PBX CONFERENCE BRIDGE CIRCUITS TWO-WIRE GAIN TYPE — WITH TRANSISTOR AMPLIFIERS

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1. GENERAL

1.01 This section covers circuit characteristics, transmission features and the application of the two-wire conference bridge circuit per SD-96595-01.

1.02 In addition to the transistorized bridge circuit, a connecting circuit is required to connect the conferencing calls to the bridge outlets. The manual connecting circuits terminate the outlets on switchboard jacks. Dial connecting circuits terminate the bridge outlets on selectors, selector connectors, or line link frames. Both manual and dial connecting circuits provide such functions as station battery, idle line terminations and supervision.

1.03 The connecting circuits for various customer premise applications of this bridge are shown in Section AB22.329.5. Connecting circuits for station systems as well as PBXs are given.

2. CIRCUIT CHARACTERISTICS

2.01 This bridge circuit provides two-way gain for low loss conference connections between a maximum of four or six 2-wire outlets. Gain is provided by grounded base transistor amplifiers. The four-outlet circuit is shown in simplified form in Fig. 1. Coupling between bridge outlets, and between the outlets and amplifiers, is by means of two coil hybrids. The use of miniaturized components makes the conference circuit equipment extremely compact.

2.02 The bridge circuit will operate on either a 24- or 48-volt PBX power supply, or on power derived from a 48-volt central office supply. Current drain is .020 ampere for the four-outlet and .033 ampere for the six-outlet unit. Where a 48-volt central office supply is used, a voltage regulator circuit is required. The regulator is furnished as an optional plug-in unit. It maintains the voltage applied to the transistor amplifiers within the operational range of 15 to 37 volts with supply voltages in the range from 16 to 52 volts.

2.03 The conference bridge circuit will not be damaged by voltage surges of less than 600 volts or by 20-cycle ringing voltages. Normal station protection which is used on exposed plant will provide adequate protection for this bridge.

2.04 In the simplified circuit of Fig. 1 a current received from a line connected to one outlet, such as A, will by transformer action in the high-impedance transformer cause an equal current to flow out of the opposite outlet, in this case B. Currents A and B are additive in the low-impedance transformer and their sum is fed to the input of the amplifier. The amplifier input impedance is very low and the power consumed is negligible. The output of the amplifier supplies power to the other pair of outlets, C and D. Currents introduced by this path oppose each other in the low-impedance transformer associated with these outlets, and feedback via the second amplifier is prevented or greatly reduced.

2.05 A simplified schematic of the six-outlet bridge is shown in Fig. 2. The transmission theory of this arrangement is fundamentally the same as the four-outlet circuit. There is, however, one principal difference. The output winding of each amplifier is divided into two

halves, one half for each of two hybrids. Each amplifier utilizes only that half of the winding between its collector and the battery center tap to introduce energy into the hybrid. By this means, one amplifier can energize the four outlets of two hybrids.

2.06 Assume all outlets terminated and outlet A energized from a PBX station. Energy is then inductively transferred to outlet B and to the input of amplifier 1. This amplifier will then energize outlets C, D, E, and F by means of its output windings associated with hybrids 2 and 3. The same theory will apply to exciting any individual outlet with a corresponding transfer of energy to the remaining five outlets.

3. TRANSMISSION FEATURES

3.01 With balanced impedances connected to the outlets, the nominal transmission loss from outlet to outlet is about 1.2 db for both the four- and six-outlet bridge from 500 to 3000 cps and about 2.5 db at 250 cps. In practice, the outlet impedances will not be a perfect match and this will cause some variation in transmission loss. To minimize this, all idle ports are terminated in 900 ohms by the connecting circuit. Under these conditions there will be only a few calls in which the insertion loss departs as much as ± 3.0 db from the nominal, and the circuit will have a high degree of stability. If one or more of the outlets are left unterminated, insertion losses and feedback will become excessive and, in extreme cases, the circuit will oscillate.

3.02 This bridge will meet the transmission loss objectives specified in Section AB22.329.0, Par. 3.02. Under the normal range of loop, central office and tie trunk impedances connected to the bridge, the echo return loss will average about 11.0 db and the singing point about 6.0 db.

3.03 Extreme cases of impedance dissimilarity can reduce the stability margin of the bridge. These can be minimized by procedures as discussed in Section AB22.329.0, Par. 3.04.

3.04 Optimum transmission results will be obtained if loops of similar impedance are connected to opposite outlets of the bridge. These outlets are A and B, C and D, E and F.

3.05 As discussed in Section AB22.329.0, Par. 3.06, only one central office trunk connection should be permitted on any one conference.

4. APPLICATION

4.01 This conference bridge has good transmission capabilities under most PBX conference requirements. The low cost, minimum space requirement and transmission capabilities make it a good choice for PBX conference applications. Manual conference connecting circuits will not be initially available for manual PBXs. The idle port must be terminated immediately to prevent instability when a conferee hangs up. Connecting circuits and cord circuit modifications to accomplish this have not been developed for manual PBXs. Therefore, it will be necessary to verify the availability of the connecting circuit before specifying this conference bridge circuit.

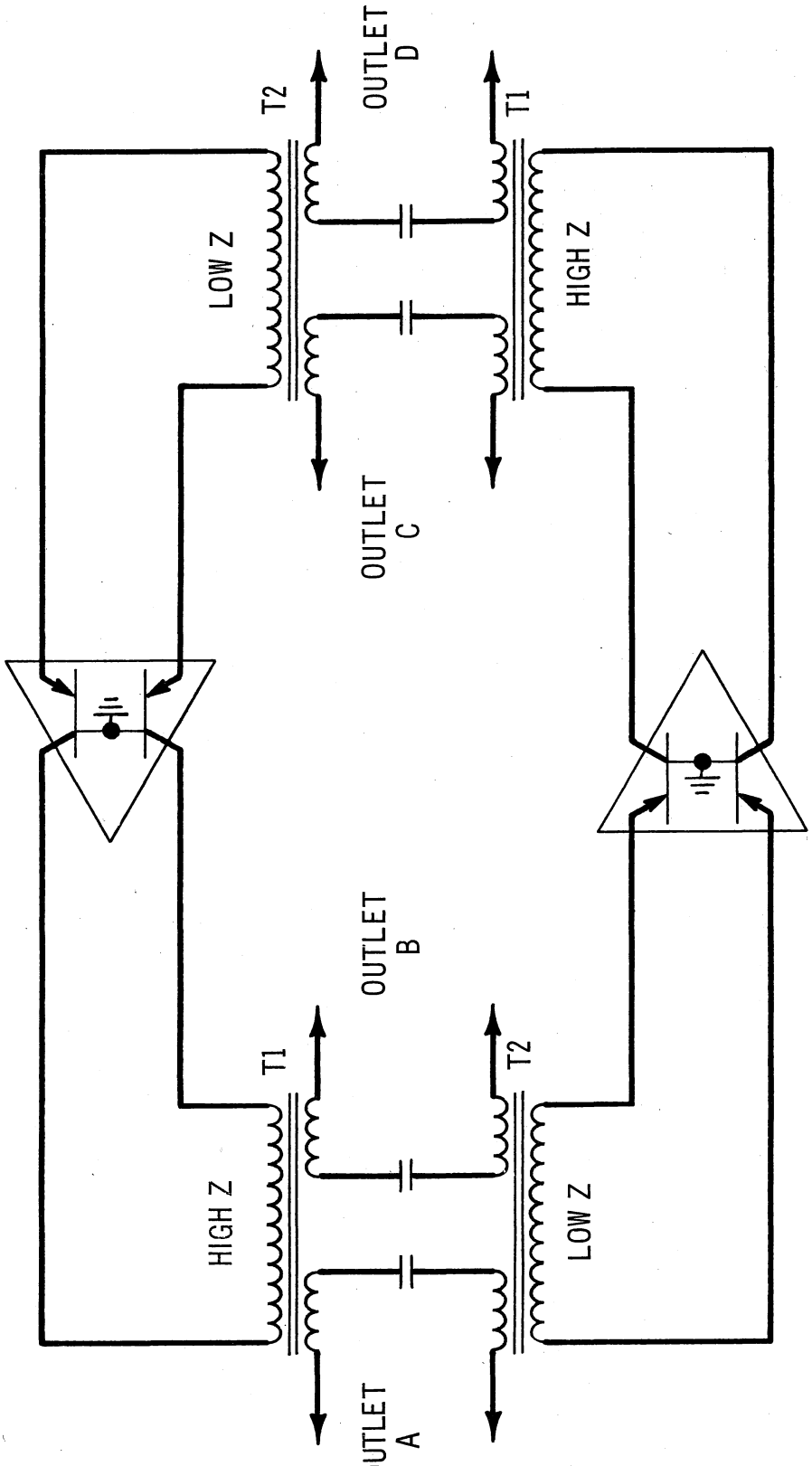

Fig. 1 – Four-Outlet Conference Circuit

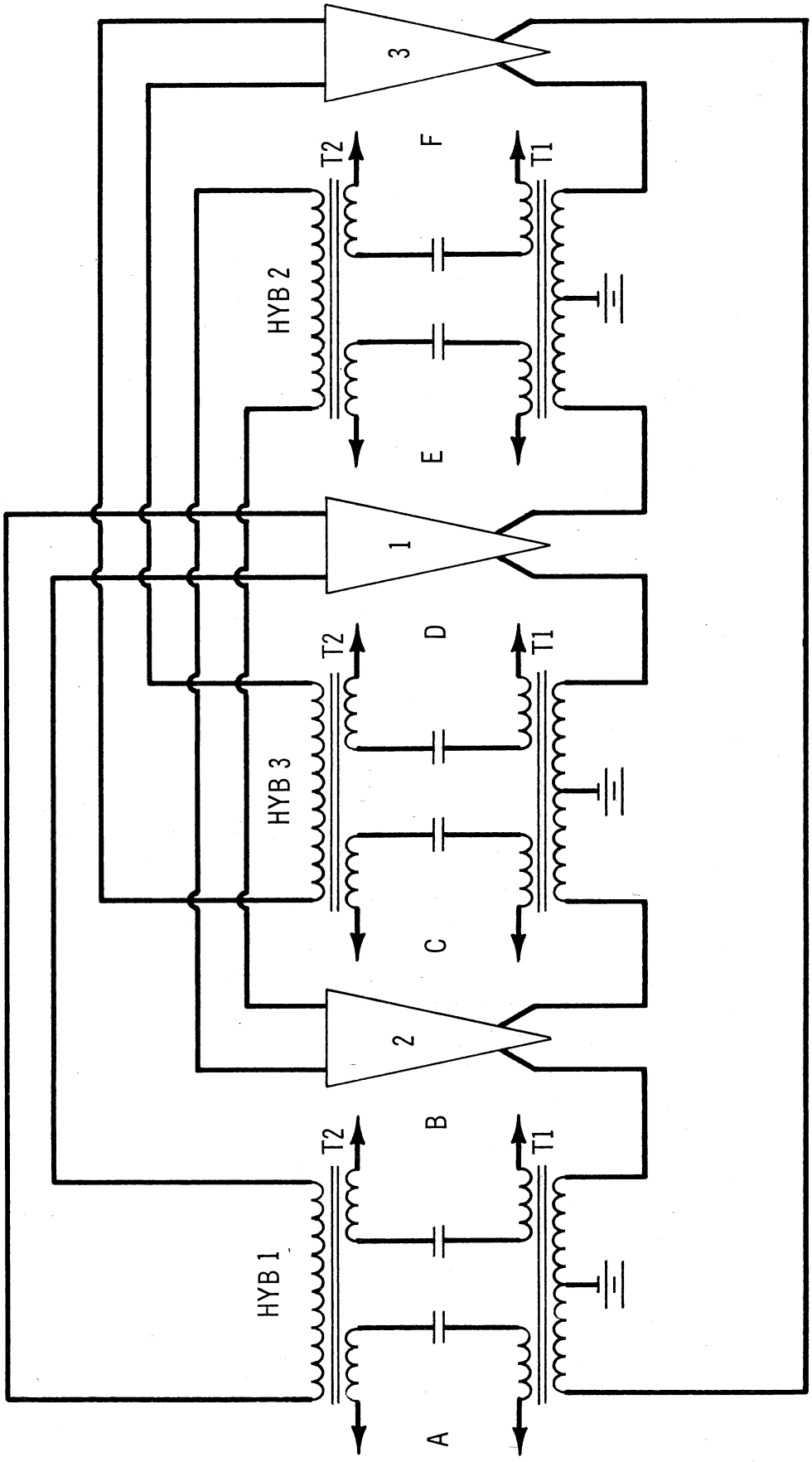

Fig. 2 – Six-Outlet Conference Circuit