A.E.CO. TYPE 85 TELEPHONE DESCRIPTION AND OPERATION

CONTENTS PAGE

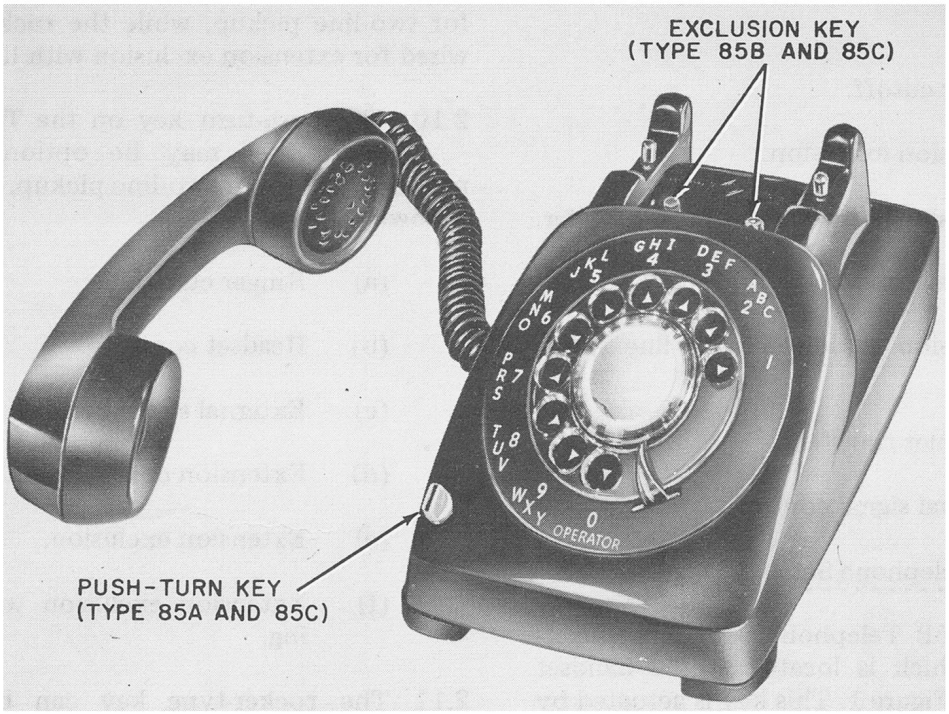
1. GENERAL

1.01 This section provides a description of, and operating instructions for the A.E.Co. Type 85 Key Telephone Set. Installation and field maintenance instructions for the Type 85 Telephone Set are covered in another section in this series of General System Practices.

2. DESCRIPTION

2.01 The Type 85 Telephone Set (Figure 1) is basically a Type 80 set to which either one or two keys have been added in manufacture. The resulting variations are in existence in manually adjusted (NA-852), self-compensating with potted transmission unit (NB-852), and self-compensating with printed wiring board transmission unit (NC-852) sets.

2.02 The purpose for the added key, or keys, on the Type 85 Telephone Set, is to provide certain optional functions not possible with the basic Type 80 set. No single version of the Type 85



set will provide all the variations possible among all the Type 85 sets. However, by proper choice of set, the most desirable combination of optional functions for a given application can usually be obtained. For instructions for incorporating the various options in the Type 85 sets, see the section on installation and maintenance of the A.E.Co. Type 85 Telephone Set in this series of General System Practices.

Type 85A Telephone Set

2.03 The Type 85A Telephone Set is equipped with a push-turn key which is located below and to the left of the dial. The key is factory wired for two-line pickup, using the locking turn section of the push-turn key. This modification permits the user to answer and originate calls on either of two lines, using a single telephone. The non-locking push section of the key is factory wired for operating an external signaling device such as a buzzer, bell, or lamp.

2.04 The Type 85A set is equipped with one ringer, which is wired across line one. When a ringer is required for line two, it must be installed external to the set.

2.05 With minor wiring changes, the turn key on the Type 85A Telephone Set may be adapted to provide, instead of two-line pickup, any of the following:

(a) Ringer cutoff.

(b) Extension exclusion.

(c) Extension control with ringer transfer.

(d) Headset control.

(e) Extension exclusion with line shorting.

(f) Customer transfer.

(g) External signal control.

Type 85B Telephone Set

2.06 The Type 85B Telephone Set has a rocker-type key which is located at the handset cradle as shown in Figure 1. This key is actuated by two pushbuttons—one red and the other chrome. It is factory wired for extension exclusion, and all extensions are excluded when the user depresses the chrome pushbutton. The extensions are automatically reconnected, and the chrome pushbutton restored when the handset is placed in its cradle. The extensions can also be reconnected without hanging up the telephone, by depressing the red pushbutton.

2.07 The Type 85B Telephone Set can be optionally wired so that the key provides two-line pickup instead of extension exclusion. When wired for two-line pickup, depressing the chrome pushbutton, or replacing the handset on the cradle, restores the connection to line one.

2.08 It is possible to wire the key on the Type 85B Telephone Set for extension control with ringer transfer, ringer cutoff, or external signal control. Mechanically, however, these applications are not practicable, since these functions are required to remain operative with the telephone in the on-hook condition, and the key on the Type 85B set returns to normal when the handset is returned to its cradle.

Type 85C Telephone Set

2.09 The Type 85C Telephone Set combines the optional provisions of both the Type 85A and Type 85B sets, as is shown in Figure 1. On the Type 85C set, the push-turn key is factory wired for two-line pickup, while the rocker-type key is wired for extension exclusion with line shorting.

2.10 The push-turn key on the Type 85C Telephone Set may be optionally wired to provide, in place of two-line pickup, any one of the following:

(a) Ringer cutoff.

(b) Headset control.

(c) External signal control.

(d) Extension control with ringer transfer.

(e) Extension exclusion.

(f) Extension exclusion with line shorting.

2.11 The rocker-type key can be rewired to provide extension exclusion without line shorting, or disconnection of external apparatus.

However, since it has one less contact spring than the key furnished with the Type 85B set, it cannot be adapted to other applications which call for connection of external apparatus.

2.12 The exclusion key of the Type 85C set may be converted to provide holding for line one, instead of extension exclusion. To accomplish this, a holding bridge (422510) is connected in series with the exclusion key and across line one. When the exclusion key is operated, the holding bridge is connected across line one, placing it in hold. Line one is taken off hold when either the handset is returned to the cradle, or the red pushbutton of the exclusion key is depressed.

2.13 The holding bridge assembly for the application of Paragraph 2.12, mounts on the base of the telephone to the right and in front of the ringer. The long portion of the L-shaped board is parallel to the side of the base, with the shorter portion situated directly below the exclusion key springs and parallel to the back of the transmission network.

Type 85D Telephone Set

2.14 The Type 85D Telephone set is a Type 85C set in which the exclusion key is wired in the field to provide holding. This type of set is not available as a factory wired unit. Each Type 85C set that is modified in this manner should be marked on its base plate as a Type 85D set at the time that the modification is incorporated.

Code Number Identification

2.15 The stocklist code number stamped on the base of the Type 85 Telephone Set identifies the color and operational characteristics originally provided at the factory. It will not indicate repair shop alterations, or field modifications, unless appropriate code changes have been made at the time that such work was performed.

2.16 The stocklist code number consists of a two-letter prefix, a base number, and a group of numerical and alphabetical suffixes. A typical stocklist code number is NC-852001-CSL1. Each component of this number has its own special significance in regard to the makeup of the represented telephone set.

2.17 The two-letter prefix of the stocklist code number indicates the type of circuitry contained in the set as follows:

(a) NA - A manually adjusted telephone with a potted transmission unit.

(b) NB - A self-compensating telephone with a potted transmission unit.

(c) NC - A self-compensating telephone with a printed wiring board transmission unit.

2.18 The base number 852 in the stocklist code number indicates a desk model key telephone with a retractile handset cord.

2.19 The fourth and fifth digits of the stocklist code number (immediately following the base number) indicate color as follows:

(a) 00 — Black

(b) 10 — Sand Beige.

(c) 11 — Dawn Gray.

(d) 12 — Jade Green.

(e) 15 — Turquoise

(f) 19 — Gardenia White.

2.20 The sixth digit of the stocklist code number indicates the optional equipment included in the set, and thus whether the set is 85A, 85B, or 85C, as follows:

(a) "1" — Push-turn key only (Type 85A set).

(b) "2" — Exclusion or rocker-type key only (Type 85B set).

(c) "3" — Push-turn key and rocker-type key (Type 85C set).

2.21 The first letter suffix of the stocklist code number indicates the type of dial, as follows:

(a) "A" indicates a numeric 1 to 0 dial plate.

(b) "B" indicates no dial (blank).

(c) "C" indicates a dial with metropolitan number plate.

2.22 The second and third suffix characters may be either letters or numerals, and are used to indicate the type of ringer included in the set, as follows:

(a) SA — Straight-line ringer with adjusting wheel.

(b) SL — Straight-line ringer without adjusting wheel.

(c) 16 — Harmonic Ringer, 16.6 Hz.

(d) 20 — Harmonic or Decimonic ringer, 20 Hz.

(e) 25 — Harmonic ringer, 25 Hz.

(f) 30 — Harmonic or decimonic ringer, 30 Hz.

(g) 33 — Harmonic ringer, 33.3 Hz.

(h) 40 — Decimonic ringer, 40 Hz.

(i) 42 — Harmonic ringer, 42 Hz.

(j) 50 — Harmonic ringer, 50 Hz.

(k) 51 — Decimonic ringer, 50 Hz.

(l) 54 — Harmonic ringer, 54 Hz.

(m) 60 — Decimonic ringer, 60 Hz.

(n) 66 — Harmonic ringer, 66 Hz.

(o) 67 — Harmonic ringer, 66.6 Hz.

Common Characteristics

2.23 The Type 85 desk telephone set weighs approximately 6¼ pounds and measures 9 inches long, by 4¾ inches high, by 5 inches wide. It has four rubber feet located on the base (one at each corner) to protect its supporting surface from scratches.

2.24 The transmission network in NA-852 sets (Figure 2) contains no non-linear elements. It consists of an induction coil, three resistors, and a three-section capacitor used in a circuit of lower efficiency than that of the varistor regulated type. This circuit is associated with a separate rheostat, the purpose of which is to adjust the transmitter current to the proper level in short loops. Adjustment is made externally with a screwdriver.

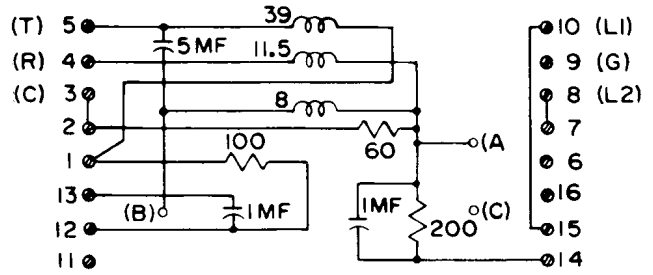


Figure 2. Schematic Diagram of Transmission Unit for Manually Adjusted Circuit.

2.25 The series-rheostat transmission unit circuit has been superceded by the self-compensating varistor-regulated circuit. This circuit employs varistor action for regulating the amplitude of both the sidetone and transmission signals. Two varistors included in the network exhibit decreased resistance when the potential across them increases due to the increase in loop current in short loop connections. Varistor V11, which is bridged across the line in series with a limiting resistor (Figure 3) introduces a shunt loss between the impedance of the line and the impedance of the set. This provides regulation of both the transmit and receive levels. Varistor V22 provides an a-c path which shunts resistor R3 in the sidetone balancing impedance, as well as a d-c path which shunts the transmitter branch. Therefore, this varistor serves the dual function of maintaining sidetone balance while controlling transmitter current.

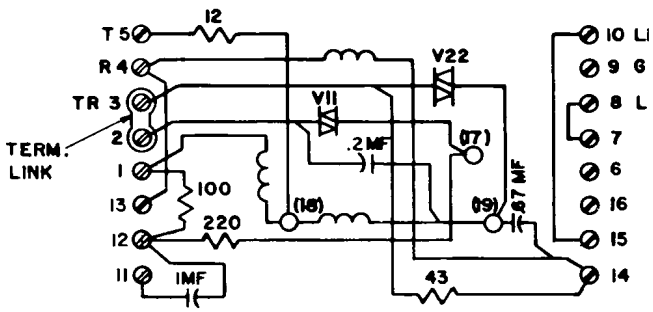


Figure 3. Schematic Diagram of Transmission Network for Self-Compensating Circuit.

2.26 In the ealier self-compensating (NB-852) sets, the transmission network components are embedded in a protective jelly within an inverted, shallow, rectangular styrene cup. This arrangement is equipped with terminals along two opposite edges. Since the components are not accessible for tests, additional test points, numbered 2, 14, 17, 18, and 19, are provided on this type of network.

2.27 The transmission network components in NC-852 sets, consist of an anti-sidetone induction coil, two silicon carbide varistors, four resistors and three capacitors. These components are mounted on a printed-wiring board and interconnected by circuit lines of copper sheet laminated to the underside of the board. The complete transmission unit is supported along its terminal edges by an L-shaped styrene bracket arranged with tabs which snap over the board at three points. The printed wiring board is fastened to the telephone set base by screws passing through mounting brackets at two corners of the induction coil. The physical arrangement of this transmission unit is shown in Figure 4.

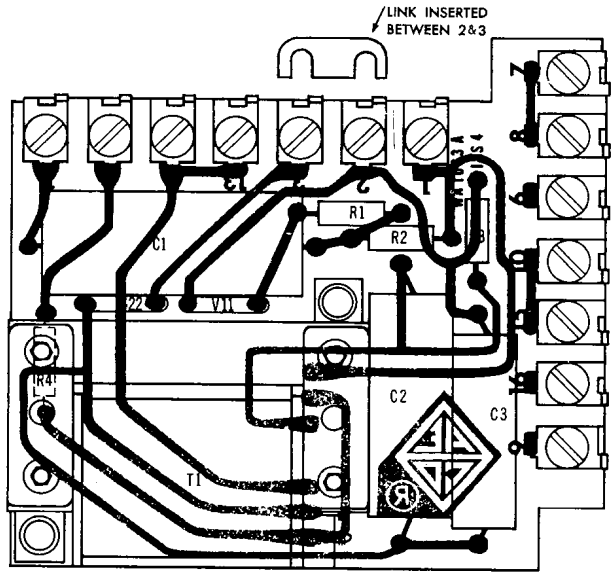


Figure 4. Physical Arrangement of Printed Circuit Board.

2.28 In potted networks of both the manually-adjusted and the self-compensating types, the value of the dial pulse contact spark suppression capacitor at terminal 12 is 1 μF. The same value is used with the early version of the printed-wiring board network marked WA-1063-A. To reduce the generation of false impulses by trunk pulse-repeating relays, the value of this capacitor has been reduced to 0.33 μF on the new Type WA-1154-A Transmission Units, and on later model Type WA-1120-A Transmission Units.

2.29 Terminals 2 and 23 on the Type WA-1154-A Transmission Unit, and terminals 2 and 3 on Type WA-1120-A Transmission Unit, respectively, form an electrically common point in the completed telephone set. In the potted network assembly, this interconnection is made externally by use of a brass terminal link, to permit leaving the two terminals isolated for inspection tests. A similar external link is required on earlier vintage Type WA-1063-A transmission units through Issue 10. On Type WA-1063-A, Issue 11 and above, and all Type WA-1120-A and WA-1154-A transmission units, these two terminals are permanently connected by an etched copper laminate line on the board, and no external link is required.

2.30 The manually adjusted and early versions of the self-compensating transmission unit, use substantially the same induction coil. Beginning with Issue 2 of the WA-1120-A transmission unit, the size has been substantially reduced, and the board layout somewhat altered. The induction coil on the WA-1154-A transmission unit is similar in size and shape to that of the WA-1120-A transmission unit. It now provides terminal 21 which is a tap on the third winding that is approximately at the electrical mid-point of the circuit. This tap provides a constant 2650-ohm mark which can be used for second party identification. This is equivalent to the 2650-ohm mark which is provided by W.E.Co.

2.31 The WA-1154-A transmission unit provides improved transmission quality primarily by increasing resistivity of the varistors, reapportionment of the induction coil turns, and increasing the value of two capacitors. Two resistor values have also been changed to re-establish optimum performance.

2.32 Along with the changes that have taken place in the transmission unit, there are mechanical differences in sets of different dates of manufacture. Prior to the introduction of the printed circuit board transmission unit, the base was arranged for rear entry of the handset cord. A heavy bar cord clamp, mounted behind the rear ringer gong, is used for cord retention on these sets. Housings of current manufacture are provided with a third cord-clearance indentation at the left

rear to accommodate this earlier method of entry. Earlier handset cords were somewhat larger in diameter and lacked the strain relief grommet. With later sets, there is a piercing in the left side of the base, to which the standard J-clip strain relief clamp on the present cord is attached.

2.33 The receiver cap and capsule now have minor modifications. The cloth covering on the capsule has been removed and the new cap has smaller holes over a bigger diameter. These changes assist in obtaining the high-frequency improvement now offered by the Type WA-1154-A Transmission Unit.

2.34 The hookswitch actuating buffer was originally made of metal, rather than the present nylon, and acted on an intermediate (non-contact) spring. The earlier hookswitches are also of chromed metal rather than the present clear acrylic.

2.35 Dials were formerly equipped with screw terminals in place of the present wrapped and soldered connection. They also used the D-780697-A acrylic fingerwheel assembly instead of the present one-piece design. Dials on black sets were originally equipped with lacquered brass fingerwheels. For further details about dials, see the 473-820 series of General System Practices.

2.36 To accommodate the various options, the Type 85 Telephone Set requires a line cord with more conductors than that used with the basic Type 80 set. To provide terminals for the additional conductors, a terminal strip (Terminal Strip B) is bracket mounted in a horizontal position immediately above the ringer coils.

3. OPERATION

3.01 The operation of the Type 85 Telephone Set, when in conventional use, is the same as for the basic Type 80 set. To originate a call, lift the handset from the cradle, wait for a dial tone; then dial the desired number. To answer a call, lift the handset from the cradle and begin conversation. To terminate a call, place the handset in its cradle.

3.02 When making use of the various options available with the Type 85 set, certain deviations from the standard telephone operating procedure must be included. These are described for each of the possible options in the paragraphs that follow.

Extension Exclusion with or without Line Shorting

3.03 On Type 85A and 85C sets having the push-turn key wired for extension exclusion or extension exclusion with line shorting, rotate the key to its locking position to exclude all extensions from the line. When the need for privacy no longer exists, manually rotate the key to its normal position to reconnect the extensions to the line.

3.04 On Type 85B and 85C sets with the rocker-type key at the cradle area wired for extension exclusion or extension exclusion with line shorting, press the chrome pushbutton to exclude all extensions from the line. To reconnect the extensions, place the handset in the cradle. This automatically restores the rocker-type key. When it is necessary to reconnect the extensions to the line while maintaining the existing telephone connection, depress the red pushbutton.

Two-Line Pickup, One-Line Hold

3.05 Sets having either the push-turn key or the rocker-type key wired for two-line pickup and one-line hold, are connected to line one when the key is in the normal position.

3.06 On Type 85A and 85C sets having the push-turn key wired for two-line pickup, to pick up line two and simultaneously place line one on hold, turn the key to its locking position. To return the set to line one, manually return the turn key to its normal position.

3.07 For Type 85B and 85C sets with the rocker-type key wired for two-line pickup and one-line hold, depress the chrome pushbutton after lifting the handset from the cradle, to pick up line two and place line one on hold. To restore the connection to line one at the end of a call on line two, replace the handset in its cradle. To restore the connection to line one without placing the handset in the cradle, depress the red pushbutton.

Ringer Cutoff

3.08 Ringer cutoff is limited to the push-turn key only, and therefore is limited to the Type 85A and 85C sets. This limitation is imposed because the rocker-type key cannot be retained in

the actuated condition with the telephone handset in the cradle. On sets with the push-turn key wired for ringer cutoff, rotate the key to its locking position to cut off the ringer. To connect the ringer, return the key to its normal condition.

Single Line Extension Cutoff with Ringer Transfer

3.09 Single line extension cutoff with ringer transfer is available with the push-turn key only, and therefore is limited to the Types 85A and 85C sets. With sets wired for this option, turn the key to its locking position to transfer the complete telephone service to an extension while disconnecting the telephone on which the turn key is located. To restore service to the key telephone, turn the key to its normal position.

Headset Control

3.10 Headset control is provided by the push-turn key only, and therefore is limited to the Type 85A and 85C sets. On sets wired for his option, turn the key to its locking position to connect the monitoring headset. To disconnect the headset, return the key to its normal position.

External Signal Control

3.11 When the push-turn key on the Types 85A and 85C sets is wired to connect an auxiliary external signaling device to the ringer circuit, to activate the external signaling device, turn the key to its locking position. To disconnect the external signaling device, return the turn key to its normal position.

Remote Signaling

3.12 The push section of the push-turn key is normally used to actuate a remote signaling device such as a buzzer, bell, or lamp for the purpose of informing others of a telephone call. Therefore this option is limited to Types 85A and 85C sets. To actuate the remote signal, press the push-turn key. To stop the remote signal, release the push-turn key.