TYPE 190107 NETWORK

CONTENTS

1 GENERAL DESCRIPTION

1.1 The type 190107 network assembly provides all the components necessary to connect and match the impedance of the type 65 handset transmitter and receiver units to a two wire telephone circuit.

1.2 The unit incorporates radio frequency filter and side tone balancing circuits in addition to the impedance matching components.

1.3 All the components are mounted to the underside of the molded terminal board which is clipped to the sealing compound filled mounting container.

2 TECHNICAL DESCRIPTION

2.1 The circuit is shown in Fig. 2-1; the dashed lines show typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.

2.2 EQUALIZATION

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

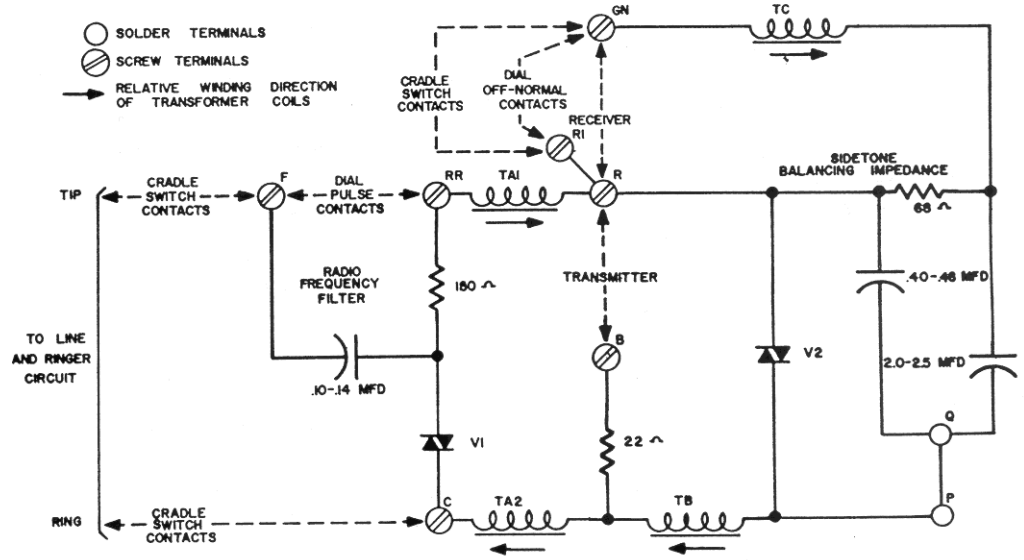

Fig. 2-1 CIRCUIT DIAGRAM

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.

2.3 TRANSMISSION

The direction of winding of the four coils of the transformer is indicated by arrows in Fig. 2-1. Received speech currents pass via windings TA_1, TB and TA_2, each of which produces an additive voltage in winding TC. The received currents also produce a voltage across the 68 ohms 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 turns ratio of winding TB to windings TA_1 and TA_2.

2.4 SIDETONE BALANCING

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 68 ohms 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, as 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.

2.5 RADIO FREQUENCY FILTERING

The 180 ohms 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.

3 TESTING

3.1 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 Fig. 2-1. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Fig. 3-1 shows the layout of the terminal board of the assembly.

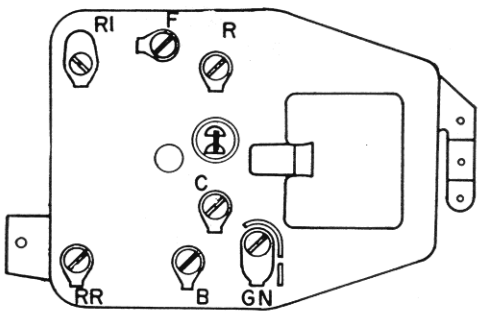

Fig. 3-1 TERMINAL BOARD LAYOUT

3.2 To assist in testing network assemblies in the field, Table 3-1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

Table 3-1 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_2 and TB windings	28.8-35.2
B - C	TA_2 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.

TYPE 75335-1 NETWORK

CONTENTS

1 GENERAL DESCRIPTION

1.1 The type 75335-1 network assembly provides all the components necessary to connect and match the impedance of the type 65 handset transmitter and receiver units to a two wire telephone circuit.

1.2 The unit incorporates radio frequency filter and side tone balancing circuits and a 0.5 mfd. ringer capacitor in addition to the other circuits.

1.3 All the components are mounted on the underside of the molded terminal board which is clipped to the sealing compound filled mounting container.

2 TECHNICAL DESCRIPTION

2.1 The circuit is shown in Fig. 2-1; the dashed lines show typical connections to other components of a complete telephone instrument. The features of the circuit are briefly discussed in the following paragraphs.

2.2 EQUALIZATION

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 varistors in the circuit

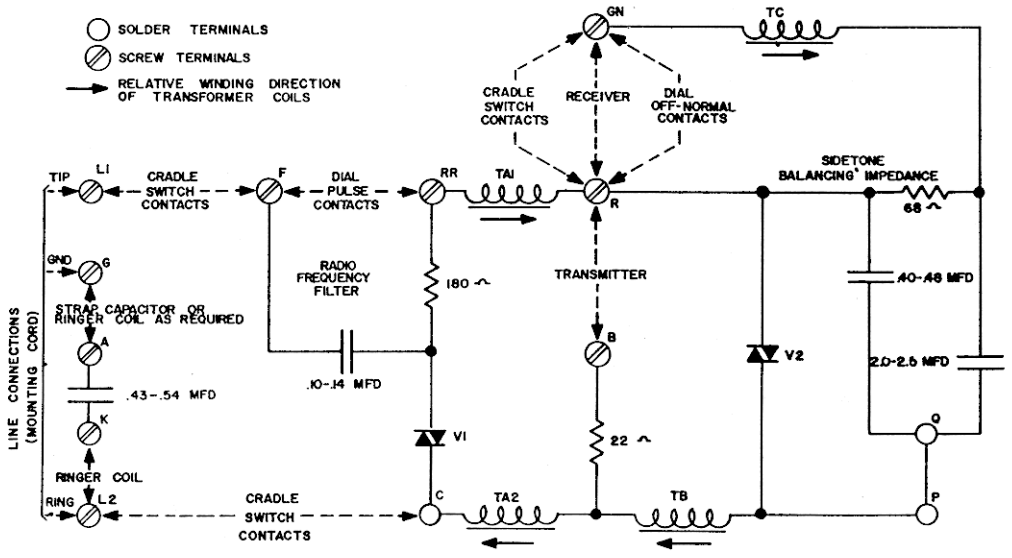

Fig. 2-1 CIRCUIT DIAGRAM

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.

2.3 TRANSMISSION

The direction of winding of the four coils of the transformer is indicated by arrows in Fig. 2-1. Received speech currents pass via windings TA_1, TB and TA_2, each of which produces an additive voltage in winding TC. The received currents also produce a voltage across the 68 ohms 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 turns ratio of winding TB to windings TA_1 and TA_2.

2.4 SIDETONE BALANCING

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 68 ohms 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, as 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.

2.5 RADIO FREQUENCY FILTERING

The 180 ohms 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.

3 TESTING

3.1 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 Fig. 2-1. Note that the soldered connection between terminals P and Q can be opened to permit testing of the two network capacitors. Fig. 3-1 shows the layout of the terminal board of the assembly.

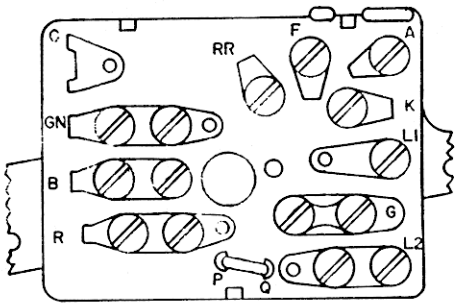

Fig. 3-1 TERMINAL BOARD LAYOUT

3.2 To assist in testing network assemblies in the field, Table 3-1 gives the values of resistance and capacitance which should be measured when tests are made between various pairs of terminals.

Table 3-1 POINT TO POINT TEST VALUES

Terminals	Components	Test Value
F - RR	Filter Capacitor	.09 - .14
A - K	Ringer Capacitor	.43 - .54
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_2 and TB windings	28.8-35.2
B - C	TA_2 winding and resistor	35.1-42.9
B - P	TB winding and resistor	33.3-40.7
R - GN	TC winding and resistor	74.3-90.7
R - RR	TA_1 winding	12.1-14.9
R - P	V2	(1) 1.6K min
		(3) 72-87

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.