

BELL SYSTEM PRACTICES

Station Installation
and Maintenance

SUPPLEMENTARY

ADDENDUM C32.535

Issue A, 10-15-53-N

T. P. T. & T. Co.

500 TYPE TELEPHONE SETS

1. GENERAL

1.01 This Supplementary Addendum, which supplements Section C32.535, issue 2 and Addendum, issue C is issued to provide temporary information on several new 500 series telephone sets which are available. This Supplementary Addendum should be retained with subsequent issues of the section until notice is given covering its cancellation or reissue.

1.02 Paragraphs 1.05, 2.19, 2.20, 2.21 and 2.22 and Figures 3, 4 and 5 are added.

1.05 Several types of low demand 500 series sets have been made available, i.e.: 500E-3 and 500F-3, 500L-3 and 500M-3, 502A-3 and 502B-3 and 511A-3 and 511B-3. A brief description of each type is given below and circuits of three of the new sets are reproduced.

2. DESCRIPTION AND USE

2.19 The 500E-3 (manual) and 500F-3 (dial) sets will replace 302AA and AC sets respectively. These sets are equipped with a left-hand plunger switch to minimize interference, when the hand set is removed at one of the stations on the line when the line is already in use. When the hand set is first removed a low loss a-c bridge, including the receiver and dial filter, is placed across the line. If the line is not already in use, the subscriber pulls up the plunger switch which closes the talking and dialing circuits. Since demands for 302AA (manual) telephone sets have been at levels which do not appear sufficient to warrant the manufacture of comparable 500E-3 (manual) sets,

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500E-3 sets will be available only by conversion.

Use of this type of set is limited to Public Emergency Reporting Service Stations.

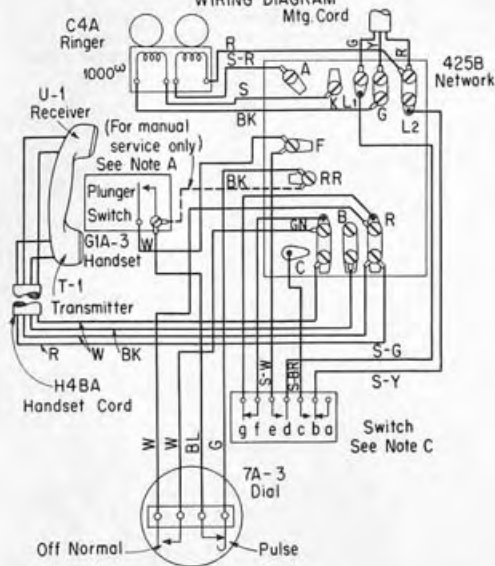
2.20 The 500L-3 (manual) and 500M-3 (dial) telephone sets do not replace any apparatus. These sets are similar to the 500C-3 and 500D-3 telephone sets except for an added terminal strip and a different switchhook circuit arrangement. These changes provide for separate talking and ringing circuits for use with 1A Telephone Answering Sets, 2B Key Telephone Systems and 507A and 507B P.B.X. attendant stations. They also permit the use of additional ringing bridges in specific instances when needed where a local ringing source is available. The 500L-3 (manual) set will be obtainable only by conversion.

2.21 The 502A-3 (manual) and 502B-3 (dial) telephone sets are similar in appearance to the 500C-3 and 500D-3 telephone sets except that they have been provided with the exclusion feature which permits the user to cut off an extension station to assure added privacy. This is brought about by a (left-hand) switchhook plunger. These sets are for use in 1A and 1A1 Key Telephone Systems where exclusion service is desired and also at attendants' positions. They will replace 402A and 402C telephone sets. Connection and circuit schematic information concerning these sets will be covered in SD-69209-01.

2.22 The 511A-3 (manual) and 511B-3 (dial) telephone sets are similar to the 510-type set, except that in addition to the single combination turn and pushbutton key, which permits the pickup of two lines plus the signaling feature, they are also provided with the switchhook plunger exclusion feature. They are intended for use in 1A Key Telephone Systems and will replace 410CA, CC, 411AA, AC, CA and CC Telephone sets. Connection and circuit schematic information for these telephone sets has been covered in SD-69208-01. Since the demand for manual sets of the

402, 410 and 411 types has not appeared to be of such proportions as to justify the manufacture of equivalent types in the 500 series and also because conversion to manual types can readily be made, both in the field and shop, the 502A-3 and 511A-3 telephone sets will be available only through conversion.

500E-3 & 500F-3 TELEPHONE SET WIRING DIAGRAM



Notes:

- A. 500E-3 (For Manual Service) same as 500F-3 except replace dial with apparatus blank and strap terminal on plunger switch to (RR) terminal on network with black lead as shown.
- B. When the handset is removed, contact, *gf*, breaks last.

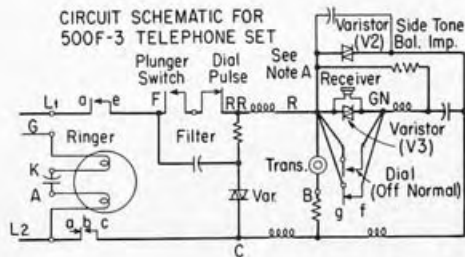
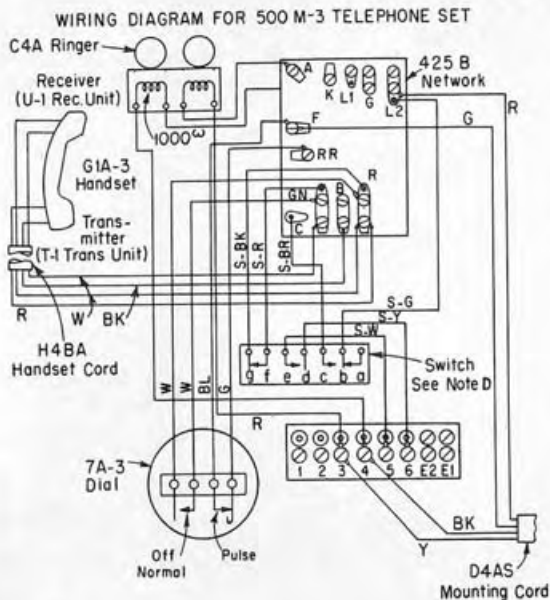


Figure 3

500 M-3 TELEPHONE SET



Notes:

- A. For manual service: (500 L-3) some as 500 M-3 except replace dial with apparatus blank and transfer green lead from (F) to (RR) terminal on network.
- B. When ringer condenser is required in series with ringer, transfer slate ringer lead to (K) terminal on network.
- C. Contact sequence:
 Removing handset - 1. de closes before cb
 2. fg opens
 Restoring handset - 1. fg closes
 2. cb opens before de

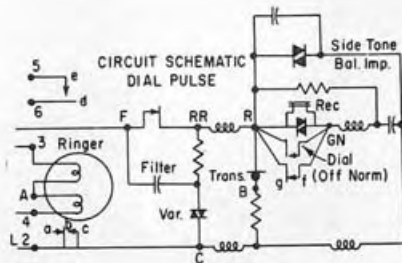


Figure 4

502B-3 TELEPHONE SET

WIRING DIAGRAM FOR 502B-3 TELEPHONE SET

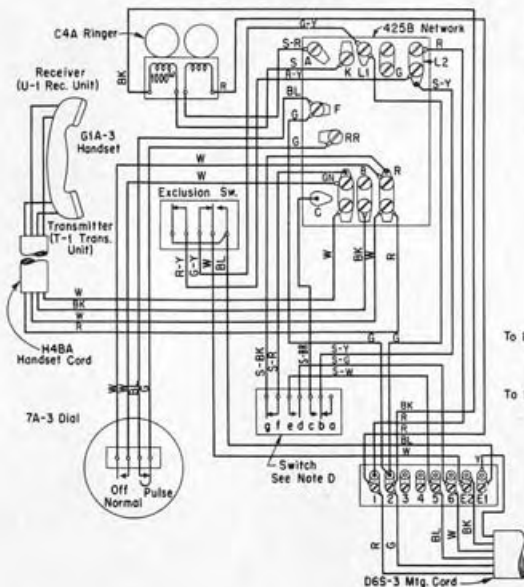
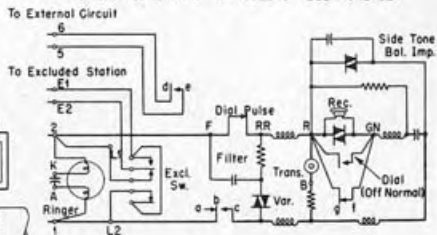


Figure 5

Notes:

- 502 A-3 (For Manual Service) Same as 502B-3 except replace dial with 95A-3 Apparatus Blank and transfer Green lead from (F) to (RR) terminal on network.
- To permanently silence ringer:
Transfer Black ringer lead to (X) terminal on network.
- 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.
- Contact sequence:
Removing Handset
 - de closes before cb
 - fg opens
 Restoring Handset
 - fg closes
 - cb opens before de

CIRCUIT SCHEMATIC FOR 502B-3 TELEPHONE SET



TELEPHONE SETS
500-TYPE
FOR USE IN NOISY LOCATIONS

1. GENERAL

1.01 This addendum, which supplements Section C32.535, is issued to specify the use of 500-type sets in very noisy locations.

This addendum should be retained with subsequent issues of the section until notice is given covering its cancellation or reissue.

1.02 Paragraph 3.08 and 3.09 are added.

3. USE

3.08 The 500-type telephone sets, without modification, have been found to perform satisfactorily in locations with a high noise level where other type telephone sets are considered to be unsatisfactory. It is therefore recommended that they be applied for use in such locations in lieu of push-to-listen or other similar arrangements. In locations with an extremely high noise level, in the order of 90 to 100 db, the 500-type telephone sets may be modified in

accordance with paragraph 3.09 of this addendum to provide the additional attenuation required under extreme noise conditions. The modified set shall not be used, however, unless the unmodified set is incapable of satisfactory performance under a specific noise condition.

3.09 To increase the attenuation of the 500-type telephone sets for use in extremely noisy locations, connect an Allen Bradley type GB, 39 ohm, 1 watt, or equivalent type, resistor across the B and RW terminals of the equalizer, or to terminals B and R for the sets with 425-B networks. This resistor may be ordered as follows:

(Qty) Resistor - Allen Bradley type GB, 39 ohm, 1 watt or equivalent.

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SECTION C32.535
Issue 4, May, 1954
AT&T Co Standard

TELEPHONE SETS
500 AND 501 TYPE
DESCRIPTION AND USE

1. GENERAL

- 1.01 This section describes and indicates the uses for 500- and 501-type common battery telephone sets.
- 1.02 The section is reissued to include 500E/F-, 501F-, and 500H-type telephone sets.
- 1.03 Due to extensive changes in this section, marginal arrows have been omitted.
- 1.04 Replacement parts are now listed in Section C32.544, Telephone Sets—500 Series—Supplies.

2. DESCRIPTION

- 2.01 **Appearance:** Fig. 1 shows a 500-type telephone set.



Fig. 1—500-Type Telephone Set

2.02 Mounting and Housing: All parts enclosed by the housing, including the dial or apparatus blank, line switch (switchhook), and cording, are mounted on the metal base. The plungers are part of the housing assembly. The housing can easily be replaced and is fastened to the base with two special, roundhead, captive machine screws. Three-conductor, neoprene-jacketed mounting cords are standard with all 500- and 501-type sets except the 500H (6-conductor) and 500L/M (4-conductor).

2.03 Network: The code number of the network (425A or 425B) and the terminal designations are cast in the surface of the terminal block which covers the network case and are also stamped on the side of the case. Circuit elements inside the network case are mounted on the underside of the terminal block. This includes a filter which not only suppresses dial pulsing interference with radio, but increases the life of the pulsing contacts. The network shall not be replaced in the field.

2.04 Transmission Equalization: Equalizers are required in 500 series telephone sets used near central offices or as "on premise" PBX stations. Zoning practices provide specific information on their use. Telephone sets are equipped for equalization as follows:

- (a) Sets coded 500A/B and 501A/B have 311A equalizers and 425A networks.
- (b) Sets coded 500J/K and 501J/K **do not** have equalizers.
- (c) All other 500 series sets have 425B networks which contain the necessary apparatus for equalization.

2.05 Dial: All 500 series dial telephone sets are equipped with 7-type dials:

2.06 Ringer: Early 500-type sets used C2A ringers and 501-type sets used C3A ringers. These ringers are not interchangeable. The C4A ringer can be used with either 500- or 501-type telephone sets. C-type ringers are high impedance and their sound output is several db higher than the B-type ringer. The subscriber may adjust the volume to one of four levels by rotating a notched wheel in the base of the set. If authorized by a service order or other local instructions, the stop that normally prevents ringer cutoff may be bent by the installer, as described in Section C32.537, 500 Series Telephone Sets, (500 and 501 Type), Installation. This will allow the user to completely silence the bell.

2.07 Handset: G1A handsets are standard with all telephone sets in the 500 series. Neoprene-jacketed, 4-conductor

handset cords are furnished. Retractable cords are available with proper authorization.

2.08 **Manual and Dial Set Coding:** The type of telephone set and date of assembly is stamped with aluminum lacquer on the base of the set approximately as shown in Fig. 2.

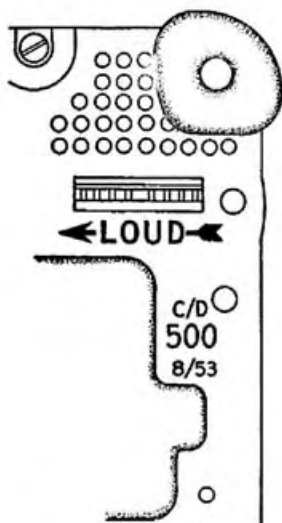


Fig. 2—Base of 500 Series Sets

Code numbers such as 500C/D cover both manual and dial versions of a particular type set. When necessary to specify manual or dial, use the appropriate code letter shown in Table A.

Table A

500-Type Sets		501-Type Sets	
Manual	Dial	Manual	Dial
A	B	A	B
C	D	C	D
E	F		F
	H	J	K
J	K		
L	M		

Note: Early 500J/K and 501J/K sets were coded 500T and 501T respectively.

3. USE

3.01 **General-Purpose Telephone Sets:** Telephone sets coded 500A/B and 500C/D are general-purpose sets for use with manual or dial common battery service on individual lines, including PBX and 1A key stations which require tip and ring only, or for any party-line service with nonpolarized ringing.

3.02 **Tube Sets:** Each telephone set coded 501A/B or 501C/D is furnished with a cold cathode gas-filled tube as part of its ringing circuit. They are primarily for use with polarized ringing service (4-party selective or 8-party semiselective). The 501J/K is for the same purpose where equalization is not required.

Note: Tube sets may be used with 4-party semiselective or divided code ringing for the purpose of reducing inductive interference as covered in Section C63.271, Line and Ringer Connections to Reduce Induction.

3.03 **Special Purpose Sets:** The following paragraphs cover the description and uses of special purpose sets coded 500 or 501.



Fig. 3—500F Telephone Set Showing Plunger Switch and Instruction

3.04 **500E/F:** This set is used for party-line service with nonpolarized ringing. It should not be used as tip party on a service which requires tip-party identification. The 500E/F is equipped with a plunger switch and wired to avoid interference with another party-line user's dialing or talking when the handset is lifted to place a call. Only a low-loss receiver circuit is bridged across the line with normal operation of the line switch (switchhook) contacts. When it is found that the line is not busy, pulling up the left plunger operates the plunger switch and cuts in the talking and dialing circuit elements. (See Fig. 3.) A call can then be placed or answered. Replacing the handset restores the switch automatically. The 500E/F replaces 302AA (Manual) and 302AC (Dial) telephone sets.

3.05 **501F:** Where polarized ringing is used, this set provides the same feature as the 500F. It replaces the 306G telephone set. (See Note in 3.02.)

3.06 **500H:** This set is equipped with a lucite dial finger wheel, a lamp which illuminates the dial, and a 6-conductor mounting cord. (See Fig. 4.) The lamp circuit is closed through the line switch (switchhook) contacts when the handset is lifted from its cradle. The light goes out when the handset is replaced. An auxiliary 6- to 8-volt ac or dc power source for the lamp circuit is required. Due to its wiring arrangement, the 500H cannot be used as tip party on message rate, automatic ticketing, AMA, or zone registration services. Its use otherwise is the same as the 500C/D.



Fig. 4—500H Telephone Set With Illuminated Dial

3.07 **500L/M:** This set is to be used at installations which require that the ringer circuit be brought out separately through the mounting cord. Examples are 1A-type telephone answering sets, 507-type PBX attendants' stations, certain 2B key telephone system stations, etc. A 4-conductor mounting cord and an additional terminal strip are provided. With the above exceptions, other parts of 500L/M telephone sets are the same as the 500C/D. Manual sets (500L) are available only by conversion.

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ADDENDUM C32.537
Issue 1, June, 1954
AT&T Co Standard

500 SERIES TELEPHONE SETS

(500 AND 501 TYPE)

INSTALLATION

1. GENERAL

1.01 This addendum supplements Section C32.537, Issue 3.
It is issued to cover the use of the new 1542A inductor for radio signal demodulation suppression.

1.02 The 1542A inductor, which was not available at the time the section was reissued has been found to be much simpler and more suitable for use than the one or more capacitors recommended in part 6.

6. RADIO SIGNAL DEMODULATION SUPPRESSION

6.05 Add the following paragraph: The 1542A inductor, as covered in Section C55.804, Radio Signal Suppression 1542A Inductor, should normally be used to suppress radio interference. Where this equipment is not available, the capacitor method described in paragraph 6.02 should be employed.

500 AND 501-TYPE TELEPHONE SETS INSTALLATION

1. GENERAL

1.01 This addendum which supplements Section C32.537, issue 2, is issued to delete certain information contained in the section. This addendum should be retained with subsequent issues of the section until notice is given covering its cancellation or reissue.

1.02 Paragraphs 3.02 and 5.05 are rewritten and Figures 1 and 2 are to be disregarded insofar as they refer to bending the stop tab of the detent spring to allow the adjusting wheel to silence the ringer.

3. RINGER

3.02 Explain to the subscriber the operation of the wheel in the base of the set for controlling the ringer sound output as described in Part 5 — Tests.

5. TESTS

5.05 Disregard this paragraph.

Ringer cutoff by use of the adjusting wheel is not approved for use in this Area.

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SECTION C32.537
Issue 3, April, 1954
AT&T Co Standard

500 SERIES TELEPHONE SETS
(500 AND 501 TYPE)
INSTALLATION

1. GENERAL

- 1.01 This section covers the installation procedures for the 500 series telephone sets listed below:

500 Type

500A/B	500C/D	500E/F
500H	500J/K	500L/M

501 Type

501A/B	501C/D
501F	501J/K

1.02 Information is also included regarding the biasing spring setting, permanent silencing of extension station ringers, ringer cut-off feature, interference from radio broadcasting stations, conversion of sets for manual service, and the use of 500 series sets in noisy locations.

1.03 The section is reissued to include information on the 500E, F, H, L, and M telephone sets and the 501F telephone set.

1.04 Due to extensive changes in this section, marginal arrows have been omitted.

2. LOCATING

2.01 In locating the telephone set, be guided by the subscribers' wishes and the requirements covered in the section titled, "Subscriber and Telephone Sets For Indoor Locations, Installation," (C31.145). Consideration should be given to such items as signal audibility, protection from the elements, accessibility, hazard to user, etc.

2.02 If the subscribers' wishes cannot be followed, explain the reason therefore. If **satisfactory arrangements cannot be made, consult your supervisor before proceeding with the work.**

3. RINGER

3.01 **Biasing Spring Setting:** The proper biasing spring settings for the class of service furnished are shown in Table A. If the spring is not in specified notch, shift to correct notch. The notch nearest the fixed gong is the high tension notch. The biasing spring may be shifted to either notch by using the end of the finger. Care should be taken to prevent bending of the spring.

Caution: Do not use any tools to relocate the biasing spring.

Table A

Class of Service	Biasing Spring Notch
Bridged Ringing Services	
Individual Line and PBX Stations (Except as stated in Note 1)	High (See Note 3)
Nonselective Party Lines	Low
Grounded Ringing Services	
2-party Flat and Message Rate	High (See Note 3)
4-party Semiselective (Except as stated in Note 2)	High (See Note 3)
Divided Code Ringing	Low
4-party Selective } (C3A)	High
8-party Semiselective } (C4A)	Low (See Note 4)

Note 1: When **three** or more ringers are bridged across the line, the biasing spring should be in the **low** notch on all ringers.

Note 2: Where **five** ringers are connected between the same side of line and ground, the biasing spring should be in the **low** notch on all ringers on that side of line.

Note 3: However, ringers in nontube-type telephone sets which are not ringing properly may have the biasing spring placed in the low tension notch to increase the sensitivity of the ringer.

Note 4: If the ringer buzzes on short loop installations when the party of opposite polarity is being called, place the biasing spring in the **high** tension notch. If it still buzzes or fails to ring, replace the ringer.

3.02 **Permanent Silencing of Ringers:** To permanently silence station ringers in the 500- and 501-type telephone sets, transfer ringer leads at terminal on network to correspond with the wiring changes indicated in bold face type and associated notes.

- (a) For bridged, ring party, tip party of flat rate except flat and message rate services covered below:

Type of Set	Ringer Leads			
	Red	Black	Slate	Slate-Red
500A/B	K	K	E	E
500C/D	L2	K	K	A
500E/F	L2	K	K	A
500H	L2	K	K	A
500J/K	K	K	E	E

- (b) For tip party of 2-party dial message rate and flat rate automatic message accounting and zone registration:

Type of Set	Ringer Leads			
	Red	Black	Slate	Slate-Red
500B*	K	G	M	E
500D*	K	G	B	K
500K*	K	G	M	E

*Transfer slate switch lead from **L2** to **A** terminal on network.

- (c) For tip party of 2-party flat rate automatic ticketing:

Type of Set	Ringer Leads			
	Red	Black	Slate	Slate-Red
500B*	M	E	K	G
500D*	B	K	K	G
500K*	M	E	K	G

*Transfer slate switch lead from **L2** to **A** terminal on network.

- (d) For 4-party selective and 8-party semiselective services:
 (1) For (—) and (+) ring- and tip-party stations:

Type of Set	Ringer Leads (C3A)	
	Red	Black
501A/B	E	E
501C/D	K	K
501J/K	E	E

- (2) For (—) ring- and (—) tip-party stations:

Type of Set	Ringer Leads (C4A)			
	Red	Black	Slate	Red-Slate
501A/B	K	K	K	A
501C/D	K	K	A	K
501F	K	K	A	K
501J/K	K	K	K	A

- (3) For (+) ring- and (+) tip-party stations:

Type of Set	Ringer Leads (C4A)			
	Red	Black	Slate	Red-Slate
501A/B	A	K	K	K
501C/D	K	K	A	K
501F	K	K	A	K
501J/K	A	K	K	K

4. RINGER CUT-OFF FEATURE

4.01 If ringer cut-off feature is to be provided, the stop adjacent to the detent spring on the ringer volume control must be bent away so that it does not engage the stop on the rim of the ringer frame immediately behind the movable gong. This allows the cam section of the movable gong mounting to engage the stop rod and prevent movement of the armature and clapper (see Figs. 1, 2a, and 2b). Instruct subscriber to turn wheel as far to the right (away from loud position) as it will go to provide ringer cut-off.

Note: Ringer cut-off feature should not be provided unless authorized by service order or local regulations.

Approx. location of Jaws of Long-Nose Pliers, when bending Stop Tab up or down.

Bend in this area only

Do not attempt to bend Tab at this point.

Detent Spring

Stop Tab on Detent Spring

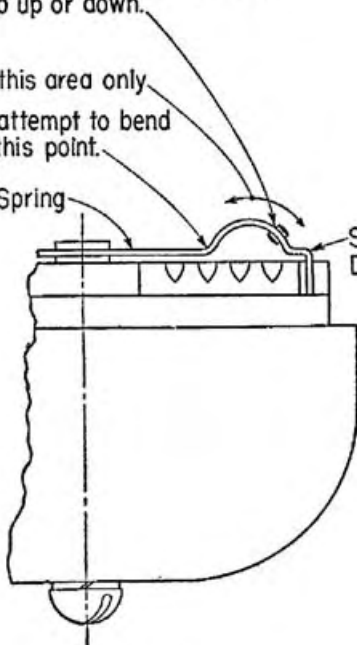


Fig. 1

Caution: In bending the stop spring, use care not to bend any portion of the adjacent detent spring.

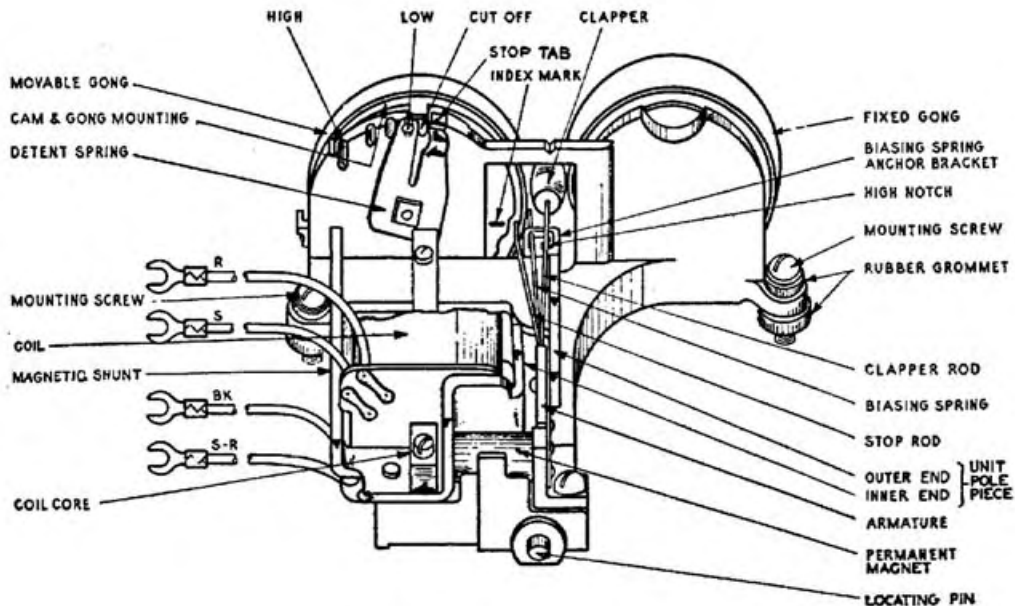


Fig. 2a—Typical "C" Type Ringer

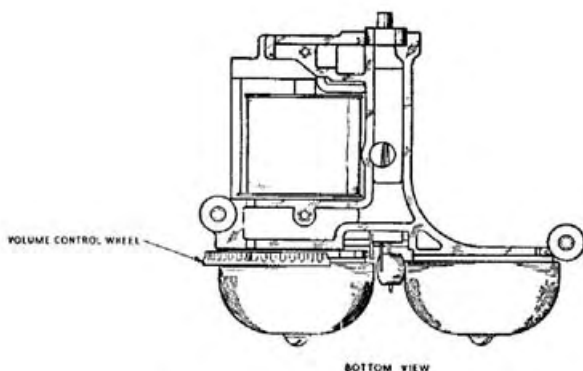


Fig. 2b—Typical "C" Type Ringer

5. TESTS

5.01 Station Testing: Upon completion of the installation, make tests in accordance with the section in the C60 Division, covering tests with the test desk or in accordance with local practices.

5.02 Make ringing and bell tapping tests by dialing proper test code or calling test desk. If ringer fails to ring satisfactorily or bell taps when the biasing spring is in the notch specified in Table A, proceed as follows:

- (1) Check line and ringer connections.
- (2) If connections are satisfactory and high bias tension is specified, replace ringer.
- (3) If low bias tension is specified, shift biasing spring to high notch and retest for ring and bell tap. If ringer fails or bell taps, replace ringer.

5.03 Show the subscriber how to pick up and hold the telephone set with the handset in place on the mounting, and how to move the ringer volume control adjustment wheel. Obtain a ringback and let subscriber listen to the different volume levels and make the selection.

Note: There should be a definite reduction in volume when the volume control is moved away from the "loud" position. If no change occurs check gong mounting screws for tightness.

5.04 Give instruction card (P-348114) to subscriber. If subscriber is not present, leave instruction card just under the front feet of the set where it will be readily seen. In the latter case, leave the control wheel in the position which seems best for the premises.

6. RADIO SIGNAL DEMODULATION SUPPRESSION

6.01 When interference from radio broadcasting is experienced, e.g., in the proximity of a radio transmitting station, a 0.02-mf capacitor (KS-13814-L7) should be added as indicated in 6.02.

6.02 The 0.02-mf capacitor (KS-13814-L7) should be added to the set in the field when conditions require and should be connected as follows:

500A and B 501A and B	Across terminals L and RW of 311A equalizer and placed against side of equalizer nearest switch.
500J and K 501J and K	Across terminals L2 and GN of network and placed against side of network nearest the ringer.
500C, D, E, F, H, L, and M 501C and D 501F	Across terminals F and L2 of network and placed between end of network and ringer gong. In some cases an additional 0.02-mf capacitor across terminals R and RR and placed against side of network nearest the ringer is necessary.

6.03 Connect the bare wires of the capacitor under the terminal screws and cover the exposed portion of the bare wire with tape or tubular insulation. In 500A/B and 501A/B sets a 6-40 by 1/4-inch BHM screw (P-294615) or an unused screw from the network will be required to connect the capacitor to the "L" terminal of the 311A equalizer.

6.04 The capacitor should be located so that it will not interfere with the operation of the set.

7. CONVERSION FOR MANUAL SERVICE

7.01 To convert the 500 series sets for manual service, remove the dial and dial leads, place a 95A-3 apparatus blank, and make the wiring change indicated in the following table for the particular type of set.

Type of Set	Wiring Changes
500B 501B	Transfer Slate-Brown switch lead to RR terminal on network.
500D 501D	Transfer Slate-White switch lead to RR terminal on network.
500F	Strap terminal on plunger switch to RR terminal on network.
500K 501K	Transfer Slate-Brown switch lead to RR terminal on network.
500M	Transfer Green lead from F to RR terminal on network.

8. POWER SUPPLY ARRANGEMENTS FOR 500H ILLUMINATED DIAL SET

8.01 For the 500H illuminated dial set, a 6- to 8-volt ac or dc power supply must be provided to light the dial lamp (GE #46 MAZDA). The dial lamp lights when the handset is removed from switchhook.

8.02 The KS-15675-L1 transformer, connected to a 105- to 125-volt ac supply receptacle will provide for ac operation. Where possible, the installer should avoid the use of power receptacles that are under the control of a switch. If suitable ac supply is not available, dc operation may be obtained by using dry cell batteries or other 6- to 8-volt dc supply.

8.03 The KS-15675-L1 transformer must be mounted near the power supply outlet as it is equipped with an 18-inch cord. It may be mounted on a baseboard or other suitable surface by using two No. 4 R.H. blue wood screws (see Fig. 3). Where appearance is a prime consideration the transformer may be located in a basement, furnace room, or other accessible location, provided the wiring limitations covered in 8.04 are not exceeded.

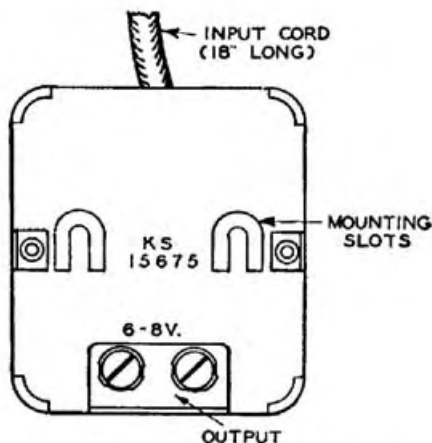


Fig. 3—KS-15675 Transformer (Rear View)

8.04 A 2-conductor wire should be provided for the 6- to 8-volt output supply to the connecting block. The 44A-type connecting block (or equivalent) is required for connecting line wires and power supply wires to the telephone set mounting cord. For proper operating efficiency the length of wire between the transformer and the connecting block should not exceed 25 feet, using 20 gauge JKT wire.

9. NOISY LOCATIONS

9.01 The use of 500-type equalized telephone sets is recommended in noisy locations such as generator rooms in power plants, loading ramps at air fields, etc. In locations where noise is extremely severe a 500-type equalized telephone set, equipped with a KS-13491-L1, 1-watt, 39-ohm resistor connected across the transmitter circuit should be used. This transmitter shunt decreases transmitting efficiency and therefore reduces sidetone noise. The loss of transmission is compensated for by the natural tendency to raise the voice in noisy locations.

9.02 The KS-13491-L1 resistor should be connected in the 500 series sets as shown below:

Type of Set	Connections
500A/B	Between B and RW terminals on Equalizer
500J/K	Between B and RW terminals on Term. Strip
500C/D 500E/F 500H 500L/M	Between R and B terminals on the network

9.03 No mounting arrangements are required since the resistor leads furnish adequate support.

BELL SYSTEM PRACTICES
Station Installation and Maintenance

SECTION C32.538
Issue 3, October, 1953
AT&T Co Standard

TELEPHONE SETS

500 SERIES

(Including Tube and Key Sets)

CORDING

1. GENERAL

1.01 This section covers the cording of the 500A, B, C, D, E, F, H, J, K, L, M; 501A, B, C, D, F, J, K; 502A, B; 510A, B, E, F; 511A and B telephone sets.

1.02 This section is reissued to include the 500E, F, H, L, M; 501F, 502A, B; 510A, B, E, F; 511A and B; to include 500C, D; 501C and D telephone sets converted from 500J, K, 501J and K telephone sets, respectively; and to make other changes of a minor nature.

1.03 Cords and conductors shall be properly fastened and arranged in accordance with applicable figure.

1.04 The figures given herein are intended to show only the mechanical arrangement of the cords and conductors within the telephone sets so as to obtain correct anchorage, avoid interference with other parts, etc.

2. CORDING

2.01 Except for changes in terminal connections, the cording of the telephone sets for all classes of service should conform as closely as possible to the figures as listed in Table A.

TELEPHONE SETS
500 SERIES

(INCLUDING TUBE AND KEY SETS)

CORDING

TABLE A
Cording of Telephone Sets—500 Series
(Including Tube and Key Sets)

Telephone Set Code	Con-verted from	Ringer Code			Figure	Page
		C2A	C3A	C4A		
MANUAL						
500A	500J	X		X	1A, 1B	4, 5
500C		X		X	2A, 2B	6, 7
500C		X		X	17	36
500E		X		X	3A, 3B	8, 9
500J		X		X	5A, 5B	12, 13
500L		X		X	6A, 6B	14, 15
501A			X		7A, 7B	16, 17
501A				X	8A, 8B	18, 19
501C	501J		X		9A, 9B	20, 21
501C				X	10A, 10B	22, 23
501C			X		18	37
501J			X		12A, 12B	26, 27
501J				X	13A, 13B	28, 29
502A				X	14A, 14B	30, 31
510A				X	15A, 15B	32, 33
510E				X	15A, 15B	32, 33
511A				X	16A, 16B	34, 35
DIAL						
500B	500K	X		X	1A, 1B	4, 5
500D		X		X	2A, 2B	6, 7
500D		X		X	17	36
500F		X		X	3A, 3B	8, 9
500H		X		X	4A, 4B	10, 11
500K		X		X	5A, 5B	12, 13
500M		X		X	6A, 6B	14, 15
501B			X		7A, 7B	16, 17
501B	501K			X	8A, 8B	18, 19
501D			X		9A, 9B	20, 21
501D				X	10A, 10B	22, 23
501D			X		18	37
501F				X	11A, 11B	24, 25
501K			X		12A, 12B	26, 27
501K				X	13A, 13B	28, 29
502B				X	14A, 14B	30, 31
510B				X	15A, 15B	32, 33
510F				X	15A, 15B	32, 33
511B				X	16A, 16B	34, 35

TELEPHONE SETS
500 SERIES

(INCLUDING TUBE AND KEY SETS)

CORDING

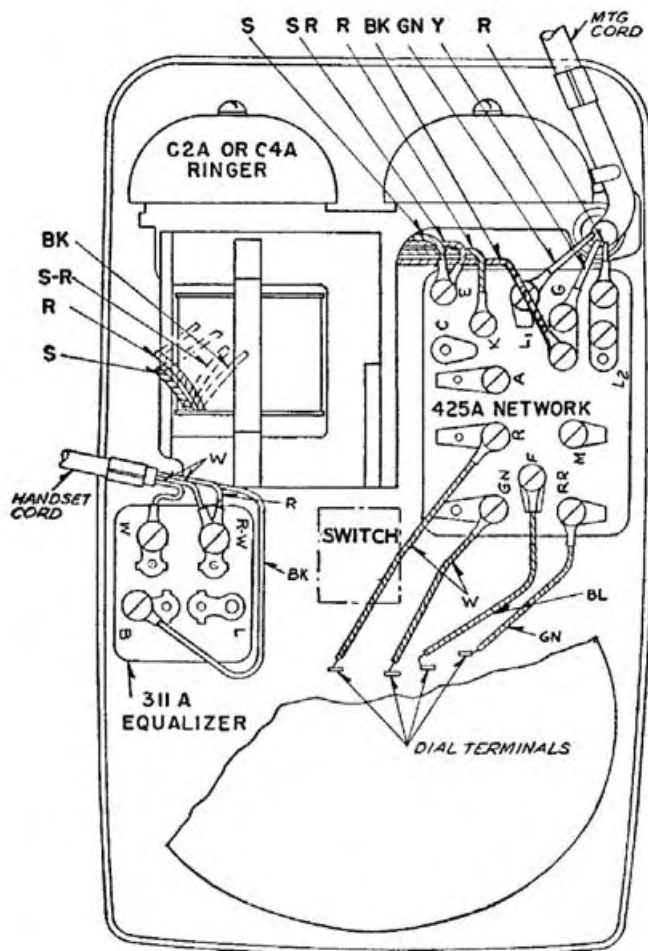


Fig. 1A—500A (Manual) and 500B (Dial) Telephone Sets—Cording

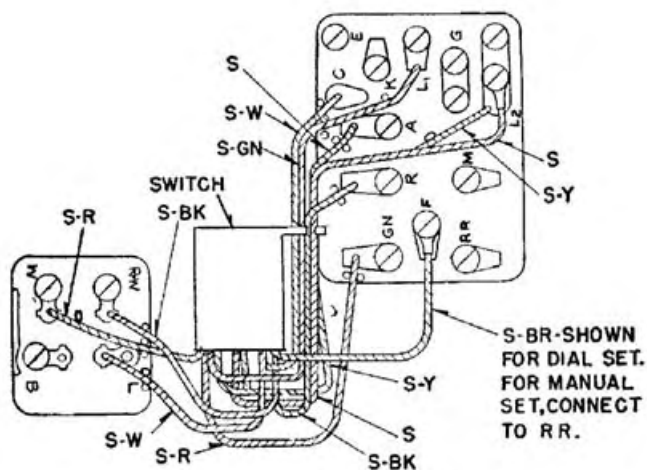


Fig. 1B—500A (Manual) and 500B (Dial) Telephone Sets—
Switch Detail

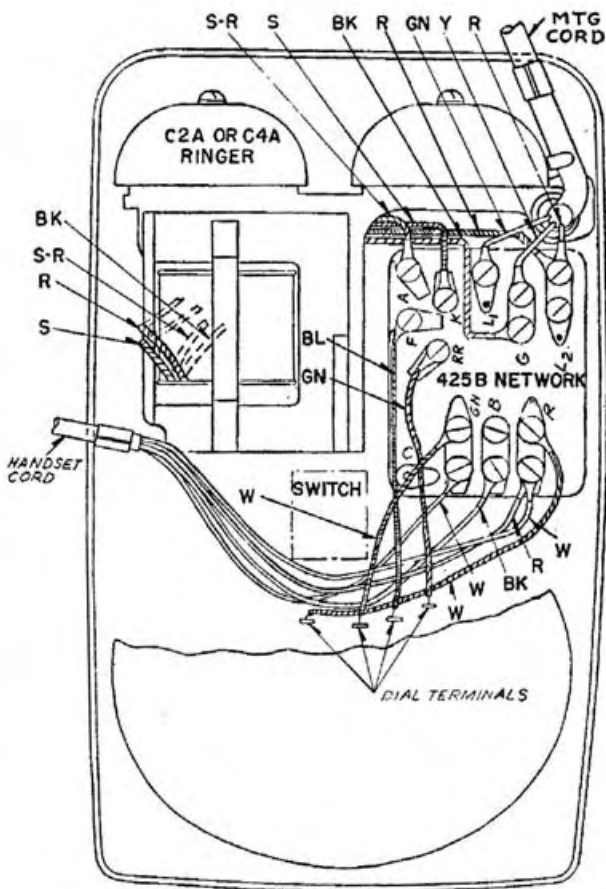


Fig. 2A—500C (Manual) and 500D (Dial) Telephone Sets—Cording

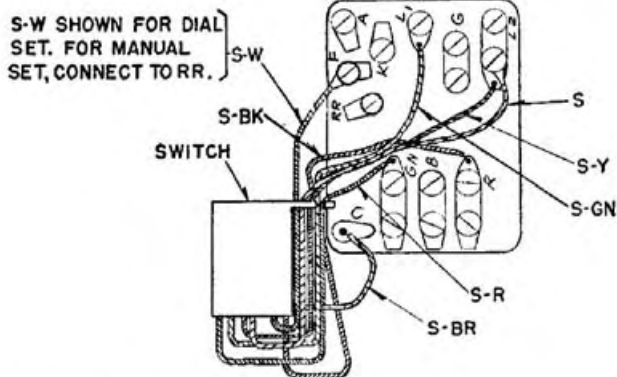


Fig. 2B—500C (Manual) and 500D (Dial) Telephone Sets—
Switch Detail

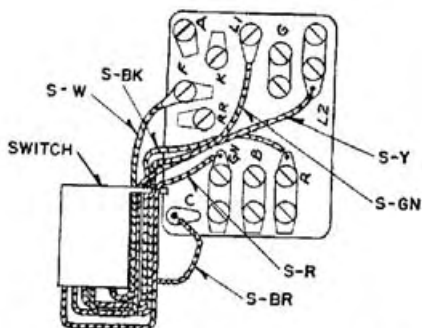


Fig. 3B—500E (Manual) and 500F (Dial) Telephone Sets—
Switch Detail

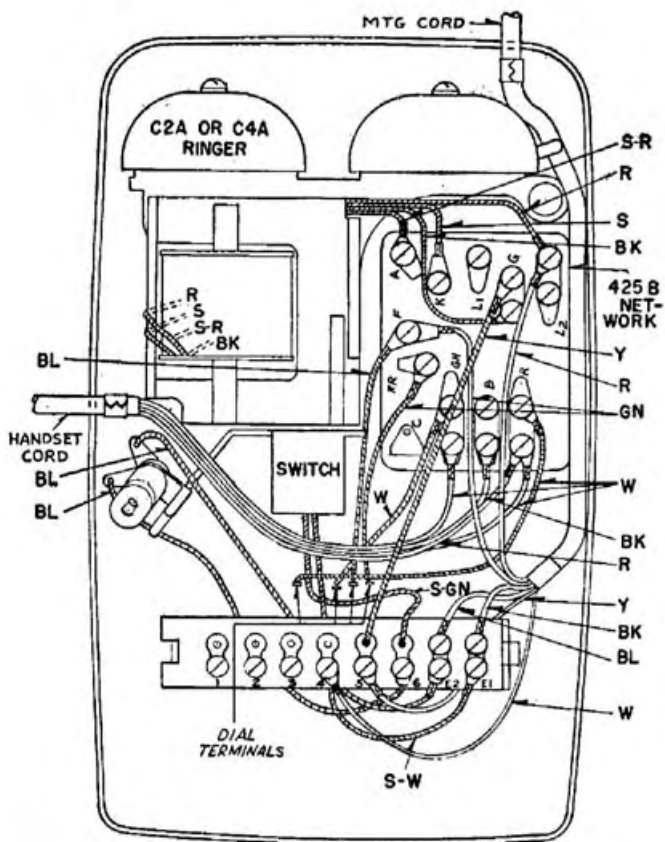


Fig. 4A—500H (Dial) Telephone Set—Cording

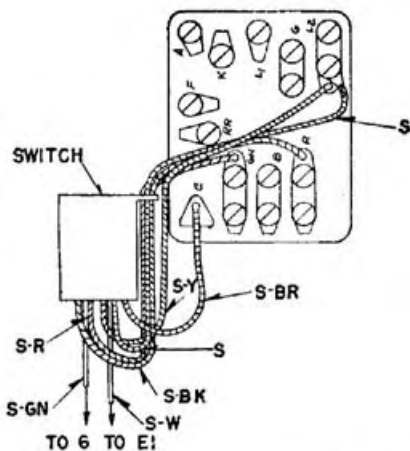


Fig. 4B—500H (Dial) Telephone Set—Switch Detail

TELEPHONE SETS

500 SERIES

(INCLUDING TUBE AND KEY SETS)

CORDING

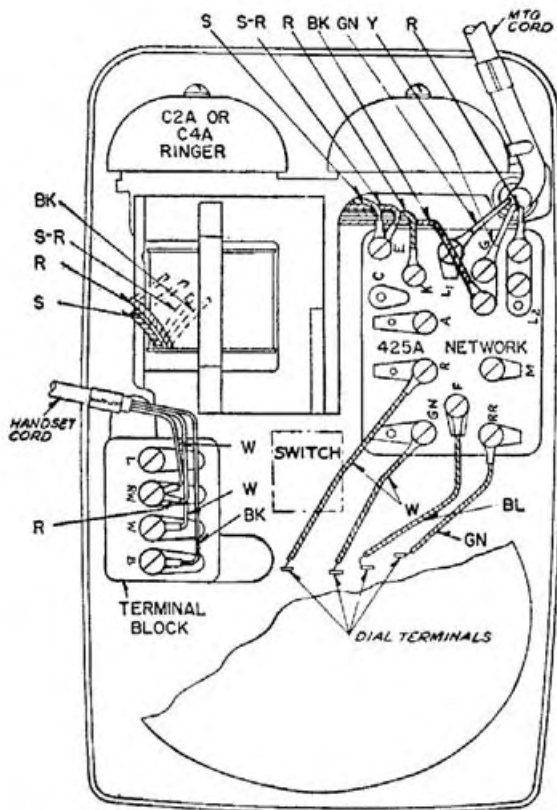


Fig. 5A—500J (Manual) and 500K (Dial) Telephone Sets—Cording

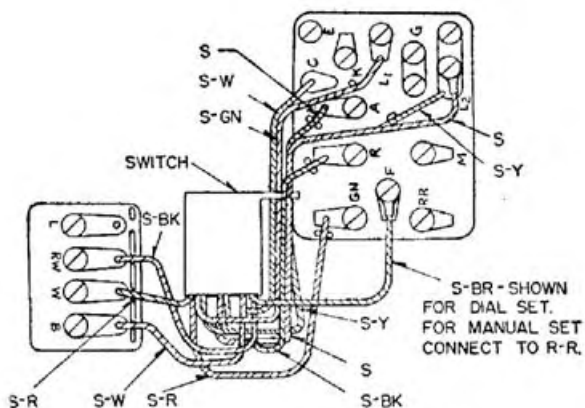


Fig. 5B—500J (Manual) and 500K (Dial) Telephone Sets—Switch Detail

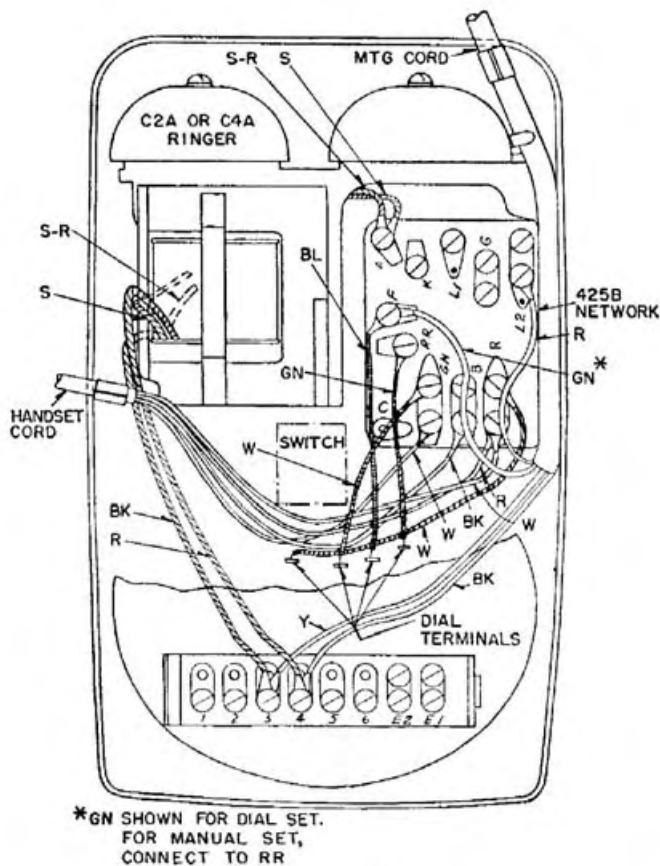
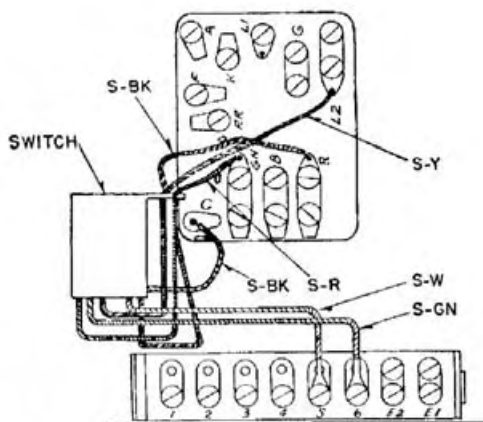


Fig. 6A—500L (Manual) and 500M (Dial) Telephone Sets—Cording



**Fig. 6B—500L (Manual) and 500M (Dial) Telephone Sets—
Switch Detail**

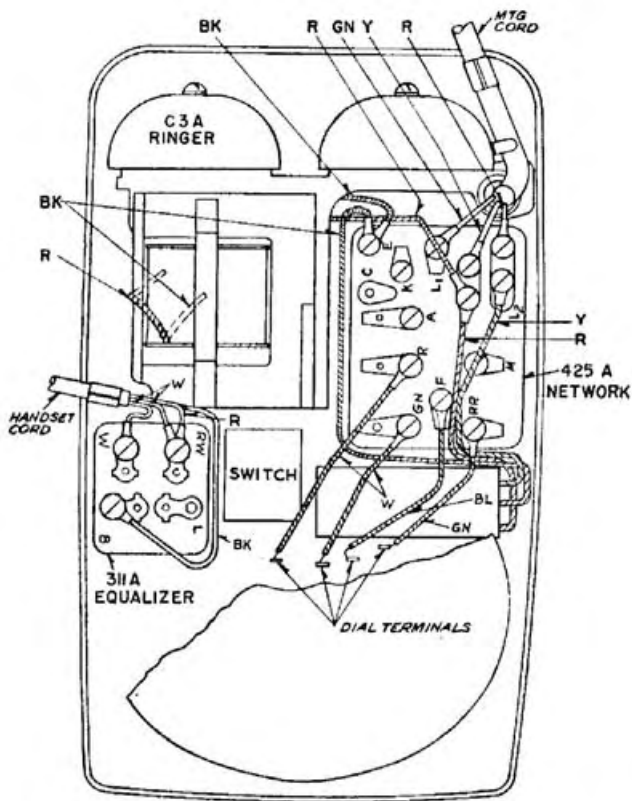


Fig. 7A—501A (Manual) and 501B (Dial) Telephone Sets with C3A Ringer—Cording

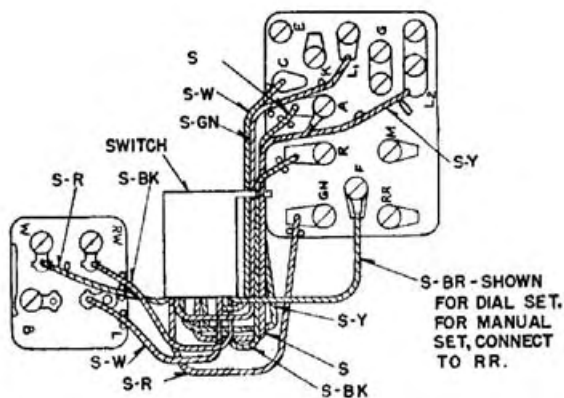


Fig. 7B—501A (Manual) and 501B (Dial) Telephone Sets with C3A Ringer—Switch Detail

TELEPHONE SETS
500 SERIES
(INCLUDING TUBE AND KEY SETS)
CORDING

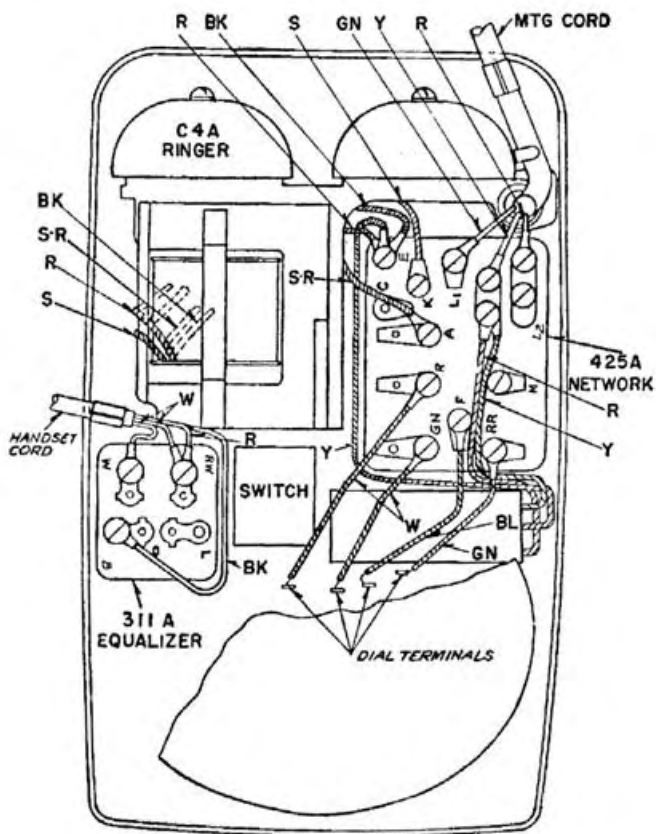


Fig. 8A—501A (Manual) and 501B (Dial) Telephone Sets with C4A Ringer—Cording

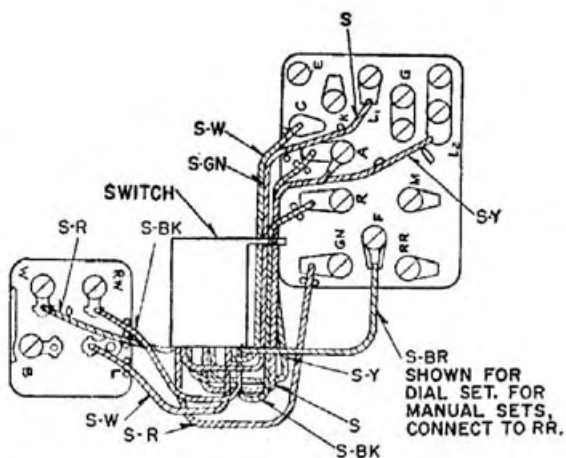


Fig. 8B—501A (Manual) and 501B (Dial) Telephone Sets with C4A Ringer—Switch Detail

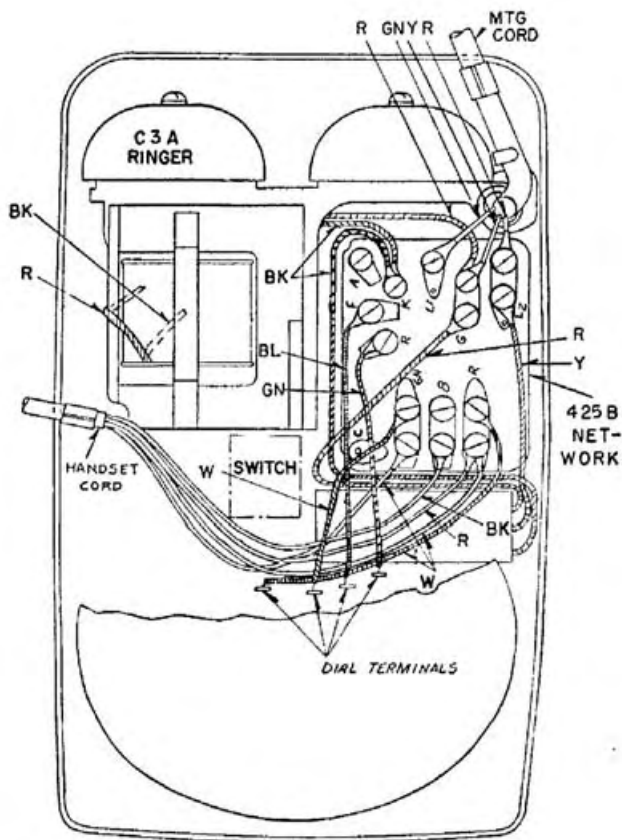


Fig. 9A—501C (Manual) and 501D (Dial) Telephone Sets with C3A Ringer—Cording

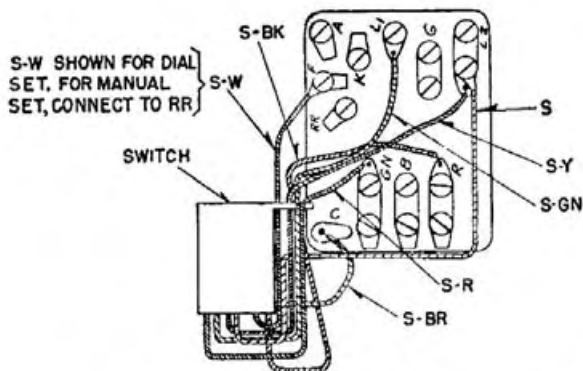


Fig. 9B—501C (Manual) and 501D (Dial) Telephone Sets with C3A Ringer—Switch Detail

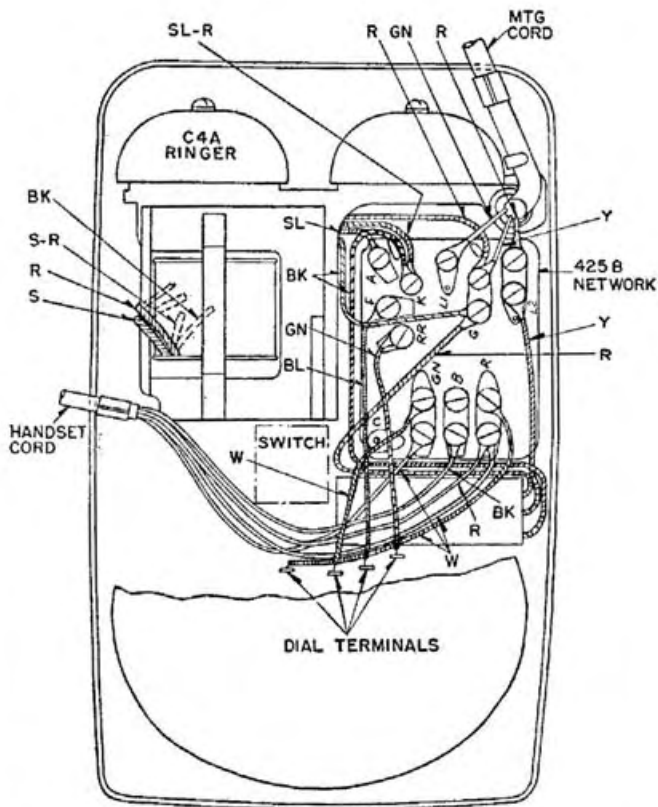


Fig. 10A—501C (Manual) and 501D (Dial) Telephone Sets with C4A Ringer—Cording

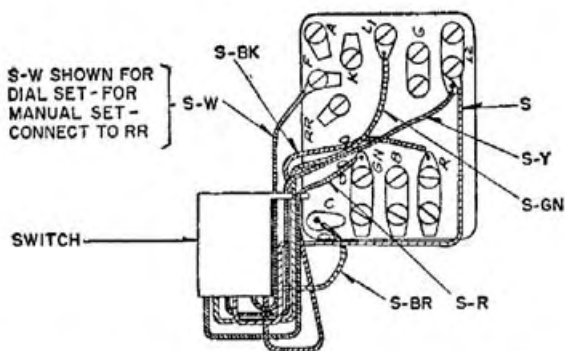


Fig. 10B—501C (Manual) and 501D (Dial) Telephone Sets with C4A Ringer—Switch Detail

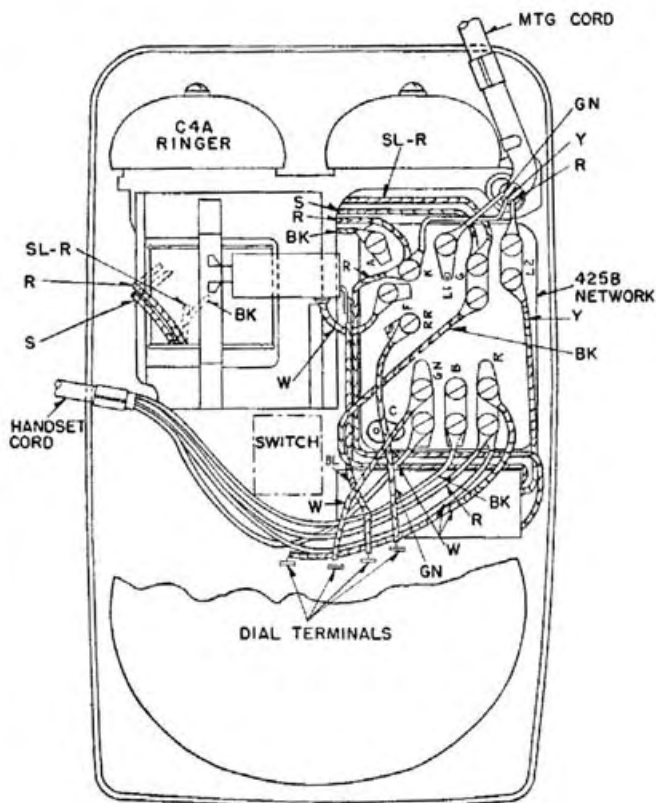


Fig. 11A—501F (Dial) Telephone Set—Cording

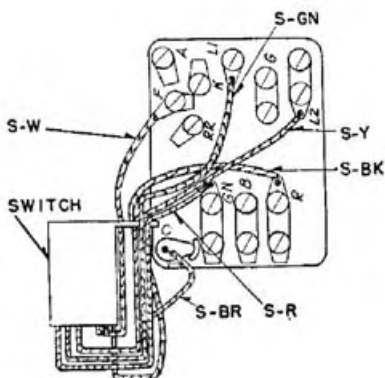


Fig. 11B—501F (Dial) Telephone Set—Switch Detail

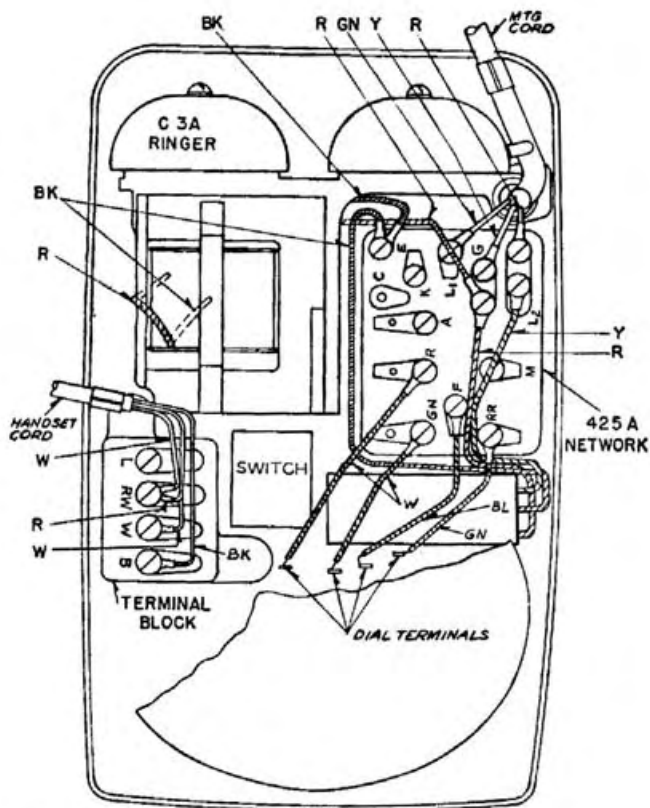


Fig. 12A—501J (Manual) and 501K (Dial) Telephone Sets with C3A Ringer—Cording

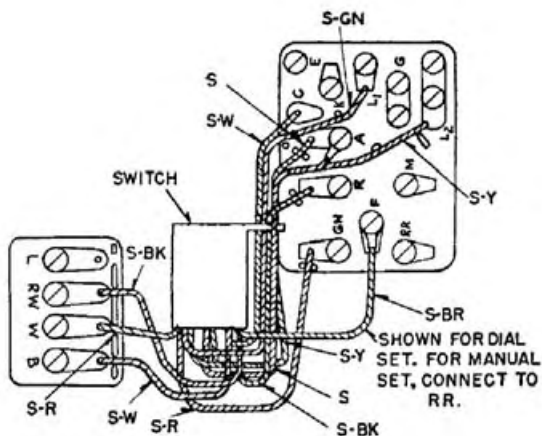


Fig. 12B—501J (Manual) and 501K (Dial) Telephone Sets with C3A Ringer—Switch Detail

TELEPHONE SETS
500 SERIES
(INCLUDING TUBE AND KEY SETS)
CORDING

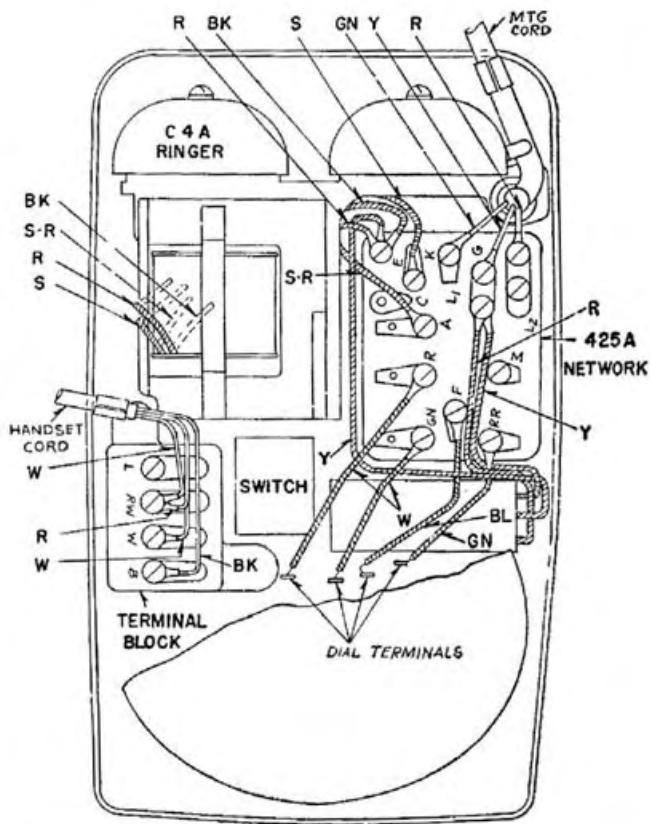


Fig. 13A—501J (Manual) and 501K (Dial) Telephone Sets with C4A Ringer—Cording

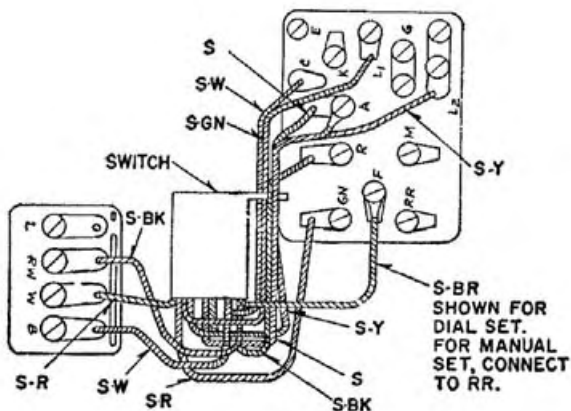


Fig. 13B—501J (Manual) and 501K (Dial) Telephone Sets with C4A Ringer—Switch Detail

TELEPHONE SETS

500 SERIES

(INCLUDING TUBE AND KEY SETS)

CORDING

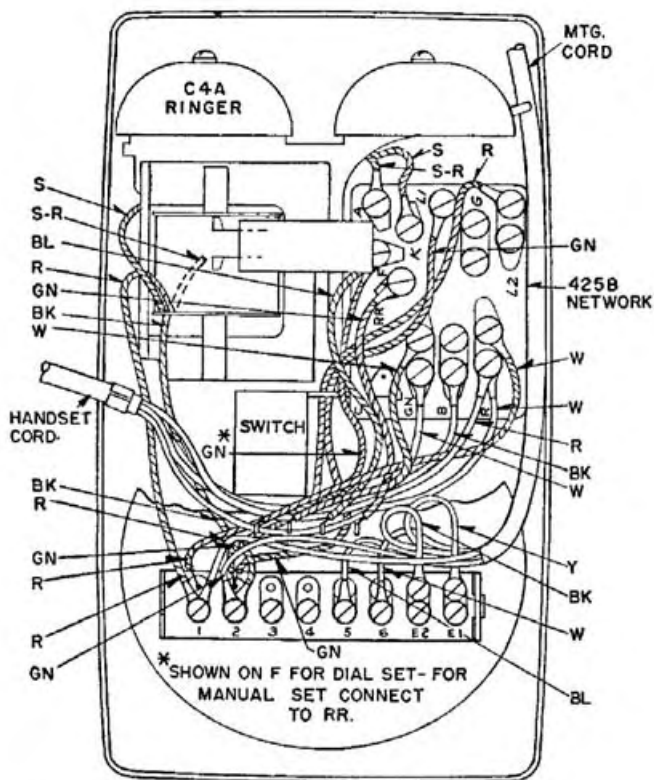


Fig. 14A—502A (Manual) and 502B (Dial) Telephone Sets—Cording

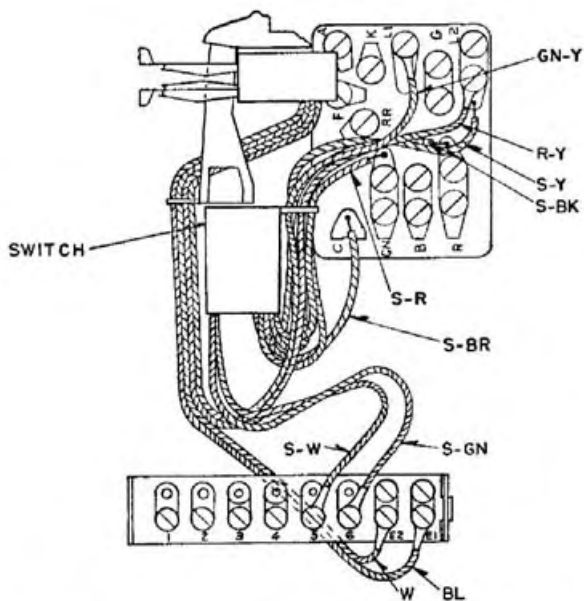
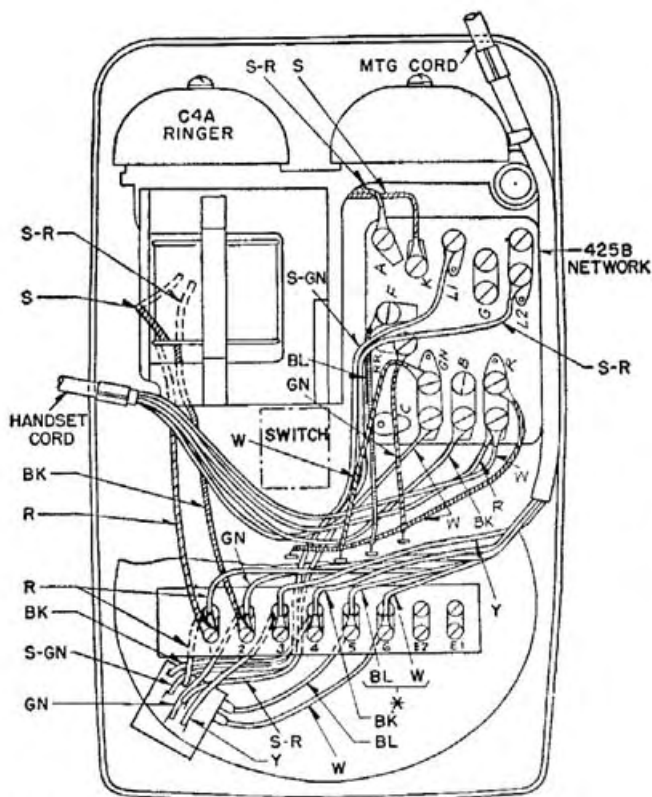


Fig. 14B—502A (Manual) and 502B (Dial) Telephone Sets—
Switch Detail



* 4 COND MTG CORD USED
ON 510A AND B SETS
6 COND MTG CORD USED
ON 510E AND F SETS

**Fig. 15A—510A and E (Manual) and 510B and F (Dial)
Telephone Sets—Cording**

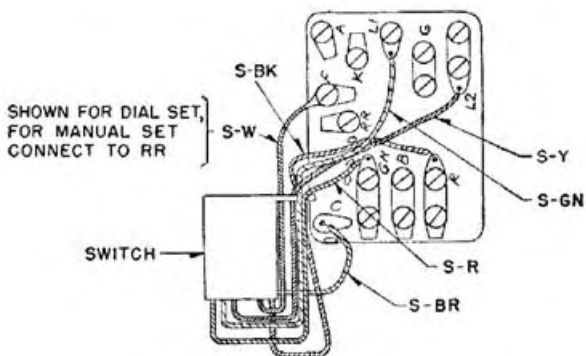


Fig. 15B—510A and E (Manual) and 510B and F (Dial) Telephone Sets—Switch Detail

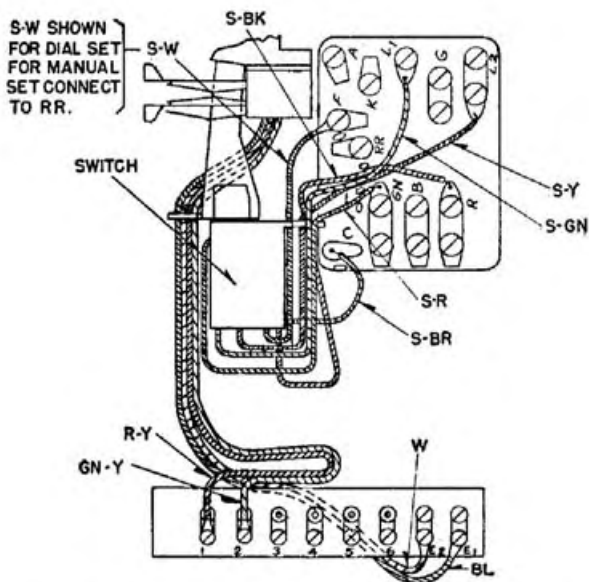
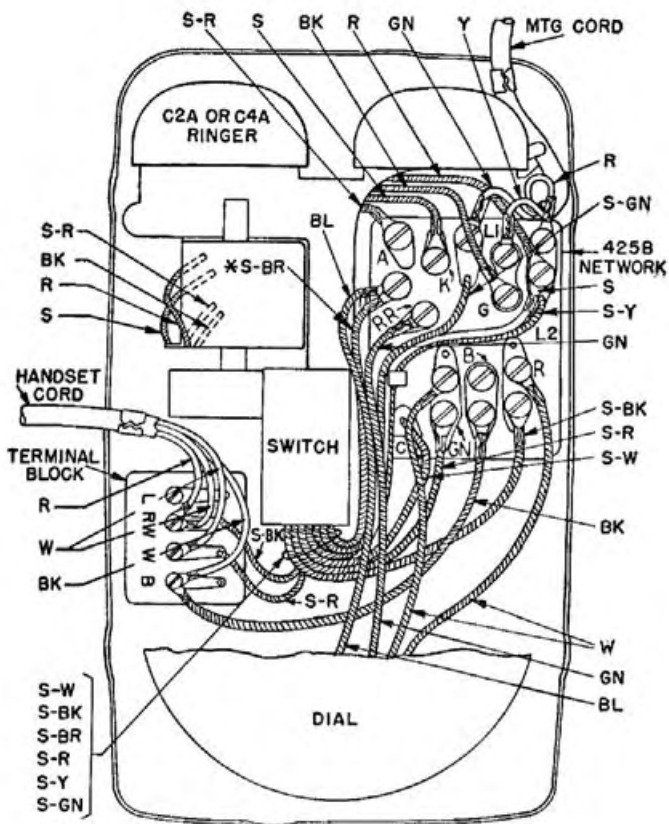
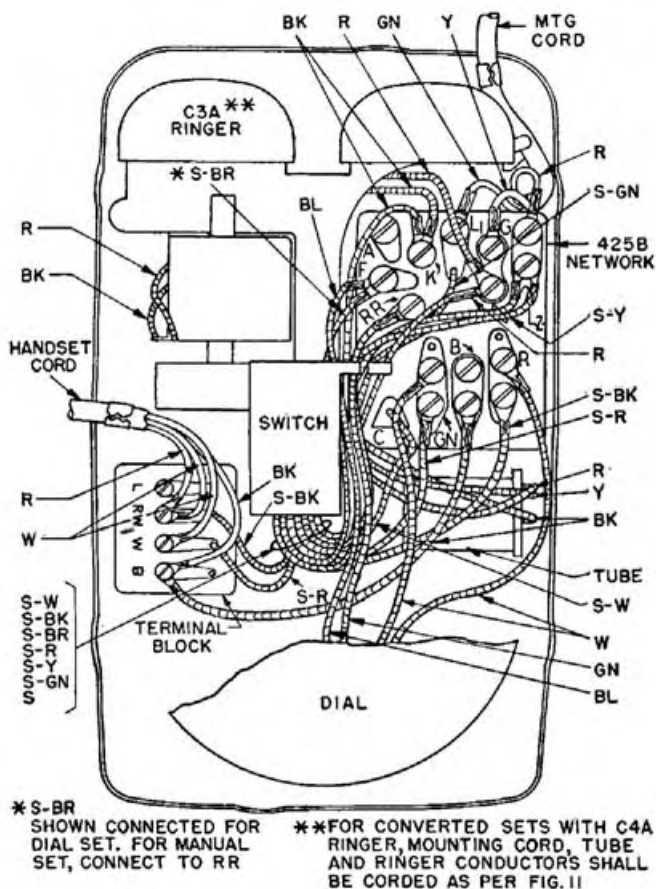


Fig. 16B—511A (Manual) and 511B (Dial) Telephone Set—Switch Detail



* SHOWN CONNECTED FOR DIAL SET-
FOR MANUAL SET CONNECT TO RR.

Fig. 17—500C (Manual) and 500D (Dial) Telephone Sets
Converted from 500J/K Telephone Sets—Cording



**Fig. 18—501C (Manual) and 501D (Dial) Telephone Sets
Converted from 501J/K Telephone Sets—Cording**

BELL SYSTEM PRACTICES
Station Installation and Maintenance

SECTION C32.539
Issue 2, June, 1954
AT&T Co Standard

500 SERIES TELEPHONE SETS

(500 AND 501 TYPE)

MAINTENANCE

1. GENERAL

- 1.01 This section covers requirements and procedures for the maintenance of the following sets:

500 Type

500A/B	500E/F	500J/K
500C/D	500H	500L/M

501 Type

501A/B	501F
501C/D	501J/K

1.02 This section is reissued to include data on the assembly of replaceable units and to bring the information up-to-date. Due to extensive changes, marginal arrows have been omitted.

1.03 The maintenance of handsets, dials, ringers, and other components of the 500 series telephone sets shall be in accordance with the sections dealing with these apparatus items.

1.04 Sections dealing with description, installation, connections, and cording of these sets should be consulted for information pertinent to the maintenance procedures covered in this section.

2. REQUIREMENTS AND PROCEDURES

General

2.01 When the telephone set is dirty, clean the external surfaces and remove loose dust from the interior in accordance with instructions included in Section C30.012, Station Sets—Cleaning.

2.02 Make a careful visual inspection of the exterior and interior of the sets for obvious defects, such as loose, displaced or broken parts, obstruction of moving parts, or the presence of foreign matter that may interfere in some way with the proper operation of the set. Determine if any such defect was responsible for trouble condition before proceeding with corrective measures or more detailed maintenance procedures.

2.03 Check that all connections associated with screw terminals are secure at their respective terminals and that terminal screw threads are not stripped. Where stripped holes are found at the terminals of the network, the regular screws shall be replaced with P-174074 self-tapping screws, or approved equivalent.

3. ASSEMBLY OF REPLACEABLE UNITS

Housing Assembly

3.01 The housing is removed by loosening the two captive mounting screws located in the right front and left rear portions of the base.

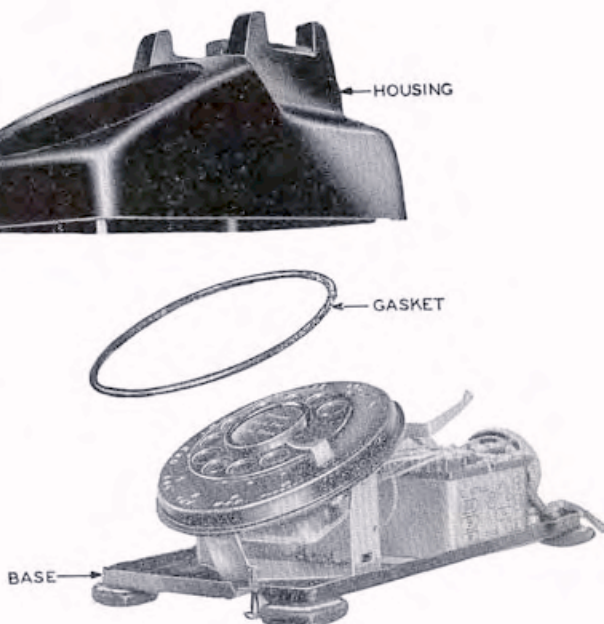


Fig. 1—Housing Assembly

3.02 When housing is replaced, gasket must be in place on outer rim of dial, cords properly anchored and in place, and housing aligned with base of set before tightening the two captive mounting screws.

Plunger Assembly

- 3.03 Plungers are accessible by removing hand-hold cover mounting screw and the hand-hold cover.

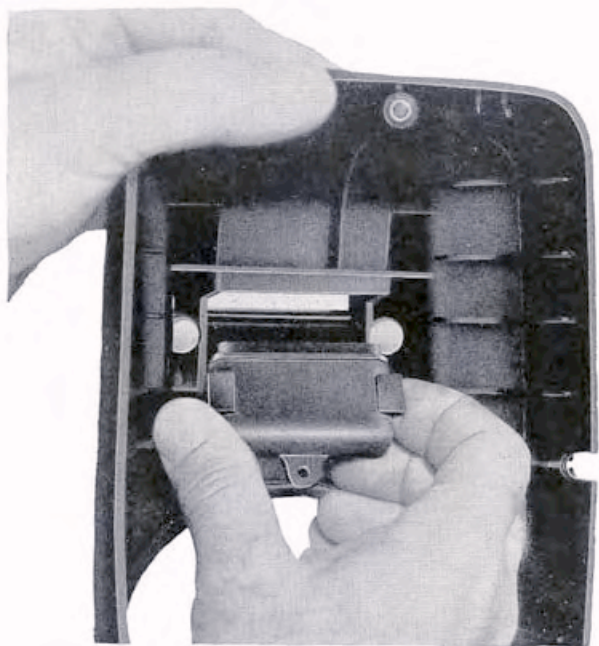


Fig. 2—Plunger Assembly

- 3.04 When reassembling, place lip of hand-hold cover beneath lip of housing and slide cover into place. Center cover so plungers will not fall past and replace screw.

Dial Assembly

3.05 To remove dial assembly, disconnect dial leads at their respective terminals on the network, loosen mounting screws and slide unit from bracket.

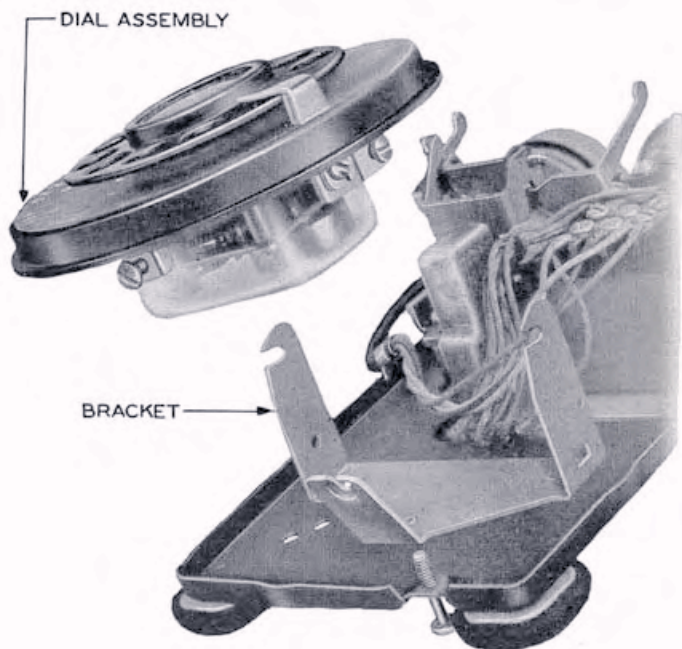


Fig. 3—Dial Assembly

3.06 To install: (1) Slide dial assembly into position and tighten mounting screws. (2) Connect dial leads to their proper terminals and dress dial leads to avoid interference with movement of the operating bracket of the switch assembly.

Tube Assembly—(501-Type Sets)

3.07 The 426A tube assembly is removed by disconnecting the yellow, black, and red tube leads from their respective terminals on the network and removing the tube assembly mounting screw.

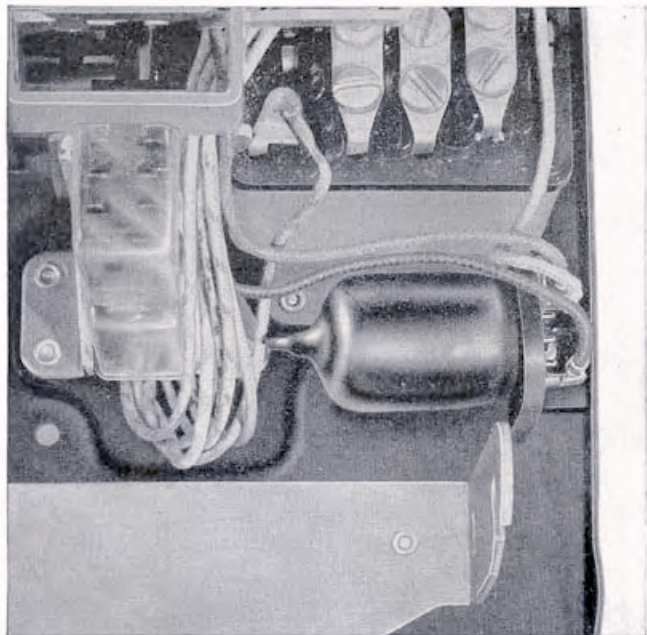


Fig. 4—Tube Assembly

3.08 Install tube assembly as follows: (1) Slide tube assembly into position and replace mounting screw. (2) Connect tube leads to their proper terminals and dress leads to avoid interference with movement of operating bracket.

Ringer Assembly

3.09 C3A ringer is removed by disconnecting the black and red ringer leads from their respective terminals on the network and removing the two ringer assembly mounting screws and lock washers.

3.10 C2A or C4A ringers are removed by disconnecting the black, red, slate, and slate-red ringer leads from their respective terminals on the network and removing the two ringer assembly mounting screws and lockwashers.

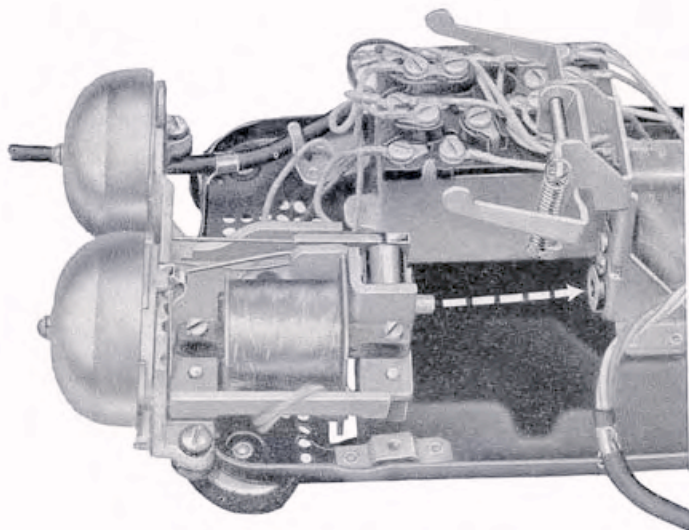


Fig. 5—Ringer Assembly

3.11 Install ringer assembly as follows:

- (a) Place ringer leads beneath coil and dress from left to right.
- (b) Slide ringer assembly into position by locating guide pin in grommet hole of switch assembly mounting.

- (c) Align ringer assembly so that volume control knob is parallel with the slot in the base. The control knob should turn freely without binding.
- (d) Replace the two ringer assembly mounting screws and lockwashers.
- (e) Connect ringer leads to their proper terminals, and dress ringer leads between frame of network and right-hand ringer gong mounting to avoid interference with gong.

Cord Assembly

3.12 To disconnect either the handset or mounting cord from the set base, disconnect cord leads from their respective terminals on the network and hold ferrule of stay hook at right angles to base and remove stay hook from base slot.

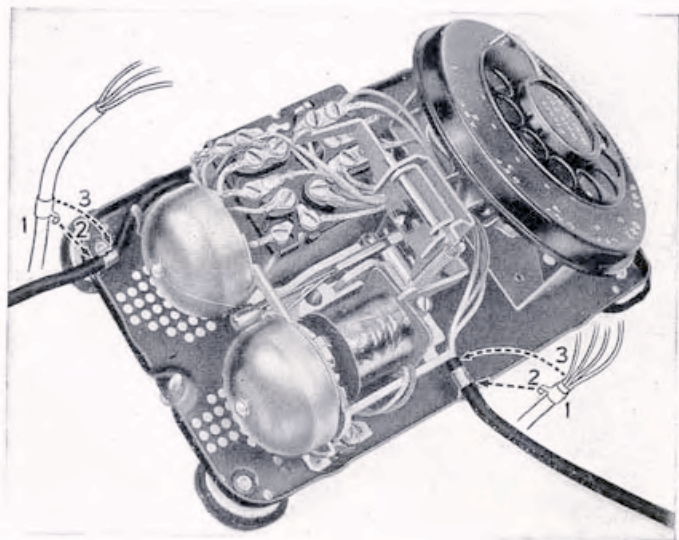


Fig. 6—Cord Assembly

3.13 To connect either cord to the set base, (1) Hold ferrule of stay hook at right angle to base. (2) Slide stay hook into base slot. (3) Tilt ferrule of stay hook parallel to base which locks stay hook in slot. (4) Connect cord leads to their respective terminals on the network and dress to avoid interference with moving parts and ringer gongs.

Note: Anchor mounting cord beneath stay hook in right rear corner of base to prevent interference with ringer gong.

Handset Assembly, G1-Type

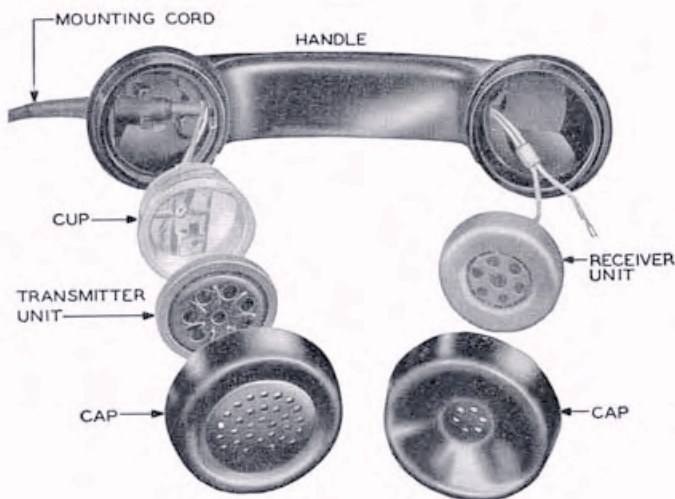


Fig. 7—Handset Assembly, G1-Type



Fig. 8—Transmitter Cup, G1-Type Handset

3.14 When the handset cord leads are connected to transmitter cup terminals, the spade tips are pushed forward toward the raised shoulder molded on the cup before tightening terminal screws.

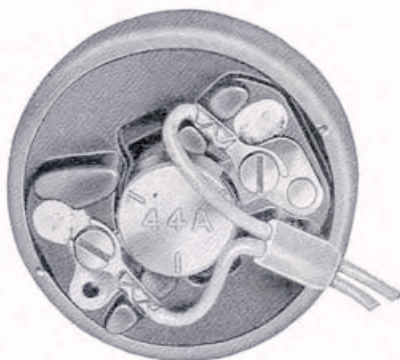


Fig. 9—Receiver Unit, G1-Type Handset

3.15 When the handset cord leads are connected to receiver unit terminals, the shank of the spade tips are placed between the guides molded on the receiver unit before tightening terminal screws.

4. MAINTENANCE

4.01 Table A lists a number of troubles that may occur in these sets, the probable causes, and corrective measures to be taken. It assumes that an OK test has been made of the line (and ground) termination at the connecting block, jack, or equipment terminals.

TABLE A

Trouble	Probable Causes	Corrective Measure
1. Bell does not ring	Ringer disconnected or wired wrong in set	Connect correctly.
	Volume control wheel in cut-off position	Move control wheel to ring position.
	Open winding	Replace ringer.
	Metal particles in armature gap	Remove particles with scotch tape or approved equivalent.
	No ground (party lines)	Check ground circuit.
	Open tube	Short-circuit yellow and black tube leads and, if ringer operates when ringing voltage of correct polarity is applied, replace tube.

TABLE A (Cont.)

Trouble	Probable Causes	Corrective Measure
2. Bell too loud	Volume control wheel in wrong position	Move control wheel to most favorable position and advise customer how to use it.
	Gong loose	Tighten screw as required.
3. Bell not loud enough	Volume control wheel in wrong position	Move control wheel to louder position and advise customer how to use it.
	Set on sound-absorbent material	Place set on hard surface.
	Cord touching gong	Dress cord properly.
4. Bell taps while dialing or operating switch	Incorrect wiring	Check line cord and ringer connections.
	Biasing tension too low	Place biasing spring in high-tension notch. If ringer still taps, replace ringer.
5. Bell rings when other party is called, cross ring or false ring	Incorrect wiring	Check line cord and ringer connections.
	Biasing tension too low	Place biasing spring in high-tension notch. If ringer still cross rings, replace ringer.

6. Bell keeps ringing when handset is removed	Open in handset cord, or at dial pulse contacts	Replace handset cord or dial.
	Open induction coil, equalizer filament or set wiring	Replace telephone set.
	Line contacts on switch do not close	Check switch cover, ears should fit into notches.
7. Bell rings. No one on line	Open handset cord or receiver unit	Replace handset cord or receiver unit.
	Dial "off normal shunt" contacts closed	Replace dial.
	Open induction coil or transmission condenser	Replace telephone set.
	Switch receiver contacts do not open	Check switch cover.
8. No dial tone or set dead	Open mounting or handset cords	Replace cord.
	Defective receiver unit or varistor shorted	Replace receiver unit.
	Dial pulse contacts open or "off normal shunt" contacts closed	Replace dial.
	Open induction coil	Replace telephone set.
	Switch contacts do not operate	Check switch cover.

TABLE A (Cont.)

Trouble	Probable Causes	Corrective Measure
9. Cannot break dial tone	Dial pulse contacts do not open	Replace dial.
	Dial filter condenser shorted	Replace telephone set.
10. Loud clicks while dialing	Dial "off normal shunt" contacts do not close	Replace dial.
11. Cannot hear	Open or shorted receiver unit or handset cord	Replace receiver unit or handset cord.
	Dial "off normal shunt" contacts closed	Replace dial.
	Open in induction coil or in network	Replace telephone set.
	Switch receiver contacts do not open	Check switch cover.
12. Distant party cannot hear	Defective transmitter or handset cord open	Replace transmitter or handset cord.
13. High sidetone	Defective sidetone balancing network	Replace telephone set.
14. Interference from radio station	Proximity to radio station	Refer to Section C32.537.
15. Induced low frequency noise	Unbalanced power and ground condition	Refer to Section C63.271.

16. Dial lamp does not burn	Lamp burned out	Replace lamp.
	Transformer plug out of receptacle	Replace plug.
	Transformer winding open	Replace transformer.
	No power at AC receptacle	Check with subscriber (possible blown fuse or power controlled by switch).

Plungers

4.02 Both plungers shall move freely without binding or squeaking throughout their entire travel. Where binding or squeaking exists, remove housing and determine cause. Clean plungers and plunger holes with a KS-2423 cloth moistened with KS-7860 petroleum spirits. If binding or squeaking continues after cleaning, replace the plungers.

Operating Bracket—Switch Assembly

4.03 The operating bracket shall function without binding or squeaking when removing or restoring the handset. If necessary, remove housing and determine cause. Clean the following bearing surfaces with a KS-2423 cloth moistened with KS-7860 petroleum spirits, bosses on operating bracket arms, spring anchor points, operating bracket, and shaft bearing points. Lubricate the previously cleaned bearing surfaces with No. 2 or softer graphite pencil. If after cleaning and lubrication, binding and squeaking continues, replace the set.

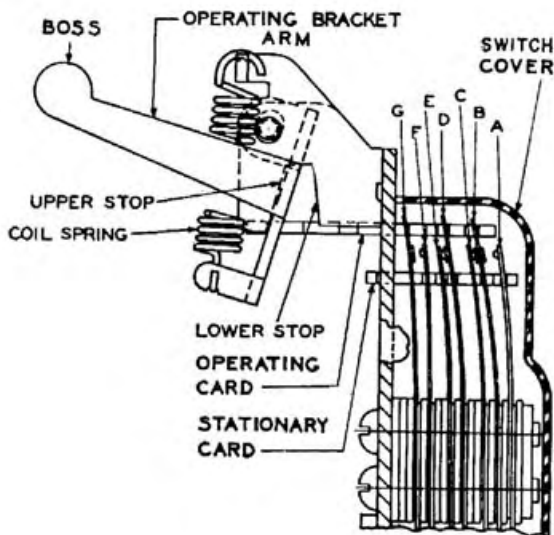


Fig. 10—Switch Assembly

Switch Cover—Switch Contact Springs

4.04 To remove switch cover: (1) Depress sides of cover between thumb and second finger of left-hand to release ears on sides of cover from indents in the switch assembly mounting. (2) Tilt bottom of cover up and away from mounting. (3) Press down on top of cover with index finger to release ear on top of cover from its indent. (4) Remove cover. When installing cover: (1) Place ear at top of cover in its indent. (2) Depress sides of cover and push cover forward and upward until ears on sides of cover are in their indent. (3) Check that all cover ears are securely fastened in the indents in the switch assembly mounting.

Note: If cover ears are broken or not properly secured in their indents, change cover.

Contact Cleaning—Switch Contact Springs

- 4.05 Remove housing, dial assembly, and switch cover when necessary to clean crossbar contacts with a 265B tool.

Note: No field maintenance shall be performed on the switch contact spring assembly except replacement of the switch cover and cleaning of contacts. Replace set when required.

Plunger Switch Assembly—(500E/F and 501F Type Sets)

- 4.06 If left-hand plunger fails to lock when pulled upward to its extreme position, replace set.
- 4.07 If required burnish crossbar contacts with a 265B tool.

Note: No field maintenance shall be performed on the plunger switch assembly except cleaning of contacts. Replace set when required.

Dial Light Assembly—(500H-Type Set)

- 4.08 To replace lamp bulb: (1) Remove lamp cover by turning counterclockwise and lifting. (2) Unscrew lamp bulb by turning counterclockwise with tips of fingers. (3) Screw new lamp bulb firmly in place. (4) Replace lamp cover, turning it clockwise in its bayonet receptacle as far as it will go.

Feet

4.09 Feet, or friction pads if present shall not be cut, worn, or have foreign matter imbedded in them to an extent which might scratch the surfaces on which the set is placed. If necessary the feet may be cleaned by rubbing briskly with a piece of cloth or a stiff bristle brush.

4.10 Feet that do not meet the requirements in 4.09 shall be equipped with triangular friction pad KS-8035. If the set is already equipped with friction pads and they do not meet specified requirements, they shall be replaced with new friction pads. The pads shall be applied as shown in Fig. 11.

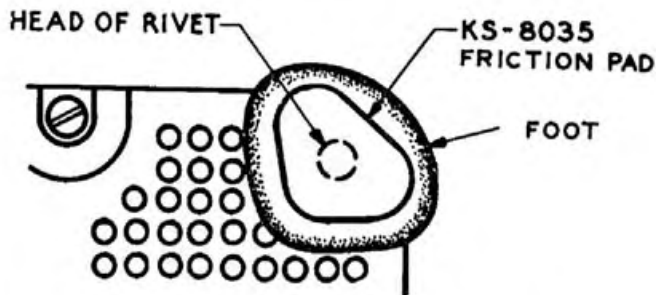


Fig. 11—Base Plate with Foot and Friction Pad Assembled

4.11 If any foot is missing, replace the set.

5. STATION TESTING

5.01 When the trouble condition has been rectified, make a test of the station in accordance with local practices, or as outlined in Section C61.711, Tests with Test Desk—Common Battery Stations.