MANUAL CONFERENCE CIRCUIT FOR 4-WIRE NO. 5 CROSSBAR OFFICES WITH 5C OR 5D SWITCHBOARD DESCRIPTION

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1. GENERAL

A. Scope

1.01 This section describes the operation and circuitry of the 6-way, 4-wire manual conference bridge (SD-68528).

B. Purpose of Equipment

1.02 This bridge is used with the No. 5C or 5D switchboard to permit the manual establishment of conference arrangements by the switchboard operator. The circuits connected to the bridge may be any combination of 4-wire trunks and 4-wire line facilities. The line facilities may be terminated in 2-wire or 4-wire station equipment.

1.03 These conference bridges may be used in association with switchboards which provide dial service assistance in switched services networks. These networks are described in Section 310-200-100.

1.04 The following are SD drawings related to this section.

SD-68528 — Switchboard No. 5C or 5D 6-Way Conference Circuit

SD-64366 — Telephone Repeater Voice Operated Loss Control and Suppressor Circuit

1.05 The following practices contain information supplementary to this section.

310-200-100 — Switched Services Networks Using Central Office Switching Machines — Description

310-290-500 — Manual Conference Circuit for 4-Wire No. 5 Crossbar Offices with 5C or 5D Switchboard — Service Maintenance

332-432-100 — VOLCAS for 22-Type Repeaters Used with Toll Conference Grouping Circuits

2. OPERATIONAL DESCRIPTIONS

A. Conference Arrangements

2.01 In establishing conference arrangements, a single bridge may be used to provide access for three to six circuits. When more than six circuits require access, two or more bridges may be connected in tandem to provide the necessary access connections. For transmission reasons, conference arrangements are limited to a maximum of 14 circuits, using three bridges in tandem. Fig. 1 and Fig. 2, respectively, show typical single-bridge and 3-bridge tandem arrangements.

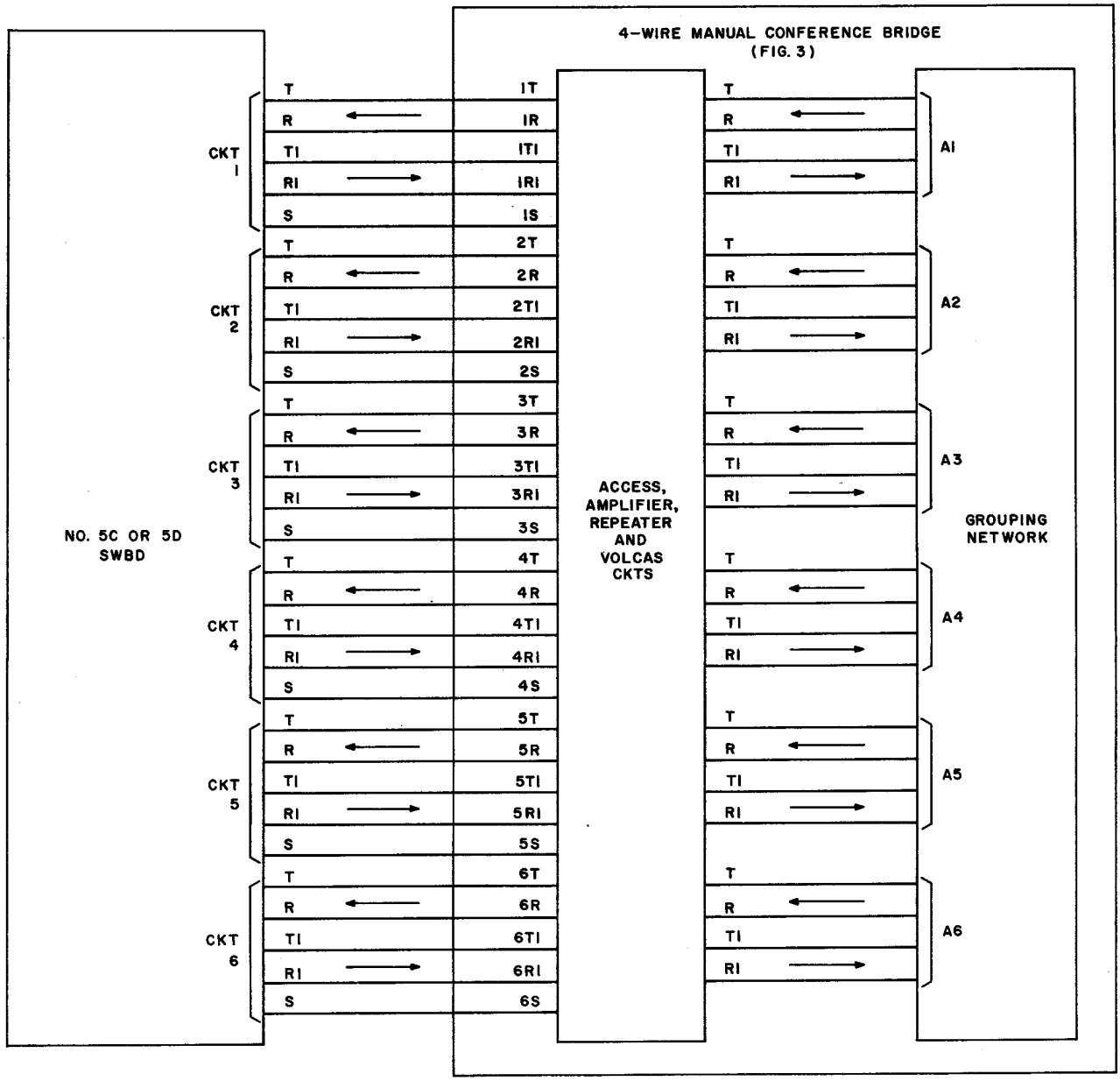

Fig. 1 — Single-Bridge Conference Arrangement

2.02 The order of connection of circuits to a bridge is immaterial, except that where a single trunk interconnects with local circuits, the trunk should be connected to branch 1 of the bridge (circuit 1 of the switchboard, Fig. 1). Where more than one trunk interconnects with a bridge, the trunk having the least satisfactory transmission characteristics should be connected to branch 1, with the remaining circuits connected in any order. Connection of trunks to branch 1 is preferred because that branch provides additional amplification in the T1 and R1 leads.

2.03 When two or more bridges are connected in tandem, adjacent bridges shall be connected through the switchboard so that branch 1 of one bridge connects to other than branch 1 of the adjacent bridge. (As shown in Fig. 2, the connection between bridges is branch 1 to branch 6.)

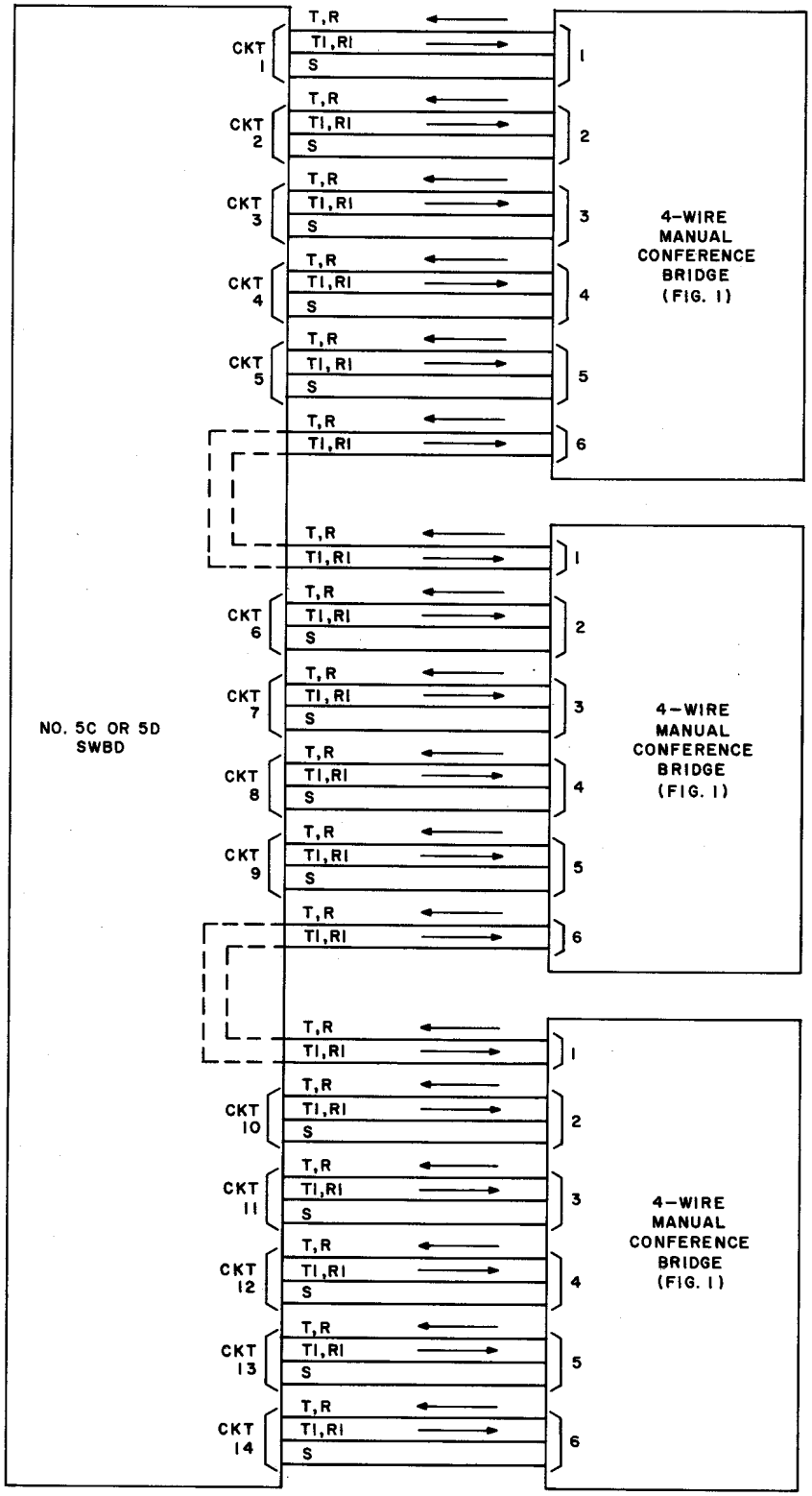

Fig. 2 — 3-Bridge Tandem Conference Arrangement

2.04 When a single trunk is connected to a tandem bridge arrangement, it should be connected to that branch 1 not connected to an adjacent bridge. When more than one trunk is connected, connection shall be determined as discussed in 2.02.

B. Talking

2.05 The switchboard operator manually patches those circuits participating in a conference call to the switchboard jacks connecting to the conference bridge. A switchboard busy S lamp for the bridge will light when the first circuit is connected to the bridge, remaining lighted as long as any circuit is connected. Circuits may be added to, or removed from, the conference arrangement at will. The disconnection of the last circuit from the bridge will extinguish the switchboard busy lamp.

3. CIRCUIT DESCRIPTIONS

A. Grouping Network (Fig. 3)

3.01 In the grouping network, the output leads of each connected circuit are interconnected to the input leads of all other circuits. As shown in Fig. 3, voice currents incoming on the T1 and R1 leads of each arm (A1 through A6) are applied through a single resistor in each of the remaining arms to the T or R leads outgoing from the grouping network. It should be noted that the T1 and R1 leads in some arms are connected respectively to T and R leads, but in other arms are reversed and connected respectively to R and T leads. This reversal generally improves the singing and echo margin of the bridge. The grouping network introduces a loss of about 19 db between the input arm and each output arm.

B. Amplifiers (Fig. 3)

3.02 A VF amplifier is provided in the T and R leads between each arm of the grouping network and the switchboard jack circuit, with an additional VF amplifier also being provided in the T1 and R1 leads in arm 1 (A1). These amplifiers provide compensation for the 19-db loss introduced by the grouping network.

C. Repeater Coils (Fig. 3)

3.03 Two repeater coils are provided in branch 1 of the bridge and are located in the output circuitry of the VF amplifiers of each conducting pair. These repeater coils serve two functions:

(a) They apply the output signals of the VF amplifiers to the HO-DROP and HO-LINE jacks to permit monitoring of the voice currents through the bridge (4.04).

(b) They are used in conjunction with the VOLCAS for applying impedances across the conducting pairs to inhibit singing and echo currents in the bridge under certain conditions (3.06).

D. VOLCAS Circuit (Fig. 3)

3.04 A VOLCAS (Voice Operated Loss Control and Suppressor) circuit is always provided in branch 1 (referred to as "VOLCAS arm") of the bridge. Additional VOLCAS circuits may also be provided in other bridge branches if necessary, but normally a VOLCAS is provided only in branch 1. The function of the VOLCAS is to connect a loss (impedance) across both conducting pairs of branch 1 whenever voice currents are absent in these pairs to prevent bridge singing. If voice currents appear in one pair, the VOLCAS will remove the impedance from that pair to permit normal conduction, while also increasing the impedance of the other conducting pair to suppress echo currents which might otherwise occur. A description of the VOLCAS is found in Section 332-432-100.

3.05 As shown in Fig. 3, any voice signals present on the T and R or T1 and R1 conducting pairs will be coupled through the repeater coils to the associated amplifier and rectifier circuit of the VOLCAS. These signals to the amplifier and rectifier circuit will cause operation of the associated HE or HW relay. During the absence of voice currents on the conducting pairs, the HE and HW relays are nonoperated.

3.06 When nonoperated, relays HE and HW apply resistive impedances across the output of the repeater coils. These impedances are reflected across the conducting pairs to inhibit sing-

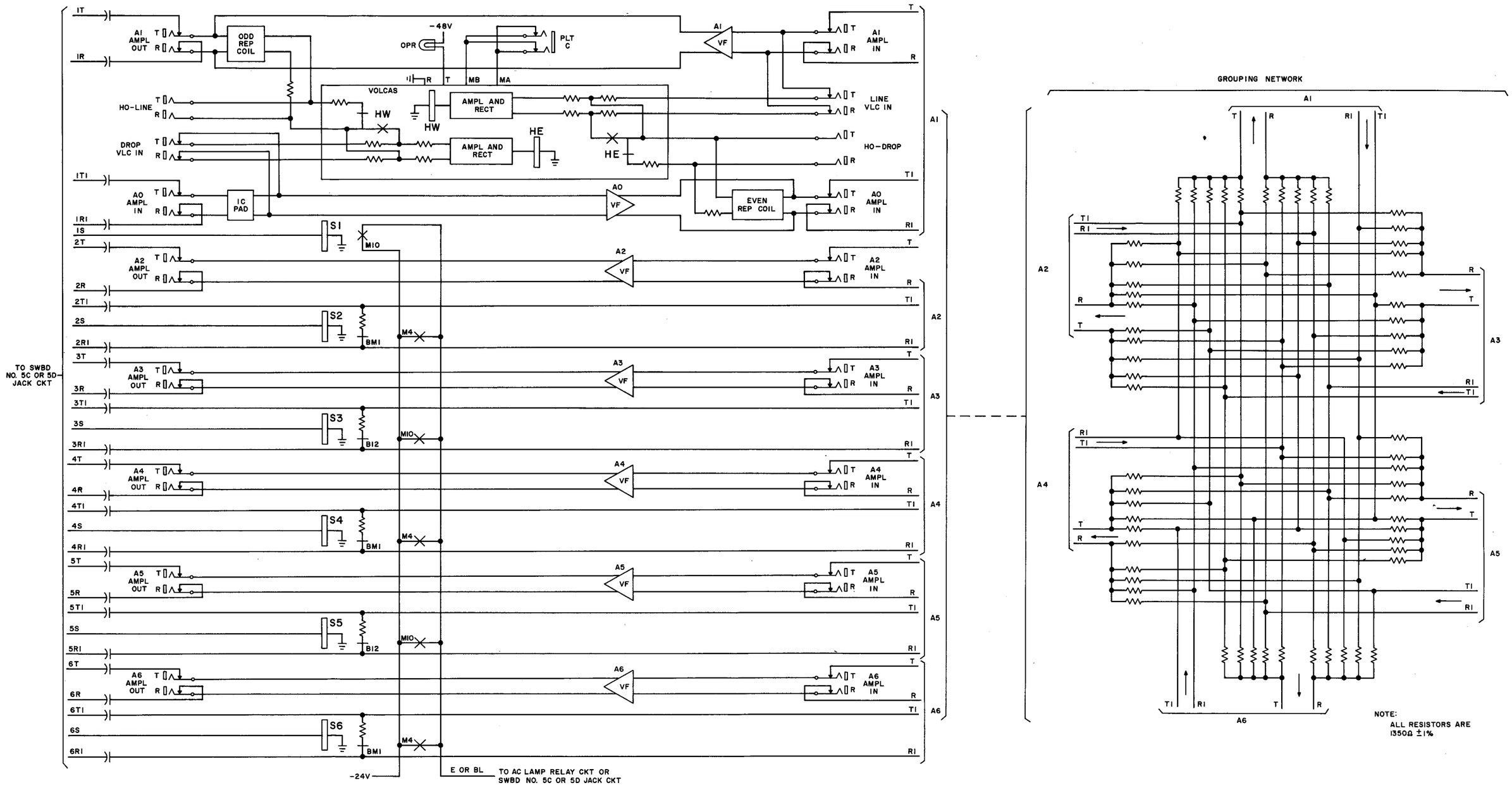

Fig. 3 — Typical Conference Bridge Arrangement — Simplified

ing on the lines during the no-signaling condition. When either relay operates, the impedance is removed from across the associated conducting pair. The operated relay at the same time applies an impedance across the input to the amplifier of the other conducting pair to suppress any echo currents that might be present.

E. Access Circuit (Fig. 3)

3.07 Access circuitry is provided between the switchboard and the conducting leads of the bridge. This circuitry consists of blocking capacitors, S relays (S1 through S6), and 600-ohm termination resistors. The capacitors block dc voltage from the coils of the VF amplifiers, while 600-ohm terminations appear across the T1 and R1 leads of all unused branches of the bridge (except branch 1) so the bridge appears as a constant load to the switchboard circuitry.

3.08 When a circuit is connected to the bridge, the S relay associated with the connected branch is operated by battery applied on the S lead from the switchboard. The operated S relay disconnects the 600-ohm termination from the associated T1 and R1 leads to permit signal transmission into the grouping network. The operated S relay also provides a battery path for the switchboard busy lamp so that the connection of any circuit to the bridge will operate the lamp.

4. TESTING AND MONITORING FEATURES

A. Testing

4.01 To permit testing and adjusting of the conference bridge, cut-off jacks are provided on the input and output sides of the amplifiers and on the input side of the VOLCAS.

4.02 Testing of each amplifier is accomplished by patching a sending source and a receiving unit to the associated AMP IN and AMP OUT jacks and comparing the input and output signals. When separation of the VOLCAS from the amplifier circuit is required, this may be accomplished by the insertion of dummy plugs into the LINE VLC IN and DROP VLC IN jacks. A 20-db 1C pad (Fig. 4) is provided for insertion between the LINE VLC IN and DROP VLC IN jacks and the sending source when required for reducing the sending level sufficiently to permit testing of the VOLCAS minimum sensitivity level. Patching between the pad and jacks requires use of a 2P13B patch cord (Fig. 5).

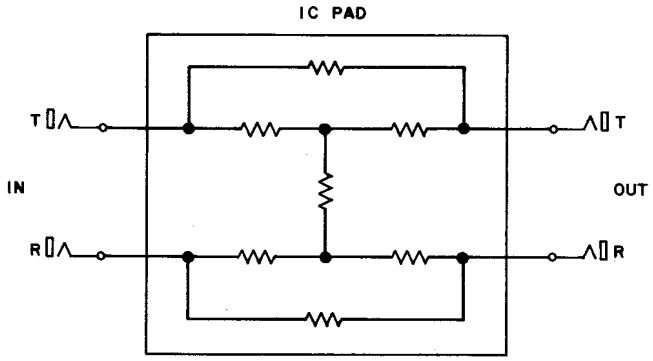

Fig. 4 — 1C Pad (20 DB)

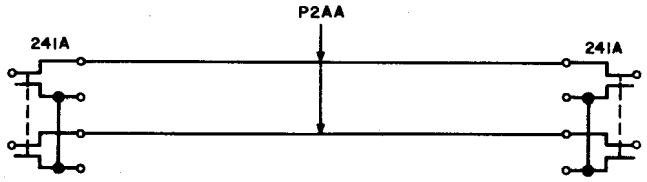

Fig. 5 — 2P13B Patch Cord for Monitoring and Testing

4.03 The OPR lamp associated with the VOLCAS in branch 1 (Fig. 3) provides a visual indication of the proper operation of the VOLCAS interval relays during testing. Plate current of the VOLCAS detector tubes (not shown in Fig. 3) may be measured by inserting a 2W42A milliammeter patching cord (Fig. 6) between the PLT C jack of branch 1 (Fig. 3) and a milliammeter.

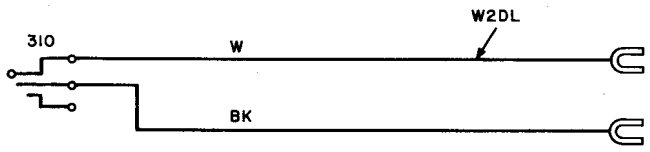

Fig. 6 — 2W42A Patch Cord for Milliammeter

B. Monitoring

4.04 The HO-LINE and HO-DROP jacks permit monitoring on the bridge VOLCAS arm. In monitoring, two patching cords (Fig. 5) are patched between the above jacks and the LINE MON and DROP MON jacks of a monitoring circuit (Fig. 7). Another patching cord is then patched from the TEL jack of the monitoring circuit to jacks of a telephone set circuit. The attendant may then monitor on both the drop and line sides simultaneously, or on either side alone by operation of the telephone set key.

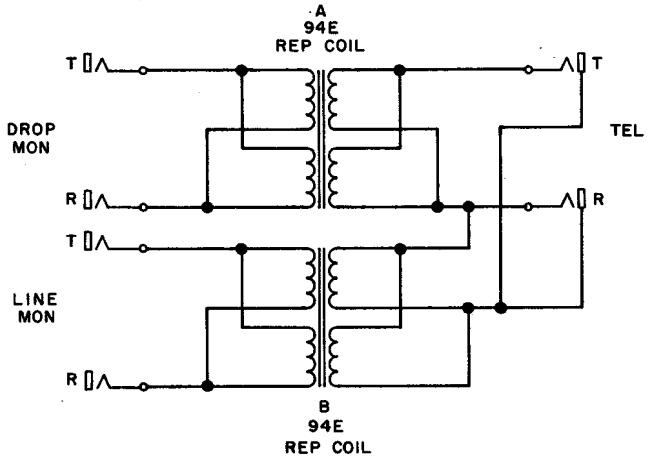

Fig. 7 — Monitoring Circuit