COMMAND CONFERENCE CIRCUIT

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1. GENERAL

1.01 This section covers the transmission, signaling and supervisory aspects of the Command Conference Circuit, SD-66693-01. This circuit is designed for use with a 605A, 701A, or 711A PBX. It is capable of serving as many as 63 called stations with no gain device in the circuit.

1.02 The circuit is designed for use in situations where it is required to converse with many called stations simultaneously. Emergency information may be transmitted or received between a control or subcontrol station and the called stations bridged to the circuit. No gain devices are required since:

(1) All stations are designed to meet the transmission and signaling requirements for the PBX.

(2) The configuration of the bridging circuit minimizes the transmission losses between the control or subcontrol stations and the called stations.

1.03 The equipment provides 2-way communication between any called station and the control or subcontrol station. The transmission loss between called stations, in general, is considerably higher. Therefore, the circuit is not designed to be used to communicate between called stations.

1.04 The Command Conference Circuit provides the following features:

(a) The called stations are bridged in a series-parallel arrangement with a maximum of 21 stations in each of three branches.

(b) The circuit is designed so that each branch feeds a minimum of nine electrically equivalent called stations. Building-out resistors are provided for use, if required.

(c) One-to-three branches may be provided depending on the number of called stations to be bridged.

(d) Each station uses a 307P retard coil as a repeating coil. It is strapped for a 1:1 ratio.

(e) The control and subcontrol stations are equipped with a push-to-talk feature.

(f) The control, subcontrol and called stations are operated on a 2-wire basis.

(g) A tone is applied to a busy called station to tell the station it is wanted on a conference call.

(h) Called stations may be preselected for a conference call by keys at the controller's station. This feature is available for systems with up to 21 called stations.

(i) A loudspeaker may be provided at the control station to permit the controller's aides to hear the called station. The loudspeaker is connected to the circuit when a pushbutton in the controller's hand set is depressed. During this interval, the controller's transmitter is de-energized to avoid feedback between the loudspeaker and transmitter.

2. APPLICATION SCHEMATIC

2.01 Fig. 1 shows an application schematic for one-to-three control stations. With one control station, a maximum of 63 called stations may be bridged. With two control stations, a maximum of 36 called stations may be bridged as shown. With three control stations, a maximum of 30 called stations may be bridged.

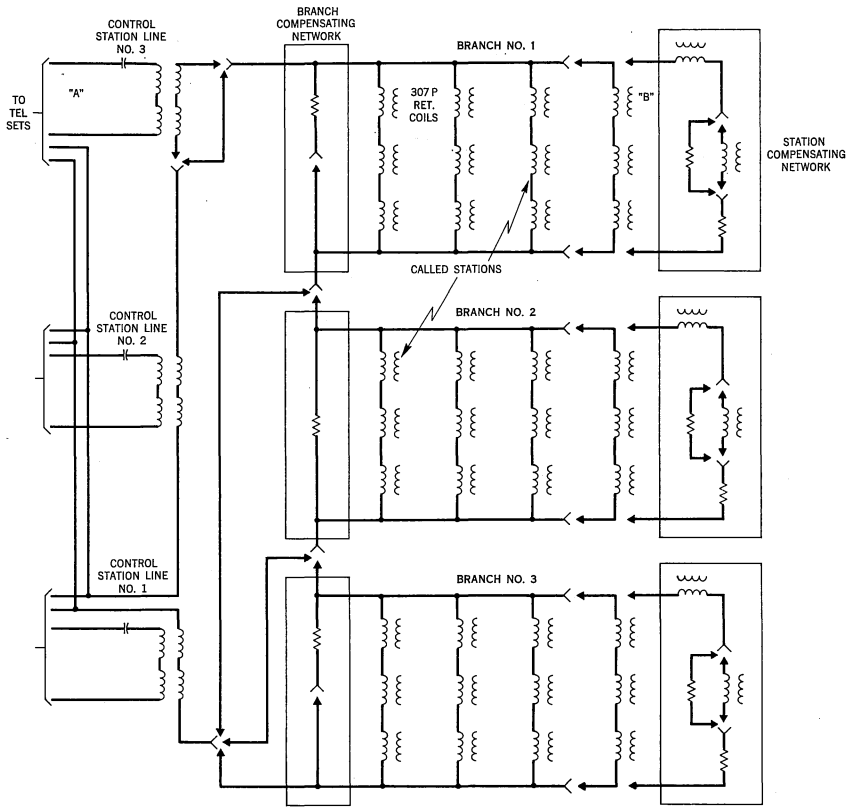

Fig. 1 – Application Schematic with Up to Three Control Stations

2.02 Fig. 1 shows each branch built out equivalently to, say 15 called stations. Each 307P retard coil represents a called station. Each station compensating network is then strapped to be electrically equivalent to one additional called station.

2.03 Fig. 2 shows an application schematic for one control station with or without a subcontrol station. With one control station, a maximum of 63 called stations may be bridged, as shown. With one control and one subcontrol station, as many as 62 stations may be bridged. Each branch is built out to the desired number of called stations as described above.

3. COMPENSATING NETWORKS

3.01 Each branch of the circuit is built out to the same number of stations, electrically. Two compensating networks are provided for this purpose.

3.02 Fig. 2 of SD-66693-01 provides an arrangement whereby branches of 3, 6, 9, 12 and 15 called stations may be simulated by resistances. Fig. 11 of SD-66693-01 provides a similar arrangement whereby one or two called stations may be simulated with resistances.

4. TRANSMISSION AND LOOP RESISTANCE CONSIDERATIONS

4.01 In order to design a conference circuit, the following transmission aspects should be considered:

(a) The loop loss to any station should not exceed 4.3 db at 1000 cycles.

(b) The loop resistance to any station should not exceed 900 ohms.

(c) The leakage resistance of any loop should not be less than 10,000 ohms between wires and each wire to ground.

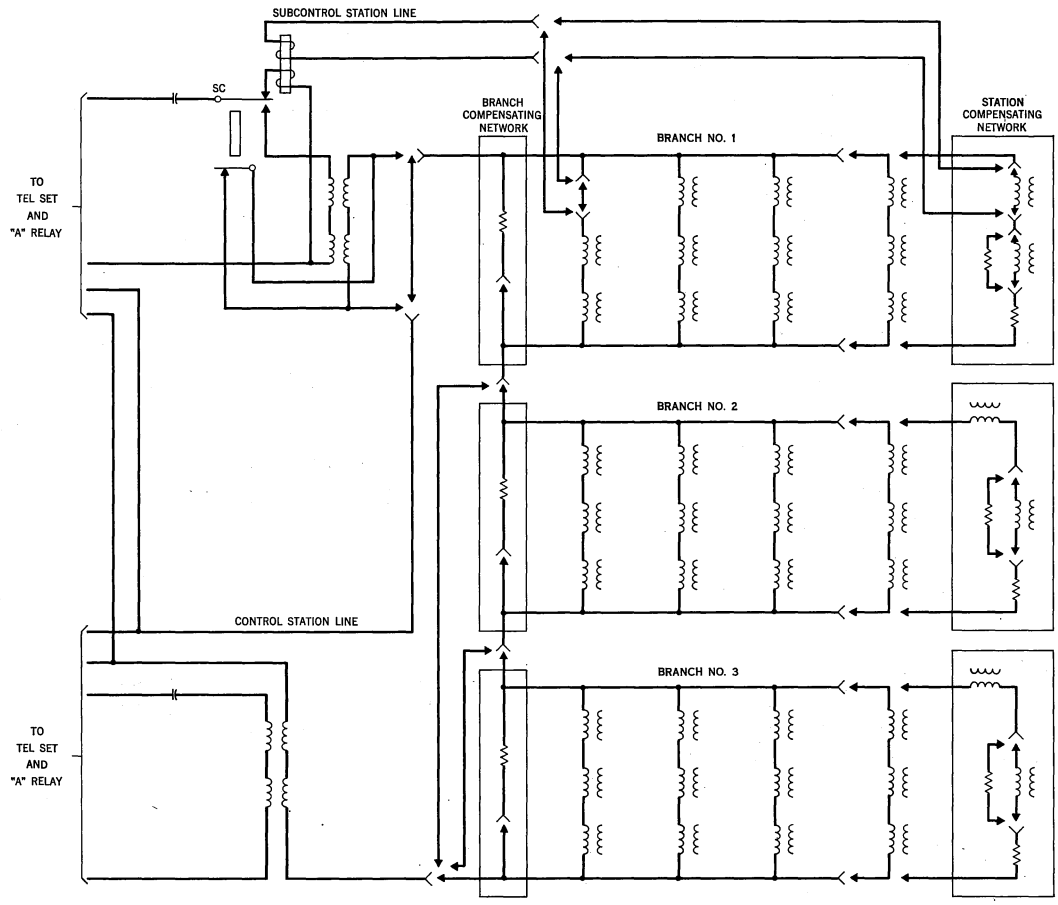

Fig. 2 – Application Schematic with One Control and Subcontrol Station

(d) All loops should be designed on a 2-wire basis.

(e) Maximum resistance of each wire between control or subcontrol telephone set (Figs. 7 and 27 of SD-66693-01) and its hold circuit (Figs. 12 and 13 of SD-66693-01) — 15 ohms.

(f) Maximum resistance of leads to busy and supervisory lamps:

600 ohms with 0V E.P.*

450 ohms with 5V E.P.

250 ohms with 10V E.P.

* Earth Potential

(g) Maximum E.P. between grounds at lamp cabinets — 10V.

(h) Maximum resistance of "LS" (line selection) leads between Figs. 22 and 25 of SD-66693-01:

165 ohms with 0V E.P.

120 ohms with 2V E.P.

4.02 The through bridge loss at 1000 cycles is shown in Table I below. This is the loss from Figs. 3 or 30 through Fig. 1 of SD-66693-01. It is shown as the loss from "A" to "B" of Fig. 1 of this section. Point "B" is the station referred to in Table I.

TABLE I

No. of Stations or Equiv. in Branch	Through Loss (db) with: 3 Fig. 1*	2 Fig. 1 & "F" Fig. 11*	1 Fig. 1 & "G" Fig. 11*
9	10.5	10.7	10.9
12	12.1	12.1	12.3
15	13.1	13.3	13.5
18	14.2	14.4	14.6
21	15.2	15.3	15.6

* SD-66693-01

4.03 The series parallel arrangement of the stations provides an impedance of 900 ohms looking from the bridging point of each station and its associated extension loop. This provides a good side tone balance either for "on-premises" or "off-premises" stations. In addition, for "off-premises" extension connections, reflection losses between the long extension loops and the bridged stations are minimized by the impedance matching which is obtained by the series parallel arrangement.

4.04 In order to avoid excessive transmission loss to some of the stations in the event others fail to answer or hang up before the call is completed, a 400-ohm resistance is bridged across the circuit which is approximately the impedance of a push-to-talk set and its associated impedance coil. This resistance is in the circuit in the idle condition.

4.05 The receiving gain due to the use of a push-to-talk set is in the order of 4 db for the 302 telephone set. One half of this is due to the improvement in circuit efficiencies obtained by short-circuiting the transmitter and an additional 2 db is obtained by the elimination of side tone in the set. On short loops the 500 type set is about 1 db better while on long loops it is up to 6 db better.

4.06 The transmitting gain of the 500 type set is about 2 db poorer than the 302 type telephone set on short loops. However, the 500 type set is up to 3 db better on long loops than the 302 type set.

4.07 If a station in one arm of a group of three series stations is talking to a station in any other arm of three series stations, the loss due to the remaining bridged station on the connection is shown in Table II. Fig. 1 of this section shows these stations represented by the 307P retard coil.

4.08 With the minimum number of called stations (27) in the conference circuit, Table II shows that the transmission between called stations is poor. Additional stations bridged to the conference circuit would make the transmission even worse.

TABLE II

Total No. of Bridged Stations	Stations in Series with Each Station	Stations in Parallel at Bridging Point — Other Groups of Three	Loss Due to Series & Parallel Stations — db
9	2	1	11
12	2	2	14
18	2	4	17
24	2	6	20

4.09 The loss from the control or subcontrol station to any called station is approximately the same regardless of the number of stations which answer the call. This is true since 400-ohm idle line terminations are provided.