

NUMBERED TYPE RINGERS MAINTENANCE

1. GENERAL

1.01 This section covers the procedures and requirements for maintaining numbered type ringers and 392-type loud ringing bells.

1.02 This section is reissued for the following reasons:

- (a) To change title.
- (b) To rearrange material on numbered type ringers and transfer information relative to B-type ringers.

1.03 Due to extensive changes made, the use of arrows has been omitted.

1.04 The following figures illustrate typical numbered type ringers and their component parts.

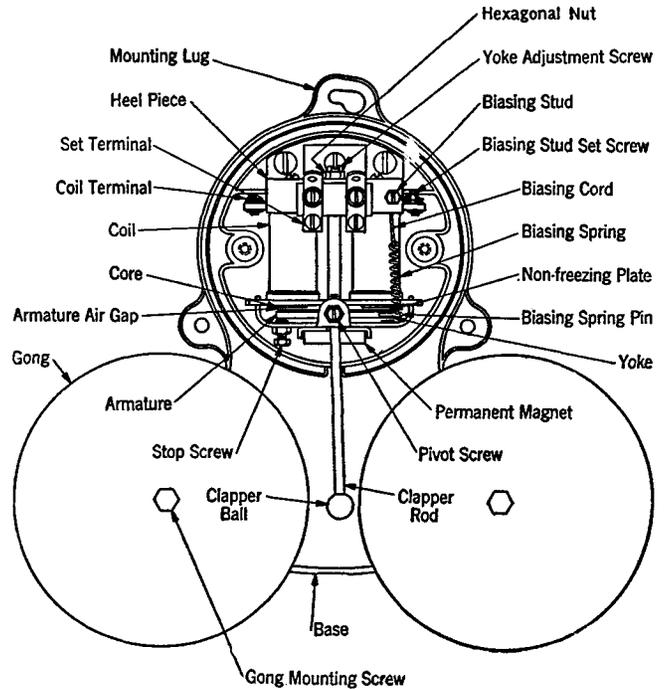
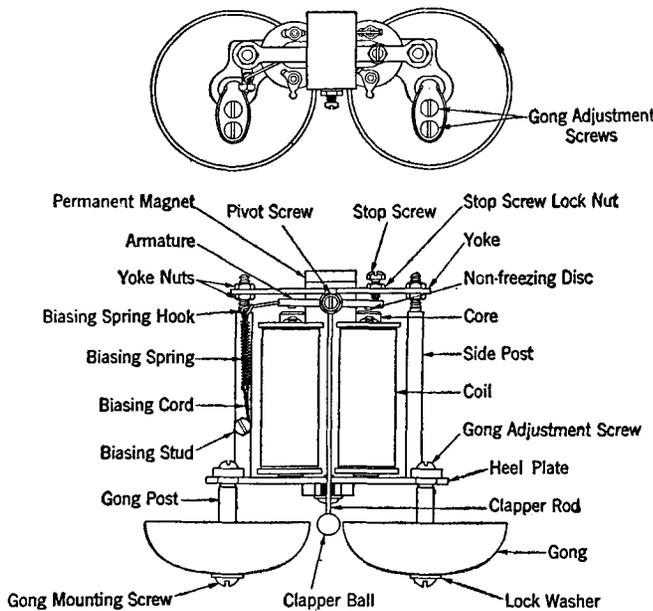
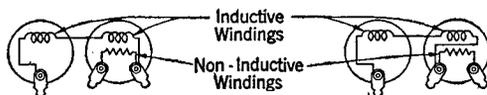


Fig. 2—392-Type Subscriber Sets (Loud Ringing Bell)



Note: 42, 48 and 52 type ringers having a 3000 ohm non-inductive winding in series with the inductive windings have the junction brought out to a third terminal and are connected as follows:



Connections with terminals at heel plate end

Connections with terminals at armature end

Note: 42 type ringers are equipped with a black lead on the biasing spring side and a red lead on the other side.
66 type ringers have gong posts which are bent outward to accommodate 3 inch gongs.

Fig. 1—Typical Numbered Ringer

Notes on Numbered Ringers

Type	Remarks
38, 51	Following not furnished—may be added (1) Biasing Bracket P-108456 (2) Biasing Bracket Screws P-108455 (3) Biasing Spring and Cord P-290065 (4) Biasing Stud P-108457
Optional	Section C31.208 contains information relative to replacing certain numbered type ringers in the field with a B-type ringer.

Armature Stop Spring

1.05 Armature stop springs which prevent sticking, are provided for use on ringers other than loud ringing bells, 38-, 46-, 47-, 51-, 55-, and 65-type or where ringers are equipped with chromium-plated armatures or are unbiased (see Fig. 3).

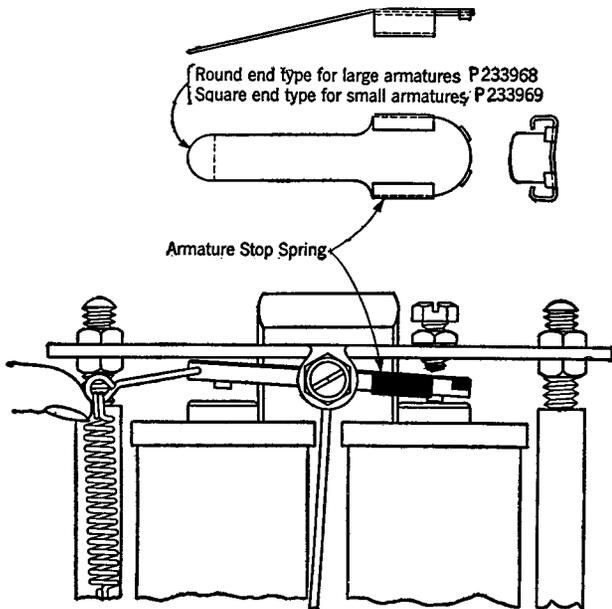


Fig. 3—Armature Stop Spring

Note: Readjust stop screw to obtain proper airgap when testing and adjusting airgaps (see. 2.02).

2. MECHANICAL REQUIREMENTS

Pivot Screw

2.01 Pivot screw adjustment should allow the armature to work freely with perceptible but not excessive pivot play. If necessary, loosen locknut with 129B tool and adjust pivot screw with screwdriver to meet requirement; so that with locknut tightly set up, the requirement will be met.

Airgap

2.02 The following tables and figures show the procedures, methods, and requirements necessary to complete the check for proper airgap adjustments.

Table A
REQUIREMENTS

2-, 6-, 7-, 8-, 42-, 48-, 52-, 66-, 68-, 72-, and 78-Type Ringers	When "GO-NO GO" Gauges Are Provided		Nominal Dimension of Airgaps	
	Biasing Spring Side	Stop Screw Side	Biasing Spring Side	Stop Screw Side
	Code of Gauge		Inch	
*Biased, at 4-party full selective, and 8-party semiselective stations with relay sets and magneto grounded ringing party line stations rung with polarized current	126D	126A	0.060	0.012
(Where relay sets are converted to vacuum tube sets, ringers need not be readjusted if stop screw side is 0.012" and biasing spring side is 0.030" to 0.065". If, however, readjustment is required bring airgaps within the requirements shown just below.)				
*Biased, at all other common battery and magneto stations	126C	126A	0.035	0.012
Unbiased at magneto stations	126A	126A	0.012	0.012
*46-, 47-, 55-, and 65- and 38- and 51-Type Ringers with Solid Armature Stops (Figs. 2 and 3)	126A (0.015" part)	126A (0.015" part)	0.016	0.016
*38- and 51-Type Ringers with Flexible Armature Stops (Fig. 2)	126B (0.020" part)	126B (0.020" part)	0.020	0.020

Table A (Cont'd.)

392-Type Loud Ringing Bells	When "GO-NO GO" Gauges Are Provided		Nominal Dimension of Airgaps	
	Biasing Spring Side	Opposite Side	Biasing Spring Side	Opposite Side
	Code of Gauge		Inch	
Biased, at 4-party full selective and 8-party semiselective stations	126D	126A	0.060	0.012
Biased at all other stations	126B	126A	0.024	0.012
Unbiased	126A	126A	0.012	0.012

*When reduced volume is desired at stations use 127A (0.004") gauge for minimum airgap on stop screw side. On ringers equipped with flexible armature stops, this dimension shall be measured with the stop on the side not being gauged just touching the pole piece.

Table B

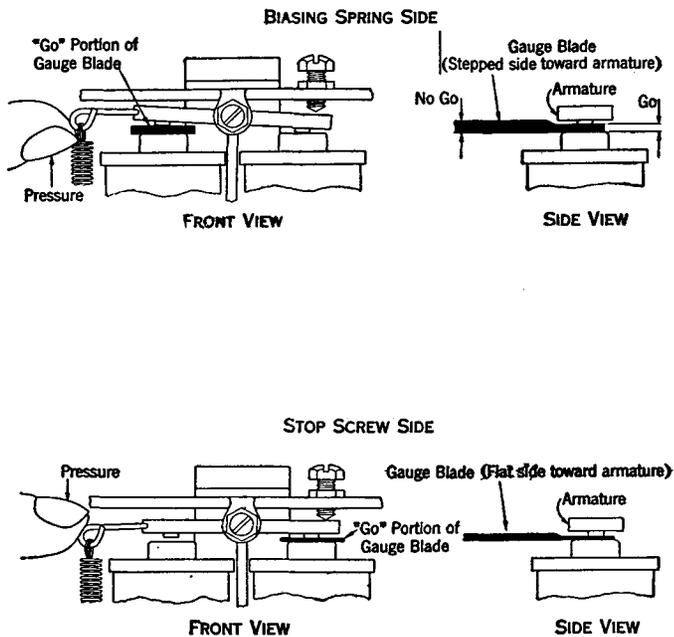
ADJUSTMENT METHODS

Ringer Type	Remarks
2, 6, 7, 8, 42, 48, 52, 66, 68, 72, 78	a) Adjust airgap on biasing spring side by means of yoke nuts. b) Adjust airgap on stop screw side by means of stop screw.
38, 46, 47, 51, 55, 65	a) Adjust yoke by means of yoke adjustment screw with screwdriver so that gauge fits either airgap on ringers having solid armature stops. b) When ringers have flexible armature stops, deflect stops fully against armature.
392-Type Loud Ringing Bell	a) Adjust airgap on biasing spring side by means of yoke adjusting screw so that blade fits in gap as illustrated in Fig. 7. If there is a stop screw on biasing spring side, remove it. b) Do not disturb hexagonal nut associated with yoke adjustment screw. c) Adjust on other side by means of stop screw (see Fig. 7).
All	a) Move gongs as required to facilitate measurement of airgaps.

Table C

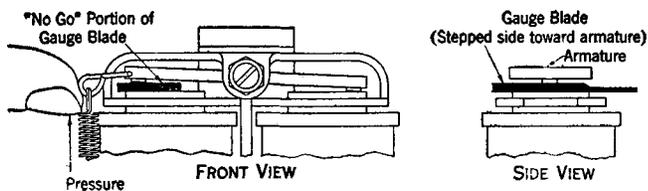
APPLICATION OF GAUGES

Ringer Type	Remarks
All	Apply gauges as shown in Figs. 4, 5, 6, and 7 while applying slight pressure on biasing spring hook.
All	Requirements are met when "GO" (thin) part of blade enters easily, and the "NO-GO" (thick) part does not enter without forcing.
46, 47, 51, 55, 65, 38, and 51	Having solid armature stops "NO-GO" of 126A shall enter with slight looseness. Having flexible stops "GO" 126B shall enter with slight friction.
All	When "GO-NO GO" gauges are not available, gauges such as 37B, 38B, or 43 type may be used. Blade may enter with a slight looseness or with slight friction.



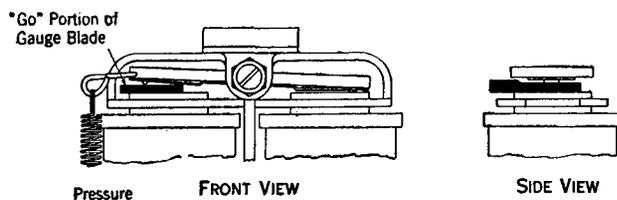
Note: See that gauge blade rests flat on pole face.

Fig. 4—Method of Checking Airgaps On 2-, 6-, 7-, 8-, 42-, 48-, 52-, 66-, 68-, 72-, and 78-Type Ringers



Note: See that gauge blade rests flat on pole face.

Fig. 5—Method of Checking Airgaps on 46-, 47-, 55-, 65-, 38-, and 51-Type Ringers Having Solid Armature Stops



Note: See that gauge blade rests flat on pole face.

Fig. 6—Method of Checking Airgaps on 38- and 51-Type Ringers Equipped with Flexible Armature Stops

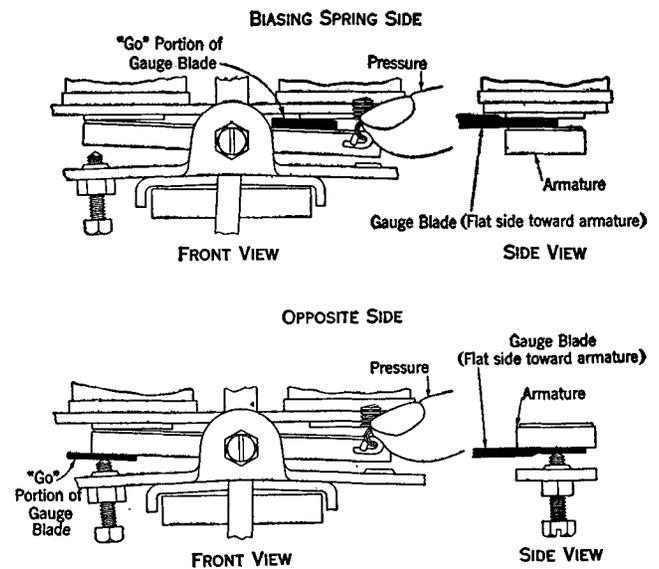


Fig. 7—Method of Checking Airgaps on 392-Type Subscriber Sets (Loud Ringing Bells)

3. GONG ADJUSTMENTS AND GONG ATTACHMENTS

All Gongs Except 39A (Cathedral) Gongs

3.01 Operate armature from side to side (by means of biasing hook, if present) holding it momentarily in extreme positions of its travel. Do not grasp clapper rod to operate armature. See that clapper ball strikes each gong so as to produce a single clear tone, but does not rest against either gong, except in the case of loud ringing bells (392-type), where it is permissible to have the clapper ball just touch the gongs at the end of each stroke. On ringers where the airgaps are changed from 0.035 inch and 0.012 inch to 0.060 inch and 0.012 inch, or vice versa, it may be necessary to bend the clapper rod slightly to meet this requirement. If this is the case, the rod should be bent close to the armature with a pair of long-nosed pliers. If clapper rod strikes coil or other part of the ringer or, in wooden sets, the side of the hole through which the rod protrudes, the rod may be straightened or slightly bent as required.

39A (Cathedral) Gongs (Used on 78-Type Ringers Only)

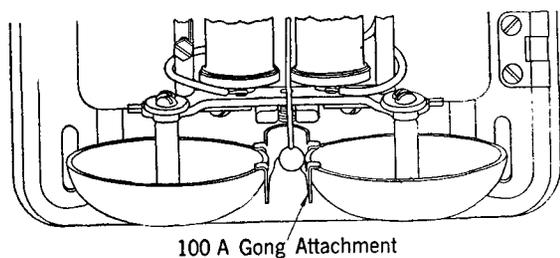
3.02 Installation:

- See that screws holding mounting plate to ringer are tight. Loosen gong adjustment screws just enough to permit swinging the spiral steel gongs with some friction.
- With some tension on biasing spring, so that clapper rod is held toward stop screw side, swing spiral steel gong on stop screw side so that it clears clapper ball by approximately 0.020 inch. (Gauge by eye. This adjustment is for preliminary guidance only.)
- With clapper rod held toward biasing spring side by applying finger to biasing hook, swing gong on biasing spring side so that it clears clapper ball by approximately 0.012 inch. (Gauge by eye. This adjustment is for preliminary guidance only.)

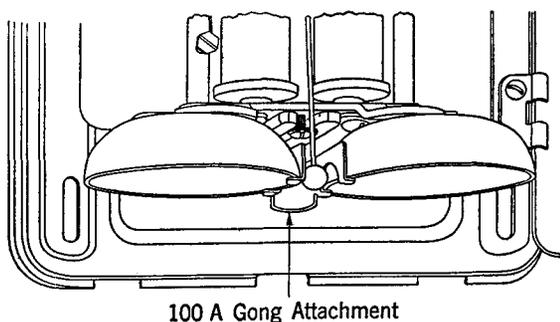
- Obtain ring and see that both gongs are being struck. If a rattling sound is heard, one or both gongs may be too close to clapper, or too far away. If necessary, adjust each gong as required until satisfactory ringing is obtained, as judged by the sound. Tighten all gong adjustment screws securely, and recheck to see that sound is still satisfactory.

100A and 100B Gong Attachments

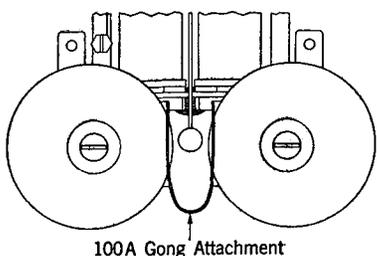
3.03 The following figures and notes show procedures and methods recommended for the installation of gong attachments on numbered type ringers.



100 A Gong Attachment
Fig. 8—100A Gong Attachment on 6-, 7-, 8-, 42-, 48-, and 52-Type Ringers



100 A Gong Attachment
Fig. 9—100A Gong Attachment on 68- and 72-Type Ringers



100A Gong Attachment
Fig. 10—100A Gong Attachment on 78-Type Ringers

Note: The 100B gong attachment may be used in place of the 100A type and installed in a similar manner except for types shown in Fig. 8, where the open end shall be toward base of the subset.

4. BIASING SPRINGS

4.01 The types of biasing springs to be used on the various types of ringers and loud ringing bells are as follows:

Ringers	Types of Biasing Springs	
All biased ringers except as noted below	Spring assembly with brown cord	P-290065
8B ringers used for 4-party selective service and 6J, 6JA, and 66JA ringers for 8-party semiselective magneto service	Spring assembly with red cord	P-157309
Loud Ringing Bells		
392D and K	Spring assembly with green cord	P-290335
392J	Spring assembly with red cord	P-157309
392L	Spring assembly with orange cord	P-290166
392M	Spring assembly with white cord	P-290336

Placing Biasing Springs

4.02 The following figures and notes are recommended as proper procedure when attaching biasing spring cords.

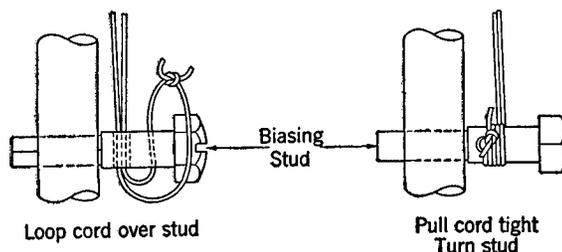


Fig. 11—Attaching Biasing Springs on Ringers

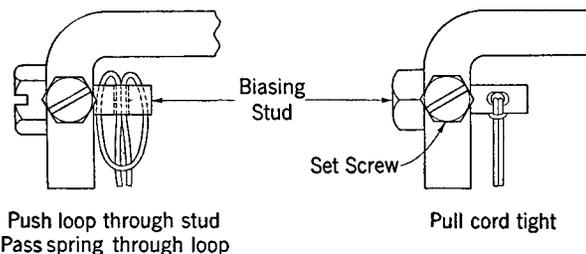


Fig. 12—Attaching Biasing Springs on 392-Type Loud Ringing Bells

Note 1: Turn stud in a clockwise direction.

Note 2: When placing biasing springs having a double loop at each end on sets having a biasing spring arm with a hole at the end instead of a loop, clip off all but about 7/8 of a turn of the double loop at the end of the biasing spring, which will permit the spring to be hooked through the hole in the biasing spring arm.

Biasing Spring Adjustments

4.03 It is recommended, that Table D serve as a guide in determining the correct procedures to follow when testing and adjusting numbered type ringers. The numerals in parentheses refer to the notes succeeding the table.*

Table D
BELL TAPPING AND CROSS RINGING TESTS

COMMON BATTERY MANUAL STATIONS	BELL TAPPING		CROSS RINGING		FINAL ADJUSTMENT
	Test	Adjust	Test	Adjust	
Individual (Including PBX Exts.)	4.04(1)	4.07			4.13
Manual Ringing 2-Pty. Selective and 4-Pty. Semiselective	4.04(1)	4.07	4.08(2)	4.11(2)	4.13
Manual Ringing Divided Code	4.04(1)	4.07	4.08(3)	4.11(3)	4.13
Machne Ringing 2-Pty. Selective and 4-Pty. Semiselective. (See Note 4)	4.04(1)	4.07	4.10(3)	4.12(3)	4.13

Table D (Cont'd.)

BELL TAPPING AND CROSS RINGING TESTS

COMMON BATTERY MANUAL STATIONS	BELL TAPPING		CROSS RINGING		FINAL ADJUST- MENT
	Test	Adjust	Test	Adjust	
Machine Ringing Divided Code (See Note 4)					4.14
4-Pty. Full Selective 8-Pty. Semiselective	(5)		(5)		4.15 4.16 4.17 4.18

Table D (Cont'd.)

DIAL STATIONS	BELL TAPPING		CROSS RINGING		FINAL ADJUST- MENT
	Test	Adjust	Test	Adjust	
Individual (Including PBX Exts.)	4.05	4.07			4.18
2-Pty. Selective Flat Rate 2-Pty. Selective Msg. Rate Ring. Stas. 4-Pty. Semiselective	4.05	4.07	4.10(3)	4.12(3)	4.18
2-Pty. Selective Msg. Rate Tip Stations	4.06	4.07	4.10(3)	4.12(3)	4.18
4-Pty. Full Selective 8-Pty. Semiselective	(5)		(5)		4.15 4.16 4.17 4.18
Divided Code					4.14
BIASED MAGNETO GROUNDED RINGING PARTY LINE STATIONS With AC Ringing Supply			4.09(6)	4.11(6)	4.18
With Superimposed Ringing Supply					4.16
With Pulsating Ringing Supply					4.17

Note (1): At stations being prepared for cutover to dial make bell tapping test as per 4.06 or under circuit conditions established by local cutover procedure.

Note (2): This test may be made at all stations of these types, including those being prepared for cutover to dial, in order to prevent cross ringing while being rung manually before cutover.

Note (3): This test may be omitted when local instructions so specify.

Note (4): Where all local calls are completed by machine ringing.

Note (5): The biasing spring adjustment per 4.15, 4.16, 4.17, or 4.18 makes these tests unnecessary.

Note (6): This test not required where condensers are used in series with receivers. (Reference is made to Section C41.002, Magneto Stations—Apparatus and Use.)

Test for Bell Tapping—Common Battery Manual Individual 2-Party Selective, 4-Party Semiselective, and Manual Ringing Divided Code Stations (Including Manual PBX Extensions).

4.04 Operate switchhook rapidly with talking battery on the line. Bell should not ring or tap.

Note: At coin collector stations make tapping test with coin trigger operated (circuit grounded).

Test for Bell Tapping—Dial Individual, 2-Party Selective Flat Rate, 2-Party Selective Message Rate Ring Stations, and 4-Party Semiselective Stations (Including Dial PBX Extensions).

4.05 This test may be made by either of the following methods: (Bell should not ring or tap.)

Method (a): Dial ringer test code; and after hearing second dial tone, dial proper digit as indicated:

Digit to be Dialed	Individual or 2-Pty. Station	4-Pty. Semisel. Station
6	Ind. or Ring Pty. Tip Pty.	1-Ring Pty. on Ring
7		1-Ring Pty. on Tip
8		2-Ring Pty. on Ring
9		2-Ring Pty. on Tip

Then dial "zero" as often as required, noting whether bell rings or taps.

Method (b): Dial any digit over "5" which is not a special code such as "long distance," "operator," etc. Hang up each time before repeating this test.

Note 1: On calls which require connection to the automatic ticketing central office equipment, the ringers on 2-party flat rate lines are subject to more severe bell tapping conditions than normally encountered on other types of calls. Where local experience indicates that this bell tapping condition is not severe enough to require the 30-gram adjustment, the ringers may be adjusted by reducing the biasing spring tension until bell taps, and then increasing the tension by turning the biasing spring stud 1/16 turn at a time as covered in 4.07.

Note 2: No provision is made for a bell tapping test in a No. 5 crossbar office except where incidental to the ringer test outlined in C31.204, Ringers and Loud Ringing Bells—Maintenance and Ringing Test.

Note 3: See that dialing at each telephone set does not cause tapping of any ringers connected to the same line on the same premises. (Review 4.06 of this section, and 4.02 Note 5, Section C31.204, Ringers and Loud Ringing Bells—General Maintenance and Ringing Test.)

Note 4: When station or ringer cut-off keys are provided, test for tapping with keys in all positions.

Note 5: At dial PBX extension stations, use Method (b). At dial stations on manual PBX's, obtain through dialing connection and use Method (a) or (b).

Test for Bell Tapping—Ground Identification

4.06 Where specific classes of service require a ground identification from the subscriber's set (e.g. tip-party), bridge the hand-test set across line and use dial of test set to test for bell tapping. At step-by-step stations use only Method (b) in 4.05.

Adjustment to Prevent Bell Tapping

4.07 Procedure:

(1) Change biasing spring tension (by turning biasing stud) to a position slightly below that required to stop tapping.

- (2) Increase biasing spring tension by turning biasing stud not more than 1/16 turn at a time, in clockwise direction, testing for bell tapping each time and continuing until bell does not tap.

Test for Cross Ringing—Manual Ringing Party Line Common Battery Stations

4.08 Request operator to give a series of rings of the opposite polarity at the station reporting the trouble, and proceed as follows:

- (1) With receiver on switchhook (or handset on mounting) bridge hand-test set across L1 and R terminals of subscriber set. (Test set talking circuit may be either open or closed.)
- (2) During a silent interval, short-circuit L2 and R terminals with a 663 cord or other suitable test cord.
- (3) On next ring, as indicated by audible ringing sound in test set receiver, bell should not ring or tap.

Test for Cross Ringing—Biased Magneto Grounded Ringing Party Line Stations Rung from AC Ringing Supply

4.09 Procedure:

- (1) Request operator to give a series of rings at the station which reported the trouble, and replace receiver or handset.
- (2) During a silent interval, raise station receiver or handset.
- (3) On next ring, as indicated by audible ringing sound in station receiver, bell should not ring or tap.

Test for Cross Ringing—Machine Ringing Manual and Dial Party Line Stations (Make only when locally specified)

4.10 Procedure:

- (1) Obtain ring at the station reporting the trouble.
- (2) Reverse line wire at subscriber set terminals.
- (3) Bridge test set (with condenser cut in) across L1 and L2 terminals of subscriber set, and monitor on the line. (If test set does not contain a condenser, a 0.01 mf condenser, such as a 152A condenser of a 61A filter, may be used in series with test set.)
- (4) During a ringing interval as indicated by audible ringing sound in test set receiver, short circuit condenser and trip ringing. Bell should not ring or tap.
- (5) If bell rings or taps, proceed as in 4.12. If not, restore original line connections.

Adjustment to Prevent Cross Ringing—Manual Ringing Party Line Common Battery Station and Biased Magneto Grounded Ringing Stations Rung from AC Ringing Supply

4.11 Increase biasing spring tension by turning biasing stud not more than 1/16 turn at a time in clockwise direction testing for cross ringing each time, as in 4.08 or 4.09, and continuing until bell is silent.

Adjustment to Prevent Cross Ringing—Machine Ringing Manual and Dial Party Line Stations

4.12 Increase biasing spring tension by turning biasing stud not more than 1/16 turn at a time in clockwise direction testing for cross ringing each time, as in 4.10, and continuing until bell is silent. Restore original line connections.

Final Adjustment and Margin Test—All Stations Except Divided Code Machine Ringing and 4-Party Full Selective, 8-Party Semiselective Stations

4.13 After completing tests and adjustments to prevent tapping and (if required) cross ringing, obtain a ring, and increase biasing spring tension by 1/2 turn of biasing stud in clockwise direction. If ringing does not start after a silent interval and continue clearly and steadily while the extra tension is being applied, replace ringer or loud ringing bell and repeat all necessary tests and adjustments. If this test is met satisfactorily, reduce tension by 1/4 turn of the biasing stud.

Note 1: If in making any of the above adjustments (except the margin test) it becomes necessary to stretch biasing spring as far as biasing stud, spring is defective and should be replaced. Repeat biasing spring tests and adjustments. If in adding the extra half-turn for the margin test the spring would be wound up on the stud, do not wind it on the stud but make the ringing test; and if that is satisfactory, turn the stud back to a point 1/4 of a turn above the position determined in 4.07, 4.11, or 4.12.

Note 2: In certain step-by-step offices the ringer test circuit (SD-31140-01) has been modified for a more severe bell tapping test. In cases where ringing is not satisfactory, turn the stud back to a point 1/8 turn above the position determined in 4.07. If ringing still is unsatisfactory, replace ringer and make all the necessary tests and adjustments.

Final Adjustment and Margin Test—Divided Code Machine Ringing Stations

4.14 The methods outlined in 4.04, 4.07, 4.10, and 4.12 may be followed to complete this test.

Final Adjustment and Margin Test—4-Party Selective and 8-Party Semiselective Stations

4.15 In dial superimposed current districts having equipment for mechanical testing of ringers, proceed as follows:

- (1) Dial ringer test code.
- (2) When second dial tone is heard, obtain special bell adjusting current by dialing code indicated below corresponding to the station being tested:

Code	Party
06	— Party on Ring
07	— Party on Tip
08	+ Party on Ring
09	+ Party on Tip

- (3) About one second after dialing is completed replace receiver on switchhook. Continuous ringing should be obtained.
- (4) Increase tension of biasing spring until bell stops ringing.
- (5) Decrease tension until a two-gong ring is just obtained.
- (6) To release testing equipment lift receiver or handset.

4.16 In other superimposed current districts, request test desk to ring with bell-adjusting current and proceed as in (4) and (5) above. When adjustment is completed, advise test desk to that effect.

Note 1: In areas where ringers are connected to ground and a difference of more than 3 volts earth potential exists, satisfactory ringing may not be obtained. In districts in which this condition occurs frequently, refer the case to the supervisor for special instructions.

Note 2: Where bell-adjusting current is not available, regular ringing current should be used according to the method in 4.17.

4.17 In pulsating current districts, obtain ring at the station being tested, with regular ringing current. Then proceed as follows:

- (1) Increase biasing spring tension by turning stud in clockwise direction until ringing is just stopped.

- (2) Decrease tension, noting that ringing is resumed, and counting turns of biasing stud until ringing is stopped due to biasing tension being too low.
- (3) Increase tension one-half the number of turns counted in (2).
- (4) If bell does not stop ringing when biasing spring is extended to the stud, do not wind spring on stud, but adjust spring to a position midway between this position and the point at which ringing fails due to the tension being too low.

Adjustment—Tube Sets

4.18 When a subscriber set is equipped with a cold cathode-type vacuum tube, the biasing spring tension should be no more than is necessary to obtain good steady ringing.

5. LOUDNESS OF SIGNAL AND GONG DISTINCTIVENESS

Adjustment for Reduced Loudness of Signal

5.01 Reduce the stroke (or travel) of the armature by reducing the airgap on the stop screw side, and readjusting gongs. Never reduce airgap below 0.004 inch (use 127A gauge). Blade may enter with slight looseness or slight friction.

Caution: If ringer is to be silenced, do not use this method. Disconnect ringer and see that connections for remaining ringers are in accordance with instructions on line and ringer connections.

Adjustment for Increased Loudness of Signal—78A Type

5.02 On 584- and 684-type sets, if there is a complaint of low ringer volume, 78-type ringers may be adjusted to have louder volume by setting the gap at 0.060 inch on the biasing spring side and 0.024 inch on the other side. After the airgaps have been set, readjust gongs. Then adjust biasing spring until no tapping is encountered when tested in accordance with 4.04 or 4.05 of this section. Increase biasing spring tension by 1/2 turn of the biasing stud. A ring should be satisfactory under this condition, and if ringer fails to ring, it should be replaced. If this test is met satisfactorily, reduce tension by 1/4 turn of the biasing stud.

5.03 The following table is recommended as a guide at installations where two or more ringers require distinctive tones.

Table E
DISTINCTIVE GONG CHOICES

Choice	A Phenol Plastic 584-, 684-Types	B Metal Sets 533-, 534-, 553-, 554-, 634-, 653-Types		C Exposed Gong Sets 295-, 333-, 334-, 433-, 434-, 495-Types
	Eccentric Gongs	Eccentric Gongs	Concentric Gongs	Concentric Gongs
1 Stand. Equip.	1—36A 1—37A	2—29C	2—29B	2—29A
2	2—37A	2—31C	2—31A	2—31A
3	2—36B	2—32C	2—32A	2—32A
4	1—39A Cathedral Gong	2—38C	2—38A	2—38A
5	Choice 1, 2, or 3 with 100A or 100B Gong Attachment	Choice 1 or 4 with 100A or 100B Gong Attachment	Choice 1 or 4 with 100A or 100B Gong Attachment	2—38A (Cowbell)
6	2—36D		2—#7 Walnut Gongs	2—#7 Walnut Gongs
7 Buzzer Sound	Spread gongs apart so that clapper does not strike them when ringing current is applied. If clapper hits with gongs farthest apart, remove gongs. This applies to all sets listed above.			

Note: Nos. 7, 38A, and 39A gongs are recommended for impaired hearing. However, depending on type of impairment, other gongs may be more effective.