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LOUD-SPEAKING TELEPHONE CONVERSION SET TYPE 88AT (TRANSISTORIZED)

1. APPLICATION

This conversion set gives loud-speaking service to a subscriber who has an *Automatic Electric Company* Standard Type 80 Telephone, Key Feature Telephone Type 85A, 85B, or 85C, Key-Telephone System Type 86-10A or 10A1, or a Western Electric Company Telephone set of the "400" series or "500" series used in a Western Electric Company No. 1A or No. 1A1 Key-Telephone System.

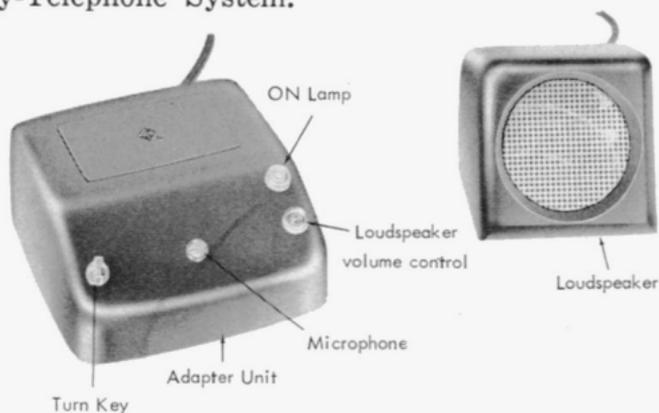


Figure 1. Loud-Speaking Telephone Conversion Set Type 88AT (Transistorized). Adapter-Unit at left, Loudspeaker at right.

2. DESCRIPTION

The conversion set (figure 1) comprises a loudspeaker, 3-conductor cord, 6-conductor cord, and an adapter-unit (consisting of a turn key, microphone, flashing indicator lamp, and a volume control.)

The purpose of the flashing lamp is to indicate to the subscriber that he has seized the line.

Under certain operating conditions, normal telephone-line power may not be sufficient for the transistorized *Loud-Speaking* telephone. In this case it may be necessary to use a separate Type 88 power supply. One of the 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 to 500 ohms the maximum loop resistance for satisfactory dialing and ring cut-off operation. If this restriction is not possible, the separate Type 88 power supply should be employed.

3. INSTALLATION

3.1 Arrangement. Place the adapter-unit on the desk next to the telephone. The speaker should be placed at the necessary distance from the adapter-unit to minimize feedback. Never face the adapter-unit microphone directly at the loudspeaker.

4. INSTRUCTIONS TO USER

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

4.2 Loud-speaking operation. To answer a call, simply turn the turn key on the adapter-unit clockwise. The ON lamp flashes. When you hear dial tone, dial the number, and listen for ringback tone. Adjust loudspeaker volume control for proper volume.

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 counter-clockwise; the ON lamp will cease flashing.

RECEPTION. Adjust the volume control so that you can hear the distant speaker'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.

TRANSMISSION. As the person speaking moves away from the microphone, the sound in the distant receiver decreases. When the *Loud-Speaking Adapter-Unit* 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, a poor connection, or on long distance calls, speak within 2-feet of the microphone. Keep the side of the adapter-unit at an angle of not over 90° to the nearest sound path from the loudspeaker.

PRIVACY CONTROL. The turn key on the adapter-unit 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 finger on the turn key.

RECALL. If you wish to recall ("flash") the operator, turn the turn key alternately on the adapter-unit until the operator answers. (Or, if you wish to talk privately with the operator, transfer to handset operation as in §4.1, and press one of the hookswitch plungers on the telephone several times in the usual way.)

4.3 Conference. *The Loud-Speaking Telephone Conversion Set* 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 adapter-unit and telephone in one place; do not turn the microphone toward each conferee as he speaks.

4.4 Change of method of operation. If, at any time during a conversation, you wish to change from loudspeaker operation to handset operation, lift the handset on the telephone, and turn the turn key counter-clockwise. The ON lamp 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.

5. LOUSPEAKER OPERATION PRINCIPLE

Figure 2 illustrates the loud-speaking operation. When the subscriber using the *Loud-Speaking Adapter-Unit* speaks, his voice is picked up by the microphone, amplified by the transistor microphone amplifier (figure 5), and connected thru the balance network out on the telephone line to the distant subscriber.

5.1 **Balance network.** The purpose of the balance network (figure 2) is to couple the microphone amplifier and loud-speaker amplifier, but keep the coupling between the microphone amplifier and loudspeaker amplifier at a minimum.

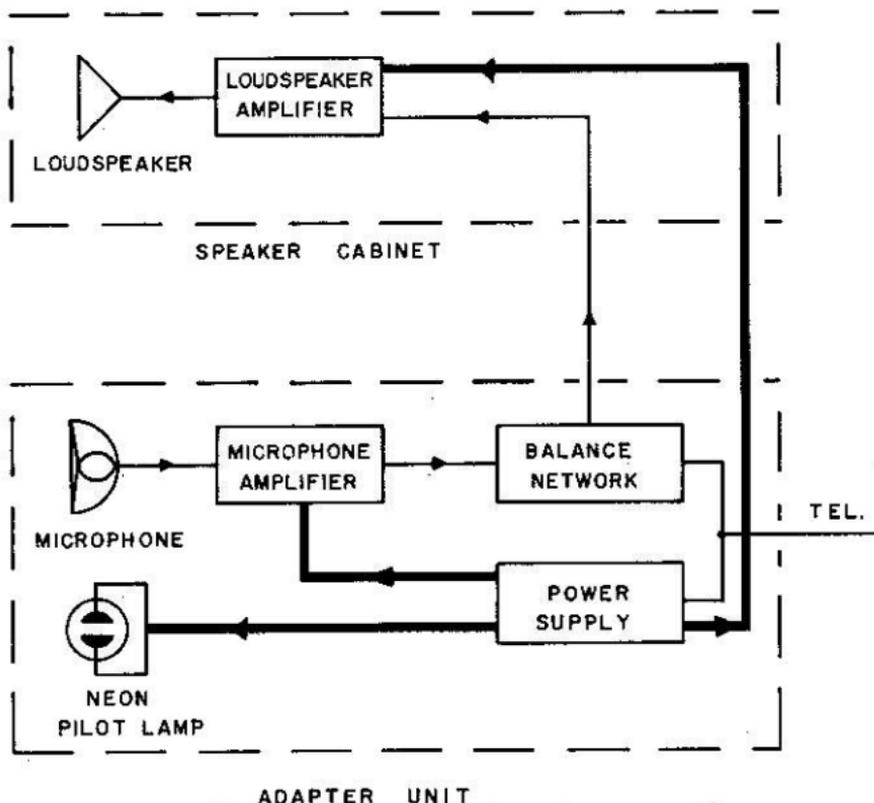


Figure 2. Block diagram, loudspeaker operation.

6. TROUBLESHOOTING AT INSTALLATION

Verify the subscriber's report of trouble by making calls using (1) the handset, and (2) the loud-speaking section. If the loud-speaking section operates properly, but the handset does not operate correctly, use the methods normally used to repair the telephone. Continued on page 10.

7. CONNECTIONS TO DIFFERENT TELEPHONES

7.2 Connect the loudspeaker cord to the adapter-unit. Connect the adapter-unit to the telephone (refer to different types of telephones in this bulletin). The unit is ready for operation.

7.3 Automatic Electric Company Type 80, 85A, 85B, or 85C telephones. Connect the adapter-unit 6-conductor-cord red, green, yellow, and black leads to telephone set as in figure 3.

7.4 Automatic Electric Company Type 86-10A or 10A1 key-telephone system. For use with the 10A key-telephone system, connect the adapter-unit 6-conductor-cord red, green, yellow, and black leads to the telephone set as in figure 4A. For use with the 10A1 key-telephone system, connect the adapter-unit 6-conductor-cord red, green, blue, yellow, black and white leads to the telephone set as in figure 4B.

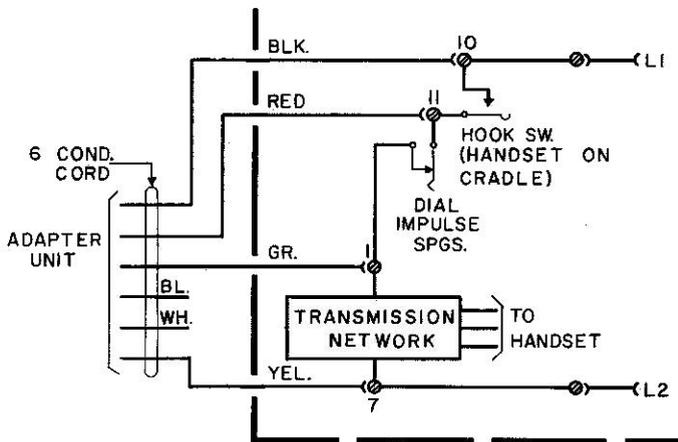


Figure 3. Connections to A. E. Co. Type 80, 85A, 85B, and 85C telephones.

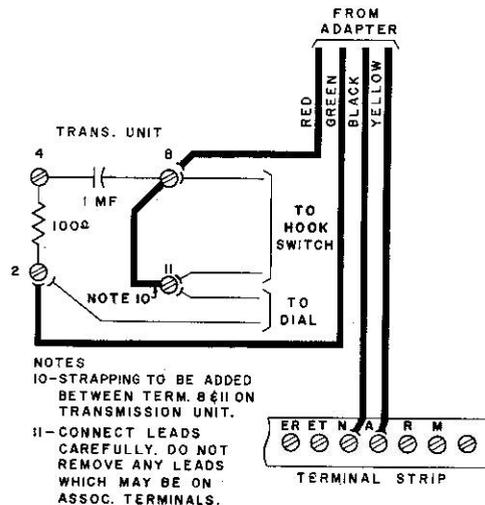


Figure 4A. Connections to A. E. Co. Type 86-10A key-telephone system.

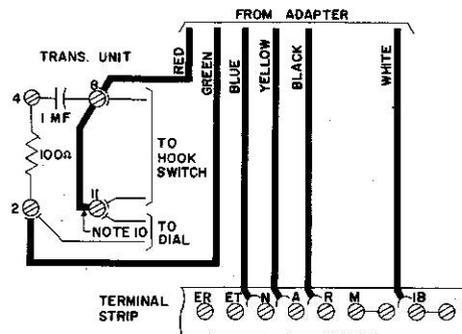


Figure 4B. Connections to A. E. Co. Type 86-10A1 key-telephone system.

**LOUD-SPKG. CONVERSION SET
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7.5 Western Electric Company series "400" telephone set used in key-telephone system No. 1A. Connect the adapter-unit 6-conductor-cord green, red, yellow, and black leads to the telephone set as in figure 6.

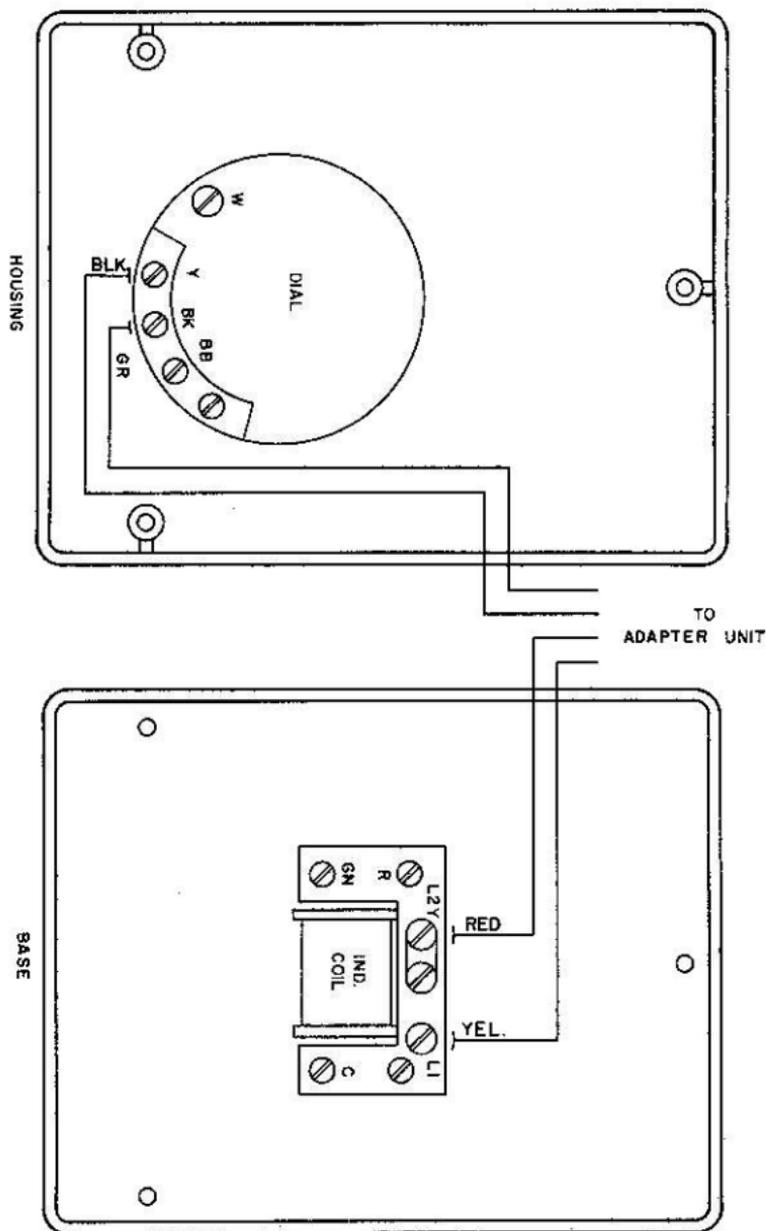


Figure 6. Connections to W. E. Co. series "400" telephone set used in key-telephone system No. 1A.

7.6 Western Electric Company series "500" telephone set used in key-telephone system 1A. Connect the adapter-unit 6-conductor-cord black and red leads to the telephone set as in figure 7. Tape both of the yellow and green leads.

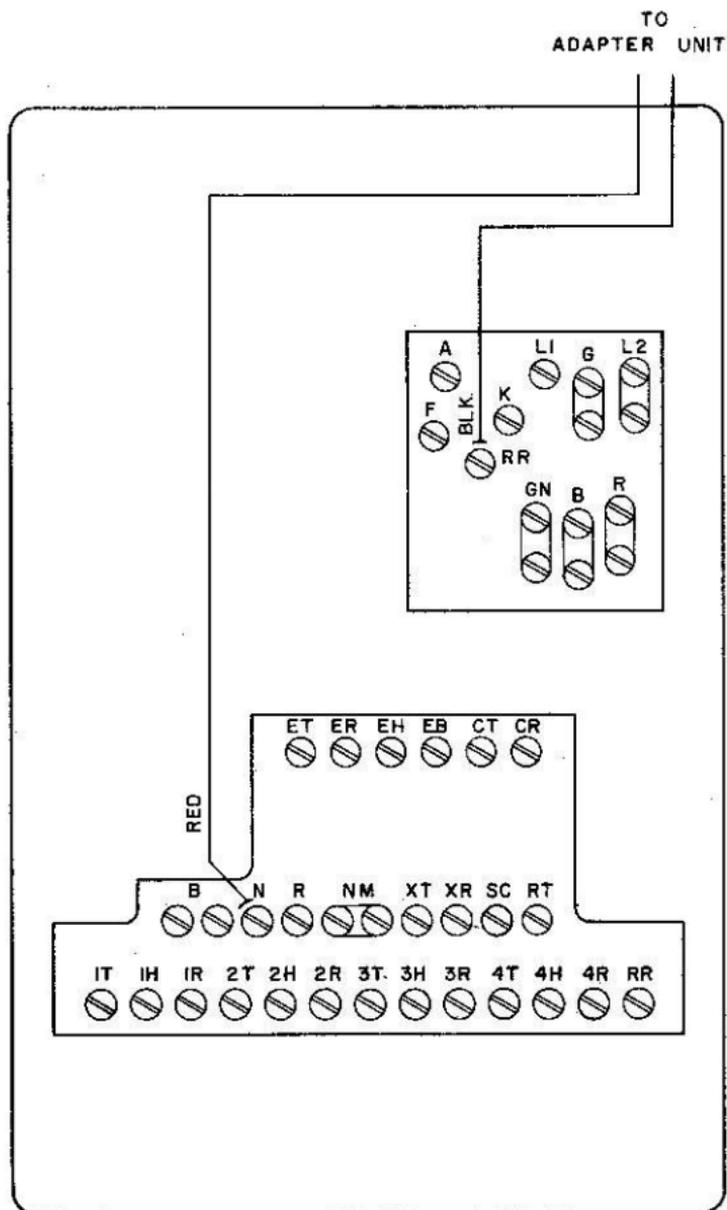


Figure 7. Connections to W. E. Co. series "500" telephone set used in key-telephone system No. 1A.

7.7 Western Electric Company series "500" telephone set used in key-telephone system No. 1A1. Connect the adapter-unit 6-conductor-cord yellow, green, red, and black leads to the telephone set as in figure 8

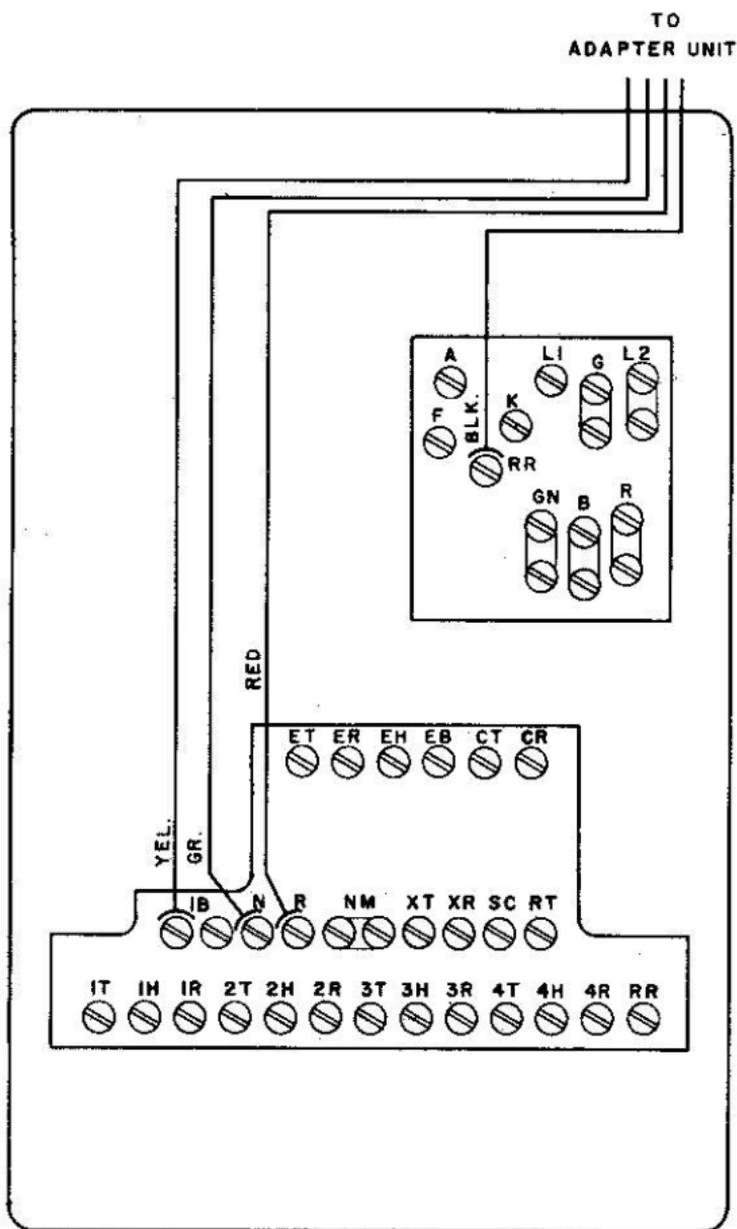


Figure 8. Connections to W. E. Co. series "500" telephone set used in key-telephone system No. 1A1.

8. TROUBLESHOOTING AT INSTALLATION (Continued)

If the trouble seems to be in the adapter-unit, follow this procedure: (1) Check the adjustment of the springs on the turn key. (2) Make a visual check of the wiring in the adapter-unit and loud-speaking cabinet. (3) If the microphone section is functioning properly, but the loudspeaker section is not, the trouble is probably in the loudspeaker cabinet printed wire board (figure 5).

Disconnect the five wires leading to the printed wire board and try a replacement board. See figure 9 for connections. If the microphone section or both the microphone and loudspeaker sections do not operate, the trouble is probably in the adapter-unit printed wire board (figure 5).

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

Note: The subscriber's telephone will operate as a regular telephone with either the adapter-unit or loudspeaker printed wire board removed.

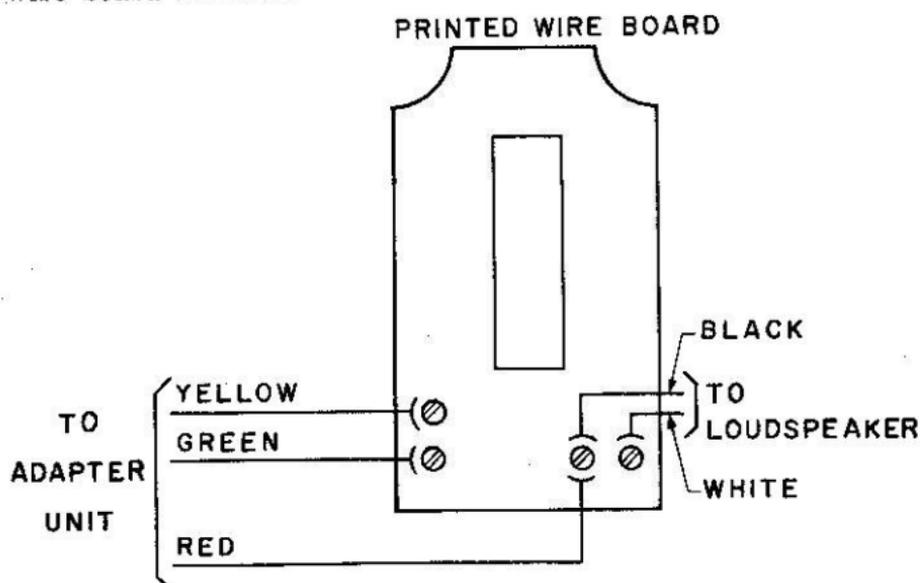


Figure 9. Loudspeaker printed wire board connections.

9. CIRCUIT PRINCIPLE

When the handset is being used, the telephone circuit is similar to that of a standard type telephone. The turn key on the adapter-unit switches the line from the standard telephone circuit to the loudspeaker amplifier circuit.

A block diagram of the loud-speaking operation is shown in figure 2. When a subscriber using the adapter-unit speaks, his voice is picked up by the microphone amplifier, fed thru the balance network out on the telephone line to the distant subscriber. When the distant subscriber speaks, his voice travels thru the telephone line and balancing network into the loudspeaker amplifier, is amplified by this amplifier and reproduced by the loudspeaker.

The amplifiers are entirely powered by the telephone line. Some of the d-c voltage from the telephone line is fed into the power supply which distributes the power to the amplifiers and pilot lamp.

The purpose of the balance network is to couple the microphone amplifier and loudspeaker amplifier to the telephone line, but keep the coupling between the microphone amplifier and loudspeaker amplifier at a minimum. Since there is acoustical coupling between loudspeaker and microphone, any electrical coupling between the amplifiers will increase the tendency for acoustical feedback (howl). The balance obtainable is dependent upon line impedance and will vary with different line conditions.

10. ORDERING INFORMATION

Loud-Speaking Telephone Conversion Set Type 88AT (complete as shown in figure 1).....Order as L-7034-AO to MO*

11. PARTS-ORDERING INFORMATION

<i>Part</i>	<i>Order from A. E. Co. as</i>
Adapter-unit housing	D-490049-A-M*
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, 6-conductor, adapter-unit (Black).....	D-543286-A
Cord, 6-conductor, adapter-unit (Color).....	D-543286-B
Type 88 power supply.....	L-7038-AO
Knob for volume control (clear).....	D-59299-A
Knob (turn key).....	D-59282-A

Continued on page 12.

*See page 12.

12. ORDERING INFORMATION (Continued)

Lamp (G. E. Co. #NE-51).....	FD-1023-AD
Lamp socket assembly.....	D-94088-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
Transformer assembly	D-95103-A
Turn key	D-735367-A

*For ordering specific color, see below:

<i>Color</i>	<i>Letter Designation</i>
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
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.)