

# **AUTOMATIC ELECTRIC COMPANY**

## **HANDSETS**

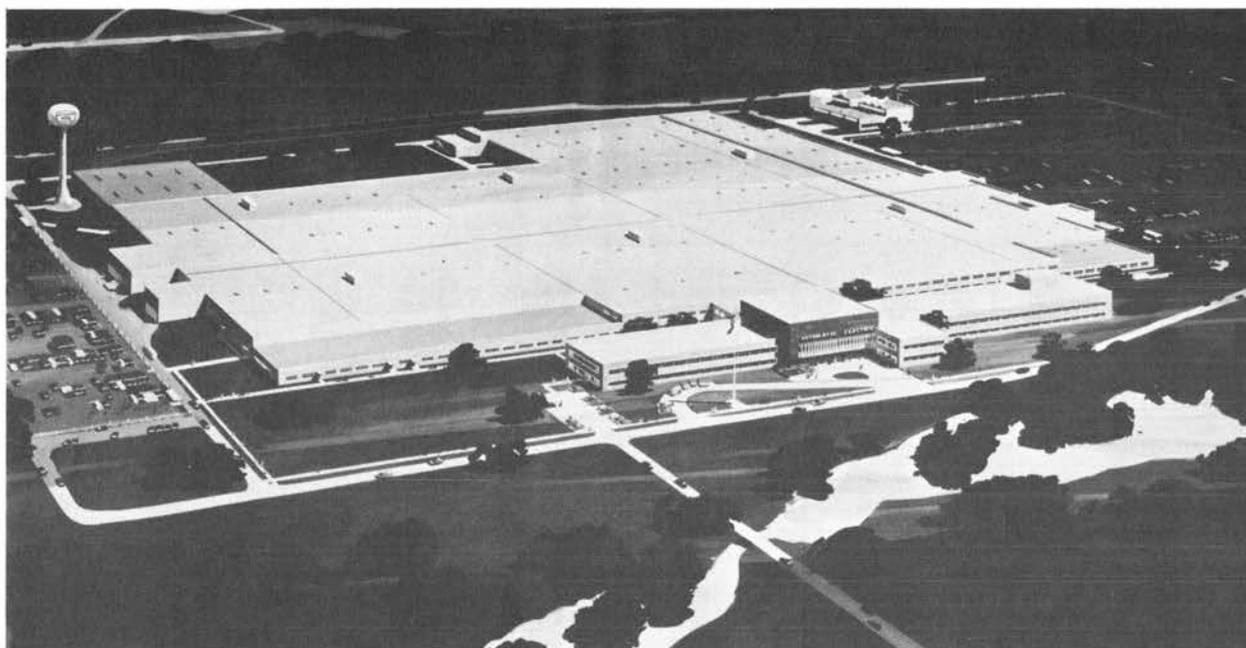
**Type 81 and 810**

**Type 820 SOUND-BOOSTER<sup>TM</sup>**

**Type 84 and 840**

Technical  
Bulletin **473-937**

***AUTOMATIC ELECTRIC***  
SUBSIDIARY OF  
GENERAL TELEPHONE & ELECTRONICS **GTE**



Automatic Electric Company General Offices, Laboratories and principal manufacturing facilities are located in this new 37 acre plant in Northlake, Illinois, a suburb of Chicago. Branch factories are located in Genoa, Illinois and Waukesha, Wisconsin.

These modern facilities are devoted exclusively to the manufacture of a complete line of automatic telephone equipment, electrical control components and systems.

DESCRIPTION AND FIELD MAINTENANCE  
HANDSETS, A.E.CO. TYPES 81 AND 810

## 1. GENERAL

1.01 This section provides descriptive information and maintenance procedures for A.E. Co. Types 81 and 810 handsets.

## 2. DESCRIPTION

2.01 The 81 and 810 handsets are identical in external appearance (see Figure 1). All of the molded parts are thermoplastic material. Handset components (except cords) are shown in Figures 3 and 4. Handset numbers, telephone set used on, and replacement handset cord numbers are given in Table 1.

2.02 The Type 810 handset is molded of styrene in colors to match the housing of A.E. Co. telephone sets and is arranged to accommodate the coordinated Type 810 transmitter and receiver units, which match the electrical characteristics of the A.E. Co. self-compensating transmission network. In the past, the black Type 81 handset was molded of phenolic and handsets of other colors were molded of butyrate. All Type 81 handsets now being assembled have the same styrene shells and caps as the Type 810. The Type 81 handset is arranged with slightly different hardware and cordage than the Type 810 to accommodate the Type 81 transmitter and receiver units used with the A.E. Co. manually-adjusted rheostat-type circuit. In either case the transmitter unit, like those in A.E. Co. handsets of earlier manufacture, is connected into the circuit by means of contact springs which fit into grooves molded into the transmitter cavity of the handset shell. Connections at the Type 810 receiver are made directly to screw terminals on the back of the unit; on the Type 81 receiver, a set of contact springs in the receiver cavity of

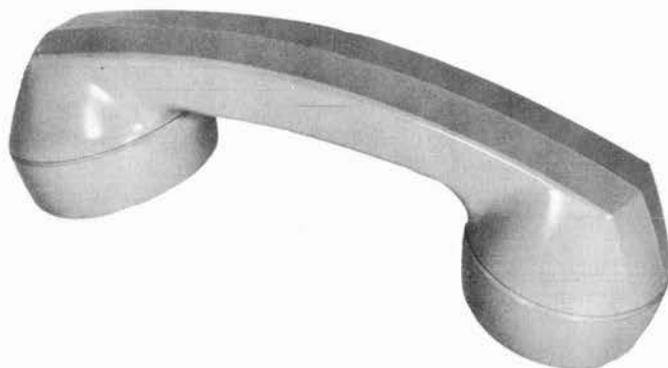


Figure 1. Type 81 or Type 810 Handset.

the handset shell provides connection. The two-types of handset capsules should not be interchanged; transmitters may be distinguished only by their ink-stamped code markings, while the Type 81 receiver may be identified by the external jounting of its magnet, as well as by the code. A three-conductor cord further distinguishes a Type 81 handset from a Type 810, which uses a four-conductor cord. The additional conductor provides a separate path to the receiver, free of d-c flow, to prevent acoustic shock when the dial goes off-normal. Present production cords for Type 810 handsets are constructed of PVC-jacketed cordage with four PVC-jacketed conductors in line cord colors: red, green, yellow and black. At the handset end a tapered grommet surrounds the jacket to prevent abrasion at the entrance hole, and a cord clamp screwed to the transmitter rim contact spring provides strain relief. On an 810 handset cord, a standard J-clip strain relief is provided at the telephone set end.

2.03 Where the Type 81 or 810 handset is used on a paystation, an armored handset cord (cord No. 4PC3, see Figure 2) can be used as protection against vandalism. It is a four conductor cord having a flexible stainless steel hose over a black plastic jacket. The handset end is equipped with a nylon bushing for anchoring the cord to the handset. At the paystation end, depressions in the steel hose accommodate a steel clip, two sizes of which are furnished with the cord. This clip securely anchors the cord to the paystation backplate at the point of entry. This cord is specifically designed for the Type 810 handset but can also be used on the Type 81 handset with a minor wiring change required because of the change from three to four conductors.

## 3. INSTALLATION

3.01 Installation procedures for cord connection at the telephone set are given in the related publications in the 473 series covering installation of the telephone set (see 476 series for paystations). Instructions for replacing cords, caps, and capsules are given in Part 4 of this section.

3.02 The armored handset cord can be installed as follows:

- (1) Remove the existing cord from the paystation housing and from the handset.
- (2) Pull the armored cord through the hole in the transmitter cavity. The nylon

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Table 1. Handset Numbers and Usage.

| HANDSET NO.<br>(Note 1) |           | TELEPHONE SET<br>USED ON<br>(A.E. CO. TYPES) | REPLACEMENT<br>HANDSET<br>CORD<br>(Note 1)                       | COLORS AVAILABLE         |   |
|-------------------------|-----------|--|--|--------------------------|---|
| TYPE 81                 | TYPE 810  |  |  |                          |   |
| L-9024-CO               |           | MANUALLY-ADJUSTED                            | 80, 82, 83, 85, 86,<br>87, 88T, 90                               | 3HA6                     | Black   |
| L-9024-DO               |           |  | LPA-80 Series<br>Paystations                                     | 3PC1**                   | Black   |
| L-9027-C*               |           |  | 80, 83, 85, 86, 87,<br>88T, 90, and LPA-80<br>Series Paystations | 3HA6**                   | Standard Colors for Tele-<br>phone Sets Except Black. |
| L-9031-CO               |           |  | 80T  | 3HA6                     | Black   |
| L-9032-C*               |           |  | 80T  | 3HA6                     | Standard Colors for 80T<br>Except Black.              |
| L-9044-CO               |           |  | 183  | 3HA15                    | Black   |
| L-9045-C*               |           |  | 183  | 3HA15                    | Standard Colors for 183<br>Except Black.              |
|                         | L-9047-C* | SELF-COMPENSATING                            | 860  | 4HA11                    | Standard Colors for 860                               |
|                         | L-9050-C* |  | 182  | 4HA4                     | Standard Colors for 182                               |
|                         | L-9053-CA |  | 80, 85, 86, 87, 183,<br>90M                                      | 4HA6                     | Black   |
|                         | L-9053-DA |  | LPB-80 Series Pay-<br>stations                                   | 4HA6**                   | Black   |
|                         | L-9054-C* |  | 80, 85, 86, 87, 183,<br>90M and LPB-80<br>Series Paystations     | 4HA6**                   | Standard Colors for Tele-<br>phone Sets Except Black. |
|                         | L-9054-DF |  | 90M When Used in<br>Housing for Primary<br>Security System       | D-543506-A               | Red   |
|                         | L-9060-CA |  | 880  | 4HA12                    | Black   |
|                         | L-9061-C* |  | 880  | 4HA12                    | Standard Colors for 880<br>Except Black.              |
|                         | NL-19585  |  | Leich PABX Turret  | NL-19584<br>(plug-ended) | Standard Colors for Leich<br>PABX Turrets.            |

\* Color Suffix.

\*\* An armored handset cord (4PC3) can be installed when the handset is used on a paystation (see paragraph 2.03).

Note 1: New handsets (identified by the L-prefix order numbers listed in this table) are equipped with a cord.

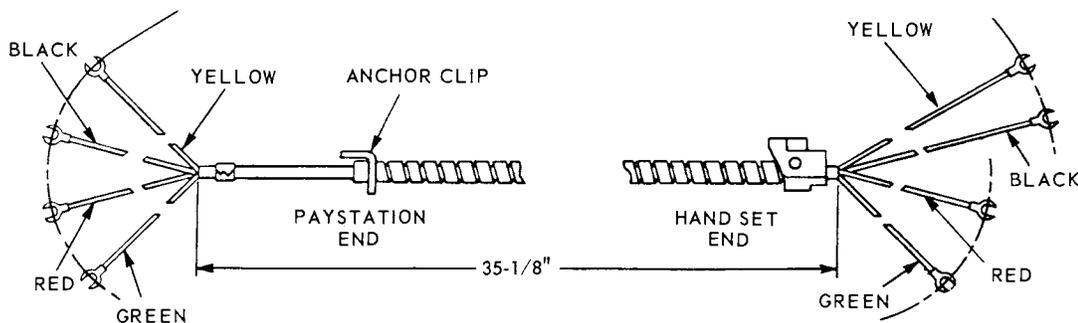


Figure 2a. Cord Dimension, Wire Color, and End Orientation.

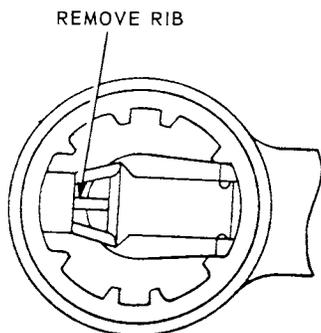


Figure 2b. Transmitter Cavity with Rib Location Shown.

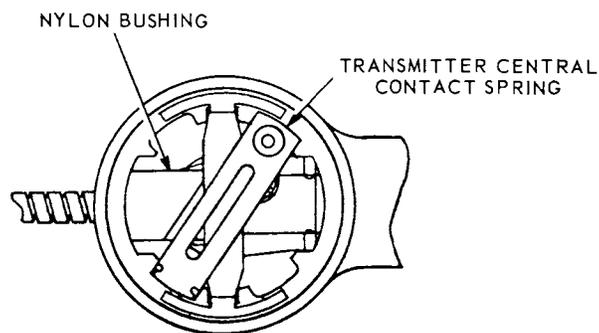


Figure 2c. Transmitter Cavity with Center Transmitter Spring and Nylon Bushing Location Shown.

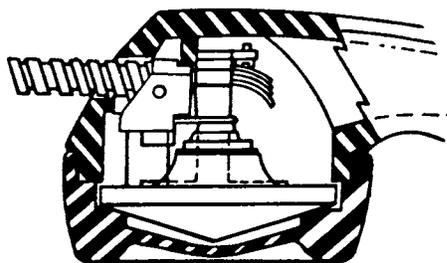


Figure 2d. Cross Section of Transmitter Cavity.

Figure 2. Armored Handset Cord.

- (3) Attach the leads of the armored cord to the terminals of the transmitter and receiver.
- (4) Replace the transmitter and receiver capsules and caps.
- (5) Remove the paystation upper housing. Loosen the upper housing equalizer spring and swing it to a vertical position.
- (6) Insert the armored cord through the side hole of the paystation backplate. The flat surface of the armor must face the front of the paystation.
- (7) Snap the shorter clip over the cord at the place where the armor is flattened. (The longer clip is required on older backplates.)

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- (8) Swing the equalizer spring back and tighten it firmly to lock the clip in place.
- (9) Connect the cord leads to the terminals of the paystation. (See the related publications in the 476 series.)

NOTE: On paystations equipped with a Type 81 handset, connect the black and green handset cord leads to the same terminal screw in the paystation.

4. FIELD MAINTENANCE

Caps and Capsules

4.01 If a cap or capsule is defective, it should be removed from the handset shell and a replacement cap or capsule should be installed. Caps can be removed by holding the handset with the face of the caps up and then unscrewing the caps. After a cap has been removed, a capsule can be lifted directly from the cavity. (The black and yellow handset cord leads connect directly to the receiver capsule in a Type 810 handset. These leads must be disconnected and reconnected when replacing a receiver capsule in the 810 handset.) Numbers for replacement parts are given in Figures 3 and 4.

NOTE: Although all handset caps and shells now being manufactured are thermoplastic material (styrene), earlier black caps and shells were phenolic. When replacing caps it is not desirable to mate components made of different materials since a cap of one material does not tighten down easily on and is difficult to remove from a handset shell made of the other material. Caps and shells made of the styrene material are lighter in weight than the older phenolic components.

Cords

4.02 Cords can be replaced as follows (see Table 1 for order numbers of replacement cords):

NOTE: Information on the armored handset cord used on some paystation handsets is provided in paragraph 3.02.

- (1) Remove the telephone set housing and disconnect the handset cord.
- (2) Remove the caps and capsules from the handset.
- (3) Lift out and remove the transmitter central contact spring.
- (4) Loosen the terminal screw on the central contact spring and rim contact

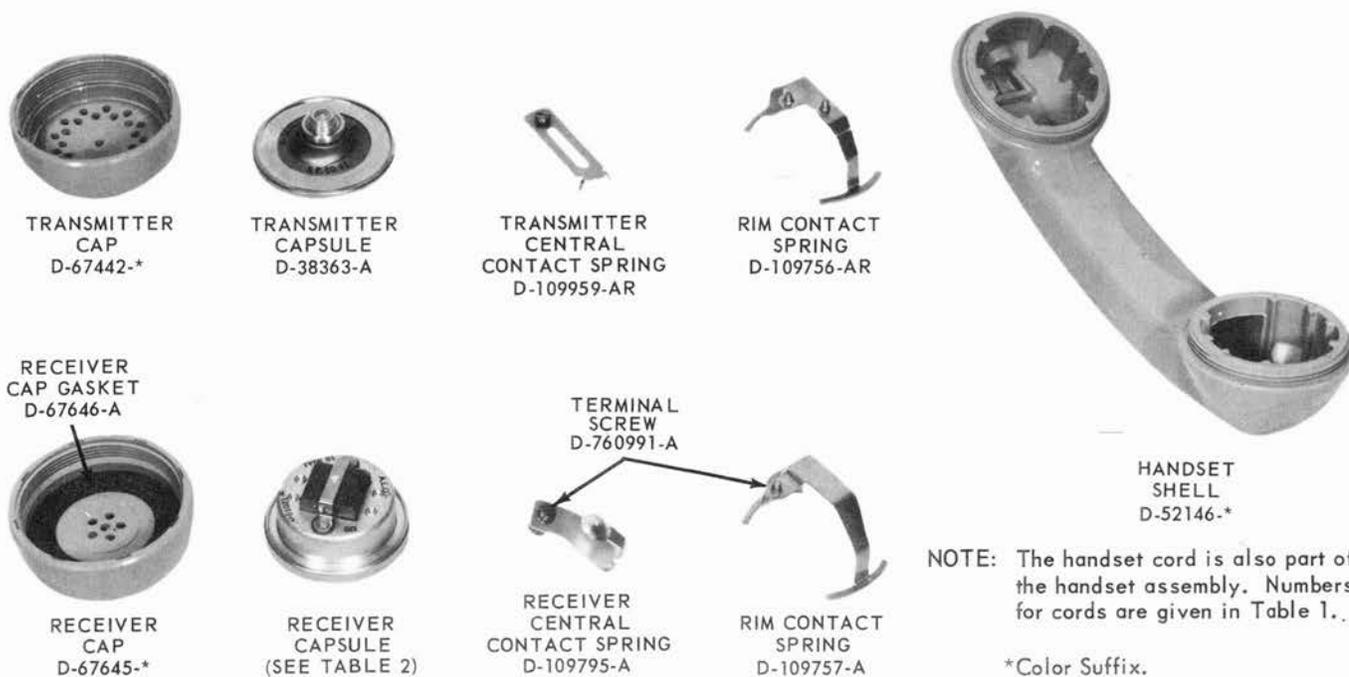


Figure 3. Type 81 Handset Components.



Figure 4. Type 810 Handset Components.

spring and disconnect the green and red leads (see Figures 5 and 6).

- (5) Loosen the strain relief clamp screw and free the clamp.
- (6) Loosen the terminal screws at the receiver end (see Figures 5 and 6) and remove the cord lead.

- (7) Pull out the old cord and feed the leads of the new cord through the entrance hole in the transmitter end of the handset. Feed the leads that must be connected at the receiver end through the handset handle and into the receiver cavity.

NOTE: Newer Type 81 handsets have a separate spade-tipped green wire connected to the transmit-

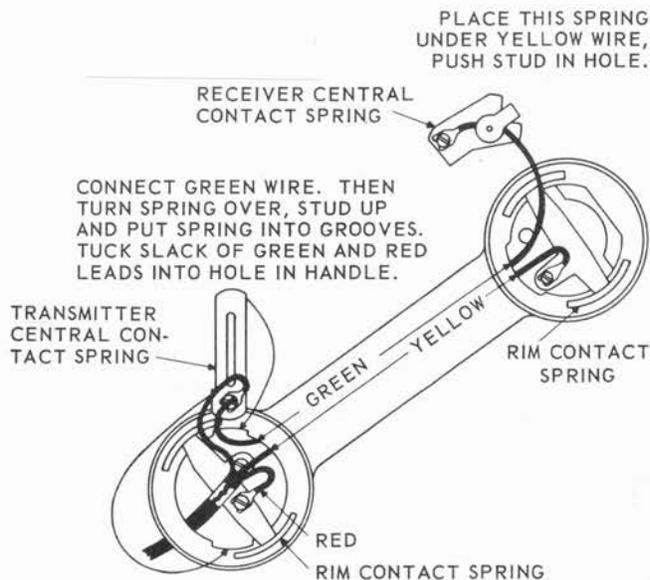


Figure 5. Internal Wiring for Type 81 Handset.

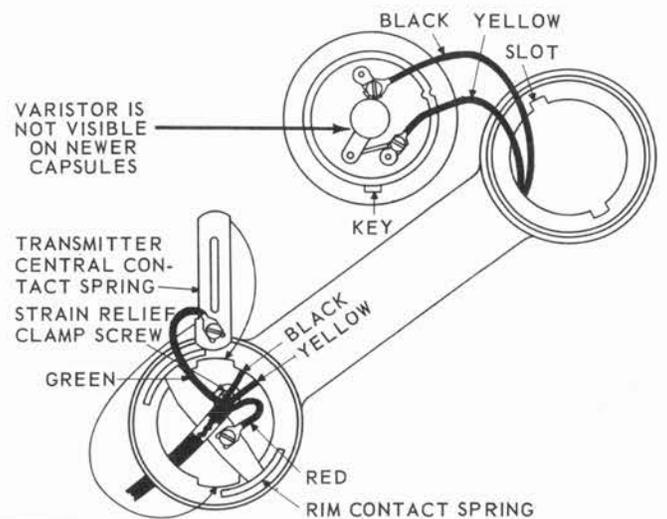


Figure 6. Internal Wiring for Type 810 Handset.

ter central contact spring and receiver central contact spring (as shown in Figure 5). This wire must be removed. The green lead of the replacement handset cord (3HA6) is of sufficient length to reach the receiver cavity and has two spade terminals so that it can be connected at both the transmitter central contact spring and receiver central contact spring.

- (8) Connect the handset cord leads, fasten the strain relief clamp, and replace the springs, capsules and caps.
- (9) Connect the cord at the telephone set and make a test call. Refer to the pub-

lication covering the telephone set for instructions on connecting a handset cord to the telephone set.

Table 2. Receiver Capsules for Type 81 Handsets.

| Handset No.                          | Receiver Capsule No. |
|--------------------------------------|----------------------|
| L-9024<br>L-9027<br>L-9044<br>L-9045 | D-51021-A            |
| L-9031-CO<br>L-9032                  | D-51022-A            |

DESCRIPTION, INSTALLATION, AND FIELD MAINTENANCE

A. E. CO. TYPE 820 SOUND-BOOSTER<sup>TM</sup> HANDSET

|    | CONTENTS                               | PAGE | Color              | Suffix |
|----|--|------|--------------------|--------|
| 1. | GENERAL . . . . .                      | 1    | Jade Green         | CD     |
| 2. | DESCRIPTION . . . . .                  | 1    | Classic Ivory      | CE     |
|    | Limitations . . . . .                  | 2    | Garnet Red         | CF     |
|    |  |      | Turquoise          | CG     |
| 3. | INSTALLATION . . . . .                 | 2    | Sunlight Yellow    | CJ     |
|    | Type 182 and 182A Telephones . . . . . | 3    | Forget-Me-Not Blue | CK     |
|    | Type 860A and 880 Telephones . . . . . | 4    | Camellia Pink      | CL     |
| 4. | MAINTENANCE . . . . .                  | 4    | Gardenia White     | CM     |
|    | Transmitter and Receiver . . . . .     | 4    |                    |        |
|    | Volume Control . . . . .               | 4    |                    |        |
|    | Receiver Amplifier . . . . .           | 5    |                    |        |
|    | Retractable Cord . . . . .             | 5    |                    |        |

The handset comes equipped with a matching retractile cord.

1. GENERAL

1.01 The Type 820 SOUND-BOOSTER handset (Figure 1) is similar to a Type 810 handset; but in addition, it contains a single stage, variable gain, transistorized amplifier which increases the sound volume from the receiver. It can be used with any self-compensating A. E. Co. telephone.

1.02 The amplifier of the handset puts special emphasis on high audio frequencies, where most hearing deficiencies occur; and, is capable of producing a gain of approximately 28db on loops of 0- to 1300-ohms. The amplifier is powered from the d-c voltage across the transmitter and therefore does not penalize the supervisory limit of the loops on which it is used.

2. DESCRIPTION

2.01 The Type 820 SOUND-BOOSTER handset (L-9075) is available in Black and ten colors. It will match the color of any A. E. Co. telephone to which it can be connected. The handset colors are:

| Color      | Suffix |
|------------|--------|
| Black      | CA     |
| Sand Beige | CB     |
| Dawn Gray  | CC     |



Figure 1. Type 820 SOUND-BOOSTER Handset.

2.02 The amplifier is mounted on a printed wiring card assembly which is inserted into the handset receiver cavity (Figures 2 and 3). The printed wiring card assembly is held in place by two threaded studs on the volume control unit. The threaded studs also serve as electrical connectors. The



Figure 2. Type 820 Handset (Top View).

volume control (Figure 2) consists of a 500-ohm potentiometer and is placed directly behind the receiver capsule. This placement allows ease of signal level adjustment by the thumb or forefinger, and keeps the volume control dial out of the way when a change of setting is not needed. When set at "0," the handset performs essentially the same as the Type 810 handset; as the volume control dial is rotated, the gain increases. When 9 is reached, the amplifier operates at full gain.

#### Limitations

2.03 The 820 handset is not suited for use with Leich instruments because of the 45° cradle contour of the Leich housing. Because it is unsuited from an electrical standpoint, the 820 handset should not be used with A. E. Co. telephones equipped with manually adjusted transmission networks.

2.04 The output of the amplifier is connected to the receiver capsule by two spade lugs (blue and white conductors). D-c

power is supplied to the amplifier by two conductors (red and green) connected to terminal screws in the transmitter cavity. The yellow and black conductors of the handset cord are connected to terminal screws (Figure 3) on the printed wiring card and provide the input to the amplifier. A standard four-conductor cord is used to connect the handset to the telephone. The amplifier (circuit shown in Figure 4) is located, electrically, between transmission unit terminals 3 and 4, and the receiver capsule.

### 3. INSTALLATION

3.01 Installation of the Type 820 SOUND-BOOSTER handset is basically the same for all types of telephones to which it can be connected. Exceptions arise with the Type 182, 182A, 860A, and 880 telephones. The following installation procedures are in three parts: first, installation for the majority of self-compensating telephones; next, for the Type 182 and 182A telephones; and last, for Type 860A and 880 telephones.

3.02 This installation procedure is for all self-compensating telephones excluding the Type 182, 182A, 860A, and 880 telephones. Proceed as follows:

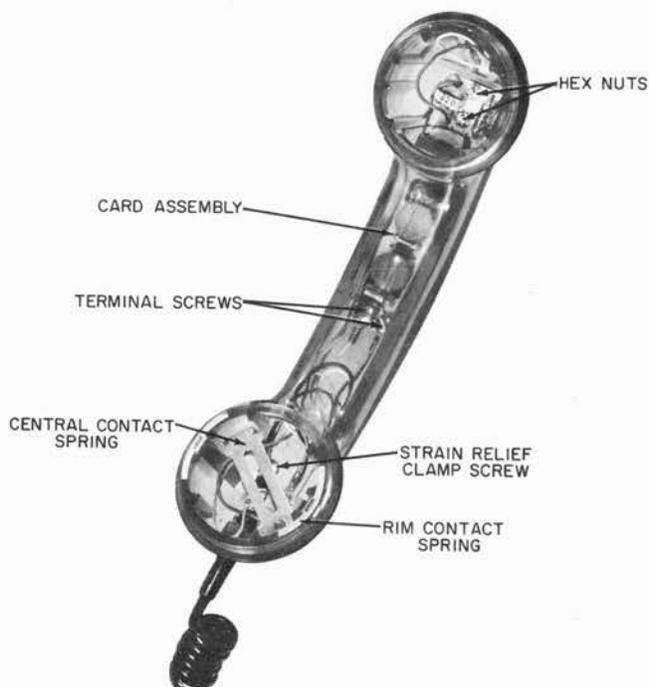
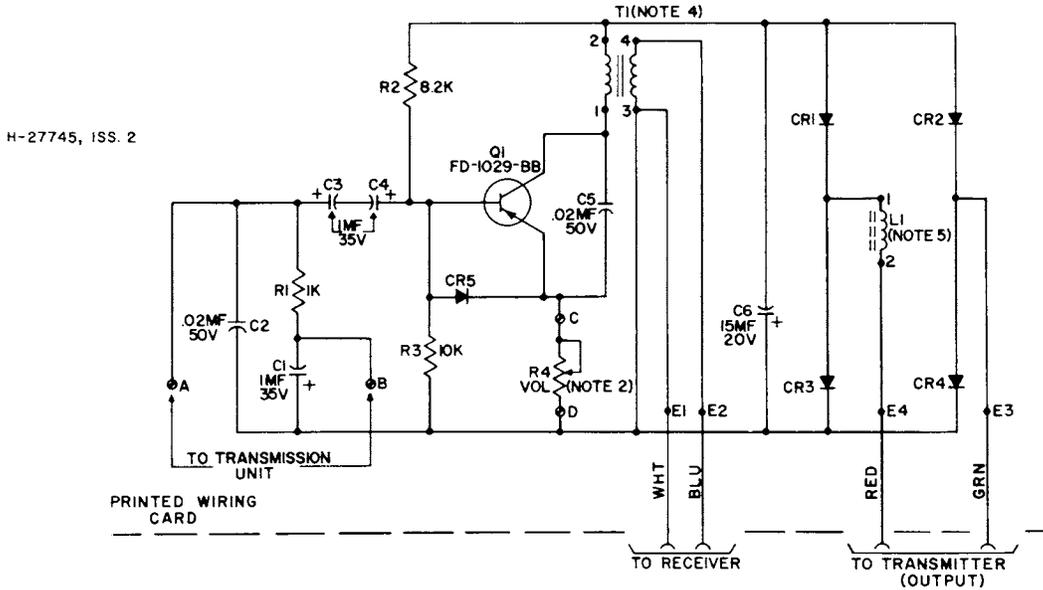


Figure 3. Type 820 Handset (Bottom View).



NOTES:

- 1- R1, R2 AND R3 ARE 1/4 WATT 10%.
- 2- R4 - 500 OHM POTENTIOMETER, REVERSE LOG TAPER.
- 3- CR1 THRU CR5 ARE FD-1029-DF.
- 4- T1 - AUDIO OUTPUT TRANSFORMER, P- 500 OHM, S- 150 OHM.
- 5- LI - ISOLATION CHOKE COIL.
- 6- LEADS CANNOT BE TRANSPOSED, CONNECTIONS MUST BE MADE AS SHOWN ON WIRING DIAGRAM.
- 7- FOR MAXIMUM OUTPUT, SOUND-BOOSTER HANDSET IS TO BE USED WITH TELEPHONE HAVING SELF-COMPENSATING CIRCUIT.

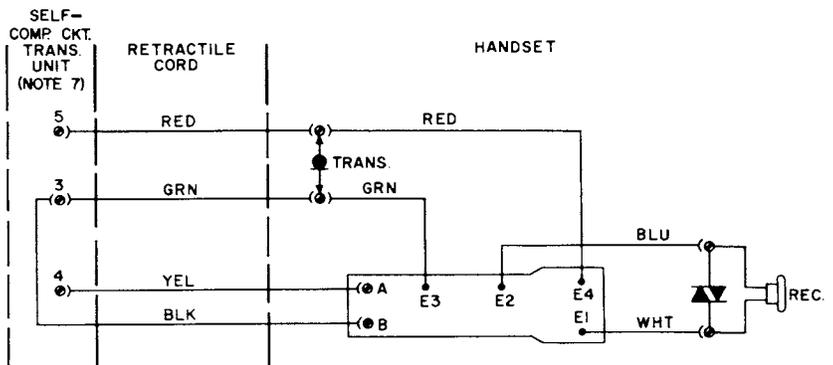


Figure 4. Schematic and Wiring Diagram, Type 820 SOUND-BOOSTER Handset.

- (1) Gain access to the transmission unit of the particular telephone to which the Type 820 handset is to be connected.
- (2) Loosen the terminal screws to which the four retractile cord leads are connected and remove the standard retractile cord handset.
- (3) Connect the Type 820 handset retractile cord leads to the following terminals on the transmission unit: Green-(3), Black-(3), Yellow-(4), and Red-(5). These connections are shown on the wiring diagram of Figure 4.

NOTE: Leads cannot be transposed.

- (4) Reassemble the telephone, make a test call, and check the operation of the volume control.

Type 182 and 182A  
Telephones

3.03 The Type 820 handset need not be modified for use with the Type 182 or 182A telephones. However, care must be exercised during installation of the handset to prevent the handset cord from interfering with normal telephone operation. The text applies to both telephones, except where indicated. Perform the following steps to install the handset:

- (1) Remove the handset and retractile cord from the Type 182 or 182A telephone.
- (2) Connect the J-clip strain relief clamp, on the retractile cord of the Type 820 handset, to the piercing provided in the telephone base-plate or molded base.

- (3) On the Type 182 telephone, remove the lacing cords from the existing leads inside the telephone.
- (4) Connect the Type 820 handset retractile cord leads to the 182 or 182A telephone per paragraph 3.02(3).
- (5) Retie the lacing cords on the Type 182 telephone including the leads from the Type 820 handset.
- (6) Position the extra cord length to the right of the J-clip strain relief clamp.

NOTE: Make certain that the extra cord length does not interfere with the dial night light control (Type 182 telephone). Do not position this extra cord length to the left of the J-clip strain relief clamp because there is insufficient space, and if the cord happens to slip under the hookswitch plunger, it is possible that it will keep the hookswitch in the "offhook" position.

#### Type 860A and 880 Telephones

3.04 The trim of the Type 820 handset's cord at the transmission unit end is not of sufficient length for use with Type 860A and 880 telephones. Therefore, the existing handset cord of the Type 860A or 880 telephone is substituted for the cord supplied with the Type 820 handset.

3.05 Remove the existing handset from the Type 860A or 880 telephone, leaving the handset cord attached to the telephone.

3.06 To remove the handset cord from the Type 820 handset, perform the following steps:

- (1) Remove the transmitter and receiver caps and capsules per instructions in paragraph 4.02(1).
- (2) Remove the volume control unit per instructions in paragraph 4.04(2) and (3).
- (3) Remove the card assembly per instructions in paragraph 4.05(3)-(6).

- (4) Remove the retractile cord from the handset per instructions in paragraph 4.06(3).
- (5) Install the substitute retractile cord per instructions in paragraph 4.06(4)-(6).
- (6) Reassemble the handset per instructions in paragraph 4.05(8)-(14).

#### 4. MAINTENANCE

4.01 The Type 820 SOUND-BOOSTER handset is seldom replaced in its entirety, as most difficulties can be remedied by replacing the defective component. The following instructions describe how to replace the various components associated with the Type 820 handset.

##### Transmitter and Receiver

4.02 To remove the transmitter and receiver capsules, proceed as follows:

- (1) Hold the handset in a horizontal position (caps up) and remove the transmitter and receiver caps and capsules. (To detach the receiver capsule, the blue and white leads must be disconnected.)
- (2) Replace the defective capsules. (Capsules are sealed units and cannot be repaired in the field.)
- (3) Reconnect the blue and white leads to the receiver capsule, return the capsules to their respective cavities, and replace the caps. (The capsules are so designed that they cannot be interchanged.)

4.03 The part numbers for the capsules used in the Type 820 handset are:

- (1) Transmitter - D-38379-A.
- (2) Receiver - D-51024-A.

##### Volume Control

4.04 To replace the volume control unit (D-284602-C1), proceed as follows:

- (1) Remove the receiver cap and capsule from the handset.
- (2) At the receiver cavity, remove the two hex nuts and lockwashers (Figure 3) on the visible end of the card assembly.

- (3) At the top-side of the handset, pull out the volume control unit.
- (4) With the replacement volume control unit set to its full counterclockwise position, insert the two threaded studs through the mounting holes in the handset.

NOTE: The "0" should align with the center line opposite the retractile cord on the handset.

- (5) With the two threaded studs through the holes in the card assembly, replace the lockwashers and hex nuts and tighten.
- (6) Replace the receiver capsule and cap.

#### Receiver Amplifier

4.05 When a problem develops in the receiver amplifier, the card assembly (WA-1095-A) is replaced in its entirety. To replace the card assembly, proceed as follows:

- (1) Remove the transmitter and receiver caps and capsules in accordance with paragraph 4.02(1).
- (2) Remove the volume control unit in accordance with paragraph 4.04(2) and (3).
- (3) Remove the central contact spring (Figure 3) from the transmitter cavity, loosen the terminal screw, and remove the two green leads.
- (4) Loosen the terminal screw on the rim contact spring (Figure 3) and remove the two red leads.
- (5) Pull the card assembly up and out of the receiver cavity, being careful not to damage any of its components.
- (6) Loosen the two terminal screws on the end of the card assembly and remove the yellow and black leads. The card assembly should now be free of the handset.
- (7) Place the replacement card assembly near the receiver cavity and connect the black and yellow retractile cord leads to the terminal screws in accordance with the wiring diagram (Figure 4).

- (8) Insert the red and green leads on the card assembly into the receiver cavity and through the hollow handgrip.
- (9) Insert the card assembly into the receiver cavity and slide it into the hollow handgrip until it is in place. Be careful that no components are damaged while inserting the card assembly.
- (10) Replace the volume control unit in accordance with paragraph 4.04(4) and(5).
- (11) In the transmitter cavity, connect the two red leads to the terminal screw on the rim contact spring.
- (12) In the transmitter cavity, connect the two green wires to the terminal screw on the central contact spring and insert the central contact spring in place in the transmitter capsule.
- (13) In the receiver cavity, connect the blue and white leads to the receiver capsule.
- (14) Replace the transmitter and receiver capsules and caps.

#### Retractile Cord

4.06 The procedure for replacing the retractile cord on a Type 820 handset is similar to that for replacing the card assembly. To replace the retractile cord proceed as follows:

- (1) Disconnect the retractile cord leads from the transmission unit of the telephone.
- (2) Follow the instructions in paragraph 4.05(1)-(6).
- (3) In the transmitter cavity, loosen the strain relief clamp screw (Figure 3), slide the clamp to the left, and pull the cord from the retractile cord entrance.
- (4) Place the replacement retractile cord through the retractile cord entrance hole; then, hook the strain relief clamp on the strain relief screw and tighten.
- (5) Insert the yellow and black retractile cord leads through the hollow handgrip.

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(6) Place the card assembly near the receiver cavity and connect the black and yellow retractile cord leads to the terminal screws in accordance with the wiring diagram (Figure 4).

(7) Follow the instructions in paragraph

4.05(8)-(14) to reassemble the unit.

(8) Connect the four retractile cord leads to the transmission unit of the telephone in accordance with the wiring diagram (Figure 4).

NOTE: Leads cannot be transposed.

DESCRIPTION, OPERATION, AND FIELD MAINTENANCE

TYPE 84 AND 840 HANDSETS

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remotely located equipment, such as a dictation machine. These handsets are also used to conserve battery current on local battery railroad telephone installations.

2. DESCRIPTION

2.01 The Type 84 and 840 handsets are similar in appearance to the standard Type 81 and 810 handsets with the exception of a push button protruding through the side of the handgrip and a spring combination installed within the interior of the handgrip. The handsets measure approximately 8-1/2" long, 2-3/4" high, and 2-1/2" wide.

2.02 The Type 84 handset is available with 3-, 4-, 5-, or 6-conductor cord while the Type 840 handset has either a 4- or 5-conductor cord depending upon the service function. Type 84 and 840 handsets are available in Black and ten colors (Sand Beige, Dawn Gray, Jade Green, Classic Ivory, Garnet Red, Turquoise, Sunlight Yellow, Forget-Me-Not Blue, Camellia Pink, and Gardenia White).

3. OPERATION

3.01 For anti-noise operation the push-button actuated spring combination is wired to shunt the transmitter out of the circuit, eliminating the sidetone from the sound that enters the user's transmitter. Standard anti-sidetone circuits are designed to permit a portion of the sound picked up by the transmitter to enter the receiver. Shunting the transmitter eliminates this portion of the sidetone, thus permitting only the sounds transmitted by the distant party's transmitter and some line noises to enter the user's receiver.

3.02 The push-button switch can be wired for either press-to-talk, or press-to-listen at the user's option. When wired for press-to-talk operation it is necessary to depress the push button to transmit, that is, the transmitter is normally out of the circuit. For press-to-listen operation the transmitter is normally in the circuit. To eliminate the sound from the transmitter input it is necessary to depress the push button. Figures 2 and 3 illustrate the wiring of press-to-talk and press-to-listen handsets, respectively.

3.03 For remote control, the push-button switch is wired to actuate the equipment when the push button is depressed.

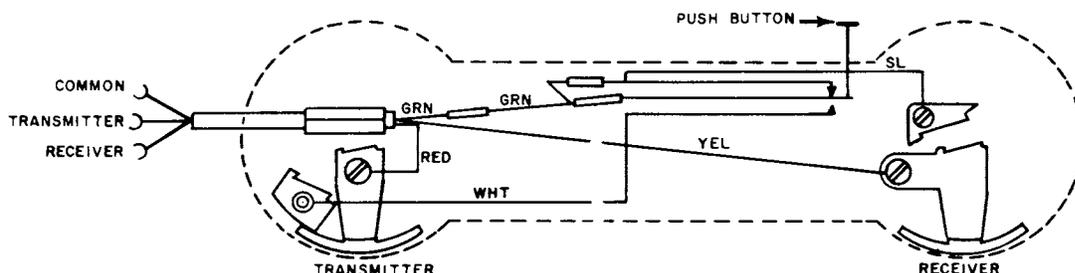
1. GENERAL

1.01 The Type 84 and 840 handsets are equipped with a push-button switch that can be wired to perform various functions not possible with a standard handset. The Type 84 handset is adaptable to most Automatic Electric Company telephones equipped with a manually adjusted loop compensator, and the Type 840 handset to telephones utilizing self-compensating features. The handset shown in Figure 1 represents an 84 or 840 handset as both have the same outward physical appearance.



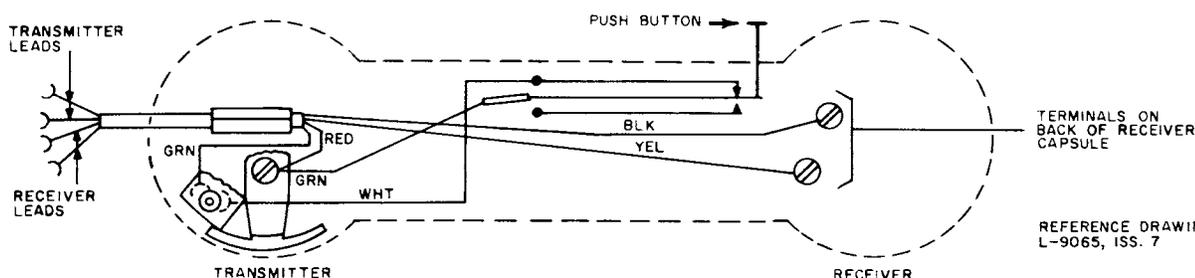
Figure 1. Type 84 or 840 Handset.

1.02 These handsets can be used advantageously in noisy locations to minimize sidetone, thus improving the reception of the distant party. Also, the push-button switch of the handset can control the operation of



H-63544, ISS. 6

Figure 2a. Type 84 Handset Wired for Press-To-Talk Operation.



REFERENCE DRAWING  
L-9065, ISS. 7

Figure 2b. Type 840 Handset Wired for Press-To-Talk Operation.

3.04 On local-battery railroad telephones, where the transmission loop between stations is long, the push button is wired for press-to-talk operation. Depressing the push button places a 750-ohm resistor in series with the receiver, diverting a portion of the battery receiver current to the transmission circuit.

#### 4. MAINTENANCE

##### Capsule Replacement

4.01 To replace the transmitter and receiver capsules of the handset, proceed as follows:

- (1) Hold the handset in a horizontal position with the caps facing upward and unscrew and remove the transmitter and receiver caps.
- (2) Remove the transmitter and receiver capsules from their respective cavities.
- (3) If capsules are defective, discard and replace with new capsules. (Capsules are sealed units and cannot be repaired in the field.)
- (4) Insert the transmitter and receiver capsules into their respective cavities. (The capsules are so designed that they cannot be interchanged.)

- (5) Replace the transmitter and receiver caps.

- (6) Make a test call.

##### Retractable Cord Replacement

4.02 Cord replacement procedures of the Type 84 and 840 handsets are similar, with the exception that some connections are mechanically different. Use the following procedure to replace the cord in the Type 84 or 840 handset.

- (1) Remove the transmitter and receiver capsules per paragraph 4.01.
- (2) Lift out the central contact springs from the transmitter and receiver cavities (Figure 4). The Type 840 handset has central contact springs in the transmitter cavity only.

NOTE: Before removing any leads, check Table 1 or Table 2 to determine which leads must be removed.

- (3) Loosen screws and remove leads from central and/or rim contact springs in transmitter and receiver cavities. The leads terminate at the receiver capsule itself in the Type 840 handset.
- (4) Disconnect the cord conductor(s) that are connected to the push-button

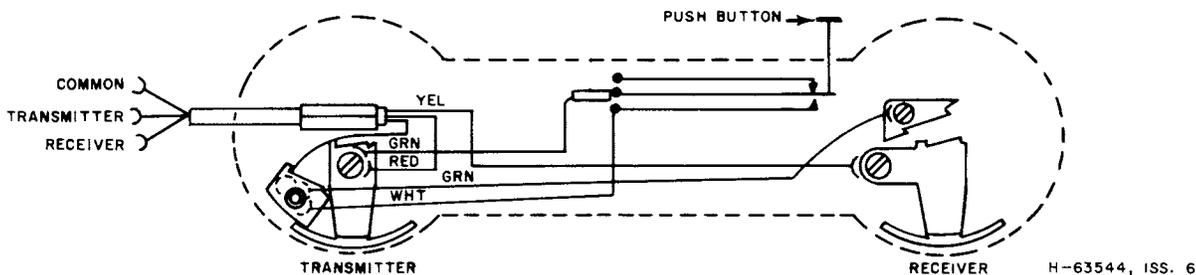


Figure 3a. Type 84 Handset Wired for Press-To-Listen Operation.

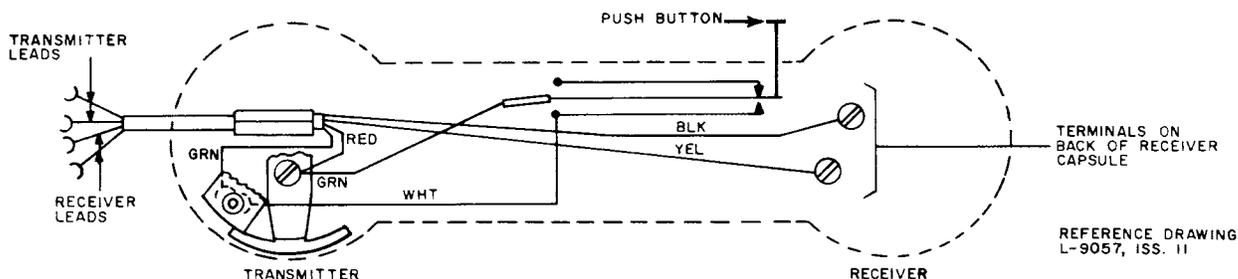


Figure 3b. Type 840 Handset Wired for Press-To-Listen Operation.

spring combination. These line cord leads terminate at a screw and nut connection, shown in Figure 4, and are covered by a sleeve.

- (5) Remove cord holder screw from rim contact spring and pull out cord.
- (6) Insert leads of replacement cord through entrance hole at transmitter end of handset.
- (7) Check Table 1 or Table 2 to determine which leads must be fed through handgrip. It may be helpful to connect an extra length of wire to the line cord lead to facilitate feeding the lead through the handgrip.
- (8) Connect line cord holder to rim contact spring.
- (9) Connect line cord leads per Table 1 or 2. If a cord lead is connected to the push-button spring combination, ascertain that the sleeve is replaced over the screw and nut connection.
- (10) After all leads have been connected, loop the slack into the handgrip.
- (11) When replacing the central contact spring in the transmitter cavity, the screw and lead termination must face down; the stud faces up.

(12) On the Type 84 handset, the screw on the receiver central contact spring faces up, the stud faces down, in the recess in the receiver cavity.

- (13) Replace transmitter and receiver capsules and caps.

#### Push-Button Spring Replacement

4.03 Use the following procedure to replace the push-button spring combination in the Type 84 or 840 handset.

- (1) Remove handset caps and capsules.
- (2) Disconnect the push-button leads from the transmitter or receiver connections. If a wiring diagram is unavailable, make a sketch showing the switch wiring to facilitate wiring the new switch.
- (3) Remove flat-head screw from the side of the handgrip.
- (4) It may be helpful on some handsets to remove the spring combination dust cover, and the receiver rim contact spring before attempting to remove the push-button spring combination.
- (5) Press the push button into the handgrip, and remove push-button spring combination through receiver cavity.

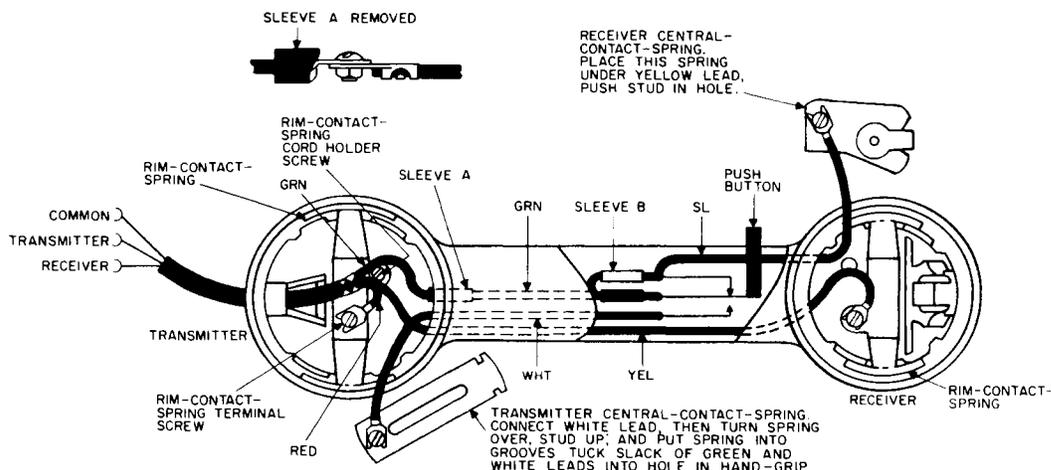


Figure 4a. Cord Terminations, Type 84 Handset.

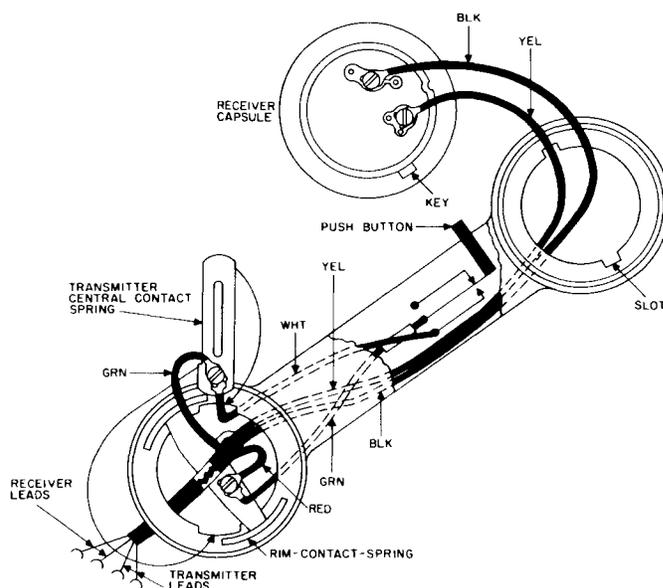


Figure 4b. Cord Terminations, Type 840 Handset.

- |  |   |
|--|---|
| <p>(6) Unsolder wires and resistor (if provided) from spring combinations, noting their position and solder to replacement spring combinations. If the replacement switch contains wire leads, ascertain that they are wired in the same position.</p> <p>(7) Place push-button spring combination into receiver cavity, feed in proper leads through handset grip. Replace dust cover.</p> <p>(8) Align push button with the proper hole in handgrip and replace flat-head screw.</p> | <p>(9) Reconnect leads per wiring diagram or sketch.</p> <p>(10) Replace receiver central contact spring, and rim contact spring if removed.</p> <p>(11) Replace caps and capsules.</p> |
|--|---|
5. CONNECTION TO TELEPHONE
- 5.01 To remove the telephone housing refer to the applicable publication in the 473 series. Table 3 lists the termination points for the 84 and 840 handset. The telephones and handsets listed are the most commonly used. For other applications contact Automatic Electric for connection information.

6. ORDERING INFORMATION

Type 84 Handsets

| Description  | Order Number<br>Handset With<br>Retractable Cord |
|--|--|
| Common Battery Installation (Push-to-Talk)                   | L-9046-CO  |
| Local Battery Installation (Push-to-Talk)                    | { Type 80, 83, 90M Telephone L-9030-CO           |
|  | { Type 10A Railway Telephone L-9030-EO           |
|  | { Type 183 Telephone L-9030-FO                   |
| Anti-Noise Telephone (Push-to-Listen)                        | { Type 183 Telephone L-9035-EO                   |
|  | { Type 80 and 90M Telephone L-9035-CO            |
| Anti-Noise Telephone (4 Cond Cord)                           | L-9063-CO  |
| Switch Wired for Control of External Equipment (5 Cond Cord) | L-9048-CO  |
| Switch Wired for Control of External Equipment (6 Cond Cord) | L-9051-AO  |

NOTE: The above order numbers are for black handsets. If colored handset is desired, use the above order number and indicate color. Colors available are shown in Table 4.

Replacement Parts, Type 84 Handsets

| Description                        | No.<br>Req'd.   | Order Number  |   |
|------------------------------------|---|---|---|
| Handset Shell                      | 1   | D-52149-A*  |   |
| Transmitter Cap                    | 1   | D-67422-A*  |   |
| Receiver Cap                       | 1   | D-67423-A*  |   |
| Transmitter Capsule                | { L-9046 L-9048 }<br>{ L-9030 L-9051 }<br>{ L-9035 L-9063 } | 1 D-38363-A<br>1 D-38375-A                                  |   |
|                                    | Receiver Capsule  | { L-9046 L-9030 L-9035 }<br>{ L-9063 }<br>{ L-9051 L-9048 } | 1 D-51021-A<br>1 D-51022-A<br>1 D-51021-B |
|                                    |   | Spring Assembly   | 1 NP-21-A1                                |
| Switch Shield                      |   | 1 D-490013-A  |   |
| Transmitter Central-Contact Spring | 1   | D-109794-A  |   |
| Transmitter Rim-Contact Spring     | 1   | D-109756-A  |   |
| Receiver Central-Contact Spring    | 1   | D-109795-A  |   |
| Receiver Rim-Contact Spring        | 1   | D-109757-A  |   |

SECTION 473-801-200  
ISSUE 1

|                        |           |   |   |             |              |
|------------------------|-----------|---|---|-------------|--------------|
|                        | L-9046-CO | } |   |             |              |
|                        | L-9063-CO |   |   | 1           | D-543145-A** |
|                        | L-9035-CO |   |   |             |              |
|                        | L-9035-EO | } |   | 1           | D-543274-A** |
| Retractable Cord       | L-9030-CO |   |   | 1           | D-543143-A   |
|                        | L-9030-EO |   |   | 1           | D-543275-A   |
|                        | L-9030-FO |   |   | 1           | D-543323-A   |
|                        | L-9048-CO |   |   | 1           | D-543309-A   |
| Cord and Plug Assembly | L-9051    |   | 1 | D-543326-A  |              |
| Jumper Wire            |           |   | 1 | D-543070-AW |              |

\*Order numbers are for black. If color parts are desired use the order number as shown and indicate color wanted. Colors available are shown in Table 4.

\*\*Replacement cord has four conductors. Cut off black conductor at butt of terminal.

Type 840 Handsets

|  | Description                 | Order Number<br>Handset With<br>Retractable Cord |
|--|-----------------------------|--|
| Push-to-Listen                                 | { Type 80 and 90M Telephone | L-9057-*   |
|  | { Type 183 Telephone        | L-9057-DA (Black only)                           |
| Push-to-Talk                                   | { Type 80 and 90M Telephone | L-9065-*   |
|  | { Type 183 Telephone        | L-9065-DA (Black only)                           |
| Switch Wired for Control of External Equipment |                             | L-9056-CA (Black only)                           |

\*See color suffix chart Table 4.

Replacement Parts, Type 840 Handsets

|                     | Description          | Amt.<br>Req'd. | Order Number              |
|---------------------|----------------------|----------------|---------------------------|
| Handset Shell       |                      | 1              | See Color<br>Suffix Chart |
| Transmitter Cap     |                      | 1              | See Color<br>Suffix Chart |
| Receiver Cap        |                      | 1              | See Color<br>Suffix Chart |
| Transmitter Capsule | { L-9056             | 1              | D-38379-A                 |
|                     | { L-9057      L-9065 | 1              | D-38386-A                 |

|                                    |        |           |            |            |
|------------------------------------|--------|-----------|------------|------------|
| Receiver Capsule                   |        | 1         | E-51024-A  |            |
| Spring Assembly                    |        | 1         | NP-21-A1   |            |
| Switch Shield                      |        | 1         | D-490013-A |            |
| Transmitter Rim-Contact Spring     |        | 1         | D-109756-A |            |
| Transmitter Central-Contact Spring |        | 1         | D-109794-A |            |
| Receiver Cushion Spring            |        | 1         | D-109918-A |            |
|                                    | L-9056 | 1         | D-54338-A  |            |
| Retractable Cord                   |        | L-9057-DA | 1          | D-543342-A |
| *See color suffix chart.           | L-9057 | L-9065    | 1          | D-543145-* |

Table 1. Connection Chart, Type 84 Handsets.

| Type Handset | Application                                    | Transmitter Connections |                     | Receiver Connections    |                     | Switch Connections |               |              |  |
|--------------|--|-------------------------|---------------------|-------------------------|---------------------|--------------------|---------------|--------------|--|
|              |  | Central-Contact Springs | Rim-Contact Springs | Central-Contact Springs | Rim-Contact Springs | Armature           | Break Contact | Make Contact |  |
|              |  | 3-CONDUCTOR CORD        |                     |                         |                     |                    |               |              |  |
| L-9046       | Common battery installation push-to-talk       | Green                   | Red                 |                         | Yellow              |                    |               |              |  |
| L-9030       | Local battery installation push-to-talk        |                         | Red                 |                         | Yellow              | Green              |               |              |  |
| L-9035       | Anti-Noise telephone push-to-listen            | Green                   | Red                 |                         | Yellow              |                    |               |              |  |
|              |  | 4-CONDUCTOR CORD        |                     |                         |                     |                    |               |              |  |
| L-9063       | Anti-Noise telephone                           | Green                   | Red                 | Black                   | Yellow              |                    |               |              |  |
|              |  | 5-CONDUCTOR CORD        |                     |                         |                     |                    |               |              |  |
| L-9048       | Switch wired for control of external equipment | Green                   | Red                 |                         | Yellow              | Blue               |               | Black        |  |
|              |  | 6-CONDUCTOR CORD        |                     |                         |                     |                    |               |              |  |
| L-9051       | Switch wired for control of external equipment | Green                   | Red                 | Yellow                  | Black               | White              |               | Blue         |  |

Table 2. Connection Chart, Type 840 Handsets.

| Type Handset     | Application                                    | Transmitter Connections |                     | Receiver Capsule Connections        |        | Switch Connections                      |                                     |              |
|------------------|--|-------------------------|---------------------|-------------------------------------|--------|---|-------------------------------------|--------------|
|                  |  | Central-Contact Springs | Rim-Contact Springs | Terminal Screws on Receiver Capsule |        | Armature                                | Break Contact                       | Make Contact |
|                  |  | 4-CONDUCTOR CORD        |                     |                                     |        |   |                                     |              |
| L-9057<br>L-9065 | Push-to-Listen<br>Push-to-Talk                 | Green                   | Red                 | Black                               | Yellow | Green from trans central-contact spring | White from trans rim-contact spring |              |
|                  |  | 5-CONDUCTOR CORD        |                     |                                     |        |   |                                     |              |
| L-9056           | Switch wired for control of external equipment | Green                   | Red                 | Black                               | Yellow | White from trans rim-contact spring     |                                     | Blue         |

Table 3. Cord Terminations at Telephone, Type 84 and 840 Handsets.

| Handset           | Usage   | Handset Cord Terminations Telephone Transmission Unit<br>Handset Cord Conductors |     |     |     |           |     |                    |     |     |     |      |     |                    |     |     |     |                  |           |
|-------------------|---|--|-----|-----|-----|-----------|-----|--------------------|-----|-----|-----|------|-----|--------------------|-----|-----|-----|------------------|-----------|
|                   |   | Type 80 Telephone  |     |     |     |           |     | Type 90M Telephone |     |     |     |      |     | Type 183 Telephone |     |     |     |                  |           |
|                   |   | Grn  | Yel | Red | Wht | Blue      | Blk | Grn                | Yel | Red | Wht | Blue | Blk | Grn                | Yel | Red | Wht | Blue             | Blk       |
| L-9046            | Common Battery Installation<br>Push-to-Talk               | 3  | 4   | 5   |     |           |     |                    |     |     |     |      |     |                    |     |     |     |                  |           |
| L-9030            | Local Battery Installation<br>Push-to-Talk                | 3  | 4   | 5   |     |           |     |                    |     |     |     |      |     |                    |     |     |     |                  |           |
| L-9035            | Anti-Noise Telephone<br>Push-to-Listen                    | 3  | 4   | 5   |     |           |     |                    |     |     |     |      |     |                    |     |     |     |                  |           |
| L-9063            | Anti-Noise Telephone<br>(Used on Type 80T Telephone Only) | 3  | 12  | 5   |     | 11        |     |                    |     |     |     |      |     |                    |     |     |     |                  |           |
| L-9048            | Switch Wired for Control<br>of External Equipment         | 3  | 12  | 5   |     | Ext Equip |     |                    |     |     |     |      |     |                    |     |     |     |                  | Ext Equip |
| L-9051            | Switch Wired to Control<br>External Equipment             | 3  | 12  | 5   |     | Ext Equip |     |                    |     |     |     |      |     |                    |     |     |     |                  | Ext Equip |
| TYPE 840 HANDSETS |   |  |     |     |     |           |     |                    |     |     |     |      |     |                    |     |     |     |                  |           |
| L-9057            | Push-to-Listen  | 3  | 4   | 5   |     | 3         |     |                    |     |     |     |      |     |                    | 5   |     |     |                  |           |
| L-9065            | Push-to-Talk  | 3  | 4   | 5   |     | 3         |     |                    |     |     |     |      |     |                    | 5   |     |     |                  |           |
| L-9056            | Switch Wired for Control<br>of External Equipment         | 3  | 4   | 5   |     | 3         |     |                    | G9  |     |     |      |     |                    | 5   |     |     | Term Strip<br>4G | 20        |

Table 4. Color Suffix Chart.

| Handset<br>L-9057-<br>L-9065- | Retractable Cord<br>D-543145- | Retractable Cord<br>D-543342- | Handset Shell<br>D-52149- | Transmitter Cap<br>D-67422-A (Blk)<br>D-67442- | Receiver Cap<br>D-67647-A (Blk)<br>D-67645- | Color                        |
|-------------------------------|-------------------------------|-------------------------------|---------------------------|--|---|------------------------------|
| CA                            | A                             |                               | A                         |  |   | Black                        |
| CB                            | B                             |                               | B                         | B  | B   | Sand Beige                   |
| CC                            | C                             |                               | C                         | C  | C   | Dawn Gray                    |
| CD                            | D                             |                               | D                         | D  | D   | Jade Green                   |
| CE                            | E                             |                               | E                         | E  | E   | Classic Ivory                |
| CF                            | F                             |                               | F                         | F  | F   | Garnet Red                   |
| CG                            | G                             |                               | G                         | G  | G   | Turquoise                    |
| CJ                            | J                             |                               | J                         | J  | J   | Sunlight Yellow              |
| CK                            | K                             |                               | K                         | K  | K   | Forget-me-not Blue           |
| CL                            | L                             |                               | L                         | L  | L   | Camellia Pink                |
| CM                            | M                             |                               | M                         | M  | M   | Gardenia White               |
| DA                            |                               | A                             | A                         | A  | A   | Black for Type 183 Telephone |

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