

**AUTOMATIC**  **ELECTRIC**

Northlake, Illinois, U.S.A.

Technical  
Bulletin 700-80  
Issue 5, June 1958

## TELEPHONE TYPE 80 — INSTALLATION AND ADJUSTMENTS —

### I. DESCRIPTION

The type 80 telephone is a self-contained desk set; no separate ringer box is needed. The set is equipped with a 3-conductor line cord which terminates in a small, plastic, 3-conductor connecting block. The line wires are also connected to the connecting block. The connecting block accepts wiring for either bridged or divided ringing. No soldering is required.



*Figure 1.*

For automatic systems the type 80 telephone has a dial, or for manual systems it lacks the dial; both are installed alike. Instructions follow for several sorts of installation:

- A. E. Co. "standard" type 80 (§4)
- Modified standard (§5 and §6)
- Party-line station with spotter dial for S.A.T.T. system A (§6 and §7)
- Party-line station for S.A.T.T. system B (§8)
- Superimposed ringing (§9)
- P-A-B-X and P.B.X. (§4 and §12.3 or §12.4)

## 2. LINE POLARITY

Line polarity is important at divided-ringing party-line stations, and in S.A.T.T. exchanges.

Connection instructions thruout this bulletin assume the interior wires between the protector (or P.B.X. switchboard, etc.) and the telephone location in the subscriber's premises have their polarities identified by these standard tracers:

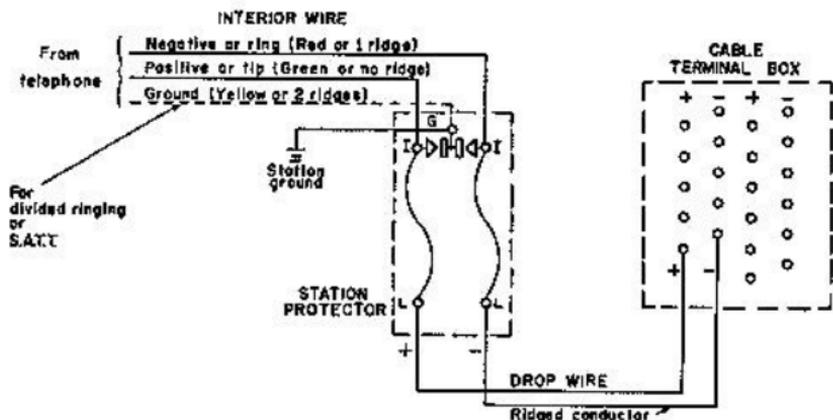


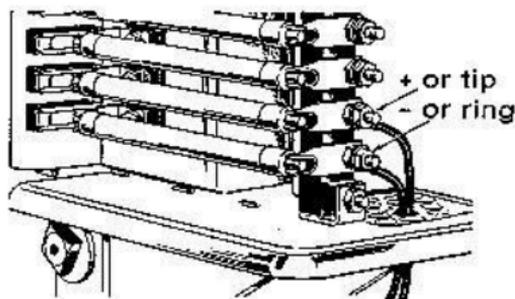
Figure 2. Typical connections to protector, cable terminal, etc.

We offer this following *r* alliteration — ring (—), red, right,

**R**ing (negative line) CONNECTS TO:  
 red (or 1-ridge) interior-wire conductor  
 right-hand station-protector terminal screw  
 ridged ("tracer") drop-wire conductor  
 right-hand cable-terminal stud.

ridged — to help you remember these connections. This *R* alliteration and figure 2 apply for any interior wire, and for drop wire to a strand-mounted or sheath-mounted cable terminal, or to an unprotected pole-mounted or wall-mounted cable terminal.

At a protected pole-mounted or wall-mounted cable terminal figure 3 and the *T* alliteration, "tip" = "top", apply instead for the drop wire only. As in figure 3, connect the +line ("tip") to the upper terminal stud of the pair, and the —line ("ring") to the lower terminal stud of the pair.



**Figure 3. Polarities and drop-wire connections at a typical pole-mounted protected cable terminal.**

Sometimes you may be uncertain of the polarities of the line conductors, although you will always know which is the ground wire, since you have just installed it. To determine the polarities of the line conductors, when a ground wire is readily available, use a hand test telephone (such as A.E. Co. #L-965-A2, see Bulletin 703-965) as follows:\*

Clip one lead to the ground wire, and listen for a click as you touch the other clip to each line wire. *The louder click* (followed sometimes by dial tone) *indicates the -line ("ring")*. (The +line ("tip") usually will not sound completely dead, but will give a weaker click [due to earth potential difference].)

If no ground wire is readily available, as when making connections to a transposed open-wire line at a pole, determine line polarity with a portable d-c (d'Arsonval) voltmeter.

\*Do not test on a busy line, and when testing do not press either of the test telephone buttons.

### **3. COLOR CODE CHANGE in 3-conductor cords**

During 1957 the color code of the leads in the three-conductor telephone cords—handset cord and line cord—were changed as shown in the table below.

<i>New</i>	<i>Corresponding Old</i>
yellow	red
red	black
green	white

Throughout this bulletin both color codes are shown in the text and the illustrations as follows: new color, oblique line, old color; for example: green/white . . . .

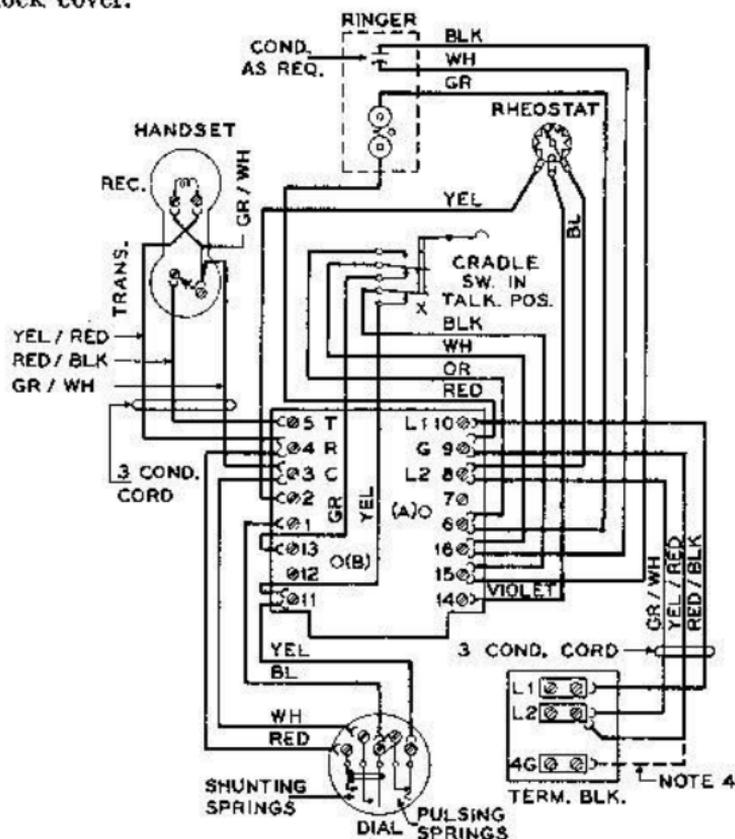
## 4. "STANDARD" TYPE 80

Identifiable by circuit label-card D-530142-A inside the telephone

These instructions apply to a type 80 telephone with straight-line or harmonic ringer (but without party-identity [S.A.T.T.] dial and without cold-cathode tube for superimposed ringing).

Select a location for the telephone connecting block which will allow ample cord length and where the connecting block will not be conspicuous. To install (figure 13, 14, or 15):

Loosen the connecting-block cover-screw, and remove the connecting-block cover.



**Note 1.** Contacts "X" break first and make last.

**Note 2.** If bells of biased ringer tap during dialing of another telephone on the line, reverse ringer connections at terminals 6 and 9.

**Note 3.** If no dial is used, connect blue and yellow dial wires to terminal 2, white to terminal 3 and red to terminal 4 of dial blank.

**Note 4.** Wiring at terminal block shown for metallic (bridged) ringing. For ground (divided) ringing move yellow/red lead at terminal block from terminal L2 to 4G. To ring from L2 to ground reverse line leads at terminal block.

**Note 5.** Terminals (A) and (B) are for tests.

**Figure 4. Wiring diagram (standard).**

Mount the connecting block, using the 2 screws supplied with the connecting block.

Notice which color code is employed by the telephone line cord and follow connecting instructions accordingly. See §3.

Slip the tie-cord clip ring (figure 13, 14, or 15) over the connecting-block cover-screw post.

FOR BRIDGED RINGING connect the line cord and line wires as shown in figure 13. Connect the line cord green/white and yellow/red leads both to connecting-block terminal L2.

FOR PARTY RUNG ON + LINE ("TIP") connect the line cord and line wires as shown in figure 14.

FOR PARTY RUNG ON - LINE ("RING") connect the line cord and line wires as shown in figure 15.

For a normal line in a 48- or 50-volt exchange:

{If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.  
 {If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.  
 Review §12 and §13 for conditions which require a special setting.

Call the central office for a ringing test. If the telephone has a straight-line ringer with loudness control, adjust the loudness control (figure 22) to suit the subscriber.

Make sure the tie-cord clip ring still is in place, and replace the connecting-block cover.

Stamp directory-number on number card as in §14 or §15.

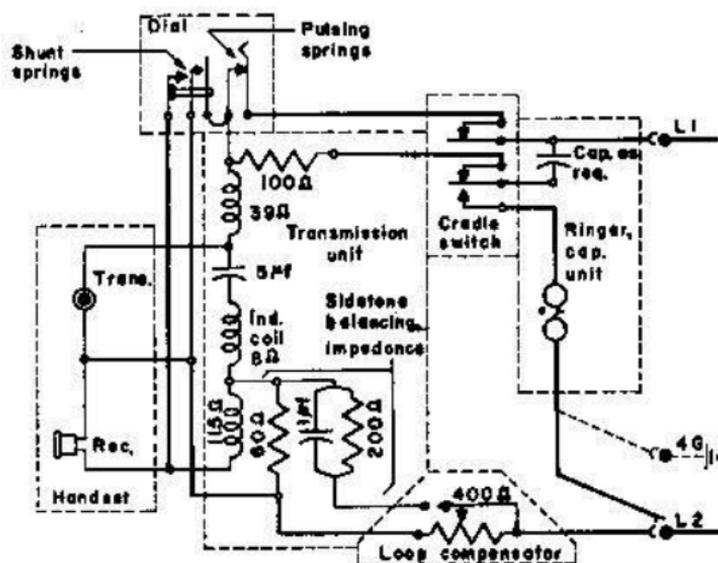


Figure 5. Schematic (standard).

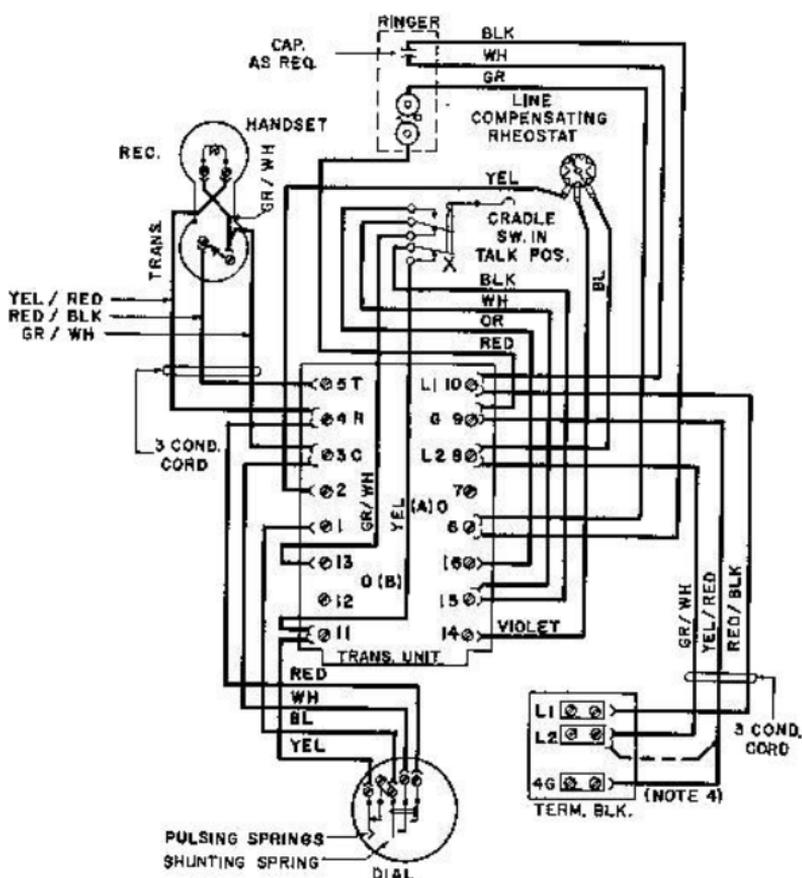
## 5. R. E. A. TYPE 80-W AND R. E. A. TYPE 80-Y

Identifiable by circuit label-card D-530214-A inside the telephone

These differ from A. E. Co.'s standard type 80 only in that the ringer is connected to the line during conversation, requiring an additional capacitor across the pulse springs for spark-suppression.

Type 80-W has a dial. Type 80-Y has no dial (see note 3 below).

Select a location for the telephone connecting-block which will allow ample cord length and where the connecting-block will not be conspicuous. To install (figure 13, 14 or 15):



**Note 1.** Contacts "X" break first and make last.

**Note 2.** If bells of biased ringer tap during dialing from another telephone on the line, reverse ringer connections at transmission-unit terminals 6 and 9.

**Note 3.** If no dial is used, connect blue and yellow dial wires to terminal 2, white to terminal 3 and red to terminal 4 of dial blank.

**Note 4.** Drawing shows terminal block wiring for divided (ground return) ringing. For bridged ringing connect yellow/red line cord lead at terminal block to L2.

**Note 5.** Terminals (A) and (B) are for tests.

**Figure 6. Wiring diagram (R. E. A.).**

Loosen the connecting-block cover-screw, and remove the connecting-block cover.

Mount the connecting block, using the 2 screws supplied with the connecting block.

Slip the tie-cord clip ring (figure 13, 14, or 15) over the connecting-block cover-screw post.

Notice which color code is employed by the line cord and follow connecting instructions accordingly. See §3.

FOR PARTY RUNG ON + LINE ("TIP") connect the line cord and line wires as shown in figure 14.

FOR PARTY RUNG ON - LINE ("RING") connect the line cord and line wires as shown in figure 15.

FOR BRIDGED RINGING connect the line cord and line wires as shown in figure 13. Connect the line cord green/white and yellow/red leads both to connecting-block terminal L2.

For a normal line in a 48- or 50-volt exchange:

If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.  
 If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.  
 Review §12 and §13 for conditions which require a special setting.

Call the central office for a ringing test. If the telephone has a straight-line ringer with a loudness control (figure 22), adjust the control to suit the subscriber.

Make sure the tie-cord clip ring still is in place, and replace the connecting-block cover.

Stamp directory-number on number card as in §14 or §15.

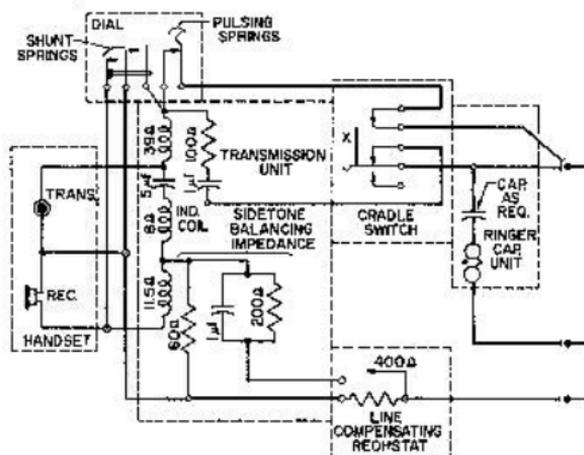
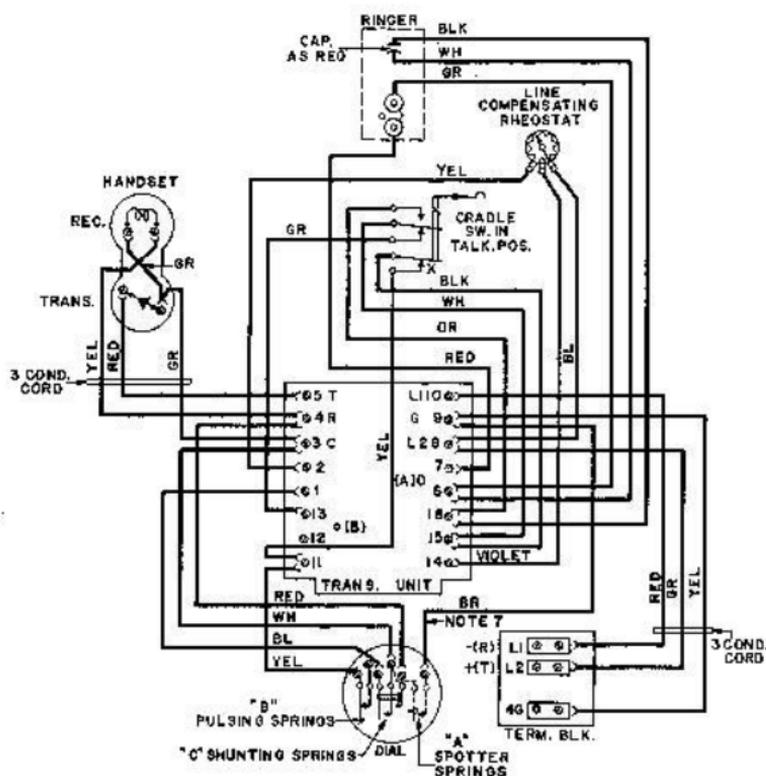


Figure 7. Schematic (R.E.A.).

## 6. NON-S.A.T.T. OR FOR S.A.T.T. SYSTEM A with 1 $\mu$ f dial-pulse spark-suppression capacitor

Identifiable by circuit label-card D-530238-A inside the telephone



**Note 1.** Contacts "X" to break first and make last.

**Note 2.** Spotter springs "A" (when used) to operate when "B" pulsing springs are closed.

**Note 3.** Do not reverse line leads. Polarity of line must be maintained as shown.

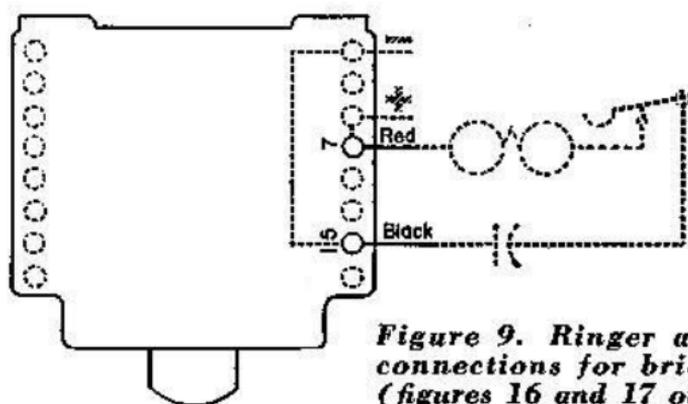
**Note 4.** The telephone is furnished for bridged ringing. For divided ringing move red ringer lead from terminal 7 to terminal 9.

**Note 5.** If bells of biased ringer tap when dialing from another telephone on the line, reverse green and red ringer leads.

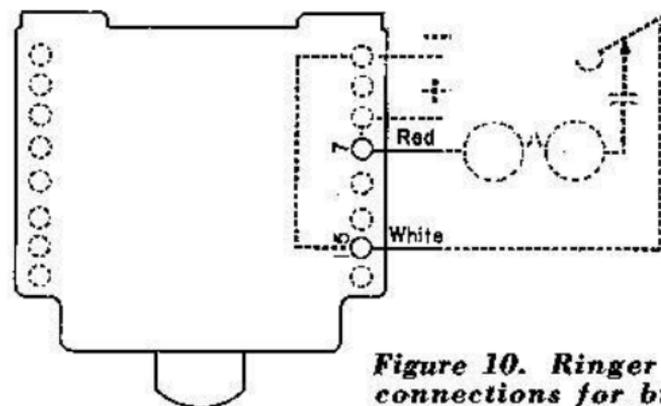
**Note 6.** Terminals designated (A) and (B) are for testing purposes.

**Note 7.** When standard dial is used, tape dial-end of brown lead.

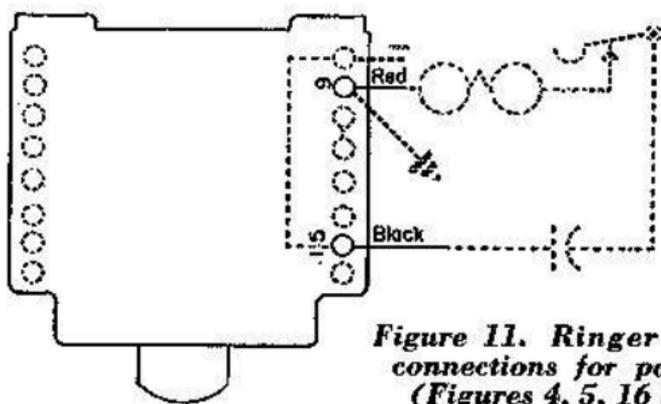
**Figure 8. Wiring diagram (1  $\mu$ f spark suppression).**



**Figure 9.** Ringer and capacitor connections for bridged ringing (figures 16 and 17 only).



**Figure 10.** Ringer and capacitor connections for bridged ringing (figures 8 and 12 only).



**Figure 11.** Ringer and capacitor connections for party on — line (Figures 4, 5, 16 and 17 only).



If this installation uses a S.A.T.T. dial, check that the party-identity pulse will be on the +line. At the terminal block, attach to L1 and L2 the clips of a hand test telephone (such as A. E. Co. #L-965-A2). Press test-telephone button C and, with the subscriber's handset in the cradle, dial "5" on the subscriber's dial. As the dial returns, listen at the test telephone. If you hear no click you have connected the subscriber's telephone correctly; if you hear a click, reverse the "interior" wires at terminal-block terminals L1 and L2.

For a normal line in a 48- or 50-volt exchange:

If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.

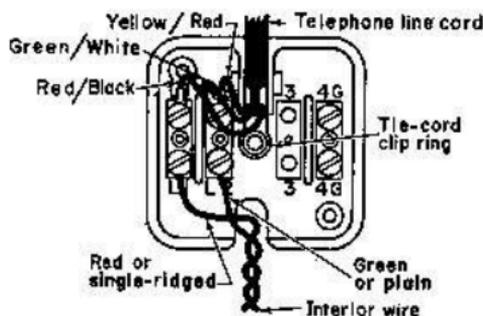
If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.

Review §12 and §13 for conditions which require a special setting.

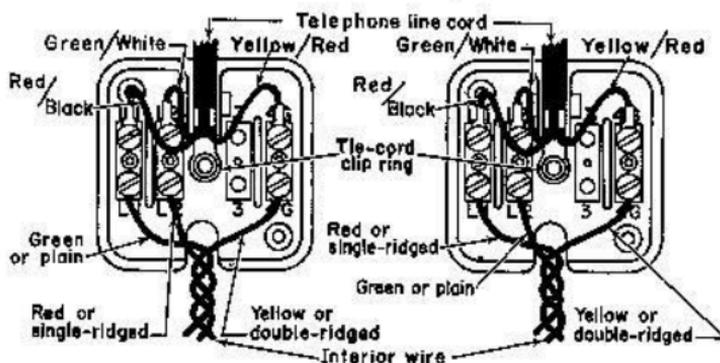
Call the central office for a ringing test.

Make sure the tie-cord clip ring still is in place, and replace the connecting-block cover.

Stamp directory-number on number card as in §14 or §15.



**Figure 13. Terminal-block connections for bridged ringing (non-S.A.T.T.).**



**Figure 14. Terminal-block connections for party-line standard telephone rung on +line ("tip").**

**Figure 15. Terminal-block connections for party-line standard telephone rung on -line ("ring"), for S.A.T.T. A or S.A.T.T. B station, or for superimposed ringing.**

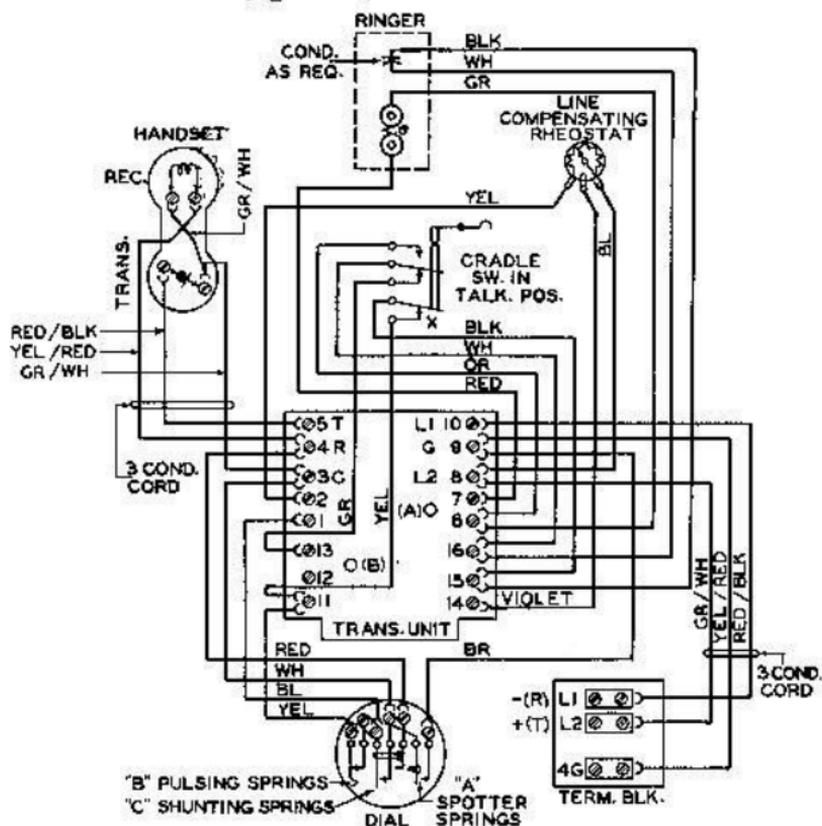
## 7. WITH SPOTTER DIAL FOR S.A.T.T. SYSTEM A using ringer capacitor for dial-pulse spark suppression

Identifiable by circuit label-card D-530158-A inside the telephone

Select a location for the telephone connecting-block which will allow ample cord length and where the connecting-block will not be conspicuous. To install (figure 15):

Loosen the connecting-block cover-screw, and remove the connecting-block cover. Mount the connecting-block, using the two screws supplied with the connecting-block. Slip the tie-cord clip ring (figure 15) over the connecting-block cover-screw post.

FOR PARTY RUNG ON — LINE ("RING"), remove telephone housing. Be sure capacitor black lead is on transmission-unit terminal 15. Move red ringer lead from transmission-unit terminal 7 to transmission-unit terminal 9 (figure 11).



**Note 1.** Contacts "X" break first and make last.

**Note 2.** Pulsing springs "B" are closed while spotter springs "A" close.

**Note 3.** Maintain line polarity as shown; do not reverse line leads.

**Note 4.** If bells of biased ringer tap during dialing from another telephone on the line, reverse ringer connections at terminals 6 and 7.

**Note 5.** Terminals (A) and (B) are for tests.

**Figure 16. Wiring diagram (S.A.T.T. system A).**

Notice which color code is employed by the telephone line cord and follow connecting instructions accordingly. See §3.

Connect the red/black lead and the negative line wire, usually red, to terminal L1 (figure 15). Connect the green/white lead and the positive line wire, usually green, to terminal L2. Connect yellow/red lead and ground wire, usually yellow, to terminal L2. In some cases the party-line first party will be equipped with a standard telephone; connect it as for an individual line, §4.

Check that the party-identity pulse will be on the + line. At the terminal block, attach the clips of a hand test telephone (such as A. E. Co. #L-965-A2) to L1 and L2. Press test-telephone button C and with the subscriber's handset in the cradle, dial "5" on the subscriber's dial. As the dial returns, listen at the test telephone. If you hear no click you have connected the subscriber's telephone correctly; if you hear one or more clicks, reverse "interior" wires at terminal block (figure 15) or reverse drop wires at protector (figure 2).

For a normal line in a 48- or 50-volt exchange:  
 {If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.  
 {If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.  
 Review §12 and §13 for conditions which require a special setting.

Call the central office for a ringing test. If the telephone has a straight-line ringer with a loudness control (figure 22), adjust the control to suit the subscriber.

Make sure the tie-cord clip ring still is in place, and replace the connecting-block cover.

Stamp directory-number on number card as in §14 or §15.

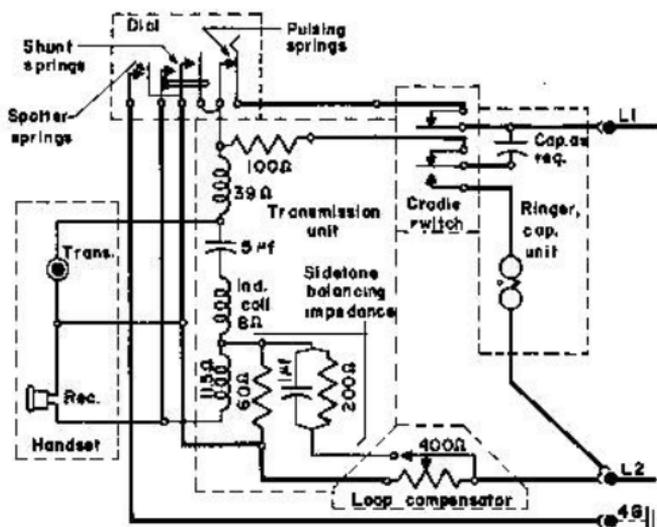


Figure 17. Schematic (S.A.T.T. system A).

### 8. PARTY-LINE STATION FOR S.A.T.T. SYSTEM B

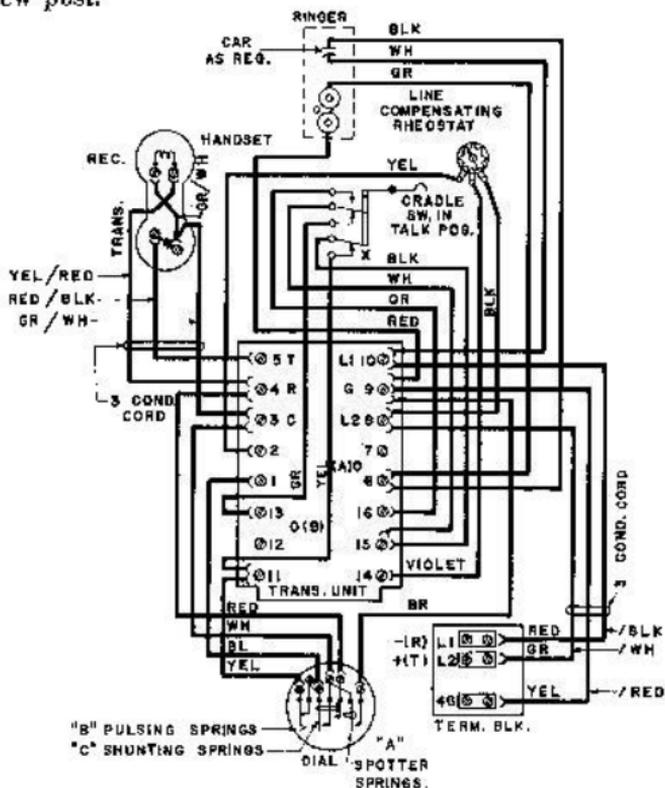
Identifiable by circuit label-card D-530213-A inside the telephone

Select a location for the telephone connecting block which will allow ample cord length and where the connecting block will not be conspicuous. To install (figure 15):

Loosen the connecting-block cover-screw, and remove the connecting-block cover.

Mount the connecting-block, using the two screws supplied with it.

Slip the tie-cord clip ring (figure 15) over the connecting-block cover-screw post.



**Note 1.** Contacts "X" break first and make last.

**Note 2.** Spotter "A" springs to operate when "B" pulsing springs are closed.

**Note 3.** The telephone is furnished with ringer wired as shown: L1 (— Ring) line) to ring from L2 (+ Tip) line) to ground. Move white (Cap.) lead from terminal 10 to terminal 7. For bridged (Metallic) ringing, move red (Ringer) lead from terminal 9 to terminal 7.

**Note 4.** Do not reverse line leads. Polarity of line must be maintained as shown.

**Note 5.** If bells of biased ringer tap when dialing from another telephone on the line, reverse ringer connections at terminals 6 and 9.

**Note 6.** Terminals designated (A) and (B) are for testing purposes.

**Figure 18. Wiring diagram (S.A.T.T. system B).**

Notice which color code is employed by the telephone line cord and follow connecting instructions accordingly. See §3.

Connect line cord and interior wire per figure 15.

If the telephone is not already wired for the proper party-station, remove housing. See §18; also §21. At transmission unit, connect thus:

	<i>Ringer red lead</i>	<i>Capacitor white lead</i>
For bridged ringing	7	10
For party on +line ("tip")	9	7
For party on -line ("ring")	9	10

Replace the telephone housing.

Check that the party-identity pulse will be on the +line. At the terminal block, attach the clips of a hand test telephone (such as A.E.Co. #L-965-A2) to L1 and L2. Press test-telephone button C and with the subscriber's handset in the cradle, dial "0" on the subscriber's dial. As the dial returns, listen at the test telephone. If you hear no click you have connected the subscriber's telephone correctly; if you hear a click, reverse "interior" wires at terminal block (figure 15) or reverse drop wires at protector (figure 2).

For a normal line in a 48- or 50-volt exchange:

{If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.

{If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.

Review §12 and §13 for conditions which require a special setting.

Call the central office for a ringing test. If the telephone has a straight-line ringer with a loudness control (figure 22), adjust the control to suit the subscriber.

Make sure the tie-cord clip ring still is in place, and replace the connecting-block cover.

Stamp directory-number on number card as in §14 or §15.

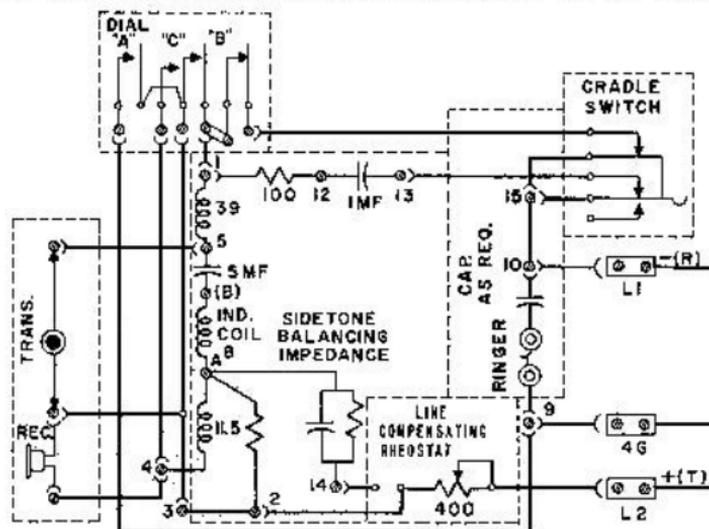


Figure 19. Schematic (S.A.T.T. system B).

## 9. SUPERIMPOSED RINGING

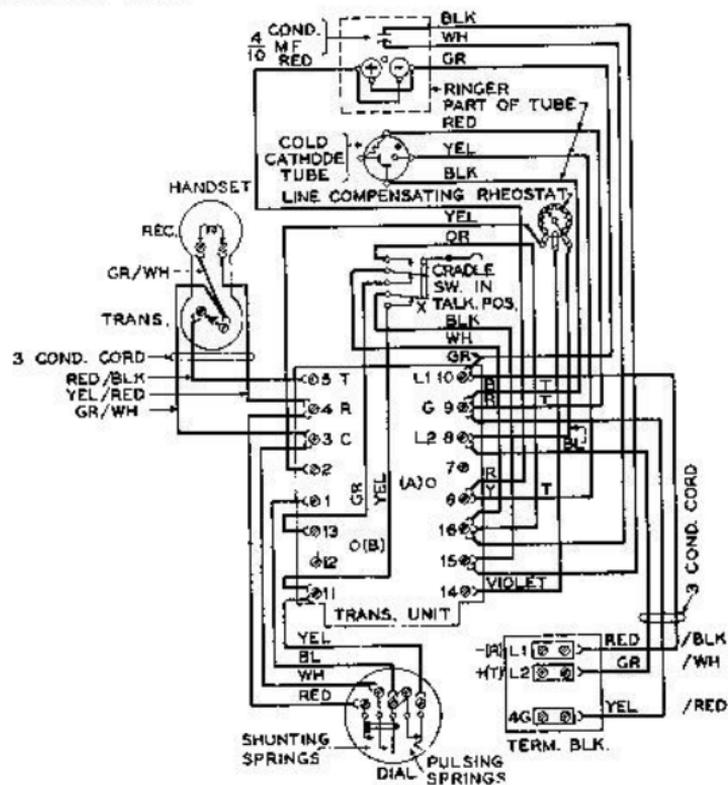
Identifiable by circuit label-card D-530159-A inside the telephone

Select a location for the telephone connecting block which will allow ample cord length and where the connecting block will not be conspicuous. To install (figure 15):

Loosen the connecting-block cover-screw, and remove the connecting-block cover.

Mount the connecting block, using the 2 screws supplied with it.

Slip the tie-cord clip ring (figure 15) over the connecting-block cover-screw post.



**Note 1.** Contacts "X" break first and make last.

**Note 2.** If no dial is used connect blue and yellow dial wires to terminal 2, white to terminal 3, and red to terminal 4 of dial blank.

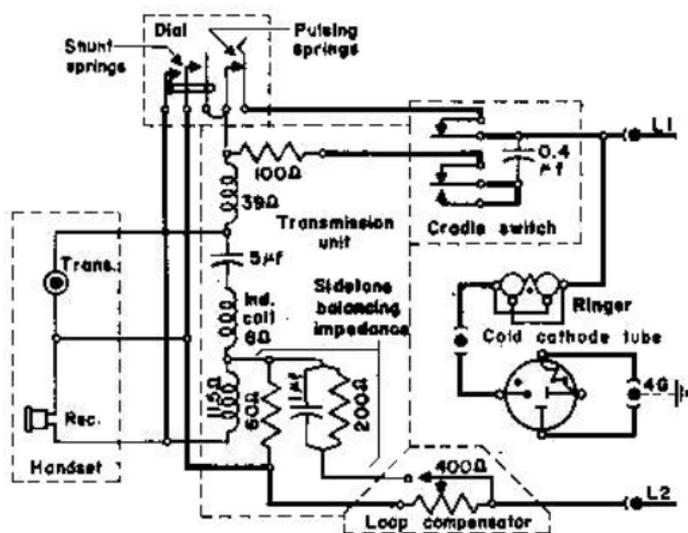
**Note 3.** Terminals (A) and (B) are for tests.

**Note 4.** Refer to page 19 table "A" for connections for four-party selective or eight-party semi-selective.

**Note 5.** When + battery is connected to + terminal of ringer, and - battery to other terminal, armature pulls away from pole to which it is biased.

**Note 6.** For ringing current use either d.c. superimposed on 20~ a.c., or 20~ pulsating d.c.

**Figure 20.** Wiring diagram (superimposed).



**Figure 21. Schematic (superimposed).**

Notice which color code is employed by the telephone line cord and follow connecting instructions accordingly. See §3.

Connect line cord and interior wire per figure 20.

If telephone is not wired already for proper party-station, remove telephone housing (see §17). Connect ringer green and red leads, and cold-cathode-tube yellow, black, and red leads according to table directly below. Replace telephone housing.

STATION	RINGER LEADS		TUBE LEADS		
	GR	RED	YEL	BLK	RED
NO. 1 OR NO. 5, —STATION ON —(RING) LINE	10	6	6	9	9
NO. 2 OR NO. 6, —STATION ON +(TIP) LINE	7	6	6	9	9
NO. 3 OR NO. 7, +STATION ON —(RING) LINE	6	10	9	6	6
NO. 4 OR NO. 8, +STATION ON +(TIP) LINE	6	7	9	6	6

For a normal line in a 48- or 50-volt exchange:

{ If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.  
 { If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.  
 Review §12 and §13 for conditions which require a special setting.

Call the central office for a ringing test.

Make sure the tie-cord clip ring still is in place, and replace the connecting-block cover.

Stamp directory-number on number card as in §14 or §15.

## 10. LOOP COMPENSATOR—*Description, purpose*

Automatic Electric Company defines "conductor-loop resistance" as the total of the resistances of the *line conductors*, the *heat coils*, and the *central-office cabling*. Thus, we don't count the resistance of the telephone instrument nor of central-office relays.

The "loop compensator" is a *rheostat-and-switch* accessible from the bottom of the telephone (figure 22). It can be set with the tip of a small screwdriver. As the arrow is turned counterclockwise from 0 to 4, the *rheostat* inserts  $0\Omega$  to  $400\Omega$  in series with the loop.

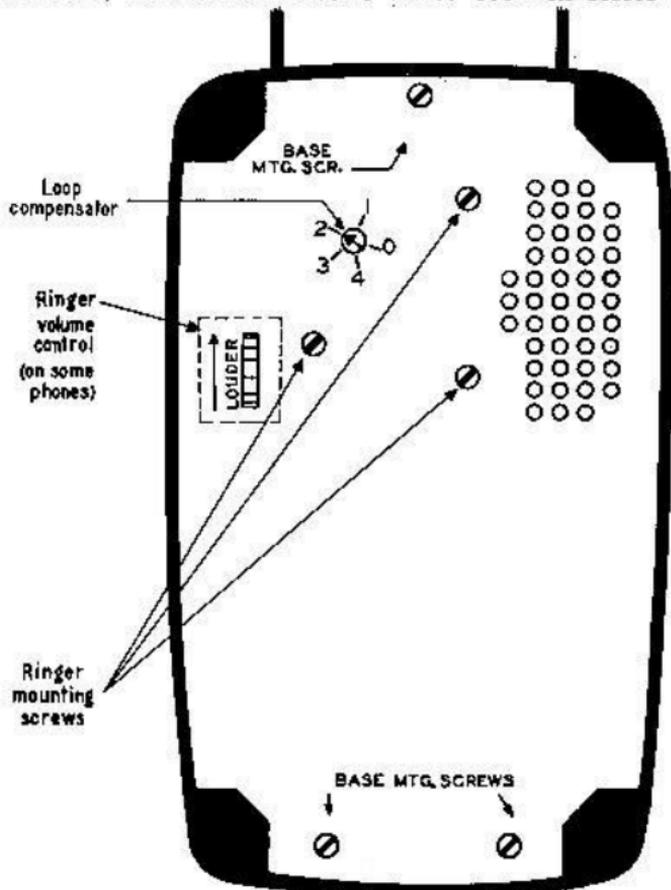


Figure 22.

When the rheostat is at 0 (as it should be for long cable loops), the *switch* element adds a capacitor and a resistor into the sidetone-balancing impedance to match more nearly the capacitive impedance of a long cable loop.

Thus, the loop compensator *minimizes sidetone*—

- (a) on a short loop by limiting transmitter current,
- (b) on a long loop by improving the balance between the sidetone-balancing impedance and the impedance characteristics of the line.

Loop compensation lessens the current diverted by a party-line subscriber near the central office listening in on conversation of another subscriber on the same line more distant from the central office.

On a reverting call, loop compensation tends to equalize the currents available to the two conversing parties.

## 11. LOOP COMPENSATOR—*Adjustment*

The type 80 telephone operates satisfactorily with the loop compensator adjusted according to the rules in §12, except in marginal or unusual locations. For such locations, adjust the loop compensator accurately (§13).

## 12. LOOP COMPENSATOR—*Adjustment rules*

### 12.1 Usual lines in a 48- or 50-volt exchange:

{If conductor-loop resistance is  $200\Omega$  or less, set loop compensator at 2.

{If conductor-loop resistance is over  $200\Omega$ , set loop compensator at 0.

#### EXCEPTIONS:

**OPEN-WIRE LINE:** If the station is connected directly to an open-wire section of over  $200\Omega$  resistance, set loop compensator midway between 0 and 1.\*

**NEAR LOADING COIL:** If the station is on a loaded subscriber loop and is less than one loading section (for type *H* loading, less than 6000') from the nearest loading coil, set loop compensator midway between 0 and 1.\*

12.2 **Party-line or extension telephone.** If two or more Automatic Electric Company telephones with loop compensators—type 80, 88, 90, etc.—are used on one line (e.g., party line, or extension telephone), set the loop compensator of each as if it were the only telephone on the line.

If the type 80 telephone is used on the same line with an entirely different make or model of telephone, set the type 80 telephone loop compensator at 0 (or midway between 0 and 1 if one of the §12.1 EXCEPTIONS applies).

12.3 **48-volt P-A-B-X, P.B.X., etc.** In a key system or P.B.X. or P-A-B-X, a type 80 telephone may receive its transmitter current from either of two different 48- or 50-volt sources.

The general idea is to adjust the loop compensator for the transmitter current received on a trunk ("outside") call:

{If station-loop + trunk resistance =  $200\Omega$  or less, set at 2\*\*.

{If station-loop + trunk resistance = over  $200\Omega$ , set at 0.

If long-line equipment or a pulse repeater at the P.B.X. or P-A-B-X supplies transmitter current on trunk calls, set loop compensator at 2\*\*.

12.4 **24-volt switchboard.** If the central-office or P.B.X. switchboard operates from 24 volts and has  $100\Omega + 100\Omega$  battery-feed coils or uses non-relay series-lamp line circuits, set loop compensator at 0; otherwise use one of the methods in §13.

\*Because the open-wire line or open-wire line section, or the loaded cable, has less effective capacitance than has unloaded cable, the aim here is merely *not* to close the switch mentioned at the bottom of page 18.

\*\*EXCEPTION: If the P.B.X. switchboard uses *non-relay* series-lamp line circuits, set loop compensator at 0.

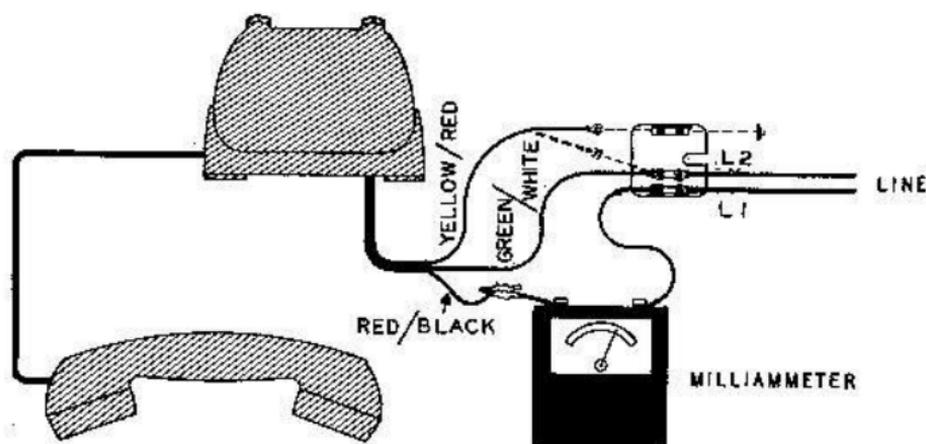
### 13. LOOP COMPENSATION—*Accurate adjustment*

13.1 **Uses.** Altho the rules of §12 are adequate for most installations, occasionally it becomes desirable that current thru line and transmitter be adjusted accurately to 60 milliamperes. Examples are: where there has been a transmission complaint; or where the subscriber does not hear well over the telephone, and this seems to be due to the noise in his room. (The sidetone from *extreme* room noise can be reduced further by setting the loop compensator to limit the line current to 55 or even 50 milliamperes.)

Use one of the methods below:

13.2 **Without assistance from the central office.** Loosen the connecting-block cover-screw, remove the connecting-block cover, and disconnect the telephone red/black lead. Per figure 23, connect a milliammeter between the telephone red/black lead and connecting-block terminal L1 so that the milliammeter is in series with the line. Take the handset off cradle, and vary the loop compensation until the milliammeter reads 60 milliamperes.

Disconnect the milliammeter, reconnect the telephone red/black lead to connecting-block terminal L1, make sure the tie-cord clip ring is still in place, put the connecting-block cover on again, and test transmission.



**Figure 23.**

*Line-current measurement at subscriber's premises.*

13.3 Test board equipped for line-current measurement thru usual  $200\Omega + 200\Omega$  battery feed. Dial the test board. Request line-current measurements. The testboardman will give you readings. Vary the loop compensator until the current is 60 milliamperes.

13.4 Test board equipped for line-resistance measurement. Dial the test board. Request line-resistance measurements. Short-circuit the line a few moments while testboardman measures loop resistance. Set loop compensator per this chart:

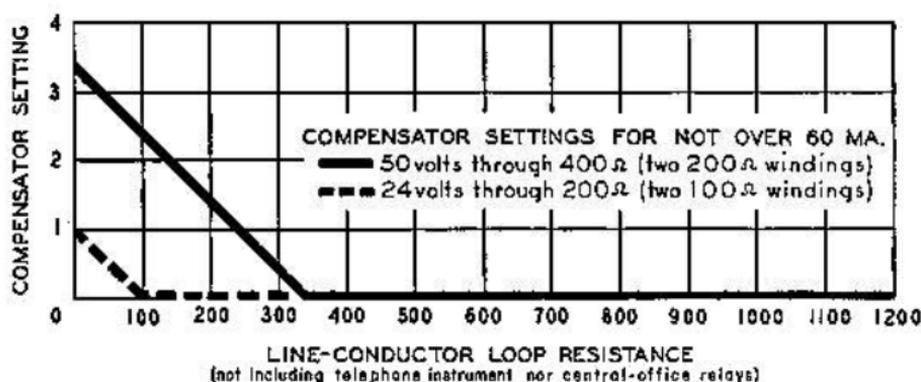


Figure 24.

13.5 Test board equipped for line-voltage measurement. Dial the test board. Request line-voltage measurement, and stay on the line. Thru a test distributor or thru a distributing-frame test shoe, the testboardman will connect to the line from which you are calling, and will connect his voltmeter across the line.

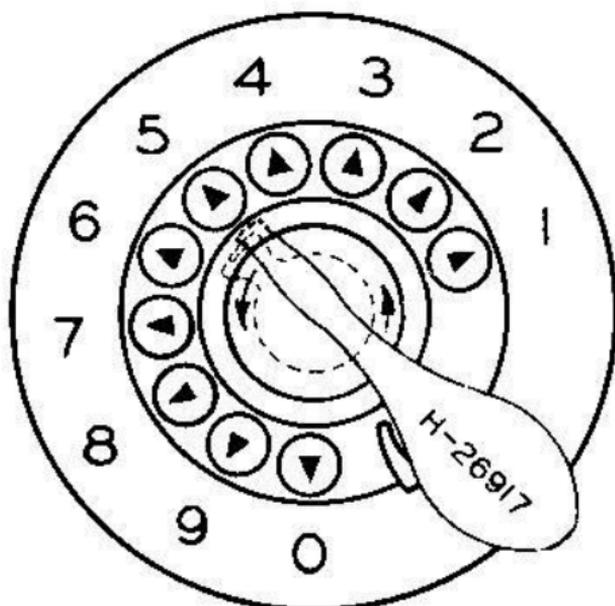
BATTERY FED THRU  $200\Omega + 200\Omega$  (usual in 48- or 50-volt exchange): Vary the loop compensator until the test-board voltmeter reads 24\* volts less than the central-office battery voltage.

BATTERY FED THRU  $100\Omega + 100\Omega$  (used in many 24-volt exchanges): Vary the loop compensator until the test-board voltmeter reads 12 volts less than the central-office battery voltage.

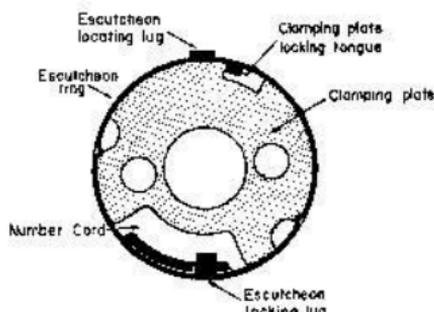
\*That is, when 60 milliamperes flow in the line, there will be 24 volts "drop" in the usual  $200\Omega + 200\Omega$  battery feed to the calling line.

#### 14. NUMBER CARD of dial with *metal* finger plate

Insert dial escutcheon tool H-26917 (or small screwdriver) between escutcheon ring and transparent cover, opposite finger hole 5 (figure 25). Press the tool downward until it engages the locking lever underneath. Then move tool counterclockwise toward finger hole 6. This unlocks the escutcheon ring. With the tool, lift ring from dial.



**Figure 25. Unlocking escutcheon ring.**

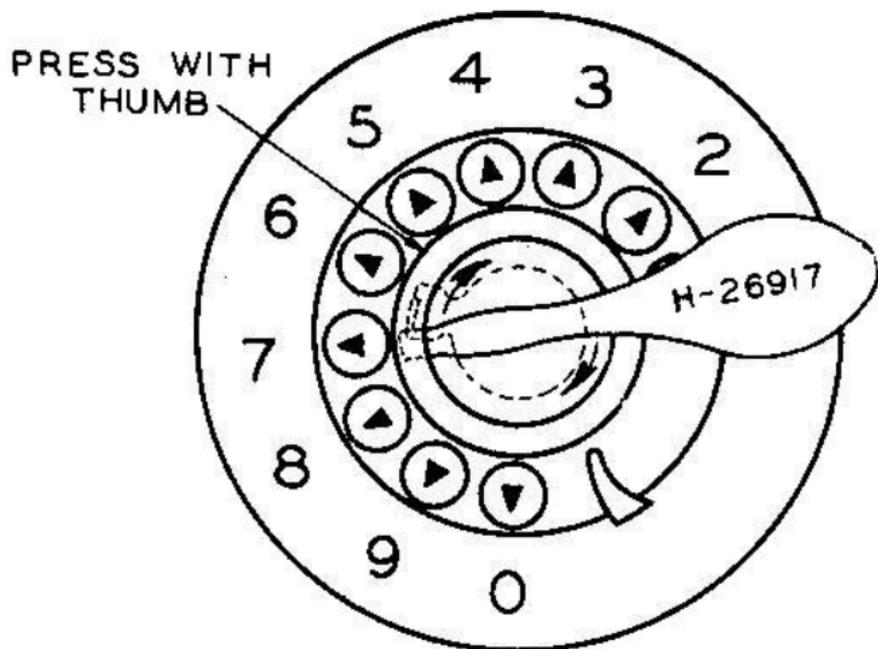


**Figure 26. Number card in escutcheon ring.**

A clamping plate holds the transparent cover and the number card to the ring (figure 26). To disassemble, rotate notched clamping plate counterclockwise.

Print or stamp the number clearly on the card.

To reassemble, first place transparent cover in escutcheon ring. Insert the number card and clamping plate. Turn clamping plate clockwise to engage its tongue, locking the assembly.

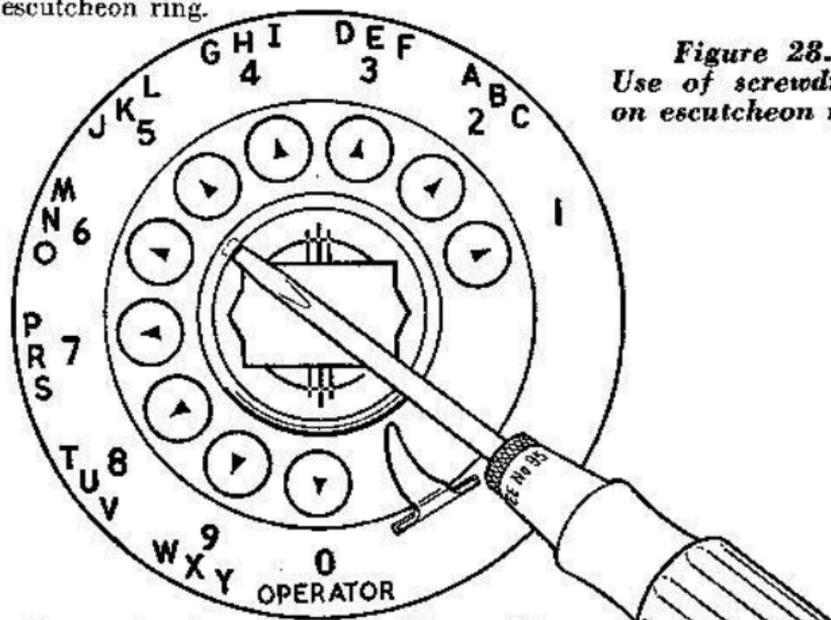


**Figure 27. Locking escutcheon ring.**

To mount on dial, check that the locking lever on finger plate is midway between finger holes 6 and 7 (figure 27). Insert small lug of escutcheon ring into slot near finger stop. Press assembly into finger plate. Insert dial tool under escutcheon ring opposite 7. Press tool down against locking lever underneath card and move the tool clockwise to 6. Assembly is now locked in place.

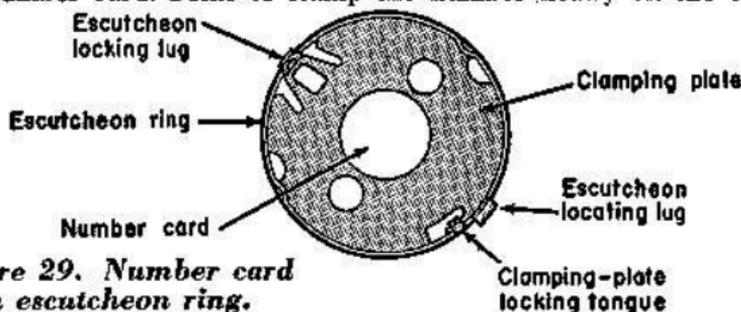
## 15. NUMBER CARD of dial with *plastic finger plate*

Inside the edge of the escutcheon ring, between finger holes 5 and 6 (figure 28), insert a screwdriver (such as A.E. Co. H-880622-1) between the escutcheon ring and the transparent cover. This will unlatch the escutcheon ring. Then, with the screwdriver, lift off the escutcheon ring.



**Figure 28.**  
Use of screwdriver  
on escutcheon ring.

Rotate the clamping plate (figure 29) counterclockwise. Remove the number card. Print or stamp the number neatly on the card.



**Figure 29. Number card  
in escutcheon ring.**

With the transparent cover in the escutcheon ring, add the number card and then the clamping plate. With the left thumb pressing lightly near one circular hole (figure 29, lower left), use the right-thumb nail in the other circular hole (figure 29, upper right) to turn the clamping plate clockwise to lock it.

Hook the escutcheon-ring locating lug into the dial near the finger stop. Between finger holes 5 and 6, insert a screwdriver (such as A. E. Co. H-880622-1) between the escutcheon ring and the transparent cover. Press the screwdriver tip until you hear or feel the clamping plate latch in.

## 16. RINGER ADJUSTMENT

16.1 **Loudness adjustment.** When so ordered, straight-line type 80 telephones have a ringer volume control (figure 22). The installer either requests the test board to ring back or dials a reverting-call switch, and, while the telephone rings, adjusts the control for loudness to suit the subscriber.

16.2 **Tinkling of straight-line ringers.** When two or more telephones using straight-line ringers are connected to the same line, occasionally a ringer tinkles when another station dials, due to charge and discharge of the ringing capacitor during dial interruptions. To correct this, remove the telephone housing (\$18) and reverse the connections of the tinkling ringer at the transmission unit (figure 30). The ringer bias spring then should prevent tinkling.

## 17. TRANSMISSION UNITS

The transmission-unit wiring diagrams (figures 30a and 30b) are for information for continuity tests, ohmmeter measurements, etc. During manufacture, the transmission unit is sealed; do not attempt repairs in the field. If it becomes damaged, replace it.

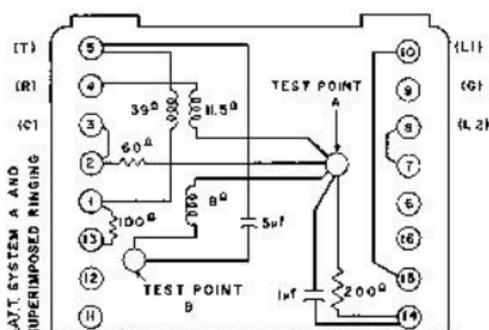


Figure 30a. Transmission-unit D-38362-A internal connections.

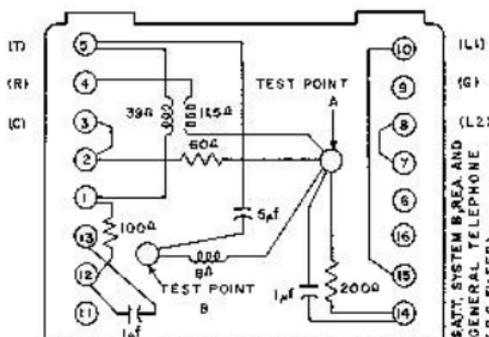


Figure 30b. Transmission-unit D-38368-A internal connections.

## 18. HOUSING REMOVAL

18.1 Loosen the three base-mounting screws shown in figure 22. Do *not* loosen any other screws on baseplate.

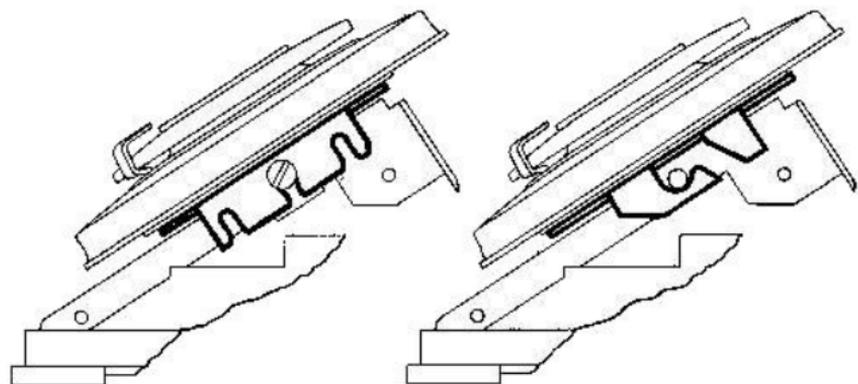
Lift housing free. Wiring and apparatus are now accessible.

18.2 If telephone is connected to the line, push hooklock downward (figure 32) to its locked-open position so that the line is not held busy and incoming calls are not lost while work is being done inside the telephone.

## 19. DIAL REMOVAL

Two different dial mountings are employed in type 80 telephones. Older dials are mounted with two screws (figure 31A). Newer dials employ a "snap-on" bayonet-lug pin mounting (figure 31B).

To examine dial action, remove telephone housing (§17.1 and §17.2). Remove the dial with its mounting plate from the frame—see §19.1, or §19.2. Do not disconnect the dial leads from the transmission unit terminals, unless you must replace the dial.



**Figure 31A. Dial mountings. Figure 31B.**

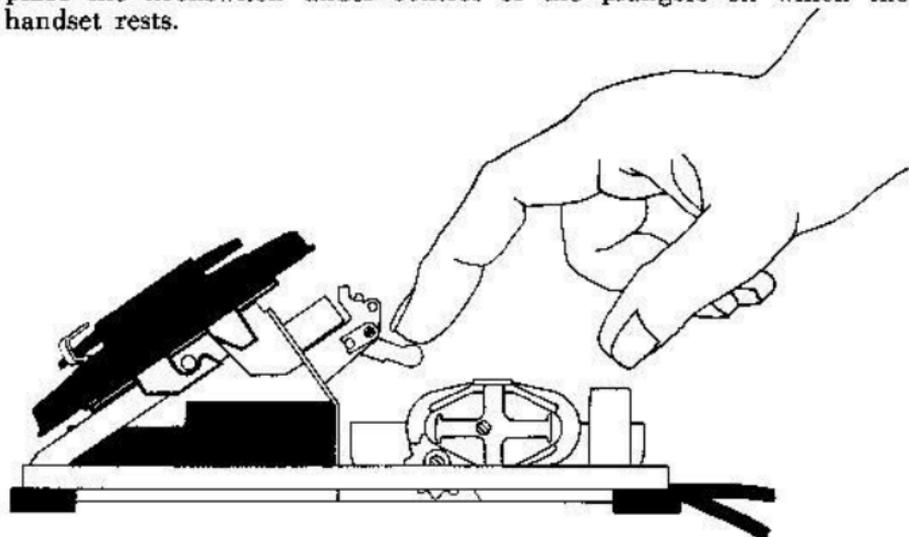
19.1 **Removal of screw mounted dial.** Loosen both screws (figure 31A). Lift the dial and mounting plate off the supporting frame. Tip the bottom of the dial up vertically, exposing dial wiring and transparent dust cover over dial springs.

19.2 **Removal of bayonet mounted dial.** Press down on dial and mounting plate (figure 31B). At the same time slide them down the frame, until lugs are disengaged from pins. Tip the bottom of the dial up vertically, exposing dial wiring and transparent dust cover over dial springs.

## 20. HOOKLOCK

As stated in §18.2, when working inside the telephone, press down the hooklock (figure 32).

When the housing is put back on the base, contours inside the housing automatically re-set the actuating lever for you, and again place the hookswitch under control of the plungers on which the handset rests.



**Figure 32. Hooklock.**

*Push down to keep bridge off line and ringer on line while telephone is being worked on.*

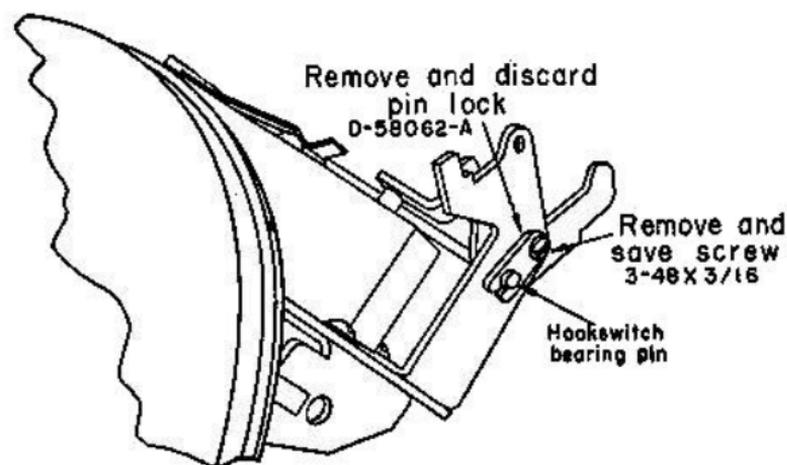
## 21. HOOKLATCH (optional)

When so ordered, the telephone is equipped with a hooklatch which prevents the hookswitch contacts closing fully when the subscriber first removes his handset. This connects the receiver but not the transmitter, keeps d-c bridge off the line, and permits a caller on a party line to ascertain whether a call is in progress before he makes a call. It prevents a second caller from mutilating the earlier caller's dial pulses, or making a click in the conversation in progress.

When the party-line caller determines the line is not in use, he presses a button near the right-hand hookswitch plunger. Now the telephone is ready for dialing and conversation. *Caution the subscriber to press this button to answer an incoming call also.*

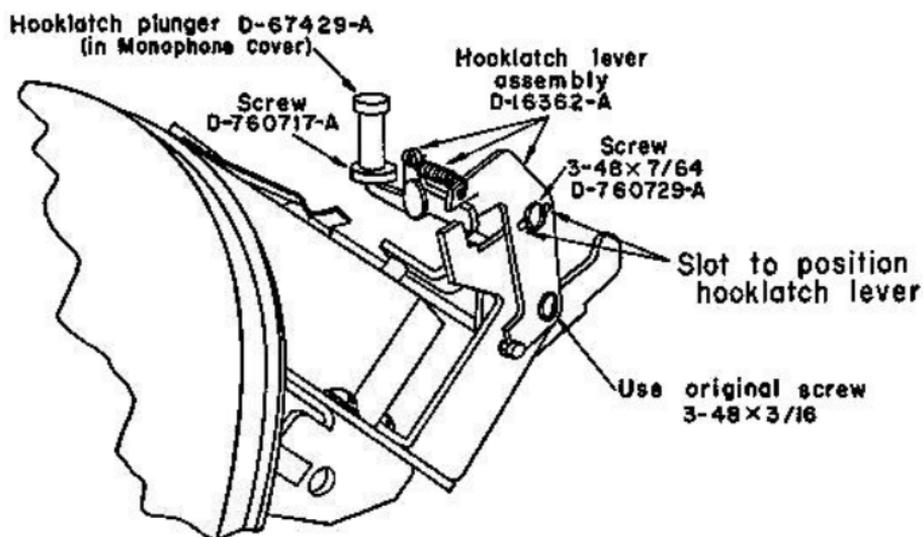
To add hooklatch to a type 80 telephone, order one conversion kit H-882172-1 (consists of parts called out in figure 34). Remove telephone housing (§18). Inside housing, locate hooklatch-plunger bushing, and, with #12 drill, drill thru bushing a 0.189" hole.

Insert the plunger from the top and screw in the plunger screw from below. Remove the #3-48 $\times$  $\frac{3}{16}$ " screw holding the U-shaped pin lock (figure 33) and discard the pin lock.



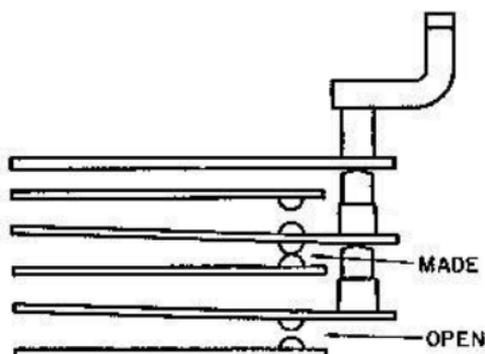
**Figure 33. Pin lock removal.**

Place the hooklatch lever assembly as in figure 34 and replace the screw. Place #3-48 $\times$  $\frac{7}{64}$ " screw D-760729-A thru the elongated hole of the hooklatch lever assembly and screw it into the upper threaded hole in the hookswitch bracket.



**Figure 34. Hooklatch installation.**

With the hookswitch actuating bar up but stopped by the hooklatch, adjust the hooklatch assembly so that the hooklatch lever moves freely. Then tighten the 2 screws. Check that the hookswitch springs only operate partially, as in figure 35.



**Figure 35. Hookswitch contact-sequence adjustment.**

## 22. RINGER-FREQUENCY CHANGE

Normally, telephones are drawn from the local storeroom, already assembled as required. If you have to change a ringer-frequency on the job, it is preferable to work in your truck rather than in the subscriber's premises . . . unless, of course, the telephone is already installed.

Remove telephone housing (§18). At the transmission unit, disconnect ringer red and green leads and capacitor white and black leads. At bottom of baseplate (figure 22) remove 3 ringer-mounting screws. Remove ringer and capacitor.

Attached to the new ringer required are wires and a suitable ringing capacitor (see table, page 30).

Using the old ringer's three #8-32 $\times$ 1/4" pan-head steel Sems-screws, mount the new ringer and capacitor on baseplate.

With a screwdriver connect the ringer and capacitor leads to transmission-unit terminals as follows:

	<i>Ringer</i>		<i>Capacitor</i>	
	<i>Red</i>	<i>Green</i>	<i>White</i>	<i>Black</i>
Standard	9	6	16	15
Rural Electrification Adm.	9	6	10	6
R. C. Filter	*	6	16	*
S.A.T.T. "A"	7	6	16	15
S.A.T.T. "B"	**	6	**	6

\*See figure 10 or 11.

\*\*See page 15.

<i>A.E.Co. piece number*</i>	<i>Ringer</i>	<i>Capacitor</i>
D-56548-ASA	{ Straight line with volume control }	0.4 $\mu$ f
D-56548-ASL	{ Straight line without volume control }	0.4 $\mu$ f
D-56548-A16	16.6~	0.7 $\mu$ f
D-56548-A20	20~	0.7 $\mu$ f
D-56548-A25	25~	0.3 $\mu$ f
D-56548-A30	30~	0.2 $\mu$ f
D-56548-A33	33.3~	0.2 $\mu$ f
D-56548-A40	40~	0.08 $\mu$ f
D-56548-A42	42~	0.08 $\mu$ f
D-56548-A50	50~**	0.08 $\mu$ f
D-56548-A51	50~***	0.08 $\mu$ f
D-56548-A54	54~	0.08 $\mu$ f
D-56548-A60	60~	0.08 $\mu$ f
D-56548-A66	66~	0.08 $\mu$ f
D-56548-A67	66.6~	0.08 $\mu$ f
D-56548-AVT	Superimposed	****
D-56548-AAC	{ For P-A-X type 34A16 only }	0.7 $\mu$ f

\*Each piece number in the table includes standard ringer (first suffix letter A). Piece number for humid-climate impregnated ringer has first suffix letter B; for example, to order impregnated straight-line ringer with volume control, order D-56548-BSA.

\*\*For use in exchanges with harmonic (or synchrononic) ringers.

\*\*\*For use in exchanges with "Decimonic" ringers.

\*\*\*\*This has a 0.4  $\mu$ f capacitor for the dial pulse-spring spark suppression circuit.

## 23. HANDSET-CORD REPLACEMENT

Remove telephone housing (§18). Push hooklock down (figure 32) if telephone is connected to the line. From the transmission unit disconnect the three handset cord leads from terminals 5T, 4-R, and 3-C. Loosen cord-clamp screw (at the left of the cord leaving telephone), remove clamp, loosen the 3 ringer-mounting screws (figure 22), and pull out old cord.

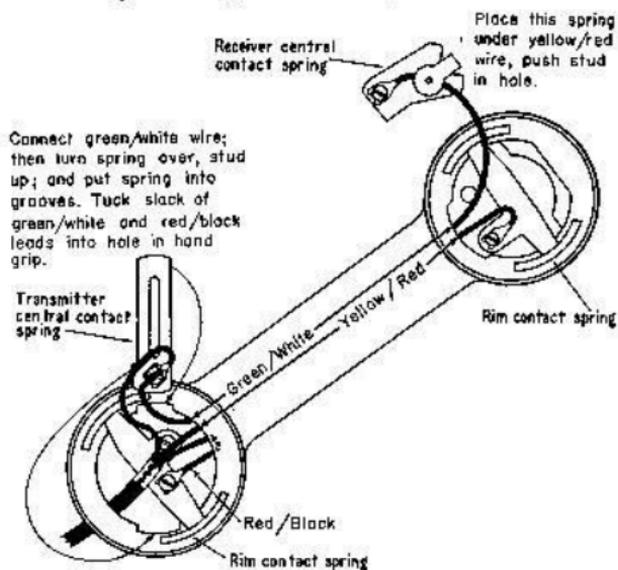
Insert new cord thru hole in baseplate flange. Attach red/black, yellow/red, and green/white\* leads to transmission-unit terminals 5-T, 4-R, and 3-C, respectively. (For color code explanation see §3).

Slide cord under lug on ringer, and pull slack out through the back of the telephone. Tighten ringer-mounting screws, replace cord clamp and screw, and tighten the screw.

\**Extensicord* leads are not colored, but each metal terminal-lug is stamped with the first letter of the color to which it corresponds; e.g., R=red.

Remove the caps and capsules of the receiver and transmitter (§25). Remove the central contact springs from both transmitter and receiver cavities (figure 36). Loosen the screws and disconnect the leads from the central contact springs. Loosen the screws and disconnect the leads to the rim contact springs in both cavities. Pull out the old cord.

Insert the leads of the new cord thru the cord entrance hole in the transmitter end of the handset and thru the hollow hand grip until the yellow/red and green/white leads reappear in the receiver cavity. Connect the yellow/red lead to the receiver rim contact spring and the green/white lead to the receiver central contact spring as in figure 36. Place the receiver central contact spring in its proper position in the cavity and replace the capsule and cap.



**Figure 36. Handset-cord replacement.**

In transmitter cavity, at the rim contact spring, attach stay cord hook to the screw which is on a projecting lug. Position the red/black lead lug under the rim-contact-spring other screw as in figure 36, and tighten the screw.

Attach green/white lead to transmitter central contact spring as in figure 36. Then turn the stud over so that the wires are beneath the spring, and the stud faces up and is near the cord entrance hole. Insert the spring into the grooves of the transmitter cavity.

Loop the slack in the red/black and green/white leads and tuck the loops into the mouth of the hand-grip hole. Put the transmitter capsule back in, and screw on its cap. Replace the telephone housing, and make a test call.

## 24. LINE-CORD REPLACEMENT

Remove the telephone housing (§18). At the transmission unit (figure 30) disconnect the 3 line cord leads from terminals 8-L2, 9-G, and 10-L1. Loosen the cord-clamp screw (at the right of the cord leaving telephone), and unhook the clamp-lug from the hole in the baseplate (at the right of the ringer armature, and over the cord). Pull out the old cord.

Take the new cord, pass the end with the hook-shaped clamp-lug thru the hole in the baseplate flange, hook the clamp-lug thru the hole in the baseplate, pull the slack out thru the back of the telephone, and tighten the cord-clamp screw. Connect the green/white lead to transmission-unit terminal 8-L2, the yellow/red lead to terminal 9-G, and the red/black lead to terminal 10-L1. (For color code explanation see §3). Replace the telephone housing.

## 25. TRANSMITTER OR RECEIVER REMOVAL

The transmitter (at the cord end of the handset) and the receiver are capsule units which may be removed by simply unscrewing the earpiece and mouthpiece caps. *Hold the handset horizontally with the caps up, so the capsules will not fall out.* The transmitter capsule is so designed that it cannot be inserted in the receiver housing by error, and vice versa. Capsules cannot be repaired at the subscriber's premises because it is impossible to open them without damaging them. If difficulty is experienced with a capsule, remove it and insert a new one. Defective units may be repaired at the factory.

## 26. REPLACEMENT PARTS

See Automatic Electric Company circular 1905—*Replacement Parts for Automatic Electric Special Telephones Substation Equipment.*

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Bulletin 700-80 dated June 1958 [issue 5] combines

Bulletin 700-80 dated March 1957 [issue 4]

Bulletin 700-80 dated April 1956 [issue 2]

Bulletin 481 dated December 1954

Form FM 40231 dated December 1954

Form FM 40231-1 dated March 1955

Bulletin 700-80 dated June 1955 [issue 1]

Bulletin 700-81 dated September 1955

This bulletin 700-80 [issue 5] is a reprinting of issue 4 incorporating new schematic diagrams and a new transmission-unit for S.A.T.T. System B, R. E. A. and General Telephone (R. C. Filter) circuits.

Note: Retain [issue 4] for older telephone circuits and wiring diagrams.