KELLOGG DIVISION OF IT&T

1954

K-500 TELEPHONE HANDBOOK

INSTALLATION AND MAINTENANCE

TM5406 - 1954

A pocket size field handbook for the first series of K-500 telephone sets. The case sometimes referred to as the banjo style and the handset as the gumdrop. The K-500 was the successor to the 1000 series “redbar” telephones. This manual contains all the information necessary for field personnel to install and service these telephones. This handbook was only for the desk version; the DK-500 dial type and the MK-500 manual type. The diagram for this set is a 21551 available in the Diagrams PDF on the Kellogg web site.

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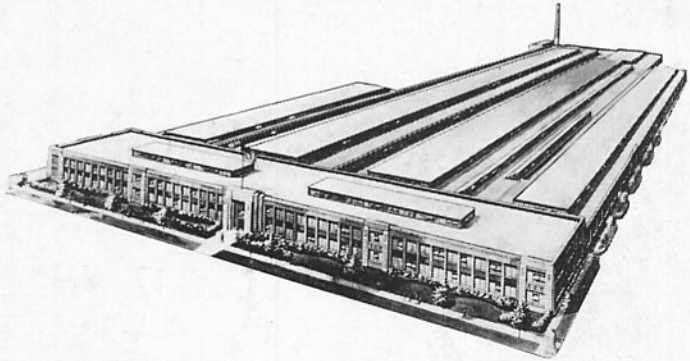
KELLOGG SWITCHBOARD AND SUPPLY COMPANY

A Division of
International Telephone and Telegraph Corporation



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FOREWARD

KELLOGG K-500

Speaks Best For Itself

The K-500 Telephone, an outstandingly superior instrument is designed with ingenious simplicity to provide these altogether new performance advantages:

1. Automatic controls for transmission equalization.
2. Superior speech quality and transmission.
3. Improved transmission, dialing and ringing performance on much longer common battery lines.

This handbook was prepared by Kellogg Switchboard and Supply Company to serve as a guide for the installation and maintenance of the K-500 Telephone.

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TELEPHONE HANDBOOK

INSTALLATION
AND
MAINTENANCE

KELLOGG DIVISION OF IT&T

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GENERAL DESCRIPTION KELLOGG K-500 TELEPHONE

Figure 1. Kellogg K-500 Telephone

1. General

This handbook discusses the Kellogg Telephone DK-500 (dial type) (figure 1) and Telephone MK-500 (manual type). It contains a general description of major components, installation and maintenance procedures, and a list of replaceable parts.

2. Ringing Services

The K-500 is an anti-sidetone set that may be used for all classes of common battery manual or dial subscribers' services. Since the types and methods of ringing are variable in common battery systems, facilities are provided in the telephone set for the following ringing services:

a. Biased Ringers (non-polarized) systems.
   (1) Individual lines.
   (2) Two-party selective divided lines.
   (3) Two-party selective message rate lines.
   (4) Two-party selective automatic ticketing lines.
   (5) Four-party semi-selective divided lines.
   (6) Code ringing non-selective bridge or divided party lines.

b. Frequency Selective Ringers.
   (1) One to five selective bridged party lines.
   (2) One to ten selective divided party lines.
   (3) Six to ten semi-selective bridged party lines.
   (4) Eleven to twenty semi-selective divided party lines.

3. Major Components

The major components of the dial and manual telephone sets consist of the handset with handset cord, housing-plunger assembly, base assembly, mounting cord, and connecting block. All components in dial Telephone DK-500 are physically and electrically identical to those in manual Telephone MK-500 except that, in the manual-type set, the dial is replaced by a dummy plug assembly.

4. Handset with Handset Cord (1-10, fig. 11)

The handset consists of a handle which houses the receiver unit, transmitter unit, transmitterholder assembly,

and the assembled handset cord. Two removable caps assemble the receiver and transmitter units.

The transmitter unit has a wide frequency response and is stable in operation. Two springs in the transmitter holder assembly provide electrical connection to the transmitter.

The receiver unit is a ring armature receiver assembly and a varistor. The ring armature receiver consists of a domed diaphragm that is driven at its circumference by a ring-shaped armature. This type of construction increases the receiver efficiency and frequency range.

The varistor is assembled directly to the receiver to protect the user from peak acoustical outputs and the receiver from demagnetization by abnormal transient electrical disturbances.

The short handle provides closer talking on the part of the subscriber, with consequent increased transmission. The four-conductor handset cord has a neoprene jacket that is anchored to the handle by a cord strain relief. At the base end of the cord, a clamp hook anchors the cord to the base plate.

5. Housing—Plunger Assembly (19-22, fig. 11)

The housing, which covers and protects the base assembly, has a cradle upon which the handset rests and a depression for use as a hand hold. The plunger assembly contains the two plungers for activating the cradle switch in the base when the handset is removed or replaced.

6. Base Assembly (23-45, figs. 11, 12)

The base assembly is attached to the housing-plunger assembly by two removable cabinet lock screws. When separated from the housing-plunger assembly, the base assembly consists of the dial, cradle switch assembly, ringer and network assembly, all mounted on a steel base plate.

a. Dial. The dial consists of the number card assembly, finger plate, numeral ring, finger stop, and the dust-cover protected gear and contact spring assemblies. The characters on the numeral ring are outside the finger plate, provid-

ing greater visibility over a wide angle of sight. In addition, the characters are white on a black background with a marker spot under each finger hole to facilitate dialing. The contact spring assemblies consist of a pair of off-normal contacts and a pair of pulse contacts. When closed, the off-normal contacts short-circuit the receiver. The dial is attached to a mounting bracket by three removable screws. In the manual-type set, the dial is replaced by the dummy plug assembly consisting of a dummy plug and clamping plate with the number card assembly.

b. Cradle Switch Assembly. The cradle switch assembly consists of an operating arm mounted on a pivot pin, a spring which raises the arm, an operating bar which actuates the contact springs, and a cover to protect the spring assembly. The entire assembly is mounted on a frame which is secured to the base plate by three removable screws. In function, the switch assembly connects the line, ringer, dial and network.

c. Ringer. The Code 130BA ringer consists of a coil with a laminated core, magnetic circuit assembly (or support pole piece assembly), a permanent magnet, clapper assembly, and two brass gongs and their resonators. The entire assembly is mounted on a frame which is secured to the base plate by two removable screws. The clapper assembly consists of an adjustable biasing spring wire, a damper rod, and a rod and weight that strikes the two gongs. An adjustable control wheel extends through the base plate. When the control wheel is rotated, the distance between the gongs and clapper weight is varied, permitting adjustment of the ringer volume. In addition, a detent spring, mounted on the same shaft with the wheel, provides controlled adjustment of the volume level. However, a stop on the detent spring prevents reducing the volume below a minimum level. The stop may be disabled to provide ringer cutoff service. For bias adjustment, the bias spring on the clapper assembly can be shifted to a high or low position. Normally the spring is in the high position.

Code No. 131 frequency selective ringers may be installed to provide frequency selective ringing service. The frequency selective ringer consists of a coil with a laminated core which is mounted on a core-slide assembly, a shunt bar, magnet, armature, clapper assembly, reed and two brass gongs and their resonators. The entire assembly is mounted on a die cast frame which is secured to the base plate by two removable screws. Ringer gaps if necessary, may be controled by means of an adjustment screw.

The ringer may be supplied with or without a volume control.

d. Network Assembly. The network assembly consists of a terminal board mounted on a can assembly. The top side of the terminal board contains the terminal screws, at which all internal wiring and the mounting cord are terminated. A transformer, capacitors, resistors, and varistors are mounted within the can assembly. These components provide sidetone balancing, transmission equalization, and suppression of radio frequency interference. The entire assembly is secured to the base plate by three removable screws.

e. Base Plate. The base plate consists of the dial mounting bracket and a foot assembly at each corner to prevent scratching the surface upon which the telephone is placed. Two holes are provided in the rim of the base plate for attachment of the clamp hooks on the handset and mounting cords. This provides strain relief and prevents the cords from being pushed into the base and interfering with the operation of moving parts.

7. Mounting Cord (9, 46, 47, fig. 11)

The three-conductor mounting cord has a neoprene jacket with a cord clamp hook at one end and cord strain relief band at the other. The clamp hook anchors the cord to the rim of the base plate, while the band anchors it to the connecting block. In function, the cord connects the telephone to the line, and provides the telephone with a conductor for grounded ringing services.

8. Connecting Block (48-52, fig. 11)

The connecting block consists of a protective cover secured to a base assembly by a removable cabinet lock screw. The base assembly contains four terminals and screws for connecting the incoming line and mounting cord, two mounting holes, and a stop for the cord strain relief band of the mounting cord.

9. Code Number Identification

Each component of the telephone is identified by a part number prefixed with a "P" or a code number. The part numbers are tabulated in table VI. Table I lists the code numbers of the telephone and its components and the location of the code number. In addition to the locations listed in the table, the telephone code number will be found on the original shipping box. The data listed in table I may be used to identify each component during the installation procedures.

TABLE I. CODE IDENTIFICATION

Component	Code Number	Location
Dial-type telephone	DK-500	On base plate P-75327 of base assembly P-75338
Manual-type telephone	MK-500	On base plate P-75327 of base assembly P-75338
Handset	65-C	
Handset cord	3030	On cord clamp hook P-75421
Mounting cord	3031	On cord clamp hook P-75351
Dial	19-G	At rear of dial on base assembly
Connecting block	28	On base assembly P-75540
Bias ringer	130-BA	On support pole piece assembly P-75398
Frequency selective ringers	131-HA, HB, or HC*	On ringer frame

* HA — Harmonic series
HB — Synchromonic series
HC — Decimonic series

INSTALLATION
KELLOGG K-500
TELEPHONE

10. Unpacking Procedure

Before unpacking the telephone set, examine the box for evidence of external damage. If the box or its contents has been damaged, report the matter in accordance with local practices. Check the code numbers of the handset, handset cord, mounting cord, base plate, and connecting block with those listed in table I and the local service order, to make sure the telephone set is the correct one for the installation.

11. Number Card

a. Dial-type Set. To install the number card (P-75415), remove and disassemble the number card assembly (P-75418), as discussed in paragraph 29. Place the number card between the protector (P-75413) and the retainer disc (P-75416). Reassemble and remount the number card assembly on the dial (code No. 19-G).

b. Manual-type Set. If the dummy plug assembly (P-75419) is already installed, mount the number card in the same manner as discussed for the dial-type set (a, above). However, if a dial set is to be converted for manual service, remove the dial (paragraph 42) and mount the dummy plug assembly by reversing the disassembly procedures discussed in paragraph 30. Then, mount the number card in the number card assembly.

12. Location of Telephone Set

The telephone set should be located in accordance with the subscriber's wishes and local practices. If the subscriber's wishes cannot be fulfilled, the installer should clearly explain the reasons. However, when satisfactory arrangements cannot be made, the local supervisor should be consulted before proceeding with the installation. The following general rules should be observed to properly locate the telephone set.

a. Power Stations. Do not install the set in electric power stations unless a local service order indicates the required protective device.

b. Explosive Areas. Do not install the set in areas that contain explosive gases until the local supervisor has been consulted.

c. Hazardous Grounds. Avoid locations that are over or near a grounded metallic object such as a radiator, sink, or electric outlet. This is especially important at locations where station protectors are installed in the line circuit and the protector ground wire is connected to a ground rod. When it is impossible to obtain adequate separation from such objects, use short mounting cords, retractile handset cords, or other remedial measurers indicated in the local practices.

d. Ringer Audibility. Locate the set where the ringing signal can clearly be heard throughout the subscriber's premises. Where maximum ringer sound output is required and the subscriber desires the set to be placed on a sound absorbing material (a soft cover or pad), inform the subscriber that such material usually reduces the sound volume. Additional requirements for ringer audibility should be obtained from local practices.

e. Dial Visibility. Be sure the set is located where there will be sufficient light for dialing both at night and during the day.

f. Accessibility Locate the set where it will be accessible for inspection. Avoid locations at which the set may be damaged or will be a hazard.

g. Vibration. Do not locate the set on a desk or table which may be subjected to considerable vibration. If an alternate location is impractical, consult the local supervisor.

h. Inductive Noise. To avoid inductive noise, locate the set at least 12 inches from 20-watt fluorescent light units, and at least 24 inches from 40-watt units. Locate the set as far as possible from neon signs, lights, or other apparatus known to induce disturbances in the telephone.

13. Location of Connecting Block

The location of the connecting block (code No. 28) primarily will be affected by the location of the telephone set. However, the following considerations should be kept in mind.

a. Avoid locations that are hazardous to installers, repairmen, and subscribers.

b. Locate the connecting block where it will be accessible for repair or maintenance. Avoid closets.

c. Do not locate the connecting block near radiators or steam pipes. The plastic base assembly (P-75540) may be damaged by the heat.

d. Mount the connecting block on a back board, when the wall location is damp or uneven.

14. Connections

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

a. Access to Terminals. For access to the terminals in the connecting block (code No. 28), remove the cover (P-75542) by removing the cabinet lock screw (P-75545) (fig. 11). For access to the terminal board of the network assembly (P-75335), loosen the two cabinet lock screws (P-75486) on the underside of the base plate (P-75327) (fig. 4) and remove the base assembly (P-75338) from the housing-plunger assembly (P-75401). Before actually making the connections, check the code number of the dial and ringer with those listed in table I.

b. Biased Ringing. The connections for ringing with the bias ringer (code No. 130-BA) are listed in table II.

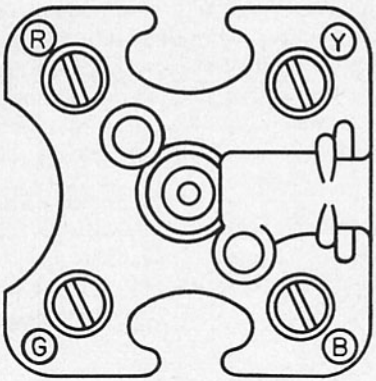


Figure 2. Terminals of Connecting Block

c. Frequency Selective Ringing. The set connections for the various frequency selective ringers, their frequencies and series code numbers are listed in circuit label 21531, one of which is packed in each telephone carton. The mounting cord and set connections for frequency selective ringing at the connecting block (code No. 28) and the terminal board of the network assembly (P-75335) are listed in table III.

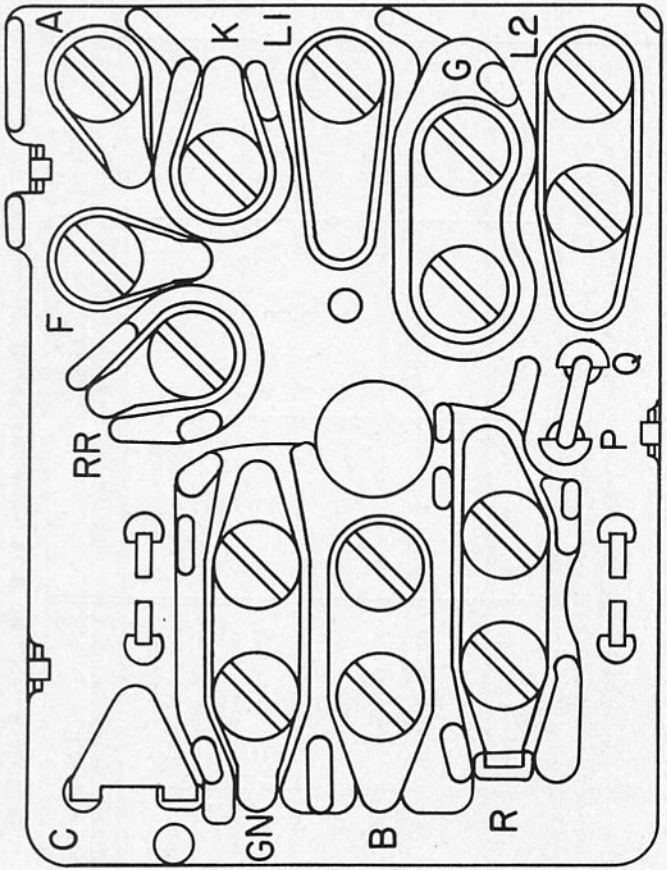


Figure 3. Terminals of Network Assembly

TABLE II. CONNECTIONS FOR BIASED RINGING

Ringing Service	Connections at Connecting Block (Code No. 28)						Connections at Network Assembly (P-75335)						
	Line			Mounting Cord (Code No. 3031)			Mounting Cord (Code No. 3031)			Ringer (Code No. 130-BA)			
	Ring	Tip	Gnd	Red	Gr	Yel	Red	Gr	Yel	Red	Blk	Sl	Sl-Red
Bridged*	R	G	Y	R	G	G	L_2	L_1	G	L_2	G	K	A
Ring Party*	R	G	Y	R	G	Y	L_2	L_1	G	L_2	G	K	A
Tip party except dial message rate	R	G	Y	G	R	Y	L_2	L_1	G	L_2	G	K	A
Tip party dial message rate	R	G	Y	G	R	Y	L_2	L_1	G	K	G	B	B
Automatic ticketing**	R	G	Y	G	R	Y	L_2	L_1	G	B	B	K	G

* Connections for bridged and ring parties are for flat and message rate service.
** Transfer slate lead of cradle switch assembly (P-75300) from terminal "L_2" to "A" on the network assembly.

TABLE III. CONNECTIONS FOR FREQUENCY SELECTIVE RINGING

Ringing Service	Connections at Connecting Block (Code No. 28)						Connections at Network Assembly (P-75335)*		
	Line			Mounting Cord (Code No. 3031)			Ringer Leads		
	Ring	Tip	Gnd	Red	Gr	Yel	Red	Black	Jumper
Bridged	R	G	Y**	R	G	G	A	G	K to L_2
Ring Party	R	G	Y	R	G	Y	A	G	K to L_2
Tip Party	R	G	Y	G	R	Y	A	G	K to L_2

* Also see circuit label no. 21531 which is packed with each telephone set.

** If ground wire is brought to connecting block.

d. Manual Service. When manual service is required, transfer the slate-white lead of the cradle switch assembly (P-75300) from terminal "F" to terminal "RR" on the network assembly (P-75335). No other changes are required in the set connections.

e. Permanent Ringer Silence. When it is desired to permanently silence the ringer, three ringer connections at the network assembly (P-75335) must be altered in accordance with the type of ringing service. Proceed as follows: (1) for bridged, ring party, and tip party except dial message rate services, transfer the black lead of the ringer to terminal "A" on the network assembly; (2) for tip party dial message rate service, transfer the slate-red lead of the ringer to terminal "K" on the network assembly (for party identification, the ringer black lead on terminal "G" and the slate lead on terminal "B" must not be disconnected); (3) for automatic ticketing service, transfer the black lead of the ringer to terminal "K" of the network assembly.

For frequency selective ringer silencing, remove the red ringer lead from "A" and attach to the same terminal to which the black lead is connected.

Before reassembling the base assembly (P-75338) and housing-plunger assembly (P-75401), refer to the cording diagrams (figs. 9 and 10) and make sure the internal cording will not interfere with moving parts. Be sure the clamp hooks (P-75421 and P-75351) of the handset cord (code No. 3030) and mounting cord (code No. 3031) respectively, are anchored in the holes of the base plate (P-75327) (fig. 9). Before replacing the cover (P-75542) at the connecting block (code No. 28), make sure the cord strain relief band (P-75410) of the mounting cord (code No. 3031) is anchored to the block base assembly (P-75540).

15. Installation Adjustments

a. Control Wheel. The control wheel (P-75376) may be adjusted to provide varied levels of ringer volume: low, intermediate, or "LOUD". For "LOUD" ringing, rotate the

control wheel in the direction indicated by the arrow (fig. 4) until the detent on the detent spring (fig. 5) falls in the last notch on the ringer frame. For intermediate ringing, rotate the control wheel until the detent falls into one of the central notches. For low ringing, rotate the control in the direction opposite to that of the arrow until the detent falls into the first notch. The use of the control wheel should be explained to the subscriber as discussed in paragraph 17.

b. Ringer Cutoff. If ringer cutoff is to be provided, carefully bend the stop tab on the detent spring until it no longer engages the stop on the rim of the ringer frame behind the movable gong (fig. 5 and 6). This permits the cam section of the movable gong mounting to engage the stop rod and therefore prevents movement of the armature and clapper assembly.

CAUTION

Perform this adjustment carefully to avoid damaging the detent spring.

c. Biasing Spring Wire. The biasing spring wire (P-75390) (fig. 5) will usually be found in the high notch (the notch near the fixed gong). However, the proper biasing spring settings for the class of service and number of ringing bridges are listed in table IV. To change the setting, carefully lift the spring with the end of the forefinger and place it in the correct notch.

CAUTION

Do not use tools to perform this adjustment.

d. Radio Signal Suppression. When radio signals from a local radio transmitting station are audible and must be suppressed, it will be necessary to install a 0.02 mf condenser (P-75559) at the network terminals as follows: Connect one condenser lead to terminal "F" and the other lead to terminal "L2".

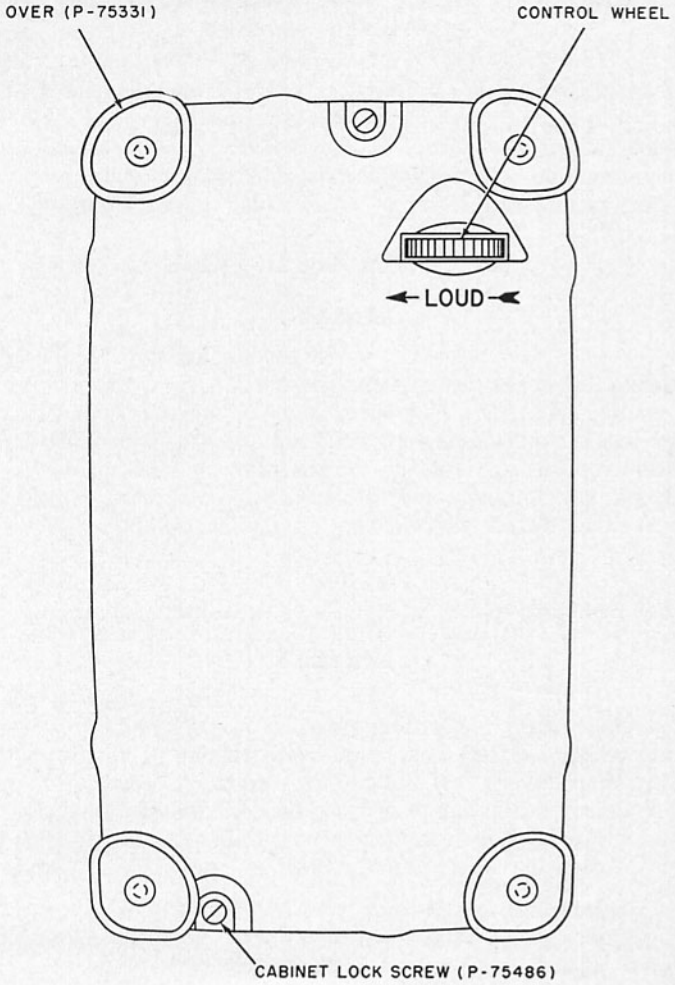


Figure 4. Base Plate, Bottom View

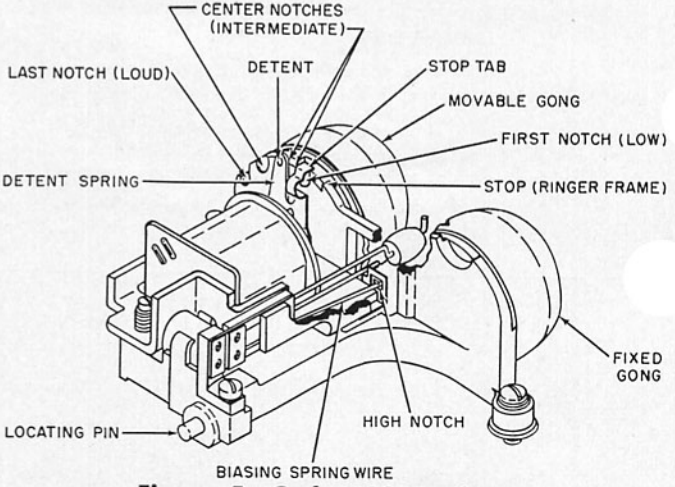


Figure 5. Code 130BA Ringer

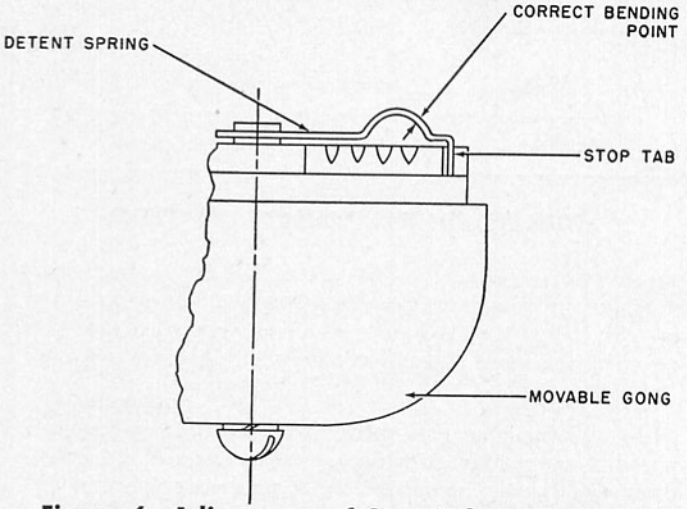


Figure 6. Adjustment of Stop Tab on Detent Spring of Code 130BA Ringer

CAUTION

Place the condenser between the end of the network and the ringer gong to avoid interference with moving parts. Be sure that each lead of the condenser is firmly connected under its terminal screw. Wrap tape around the exposed portions of each condenser lead, or if available, use tubular insulation.

If additional suppression is necessary, place another 0.02 mf (Code P-75559) condenser across terminals "R" and "RR". Place this condenser against the side of the network that is nearest the ringer.

TABLE IV. BIASING SPRING SETTING

	Class of Service	Bias Setting
Bridged Ringing Service	Individual line and P.B.X. Stations	High *
	Nonselective Party Lines	High or Low ***
Grounded Ringing Service	Two-Party Flat and Message Rate	High
	Four-Party Selective	High or Low
	Four-Party Semi-selective	High **
	Eight-Party Semi-selective	High or Low
	Divided Code Ringing	Low

* When three or more ringers are bridged across the line, the biasing spring wire shall be in the low notch on all ringers.

** Where five ringers are connected between the same side of line and ground, the biasing spring wire shall be in the low notch on all ringers on that side of the line.

***To provide best service under varying field conditions deviations from bias settings of "low" to "high" may be necessary.

16. Station Tests

When the installation has been completed, perform the station tests discussed in paragraph 22 or as modified by local practices. During the ringing test, check the operation of the control wheel (a, paragraph 15) in the low, intermediate, or "LOUD" positions. If the volume of the ringer does not change, refer to table V for the trouble shooting procedures.

17. Instructions to Subscriber

After the station tests have been completed, demonstrate the correct use of the dial and handset to the subscriber. Explain the purpose of the control wheel and its positions. Obtain a ringback and let the subscriber listen to each volume level. Rotate the control wheel to the level the subscriber selects.

If the ringer cutoff adjustment has been made (b. paragraph 15), instruct the subscriber to rotate the control wheel to the extreme right (or direction opposite to that of the arrow) to obtain ringer cutoff.

Before leaving the premises, give instruction card (P-75385) to the subscriber. If the subscriber is not at home, leave the card under the base but be sure it is visible. Rotate the control wheel to the level best suited for the premises.

MAINTENANCE
KELLOGG K-500 TELEPHONE

18. Inspection

The following paragraphs discuss the suggested maintenance inspection procedures to be performed by the repairman. However, the local maintenance practices should be consulted to make sure a complete inspection has been performed. The removal and replacement procedures are discussed in paragraphs 23 through 47.

a. Handset. Check the handle and transmitter and receiver caps for breaks, chips, or cracks. Make sure the transmitter and receiver caps are not loose. Clean each cap with a lint-free cloth. Check for noisy or burning transmitter unit.

b. Housing-Plunger Assembly. Check the housing assembly for cracks or breaks. Make sure the two cabinet lock screws are tight. Operate the plungers to make sure they do not stick or bind. If they require lubrication, apply lubricant (paragraph 20) or refer to the local practices. Check for noise or cutouts by tapping on the housing assembly while listening with the handset. If necessary, remove the base assembly, check all connections and mounting screws, and carefully remove any accumulated dust.

c. Dial or Dummy Plug Assembly. Make sure the dial or dummy plug is mounted securely. Test the speed of the dial (paragraph 22), if the dial-type set has been installed.

d. Number Card Assembly and Instruction Card. Check the legibility of the number card and instruction card. Replace in accordance with local practices. Replace the protector if it is badly scratched or torn. Make sure the retainer ring and spring are not loose or will not have a tendency to spring off.

e. Handset and Mounting Cords. Check for cuts, splits, fraying, or corrosion. Untwist a twisted cord. Make sure the cord strain relief bands and clamp hooks are not loose. Test for noise and cutouts (paragraph 22).

19. Trouble Shooting

When trouble shooting, use the data in table V as a guide to facilitate locating and correcting the fault. The table lists the trouble symptom, probable cause, and the suggested remedy. However, the actual procedure for remedying the trouble of making repairs will depend upon local practices. Thus, when a component is defective, replace the component or the telephone set as specified.

TABLE V. TROUBLE SHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY
1. Bell does not ring.	a. Wrong ringer.	a. Check code number on ringer against required ringer on service order (paragraph 9). Replace with correct ringer or telephone set (paragraph 34).
	b. Ringer disconnected or wired wrong.	b. Check ringer connections (paragraph 14).
	c. Control wheel in cut-off position.	c. Adjust to ring position (paragraph 15).
	d. Open winding in coil assembly.	d. Replace coil assembly (paragraph 35), or replace telephone set.
	e. Foreign obstruction between magnet or gongs and clapper armature.	e. Remove obstruction.
	f. No ground (party lines).	f. Consult local practices.
	g. Open ringing capacitor.	g. Replace telephone set.
	h. Ringer connected for silencing.	h. Rewire or adjust for operation.

SYMPTOM	PROBABLE CAUSE	REMEDY
2. Bell too loud.	a. Control wheel in wrong position.	a. Rotate control wheel to lower position (paragraph 15).
	b. One or both gongs too loose.	b. Tighten mounting screws.
3. Bell too low.	a. Control wheel in wrong position.	a. Rotate control wheel to higher position (paragraph 15).
	b. Foreign obstructions or wire between gong and weight on clapper rod.	b. Remove obstruction, or check cording (fig. 9).
	c. Telephone set on sound-absorbent material.	c. Relocate on hard surface in conjunction with subscribers wishes or consult local practices.
4. Bell taps while dialing or operating plungers.	a. Incorrect line or ringer connection.	a. Check connections. (paragraph 14).
	b. Biasing spring wire in low notch of spring wire bracket.	b. Check and adjust to high notch (paragraph 15). If bell continues to tap, replace ringer (paragraph 34) or telephone set.
5. Bell rings when other party is called. Cross ring or false ring.	a. Incorrect line or ringer connections.	a. Check line and ringer connections (paragraph 14).
	b. Ringing frequency wrong for frequency selective ringer.	b. Check ringer frequency in accordance with local practices.
	c. Frequency selective ringer not tuned to ringer frequency.	c. Replace with correct ringer (paragraphs 9 and 34) or replace telephone set.
	d. Wrong capacitor or connection for frequency selective ringer.	d. Check ringer connections (paragraph 14).

SYMPTOM	PROBABLE CAUSE	REMEDY
6. Bell continually rings when handset is lifted.	a. Open in handset cord, transmitter unit, or dial pulse contacts.	a. Replace handset cord (paragraph 27), transmitter unit (paragraph 25), or dial (paragraph 42).
	b. Open in induction coil or equalizer of network assembly.	b. Replace network assembly (paragraph 14) on telephone set.
	c. Open in telephone set wiring.	c. Replace telephone set.
	d. Line contacts do not close in spring nest assembly of cradle switch assembly.	d. Make sure ears of plastic cover are in notches on mounting frame. If trouble continues replace cradle switch assembly (paragraph 43) or telephone set.
7. Bell rings but no one on line.	a. Open handset cord or receiver unit.	a. Replace handset cord or receiver unit (paragraphs 27 or 24).
	b. Off-normal contacts of dial are closed.	b. Replace dial (paragraph 42), or telephone set.
	c. Open induction coil or transmission condenser in network assembly.	c. Replace network assembly (paragraph 44) or telephone set.
	d. Receiver contacts do not open in spring nest assembly of cradle switch assembly.	d. See remedy d of 6, above.

SYMPTOM	PROBABLE CAUSE	REMEDY
8. No dial tone.	a. Open in mounting or handset cord.	a. Replace cord (paragraph 46 or 27).
	b. Defective receiver unit.	b. Replace receiver unit (paragraph 24).
	c. Pulse contacts are open or off-normal contacts of dial are closed.	c. Replace dial (paragraph 42) or telephone set.
	d. Open induction coil in network assembly.	d. Replace network assembly (paragraph 44), or telephone set.
	e. Contacts do not open in spring nest assembly of cradle switch assembly.	e. See remedy d of 6, above.
9. Cannot break dial tone.	a. Pulse contacts do not open in dial.	a. Replace dial (paragraph 42), or telephone set.
	b. Dial filter or ringing condenser is short-circuited.	b. Replace telephone set.
	c. Defective receiver varistor.	c. Replace receiver unit (paragraph 24).
10. Loud clicks while dialing.	a. Off-normal contacts do not close in dial.	a. Replace dial (paragraph 42), or telephone set.
	b. Loose connection.	b. Check connections (figs. 8, 9, 10).
11. Cannot hear.	a. Open receiver unit or handset cord.	a. Replace receiver unit or handset cord (paragraphs 24 or 27).
	b. Off-normal contacts do not open in dial	b. Replace dial (paragraph 42), or telephone set.

SYMPTOM	PROBABLE CAUSE	REMEDY
	c. Open induction coil in network assembly.	c. Replace network assembly (paragraph 44) or telephone set.
	d. Receiver contacts do not open in spring nest assembly of cradle switch assembly.	d. See remedy d of 6, above.
12. Other party cannot hear.	a. Open in transmitter unit.	a. Replace transmitter unit (paragraph 25).
	b. Hanset cord is open or connection loose.	b. Replace handset cord (paragraph 27) or check connections (figs. 8, 9).
13. High sidetone.	Defective sidetone balancing network in network assembly.	Replace network assembly (paragraph 44) or telephone set.
14. Interference from radio transmitter station.	Telephone set located close to radio station.	Install suppression condenser (paragraph 15).

20. Field Maintenance Checks and Adjustments

This paragraph describes the field maintenance checks and adjustments to be performed on the telephone set. The local practices should be consulted for detailed or additional instructions.

CAUTION

Do not check or adjust the telephone set unless it is evident that trouble is present.

a. Plungers (P-75406). If the plungers bind or squeak, separate the housing-plunger assembly (P-75401) from the base assembly (P-75338) (paragraph 33). Inside the housing, inspect the plungers, plunger holes, plunger retainer (P-75405), and screw (P-75407-2). Make sure the screw is not loose, and the plunger retainer is seated properly in the housing. Lubricate the plungers and plunger holes with Molykote or as instructed by local practices. If the binding or squeaks cannot be corrected, replace the plungers.

CAUTION

Do not permit the lubricant to fall on the contact springs of the cradle switch assembly.

b. Cradle Switch Assembly (P-75300). Except for lubrication of the pivot pins, field maintenance of the spring nest assembly must be performed by qualified personnel or only when permitted by the local practices. Proceed as follows (fig. 7):

If lubrication is required, apply Molykote at the junction of the pivot pin (P-75308) with the operating arm (P-75302) and mounting frame (P-75301).

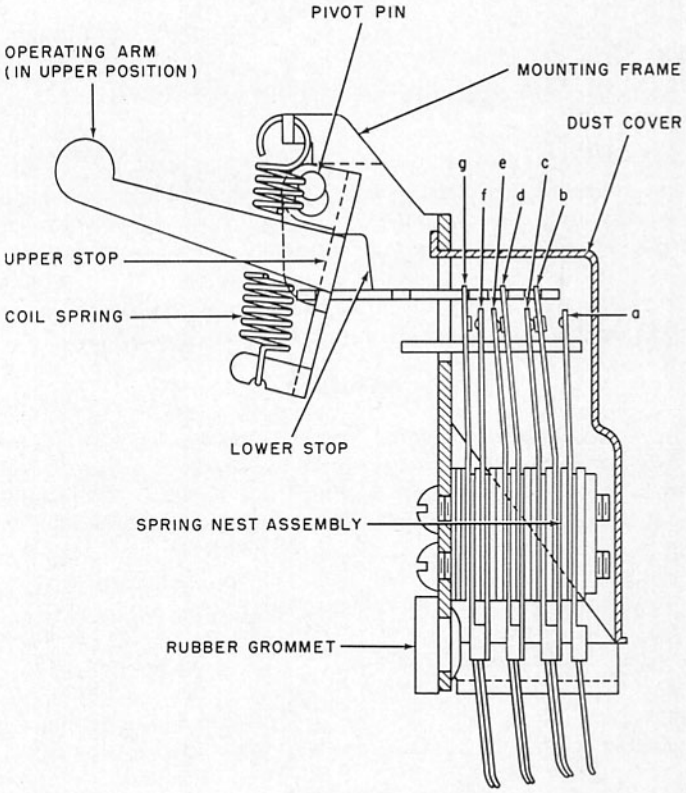


Figure 7. Cradle Switch Assembly

On the spring nest assembly (P-75309), make sure both contacts on contact spring assembly b have a perceptible follow. When operating arm (P-75302) is in its upper position, there should be a minimum gap of 1/64 of an inch between the contacts of contact spring assemblies a and b, and g and f. When the operating arm is depressed, there should be a minimum gap of 1/64 of an inch between the contacts of contact spring assemblies b and c, e and d.

When either of the plungers (P-75406) is depressed to within 1/8 of an inch of the handset cradle supports of the housing, the line circuit should be open. Check this by eye. When the handset is lifted from the plungers, the contacts should make before the plungers come to a positive stop with contacts g and f opening last.

c. Foot Assembly (P-75328). Cover (P-75331) (fig. 4) should be cleaned by brushing with a stiff bristle or soft wire brush. If the cover is cut or worn, attach friction pad (P-75558) to prevent scratching the surface on which the telephone set is located.

d. Connections and Cording. After the telephone set has been disassembled, refer to the wiring diagram (fig. 8) and the cording diagrams (figs. 9 and 10). Make sure all wires have been correctly re-connected. Check the position of the interior wiring against the cording diagram to make sure the interior wiring will not interfere with the operation of the ringer, dial, or cradle switch assembly.

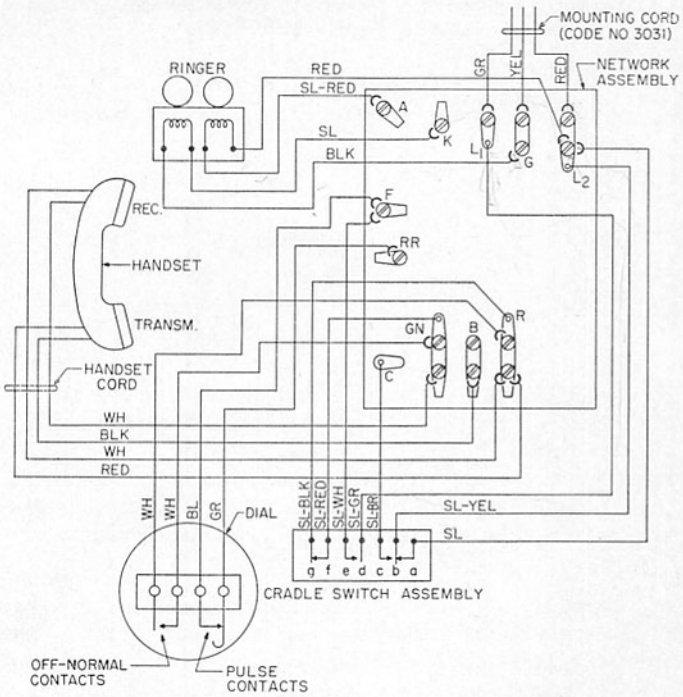
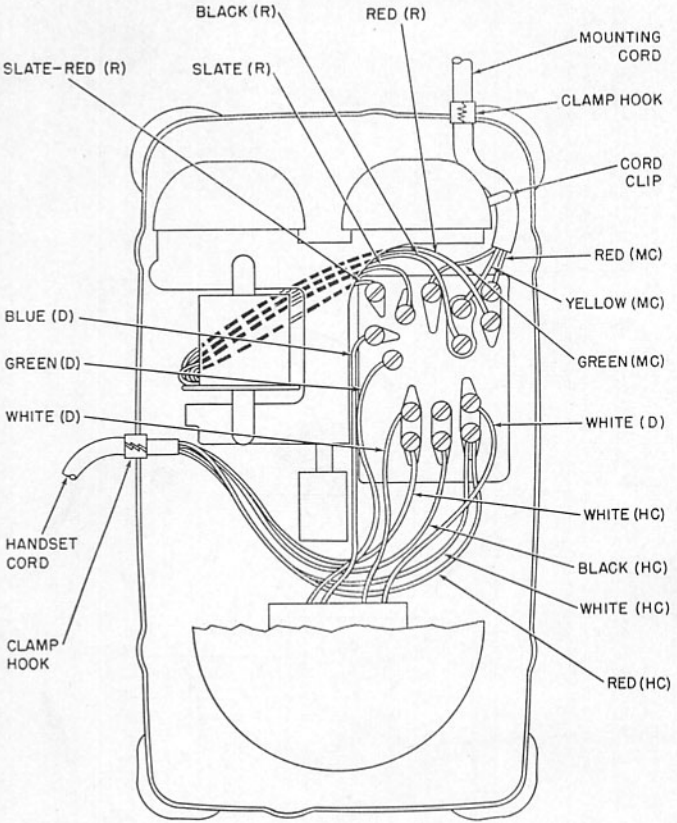


Figure 8. Telephone K-500, Wiring Diagram

21. Lubrication

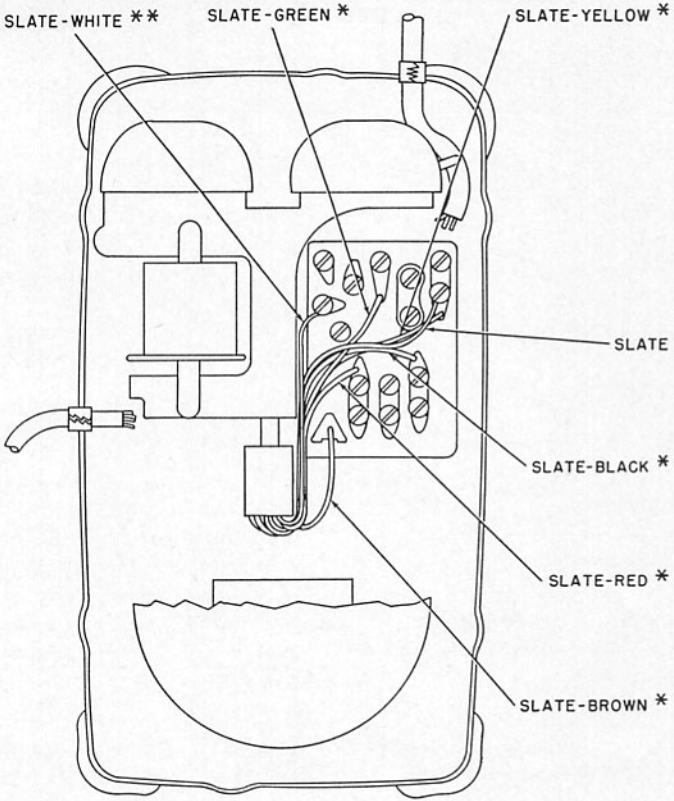
Except for lubrication of the plungers and cradle switch assembly (paragraph 20), or as indicated in local practices, no other lubrication is required for the telephone set.



NOTE:

HC- HANDSET CORD
R- RINGER
MC- MOUNTING CORD
D- DIAL

Figure 9. Cording Diagram for Ringer, Dial, and Handset and Mounting Cords



NOTE:

* SOLDERED CONNECTION

** FOR MANUAL SERVICE, TRANSFER SLATE-WHITE LEAD TO TERMINAL "RR"

Figure 10. Cording Diagram for Cradle Switch Assembly

22. Tests with Trouble Desk—Common Battery Stations

The tests discussed in this paragraph should be performed upon completion of the installation procedures, inspection, trouble shooting, checks and adjustments, and removal and replacement of parts. The test should be made with the aid of a test deskman on the dial set (DK-500) or the manual set (MK-500) in accordance with local practices. For tests at P.B.X. stations, the local superviser should be consulted for detailed instructions.

a. Ringing and Bell Tapping. Dial the proper test code or call the test deskman to make the set ring. If ringer does not ring or the bell taps, refer to table V for the remedy.

b. Transmission and Reception. Lift the handset and hold it in a vertical position. Contact and talk to the test deskman. Talk directly into the transmitter in a natural conversational tone. The lips should be almost touching the transmitter cap. Check for normal sidetone during this test. Check for difficult reception. Ask the test deskman if transmission is clear. If trouble is encountered in either case, refer to table V for the remedy.

c. Dial Speed. Make a dial speed test with the test deskman or in accordance with other local practices.

d. Noise. With the handset held firmly at the ear and mouth, shake the mounting cord and then the handset cord. If excessive noise is heard and it changes in magnitude as a cord is shaken, check the cord and replace it if necessary (paragraphs 27, 46). Test the transmitter for excessive noise by blowing gently into it. If the noise changes in magnitude during the test, then the transmitter unit is defective, and should be replaced (paragraph 25). If either a cord or the transmitter is replaced, repeat tests a through c.

e. Ring and Tip Party. At two-party selective message rate dial stations, perform tests a through d. Then, with

the test deskman, test as follows: (1) for tip party make sure the line is grounded through a 1,000 ohm ringer with the handset off the plungers and clear of ground with the handset on the plungers; (2) for ring party, the line should be grounded with the handset on or off the plungers. On automatic check systems, test by dialing the proper test code number.

23. Removal and Disassembly for Replacement

The following paragraphs discuss the procedures for removing and disassembling the major assemblies of the telephone set. Each paragraph discusses the procedure for removing or disassembling that particular component only. For disassembly, refer to figures 11 and 12, and for proper electrical connections when reassembling, refer to the wiring diagram (fig. 8) and the cording diagram (figs. 9 and 10).

24. Receiver Unit (P-75400)

Remove the receiver cap (1) by rotating it in a counterclockwise direction. Carefully tilt the handle (10) until the receiver unit (2) slides out. Loosen the two terminal screws (3) of the receiver unit to disconnect the two terminals (9) of the handset cord (Code No. 3030). Upon replacement, reassemble in the reverse order.

25. Transmitter Unit (P-75399)

Remove the transmitter cap (4) by rotating it in a counterclockwise direction. Remove the transmitter unit from the transmitter holder assembly (6). Upon replacement, reassemble in the reverse order.

26. Transmitter Holder Assembly (P-75384)

Remove the transmitter unit as discussed in paragraph 25. Lift the transmitter holder assembly out of the handle (10). Disconnect the transmitter holder assembly from the two terminals (9) of the handset cord (Code No. 3030) by loosening the two terminal screws (7). Upon replacement, reassemble in the reverse order. However, when re-

placing the transmitter holder assembly in the handle (10), be sure to align the key on the rim of the assembly with the key slot in the handle.

27. Handset Cord (Code No. 3030)

At the handset (Code No. 65-C), perform the disassembly procedures discussed in paragraphs 24 through 26. Then, with the thumb and forefinger, free the cord strain relief from the anchor post at the bottom of the handle (transmitter end). Perform this procedure carefully to avoid damaging the cord strain relief or the anchor post. Do not use long-nose pliers or a screwdriver. After freeing the cord strain relief, carefully pull the cord, its four conductors and their terminals (9) through the access hole at the transmitter end of the handle (10). Be careful not to damage the two receiver terminals as they are pulled through the core of the handle.

To remove the handset cord from the base, remove the base assembly (P-75338) from the housing-plunger assembly (P-75401) as discussed in paragraph 33. Release the cord clamp hook (P-75421) from the anchor hole in the rim of the base plate (fig. 9). Disconnect the four terminals (9) from the network assembly (40) by loosening the four terminal screws (41). Carefully pull the four freed conductors through the space between the cradle switch assembly (39) and the dial (Code No. 19-G).

Upon replacement, reassemble in the reverse order. However, when replacing the handset cord at the handset, use a fish wire to pull the receiver terminals through the core of the handle.

28. Handle (P-75383)

Perform the disassembly procedures discussed in paragraphs 24 through 27. In paragraph 27, omit the removal of the handset cord from the base assembly. Upon replacement, reassemble in the reverse order.

29. Number Card Assembly (P-75418)

Remove the two tabs of the retainer ring (11) from the dial (Code No. 19-G) or the dummy plug assembly (P-75419) and remove the number card assembly. In order, remove the retainer spring (12), retainer disc (13), number card (14), and protector (15). Upon replacement reassemble in the reverse order.

30. Dummy Plug Assembly (P-75419)

Remove the number card assembly as discussed in paragraph 29, omitting the disassembly procedures. Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Inside the housing-plunger assembly, remove the two screws (18) and then, the clamping plate (17). Carefully remove the dummy plug (16) from the outside of the housing-plunger assembly.

31. Plunger Assembly (P-75401)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Inside the housing assembly (22), remove the single screw (20). Then, carefully pull the plunger retainer (19) forward, and lift it out of the housing assembly. Remove the two plungers (21). Upon replacement, reassemble in the reverse order. When replacing the plunger retainer, be sure to align the lip of the retainer with the key slot in the housing before replacing the screw.

32. Housing Assembly (P-75402)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Remove the plunger assembly as discussed in paragraph 31. When disassembling the manual-type set, remove the dummy plug assembly as discussed in paragraph 30. Upon replacement, reassemble in the reverse order.

33. Removal of Base Assembly (P-75338) from Housing—Plunger Assembly (P-75401)

Loosen the two cabinet lock screws (P-75486) at each end of the base plate (fig. 4). Remove the base assembly from the housing-plunger assembly. Be careful not to lose the vinyl gasket (38) on the dial (Code No. 19-G). Upon replacement, reassemble in the reverse order.

34. Ringer (Code No. 130 or 131)

To remove the ringer from the base assembly, proceed as follows. Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Disconnect the coil conductors from the terminal screws (41) at the network assembly (40). Remove the mounting screw of each mounting screw assembly (34) from each ringer mounting bracket of the base assembly (P-75338). Lift the ringer until the control assembly clears the base plate access hole. Pull the ringer forward and out of the base assembly, disengaging the locating pin on the frame assembly (fig. 5) from the rubber grommet in the cradle switch assembly (fig. 7). Upon replacement, reassemble in the reverse order.

35. Coil Assembly (P-75422) and Core Lamination (P-75395)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Disconnect the coil terminals (9) at the network assembly. Remove the two screws (25) which secure the coil assembly to the support pole piece assembly. Remove the coil assembly and core lamination (24 and 26). Remove the core lamination from the coil assembly. Upon replacement, reassemble in the reverse order.

36. Support Pole Piece Assembly (P-75398)

Remove the coil assembly as discussed in paragraph 35. Lift the support pole piece assembly off the frame assembly (33). Upon replacement, reassemble in the reverse order.

CAUTION

It is necessary to remagnetize and artificially age the magnet to an optimum operating value and readjust bias tension after this disassembly procedure. It is not recommended that this be attempted at the subscribers premises since special equipment is required for proper adjustment.

37. Magnet (P-75369)

Remove the coil assembly and support pole piece assembly as discussed in paragraphs 35 and 36, respectively. Slide the magnet out of its holder in the frame assembly (28 and 33). Upon replacement, reassemble in the reverse order. (See CAUTION note of paragraph 36.)

38. Clapper Assembly (P-75393)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Remove the screw (32) from the armature bracket (P-75373). Pull the clapper assembly back to disengage the biasing spring wire from the spring wire bracket (P-75375). Remove the clapper assembly. Upon replacement, reassemble in the reverse order. (See CAUTION note of paragraph 36.)

39. Gongs (P-75396 and P-75397)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Remove the two lockwasher screws (32) and remove the gongs. Upon replacement, reassemble in the reverse order.

40. Frame Assembly (P-75388)

Remove the ringer, coil assembly and core lamination, support pole piece assembly, magnet, clapper assembly, and gongs as discussed in paragraphs 34 through 39. The control wheel (P-75376), detent spring (P-75387), and the two resonators (P-75372) cannot be further disassembled. Upon replacement, reassemble in the reverse order. (See CAUTION note of paragraph 36.)

41. Mounting Screw Assembly (P-75366) and Rubber Foot (P-75371)

The mounting screw assembly and rubber feet on the biased ringers (Code No. 131) use a screw assembly that is captivated. However, the frequency selective ringers (Code No. 131) are mounted to the base plate by two removable screws (P-75366) and lockwashers (73857), and are not equipped with a rubber foot.

42. Dial (Code No. 19-G)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Remove the number card assembly as discussed in paragraph 29. Remove the vinyl gasket (38). Disconnect the dial conductors at the network assembly (40). Loosen the three mounting screws (37). Remove the dial from the dial bracket (P-75336). Upon replacement, reassemble in the reverse order

43. Cradle Switch Assembly (P-75300)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Disconnect and unsolder the switch conductors at the network assembly (40). Remove the three nuts (42), spring washers (43), and screws (44) which secure the switch mounting frame to the base plate. Disengage the rubber grommet on the switch frame from the locating pin on the ringer frame (figs. 5 and 7), and remove the cradle switch assembly. Upon replacement, reassemble in the reverse order.

44. Network Assembly (P-75335)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Disconnect and unsolder all conductors at the network assembly. Remove the three nuts (42), spring washers (43), and screws (44) which secure the assembly to the base plate. Remove the network assembly. Upon replacement, reassemble in the reverse order.

45. Base Plate (P-75327)

To remove the base plate, perform the procedures in paragraphs 33, 34, and 42 through 45. Disconnect the base end of the handset and mounting cords (paragraphs 27 and 46, respectively). Upon replacement, reassemble in the reverse order.

46. Mounting Cord (Code No. 3031)

Remove the base assembly from the housing-plunger assembly as discussed in paragraph 33. Remove the mounting cord from the cord clip on the ringer mounting bracket (fig. 9). Release the cord clamp hook (46) from the anchor hole in the rim of the base plate (45). Disconnect the three terminals (9) from the network assembly (40) by loosening the three terminal screws (41).

At the connecting block (Code No. 28), remove the three terminals (9) and the cord strain relief band (47) as discussed in paragraph 47. Upon replacement, reassemble in the reverse order.

47. Connecting Block (Code No. 28)

Remove the cover (48) by removing the cabinet lock screw (49). Disconnect the terminals (9) of the mounting cord and the line by loosening the four terminal screws (50). Carefully lift the cord strain relief band (47) out of the base assembly (52). Disassemble the base assembly by removing the four terminal screws (50) and eight washers (51). Upon replacement, reassemble in the reverse order.

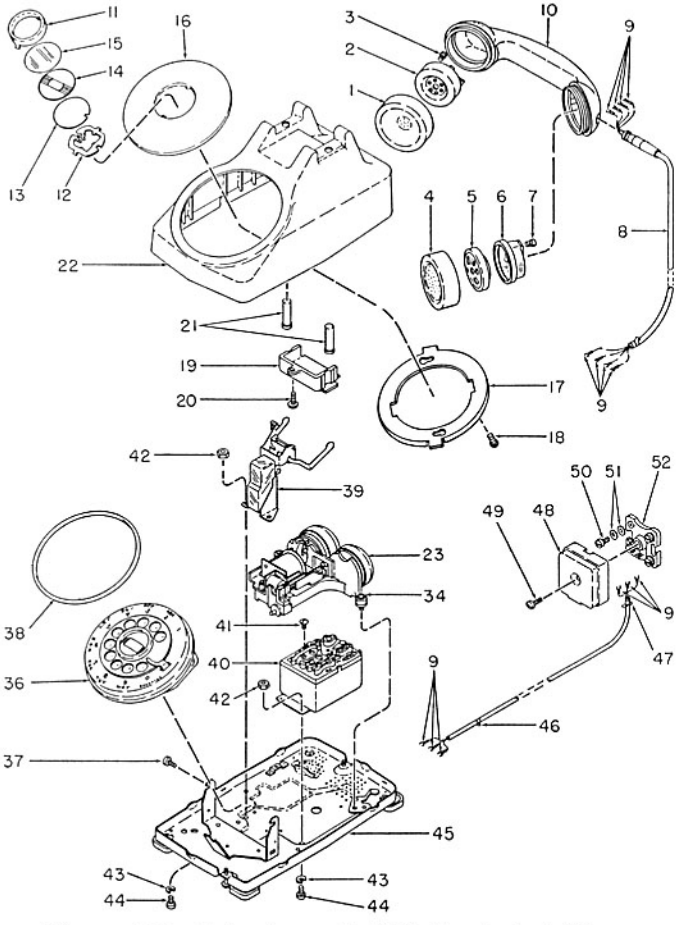


Figure 11. Telephone K-500, Exploded View

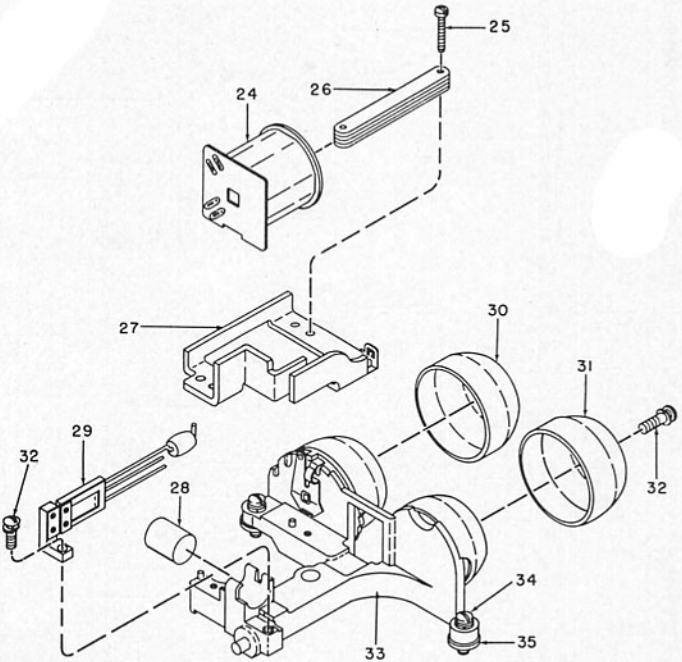


Figure 12. Code 130BA Ringer, Exploded View

TABLE VI. LIST OF REPLACEMENT PARTS

Index No.	Name of Part	Part No.	Quantity
	Handset (Code No. 65-C) (fig. 11)		
1	Receiver cap	P-75381	1
2	Receiver unit	P-75400	1
3†	Terminal screw	P-75386	2
4	Transmitter cap	P-75380	1
5	Transmitter unit	P-75399	1
6	Transmitter holder assembly	P-75384	1
7†	Terminal screw	P-75386	2
8	Handset cord (Code No. 3030)		1
9	Terminal	P-75325	24*
10	Handle	P-75383	1
	Number card assembly (fig. 11)	P-75418	1
11	Retainer ring	P-75412	1
12	Retainer spring	P-75417	1
13	Retainer disc	P-75416	1
14	Number card	P-75415	1
15	Protector	P-75413	1
	Dummy plug assembly (fig. 11)	P-75419	1
16	Dummy plug	P-75411	1
17	Clamping plate	P-75420	1
18	R.H. self tapping screw	P-75407-4	2
	Housing—Plunger assembly (fig. 11)	P-75401	1
19	Plunger retainer	P-75405	1
20	R.H. self tapping screw	P-75407-2	1
21	Plungers	P-75406	2
22	Housing assembly	P-75402	1
23	Ringer (Code No. 130 or 131) (figs. 11 and 12)		1
24	Coil assembly	P-75422	1
25	Flat fil. HD Machine screw	P-75409-2	2
26	Core lamination	P-75395	1
27	Support pole piece assembly	P-75398	1
28	Magnet	P-75369	1
29	Clapper assembly	P-75393	1
30	Gong (movable)	P-75396	1
31	Gong (fixed)	P-75397	1

Index No.	Name of Part	Part No.	Quantity
32	RH lockwasher screw	P-75408-2	3
33	Frame assembly	P-75388	1
34	Mounting screw assembly**	P-75366	1
35	Rubber foot	P-75371	1
36	Dial (Code No. 19-G) (fig. 11)		
37‡	Mounting screw	P-75487-2	3
38	Vinyl gasket	P-75474	1
	Base assembly (fig. 11)	P-75338	
39	Cradle switch assembly	P-75300	1
40	Network assembly	P-75335	1
41	Terminal screws	P-75392-2	15
42	Hex nut	P-67093	6
43	Spring washer	P-54336-5	6
44	Bind HD machine screw	P-69116-3	6
45	Base plate	P-75327	1
	Mounting cord (Code No. 3031) (fig. 11)		
46	Cord clamp hook	P-75351	1
47	Cord strain relief band	P-75410	1
	Connecting block (Code No. 28) (fig. 11)		
48	Cover	P-75542	1
49	Cabinet lock screw	P-75545	1
50‡	Bind HD machine screw	P-75487-2	4
51	Washer	P-75544	8
52	Base assembly	P-75540	1

* Total of 22 in telephones equipped with ringer No. 131. (Harmonic ringer requires 2 less leads.)

** Lockwashers P-73857 are required in telephones equipped with ringer No. 131.

† Total quantity of 4.

‡ Total quantity of 7.