PBX CONFERENCE BRIDGE CIRCUITS
GENERAL

CONTENTS PAGE

1. GENERAL

1.01 This section and its associated point sections cover the circuit characteristics, transmission considerations, and application of gain and nongain PBX conference bridges.

1.02 A conference bridge circuit is used to bridge together, on a single connection, three or more telephones with a minimum of bridging loss. In the case of PBX systems, this may involve the interconnection of station lines, tie trunks, or a central office (C.O.) trunk.

1.03 The basic types of bridge circuits are discussed in the following point sections:

AB22.329.0 PBX Conference Bridge Circuits — General

AB22.329.1 PBX Conference Bridge Circuits — Two-Wire Nongain Type

AB22.329.2 PBX Conference Bridge Circuits — Two-Wire Gain Type — With E-Type Repeater

AB22.329.3 PBX Conference Bridge Circuits — Four-Wire Gain Type — With V Repeaters

AB22.329.4 PBX Conference Bridge Circuits — Two-Wire Gain Type — With Transistor Amplifiers

AB22.329.5 Connecting Circuits for Use With Transistorized Conference Bridge Circuits

2. CONFERENCE BRIDGE CIRCUIT CHARACTERISTICS

2.01 Conference bridges are classified into two categories, gain and nongain.

Nongain Bridge Circuits

2.02 Standard nongain conference bridges consist of individual two-wire outlets which are coupled into a common bridging circuit by repeating coils or capacitors. They are relatively low in cost, require no power supply and need a minimum of maintenance. Their major drawback lies in the high insertion loss and poor return loss frequently encountered with these types of circuits.

Gain Bridge Circuits

2.03 The three basic types of gain bridges are:

(a) ***The Two-Wire E-type Repeater Bridge***

The insertion loss of this bridge is reduced by the addition of an E-type repeater. The maximum allowable repeater gain must be limited in order to maintain stability in the bridge. Although this circuit does provide improved insertion and return loss, as compared to nongain circuits, it is relatively expensive because of the repeater element and power supply requirements. It also requires lineup adjustments and maintenance on the repeater.

(b) ***The Four-Wire Repeatered Bridge***

This circuit incorporates four-wire outlets coupled into a four-wire bridging circuit. The outlets are reduced to two-wire, for PBX connections, by means of a hybrid coil in each outlet. One half of a V-type repeater, located in the receiving branch of each four-wire outlet, provides necessary gain. Insertion loss between outlets can, therefore, be adjusted to a low operational value. With proper adjust-

ment, good stability can be realized. High cost, space, power supply requirements, lineup and maintenance requirements are the main drawbacks of this bridge.

(c) ***The Two-Wire Transistor Amplifier Bridge***

This bridge utilizes unbalanced hybrid coils with intercoupled common-base transistor amplifiers to provide low insertion loss between outlets. Four or six outlets may be used depending upon equipment arrangements. This bridge has good transmission characteristics, with cost and space requirements comparable to the nongain bridges. No lineup adjustments are required.

3. TRANSMISSION CONSIDERATIONS

3.01 In accordance with improved transmission design standards, it is apparent that compatible standards must be provided for conference service at PBX locations. The ideal condition would be a conference circuit which introduces no insertion loss between outlets. Although this objective cannot be fully met under the majority of conference conditions, the use of gain-type conference circuits makes it possible to essentially eliminate discernible contrast between a conference connection and a direct connection through the PBX.

3.02 The following transmission objectives have been used as the basis for present PBX conference bridge circuit design:

(a) Insertion loss between outlets not to exceed 2.0 db between 500 and 2500 cps at an input level of −10 dbm with all outlets terminated in 900 ohms resistance. An additional 2.0 db loss is acceptable in each outlet terminating in an on-premise station.

(b) The average return loss between 500 and 2500 cps should not be less than 18 db when measured against 900 ohms resistance in series with 2 mf capacitance with the remaining outlets similarly terminated.

(c) Singing points in the 250-500 and 2500-3000 cps range should not be less than 12 db with remaining outlets terminated as in (b).

3.03 These objectives are presented as a guide only since they are, in most cases, a function of the design of the bridge itself. The transmission engineer should determine the type of bridge applicable to a specific case. A practical approach to providing good transmission would be to specify as follows:

Nongain Bridges: Where only on-premise PBX stations will be conferenced.

Gain Bridges: All other cases.

3.04 An undesirable feature inherent in two-wire conference bridges under normal service conditions is that the return loss and insertion loss varies depending on the type of loops connected to the bridge; i.e., short versus long loops, loaded versus nonloaded loops. The effect of these variations can be reduced by keeping the impedance dissimilarity between loops to a minimum. The use of loading or impedance compensation will generally prove effective in reducing this impedance variation.

3.05 From a transmission standpoint, satisfactory interconnection of two central office lines can ***only*** be made at a central office. The principal limitation when attempting to bridge such calls together at a PBX is the excessive transmission loss between the two distant parties. If two PBX C.O. trunks are conferenced at a PBX, twice the loss of the C.O. trunk plus the loss of the conference circuit itself will be inserted in the connection. This additional loss will, in many cases, make the service unacceptable to the customer. If one or both of the C.O. trunks are connected to local or toll trunks beyond the serving central office, the resulting station-to-station loss can become excessive.

3.06 ***In view of the transmission penalty incurred, it is recommended that not more than one C.O. trunk be connected to a conference bridge circuit at a PBX on any one conference call.***

3.07 The conferencing of off-premise station lines and tie trunks is acceptable although it should be realized that poor transmission may result between a station associated with a tie trunk and a station associated with the PBX C.O. trunk.