

SENSITIVITY REGULATOR

1 GENERAL. During field trials of the 700 type telephone it was found that on short lines the telephone was too loud. An automatic regulator, Regulator No.1, is included to limit the sensitivity on short lines whilst allowing fully efficiency on long lines.

2 THE REGULATOR CIRCUIT

The method of automatic regulation used is that of including a line-current sensitive regulator within the telephone.

From N.846, the regulator circuit can be seen consisting basically of a variable-loss network having a low d.c. resistance in series with the transmitter, with connections to the receiver circuit. It provides shunt paths across the transmitter and receiver, such that, on short lines with full feeding current (say 95mA), the shunt impedance is low, thus more current will be shunted away from the transmitter and receiver, reducing their sensitivity. On long lines with currents 30-40mA, the shunt impedance rises to several kilo ohms, thus the shunt currents are very small, and the sensitivity of the transmitter and receiver is normal.

3 Components

The Resistor Bulb No. 15 (RUM) is a tapped filament resistor having a pronounced positive resistance/temperature characteristic. It is connected in series with the telephone loop. The characteristics for two typical examples of line are as follows:-

LINE	LINE CURRENT	BULB RESISTANCE	BULB p.d. ($I \times R$)
Long	30 mA	10 ohms	0.3V
Short	76 mA	36 ohms	2.7V

The Rectifier Elements No. 209 (MR) have a forward resistance depending upon the potential applied to them. The resistance falls rapidly as the potential is increased.

SIMPLIFIED CIRCUIT FOR TRANSMISSION

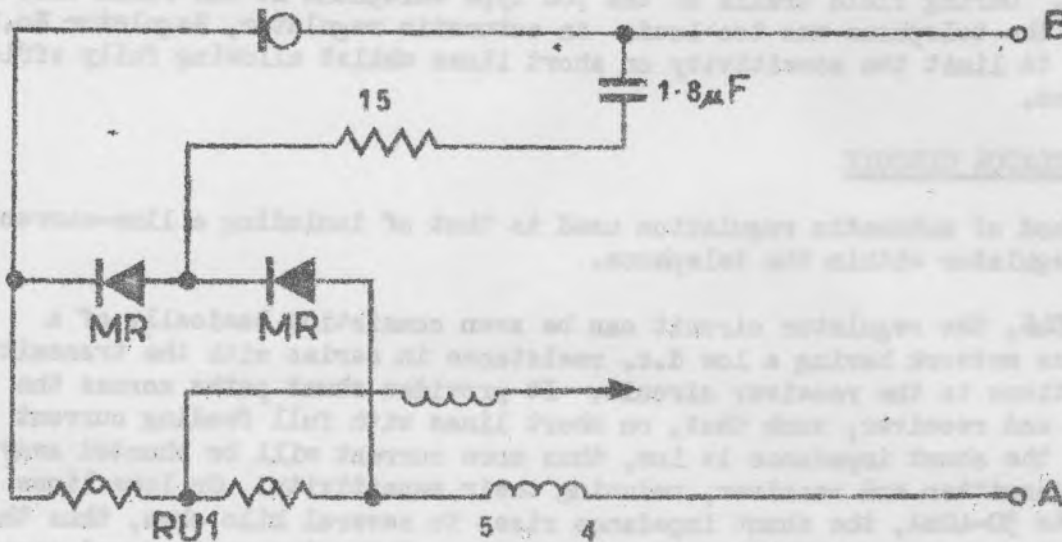


Figure 1.

4. OPERATION

From Fig. 1 an a.c. path in parallel with the transmitter, consists of part of the rectifier network, a 15 ohm resistor and $1.8\mu F$ capacitance. The degree to which the output from the transmitter is shunted by this network will depend upon -

- a. the forward resistance of the rectifier. This forward resistance is dependance upon -
- b. the potential developed across the resistor bulb which in turn is subject to -
- c. the line current (length of line).

By using two rectifiers as shown, both half cycles of the alternating component will be affected equally, thus minimising distortion. The distortion is further reduced by connecting RU and MR in a balanced "Wheatstone Bridge" arrangement such that equal biasing currents flow in each rectifier.

5. REFERENCES

EP's Telephones 1/1

JRW