

**BELL SYSTEM PRACTICES**  
**Station Installation and Maintenance**

**SECTION C32.540**  
**Issue 1, June, 1953**  
**AT&T Co Standard**

**TELEPHONE SETS**  
**510 AND 511 TYPES**  
**DESCRIPTION AND USE**

**1. GENERAL**

- 1.01 This section gives general information pertaining to the 510 and 511-type telephone sets.
- 1.02 The 510 and 511-type telephone sets supersede 410 and 411-type telephone sets. They are made available to provide the improved performance capabilities of the 500 series telephone sets.

**2. DESCRIPTION AND USE**

2.01 The 510 and 511-type sets are similar in appearance to the 500-type sets except that a single transparent combination turn and push button (584A key) is provided below and to the left of the dial. The 511-type sets are equipped with a plunger switch (to provide exclusion) in addition to the combination turn and push button. See Figs. 1 and 2.

2.02 The combined turn and push-button key when rotated is locking in both positions. When the key button is depressed it operates a set of contacts the same as a push button and is non-locking. No provision is made to illuminate the turn button.

2.03 The sets contain components used in the 500 series telephone sets, e.g., C-4 ringer and its volume adjustment control, the 425B network for transmission equalization, the 7A-3 dial or the 95A-3 apparatus blank for manual service, the G1A-3 hand set, etc.

2.04 The 425B network is enclosed in a metal container, therefore, no additional shielding is required to prevent crosstalk.

2.05 A No. 7-type buzzer may be mounted in the sets in place of the ringer, when desired, by employing a 44A bracket. The buzzer may be used as an intercommunicating signaling buzzer or as a common line signal.



Fig. 1—510-Type Telephone Set



Fig. 2—511-Type Telephone Set

2.06 The following table lists the features provided by the 510 and 511-type sets.

**TABLE 1**  
Feature Combinations Provided and Corresponding Codes  
of Telephone Sets and Cords

TELEPHONE SET CODES			FEATURES								
MANUAL (See Note 1)	DIAL	MOUNTING CORD	Number of Lines Picked Up	Signalling Circuit	Line Ringer (See Note 2)	Common or Pvt. Line Ringer or Buzzer	Exclusion	Ringer or Buzzer Cut Off by Excl. Key	Ringer or Buzzer in Set	Ext. Station or Ringer	Head Receiver Listening-In Sta.
510-A	510-B	D4AS	2		✓						
			1	✓	✓						
			1	✓	✓				✓		
			1		✓					✓	
			1		✓				✓	✓	
510-E	510-F	D6S	1		✓						✓
			2	✓	✓						
			2			✓					
			1	✓	✓					✓	
			1	✓	✓				✓	✓	
511-A	511-B	D10E	1	✓	✓						✓
			1	✓	✓						
			2	✓		✓		✓			
			2	✓		✓	✓				
			2	✓	✓		✓				
			1	✓	✓		✓		✓	✓	

Note 1: Manual sets are same as corresponding dial sets except dial is replaced with apparatus blank and slate-white cord is transferred to "RR" terminal on network.

Note 2: The normal connections for the line ringer for the 510-type telephone sets provides for ringing on line 1. If ringing on line 2 is required, connect the red and black ringer leads to terminals 3 and 4, respectively.

### 3. APPARATUS

3.01 Components and parts for the 510 and 511-type sets which may be needed for replacement purposes are indicated by arrows and numbers in Figs. 3 and 4, and are listed in Table 2.

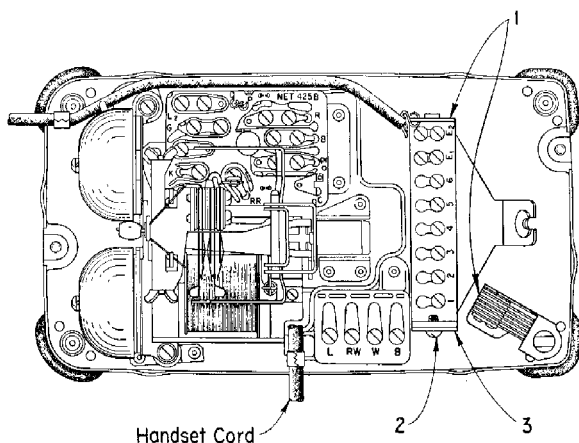


Fig. 3—Top View of 511-Type Set Without Housing Assembly

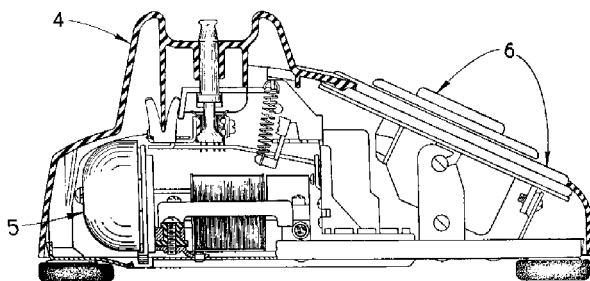


Fig. 4—Side View of 511-Type Set Through Housing Assembly

**TABLE 2**

<b>Number</b>	<b>Piece Part Number</b>	<b>Item</b>
1	P347015	Term. Strip and Key Assembly
2	—	Screw, R.H.M. St. 138-32 x 1/4
3	P338888	Retainer
4	{ P19A418 P339919	Housing Assembly—511-Type Sets Housing Assembly—510-Type Sets
5	—	C4A Ringer
6	—	7A-3 Dial (shown) or 95A-3 Apparatus Blank

3.02 Other components and parts not shown in Figs. 3 and 4 are:

Cords: D4AS-3 Mounting Cord (see Note 1)  
           D6S-3 Mounting Cord  
           D10E-3 Mounting Cord  
           H4BF-3 Hand Set Cord (see Note 2)

Handset: G1A-3 Hand Set

Note 1: The D4AU-3 cord, which is a retractile mounting cord may be substituted for the standard D4AS-3 cord when indicated on the service order or on proper authorization.

Note 2: When indicated on the service order or on other proper authorization, the H4BH-3 cord (fully retractile) or the H4BD-3 cord (semi-retractile) may be substituted for the standard H4BF-3 hand set cord.

3.03 The D4AS-3 is a four conductor cord, the D6S-3 has six conductors, the D10E has ten conductors. The conductors of the D6S-3 cord and the D10E-3 cord are arranged to reduce crosstalk.

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## **TELEPHONE SETS**

### **502, 510, AND 511 TYPES**

### **DESCRIPTION AND USE**

#### **1. GENERAL**

- 1.01 This section describes and indicates the uses for 502-, 510-, and 511-type common battery telephone sets.
- 1.02 The section is reissued to include the 502-type telephone sets.
- 1.03 Due to extensive changes in this section, marginal arrows have been omitted.
- 1.04 Replacement parts are listed in Section C32.544, Telephone Sets—500 Series—Supplies.

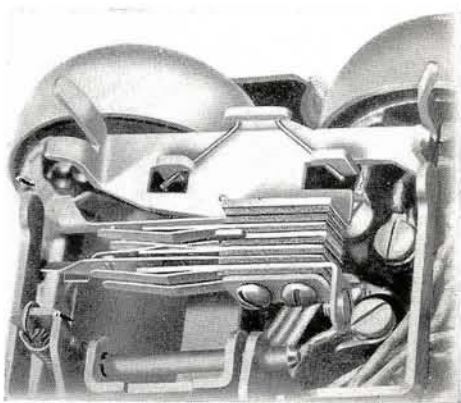
#### **2. DESCRIPTION (GENERAL)**

2.01 **Appearance:** The size and shape of 502, 510, and 511 sets are similar to 500-type telephone sets. It may be noted that the 511 set shown in Fig. 1 has a plastic turn-push button below and to the left of the dial. Also, the left plunger is designed to provide a fingerhold so that it may be lifted to operate a switch. The **502** has **only** the special plunger and the **510** has **only** the turn-push button. These features will help identify the different types of sets from an appearance standpoint.



Fig. 1—511-Type Telephone Set

2.02 **Exclusion Switch:** This switch is operated by manually lifting the left plunger, and restored by replacing the handset. When operated, it disconnects and short circuits (excludes) one or more extension stations to assure privacy of conversation (see Fig. 2).



**Fig. 2—Exclusion Switch (P-19A410 Switch Assembly)**

**2.03 Turn-Push Button Key:** Two lines may be picked up by sets equipped with this key (see Fig. 3). Turning the button transfers the talking and dialing circuits of the telephone set to either of the two lines. If only one line is desired, the key contacts may be used to cut off an extension station, an external ringer, the ringer in the set, or a headset (listening station). The key may also be used to transfer the line from the ringer in the set to an extension station or ringer. Depressing the button closes another pair of contacts. This function provides for push-button signaling.



**Note:** A P-347015 terminal strip and key assembly includes a 584A key and the terminal strip shown in Fig. 4.

**Fig. 3—Turn-Push Button (584A Key)**



2.04 **Network:** All sets covered by this section are equipped with 425P networks and are therefore provided with equalization. The network case acts as a shield and prevents crosstalk where two lines terminate in a set. Additional shielding is not required.

2.05 **Mounting and Housing:** The general information on mounting and housings covered in the description of 500-type sets also applies to 502-, 510-, and 511-type sets. In addition a terminal strip (see Fig. 4) has been provided for terminating the mounting cord or other connections. Mounting cord sizes are covered under individual set descriptions later in this section and the supplies section gives the code numbers of cords.

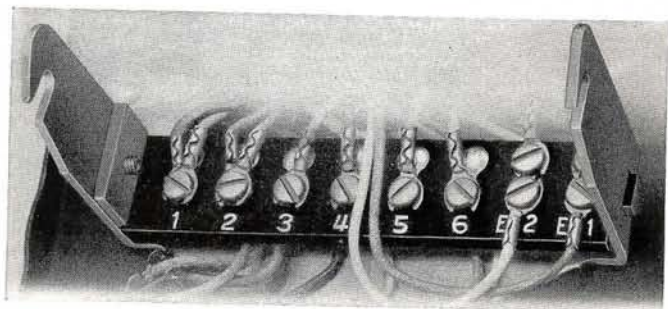


Fig. 4—P-338886 Terminal Strip Assembly

**Note:** Part of P-347015 Terminal Strip and Key Assembly

- 2.06 **Dial:** All dial telephone sets covered here are equipped with 7-type dials.
- 2.07 **Ringer:** C4A ringers with volume control are used in 502-, 510-, and 511-type telephone sets. When a signaling buzzer is desired, the ringer may be replaced with a 7-type buzzer mounted on a 44A bracket.
- 2.08 **Handset:** G1A handsets are used on all telephone sets covered in this section.
- 2.09 **Manual and Dial Set Coding:** Code numbers such as 502A/B cover both manual and dial versions of each type key telephone set to permit converting to either without changing the code number stamped on the base. When necessary to specify manual or dial, use the proper code letter with the code number shown in Table A.

**TABLE A**

TYPE OF SERVICE	SET CODE NUMBERS			
Manual	502	510	510	511
	A	A	E	A
Dial	B	B	F	B

### 3. USE

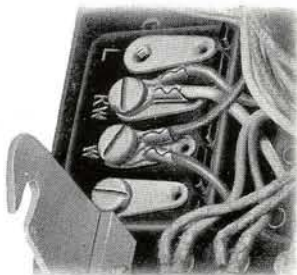
3.01 **General:** Telephone sets covered by this section are primarily for use with key telephone systems or key telephone equipment. Each type of set is equipped to provide one or more features such as exclusion, 2-line pickup, or signaling. The service uses and basic feature combinations of each type are covered in the next four paragraphs. Optional feature combinations are covered in Table B, page 7.

3.02 **502A/B:** This set is equipped with an exclusion switch and is primarily for use in 1A or 1A1 key telephone systems when only one line is required. It may also be used at attendant's positions or with 101-type key equipment. A set of contacts in the line-switch (switchhook) that "make" as the handset is lifted are wired to connect control lead "A" to ground in 1A1 key telephone systems. This is called external circuit control. The 502A/B telephone set is furnished with a 6-conductor mounting cord and replaces 402A and 402C sets.

3.03 **510A/B:** This set is primarily for use with 1A key telephone systems. It is equipped with a turn-push button key for 2-line pickup. It has a 4-conductor mounting cord and replaces 410AA and 410AC sets.

3.04 **510E/F:** This set is equipped with a 6-conductor mounting cord. Its other parts and service uses are the same as the 510A/B. The additional mounting cord pair permits 2-line pickup and signaling as basic features. The 510E/F replaces 410BA and 410BC sets.

3.05 **511A/B:** This set is intended for use in 1A key telephone systems. It is equipped with a turn-push button key for 2-line pickup and signaling, and an exclusion switch. It has a 10-conductor mounting cord and replaces 410CA- and CC-, 411AA-, AC-, CA-, and CC-types of telephone sets. It also has an auxiliary terminal block shown in Fig. 5.



**Fig. 5—Auxiliary Terminal Block (P-16A368)**

3.06 **Optional Feature Combinations:** Starting from left to right, Table B is intended to aid in the selection of a telephone set according to the combination of features required at a station. Reading right to left from a set code number gives the various feature combinations of the set.

# TABLE B

FEATURES	With Push-Button Signal Circuit	With Exclusion	Line Ringer in Set	Common Ringer or Buzzer in Set	Tel. Set Code No.	No. of Mtg. Cord Conductors
2 Line Pickup	No	No	Yes	No	510 A/B	4
			No	Yes	510 E/F	6
	Yes	Yes	Yes	No	511 A/B	10
			No	Yes	511 A/B	10
	Yes	No*	No	Yes*	511 A/B	10
		No	Yes	No	510 E/F	6
One Line	No	Yes	Yes	No	502 A/B	6
			No	Yes	502 A/B	6
		No*	No	Yes*	502 A/B	6
One Line and Cut-Off Ext.; or Aux. Headset; or Ext. with Ringer Transfer	Yes	No	Yes	No	510 E/F	6
		Yes	Yes	No	511 A/B	10
	No	No	Yes	No	510 A/B	4
One Line and Cut-Off Line Ringer Inset	Yes	No	Yes	No	510 A/B	4

\* Exclusion switch used to cut off common ringer.

**BELL SYSTEM PRACTICES**  
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**TELEPHONE SETS**  
**502, 510 AND 511 TYPES**  
**MAINTENANCE**

**1. GENERAL**

- 1.01 This section covers requirements and procedures for the maintenance of 502, 510 and 511-type telephone sets.
- 1.02 These sets are similar in appearance and construction to the 500-type telephone sets and, therefore, Section C32.539 covering the maintenance of 500-type sets shall supplement the maintenance information contained in this section. This section covers only the features that are peculiar to these type sets.
- 1.03 Sections dealing with description, installation, connections and cording should be consulted for identifying features of these sets and for information pertinent to the maintenance information covered in this section.

**2. MAINTENANCE**

**Exclusion Plunger**

- 2.01 The exclusion plunger shall remain in the operated position when pulled up to the full extent of its stroke. It shall return to the normal (fully depressed) position when the handset is placed on the cradle so that the exclusion plunger will drop by the force of the weight of the handset to its normal position.
- 2.02 Where the plunger fails to remain in the operated position (fully raised), check for a broken plunger or check that the exclusion switch contact spring pile-up is parallel to the mounting bracket. Where the plunger does not drop from the weight of the handset or fails to release from the fully depressed position when the handset is raised, check for excessive shifting of the exclusion switch assembly or for binding of the plunger at the plunger holes.

**2.03 Contact Follow:** With the cover removed, when the exclusion switch is operated by manual means the normally closed contacts shall have perceptible follow.

**2.04 Contact Separation:** The normally closed exclusion switch contacts (plunger fully depressed) shall have a minimum separation of 0.015 in. The normally open contacts (plunger fully raised) shall have a minimum separation of 0.015 in.

**Combination Turn and Push Button (584A Key)**

**2.05** The combination turn and push button plunger shall operate freely in both positions of the key and return fully to the normal position after being depressed to the limit of its stroke and then released slowly. It shall lock reliably when fully rotated and shall return to the unoperated position when released slowly from the locked position. If the plunger does not function properly, replace the telephone set.

**2.06** It shall not be possible to make or break the contacts, as the case may be, by any side thrust against the plunger in either the operated or the unoperated position.

**2.07** When the plunger is fully depressed, there shall be perceptible clearance between the bottom push button contact and the base of the set.

**2.08 Contact Sequence:** All normally closed contacts shall break before any normally open contact makes. The contacts of the turn button combination shall not be made or broken, as the case may be, by the operation of the plunger as a push button.

**2.09 Contact Follow:** All contact springs, including those which make contact when the key button is in the normal position, shall have a perceptible (approximately 0.010 in.) follow.

**2.10 Contact Separation:** The normally closed turn button contacts shall have a break of not less than 0.015 in. The normally open contacts shall have a break of not less than 0.025 in. The push button contacts shall have a minimum separation of 0.030 in.

**2.11 Contact Spring Adjustment:** Adjustment of this key should be undertaken only if the replacement of the complete telephone set would cause inconvenience. If it is necessary to adjust the key, use a 363 tool and be sure there is adequate light to work by. Particular attention should be given to the turn button contact sequence. If any adjustment is made on the contact springs, recheck all the requirements applying to the key. If the springs cannot be adjusted, the telephone set must be replaced.

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## **500 SERIES TELEPHONE SETS**

### **(502, 510, AND 511 TYPES)**

### **INSTALLATION**

#### **1. GENERAL**

1.01 This section covers installation procedures for the 502-, 510-, and 511-type key telephone sets.

1.02 This section contains information peculiar to the above sets. Reference should also be made to the Sections C32.537 "500 Series Telephone Sets (500 and 501 Types), Installation" and C31.145 "Subscriber and Telephone Sets For Indoor Locations, Installation."

#### **2. SERVICE ORDERS AND WORK SHEETS**

2.01 The service order issued for each installation, addition, or rearrangement should list the services to be provided. Where required this service order will be accompanied by a work sheet showing the operating features for each station and the type of apparatus involved.

#### **3. LOCATING AND MOUNTING**

3.01 In locating these key telephone sets be guided by the subscribers' wishes and the general requirements for mounting all telephone sets. Telephone set cords should not be exposed to moisture, and therefore should be kept off the floor if at all possible.

3.02 A 42- or 44-type connecting block should be used for connecting the wire or cable to the telephone set cord. The proper method of terminating wires or cables and cord conductors at connecting blocks is covered in the Section C33.545 "Connecting Blocks, Installation."

#### **4. LINE STATION AND RINGER LIMITATIONS**

4.01 It is desirable that the number of stations that can be connected to one line be limited so as to reduce the possibility of interference with dial pulsing or poor transmission due to the use of the line for listening-in or conference purposes. In general, not more than **six** stations should be connected directly or by key operation to **one** central office line, unless visual line and busy signals are provided.

4.02 Ringers and line signals used with these sets are subject to the same ringer connection limitations as covered in the Section C63.251, "Ringer Connection Limitations, Non-polarized Ringing Lines."

4.03 The arrangement should be such that at least **one** audible or visual signal is connected to the central office or PBX line at all times. Exception to this may be made at PBX stations in special cases where for one reason or another a ringer or signal is not needed by the subscriber.

#### **5. NUMBER CARDS AND MASKS**

5.01 The standard number card for the particular central office area should be used with these sets. On the 510- and 511-type sets a mask for the particular features at the station should also be used as covered in the Section C37.321, "Designation Strips and Cards, Description and Use."

#### **6. STATION RINGERS AND SIGNALS**

6.01 These sets contain C4A ringers and the biasing spring should be in the high tension notch except where three or more ringers are bridged across one line. In this case all ringers on that line should be in the low-tension notch.

6.02 The C4A ringer in these sets may be replaced with a 7-type buzzer mounted on a 44A bracket, for local signaling or where a common audible signal is used in a key system.



## **7. WIRING**

7.01 Wire or cable shall be selected, placed, and fastened in accordance with the following Sections that cover this work.

- (a) C24.041 "Selection of Wire and Cable."
- (b) C24.061 "Placing Wire and Cable in Buildings."
- (c) C24.062 "Wiring of Desks and Tables."
- (d) C24.081 "Fastening Wire and Cable in Buildings."

## **8. FINAL TESTS**

8.01 Upon completion of a key telephone set installation make certain that all features of the sets are functioning properly. The tests should consist principally of operating the keys to see that all pickup, cutoff, exclusion, and signaling features, ringers, buzzers, and lamps are operating properly. Check the operation of ringers with the keys in the various positions for stations having ringer cutoff.

8.02 The subscriber or his representative should be instructed as to proper operation of these sets.

8.03 Accurately report all apparatus and service features installed or disconnected as required by local practices.