PBX CONFERENCE BRIDGE CIRCUITS TWO-WIRE GAIN TYPE — WITH E-TYPE REPEATER

CONTENTS PAGE

1. GENERAL

1.01 This section covers circuit characteristics, transmission features and application of two-wire gain PBX conference bridge circuits using the E-type repeater.

1.02 The discussion in this section covers two bridge circuits. They are:

(a) SD-65719-01, a five-outlet manual conference bridge circuit.

(b) SD-65822-01, a five-outlet dial conference bridge circuit.

1.03 The manual circuit is suitable for use with the following types of PBX switchboards:

550B,C,SC	556A
551A,B,D	605A
552A,B,D,E	606B
555	607A,B
	608A,B,C

1.04 The dial circuit is used only with 701B PBXs when equipped for operation with an attendant console rather than a cord switchboard.

2. CIRCUIT CHARACTERISTICS

2.01 A simplified schematic of the basic 5-outlet conference circuit is shown in Fig. 1. Since the transmission features of the two bridges are basically alike, Fig. 1 will be used to illustrate both.

2.02 Each bridge consists of an arrangement having basically three outlets for connection to PBX stations, and two outlets for connection to trunk circuits. As discussed in Section AB22.329.0, Par. 3.06, only one central office trunk connection should be permitted on any one conference. The trunk outlets can be connected to PBX stations if desired. The manual bridge outlets are terminated in switchboard jacks. The dial bridge outlets are terminated on a selector bank. Connection to the dial bridge outlets is made on a dial or key-pulse basis by the console attendant.

2.03 Each of the station outlets utilizes a 1:1 impedance ratio repeating coil for coupling the station loops into the bridging circuit. The two trunk outlets utilize an induction coil in the manual bridge and a 1:1 repeating coil in the dial bridge. The bridge-side windings of all five coupling coils are connected in series with each other and in series with the line coil of the E-type repeater.

2.04 The station outlets of the manual conference circuit supply station battery through the station winding side of the repeating coil. When the trunk outlets are used for station connections, the station battery is supplied by the switchboard cord circuit. Battery is similarly supplied through the repeating coil of all five outlets in the dial conference circuit. This battery, however, is used for supervision in connection with the two-way position trunk circuit used by the console attendant in establishing connection to the conference circuit. Station battery in this case is furnished by the connector circuits.

2.05 Idle circuit terminations are provided in all outlets of both bridges. The termination is removed when connection is made to the outlet.

2.06 A 2 db pad is provided in each station outlet to reduce the transmission level contrast into the bridge between on-premise stations and C.O. trunks, and for return loss improvement to station connections.

2.07 Two bridges may be tied together by means of an optional grouping key to provide a 10-outlet arrangement. The key, when operated, connects one bridge in series with the other. However, as discussed in Par. 4.01, this arrangement is generally not satisfactory from a transmission standpoint.

2.08 The E-type repeater is powered by an AC power supply unit designed to operate from a standard 115-volt 60-cycle AC outlet on the customer's premises. One power supply unit will handle four repeaters.

3. TRANSMISSION FEATURES

3.01 Representative insertion losses between outlets for the five-outlet bridge are:

Sta – Sta	Sta – Trk	Trk – Trk
6.0 db	2.5 db	1.0 db

The losses shown above will vary somewhat under operating conditions depending upon the impedance of the lines connected to the outlets.

3.02 The E repeater provides gain by introducing into the bridge circuit a relatively high magnitude of negative impedance in the middle and upper voice-frequency band. At low frequencies, and at those above the voice band, magnitudes are low negative or even positive to insure stability. The gain of the repeater at any frequency is a function of the impedance of the gain-adjusting network and the sum of the outlet impedances transferred into the bridging circuit. The closer the network impedance, times a transformation factor, matches the bridge impedance, the greater the gain.

3.03 The gain-adjusting network consists of an arrangement of inductors, capacitors and resistors. Prescribed strapping connects these elements so as to control the gain of the repeater's amplifier unit to conform with the impedance of the connected circuits. Fig. 2 shows the network configuration and element values for the five-outlet bridge.

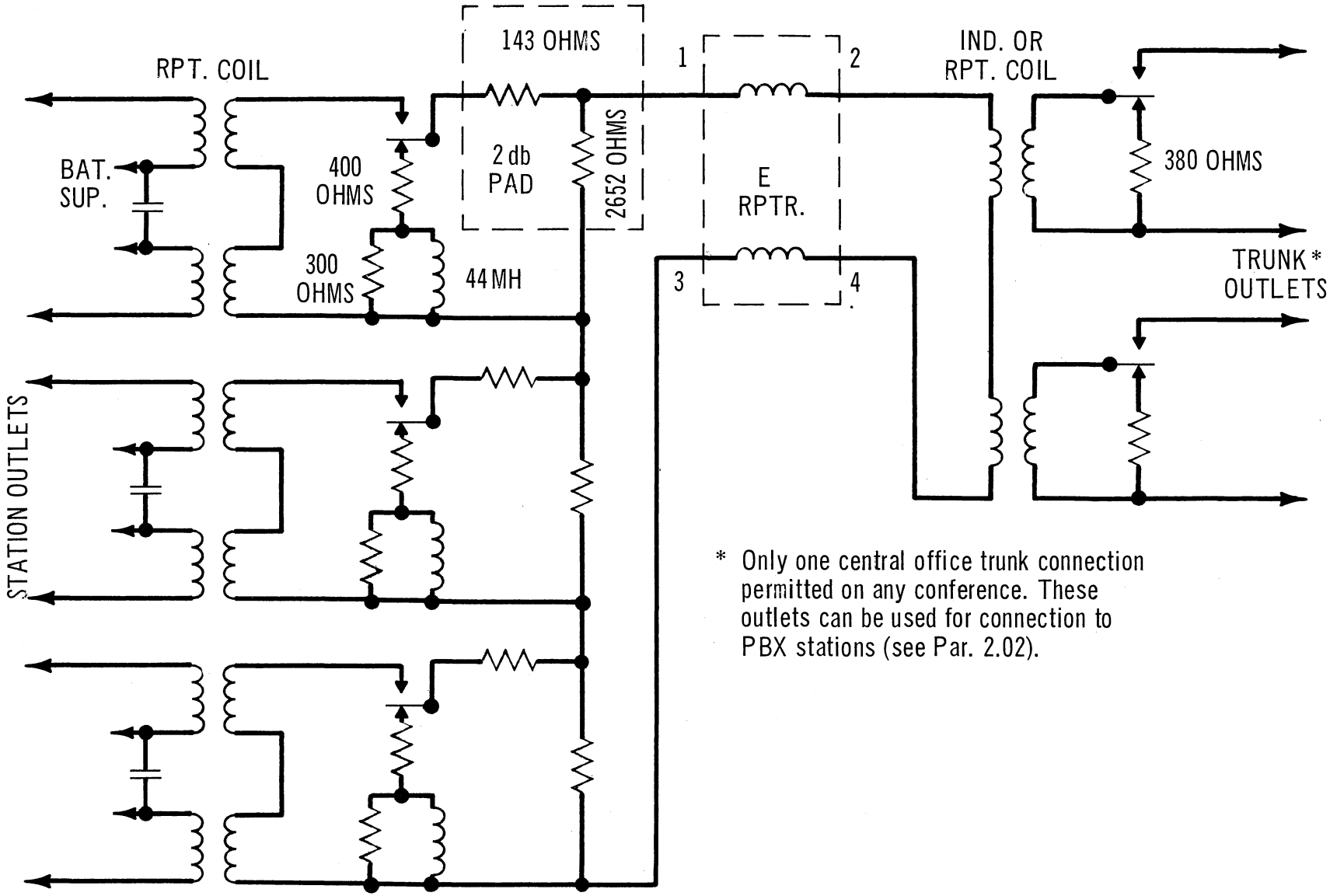
3.04 Stability of these bridges varies somewhat depending on station loop lengths. Although the bridges are more stable with short station loops, stability will be satisfactory for a total length of approximately six kilofeet for each loop. If instability is encountered with long station loops, the 9200-ohm network resistor may be reduced in value. The resistance should be decreased as little as possible consistent with stability.

3.05 When two 5-outlet bridges are combined to form a 10-outlet bridge, the individual repeater network strapping remains unchanged. The insertion losses shown in Par. 3.01 will be increased by approximately 6 db, in this case.

4. APPLICATION

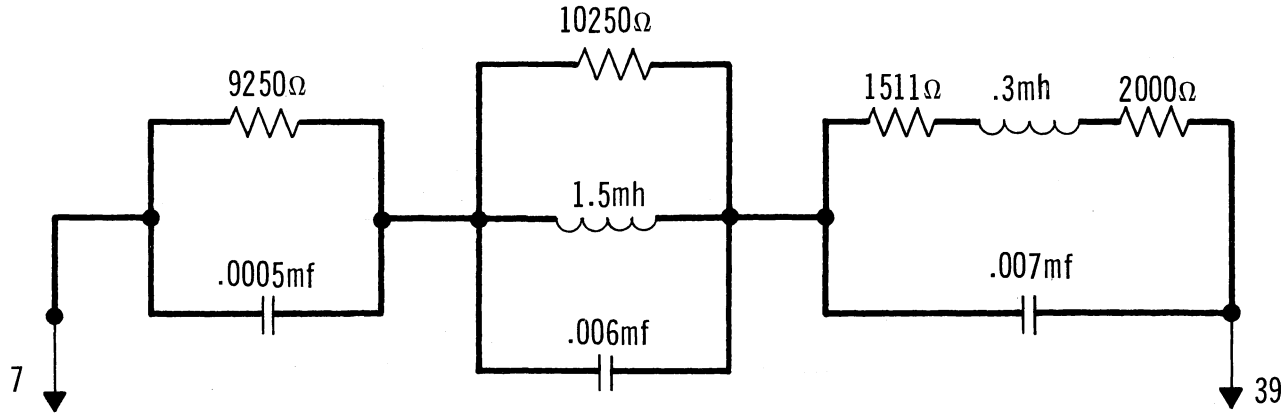
4.01 The five-outlet manual and dial conference circuit will provide satisfactory transmission performance for general PBX conference use involving stations, tie trunks and not more than one C.O. trunk. The ten-outlet arrangement should not be used where tie or C.O. trunks are to be included in a conference call. The additional loss inserted by the ten-outlet arrangement will, in many cases, degrade transmission below acceptable standards. The ten-outlet arrangement should be used for conference connections involving PBX stations only.

4.02 These conference circuits should normally be used only in those cases where arrangements using the transistorized bridge discussed in Section AB22.239.4 are not available. The various PBX conference circuits incorporating the transistorized bridge are in general less costly, require less space, and in addition are easier to line up and maintain.



* Only one central office trunk connection permitted on any conference. These outlets can be used for connection to PBX stations (see Par. 2.02).

Fig. 1 – Transmission Schematic — 5-Outlet Repeatered Bridge



STRAPPING

5-35; 6-22; 7-15-32
8-23-36-37; 9-10-21-26-28
16-20; 19-25; 29-30-33-39; 34-38

Fig. 2 – Network Strapping and Equivalent Network of Series E Repeater