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AUTOMATIC ELECTRIC

Subsidiary of
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Technical
Bulletin 701-88T
Issue 2, July 1959

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LOUD-SPEAKING TELEPHONE SET TYPE 88T (TRANSISTORIZED) —INSTALLATION AND ADJUSTMENTS—

1. DESCRIPTION

The *Type 88T Loud-Speaking Telephone Set (Transistorized)* consists of a basic Type 80 telephone, a desk-type loudspeaker, and a telephone line terminal-block, figure 1.

The Type 88T Telephone may be used as a regular telephone or a loud-speaking telephone.

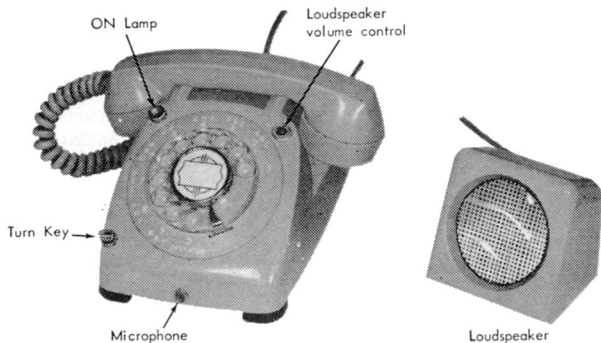


Figure 1. Type 88T Loud-Speaking Telephone Set.

When the telephone is used as a *Loud-Speaking Telephone*, the handset is not used. The turn key performs handset functions. When the *Loud-Speaking Telephone* is ON (corresponding to handset-off-hook), an indicator lamp flashes. The purpose of the flashing lamp is to indicate to the subscriber that he has seized the line. A loudspeaker volume control on the telephone enables the subscriber to increase or decrease the level of the sound received.

Under certain operating conditions it may be necessary to use a separate Type 88 power supply to power the transistorized *Loud-Speaking Telephone* which is normally powered over the telephone line. One of these conditions may occur when the telephone is connected to either a W. E. Co. 555 P. B. X., or Leich Electric L55 P. B. X., especially when battery is taken over cable pairs from the central office. As a result, local supervision may not function properly, and the loudspeaker volume may be reduced. Supervision difficulty can also occur when the telephone is connected to a P-A-B-X.

CAUTION: It may be necessary to restrict the usual 1000 ohm maximum loop to a slightly lower value in order to obtain satisfactory ring cut-off operation. If this is not possible, the separate Type 88 power supply should be employed.

2. INSTALLATION

2.1 Arrangement. Figure 2 shows the telephone and loudspeaker located for normal operation. The telephone may be on the right- or left-hand side of the desk, which ever is more convenient for the subscriber. The telephone must always be a sufficient distance from the loudspeaker to minimize feed-back. Never face the microphone (in the telephone) directly at the loudspeaker.

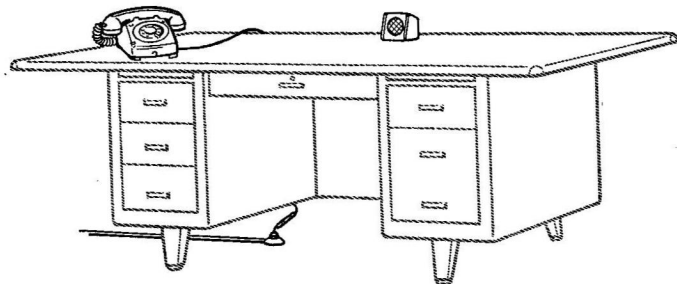


Figure 2. Typical installation.

2.2 Terminal-block mounting. Loosen the terminal-block cover screw, and remove the terminal-block cover. If the mounting surface is wood, mount the terminal-block with the two #8 x $\frac{3}{4}$ " R.H. wood screws supplied. If 3—#8 R.H. machine screws and nuts are to be used to mount the terminal-block, use $1\frac{1}{4}$ " or #19 drill to bore 2" clearance holes.

At the line terminal-block, connect the telephone 3-conductor cord as shown in figure 5, 6, or 7. (If the telephone has a S.A.T.T. dial, connect the line-cord terminal-block per figure 7). Put the terminal-block cover back on. Complete the telephone line installation to the protector, etc. as shown in figure 8, or to the P. B. X. switchboard, etc.

3. "STANDARD" TYPE 88T

Identifiable by circuit label-card D-530244-A inside the telephone

These instructions apply to a type 88T telephone with straight-line or harmonic ringer (but without party-identity S.A.T.T. dial).

Select a location for the telephone terminal-block which will allow ample cord length and where the terminal-block will not be conspicuous.

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

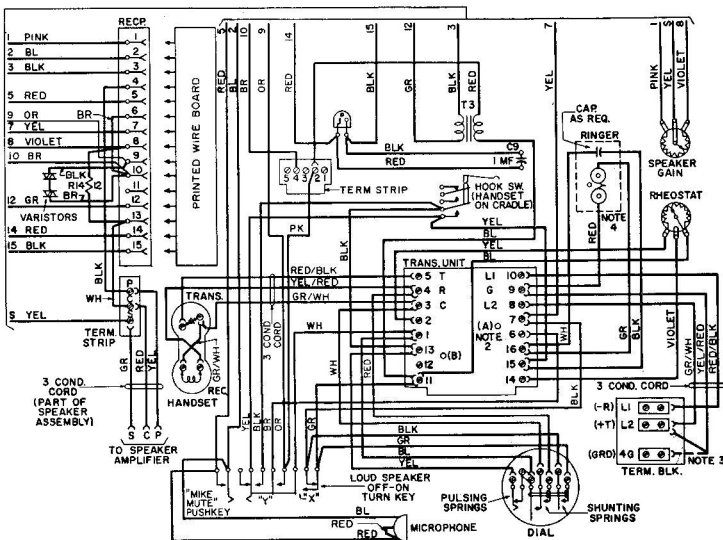


Figure 3. Wiring diagram (Standard).

NOTE 1. Contacts "X" make before "Y" contacts.

NOTE 2. Terminals (A) and (B) on transmission-unit are for testing purposes.

NOTE 3. The telephone is furnished wired for bridged ringing. For divided ringing, change wiring as follows: L1 to ground—move yellow lead at terminal-block from L2 to 4G. L2 to ground—with yellow lead on terminal 4G, reverse line leads at terminal-block.

NOTE 4. If bells of biased ringer tap when dialing from another telephone on the line, reverse green and red ringer leads at transmission-unit terminals 9 and 16.

NOTE 5. Telephone will operate as a standard telephone with or without printed wire board.

NOTE 6. If no dial is used, connect black and yellow dial wires to terminal 2 of dial blank. Black and green leads to be left unconnected, taped, and insulated from each other and circuit.

NOTE 7. All resistors are $\frac{1}{2}$ watt, carbon $\pm 10\%$ unless otherwise indicated (figure 4).

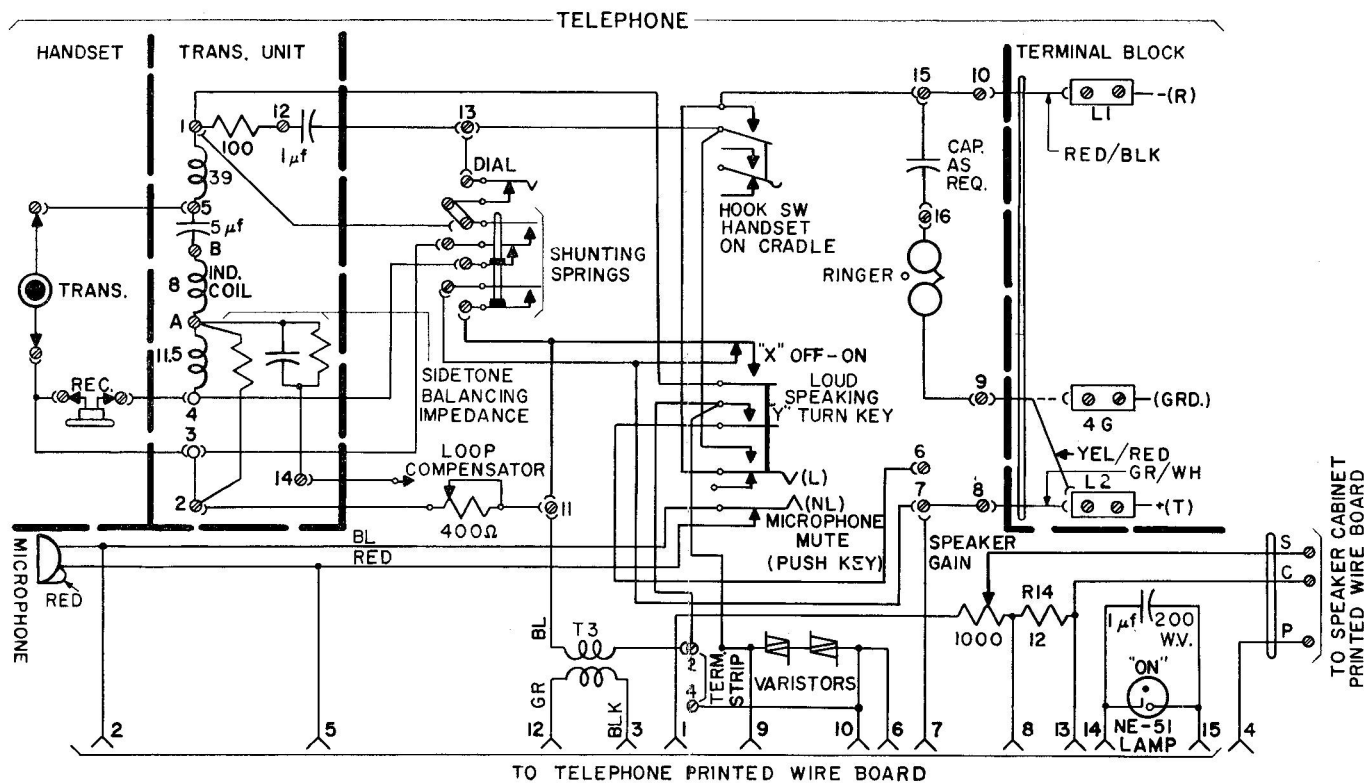


Figure 4. Schematic (Standard).

Select for the telephone terminal-block a location which will allow ample cord length and where the terminal-block will not be conspicuous. To install see figure 5, 6, or 7.

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

Mount the terminal-block, using the two screws supplied with the terminal-block.

Notice which color code is employed by the telephone line cord and follow connecting instructions accordingly. See bulletin 700-80, §3. Slip the tie-cord clip ring (figure 5, 6, or 7) over the terminal-block cover-screw post.

FOR BRIDGED RINGING connect the line cord and line wires as shown in figure 5. Connect the line cord green/white and yellow/red leads both to terminal-block terminal L2.

FOR PARTY RUNG ON + LINE ("TIP") connect the line cord and line wires as shown in figure 6.

FOR PARTY RUNG ON — LINE ("RING") connect the line cord and line wires as shown in figure 7.

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

{ If conductor-loop resistance is 200Ω or less, set loop compensator at 2.
{ If conductor-loop resistance is over 200Ω , set loop compensator at 0.

Review bulletin 700-80, §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, (bulletin 700-80, figure 22), adjust the loudness control to suit the subscriber.

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

Stamp directory-number card as in bulletin 700-80, §14 or §15. Telephone and speaker cabinet printed wire board schematic is shown on page 11, figure 11.

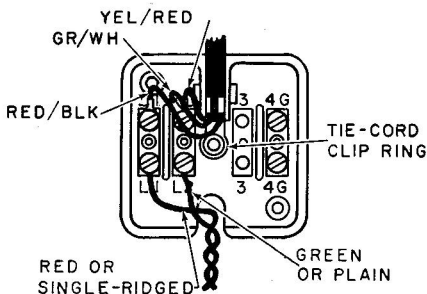


Figure 5.

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

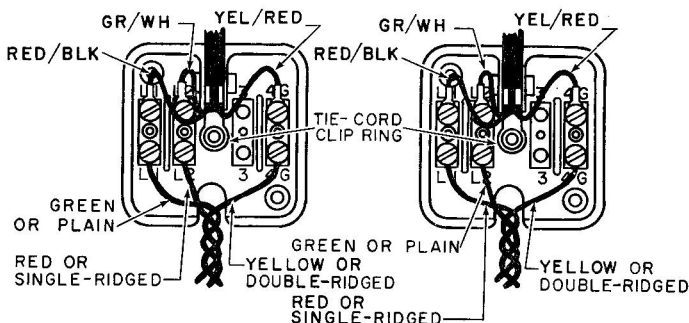


Figure 6.

Terminal-block connections for party rung on + line ("TIP") [non-S.A.T.T.].

Figure 7.

Terminal-block connections for Standard telephone party rung on - line ["RING"] or for any S.A.T.T.—dial station.

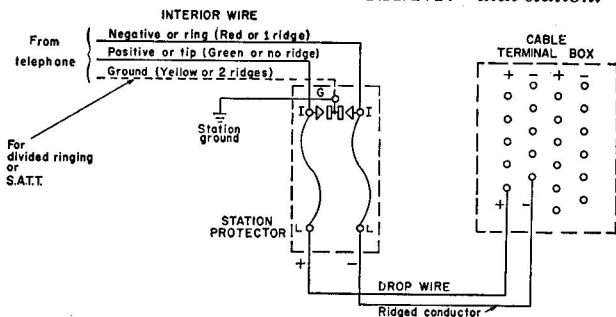


Figure 8. Wiring diagram.

Identifiable by circuit label-card D-530250-A inside the telephone

Identifiable by circuit label-card D-530250-A inside the telephone

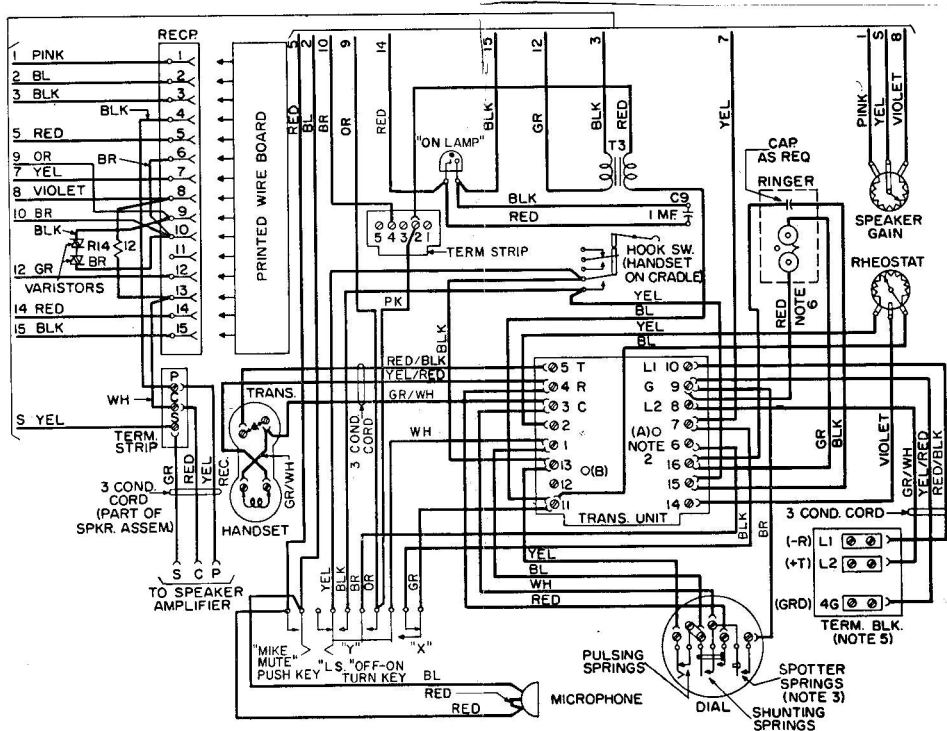


Figure 9. Wiring diagram (S.A.T.T. A and B).

NOTE 1. Contacts "X" make before "Y" contacts.

NOTE 2. Terminals (A) and (B) on transmission-unit are for testing purposes.

NOTE 3. Dial spotter springs operate when pulsing springs are closed.

NOTE 4. Telephone is furnished with ringer wired as shown—L1 to ground. L2 to ground—move black cap lead from terminal 15 to terminal 8 on transmission-unit. For bridged (metallic) ringing, move red ringer lead from terminal 9 to terminal 8 on transmission-unit.

NOTE 5. Do not reverse line leads. Polarity of line must remain as shown.

NOTE 6. If bells of biased ringer tap when dialing from another telephone on the line, reverse red and green ringer lead connections at transmission-unit terminals 9 and 16.

NOTE 7. Telephone will operate as standard telephone with or without printed wire board.

NOTE 8. All resistors are $\frac{1}{2}$ watt, carbon, $\pm 10\%$ unless otherwise indicated (figure 10).

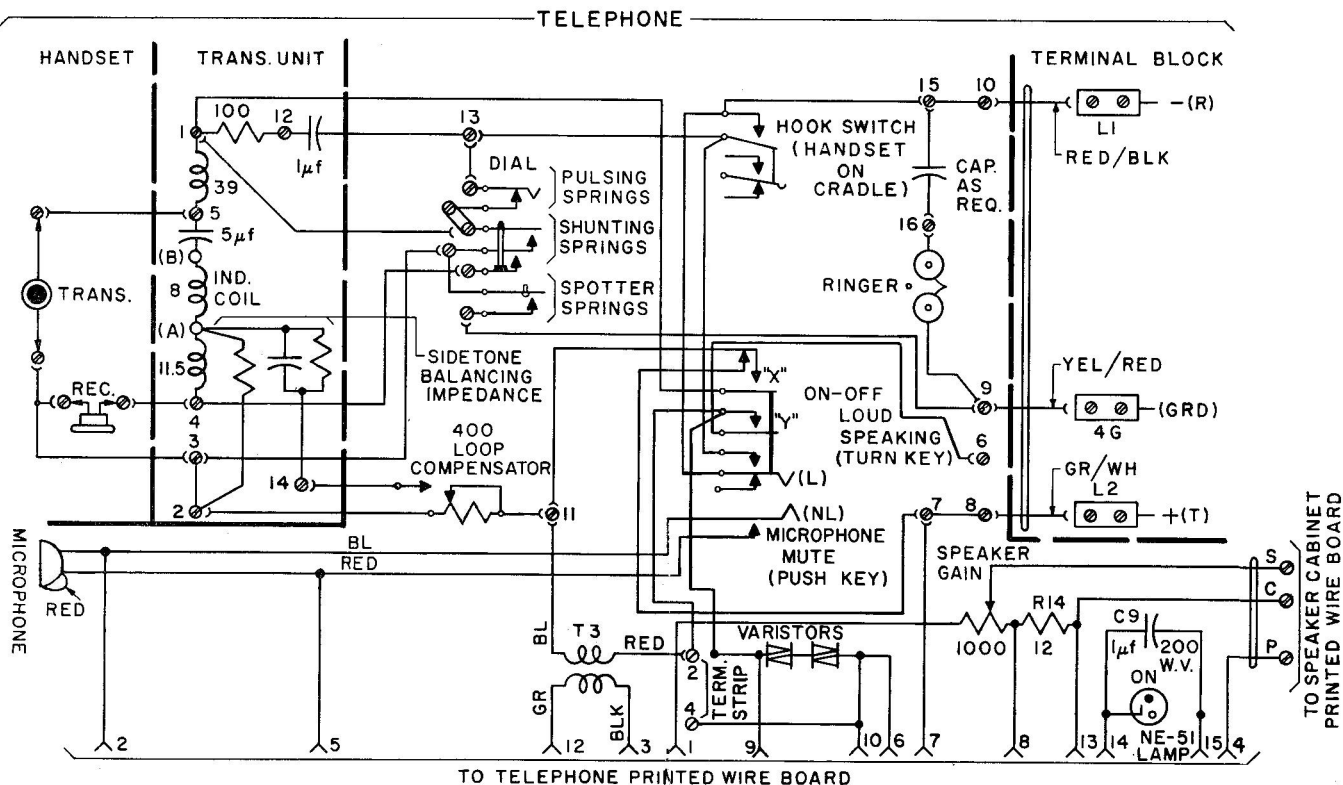


Figure 10. Schematic (S.A.T.T. A and B).

Select for the telephone terminal-block a location which will allow ample cord length and where the terminal-block will not be conspicuous. To install (figure 5, 6, or 7).

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

Mount the terminal-block, using the two screws supplied with the terminal-block.

Slip the tie-cord clip ring (figure 5, 6, or 7) over the terminal-block cover-screw post.

Notice which color is employed by the telephone line cord and follow connecting instructions accordingly (bulletin 700-80, §3).

FOR BRIDGED RINGING (NON *S.A.T.T.), connect line cord and interior wire per figure 7*.

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

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 200Ω or less, set loop compensator at 2.
- { If conductor-loop resistance is over 200Ω , set loop compensator at 0.

Review bulletin 700-80, §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 is in place, and replace the terminal-block cover.

Stamp directory-number on number card as in bulletin 700-80, §14 or §15.

Telephone and speaker cabinet printed wire board schematic is shown on page 10, figure 11.

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

5. INSTRUCTIONS TO USER

5.1 Handset operation. For handset operation use the desk set as though it were an ordinary telephone.

5.2 Loud-speaking operation. To *answer* a call, turn the turn key *clockwise*. The ON lamp flashes. When you hear dial tone, dial the number, and listen for ring back tone or busy tone.

Upon hearing the distant party, adjust the loudspeaker volume control (figure 1), and converse.

When you wish to hang up, simply turn the turn key (figure 1) *counter-clockwise*; the ON lamp (figure 1) will cease flashing.

TRANSMISSION. As the speaker moves away from the microphone, the sound in the distant receiver decreases. When the *Loud-Speaking Telephone* is in a quiet room in which sound carries well, the microphone will pick up satisfactorily words spoken several feet away. Under adverse conditions, such as a noisy room or a poor connection, or on long-distance calls, speak within 2 feet of the microphone. Keep the side of the *Loud-Speaking Telephone* at not more than a 90° angle (figure 12) to the nearest sound path from the loudspeaker.

RECEPTION. Adjust the volume control so that you can hear the distant party's voice distinctly and without effort. Do not set the volume control higher than necessary; to do so may let enough sound from the loudspeaker enter the microphone to cause a howl which will be heard at both stations. Increasing speaker volume higher than is necessary will cause very undesirable sidetone (echo) in the distant subscriber's receiver.

PRIVACY CONTROL. The turn key, while pressed, short-circuits the microphone. If, while using the instrument as a *Loud-Speaking Telephone*, you do not wish the distant party to hear room conversation, hold a finger on the turn key.

RECALL. If you wish to recall "flash" the operator, turn the turn key alternately until the operator answers. (Or, if you wish to talk privately with the operator, transfer to handset operation and push one of the hookswitch plungers slowly several times in the usual way).

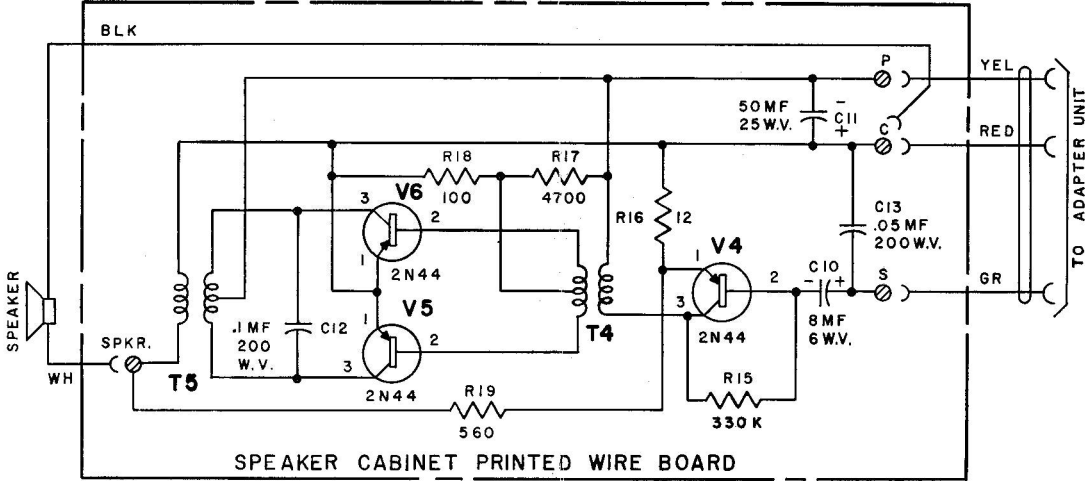
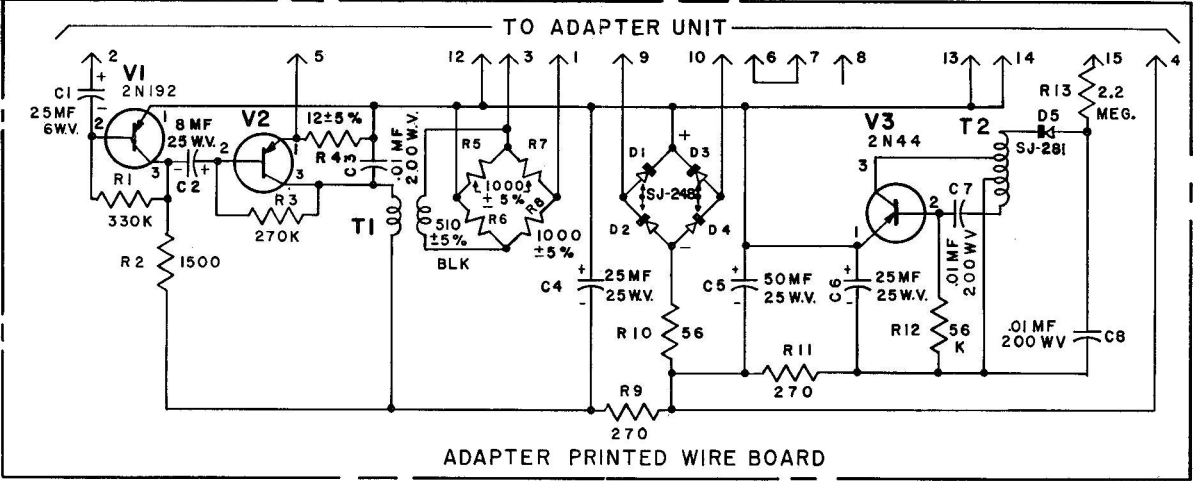


Figure 11. Telephone and speaker cabinet printed wire board schematic.

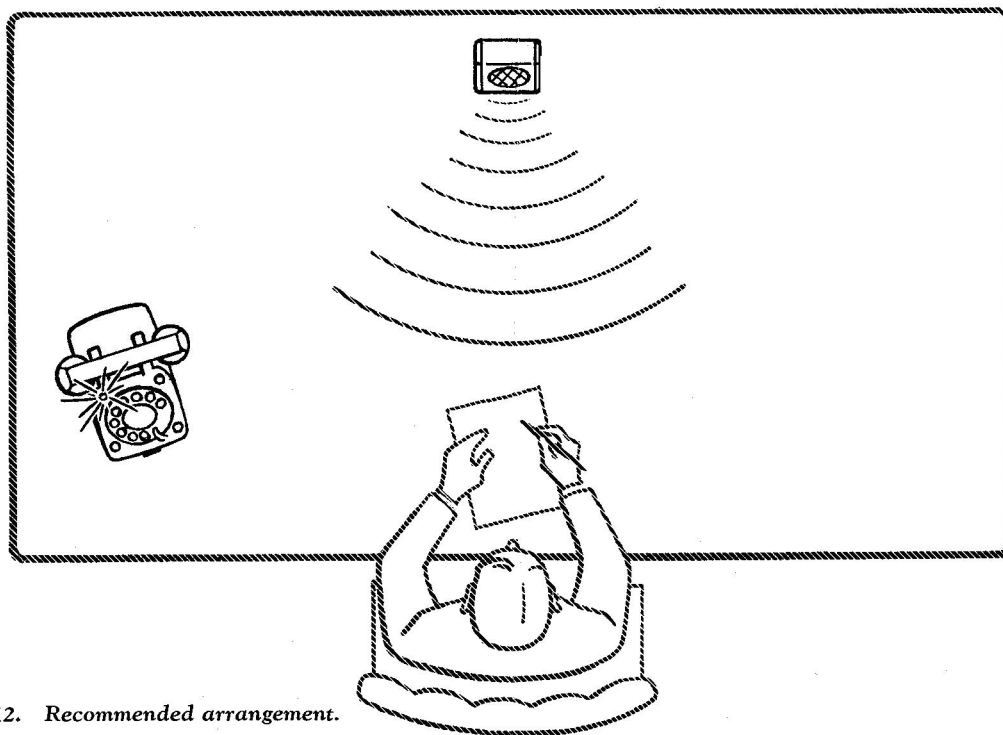


Figure 12. Recommended arrangement.

5.3 Conference. The Loud-Speaking Telephone can be useful during conferences. Unless the room is especially large and noisy, the microphone will pick up all voices in the room. Leave the telephone in one place, do not turn the microphone toward each conferee as he speaks.

5.4 Change of method of operation. If, at any time during a conversation, you wish to change from loudspeaker operation, lift the handset, and turn the turn key counter-clockwise. The ON light will cease flashing. Continue the conversation thru the handset.

If, during a conversation, you wish to change from handset operation to loudspeaker operation, turn the turn key clockwise, and replace the handset.

Automatic Electric Company suggests that the subscriber be informed by the installer of the proper method for operating the Type 88T Loud-Speaking Telephone Set.

6. LOUDSPEAKER OPERATION PRINCIPLE

Figure 13 illustrates the loud-speaking operation. When the subscriber using the *Loud-Speaking Telephone* speaks, his voice is picked up by the microphone, amplified by the *transistor microphone amplifier*, and connected thru the balance network out on the telephone line to the distant subscriber.

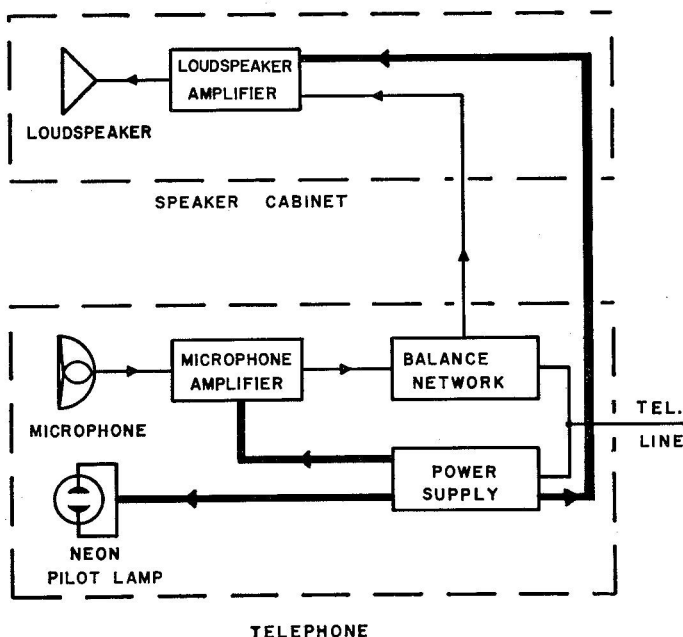


Figure 13. Block-diagram—loud-speaking operation.

6.1 Balance network. The purpose of the balance network (figure 13) is to couple the microphone amplifier and loudspeaker amplifier, but keep the coupling between the microphone amplifier and loudspeaker amplifier at a minimum.

7. TROUBLE SHOOTING AT INSTALLATION

7.1 Verify the subscriber's report of trouble by making calls using the handset and the loud-speaking section. If the loud-speaking section operates properly but the handset does not operate correctly, employ the methods normally used to repair standard type 80 telephones, bulletin 700-80. (Also check the adjustment of the springs on the turn key).

If the trouble seems to be in the loud-speaking section, follow this procedure:

1. Make a visual check of the wiring in the telephone and loud-speaker cabinet as well as the adjustment of the springs on the turn key and hookswitch.

2. If the microphone section is functioning properly but the loud-speaker section is not, the trouble is probably in the loudspeaker cabinet printed wire board. Disconnect the five wires leading to the printed wire board and try a replacement board, (see figure 14 for connections).

3. If the microphone section or both the microphone and loud-speaker sections do not operate, the trouble is probably in the telephone printed wire board.

It is not advised that the operating company attempt to make any repairs on the printed wire boards. If replacement boards are used, time and cost will usually be saved.

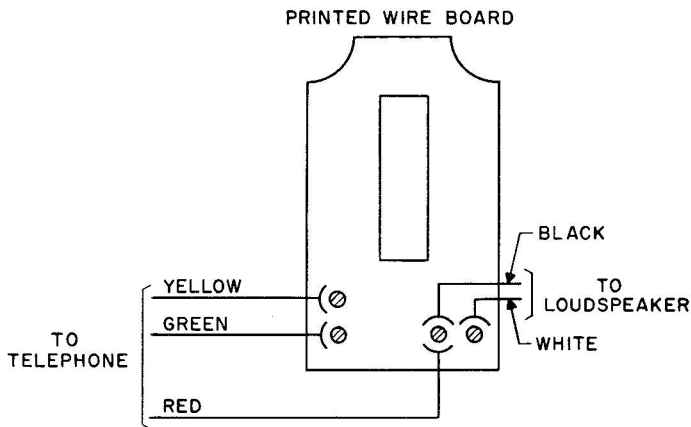


Figure 14. Loudspeaker printed wire board connections.

8. PARTS-ORDERING INFORMATION

<i>Part</i>	<i>Order from A. E. Co. as</i>
Amplifier, microphone (printed wire board).....	D-35295-A
Amplifier, speaker (printed wire board).....	D-35296-A
Cap, lamp.....	D-59300-A
Cord, 3-conductor 6' 3" (loudspeaker cabinet).....	D-543215-A-M*
Cord, handset (Retractable Cord).....	D-543118-A-M*
Housing (black).....	D-490047-A
Knob for volume control (clear).....	D-59299-A
Knob (turn key).....	D-59282-A
Lamp (G. E. Co. #NE-51).....	FD-1023-AD
Lamp socket assembly.....	D-94087-A
Loudspeaker cabinet (with printed wire board, speaker, and cord).....	L-7033-AO-MO*
Microphone.....	D-38372-A
Speaker (Jensen P-3VA, 3").....	FD-1054-AC
Telephone**, type 88T, with black housing (includes handset, handset cord, and 3-conductor cord).....	NA-88200-CSA
Transformer assembly.....	D-95102-A
Turn key.....	D-735367-A
Type 88 power supply.....	L-7038-AO
Volume control (less knob).....	D-284299-A

*For ordering specific color, see page 16.

**Non-S.A.T.T. telephone with untuned ringer.

9. TELEPHONE COLORS AVAILABLE

<i>Color</i>	<i>Letter Designation</i>
Black.....	A
Sand beige.....	B
Dawn grey.....	C
Jade green.....	D
Classic ivory.....	E
Garnet red.....	F
Turquoise.....	G
Sunlight yellow.....	J
Forget-me-not blue.....	K
Camelia pink.....	L
Gardinia white.....	M

Insert one of the above letters for color desired (e. g., when ordering a loudspeaker cabinet, specify L-7033-DO for jade green).

10. ADDITIONAL INFORMATION

For additional information on installation, adjustment, modifications*, or repair, see A. E. Co. bulletin 700-80—Telephone Type 80—Installation and Adjustments.**

*Except that superimposed-ringing ringer D-56548-AVT (listed in bulletin 700-80, June 1958 edition [issue 5]) does not mount in the Type 88T Transistorized Loud-Speaking Telephone.

**See also A. E. Co. circular 1905—Replacement Parts for Automatic Electric Telephone Special Telephones Substation Equipment.

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