359N EQUALIZER

DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This section describes the 359N equalizer, which is a plug-in apparatus unit designed for use in V4 telephone repeater applications.

1.02 The 359N equalizer is intended primarily for use in critical voiceband data transmission systems. It is similar to the 359F equalizer but is equipped with new transformers which have less envelope delay distortion, flatter low-frequency response, improved longitudinal balance, and an electrostatic shield between the windings. The 359N equalizer is designed for use between 600-ohm transmitting and receiving repeater equipment and 600-ohm circuits or lengths of nonloaded cable where gain may or may not be required and loop signaling arrangements are required.

1.03 The 359N equalizer consists of two 600:600-ohm transformers, one for the transmitting and one for the receiving side of the 4-wire circuit. The centertap on the line side is used to derive a simplex leg of each cable pair for standard V4 repeater applications. Centertaps are also provided on the 600-ohm TRMTG or RCVG AMPL socket side, on an optional basis, under control of screw-type switches on the faceplate. This arrangement allows more general use of the equalizer transformers as repeating coils in other than V4 repeater applications. Equalization results from the variation (with frequency) of the impedance mismatch between the equalizer and the cable in the transmitted frequency range. The 1000-Hz power loss of each transformer is 0.3 dB.

2. EQUIPMENT DESCRIPTION

2.01 The 359N equalizer (see Fig. 1) is a plug-in unit equipped with a 20-pin connector plug and is designed to be plugged directly into the equalizer connector socket of the repeater mounting shelf.

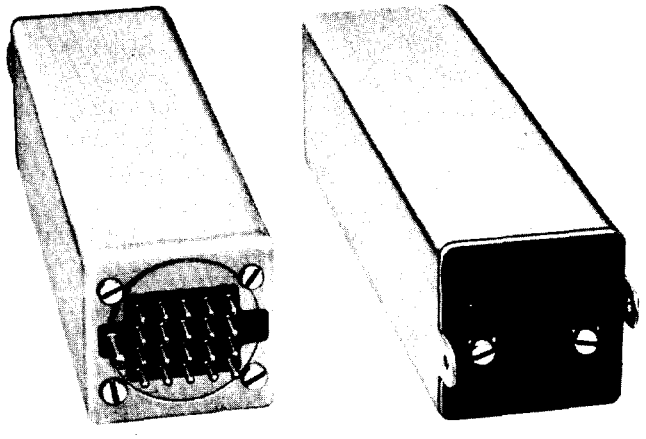

Fig. 1—359N Equalizer

2.02 The 359N equalizer consists of two transformers mounted on a printed wiring board and housed in a metal can approximately 1-3/4 inches high by 1-3/4 inches wide by 7 inches long. Tabs are provided on the front of the can to facilitate removal of the equalizer from the repeater mounting shelf by the use of a 602C or 602D tool.

2.03 Two screw-type switches, CT1 and CT2, mounted on the equalizer faceplate make available, on an optional basis, centertaps on the transformer windings facing the amplifiers.

3. CIRCUIT DESCRIPTION

3.01 Figure 2 is a schematic illustrating typical circuit connections when the 359N equalizer

is plugged into the equalizer socket of a 24V4 or 44V4 repeater. The transmitting side of the 359N equalizer is wired to provide connections to the AMPL OUT and MON jacks and contains a 2578L 600:600-ohm transformer T2. Transformer T2 connects the 600-ohm terminals of the T AMPL socket of the repeater shelf circuit output to one pair of the 4-wire line (600-ohm circuit). Transformer T2 is centertapped on the line side with a lead brought out to terminal 10 to derive a simplex leg of the transmitting cable pair.

3.02 The receiving side also contains a 2578L 600:600-ohm transformer T1 which connects the received transmission signals from the short nonloaded 4-wire line (600-ohm circuit) to the 600-ohm terminals of the R AMPL socket of the repeater shelf. The centertap of transformer T1 on the line side is brought out to terminal 5 to derive a simplex leg of the receiving cable pair. The strap between terminals 6 and 9 in the equalizer provides the required circuit continuity in the associated plug-in unit in the R AMPL socket to give an impedance of 600 ohms across terminals 1 and 3.

3.03 Transformers T2 and T1 are centertapped on the amplifier socket side to allow more general use of the transformers as repeating coils. Faceplate screw-type switches CT1 and CT2 make these taps available on an optional basis. When the equalizer is used in normal V4 repeater applications, screw-type switches CT1 and CT2 are opened (turned out). (Insulating washers are provided under the screwheads to prevent accidental connection.) This is necessary since the terminals are already in use in V4 shelf applications. When the 359N equalizer transformers are used as repeating coils in other than V4 repeater applications, the insulating washers are removed and screw-type switches CT1 and CT2 are closed (turned in) to provide access to the transformer centertaps through terminals 7 and 18, respectively.

3.04 The 2578L transformer is of a new design having a flatter low-frequency response and less delay distortion than that used in the 359F equalizer. In addition, it is equipped with an electrostatic shield which helps to reduce the noise due to longitudinal currents. In the 359N equalizer, the electrostatic shields from both transformers are connected together and brought out to terminal 8 for connection to ground through the repeater circuit.

3.05 The electrostatic shield and balanced construction of the new 2578L transformer combine to reduce longitudinal unbalance currents by 75 dB minimum over the voiceband. The loss-frequency distortion over the voiceband (300 to 3200 Hz) is ±0.1 dB relative to 1000 Hz. The envelope delay distortion over the data transmission band (500 to 3200 Hz) is less than 3 microseconds; from 1 to 5 kHz, the delay distortion is negligible. The delay at 300 Hz relative to 1000 Hz is 7 microseconds.

3.06 It should be noted that the performance data given above is for 0 dc current through the transformer winding. With 2 ma dc, either winding inductance is reduced from 3.3 h minimum (0 ma dc) to about 1.6 h. This increases the 200-Hz loss about 0.1 dB. For this reason, it is recommended that dc currents be applied on a simplex basis only and that any loop current due to unbalances be limited to 1 ma maximum. The simplex current itself may be as high as 250 ma without damage to the transformer winding.

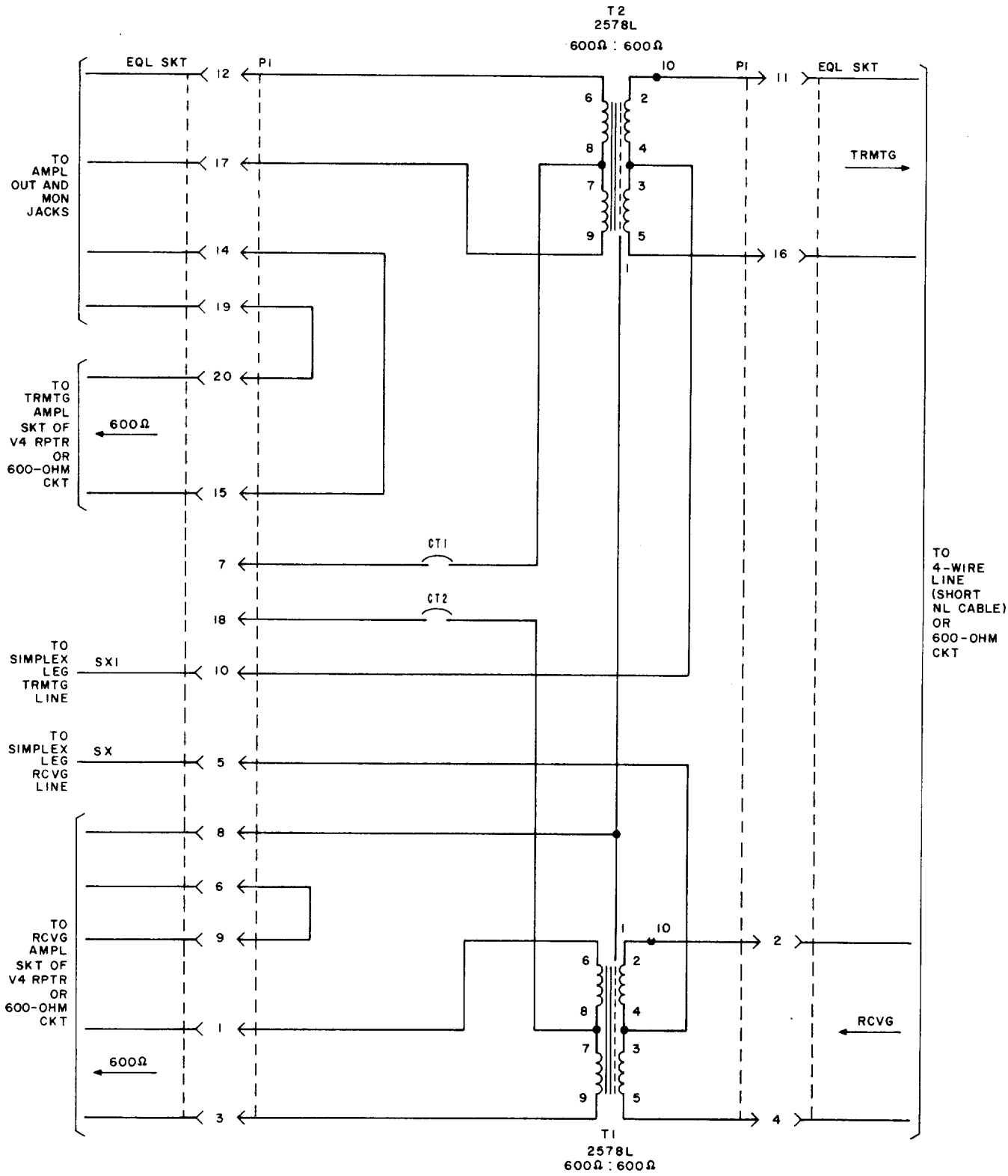

Fig. 2—359N Equalizer—Schematic and Typical Circuit Connections