

## 700 SERIES DESK TYPE TELEPHONES

### 1. GENERAL

- 1.01 This practice presents a description of the 700 series of desk telephones. The 700 series provides a group of compact, anti-sidetone type desk telephones which operate efficiently over a wide range of loop resistance and line impedance. The instruments are intended for use in special locations, such as bedrooms, or where desk space is at a premium. Each instrument consists of an oval pressed aluminum baseplate, with a non-skid rubber mat underneath, on which all internal parts are mounted. A molded plastic housing covers the assembly and provides a cradle for the handset, which is connected to the internal components by a flexible plastic covered cord (See Figure 1). A second plastic covered cord connects the instrument to a molded terminal block or wall-mounted ringer unit. *A separate ringer unit must always be fitted with these instruments*, except when they are used as extension units, as the extremely compact design does not include an internal ringer.

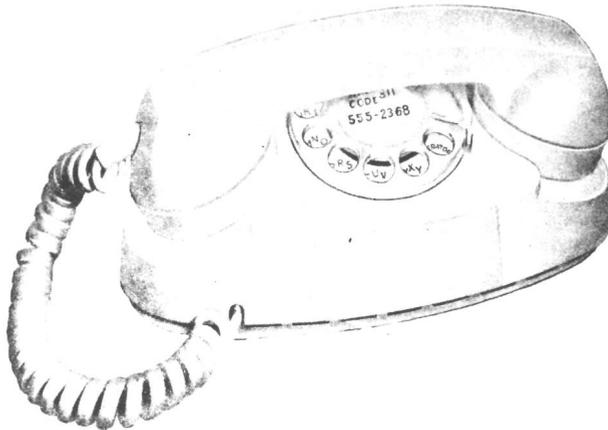


FIGURE 1 — 700-Type Telephone Set

- 1.02 The 700 telephone instrument is available for use on any class of service on any type of automatic or manual telephone system. It may be connected to its associated ringer to provide all necessary circuitry. Some special features may be provided with the instrument: specific details for each combination are given in individual C.T.S. practices.
- 1.03 Although any of the ringer units (Figure 2) may be used with the 700 telephone, specific types have been designed with the requirements of this series of telephones in view. Each of these ringers provides adequate terminal block facilities for the external circuits of the instruments.
- 1.04 Instruments in the 700 series can be supplied in various colors.

### 2. TYPE 701 (LR) 30 DESK TYPE TELEPHONE

- 2.01 The 701 (LR) 30 desk telephone is a very compact desk type of instrument with a built-in combination dial and night light which illuminates the numeral ring. A switch, at the rear, may be set so that the light glows dimly or is off when the handset is in the cradle. With the

switch in either position the light glows brightly when the handset is lifted. A separate power source of 6-8 volts ac or dc at a current of about 1/4 amp. is required to supply the lamp. *A specially designed transformer, is available for use on 110V ac power circuits.*

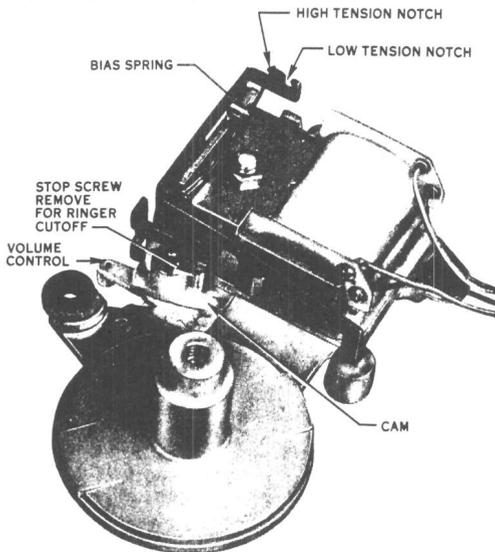


FIGURE 2 - M1A Ringer, Gong and Resonator Removed

### 3. TYPE 701 (LR) 37, 701 (LR) 38 TELEPHONES

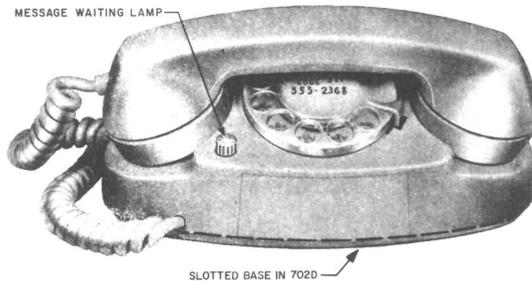
- 3.01 The 701 (LR) 37 and 701 (LR) 38 telephone sets are very compact desk types of instruments with built-in combination dial and night lights, which illuminate the numeral rings, and separate indicator lamps. A small neon lamp, located in front of the handset, may be caused to glow by applying a dc potential of 90 volts across the line conductors at a remote point. The instruments are intended for use on PBX installations where the glowing lamp is used to indicate that a message has been left at the switchboard in the absence of the called party.
- 3.02 A switch at the rear of the instrument may be set so that the dial light glows dimly, for use as a night light, or is off when the handset is on the cradle. With the switch in either position the light glows brightly when the handset is lifted. A separate power source of 6-8 volts ac or dc at a current of about 1/4 amp. is required to supply the dial lamp. *A specially designed transformer is available for use on 110V ac power circuits.*
- 3.03 The 701 (LR) 37 instrument is provided with a 1/5 watt neon indicator lamp while the 701 (LR) 38 is provided with a lower power 1/15 watt indicator lamp. *The lamps must not be interchanged as the sockets have different built-in series resistors.*
- 3.04 The installed telephone must be provided with a separately mounted, external ringer. See CSP 480-100-402 for wiring diagram.

4. TYPE 703 (LR) 30 DESK TYPE TELEPHONE

- 4.01 The 703 (LR) 30 set is a very compact desk type of instrument. It is identical with the type 701 (LR) 30 telephone except that the built-in combination dial light/night light is omitted.
- 4.02 The installed telephone must be provided with a separately mounted external ringer. See CSP 480-110-403 for ringer wiring diagram.
- 4.03 The transmission circuit for the 701 and 703 type telephone sets is equivalent to the 500 type telephone set.

5. TYPE 703 (LR) 37, 703 (LR) 38 TELEPHONE SETS

- 5.01 The 703 (LR) 37 and 703 (LR) 38 telephones are very compact desk types of instruments with the addition of indicator lamps. A small neon lamp, located in front of the handset, may be caused to glow by applying a dc potential of 90 volts across the line at a remote point. The instruments are intended for use on PBX installations where the glowing lamp is used to indicate that a message has been left at the switchboard in the absence of the called party. (See Figure 3).
- 5.02 The 703 (LR) 37 instrument is provided with a 1/5 watt neon indicator lamp while the 703 (LR) 38 is provided with a lower power 1/15 watt indicator lamp. *The lamps must not be interchanged as the sockets have different built-in series resistors.*
- 5.03 The installed telephone must be provided with a separately mounted external ringer. See CSP 480-110-404 for ringer wiring diagram.



**FIGURE 3 — 701D and 702D Telephone Sets Equipped With Message Waiting Lamp**

6. NETWORK

- 6.01 The type 190107 network assembly provides all the components necessary to connect and match the impedance of the handset transmitter and receiver units to a two wire telephone circuit.
- 6.02 The unit incorporates radio frequency filter and side tone balancing circuits in addition to the impedance matching components.
- 6.03 All the components are mounted to the underside of the molded terminal board, which is clipped to the sealing compound filled mounting container.

7. CIRCUIT DESCRIPTION

7.01 The circuit is shown in Figure 4, the dash lines show typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.

- a. The basic network design provides an increase in transmission characteristics of some 10 db over previous circuits. It has therefore been possible to include the two shunt elements in the circuit to produce increased losses on short loops and yet have negligible effect on long loops, the varistor effective resistances changing inversely to the current flowing through them.

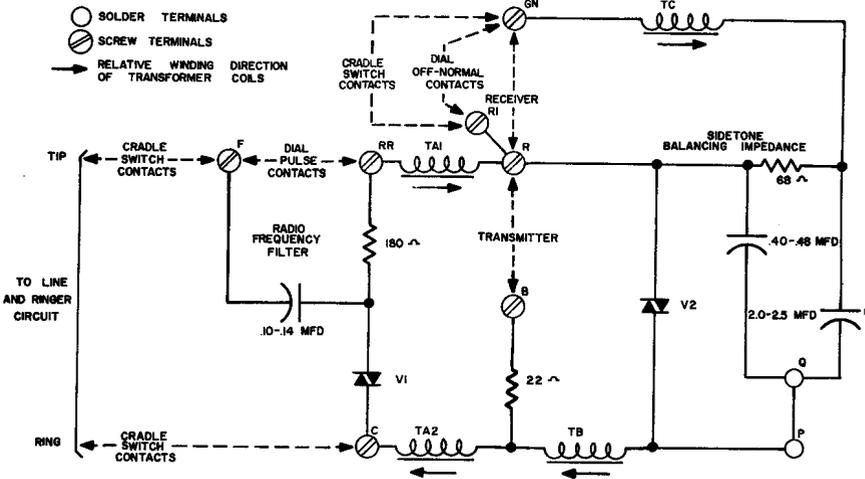


FIGURE 4 CIRCUIT DIAGRAM

- b. The direction of winding of the four coils of the transformer is indicated by arrows in Figure 4. Received speech currents pass via windings TA<sub>1</sub>, TB and TA<sub>2</sub>, each of which produces an additive voltage in winding TC. The received currents also produce a voltage across the 68Ω resistor that opposes and is almost equal to that produced by the induced voltages in winding TC. There is, therefore, very little power loss in the resistor and varistor and maximum power in the receiver. The low impedance of the transmitter is matched to the loop by the turn of winding TB to winding TA<sub>1</sub> and TA<sub>2</sub>.
- c. The current variations due to the transmitter are in opposite phase in windings TA and TB. The induced voltages in winding TC are also in opposite phase and the resultant voltage is opposed by the voltage produced across the 68Ω resistor. The net effect is that very small signals are produced in the receiver due to transmitter current changes and sidetone is very low. Also there is little power loss in the receiver, maximum transmitting levels are attained. Both varistors contribute to this condition by automatically compensating for various loop conditions to provide close matching of the loop impedance and the balancing network impedance with the transmitter circuit.

- d. The 180Ω resistor and .10 MFD capacitor provide a filter network to suppress high frequency signal components of the dial pulses which might otherwise be radiated from the telephone line and cause local interference with broadcast radio reception.

8. TESTING

- 8.01 Thorough testing of the network assembly can only be performed with elaborate test equipment. An adequate check on performance, for maintenance purposes, is to compare a suspected unit with a known good unit by substitution. Resistance and capacitance checks can be carried out between many of the terminals, as can be seen from Figure 4. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Figure 5 shows the layout of the terminal board of the assembly.

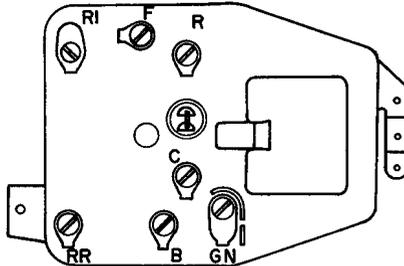


FIGURE 5 TERMINAL BOARD LAYOUT

- 8.02 To assist in testing network assemblies in the field, Table 1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

Table 1 POINT TO POINT TEST VALUES

Terminals	Components	Test Value
F - RR	Filter capacitor	.09 - .14
R - Q	Network capacitors	(4) 2.4 - 3.0
C - RR	V1 and filter resistor	(1) 4.7K min (2) 890-1070
C - P	TA <sub>2</sub> and TB windings	28.8-35.2
B - C	TA <sub>2</sub> winding	35.1-42.9
B - P	TB winding	33.3-40.7
R - GN	TC winding and resistor	74.3-90.7
R - RR	TA winding	12.1-14.9
R - P	V2	(1) 1.6K min

- NOTES: All capacitance values in microfarads and all resistance values in ohms  
 (1) with 1 ma dc flowing through circuit.  
 (2) with 10 ma dc flowing through circuit.  
 (3) with 100 ma dc flowing through circuit.  
 (4) with strap P-Q removed.