

**PBX CONFERENCE BRIDGE CIRCUITS
 FOUR-WIRE GAIN TYPE — WITH
 V REPEATERS**

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1. GENERAL

1.01 This section covers circuit characteristics, transmission features, and application of the PBX six-outlet four-wire conference bridge circuit using V Repeaters per SD-65738-01.

2. CIRCUIT CHARACTERISTICS

2.01 This is a manual conference bridge circuit and is suitable for use with the following types of PBX switchboards:

| | |
|------------|----------|
| 552A,B,D,E | 606B |
| 556A | 607A,B |
| 605A | 608A,B,C |

2.02 The conference bridge is made up of six 4-wire outlets multiplied together in a resistive bridge arrangement. Fig. 1 shows the bridging arrangement and the 128A low pass filters which are connected in the receive leg of each four-wire outlet.

2.03 The four-wire outlets terminate in a 120-type repeating coil hybrid. Gain is provided in the receive leg of each outlet by a V3 amplifier located between the hybrid and the filter. This is shown in the simplified schematic Fig. 2. The two-wire side of the hybrid is divided into two branches with both branches terminating in switchboard jacks. One jack is designated as "terminating" and the other as "through". The relay under control of the jack sleeve lead determines which branch will be connected to the hybrid coil.

2.04 The "terminating" jack branch is equipped with a 1C pad to improve return loss and transmission contrast to PBX station connections. A building-out capacitor is provided in the "through" jack branch for capacity build-out to central office (C.O.) trunks and tie trunk connections.

2.05 Idle line circuit terminations are provided in the two-wire portion of each outlet. The termination is removed when connection is made to either outlet jack.

2.06 The bridge repeaters are powered by an AC power supply unit designed to operate from a standard 115-volt 60-cycle AC outlet on the customer's premises. Each conference bridge circuit requires its own power unit.

3. TRANSMISSION FEATURES

3.01 The resistive bridging circuit (Fig. 1) has an insertion loss of 19.5 db between the send leg of one outlet and the receive leg of another. The hybrid introduces an additional 3.5 ±.4 db loss at 1000 cycles for a total basic insertion loss of approximately 26.5 db outlet to outlet. The gain of the repeaters in the outlet receive legs is continuously adjustable from 0 to approximately 36 db which allows the net insertion loss of the bridge to be adjusted to any desired value. The net insertion loss through the "terminating" jack branches will, of course, be greater by the db value of the pad used in these branches.

3.02 Although the bridge outlets can be adjusted to any value of insertion loss, a net loss of 1.0 db is the minimum value recommended consistent with adequate stability margin. Where more than one long-haul tie trunk, C.O. trunk, or both are to be connected in conference, 2.0 db is the minimum net insertion loss recommended. These loss values apply between switchboard "through" jacks.

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3.03 These low insertion losses can only be utilized if a high degree of bridge balance is obtained. A net building-out capacitor is provided in the hybrid and a line building-out capacitor in the outlet "through" jack branch as an aid in obtaining the most effective balance adjustment. A good impedance match between the bridge outlets and their terminating services is essential.

3.04 The bridge impedance is 600 ohms. PBX systems are usually a nominal 900 ohms. This impedance dissimilarity should be corrected to meet the necessary stability for low loss operation. Methods for changing the bridge to 900 ohms impedance are discussed in Par. 3.07 and 3.08. This is especially important where conferencing of long-haul VNL circuits is anticipated.

3.05 There are various means of obtaining adequate impedance match between the bridge and its PBX services. A transmission study of the customer's conference connection requirements should be made to determine the best method of providing this adequate impedance match for a particular installation.

3.06 The widest application for this bridge is found at large PBXs where conference requirements will include a multiple combination of long-haul VNL tie trunks, C.O. trunks, and off-premise stations.

3.07 Under conditions mentioned in Par. 3.06, it may be necessary to modify the conference circuit to 900 ohms to provide satisfactory service. This can be done by replacing the 120N hybrid coils with 120P coils and replacing the 600-ohm resistors in the hybrid net and idle line terminations with 900-ohm values. The 600-ohm 1C pads in the terminating jack outlet branches should be replaced with the pad arrangement shown in Fig. 4 to provide 900-ohm pads. Such modification will provide the best impedance matching capabilities to 900-ohm terminations.

3.08 Another means of providing impedance match to 900 ohms, is to install 1 to 1.5 ratio repeating coils and the 900-ohm pad in the two-wire outlets. The installation of similar coils in the hybrid net of these outlets will further improve their 900-ohm impedance matching capabilities. This method might be favored where only selected outlets require 900-ohm conversion.

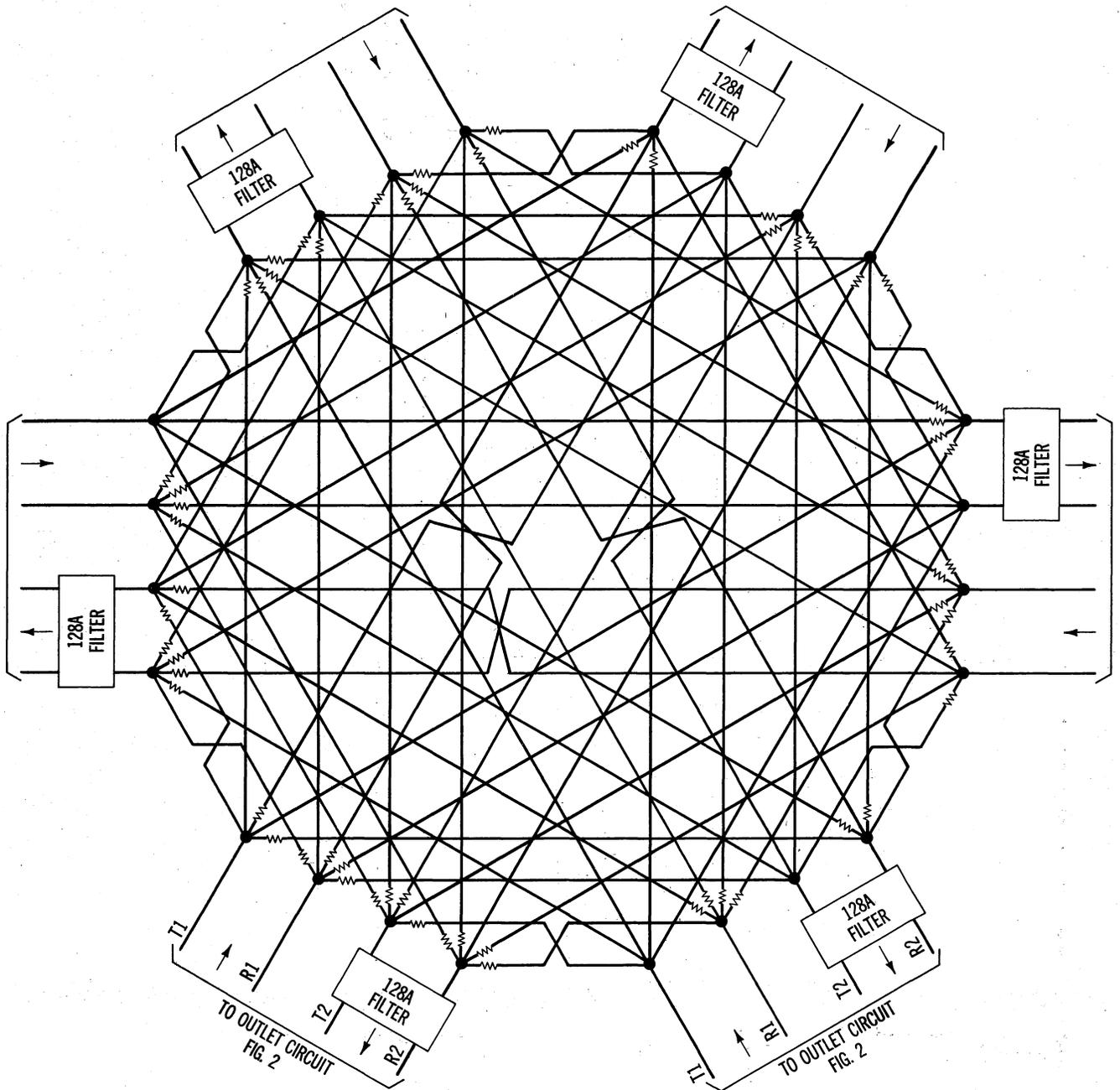
3.09 An equally important consideration, when the bridge is to be used as covered in Par. 3.06, is to obtain optimum balance between bridge outlets. This requires using standard hybrid return loss and singing point test procedures as a basis for proper adjustment of the hybrid net and line balance capacitors. These tests require jack access to various points in the bridge circuit. Therefore, consideration should be given to providing the necessary test jacks to permit adequate transmission lineup and maintenance. A recommended jack arrangement is shown in Fig. 3.

4. APPLICATION

4.01 This bridge arrangement provides the best transmission for PBX conferencing. As discussed in Section AB22.329.0, Par. 3.06, only one central office trunk connection should be permitted on any one conference.

4.02 Its chief drawbacks are the cost and space factors. Cost is the predominant factor since it is considerably more expensive than the other gain bridges. The transistorized gain bridge discussed in Section AB22.329.4 will, in many cases, do a satisfactory transmission job at less cost.

4.03 Plans are being made to modify SD-65738-01 to provide transistorized amplifiers and 900-ohm impedance operations. This modification will make the arrangement more compatible for PBX use and reduce power requirements. Standard drawings and application information will be issued when the modification is completed.



NOTE: ALL RESISTORS
1350Ω ± 1%

Fig. 1 - Four-Wire Six-Outlet Bridging Circuit

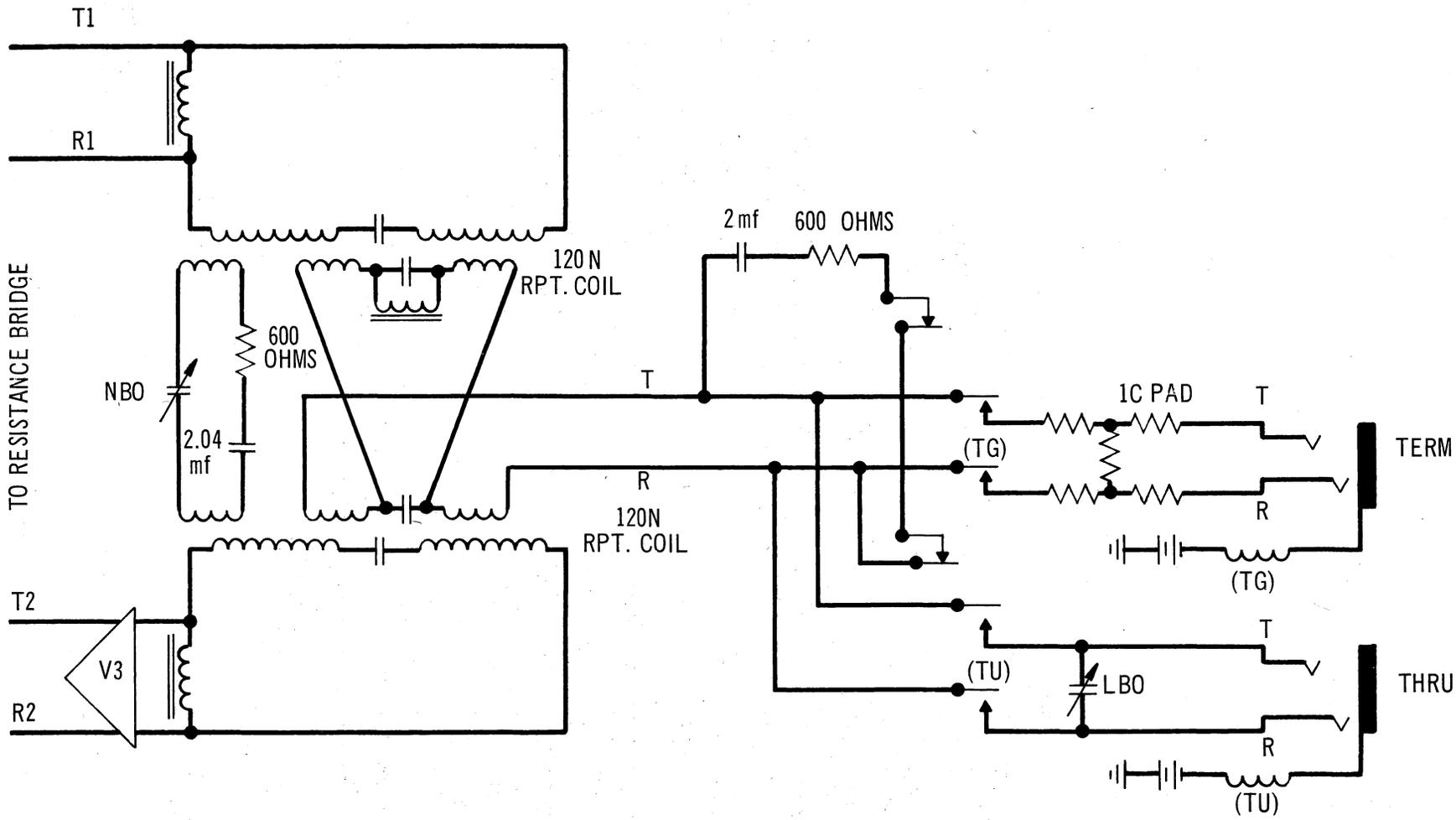


Fig. 2 - Bridge Outlet Circuit

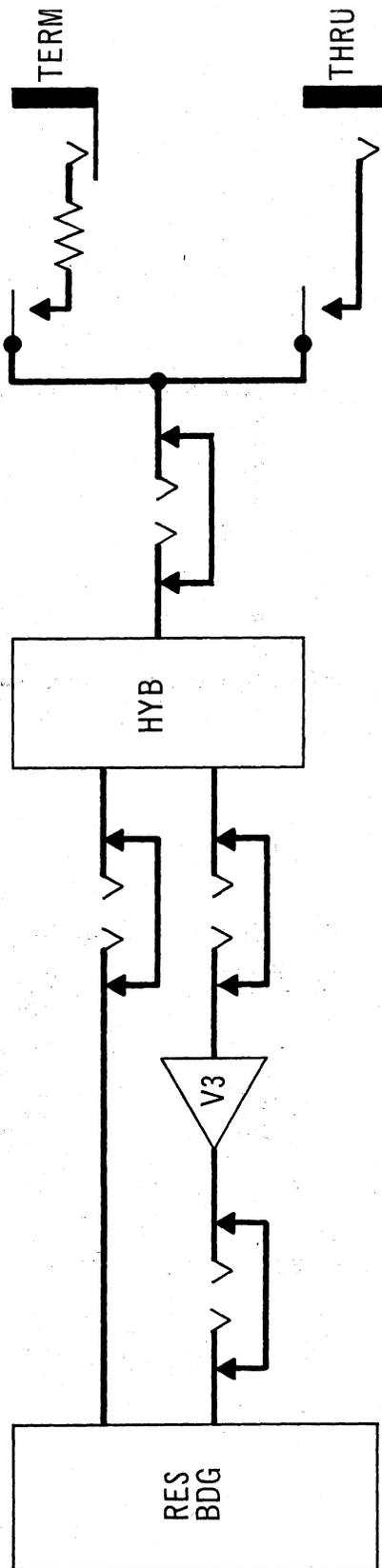
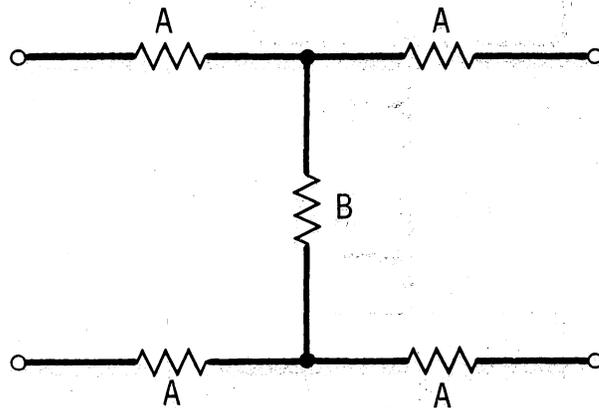


Fig. 3 - Recommended Jack Arrangement for Bridge Lineup and Maintenance



| PAD LOSS (db) | RESISTOR A (ohms) | RESISTOR B (ohms) |
|------------------|----------------------|----------------------|
| 0 | 0 | OPEN |
| 1 | 25.9 | 7798 |
| 2 | 51.4 | 3874 |
| 3 | 76.9 | 2555 |
| 4 | 101.8 | 1887 |

Fig. 4 – 900-Ohm Pad Circuit