

1H TERMINATING SET DESCRIPTION

CONTENTS	PAGE
1. GENERAL	1
2. EQUIPMENT DESCRIPTION	1
3. CIRCUIT DESCRIPTION	1
A. General	1
B. Hybrid Circuit	3
4. TRANSMISSION PERFORMANCE	3
A. 2-Wire Impedance and Bridging Loss	3
B. Terminating Set Losses	4
C. Transhybrid Loss	5

1. GENERAL

1.01 This section describes the 1H terminating set for use in the 24V4 telephone repeater as part of the Traffic Service Position System (TSPS) No. 1 operator cut-through circuit (see Fig. 1). The 1H terminating set has a high-impedance 2-wire port which may connect to (1) 2-wire 900-ohm trunks, (2) 450-ohm 2-wire port of the 1J terminating set bridged on 4-wire 600-ohm trunks, or (3) high-impedance 2-wire assistance operator trunks. The 227-type amplifiers in the associated 24V4 repeater make up for the hybrid losses and provide gain to the 4-wire 600-ohm circuit connecting to the distant TSPS operator.

1.02 The 1H terminating set consists of a 2-transformer hybrid, an RC balancing network, and on the 2-wire side, a series blocking capacitor and resistive termination.

2. EQUIPMENT DESCRIPTION

2.01 The 1H terminating set (see Fig. 2) consists of components mounted on a printed wiring board and housed in an aluminum can. The terminating set is approximately 5-1/4 inches wide, 1-3/4 inches high, and 7 inches deep.

2.02 The terminating set is a plug-in unit equipped with a 20-pin connector which plugs into a socket on the 24V4 repeater mounting shelf (J98615BJ). Tabs are provided on the faceplate so that the terminating set may be removed from the shelf by means of a 602C or 602D tool.

3. CIRCUIT DESCRIPTION

A. General

3.01 The schematic of the 1H terminating set is given in Fig. 3. The circuit consists of a 2-transformer hybrid circuit, an RC balancing network, and on the 2-wire side, a series blocking capacitor and resistive termination.

3.02 Speech signals from the 2-wire circuit at terminals 12 and 13 pass through the 5-7 windings of transformers T1 and T2 in series with resistor R1 and capacitor C1. Approximately half of the signal power is dissipated in resistor R1, with the remainder passing into transformers T1 and T2 and dividing equally in the two 4-wire loads: the 600-ohm transmitting and receiving circuits. The signal entering the receiving circuit through terminals 2 and 3 is blocked by the amplifier used in the connecting circuit and is dissipated. The signal entering the transmitting circuit through terminals 19 and 20 proceeds to the amplifier in the transmit circuit, is amplified, and is passed on to the TSPS operator at the end of the circuit. Identical voltages are induced in each 6-8 winding of transformers T1 and T2. No signal enters the balancing network (R2, C2) because the windings are connected series opposing.

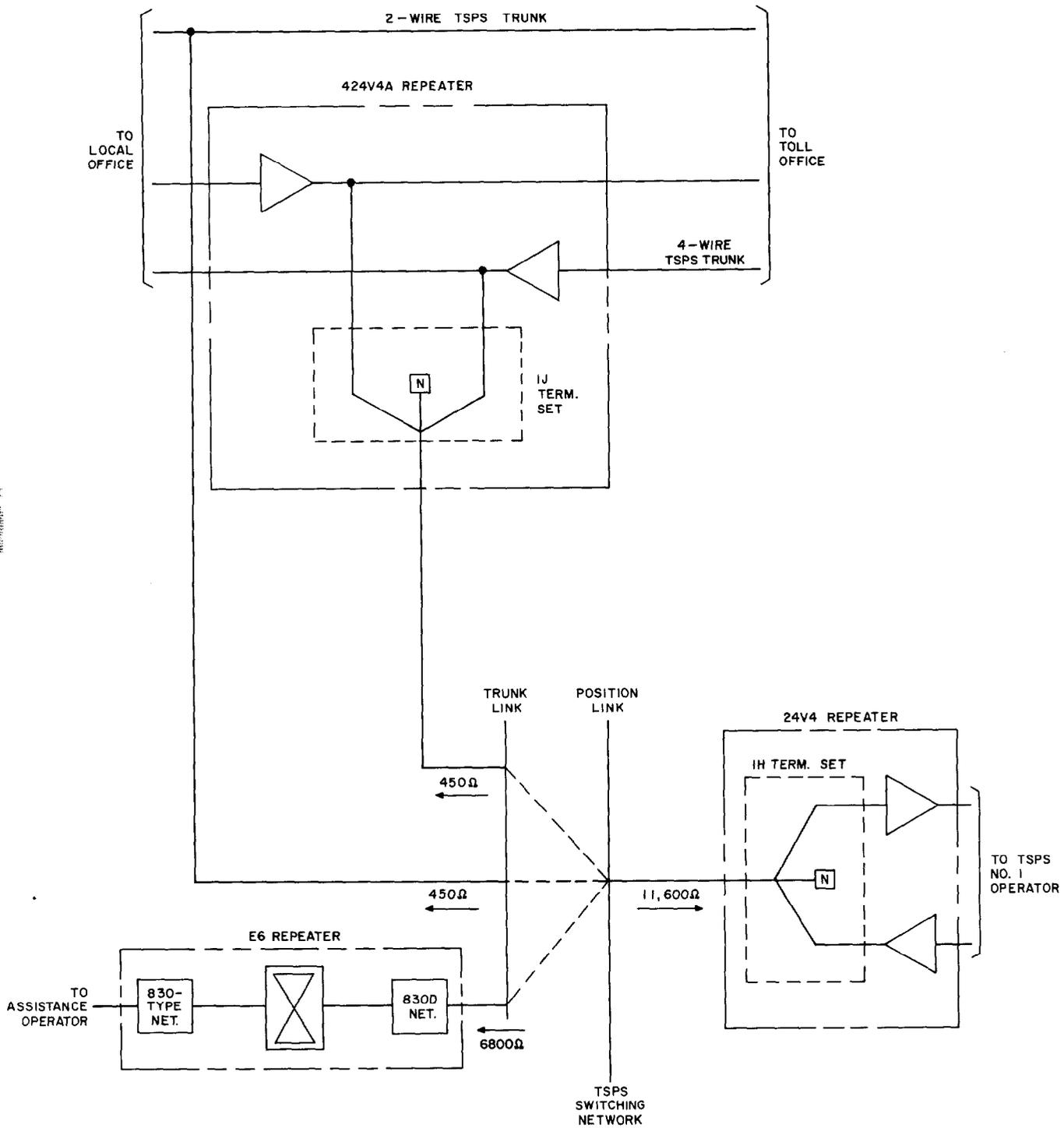


Fig. 1—TSPS No. 1 System—Block Diagram of Transmission Circuit

3.03 Speech signals are received on the 4-wire side of the terminating set at terminals 2 and 3. The signals pass through the series-connected 1-3 and 2-4 windings of transformer T2. Signal power divides, with half entering the balancing network and half entering the 2-wire circuit and built-in termination R1. Some of the energy is dissipated in resistor R1 with the remainder being delivered to the 2-wire load through terminals 12 and 13. Flux in the core of transformer T1 caused by current flow in the 6-8 winding is equal and opposite to the flux caused by current flow in the 5-7 winding. No voltage is induced in the transmit circuit. This ideal condition results when the impedance of the balancing network exactly matches

the total impedance in the 2-wire circuit (including the impedance of R1, C1).

B. Hybrid Circuit

3.04 The hybrid circuit consists of two 2602P transformers. Capacitor C1 at the midpoint of the 2-wire side of transformers T1 and T2 is used to prevent direct current from passing through the 5-7 windings. C2 is a matching capacitor in the balancing network required to balance the hybrid. Resistor R1 (5620 ohms) plus the 450-ohm nominal impedance across terminals 12 and 13 terminates the 6000-ohm 2-wire output of the hybrid. The 4-wire legs of the terminating set connect to 600-ohm circuits through terminals 19 and 20 (transmit) and 2 and 3 (receive).

4. TRANSMISSION PERFORMANCE

A. 2-Wire Impedance and Bridging Loss

4.01 The hybrid of the 1H terminating set has a nominal 2-wire impedance of 6000 ohms. Including the 5620-ohm resistor R1 in series with the 2-wire circuit, the nominal input impedance at terminals 12 and 13 is 11,620 ohms, when the two 4-wire legs are terminated in 600 ohms. When bridged on 900-ohm 2-wire trunks, the bridging loss is 0.3 dB.

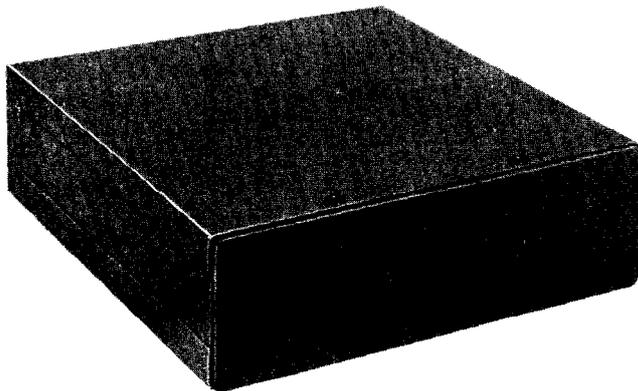


Fig. 2—1H Terminating Set—Front View

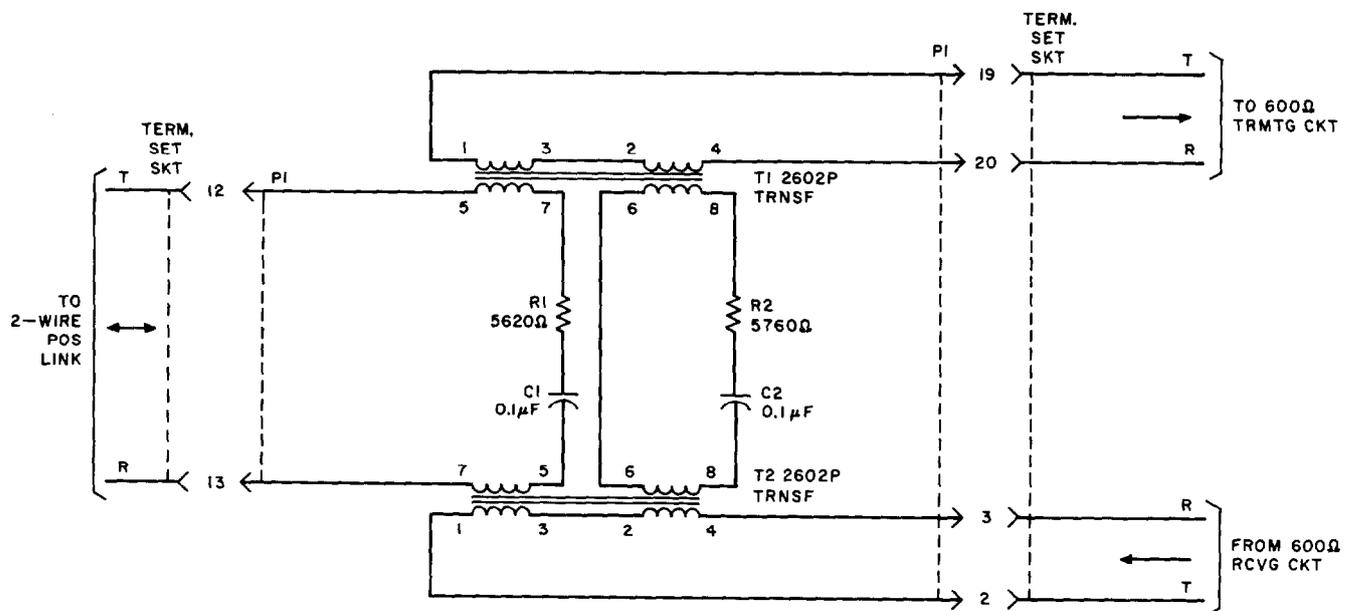


Fig. 3—1H Terminating Set—For High-Impedance Bridging on Position Link of TSPS Switching Network—Schematic

B. Terminating Set Losses

4.02 Typical 2-wire to 4-wire transmission characteristics, with 600-ohm terminations, are given in Fig. 4. The small difference in transmission from the 2-wire side through the two 4-wire sides is caused by winding capacitance differences and is not objectionable from a transmission standpoint. Test sets of 600-ohm impedance are convenient for making factory and field measurements.

Note: With a 450-ohm termination on the 2-wire side, the 1000-Hz transmission loss is 1.1 dB higher (reference condition is an ideal transformer with a 450- to 600-ohm ratio). Transformer loss in each 2-wire to 4-wire path is 0.8 dB at 1000 Hz.

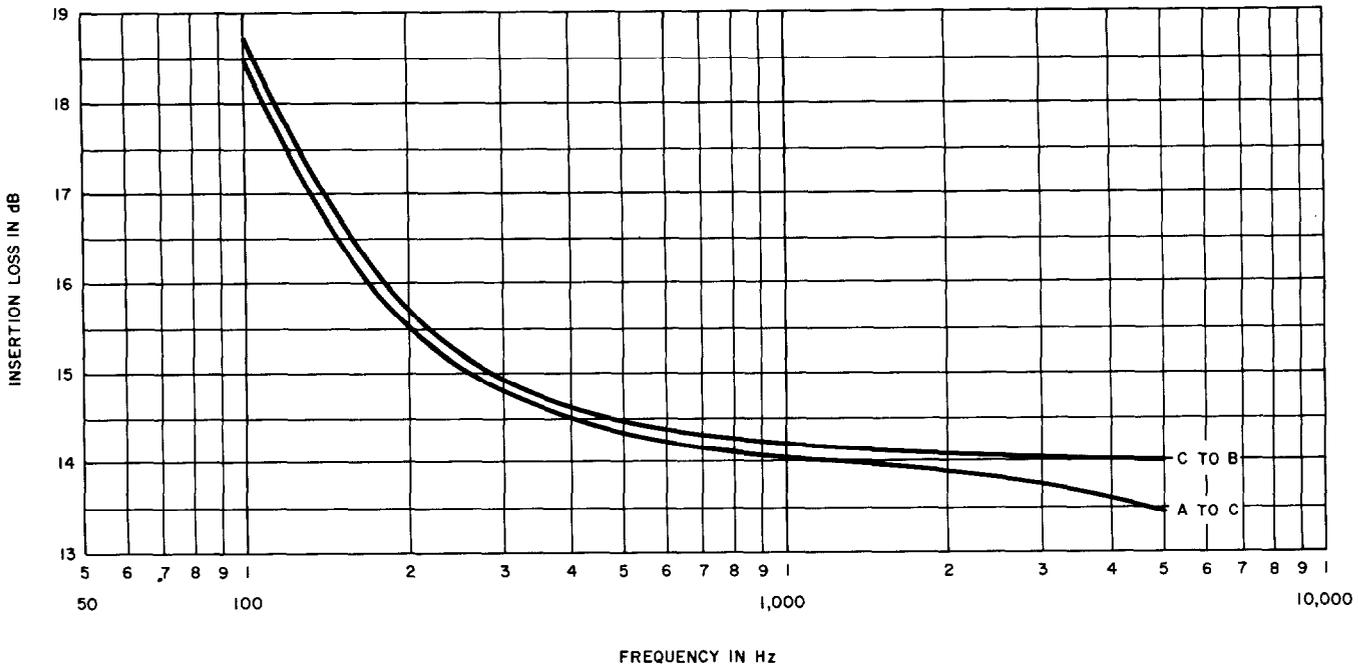
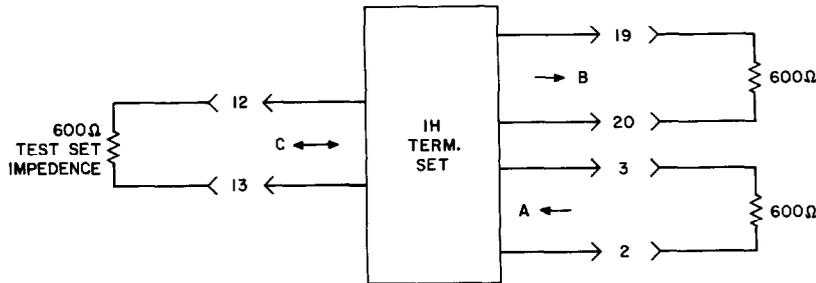


Fig. 4—IH Terminating Set—2-Wire to 4-Wire Loss—Frequency Characteristic

C. Transhybrid Loss

4.03 The typical transhybrid loss (see Fig. 5) of the 1H terminating set is measured from 600-ohm receive terminals 2 and 3 to 600-ohm transmit terminals 19 and 20, with 2-wire terminals 12 and 13 terminated in either 450 or 600 ohms. 450 ohms is the nominal circuit impedance while 600 ohms is used for factory and field measurements. Variations from the 1000-Hz transhybrid losses given in Fig. 5 can be ± 4.0 dB for an R_C of 600 ohms and ± 5.0 dB for an R_C of 450 ohms, with the curve shapes remaining essentially the same.

4.04 The transhybrid loss of the 1H terminating set forms a part of the sidetone path of the TSPS No. 1 operator's telephone circuit. External idle circuit termination of 450 ohms in series with $4\mu F$ is provided to keep the transhybrid loss high in the idle condition. This arrangement reduces operating room noise and sidetone to normal levels in the operator's receive path when a call is not actually being handled.

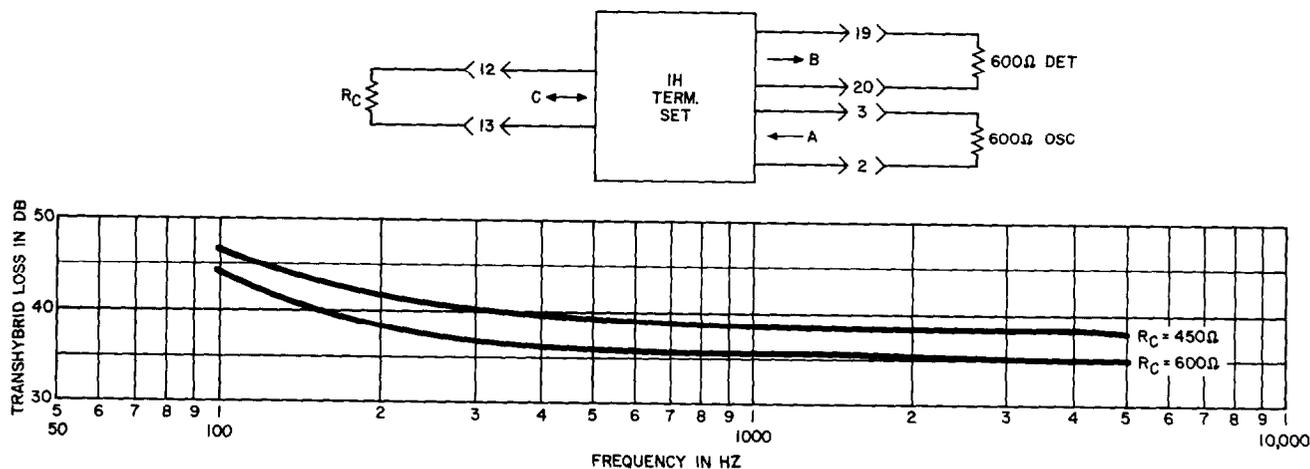


Fig. 5—1H Terminating Set—Typical Transhybrid Loss