

**AUTOMATIC**  **ELECTRIC**

Northlake, Illinois, U. S. A.

Technical  
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# HARD OF HEARING TELEPHONE TYPE 80 (TRANSISTORIZED)

## — INSTALLATION AND ADJUSTMENTS —

### 1. DESCRIPTION

The type 80 Transistorized Telephone employs a transistor amplifier in the receiving circuit for the purpose of aiding hard of hearing subscribers. The Type 80 Transistorized Telephone is a self contained desk set; no separate ringer box is necessary. The set is equipped with a volume control and a 3-conductor line cord which terminates in a small plastic 3-conductor connecting-block. The connecting-block accepts wiring for either bridged or divided ringing. No soldering is required. Telephone can be used on only 48-volt systems.



*Figure 1.*

### 2. TRANSISTOR AMPLIFIER

The Type 80 Transistorized Telephone has a printed circuit amplifier (page 28); no attempt should be made to repair it in the field. Remove the printed wire board and replace it with a new one. (Order D-35290-A as replacement board.)

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### 3. LINE POLARITY

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

Connection instructions throughout 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:

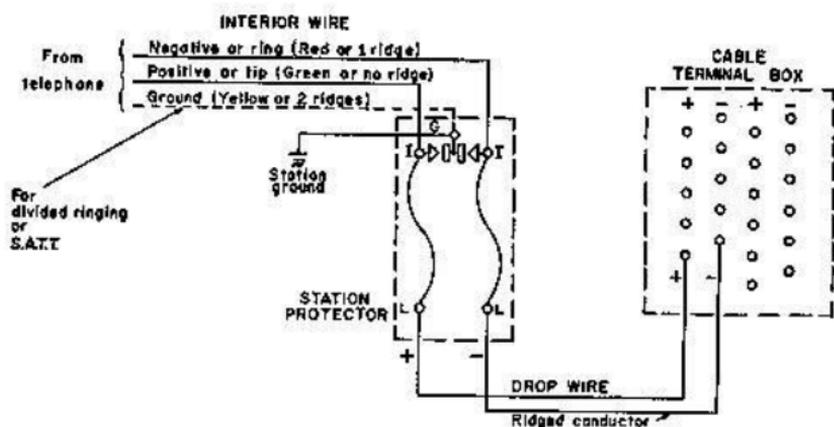


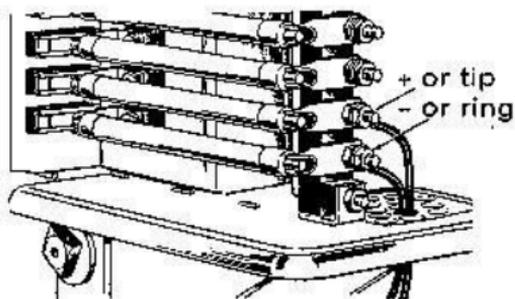
Figure 2. Typical connections to protector, cable terminal, etc.

We offer the following R alliteration (—), red, right,

**R**ing (negative line) CONNECTS TO:  
**R**ed (or 1-ridge) interior-wire conductor  
**R**ight-hand station-protector terminal screw  
**R**idged ("tracer") drop-wire conductor  
**R**ight-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 4 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 DC (d'Arsonval) voltmeter.

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

#### **4. 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, in some cases, both color codes are shown in the text and the illustrations as follows: new color, oblique line, old color; for example: green/white . . . . .

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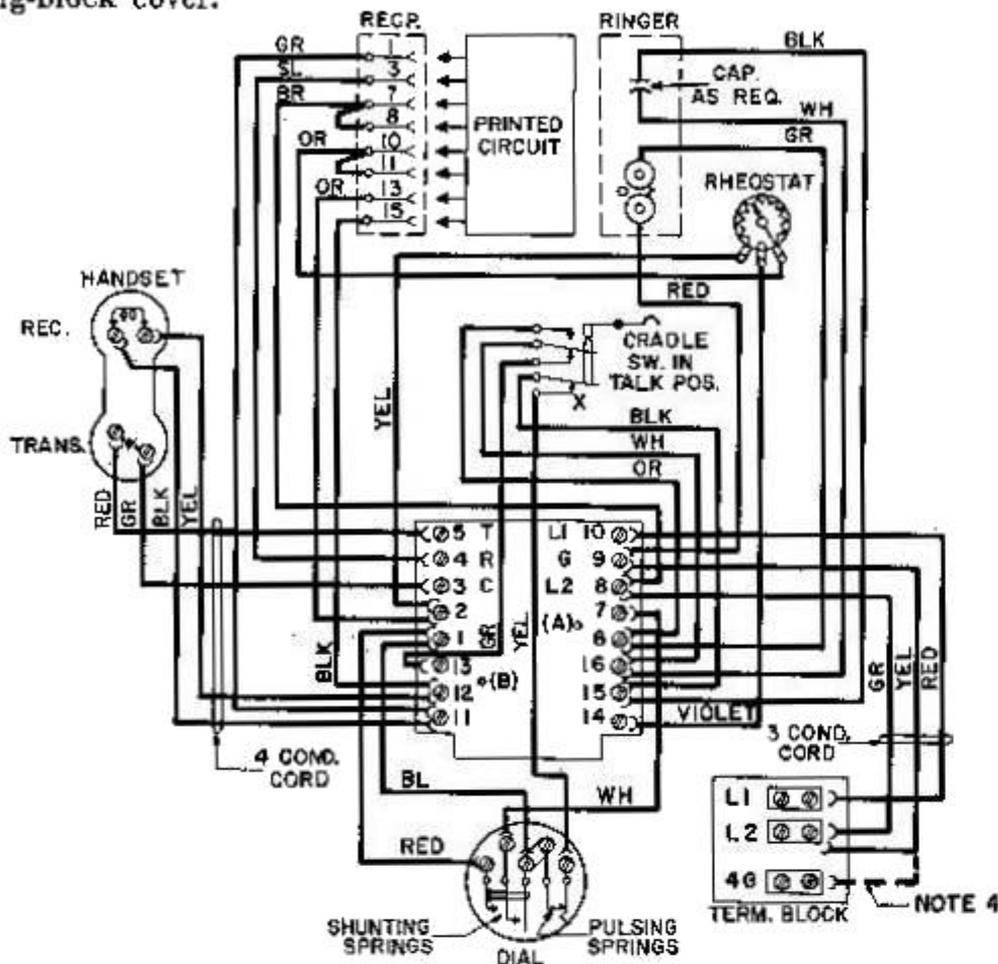
## 5. "STANDARD" TYPE 80

Identifiable by circuit label-card D-530232-A inside the telephone

These instructions apply to a Type 80 Transistorized 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 10, 11, or 12):

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 when dialing from 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 lead at terminal block from terminal L2 to 4G. To ring from L2 to ground, reverse line leads at terminal block.

**Note 5.** Terminals designated (A) and (B) are for testing purposes.

**Note 6.** To operate on 48 volt common battery system.

**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 §4.

Slip the tie-cord clip ring (figure 10, 11, or 12) over the connecting-block cover-screw post.

FOR BRIDGED RINGING connect the line cord and line wires as shown in figure 11. 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 11.

FOR PARTY RUNG ON - LINE ("RING") connect the line cord and line wires as shown in figure 12.

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 §11 and §12 for conditions which require a special setting.

Call the central office for a ringing test. If the telephone has a straight-line ringer with volume control, adjust the volume control (figure 15) 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 §13 or §14.

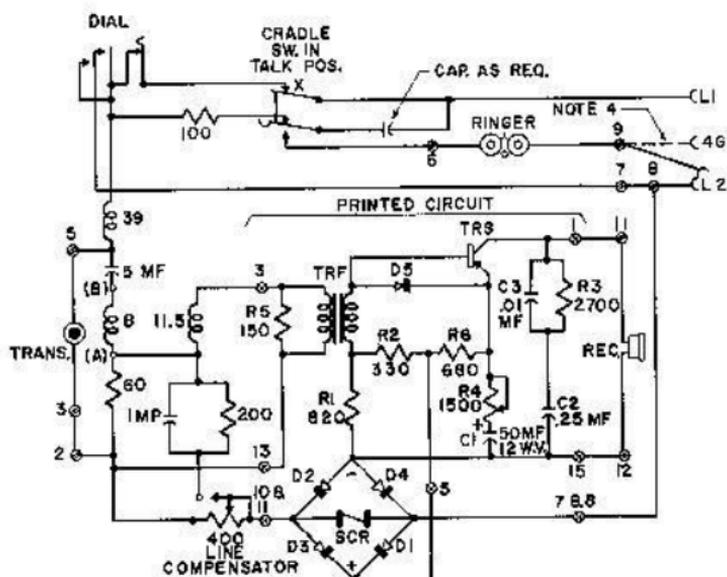


Figure 5. Schematic (standard).

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

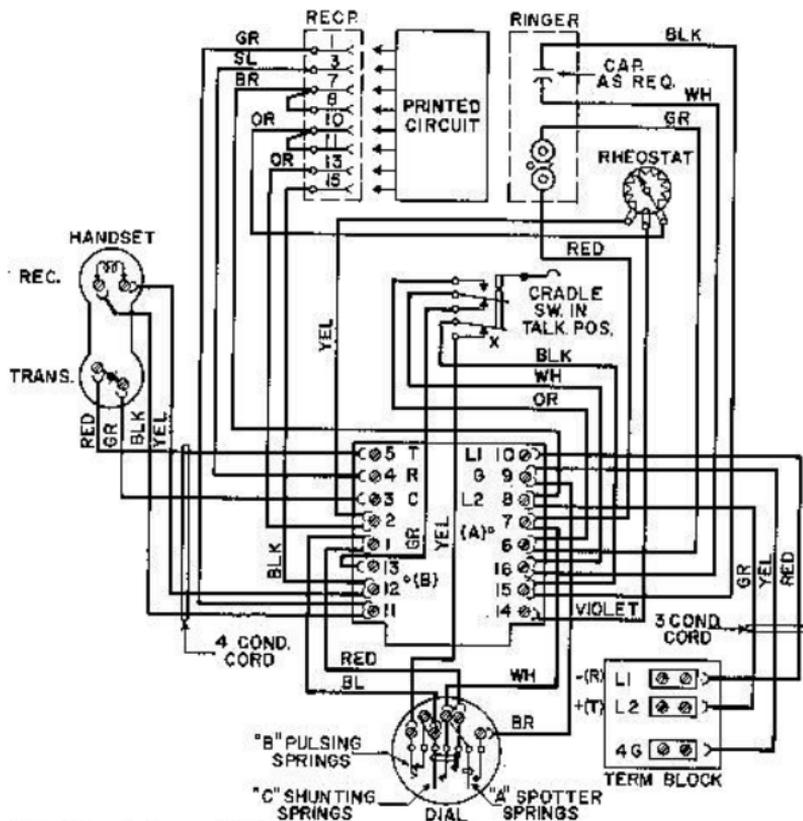
Identifiable by circuit label-card D-530233-A inside the telephone

Select a location for the connecting block which will allow ample cord length and where the connecting-block will not be conspicuous. To install (figure 12):

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 12) over the connecting-block cover-screw post.



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

**Note 2.** "A" spotter springs 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.** If bells of biased ringer tap when dialing from another telephone on the line, reverse ringer connections at terminals 6 and 7.

**Note 5.** Terminals designated (A) and (B) are for testing purposes.

**Note 6.** To operate on 48 volt common battery system.

**Figure 6. Wiring diagram. (S.A.T.T. system A).**

Notice which color code is employed by the line cord and follow connecting instructions accordingly. See §4.

Connect the red/black lead and the negative line wire, usually red, to terminal L1 (figure 12). 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, §5.

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 subscribers telephone correctly; if you hear one or more clicks, reverse "interior" wires at terminal block (figure 12) 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 §11 and §12 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 volume control (figure 15), 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 card as in §13 or §14.

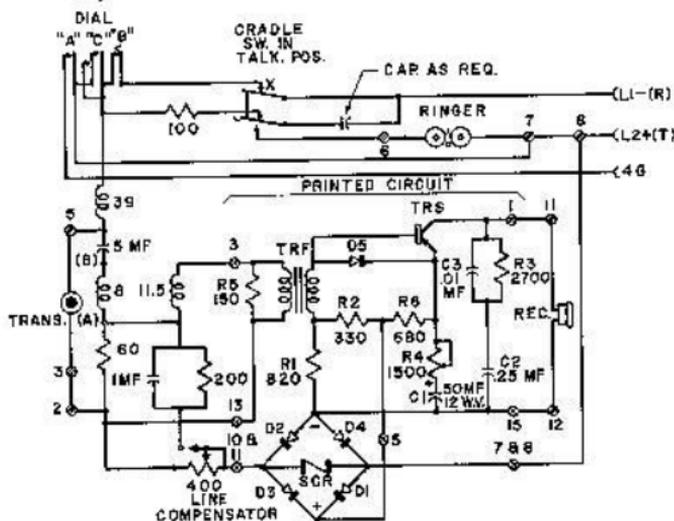


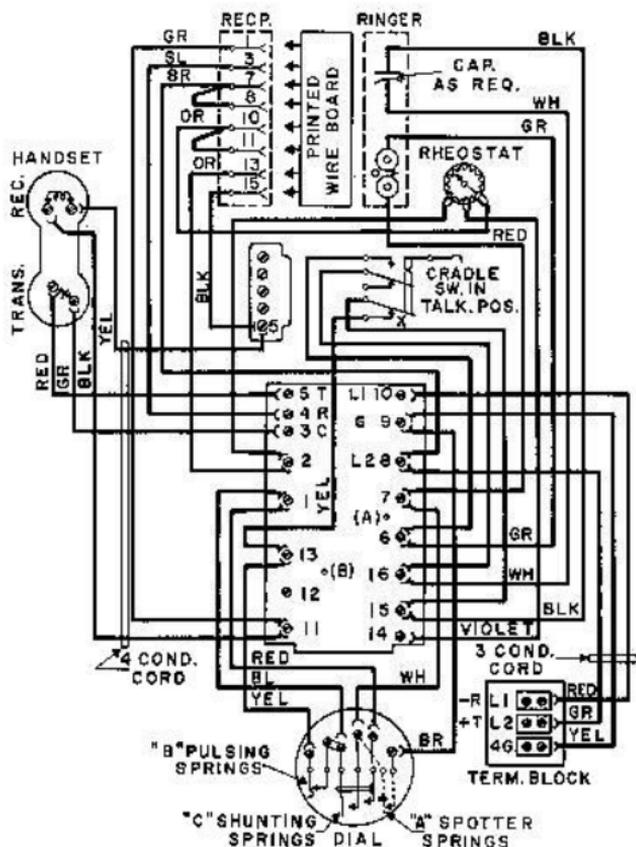
Figure 7. Schematic (S.A.T.T. system A).

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## 7. NON-S.A.T.T. OR FOR S.A.T.T. SYSTEM A

with  $1 \mu\text{f}$  dial-pulse spark-suppression capacitor

Identifiable by circuit label-card D-530264-A inside the telephone



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

**Note 2.** "A" spotter springs (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.** Telephone is furnished wired 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.

**Note 8.** To operate on 48 volt common battery system.

**Figure 8.** Wiring diagram ( $1 \mu\text{f}$  spark-suppression).

Select for the telephone connecting-block a location which will allow ample cord length and where the connecting-block will not be conspicuous. To install (figure 10 or 12):

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 10 or 12) over the connecting-block cover-screw post.

Notice which color code is employed by the line cord and follow connecting instructions accordingly. See §4.

FOR BRIDGED RINGING (NON-S.A.T.T.), connect line cord and interior wire per figure 11.\*

FOR BRIDGED RINGING (S.A.T.T. SYSTEM "A"), connect line cord and interior wire per figure 12.

FOR PARTY RUNG ON — LINE ("RING"): Remove the telephone housing. Be sure capacitor black lead is on transmission-unit terminal 15. Move ringer red lead from transmission terminal 7 to transmission-unit terminal 9 (figure 8). Put housing on again. Connect line cord and interior wire per figure 12.

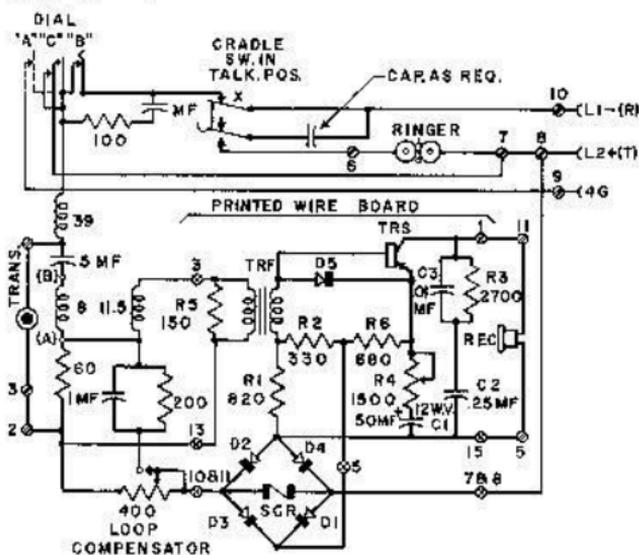


Figure 9. Schematic (1  $\mu$ f spark-suppression).

\*These instructions assume that inside the housing the telephone still is wired as it leaves the factory for bridged ringing.

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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.

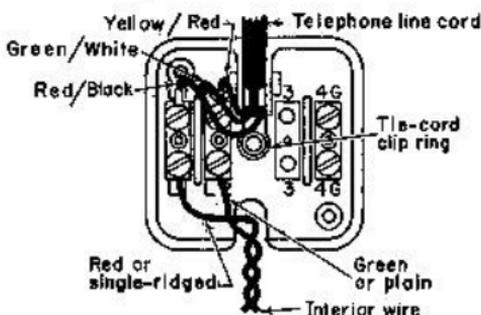
For normal line in a 48- or 50-volt exchange:

{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 §11 and §12 for conditions which require a special setting.

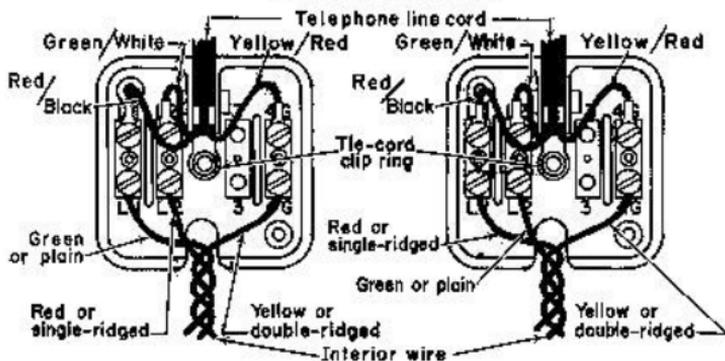
Call the central office for a ringing test.

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 §13 or §14.



**Figure 10. Terminal-block connections for bridged ringing (non-S.A.T.T.).**



**Figure 11. Terminal-block connections for party-line standard telephone rung on + line ("tip").**

**Figure 12. 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.**

## 8. SUPERIMPOSED RINGING

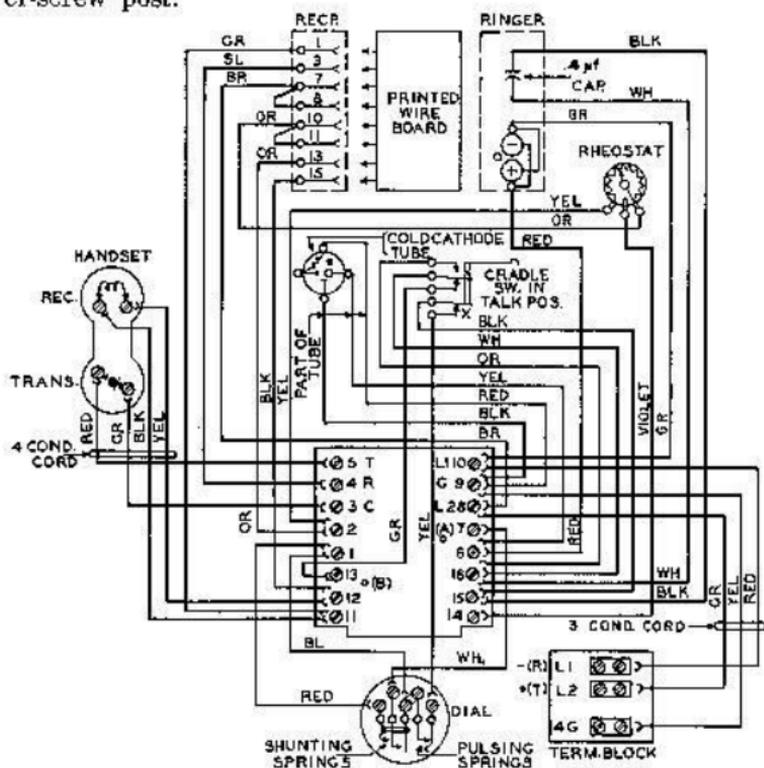
Identifiable by circuit label-card D-530265-A inside the telephone

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 12):

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 12) over the connecting-block cover-screw post.



**Note 1.** Contacts "X" to 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.** Refer to table "A" for four party selective or eight party semi-selective connections.

**Note 4.** When + battery is connected to the + terminal of the ringer, and - battery to the other ringer, the armature will pull away from the pole to which it is biased.

**Note 5.** For optimum operation, either superimposed D.C. or A.C. of 20 cycles or pulsating D.C. of 20 pulses per second should be used for ringing current.

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

**Note 7.** To operate on 48 volt common battery system.

**Figure 13. Wiring diagram (superimposed).**

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## 9. 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 15). 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.

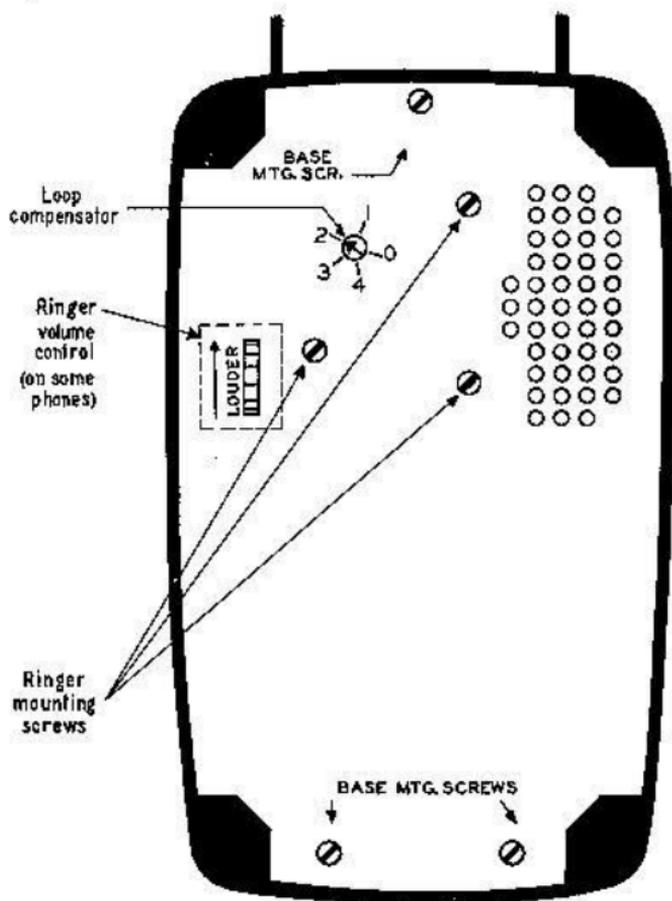


Figure 15.

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.

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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 conversing parties.

## 10. LOOP COMPENSATOR—*Adjustment*

The Type 80 Transistorized Telephone operates satisfactorily with the loop compensator adjusted to the rules in §11, except in marginal or unusual locations. For such locations, adjust the loop compensator accurately (§12).

## 11. LOOP COMPENSATOR—*Adjustment rules*

### 11.1 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.\*

**11.2 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 Transistorized Telephone is used on the same line with an entirely different make or model of telephone, set the telephone loop compensator at 0 (or midway between 0 and 1 if one of the §11.1 EXCEPTIONS applies).

**11.3 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 Transistorized 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 =  $200\Omega$ , 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\*\*.

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\*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 13.

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

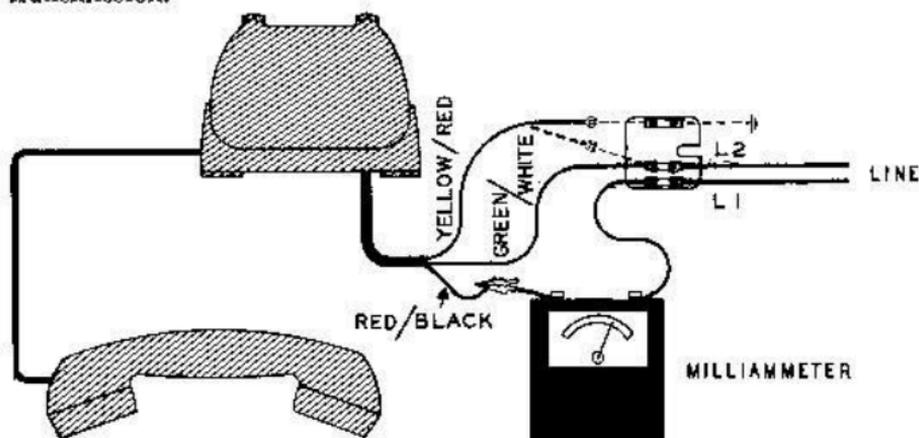
## 12. LOOP COMPENSATION—*Accurate adjustment*

12.1 **Uses.** Altho the rules of §11 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:

12.2 **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 16, 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 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.

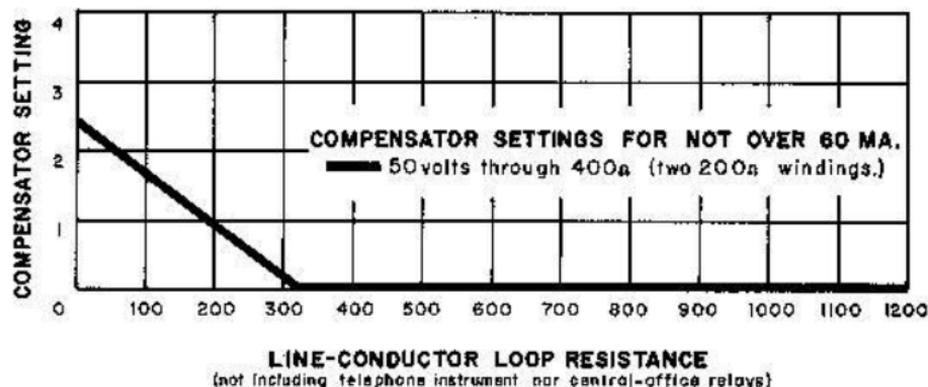


**Figure 16.**  
*Line-current measurement at subscriber's premises.*

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**12.3 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.

**12.4 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 17.**

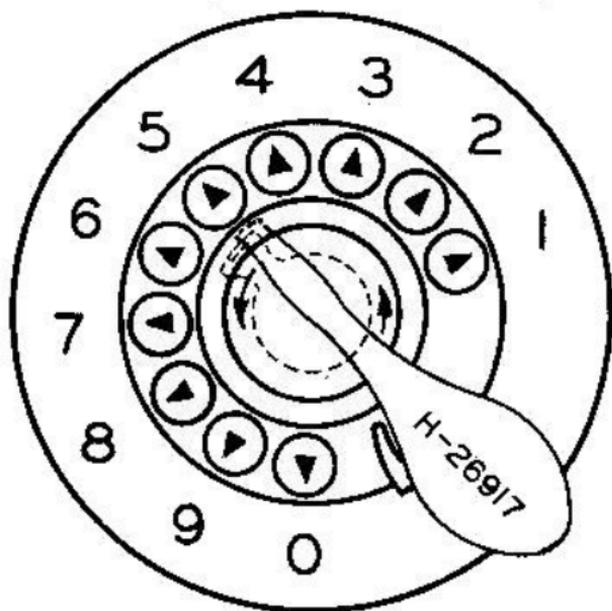
**12.5 Test board equipped for line-voltage measurement.** Dial the test board. Request line-voltage measurement, and stay on the line. Thru a test distributor or thru a distributing-frame test shoe, the testboardman will connect to the line from which you are calling, and will connect his voltmeter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

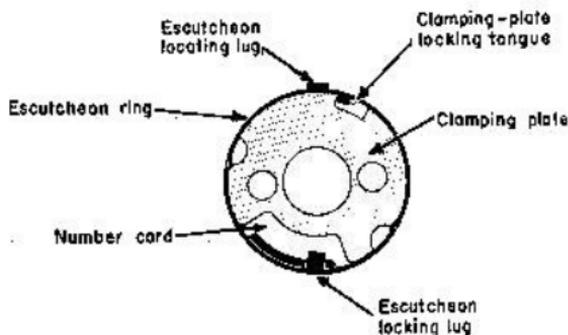
\*That is, when 60 milliamperes flow in the line, there will be 24 volts "drop" in the usual  $200\Omega + 200\Omega$  battery feed to the calling line.

### 13. 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 18). 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 18. Unlocking escutcheon ring.*

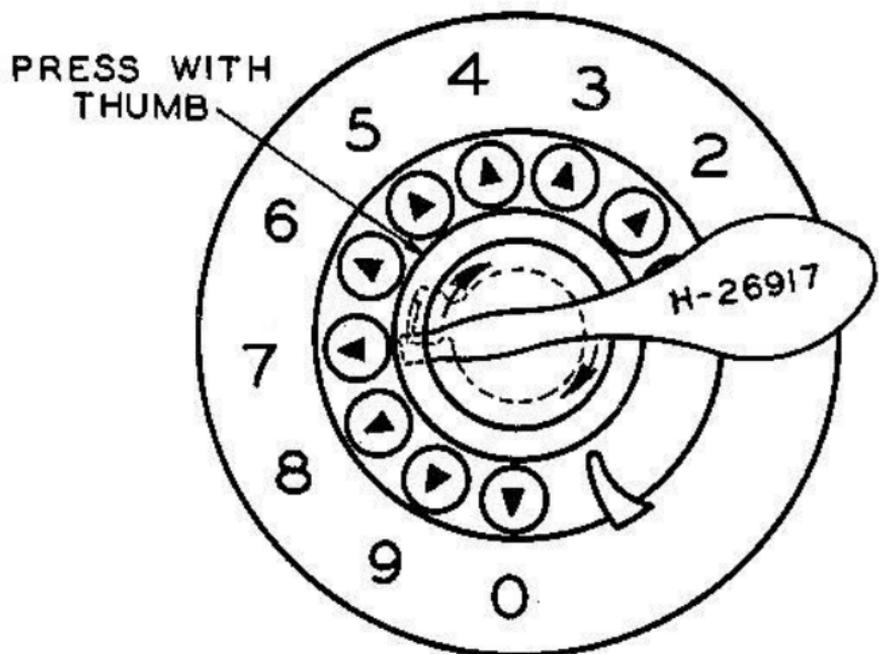


*Figure 19. Number card in escutcheon ring.*

A clamping plate holds the transparent cover and the number card to the ring (figure 19). 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 assembly.

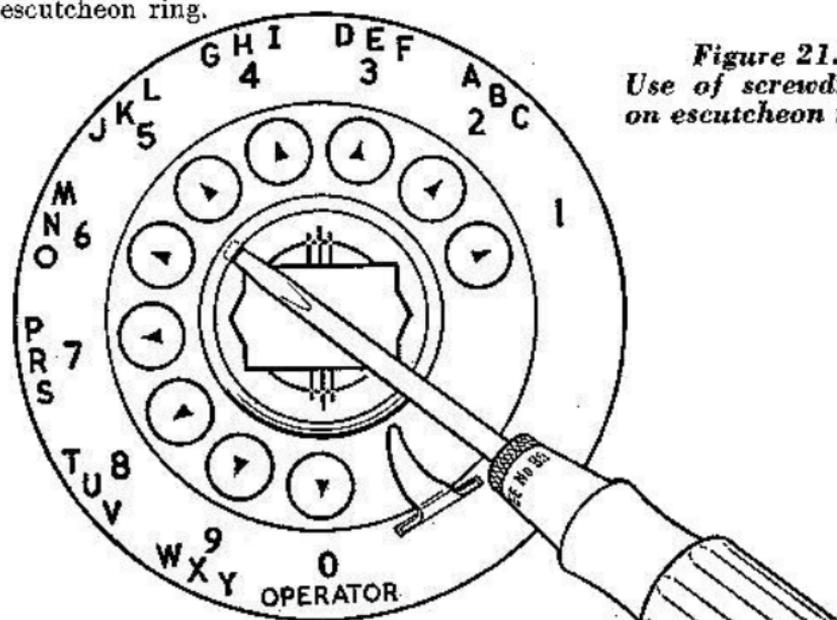


**Figure 20. Locking escutcheon ring.**

To mount on dial, check that the locking lever on finger plate is midway between holes 6 and 7 (figure 20). 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.

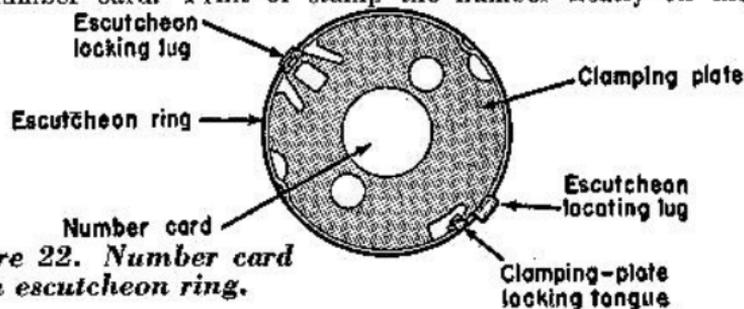
#### 14. NUMBER CARD of dial with *plastic finger plate*

Inside the edge of the escutcheon ring, between finger holes 5 and 6 (figure 20), 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 21.*  
Use of screwdriver  
on escutcheon ring.

Rotate the clamping plate (figure 25) counterclockwise. Remove the number card. Print or stamp the number neatly on the card.



*Figure 22. 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 22, lower left), use the right-thumb nail in the other circular hole (figure 22, 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.

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## 15. RINGER ADJUSTMENT

15.1 **Loudness adjustment.** When so ordered, straight-line Type 80 Transistorized Telephones have a ringer volume control (figure 12). 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.

15.2 **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 ringer capacitor during dial interruptions. To correct this, remove the telephone housing (§14) and reverse the connections of the tinkling ringer at the transmission unit (figure 23). The ringer bias spring then should prevent tinkling.

## 16. TRANSMISSION-UNIT

S.A.T.T. System A and Superimposed Ringing. The transmission-unit wiring diagram (figure 23) is 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.

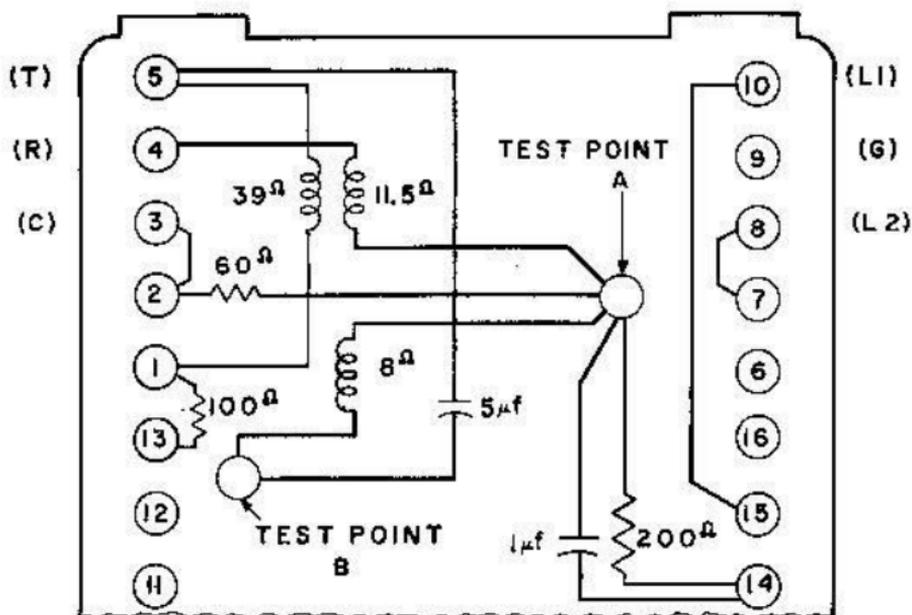


Figure 23. Transmission-unit D-38362-A internal connections.

## 17A. TRANSMISSION-UNIT

General Telephone (R.C. Filter). The transmission-unit wiring diagram (figure 24) is 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.

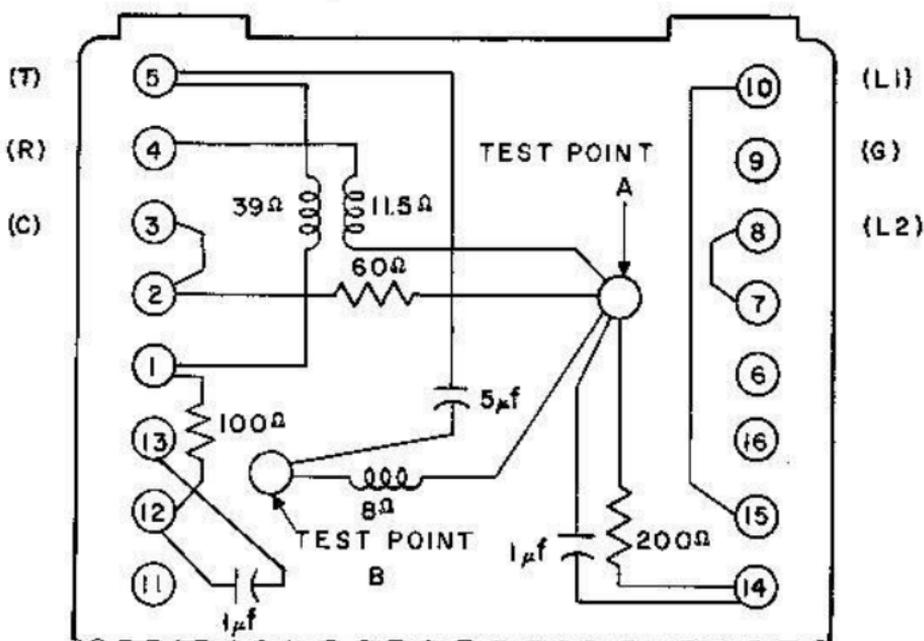


Figure 24. Transmission-unit D-38368-A internal connections.

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## 18. HOUSING REMOVAL

18.1 Remove volume control knob. Loosen the three base-mounting screws shown in figure 17. Do *not* loosen any other screws on baseplate.

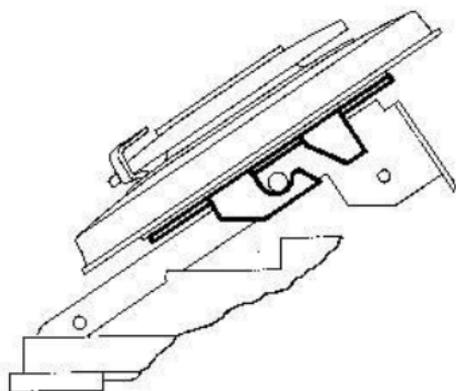
Lift housing free. Wiring and apparatus are now accessible.

18.2 If telephone is connected to the line, push hooklock actuating lever downward (figure 26) 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

A new dial mounting is employed in Type 80 Transistorized Telephones. Older dials are mounted with two screws. New dial employs a "snap-on" bayonet-lug pin mounting (figure 25).

To examine dial action, remove housing (§18.1 and §18.2). 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.



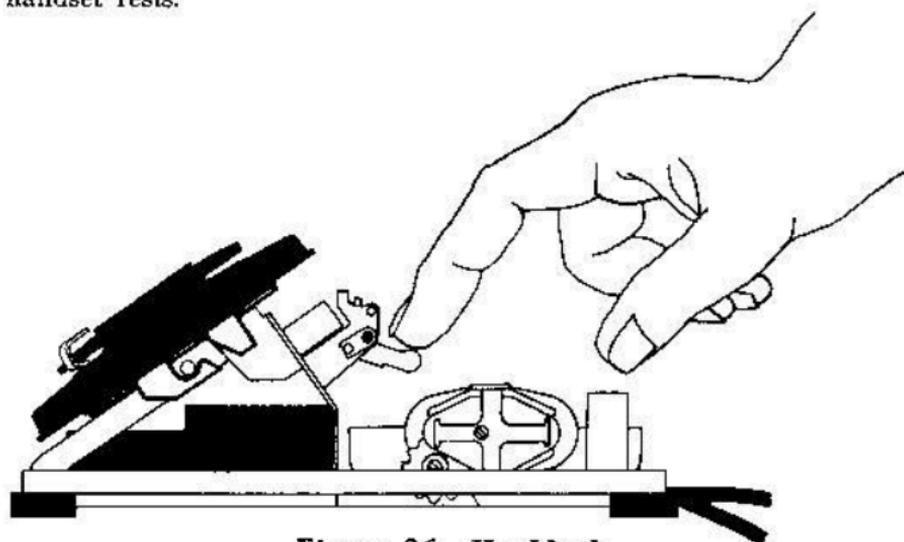
**Figure 25. Dial mounting.**

19.1 **Removal of bayonet mounted dial.** Press down on dial and mounting plate (figure 25). At the same time slide them down the frame until the 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 §18.3, when working inside the telephone, press down the hooklock lever (figure 26).

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 hooklock under control of the plungers on which the handset rests.



**Figure 26. Hooklock.**  
*Push down to keep bridge off line and ringer on line while telephone is being worked on.*

## 21. RINGER-FREQUENCY CHANGE

Remove the housing (§18). At the transmission-unit, disconnect ringer red and green leads and capacitor white and black leads. At bottom of baseplate (figure 15) remove 3 ringer-mounting screws. Remove ringer and capacitor. NOTE: Take great care when removing or replacing printed wire board (figure 28).

Attached to the new ringer required are wires and a suitable ringing capacitor (see table, page 22).

Using the old ringer's three #8-32 x 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:

	Ringer		Capacitor	
	Red	Green	White	Black
Standard	9	6	16	15
S.A.T.T. "A"	7	6	16	15

\*See figure 9, 10, or 11.

<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 $\sim$	0.7 $\mu$ f
D-56548-A20	20 $\sim$	0.7 $\mu$ f
D-56548-A25	25 $\sim$	0.3 $\mu$ f
D-56548-A30	30 $\sim$	0.2 $\mu$ f
D-56548-A33	33.3 $\sim$	0.2 $\mu$ f
D-56548-A40	40 $\sim$	0.08 $\mu$ f
D-56548-A42	42 $\sim$	0.08 $\mu$ f
D-56548-A50	50 $\sim$ **	0.08 $\mu$ f
D-56548-A51	50 $\sim$ ***	0.08 $\mu$ f
D-56548-A54	54 $\sim$	0.08 $\mu$ f
D-56548-A60	60 $\sim$	0.08 $\mu$ f
D-56548-A66	66 $\sim$	0.08 $\mu$ f
D-56548-A67	66.6 $\sim$	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) ringer.

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

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

## 22. HANDSET-CORD REPLACEMENT

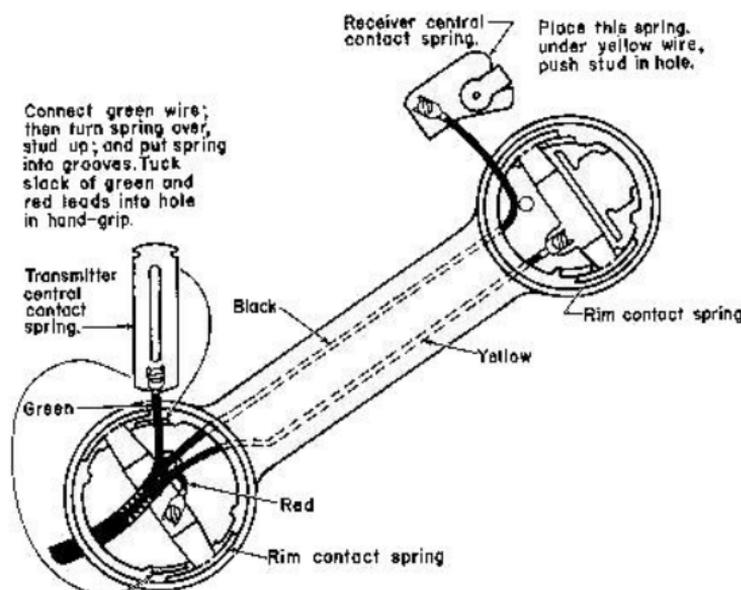
Remove housing (§18). Push hooklock lever down (figure 26) if telephone is connected to the line. From the transmission-unit disconnect the four cord leads from terminals 5T, 3C, 12, and 11. Loosen cord-clamp screw (at the left of the cord leaving telephone), remove clamp, loosen the 3 ringer-mounting screws (figure 15), and pull out old cord.

Insert new cord thru hole in baseplate flange. Attach red, green, yellow, and black leads to transmission-unit terminal 5T, 3C, 12, and 11 respectively.

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; tighten the screw.

Remove the caps and capsules of the receiver and transmitter (\$25). Remove the central-contact springs from both transmitter and receiver cavities (figure 27). Loosen the screws and disconnect the leads from the central-contact springs. Loosen the screws and disconnect the leads from the rim-contact springs in both cavities. Pull out 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 black and yellow leads appear in the receiver cavity. Connect the yellow lead to the receiver rim-contact spring and the black lead to the receiver central-contact spring as in figure 27. Replace the capsule and cap.



**Figure 27. 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 lead lug under the rim-contact spring other screw as in figure 27, and tighten the screw.

Attach green lead to transmitter central-contact spring as in figure 27. 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 green and black 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 housing, and make a test call.

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## 23. LINE-CORD REPLACEMENT

Remove the housing (§18). At the transmission-unit (figure 23 or 24) disconnect the 3 line cord leads from terminals 8-L2, 9-G, and 10-L. Loosen the cord-clamp screw (at the right of the cord leaving the 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 the 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 §4.) Replace the housing.

## 24. 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.

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\*To replace the receiver capsule for a Type 80 Transistorized Telephone handset, a type D-51022-A capsule must be ordered.

## 25. PARTS-ORDERING INFORMATION

*Part*

*Order from A. E. Co. as*

Amplifier, receiver (printed wire board) .....	D-35290-A
Base plate assembly .....	D-780659-F
Cord, handset (Retractable Cord) .....	D-543145-A-M*
Housing .....	D-490019-A-M*
Knob for volume control (clear) .....	D-59299-A
Mounting bracket assembly (printed wire board) .....	D-731597-A
Receiver Capsule (750-D.C.) .....	D-51022-A
Receptacle (printed wire board, 15-contacts) .....	FD-1004-CK

\*For ordering specific color, see below:

*Color*

*Letter Designation*

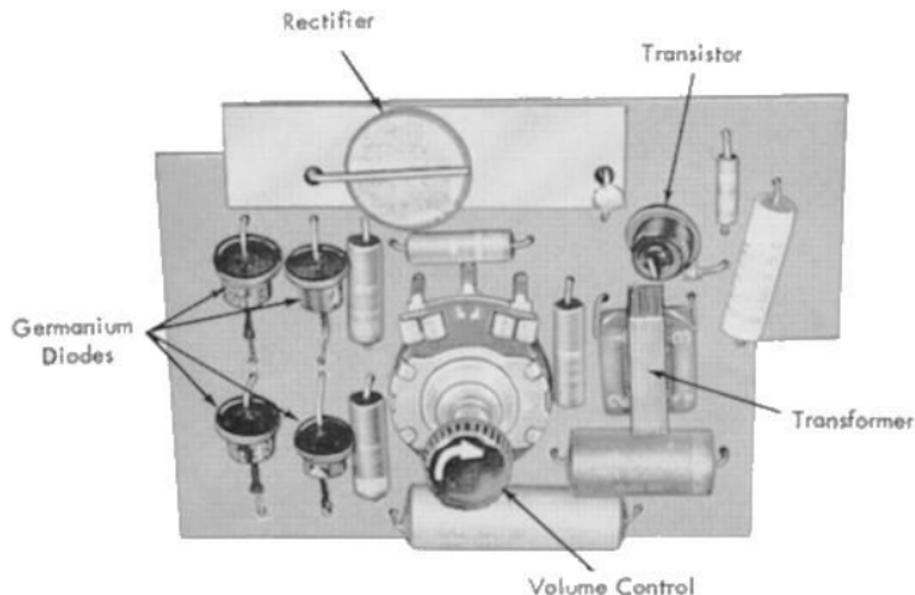
Black .....	A
Sand Beige .....	B
Dawn Gray .....	C
Jade Green .....	D
Classic Ivory .....	E
Garnet Red .....	F
Turquoise .....	G
Sunlight Yellow .....	J
Forget-Me-Not Blue .....	K
Camelia Pink .....	L
Gardenia White .....	M

Insert one of the above letters for color desired (e.g., when ordering a new housing, specify D-490019-D for jade green).

## 26. PRINTED WIRE BOARD

This Printed Wire Board was designed so that the type 80 telephone could be equipped with a transistor-amplified receiving circuit as an aid to hard of hearing subscribers.

The mounting arrangement takes advantage of current techniques used in miniaturizing electronic apparatus. The plug-in type of printed wiring board with its matching connector makes it possible to utilize the maximum amount of the limited space available without preventing access to the components of the telephone set. The plug-in feature itself is an advantage in servicing because a good unit can be immediately substituted for a defective one.



**Figure 28.**