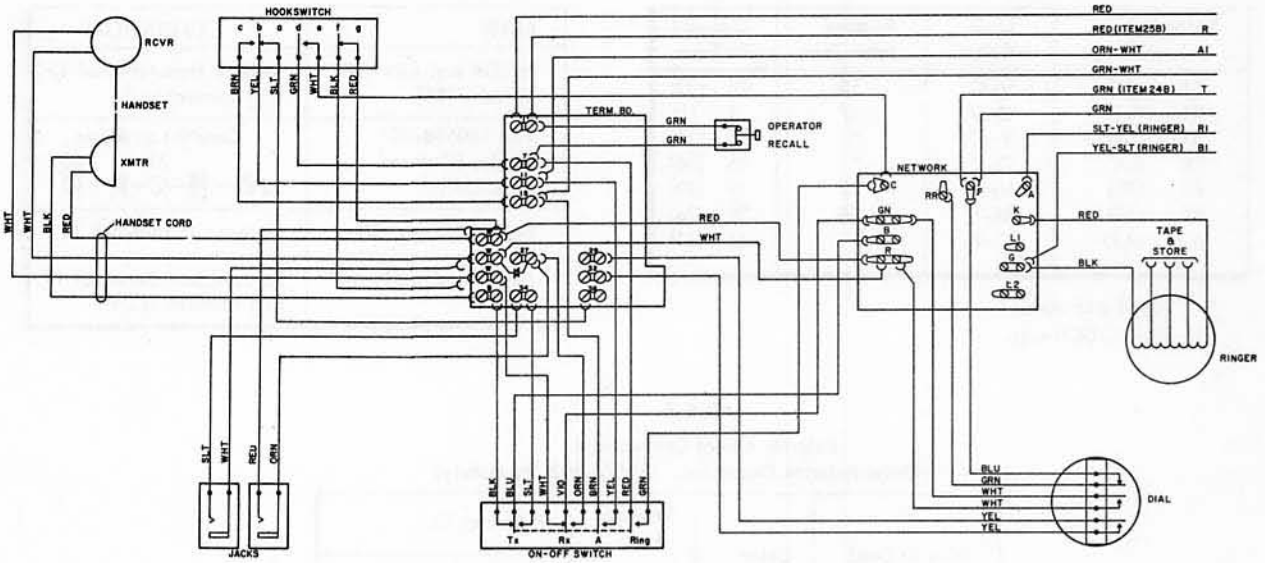
861 TYPE TELEPHONE



2861 TYPE TELEPHONE

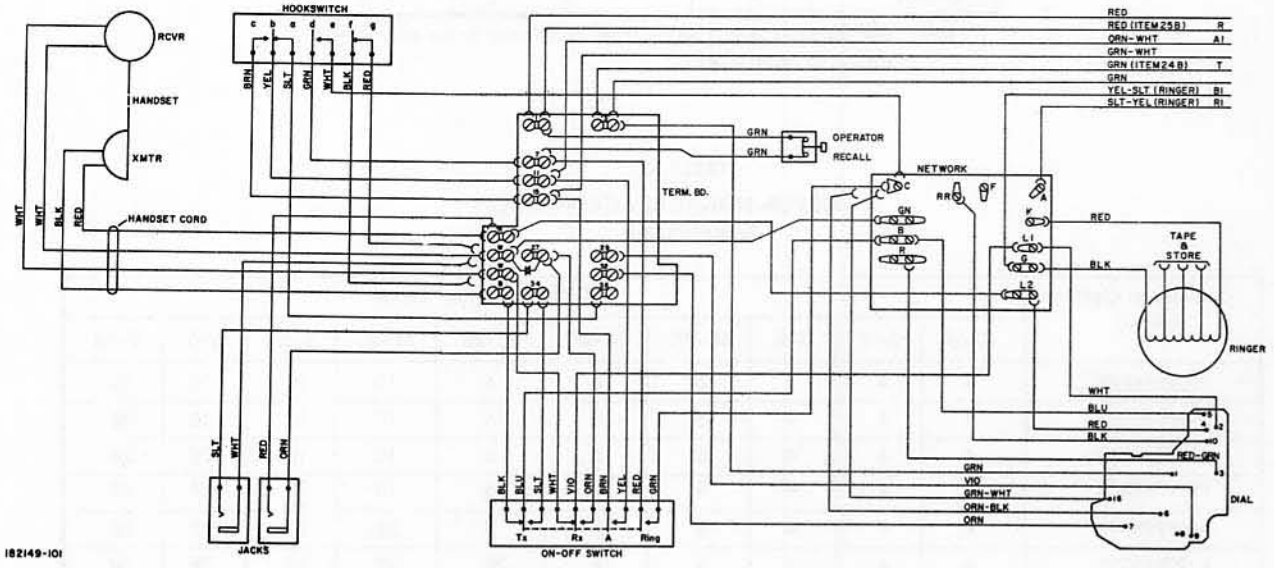


Figure 3. Set Wiring, K-861 and K-2861 Key Sets.

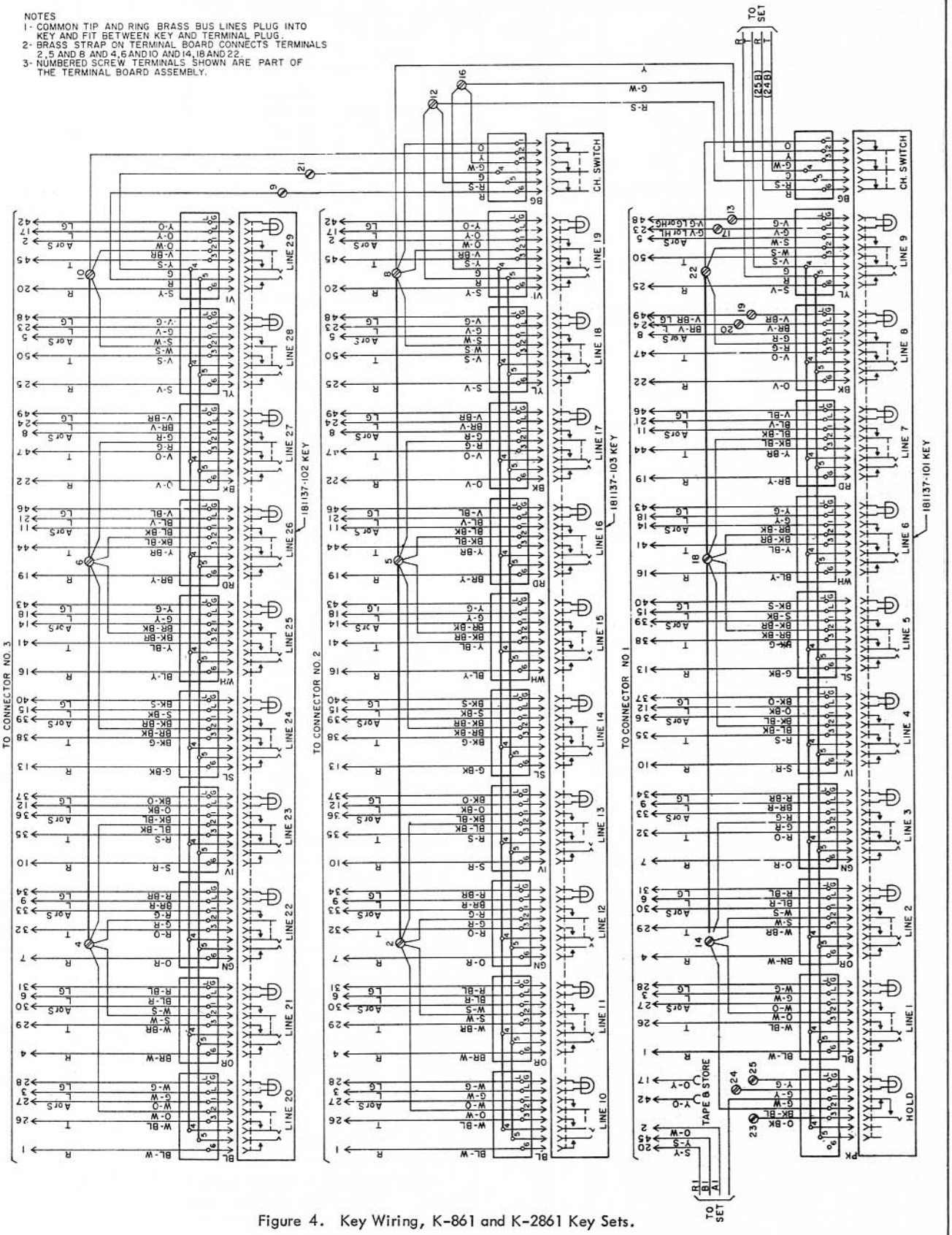


Figure 4. Key Wiring, K-861 and K-2861 Key Sets.

TABLE H

CORD ASSEMBLY, MOUNTING CORD, AND CABLE CONDUCTOR ASSIGNMENT

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

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

Note: Lead colors, lead designations, and plug/connector terminals are consistent through internal cords, mounting cord and connecting cable.

HANDSFREE TELEPHONES

7-LINE, 17-LINE AND SINGLE LINE

(DATE STAMPED THROUGH 12-76)

1.00 GENERAL

1.01 Handsfree telephones are equipped with omnidirectional microphone and a loudspeaker to permit their use without the user having to hold the handset. This feature may be switched ON or OFF. When OFF, the telephone is used in the usual manner. When ON, a user may converse on the phone from a distance of several feet and from any direction.

1.02 The multiline handsfree telephones are designed for use with multiline key telephone systems.

2.00 INSTALLATION

2.01 The telephone is installed in the normal manner except the power transformer provided with the set must be connected via the 4-conductor cord and plugged into a standard 110 vac service outlet. A 4-terminal connecting block is provided for connecting inside wiring if additional cord length is required.

3.00 OPERATION

3.01 To place or answer a call in the handsfree mode, depress the ON Button and the Line Pickup Button.

3.02 When the ON button is depressed and latched down, only a depression of the OFF button will release it. The ON button is lit continously when the handsfree circuitry is activated.

3.03 When the set is in Handsfree operation, lifting the handset from the cradle will immediately disable the handsfree circuitry and permit normal conversation on the handset. The ON button light will stay lit. Replacing the handset will reactivate the handsfree circuitry and return the set to Handsfree operation until it is normally switched off.

3.04 If it is desired to prevent the distant party from hearing local conversation temporarily during handsfree operation, press the HOLD button on a multiline set or the PRIVACY button on a single-line set. On multiline sets, the HOLD button will release when the line pickup button is again pressed. On single-line sets, the PRIVACY button must be held down as long as privacy is desired.

3.05 A special lamp located in the OFF button housing acts as a visual transmit-receive indicator. The lamp is lit when the Handsfree circuit is in transmit mode and is extinguished when the circuit is in receive mode. The lamp is not in operation when the circuitry is de-energized.

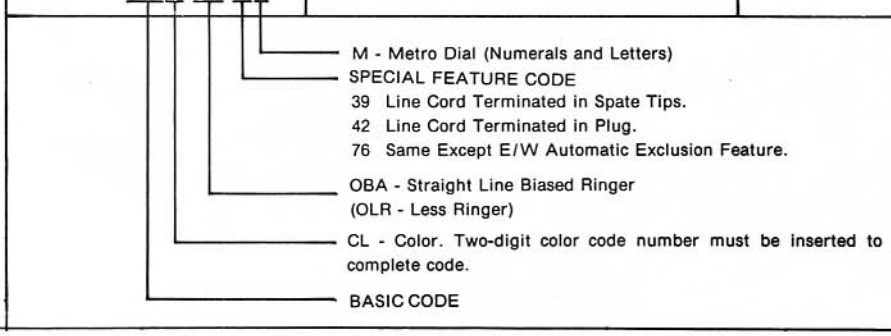
3.06 The microphone is equally sensitive to sound coming from any direction around it, including directly in front of the set.

3.07 The loudspeaker-amplifier portion of the set incorporates fully automatic volume control to eliminate differences between faint and loud calling voices. The control governing the apparent volume at the loudspeaker is located underneath the right side of the set.

3.08 Power for the Handsfree circuitry is derived from a small wall-receptacle-mounted transformer, (110 vac). The set will operate in the normal (handset) mode without power from the transformer.

TABLE A. IDENTIFICATION (UNITS DATE STAMPED THROUGH 12-76)

Code	Description	Circuit Diagram
K832CL-0BA-42M	TELEPHONE, Handsfree, 7-Line, R-D	181902-101
K832CL-0BA-76M	SAME, with Automatic Exclusion	182631-101
K833CL-0BA-42M	TELEPHONE, Handsfree, 17-Line, R-D	181903-101
K833CL-0BA-76M	SAME, with Automatic Exclusion	182633-101
K834CL-0BA-39M	TELEPHONE, Handsfree, Single-Line, R-D	181911-101
K2832CL-0BA-42M	TELEPHONE, Handsfree, 7-Line, T-T	181904-101
K2832CL-0BA-76M	SAME, with Automatic Exclusion	182632-101
K2833CL-0BA-42M	TELEPHONE, Handsfree, 17-Line, T-T	181905-101
K2833CL-0BA-76M	SAME, with Automatic Exclusion	182634-101
K2834CL-0BA-39M	TELEPHONE, Handsfree, Single-Line, T-T	181912-101



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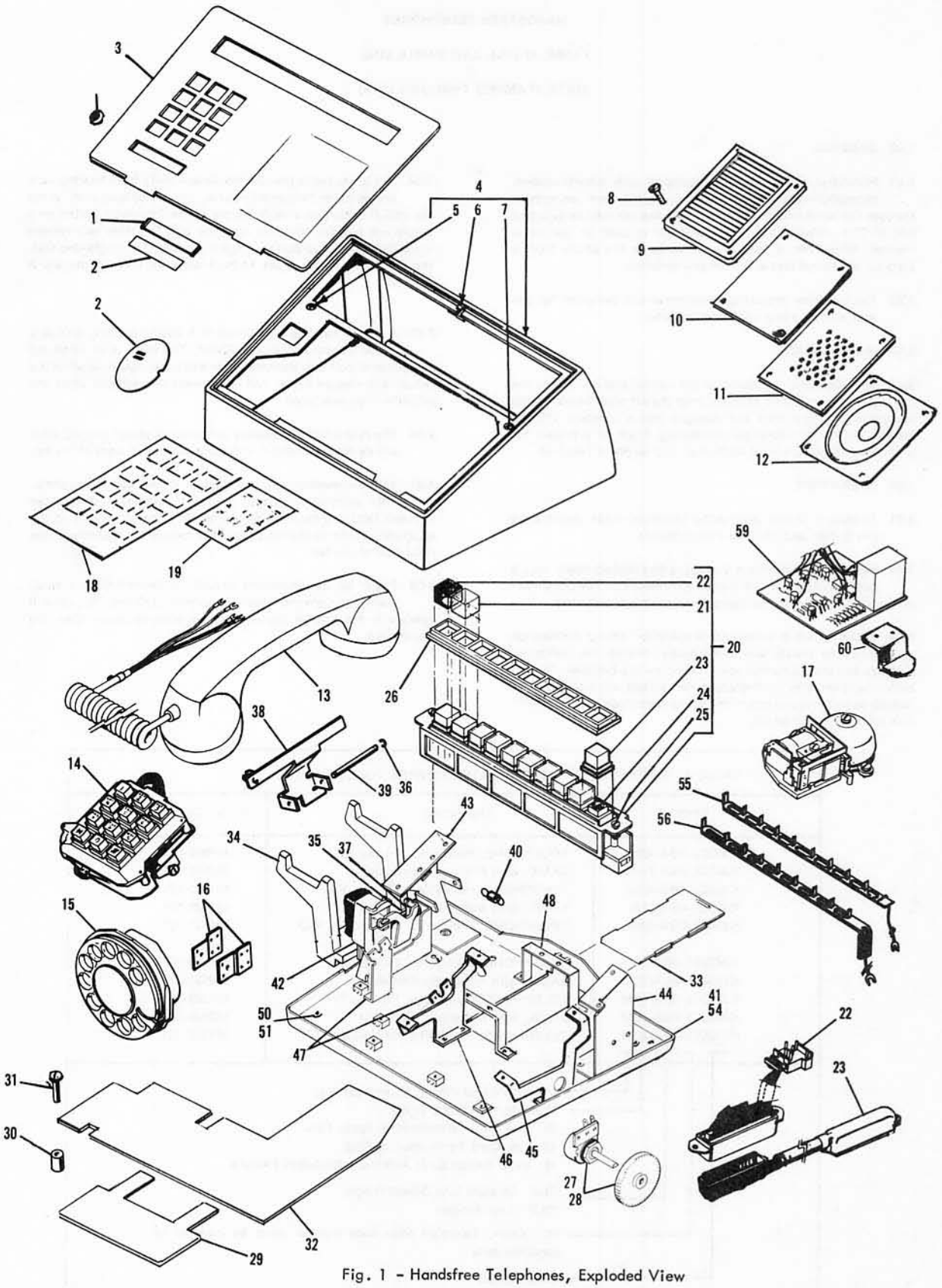

Fig. 1 - Handsfree Telephones, Exploded View

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON											
TABLE B. REPLACEABLE PARTS LIST				832		833		834		2832		2833		2834	
				42	76	42	76	39		42	76	42	76	39	
1	1	87514-101	RETAINER, T-T Number Card	-	-	-	-	-		1	1	1	1	1	
	2	87513-101	CARD, Number, T-T	-	-	-	-	-		1	1	1	1	1	
	2A	75415-101	CARD, Number, R-D	1	1	1	1	1		-	-	-	-	-	
	3	181790-###	FACEPLATE	1	-	-	-	-		-	-	-	-	-	
		182782-###	"	-	1	-	-	-		-	-	-	-	-	
		181791-###	"	-	-	1	-	-		-	-	-	-	-	
		182784-###	"	-	-	-	1	-		-	-	-	-	-	
		181875-###	"	-	-	-	-	1		-	-	-	-	-	
		181792-###	"	-	-	-	-	-		1	-	-	-	-	
		182783-###	"	-	-	-	-	-		-	1	-	-	-	
		181793-###	"	-	-	-	-	-		-	-	1	-	-	
		182785-###	"	-	-	-	-	-		-	-	-	1	-	
		181876-###	"	-	-	-	-	-		-	-	-	-	1	
	4	182789-***	HOUSING ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
	5	95992-102	SCREW, Housing	2	2	2	2	2		2	2	2	2	2	
	6	181100-101	SPRING, Latch	1	1	1	1	1		1	1	1	1	1	
	7	181289-101	SCREW, Spring Latch	1	1	1	1	1		1	1	1	1	1	
	8	181892-101	SCREW, Grille Attaching	4	4	4	4	4		4	4	4	4	4	
	9	181795-***	GRILLE, Speaker	1	1	1	1	1		1	1	1	1	1	
	10	181899-101	CLOTH, Grille	1	1	1	1	1		1	1	1	1	1	
	11	181794-101	PLATE, Speaker. (Baffle.)	1	1	1	1	1		1	1	1	1	1	
	12	181898-101	SPEAKER AND WIRE ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
	13	65**-0C2	HANDSET ASSEMBLY, (See Section 212.)	1	1	1	1	1		1	1	1	1	1	
	14	3600-00G	DIAL ASSEMBLY, T-T, (See Section 228.)	1	1	1	1	1		1	1	1	1	1	
	15	3800-00H	DIAL ASSEMBLY, R-D. (See Section 227.)	1	1	1	1	1		1	1	1	1	1	
	16	181146-101	ADAPTER, Rotary Dial	2	2	2	2	2		2	2	2	2	2	
		181145-101	SCREW, (Adapter to Bracket)	2	2	2	2	2		2	2	2	2	2	
	17	148-DBA	RINGER ASSEMBLY. (See Section 246.)	1	1	1	1	1		1	1	1	1	1	
		95966-101	SCREW. Ringer Mounting	2	2	2	2	2		2	2	2	2	2	
	18	181281-101	TAB, Designation, (Strip of 12)	1	1	2	2	-		1	1	2	2	-	
	19	181496-101	TAB, Option. (Signal, Transfer, etc.)	x	x	x	x	-		x	x	x	x	-	
	19	181900-101	TAB, OFF and ON	1	1	1	1	1		1	1	1	1	1	
	20	181901-103	KEY ASSEMBLY	1	-	-	-	-		1	-	-	-	-	
		182768-101	KEY AND CORD ASSEMBLY	-	1	-	-	-		-	1	-	-	-	
		181901-101	KEY ASSEMBLY (Lower)	-	-	1	1	-		-	-	1	1	-	
		181137-102	" (Upper)	-	-	1	-	-		-	-	1	-	-	
		182661-101	KEY AND CORD ASSEMBLY (Upper)	-	-	-	1	-		-	-	-	1	-	
		181901-102	KEY ASSEMBLY	-	-	-	-	1		-	-	-	-	1	
	21	181131-101	CAP, Clear (Total quantity per phone.)	7	7	17	17	1		7	7	17	17	1	
	22	181131-102	CAP , Clear Red (")	1	1	1	1	-		1	1	1	1	-	
	22	181131-103	CAP, Clear Yellow (")	2	2	2	2	2		2	2	2	2	2	
	23	181122-101	BUTTON, Cloudy (")	10	10	20	20	3		10	10	20	20	3	
	24	51A-745	LAMP (")	9	9	19	19	2		9	9	19	19	2	
	25	95992-102	SCREW (")	2	2	4	4	2		2	2	4	4	2	
	26	181289-101	COLLAR, 10-position	1	1	2	2	-		1	1	2	2	-	
	26	181906-101	COLLAR, 3-position	-	-	-	-	1		-	-	-	-	1	
	27	181809-101	POTENTIOMETER, (Volume Control)	1	1	1	1	1		1	1	1	1	1	
	28	181808-101	KNOB, Volume Control	1	1	1	1	1		1	1	1	1	1	
	29	181804-102	TERMINAL BOARD ASSEMBLY	1	1	1	1	-		1	1	1	1	-	
		181907-101	"	-	-	-	-	1		-	-	-	-	1	

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TABLE B. REPLACEABLE PARTS LIST, (Cont'd.)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON											
				832		833		834		2832		2833		2834	
				42	76	42	76	39		42	76	42	76	39	
1	30	181888-101	SPACER, Fiber	4	4	4	4	4		4	4	4	4	4	
	31	181145-102	SCREW	4	4	4	4	4		4	4	4	4	4	
	32	181815-101	TERMINAL BOARD ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
		181145-101	SCREW, Terminal Board Attaching	3	3	3	3	3		3	3	3	3	3	
	33	181290-101	SLIDE	1	1	1	1	1		1	1	1	1	1	
	34	181897-***	HOOK AND MICROPHONE ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
		181895-101	HOOK, Cradle	1	1	1	1	1		1	1	1	1	1	
		181893-***	HOUSING, Microphone	1	1	1	1	1		1	1	1	1	1	
		181894-101	BOOT, Microphone	1	1	1	1	1		1	1	1	1	1	
		182199-101	MICROPHONE AND BOARD ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
		181857-101	CABLE ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
		75407-102	SCREW	2	2	2	2	2		2	2	2	2	2	
		181850-101	TIE, Cable	1	1	1	1	1		1	1	1	1	1	
	35	181282-101	SHAFT, Cradle Hook	1	1	1	1	1		1	1	1	1	1	
	36	73538-108	RING, Retaining (E-Ring)	2	2	2	2	2		2	2	2	2	2	
	37	181280-101	SPRING, Cradle Hook Return	1	1	1	1	1		1	1	1	1	1	
	38	181286-101	LATCH ARM	1	1	1	1	1		1	1	1	1	1	
		182259-101	SCREW	1	1	1	1	1		1	1	1	1	1	
	39	181152-101	PIN, Latch Arm	1	1	1	1	1		1	1	1	1	1	
	40	181151-102	SPRING, Latch Arm Return	1	1	1	1	1		1	1	1	1	1	
	41	181811-101	BASE ASSEMBLY	1	1	-	-	-		1	1	-	-	-	
	41	181811-102	"	-	-	1	1	-		-	-	1	1	-	
	41	181811-103	"	-	-	-	-	1		-	-	-	-	1	
	42	181810-101	HOOKSWITCH ASSEMBLY	1	1	1	1	1		1	1	1	1	1	
	43	181150-101	BRACKET, Key, LH	1	1	1	1	-		1	1	1	1	-	
	43	181252-101	BRACKET, Key, LH	-	-	-	-	1		-	-	-	-	1	
	44	181253-101	BRACKET, Key, RH	1	1	1	1	1		1	1	1	1	1	
	45	181801-101	BRACKET, Speaker, RH	1	1	1	1	1		1	1	1	1	1	
	46	181800-101	BRACKET, Speaker, LH	1	1	1	1	1		1	1	1	1	1	
	47	181254-101	BRACKET, Dial	2	2	2	2	2		2	2	2	2	2	
	48	181255-101	BRACKET, Plug	2	2	2	2	-		2	2	2	2	-	
	49	31944-108	RIVET	19	19	19	19	15		19	19	19	19	15	
	50	182337-101	FOOT	4	4	4	4	4		4	4	4	4	4	
	51	82486-102	RIVET	4	4	4	4	4		4	4	4	4	4	
	52	95965-101	FASTENER, Ringer Mounting	2	2	2	2	2		2	2	2	2	2	
	53	181284-101	GROMMET	8	8	8	8	8		8	8	8	8	8	
	54	181141-103	BASE	1	1	1	1	1		1	1	1	1	1	
	55	181292-101	CONTACT STRIP ASSEMBLY, Green Wire (Upper Key Assembly -181137-102)	-	-	1	-	-		-	-	1	-	-	
	56	181292-102	CONTACT STRIP ASSEMBLY, Red Wire (Upper Key Assembly - 181137-102)	-	-	1	-	-		-	-	1	-	-	
	55	181292-103	CONTACT STRIP ASSEMBLY, Green Wire (Key Assembly with OFF and ON Buttons)	1	-	1	1	-		1	-	1	1	-	
	56	181292-104	CONTACT STRIP ASSEMBLY, Red Wire (Key Assembly with OFF and ON Buttons)	1	-	1	1	-		1	-	1	1	-	
			NOTE: Key Assemblies 182661-101 and 182668-101 include Cord and Plug Assemblies and Contact Strips.												
	57	181805-101	CORD AND PLUG ASSEMBLY , (ON/OFF key)	1	-	1	1	-		1	-	1	1	-	
	57	181155-101	CORD AND PLUG ASSEMBLY	-	-	1	-	-		-	-	1	-	-	
	57	181908-101	WIRE AND PLUG ASSEMBLY, Black Plug	-	-	-	-	1		-	-	-	-	1	
	57	181909-101	WIRE AND PLUG ASSEMBLY, Red Plug	-	-	-	-	1		-	-	-	-	1	
	57	181910-101	WIRE AND PLUG ASSEMBLY, Yellow Plug	-	-	-	-	1		-	-	-	-	1	

* INDENTED ITEMS ARE INCLUDED IN THE PART UNDER WHICH THEY ARE INDENTED

TABLE B. REPLACEABLE PARTS LIST, (Cont'd.)

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description *	QUANTITY USED ON											
				832		833		834		2832		2833		2834	
				42	76	42	76	39		42	76	42	76	39	
1	58	9002**-102	MOUNTING CORD ASSEMBLY, 25-Pair	1	1	-	-	-		1	1	-	-	-	
	58	9003**-102	" , 50-Pair	-	-	1	1	-		-	-	1	1	-	
	58	9008**-102	CORD, Desk Stand	-	-	-	-	1		-	-	-	-	1	
	59	182691-102	EXCLUSION CIRCUIT ASSEMBLY	-	1	-	1	-		-	1	-	1	-	
	60	182744-101	BRACKET, Exclusion Mounting	-	1	-	1	-		-	1	-	1	-	
	61	181971-101	PUSHBUTTON ASSEMBLY, (Exclusion Release)	-	1	-	1	-		-	1	-	1	-	

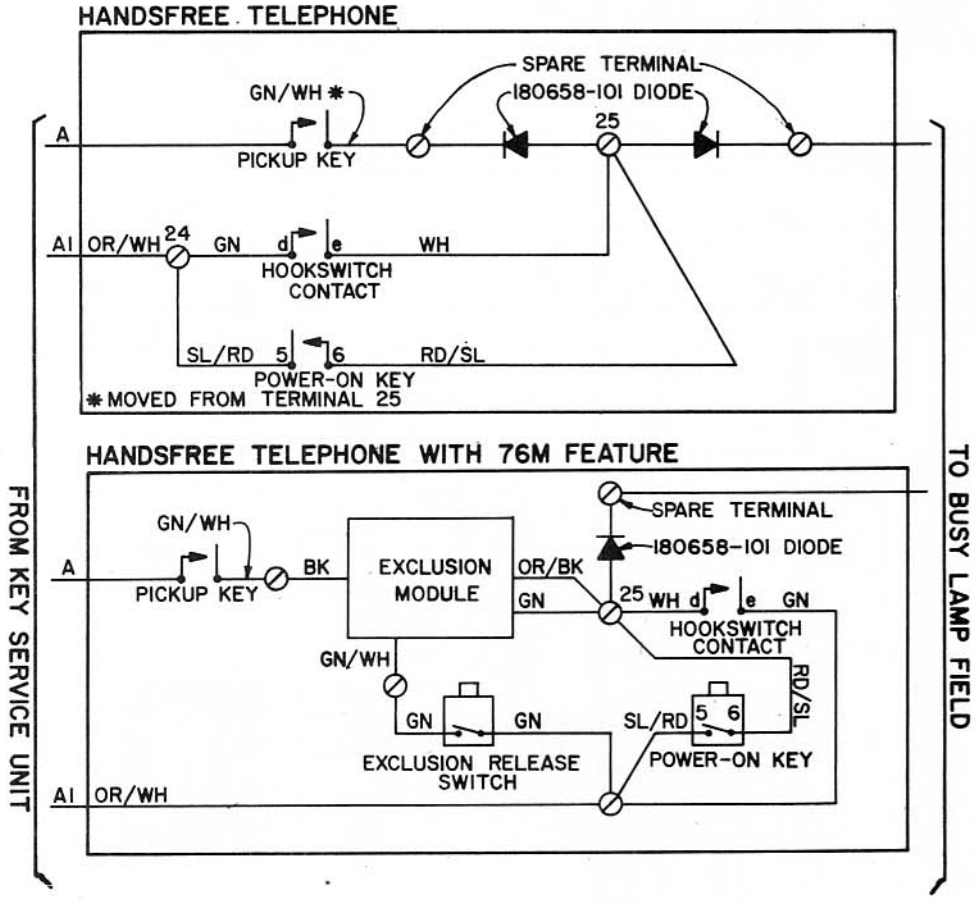

Fig. 2 - Location of Diodes for Busy-Lamp-Field Operation

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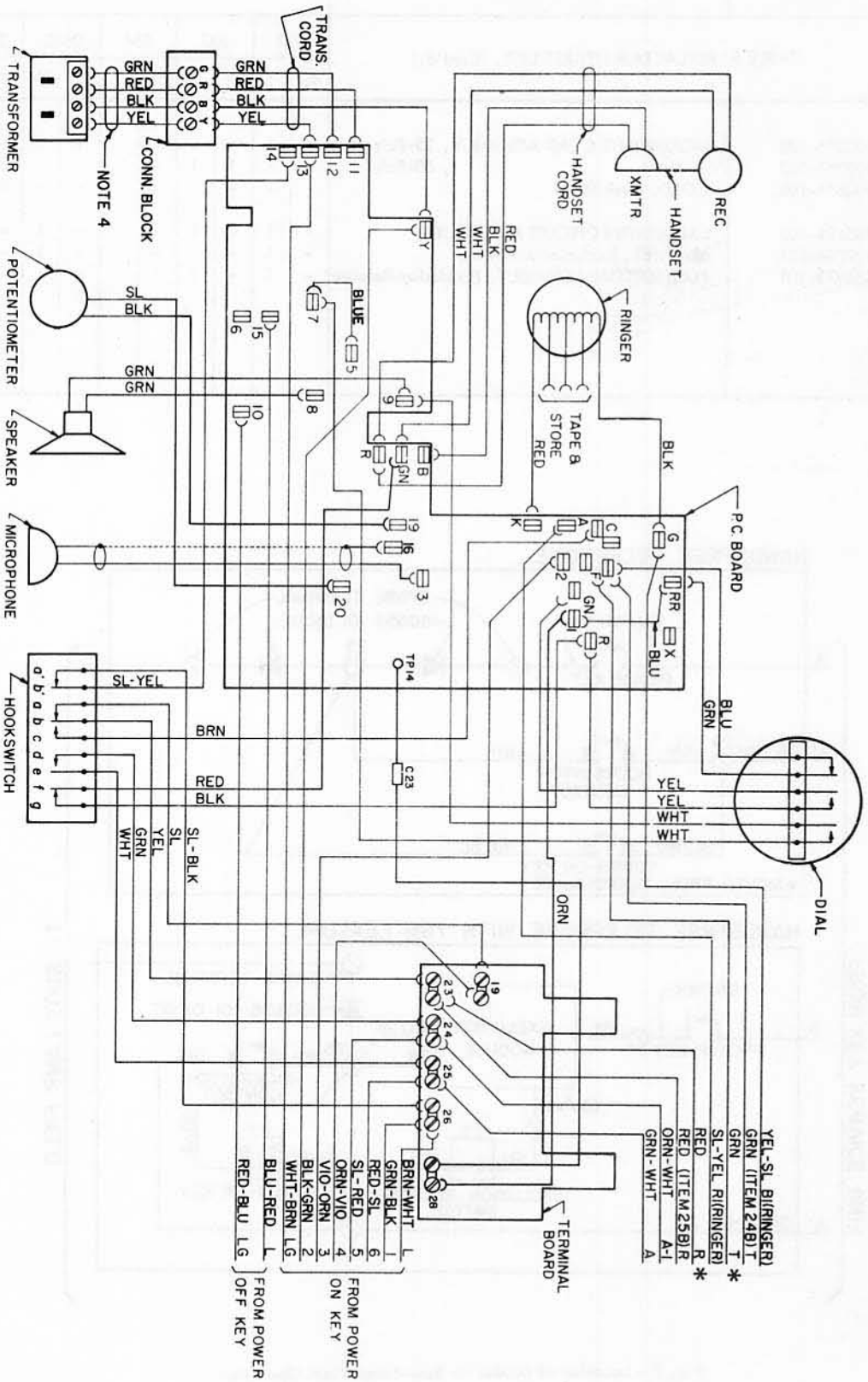

Fig. 3 - Set Wiring, K832/42 and K833/42. (Key Wiring Shown in Figures 11 and 12.) * 833 Only

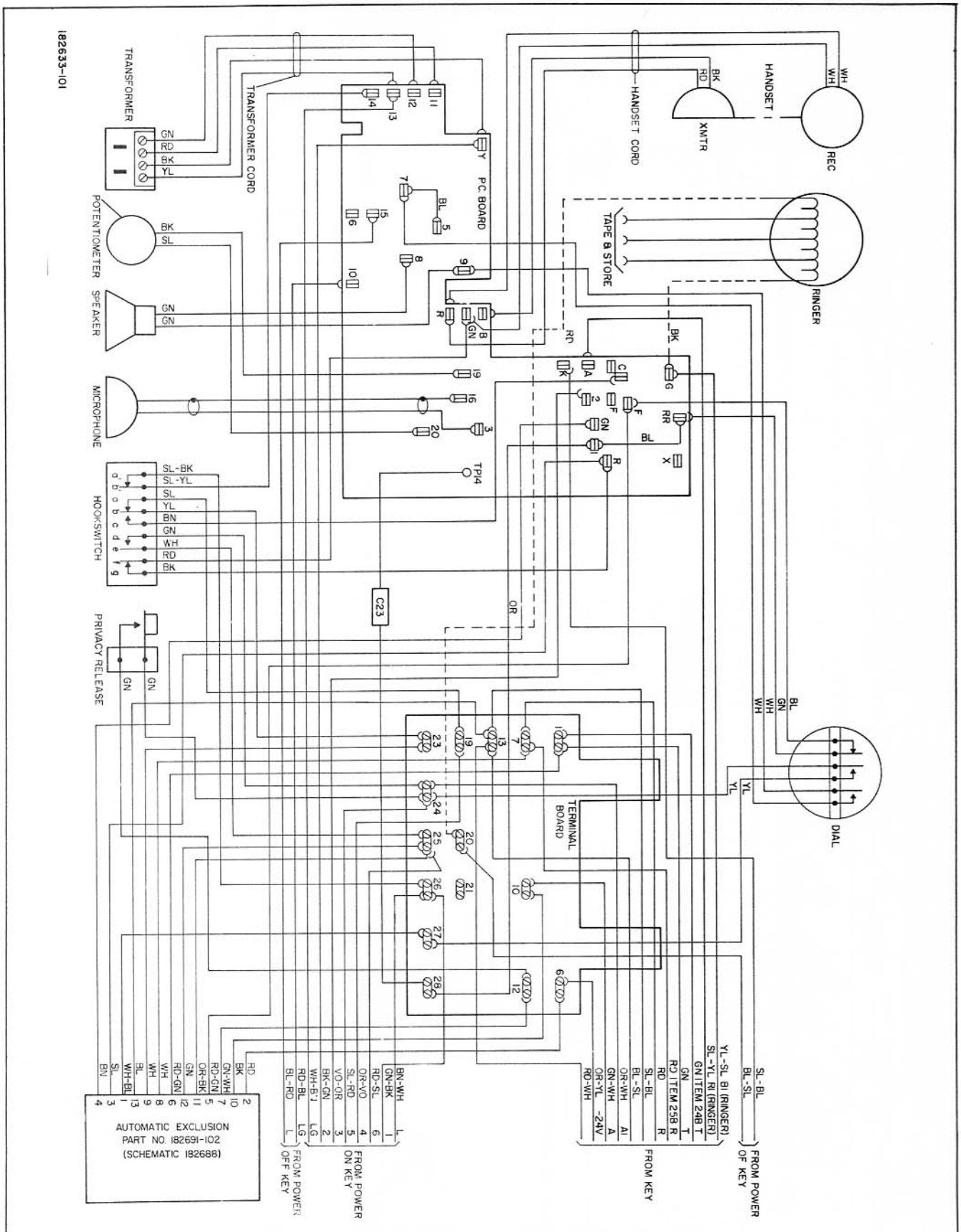

Fig. 4 - Set Wiring, K832/76 and K833/76. (Key Wiring Shown in Figures 13 and 14.)

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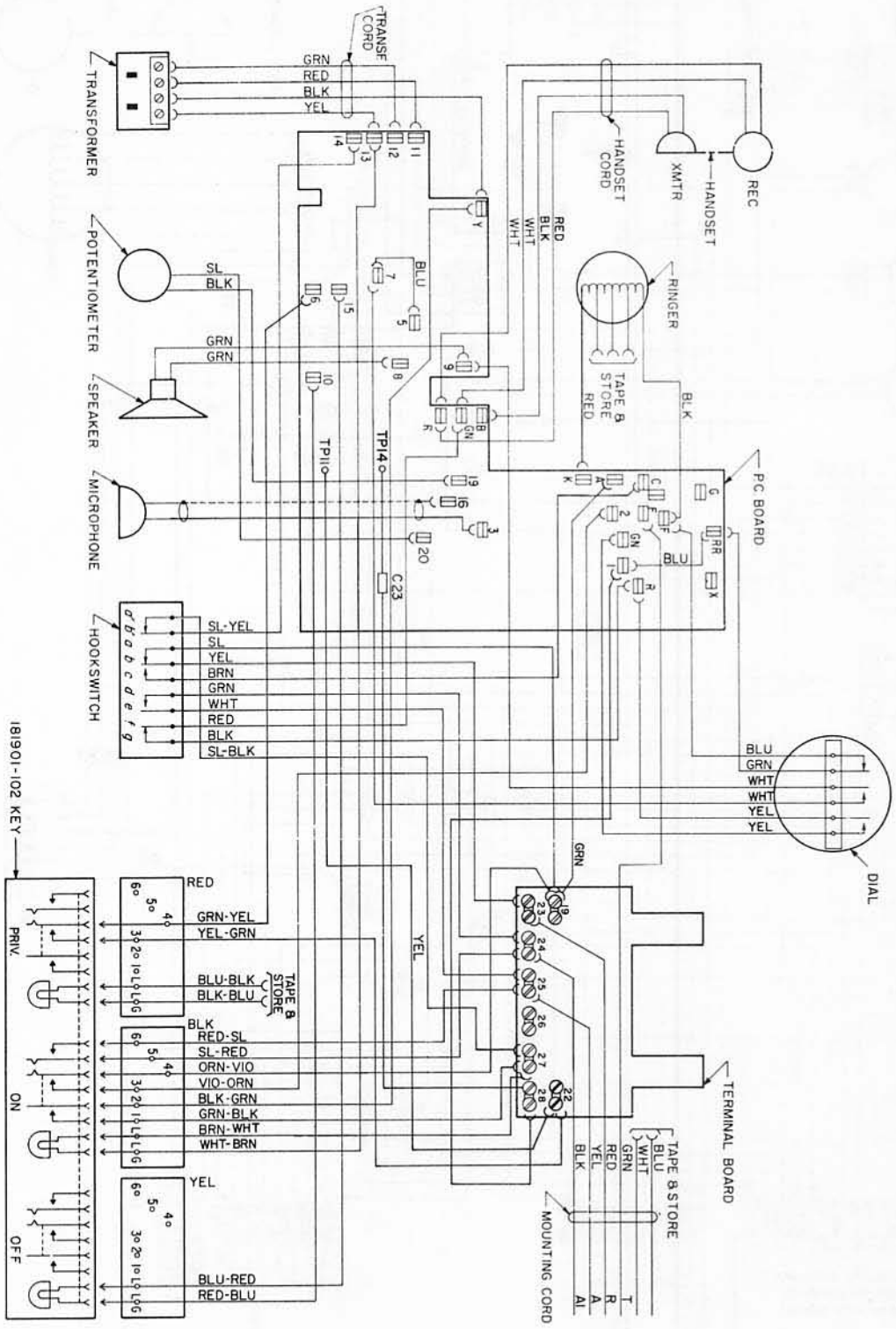

Fig. 5 - Wiring Diagram, K834

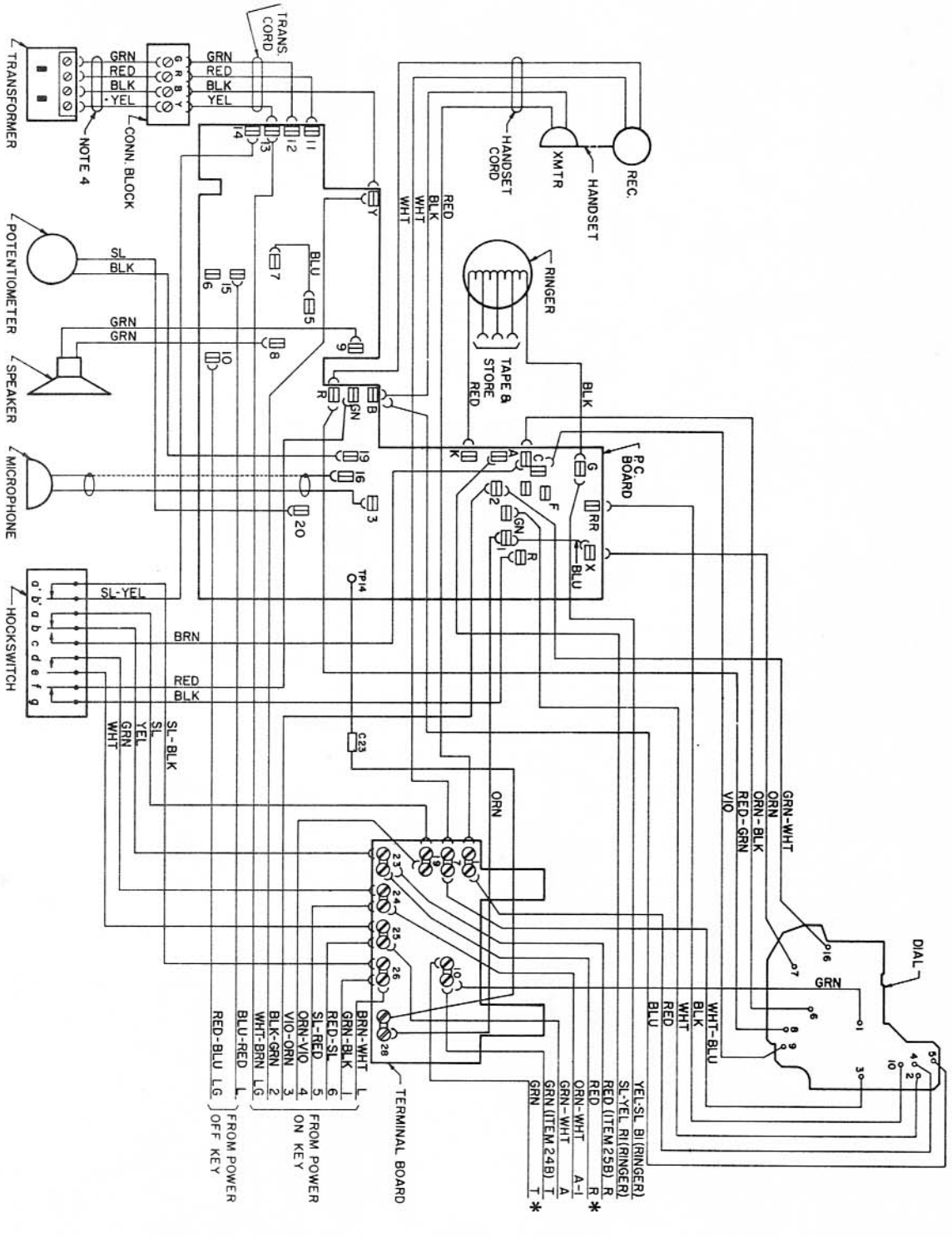

Fig. 6 - Set Wiring, K2832/42 and K2833/42. (Dial Equipped With White-Blue Lead.)
(Key Wiring Shown in Figures 11 and 12.)

* 2833 Only

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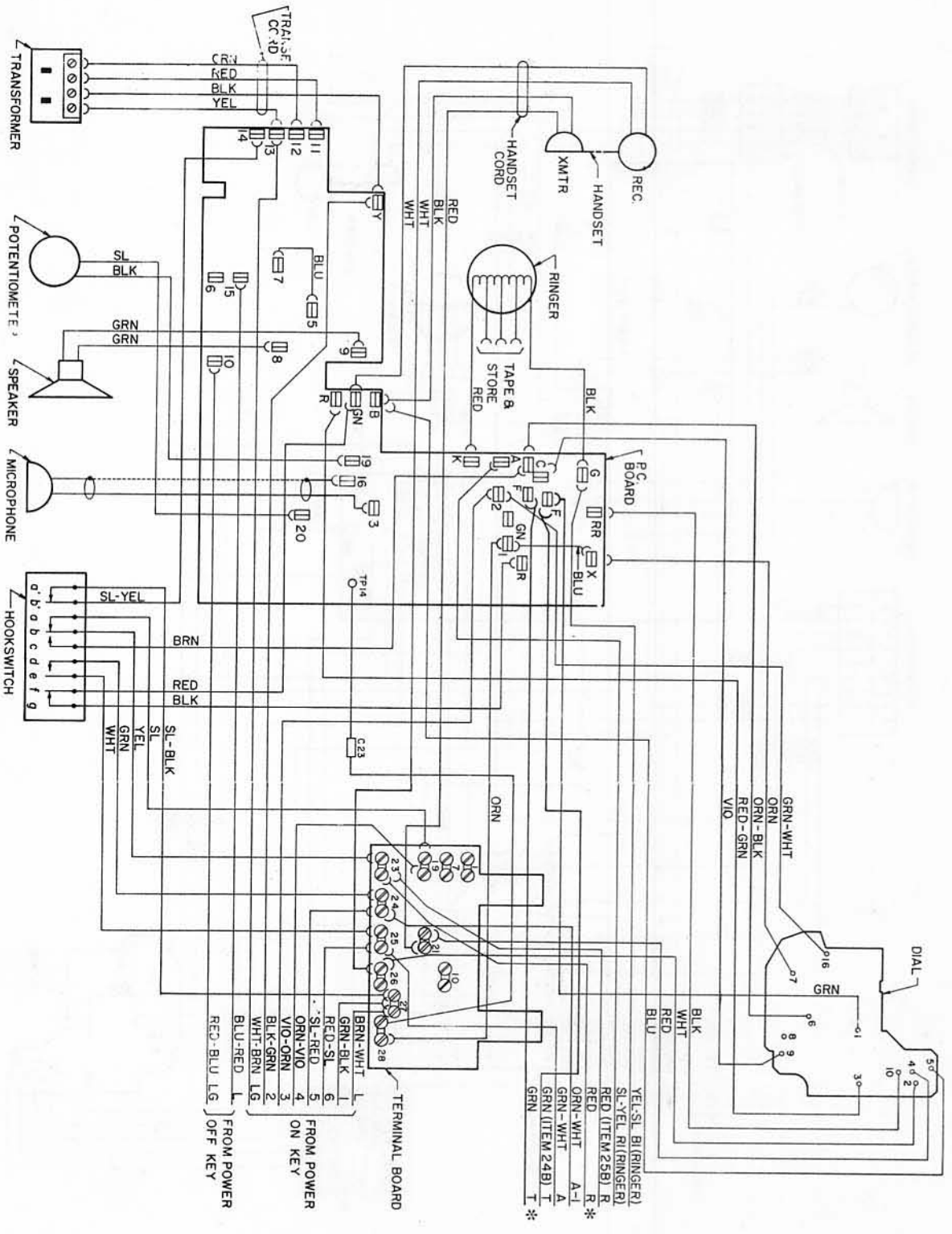

Fig. 7 - Set Wiring, K2832/42 and K2833/42. (Dial Not Equipped With White-Blue Lead.)
(Key Wiring Shown in Figures 11 and 12.)

* 2833 Only

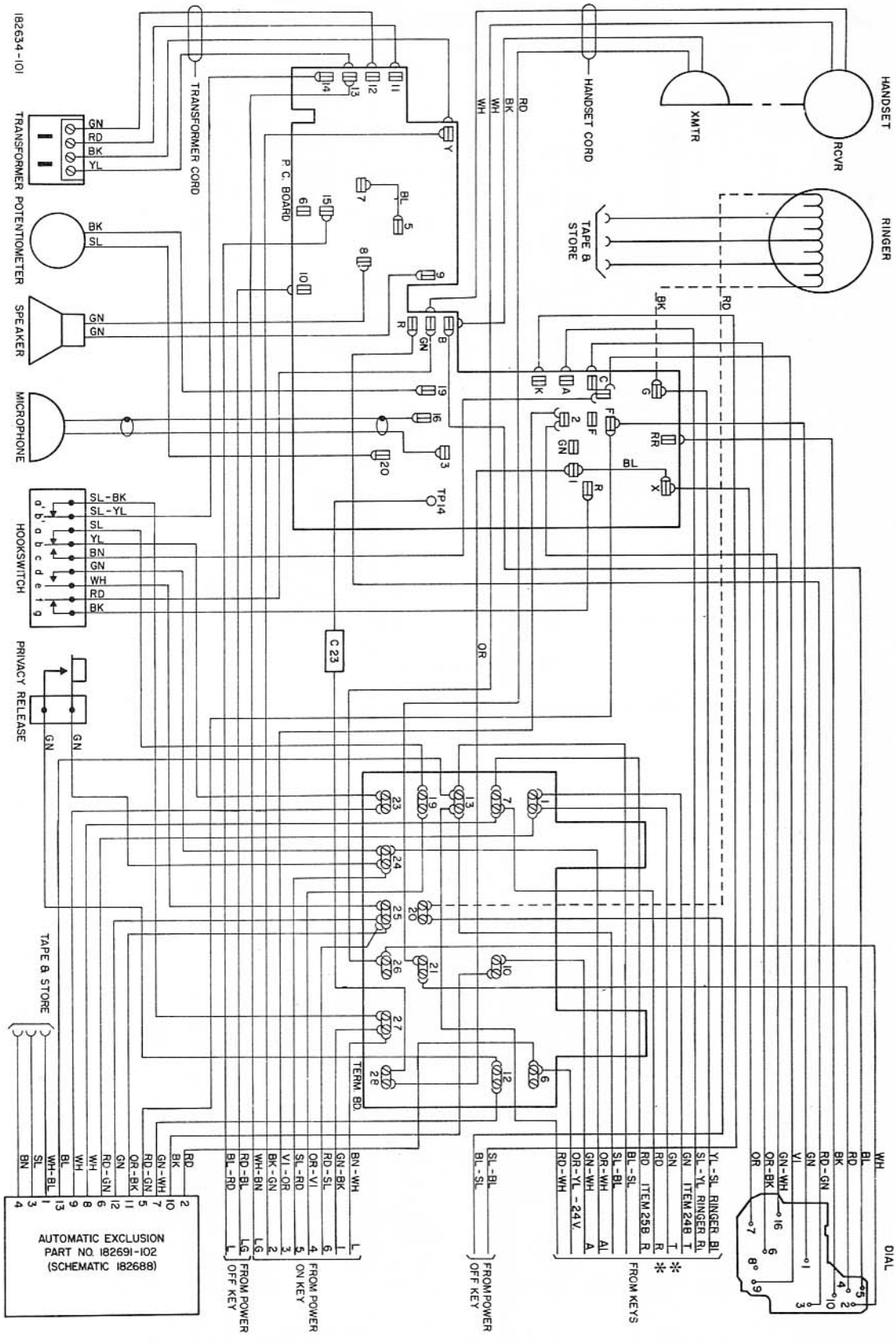

Fig. 8 - Set Wiring, K2832/76 and K2833/76. (Key Wiring Shown in Figures 13 and 14.)

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Fig. 9 - Wiring Diagram, K2834. (Dial Equipped With White-Blue Lead.)

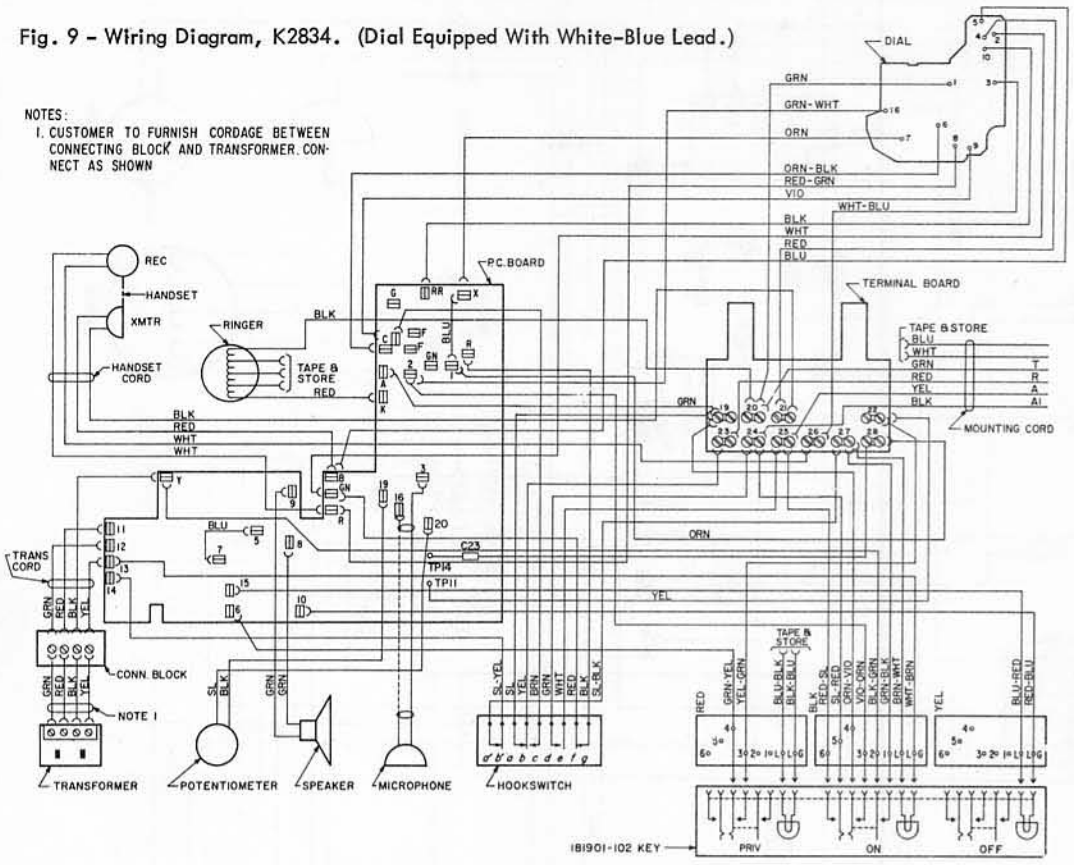
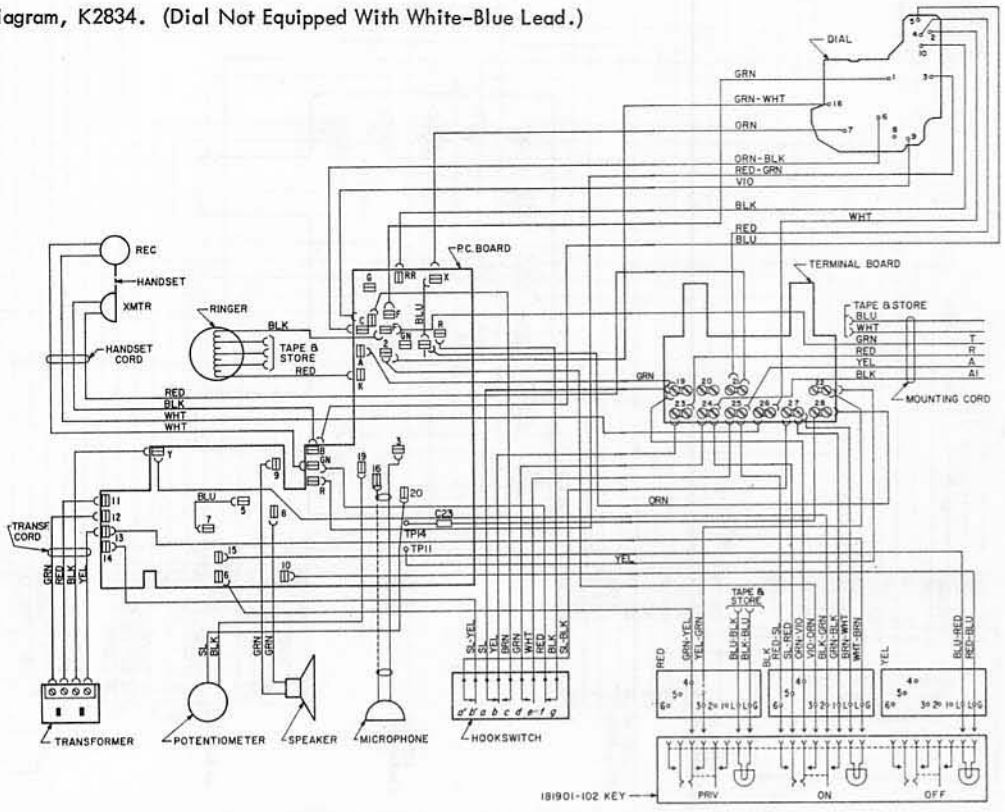
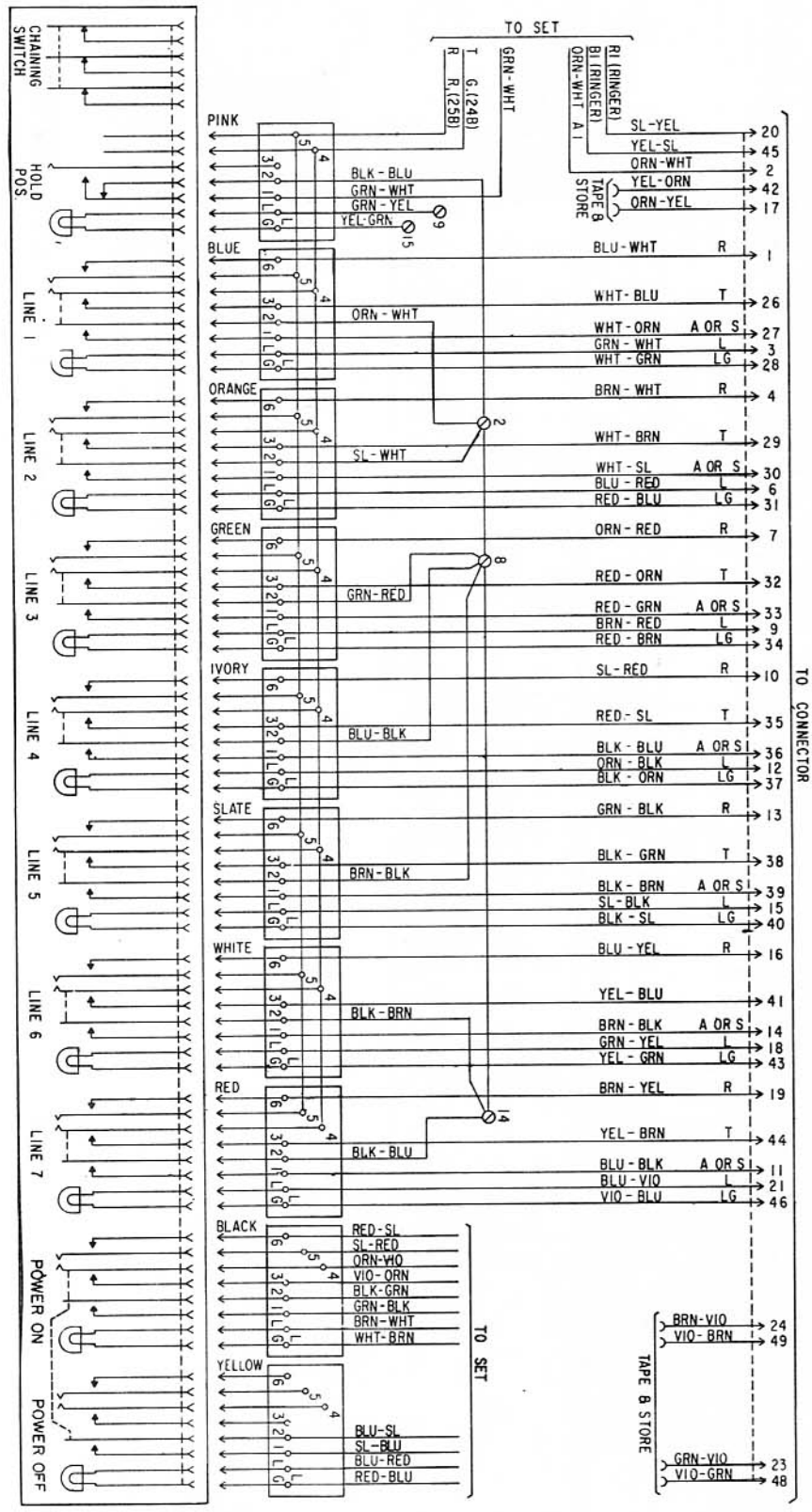


Fig. 10 - Wiring Diagram, K2834. (Dial Not Equipped With White-Blue Lead.)





181902-101

181901-103 KEY

NOTES:

1. COMMON TIP AND RING BRASS BUS LINES PLUG INTO KEY AND FIT BETWEEN KEY AND TERMINAL PLUG.
2. BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 2,8 AND 14.
3.
4. NUMBERED SCREW TERMINALS SHOWN ARE PART OF TERMINAL BOARD ASSEMBLY.
5. POSITIONS 5,8,22 AND 47 OF CONNECTOR ARE VACANT.

Fig. 11 - Key Wiring, K832/42 and K2832/42 Sets.

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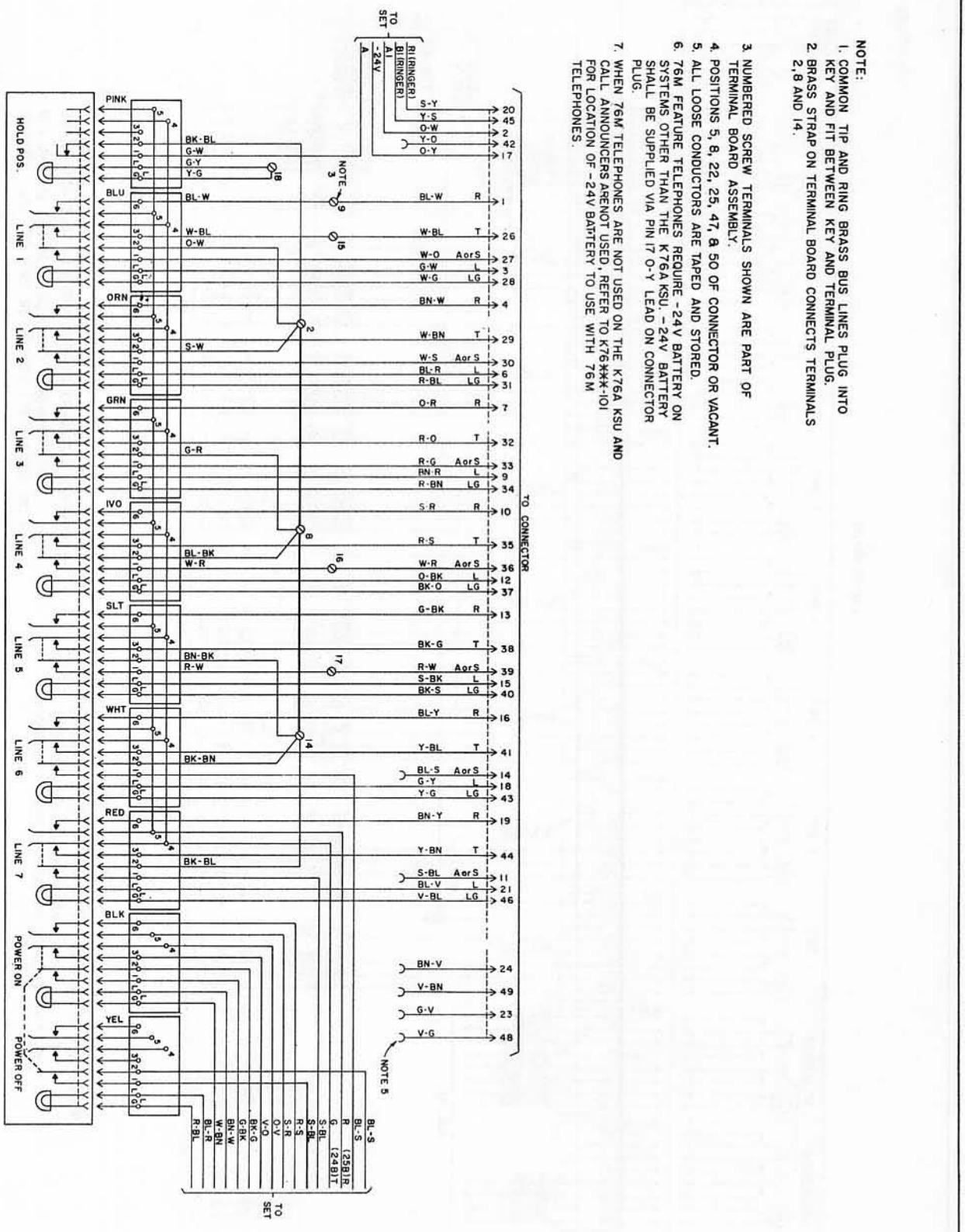
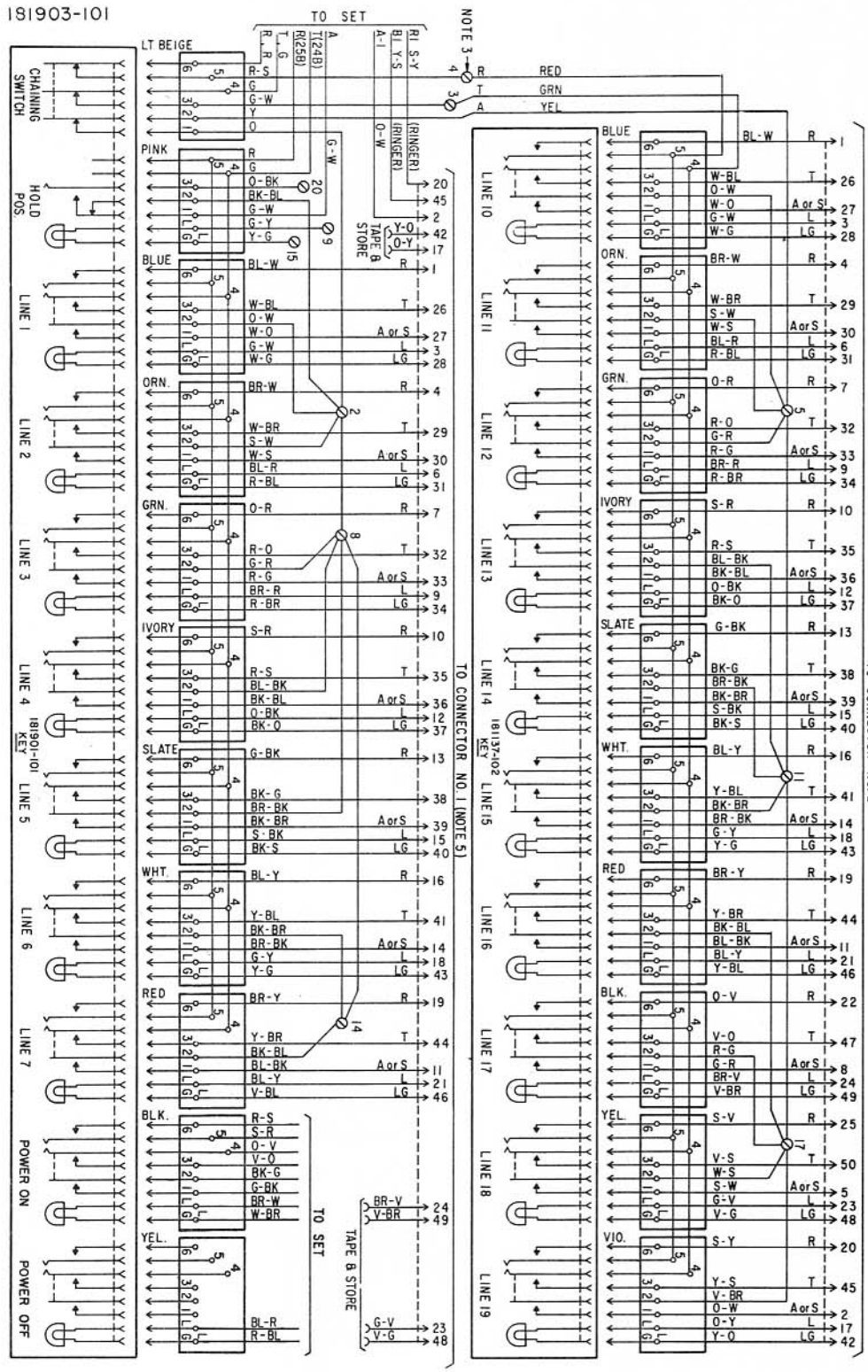


Fig. 12 - Key Wiring, K832/76 and K2832/76 Sets.



NOTES:

1. COMMON TIP AND RING BRASS BUS LINES PLUG INTO KEY AND FIT BETWEEN KEY AND TERMINAL PLUG.
2. BRASS STRAP ON TERMINAL BOARD CONNECTS TERMINALS 2,8 AND 14 AND 5,11 AND 17.
3. NUMBERED SCREW TERMINALS SHOWN ARE PART OF THE TERMINAL BOARD ASSEMBLEY.
4. CUSTOMER TO FURNISH CORDAGE BETWEEN CONNECTING BLOCK AND TRANSFORMER. CONNECT AS SHOWN.
5. POSITIONS 5,8,22 AND 47 OF CONNECTOR NO.1 ARE VACANT.

Fig. 13 - Key Wiring, K833/42 and K2833/42 Sets.

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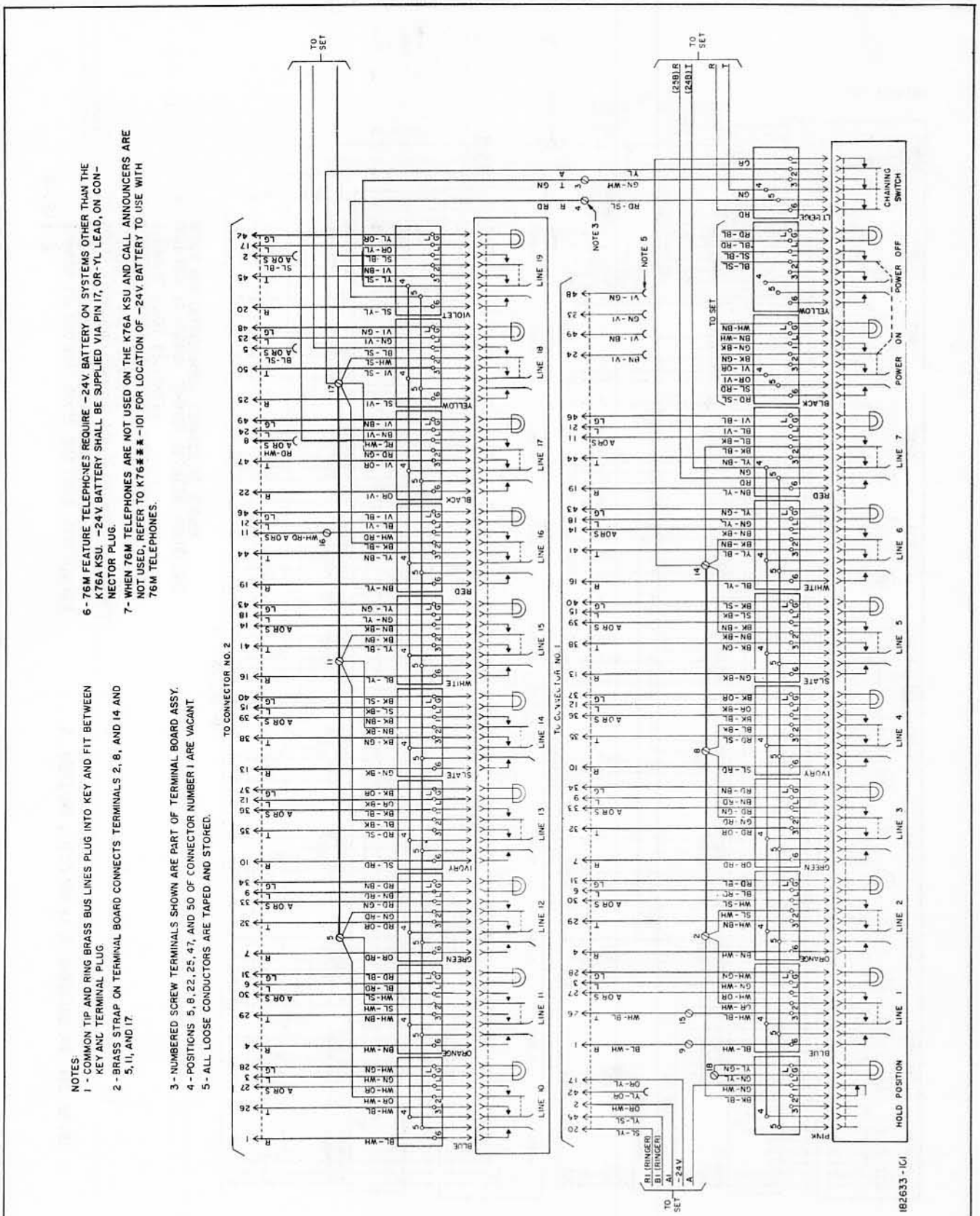

Fig. 14 - Key Wiring, K833/76 and K2833/76 Sets.

DIAL-IN-HANDSET, TRENDLINE*, TELEPHONES.
ROTARY DIAL; TYPE 200, DESK AND 254, WALL
TEL-TOUCH*; TYPE 2200, DESK AND 2254, WALL

Figure 1. Type 200, Desk Trendline Telephone

Figure 2. Type 2200 Desk Trendline Telephone

1. SCOPE

Section 362 covers general information, installation, illustrated parts lists, circuit diagrams and maintenance of "TRENDLINE" Dial-in-Handset telephones manufactured by ITT Telecommunications, Apparatus Department, Corinth, Mississippi 38834

2. IDENTIFICATION

Each telephone is identified by a code number stamped in ink on the base. See Table I, Ordering Information, for explanation of each code number.

Originally, these telephones were ordered in three separate components; the Handset, the Base, and the Handset Cord. Currently, the telephones are ordered as complete telephones; each carton containing the Handset, Base, and Handset Cord ready to install. The separate components may be ordered also. The desk telephone includes desk stand cord and a connecting block; the wall telephone does not include these items.

3. DESCRIPTION

The dial-in-handset telephone weighs approximately 2-1/4 pounds and is 9" long, 3" wide, and 3-3/4" high.

The Dial and Network are incorporated in the Handset; the Ringer and line switch in the Base. The two components are connected by a plug-in Handset Cord which is available in a selection of lengths; the standard Handset Cord has an extended length of 6 feet.

A Recall Button is provided in the Handset, just below the Dial. The user can disconnect a call by depressing the button for a moment. This permits making a series of calls without operating the line switch plunger in the telephone base.

4. OPERATION

(a) DIALING

Always listen for dial tone before dialing. When dialing with the rotary dial, do not release the dial until the finger comes firmly against the finger stop.

(b) RECALL BUTTON

The small button below the dial is the recall button. It is helpful when making consecutive calls. After completing a call, pressing the recall button for a few seconds will obtain dial tone.

NOTE: The Handset must be placed "on-hook" when the user has completed using the phone, just as with other telephones.

(c) OFF-HOOK POSITION (Wall Trendline)

You can hang the receiver (handset) on the side of the wall base if you leave the telephone temporarily during a call.

(d) HANGING UP

Always hang up the receiver when finished calling.

5. ORDERING INFORMATION

Ordering information is given in Table I.

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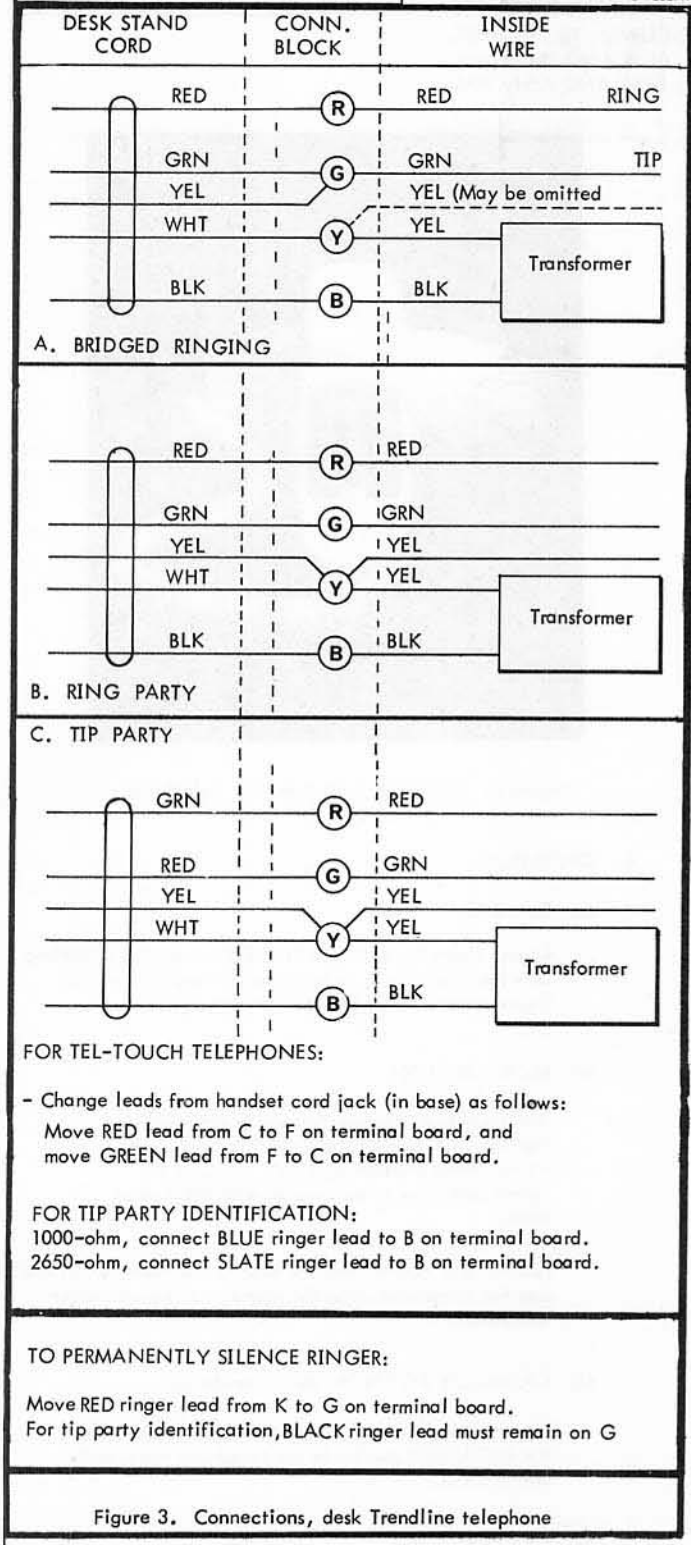


FOR TEL-TOUCH TELEPHONES:

- Change leads from handset cord jack (in base) as follows:
  Move RED lead from C to F on terminal board, and
  move GREEN lead from F to C on terminal board.

FOR TIP PARTY IDENTIFICATION:
1000-ohm, connect BLUE ringer lead to B on terminal board.
2650-ohm, connect SLATE ringer lead to B on terminal board.

TO PERMANENTLY SILENCE RINGER:

Move RED ringer lead from K to G on terminal board.
For tip party identification, BLACK ringer lead must remain on G

Figure 3. Connections, desk Trendline telephone

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

Note: If combined length of handset cord and desk stand cord is greater than 15 feet, use 53 A lamp for dial light.

6. INSTALLATION

INSTALLATION NOTE

Trendline telephones are equipped with dial lamp. If this feature is to be used, the telephone should be installed convenient to a 110-volt AC outlet. The recommended transformer, 31 ( ) 690, plugs directly into the outlet and is provided with terminals which are concealed when it is plugged in. Inside wire is used to connect the transformer to the telephone or connecting block as applicable.

6.1. INSTALLATION OF DESK TRENDLINE TELEPHONE

(a) Connect the Desk Stand Cord as shown in figure 3.

(b) Refer to figure six (6) and plug the Handset Cord into the Base and into the Handset.

6.2. INSTALLATION OF WALL TRENDLINE TELEPHONE

Wall telephones do not include a connecting block or mounting cord. Inside wire must be connected within the telephone. Inside wire will normally enter the instrument through the left hand opening in the bottom of the Base Plate. Concealed wiring may enter through any suitable hole in the Base Plate, but the installer must be sure that wiring does not foul the ringer or hookswitch.

(a) Remove Housing from Base Assembly (Figure 11)

1. Remove nameplate (1) by inserting a release tool in the slot at the right hand end and prying the nameplate out.

2. Loosen the two housing screws (3) and lift off housing.

CAUTION: REFER TO FIGURE 5 BEFORE REINSTALLING THE HOUSING

(b) Position the Base Assembly on the wall, and center mark the small end of the "keyhole" shaped holes in the base. Remove the Base Assembly and start the mounting screws. Install the Base Assembly on the screws and tighten screws.

(c) Connect inside wire as shown in figure 4.

Two general methods are shown in figure 4. Figure 4A illustrates methods of connecting when not using a connecting block. Figure 4B illustrates methods of connecting when using a connecting block as a common connection point for inside wire.

(d) Install Housing

CAUTION: SEE FIGURE 5 BEFORE INSTALLING HOUSING

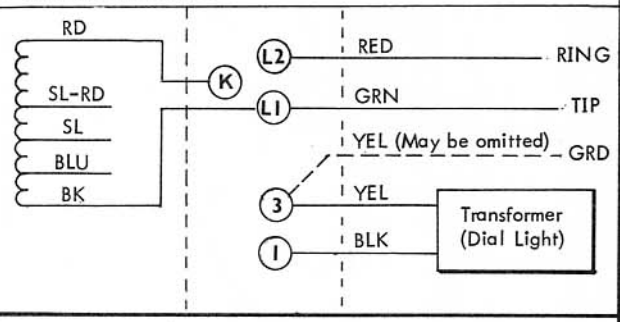
Refer to figure 5 and install Housing on Base assembly. Tighten housing screws and install nameplate.

(e) Install Handset Cord

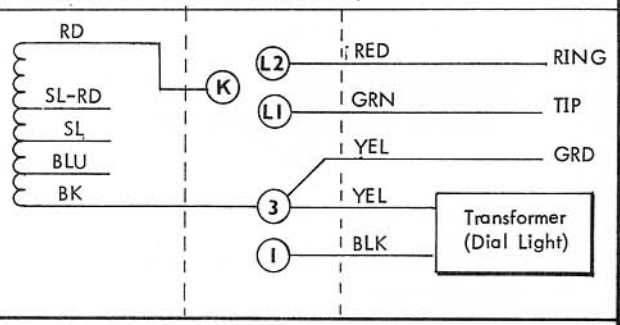
Refer to figure 6 and plug the Handset Cord into the Base and into the Handset.

RINGER | TERM. BOARD | INSIDE WIRE

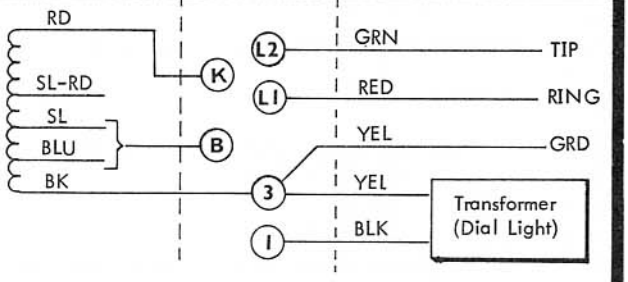
(1) BRIDGED RINGING



(2) RING PARTY (DIVIDED RINGING)



(3) TIP PARTY



FOR TEL-TOUCH TELEPHONES:

Change leads from handset cord jack (in base) as follows:

Move RED lead from C to F on terminal board, and
move GREEN lead from F to C on terminal board.

FOR TIP PARTY IDENTIFICATION:
1000-ohm , connect BLUE ringer lead to B on terminal board.
2650-ohm , connect SLATE ringer lead to B on terminal board.

TO PERMANENTLY SILENCE RINGER

Move RED ringer lead from K to 3 on terminal board.
BLACK ringer lead must also remain on 3.

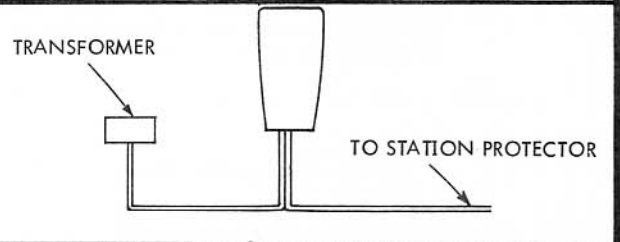
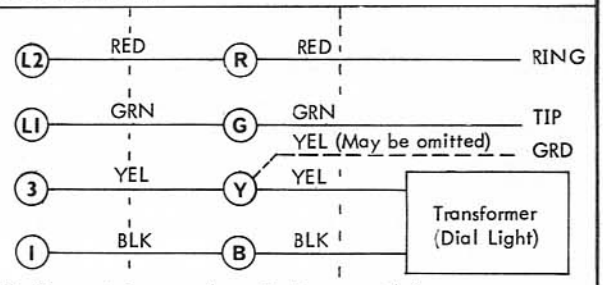


Figure 4A. Connections, wall Trendline telephone when not using a connecting block,

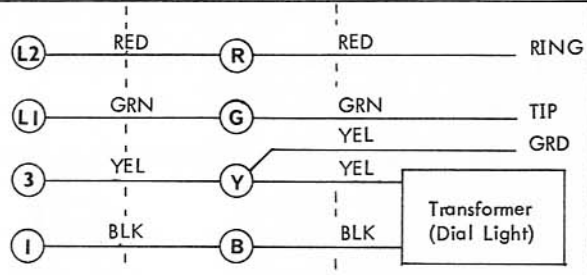
TERMINAL BOARD | CONN. BLOCK | INSIDE WIRE

(1) BRIDGED RINGING



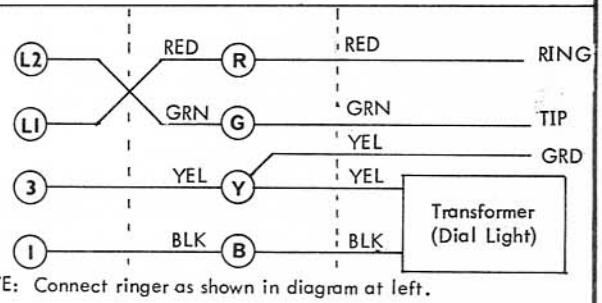
NOTE: Connect ringer as shown in diagram at left.

(2) RING PARTY (DIVIDED RINGING)



NOTE: Connect ringer as shown in diagram at left.

(3) TIP PARTY



NOTE: Connect ringer as shown in diagram at left.

FOR TEL-TOUCH TELEPHONES:

Change leads from handset cord jack (in base) as follows:

Move RED lead from C to F on terminal board, and
Move GREEN lead from F to C on terminal board.

FOR TIP PARTY IDENTIFICATION:
1000-ohm, connect BLUE ringer lead to B on terminal board.
2650-ohm, connect SLATE ringer lead to B on terminal board.

TO PERMANENTLY SILENCE RINGER

Move RED ringer lead from K to 3 on terminal board.
BLACK ringer lead must also remain on 3.

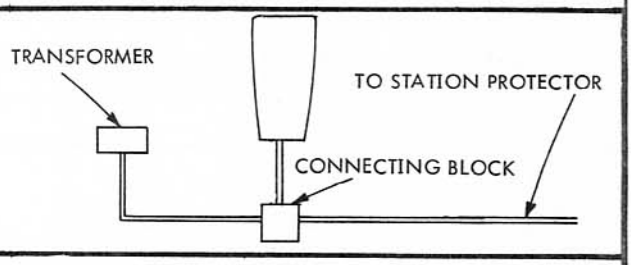


Figure 4B. Connections, wall Trendline telephone, using a connecting block as a common connecting point for inside wire and transformer leads.

NOTE: Wall Trendline telephones are factory wired for divided ringing.

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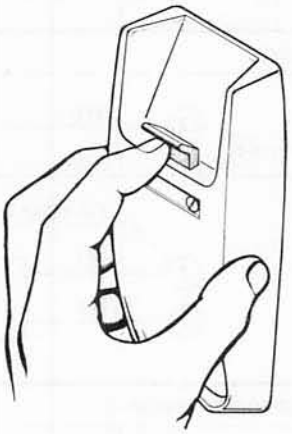
CORINTH, MISSISSIPPI
A DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

TABLE I. ORDERING INFORMATION

CODE	DESCRIPTION
COMPLETE TELEPHONES	
K-200**( )-M	Telephone, Trendline desk, rotary dial
K-254**( )-M	Telephone, Trendline wall, rotary dial
K-2200**( )-M	Telephone, Trendline desk, TEL-TOUCH dial
K-2254**( )-M	Telephone, Trendline wall, TEL-TOUCH dial
	ADD SPECIAL FEATURE CODE AS FOLLOWS:
	30-No special feature, (standard)
	37-Message-waiting, 90-volt (200 only)
	38-Message-waiting, 125-volt (200 only)
	INSERT RINGER CODE AS FOLLOWS:
	(BA)-Straight line biased ringer (153)
	(LR)-Less ringer
	SUBSTITUTE COLOR CODE AS FOLLOWS:
	00 - Black, 12 - Blue
	02 - Red, 13 - Beige
	04 - Yellow, 14 - Gray
	05 - Green, 15 - White
	09 - Ivory, 30 - Turquoise
	11 - Pink
COMPONENTS	
220A**-30M	Handset, standard, rotary dial
2220A**-30M	Handset, standard, TEL-TOUCH
AC1**( )	Base, Wall, standard
AD1**( )	Base, Desk, standard
	INSERT RINGER CODE SHOWN ABOVE
	SUBSTITUTE COLOR CODE SHOWN ABOVE
HANDSET CORDS	
1027**(03)650	Handset cord assembly, 6-feet, standard
1027**(23)650	Handset cord assembly, 9-feet
1027**(26)650	Handset cord assembly, 13-feet
	SUBSTITUTE COLOR CODE
TRANSFORMER (Dial Lamp)	
31( )690	Transformer, for dial lamp operation
DESK STAND (LINE) CORDS	
3060**(13)650	Cord, desk stand, 68-inch (standard)
3060**(25)650	Cord, desk stand, 9-feet
3060**(26)650	Cord, desk stand, 13-feet
3060**(24)650	Cord, desk stand, 25-feet
CIRCUIT LABELS	
180200	For 200 type
180201	For 254 type
180575	For 200 type with message waiting
180495	For 2200 type
180496	For 2254 type



CAUTION

WHEN INSTALLING HOUSING TO BASE, HOLD HOOKSWITCH PLUNGER UP AS SHOWN IN FIGURE TO AVOID DAMAGING THE HOOKSWITCH.

Figure 5. Installing Wall Base Housing

7. MAINTENANCE

NOTE: The following instructions are arranged in logical sequence of disassembly.

7.1 REMOVAL AND INSTALLATION OF HANDSET CORD

(a) REMOVAL OF HANDSET CORD (Figure 7).

Note: The Handset Cord plugs into the Handset and into the Base and is retained by a spring clip on the plug which clicks into locked position.

1. Insert a release tool in the slot provided as shown in figure 7A. Be sure the tool is on top of the spring clip.
2. Press the spring clip down and grasp the tool and plug as shown in figure 7B and pull out. (If the spring clip is difficult to depress, push in on the plug to relieve tension.)

(b) INSTALLATION OF HANDSET CORD (Figure 6)

1. Hold the plugs of the Handset Cord side-by-side and look at them from the end as shown in figure 6. Note that the end of one plug is "T" shaped.
2. Plug the "T" shaped plug into the Handset and the rectangular plug into the Base until the spring clip clicks into locked position.

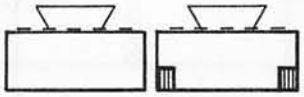


Figure 6. End View of Handset Cord Plugs. "T" Shaped Plug Plugs into Handset.

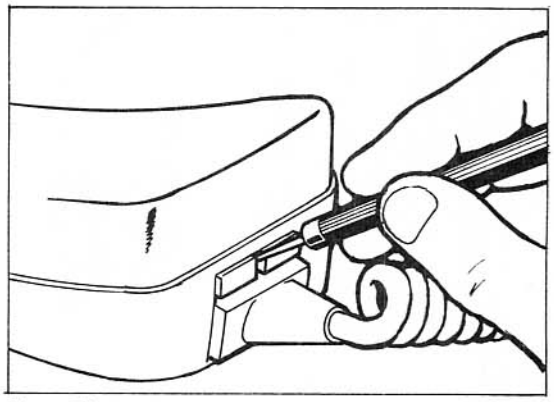


Figure 7A. Depress Spring Clip.

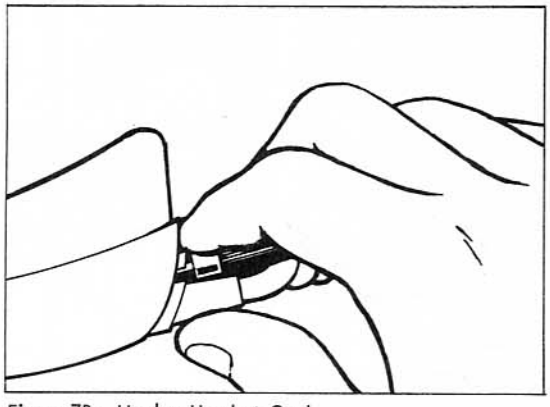


Figure 7B. Unplug Handset Cord.

Figure 7. Removal of Handset Cord. (Paragraph 7.1.)

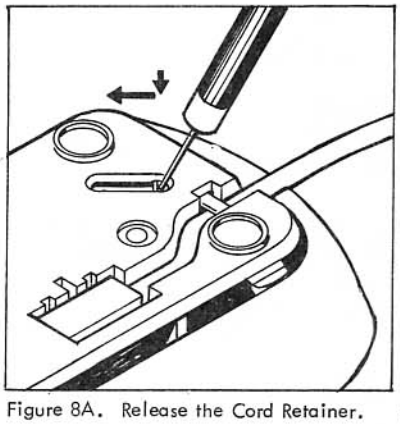


Figure 8A. Release the Cord Retainer.

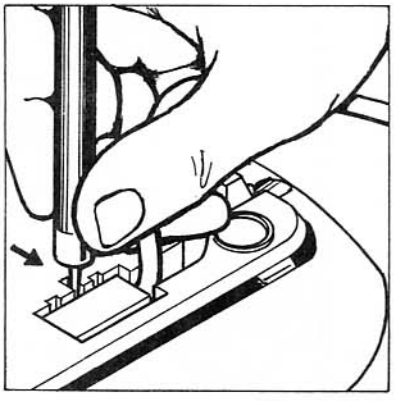


Figure 8B. Depress Spring Clip, Grasp Cord.

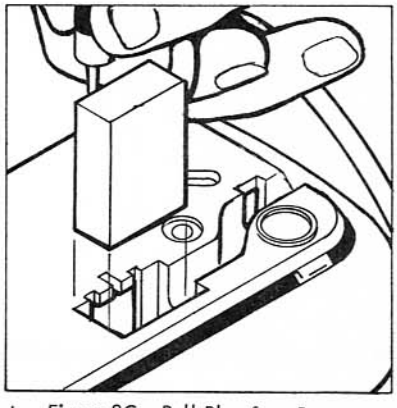


Figure 8C. Pull Plug from Base.

Figure 8. Removal of Desk Stand Cord. (Paragraph 7.2.)

7.2 REMOVAL AND INSTALLATION OF DESK STAND CORD (Figure 8)

NOTE: The Desk Stand Cord is retained in the desk base by two means: (1) The plug is provided with a spring clip which springs into locked position when the plug is inserted, and (2) a Cord retainer which pivots on a rivet and holds the cord in the channel provided in the base.

(a) REMOVAL OF DESK STAND CORD.

1. Place the point of a release tool on the Cord Retainer as shown in figure 8A. Press down lightly to free the Cord Retainer from its detent, then move it toward the left until its end clears the cord. Do not move the Cord Retainer farther than necessary.

2. Pull the cord up out of its channel. Grasp the cord and wedge the second finger between it and the base. At the same time use a release tool to release the spring clip as shown in figure 8B.

3. Pull plug out carefully as shown in figure 8C.

(b) INSTALLATION OF DESK STAND CORD

1. Plug cord in until the spring clip locks into place.

2. Press the cord down into the channel and slide the Cord Retainer over until it snaps into its detent.

3. REMOVAL AND INSTALLATION OF NAMEPLATE

(a) REMOVAL OF NAMEPLATE. Use a release tool and pry the nameplate out. (Figure 9A.)

(b) INSTALLATION OF NAMEPLATE. Insert one end of nameplate into housing. Bend opposite end into position as shown in figure 9B and let nameplate snap into place.

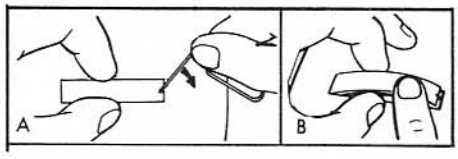


Figure 9. Removal and installation of nameplate

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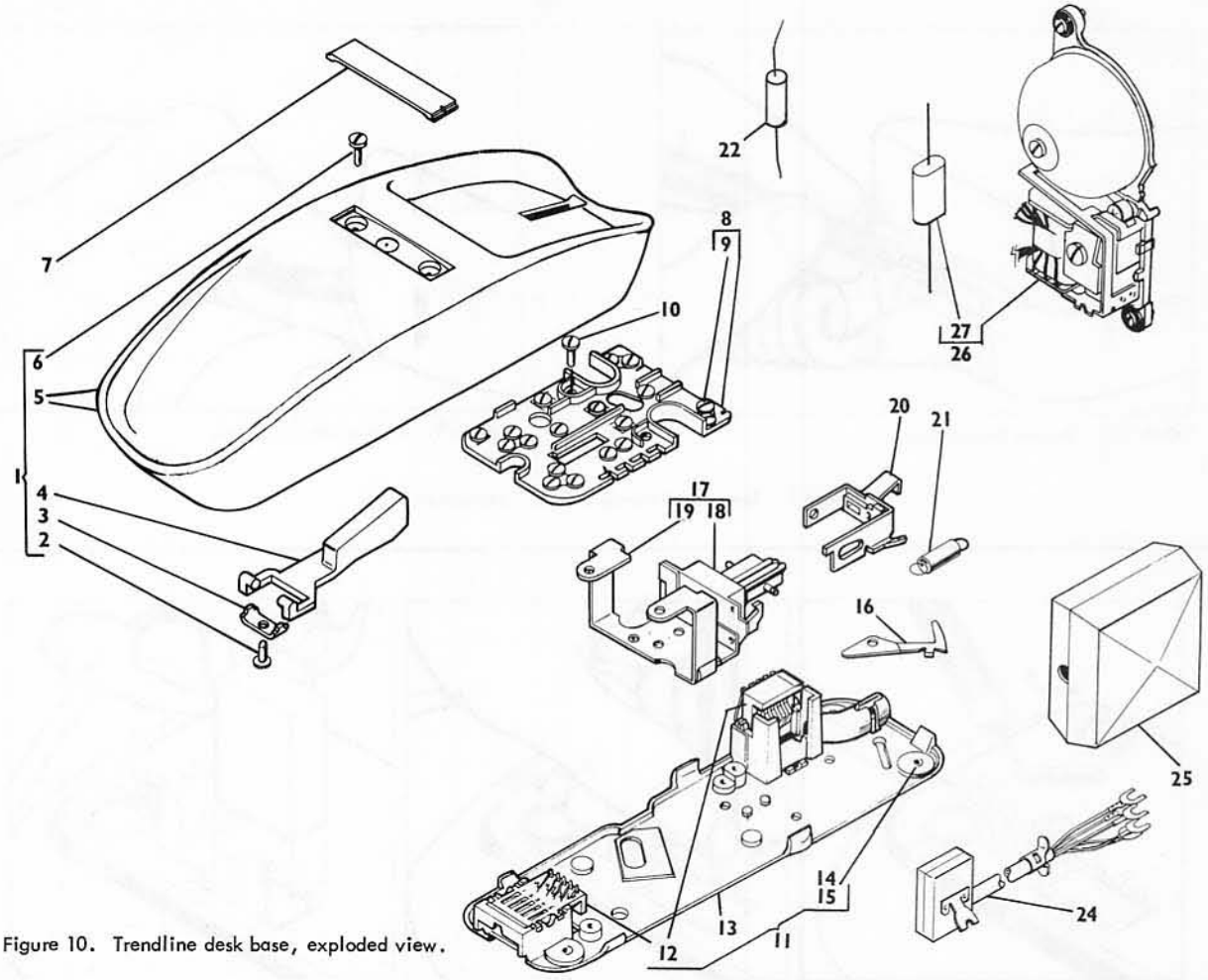

Figure 10. Trendline desk base, exploded view.

7.4 REMOVAL AND INSTALLATION OF BASE HOUSING (Desk or Wall)

(a) REMOVAL OF BASE HOUSING (Desk or Wall)

1. Remove the nameplate.
2. Loosen the two housing screws and lift off housing.

(b) INSTALLATION OF BASE HOUSING (Desk or Wall)

CAUTION: REFER TO FIGURE 5 BEFORE INSTALLING WALL HOUSING

1. Position housing carefully on base observing the caution in figure 5 for the wall base, and being sure the desk housing seats properly on the ears of the base.
2. Tighten housing screws.
3. Install nameplate.

7.5 REMOVAL AND INSTALLATION OF TERMINAL BOARD ASSEMBLY

(a) REMOVAL OF TERMINAL BOARD

To temporarily remove terminal board to access ringer, observe how wires are dressed, then remove the two mounting screws and pull terminal board up carefully.

(b) INSTALLATION OF TERMINAL BOARD

1. Install ringer capacitor if required as follows:

Note: Telephones coded (LR) are not factory equipped with ringer or ringer capacitor.

Place capacitor under terminal board and pull leads through slots at "A" and "K" and connect to "A" and "K" terminals. Clip off excess length.

Note: Leave about 1/4" spare length in the capacitor leads to permit moving the capacitor so it does not interfere with terminal screws.

2. Secure terminal board with two screws.
3. If leads have been disconnected from terminal screws, refer to appropriate circuit label to connect leads.

TABLE III. REPLACEABLE PARTS, "TRENDLINE" DESK BASE ASSEMBLY

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: AD1	AD2	AD3			
10		AD1**( )	BASE, "Trendline", Standard	X	-	-			
		AD2**( )	BASE, "Trendline", 90-volt Message Waiting	-	X	-			
		AD3**( )	BASE, "Trendline", 125-volt Message Waiting	-	-	X			
			Ringer Code:						
			(BA) Straight Line Biased Ringer	X	X	X			
			(LR) Less Ringer	X	X	X			
	1	88771-**	HOUSING ASSEMBLY	1	1	1			
	2	96006-2	SCREW, (Plunger Retainer)	1	1	1			
	3	88774-1	BRACKET, Plunger	1	1	1			
	4	88773-1	PLUNGER, Cradle Switch	1	1	1			
	5	88772-**	HOUSING	1	1	1			
	6	190139-1	SCREW, Housing	2	2	2			
	7	88554-**	NAMEPLATE (ITT)	1	1	1			
	8	88781-1	TERMINAL BOARD ASSEMBLY	1	1	1			
	9	79485-2	SCREW, (Terminal) - (Same as item 10)	18	18	18			
	10	79485-2	SCREW, (Terminal Board Attaching) - (Same as item 9)	2	2	2			
	11	180684-1	BASE PLATE ASSEMBLY, Includes Feet, Receptacles and Leads	1	1	1			
	12	NSS	RECEPTACLE	2	2	2			
		190106-220	WIRE ASSEMBLY, White	1	1	1			
		190106-221	WIRE ASSEMBLY, Black	1	1	1			
		190106-222	WIRE ASSEMBLY, Red	1	1	1			
		190106-223	WIRE ASSEMBLY, Green	1	1	1			
		190106-224	WIRE ASSEMBLY, Yellow	1	1	1			
	13	NSS	PLATE, Base (88776)	1	1	1			
	14	96009-1	FOOT, "Trendline"	4	4	4			
	15	95994-2	RIVET, Foot	4	4	4			
	16	88783-1	RETAINER, Cord	1	1	1			
		190137-8	RIVET, Cord Retainer Attaching	1	1	1			
	17	88777-1	CRADLE SWITCH ASSEMBLY	1	1	1			
	18	88559-1	CONTACT SPRING ASSEMBLY	1	1	1			
		190137-8	RIVET, Contact Spring Attaching	2	2	2			
	19	88778-1	BRACKET, Cradle Switch	1	1	1			
		31944-2	RIVET, Cradle Switch to Base	2	2	2			
	20	88779-1	ARM, Cradle Switch Operating	1	1	1			
	21	75307-1	SPRING, Return	1	1	1			
	22	62948-159	RESISTOR (470K)	-	1	-			
	22	62948-194	RESISTOR (680K)	-	-	1			
	23	(Not used)							
	24	3060**-13	CORD, Desk Stand, 68-inches (Standard)	1	1	1			
	24	3060**-24	CORD, Desk Stand, 25-feet	X	X	X			
	24	3060**-25	CORD, Desk Stand, 9-feet	X	X	X			
	24	3060**-26	CORD, Desk Stand, 13-feet	X	X	X			
	25	3200( )783	BLOCK, Connecting	1	1	1			
	26	153(BA)470	RINGER, Straight Line Biased, (Includes Capacitor)	X	X	X			
	26	152( )470	RINGER, Frequency Selective (Includes Matching Capacitor)	X	X	X			

HARMONIC		SYNCHROMONIC		DECIMONIC	
Code	Frequency	Code	Frequency	Code	Frequency
HA1	33 1/3 cps	HB1	30 cps	HC1	20 cps
HA2	50 cps	HB2	42 cps	HC2	60 cps
HA3	66 2/3 cps	HB3	54 cps	HC3	30 cps
HA4	16 2/3 cps	HB4	66 cps	HC4	40 cps
HA5	25 cps	HB5	16 cps	HC5	50 cps

27	------	CAPACITOR
	95995-3	.47mf, for frequencies 16, 16 2/3, 20 and 25 cps and BA ringer
	95995-4	.25mf, for frequencies 30 and 33 cps
	95995-5	.15mf, for frequencies 40 and 42 cps
	95995-6	.08mf, for frequencies 50, 54, 60, 66 and 66 2/3 cps

** COLOR CODE (See Table I)

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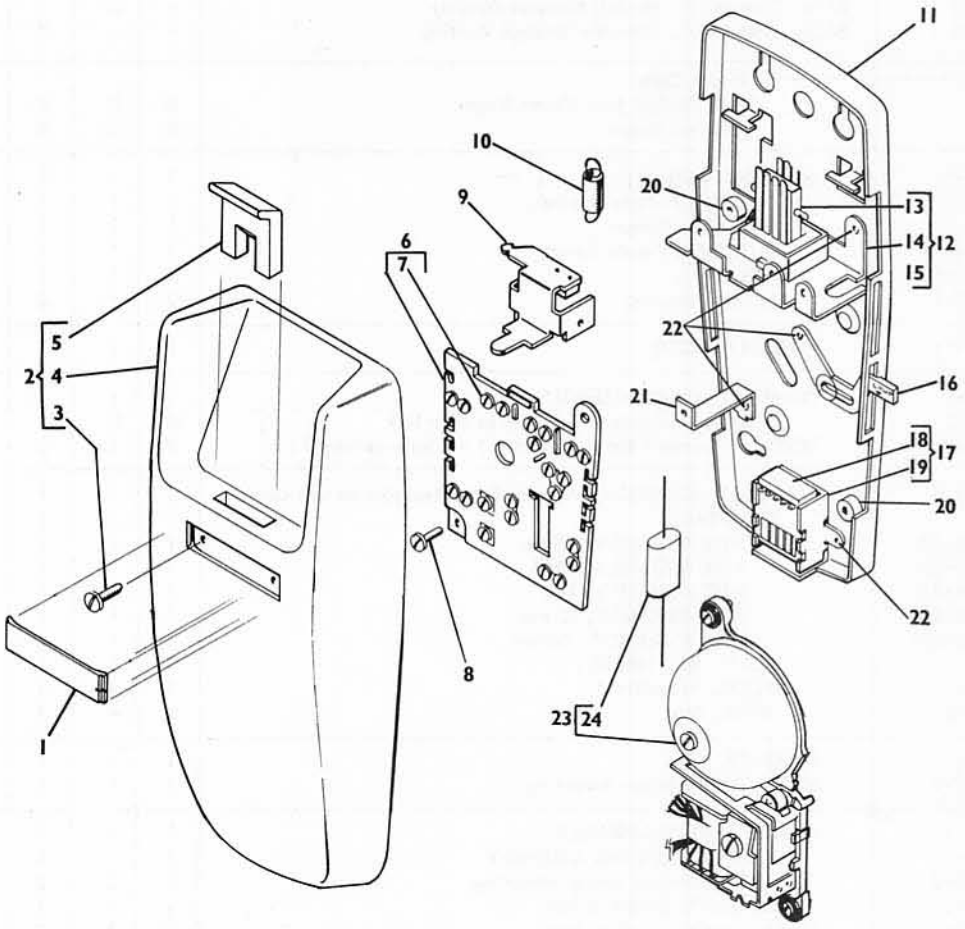

Figure 11. Trendline wall base, exploded view.

7.6 REMOVAL AND INSTALLATION OF RINGER

(a) REMOVAL OF RINGER

1. Disconnect ringer leads as follows:
   - BLACK lead from terminal "G" or "3" as applicable.
   - RED lead from terminal "K".
   - BLUE or SLATE lead from terminal "B" if connected. (For TIP party identification only.)
   - BLUE, SLATE and SLATE-RED leads are normally insulated and stored. Pull these from beneath hookswitch bracket and out of the slots in the terminal board.
2. Remove the two terminal board mounting screws and pull terminal board up.
3. Remove the two ringer mounting screws and remove ringer.

(b) INSTALLATION

Note: All Trendline ringers (152 and 153) are provided with a matching capacitor.

1. Install capacitor under terminal board as directed in paragraph 7.5 (b).
2. Place ringer on mounting bases and secure with the two screws included with each ringer.
3. Install terminal board.
4. Dress the ringer leads through a notch in the terminal board. On desk phones, connect RED ringer lead to "K" and BLACK ringer lead to "G". (Refer to figure 3 if installing phone.) On wall phones refer to figure 4 to connect ringer leads. Insulate and store spare leads dressing them through notches in terminal board. Be sure leads do not interfere with operation of hookswitch or ringer.

FIGURE NO.	INDEX NO.	PART NUMBER	NAME, Description (Indented items are included in the part under which they are indented)	QUANTITY USED ON: AC1					
			TABLE III. REPLACEABLE PARTS, "TRENDLINE" WALL BASE ASSEMBLY						
		AC1**( )	BASE, "TRENDLINE" Wall Telephone						
11	1	88554-**	NAMEPLATE (ITT)	1					
	2	88551-**	HOUSING ASSEMBLY	1					
	3	190139-1	SCREW, Housing	2					
	4	88552-**	HOUSING	1					
	5	88553-1	PLUNGER, Cradle	1					
	6	88557-1	TERMINAL BOARD ASSEMBLY	1					
	7	79485-2	SCREW, Terminal, (Same as item 8)	22					
	8	79485-2	SCREW, Terminal Board Attaching, (Same as item 7)	2					
	9								
	9	88561-1	ARM, Cradle Switch Operating	1					
	10	75307-1	SPRING, Return	1					
	11	88556-1	BASE PLATE	1					
	12	88777-2	CRADLE SWITCH ASSEMBLY	1					
	13	88559-1	SPRING ASSEMBLY	1					
	14	88560-1	BRACKET, Cradle Switch	1					
	15	190137-8	RIVET	2					
	16	88568-1	LEVER, Volume Control	1					
	17	88563-1	RECEPTACLE AND BRACKET ASSEMBLY, (Includes Wires)	1					
	18	88565-1	RECEPTACLE ASSEMBLY, (Includes Wires)	1					
	19	88564-1	BRACKET, Receptacle	1					
	20	95965-1	FASTENER, (Tapped Block)	2					
	21	88550-1	BRACKET, Terminal Board Mounting	1					
	22	190137-10	RIVET	7					
	23	153(BA)470	RINGER, Straight Line Biased (Includes Capacitor)	1					
	23	152 (--)470	RINGER, Frequency Selective(Includes Matching Capacitor)	1					

HARMONIC		SYNCHROMONIC		DECIMONIC	
Code	Frequency	Code	Frequency	Code	Frequency
HA1	33 1/3 cps	HB1	30 cps	HC1	20 cps
HA2	50 cps cps	HB2	42 cps	HC2	60 cps
HA3	66 2/3 cps	HB3	54 cps	HC3	30 cps
HA4	16 2/3 cps	HB4	66 cps	HC4	40 cps
HA5	25 cps	HB5	16 cps	HC5	50 cps

	24	------	CAPACITOR (Included with Ringer)
		95995-3	.47mf, for frequencies 16, 16 2/3, 20 and 25 cps
		95995-4	.25mf, for frequencies 30 and 33 1/3 cps
		95995-5	.15mf, for frequencies 40 and 42 cps
		95995-6	.08mf, for frequencies 50, 54, 60, 66 and 66 2/3 cps
			ADDITIONAL PARTS REQUIRED FOR MESSAGE-WAITING FEATURE (Not Shown)
		62948-159	RESISTOR, (470K); for 90-volt Message Waiting
		62948-194	RESISTOR, (680K); for 125-volt Message Waiting
		95544-5	CAPACITOR, (To add flashing feature)

** SUBSTITUTE COLOR CODE

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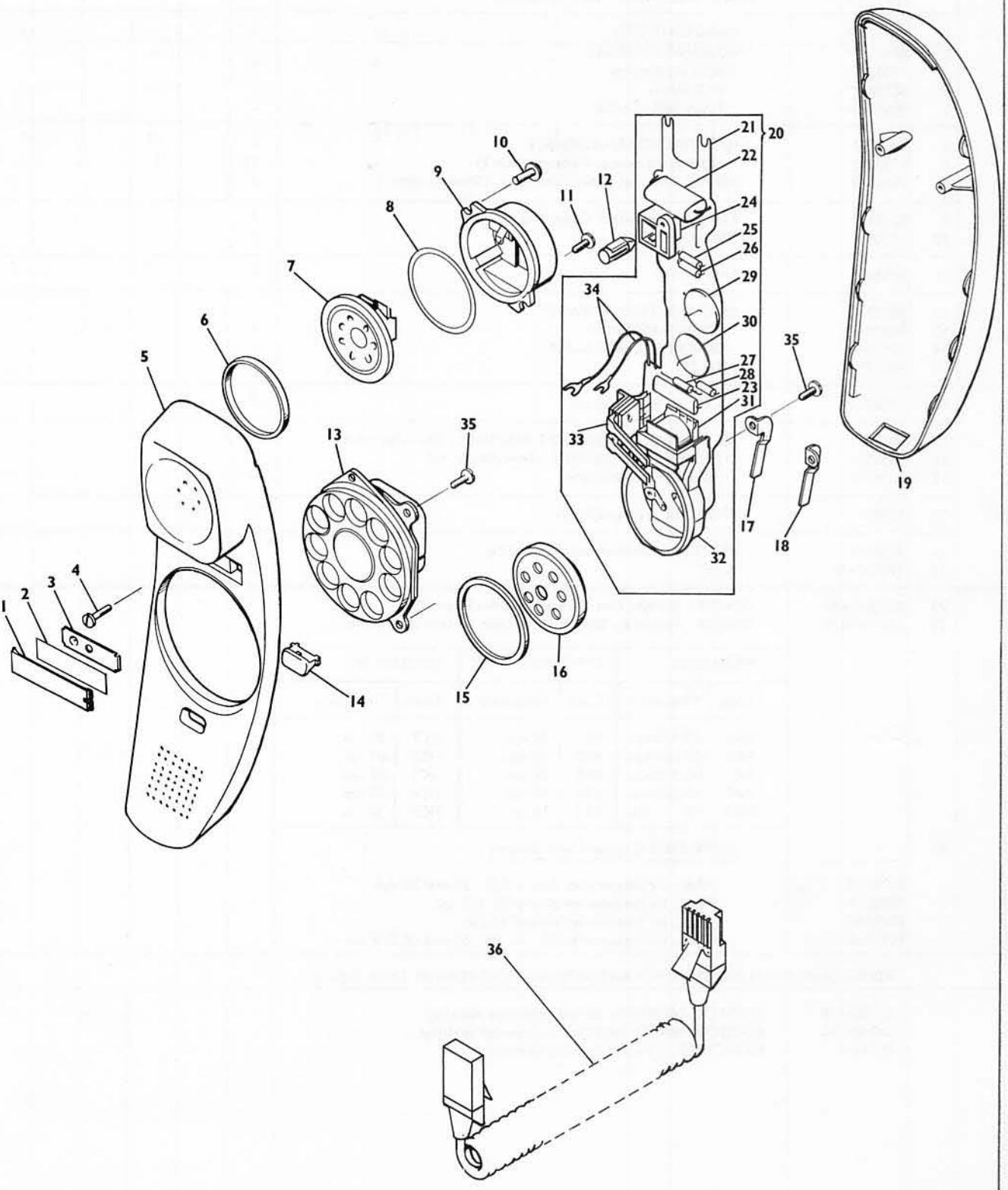

Figure 12. Rotary Dial Trendline Handset, Exploded View.
(Handset Cord is not part of Handset Assembly.)

FIGURE NO.	INDEX NO.	PART NUMBER	(Indented items are included in the NAME, Description part under which they are indented)	QUANTITY USED ON:					
			TABLE IV. REPLACEABLE PARTS, "TRENDLINE" HANDSET	220 30	220 37/38				
		220**-30M 220**-37M 220**-38M	HANDSET ASSEMBLY, "TRENDLINE", Standard HANDSET ASSEMBLY, "TRENDLINE", Message-Waiting (Used with AD2 or AD3 Base Assembly)						
12	1	87514-1	RETAINER, Number Card	1	1				
	2	87513-1	CARD, Number	1	1				
	2	87513-2	CARD, Number; Strip of 6	1	1				
	3	88593-1	SHIELD, Light	1	1				
	4	75407-6	SCREW, Housing	2	2				
	5	88707-**	HOUSING, "Trendline" Handset, Front	1	1				
	6	88704-1	GASKET, Receiver (Grommet Type)	1	1				
	7	88250-1	RECEIVER Unit	1	1				
	8	88706-1	GASKET	1	1				
	9	88594-1	CUP, Receiver	1	1				
	10	180245-2	SCREW, Washer Head	2	2				
	11	69116-4	SCREW, Transmitter and Receiver Terminal	4	4				
	12	96405-1	LAMP (53B) (Dial Light)	1	–				
	13	10A(G)450	DIAL ASSEMBLY (95991-1)	1	1				
			(See Section 229 for breakdown of dial parts.)						
		180308-**	NUMBER CARD, Colored	1	1				
	14	88701-**	BUTTON, Recall	1	1				
	15	88705-1	GASKET, Transmitter	1	1				
	16	75555-1	TRANSMITTER	1	1				
	17	88719-2	RETAINER, Transmitter, LH	1	1				
	18	88719-1	RETAINER, Transmitter, RH	1	1				
	19	88718-**	COVER, Handset	1	-				
	19	180239-**	COVER AND LAMP ASSEMBLY, Message-Waiting	-	1				
		180241	LAMP AND LENS ASSEMBLY	-	1				
		88213	TUBING, Insulating	-	2				
	20	88708-1	FLEXPRINT ASSEMBLY (Includes items 21 thru 34)						
	20	88708-2	FLEXPRINT ASSEMBLY		1				
	21	88709-1	FLEXPRINT	1	1				
	22	95995-1	CAPACITOR	1	1				
	23	95995-2	CAPACITOR	1	1				
	24	88589-1	LAMP HOUSING ASSEMBLY	1	-				
	25	62948-9	RESISTOR	1	1				
	26	62948-113	RESISTOR	1	1				
	27	62948-78	RESISTOR	1	1				
	28	62948-107	RESISTOR	1	1				
	29	95974-1	VARISTOR	1	1				
	30	95974-2	VARISTOR	1	1				
	31	88710-1	COIL, Induction	1	1				
	32	88597-1	CUP, Transmitter	1	1				
	33	88576-1	SWITCH ASSEMBLY, RECALL	1	1				
	34	88723-1	WIRE ASSEMBLY	2	4				
		88127-2	SCREW, (Lamp Housing and Recall Switch Attach.)	2	4				
	35	88127-2	SCREW, (Transmitter Retainer, 2; Dial, 3.)	5	5				
	36	1027** (03) 650	CORD, Handset, 6 feet of usable length						
	36	1027** (25) 650	CORD, Handset, 9 feet of usable length						
	36	1027** (26) 650	CORD, Handset, 13 feet of usable length						

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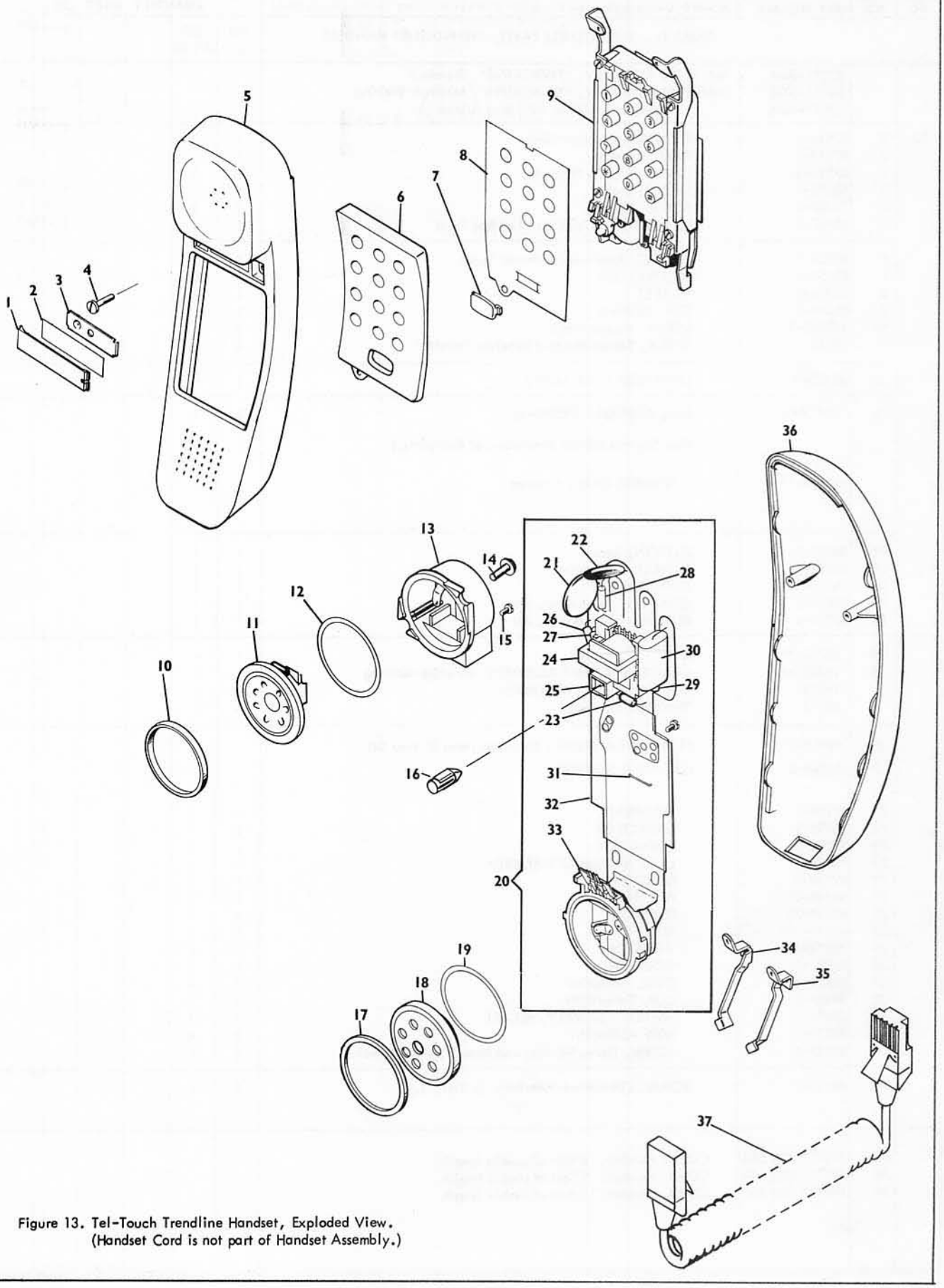

Figure 13. Tel-Touch Trendline Handset, Exploded View.
(Handset Cord is not part of Handset Assembly.)

FIGURE NO.	INDEX NO.	PART NUMBER	(Indented items are included in the NAME, Description part under which they are indented)	QUANTITY USED ON: 2220 30M	2220 37/38				
			TABLE V. REPLACEABLE PARTS LIST, "TEL-TOUCH" TRENDLINE HANDSET						
13		2220**-30M	HANDSET ASSEMBLY, Standard T-T Trendline	1	-				
		2220**-37/38M	HANDSET ASSEMBLY, Message-Waiting T-T Trendline	-	1				
	1	87514-1	RETAINER, Number Card	1	1				
	2	87513-1	CARD, Number	1	1				
	2	87513-2	CARD, Number; Strip of Six 87513-1	X	X				
	3	88593-1	SHIELD, Light	1	1				
	4	75407-6	SCREW, Housing	2	2				
	5	180261-**	HOUSING, T-T Trendline Handset; Front	1	1				
	6	180445-2	GUIDE, Light; (Includes Dial Letters)	1	1				
	6	180445-1	GUIDE, Light; Plain	-	-				
	7	180426-1	BUTTON, Recall	1	1				
	8	180452-##	CARD, Background	1	1				
	9	180499-1	DIAL, Trendline T-T 3700(D)450	1	1				
		180330-1	SCREW, Dial Attaching, Lower	2	2				
		96406	SCREW, Dial Attaching, Upper	2	2				
	10	180365-1	GASKET, Receiver Unit to Handset Housing	1	1				
	11	88250-1	UNIT, Receiver	1	1				
	12	88706-1	GASKET, Receiver Unit to Cup	1	1				
	13	180402-1	CUP, Receiver	1	1				
	14	180245-2	SCREW, Washer Head	4	4				
	15	180329-1	SCREW, Receiver Terminal	2	2				
	16	96405-1	LAMP, Dial Light (53B)	1	-				
	17	88705-1	GASKET, Transmitter Unit to Handset Housing	1	1				
	18	75555-1	UNIT, Transmitter	1	1				
	19	180327-1	GASKET, Transmitter Unit to Cup	1	1				
	20	180455-101	FLEXPRINT ASSEMBLY, (Network)	1	-				
	20	180455-102	FLEXPRINT ASSEMBLY, (Network)	-	1				
	21	180342-1	VARISTOR, (RV3)	1	1				
	22	180340-1	VARISTOR, (RV2)	1	1				
	23	180334-1	VARISTOR, (RV1)	1	1				
	24	88710-1	TRANSFORMER, (Induction Coil)	1	1				
	25	180428-1	BLOCK, Lamp and Transformer	1	1				
	26	62948-113	RESISTOR, (R1)	1	1				
	27	62948-160	RESISTOR, (R4)	1	1				
	28	62948-78	RESISTOR, (R3)	1	1				
	29	62948-107	RESISTOR, (R2)	1	1				
	30	95995-1	CAPACITOR, (C1)	1	1				
	31	180335-1	STRAP	1	1				
	32	180414-1	INSULATOR	1	1				
	33	180429-1	CUP, Transmitter (Includes Recall Switch, Cord Receptacle and Terminal Screws)	1	1				
		69116-4	SCREWS, Terminal	2	2				
	34	180424-1	BRACKET, Transmitter Cup, LH	1	1				
	35	180423-1	BRACKET, Transmitter Cup, RH	1	1				
		96406	SCREW, Bracket Mounting	2	2				
	36	180262-**	COVER, Handset	1	-				
	36	181075-***	COVER AND LAMP ASSEMBLY	-	1				
	36	180241-101	LAMP AND LENS ASSEMBLY	-	1				
	37	1027**-066	CORD, Handset, 6-foot useable length						
	37	1027**-108	CORD, Handset, 9-foot useable length						
	37	1027**-156	CORD, Handset, 13-foot useable length						

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7.7 RECEPTACLE ASSEMBLIES

The receptacle assemblies (12, figure 10 and 18, figure 11) are staked in place and replacement is not recommended.

7.8 REMOVAL AND INSTALLATION OF HOOKSWITCH ASSEMBLY

(a) REMOVAL OF HOOKSWITCH ASSEMBLY

Use the point of an oversize drill and drill off the heads of the three mounting rivets. Drive rivets out.

CAUTION: Do not drill into die cast base.

(b) INSTALLATION OF HOOKSWITCH ASSEMBLY

Rivet hookswitch assembly in place. Connect leads as shown in appropriate circuit diagram.

7.9 DISASSEMBLY AND REASSEMBLY OF HANDSET

NOTE: Instructions are in logical sequence of disassembly. Assemble in reverse order.

(a) HANDSET CORD

See paragraph 7.1.

(b) NUMBER CARD AND LIGHT SHIELD GROUP. (Items 1, 2 and 3)

Remove retainer (1) as shown in figure 9. Lift out number card (2) and light shield (3).

(c) HANDSET COVER (Item 19)

Loosen housing screws (4) and remove cover.

CAUTION: On message-waiting phones, loosen cover, disconnect lamp leads, then remove cover.

(d) FLEXPRINT ASSEMBLY (Item 20)

(1) FLEXPRINT ASSEMBLY, Rotary Dial (Figure 12)

Disconnect flexprint leads from receiver cover (9) and dial. The dial does not have an off-normal switch and two leads (34) are all required. Remove the screw which secures the lamp block to the front housing. Remove the two screws (35) and retainers (17 and 18). Remove flexprint being careful not to drop the transmitter (16).

(2) FLEXPRINT ASSEMBLY, Tel-Touch (Figure 13)

Disconnect flexprint leads from receiver cover (13).
Remove the seven dial terminal screws.
Remove the four dial mounting screws and remove dial.
Remove the two transmitter bracket screws and remove brackets (34) and (35). Remove flexprint assembly, being careful not to drop the transmitter.

Note: Removing components from the flexprint will require desoldering techniques. Remove and install these items by substitution.

(e) TRANSMITTER GROUP

Lift out transmitter and gasket.

(f) RECEIVER GROUP

Remove the two washer-head screws that hold the receiver cup in place and remove cup, receiver and gaskets.

(g) DIAL GROUP

Rotary Dial (Figure 12). Remove three screws (35) and lift out Dial. Tel-Touch Dial (Figure 13). Dial removal is covered in (d) (2). Remove Background Card (8) with recall button (7) and the Light Guide (6).

(h) RECALL BUTTON (Item 14)

On rotary dial phones, lift Recall Button from Front Housing. On Tel-Touch phones, push Recall Button From Background Card.

TABLE VI. Connections for 4-Party full selective or 8-Party semiselective ringing using 180640 Diode

PARTY	LINE WIRE CONNECTIONS AT CONN BLOCK			DIAL LT TRANS LEADS		MOUNTING CORD AT CONNECTING BLOCK					MOUNTING CORD OR INSIDE WIRE AT TERMINAL BOARD					180640 DIODE		RINGER LEADS					STRAP FROM A
	RING	TIP	GRD													1	2	BK	R	S	S-R	BL	BK
LEADS	R	G	Y	1	2	R	G	Y	W	BK	R	G	Y	W	BK								
– RING	R	G	Y	Y	B	R	G	Y	Y	B	L2	L1	3	3	1	L2	G	K	3	Insulated and stored.	G	B	3
– TIP	R	G	Y	Y	B	G	R	Y	Y	B	L2# / L1*	L1# / L2*	3	3	1	L2	G	K	3		G	B	3
+RING	R	G	Y	Y	B	R	G	Y	Y	B	L2	L1	3	3	1	3	G	K	L2		G	B	L2
+TIP	R	G	Y	Y	B	G	R	Y	Y	B	L2# / L1*	L1# / L2*	3	3	1	3	G	K	L2		G	B	L2

* Connections for AC1 base (wall)
\# Connections for AD1 base (desk)

NOTE: Disconnect SLATE lead from hookswitch, Insulate and store.

For connecting 4-party full selective or 8-party semiselective ringing in the Trendline desk or wall telephone, install the 180640 diode assembly in the telephone base. Position the diode in the large slot provided in the terminal board and connect the leads as shown in table below. Lead No. 1 extends from the end of the diode marked with a dot or a color band.

TABLE VII. CONVERSION TO 1A1, 1A2, and 6A KTS MOVE LEADS AS FOLLOWS:

LEAD AND COLOR			TERMINAL BOARD	
			From:	To:
LINE SWITCH		BR	C	G
		Y	L2	3
RINGER	AC1	BK	3	C
	AD1	BK	G	C
MTG CORD or IW		R	L2	C
CAPACITOR STRAP		BK	L2	L1 (Note 2)

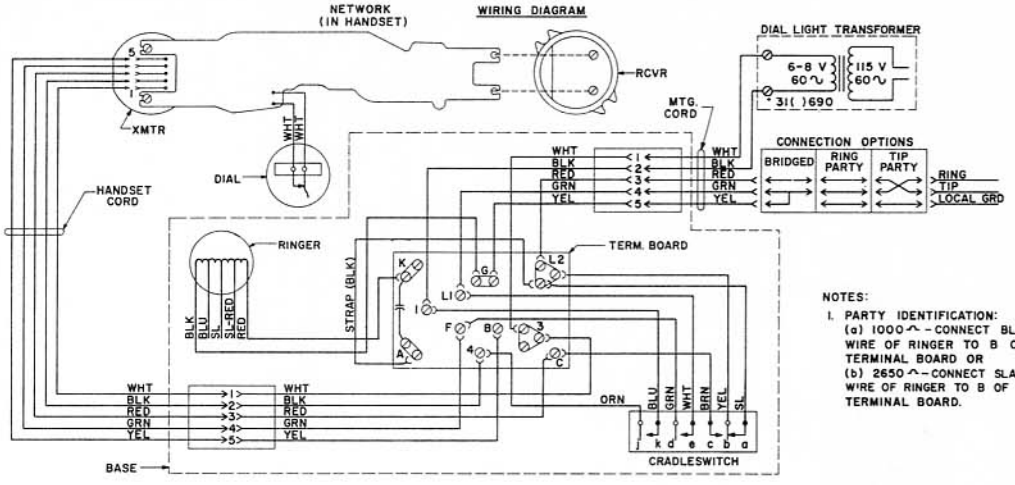
Notes:

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

TABLE VIII
POLARITY GUARD ASSEMBLY
CONNECTIONS (AC1 OR AD1 TELEPHONE BASE)

WIRE OR LEAD	COLOR	REMOVE FROM	CONNECT TO	
		TERM BOARD	POLARITY GUARD ASSEMBLY	TERM BOARD
Handset Cord Jack	R	C	Term. R	
	G	F	Term. T	
Polarity Guard Assembly	R			C
	G			F

Note: For use when specified by local instructions for end-to-end installations.



NOTES:
1. PARTY IDENTIFICATION:
(a) 1000 ∿ - CONNECT BLUE WIRE OF RINGER TO B OF TERMINAL BOARD OR
(b) 2650 ∿ - CONNECT SLATE WIRE OF RINGER TO B OF TERMINAL BOARD.

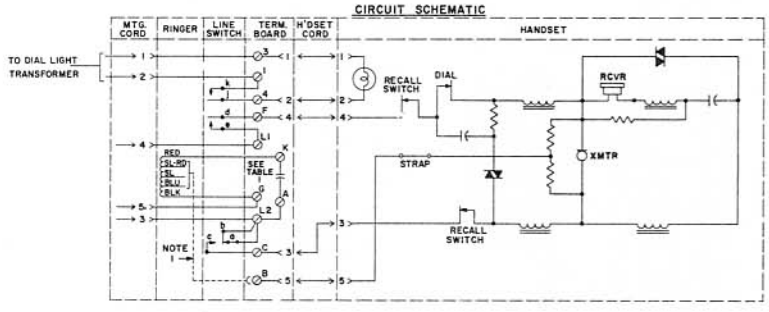
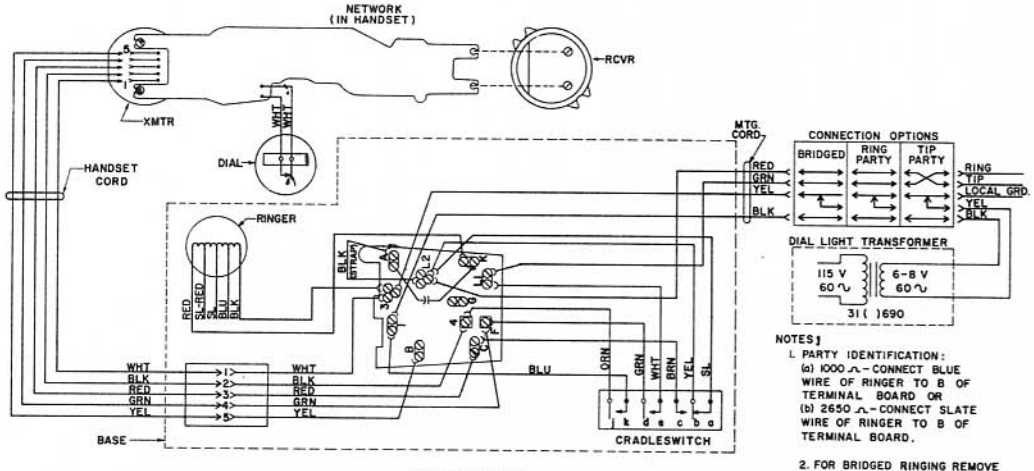


TABLE I
USE CAPACITOR VALUE AS REQUIRED

RINGER SERIES CAPACITOR	
CAPACITOR MFD.	CODE SERIES
.47	HA4, HA5, HB5, HC1 (BA)
.25	HA1, HB1, HC3
.15	HB2, HC4
.08	HA2, HA3, HB3, HB4, HC2, HC5

Figure 14. Wiring diagram and circuit schematic, (K-200/30)



NOTES:
1. PARTY IDENTIFICATION:
(a) 1000 ∿ - CONNECT BLUE WIRE OF RINGER TO B OF TERMINAL BOARD OR
(b) 2650 ∿ - CONNECT SLATE WIRE OF RINGER TO B OF TERMINAL BOARD.
2. FOR BRIDGED RINGING REMOVE BLACK RINGER LEAD FROM TERMINAL 3 AND CONNECT TO L1.

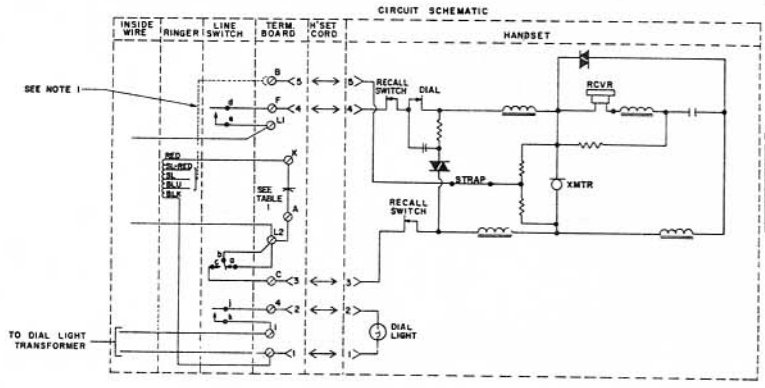


TABLE I
USE RINGER CAPACITOR VALUE AS REQUIRED

RINGER SERIES CAPACITOR	
CAPACITOR MFD.	CODE SERIES
.47	HA4, HA5, HB5, HC1 (BA)
.25	HA1, HB1, HC3
.15	HB2, HC4
.08	HA2, HA3, HB3, HB4, HC2, HC5

Figure 15. Wiring diagram and circuit schematic, (K-254)

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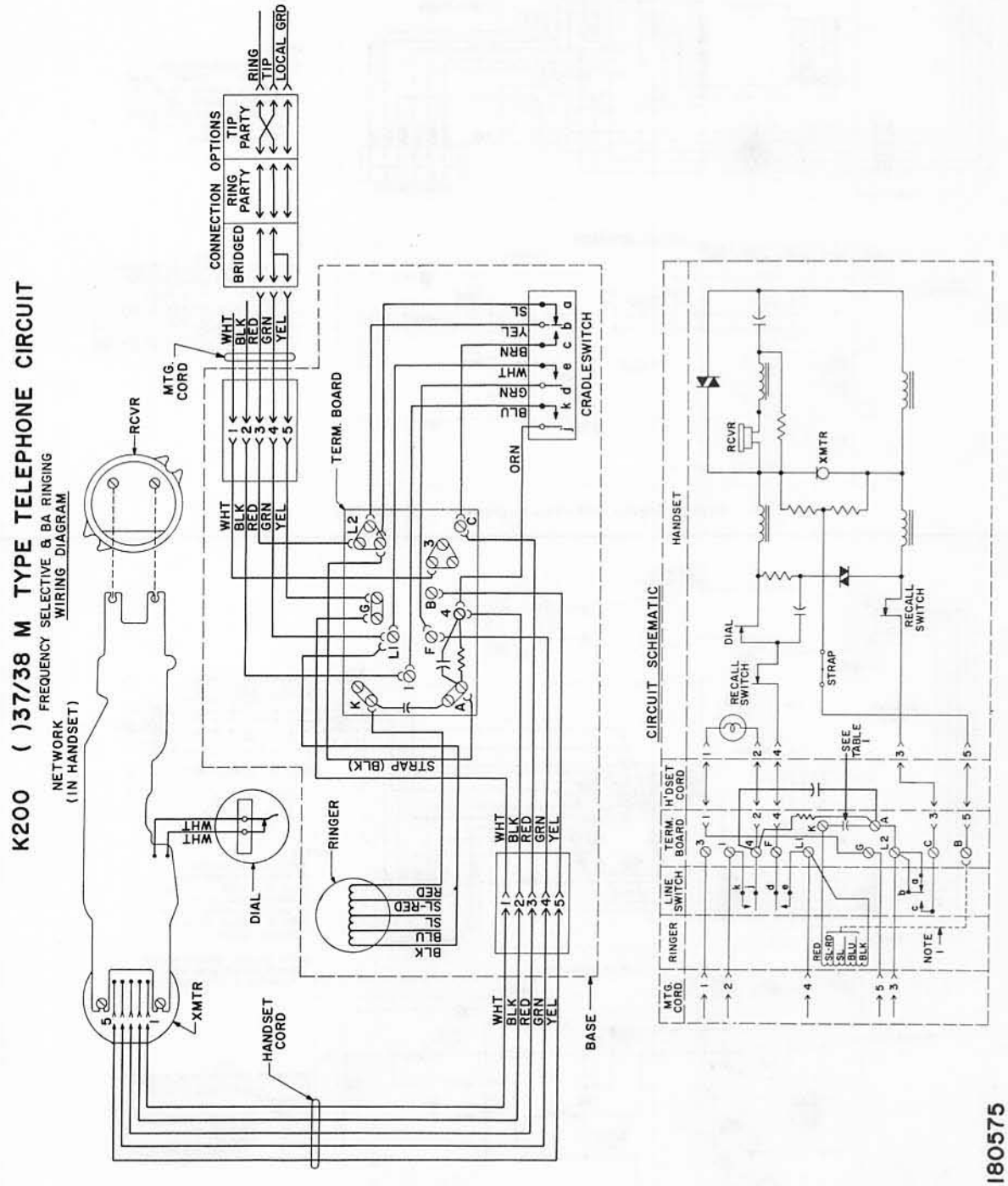

Figure 16. Wiring diagram and circuit schematic, (K-200/37 or 38)

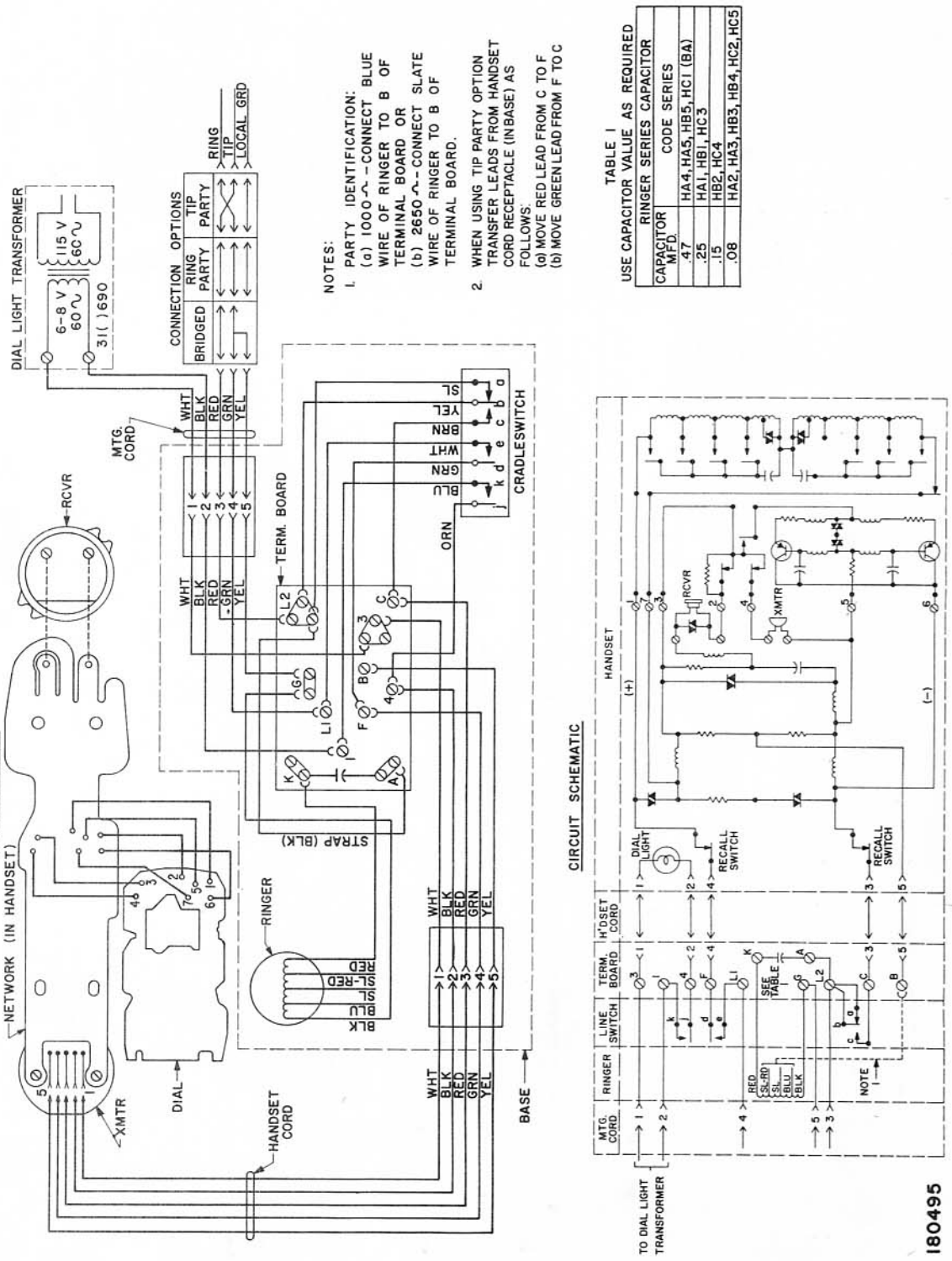

Figure 17. Wiring diagram and circuit schematic, (K-2200)

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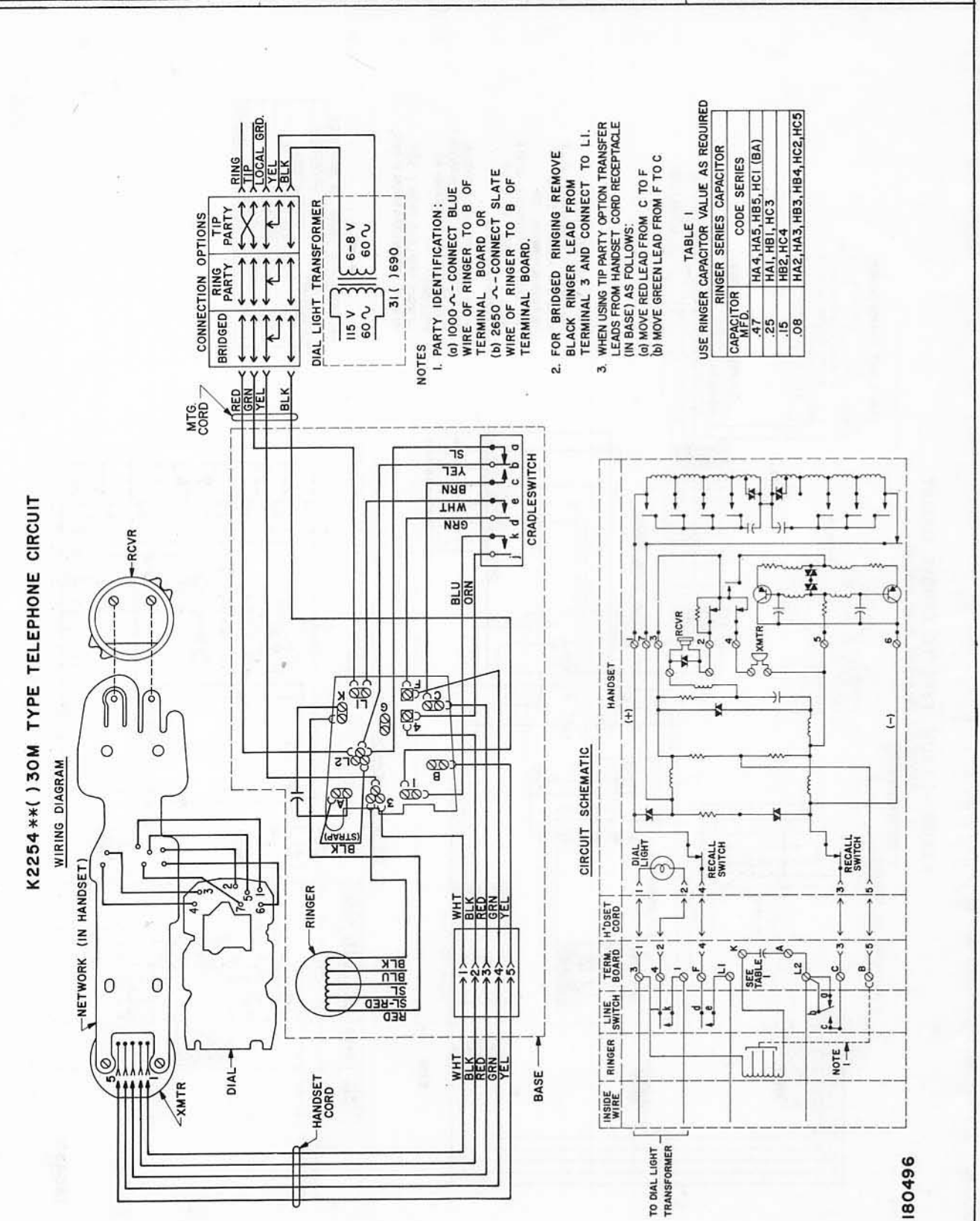

Figure 18. Wiring diagram and circuit schematic, (K-2254)

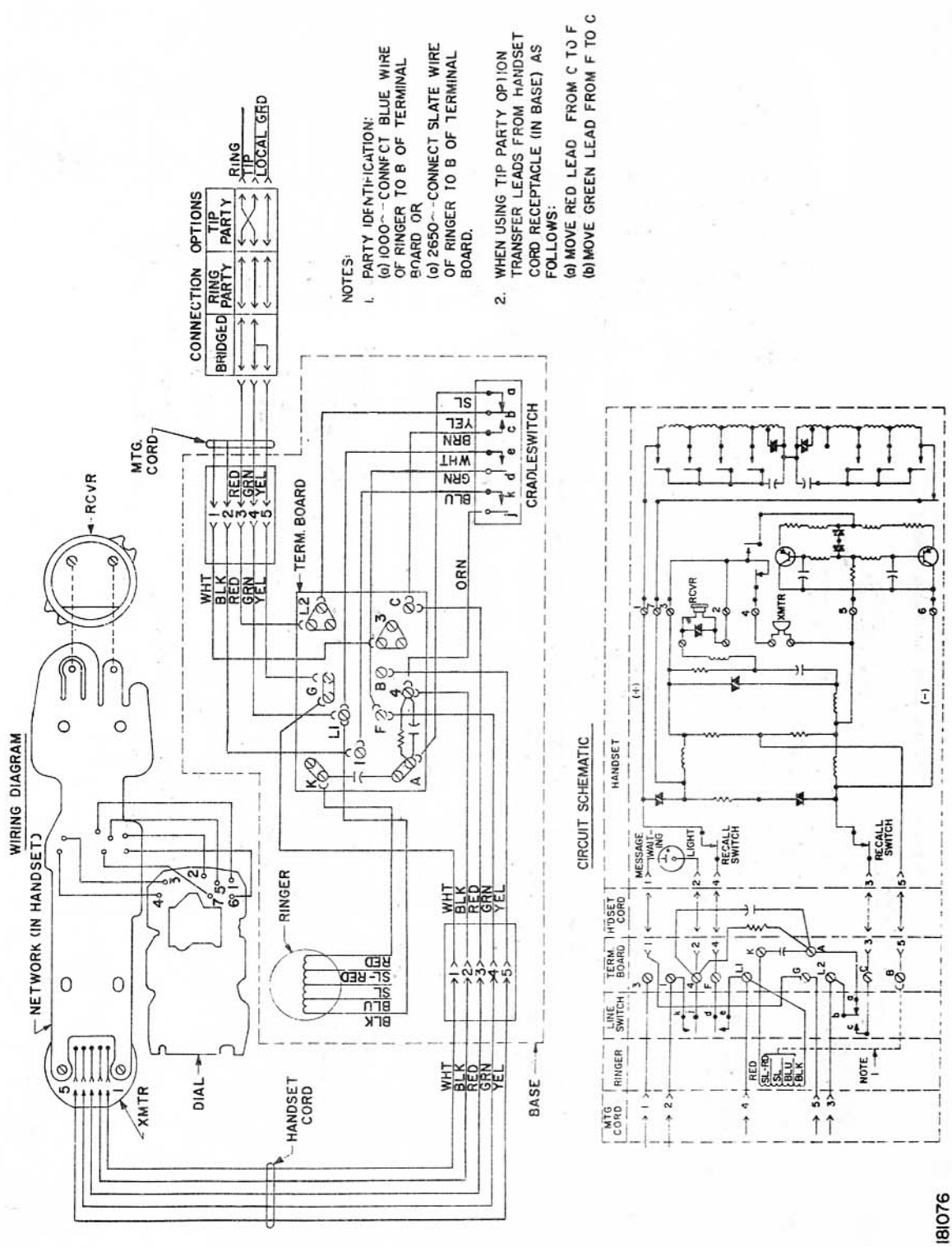

Figure 19. Wiring Diagram and Circuit Schematic, K2200/37/38M

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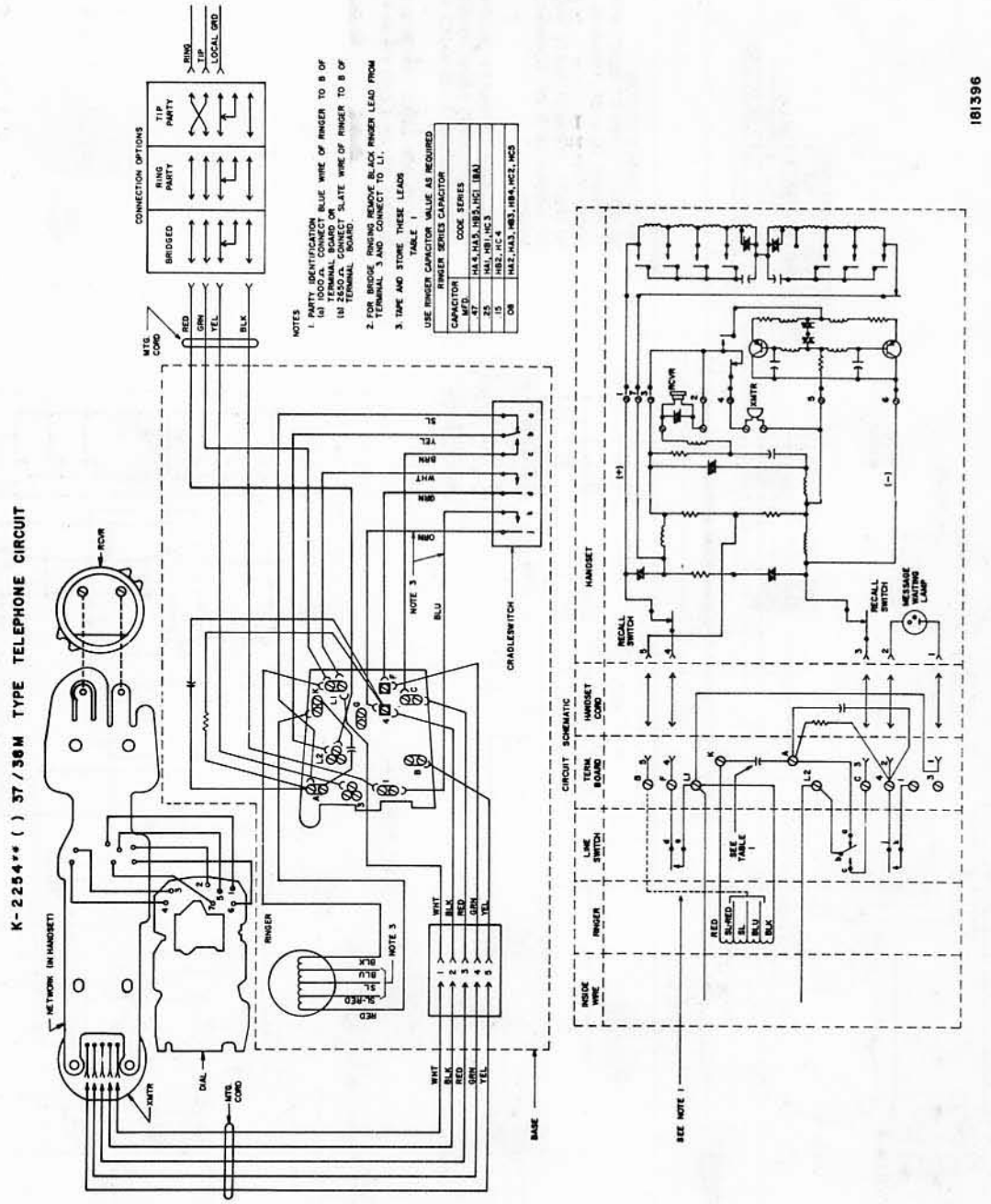


Figure 20. Wiring Diagram and Circuit Schematic, K2254/37/38M

(Ringer capacitor mounted outside network)

2554 TYPE TELEPHONE CIRCUIT

(151 FREQ. SEL.–148 BA RINGER)

WIRING DIAGRAM

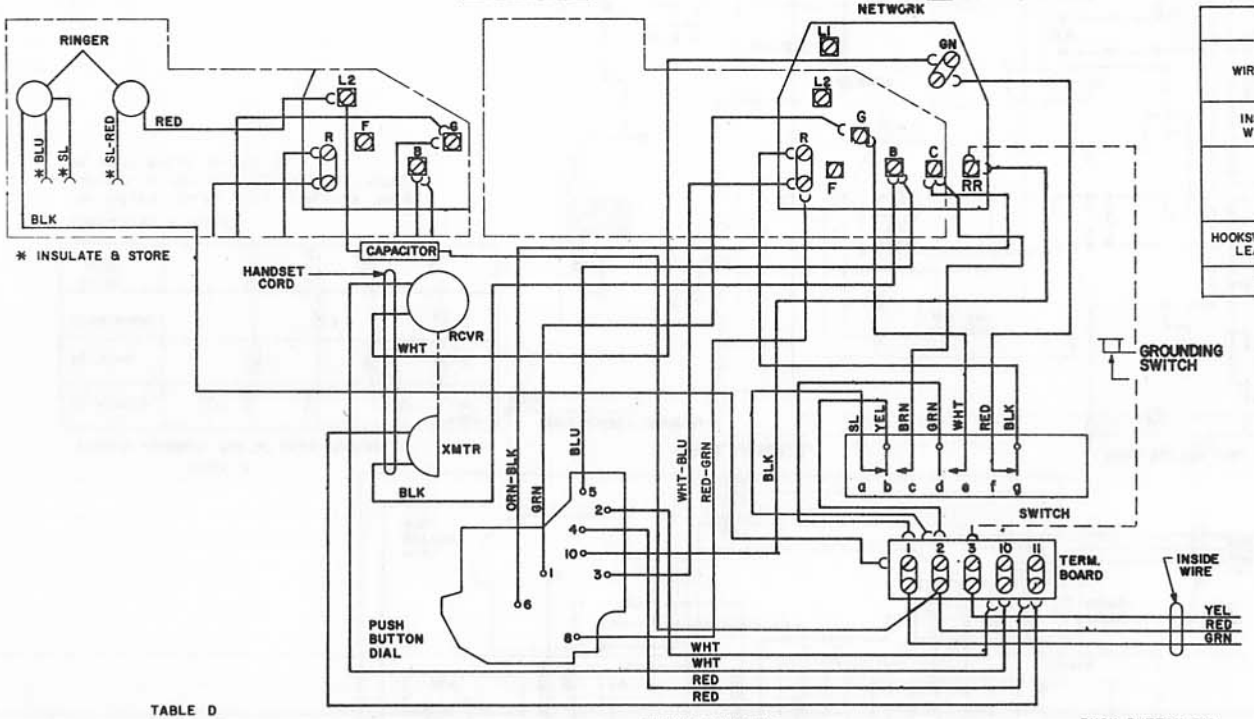


TABLE A
LINE AND RINGER CONNECTIONS

WIRE OR LEAD			INDIV. OR BRDG.	RING PARTY	TIP PARTY: NO IDENT. GRD.	TIP PARTY: IDENT. GRD. 1000 OHMS	TIP PARTY: IDENT. GRD. 2650 OHMS
INSIDE WIRE	RING	R	2	2	1	1	1
	TIP	G	1	1	2	2	2
	GRD	Y	3	3	3	3	3
	RED		L2	L2	L2	L2	L2
	BLK		1	3	3	3	3
	BLU		*	*	*	*	*
	SL		*	*	*	B	*
	SL-RED		*	*	*	*	B
HOOKSWITCH LEADS	SL		2	2	2	L1	L1
	WHT		G	G	C	C	C
	BRN		C	C	G	G	G
RINGER			2	2	2	L1	L1
CAPACITOR			L2	L2	L2	L2	L2

* INSULATED & STORED

TABLE B
RINGER LEAD CONNECTIONS TO SILENCE RINGER PERMANENTLY

TIP PARTY IDENTIFYING GRD.	RINGER LEADS: RED	BLACK	SLATE	SLATE-RED
1000 OHMS	*	3	B	*
2650 OHMS	*	3	*	B

* INSULATED & STORED

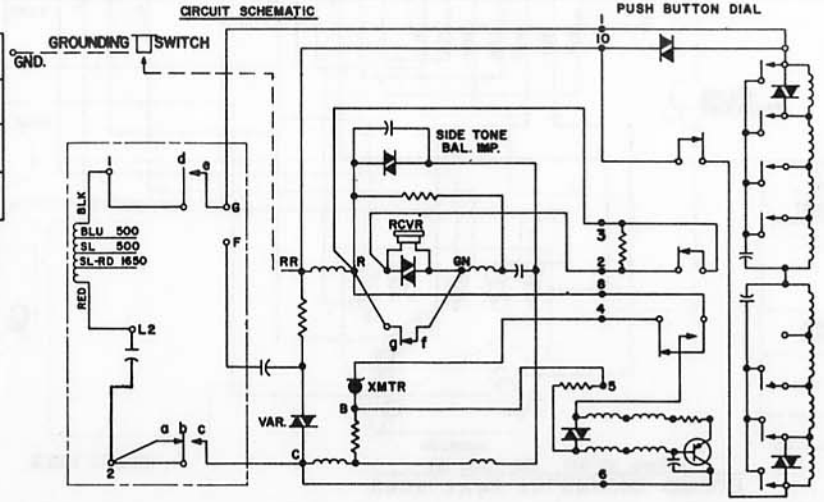
TABLE D
CIRCUIT CHANGES FOR "A" LEAD CONTROL

HOOKSWITCH	SL *	YEL	BRN	RINGER CAP.	
NETWORK		L1	C	L2	
TERM. BOARD		3		1	
INSIDE WIRE		YEL(A)	BLK(A)	RED	GRN

* INSULATED & STORED

TO PREVENT FALSE HOLD CONDITION WHEN HANDSET IS RESTORED, HOOKSWITCH CONTACTS de MUST BREAK BEFORE bc.

CIRCUIT SCHEMATIC



NOTE:
1- RINGER CUT-OFF CONTROL BY CUSTOMER: BEND TANG ON VOLUME CONTROL BRACKET FORWARD (TOWARD FRONT OF UNIT) TO ALLOW LINKAGE TO MOVE RINGER TONE LEVER TO MAXIMUM CUT-OFF POSITION.

2- DOTTED LINES INDICATE CONNECTIONS FOR SPECIAL FEATURE 34 (GROUND BUTTON)

TABLE C
RINGER SERIES CAPACITOR

CAPACITOR MFD.	CODE SERIES
.47	HA4, HA5, HB5, HC1, BA,
.25	HA1, HB1, HC3
.15	HB2, HC4
.08	HA2, HA3, HB3, HB4, HC2, HC5

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