

# ADJUSTMENT OF SUBSTATION APPARATUS

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# ADJUSTMENT OF SUBSTATION APPARATUS

## GENERAL

### Section 1

If apparatus does not operate satisfactorily when adjusted according to these specifications, it should be replaced as defective.

Before an adjustment is completed all lock nuts or set screws should be tightly set up and the adjustment should be made so it is correct with the nuts or screws tight.

Ringers and loud ringing bells should have standard air gap adjustments when received from Western Electric Company or storeroom. It will not in general be necessary to check these adjustments on new installations.

**GENERAL**

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**On New Installations**

- (1) Check gong adjustment of ringers and loud ringing bells and if necessary adjust gongs.
- (2) Adjust biasing spring (if present), of ringers and loud ringing bells.
- (3) Test apparatus with central office ringing current. If apparatus does not operate satisfactorily, check all adjustments and if necessary adjust.

**On Removals** where apparatus is reused without going through storeroom check all adjustments and if necessary adjust.

**Where Trouble with Apparatus is Experienced** check all adjustments and if necessary adjust.

**TYPES OF RINGERS****Distinguishing Between Types**

Section 2

- (a) #8, #42 and similar type ringers have yoke supported by ringer posts and armature adjusted by nuts threaded onto ringer posts. (See Section 6.) These ringers are used on both common battery and magneto lines.
- (b) #38 and similar type ringers have yoke supported by pole pieces and armature adjusted by yoke adjustment screw in center of yoke. (See Section 11.) These ringers are used only on magneto lines.

**Use of Biased Ringers**

Section 3

A ringer is biased when it has a biasing spring to normally hold armature against stop screw or pole piece.

Biased ringers are used on—

- (a) Common battery lines to prevent tapping due to discharges when line is short-circuited, in testing, inserting switchboard plug in jack, or otherwise.
- (b) Common battery and magneto two-party selective and four-party semi-selective lines to prevent false ringing due to subscriber on opposite side of line removing his telephone from switch-hook while his bell is being rung.
- (c) Common battery and magneto four-party selective lines to ring selectively with superimposed or pulsating current.

- (d) Magneto center checking lines to prevent false ringing when another party on line operates pulsating current substation generator to call Central Office.
- (e) Magneto two-party selective and four-party semi-selective lines to prevent false ringing when another party on line operates alternating current substation generator to call Central Office.
- (f) Magneto lines to prevent tapping or false ringing from inductive disturbances or ground potential or to prevent tapping where rural stations are connected to common battery offices and have condensers in series with ringers so they are similar to common battery ringers biased to prevent tapping.

#### Use of Unbiased Ringers

Section 4

A ringer is unbiased when it does not have a biasing spring.

Unbiased ringers are used—

- (a) On magneto individual and non-selective party lines, except (d) and (f), Section 3.
- (b) In certain common battery sets provided with ringers not arranged so that biasing springs can be attached.

#### Use of Equal and Unequal Armature Air Gaps

Section 5

Armature air gap is distance between stop pin and pole piece at one end of armature with other end at extreme position of its travel toward pole piece. Armature air gaps at both ends will be equal if armature stops against pole piece at each end of its travel. Air gaps will be unequal if armature stops against stop screw at one end of its travel. (See diagram in Section 6.)

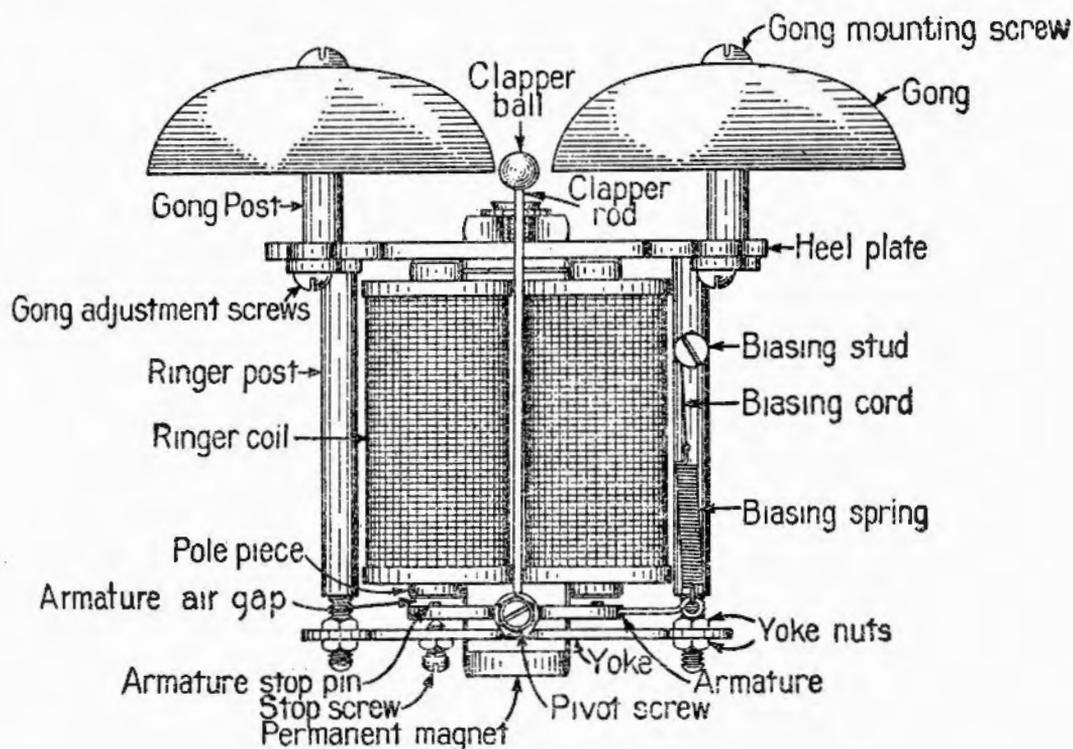
To secure most satisfactory ringer operation—

- (a) Unequal armature air gaps are used with biased common battery ringers and magneto four-party selective ringers.
- (b) Equal armature air gaps are used with common battery ringers unequipped for biasing springs and all magneto ringers except four-party selective ringers.

## ADJUSTING #8, #42 AND SIMILAR TYPE RINGERS

Diagram of Parts

Section 6



### Pivot Screw

Section 7

See that pivot screw allows armature to work freely without excessive side play.

### Yoke and Stop Screws

Section 8

Check armature air gaps with gauge blades specified below. Adjust only if blades fail to fit in air gap with slight friction.

If adjustments are required—

- (1) Loosen gong adjustment screws and separate gongs as far as possible. With biased ringers loosen stop screw so it is out of contact with armature and slacken biasing cord so as to remove all tension on armature.
- (2) Adjust yoke by means of yoke nuts so it is approximately at right angles to ringer posts and gauge blade in table below fits with slight friction between either armature stop pin and pole piece with opposite stop pin and pole piece in contact.

In addition for ringers requiring unequal air gaps (biased common battery ringers and magneto four-party selective ringers).

(3) Adjust stop screw so that with armature against it, gauge blade in table below fits with slight friction between armature stop pin and pole piece on stop screw side.

	Gauge	Blade for Yoke Adjustment	Blade for Stop Screw Adjustment
All biased common battery ringers except four-party selective ringers . . . . .	#37	.024"	.012"
Common battery and magneto four-party selective ringers . . . . .	#38	.060"	.012"
Common battery ringers unequipped for biasing springs . . . . .	#37	.012"	No stop screw adjustment
All magneto ringers except four-party selective ringers . . . . .	#43	.012"	No stop screw adjustment

Adjust ringers at extension stations and extension ringers with same air gaps as main station ringers.

### Gongs

### Section 9

Check gong adjustment. Clapper ball should clear gongs by approximately 1/64" with armature held in extreme positions of its travel. Operate armature to either side by pushing toward pole piece and see that clapper ball strikes but does not rest against gongs. If necessary adjust to obtain this result by means of gong adjustment screws.

**ADJUSTING #8, #42 AND SIMILAR TYPE RINGERS**

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**Biassing Spring**

**Section 10**

Adjust biassing spring of all biased ringers except four-party selective ringers with enough tension to prevent tapping or false ringing without affecting proper operation of ringer.

For four-party selective ringers in districts employing superimposed current, have line put up to Wire Chief's desk and have him operate ringer with bell adjusting current. Tighten biassing spring until bell stops ringing, then loosen spring until a good ring is just obtained.

For four-party selective ringers in districts employing pulsating current, adjust biassing spring with regular ringing current to a position midway between positions in which ringing of bell is just stopped by spring being respectively too tight and too loose.

Note (a)—If extension station with ringer or extension ringer is added at an existing four-party selective station, readjust spring of main station ringer. If added at other than a four-party selective station, check biassing spring adjustment of main station ringer and if necessary readjust.

Note (b)—When parties are added or removed on four-party selective lines in pulsating districts, Wire Chief shall test ringers of all parties on line, and if ringing trouble is detected at any station, biassing spring of its ringer shall be readjusted.

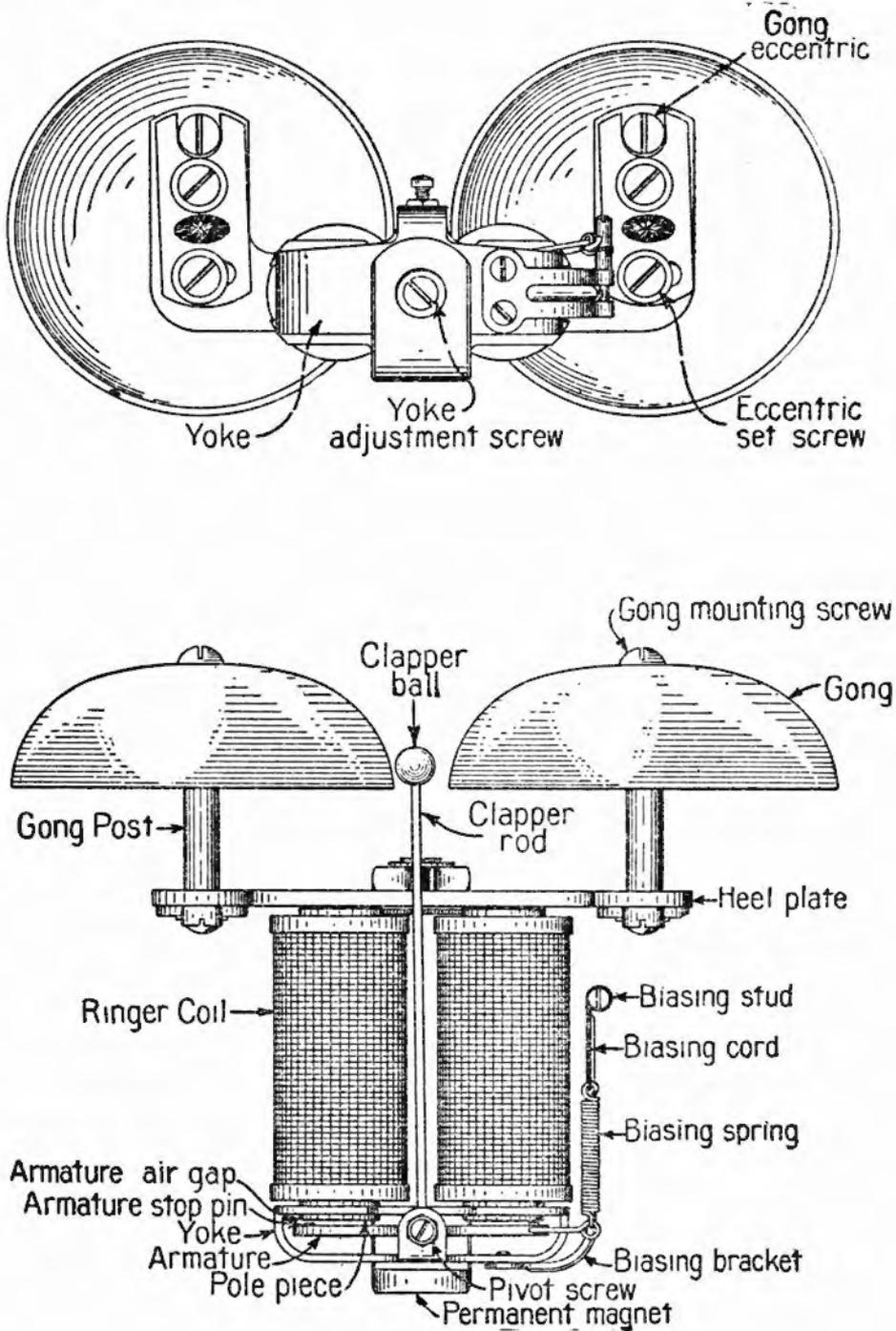
Note (c)—In adjusting four-party selective ringers, if to stop bell ringing spring must be wound on biasing stud, do not wind spring on stud, but make adjustment as if bell stopped ringing when spring touched biasing stud.

Note (d)—If biasing springs of four-party selective ringers in superimposed districts are adjusted when ringers are connected to ground and a difference of more than 3 volts ground potential exists, satisfactory ringing may not be obtained. In districts where conditions of this kind are liable to be frequent, spring should be adjusted with ringer temporarily bridged on line. In districts where this is necessary, supplemental instructions will be issued.

# ADJUSTING #38 AND SIMILAR TYPE RINGERS

Diagram of Parts

Section 11



## Pivot Screw

## Section 12

See that pivot screw allows armature to work freely without excessive side play.

## Yoke

## Section 13

Check armature air gap with gauge blade specified below. Adjust only if blade fails to fit in air gap with slight friction. If adjustment is required—

- (1) Loosen eccentric set screws and separate gongs as far as possible by turning gong eccentrics. With biased ringers slacken biasing cord so as to remove all tension on armature.

Stop screws in yoke are not needed for this adjustment. Remove them if present.

- (2) Adjust yoke by turning yoke adjustment screw so that .016" blade of #43 gauge fits with slight friction between either armature stop pin and pole piece with opposite stop pin and pole piece in contact.

## Gongs

## Section 14

Check gong adjustment. Clapper ball should clear gongs by approximately 1/64" with armature held in extreme positions of its travel. Operate armature to either side by pushing toward pole piece and see that clapper ball strikes but does not rest against gongs. If necessary adjust to obtain this result by turning gong eccentrics.

## Blasing Spring

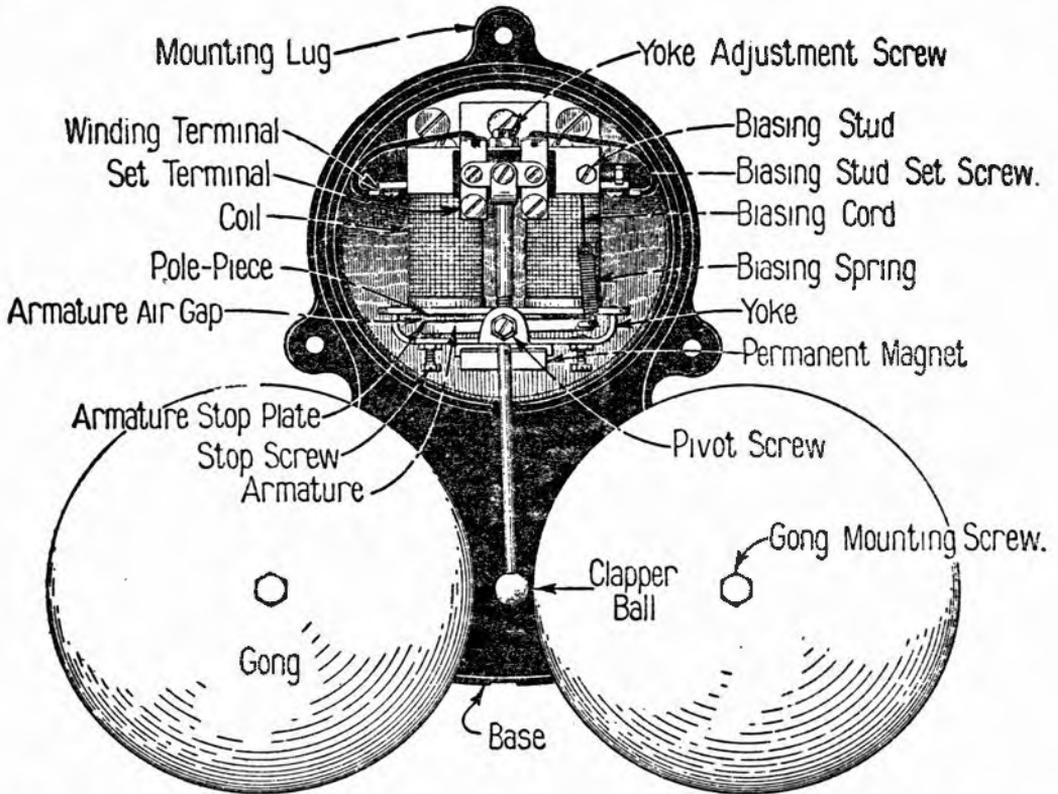
## Section 15

If ringer is biased to prevent tapping or false ringing, adjust spring with enough tension to obtain this result without affecting proper operation of ringer.

## ADJUSTING #392 SUBSCRIBER'S SETS (LOUD RINGING BELLS)

Diagram of Parts

Section 16



**Pivot Screw**

**Section 17**

See that pivot screw allows armature to work freely without excessive side play.

**Yoke and Stop Screws**

**Section 18**

Check armature air gaps with gauge blades specified below. Adjust only if blade fails to fit in air gaps with slight friction. If adjustments are required—

- (1) Loosen gong mounting screws and by turning gongs separate them as far as possible. With biased sets slacken biasing cord by loosening biasing stud set screw and turning biasing stud. If stop screws are present loosen them so they will not interfere with armature.

- (2) Adjust yoke by turning yoke adjustment screw (having slotted head) so that gauge blade in table below fits with slight friction between armature stop plate and either pole piece with opposite pole piece in contact with stop plate.

	Gauge	Blade
Unbiased sets and sets biased to prevent false ringing.....	#37, #38 or #43	.012"
Sets biased for four-party selective ringing .....	#38	.060"

In addition for sets biased for four-party selective ringing:

- (3) Adjust stop screw on biasing spring side so that it just touches armature when latter is held against opposite pole piece.
- (4) Adjust yoke by turning yoke adjustment screw (having slotted head) so that .012" blade of #38 gauge fits with slight friction between armature stop plate and pole piece on side opposite from biasing spring when armature is held against stop screw on biasing spring side.
- (5) Adjust stop screw on opposite side from biasing spring so that .012" blade of #38 gauge fits with slight friction between its end and surface of armature when latter is held against stop screw on biasing spring side.

## Gongs

## Section 19

Check gong adjustment. Clapper ball should clear gongs by approximately 1/64" with armature held in extreme positions of its travel. Operate armature to either side by pushing toward pole piece and see that clapper ball strikes but does not rest against gongs. If necessary adjust to obtain this result by turning gongs on gong posts.

## Biasing Spring

## Section 20

With sets biased to prevent false ringing, adjust biasing spring with enough tension to obtain this result without affecting proper operation of bell.

With sets biased for four-party selective ringing, adjust biasing spring according to Section 10.

## ADJUSTING #292 SUBSCRIBER'S SETS (LOUD RINGING BELLS)

These sets should not be used for new installations on four-party selective lines. For such installations only #392 sets should be used.

### Pivot Screw

### Section 21

See that pivot screw allows armature to work freely without excessive side play.

### Stop Screws

### Section 22

Check armature air gap with gauge blade specified below. Adjust only if blade fails to fit in air gap with slight friction. If adjustment is required—

- (1) Loosen gong mounting screws and by turning gongs separate them as far as possible. With biased sets slacken biasing cord by turning biasing stud.
- (2) Adjust stop screws so that armature appears clamped in midposition. Withdraw both stop screws about 1/6 turn so that when armature is held against one stop screw the .012" blade of #37, #38 or #43 gauge fits with slight friction between armature and end of other stop screw.

### Gongs

### Section 23

Check gong adjustment. Clapper ball should clear gongs by approximately 1/64" with armature held in extreme positions of its travel. Operate armature to either side by pushing toward pole piece and see that clapper ball strikes but does not rest against gongs. If necessary adjust to obtain this result by turning gongs on gong posts.

### Blasing Spring

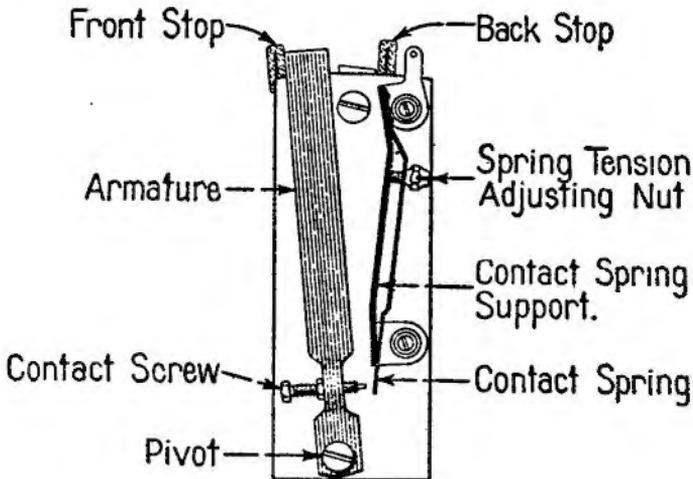
### Section 24

With sets biased to prevent false ringing, adjust blasing spring with enough tension to obtain this result without affecting proper operation of bell.

# ADJUSTING RELAYS IN SELECTIVE RINGING SETS

Diagram of Parts

Section 25



Contact Screw and Spring

Section 26

- (1) See that subscriber's set is mounted plumb.
- (2) See that relay armature does not bind against sides of relay and that it moves freely on its pivots.
- (3) Test relay with central office ringing current. If armature does not operate positively, loosen spring tension adjusting nut; if armature does not fall back readily, tighten spring tension adjusting nut.

To Stop Humming

Section 27

If relay armature hums enough to cause trouble when other parties are being rung, humming may be materially reduced by the following adjustment—

- (1) Tighten spring tension adjusting nut and set up contact screw as far as possible without interfering with operation of armature or contact.
- (2) Bend back stop as far away from core as possible without allowing armature to hit contact spring support.

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