

**COMMAND POST ALERTING NETWORK (COPAN)
JOINT CHIEFS OF STAFF ALERTING NETWORK (JCSAN)
GENERAL DESCRIPTION**

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| | A. Console | 7 | | 1. GENERAL | |
| | B. Alert Call | 7 | | 1.01 This section describes the operation of the Command Post Alerting Network (COPAN) used by the United States Air Force and the Joint Chiefs of Staff Alerting Network (JCSAN). The term COPAN, as used in this section, will refer partially to both networks (COPAN and JCSAN) except where denoted in the text. In the JCSAN network, the Remote Command Post employs the 306 Switching System (306 SS) for line and trunk interconnection. | |
| | C. On-Hook Supervision | 9 | | 1.02 This section is reissued to provide information concerning new operating functions for the remote end line and duty officer telephone set circuit, and to provide general revision as required. | |
| | D. Releasing Alert Call | 9 | | 1.03 The following abbreviations will apply to this section: | |
| | E. COPAN Reverse Pre-Emption Call | 9 | | MCP—Main Command Post | |
| | F. Console to PBX Call | 10 | | RCP—Remote Command Post | |
| | G. Releasing Console to PBX Call | 10 | | DO—Duty Officer | |
| 7. | OPERATION—REMOTE COMMAND POST (COPAN) | 10 | | 1.04 Sections covering various testing and maintenance aspects of COPAN circuits and equipment will be found in the 310 Division following this section. | |
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2. DESCRIPTION

2.01 The COPAN and the JCSAN systems are private line telephone networks, radiating from the MCP at the Pentagon to RCPs located at military headquarters throughout the world. These systems are designed to pre-empt circuits normally terminating in PBX switchboards, enabling the MCP to establish immediate contact with RCPs and to connect them in any desired combination to form immediate conference capabilities. Since it is a basic requirement that all RCPs be contacted in the minimum time, all points desired in a conference are signaled simultaneously, switching is performed automatically, and supervisory lamp indications at the MCP console inform the console operator of the completion of switching operations and of an "off-hook" condition at the RCP.

2.02 To enable the MCP to conference any or all circuits and maintain the highest quality of voice transmission, 4-wire conference bridges are provided. Additional bridging facilities enable the console operator to connect any desired local lines to the conference. Due to the number and length of the circuits involved, it is imperative that all COPAN and JCSAN circuits and equipment are maintained to meet operating standards at all times.

2.03 When not used for COPAN or JCSAN alert calls, the circuits in this network are used for normal PBX-to-PBX traffic. This provides additional facilities for handling lower priority traffic and a means for checking the quality of the circuits through usage. It must be remembered, however, that these circuits may be pre-empted from the PBXs at any time to establish an alert call.

2.04 Continuous, low level, test tone is applied to these circuits when in an idle condition. If, for any reason, this tone is interrupted, an alarm is activated at the MCP indicating trouble on the circuit. This alarm is duplicated in the Long Lines testroom and in the associated operating company testrooms.

2.05 A means for continuously checking the condition of the 4-wire line(s) between the RCP connecting circuit and the associated residence telephone set(s) is provided by a direct current loop continuity check on both the transmit and the receive pairs.

2.06 Alternate dedicated private line circuits are provided to most JCSAN locations and two COPAN locations. (Hot Line AUTOVON is used to provide backup communications to both COPAN locations.) If an alert is initiated on the primary circuit and proper switching indications are not received at the MCP, the equipment at the MCP automatically transfers to the alternate circuit and signals the RCP. (See 2.11 and 11.01.) An alarm indication at the MCP consoles advises of trouble on the primary circuit.

2.07 Some of the COPAN or JCSAN circuits can be switched to an Alternate MCP location. The switch point to perform this operation is located at an office other than the terminal office and is referred to as a "Y" Switch Point. When circuits are switched to the Alternate MCP, the Alternate MCP has full control of circuit operation, and alerts are established in the same manner as by the MCP. (See Fig. 1 and 2.)

2.08 Both JCSAN and COPAN Remote Command Posts have the capability of making an alert call to the MCP. This feature is known as REVERSE PRE-EMPTION. When a reverse pre-emption call is initiated by the RCP, PBX switchboards are pre-empted, switches are operated, and the MCP is signaled. When the MCP has answered this call, the circuit is in the same condition as when an alert call is initiated by the MCP.

2.09 The RCP has the ability to conference many residence lines, one or more local PBX lines, and up to three radio lines, depending on the features at the RCP location. These local circuits can be conferenced with the long-haul circuits in any combination.

2.10 The COPAN equipment provides the following features:

- Two PBX lines in the DO console
- Addition of up to three radio lines in the DO console
- A RESIDENCE RELEASE key in the DO console which permits the DO to release any individual residence line from a conference

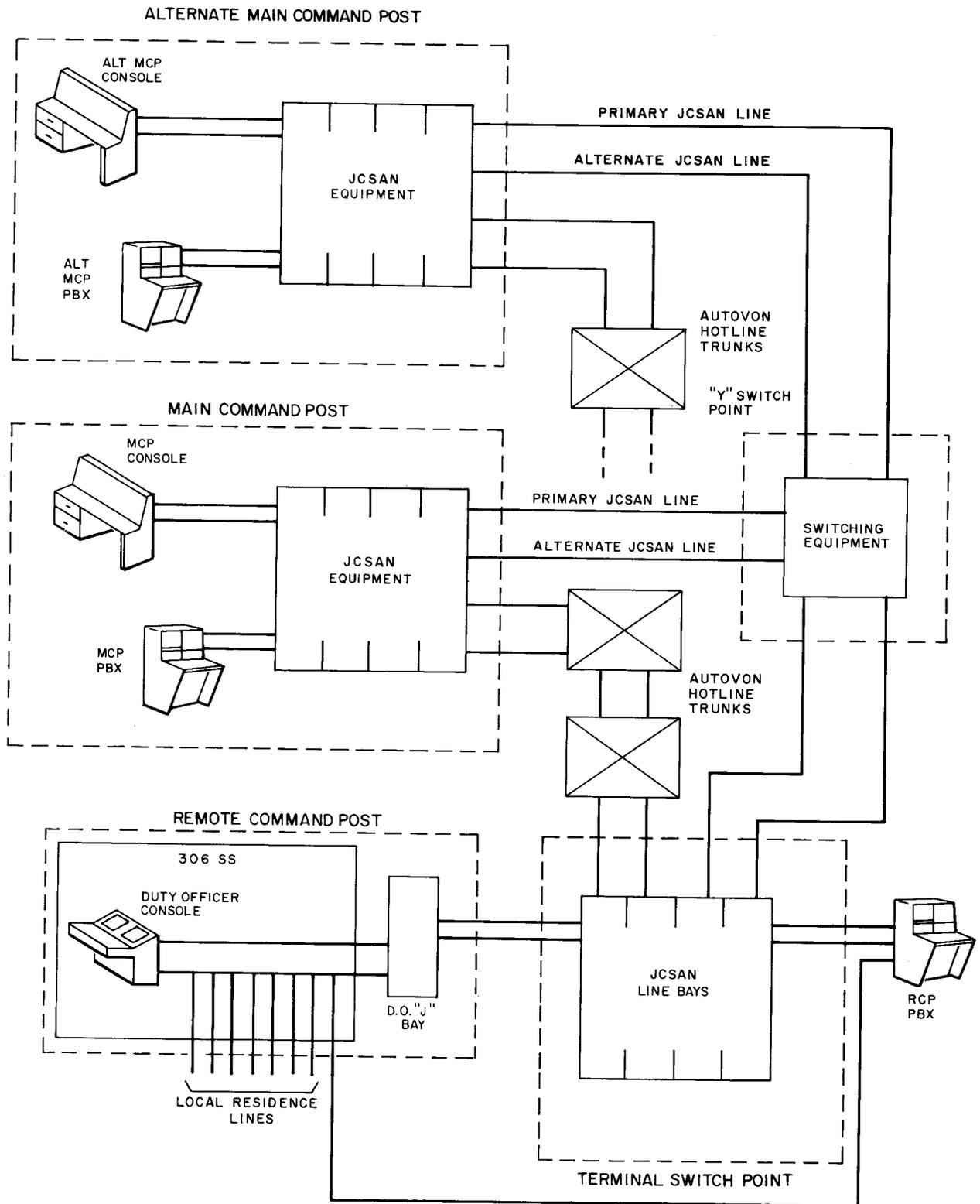


Fig. 1—JCSAN Circuit Layout

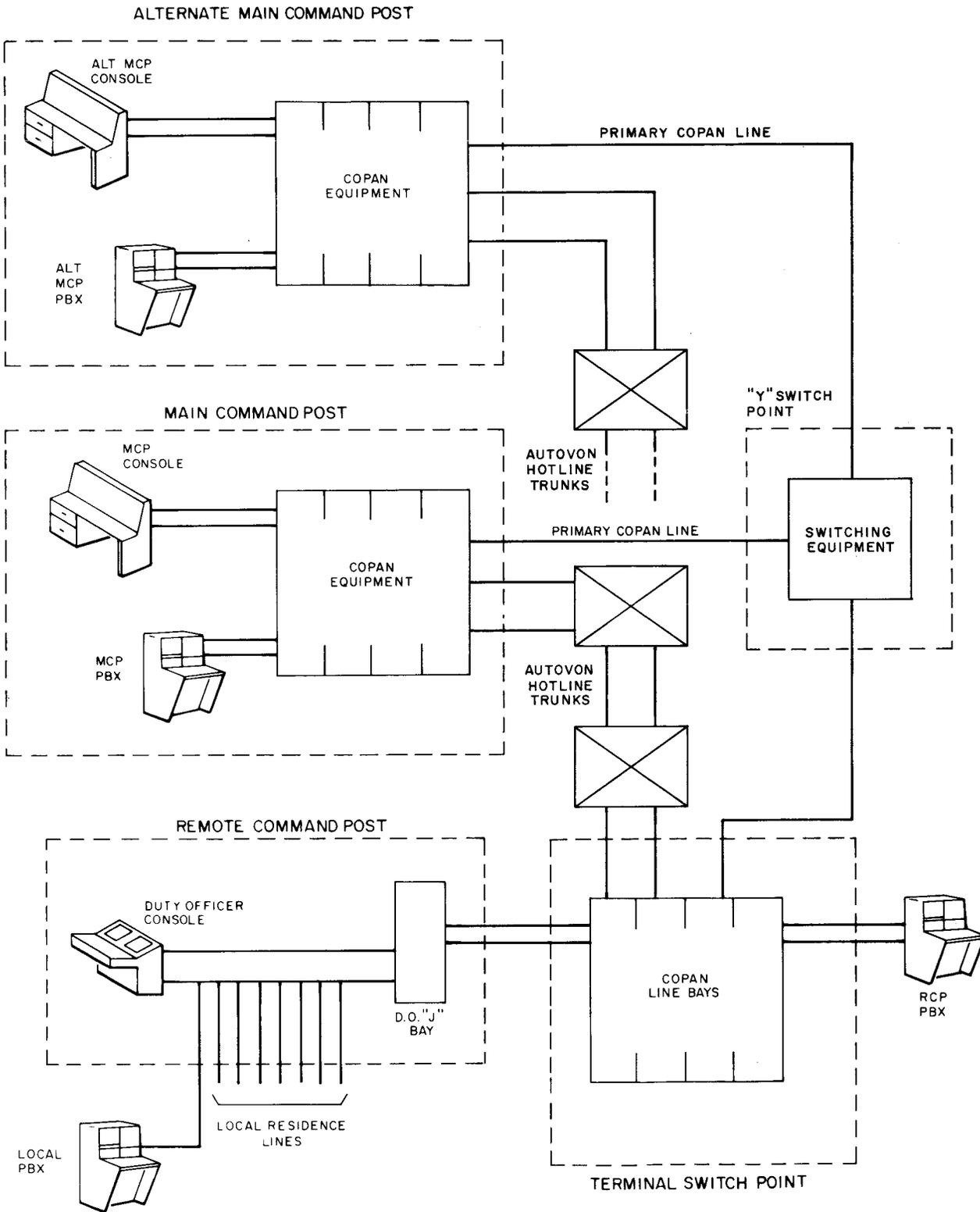


Fig. 2—COPAN Circuit Layout

- A residence line circuit continuity check and an associated alarm indication at the DO console
 - The ability for the DO to talk individually to each incoming line or conference any number of local lines to an incoming trunk with the ability to leave and return to the call at will and to transfer the conference from one trunk to another
 - Local line capacity of the DO console of up to 28 lines, which may be any combination of residence lines, PBX lines, radio lines, and remote residence lines, as required, (COPAN only)
 - The use of two Hot Line Automatic Voice Network (AUTOVON) terminations
 - The use of one long-haul private line termination (COPAN only)
 - The use of long-haul private line terminations (JCSAN only)
 - Visual ringing indication on residence telephones
 - An arrangement to minimize false signals to the MCP should the DO "fumble" the switch hook when answering an alert
 - A lockout to prevent the connected RCP code generator from transmitting a spurious signal while the MCP is transmitting or awaiting a reply to a code previously transmitted
 - A flashing line lamp to indicate an incoming call, a winking line lamp to indicate trouble conditions, and a steadily lighted line lamp to indicate an established connection (at RCPs console)
- 2.11** The JCSAN equipment provides the same features as found in the COPAN equipment except, at the Remote Command Posts, the JCSAN equipment terminates into the 306 SS as described in Section 981-208-100.¶

3. LINEUP

- 3.01** All circuits shall be lined up initially and shall be maintained within the transmission

limits specified in applicable Bell System Practices or those of responsible administration.

3.02 Initial lineups on circuits with both terminals within the continental United States are to be made by the responsible control offices in accordance with standard circuit order tests per applicable Sections 660-450-300, 660-450-301, 660-450-302, etc. Lineups on circuits with a terminal outside the continental United States are to be lined up in accordance with the responsible administration practices.

3.03 Additional information concerning initial and routine tests will be found in Part 5 of this section.

4. OFFICE RESPONSIBILITIES

4.01 All offices shall assume normal responsibilities as outlined in Section 660-201-010 or in applicable administration instructions and as supplemented by this section.

4.02 The Network Control Office responsible for the COPAN and JCSAN networks is the Pentagon Long Lines Testroom.

4.03 It is important that Circuit Control Offices keep the Network Control Office advised of all troubles and their status so that the customer at the Main Command Post may be advised. ¶ This applies to AUTOVON only. PENT 3 is circuit control office for all COPAN-JCSAN private lines.¶

4.04 Each office shall maintain complete and accurate logs of all actions in connection with service, tests, and troubles on these circuits.

4.05 In order that these circuits may be made good promptly, in case of circuit failure, each office should maintain accurate and up-to-date instructions which outline the action to be taken. Control offices should discuss various ways of patching and rerouting facilities with other offices in advance. This information should be attached to the circuit layout cards for ready reference.

4.06 All offices should cooperate in the handling of private line service order (PLSO) work, circuit order work, and testing on these circuits to keep release or out-of-service time at a minimum. Before requesting releases, all operations should be analyzed to determine if circuit sections or

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equipment can be patched or rerouted, and that all offices involved are ready to start work when the release is obtained.

4.07 Requests for releases on any portion of the circuit will be forwarded to the Network Control Office for approval before proceeding with any type of work. Releases should be planned as discussed in 4.06. (See also 5.03.)

4.08 On circuits which can be remotely switched to the Alternate MCP location, cutting off the MCP, an Alternate Control Office will be specified on the circuit layout card.

4.09 Under normal operating conditions, the designated Alternate Control Office will function as subcontrol for that portion of the circuit from the "Y" Switch Point to the Alternate MCP.

4.10 When a circuit is switched to the Alternate MCP, the Alternate Control Office will assume full Circuit Control Office functions.

4.11 In the event that all service is switched from the MCP to the Alternate MCP, the Alternate Control Office will assume the duties of Network Control Office for all services from the Alternate MCP.

4.12 In addition, the following items should be observed.

(a) *Network Control Office*

1. Maintain close contact with the customer at the MCP and advise concerning troubles and general operating status of the network.
2. Maintain contact with control offices and provide assistance in handling unusual or chronic troubles or unsatisfactory conditions.
3. Exchange telephone numbers with Control Offices, "Y" Switch Points, and Serving Test Centers to ensure prompt action in handling service troubles and other calls for attention.
4. Be responsible for obtaining releases from the MCP on any portion of the circuit. (See 5.03.)

(b) *Control and Subcontrol Offices*

1. Actively participate in obtaining trouble clearance on associated circuits.
2. Assist Serving Test Centers in trouble clearance.
3. Keep Network Control Office advised of status and clearance of troubles.

(c) *Serving Test Centers*

1. Establish close liaison with the local telephone company and/or customer maintenance groups to:
 - (a) Ensure adequate coverage and proper handling of troubles
 - (b) Provide copies of circuit layout cards, drawings, sections, and other necessary or helpful information
 - (c) Assist in training and equipment testing
 - (d) Ensure that adequate test equipment is available.
2. Keep Control Office advised of all troubles and conditions on the circuit within the territory.
3. Make sure that all personnel are familiar with engineered plant layout (EPL) switches, their location and operation, and that the controls are designated properly.
4. Where the Serving Test Center (STC) is contemplating closing, partially or fully, it will be the responsibility of the STC to arrange for adequate handling of customer calls for attention and service calls to the Control Office during uncovered periods. The STC will notify the Control Office of arrangements made.

(d) *"Y" Switch Points*

1. Maintain an up-to-date list of EPLs and their associated switch control operations. This list should be immediately available in the vicinity of the switch controls.

2. Instruct all personnel concerned with the use and purpose of the list and the operation of the switches. (See 5.06.)
3. Furnish the Control Office with a phone number in the vicinity of the switch controls which will be answered promptly.

5. CIRCUIT MAINTENANCE

- 5.01** Circuit maintenance should in general be handled in the standard manner. This requires that the circuits be released by the customer and removed from service for testing purposes.
- 5.02** The customer has designated the Chief Operator or trouble operator at the MCP PBX as contact for all releases, turnups, turndowns, trouble reports, etc. This operator will be responsible for obtaining necessary customer concurrences and advising all customer locations involved in such matters.
- 5.03** The telephone company contact with the Chief Operator or trouble operator at the MCP PBX will be the Network Control Office. *All* requests for releases, turnups, turndowns, trouble reports, etc, by telephone company personnel, will be referred to the Network Control Office.
- 5.04** Serving Test Centers, receiving reports of circuit difficulties or impairments, will immediately notify the Circuit Control Office which will then notify the Network Control Office. The Network Control Office will keep the customer advised of the progress of restoration or repair.
- 5.05** All offices should arrange for the centralized location of circuit appearances for quick sectionalizing and patching and provide adequate designations and protective devices consistent with the importance of these circuits.
- 5.06** An EPL is provided on nearly all primary circuits on that portion of the circuit within the continental United States. EPLs provide a full-time make-good available between the Control Office and the "Y" point and between the "Y" point and the distant STC. An EPL is also provided between the Alternate MCP STC and the "Y" point. The transmitting side of the regular and EPL circuits are dual fed, on a bridge basis, at each of these offices. A switch, located on the receive side, connects the EPL to the equipment at these

offices. The Control Office will request that switches be operated, or unoperated, when it is necessary to switch to the EPL.

6. OPERATION—MAIN COMMAND POST

A. Console

6.01 Two identical consoles, located at the Main Command Post, contain all keys for establishing alerts and conferences, and supervisory lamps which indicate circuit conditions. (See Fig. 3.) A row of three keys and associated lamps are provided at the MCP console for each Remote Command to be contacted.

B. Alert Call

6.02 To establish an alert from the MCP, the console operator first selects one of four bridge circuits provided by operating a BRIDGE SEL button. The operator then depresses the COPAN SEL/REL key associated with each Duty Officer to be contacted. ♦This is true when placing individual calls or two or more calls at a time. When a full JCSAN or COPAN conference is made, the MCP DO depresses the gang bar button. This gang bar automatically depresses (grounds select leads of) all SEL/REL keys of all circuits used in the conference. ♦ These operations pre-empt the PBX, switch the circuit (4-wire) to the bridge circuit selected, disable the alarm circuit, and remove low level tone from the line. The following supervisory indications are given as follows:

At the MCP PBX

- (a) Audible pre-empt tone on the circuit
- (b) Pre-empt lamp lights
- (c) Busy lamp lights.

At the MCP console

- (a) White BUSY lamp lights (steadily)
- (b) Yellow COPAN SEL/REL lamp flashes
- (c) BRIDGE CONN lamp flashes (color will be red, green, yellow, or blue depending on bridge selected)

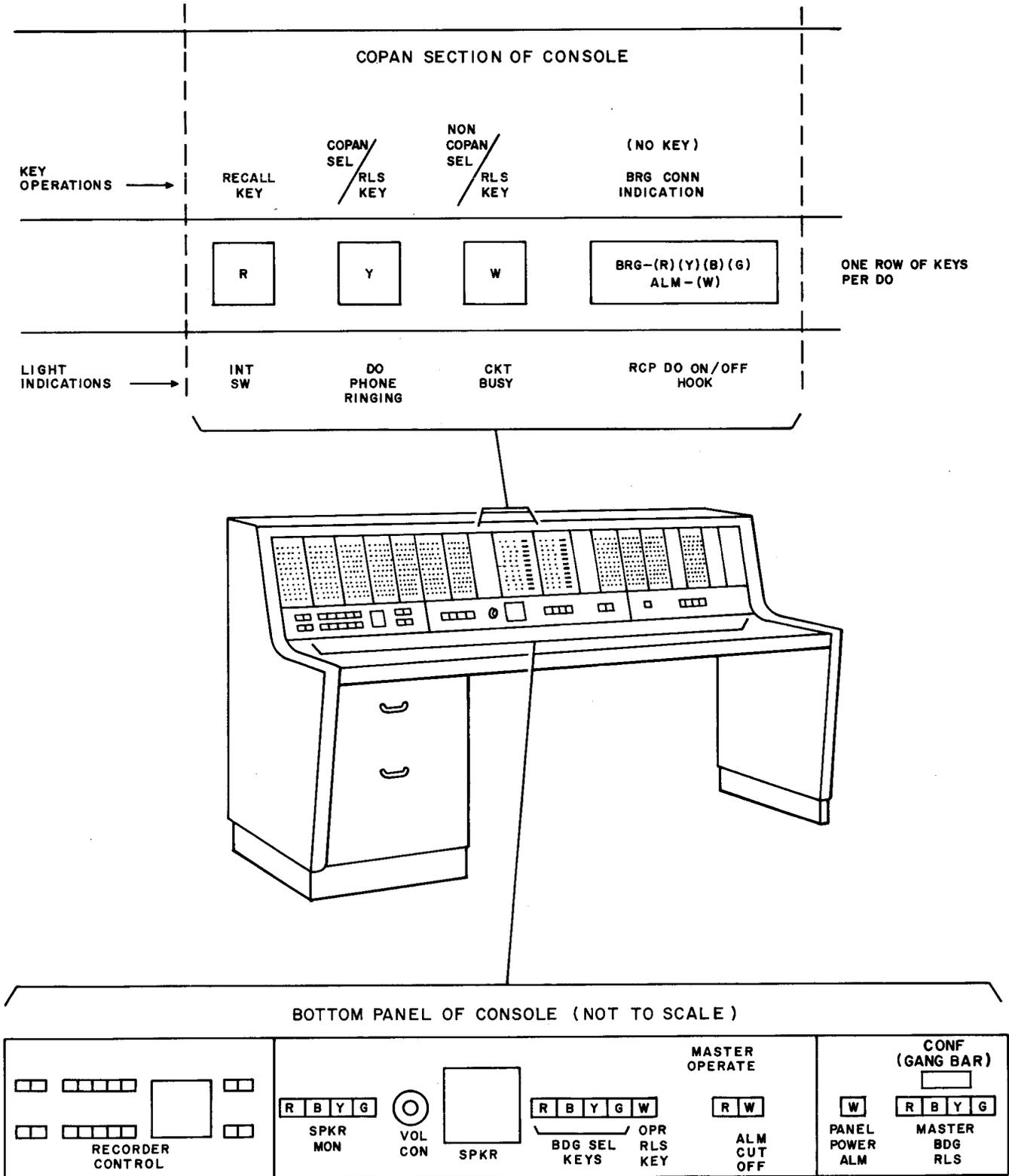


Fig. 3—Main Command Post Console

- (d) Red RECALL lamp flashes *if* an intermediate switch is required.

6.03 The console operator now depresses the MASTER OPERATE button. This starts the SC2 signaling equipment and codes are sent out. The first code to go out will be the intermediate switch code, if required. When this switch has operated, a long pulse reply is received from the Intermediate Switch Point, indicating to the MCP equipment that the operation was completed and will cause the flashing red RECALL lamp to change to a steadily lighted indication. The SC2 signaling equipment now sends the alert or call code. This code will switch the circuit from the PBX to the Duty Officer at the RCP and ring the phone. The RCP PBX, being pre-empted, will receive the same indications as the MCP PBX. (See 6.02.) When the Duty Officer phone is ringing, a long pulse reply is sent to the MCP which causes the flashing yellow COPAN SEL/REL lamp to change to a steadily lighted condition. It also conditions the SC2 equipment to send an off-hook inquiry code. If the Duty Officer answers before this code has reached the RCP equipment, a long pulse reply is sent to the MCP on receipt of this code. This will cause the flashing BRIDGE CONN lamp to change to a steadily lighted condition. When all flashing lamps have changed to a steady indication, the conference is set up and all Duty Officers signaled are on the line. This operation should take about 10 seconds. If, however, after all codes have been transmitted, there were any codes to which there was no long pulse reply, the equipment at the MCP will send those codes a second time. (See 6.04.) If the Duty Officer goes off-hook any time after the off-hook inquiry code has been transmitted two times, a long pulse reply signal is transmitted to the MCP. This will start the SC2 signaling equipment which will resend that particular off-hook inquiry code. A long pulse reply to this code will then change the associated flashing BRIDGE CONN lamp to a steady indication and notify the MCP console operator that the DO is on the line.

6.04 If an alternate circuit is provided and long pulse replies were not received to the intermediate switch code or the alert code after they have been transmitted twice (as in 6.03) on the primary circuit, a trouble transfer circuit at the MCP will automatically switch to the alternate sender which transmits the codes twice more if necessary. If neither of these codes are answered by a long pulse, a transfer to the alternate circuit

(if provided) occurs (JCSAN only). Codes will be transmitted twice on this circuit if necessary. Supervisory indications will be transferred to the keys associated with the alternate circuit on the MCP console. An alarm will appear, associated with the primary circuit, indicating trouble on this circuit.

6.05 The above (6.04) is true for the JCSAN network only. COPAN alternates have been removed and replaced by the AUTOVON network.

C. On-Hook Supervision

6.06 Should an RCP Duty Officer *and all parties* go "on-hook" (hang up) during a conference call, a code is transmitted to the MCP which will cause the BRIDGE CONN lamp to flash.

D. Releasing Alert Call

6.07 To release circuits at the completion of a call, the MCP console operator first operates the OPR SEL key. The operator then depresses the COPAN SEL/REL keys associated with the circuits to be released and operates the MASTER OPERATE key. Release codes are transmitted by the MCP SC2 equipment which will release the switches at the RCP and connect the circuit to the RCP PBX. A long pulse reply to the MCP indicates that this operation was performed. The COPAN SEL/REL lamp and the BRIDGE CONN lamp at the MCP console will be extinguished and the circuit will be returned to the MCP PBX.

E. COPAN Reverse Pre-Emption Call

6.08 When a Reverse Pre-emption call is initiated by an RCP Duty Officer, a code is received by the MCP which audibly rings the MCP and causes the yellow COPAN SEL/REL lamp, associated with the calling Duty Officer, to flash. The console operator selects a bridge and depresses the flashing COPAN SEL/REL key. The BRIDGE CONN and COPAN SEL/REL lamps are now steady and conversation may begin. The circuit at this time is in the same condition as if the MCP initiated the call and must be released by the MCP as described in 6.07.

F. Console to PBX Call

6.09 The MCP may make a call to the RCP PBX from the MCP console. To do this the MCP operator selects a bridge by operating a BDG SEL key, then operates the PBX SEL/REL key associated with the point to be called. This operation will pre-empt the MCP PBX (supervisory indications at the PBX will be the same as shown in 6.02), switch the circuit (4-wire) to the bridge selected, disable the alarm circuit, remove low level tone from the line, and signal the RCP PBX. When the RCP PBX answers, conversation may begin.

G. Releasing Console to PBX Call

6.10 To release a PBX call, the MCP console operator first depresses the OPR REL key. The operator then depresses the PBX SEL/REL key associated with the circuit which releases the circuit from the console and returns it to normal PBX operation.

7. OPERATION—REMOTE COMMAND POST (COPAN)

A. Console

7.01 A 60-button console (see Fig. 4 and Table A) is provided at each Duty Officer location. These sets are designed for 4-wire operation with push-to-talk handsets. The following description will cover the basic operations at the RCP.

B. Alert Call

7.02 When an alert call is received from the MCP, the DO key lamp will light, the LINE lamp associated with the incoming line will flash, and the bell will ring. To answer the call, the DO goes off-hook and depresses the regular line TALK button or the line TALK button associated with a flashing lamp. This will retire the bell and cause the incoming LINE lamp to light steadily. The DO may now talk to the MCP. This applies to COPAN. JCSAN RCP operation is covered in Sections 981-208-100 and 480-713-301.

C. Conferencing

7.03 To conference, the DO depresses the button associated with residence line(s) to be contacted. After the residence line(s) answers, the DO depresses the conference key. Then all lines and the DO are in conference. This would include an incoming line (COPAN line, AUTOVON, etc) if a line TALK key was depressed. The DO can only set up one conference at a time with only one incoming line at a time. The DO still must remain off-hook if a PBX line is in conference with MCP because no on-hook supervision is furnished with PBX lines.

D. Termination of Alert Call

7.04 At the termination of the alert, the DO and all local lines hang up. This normals the DO console and all lamps go out except the LINE lamp. This lamp remains on until all switching is

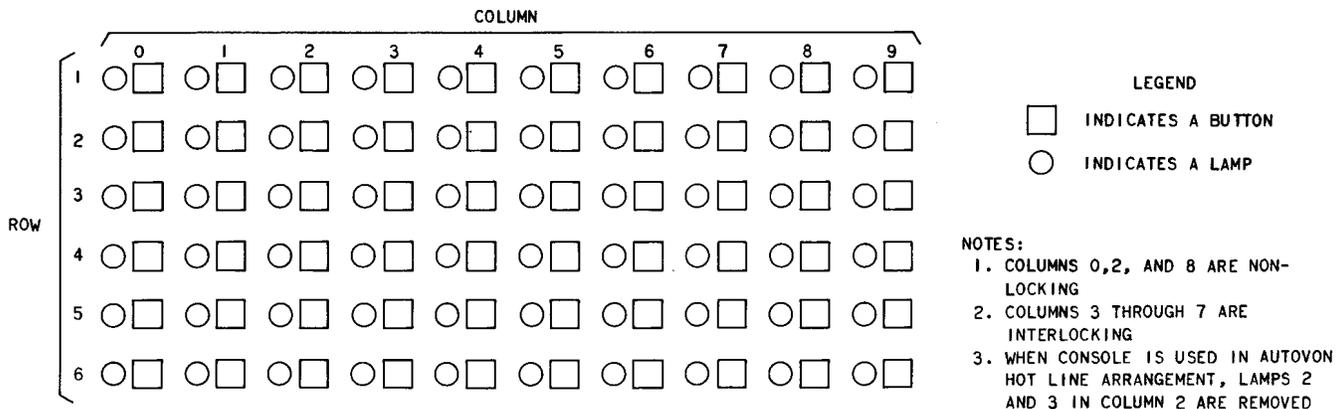


Fig. 4—Duty Officer Console Face Layout Per SD-1G158-01 (See Table A for Designations)

→TABLE A←

KEY DESIGNATIONS FOR COPAN DUTY OFFICER CONSOLE — RCP — PER SD-1G158-01

| | | COLUMN | | | | | | | | | |
|------------------|---|------------------------------------|--|----------------------|-------------------|---------------------|-------------------|----------------|--------------------------|-----------------------|----------------------------------|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| PUSHBUTTON (ROW) | 1 | MCP DUTY OFFICER NL | REGULAR LINE TALK L | MCP PBX NL | L | CMDR OFFICE L | CMDR HOME L | X0 OFFICE L | X0 HOME L | LOCAL CONTROL NL | RECORDER 1 L |
| | 2 | HOT LINE TO MCP (ONLY COPAN) NL | ALTERNATE LINE TALK OR AUTOVON SELECT L | MCP NL | L | D. CMDR OFFICE L | D. CMDR HOME L | L | L | DISTANT CONTROL NL | RECORDER 2 L |
| | 3 | HOT LINE TO MAXWELL (ALTAN) NL | ALTERNATE LINE TALK OR AUTOVON SELECT L | MCP NL | L | C.S. OFFICE L | C.S. HOME L | L | L | REGULAR NL | RECORDER TRANSFER NL |
| | 4 | NL | L | NL | L | MM OFFICE L | MM HOME L | L | LOCAL PBX L | ALTERNATE NL | RECORDER REVERSE L |
| | 5 | NL | L | NL | L | MA OFFICE L | MA HOME L | AIR ROOM L | LOCAL PBX L | ALARM NL | RECORDER PLAYBACK L |
| | 6 | NL | L | RERING RELEASE NL | CONFER-ENCE NL | PM HOME L | ASST MM HOME L | AUG CP L | LOCAL LINE RELEASE NL | RING NL | RECORDER RELEASE (OR STOP) NL |

Note 1: L indicates locking lighted keys.

Note 2: NL indicates nonlocking lighted keys.

Note 3: Keys 1 through 5 in column 3; keys in column 4, 5, and 6; and keys 1 through 5 in column 7 may be used for local residence lines, SF residence lines, local PBX lines, or radio lines.

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completed and the circuit is restored to PBX operation.

E. Reverse Pre-Emption

7.05 To initiate a REVERSE PRE-EMPTION call, the DO goes off-hook and operates a line TALK key. The LINE TALK lamp will light. The operator now depresses the MCP DO key. The MCP DO lamp lights, the LINE lamp lights, a code is transmitted to the MCP, and the RCP PBX is pre-empted. After this code is received at the MCP (about 2 seconds), the RCP DO will receive an audible ring (induced 20 Hz) which tells the RCP DO that the MCP has been reached. When the MCP answers (see 6.08), the audible ring will stop and conversation may begin. When the call is completed, the DO hangs up. The circuit must be released by the MCP. (See 6.07.)

F. Calling MCP PBX

7.06 To place a call to the MCP PBX, the DO goes off-hook and selects an *idle* line and operates the associated line TALK key. The LINE TALK lamp lights and then the DO depresses the MCP PBX key. The MCP PBX key lamp will light, the RCP PBX is cutoff, the LINE key lamp lights, and a ringing signal is transmitted to the MCP PBX. When MCP PBX answers, conversation may begin. When the call is completed, the DO hangs up and the circuit is normal.

G. Rering

7.07 The DO can receive a rering from the MCP during a conference whether the DO is on- or off-hook. If a rering comes in while on-hook, the DO answers as described in 7.02. If the DO is off-hook, the rering release key (RRR) is depressed to silence the bell. All other indications will be the same as when the DO normally answers.

8. OPERATION—REMOTE COMMAND POST (JCSAN)

8.01 JCSAN operation at the Remote Command Post and its association with the 306 SS is described in Section 981-208-100.

9. SC2 SIGNALING

9.01 SC2 signaling is used on both JCSAN and COPAN networks. The Main Command Post transmits Selective Control System SC2 coded

signals (pulse length codes) to initiate functions at Remote Command Posts. (See Fig. 5.) The operation of the SC2 System is described in Section 982-305-100.

9.02 SC2-type code sending and receiving equipment is also used at Terminal Points to transmit coded signals (pulse length codes) toward the Main Command Post. These codes are used for reverse pre-emption and on-hook indications.◆

10. CONTINUITY TEST TONE

10.01 When a circuit is not being used between PBXs or for an alert, a 2400-Hz tone, 20 dB below normal level, is transmitted from the Main Command Post. (See Fig. 5.) Detection of this tone by the Terminal Switch Point causes 2600-Hz tone, also 20 dB below normal level, to be transmitted toward the Main Command Post. If, for any reason, this tone is not detected by the Main Command Post or the level drops 8 dB, an alarm is received by the MCP console. A 10-second delay feature is built into this alarm circuit to prevent operation from momentary opens.

11. HOT LINE AUTOVON

11.01 The COPAN alternate circuits consist of paired access lines: one serving the MCP, and one serving the RCP. These are button-selected at the console. An off-hook from the Main Command Post toward the ESS causes the Electronic Switching System (ESS) of the AUTOVON to spill forward the digits associated with the access line at the RCP. The RCP can reach the MCP in the same manner.

11.02 Alternate Alerting Network (ALTAN) is similar in operations to the Hot Line AUTOVON (11.01).◆

12. EQUIPMENT ARRANGEMENT

12.01 The equipment necessary to perform the functions required in the COPAN network is listed below:

(a) *Main Command Post*

Switching System No. 304 4-wire line circuit per SD-1G155-01

Alerting circuit per SD-1G124-01

Line Switching circuit per SD-1G125-01
 Alternate Line Switching circuit per SD-1G147-01
 SC2 Main Station circuit per SD-1G057-01
 Signaling circuit per SD-1G060-01
 Code Sending and Receiving circuit SD-1G145-01
 Signaling Load Transfer circuit per SD-98091-01
 Ringer Oscillator circuit per SD-64419-01
 VOLCAS circuit per SD-64366-01
 1A Echo Suppressor circuit per SD-59031-01
 SF Signaling circuit per SD-98090-01 or SD-98124-01
 Ringdown Tie Trunk circuit per SD-65681-01
 Special Console C & P Co. drawings 3351-263 and 3351-268
 E AND M Trunk circuit per C and P Co. drawing C-90235.

(b) **Terminal or Intermediate Switch Point**

Line Switching circuit per SD-1G133-01
 Power Supply circuit per SD-1G131-01
 PBX Terminating and Signaling circuit per SD-1G135-01
 SC2 Satellite Station circuit per SD-1G058-01
 Signaling circuit per SD-1G061-01
 SF Signaling circuit per SD-98090-01 or SD-98124-01
 Signaling Load Transfer circuit per SD-98091-01
 Ringer Oscillator circuit per SD-64419-01
 Hybrid Coil circuit per SD-66679-01
 VOLCAS circuit per SD-64366-01
 1A Echo Suppressor circuit per SD-59031-01

Audible and Visual Alarm circuit per SD-96188-01 (typical)

Miscellaneous Alarm circuit per SD-65761-01 (typical)

Code Sending and Receiving circuit per SD-1G145-01

Signaling circuit per SD-1G060-01.

(c) **Remote Command Post**

Line Switching and Telephone circuit SD-1G158-01.

Note: Some stations have SD-1G134-01 equipment which has been modified per SD-1G158-01.

Power Supply circuit per SD-1G131-01

VOLCAS circuit per SD-64366-01

◆Switching System No. 306 4-Wire CO trunk circuit per SD-1G220-01◆

1A Echo Suppressor circuit per SD-59031-01

◆3A Echo Suppressor per SD-5G022-01◆

Flashing circuit per Fig. 2 of SD-1G125-01

12.02 Testing equipment used at the various locations are listed as follows:

(a) **At All Locations**

J94021A Transmission Measuring Set or equivalent

J64001R, L1 Vacuum Tube Test Set or equivalent

5A Attenuator or equivalent

KS-14510, L5 (Weston) Volt-ohmmeter or equivalent

(b) **At Network Control Office**

J1G008A, L1 Pulse Length Code Test Set

J1G008B, L1 Signaling Unit Circuit

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J68602 CL, L1 2600-Hz Signaling Circuit

J98613AL, L1 2400-Hz Supply Unit

- (c) ***At all locations where VOLCAS equipment is furnished:***

35A-Type Test Set or equivalent

Weston Model 280 Portable Milliammeter

- (d) ***At all locations where SF signaling equipment is furnished:***

J64730B, L1 2B Signaling Test Set

Hasler Ltd, Berne type 1.1421.003—

Impulsograph, or Brush Electronics
RD 2322-00.

Oscillograph and RA 2402-10—

Chart Take-Up Drive *or Equivalent.*

- (e) ***At all locations where SC2 Code Signaling equipment is furnished:***

J1G009A, L1 Dial Test Set

- (f) ***At all locations where Ringer Oscillator equipment is furnished:***

J68602AH, L1 Portable Test Set

- (g) ***At all locations where 1A Echo Suppressor equipment is furnished:***

J68605M, L1 or L3 Echo Suppressor Test
Set

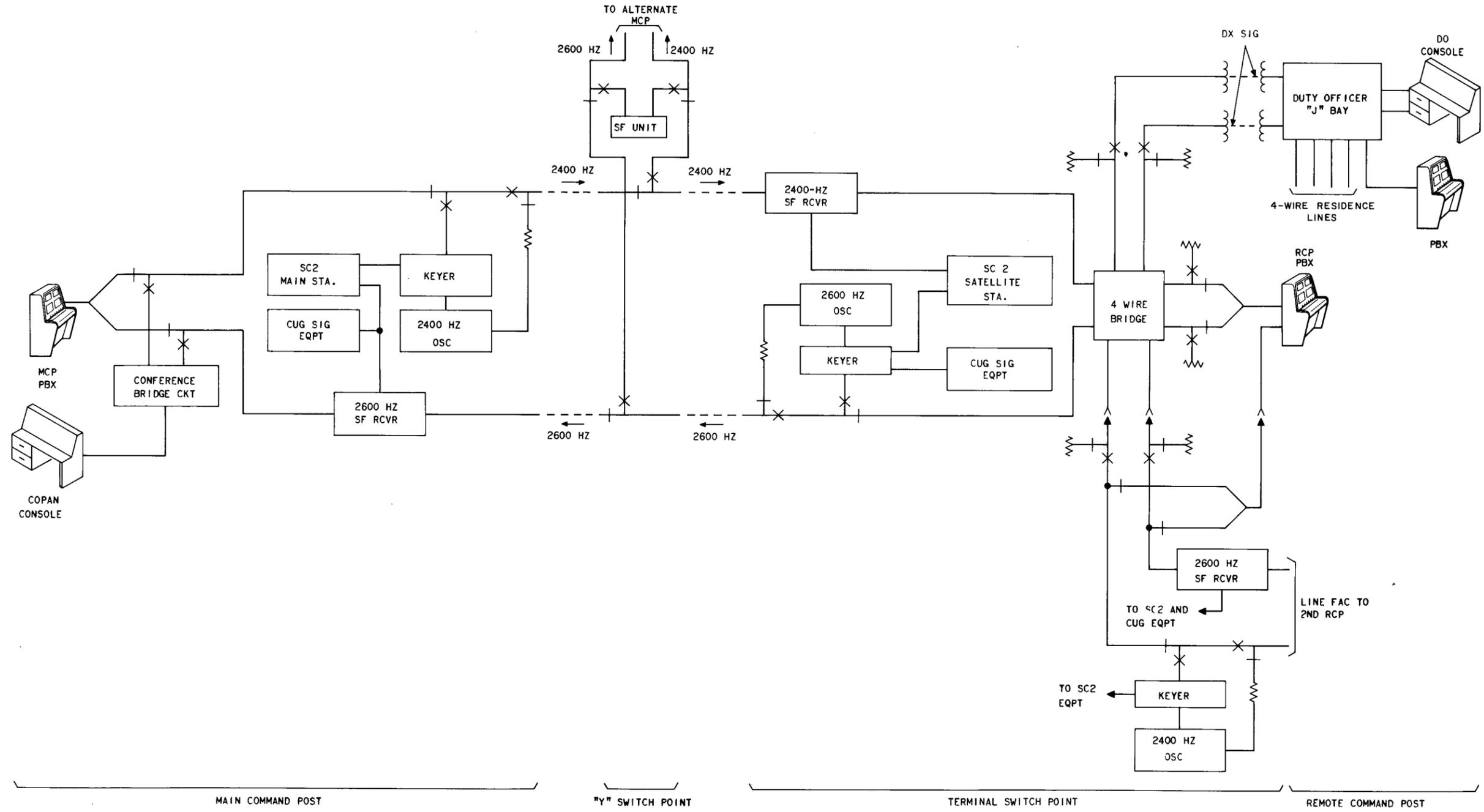


Fig. 5—Signaing Arrangement COPAN Circuit