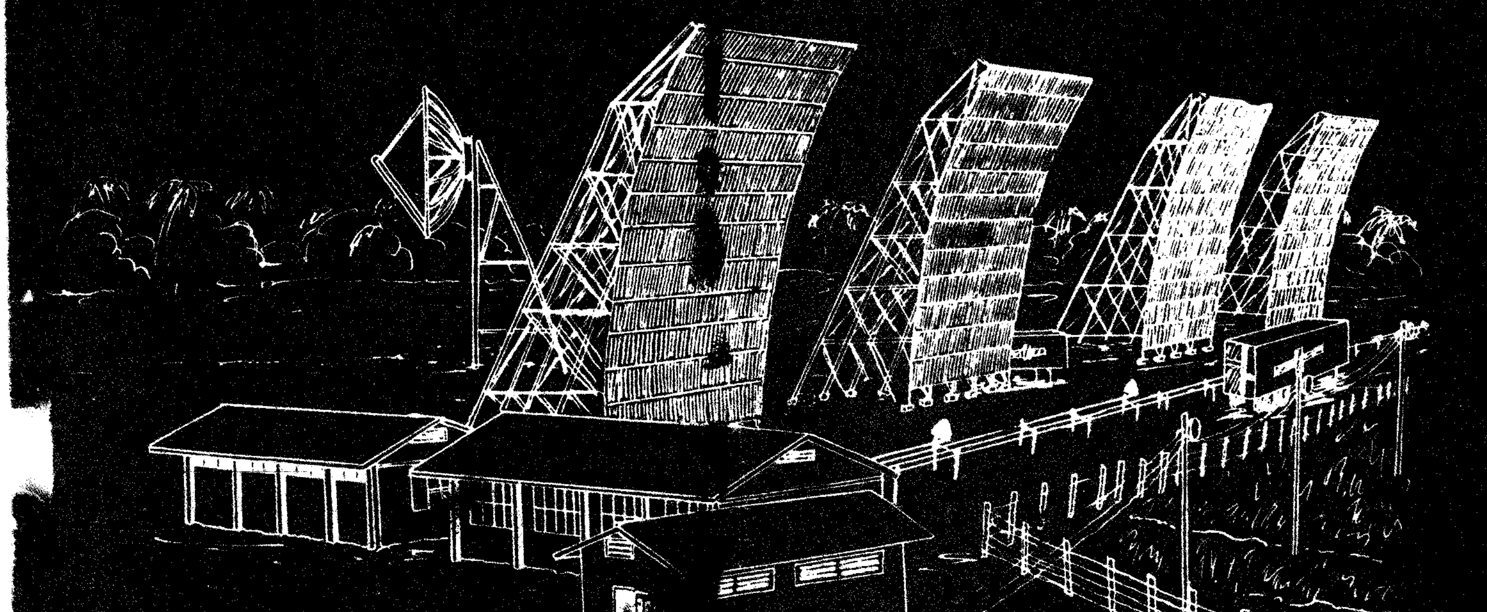
TECHNICAL CONTROL STANDARDS AND PRACTICES



REGIONAL COMMUNICATIONS GROUP

1st SIGNAL BRIGADE (USASTRATCOM)

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

SCCPV-RG-PO-NW 1 June 1969

SUBJECT: Technical Control: Standards and Practices

All Long Lines Personnel
Regional Communications Group (Vietnam)

1. "Long Lines Technical Control Standards and Practices" is published for the information and guidance of all long lines personnel. It provides a single source for locating Regional Communications Group publications setting forth policy and guidance that is not included in applicable regulations.

2. "Standards and Practices" is meant to supplement, but not replace, the individual site SOP's which are still required. Items in "Standards and Practices" are issued to publish guidance in areas where common procedures are necessary for efficient operations.

3. Items are issued individually, as necessary, with the INDEX specifying current editions of each. The "Items" will be kept in numerical order in a suitable binder and made readily available for reference in each technical control.

4. Items published in "Long Lines Technical Control Standards and Practices" are directive in nature and effective upon issue.

JOHN E. HOOVER
Colonel, SigC
Commanding

PREFACE

This edition was designed to bring the technical controller up to date on the many changes that have taken place in the Integrated Communications Systems since the first publication in 1967.

Whereas the ICS Orientation Manual is the guide-book for the system's managers, the Technical Control Standards and Practices is the guidebook for the operators in the field.

In preparing this second edition, the editor extends his appreciation to the personnel of Networks Branch, Plans and Operations Division, Headquarters, Regional Communications Group. 1LT Richard Gutierrez, MSG Raymond Cox and SP5 Harold Ketner are acknowledged for their efforts in preparing this edition for the final printing.

Gary S. Brown
GARY S. BROWN
CPT, SigC
Chief, Networks Branch

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0010-03

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0512-02 Equipment Assignments for Pre-Wired Equipment
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0540-02 Use of DC Isolation Relays in the ICS
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DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO SAN FRANCISCO 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0191-04

SUBJECT: CUTOVER CONTROL DIRECTOR

1. REFERENCE: USMACV COMMUNICATIONS-ELECTRONICS OPERATING INSTRUCTIONS DATED 15 JULY 1965 (C).

2. IAW ABOVE REFERENCE CPT GARY S. BROWN IS APPOINTED ICS CUTOVER CONTROL DIRECTOR. 1LT RICHARD R. GUTIERREZ IS APPOINTED THE ALTERNATE DIRECTOR.

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACITCES

SCCPV-RG-PO-NW

ITEM NR: 0201-01

SUBJECT: Circuit Activation Documents

1. Purpose. The purpose of circuit activation documents is to provide the technical controls with all the information needed in order to activate, realign, or deactivate circuits as directed by DCA-SAM. The Letter of Transmittal, as described below, is directed to the Long Lines Area Commander to insure that necessary command emphasis is placed on the actions required.

2. Circuit Engineering Order (CEO)

a. This is issued by DCA-SAM and is the authority to realign, activate, or deactivate a circuit. This document is normally received by ICS sites through electrical transmission means (Inlosure 1) however, they are usually delivered locally by courier (Inclosure 2).

b. The format for CEO's contains three (3) paragraphs. The information contained in each paragraph is outlined in Inclosure 3.

3. Circuit Layout Record (CLR)

a. This document is prepared and issued by DCA-SAM. It is the detailed engineering layout of the circuit to include specification of all levels, signalling, and conditioning equipment. These records are issued directly to Hqs, RCG for all RCG operated technical controls in RVN and are delivered by Networks Branch couriers to each Long Lines Area Commander concerned. Sample is attached as Inclosure 4.

b. When the CLR contains more than two (2) cards, a cover card is usually attached which shows the complete routing of the circuit, to include the subscribers, and the system and channel numbers of each leg of the circuit. This same information is contained in paragraph 2i of the CEO. The first card of Inclosure 4 is a sample of a cover card.

c. Networks Branch, P&O Division, USA Regional Communications Group prescribes the individual items of circuit conditioning equipment (e.g., Pads, amplifiers, SF units, etc.,) by sequence number, row and bay location, and frame location to be used at a particular site to implement the CEO. All jacks, signalling devices, and items of conditioning equipment are represented by a block and entered directly on the CLR. The identification of the numbering system is explained in Inclosure 4.

d. The meanings of the symbols used on a CLR are found on pages 11-26 thru 11-43, DCA Circular 310-70-1, dated January 1967.

4. Letter of Transmittal. This is issued by Networks Branch, P&O Division, USA Regional Communications Group and provides:

a. A continous record of transmittal for all CLR's and TLR's distributed.

b. The scheduled due date each circuit action is to be accomplished.

c. The relative priority of activations of all actions within a given due date. This is to provide the guidance for all tech controls concerned to expend their efforts on the same circuit at the same time.

d. The applicable CEO number.

e. The applicable CLR date.

Sample is attached as Inclosure 6.

5. Trunk Layout Records (TLR) These are prepared and issued by DCA-SAM to reflect the establishment and routing of systems, supergroups, groups and thru-groups. Networks Branch,P&O Division, Regional Communications Group prepares each TLR to reflect multiplex, VF jack, & CKT jack assignments within the terminating technical controls. These are distributed in the same manner as CLR's. The identification of the groups, MUX Channels, VF jacks and CKT jacks on the TLR is explained in Inclosure 5,

6. Transmittal of Cutover Documents.

a. As explained above, CEO's are normally electrically transmitted by DCA-SAM to all activities concerned. CLR's and TLR's by their nature, cannot be electrically transmitted. To provide the minimum possible response time to circuit activations, these documents are hand carried by Networks Branch couriers to major sites. At present, courier distribution is made to Cam Ranh Bay, Nha Trang, Qui Nhon, Da Nang, and Pleiku. The LLA Commanders are responsible for further distribution to their respective LL Det tech controls. When a courier departs Hqs RCG, the sites concerned will be notified by telephone of his impending arrival and will be requested to send someone to board the aircraft when it arrives to pick-up and receipt for the cutover documents. This is to insure that the courier will not lose his seat or miss his plane when it leaves for its next destination. Failure to meet the courier on the aircraft, when requested, delays delivery of cutover documents by 1-2 days.

b. Upon receipt of cutover documents from the courier, the Long Lines Area Commander, or his designated representative, will sign for them in the space provided in the Letter of Transmittal and return the signed copy to the courier.

c. Cutover documents will be continously accounted for by receipt until they reach the site OIC of the technical control listed on the CLR. Sufficient copies of the Letter of Transmittal are provided for this purpose.

7. Changes to Equipment Assignments. CLR's specify by number what circuit conditioning equipment is to be used in support of each particular circuit. Equipment assignment is centrally controlled at Hq, USA Regional Communications Group (Networks Branch) by punched-card procedures. Thus, it is necessary that changes to equipment assignment be thoroughly coordinated so that Networks Branch, RCG, can maintain an accurate record of both assigned and unassigned equipment. Apparent spare equipment at any technical control facility might be programmed for use on a contingency circuit or for use on a circuit for which a CLR has not yet been issued. If this equipment is used without the approval of Networks Branch, a double equipment assignment may result thus causing a delay in the activation of the new circuit. Changes and/or corrections to CLR equipment assignments will be coordinated with the Engineering Section, Networks Branch. This section can be reached at MACV 2260/2361, or through the TSN EE building order wire panel by asking for RCG. (Also see S&P Item Nr. 0221 "Engineering Changes to ICS Circuits").

8. Lost CEO's and CLR's.

a. If the CEO is not received, the site should go to the comm center which supports them and put a tracer on the CEO message. If this fails, the site should request a copy of the CEO from their DCA Detachment.

b. CLR's are couriered as explained in Paragraph 6. Networks Branch maintains files on the receipted Letter of Transmittal (LOT). Three copies of the CLR are given for each circuit. A lost CLR should be the rare exception not the rule. In case of a lost CLR, request a copy of the CLR from your DCA Detachment. If this fails, notify Networks Branch.

VV RCG001
PP RUHK
DE RUMSRG 01 2060815
ZNR UUUUU
P 250530Z JUL 67
FM: DCA-SAM/RVN
TO: RUHK/DCA-PAC, HAWAII
ZEN/CO USA RGN COMM GP, RVN
ZEN/CO USA STRATCOM LLA, NHA TRANG
ZEN/COMDR 1879TH COMM SQ, NHA TRANG
ZEN/CO 21ST SIG GP, NHA TRANG
ZEN/DCA-SAM DET, NHA TRANG
ZEN/CO USA STRATCOM LLA, CAM RANH BAY
ZEN/CO USA STRATCOM LLA, QUI NHON
INFO: ZEN/COMUSMACV
ZEN/CG USARV
ZEN/CG 1ST SIG BDE (USA STRATCOM)
ZEN/COMDR 1964TH COMM GP, TSN
ZEN/CH ACOC, TSN
ZEN/DCA-SAM/THAI, KORAT
ZEN/CO 2ND SIG GP, LONG BINH

PAGE TWO RUMSRG 01 UNCLAS
SUBJ: IWCS DS-KS44-04

1. THIS CEO ISSUED TO CHANGE ROUTE OF SUBJECT CIRCUIT.
2. DETAILS:
   A. COORDINATOR: DCS STA CAM RANH BAY
   B. DELTA UNIFORM BRAVO VICTOR KILO SIERRA FOUR FOUR
   C. CAM RANH BAY/LD SWBD (TSM) - QUI NHON/LD SWBD (TSM)
   D. THREE BRAVO
   E. ON ORDER OF THE IWCS CUTOVER DIRECTOR
   F. FULL DUPLEX/FULL PERIOD
   G. VOICE 20/ 2600 HZ RINGDOWN 2 WIRE
   H. UNSECURED (00)
   I.

CRB TSM	77 CABLE		RCG CRB
CRB TCG	77UQ16 003	000	TCG QNH
QNH TCG	77 CABLE		TSM QNH

   J. ALLOCATIONS DCA-SAM TSN 4171
   O & M REP PAGE COMMENGINEERS TSN 4720
   M. 77UTV7 404 000 SPARE
   77UMV5 120 000 SPARE
   N. (1) FOR DCA-PAC: (06-208)
   (2) SWITCHBOARDS WILL PROVIDE IDLE LINE TERMINATION

3. K,L.
BT
NNNNN

Incl 1, Page 1
Item Nr. 0201-01
RCG LL TCG S&P

JOINT MESSAGEFORM - CONTINUATION SHEET

SECURITY CLASSIFICATION

UNCLASSIFIED

FROM:

UNCLAS DCA-SAM V510/9843/Sep 67, for MACV J-6, USARV ACOF
CEO IWCS S9843/OC19-4

1. This CEO issued to change route of subject circuit via IWCS from Phan Rang to Pr Line.

2. Details:

a. Coordinator: DCS STA Tan Son Nhut

b. Juliet Romeo Foxtrot Victor Zero Charlie One Nine

c. Phan Rang/TUOC (TUC) - TAN SON NHUT/7HT AF CP (ACP)

d. Two Delta

e. On order of the IWCS Cutover Director

f. Full Duplex/Full Period

g. Voice 20/1600 Hz Ring Down 2 Wire

h. Unsecured (00)

i.

PRG	TUC	77	CABLE		TCG	PRG
PRG	TCG	77UM4V	103	000	TCG	PRL
PRL	TCG	77UT89	305	000	TCG	TSN
TSN	TCG	77	CABLE		ACP	TSN

j. Allocations DCA-SAM TSN 4171

IWCS Cutover Director MACV 2260

m. 77UMV9 106 000 Spare

n. (1) For DCA-PAC: (09-206)

(2) Coordinating station will submit in-effect or exception reports in accordance with DCAC-310-70-1 and US MACV.

CEOI.
3. k, l.

SYMBOL	PAGE NR	NR OF PAGES	SECURITY CLASSIFICATION	INITIALS
UNCLASSIFIED	2	2	V510	

DD FORM 1 MAY 55 173-1

Explanation of Paragraphs of a CEO

Paragraph	Explanation
1.	The reason for the CEO being issued.
2.	Details of the circuit:

a. The tech control responsible for coordinating the implementation of the CEO.

b. Phonetic spelling of the CCSD.

c. The terminal tech controls with their respective subscribers.

d. Restoration priority of the circuit, spelled phonetically.

e. DTG specifying when the circuit is to be activated.

f. Type and time of operation of the circuit i. e., half duplex, full duplex, and full period (24 hrs per day) or the hours during which the circuit is to be active.

g. Type of circuit (voice, teletype, data, facsimile, or video) and the signalling used.

h. Will indicate secured or unsecured circuit. If the circuit is secured, this sub-paragraph will also indicate the type of secure equipment used.

i. Complete routing of the circuit from subscriber to subscriber. Each line shows the system and channel number for that leg of the circuit.

j. Contact personnel and/or offices involved with the circuit and their telephone numbers. Information concerning the circuit can be obtained by calling the appropriate number.

k. Validating reference i.e., the headquarters that validated the request for the circuit.

l. Circuit number returned to DCA-PAC/DCA-SAM.

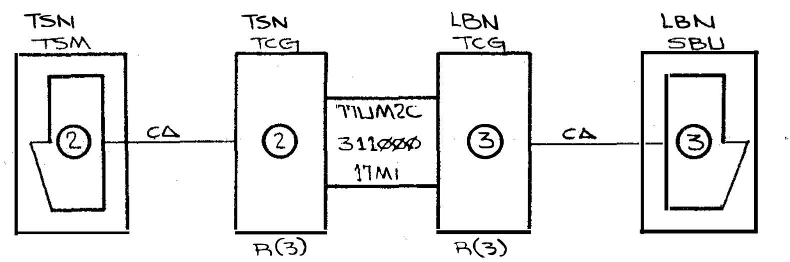
m. If the CEO calls for a realignment or deactivation of a circuit, this will give the systems and channels on the original routing that will be cleared.

n. Other details of the circuit not covered in the sub-paragraphs above.

Paragraph	Explanation
3.	This paragraph contains the letters of the sub-paragraphs not used in paragraph 2 above. This insures the reader that those sub-paragraphs are not applicable to the CEO and were not left out in error.

CIRCUIT LAYOUT RECORD

1. CCSD DUBV KSF3	2. COML/OTHER NO.	3. FROM/TO TAN SON NHUT-TSM/LONG BINH-SBU
4. CEO NO. 580395/KSF3-6	5. ASSUME CEO	6. SVC DATE PER IWCS c/o DIB
7. IN EFFECT DATE	8. CONTROL OFFICE TSN	9. DCS TECH SCD V1
10. RESTRN PRI 4B	11. SVC AVAIL △	12. TYPE OP F
13. SECEQUIP (CODE) ØØ	14. NET LOSS DB	15. GOC
16. TEST FREQ 1K-HZ	17. ERROR RATE	18. CLASS TIE
19. SIG OP TONE OFF WHILE IDLE	20. PREC LEVEL	21. MODE OF OP
22. DCA-SAM ENGR/DATE HENDY/RS/16JAN68	23 PHONE TSN 3725	24. TSR (VALIDATION) NO.
25. REMARKS REROUTE		



NOTE: SWITCHBOARDS WILL PROVIDE IDLE LINE TERMINATION

IF CIRCUIT WIRING DIFFERS FROM THAT SHOWN ON THESE CARDS, RETURN CORRECTED COPY TO DCA-SAM

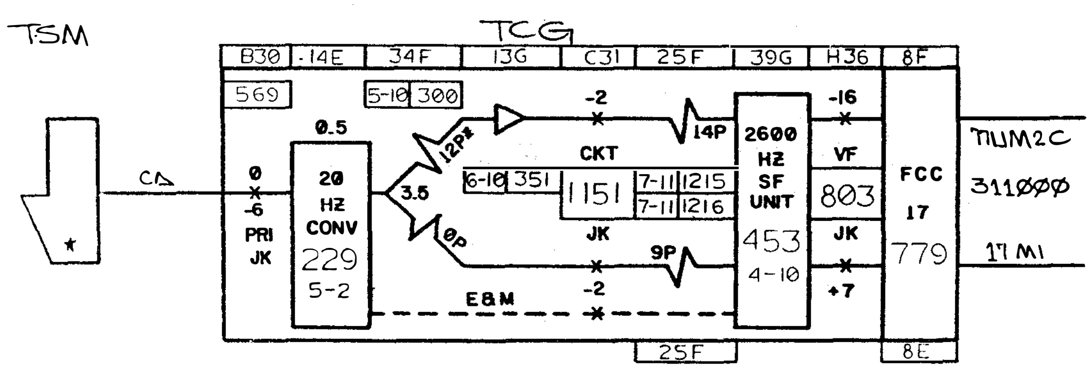
26. DISTRIBUTION (23), A(12), R(9), L.6

1. CCSD DUBV KSF3 CLR NUMBER Ø1528 CARD 1 OF 3

DCA FORM SEP 66 139 CLR-3

CCSD DUBV KSF3	DCA-SAM ENGR/DATE HENDY/RS/16JAN68	TSN 3725	RCG ENGR/DATE FAJARDO 19 JAN 68

TAN SON NHUT



*PAD INCLUDES 6DB VARISTOR NET LOSS

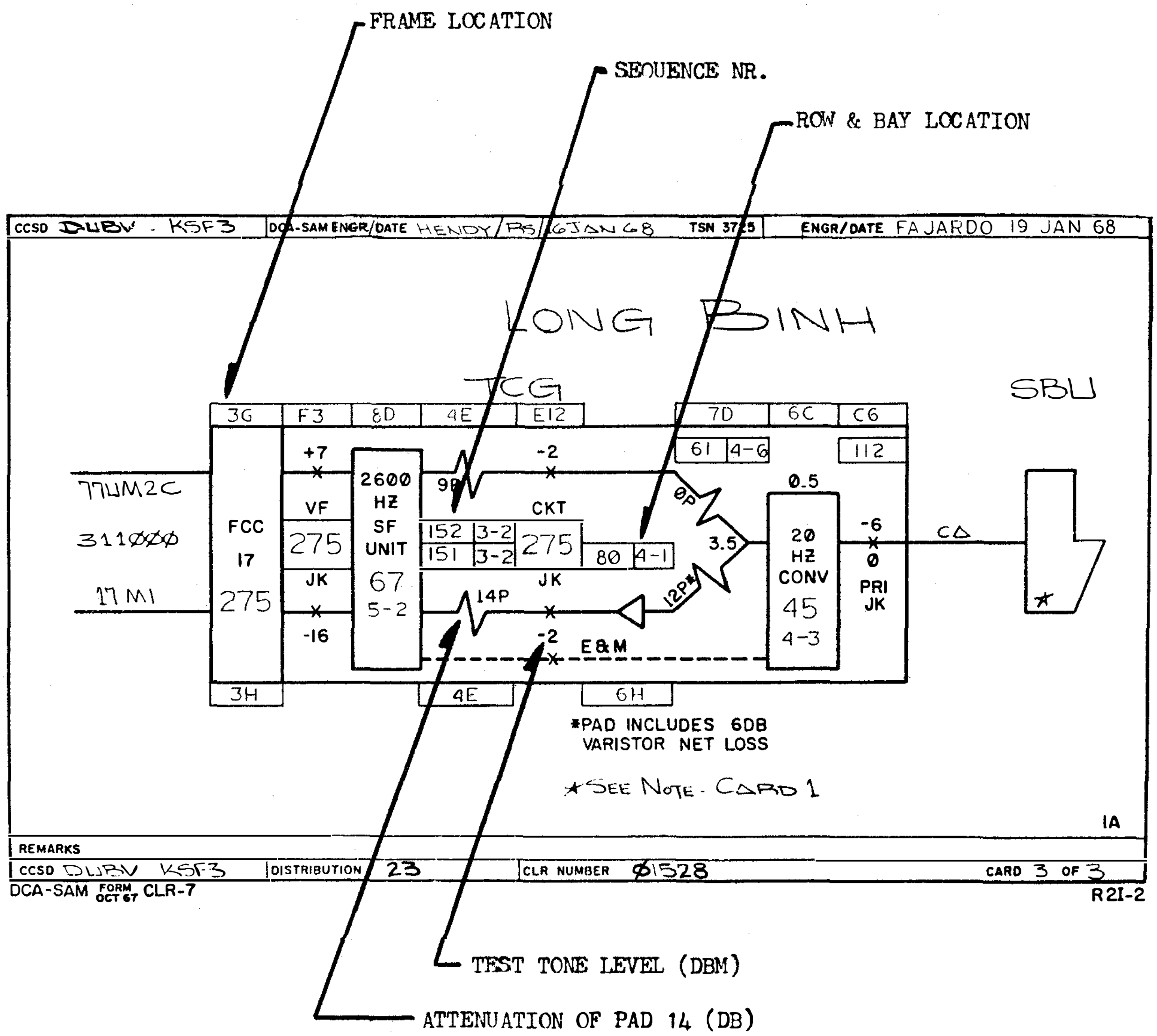
★ SEE NOTE - CARD 1

A1

REMARKS

CCSD DUBV KSF3 DISTRIBUTION 23 CLR NUMBER Ø1528 CARD 2 OF 3

DCA-SAM FORM OCT 67 CLR-7 L2I-2



Incl 4, Page 2
Item Nr. 0201-01
RCG LL TCG S&P

TRUNK LAYOUT RECORD

1. TRUNK DESIG 77UZ2S TRU GP | 2. FROM/TO TAN SON NHUT TCG / DA NANG TCG | 3. MILEAGE 506 MI

4. COML/OTHER NO | 5. CHAN EQUIPPED FOR OP 12 | 6. IN-EFFECT DATE

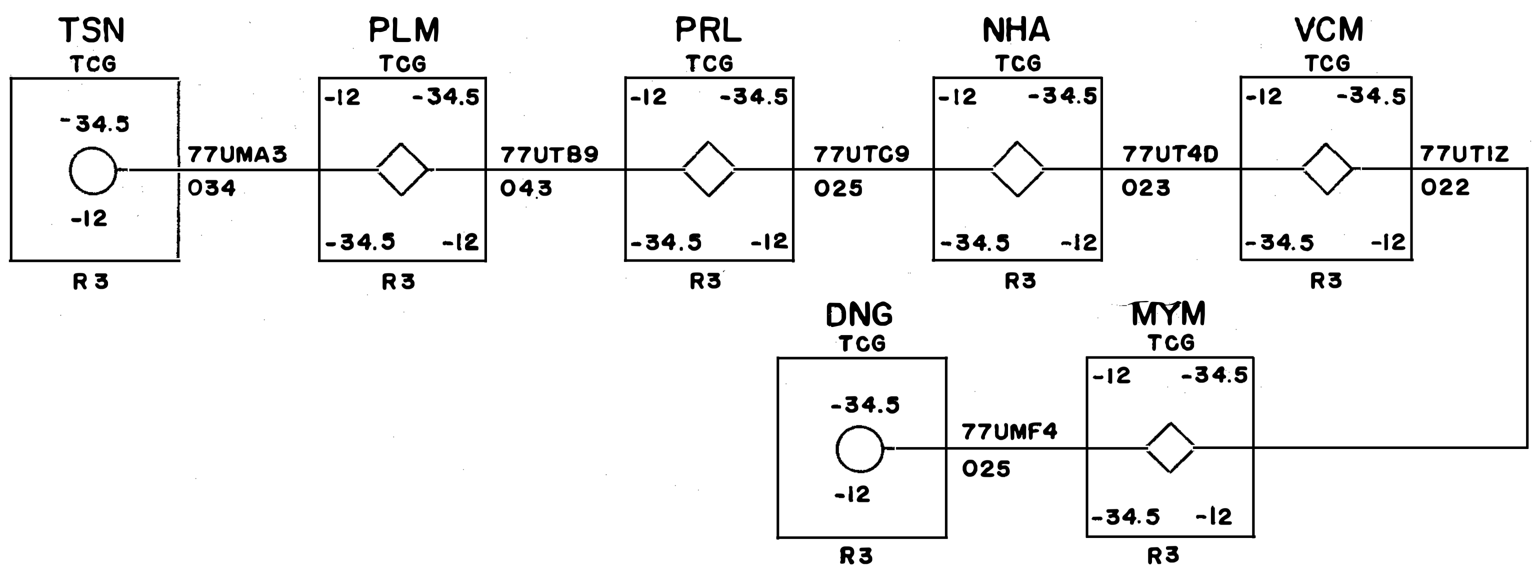
7. ASSUME CEO IN EFFECT | 8. TYPE SIGNALING

9. CONTROL OFFICE TSN | 10. DCS TECH SCD | 12. DATE OF TLR ISSUE 19 MAR 68

11. REMARKS ESTABLISH | 13. TLR ISSUE NO. 1

14. ENGR HENDY / JAP TSN 3725

15. CEO S81876 / 77UZ2S-1

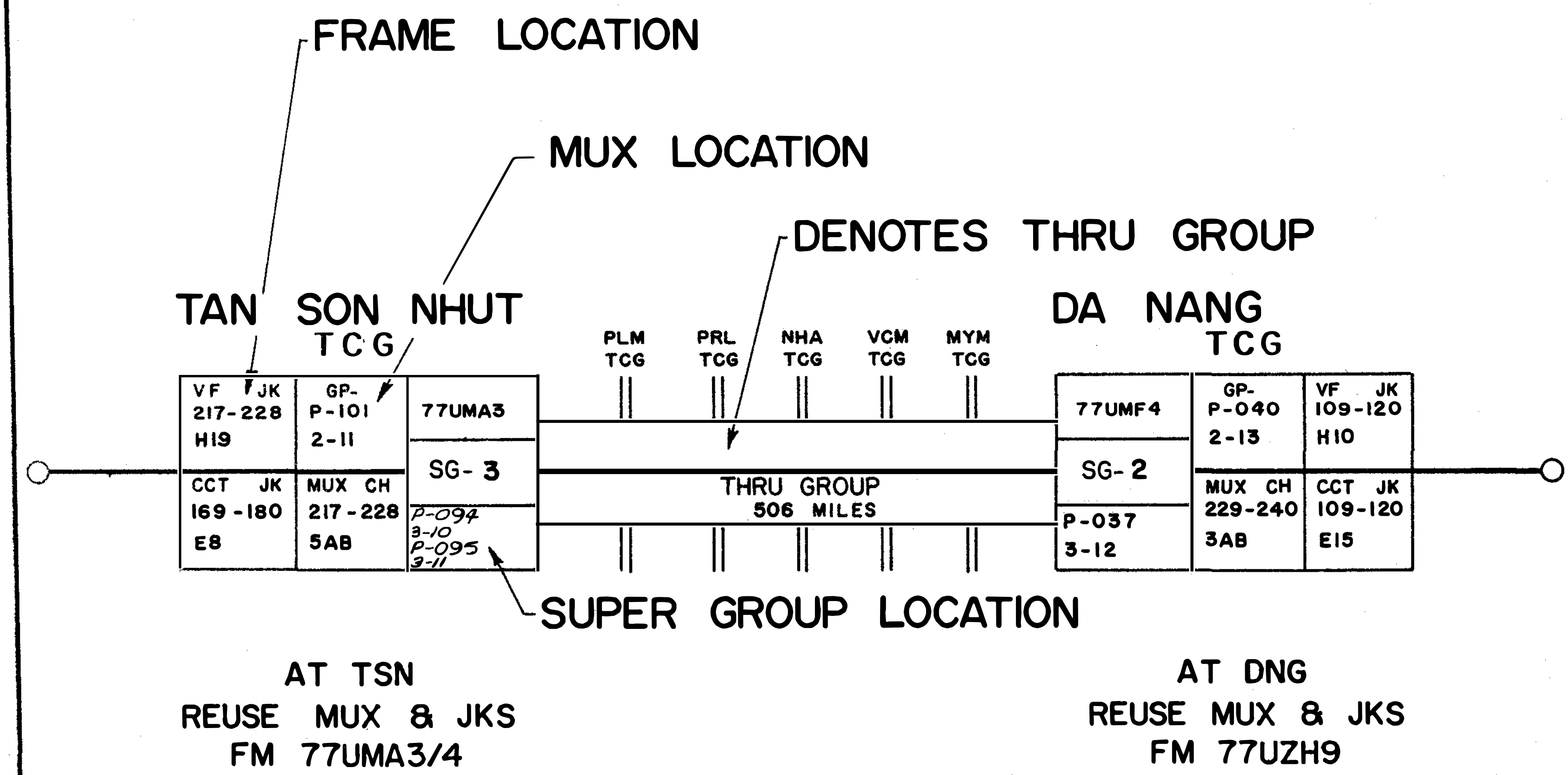


16. DISTRIBUTION (39) A(12), R(24), L, N, D,

1. TRUNK DESIG 77UZ2S TRU GP TLR NO. 07912 CARD 1 OF 2

DCA FORM SEP 66 155 TLR-1

TRUNK DESIG 77UZ2S TG | DCA-SAM ENGR/DATE HENDY / JAP / 19 MAR 68 | RCG ENGR/DATE HOLLEY 21 MAR 68



REMARKS

TRUNK DESIG 77UZ2S TG | DISTRIBUTION 39 | TLR NUMBER 07912 | CARD 2 OF 2

DCA-SAM FORM DEC 67 TLR-5

TLR-8

TRUNK LAYOUT RECORD

1. TRUNK DESIG 77UT22 SUPER GP | 2. FROM/TO PHU BAI TCG / QUANG TRI TCG | 3. MILEAGE 42 MI

4. COML/OTHER NO | 5. CHAN EQUIPPED FOR OP 60 | 6. IN-EFFECT DATE PER ICS C/O DIR. 16 OCT 68

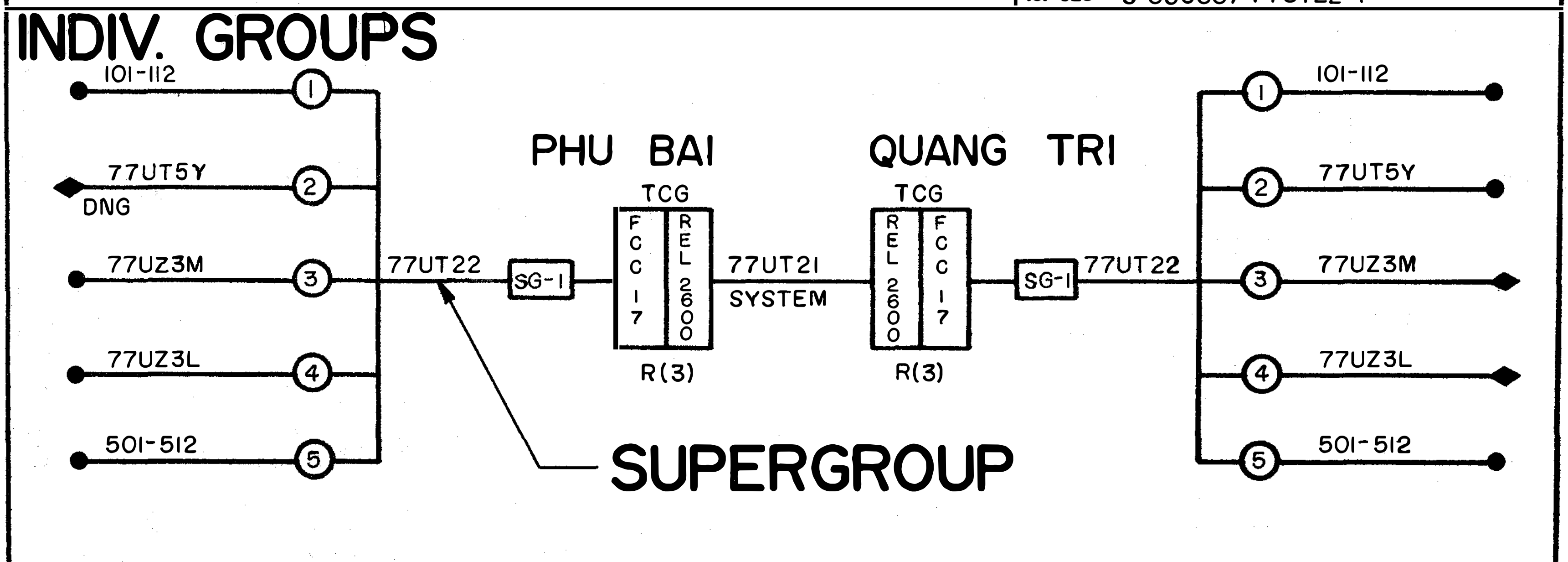
7. ASSUME CEO IN EFFECT | 8. TYPE SIGNALING

9. CONTROL OFFICE PHB TCG | 10. DCS TECH SCD | 12. DATE OF TLR ISSUE 7 SEP 68

11. REMARKS ESTABLISH | 13. TLR ISSUE NO. 1

14. ENGR LASH / JAM TSN 3725

GRP-5 | 15. CEO S 85688/ 77UT22-1

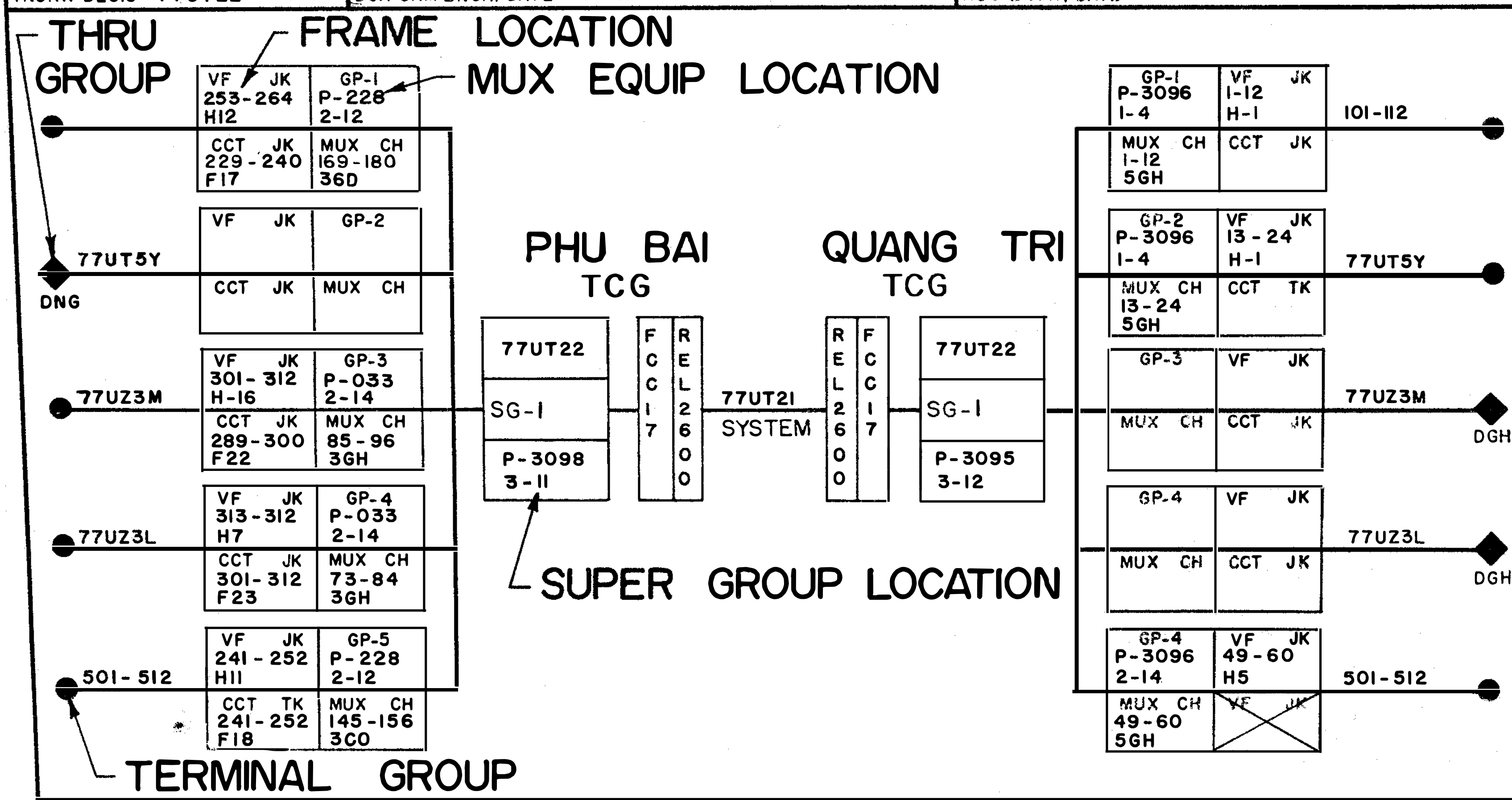


16. DISTRIBUTION (22) A (12) R (9) PB

1. TRUNK DESIG 77UT22 SUPER GP | TLR NO. 25135 | CARD 1 OF 2

DCA FORM SEP 66 155 | TLR-2

TRUNK DESIG 77UT22 SGP	DCA-SAM ENGR/DATE LASH/JAM/7 SEP 68	RCG ENGR/DATE BRADLEY PCE. 11 SEP 68



REMARKS			
TRUNK DESIG 77UT22 SGP	DISTRIBUTION (22)	TLR NUMBER 25135	CARD 2 OF 2

DCA-SAM FORM DEC 67 TLR-5

TLR-7

Incl 5 Page 4 ITEM NR 0201-01 RCG LL TCG S&P

DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL	SUBJECT
SCCPV-RG-PO-NW	TRANSMITTAL OF CIRCUIT

TO CO, USASTRATCOM LLD

FROM CH, NETWORKS BRANCH
HQ, USA REG COMM GP
APO 96243

DATE

CMT 1

1. TRANSMITTED HEREWITH ARE THE FOLLOWING CIRCUIT LAYOUT RECORDS (CLR):

CCSD	FROM TO	CLR DATE	DUE DATE	CEO#	PRIORITY
PAR9	TSN-PLM-NHA-QNH-DNG-PHB	27 MAY	ASAP	83473	1
K800	TSN-PKU	25 MAY	ASAP	83463	2
K769	TSN-PKU	25 MAY	ASAP	83487	3
SHF9	TSN-PLM-LBN-BNH	25 MAY	10 JUNE	83447	1
J931	TSN-NHA	27 MAY	12	83447	2
KSG8	TSN-LBN-BNH-PKU	25 MAY	"	83442	3
KUR1	TSN-BNH-NHA	26 MAY	"	83432	4
KW03	TSN-SGN-LBN-BNH	25 MAY	"	83441	5
XGC7	TSN-PLM-GDH-NHA	28 MAY	"	83485	6
ZHN6	TSN-PKU-QNH	28 MAY	"	83501	7
ZLE1	BNH-TSN-CRA-NHA	25 MAY	"	83443	8
ZUB6	TSN-PLM	28 MAY	"	83484	9
0C33	TSN-NHA-LBN-BNH	25 MAY	"	83444	10
77UX2L	LBN-BNH	20 MAY	ASAP	83332	
77UZ2X	PLM-VTU-CRB	17 MAY	ASAP	83274	

2. REQUEST YOU ACKNOWLEDGE RECEIPT BY SIGNING AND RETURNING TO THIS OFFICE ONE (1) COPY OF CMT BELOW.

GARY S. BROWN
CPT, SIGC
CHIEF, NETWORKS BRANCH

TO: CH, NETWORKS BRANCH
HQ, USA REG COMM GP
APO 96243

THE UNDERSIGNED ACKNOWLEDGES RECEIPT OF THE ABOVE CIRCUIT LAYOUT RECORDS

NAME (PRINTED) ______________________________

SIGNATURE ______________________________ DATE ____________________

RCG FORM 35

REVISED 28 JUL 67

INCL 6, PAGE 1
ITEM NR. 0201-01
RCG LL TCG S&P

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0211-02

SUBJECT: Standard Activation/Cutover Procedure

1. BACKGROUND: Experience has shown that a systematic procedure is highly desirable during circuit activations and cutovers. The habitual use of such a procedure will greatly increase the efficiency of an ICS tech control.

2. PURPOSE: The purpose of this item is to specify the standard activations/cutover procedure. Special considerations for secure voice circuits are covered in S&P Item Number 0212 and those for expedited activations in Item Number 0231.

3. GENERAL:

a. The ICS circuit activations procedure has been established as a three-day process with specific actions being accomplished each day. This is a concurrent process in that the first day actions will be repeated for each group of circuits as the paperwork (CLR's) is received by the tech controls. Pictorially the process appears as:

1st batch	C-2	C-1	C-Day			
2nd batch		C-2	C-1	C-Day		
3rd batch			C-2	C-1	C-Day	
4th batch				C-2	C-1	C-Day
	1st day	2nd day	3rd day	4th day	5th day	6th day

b. As many as three different operations may be in progress on any one day.

c. The operations that are to be carried out during each day of the three day process are:

C-2	Circuits Wired
C-1	Circuits Checked and Aligned
C-Day	Circuits Cutover

4. Immediately Upon Receipt of Activation Documents:

a. CLR's are checked for obvious engineering errors. Report errors to Networks Branch, via orderwire, immediately.

b. CEO number is verified with that on hand and CEO and CLR cross-checked to insure no inconsistencies exist.

c. Any problems will be reported on the next CEO status report submitted to Networks Branch (Item Nr: 1101)

5. DAY C-2:

a. Equipment Assignment Check: In-station equipment records are checked against the CLR for duplicate assignments. Coordination must be made with Networks Branch at the earliest possible time for corrections if required.

b. Coordination: Initial contact will be made with all other agencies and/or services concerned for necessary support. (This includes the subscriber). It is extremely important that this coordination be accomplished at the earliest possible time. Support actions such as wiring DCO's for Operator Direct Dial (ODD) operation, wiring AN/MSQ-73's or initiating work orders to establish a metallic path from TCG to subscriber can be time consuming when dealing with units not under RCG control. Other agencies/services which are supporting tech control facilities must be given the required activation date in order that timely completion of their work may be assured.

c. Establish Path to Subscriber: If cutover action is to be made for existing subscriber, the metallic path will be verified and the sub notified of the impending action. If a new circuit activation is involved, the subscriber will be located, his ability to properly terminate the circuit verified, and he will be informed of the anticipated activation date. Action must be taken to establish the cable path to the sub. Again, all problem areas that cannot be resolved by the tech control or LLA concerned should be immediately reported to Networks Branch.

d. Wire Circuit: When actions outlined in a through c above have been taken, all circuits should then be wired according to the CLR. It is the primary objective of the first day to disclose errors, discrepancies, and problem areas before manpower is expended in the wiring of circuits. However, if any of the actions outlined above cannot be accomplished, wiring will still be completed by the end of the first day (C-2).

e. Report on Problems: When problems are discovered, immediately relay this information as indicated above.

f. It is the responsibility of the coordinating station to verify that all stations have completed C-2 Procedures.

6. DAY C-1:

a. In-House Check and Alignments:

1. All circuits that were wired the previous day are checked "In-House" by inserting a 1kHz test tone at the proper level first into the EQ IN side of the VF jacks. The level of this test tone is measured at the circuit jacks and EQ side of the primary jacks. Pad and amplifier levels are adjusted at this time to insure that the circuit is wired properly. The above procedure is repeated for the send side of the circuit by inserting a 1kHz test tone of the proper level to the EQ side of the Primary jack and measuring levels at the circuit jacks and EQ out side of the VF jacks. Proper operation of SF units and RD converters on the receive path is then checked by inserting a 2600 Hz or 1600 Hz tone into the EQ in side of the VF jacks and monitoring the 20 Hz output of the RD converter at the primary jacks. The reverse procedure is then applied to check conversion on the send path.

2. Problems discovered during the "in-house" check must be resolved at this time. Standard trouble shooting procedures are followed generally, with one controller at the board and one controller tracing the signal on the frame with headsets.

3. Upon completion of in-house check and alignment, each non-coordinating station will contact the coordinating station and inform him they are ready for the End-to-End check and alignment or report problems encountered.

b. "End-to-End" Check and alignment:

1. Coordinating TCG establishes a time for the circuits to be aligned end-to-end.

2. Under the direction of the coordinating TCG, each circuit path is

lined up end-to-end by inserting a 1kHz test tone into the EQ side of the primary jack at the other end. This process is then reversed and repeated. Signalling is then checked by removing the 1kHz test tone and inserting a 20 Hz signal. At the opposite end, a TA-312 telephone or similar type instrument should be connected to check the ring. This process is also reversed and repeated. Adjustments, and de-bugging as necessary, are accomplished. When the coordinating TCG verifies that the circuit has been checked out and is ready, he sets a time with other stations and subscribers concerned for the actual cutover.

c. Subscriber loop Check: The subscriber is notified of the time of cutover by the serving TCG, and, if necessary, his concurrence to momentarily disrupt service. If a new path to the sub was established, the cable pair to the sub should be identified, tagged and checked out.

d. It is the responsibility of the coordinating station to verify that all stations have completed C-1 procedures.

7. DAY C:

a. The sub is again notified of the cutover/activation just before action is taken. The circuit is then jumpered to its new path.

b. The circuit is checked out, subscriber-to-subscriber. If a voice circuit, both subs must be able to signal each other as well as talk. If a secure TTY or data circuit, both subs must be able to contact each other in the secure mode. Special arrangements for secure voice circuits are discussed in Item 0212.

c. If this is a cutover action and the new path does not work after cutover, the subscribers will be returned to the old path immediately.

d. Upon activation, the coordinating station will immediately submit an in-effect report to DCA-SAM, info RCG and ACOC, via the DCS TTY network. This report will include CCSD, CEO number, Date-Time-Group of completion, and any variation necessary. No engineering changes will be made without prior coordination with Networks Branch. If an engineering variation was necessary, a copy of the CLR, changed to reflect the new engineering, will be forwarded to DCA-SAM.

e. It is the responsibility of the coordinating station to accomplish the required action on C-Day and submit related reports.

8. Delayed Cutover: Every effort should be made to cutover NLT the due date. Familiarization in the proper handling of problems encountered is a necessity. Most problems will be encountered prior to the due date. Much confusion has arisen over who should be informed and when. The problem should be reported as soon as it is discovered. The following guideline lists; who to contact and the means to use. (See Item 1110 for additional guidelines)

	NETWORKS BRANCH TELEPHONIC	NETWORKS BRANCH CEO STATUS	DCA SAM EXCEPTION REPORT
Sub does not want ckt		X	X
Sub cannot be located		X	X
No cable to sub		X	X
Sub has no equipment		X	X
Sub has faulty equipment		X	X
Sub has not terminated		X	X
Double equipment assignment	X	X	
Double channel assignment	X	X	X
RCG TCG has no paperwork	X	X	
No paperwork outside RCG		X	X
Noisy path		X	X
RCG Control wiring problems	X	X	
Wiring problems outside RCG		X	X
Ckt needs reengineering		X	X
Hold status per RCG		X	
Hold status outside RCG		X	X
Equipment needed RCG TCG		X	
Equipment needed outside RCG TCG		X	X
Awaiting system activation		X	X
Awaiting WECO conditioning		X	X
Awaiting Page installation		X	X

All double channel assignments will be verified through Networks Branch prior to submission of exception reports to DCA-SAM.

All changes in status will be followed either with a telephonic change, a CEO status report change or an exception report as designated by the above guideline.

9. Each individual IWCS control will have an SOP for standard Activation and Cutover Procedure. This SOP will cover in detail, station practices for the implementation of this document.

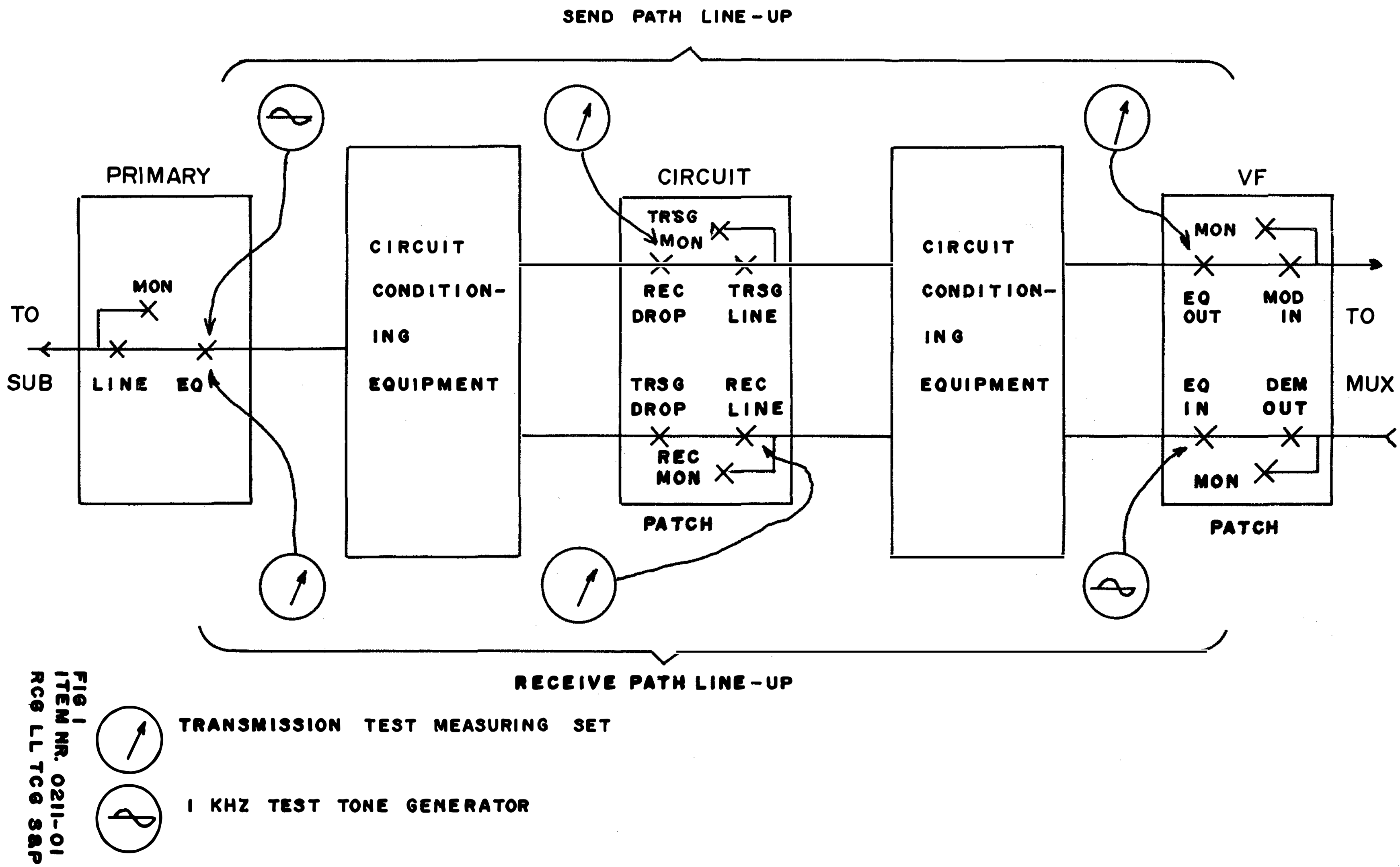


FIGURE 1: "IN-HOUSE" LINE-UP PROCEDURES

FIG 1
ITEM NR. 0211-01
RCG LL TCG S&P

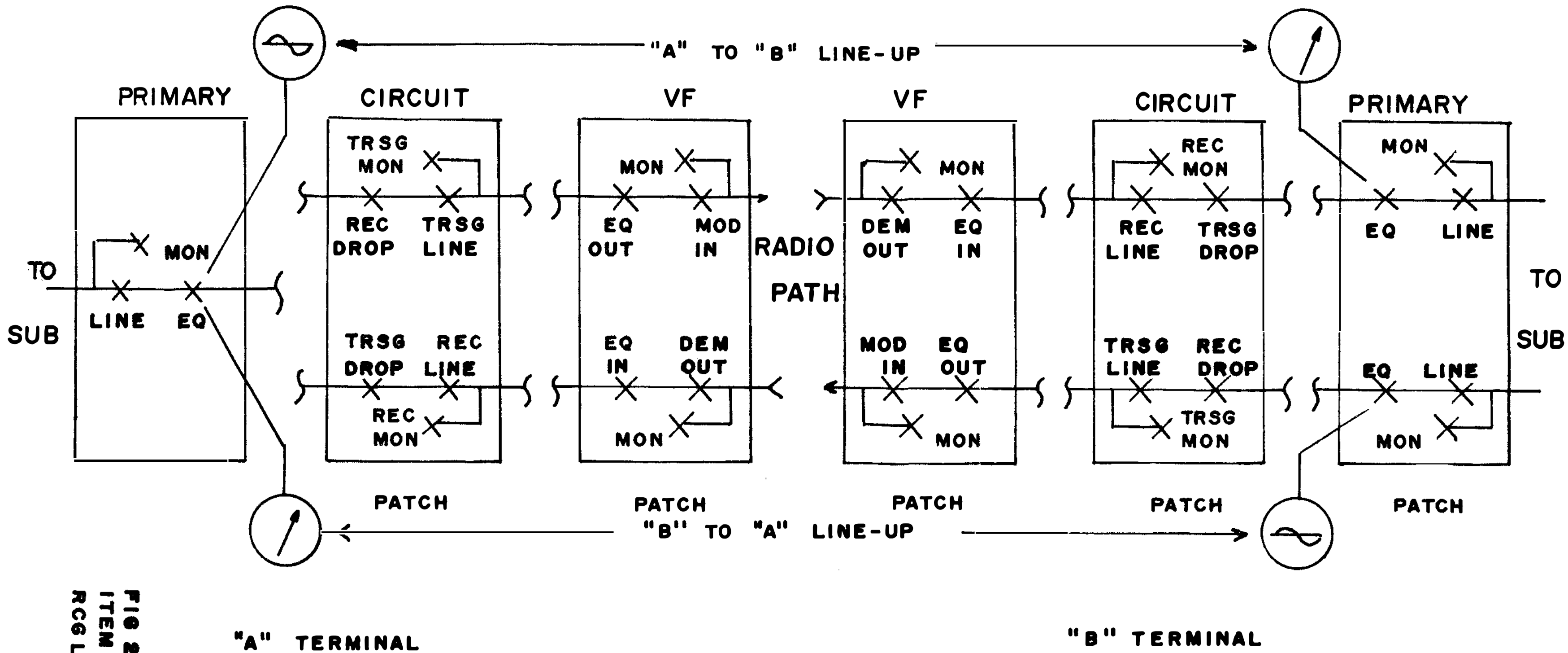


FIGURE 2. LINE-UP PROCEDURES "END-TO-END"

FIG 2
ITEM NR. 0211-01
RCGLL TCG S&P

DEPARTMENT OF THE ARMY
HEADQUARTERS, USA REGIONAL COMMUNICATIONS GROUP (RVN)
APO San Francisco 96243

SCCPV-RG-PO-NW

Item Nr: 0212-01

SUBJECT: AUTOSEVOCOM Circuit Conditioning

1. Purpose: The purpose of this item is to delineate the special testing required for AUTOSEVOCOM circuits.

2. General: AUTOSEVOCOM circuits are required to meet or exceed the DCA S3 technical schedule for circuit parameters (given in S&P item nr. 0215-01). S3 conditioning requires certain testing which Technical Controllers must become familiar with. Upon completion of testing, the Delay/Amplitude Equalizer will be inserted into the circuit and adjusted to compensate for any deficiencies. Should it become impossible to bring the circuit up to S3 standards, Technical Controllers will continue to attempt to activate the circuit and will inform DCA with an "In-Effect with Variation" or "Exception" report as to what tests were not met.

3. Test Equipment: Wideband Oscillator (HP 200 CDR), Level Measuring Set (DAVEN 12B), Impulse Noise Counter (NEC, TTS-58A), Envelope Delay Test Set (Sierra 340B).

4. Description: The first part of this S&P item will give a brief description of the tests to be performed and why they are necessary. The second part will give a description of the test procedures. All conditioning performed by Technical Controllers will be from EE building to EE building. The subscriber portion of the circuit will be conditioned by other personnel.

5. Test Description:

a. ENVELOPE DELAY DISTORTION & EQUALIZATION

(1) This test shows the delay, for an incremental change in frequency relative to the delay undergone by a reference frequency.

(2) Measurements will be made at selected frequencies, such as at

each 200 Hz with 2000 Hz used as reference. Where readings show a distinct change in delay, the measurements must be taken at closer intervals.

(3) Delay distortion, origionally called phase distortion, is caused by the different speeds that different frequencies travel over a transmission path. This path will include the cable system between the tech control and the subscriber, the channel filters in the multiplex equipment, and the atmospheric conditions of the radio link. Channel filters cause a large problem due to their sharp cut-off characteristics in seperating one channel from another. This sharp cut-off introduces delay that must be corrected for by use of the Delay/Amplitude Equalizer. Another cause of delay is by echoes resulting from imperfect line terminations.

(4) It can be seen that there are many areas which can cause delay in the circuit. Each of the problem areas can be corrected for by the equalizer with the exception of improper line terminations, which can be corrected for by site personnel, replacement of extremely bad channel filters, and replacement of poor quality cable with spiral-four cable.

(5) Test equipment will consist of an Envelope Delay Test Set, Model 340B, made by Sierra, at each end. Delay measurements relative to a 2.0 kHz frequency will be made at the selected frequencies, 500 Hz, 600 Hz, 800 Hz, 1000 Hz, 1200 Hz, 1400 Hz, 1600 Hz, 1800 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2900 Hz.

(6) Tests will be made with all equipment in circuit. The only exceptions will be the delay equalization equipment and the 2600 SF unit which will be strapped out during initial measurements.

(7) Before inserting the equalizer in the circuit the following procedure must be followed:

(a) Make sure all locking rings are NOT in the locked position before operating the control knobs.
(b) Set the amplitude controls to about ½ clockwise position.
(c) Set the delay controls to about ½ clockwise position.
(d) Set all frequency switches off.

NOTE: Even though the equalizer is wired in the circuit, tests will be run with unit strapped out to determine if equalization is necessary. If necessary, all subsequent tests will be made with the equalizer in circuit.

(8) The Delay/Amplitude Equalizer controls perform the following functions:

(a) The frequency switch--selects the frequency at which equalization will be applied.
(b) Delay control--adjusts the amount of delay.
(c) Amplitude control-- adjusts the amount gain for amplitude distortion.
(d) Attenuator--fixed or variable, depending upon which model is used, to adjust the overall gain of the unit.
(e) Locking rings--to lock the delay and amplitude controls once they have been set.

(9) The receive station will use the test data sheet (Inclosure 1) to record the amount of delay present on the circuit. Once this is completed and the quality of the circuit has been determined then corrective measures can be taken. This will involve either eliminating the problem or correcting it by use of the Delay/Amplitude Equalizer.

(10) Once you have measured the amount of delay in the circuit, select the appropriate frequency selector switche(s), strap in the equalizer, and adjust the delay control above the desired frequency selected for the proper amount of delay to meet S3 standards. Do this for each frequency that is required. Once you have adjusted the delay to the required limits, test for amplitude distortion. If the tested frequencies do not meet the standards set by DCA then follow the same procedure as delay correction for amplitude correction. Select the appropriate frequency control and adjust the amplitude control above it for the proper level. Now the fun begins. You will note that the delay and amplitude controls interact with one another. Therefore, you will have to measure the delay again to determine how much effect the amplitude control had on the amount of delay. Readjust for delay. Remeasure the amplitude and readjust if necessary. If necessary, remeasure the delay again, readjust again, etc. Continue to repeat the previous steps until both amplitude and delay standards are met. This may take a considerable amount of time but must be done. As an example, assume you have just finished testing for delay distortion. Your readings indicate that at 800 Hz and 1900 Hz you are not within S3 standards. Put the equalizer in circuit. Select two frequency switches; one at 800 Hz (700 Hz or 900 Hz if none is available at 800 Hz) and one at 1900 Hz (1800 Hz or 2000 Hz). Have the distant end send you 800 Hz. While observing the amount of delay adjust the delay control above the appropriate frequency switch and attempt to correct. Assume you do

correct for the delay at 800 Hz, now go on to 1900 Hz. Perform the same procedure. NOTE: You will notice that more than one frequency switch can be used for the same frequency. If unable to correct for delay or amplitude distortion with one frequency switch, insert a second, a third, etc. if necessary. After you have corrected for both frequencies test again (the equalizer is left in circuit). The reason for this is, even though you have corrected for 800 Hz and 1900 Hz, due to the inability of the delay network to correct for delay at only the frequencyselected, you may find you have effected the frequencies on either side of the two you have corrected for. This will require a trial and error situation to correct for any frequencies effected. Assume you have an acceptable delay curve. Now test for amplitude distortion. You find that at 2300 Hz you are not within S3 standards. Following the procedure used in delay correction, attempt to correct for amplitude. Once you have corrected for amplitude re-test for delay. The reason is that the delay and amplitude controls interact with one another and when correcting for one you may change the delay or amplitude of the other. Due to this, you may be required to perform several tests before both delay and amplitude distortion are corrected for. Take your time; you cannot properly equalize for delay and amplitude in 15 minutes, especially on a marginal circuit.

(11) Once the equalization is complete, and the circuit is within the parameters established by the DCA Technical Schedule (Ref. Item Nr. 0215-01), then the control knobs should be locked in position with the locking rings. This will help eliminate the accidental changing of the control knob positions.

(12) The correction of delay distortion is most important due to its relative effect on secure voice and data equipment. A circuit with as little as 1 millisecond of delay can cause data signals to be received garbled and can keep secure voice equipment from staying in cipher condition. Therefore, ALWAYS correct for Envelope Delay Distortion first. NOTE: Envelope delay measurements must be conducted at compatible interfaces. For example, if delay is to be measured with the transmitter at the equipment side of a group modulator, then the receiver must be applied at the equipment side of a connected group demodulator. Measurements cannot be made with the transmitter on the equipment side and the receiver on the line side, for in such an arrangement the frequency translation process would present to the receiver information that it could not accept.

b. FREQUENCY RESPONSE (AMPLITUDE DISTORTION)

(1) This test shows the gain or loss of the circuit over the band-

width of interest related to its gain or loss at a reference frequency. This test is used to determine which frequencies are attenuated more or less than others. All frequencies are not attenuated equally, therefore, as the frequency changes so will the amount of attenuation. Normally, as the frequency increases so does the amount of attenuation. This is true for cable and carrier systems.

(2) Measurements are made at selected frequencies, such as at each 200 Hz with 1000 Hz used as reference. Where readings show a distinct change in level the measurements must be taken at closer intervals.

(3) The areas of trouble will arise from the filters and amplifiers in carrier equipment, amplifiers in the control, and loading coils and repeaters used in the cable between the control and the sub. The problems arising from filters and amplifiers in carrier equipment are normally due to failure. This equipment should be replaced rather than corrected for by equalization. Also the overdriving of amplifiers in the control will cause problems.

(4) It can be seen that there are many areas which can cause loss in a circuit to vary. Each of the problem areas must be considered whenever the attenuation exceeds the levels prescribed by DCA. This is especially true in data communications and secure voice systems. Secure voice systems require one of the highest quality circuits, a minimum of noise, and as flat a response as possible to keep the equipment in cipher condition.

(5) Test equipment will consist of a Wideband Oscillator (HP 200 CDR) and a Level Measuring Set (DAVEN 12B) or equivalent at each end. Output level measurements relative to a 1.0 kHz reference frequency a 0 dbm will be made at the selected frequencies, 300 Hz, 400 Hz, 600 Hz, 800 Hz, 1000 Hz, 1200 Hz, 1400 Hz, 1600 Hz, 1800 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, 2800 Hz, and 3100 Hz. NOTE: The 2600 SF Unit must be strapped out.

(6) Prior to making on-line tests the oscillator output level must be checked at each test frequency with a 600 ohm termination at the send station. This level should not vary. If this level does vary, then each test frequency must be adjusted to 0 dbm before sending.

(7) The receive station will measure and record the level at each frequency on the test data sheet (Inclosure 1) to determine if amplitude distortion is present. Once this is completed and the quality of the circuit has been determined, then corrective measures can be taken. This will involve either eliminating the problem or correcting it by use of the Delay/Amplitude

Equalizer.

(8) Once the equalization is complete and the circuit is within the parameters established in the DCS Technical Schedule (Ref. Item Nr. 0215-01) then the control knobs should be locked in position with the locking rings. NOTE: Once the equalization is complete, the unit must NOT be touched or re-adjusted lest the quality of the circuit be impaired. Any changes in the control knob settings will result in the need of a complete rerunning of tests to insure that the circuit still meets the parameters in the DCS Technical Schedule.

c. IDLE CHANNEL NOISE & IMPULSE NOISE

(1) This test is performed on circuits to determine the noise inherent when there is no signal applied.

(2) These measurements, in db, may include basic or white noise, random noise, total channel noise, and impulse noise.

(3) White noise is the irreducible minimum noise encountered in a working system when that system is correctly lined up and not in traffic. It is caused principally by thermal agitation and is evident in a receiver as a hissing sound.

(4) Total channel noise is the sum of random noise and intermodulation products plus crosstalk.

(5) Impulse noise is caused by abrupt changes in noise level of short duration. Generally, impulse noise does not seriously degrade the transmission quality of a voice communication circuit unless the noise is of a continuously interferring nature. In data transmission, however, short bursts of high intensity may alter the data waveform, therby causing errors. In secure voice communications these high intensity bursts would cause the secure equipment to drop from its cipher condition.

(6) The transmission criteria for AUTOVON, AUTODIN, and AUTOSEVOCOM specifies an impulse count at a particular level, for a given period. This approach will be used to determine the suitability of speech circuits for data and secure voice transmission.

(7) Test equipment for Total Channel Noise will be the Level

Measuring Set (DAVEN 12B) or equivalent at each end. Test equipment for **Impulse Noise** will be the Impulse Noise Counter (NEC, TTS-58A) at each end. Each end station will record the readings on the test data sheet (Inclosure 1).

(8) Inducted dialing and switching pulses, relay contacts, loose fuses, "shorted" patch cords, cold solder joints, poorly soldered connections, and unsoldered connections on the frame are the primary causes of noise on circuits. BEFORE A CIRCUIT IS TURNED DOWN BECAUSE OF HIGH NOISE LEVELS, CHECK YOUR IN-HOUSE WIRING. You may find your trouble.

d. MAXIMUM CHANGE IN AUDIO FREQUENCY (FREQUENCY TRANSLATION)

(1) This test is to determine if a change in audio frequency occurs in multiplex equipment and if so how much.

(2) Maximum change in audio frequency occurs when a signal passes through Frequency Division Multiplex (FDM) equipment. Due to the instability of the FDM system it is subject to translation error. This is a phenomenon of non-synchrous FDM systems; that is, those in which the carrier frequencies at different sites are produced by independent frequency generators. In modern carrier links, all carrier frequencies are derived from a single master oscillator, the master oscillator of all stations being synchronized by a pilot tone and high resolution servos. In such a system, any errors in frequency translation will normally cancel out so that no significant deviation will result.

(3) Measurements will be made at 1000 Hz. at 0 dbm.

(4) Translation error has little effect on voice intelligence, unless the change is too great, resulting in the loss of a portion of a circuit or a complete sideband.

(5) In a voice circuit handling digital traffic, such as data or secure voice, a shift of a few Hertz will result in a distorted output and cause the data to be received garbled and secure voice equipment to not function properly.

(6) Test Equipment will consist of a Wideband Oscillator (HP 200 CDR) and a Frequency Counter or equivalent at each end. The frequency counter in the Sierra 340B may be used.

(7) The receive station will record on the test data sheet (Inclosure 1) any translation present. If it is found that the circuit fails to meet the parameters established by the DCS Technical Schedule (Ref Item Nr. 0215-01) then the carrier equipment must be checked.

e. CIRCUIT LEVEL VARIATION (NET LOSS)

(1) This test is to determine the stability of net loss in a circuit. Stability of net loss is the variation with time of the end-to-end transmission system losses. It may or may not equal the sums of losses due to various causes.

(2) The amount of net loss is not usually a critical factor since most equipment provides for level adjustments to overcome net loss. Net losses may occur when the input limitations of level regulating devices are exceeded.

(3) Measurements may be made at the mid-band frequency or other in-band frequencies, as required by the particular circumstances.

(4) Variations in level can be caused by the following:

(a) Transmission line losses due to changes in temperature, humidity, leakage between adjacent pairs, etc.
(b) Improper impedance matching.
(c) Deterioration of amplitude regulating device components.
(d) Fading of radio signals.

(5) Variations are not usually critical for VFTG and telephone circuits but are extremely important in data and secure voice. Level variations can cause data to be received garbled and secure voice equipment not to remain in cipher condition.

(6) Test equipment will consist of a Wideband Oscillator (HP 200 CDR) and a Level Measuring Set (DAVEN 12B) or equivalent at each end.

(7) The receive station will record the level of the received test tone on the test data sheet (Inclosure 1).

(8) Correction of level, or net loss, variations can be normally done by correction of the listed causes. The biggest causes will be the fading radio signals and the incorrect alignment of equipment.

6. Test Procedures:

a. ENVELOPE DELAY DISTORTION

(1) Tests will be made with all equipment in the circuit except for the Delay/Amplitude Equalizer and the 2600 SF Unit which will be strapped out during initial testing.

(2) Measurements will be made at the appropriate frequencies (Ref. para. 5,a,(5),).

(3) In the end-to-end test, each end of the circuit under test must perform the preliminary test set calibration of the Sierra 340B. Preliminary test calibration will be as follows:

(a) Turn PWR switch to on (allow 2 hours for warm-up period).
(b) Set function switch to CHECK.
(c) Connect RF out to RF in.
(d) Set FREQ. RANGE to 0.3-5.0 kHz.
(e) Observe DELAY reading (upper row on nixie tubes) for -40.000 microseconds ± 1 digit.
(f) Observe FREQ reading (lower row of nixie tubes) for 100.00 kHz ± 1 digit.
(g) Adjust P out and P in for a reading of -5 dbm on the input signal dbm meter.
(h) Set MOD FREQ to position A. (This is the position for using 83 1/3 Hz modulating frequency. The 83 1/3 Hz modulating frequency is the most suitable for the majority of the applications of the test set providing good resolution and reading stability. Maximum sensitivity may be obtained by using 250 Hz modulation, or maximum resolution by using 25 Hz. However, as a result of the increased resolution abtained with 25 Hz modulation, some increase in the jitter of the reading is to be expected).
(i) Set function switch to either RCVR or XMTR.
(j) Set DELAY reading to some arbitrary reference point such as +2000 or +4000 microseconds with the Ø (phase) adjust. The equipment is now ready for use.

(4) A voice Order Wire is normally used to coordinate all test setups between stations.

(5) Transmit end patches RF out to input of circuit under test and

performs the following steps:

(a) Z out to 600 ohms.
(b) SWEEP HZ to MAN.
(c) Function switch to XMTR.
(d) MOD FREQ to A
(e) kHz to 2000 Hz.
(f) P out to -16 dbm or the normally established send level.

(6) Receive end patches RF in to the output of the circuit under test and performs the following steps:

(a) Z in to 600 ohms.
(b) P in to get a reading at the normally established receive level.
(c) Function switch to RCVR.
(d) Tell transmit end to adjust Ø (phase) adjust so he receives +2000 or +4000 microseconds delay for reference.

(7) Transmit end adjusts kHz to frequencies as requested by the receive end. Readings are recorded on the test data sheet (Inclosure 1). The difference between +2000 or +4000 microseconds and the readings received is the amount of delay.

(8) See Figure 1 for test configuration.

b. FREQUENCY RESPONSE (AMPLITUDE DISTORTION)

(1) Tests will be made with all equipment in circuit except for the 2600 SF Unit which will be strapped out during testing. (The equalizer will remain strapped out also unless it was used to correct for Delay Distortion).

(2) Measurements will be made at the appropriate frequencies. (Ref. para. 5,b,(5),).

(3) Test equipment will be a Wideband Oscillator and a Level Measuring Set at each end.

(4) In the end-to-end test each end must perform the preliminary test calibration. Preliminary test calibration will be as follows:

(a) Put oscillator range switch in X100.
(b) Connect oscillator to level meter.
(c) Set impedance to 600 ohms.
(d) Adjust output of oscillator for 0 dbm reading on the level meter at 1000 Hz (or the frequency being tested).

(5) Transmit end patches the output of the oscillator to the input of the circuit under test.

(6) Receive end patches the output of the circuit under test to the input of the level meter.

(7) Transmit end adjusts frequencies as requested by the receive end. Readings are recorded on the test data sheet (Inclosure 1). The difference between the received level readings and the reference frequency is the frequency response.

(8) Perform step (4),(d), above for each frequency used during test.

(9) This test may be done in both directions simultaneously.

(10) See Figure 2 for test configuration.

c. IDLE CHANNEL NOISE

(1) This test will be made with all equipment in circuit.

(2) Test equipment will consist of a Level Measuring Set (DAVEN 12B) or equivalent at each end.

(3) In the end-to-end test each end must perform the preliminary test calibration as in the previous test (Ref. para. 6b,(4),).

(4) Transmit end patches the output of the oscillator to the input of the circuit under test.

(5) Receive end will patch the output of the circuit under test to the input of the level meter.

(6) Transmit end will then remove the tone from the input of the circuit and terminate it in a 600 ohm resistive load.

(7) Receive end will record the level received on the test data sheet (Inclosure 1). This will be the idle channel noise.

(8) This test may be done in both directions simultaneously.

(9) See Figures 2 and 3 for test configurations.

d. IMPULSE NOISE

(1) This test will be made with all equipment in circuit.

(2) Test equipment will be the Impulse Noise Counter (NEC, TTS-58A).

(3) In the end-to-end test each end must perform the preliminary test set procedures used to indicate if the test set will function correctly. The procedure is as follows:

(a) Connect a DC Voltmeter to the two BATT test pin jacks.
(b) Turn the POWER switch to ON.
(c) Turn the timer knob clockwise until you hear a click. The voltmeter should give you a reading.
(d) Set the REF LEVEL control so the counters are not counting.
(e) Observe the voltmeter reading. Fresh batteries will read 18 volts. If the batteries read less than 12 volts they should be replaced.

(4) Receive end patches the input of the test set to the output of the circuit under test and performs the following steps:

(a) Set the INPUT to 600 ohms (Transmit end should have input of the circuit under test terminated in a 600 ohm resistive load).
(b) Set the TERM/BRDG switch for TERM.
(c) Set the WTG switch to VOICE.
(d) Set the HOLD switch to OFF.

(5) With the above controls set, the sensitivity can now be set to make the measurements. Set by the following steps:

(a) Set the main REF LEVEL to the nearest setting below the desired level.
(b) Set the channel REF LEVEL for the levels to be measured. The total db range measured at one time cannot exceed 20 db. The LO counter,

channel A, must have the lowest setting. The MID counter, channel B, must have the middle setting. The HI counter, channel C, must have the highest setting. CAUTION: When using the test set near full sensivity (at the 10 or 0 db steps) the following precautions are necessary:

(c) The test set should not be in a strong AC magnetic field.
(d) The HOLD switch should be OFF.
(e) The WTG switch should NOT be in the FLAT position.

(6) When set properly, counter "A" will register those impulses which exceed the level indicated for "A", and are less than those indicated for "B". "B" counter will register those counts which exceed that indicated for "B" and are less than that of "C". "C" counter will register all counts which exceed that indicated for "C".

(7) As an example, the main REF LEVEL setting is on 40. The channel REF LEVEL setting for "A" is 0, "B" is 6, and "C" is 12. Counter "A" has 156 counts, counter "B" has 68 counts, and counter "C" has 7 counts. This indicates 156 counts were greater than 40 dbrn but less than 46 dbrn, 68 counts exceeded 46 dbrn but were less than 52 dbrn, and 224 counts exceeded 40 dbrn but were less than 52 dbrn. 7 counts exceeded 52 dbrn, 75 (68+7) counts exceeded 46 dbrn, and 231 (156+68+7) counts exceeded 40 dbrn.

(8) The timer is the last step. The proper operation of the TIMER is accomplished as follows: (NOTE: Power must be on.)

(a) Normally set the TIMER for 15 or 30 minutes.
(b) When the TIMER is turned clockwise a click will indicate that power is applied.
(c) After the TIMER is released, the timing operation will start.
(d) The timing can be changed at any time by resetting the TIMER knob.
(e) The counting operation can be ended manually by turning the knob counter-clockwise until a click is heard at 0. (do not go into the continuous region).
(f) For manual operation, turn the TIMER knob counter-clockwise into the continuous region until a click is heard.
(g) To stop the test, turn the TIMER knob clockwise toward 0 until a click is heard.
(h) For short tests, (any time less than 20 minutes) turn the

TIMER knob to 20 then return to desired time.

(9) This test can be run in both directions simultaneously.

(10) See Figure 4 for test configuration.

e. MAXIMUM CHANGE IN AUDIO FREQUENCY (FREQUENCY TRANSLATION)

(1) This test will be made with all equipment in circuit.

(2) Test equipment will consist of a Wideband Oscillator (HP 200 CDR) and the Sierra 340B used as a frequency counter or equivalent at each end.

(3) Before performing tests the oscillator must be calibrated to the 340B for an output of 1000 Hz ± 1 digit at 0 dbm

(4) Transmit end patches the output of the oscillator to the input of the circuit under test.

(5) Receive end patches the output of the circuit under test to the input of the 340B used as a frequency counter.

(6) Receive end will observe the 1000 Hz test tone as indicated on the 340B for a period of 5 minutes and record the maximum frequency deviation above and below the 1000 Hz on the test data sheet (Inclosure 1). The amount of deviation will be the amount of frequency translation.

(7) See Figure 5 for test configuration.

f. CIRCUIT LEVEL VARIATION (NET LOSS)

(1) This test will be made with all equipment in circuit.

(2) Test equipment will consist of a Wideband Oscillator (HP 200 CDR) and a Level Measuring Set (DAVEN 12B) or equivalent at each end.

(3) Before performing tests the oscillator and level meter must be calibrated as in the Frequency Response Test (Ref. para. 6b, (4),).

(4) Transmit end will patch the output of the oscillator to the

input of the circuit under test.

(5) Receive end will patch the output of the circuit under test to the input of the level meter.

(6) Receive end will observe the received test tone level for a period of 10 minutes and record on the test data sheet (Inclosure 1) the maximum variations above and below the reference level. The amount of deviation of the received test tone from the reference level will be the amount of circuit level variation or net loss.

(7) This test can be performed in both directions simultaneously.

(8) See Figure 2 for test configuration.

7. <u>Conditioning:</u> By referring to the results of Tests 6a and 6b and comparing these to the S3 standards, the proper delay and amplitude equalization can be determined for the circuit in question. Adjustment of the Equalizer is accomplished by referring to the instruction booklet furnished with each unit. When the equalization is completed, the 2600 SF Unit is strapped back in the circuit and the circuit is brought up in the non-secure mode of traffic. SECORD operators are then contacted and the circuit will be tested in the secure mode. Once the SECORD operators accept the circuit, it may be formally activated. If the circuit failed to meet any of the S3 standards, detailed information to this effect will be submitted on the "In-Effect Report".

SUBJECT: AUTOSEVOCOM Circuit Conditioning

CCSD____________ CEO____________ DATE____________

STATION "A"____________ STATION "A" OPERATOR____________

STATION "B"____________ STATION "B" OPERATOR____________

ENVELOPE DELAY DISTORTION TEST

Reference Frequency____________kHz

Reference Delay____________us

Frequency (Hz)	Delay (us)
500	
600	
800	
1000	
1200	
1400	
1600	
1800	
2000	
2200	
2400	
2600	
2900	

FREQUENCY RESPONSE TEST

Reference Frequency____________kHz

Reference Level____________db

Frequency (Hz)	Level (db)
300	
400	
600	
800	
1000	
1200	
1400	
1600	
1800	
2000	
2200	
2400	
2600	
2800	
3100	

FREQUENCY TRANSLATION TEST

Send Reference Frequency__________Hz

Received Reference Frequency______

to ______

Maximum Frequency Deviation______Hz

IMPULSE NOISE TEST

Received Counter Readings After 30 Mins.

Settings__________Readings________"A"

Settings__________Readings________"B"

Settings__________Readings________"C"

CIRCUIT LEVEL VARIATION TEST

Send Reference Level__________db

Received Reference Level__________db

Maximum Level Variation__________db

IDLE CHANNEL NOISE TEST

Send 0 db, Receive__________db

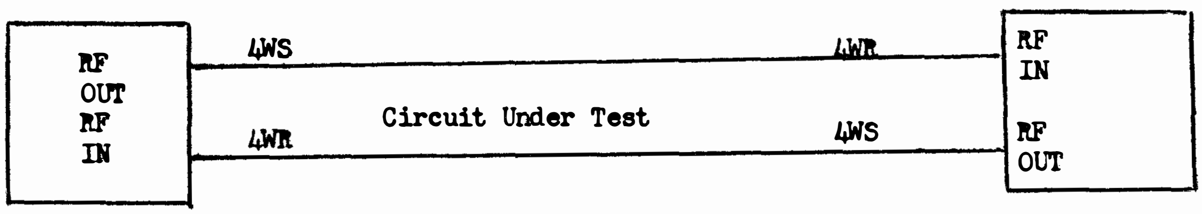
Send Terminated, Receive__________db

DESCRIPTION OF EQUIPMENT

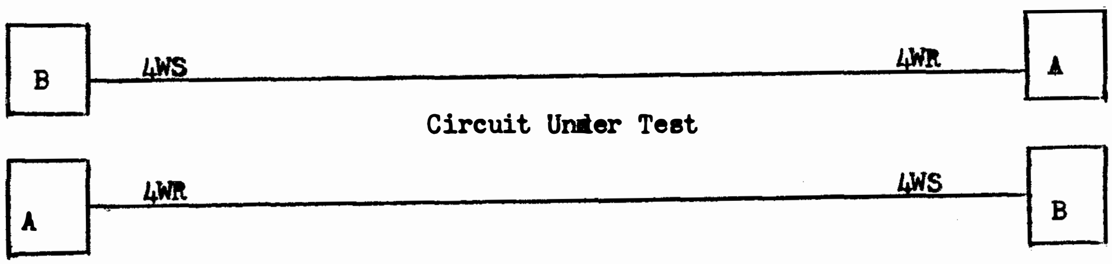
IDENT	DESCRIPTION	MFR	P/N
A	Level Measuring Set	DAVEN	12B
B	Wideband Oscillator	HP	200 CDR
C	Impulse Noise Counter	NEC	TTS-58A
D	Envelope Delay Test Set	SIERRA	340B
E	600 Ohm Termination Plug	----	----

TEST CONFIGURATIONS

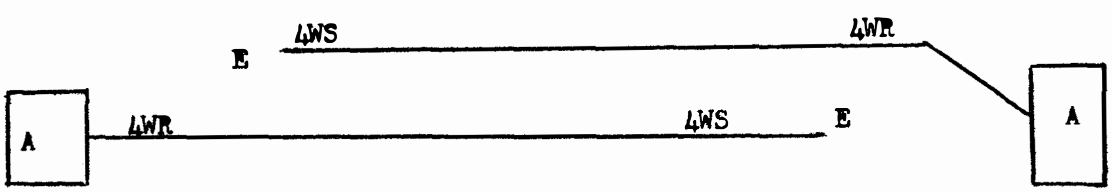
Test 1 Figure 1



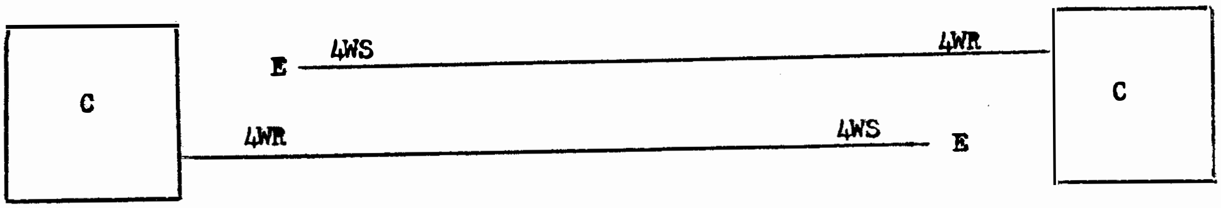
Test 2,3, & 6 Figure 2



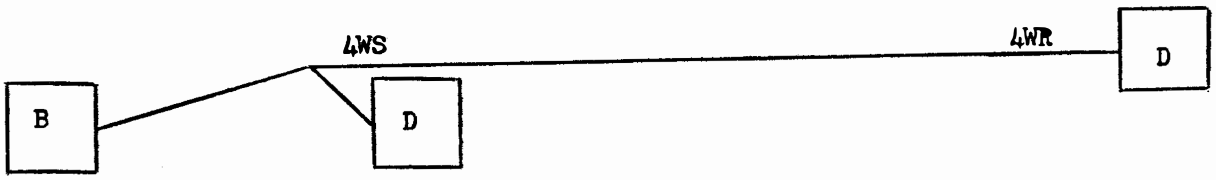
Test 3 Figure 3



Test 4 Figure 4



Test 5 Figure 5



DEPARTMENT OF THE ARMY
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SCCPV-RG-PO-NW

Item Nr: 0213-01

SUBJECT: Circuitry Using 2600 Hz Tone-On-While-Idle Condition (AUTOSEVOCOM, Dial)

1. Background: In the past it has been found that all Technical Controllers were not familiar with how to properly maintain and restore tone-on-while-idle circuits.

2. Purpose: The purpose of this S&P item is to aid the Technical Controller in troubleshooting and maintaining tone-on-while-idle circuits. To aid the Technical Controller the following areas will be covered:

a. Typical Problem Areas
b. Troubleshooting Techniques
c. Restoral Procedures
d. Maintenance

3. General: The problem areas found in tone-on-while-idle circuits are not necessairly all found in ICS. They may be found in the cable connecting the ICS to the DCO (Dial Central Office) or DTE (Dial Telephone Exchange), the cable connecting the DCO or DTE to the subscriber, or the subscriber itself.

a. The problem areas found in the ICS may be any one or more of the following:

(1) SF Units
(2) E&M Signaling Leads
(3) Amplifiers
(4) Equalizers
(5) Carbon Blocks

b. The problem areas found in the cable connecting the ICS to the sub through the DCO or DTE may be any one or more of the following:

(1) Carbon Blocks

(2) E&M Signaling Leads

c. The problem areas found at the sub may be any one or more of the following:

(1) Carbon Blocks
(2) E&M Signaling Leads
(3) Power Supply
(4) In-house Equipment

4. Discussion: Certain procedures must be followed in troubleshooting tone-on-while-idle circuits. In order to facilitate the quick restoral of a tone-on-while-idle circuit the following procedure must be followed:

a. Check the level of the SF tone. It should be a -13dbm0. If it is not refer to S&P item nr. 0542-01 on how to adjust it to the proper level.

b. Place the circuit on your spare equipment.

c. If the problem still exists or you do not have spare equipment then continue to troubleshoot as indicated in the following paragraphs.

d. Distant end fails to answer;

(1) Monitor for the presence of the SF tone when your sub is off-hook.

(a) Non-presence of SF tone eliminates any problem between your VF jacks and your sub.

(b) Presence of SF tone indicates the problem area in either your house or the subs equipment.

(2) There are theoretically only three problem areas;

(a) The SF Unit
(b) The "M" Lead
(c) The Subs Equipment

(3) Change your SF unit. (This will always be the first step in correcting your in-house problems. Remember to line-up replacement SF Unit.)

(4) If the problem continues, have your sub check his equipment. Indications are that he is failing to change the condition of his "M" lead from ground to -48vdc while in the off-hook condition.

(5) Once the problem has been corrected have your sub ring the distant end.

(6) Monitor the voice contact. If the circuit is 5-by-5, return it to traffic. (In AUTOSEVOCOM, request the subs go secure with each other. Once accomplished you can return the circuit to traffic.)

e. Distant end unable to ring your sub; distant ICS is OK.

(1) There are theoretically only three problem areas;

(a) The SF Unit
(b) The "E" Lead
(c) The Subs Equipment

(2) Change your SF Unit.

(3) If the problem continues, ground the "E" lead at the carbon block. (Do not ground the "E" lead at the Circuit Jacks unless you do not have carbon blocks.)

(a) A ringing indication at the sub reveals that the problem is either an "open" "E" lead to the carbon blocks from the SF Unit or an "open" carbon block on the frame.

(b) If your sub still does not receive a ringing indication, then the problem is either an "open" "E" lead between you and your sub or your sub has faulty equipment. (The "open" "E" lead could also be an "open" carbon block at the DCO or DTE.)

(4) If the "E" lead is found to be good to your sub, have him check his equipment.

(5) Once the problem is corrected, request the distant sub to ring your sub.

(6) Monitor the voice contact. If the circuit is 5-by-5, return it

to traffic. (In AUTOSEVOCOM, request the subs go secure with each other. Once accomplished you can return the circuit to traffic.)

f. Your sub is receiving a steady ringing indication.

(1) Monitor for the presence of the SF tone.

(a) Non-presence of SF tone indicates the distant sub may be trying to call but is unable to hear your sub. Contact distant ICS.

(b) Presence of SF tone indicates the problem is at your end.

(2) There are theoretically only three problem areas;

(a) The SF Unit
(b) The "E" Lead
(c) The Subs Equipment

(3) Change your SF Unit.

(4) If the problem continues have the DCO or the DTE check the condition of the "E" lead between you and your sub.

(a) If the "E" lead is grounded, pull your carbon blocks on the "E" lead to determine where the bad portion of the "E" lead is located. Rewire when located.

(b) If the "E" lead is "open", it is good, and the problem must be in your subs equipment. Have him check it.

(5) Once the problem is corrected have the distant sub ring your sub.

(6) Monitor the voice contact. If the circuit is 5-by-5, return it to traffic. (In AUTOSEVOCOM, have the two subs go secure. Once accomplished, the circuit may be restored to traffic.)

g. Distant ICS informs you that his sub is getting a ringing indication. His house is OK.

(1) There are theoretically only three problem areas;

(a) The SF Unit
(b) The "M" Lead
(c) The Subs Equipment

(2) Change the SF Unit.

(3) If the problem still exists have the DCO or DTE check the condition of the "M" lead between you and your sub.

(a) If it is "open", pull the carbon blocks and check with an Ohm Meter if the "open" is in your house. Once found, whether in your house or in the connecting cable, rewire.

(b) If it has -48vdc on it, the problem is in the subs equipment.

(4) Once the problem is corrected have your sub ring the distant end.

(5) Monitor the voice contact. If the circuit is 5-by-5, return it to traffic. (In AUTOSEVOCOM, have the two subs go secure. Once accomplished, the circuit may be restored to traffic.)

h. The preceeding examples are the most common problem areas. Other areas such as the multiplex equipment, radio equipment, and the radio path are the exception rather than the rule. As an example, if you are transmitting a SF tone but the distant end is not receiving it the problem area is probably one of the above.

i. Another problem area was discovered in the interaction found between some VF amplifiers and the equalizers. This interaction effects the signal level and shape and can only be corrected by replacing the VF amplifiers until one is found that will not interact with the equalizer.

5. Summary: Since AUTOSEVOCOM circuits are high priority circuits, utmost speed must be used to restore these circuits to traffic. Since speed is important, remember to troubleshoot in the order given, i.e. spare equipment, replacement of SF unit, the rest of your house, the connecting cable, and the subscriber.

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SCCPV-RG-PO-NW

Item Nr: 0214-01

SUBJECT: Installation and Use of Modified Pulse Link Repeaters (Stelma Model PLR-3)

1. General: In activating dial telephone and AUTOSEVOCOM circuits, it has been found that excessive AC voltage (hum) on the E&M leads will cause the Collins Radio 2600 Hz SF Unit to malfunction.

2. Purpose: The purpose of this S&P item is to aid the Technical Controller in adapting the PLR for use with dial & AUTOSEVOCOM circuits in lieu of DX units when using extended E&M leads.

3. Discussion: Pulse Link Repeaters have been found to be very effective in isolating the AC voltage (hum) when modified according to Page Communication Engineering: Field Engineering Work Order (FEWO) Nr. 226. In the modified configuration, the PLR will no longer be employed as an E&M lead reversal unit. Instead, the PLR will be used to isolate the E&M leads from the AC voltage.

a. When the PLR has been modified it will isolate two (2) circuits from the subscriber (DTE, DCO, SVS, etc.). The installation of a PLR in a circuit is accomplished as follows:

(1) E1, E2, M1 and M2 are cabled from the PLR to the CDF.

(2) The "E" leads from the PLR (E1 and E2) will be jumpered to the "M" leads from the sub. E1 (pin 6) to M of one circuit and E2 (pin E) to M of other circuit.

(3) The "M" leads from the PLR (M1 and M2) will be jumpered to the SF Units "M" leads. M1 (pin C) to M of one SF Unit and M2 (pin 3) to M of the other SF Unit.

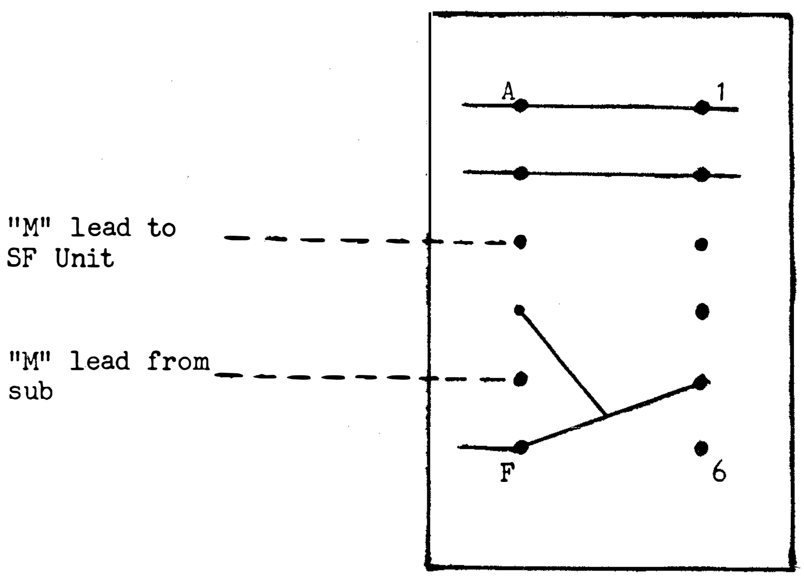
(4) The "E" lead of the SF Unit is connected to the "E" lead from

the sub in the normal fashion.

(5) In order for the PLR to function correctly, E1 and M2 must be used on one circuit and E2 and M1 must be used for the other circuit. (Examination of Figure 1 or sketch 2 of FEWO Nr. 226, will show this).

b. If excessive percentage of break/make is encountered in dial circuits by using the PLR, refer to instruction manual for the PLR and FEWO Nr. 226.

Figure 1
(Back of PLR)



Use terminals A to F for one circuit;
use terminals 1 to 6 for other circuit.

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SCCPV-RG-PO-NW

Item Nr: 0215-01

SUBJECT: DCS Technical Schedule

1. Purpose: The purpose of this item is to present the various circuit parameters for AUTOVON, AUTODIN and AUTOSEVOCOM circuits.

2. General: Different types of information require a different quality of circuit. For example, voice (ringdown) traffic does not require as high a quality circuit as high speed data. For this reason DCA has established a schedule relating the type of traffic to be carried and the quality of the circuit.

3. Description: The following tables relate certain types of AUTOVON, AUTODIN and AUTOSEVOCOM traffic to the DCA parameter code and then break the parameter code down as to what circuit parameters are required. These tables are provided as a handy reference. For more detailed information, consult appropriate DCA reference manuals.

Parameter Code*	AUTOVON (Access Lines)
V2	Voice grade
S3	Special grade, such as AUTOVON switch access (2400 bits/sec) from the following: alternate voice data terminal, AUTODIN or DSSCS switch, secure voice terminal, secure voice cordless switchboard, SEVAC, VOCOM SWITCH, and other secure foice 4-wire switchboards.
	(Trunks, Interswitch)
V2	Voice grade
S3	Special grade (no regenerators at either end)
S1	Special grade (regenerators at both ends)
S2	Special grade (regenerators at one end)

AUTODIN
(Access Lines)

D1 1200 or 2400 bits/sec

D2 1200 bits/sec multiplexed. Includes service where user and AUTODIN switching center provides Modems which are frequency division multiplexed to provide a number of channels on a single VF channel. This VF channel may be multiplexed with any compatible combination of 75, 150, 300, or 600 baud Modems not to exceed 1200 baud total. VF bridging at transmission nodal points is employed to serve noncolocated users.

(Trunks)

D1 2400 bits/sec dedicated circuit from one AUTODIN switch to another.

AUTOSEVOCOM
(Access Lines)

S1 Secure voice terminal (2400 bits/sec) to VOCOM switch.

S3 Secure voice terminal (2400 bits/sec) to 4-wire JOSS or 5-D switchboard, part of AUTOSEVOCOM.

S1 2400 bits/sec (VOCOM, switch to either VOCOM switch or special 758 switch).

S3 2400 bits/sec (JOSS to either JOSS or cordless switchboard).

S3 2400 bits/sec (SEVAC to JOSS or 5-D switchboard).

* Parameter code is given in Block 9 of the CLR Card.

DCS TECHNICAL SCHEDULE
Circuit Parameters

Characteristics	Unit of Meas	S1	S2	S3	V2	D1	D2
Frequency Response 0.3-2.7 kHz	db						-2 to +6
0.3-3.0		-2 to +6	-1.5 to +4.5	-1 to +3	-3 to +8	-2 to +6	-3 to +12
0.5-2.8		-1 to +3	-0.5 to +2	-0.5 to +1.5		-1 to +3	
1.0-2.4							-1 to +3
0.7-2.3					-1 to +3		

In the above table, loss frequency characteristics are given in terms of comparison to the measured loss at 1000 Hz. For example, in the S1 schedule the loss frequency characteristic should not exceed the range of 2 db more loss (-) to 6 db less loss (+) between 0.3-3.0 kHz when compared to the measured loss at 1000 Hz.

DCS TECHNICAL SCHEDULE
Circuit Parameters

Characteristics	Unit of Meas	S1	S2	S3	V2	D1	D2
Maximum Envelope Delay Distortion	micro-secs						
0.5-2.8 kHz		3000	1500	600		3000	
0.6-2.6		1500	750	300		1500	
1.0-2.4							1000
1.0-2.6		500	250	100		500	1750
Maximum Net Loss Variation	db	±4	±3	±2	±2	±4	±4
Maximum Change in Audio Frequency	Hz	±5	±5	±5	±5	±5	±5
Maximum Allowable Channel Noise	dbm*						
0-50 miles	F1A	-54	-54	-54	-54	-54	-54
51-100	wtg	-51	-51	-51	-51	-51	-51
101-400		-48	-48	-48	-48	-48	-48
401-1000		-44	-44	-44	-44	-44	-44
1001-1500		-42	-42	-42	-42	-42	-42
1501-2500		-40	-40	-40	-40	-40	-40
2501-4000		-38	-38	-38	-38	-38	-38
4001-8000		-35	-35	-35	-35	-35	-35
8001-16000		-32	-32	-32	-32	-32	-32

Consider a satellite channel as equivalent to a 2000 mile landline channel in determining circuit length. *Weighted circuit noise power in dbm using the DAVEN 12B with F1A-line weighting.

Characteristics	Unit of Meas	S1	S2	S3	V2	D1	D2
Impulse Noise Reference Level 72 dbrnØ voice band wtg	Max Counts in 15 min above ref level	15	15	15		15	15

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0216-01

SUBJECT: Operation and Installation of the Regenreative Repeater Model TH-73/UGA-5

1. Background: Regenerative Repeaters are normally not required for teletype circuits traversing the ICS. However, many times tactical subscribers are in such an environment that their input to the ICS is extremely distorted. Regenerative Repeaters may be placed in the circuit at the ICS facility closest to the subscriber to automatically compensate for subscriber distortion. They are especially useful on Mode V AUTODIN circuits.

2. Purpose: The purpose of this S&P item is to familiarize the Technical Controllers and wiremen with Regenerative Repeater operation and circuit wiring configurations. This item will be in three (3) parts;

A. Operation
B. Strapping options
C. Circuit wiring configurations

3. Discussion:

A. Operation

(1) The Regenerative Repeater, Model TH-73/UOA-5, is capable of operating in either automatic or manual mode, providing a regenerated output of either synchronous or start-stop data or teletype signals.

(2) It will operate at either 20 millamperes neutral, 60 millamperes neutral, or polar keying input.

(3) It will accept up to 45 per cent marking or spacing distortion and regenerate the applied signal at less than 1 percent distortion.

(4) It can be adjusted for operating at 45.5, 74.2, or 75 baud start-stop keying or 37.5, 61.1, 75, or 150 baud synchronous keying.

(5) In the Automatic mode of operation the TH-73 automatically regenerates either a start-stop or synchronous signal. It regenerates the synchronous signal by detecting the absence of the Mark-hold condition present in the start-stop signal.

NOTE: Recent tests indicate that Regenerative Repeaters operating in the automatic mode of operation are not as reliable as those operating in the manual mode. For more reliable performance, the regenerative repeater should be set for manual operation.

(6) In start-stop operation the TH-73 can put out a constant Mark-hold condition when no signal is applied

B. Strapping Options

(1) For 20 ma neutral operation, terminals E3 and E4 must be strapped together.

(2) For 60 ma neutral operation, terminals E4 and E5 must be strapped together.

(3) For polar operation, terminals E1 and E2 must be strapped together.

(4) For 5-, 6-, 7-, or 8-unit level code, start-stop keying, strap as follows;

(a) 5-unit level code strap terminals 1to2 and 4 to 5.

(b) 6-unit level code strap terminals 1 to 3 and 4 to 5.

(c) 7-unit level code strap terminals 4 to 2 and 1 to 5.

(d) 8-unit level code strap terminals 4 to 3 and 1 to 5.

(5) To use the Mark-hold provision on start-stop signals strap terminals 2 to 3 on printed circuit card A9. When not desired, strap terminals 1 to 2.

(6) To provide a decrease in the probality of noise-pulses switching the equipments mode of operation from synchronous to start-stop, strap terminals 1 to 2 on printed circuit card A11. When noise or hits are not a problem strap terminals 2 to 3.

C. Circuit wiring configuration

(1) There are three (3) configurations in which the TH-73 will be used;

(a) Through house circuits between VFTC equipments
(b) Circuits terminating at subscriber with ICS supplying send and receive battery
(c) Circuits terminating at subscriber with the subscriber supplying send and receive battery

(2) In wiring the TH-73 in a through house configuration, on the input, wire the "-" or "T" contact of the unit to "T1" of the DC REC JACK and the "+" or "R" contact to "R1" of the DC REC JACK. On the output, wire the "+" or "M" contact of the unit to "T1" of the DC SEND JACK and the "T" or "Tongue" of the unit to "R1" of the VFTC send battery.

(3) In wiring the TH-73 in a circuit to a subscriber with ICS supplying the send and receive battery, wire the "-" or "T" contact of the unit to "T1" of the DC REC JACK and the "+" or "R" contact of the unit to "R1" of the DC REC JACK on the input. On the output, wire the "+" or "M" contact to "R" of Hub Repeater Terminating Unit #1. From Hub Repeater Terminating Unit #2, wire the "T" to "T" of cable to the sub. Wire the "T" or "Tongue" of the TH-73 to the "T" of Hub Repeater Terminating Unit #1. From Hub Repeater Terminating Unit #2, wire the "R" to "R" of the cable to the sub. Hub Repeater Terminating Units #3 and #4 will have the "T" and "R" contacts "shorted" together; i.e., "T"and "R"of #3 shorted, and "T" and "R" of #4 shorted.

(4) In wiring the TH-73 in a circuit from a subscriber with ICS supplying the send and receive battery, wire the "T" of cable from subscriber to "T" of Hub Repeater Term. Unit #1 and "R" of cable from subscriber to "R" of Hub Repeater Term. Unit #1. From Hub Repeater Term. Unit #2 wire "T" to "-" or "T" of TH-73 input and "R" of Hub Repeater Term. Unit #2 to "+" or "R" of TH-73 input. On the output of TH-73, wire the "+" or "M" contact to "T_1" of the DC SEND JACK and the "T" or Tongue" of the unit to "R_1" of the VFCT send battery.

(5) In wiring a TH-73 from a subscriber supplying his own send and receive battery, on the inpute wire the "-" or "T" contact of the unit to the "T" of the cable from the subscriber and the "+" or "R" contact of the unit to the "R" of the cable from the subscriber. On the output, wire the "+" or "M" contact of the unit to "T_1" of the DC SEND JACK and "T" or "Tongue" of the unit to "R_1" of the VFCT send battery.

(6) In wiring the TH-73 to a subscriber supplying his own send and receive battery, for the input, wire the "-" or "T" contact of the unit to "T1" of the DC REC JACK and "+" or "R" or the unit to "R1" or the DC REC JACK. On the output, wire the "+" or "M" contact of the unit to the "T" or the cable to the subscriber and the "T" or "Tongue" of the unit to the "R" of the cable to the subscriber.

NOTE: In the event that you cannot get the unit to key, as indicated by the neon bulb on the front ot the TH-73, reverse the input leads; similarly, if the output remains in a Mark-hold condition, with keying in, reverse the output leads. Most of the problems that will arise are a result of incorrect polarity. Reversal of input and/or output leads should eliminate this.

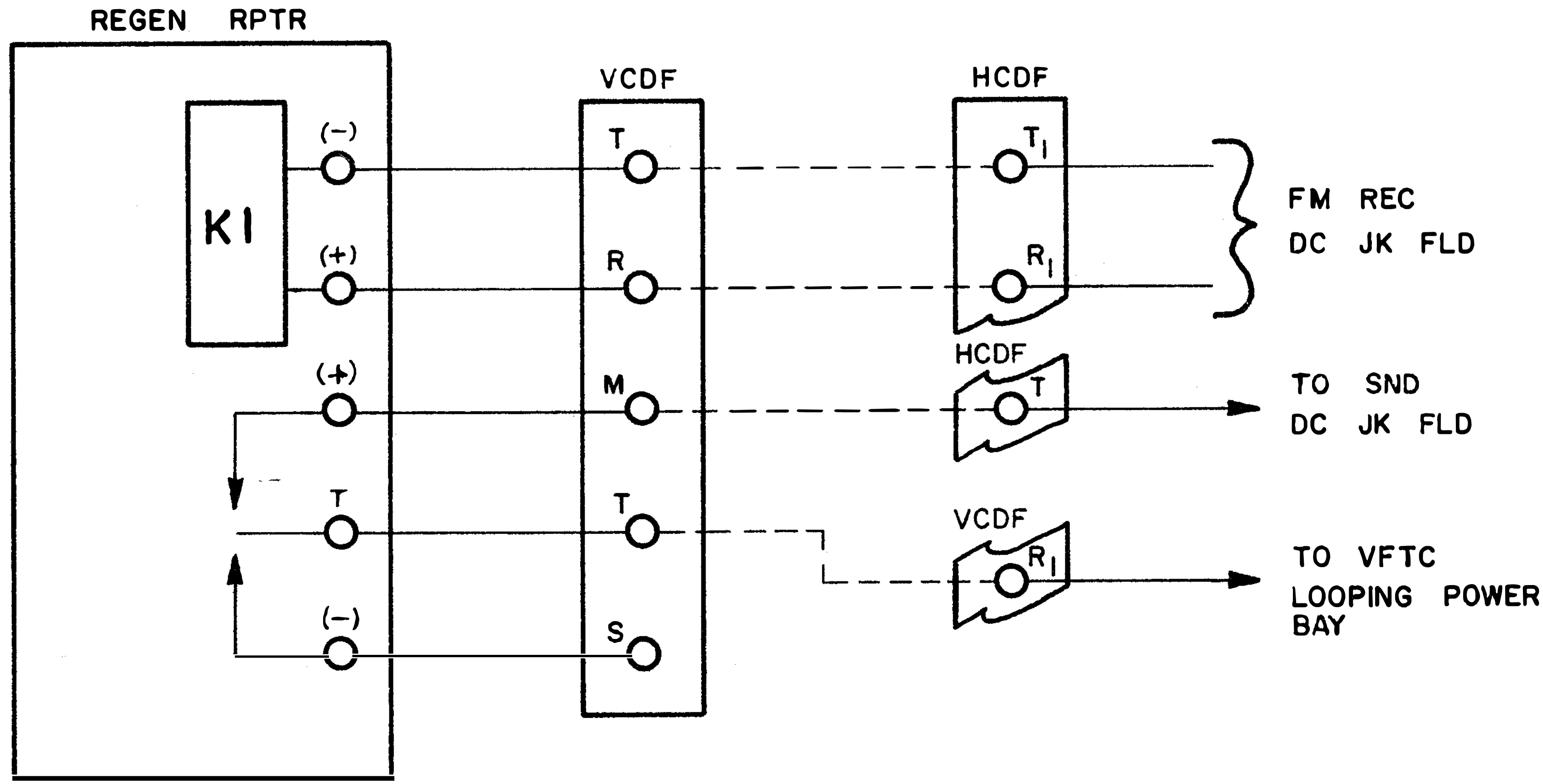

FIG A. REGEN RPTR BACK TO BACK OR THRU OPERATION

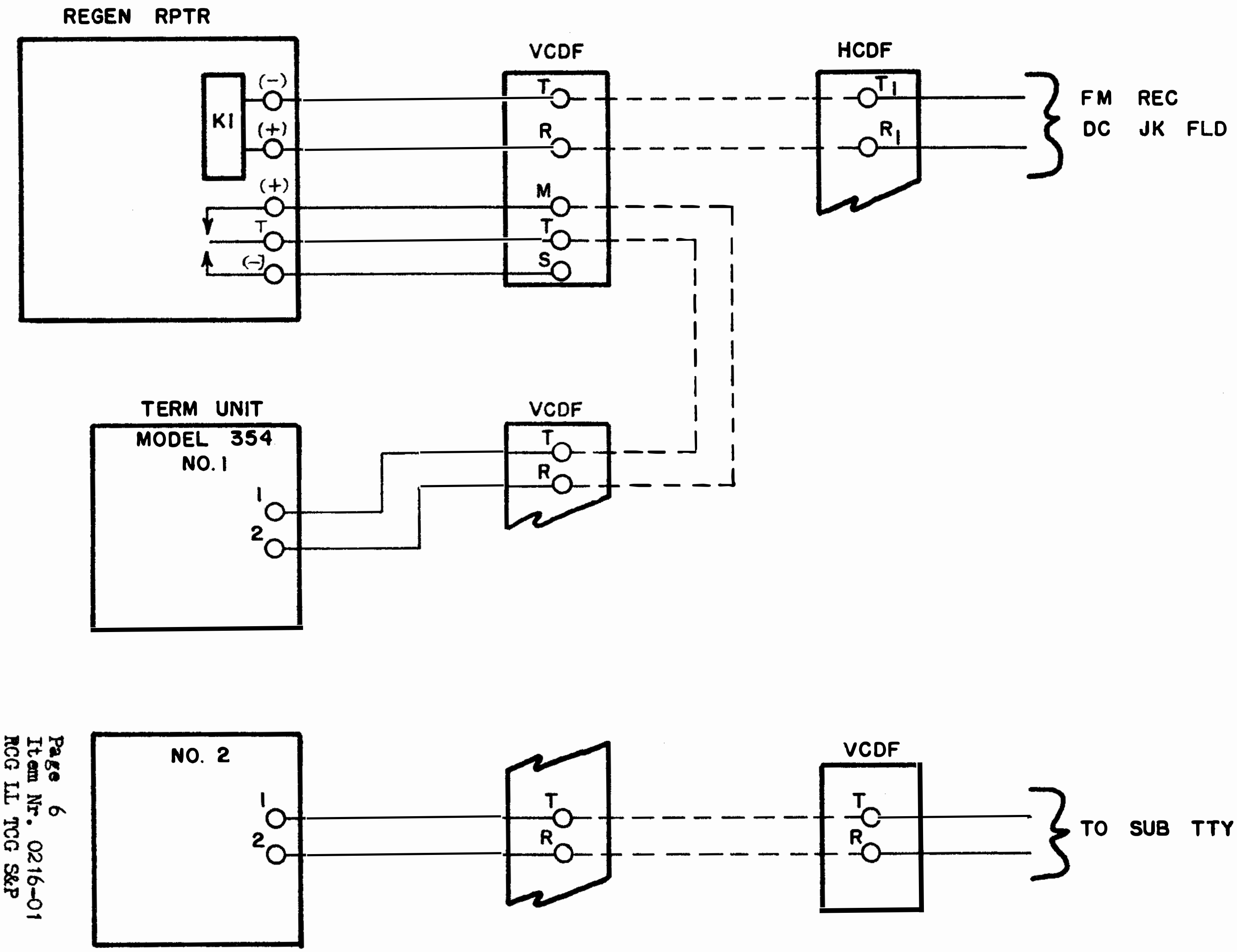

FIG. B REGEN RPTR END TERMINAL OPERATION (RECEIVE)

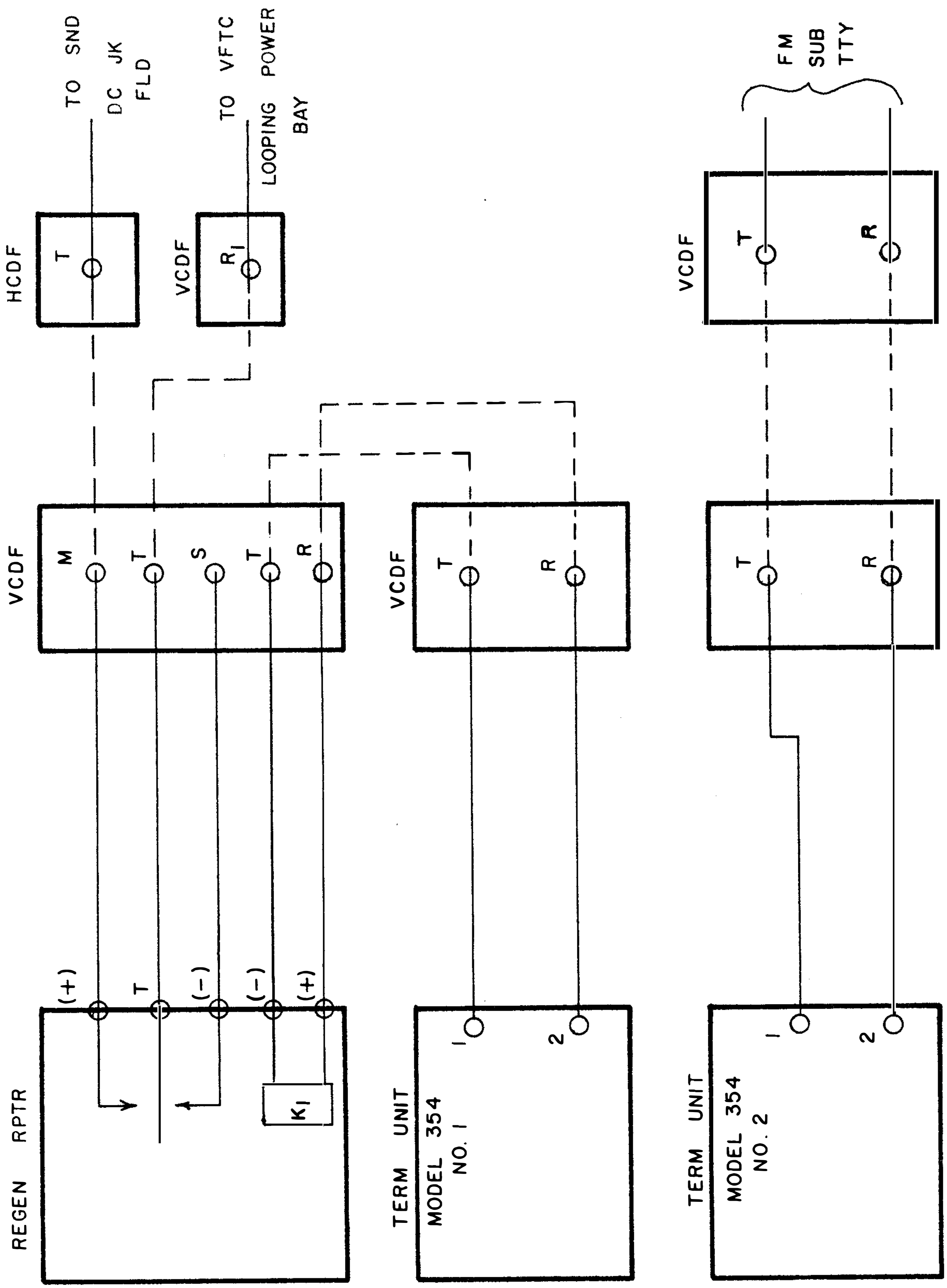

FIG. C REGEN RPTR END TERM OPERATION (SEND)

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TECHNICAL CONTROL

STANDARD AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0217-01

SUBJECT: Operation and Installation of Hub Repeaters

1. Background: Hub repeaters are presently being integrated into teletype circuits traversing the ICS. Therefore, it is necessary for the Technical Controller to be familiar with its operation. Hub repeaters have also been found to be useful as a battery source for the regenerative repeater, which does not supply either send or receive battery.

2. Purpose: The purpose of this S&P item is to familiarize the Technical Controller and wireman with Hub Repeater operation and circuit wiring configurations. This item will be in three (3) parts:

a. Operation
b. Wiring Configurations
c. Use with the Regenerative Repeater

3. Discussion: The Hub Coupling Unit Type 353 Model 1 consists of four (4) Terminating Units Type 354 Model 1 and one (1) Hub Jackfield Type 355 Model 1. These five units are mounted together on two horizontal mounting bars. The assembly is 19 inches wide and fits in a standard rack.

a. Operation.

(1) The Hub Coupling Unit Type 353 Model 1 provides a DC Half-duplex neutral signal for four (4) subs. The Hub uses inverse neutral keying; a mark condition felt on the input leg is seen in the hub as a space and is seen in the output legs as a mark. A space condition felt on the input leg is seen in the hub as a mark and is seen in the output legs as a space. The four (4) circuits are of the parallel type through the Hub. Each DC half-duplex teletype circuit (loop) is provided with isolated coupling to the hub by its terminating unit. Because of the isolated coupling, each teletype circuit can be operated

with a different loop battery and value of loop current. In this unit, a single battery is used for the hub and all teletype loops.

(2) The hub operates on a half-duplex basis, and all DC teletype loops must be closed for the hub to operate. When any circuit sends signals into the hub, only these signals can be received from the hub by all other circuits.

(3) Message interruption (breaking) by any receiving station is accomplished when that receiving operator opens his DC teletype loop. Hub operation halts and all stations go the "space" condition, including the original sending maching. This informs the sending operator that another station on the hub wishes to interrupt. NOTE: This will also inform the subs that one of the subs on the hub is having trouble such as a broken cable pair.

b. Wiring Configurations

(1) In wiring a half-duplex multipoint circuit with four or less subscribers into a hub, wire each subscriber to one of the four (4) terminating units. If less than four (4) subscribers are wired to a hub coupling unit, the unused terminating units must be strapped T to R on the VCDF. Otherwise the hub will detect a "space" (no current) condition on the unused terminating set and will place all other circuits in a "space" condition. See Fig. 1.

(2) To wire more than four (4) subscribers into a multipoint half-duplex teletype circuit, two (2) or more hub jackfields must be connected together. This is accomplished by strapping one pin (9, 10, 11, or 12) on the VCDF of one hub coupling unit to one pin (9, 10, 11, or 12) of the other hub coupling unit. Subscribers are connected to the terminating sets corresponding to the interconnected hub jackfields. Once again all unused term sets of the hub coupling units in use must be strapped T to R on the VCDF. See Fig. 2. (NOTE: This procedure may be continued to interconnect any desired number of hub coupling units together providing a multipoint capability limited only to the number of terminating units in house).

c. Use with the Regenerative Repeater

(1) When utilizing the hub repeater as a loop battery for the regenerative repeater, wire the output of the regenerative repeater to one terminating unit of a hub coupling unit and the subscriber to another terminating unit of the same hub coupling unit. Strap the remaining two (2) terminating units of the hub coupling unit T to R on the VCDF to simulate closed loops. See Fig. 3

4. Summary:

a. Before wiring a subscriber to any terminating unit, turn all of the loop current controls fully counterclockwise.

b. The hub coupling unit is a very useful piece of equipment in that it minimizes the work necessary for wiring in multipoint half-duplex teletype circuits.

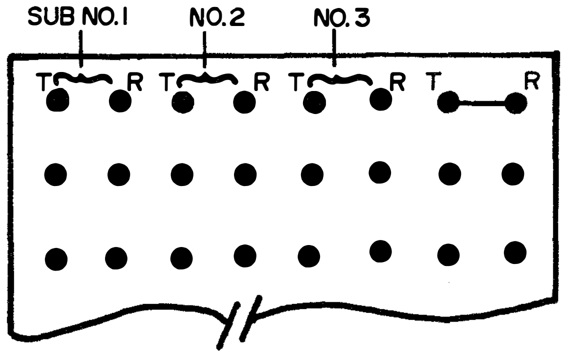


FIG 1. Typical frame connections for 3 subs

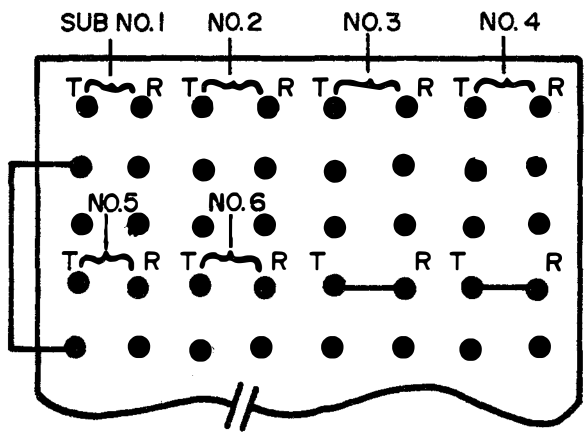
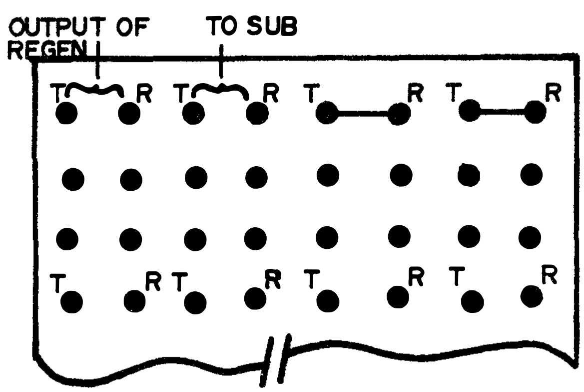


FIG 2. Typical frame connections for 5 or more subs



Incl 1
ITEM NR 0217-01
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FIG 3. Typical frame connections for tying sub to regen

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCVRG-PO

ITEM NR. 0221-02

SUBJECT: Engineering Changes to ICS Circuits

1. BACKGROUND: Past experience has shown that when engineering changes to circuits are made in the field, there is more danger of creating trouble than clearing it. It may appear "obvious" that the signalling frequency should be 1600 Hz not 2600 Hz; however, when this change is made only at one site, or even at both terminals, the trouble may still not be cleared. It is usually necessary to examine the entire circuit layout to determine exactly what is required. This is best done either by Networks Branch or DCA-SAM as appropriate.

2. PURPOSE: The purpose of this item is to clearly specify the proceedures to be followed in instances when engineering changes are required. These procedures have been coordinated with DCA-SAM.

3. GENERAL: All engineering changes on ICS circuits will be telephonically coordinated with Networks Branch, prior to any action on the part of the TCG. Networks Branch will analyse the problem and coordinate with DCA-SAM Engineering, V-520. A decision will be made and Networks Branch will inform the site of the action to be taken. Normally the circuit will be placed on a hold status and a pick-up CLR and new scheduled due date will be sent to the field. If expeditious action is required, sites will be informed by Networks Branch of the engineering changes to be made. Only upon such notification from Networks Branch will action be initiated. Your attention is drawn to the statement in the bottom left-hand side of all CLR cards: "IF CIRCUIT WIRING DIFFERS FROM THAT SHOWN ON THESE CARDS, RETURN CORRECTED COPY TO DCA-SAM". In all cases of engineering changes, a corrected copy of the CLR will be returned to DCA-SAM IAW with these instructions. The coordinating station is responsible for completion of the above action.

4. DCA-SAM DETACHMENTS: ALL DCA-SAM Detachments have been made aware of these policies by HQ, DCA-SAM. These are not meant to impede close working relations with the DCA-SAM field detachment, but rather, to prevent confusion that may result because of division of the responsibility for authorizing and coordinating engineering changes. In instances of acute

emergency, the site OIC should use his own good judgement; however, experience has shown, on many occasions, that following the procedures outlined herein results in clearing troubles faster than by implementing uncoordinated changes.

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0231-01

SUBJECT: Expedited Circuit Activations

1. Background: The standard activation procedure as described in Item Nr. 0211 requires a minimum of four days to complete. There are often requirements that must be met in less time than this. The two primary causes of delay are: (a) The time required to transmit the cutover documents to the site and (b) the time rquired to wire the conditioning equipment specified on the CLR. It is necessary to develop special procedures to follow when response time is critical. It should be noted though, that excessive use of these procedures could cause a large amount of confusion and greatly lower the overall efficiency of the ICS. Thus it is necessary in expediting activations to vary as little as possible from the normal procedure and follow up the variations as quickly as possible. Due to the increased number of immediate circuits, reflecting the changing situation, a joint effort of all involved is necessary to prevent downgrading the overall efficiency of the ICS.

2. Concept: The two primary causes of delay are countered in the following manner: (a) The time required to transmit the cutover documents is eliminated by using telephonic communications to the individual sites involved and (b) the time required to wire the conditioning equipment specified on the CLR is eliminated through the use of Pre-Wired Equipment.

3. Procedure:

a. Normally DCA-SAM will be notified of the requirement for an immediate circuit and will receive special details as to the type of service desired, etc. Occassionally, DCA Detachments will not contact DCA-SAM but will issue instructions directly to an ICS site. The initial reaction at the site will be to contact Networks Branch who in-turn will contact DCA-SAM in order to verify the requirement and have the necessary paper work initiated. In cases of extreme operational emergencies, the decision to activate without Networks Branch coordination will be at the discretion of the site OIC. Since Networks Branch is operated on a 24 hour basis, cases of extreme emergency should be rare. Loss of ability to communicate with Networks Branch would be considered as an extreme emergency.

b. DCA-SAM, V510, will make a rough draft CEO and immediately contact Networks Branch, Telephonically passing the necessary information for immediate activation. V510 then passes the necessary information to V520 who immediately begins the immediate Master CLR. V510 then dispatches the CEO to the field.

c. Networks Branch, as soon as the necessary information has been received from V510, contacts each site involved giving them the route into and/or out of house as well as the type of Pre-wired Equipment to utilize (See Item Nr. 0511). Each distant end is given the necessary information to wire into their sub as well as contact name and number if available. At this point the sites can establish the radio path, tie in the subscribers, and activate the circuit.

d. V520 completes the Master CLR and delivers it to Networks Branch.

e. Networks Branch personnel will assign the necessary conditioning equipment.

f. Networks Branch will then telephonically contact each individual site involved, inform them to pull a particular Immediate Circuit Pre-Print and pass the hard-wired equipment assignments to them. The site will immediately wire in the assigned equipment and free the pre-wired equipment which was utilized.

g. Networks Branch will then return the Master CLR to V520 for reproduction in card form. The CLR's are returned to Networks Branch who inturn distributes it to the field. The individual sites will remove the Immediate Circuit Pre-Print and replace it with the CLR.

4. Scheduling of Activation: Normally, circuits important enough to warrant expedited procedures as described in this item will have first priority for activation over all other activations in progress. If there appears to be any possible problems either in activating this circuit, or it conflicts with other actions, the Chief, Networks Branch, MACV 2260/2361, will be notified immediately.

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0241-02

SUBJECT: Standard Circuit Configuration

1. Background: There are several circuit configurations that are frequently used in preparing Circuit Layout Records. The use of standarized configurations assists in discussing CLR details by teletype or telephone.

2. Purpose: This item specifies the layout and common usage of 25 standard circuit configurations used by DCA-SAM in preparing CLR's.

3. General:

a. The standard circuit configurations are listed in para 4 with figures shown in Incl 1.

b. Several of the circuit configurations have blank spaces left in them, e. g. T4I-2, L/R4I-3, L/R4I-1. These are to permit either attenuators or amplifiers to be inserted as required.

4. Description of Pre-prints:

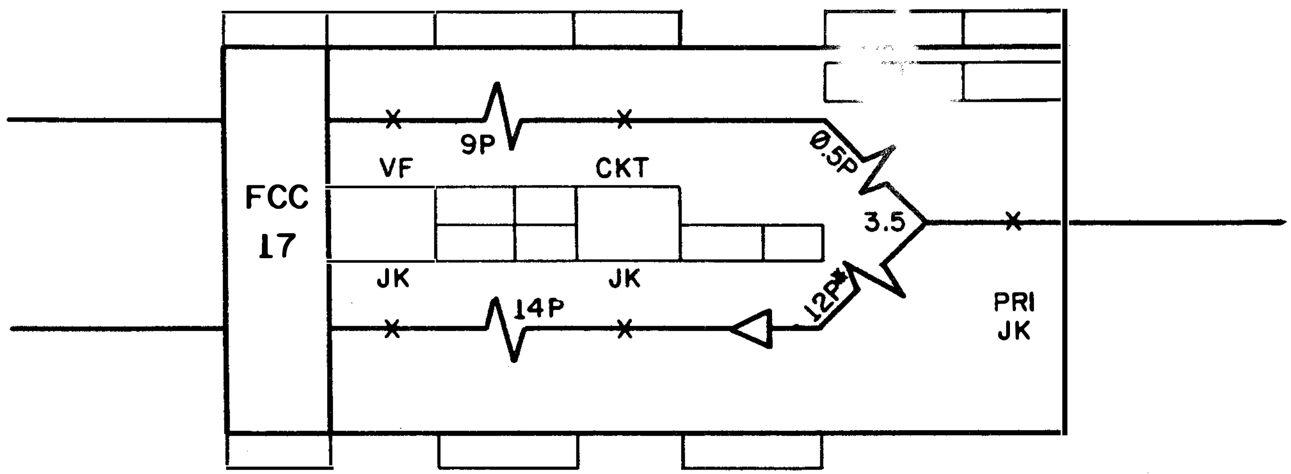
PRE-PRINT DESIGNATOR	DESCRIPTION
L/R2I-2	IWCS MUX to two-wire subscriber. 2600 Hz SF signalling with 20 Hz ringdown. Standard levels at VF and CKT jacks
L/R2I-3	IWCS MUX to two-wire subscriber. 1600 Hz signalling with 20 Hz ringdown. Standard levels at VF and CKT jacks.

PRE-PRINT DESIGNATOR	DESCRIPTION
T4I-2	2600 Hz SF to 1600 Hz SF conversion. Missing elements may be either attenuators or amplifiers to obtain levels desired. Standard levels at VF and CKT jacks.
T4I-1	IWCS MUX to IWCS MUX. No signalling. Standard levels at VF and CKT jacks.
L/R4I-3	IWCS MUX thru CCT jacks to Transportable MUX on PRI jacks. No signalling. Missing unit may be attenuator or amplifier as necessary. Standard levels at VF and CCT jacks. Levels at PRI jacks vary depending on levels required to interface with Transportable MUX.
L/R2I-1	IWCS MUX to two-wire subsriber. No signalling. Standard levels at VF and CKT jacks. Variable at PRI jacks.
L/R4I-1	IWCS MUX to Transportable MUX on VF jacks. No signalling. Missing unit may be attenuator or amplifier as necessary. Standard levels on IWCS VF jack and both CKT jacks. Variable on Transportable MUX VF jack.
L/R4I-8	VF composite tone path of VFCT System
L/R2I-8	Used to specify a pre-wired contingency path used to patch a circuit through the tech control from IWCS MUX to a 2 wire ringdown subscriber.
T4I-4	Four-way four-wire bridge. Thru legs are IWCS MUX. One leg terminated by local subscriber and one leg terminated by 600 ohm termination.
L/R6I-1	IWCS MUX to 6-wire subscriber, E & M signalling extended, 2600 Hz SF signalling. Standard levels at VF, CKT and PRI jacks.
T4I-3	Four-way four wire bridge. Thru legs are IWCS MUX. One leg terminated by 600 ohm termination.
L/R2I-9	Used to show half duplex operation where the VFCT supplies loop battery on both send and receive loops. The isolation relay is required to isolate the send and receive loop batteries so that only one supplies loop current for the subscriber.

PRE-PRINT DESIGNATOR	DESCRIPTION
L/R4I-12	Used for full duplex operation where the VFCT equipment supplies loop battery on the receive loop only. The battery for the transmit loop is supplied by the subscriber's equipment.
L/R4I-13	Used for full duplex operation where the transmit and receive battery is suppled by the VFCT equipment.
L/R4I-15	Used for full duplex operation where it is necessary to interface IWCS VFCT to VFCT's with different loop battery requirements.
T2I-1	Used for full duplex operation where two compatible VFCT systems are interfaced. Both VFCT systems supply loop battery for their own receive loops.
T2I-2	Used for half duplex operation multi-pointed. Interfacing two compatible VFCT systems and providing access to the system by a local subscriber. When this pre-print is used, the distant end subscribers must be configured for full duplex operation.
TLR-6 TLR-7 TLR-8	Used for equipment assignment of VF and CKT jacks, and MUX channels to a Trunk Group.
T4I-5 T4I-7 T4I-8	Used to show path for contingency and programmed pre-empt circuits utilizing existing circuit paths
T4I-6	Used to specify a pre-wired contingency path used to patch a circuit through the tech control from one IWCS MUX to another IWCS MUX.

CCSD	DCA-SAM ENGR/DATE	TSN 3725 RCG ENGR/DATE

TCG



*PAD INCLUDES 6DB
VARISTOR NET LOSS

2D

REMARKS

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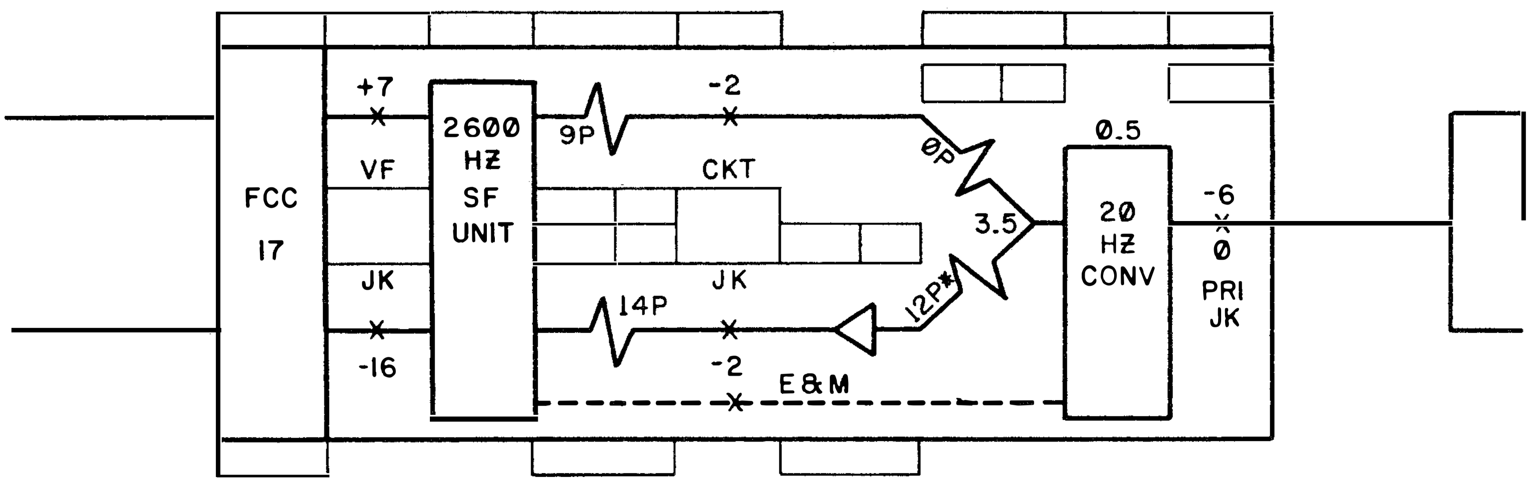

*PAD INCLUDES 6DB
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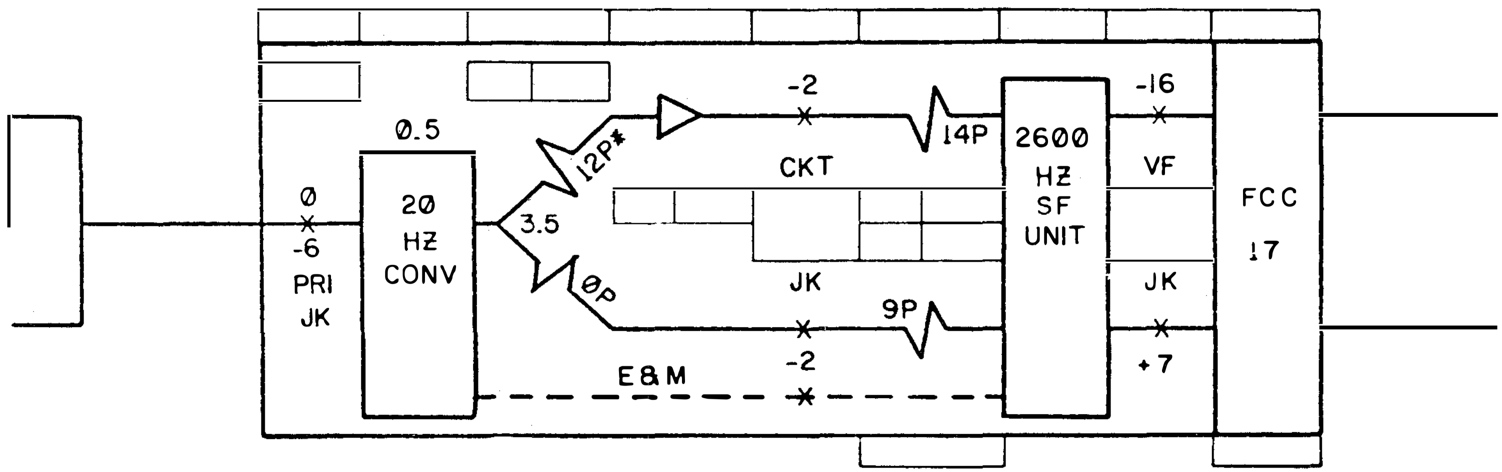

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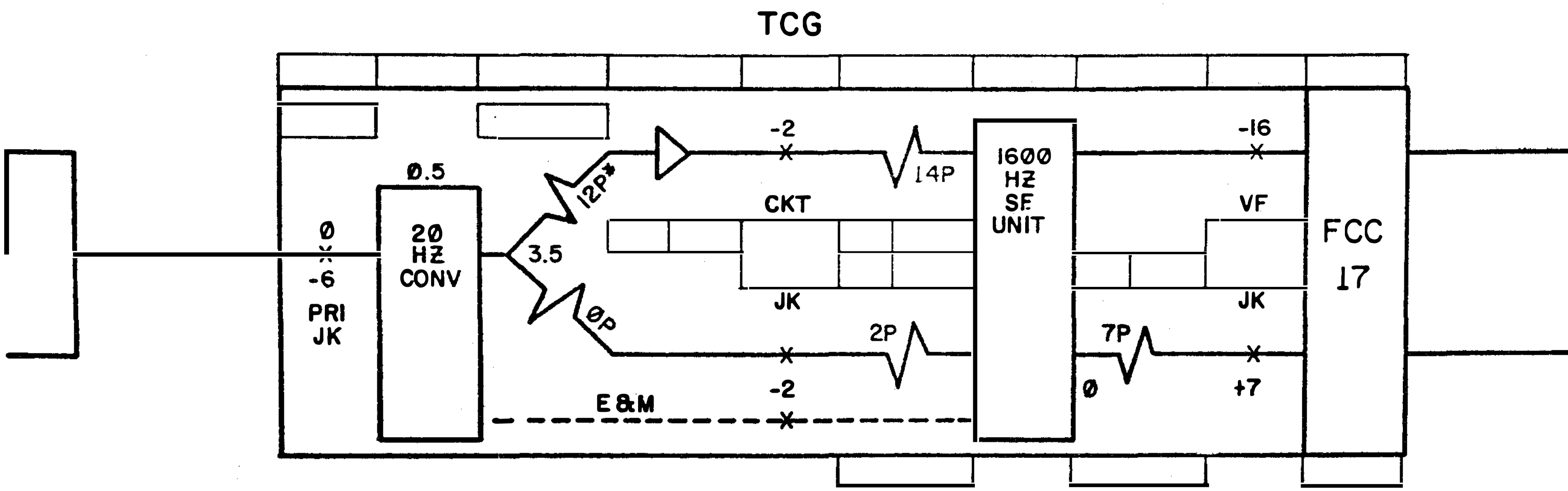

*PAD INCLUDES 6DB VARISTOR NETWORK LOSS

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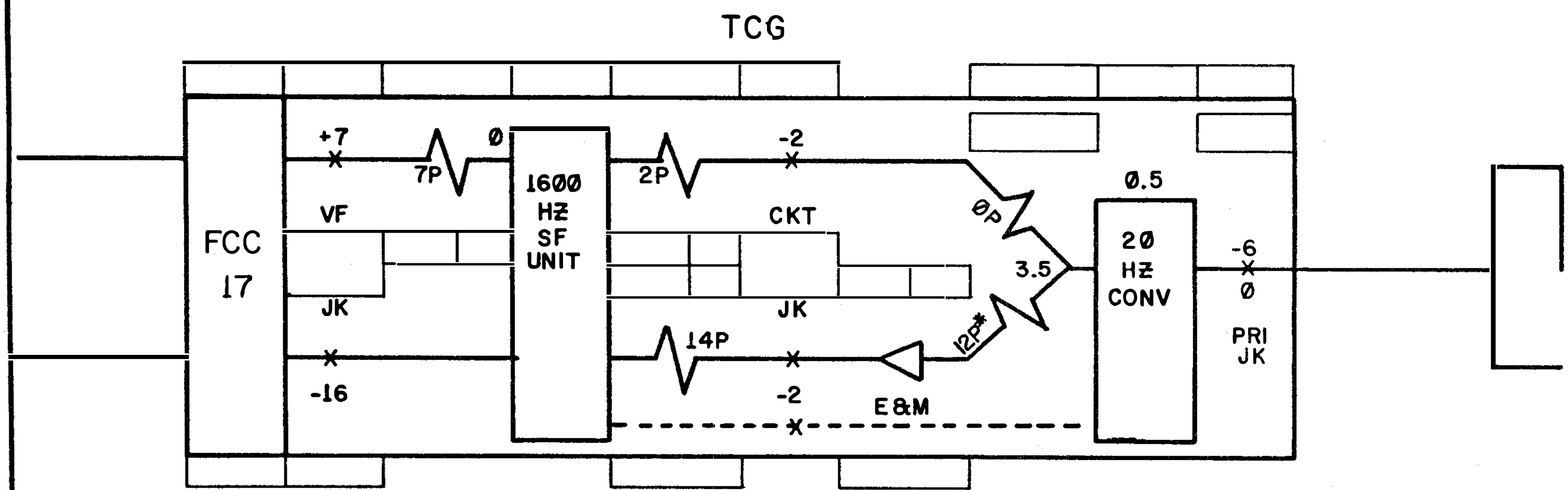

*PAD INCLUDES 6DB VARISTOR NETWORK LOSS

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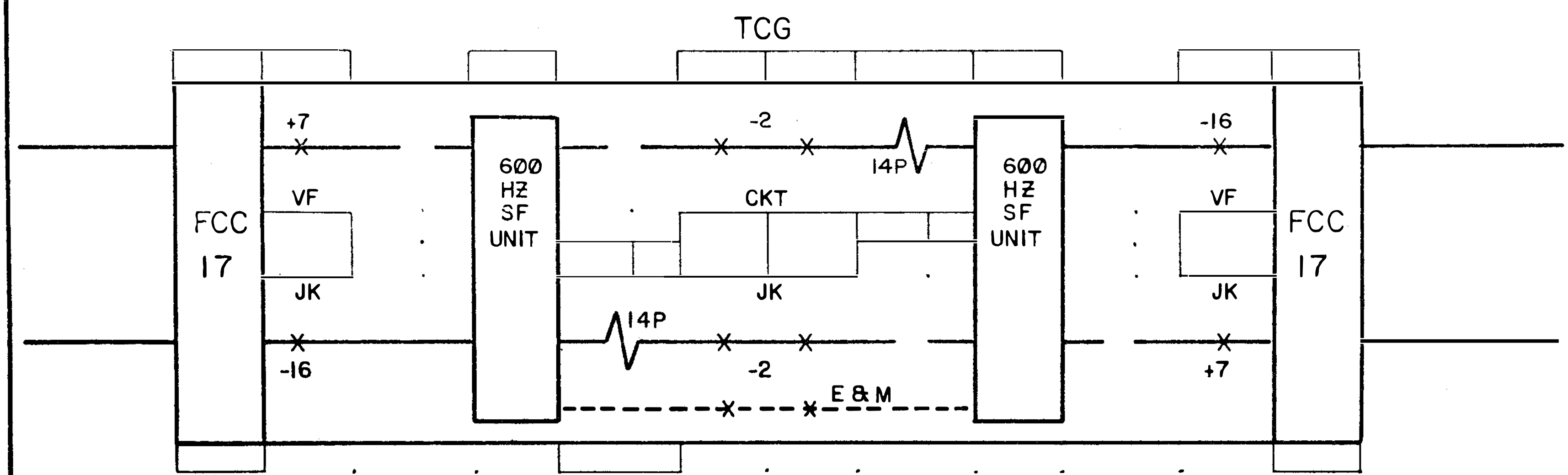

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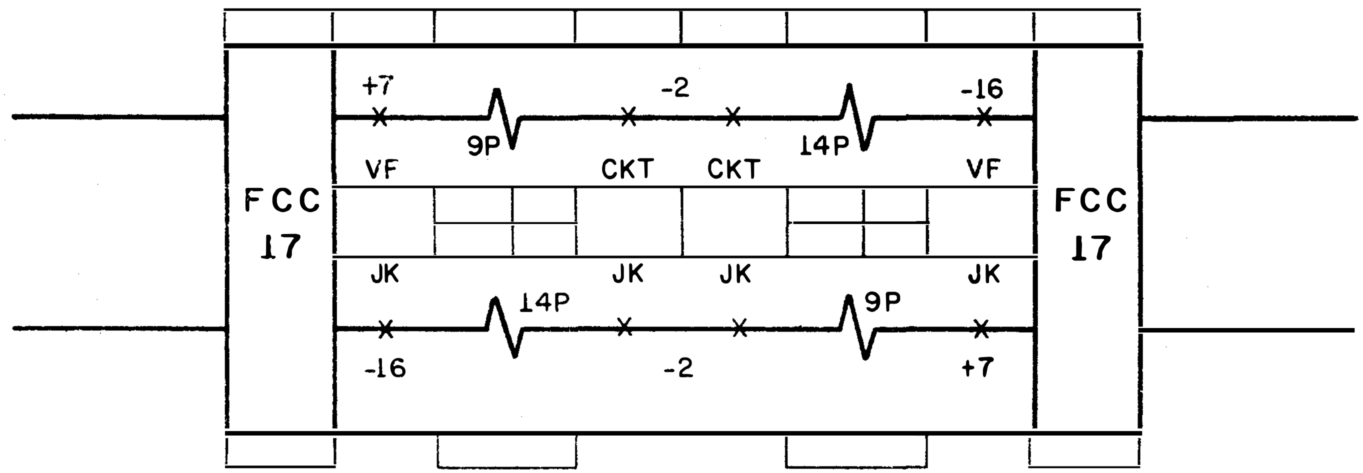
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

DCA-SAM FORM OCT 67 CLR-7

T4I-2

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE



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REMARKS

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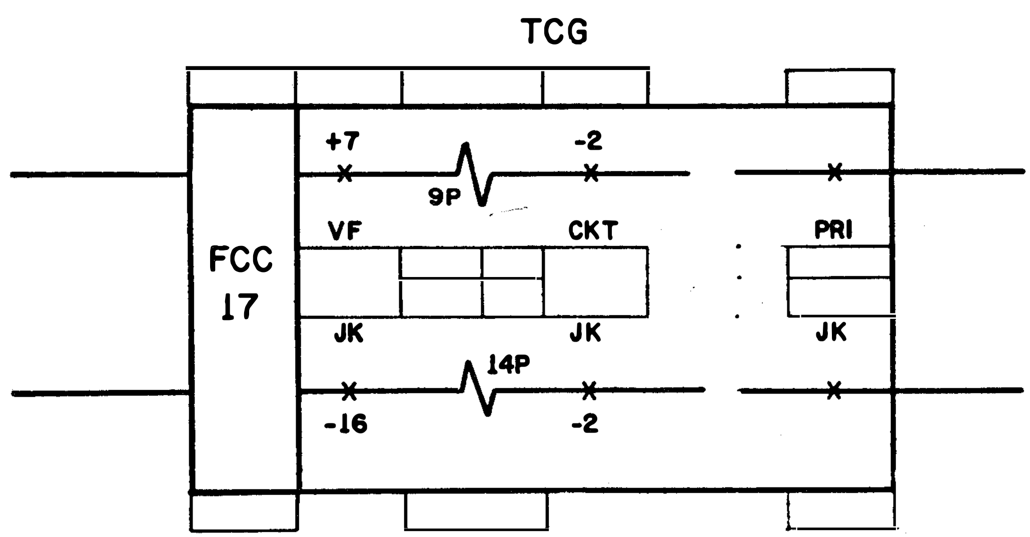

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REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

R4I-3

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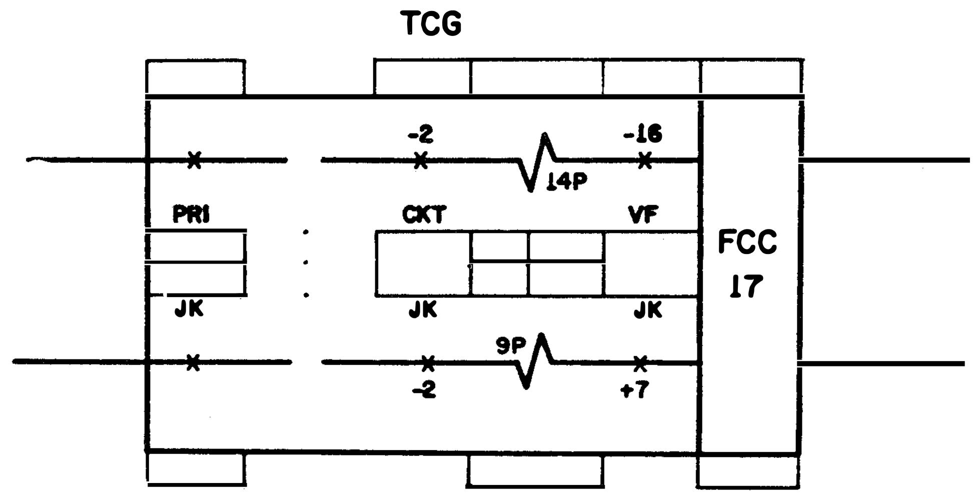

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REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

L4I-3

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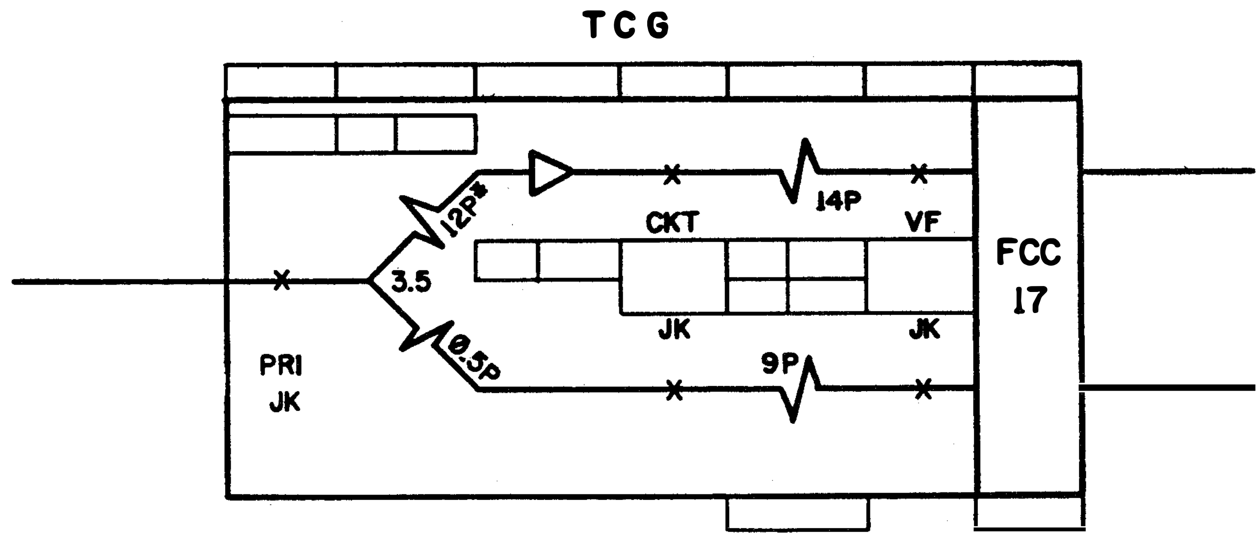

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D2

REMARKS

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DCA-SAM FORM OCT 67 CLR-7

L2I-1

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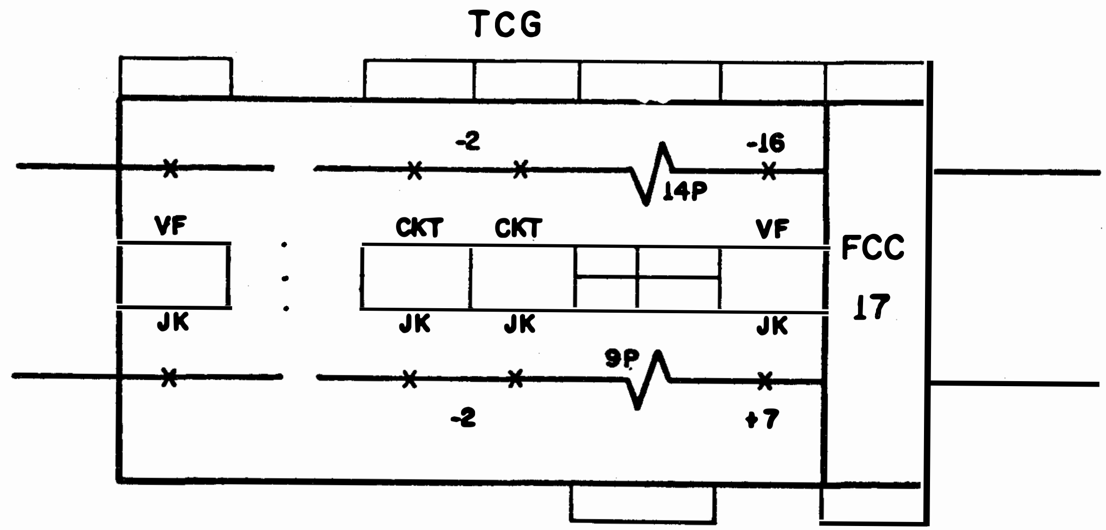

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REMARKS

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DCA-SAM FORM OCT 67 CLR-7

L4I-1

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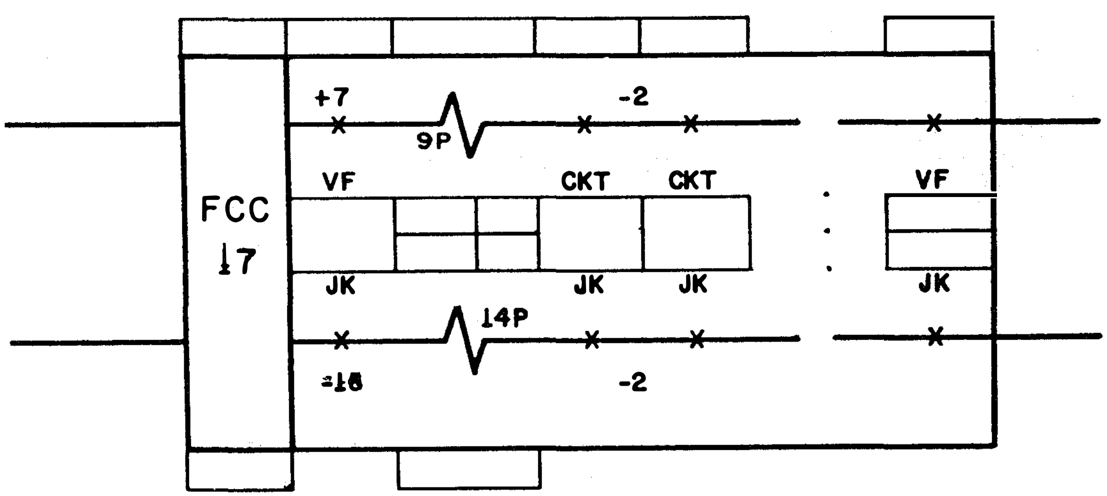

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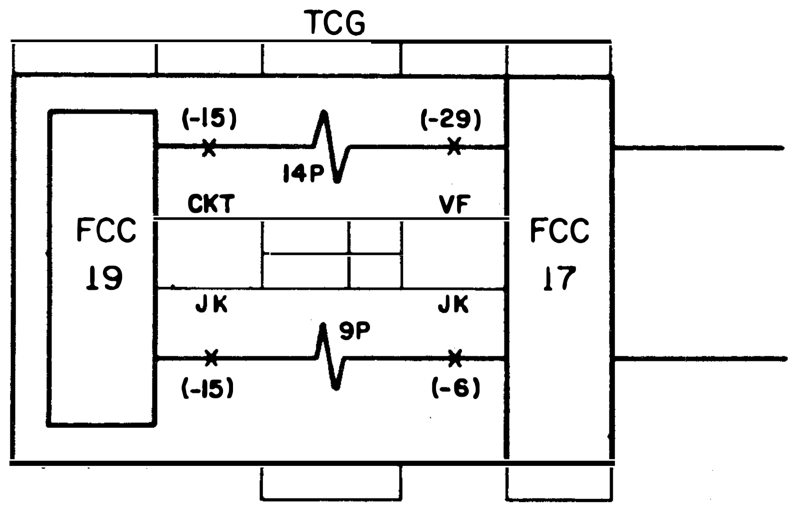

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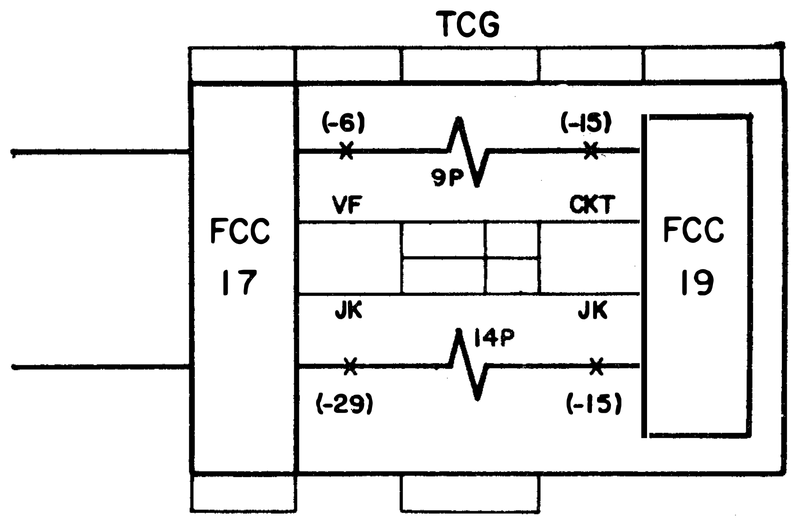

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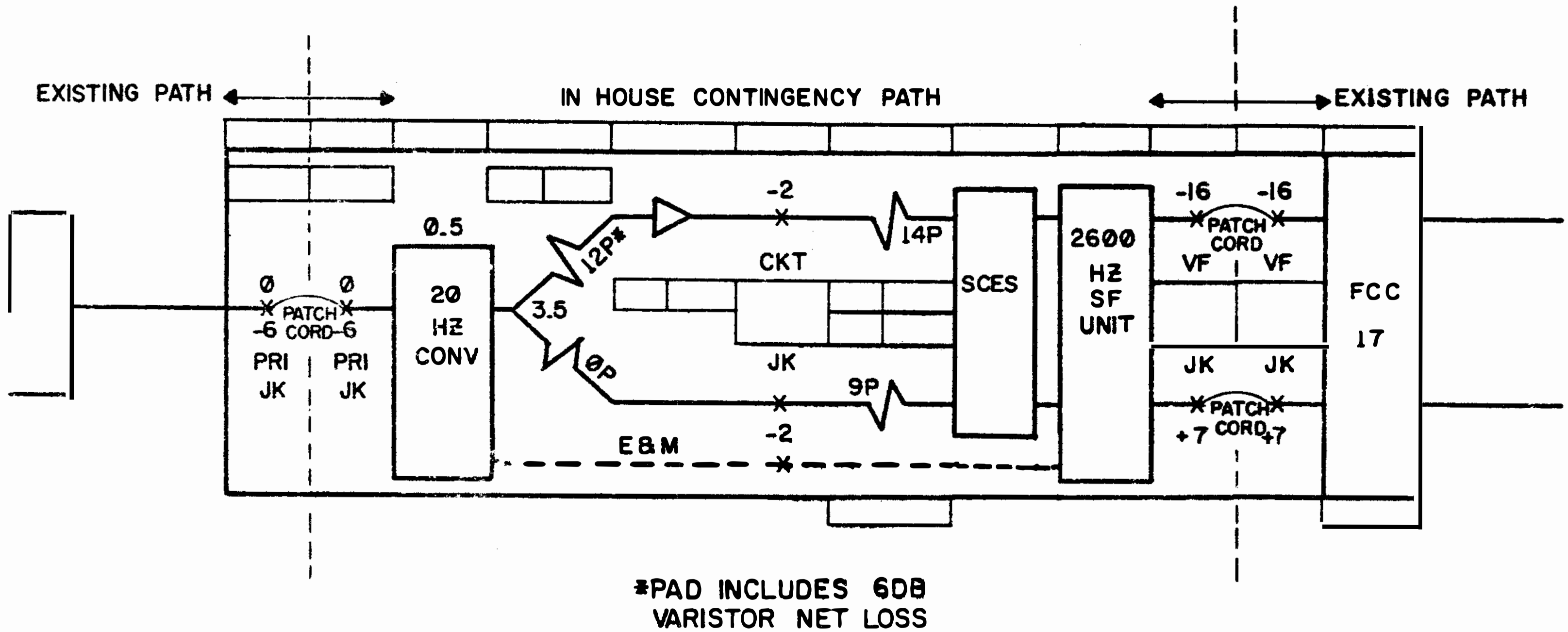

REMARKS

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DCA-SAM FORM OCT 67 CLR-7

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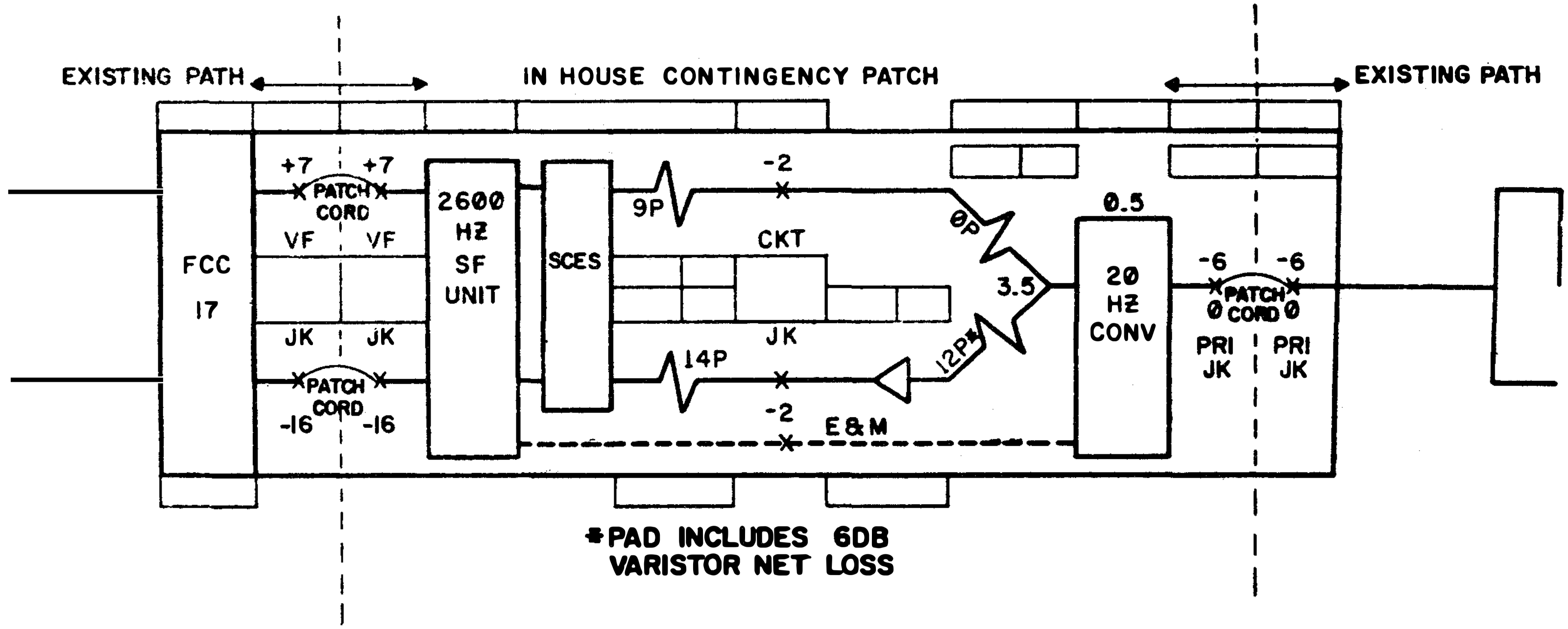


*PAD INCLUDES 6DB VARISTOR NET LOSS

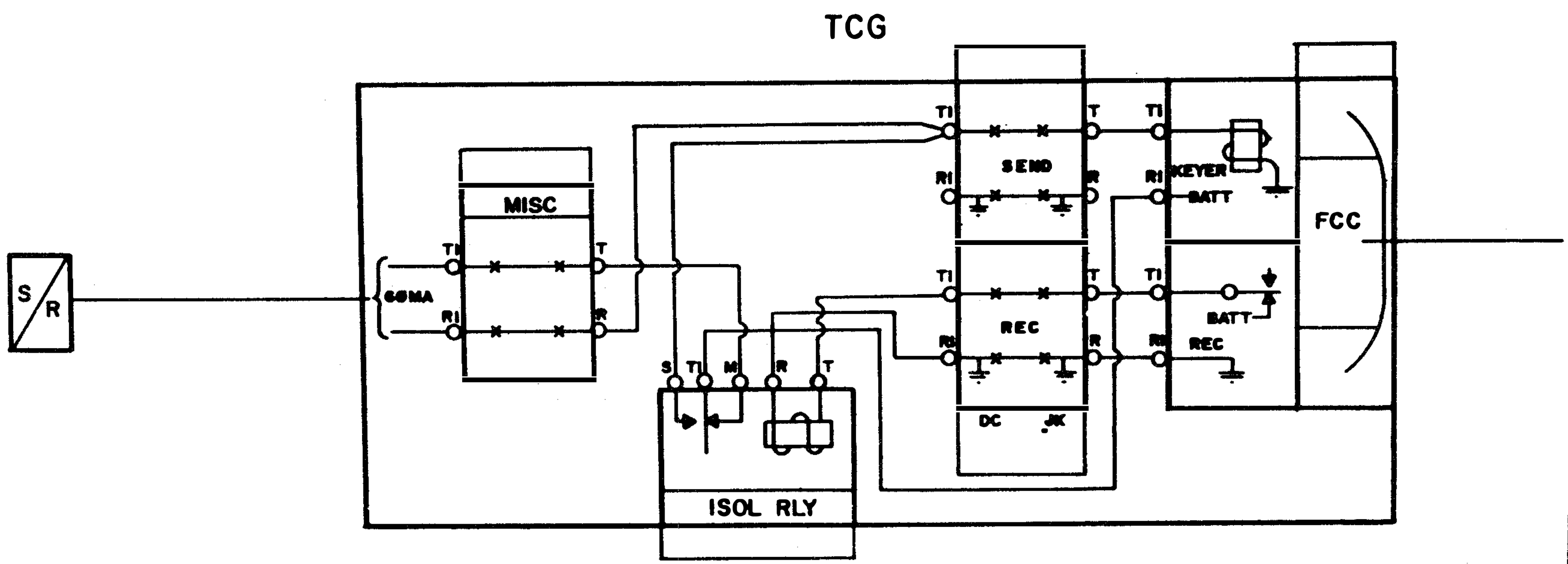
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

DCA-SAM FORM OCT 67 CLR-7

R2I-8

CCSD	DCA-SAM ENGR/DATE TSN 3725	RCG ENGR/DATE



REMARKS

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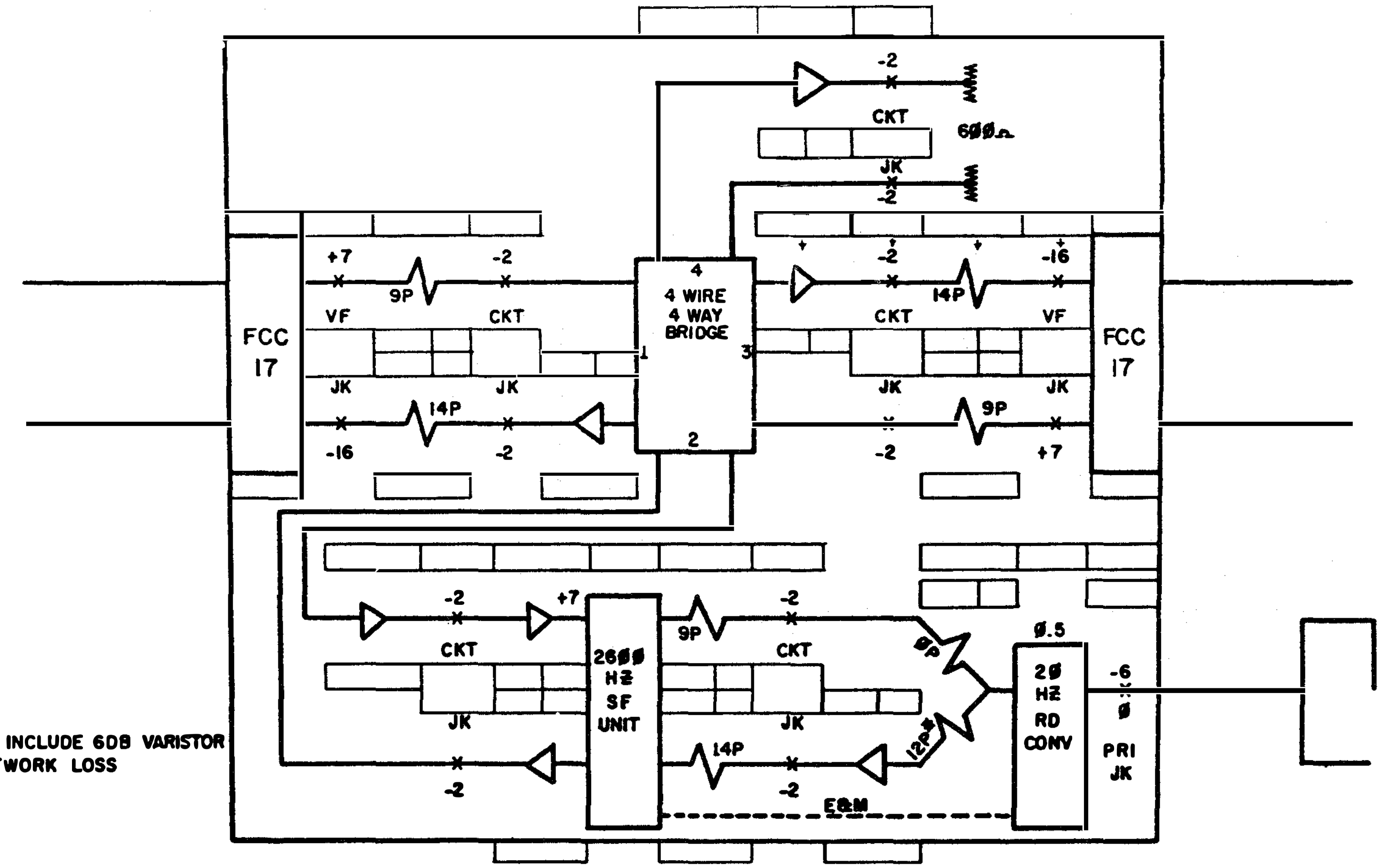

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44A

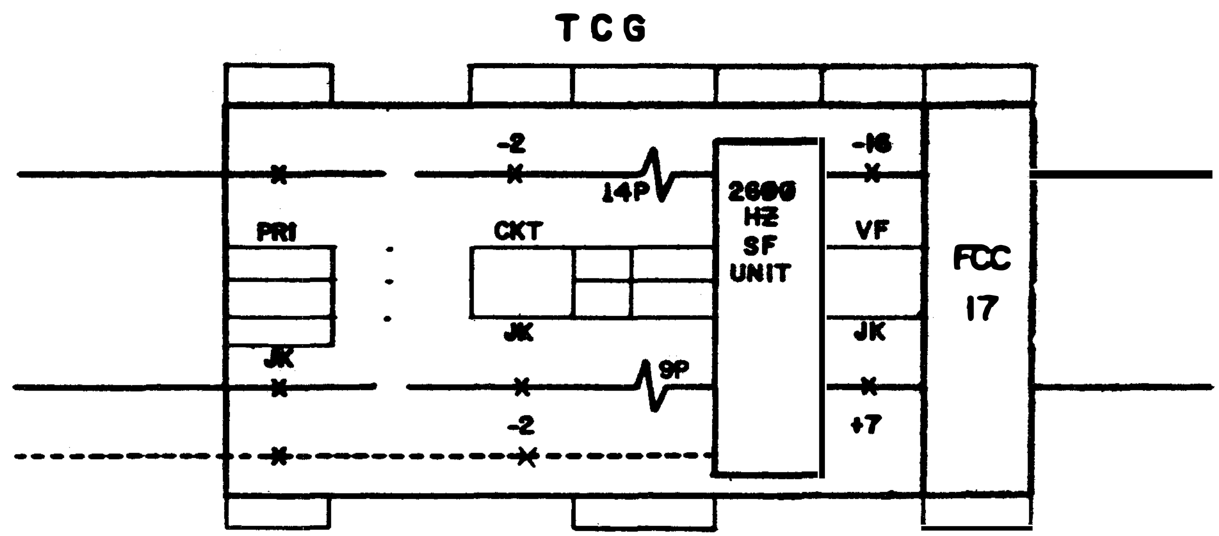
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

DCA-SAM FORM OCT 67 CLR-7

T4I-4

CCSD	DCA-SAM ENGR/DATE	TSO 3726 RCS ENGR/DATE



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REMARKS			
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DCA-SAM FORM OCT 67 CLR-7

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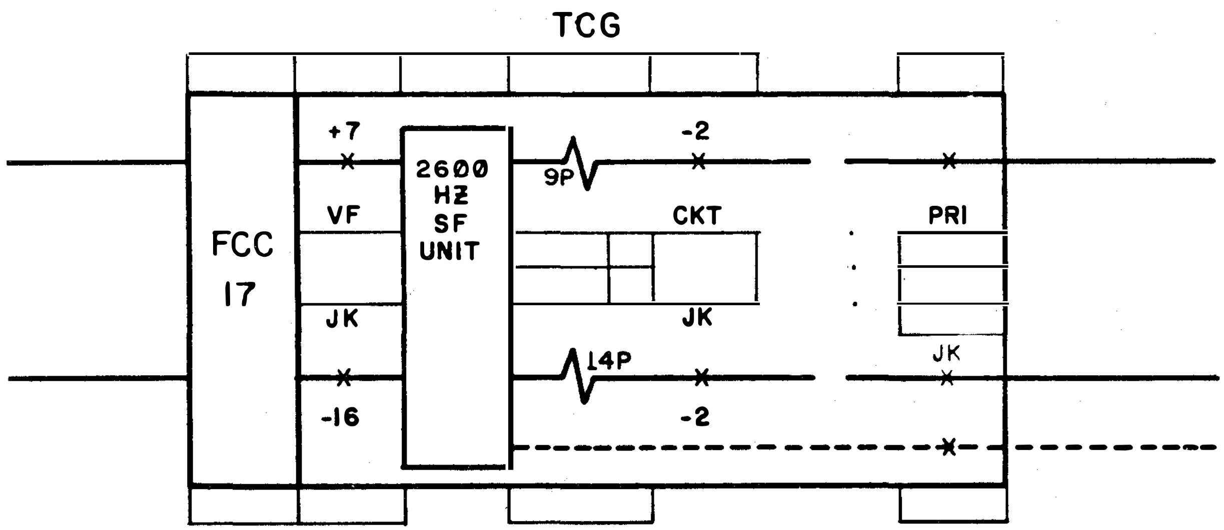


1B

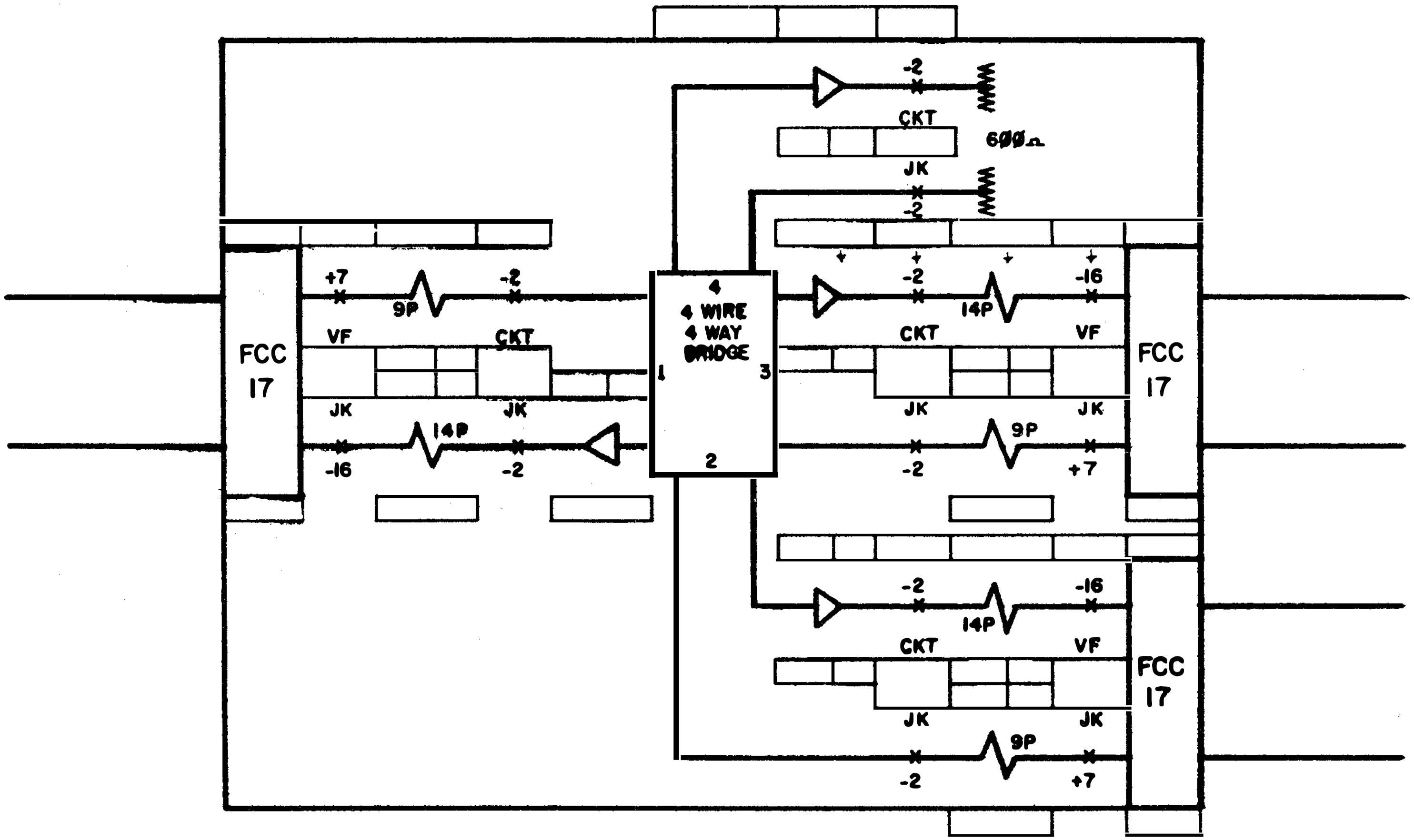
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

DCA-SAM FORM OCT 67 CLR-7

R6I-1

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE



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REMARKS			
CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

T4I-3

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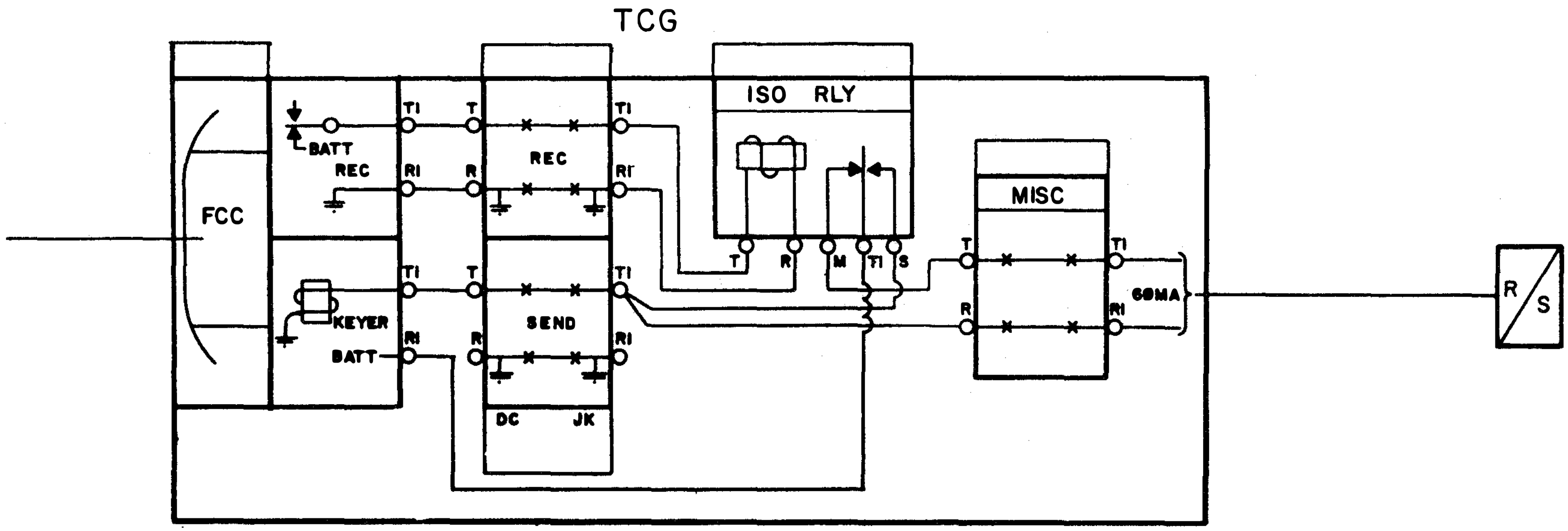


REMARKS

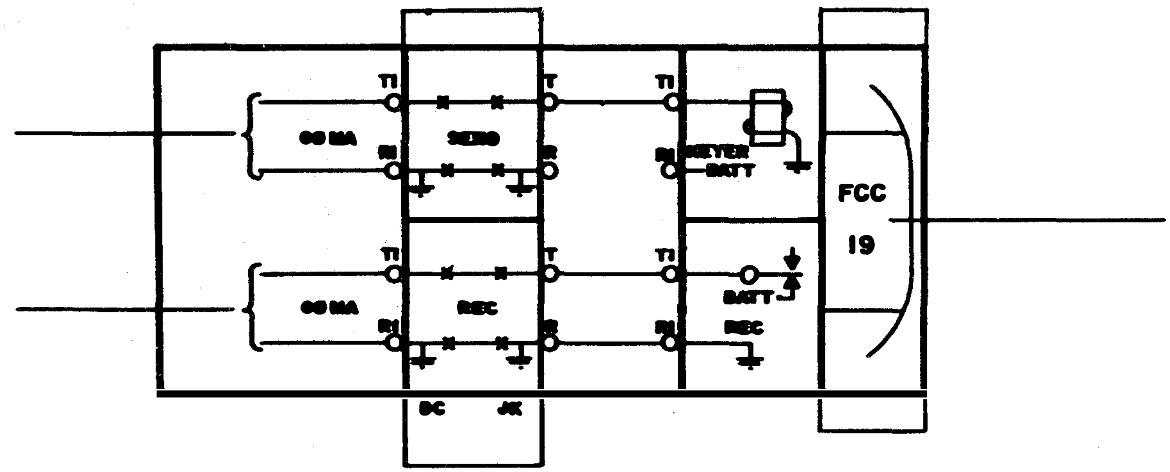
CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

DCA-SAM FORM OCT 67 CLR-7

R2I-9

	DCA-SAM ENGR/DATE	TSN 372.5	RCS ENGR/DATE

TCG



REMARKS

	DISTRIBUTION	CLR NUMBER	CARD OF

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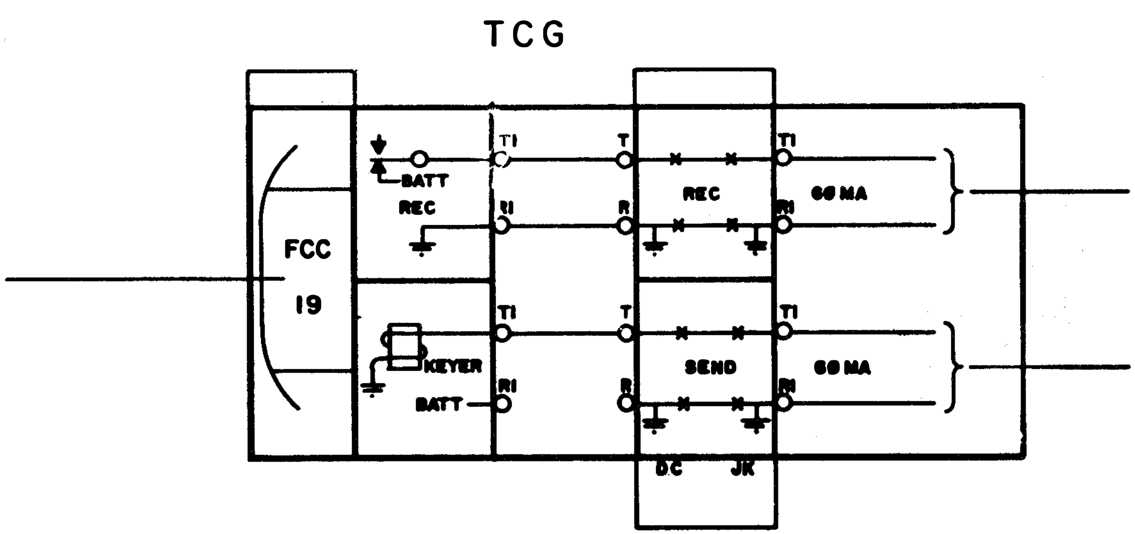


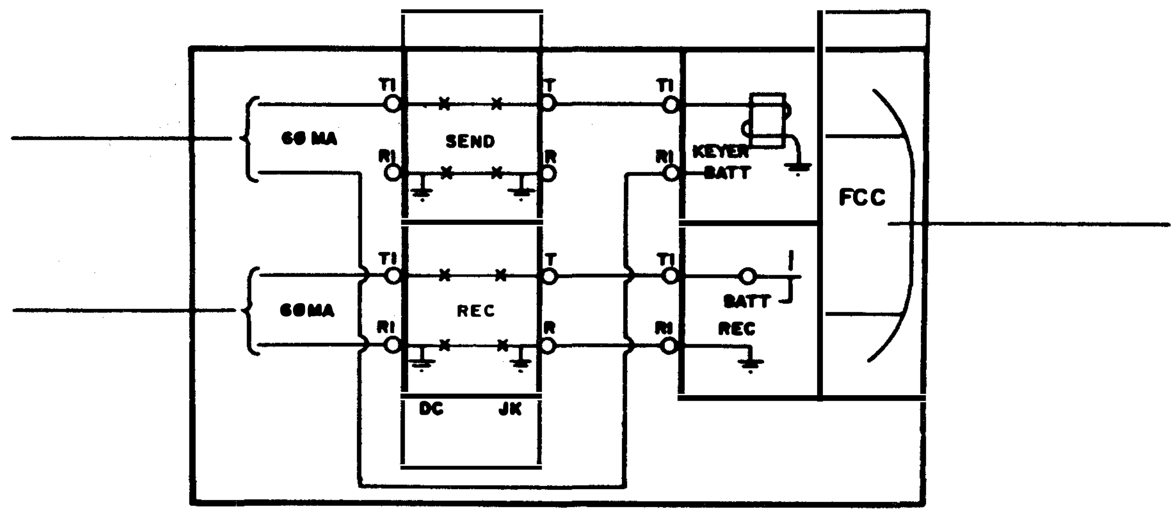
REMARKS			
CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

R4I-12

CCSO	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE

TCG

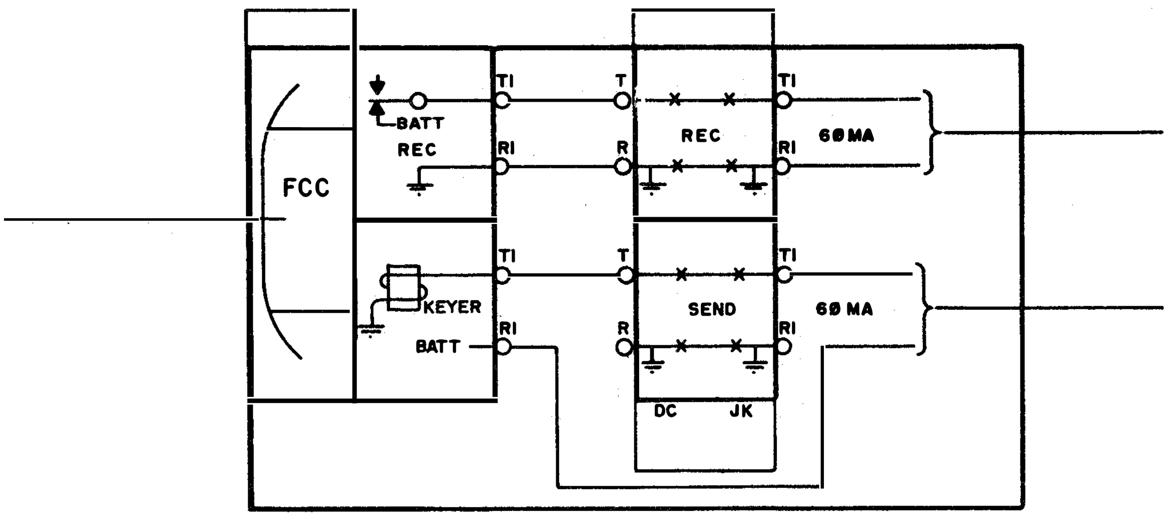


REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE

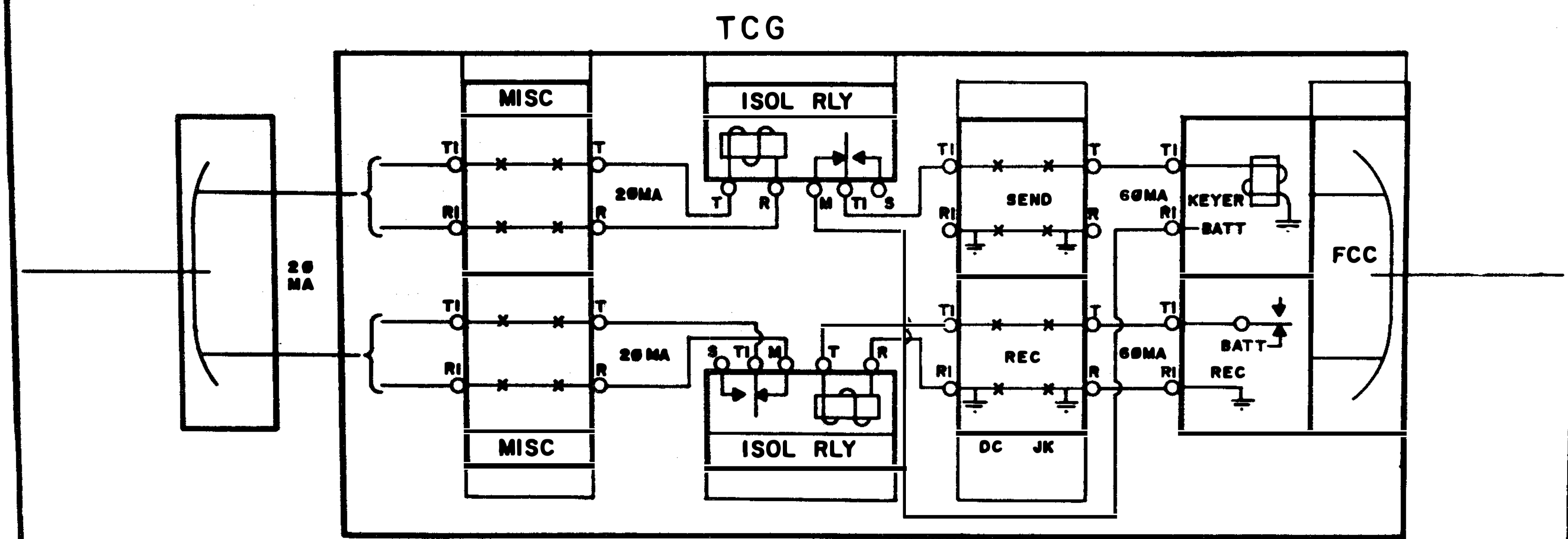
TCG



REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE



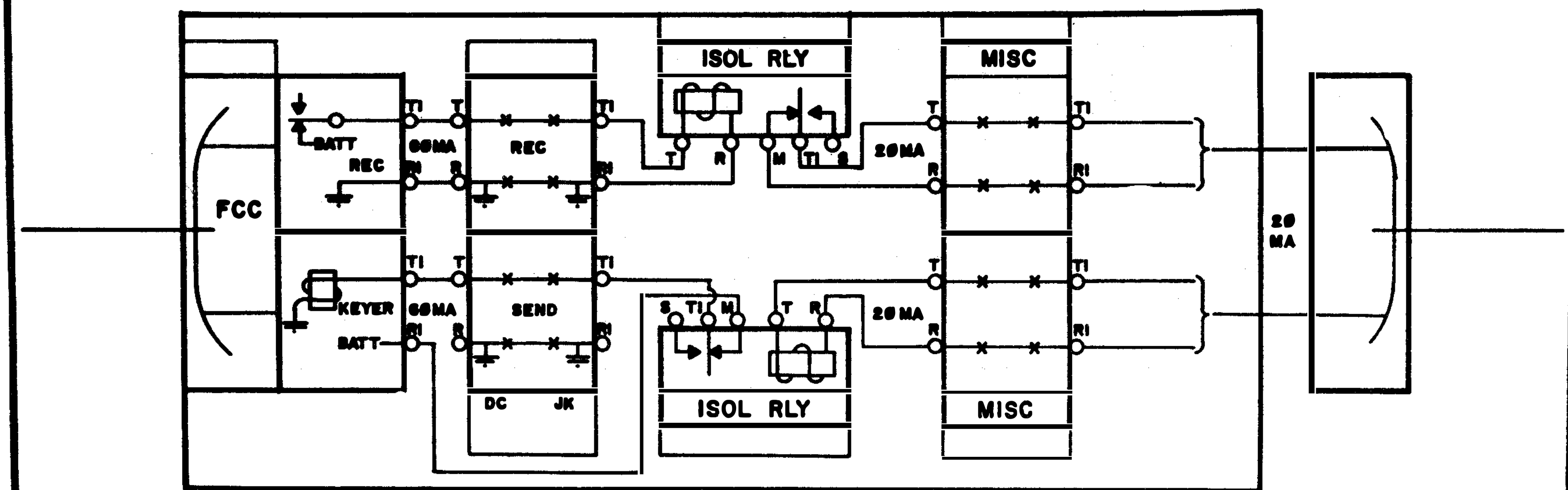
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

L4I-15

CCSD	DCA-SAM ENGR/DATE TSN 3725	RCG ENGR/DATE



REMARKS

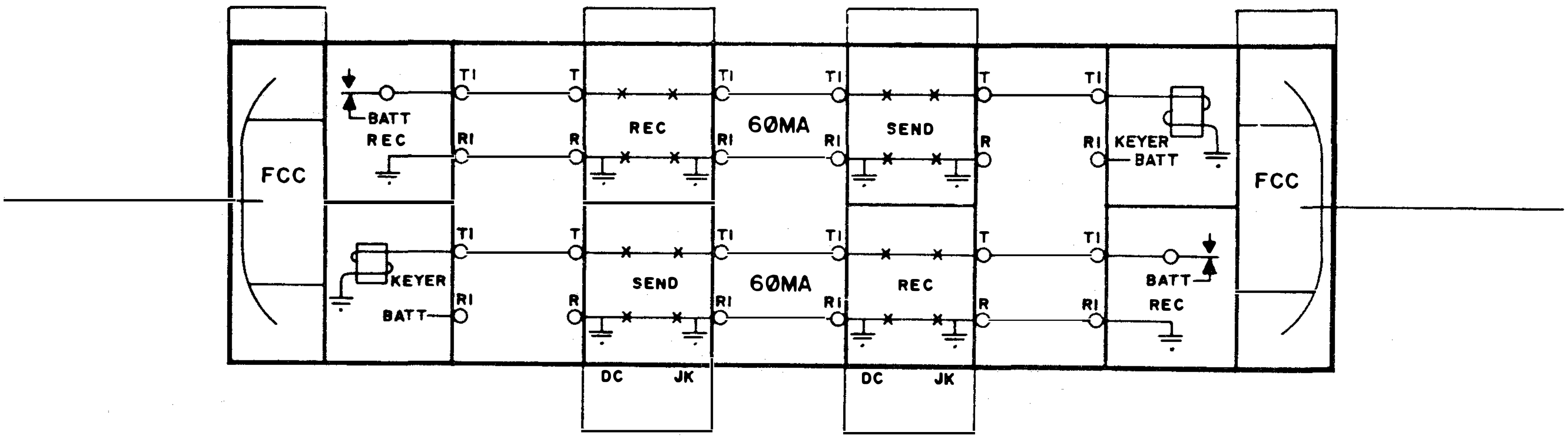
CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

R4I-15

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE

TCG



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DCA-SAM FORM OCT 67 CLR-7

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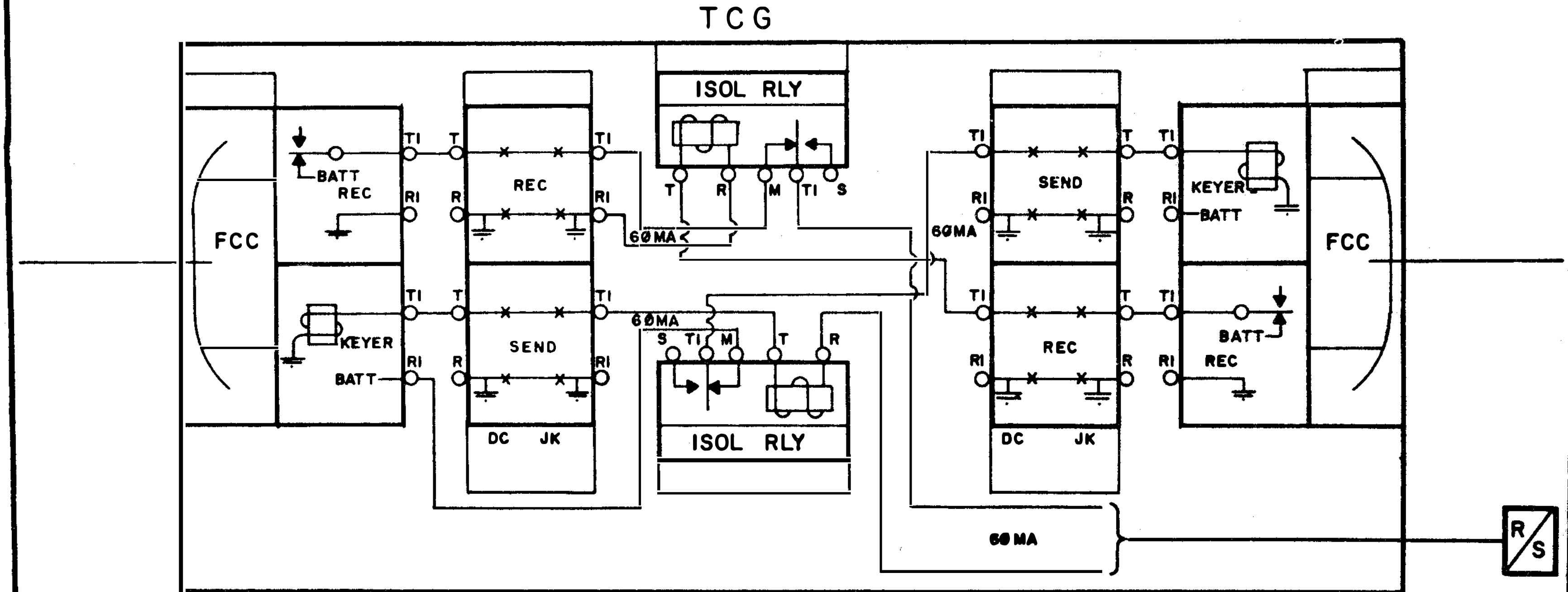

REMARKS			
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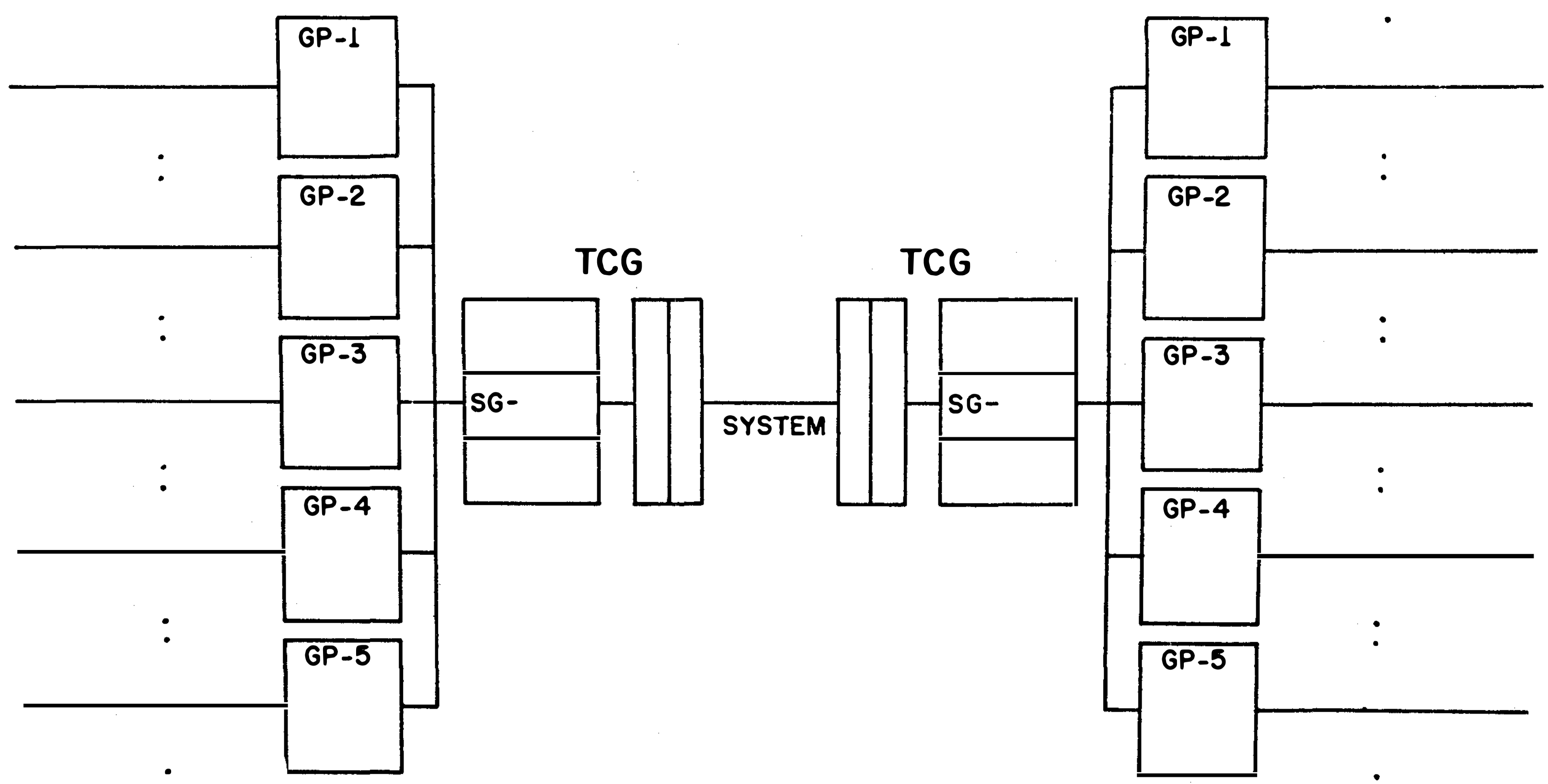
TRUNK DESIG	DCA-SAM ENGR/DATE	RCG ENGR/DATE



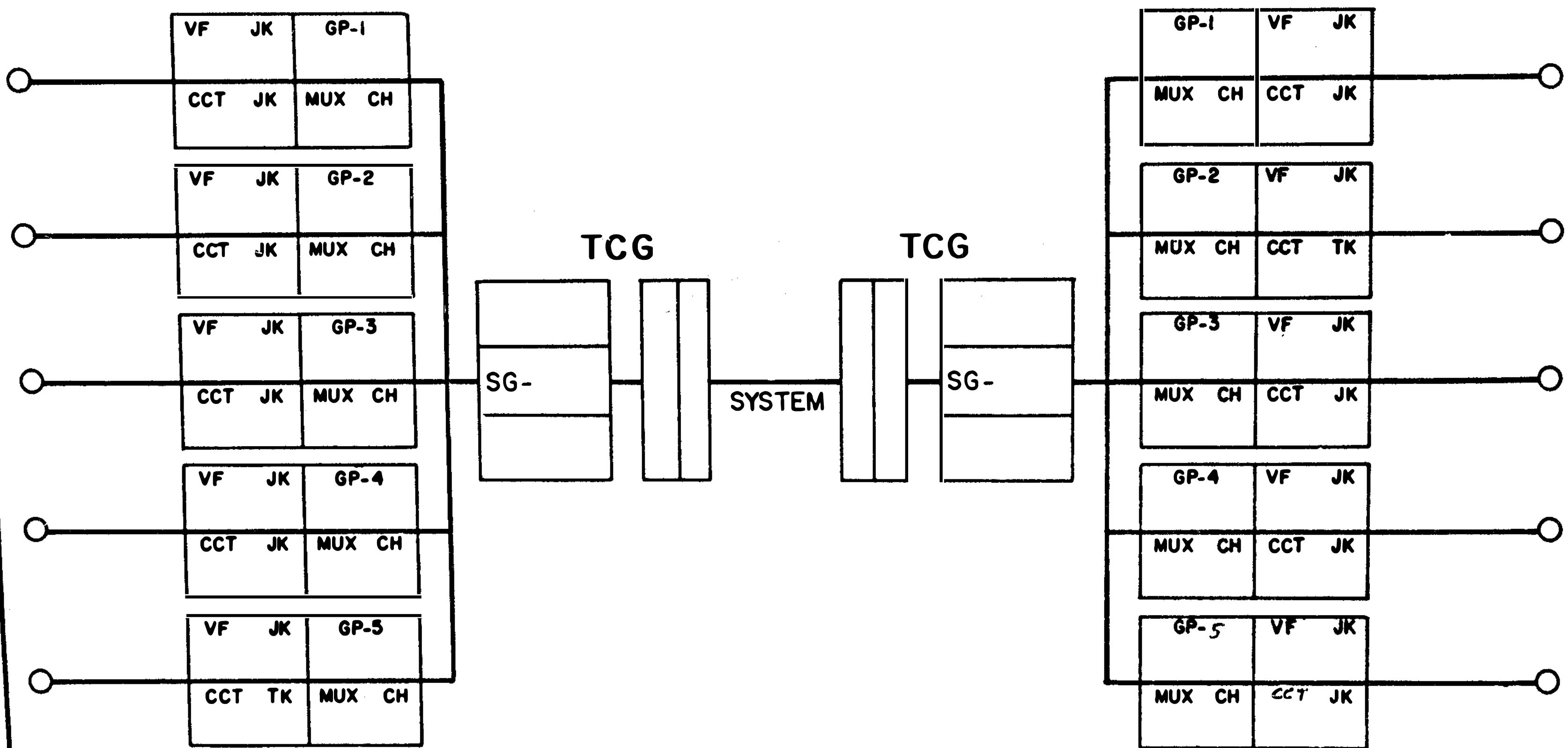
REMARKS

TRUNK DESIG	DISTRIBUTION	TLR NUMBER	CARD OF

DCA-SAM FORM DEC 67 TLR-5

TLR-6

TRUNK DESIG	DCA-SAM ENGR/DATE	RCG ENGR/DATE



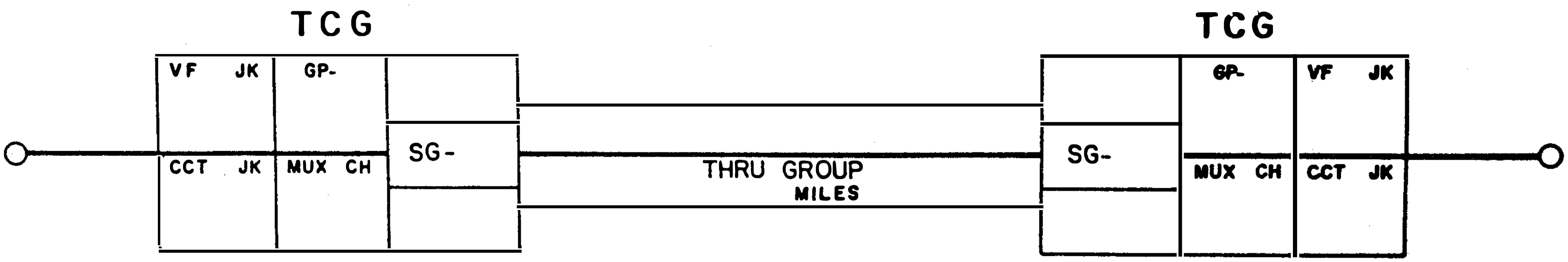
REMARKS

TRUNK DESIG	DISTRIBUTION	TLR NUMBER	CARD OF

DCA-SAM FORM DEC 67 TLR-5

TLR-7

TRUNK DESIG	DCA-SAM ENGR/DATE	RCG ENGR/DATE



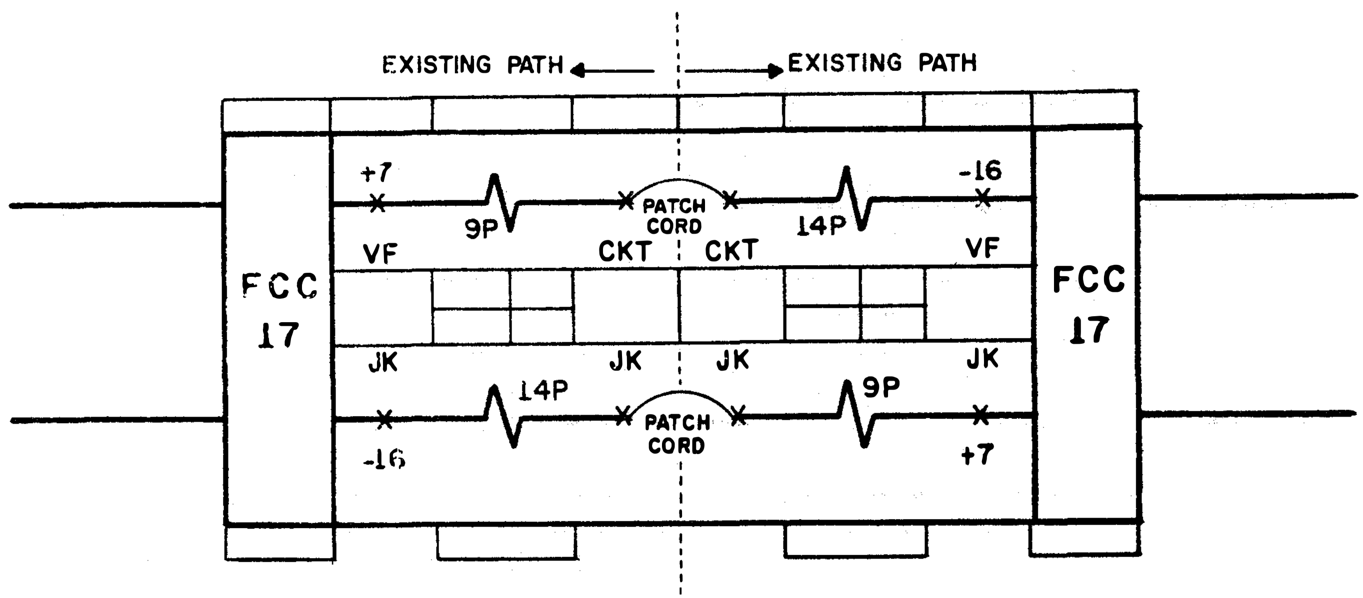
REMARKS

TRUNK DESIG	DISTRIBUTION	TLR NUMBER	CARD OF

DCA-SAM FORM DEC 67 TLR-5

TLR-8

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE



2LR

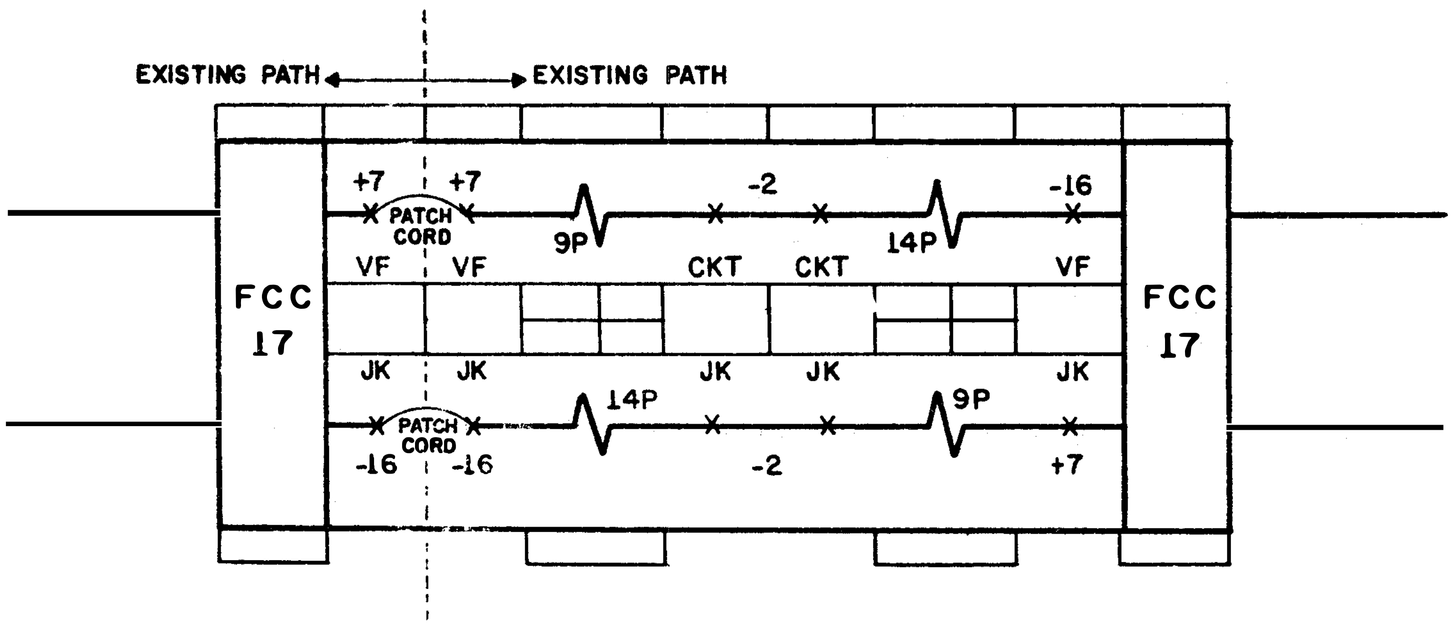
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

DCA-SAM FORM OCT 67 CLR-7

T4I-5

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE



2LR

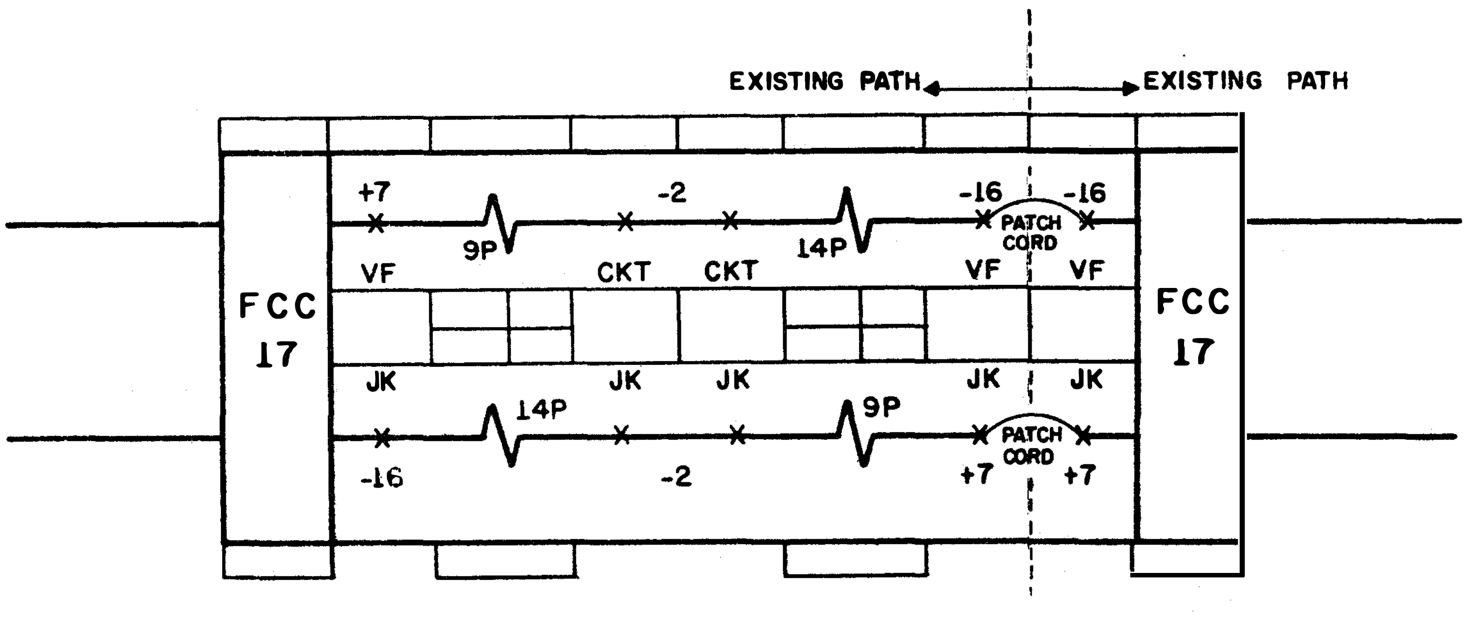
REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

T4I-7

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE

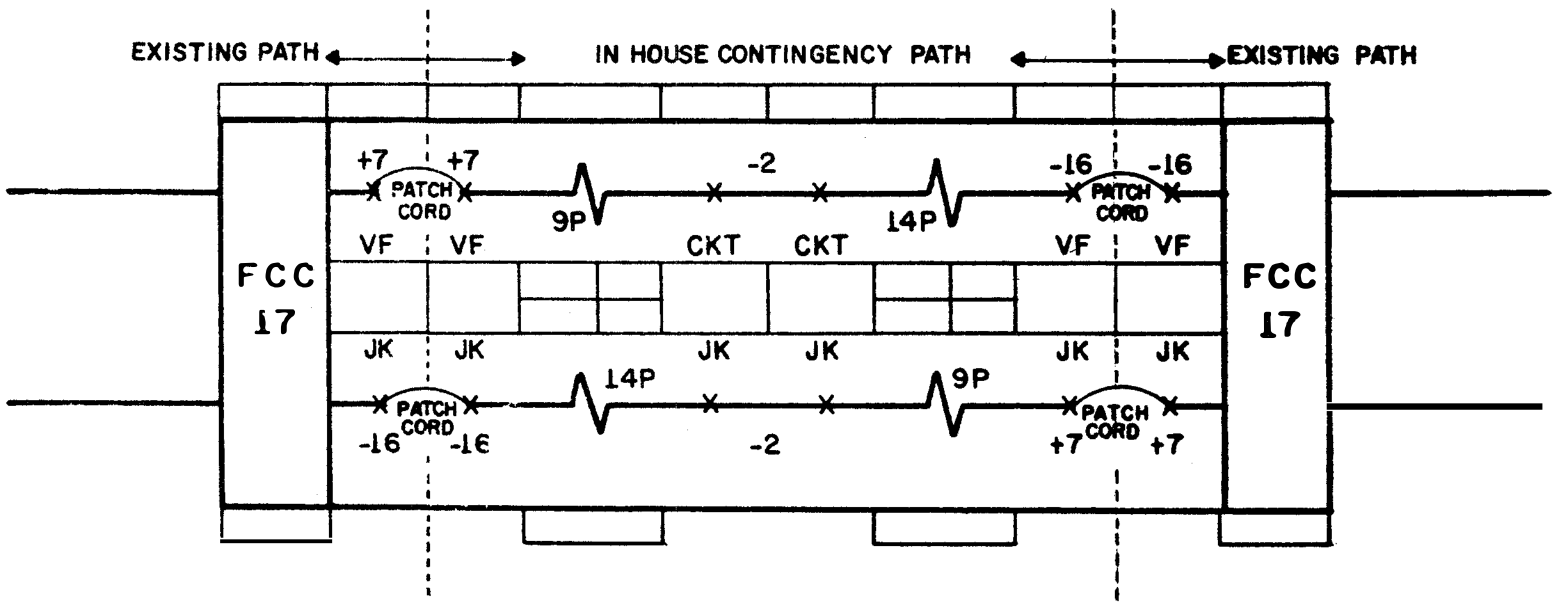


2LR

REMARKS

CCSD	DISTRIBUTION	CLR NUMBER	CARD	OF

CCSD	DCA-SAM ENGR/DATE	TSN 3725	RCG ENGR/DATE



2LR

REMARKS			
CCSD	DISTRIBUTION	CLR NUMBER	CARD OF

DCA-SAM FORM OCT 67 CLR-7

T4I-6

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0250-01

SUBJECT: Activation and Testing of DC Circuits

1. Background: Recent experience has shown that activation of DC circuits is often delayed due to the lack of a standard procedure for activation and testing of this type of circuit and/or VFCT systems. Since VFCT is relatively new to the ICS, many of the tech controllers at ICS facilities are unfamiliar with the DC facilities available to them. This is particularly true of the DC patching facilities which are unique to the ICS, and which differ greatly from those found elsewhere in fixed stations.

2. Purpose: The purpose of this item is to provide the technical controller with a reference which details the DC facilities available and standardizes activation and testing procedures.

3. DC Patch Panels:

a. The ICS DC patch panel is designed to facilitate timely patching and testing of DC circuits during activation and restoration. It is designed to operate with no patch cords under normal conditions. All circuits are wired "normal-thru". Thus a patch in the patch bay is an indication of an abnormal condition and each man on duty in the facility should be aware at all times of the purpose of each patch. Patch cords will be tagged as outlined in S&P Item No. 0710-01. Page Communications drawing #SKF 4433-0098 details the complete "in-house" wiring of all normal telegraph circuits. This two (2) page drawing is available at each IWCS facility for reference. This item will refer to the drawing and will explain the patch panel operation in detail.

b. The basic operation of the patch panel is shown in Figure 1 of this item.

(1) Set jacks are provided for both the line and equipment side of the circuit. These set jacks are points of entry into the circuit for patching only. When used, they break the circuit to the sub. They should

never be used for testing active circuits since this practice would interrupt service.

(a) The send LINE jack provides access to the VFCT tone keyer (the channel is considered a line for the purpose of patching). When a patch is inserted into this jack, it is connected to the appropriate tone keyer. This action also provides a ground for the T1 lead, completing the subscriber's loop so that this loop may be tested.

(b) The receive LINE jack provides access to the VFCT tone converter. When a patch is inserted into this jack, it is connected to the appropriate tone converter. This action also provides negative(-) loop battery to the T1 lead, permitting testing of the subscriber loop. This loop battery also prevents the subscribers equipment from running open when patched off.

(c) The send EQUIPMENT jack provides access to the subscriber send loop (the subscriber loop is considered the equipment for the purpose of patching). A patch inserted into this jack is connected to the subscribers send equipment. This action also places negative (-) loop battery on the T lead so that the appropriate tone keyer may be tested.

(d) The receive EQUIPMENT jack provides access to the subscriber receive loop. A patch inserted into this jack is connected to the subscriber's receive equipment. This action also places ground on the T lead, completing the loop and permitting testing of the appropriate tone converter.

(2) Looping or monitor jacks are provided on both the line and equipment side of the loop. These jacks are wired so that test equipment may be inserted into the loop without interrupting service. These jacks are simply normal-thru series jacks. Test equipment patched into them becomes a portion of the loop, and loop current flows thru the test equipment.

(a) The send line MONITOR jack is connected in series with the VFCT tone keyer loop. This jack is normally used to insert test into the loop, thereby keying the tone keyer. The jack may also be used to test and adjust loop current by patching in a milliammeter, or it may be used to measure send distortion by patching in a distortion analyzer (DAS-10 or DAC-5).

(b) The receive line MONITOR jack is connected in series with the VFCT tone converter loop. This jack is normally used to measure receive distortion by patching a distortion analyzer into it. A milliammeter may be patched into it to test and adjust loop current.

(c) The send equipment MONITOR jack is connected in series with the subscriber send loop. It is normally used to test distortion of the subscribers send keying, and also may be used to test and adjust loop current on the subscriber loop.

(d) The recive equipment monitor jack is connected in series with the subscribers receive loop. It is normally used to test the distortion being received by the subscriber, and it may also be used to measure and adjust loop current on the subscriber loop.

(e) As noted in Para. (1) above, any patches in the set jacks (line or equipment) will split the subscribers loop from the VFCT loop. The monitor jacks remain with their respective loops and may be used to test individual portions of the loop without effecting the other portion.

(f) A detailed study of Page Communications drawing #SKF 4433-0098 will be of great benefit to all ICS site personnel. A thorough knowledge of DC circuit wiring will expedite circuit activations, greatly reduce troubleshooting time, and reduce outages caused by mispatches.

c. Important features of Sheet One (Telegraph Send) of the drawing:

(1) The line cut key when turned to the horizontal position accomplishes the following functions:

(a) Separates the T lead from the T1 lead.

(b) Places negative battery to the T lead, providing loop current to the tone keyer.

(c) Provides ground to the T2 lead completing the subscriber loop and thereby providing loop current to the subscriber.

(d) Applies ground to the cut lamp circuit causing it to light.

(2) Note that, effectively, the cut key separates the subscriber loop from the tone keyer loop and permits independant testing of each. The monitor jacks remain with their respective loops.

d. Important features of Sheet Two (Telegraph Receive) of the drawing:

(1) The line cut key, when turned to the horizontal accomplishes the following functions:

(a) Provides ground on the T lead, closing the tone converter loop to allow testing.

(b) Applies negative (-) battery to the T1 lead maintaining loop current on the subscriber's receive loop and permitting testing.

(c) Completes the cut lamp circuit, lighting the lamp.

(2) Note again that the cut key has effectively split the tone converter loop and subscriber loop, allowing individual testing of each. The monitor jacks remain with their respective loops.

4. Activation of new ICS VFCT trunks:

a. Checks and Coordination: Immediately upon receipt of activation documents for a new IWCS trunk, the following procedures are required:

(1) Check each CEO for possible erroneous channel assignment, and insure action is implemented for the latest CEO.

(2) Check each CLR number to insure it corresponds with its respective CEO, and look for obvious engineering errors such as double equipment assignments etc.

(3) Coordination:

(a) The coordinating site will check with each site involved in the activation and insure that the above has been accomplished.

(b) Each site will coordinate with the support units and subscribers to insure that cable pairs, cross connects etc., will be available prior to activation.

b. Wiring and testing of "in-house" VF path:

(1) Upon completion of the steps outlined in Para. a, activation personnel will wire the VF path as outlined on the CLR.

(2) When wired, the VF path will be tested as follows:

(a) To test the wiring of the receive path, insert a 1KHz test tone into the EQUIPMENT IN jacks at the VF patch bay. Measure the level of this tone at the circuit patch bay.

(b) To test the wiring of the send path, insert the test tone into the EQUIPMENT IN jacks at the circuit patch bay and measure the level of this tone at the VF patch bay.

(c) Discrepancies noted in the above steps will be corrected prior to continuing.

c. At this point, the tone pack should be patched back-to-back at the circuit patch bay and completely tested as outlined in appropriate TM's.

d. Establishing the VF path TCG-TCG:

(1) When the VF path has been wired and checked, the coordinating TCG will be notified that the path is ready for end-to-end alignment.

(2) The coordinating TCG will establish the time for the end-to-end alignment.

(3) Under the direction of the coordinating TCG, the path is lined up by inserting a 1KHz test tone into the SEND EQUIPMENT jack while utilizing a meter at the RECEIVE EQUIPMENT jack of the circuit patch bay.

e. Establishing the trunk:

(1) Upon completion of alignment, the coordinating TCG will direct that the tone pack be placed on its path and tested.

(2) Each TCG will check for proper VF levels.

(3) Each DC channel will be tested as follows:

(a) The coordinating TCG will designate one terminal as "A", and the other as "B".

(b) Terminal A will insert 75 baud AC reversals from a DAS-10 or a DAC-5 into the SEND LINE jacks of each DC channel. (60 milliamps must be patched into the circuit from the misc DC patch panel for this test)

(c) The distortion analyzer portion of the DAS-10 or DAC-5 will be plugged into the RECEIVE LINE jacks of the channel being tested at Terminal B.

(d) DCA standards require that distortion not exceed 5% with bias. Any channels not meeting this requirement must be tested and aligned as outlined in appropriate TMs. Should all channels fail this test, the problem probably is in the VF path, and it should be re-tested.

(e) During these tests, Tech Controllers must be alert in order to avoid needless troubleshooting. The possibility of faulty test equipment at either terminal cannot be overlooked.

(f) Unless countermanded by this Headquarters, no TCG will adjust equipment using signals from the distant end or a subscriber. VFCT equipment must be adjusted on a back-to-back basis using standard alignment procedures. Adjusting equipment utilizing faulty signals will cause prolonged outages should the trunk be patched to spare equipment at a later date, or should the equipment be used to restore a higher priority trunk.

(g) To test the trunk from Terminal B to terminal A, reverse the procedures outlined in para. (b) thru (d).

f. When the above procedures have been completed, and all channels meet the requirements in both directions from TCG to TCG, the trunk is considered activated, and an in-effect report will be submitted by the coordinating TCG for the trunk.

5. Activation of individual DC channels:

a. Checks and coordination identical to those outlined in Para. 5a will be accomplished for each individual DC circuit.

b. Wiring will be accomplished as outlined on the CLR.

c. Advise the local subscriber to place his equipment on the line.

d. Establishing the circuit:

(1) Have the distant end send a mark on the channel to be activated.

(2) Insert a milliammeter into the RECEIVE EQUIPMENT MONITOR jacks.

(3) Adjust the receive loop current for 60 milliamps.

(4) Insert a milliammeter into the SEND EQUIPMENT MONITOR jacks.

(5) Adjust the send loop for 60 milliamps.

(6) Request the local subscriber send test from his equipment.

(7) Insert a distortion analyzer into the send circuit by plugging it into the SEND EQUIPMENT MONITOR jack.

(a) Distortion must read less than 5% with no bias.

(b) If this standard is not met have the subscriber make necessary adjustments to his equipment.

(8) Have the distant end TCG and subscriber check the test they are receiving.

(9) Reverse the process outlined in para (6) through (8) above to check the receive portion of the circuit.

(10) If the above tests are successful the circuit is activated and an "in-effect" report will be submitted by the coordinating TCG.

(11) If the circuit does not operate properly, troubleshoot the circuit end to end.

(a) Subscriber to TCG.

(b) TCG-TCG.

(c) TCG to subscriber.

6. <u>Cutover of NON-ICS trunks and circuits to ICS</u>:

a. Every situation that may arise in the cutover of an already active NON-IWCS trunk to IWCS cannot be covered in this item but basic procedures will be outlined here.

b. The following is a list of situations which may arise beginning with the most desirable and ending with the least desirable.

(1) <u>Complete new path and equipment</u>: In this case a complete new path and all new equipment is available from individual channel user to channel user.

(2) <u>New path and equipment TCG-TCG</u>: In this case a new path and new terminal equipment are present; however, DC cable pairs and subscriber equipment must be re-used.

(3) <u>New terminal equipment at each TCG only</u>: In this case new ICS terminal equipment is assigned at each TCG but the present path, DC cable pairs and subscriber equipment must be used. This situation can normally be alleviated by temporarily altrouting the present VF trunk while establishing the new trunk.

(4) <u>New VFCT equipment at only one TCG</u>: This is the most undesirable of all situations as altroutes are impossible and some outage must occur. The big problem here is that in most cases all send channels must be cut simultaneously and if trouble should develop extended outages can occur.

c. The success or failure of the cutover of complete VFCT trunks depends greatly on the imagination, ingenuity, and ability of the Tech controllers accomplishing the cutover. However, the following practices should be closely followed to avoid extended outages.

d. Complete new path and equipment sub-sub.

(1) Establish the new trunk and individual channels as outlined previously in this item.

(2) As circuits are tested and proven good advise subs to commence using new paths.

(3) As each circuit is activated on the new path an in-effect report will be submitted by the coordinating tech controls.

e. New path and terminal equipment TCG-TCG.

(1) Establish new trunk and test each channel as outlined previously in this item.

(2) Cut each individual circuit, in one direction only and one at a time to the new trunk.

(3) Care should be taken to avoid extended outage on any circuit. If a circuit should remain out for longer than 15 minutes consideration should be given to what method would restore service soonest; i.e., continue to work on new circuit path or return to old path.

(4) Never attempt to cut a circuit to a new path while it is out for another reason. Rather than save outage time this action could confuse the original RFO and cause extended outage.

f. New terminal equipment at each TCG no new path.

(1) Temporarily alt-route the present trunk via a spare VF path.

(2) Proceed as outlined in para e above.

g. New terminal equipment at one TCG only.

(1) Parallel the receive tone-pack to the new VFCT terminal.

(2) Cut individual receive circuit as outlined previously.

(3) If individual tone keyers can be removed easily from both the old and new VFCT terminals proceed as follows:

(a) Pull out tone keyers from the new terminal and parallel it's output with that of the old terminal.

(b) Cut one send circuit at a time to the new terminal, simultaneously removing the tone keyer for the channel concerned from the old terminal and inserting the tone keyer into the new terminal.

(4) If tone keyers are not removable proceed as follows:

(a) Cut the total send system from the old terminal to the new terminal.

(b) As rapidly as possible cut individual DC circuits to new terminal.

(c) Extreme caution must be exercised with this method since every individual DC circuit is out at the instant the VF portion is cut to the new terminal. Extended outages can occur. Individual DC circuits should be cut to the new terminal in accordance to restoration priority assigned.

7. Troubleshooting and restoration of DC circuits is covered in detail in DCAC 310-70-1. Each Tech Controller will be required to read the four volumes of this manual and must have a thorough knowledge of it's contents.

8. DC circuits and interface:

a. Types of DC circuits:

(1) Full-Duplex: A full-duplex circuit provides simultaneous two-way service between the two subscribers (Figure 2).

(2) Half-Duplex: The half-duplex circuit provides transmission in only one direction at a time. It is common practice to connect the SEND and REC equipment in series to provide "reversible" service (Figure 3).

(3) Multipoint: The multipoint circuit is extremely popular in Vietnam. A four-subscriber system is shown in Figure 4. Note that the SEND and REC equipment at each subscriber station has been connected in series to operate half-duplex. Would it be possible to have a full-duplex multipoint? Obviously not since there are not separate transmit and receive paths. Another point to note in Figure 4 is the fact that there is only one closed path for the DC signal through all the equipment. The presence of more than one closed path, results in an in-operative circuit.

b. ICS THROUGH - STATION CONNECTION:

The through-station connection is quite simple (Figure 5). It is used to extend an incoming VFCT channel out over another system. Because of the arrangement of the battery supplies in the ICS VFCT terminals it is not possible to make the connection directly as shown in Figure 5. In fact the only connections made are shown in Figure 6.

c. Use of Isolation Relays:

(1) Fixed-Plant and Tactical VFCT DC Interface:

A very common use of isolation relays here in Vietnam is interfacing 60 ma fixed-plant terminals with the 20 ma tactical equipment, AN/TCC-4/2D. The tactical equipment has only one loop current value possible, 20 ma, and battery is provided internally just as with the fixed plant equipment. The interface is obtained by creating separate loops for the 20 ma and 60 ma currents. (Figures 7)

(2) Subscriber wished to provide his own loop battery. This is

often done in large comcenters to facilitate in-station testing and trouble-shooting. This creates a problem since there should be only one battery in each loop. The obvious answer is to create two loops as on the RECEIVE side in Figure 8. However, because of the arrangement of the battery surply and the ground in the SEND side of the terminal equipment, an isolation realy is not necessary if one side of the SEND circuit is connected to the ground of the VFCT terminal.

(3) Half-Duplex Circuit:

When the subscriber's send and receive equipment is placed in series as in Figure 3, a problem arises since the SEND and RECEIVE portions of the terminal can not be placed in the same loop. Again the solution is an isolation relay inserted as shown in Figure X-9. The subscriber's loop current is provided by the SEND side of the VFCT terminal. The isolation relay is installed so as to permit:

(a) The RECEIVE tone converter to control the current in the subscriber loop.

(b) The subscriber's transmitting equipment to control the current in the loop to the SEND tone keyer. Note that the VFCT channel still operates in the full-duplex mode.

(4) The Problem of Low Subscriber Current:

Occassionally here in Vietnam the situation depicted in Figure X-10 is encountered. The shunt losses in wet cable and bad splices are so great that the subscriber does not receive enough loop current for his machines to operate properly. The obvious answer is to put in more current at the terminal: however, there is a limit as to how much current can go through the VFCT equipment without causing damage. Again, isolation relays provide the answer (Figure 11). Additional battery supplies which can provide the higher current required are available in the loop power supply bays.

d. IWCS Multipoint Circuits:

Multipoint teletype circuits are very common in Vietnam, and, because of the many links involved and the number of isolation relays used to connect these links, they are the cause of a great deal of trouble. Two types of multipoint circuits possible in the **ICS** are discussed below.

(1) Hub Multipoint:

The hub arrangement shown in Figure X-12 is the <u>desired configuration</u> for multipoints in the IWCS. The equipment connections at the hub station are shown in Figure 13. Figure 13 is for a four-spoke hub system with a subscriber at the hub. It can easily be expanded to more spokes by adding two isolation relays for each new VFCT channel. Note however, there may be only one center or "hub" station.

(2) Half-Duplex Multipoint:

The network configuration for the half-duplex multipoint is shown in Figure 14. This configuration allows more than one "multipointing" station; however, it is not recommended for the ICS since it requires more equipment and is more difficult to adjust properly. The equipment connections for a multipointing station are shown in Figure 15. This configuration is also expanded by adding two isolation relays for each additional VFCT terminal, and it may have as many "multipointing" stations as desired.

e. Multiple Drops:

Often it is desired to have more than one DC subscriber on a circuit at a terminal. This is only possible with half-duplex circuits. If the sum of the loop resistance to all subscribers is not too great, this service can be provided by connected additional stations in the half-duplex loop (Figure 16). If the total loop resistance of all loops is too high, then separate loops must be established using isolation relays (Figure 17).

9. VF interface: The chart attached as Inclosure 1 lists complete capabilities of most VFCT systems presently in use in Vietnam. It will be noted that channel center frequencies differ with different equipment types. Since most fixed plant VFCT equipment is so designed that individual send and receive channel modems can be removed and interchanged, VF interface between two different systems is easily accomplished.

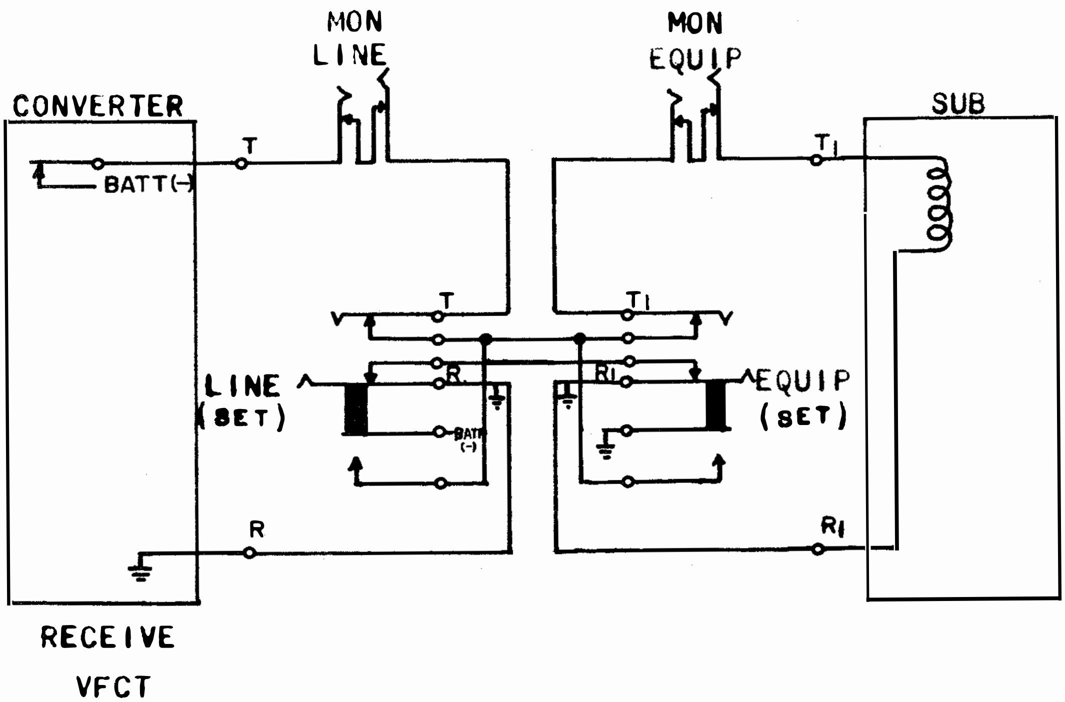


Figure 1A Simplified IWCS DC Send Jacks,
(Full-Duplex Connection)

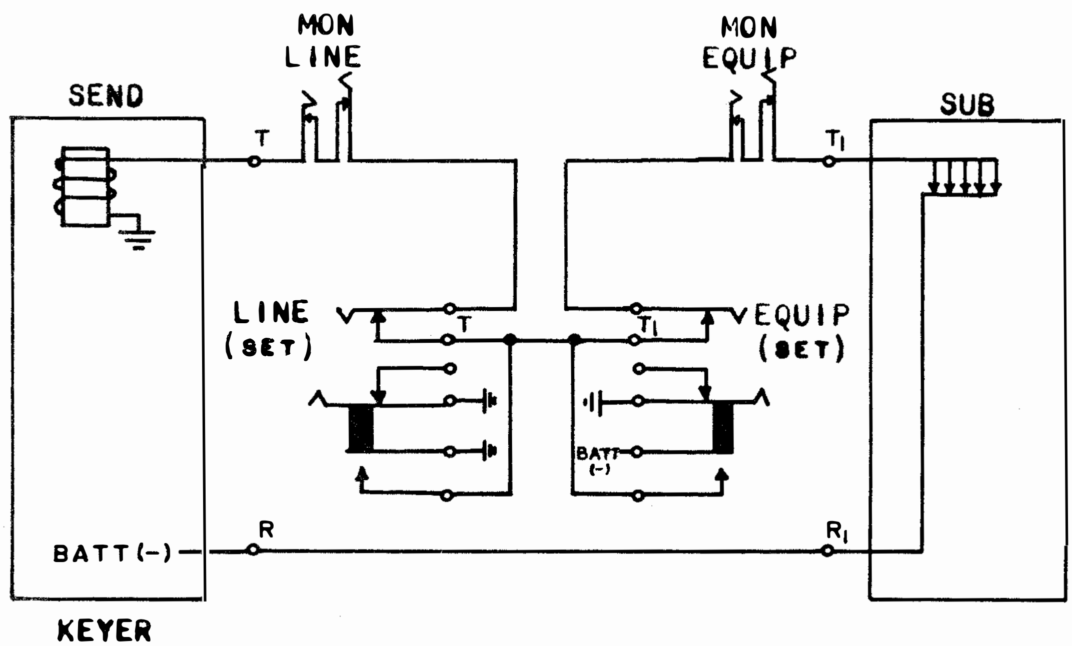


Figure 1B Simplified IWCS DC Receive Jacks,
(Full-Duplex Connection)

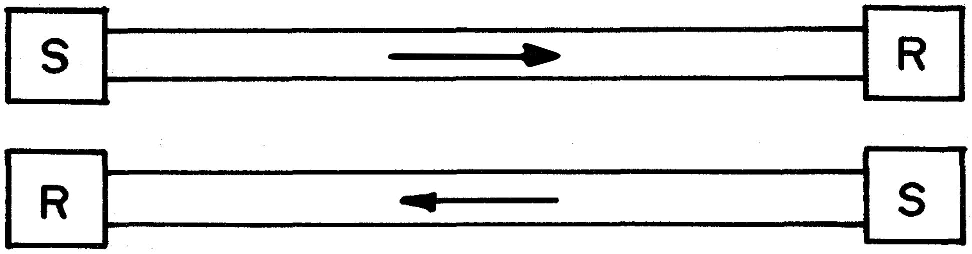


Figure 2 Full-Duplex Circuit

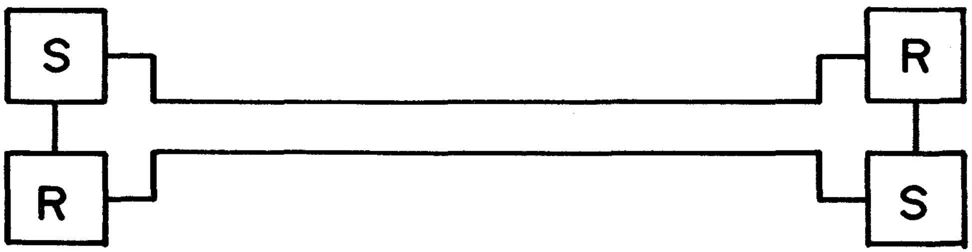


Figure 3 Half-Duplex Circuit

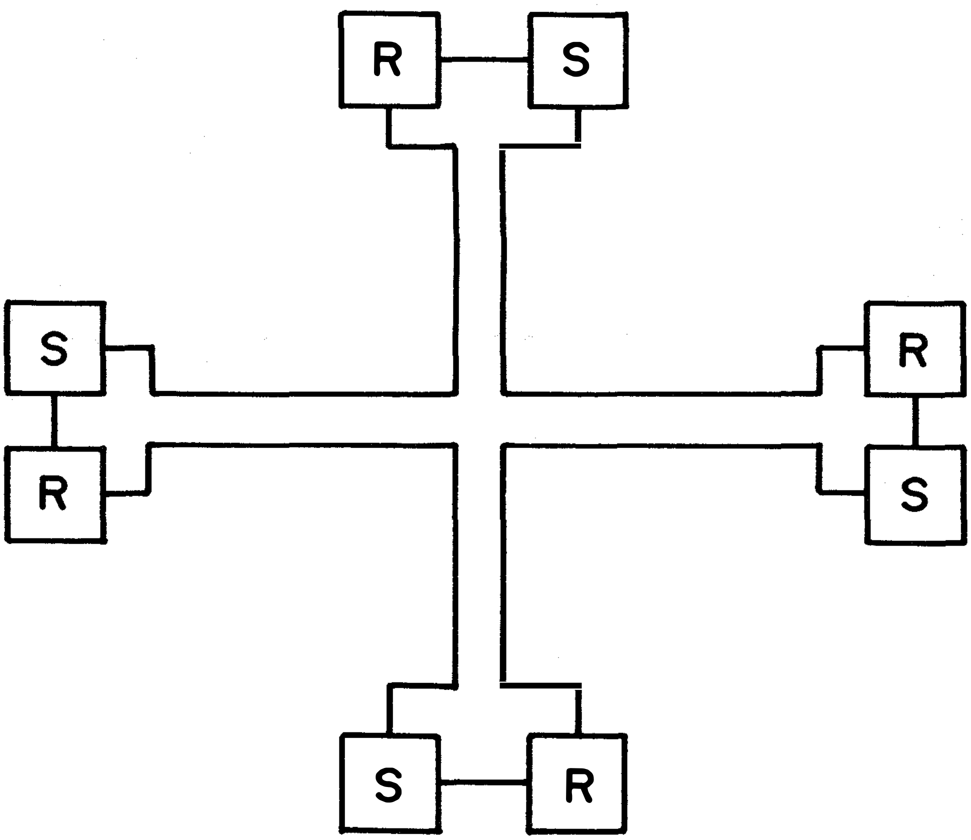


Figure 4 Multipoint Circuit

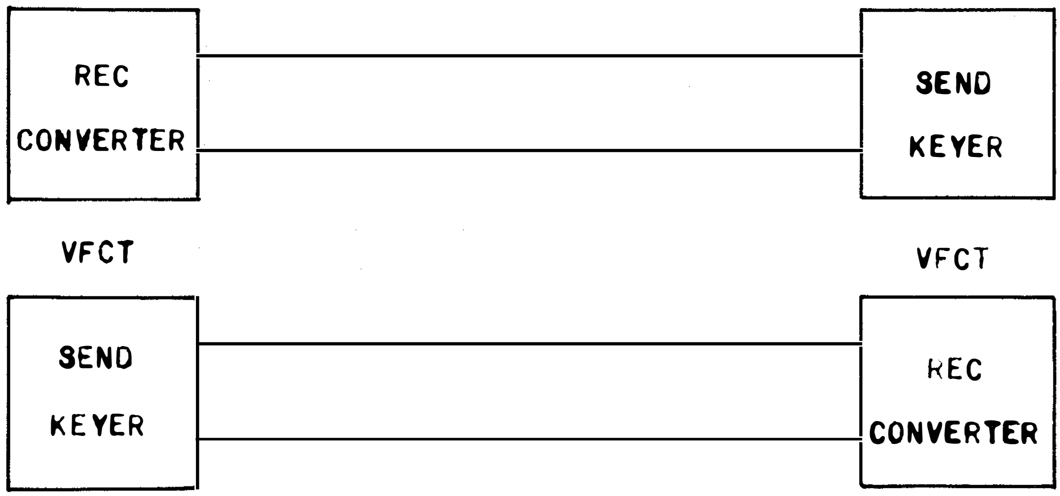


Figure 5 Through-Station Connection

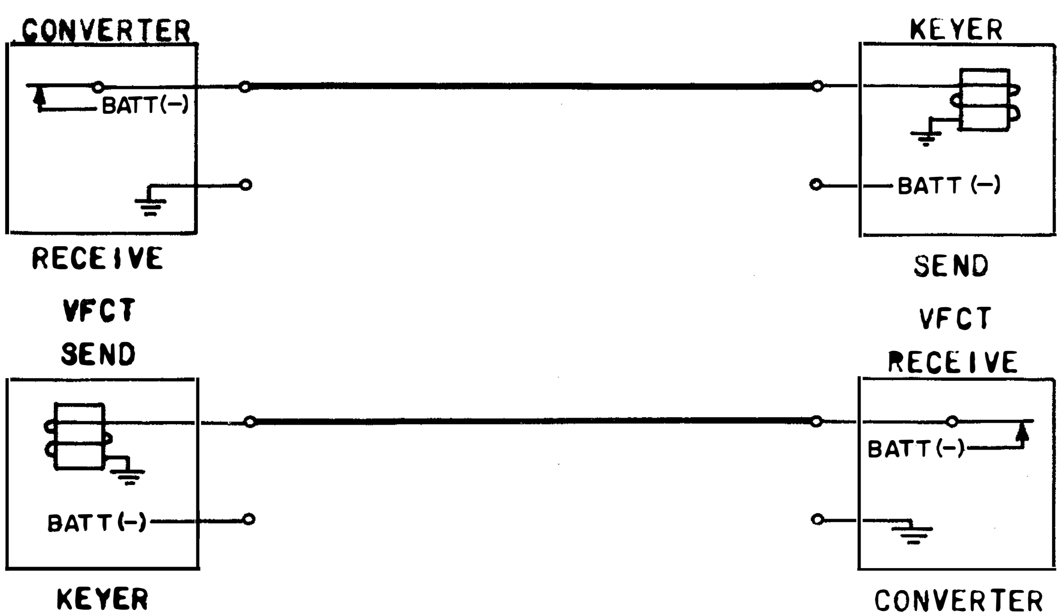
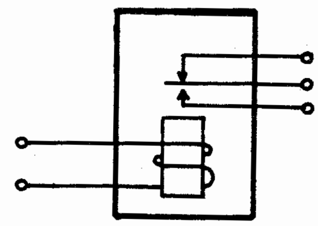


Figure 6 IWCS Through-Station Connection



Basic Isolation Relay

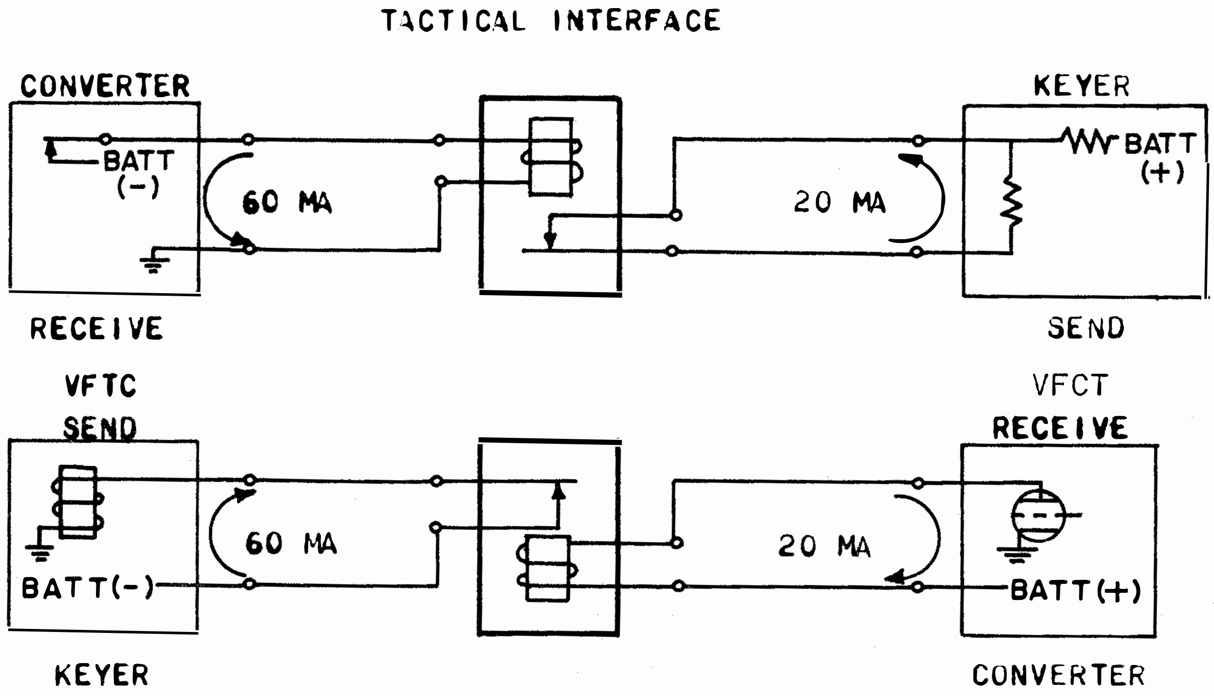


Figure 7 Fixed-Plant and Tactical VFCT Interface

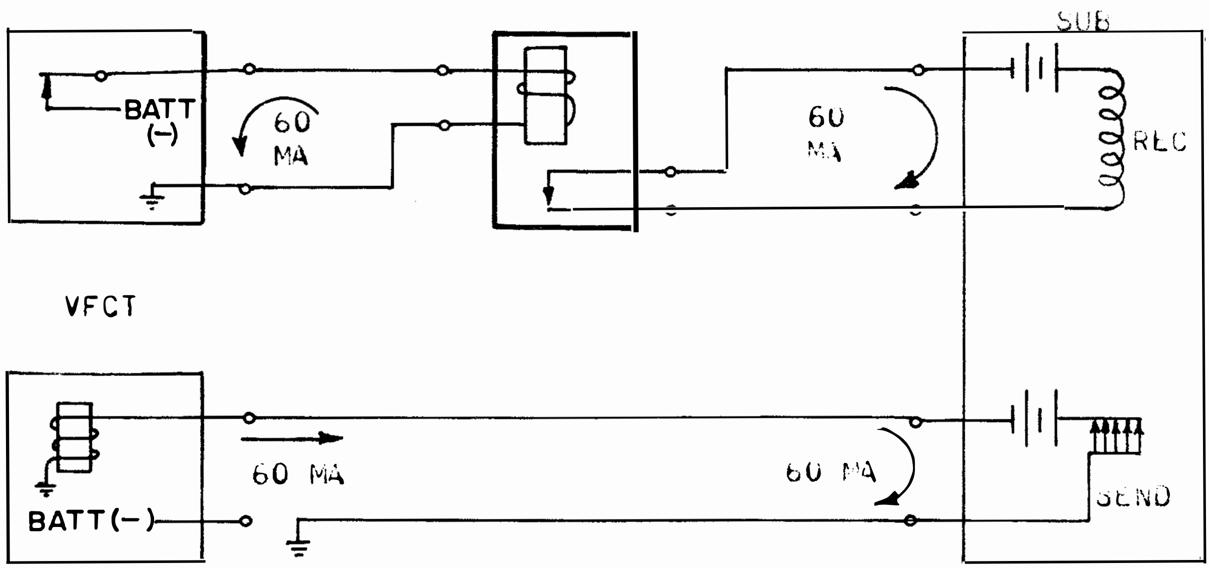


Figure 8 Subscriber Providing Battery
(Full Duplex)

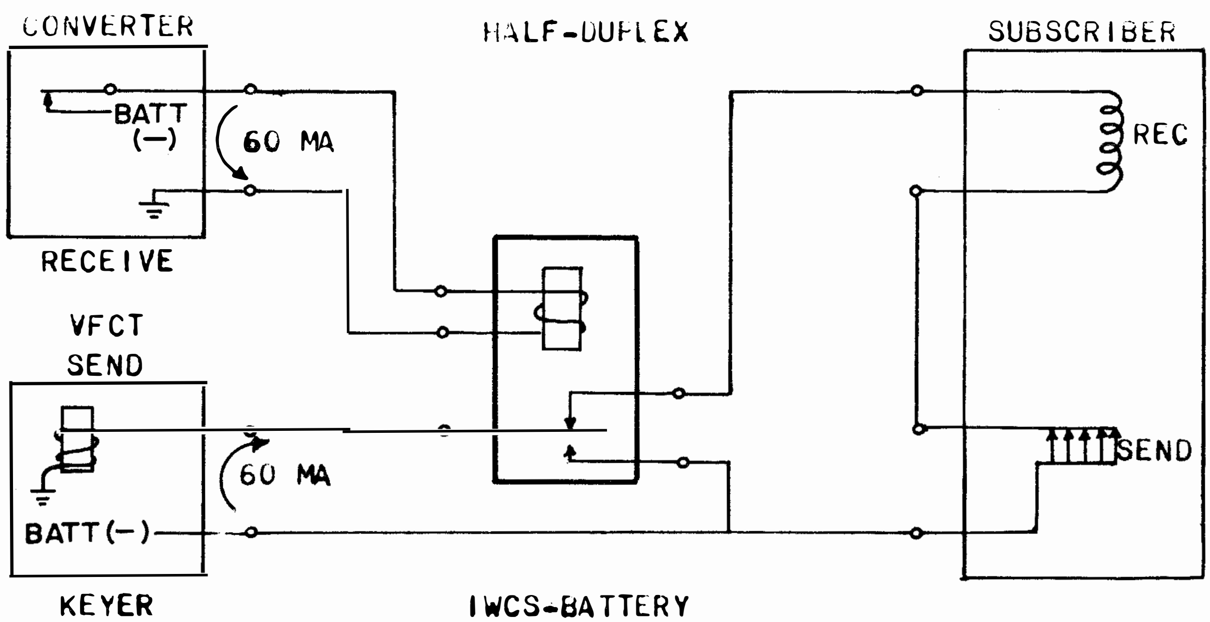


Figure 9 Half-Duplex Connection to IWCS VFCT Terminal

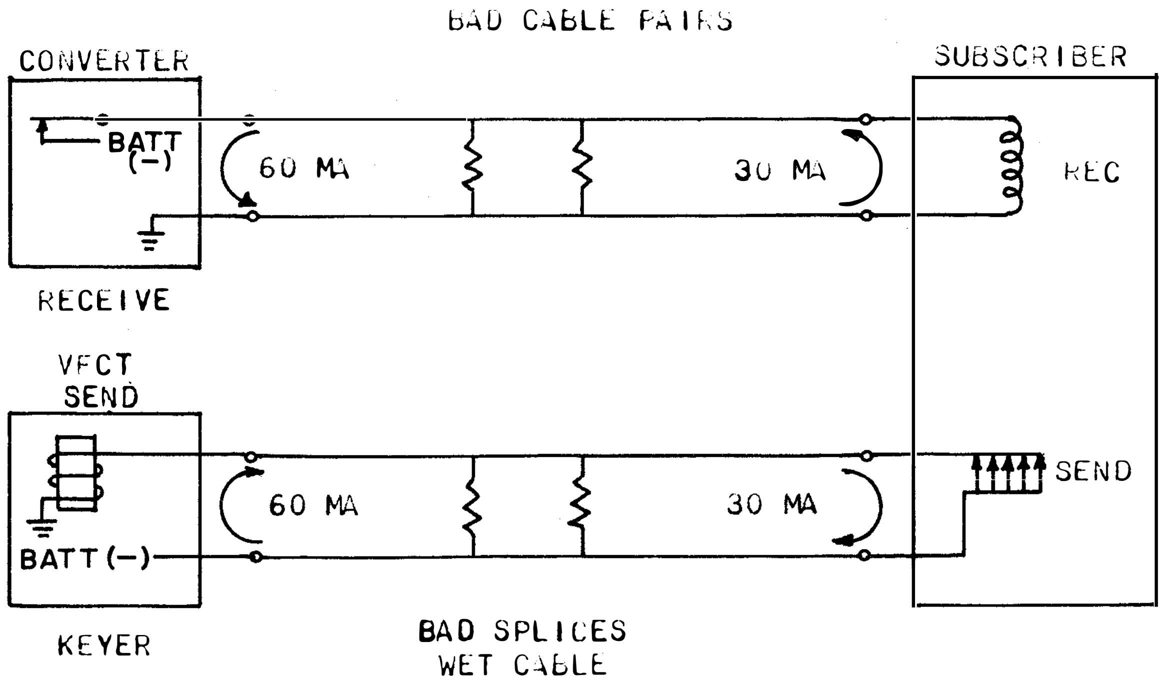


Figure 10 Low Subscriber Current

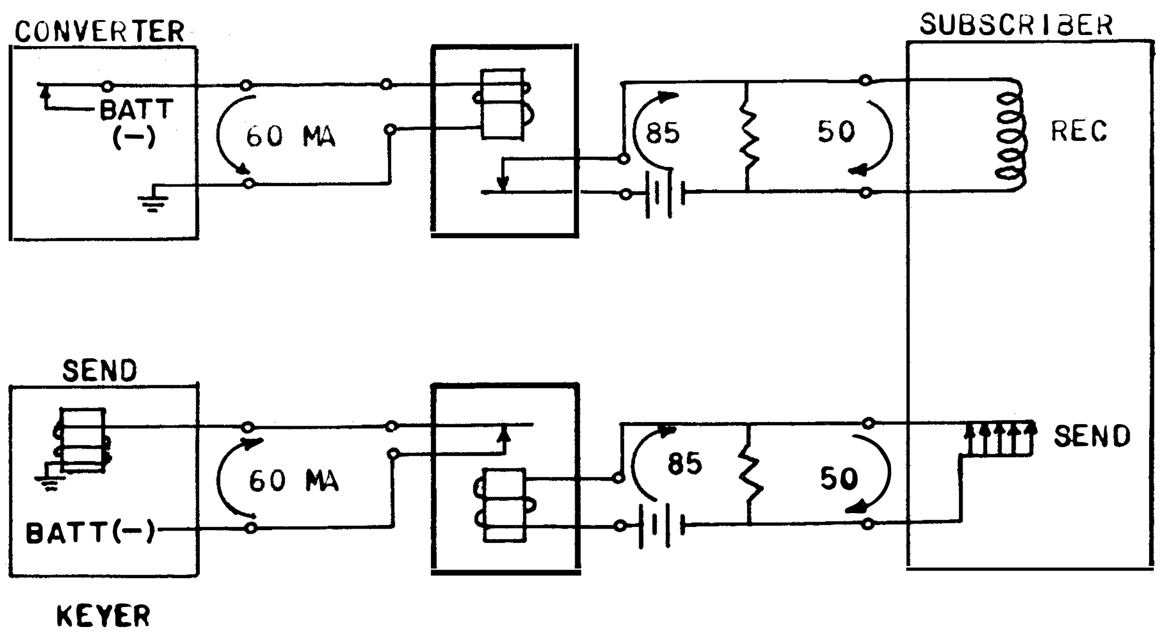
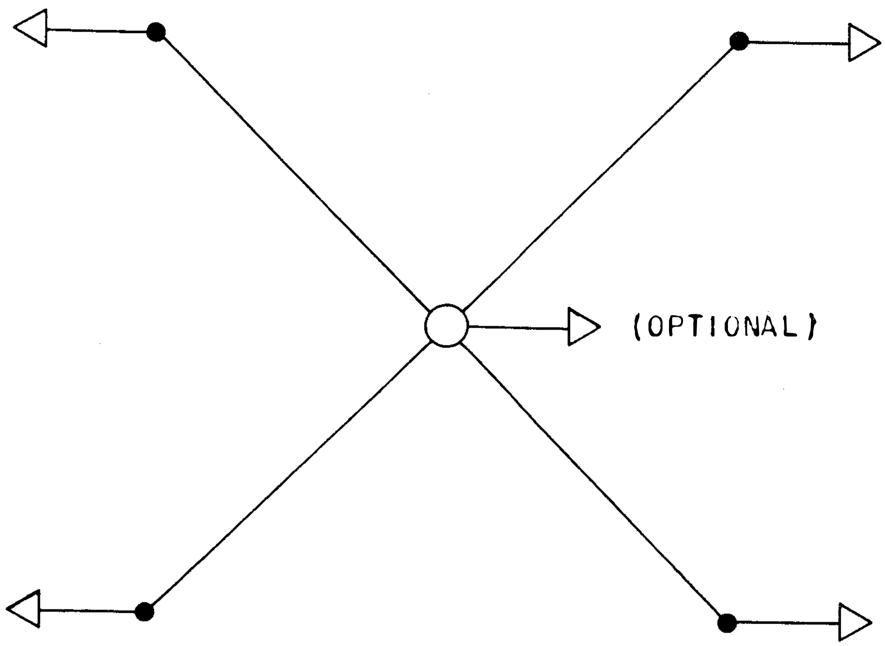


Figure 11 Solution to Low Subscriber Current



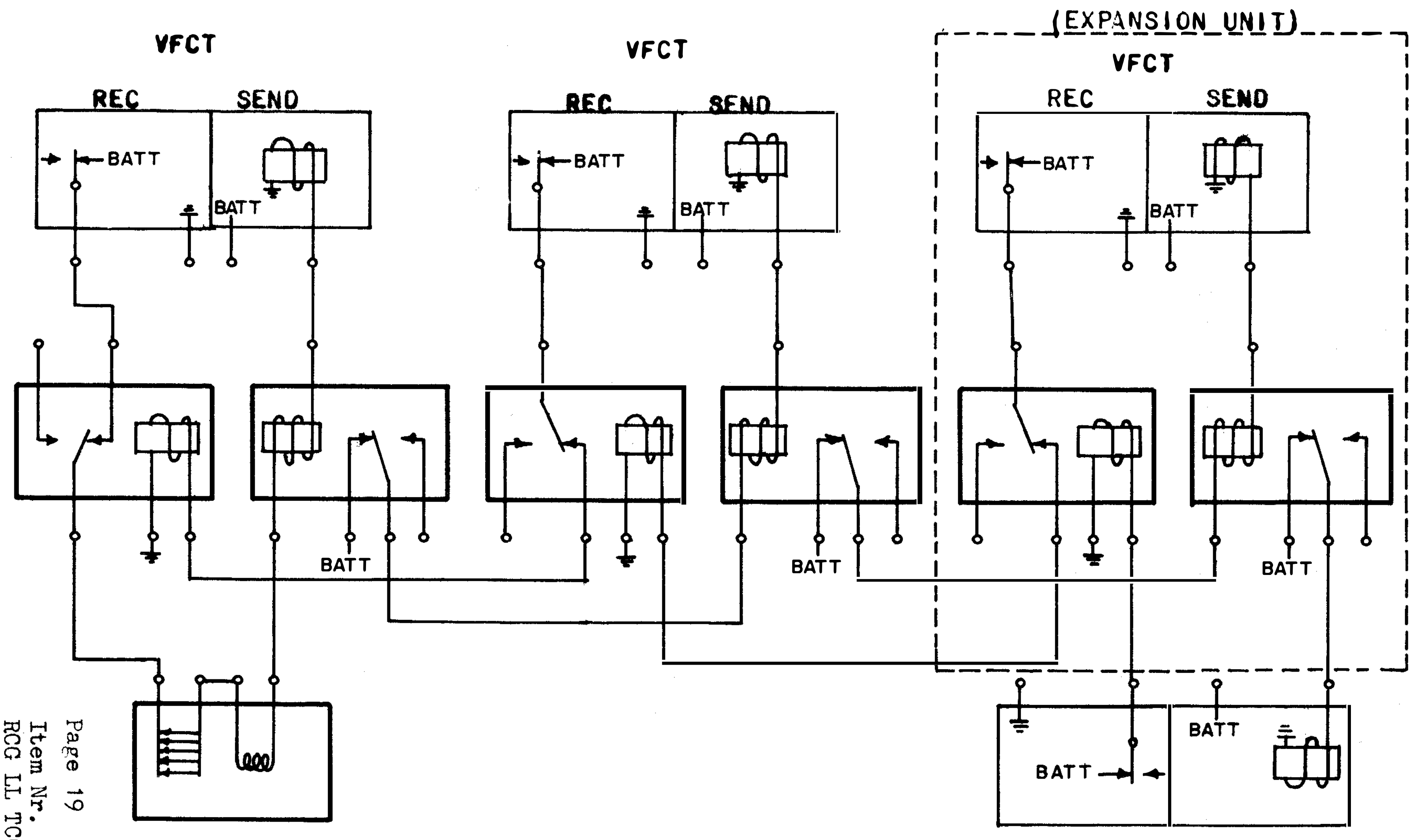
LEGEND: ○ HUB STATION

● TERMINAL STATION

▷ SUBSCRIBER

NOTES: SUBSCRIBER EQUIPMENT AT LOCATION OTHER THAN THE HUB STATION IS WIRED FDX BUT OPERATES HDX.

Figure 12 Hub Multipoint, Network Configeration



NOTE: ALL RELAYS ARE SHOWN IN NORMAL IDLE POSITION; "MARK" OR "HOLD".

Figure 13 Hub Station Connections

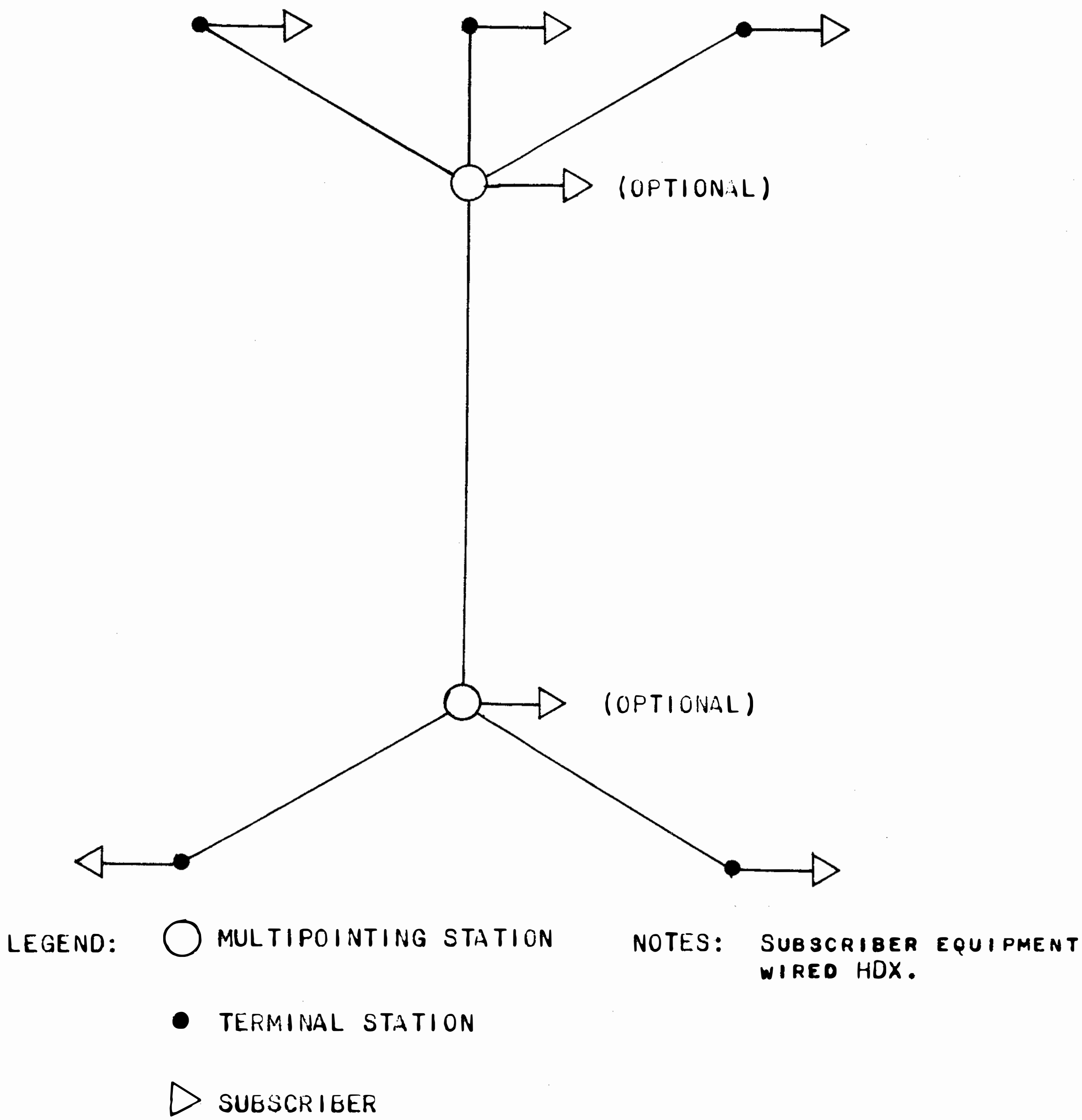
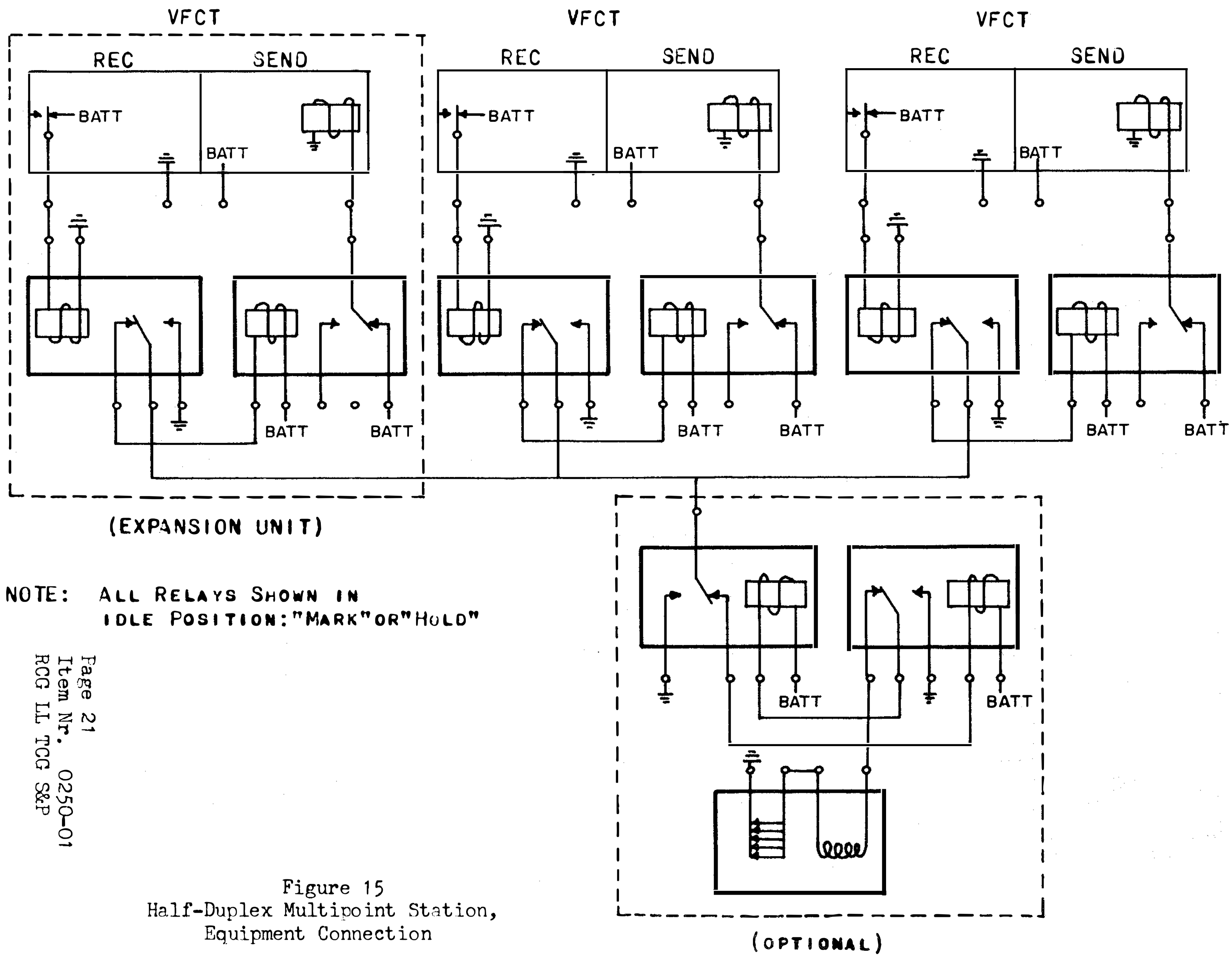


Figure 14 Half-Duplex Multipoint, Network Configuration



NOTE: ALL RELAYS SHOWN IN IDLE POSITION: "MARK" OR "HOLD"

Figure 15
Half-Duplex Multipoint Station,
Equipment Connection

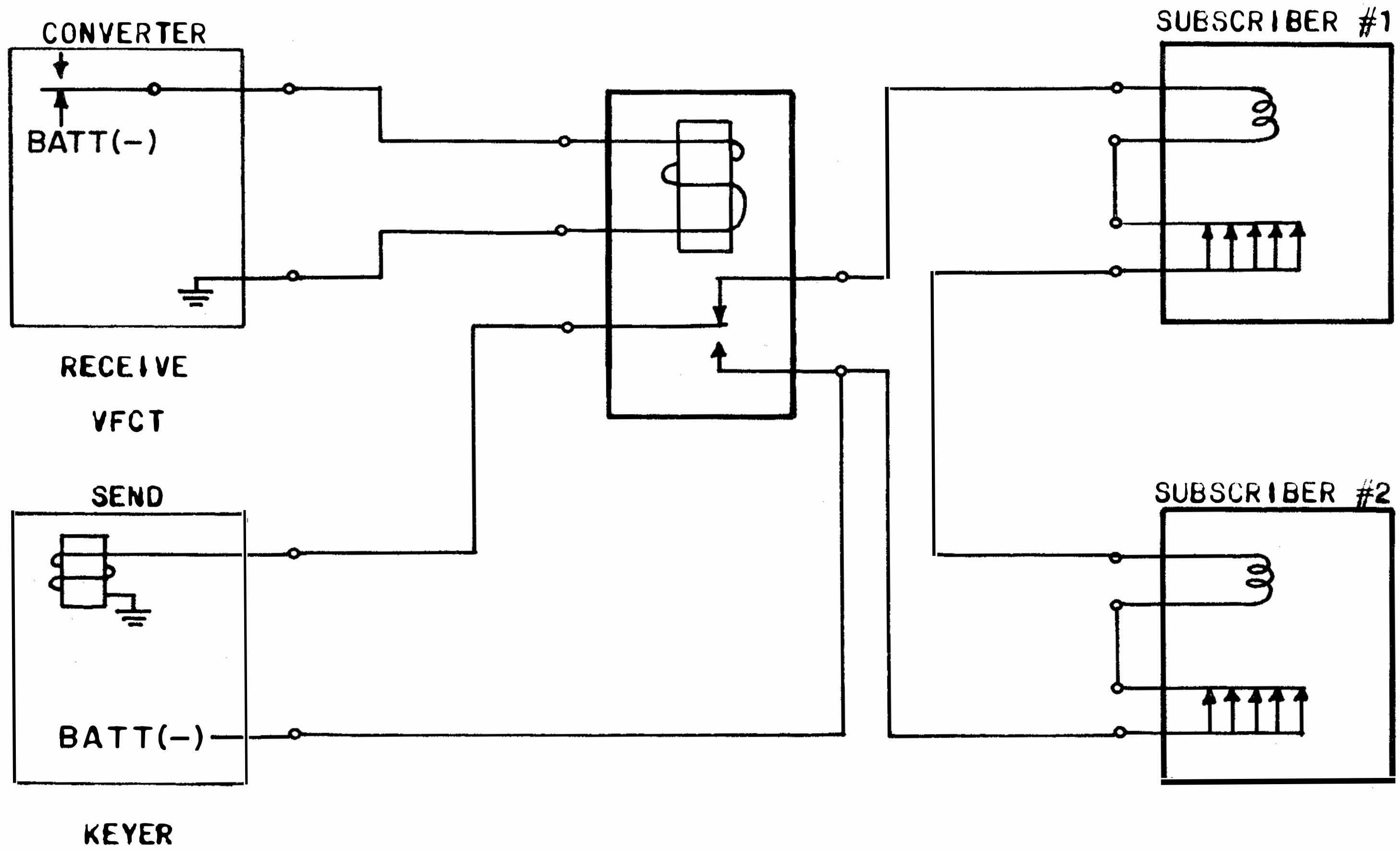


Figure 16 Half-Duplex Circuit, Multiple Drop, Common Loop

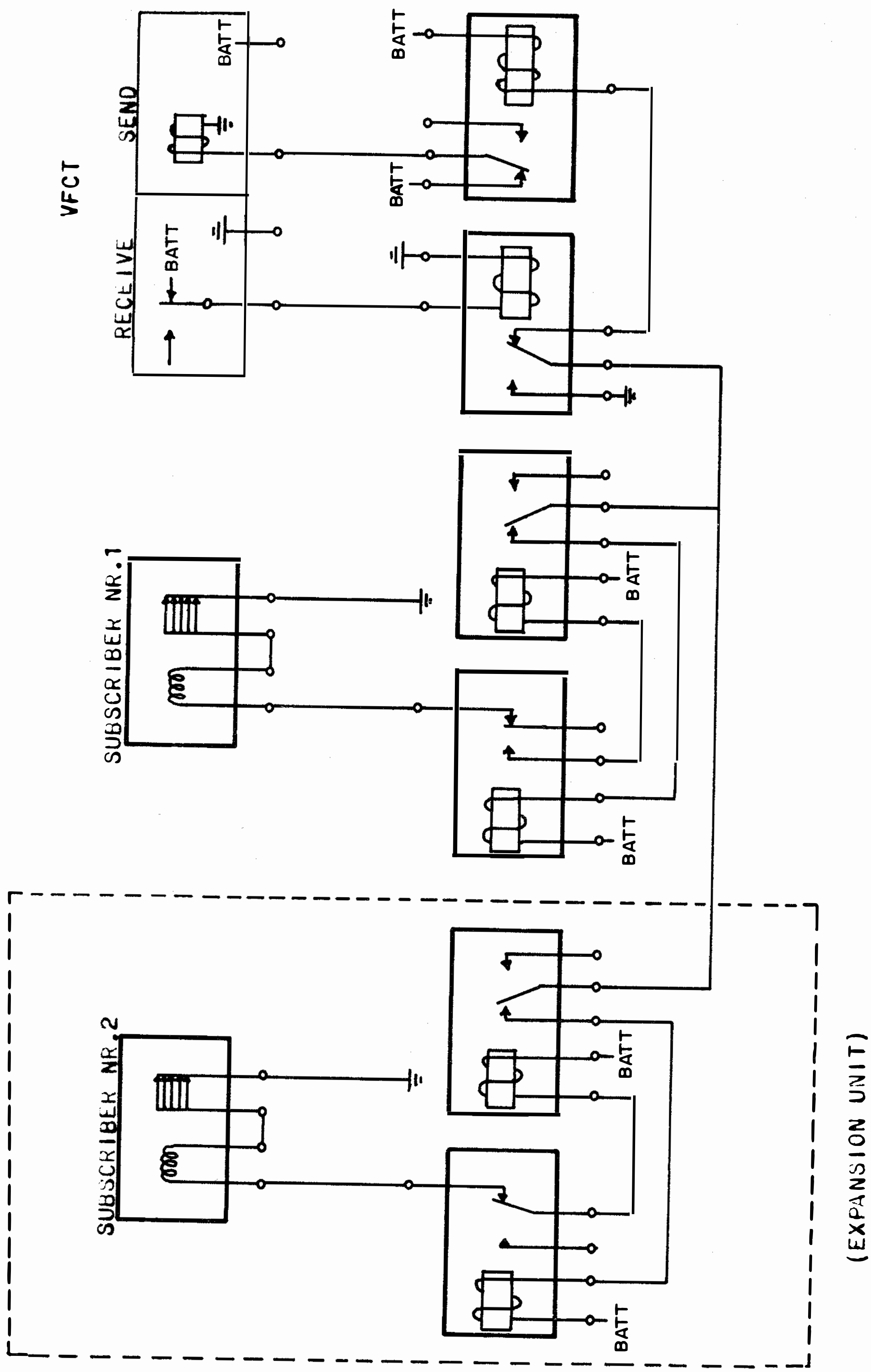


Figure 17 Half-Duplex Circuit

Frequencies			425	595	765	935	1105	1273	1445	1615	1785	1955	2125	2295	2465	2635	2805	3230
Non-diversity (Note 2)																		
AN/FCC-3, -7, -8 (Note 1)			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
AN/FCC-19, -25, FGC-60			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NRC-235						1	2	3	4	5	6	7	8	9	10	11	12	
AN/TCC-4		SEND									8	4	7	3	6	2	5	1
(2W)	Term"A"	RECV	5	1	6	2	7	3	8	4								
AN/TCC-4		SEND	9	13	10	14	11	15	12	16	8	4	7	3	6	2	5	1
(4W)	Term"A"	RECV	5	1	6	2	7	3	8	4	12	16	11	15	10	14	9	13
AN/TCC-20		SEND		1		2		3		4								
	Term"A"	RECV	1		2		3		4									

Diversity: All even numbered channels are inverted (Mark freq. below center freq).

AN/FGC-29, -61, -61A	2	4	6	8	10	12	14	16	1	3	5	7	9	11	13	15

Note 1: The FCC-3 contains only channels 1 thru 8 plus an additional four (4) wideband channels which are not compatible with any other system presently in use. The center frequencies of these additonal channels are:

9-1955 (± 85 Hz) 11-2805 (± 85 Hz)
10-2380 (± 85 Hz) 12-3230 (± 85 Hz)

The first 8 channels of 2 each FCC-3's will form a 16 channel system utilizing channel converters provided. The FCC-7 contains channels one thru eight and channel converters which may be used with an FCC-8 to form a 16 channel system.

Note 2: All channels shift ± 42.5 unless otherwise indicated.

Note 3: TH-5 center freq 1275 Hz, shift ± 50 Hz

Note 4: Neutral loop current of the FCC-19,25 is variable from 10 to 100 ma

INTERNAL BATTERY CAPABILITIES

	neut	polar	rec	snd
AN/FCC-3	60ma	30ma	x	
	20ma			
AN/FCC-19	(Note 4)	20ma		
AN/FCC-25	(Note4)	20ma		
AN/FGC-29	60ma		x	x
AN/FGC-60	60ma		x	
AN/FGC-61	60ma		x	x
	20ma			
AN/FGC-61A	60ma		x	x
	20ma			
NRC-235	60ma		x	
AN/TCC-4	20ma		x	x
AN/TCC-20	20ma		x	x
TH/5	20ma		x	x

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

SCCPV-RG-PO-NW

ITEM NR: 0255-01

SUBJECT: Test Procedures for **Dial** Trunks

1. Background: With the advent of the Southeast Asia Automatic Telephone System, dial circuits are becoming more prevelent. Dial circuits require more testing since they are more sensitive. Similarly, following activation, this type of circuit will require a more thorough and periodic quality check.

2. Purpose: The purpose of this S&P item is to establish test procedures which will be accomplished prior to circuit activation and during quality assurance checks. Should the circuit fail to meet these criteria, the tech controller will continue to attempt to activate the circuit but will submit an "In-effect with variation" or an "exception" report.

3. General: This S&P item is applicable to the testing of Tandem Trunks (Switch to Switch) or Primary Trunks (DTE to Switch). It is absolutely essential that tech controllers become intimately familiar with the operation of the Lenkurt Electric 26600 Test Set. This instrument will be employed in setting the percent make and break for the Collins 2600 SF Unit. The tests to be performed will be; 1000 Hz level test, linearity test, frequency response test, noise test and signaling and supervision test. For testing and recording purposes, the originating terminal will be designated A and the terminating end Z. If the channel is a multi-link, the intermediate links will be designated A to B, B to C, C to D, ..., Y to Z.

a. 1000 Hz Level Test (Tech Control to Tech Control). This test is used to establish initial levels and alignment of the circuit. A Daven 12B Level Measuring Set will be used. Procedure for a single link is as follows:

(1) On dial circuits the Tech Controllers at terminals A and Z will have the DTE or SWC busy-out the trunk to be tested and insert dummy jacks into the SIG DROP jacks. This will prevent false seizure of the trunk circuits.

(2) At terminal A VF Board apply a test tone (-16dbm, 1000Hz, 600 ohms) at the MOD IN jack of the channel under test.

(3) Read and record the level received at the terminal Z VF Board DEM OUT jack.

(4) At terminal Z VF Board apply a test tone (-16dbm, 1000Hz, 600 ohms) to the MOD IN jack of the channel under test.

(5) Read and record the level received at the terminal A VF Board DEM OUT jack.

(6) All received levels should be +7.0 dbm ±1.0 db.

(7) For multilink trunks, perform test steps 3.a.(1)-(6) for links A to B, A to C, A to D, ... , A to Z.

b. Linearity Test (Tech Control to Tech Control). This test is used to determine if the trunk has the same gain for two different input levels. Non-linearity will introduce distortion which in turn will degrade the quality of the trunk. A Daven 12B Level Measuring Set will be used. Procedure for a single link is as follows:

(1) At terminal A VF Board apply a test tone (-26 dbm, 1000 Hz 600 ohms) at the MOD IN jack.

(2) Read and record the level received at terminal Z VF Board DEM OUT jack.

(3) At terminal Z VF Board apply a test tone (-26 dbm, 1000 Hz, 600 ohms) at the MOD IN jack.

(4) Read and record the level received at terminal A VF Board DEM OUT jack.

(5) The received levels at terminals A and Z VF Board should be -3.0 dbm ±1.0 db.

(6) Repeat steps 3.b.(1)-(4) using a -20 dbm test tone level.

(7) The received levels at terminals A and Z should be +3.0 dbm ±1.0 db for the test tone level used in step 3.b.(6).

(8) For multilink trunks, perform test steps 3.b.(1)-(7) for links A to B, A to C, A to D, ..., A to Z.

c. Frequency Response Test (Tech Control to Tech Control). This test is used to determine if the trunk is within the DCA standards for Dial Circuits. A Daven 12B Level Measuring Set will be used. Procedure for a single link is as follows:

(1) On dial type circuits the Tech Controllers at A and Z shall have the circuits in the busy condition and insert dummy plugs in the SIG DROP jacks to prevent false seizure of the trunk.

(2) At terminal A VF Board apply a test tone (-26 dbm, 600 ohms) at the MOD IN jack using frequencies between 400 and 2800 Hz with 400 Hz increments.

(3) Read and record the level received at terminal Z VF Board DEM OUT jack.

(4) At terminal Z VF Board apply a test tone (-26 dbm, 600 ohms) at the MOD IN jack using frequencies between 400 and 2800 Hz, with 400 Hz increments.

(5) Read and record the level received at terminal Z VF Board DEM OUT jack.

(6) The received levels at terminals A and Z should not exceed plus seven decibles and minus three decibles from the one kilohertz level.

(7) For multilink trunks, perform test steps 3.c.(1)-(5) for links A to B, A to C, A to D, ..., A to Z.

d. Noise Test (Tech Control to Tech Control). The purpose of this test is to measure the carrier noise. A Daven 12B Level Measuring test set will be used. Procedure is as follows:

(1) On dial type circuits the technical controllers at terminals A and Z shall ask the DTE or SWC to busy out the trunk under test and insert dummy jacks into the EQ OUT. In addition, the technical controllers shall insert dummy plugs into the SIG DROP jacks in order to prevent false seizure of the trunk circuit.

(2) At terminal A (VFPB) terminate the MOD IN jack with a 600 ohm terminating plug.

(3) Connect a Daven 12B to the terminal Z VFPB DEM OUT jack. Set the FUNCTION switch to the 600 ohm position. Use flat weighting.

(4) Read and record the noise level indicated at the terminal Z VFPB on the Daven 12B.

(5) At terminal Z VFPB terminate the MOD IN jack with a 600 ohm terminating plug.

(6) Connect a Daven 12B to the terminal A VFPB DEM OUT jack. Set the FUNCTION switch to the 600 ohm position. Use flat weighting.

(7) Read and record the noise level indicated at the A VFPB on the Daven 12B.

(8) The noise levels at terminals A and Z, as read directly on the Daven 12b, should be less than or equal to -50 dbm at the VFPB for primary trunks or -40 dbm at the VFPB for tandem trunks.

(9) Remove test equipment, dummy plugs and restore busy condition to normal.

(10) If the circuit fails to meet the specified noise limits, check the carrier system.

e. Signaling and Supervision Test (Tech Control to Tech Control). The purpose of this test is to check the signaling and supervisory functions of the 2600 Hz SF signaling units at the Tech Controls. These tests apply to single link or multi-link channels. Test equipment required is a Lenkurt Electric Type 26600 or equivalent. The test procedure is given in S&P Item Nr. 0542-01.

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0301-01

SUBJECT: Circuit Restoration by Rerouting

1. Purpose: To prescribe a rapid and effective procedure in the restoration of disrupted communication service within the responsibility of the US Regional Communications Group, Vietnam.

2. Rerouting Circuits:

a. During extended outages, individual circuits are rerouted over other existing facilities in accordance with their restoration priority. Every circuit is assigned a restoration priority in accordance with DCA policy.

b. DCA Circular 310-55-1, paragraph 3520, provides a guidance for technical controllers in the restoration of high priority circuits.

c. To assist the control personnel in visualizing possible reroute paths available, a block diagram will be furnished each control showing trunks between stations that would permit reroutes. This chart will be large enough to permit ease of reference by the controller. See reference a. Vol 2, Page 2-6.

d. Technical control patch panels will be labeled in such a manner as to permit fast and positive identification of trunks and circuits that terminate or pass through the patch panel.

e. Responsibility for initiating reroute actions rests with the receiving technical control facility that discovers the outage, or has an outage reported to them by the subscriber. This does not relieve the technical control who has the "Send" outage of the responsibility to coordinate the resteral of the circuit when it is evident that the receiving technical control facility lacks the means or ability to do so.

3. Pre-emption: The following will be used as a guidance when it becomes necessary to pre-empt a circuit for resteral of another.

a. The lowest priority circuit available will be designated for pre-emption.

b. If the pre-empted circuit is not the lowest priority available, it will, in turn, be restored by pre-empting another lower priority circuit.

c. When the path of the pre-empting circuit will carry the pre-empted circuit (i.e. tone pack pre-empting a voice circuit) the pre-empted circuit will be resotred by this method, (i.e. transposing channels).

d. Every effort will be made to restore the pre-empted circuit to it's normal path as soon as possible. Restoral to the normal path will be made as soon as all difficulties have been corrected.

e. The practice of constantly pre-empting the same circuit when others of equal priority are available will not be tolerated. Priority charts are available at each technical control facility and must be consulted for all pre-empting procedures.

f. When it is evident that the restoral of a high priority circuit, that has been pre-empted will be extended, frequent changes to other circuits of equal priority, if available, will be made so that no user will be unduly denied service.

4. <u>Marking control panels</u>: To assist the controllers in rapidly selecting the lowest priority circuits available for pre-empting, each circuit on the patch panel will be color-coded using a color-coded tab. Additionally, each tab will be marked with the circuit number and the restoration priority. Different color tabs will be used as follows:

a.	Restoration priority	1 - Red, Pink
b.	"	2 - Blue
c.	"	3 - Green
d.	"	4 and 0 - White
e.	Spare channel	- Brown
f.	Data	- Red with White Stripes
g.	AUTODIN	- Blue with White Stripes

5. References:

a. DCA Circular 310-70-1 w/ch 1

b. 1st Sig Bde Regulation 105-6

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APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCVRG-PO

ITEM NR. 0401-01

SUBJECT: SOP for Contingency Restoration Plans

1. Restoration Philosophy:

a. Circuits will be restored by the pre-emption of channels on existing systems. In the detailed patching instructions, the path to be pre-empted will be specified by system and channel numbers only. To alleviate the requirement for constant revision, CCSD circuit numbers will not be used.

b. If any conditioning equipment is required in the station, it will be fully pre-wired between the appropriate jack appearances utilizing a portion of each patch panel reserved for contingency paths.

c. The layout of contingency paths shall conform to the DCA H-500 standards as closely as possible.

d. A discussion of the restoration techniques is given in ANNEX C.

2. Documentation:

a. Each circuit to be restored will be documented with a CLR and OLC's identified with the name of the plan.

b. Both the CLR and the OLC will be annotated to indicate which portion of the path is existing and which part is pre-wired for contingency plan use only.

c. After the necessary pre-wiring has been accomplished, the CLR and OLC's for each circuit will be clipped together and placed in the contingency plan envelope.

d. Any changes in the thru-group plan will be supported by a TLR also identified with the contingency plan name. An OLC will be provided to designate the equipment to be used to implement this contingency TLR.

e. When the plan is executed the contingency TLR/OLC's CLR/OLC's in the envelope will replace TLR/OLC's and CLR/OLC's in the active file bearing the same identification codes. Old recrods will be retained in an inactive file until a permanent reroute for all affected circuits is established.

3. Preparatory Actions:

a. Upon receipt of the contingency plan, it will be checked for completeness against the list on the face of the envelope. There should be a CLR and OLC or TLR and OLC for each circuit or trunk listed.

b. Each CLR/OLC and TLR/OLC will be carefully examined to insure that it is fully understood. Those requiring the use of a pre-wired contingency path in the station will be identified and the necessary wiring cross-connections installed as soon as possible.

c. After all pre-wiring is complete, each station will perform a dry rehearsal of the entire plan. This will involve selecting a patch cord of the proper length and simulating its insertion in the proper jacks. This patch cord will be laid aside and another used for the next patch. The purpose of this rehearsal is to determine if enough patch cords of the proper length are available. If there are less than 24 spare four conductor patch cords in the station not used by the plan, a report will be made immediately to Hqs, RCG, Networks Branch, P&O Division, 923-2260/2361. The site OIC will insure that all technical control personnel go through at least one of these preparatory rehearsals.

d. After the rehearsal has been completed, the OLC's will be clipped to their applicable CLR or TLR and replaced in the envelope in the order given on the cover.

e. A report is required upon completion of preparatory actions. See "Reports".

4. Execution Actions:

a. Upon notification to execute any contingency plan, all technical control personnel including contractors will report immediately to the technical control center.

b. Upon notification to execute a given plan, the TLR/OLC's and CLR/OLC's will be removed from the applicable storage envelope. Each OLC will be examined, starting with those pertaining to TLR's, and the patches specified will be inserted.

c. After all the required patches have been inserted, the notifications report will be submitted. The contingency plan TLR/OLC and CLR/OLC cards will be placed in the active file and the old cards bearing the same number will be withdrawn and filed in an inactive file.

d. The station will then check each circuit for which it has coordination responsibility. (Indicated in item number 8 of the contingency CLR). If the circuit can pass traffic even though it may not be of the highest quality possible, it will be logged in and checking will proceed to the next circuit. All circuits will be checked as quickly as possible. The priority for working on the circuits will be:

(1) Those circuits not capable of passing traffic in order of restoration priority.

(2) Those circuits passing traffic starting with the poorest quality circuit first.

5. Rehearsals:

a. Upon notification to reheare any plan, all technical control personnel including contractors will report immediately to the technical control. For any pre-announced rehearsal, the site OIC will INSURE that all personnel are present.

b. There will be two types of rehearsals - "dry" and "wet". The same code name will be used to specify either type of rehearsal. For a "wet" rehearsal, the specific trunks and/or circuits to be placed on their contingency paths will be given following the code word, e.g. "Kingpin, 77UT7Ø, Z9Ø3, KØK1,...."

c. During a dry rehearsal all patching actions will be simulated. A patch cord of the appropriate length will be selected and the action of inserting it in the proper jacks will be simulated. This patch cord will be laid aside and the next patch will be simulated. The order for simulated patching will be the same as that for execution. If the plan requires coordination with another tech control, the call will be placed, but each call will be prefaced by the rehearsal code word.

d. During a wet rehearsal all patches will be simulated except those pertaining to the trunks and circuits given in the notification message. The patching, reporting, and follow-up actions for these circuits will be the same as for actual execution.

e. When all the initial patches, either simulated or actual, have been completed the appropriate report will be submitted to the ACOC (see para 7, "Reports").

f. The present TLR and CLR files will not be disturbed during any rehearsal.

6. Notification Procedures:

a. Initial notification to execute a contingency plan (test or actual) will normally come from DCA-SAM but may come from HQ, 1st Signal Brigade or from within HQ, USA Regional Communications Group.

b. Authority to initiate the execution of a contingency plan (test or actual) within HQ, USA Regional Communications Group is limited to the Commanding Officer, Deputy Commander, and the Chief, P&O Division. The SYSCON Duty Officer is designated authority to initiate any plan in an emergancy only after all attempts to contact the above personnel in a reasonable amount of time (15 minutes maximum) have failed.

c. If this plan is executed by higher headquarters or DCA-SAM, the person receiving the call will record the name of the person calling, his position (i.e.; DCA-SAM Operations Duty Officer), and his telephone number. Immediately upon hanging up, the received information will be verified by returning the call. Once notification has been verified, the SYSCON Duty Officer will be notified and the notification plan for the contingency plan being executed will be initiated. Notification plans for each contingency plan are given in separate S&P items.

d. Each technical control in the notification chain will record in the station log as a minimum:

(1) Name and position of the person calling.

(2) Date and time of call.

The technical controller will immediately notify his OIC and/or NCOIC and then call the next control per the appropriate notification plan. (See Annex A for a sample). The notification plan for a contingency plan will be found on the cover of the storage envelope. After placing this call, the tech controller will record in the station log as a minimum:

(1) Name and position of person called.

(2) Date and time of call.

7. Reports:

a. An initial report shall be made by each station when the prewiring of the contingency path has been completed and/or the ability of the station to make the required patches has been verified. Report will be submitted to Hqs, RCG, Networks Branch, ICSS Office.

b. A report shall be submitted after each rehearsal or execution of the plan. Items to be given.

TO: ACOC
INFO: RCG, SYSCON

Code Name of Rehearsal ________________

Time notification was received ________

Notification passed to

(names and times) ___________________

____

____

Time that required patching actions were completed
(simulated or actual) ________________

This report will be submitted to the ACOC as soon as possible.

c. During an actual execution of the plan or a "wet" rehearsal, the coordinating TCG (control office) for each circuit will be responsible for notifying the ACOC of the time that circuit is turned over to traffic. Activation reports may be consolidated and submitted at 3-hour intervals for the first 12 hours. After that time individual reports will be submitted.

8. <u>Storage</u>:

a. All of the material pertaining to a specific plan will be placed inside an envelope used specifically for that purpose. This material will be primarily TLR/OLC's and CLR/OLC's; however, amplifying instructions and special notes may also be included.

b. The storage envelope will have the following information on it (See Annex A for a sample):

(1) Code name for execution

(2) Code name for rehearsal

(3) List of circuits and trunk groups affected at this station.

(4) Notification chain for this plan.

c. The envelope will be left unsealed and placed in a file cabinet drawer specifically designated for that purpose.

Contingency Plan

FOXTROT - EXECUTE

KINGPIN - REHEARSAL

<u>Trunks and Circuits effected at this station</u>

Trunks: - - - - - - - - - - - -

- - - - - - - - - - - -

Circuits: - - - - - - - - - - -

- - - - - - - - - - -

- - - - - - - - - - -

(Notification Plan)

Annex A, Item Nr. 0401-01, RCG LL TCG S&P

ANNEX B

Restoration Technique

Refering to figures 1 and 2 will greatly aid in understanding the technique used for restoring circuits.

The basic principle is to pre-empt channels at the voice-frequency patch panel without regard as to what conditioning equipment may be connected to that channel. In order to accomplish this it is necessary to have a pre-wired contingency path across the office to go from one standard channel to another. These pre-wired contingency paths permit DCA H-500 standards to be followed.

The two basic problems in restoration are:

1. Restoring the connection between two subscribers when an intermediate point is disabled.

2. Restoring terminal operations at some new location when a terminal is disabled.

Figure 1 pertains to the first type of restoration. In this situation existing channels are pre-empted to re-connect the two terminal TCG's. If the contingency plan considers the disabling of one of the terminal TCG's, then there must also be a contingency path pre-wired from the new terminal TCG to the subscriber (see Fig 1b).

Figure 2 illustrates two situations possible in terminal restoration. On the left, it is possible to make good the connections to the new terminal by a simple circuit panel patch since both paths go through the same TCG. On the right it has been necessary to get the subscriber to the new terminal TCG by the use of pre-wired contingency paths and make-good patches.

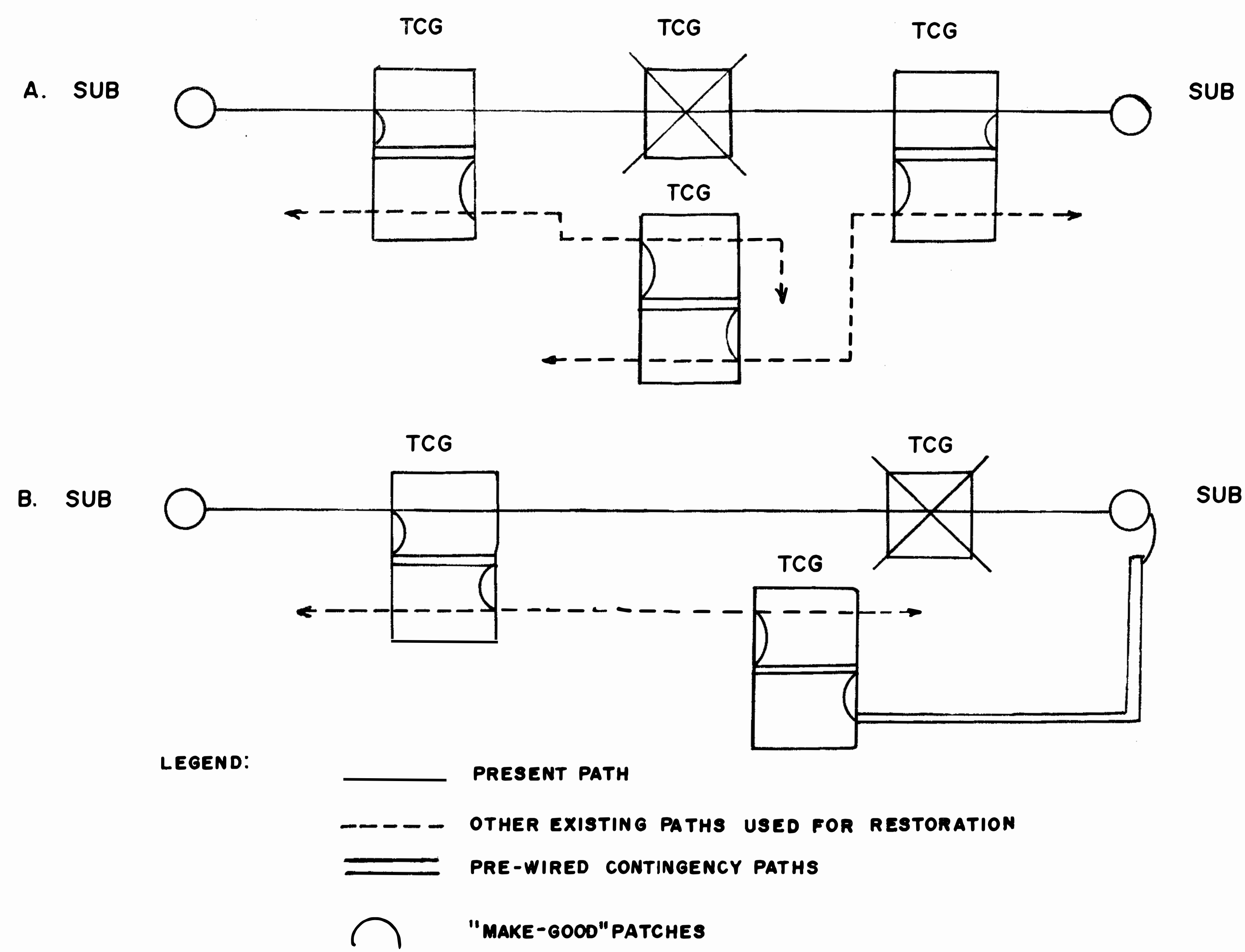

FIG I: RESTORATION TECHNIQUE THRU CHANNEL

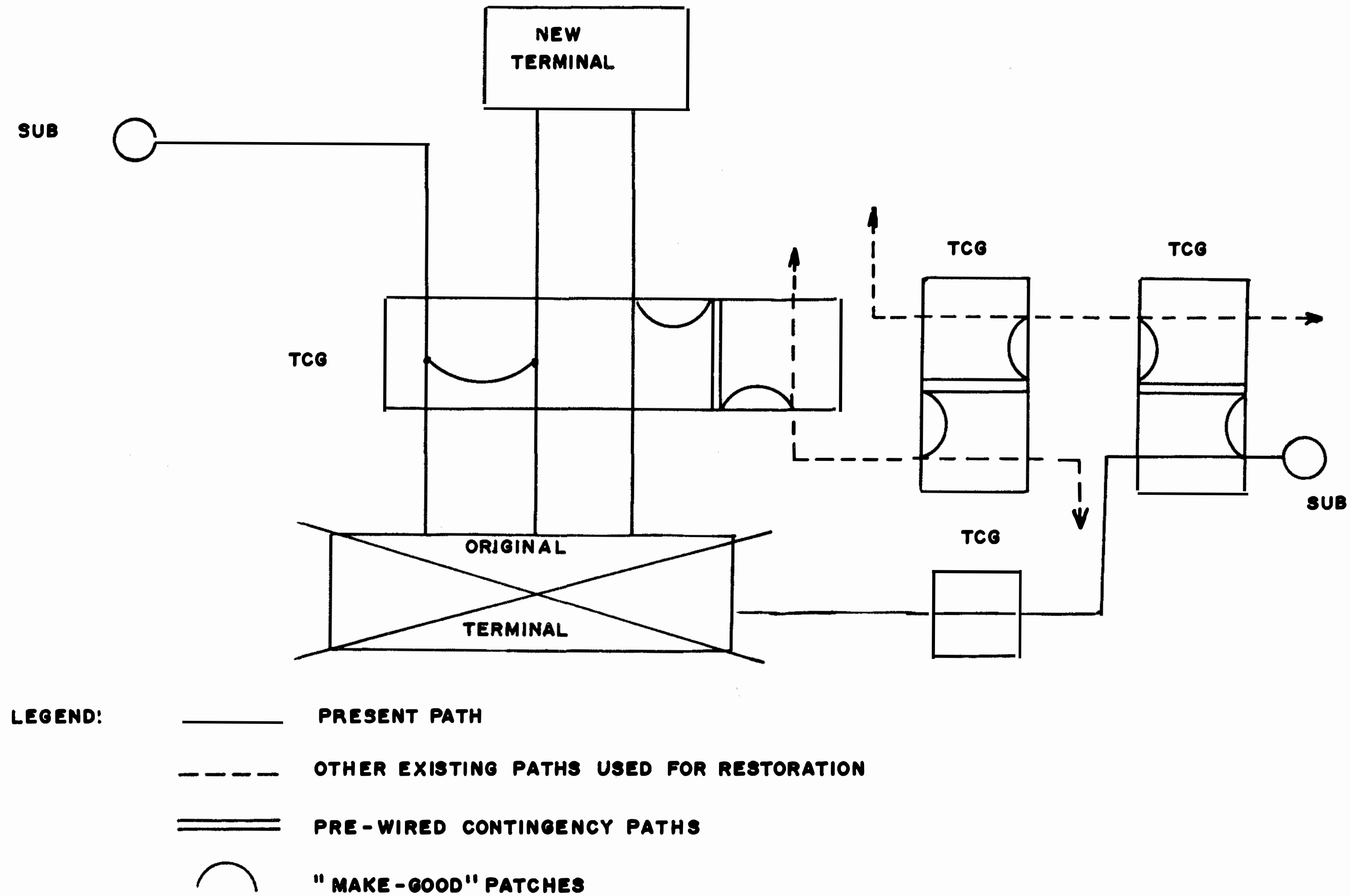

FIG 2: RESTORATION TECHNIQUE— TERMINAL OPERATIONS

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APO SAN FRANCISCO 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

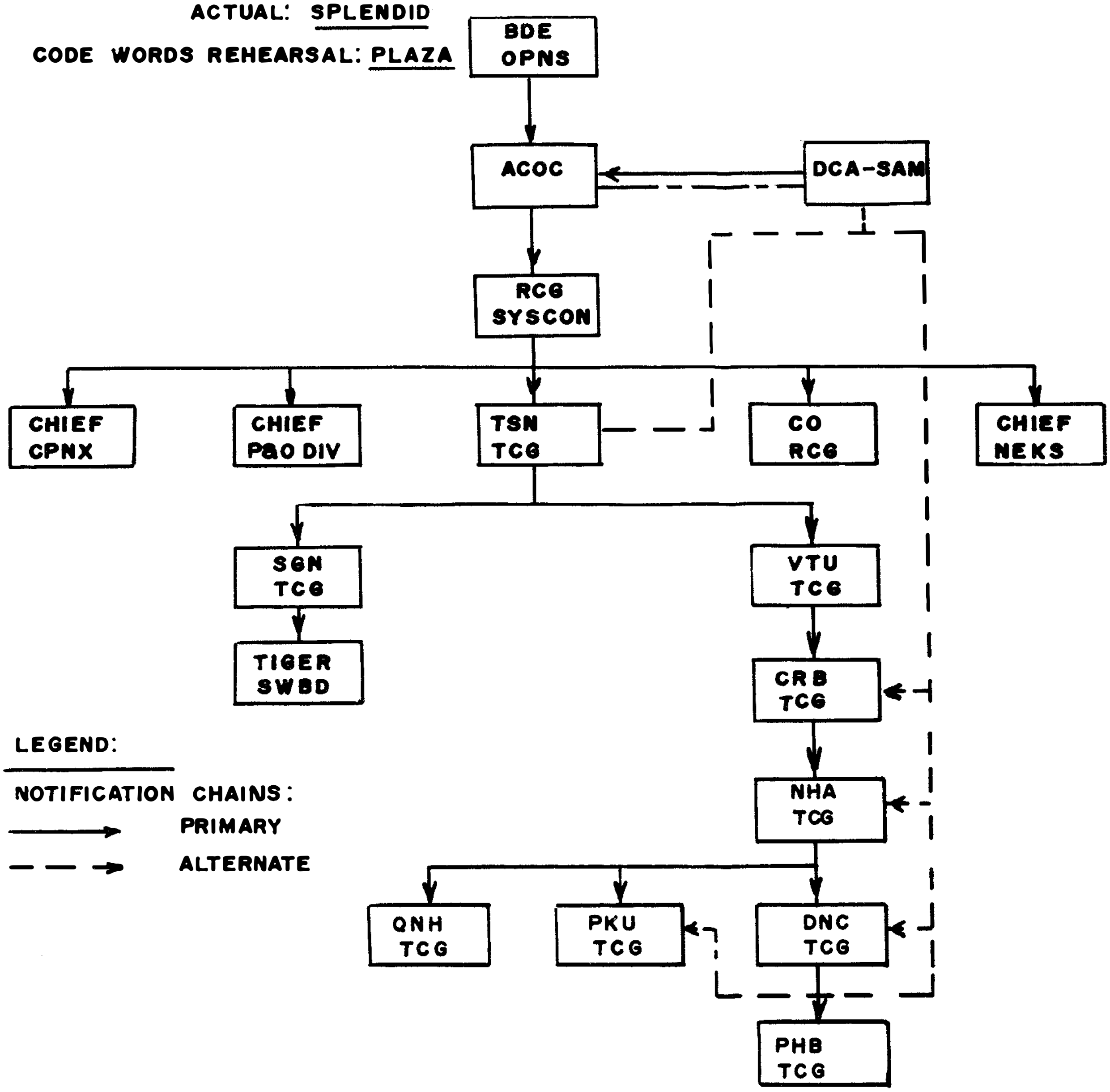
SCCVRG-PO

ITEM NR. 0411-01

SUBJECT: CONTINGENCY PLAN SPLENDID/PLAZA NOTIFICATION PLAN (VIETNAM)

ACTUAL: SPLENDID

CODE WORDS REHEARSAL: PLAZA



DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0511-01

SUBJECT: Pre-Wired Equipment

1. Background: With the advent of ICS and fixed-plant circuit conditioning equipment, the ability to restore and altroute circuits in a timely fashion has been markedly decreased. Since spare pads, amplifiers, ringers, etc. are available to the technical controller only by hard-wiring on the combined distribution frame, a time consuming process, there is no built-in capability to immediately replace defective equipment or troubleshoot circuits by patching in substitute items.

2. Purpose: To establish a basic configuration of pre-wired equipment, which will be available at each ICS technical control, for use in emergency patching and equipment replacement.

3. Equipment to be Wired: Attached as Inclosure 1 is a schematic of one basic set of the desired configuration. One or two of these basic sets will be installed in each technical control depending upon its size. Item Nr. 0512 will make the specific equipment assignments for each ICS technical control.

4. Use: Some of the specific uses for which this pre-wired equipment is intended are the following:

a. Circuit Altroutes: Circuit altroutes can be made on the VF patch board by the use of 23 db pads available in the basic pack. By patching into the MOD jack of #1 and out of the DEM jack of #2, one 23 db pad is available for use in patching between channels of the AN/FCC-17 MUX as they appear on the VF patch board. A capability of patching eight circuits (both send and receive sides) is available in each basic pack. Positions 7 and 8 in the basic pack are used to convert the levels of a channel of the IWCS MUX (AN/FCC-17 which uses +7, -16 dbm at the VF board) to those of tactical MUX (AN/TCC-13 or AN/TCC-7 which uses 0,0 or 0, -4 dbm levels at the PRI board).

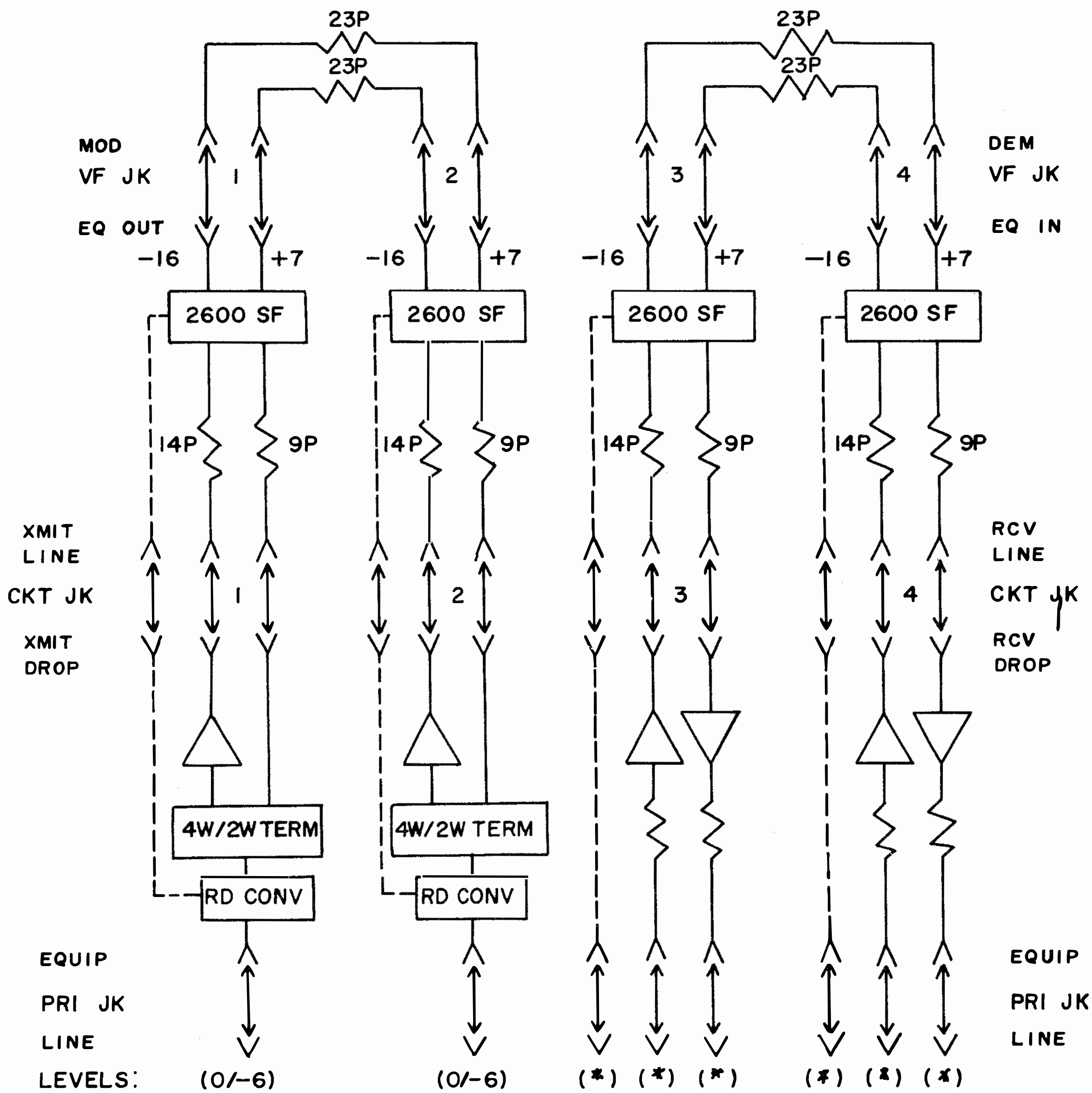
b. Equipment Replacement (troubleshooting): During circuit troubleshooting, the simplest and fastest method of locating the trouble is by replacing components or groups of components. If an active, high priority circuit is down, the entire in-station path can be replaced putting the circuit back to service on a patch basis while standard troubleshooting techniques are employed on the normal path. In the basic pack, a combination of commonly found in-station configurations are pre-wired to the Primary, Circuit, and Voice-Frequency patch boards for this purpose. A complete spare path or portion thereof can be patched into any active circuit as required to replce specific items of equipment or the entire configuration. For example, if a 2600 Hz/20 Hz RD circuit is not working properly and the trouble is thought to be in the SF unit, its normal SF unit can be bypassed by patching the SF unit and pads available (#1, 2, 3, or 4) at the VF and CKT jacks. An alternate solution is to patch over the entire circuit at the VF and PRIMARY boards (#1 or #2). After the circuit is restored to service by patching in the spare equipment, normal troubleshooting methods may be used to locate the problem within the assigned, "hard-wired" equipment. It is important to remember that such patching cannot be done indiscriminately, as some sets of spare equipment have extra pads and amplifiers installed for flexibility in adjusting levels for non-standard circuits. These levels must be adjusted before patching can be accomplished.

5. Description: Descriptions of each of the twelve basic pack positions are given below:

POSITION	AVAILABLE AT (FROM/TO)	STANDARD OPTION NR. (SEE ITEM NR. 0241-01	DESCRIPTION OF CIRCUIT
1.	EQ IN & EQ OUT (VF) EQ (PRI)	1A/A1	2600/20 Hz 2W RD circuit into MUX
2.	EQ IN & EQ OUT (VF)/EQ (PRI)	1A/A1	2600/20 Hz 2W RD circuit into MUX

3	EQ IN & EQ OUT (VF)/EQ (PRI)	1B/B1	2600 Hz/E&M signaling 4W into MUX (Tone on while idle)
4	EQ IN & EQ OUT (VF)/EQ (PRI)	1B/B1	2600 Hz/E&M signaling 4W into MUX (Tone on while idle)
5	EQ IN & EQ OUT (VF)/EQ (PRI)	1AX/XA1	1600 Hz/20 Hz RD circuit into MUX. (Used with a TA-182)
6	EQ IN & EQ OUT (VF)/EQ (PRI)	1AX/XA1 (Modified)	1600 Hz/20 Hz 2W RD circuit into tactical MUX (Used with TA-182).
7	EQ IN & EQ OUT (VF)/EQ (PRI)	2H/H2	ICS MUX interface with tactical MUX-no signaling
8	EQ IN & EQ OUT (VF)/EQ (PRI)	2H/H2	ICS MUX interface with tactical MUX-no signaling

1-2	MOD-1/DEM-2 (VF)	23 db pad for MUX Patching
	DEM-1/MOD-2 (VF)	23 db pad for MUX Patching
3-4	MOD-3/DEM-4 (VF)	23 db pad for MUX Patching
	DEM-3/MOD-4 (VF)	23 db pad for MUX Patching
5-6	MOD-5/DEM-6 (VF)	23 db pad for MUX Patching
	DEM-5/MOD-6 (VF)	23 db pad for MUX Patching
7-8	MOD-7/DEM-8 (VF)	23 db pad for MUX Patching
	DEM-7/MOD-8 (VF)	23 db pad for MUX Patching
9-10	MOD-9/DEM-10 (VF)	23 db pad for MUX Patching
	EQ OUT-9/EQ IN-10 (VF)	23 db pad for MUX Patching
	DEM-9/MOD-10 (VF)	23 db pad for MUX Patching
	EQ IN-9/EQ OUT-10 (VF)	23 db pad for MUX Patching
11-12	MOD-11/DEM-12 (VF)	23 db pad for MUX Patching
	EQ OUT-11/EQ IN-12 (VF)	23 db pad for MUX Patching
	DEM-11/MOD-12 (VF)	23 db pad for MUX Patching
	EQ IN-11/EQ OUT-12 (VF)	23 db pad for MUX Patching



* VARIABLE

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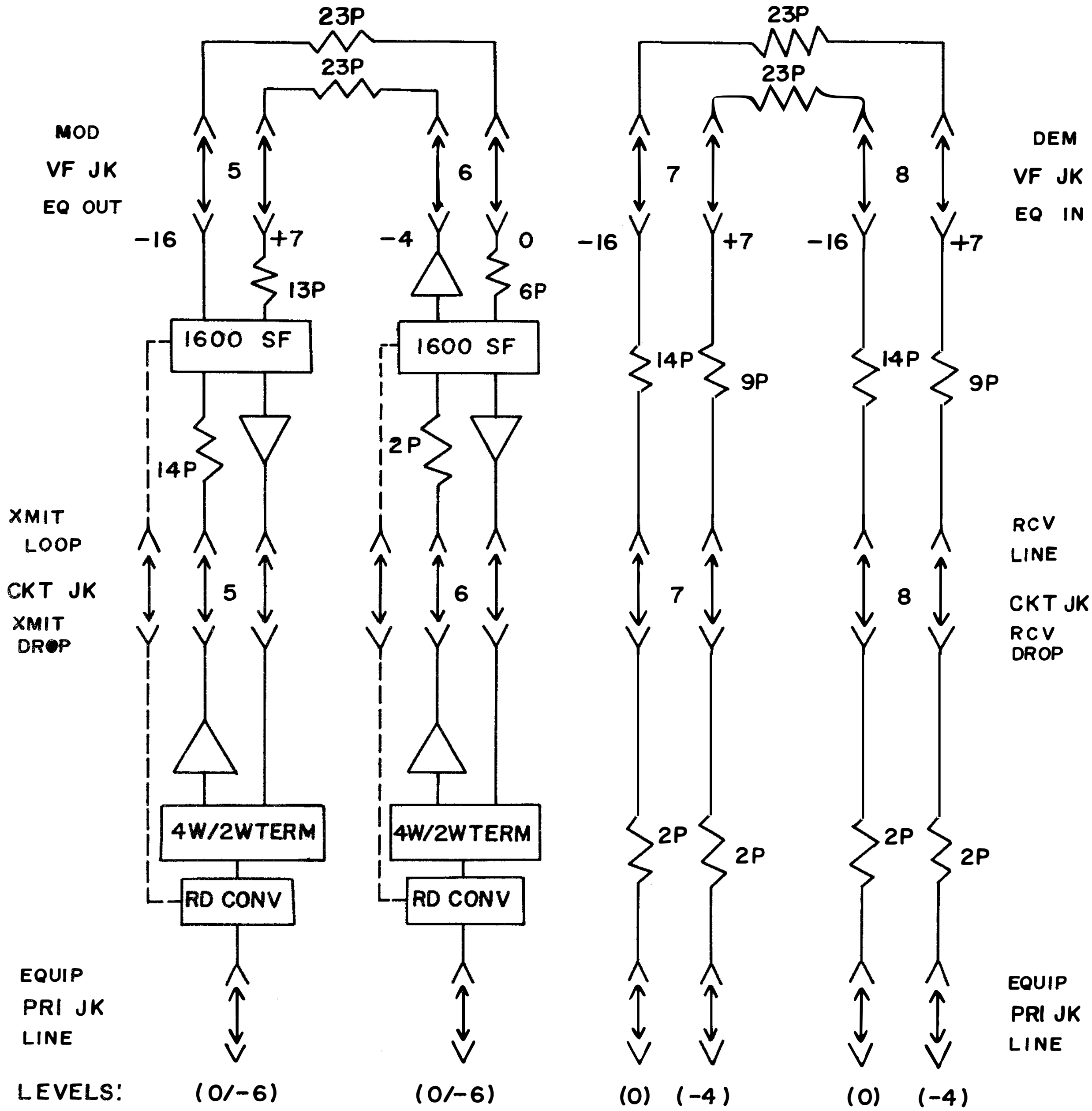
RCG LL TCG S&P



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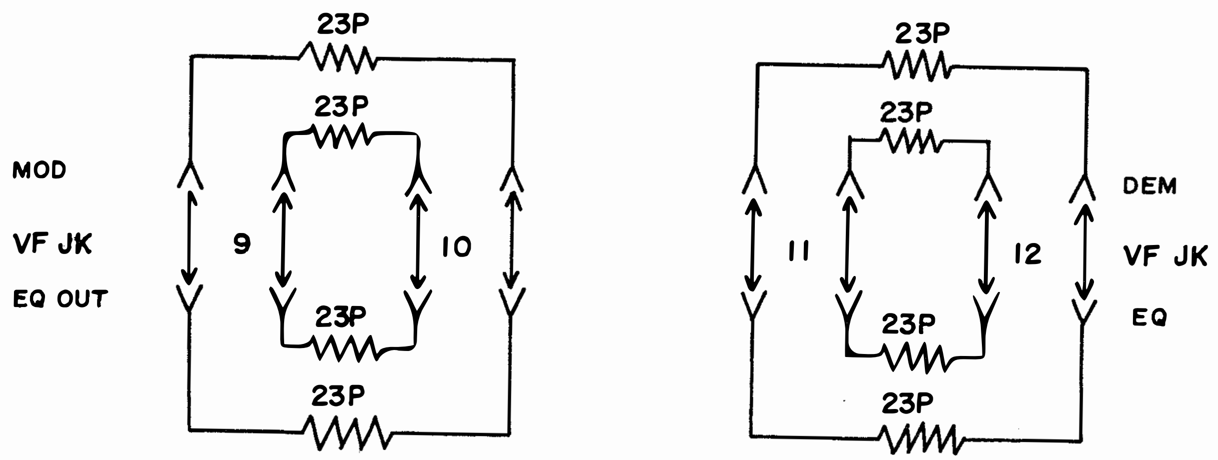

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DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0512-02

SUBJECT: Equipment Assignments for Pre-Wired Equipment

1. Background: S&P Item Nr. 0511 describes a standard configuration of pre-wired equipment to be used for emergency equipment replacement and expedited activations.

2. Purpose: This item specifies the exact pieces of equipment to be used at each site to assemble these sets of pre-wired equipment.

3. Assignments: The assignments for each ICS site are given in Incl 1. This supersedes all previous assignments.

4. Report: Each site will submit a report to Networks Branch, P&O Division, upon completion of the wiring required. This equipment will be wired NLT 15 days following activation of a site yet to be accepted.

SITE	NUMBER OF SETS TO BE WIRED	VF JK	CKT JK	PRI JK	2600	1600	RDC	PAD	AMP	4WT
	QUANTITY REQ'S PER SET	12	12	14	4	2	4	40	11	4
AKE	1	217-228	217-228	179-192	117-120	59-60	177-180	531-570	170-180	177-180
BIJ	1	205-216		179-192	57-60	35-36	33-36	441-480	110-120	57-60
BMT	1	109-120	109-120	179-192	57-60	59-60	177-120	201-240	170-180	117-120
BNH	1	109-120	109-120	179-192	57-60		117-120	321-360	170-180	117-120
BTY	1	205-216		179-192	45-48		42-45	201-240	2-12	42-45
CCI	1	85-96		131-144	21-24	22-23	21-24	201-240	62-72	33-36
CHL	1	109-120	109-120	179-192	57-60	35-36	93-96	201-240	86-96	93-96
CMU	1	85-96		131-144	33-36	11-12	21-24	201-240	38-48	21-24
CRA	1	109-120	73-84	1-14	1-4	1-2	1-4	1-39 75	1-11	1-4
CRB	1	469-480	493-504	49-62	16-19	1-2	17-20	72-110 131	21-24 27-31 34-35	495-498

	QUANTITY REQ'D PER SET	12	12	14	4	2	4	40	11	4
SITE	NUMBER OF SETS TO BE WIRED	VF JK	CKT JK	PRI JK	2600	1600	RDC	PAD	AMP	4 WT
CTO	1	109-120	109-120	179-192	45-48	57-60	117-120	321-360	170-180	117-120
DAN	1									
DBT	1									
DGT	1	193-204		107-120	93-96	59-60	45-48	441-480	158-168	69-72
DNC	1	205-216		371-384	57-60	95-96	57-60	441-480	242-252	93-96
DNG	2	709-720 121-132	121-132 709-720	145-156 265-280	41-44 143-146	34-35 37-38	40-42 88-91 149	404-445 695-730 197-200	121-125 138-142 221-232	41-42 108-113
GDH	1	337-348	193-204	85-98	47-50		48-51	72 169-202 205-209	64-72 75-76	62-65
HUE	1	109-120	109-120	179-192	56-59	35-36	93-96	201-240	86-96	93-96
LBN	1	157-168	157-168	179-192	56-59		117-120	561-600	206-216	213-216

Incl, Page 2, Item Nr. 0512-02, RCG LL TCG S&P

	QUANTITY REQ'D PER SET	12	12	14	4	2	4	40	11	4
SITE	NUMBER OF SETS TO BE WIRED	VF JK	CKT JK	PRI JK	2600	1600	RDC	PAD	AMP	4 WT
LXN	1	205-216		179-192	33-36	11-12	21-24	441-480	38-48	21-24
MYM	1	109-120	73-84	25-38	24-27	13-14	25-27 32	101-139 13	25-30 33-35 39-40	25-28
NHA	2	349-360 829-840	241-252 829-840	397-424	108 109 111-116	19-20 24,26	75-76, 68,79, 81,82 85-86	681-718 843-882 907 678	78-80 82,89 328- 344	397-424
NHH	1	97-108		131-144	21-24	47-48	33-36	201-240	110-120	45-48
PHB	1	85-96	157-168	60-72, 87	20-23	1,2	26-27 61,62	55-82 167-175 192 217,218	25-29 75-78 46,52	21-23 66
PHC	1	205-216		169-182	57-60	23-24	93-96	353-392	98-108	69-72
PHT	1	97-108		179-192	21-24	23-24	21-24	201-240	62-72	33-36

	QUANTITY REQ'D PER SET	12	12	14	4	2	4	40	11	4
SITE	NUMBER OF SETS TO BE WIRED	VF JK	CKT JK	PRI JK	2600	1600	RDC	PAD	AMP	4WT
PKU	2	349-360, 589-600	325-336, 745-756	121-132, 157-172	321-328	1, 3, 7, 8	361-368	959-1002, 1008-1043	165-185	96-103
PLM	2	349-360 709-720	661-672 289-300	397-408 529-544	46,48,50 52,54 57-61	54-57	39-42 49-50 90-114	795-836 923-960	156,166 186-188 191-207	83-90
PLO	1	193-204		131-144	45-48	119-120	57-60	441-480	254-264	69-72
PNT	1	109-120	109-120	179-192	57-60	23-24	81-84	171-210	74-84	81-84
PRG	1	109-120	109-120	179-192	57-60	35-36	93-96	201-240	86-96	93-96
PRL	1	229-240	157-168	37-50	29-32	1-2	26-29	121-150 161-170	29-37 46-47	27-30
QNC	1	97-108		179-192	21-24	22-23	21-24	201-240	62-72	33-36
QNG	1	109-120	109-120	179-192	33-36	35-36	69-72	141-180	62-72	69-72
QNH	1	349-360	229-240	97-108 191-192	34-37	2-3	33-36	489 217-246 463-471	119-124 183-187	33-36

SITE	QUANTITY REQ'D PER SET / NUMBER OF SETS TO BE WIRED	12 VF. JK	12 CKT JK	14 PRI JK	4 2600	2 1600	4 RDC	40 PAD	11 AMP	4 4WT
QTR	1	205-216		179-192	21-24	23-24	57-60	321-360	182-192	57-60
RGA	1									
SCT	1	109-120	109-120	179-192	117-120	59-60	177-180	411-450	170-180	177-180
SDC	1									
SGN (AEB)	1	97-108	73-50	37-50	1-4		1-4	73-112	35-35	1-4
SGN TCG	2	169-180 589-600	229-240 577-588	145-156 241-256	100-102 106,108,109 125,126		92-93 98	416-457 600-636 641	72,75 131 156-174	101-103 137-141
SGN TCM	1	73-84	73-84	179-192	45-48		45-48	81-120	38-48	45-48
TNH	1	97-108		179-192	9-12	47-48	21-24	201-240	98-108	33-36

	QUANTITY REQ'D PER SET	12	12	14	4	2	4	40	11	4
SITE	NUMBER OF SETS TO BE WIRED	VF JK	CKT JK	PRI JK	2600	1600	RDC	PAD	AMP	4WT
TSN	2	325-336 949-960	97-108 613-624	385-395 637-652	47,55,57, 142 275-278	48,49 63-64	34,36 139 268-272	1549,1550 965-1002 1383-1418 1005-1006 1277,1290	480,481 54,55,60 72,410 417,427 4340437	319-323 33-34 138,133
TYH	1	217-240		371-384	57-60	23-24	96-99	441-480	170-180	18-21
VCM	1	109-120	109-120	179-192	33-36	59-60	105-108	291-330	98-108	105-108
VLG	1			131-144	45-48	23-24	33-36	441-480	86-96	57-60
VTA	1	109-120	73-84	1-14	1-4	1-2	1-4	83 1-39	1-11	1-4
VTU	1	349-360	157-168	83-84 85-86 83-96	59-61, 67	1-2	48-51	227-256, 259-267 204	43-47 198-113	49-51, 64
DGH	**1**	**229-240**		**467-480**	**117-120**	**59,60**	**117-120**	**321-360**	**158-168**	**117-120**

DEPARTMENT OF THE ARMY
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APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0521-02

SUBJECT: Installation, Construction and Operation of Locally Fabricated 4 Way-4 Wire Bridges

1. Background: For the proper engineering of multi-point circuits it is highly desireable to use a 4-wire bridge. These bridges serve to isolate the send side of one branch from its own receive side while minimizing the losses to the receive side of other branches. Commercially fabricated bridge assemblies are programmed for installation in the ICS sites in the future; however, in the interim, a locally fabricated unit must be employed.

2. Purpose: This item contains the description, installation instructions, cross-connections and technical data for a 4 way-4 wire resistive bridge for use on multipoint circuits.

3. Description:

a. The schematic of the bridge is shown in Figure 1.

b. Figure 2 illustrates the layout of the bridge components on a distribution-frame pin block. Notice the two 600 ohm resistors mounted on the four left-hand pins. They are used to terminate the unused leg when there are only 3 branches connected.

4. Fabrication Details:

a. Determine bottom side of the 1/2 4x26 pin block.

b. Mount twenty-two 750 ohm $\pm$ 5% 1/2 watt resistors as shown in Figure 2.

c. Mount two 600 ohm ± 5% 1/2 watt resistors as shown in Figure 2.

d. Strap pins as follows with 22 ga. insulated, tinned, straping wire. Loop straps through holws on cable fanning strip located at rear of block.

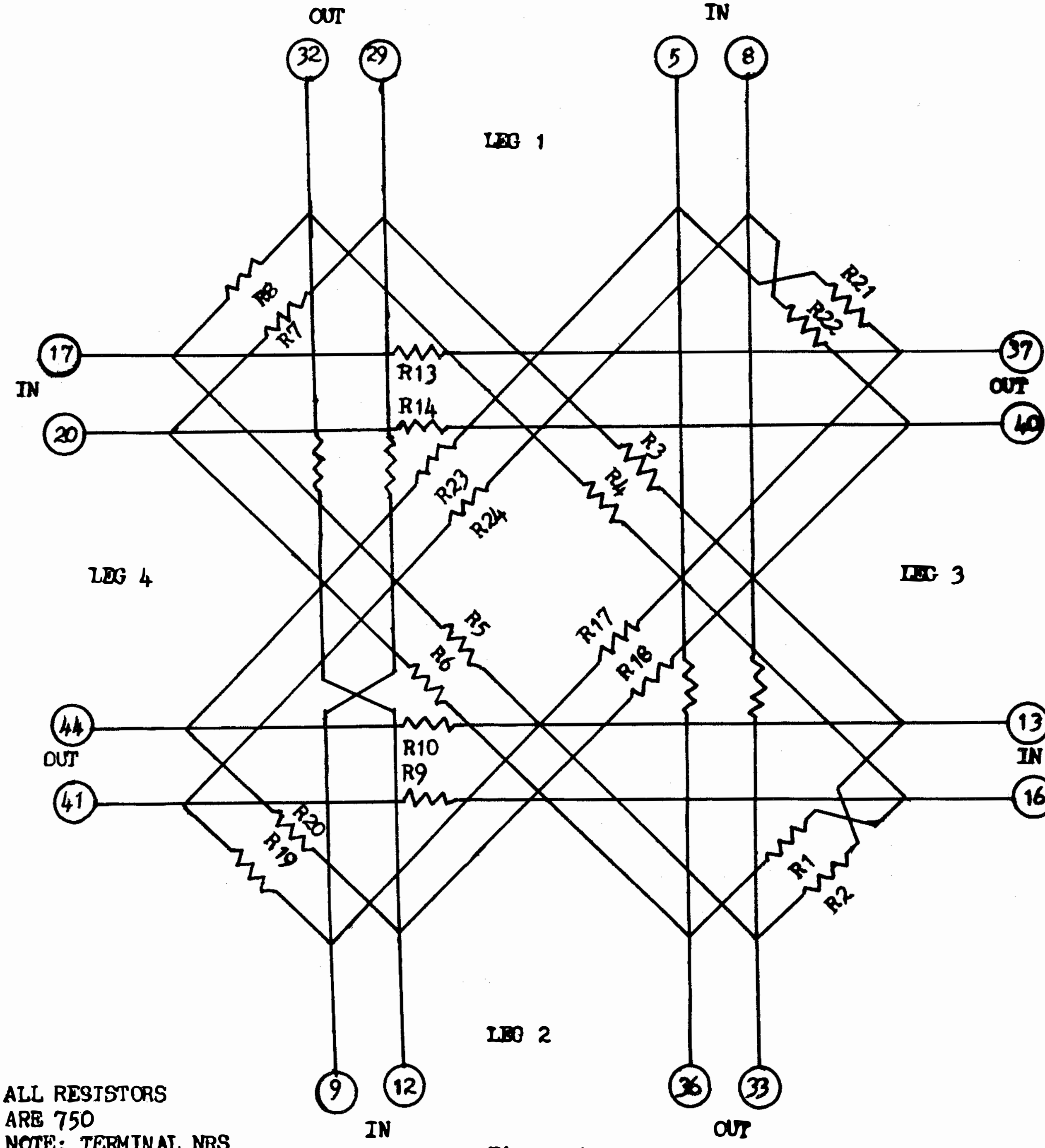
1-5-47	11-44-48
2-22-37	12-27-39
3-23-40	13-34-43
4-8-46	14-29-25
6-19-36	15-32-28
7-18-33	16-35-42
9-26-38	17-21-31
10-41-45	20-24-30

e. Form solder all connections with resin core solder.

5. Installation: Installation consists of mounting the pin-block in a suitable location on the horizontal side of the CDF.

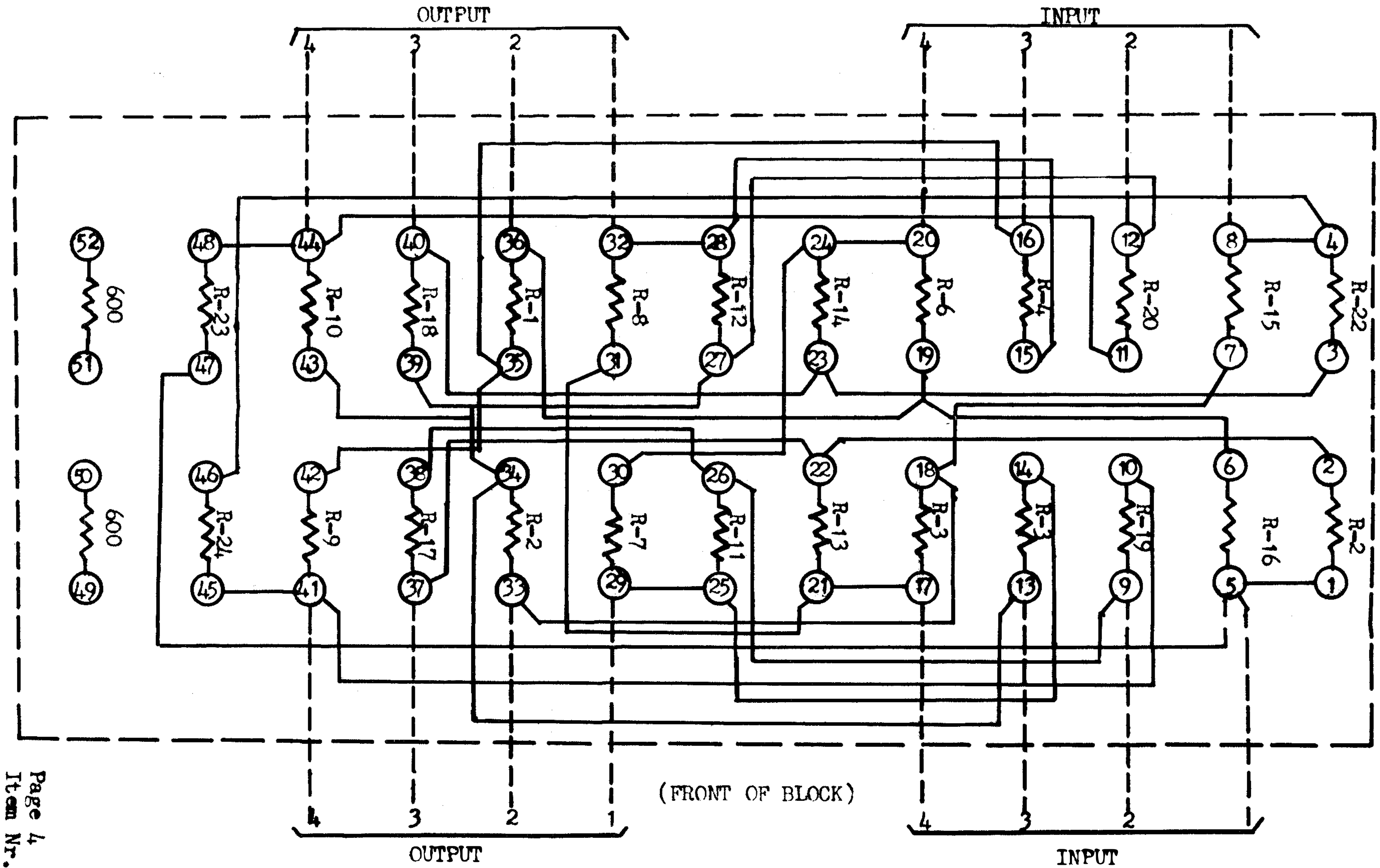
6. Technical Data: The bridge is a 4 way-4 wire circuit, 600 ohms impedance, balanced, with 14.5db loss from any input to any of the other three (3) outputs. From any input of the same leg, a minimum of 60db isolation will be measured. Measurements must be made with all unused legs terminated in 600 ohms. When in use, all unused legs must be terminated in 600 ohms.

7. Use: A typical multipoint circuit connection using this bridge is shown in Figure 4.



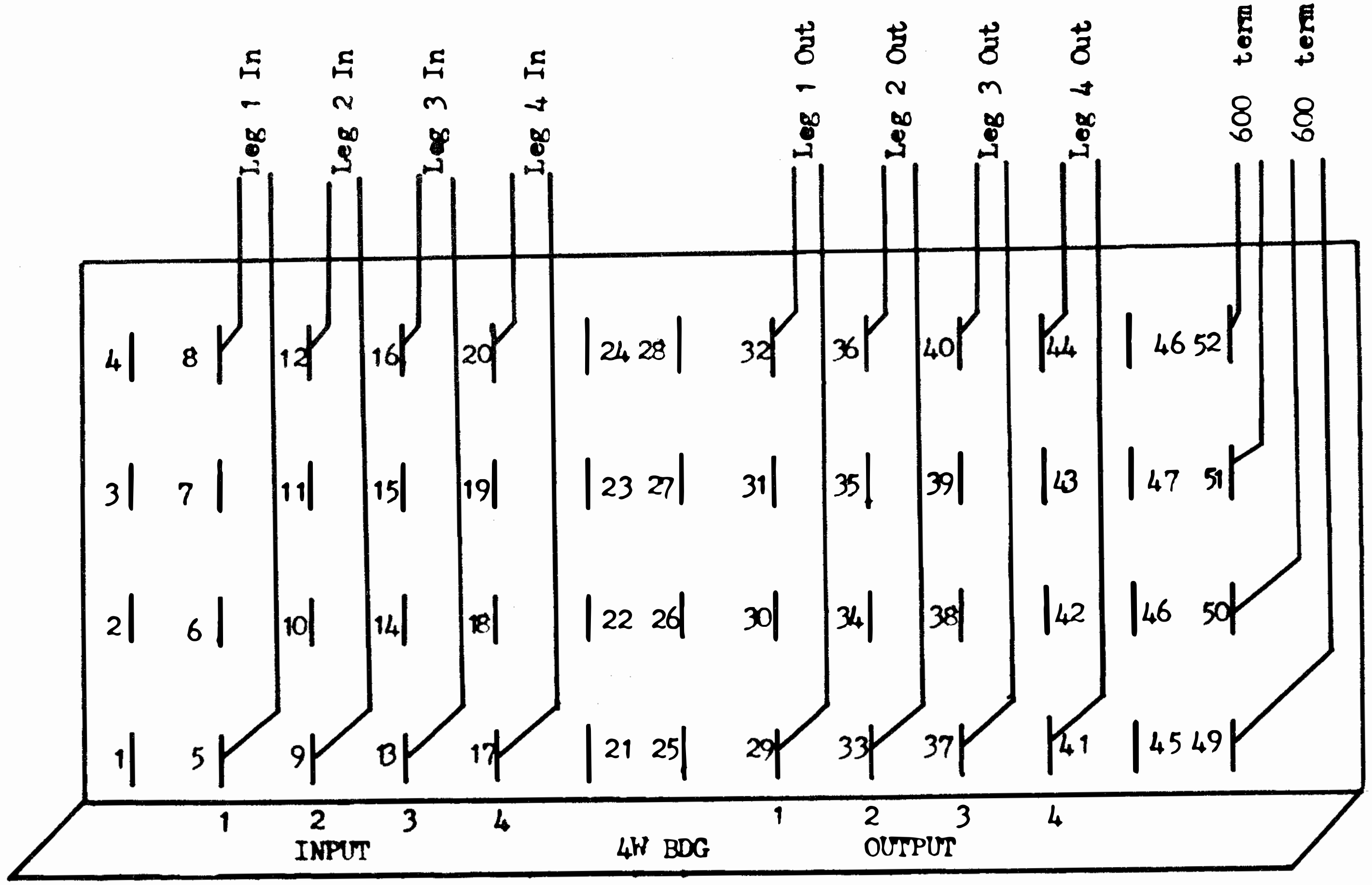
ALL RESISTORS
ARE 750
NOTE: TERMINAL NRS
ARE PIN NRS ON PIN
BLOCKS

Figure 1
4 Way - 4 Wire Bridge
Schematic
14DB NET LOSS



ALL NUMBERED RESITORS ARE 750 Ω

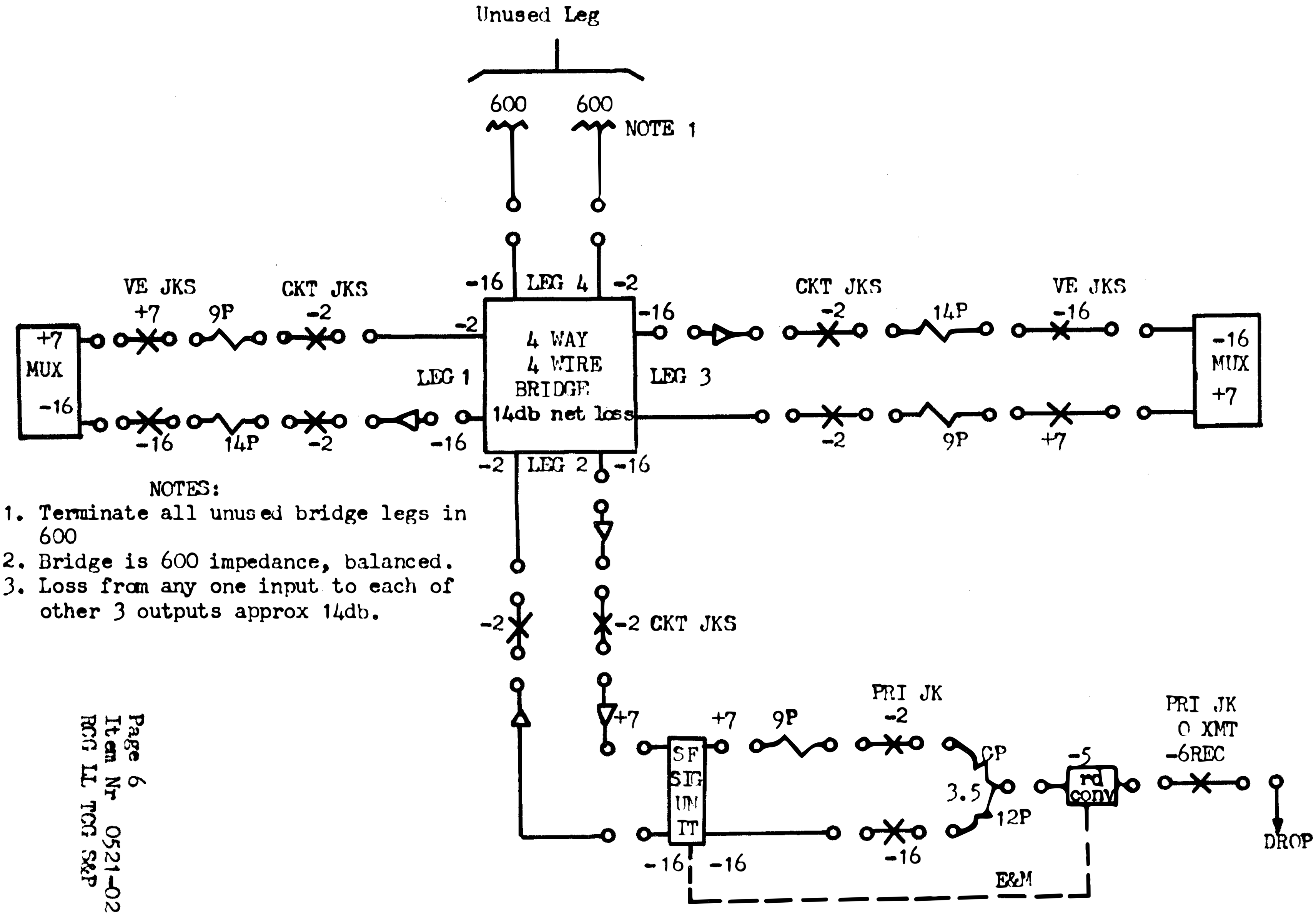
FIG 2
4 WAY - 4 WIRE BRIDGE -- ASSEMBLY 8 WIRING
($\frac{1}{2}$4x26 PIN BLOCK OR EQUIV, VIEW FROM BOTTOM)



FRONT OF BLOCK

FIG 3
4WAY-4WIRE BRIDGE
(TOP VIEW)
INPUT, OUTPUT, AND 600 OHM TERMINATION CONNECTIONS

FIG 4: TYPICAL MULTIPOINT CIRCUIT CONFIGURATION
USING 4 WAY -- 4 WIRE BRIDGE



NOTES:

1. Terminate all unused bridge legs in 600
2. Bridge is 600 impedance, balanced.
3. Loss from any one input to each of other 3 outputs approx 14db.

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0540-02

SUBJECT: Use of DC Isolation Relays in the ICS

1. Background: In the past, isolation relays have been used at the technical controller's discretion to improve or supply additional service to the subscriber (such as local page print-on-send). Because of increased utilization of these relays in DCA-SAM approved CLR's, this practice must be discontinued in all cases where not specifically detailed on the CLR. The technical controller may, however, recommend to Networks Branch, RCG, that the CLR be changed, if the use of an isolation relay is required to make a circuit operational. To test his hypothesis, the technical controller may use the two pre-wired isolation relays to implement TEMPORARILY the proposed circuit, but no permanent wiring will be made without the specific approval of Networks Branch.

2. Action to be taken:

a. Two isolation relays will be pre-wired to the DC miscellaneous jack strip. One relay will be adjusted for 20ma input operation and the other for 60 ma input.

b. If a technical controller believes that an isolation relay is required he will use one of the pre-wired relays on a patch basis.

c. If the patched in relay improves service, a request will be made to Networks Branch, RCG, for a new CLR covering the changed circuit, and for permanent assignment of an isolation relay to the circuit.

d. Requests for the use of an isolation relay soley to provide the subscriber with a local page print-out will be denied; this is part of the subscriber equipment and must be provided by him.

3. Records and Reports: Normal procedures upon implementation of a CLR will be followed.

DEPARTMENT OF THE ARMY
HEADQUARTERS, USA REGIONAL COMMUNICATIONS GROUP (RVN)
APO San Francisco 96243

SCCPV-RG-PO-NW

Item Nr: 0542-01

SUBJECT: Operation and Adjustments of the 2600 Hz SF Unit in Dial Circuits

1. Purpose: The purpose of this item is to insure that all ICS personnel understand the operation of and know how to adjust the Collins 2600 Hz SF Signaling Units for use in dial circuits.

2. General: With the implementation of the Automatic Telephone System in Southeast Asia (ATS-SEA), more direct dial circuits are coming into existance. It is absolutely essential that personnel understand the operation of SF Units. To prevent the dial pulses from being distorted at the distant terminal, the 2600 Hz SF Units must be set for 60% break, 40% make.

3. Test Equipment: Lenkurt Electric Type 26600 test set, one test circuit between technical control A and technical control B and a volt-ohm-meter.

4. Discussion:

a. The first part of this S&P item will give a brief explanation of how a 2600 Hz SF Unit operates in a dial circuit. It is most important that the function of the E and M leads be fully understood. In short, the M lead is used to transmit dialing pulses from the DTE to the EE building while the E lead transmits dialing information from the EE building to the DTE. The M lead is connected to pin 11 of the SF Unit and the return path is provided by an earth ground. The DTE transmits dialing information to the SF Unit by shorting the M lead to ground or connecting the M lead to a -48 volts dc. Pin 21 of the SF Unit, which is also strapped to pin 10, is the E lead and the return path is earth ground. The SF Unit transmits dialing information to the DTE by alternately shorting pin 21 to ground and opening this connection (open circuit). The following information relates the condition or state of the E and M leads and the tone receive or transmit state of the SF Unit;

(1) DTE puts a ground on the M lead and the SF Unit sends a -36dbm0

2600 Hz tone to the distant SF Unit.

(2) DTE puts a -48vdc on the M lead and the SF Unit sends no 2600 Hz tone to the distant SF Unit.

(3) SF Unit receives no 2600 Hz tone and sends the DTE a short on the E lead.

(4) SF Unit receives a-13dbm0 2600 Hz tone and sends the DTE an open on the E lead.

b. A typical dial circuit is shown in Figure A. The following is a simplified discussion of how dialing is accomplished. Subscriber A takes his phone off hook and dials a number. The dialing information is transferred to the SF Unit by alternately switching between ground and battery on the M lead at the DTE. The SF Unit receives these changes of state on the M lead and sends out tone bursts of 2600 Hz to the SF Unit at Z. The tone bursts are received at Z and are converted to shorts and opens, respectively, on the E lead. The shorts and opens are sent to the DTE where they enter the trunk selector switch which decodes these changes of state and selects the proper subscriber.

c. The conditions given in para. a(1),(2),(3), and (4) are <u>most important</u> and should be memorized because they will not only assist the Technical Controller in activating a circuit but will also aid him in restoring a circuit to traffic. One other point to note is that the RECEIVE LEVEL control on the SF Unit should be adjusted so that the 1.0 KHz test tone passes thru the unit with 0db gain, i.e. test tone level input is +7dbm0, therefore, the output will be +7dbm0 on the receive side of the unit.

d. The second part of this S&P item will be concerned with instructions on how to adjust the percentage break and make on an SF Unit.

(1) All spare 2600 SF Units will be adjusted initially by inserting one SF Unit at a time into the test circuit. The 26600 Test Set may be removed from the rack and placed near the 2600 SF bay, thus enabling one person to check all SF Units. Once the test circuit and 26600 Test Set are properly set up, TC Z will continue to send the proper signal until all SF Units at TC A have been adjusted. The procedure will then be reversed.

(2) The Technical Controller shall monitor the active circuits to

verify that the circuit is idle. Adjustment of SF Units on active circuits should be made during slack traffic hours.

(3) The proper set up and adjustment of the 26600 Test Set is most critical. Set up and adjust the 26600 Test Set as follows:

(a) Using a suitable cord, connect the office -48 volt battery to the test set 48V/Grd jack.
(b) Operate the DIAL PULSE---CONT PULSE toggle switch to DIAL PULSE.
(c) Adjust the SET FULL SCALE control to read zero on the percent break scale of the meter.
(d) Depress the PRESS TO MEASURE SPEED switch and operate the DIAL PULSE---CONT PULSE toggle switch to CONT PULSE.
(e) Turn both ADJ % BREAK controls to the full clockwise position.
(f) Adjust the ADJ SPEED control until the meter reads 10 pps (pulses per second) on the PULSE PER SECOND scale.
(g) Release the PRESS TO MEASURE switch.
(h) Adjust both ADJ % BREAK controls to obtain a pulse ratio of 60 percent break. The ADJ % BREAK COARSE control may give the desired reading in more than one position. <u>It should be left in the most clockwise position that will provide a 60 percent break pulse ratio</u>.

(4) At TC's A and Z, operate the E turn key of the 26600 Test Set to the O/G (vertical) position.

(5) At TC's A and Z, operate the M turn key of the 26600 Test Set to the B/G (vertical) position.

(6) At TC's A and Z, using suitable cords, connect the LINE jack on the 26600 Test Set to the Circuit Patch Bay (CPB) (6W VFPB at sites with no CPB) SIG LINE jack of the circuit under test.

(7) At TC's A and Z, using suitable cords, connect the DROP jack on the 26600 Test Set to the CPB (6W VFPB at sites with no CPB) SIG DROP jack of the circuit under test.

(8) At TC's A and Z, operate all switch keys on 26600 Test Set to the normal (center) position. The LINE DROP supervision lamps on both sets should be <u>illuminated</u> indicating an ON HOOK (idle) condition at TC's A and Z.

(9) At TC Z, operate the TWD LINE key to OFF HOOK, the TWD DROP key to ON HOOK, and the PULSE key to LINE. The LINE supervision lamp at TC A should be extinguished (OFF HOOK), the LINE supervision lamp at TC Z and the DROP supervision lamps at TC A and Z should remain illuminated (ON HOOK).

(10) At TC A, operate the MEASURE key to LINE. Adjust the SET FULL SCALE control to read zero on the percent break scale.

(11) At TC A, depress the PRESS TO MEASURE SPEED switch to measure the speed of the received dial pulse. The meter should read 10 pps, ± 0.5 pps on the PULSE PER SEC scale.

(12) At TC A, release the PRESS TO MEASURE SPEED switch to measure the percent break of the received pulses. All ICS-VIETNAM sites are equipped with a Collins 20D3 SF Unit, adjust the SF Unit front panel % BREAK control to obtain a meter reading of 59 to 61 percent break on the PERCENT BREAK scale. If the circuit is equipped with a Lenkurt 27817 SF Unit, as in some DTE's and Thailand ICS-sites, adjustment of the SF Unit front panel BIAS control to obtain a meter reading of 56 to 64 percent break on the PERCENT BREAK scale will be made.

(13) TC Z will continue to send pulses while TC A inserts the non-adjusted SF Units into the test circuit one at a time until all have been properly adjusted.

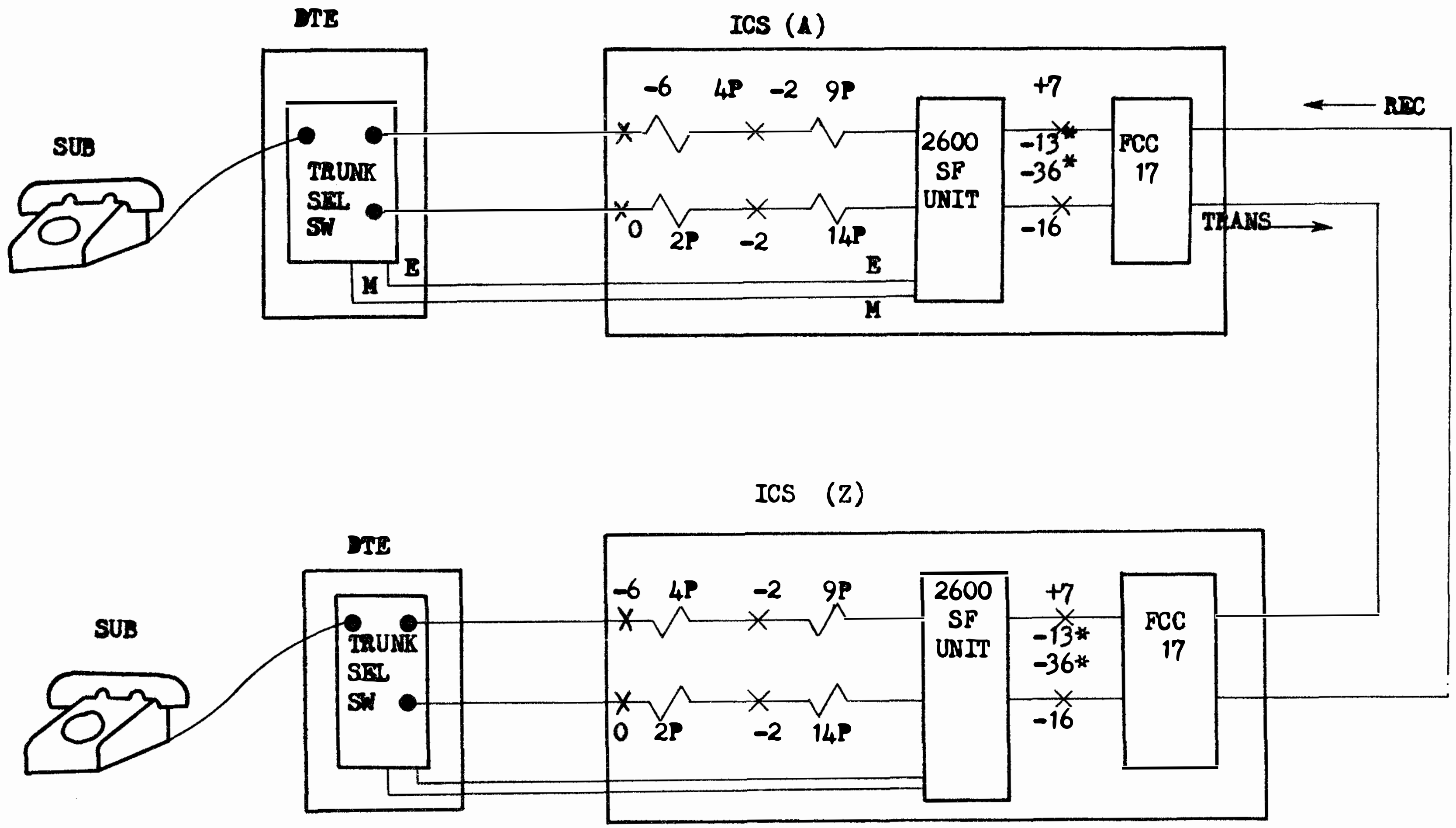
(14) Repeat steps 9 to 13 for the reverse direction of signaling, i.e., with TC A sending the signal and TC Z measuring the signal.

(15) Restore all keys on the test set at TC's A and Z to the normal (center) position.

(16) The Technical Controller shall then remove all test equipment.

(17) If the SF Unit fails to meet the specified signaling limits, the SF Units will be properly marked and turned in for repair.

(18) If problems arise, contact Networks Branch, MACV 2260, 2361, or via O/W.



* Indicates the Transmit and Receive levels of the 2600 Hz SF Unit.

FIGURE 0542-A: A typical dial circuit using 2600 Hz SF Units.

DEPARTMENT OF THE ARMY
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APO San Francisco 96243

SCCPV-RG-PO-NW

TECHNICAL CONTROL

STANDARDS AND PRACTICES

ITEM NR: 0551-01

SUBJECT: DX-2 Set Strapping

1. Background: Most of the trunks in the SEA-ATS will be of the E&M type. This type of trunk requires two separate conductors for signalling in addition to the talking pair(s). These extra leads are designated "M" for transMit and "E" for recEive. These leads must extend from the trunk circuit at one office to the corresponding trunk circuit at the distant office using the same transmission media as the talking pair(s). When this path involves a radio link, the DC signalling used on the E&M leads must be converted to an audio tone by a single frequency signalling unit (SF unit) at the radio technical control.

2. Purpose: There is an electrical limit to the length of the cable over which E&M leads may be extended. When the cable between the trunk unit and the SF Unit exceeds a length having a loop resistance of 50 ohms, the cable characteristics will cause severe distortion on the dial pulses or supervisory signals which are being transmitted, and prevent proper operation of the distant equipment. From the customer's viewpoint, this will become most apparent in the form of a high percentage of wrong numbers. In order to get around this cable length restriction, DX sets will be installed where required. A DX-1 set is used with an E&M trunking unit, while a DX-2 set is used with an SF Unit. Placing a DX set at each end of the cable run allows the cable length to be extended up to a maximum of 2500 ohms loop resistance. Optimum performance of these DX sets, however, requires that the internal balancing network be adjusted to electrically compensate for the actual cable resistance involved.

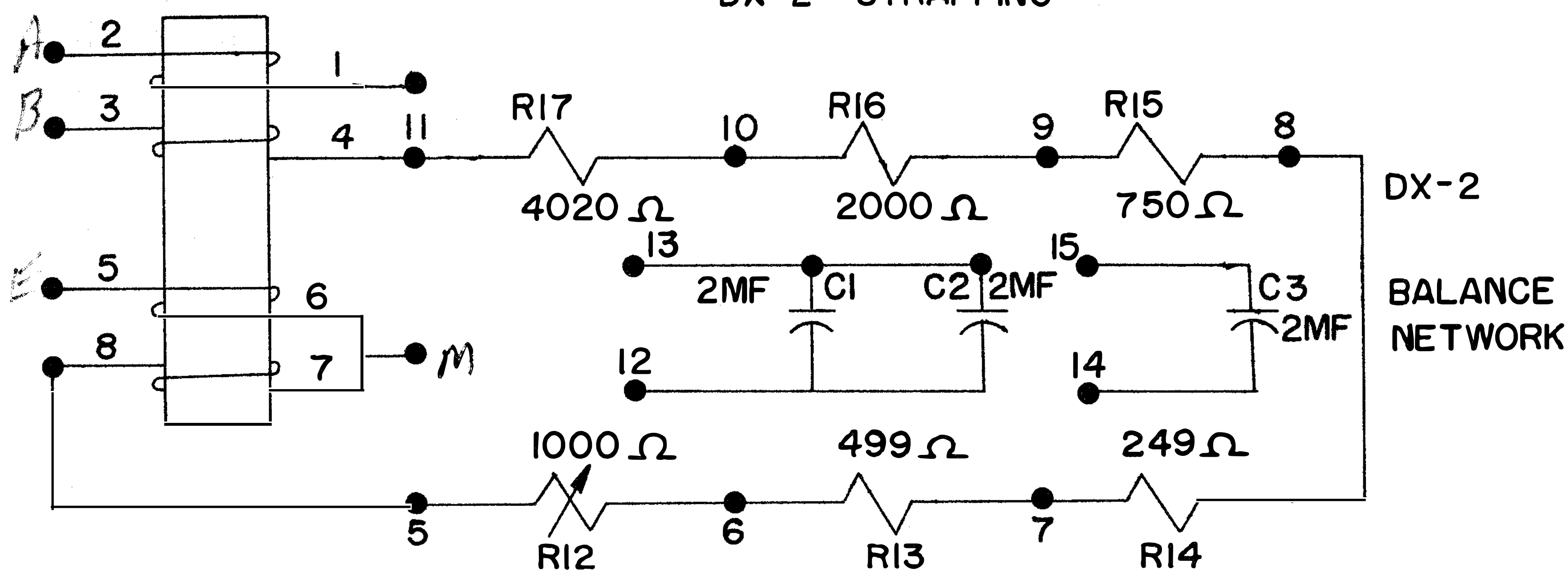
3. DX-2 Strapping: (the DX-2 may also be known as a signal lead extension cord) As shipped from the factory, there may be straps between Pins 11-13 and 5-12. If present, all straps should be removed. In addition, straps must be added as follows:

a. Proper strapping requires the known measured loop resistance for the cable pair carrying the signal leads entering from the DTE.

b. This loop resistance is then added to 1250 ohms ±125 ohms and the DX-2 is then strapped in accordance with the values listed in Table #1.

4. Adjustment: On the DX-2 set it is possible to adjust variable 1000 ohm resistor R12 and capacitors C1, C2 and C3 in the balance network to obtain minimum pulse distortion. However, this is not recommended due to the difficulty in insuring that such adjustment is not being made to compensate for relay wear or circuit faults. Consequently, the capacitors will not be used, though R12 may be adjusted to give minimum pulse distortion after all other components are properly adjusted for correct operation.

DX-2 STRAPPING



NOTES:

A. Strap series resistors R12 through R17 for Loop resistance plus 1250 ohms (plus or minus 125 ohms) See Table I.

B. R12-R17 may be adjusted or restrapped by installer as required to reduce percent-make distortion provided such adjustment is not made to compensate for relay wear or circuit faults.

C. Capacitors C1, C2, C3, not used.

Fig. 1. Excerpt from DX-2 schematic Diagram S-438727 (Stromberg-Carlson)

RESISTANCE STRAPPING FOR DX-2 CARD BALANCE NETWORK

REQUIRED RESISTANCE IN OHMS	STRAP TERMINALS	REQUIRED RESISTANCE IN OHMS	STRAP TERMINALS
250	6-11 USE R12	4500	7-10
300	6-11 USE R12	4750	6-8, 9-10
750	6-8, 9-11	5000	6-7, 9-10
1000	6-7, 9-11	5250	7-8, 9-10
1250	7-8, 9-11	5500	9-10
1500	9-11	6000	6-9
2000	8-9, 10-11	6250	6-7, 8-9
2250	6-7, 8-9, 10-11	6500	7-9
2500	7-9, 10-11	6750	6-8
2750	6-8, 10-11	7000	6-7
3000	6-7, 10-11	7250	7-8
3250	7-8, 10-11	7500	NONE
3500	10-11		
4000	6-10		
4250	6-7, 6-10		

TABLE #1 DX-2 STRAPPING

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCVRG-PO

ITEM NR. 0601-01

SUBJECT: Cable Numbering System on ICS CDF's

1. Background: Combined distribution frames in ICS Tech Controls usually terminate several outside trunk cables. Heretofore no standard or uniform method has been used to identify these cables either in the Tech Control or at the subscriber end. A uniform method must be adopted throughout the system to reduce the time and confusion in locating a particular cable and pair, both for regular cable maintenance and circuit actions.

2. Purpose: The purpose of this is to establish a standard method to be followed in numbering cables and marking CDF's at all ICS sites.

Cables on Protectors.

3. Procedure: Each individual cable sheath with common origin and destination, regardless of the number of pairs in the sheath, will be assigned a letter in alphabetical order starting with the cable terminated on the top of the left hand protector vertical of the CDF, proceeding toward the right. Cables within each group to a different destination will be lettered consecutively, starting with "A". For example:

The following cables are terminated on the CDF:

(1) 2ea 100pr cables to the dial central office.

(2) 4ea 100pr cables to the old tech control.

(3) 3 ea 100pr cables to the AF frame.

The above cables would be numbered:

(1) Ca "A" DCO

Ca "B" DCO

(2) Ca "A" ATC

Ca "B" ATC

Ca "C" ATC

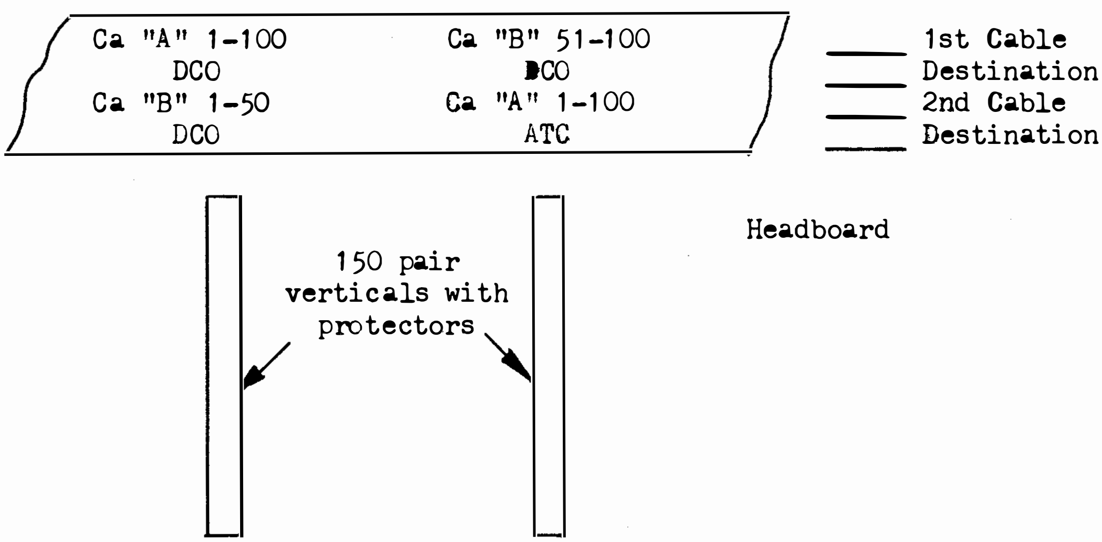
Ca "D" ATC

(3) Ca "A" AF MDF

Ca "B" AF MDF

Ca "C" AF MDF

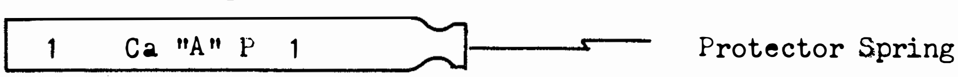
4. The designation board above the protector verticals, where provided, will be stencilled as follows:



5. <u>Marking of pairs on Protectors</u>:

a. Cook Type

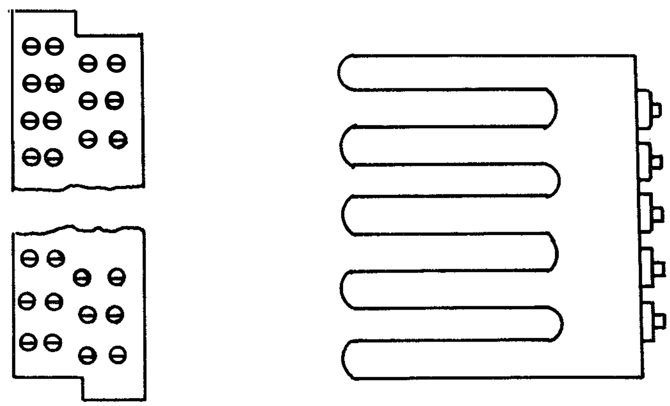
Where cables are terminated on Cook Type protectors both the right and left hand spring on pair 1 will be stencilled as follows:



Every succeeding fifth spring on both sides will be marked with the pair number only. This sequence of marking will continue for the entire cable.

b. Reliable Type Protectors: Where cables are terminated on Reliable Type protectors pairs will be stencilled in the same manner as (a) on both sides of the protector strip directly in line with the fuse mounting of the desired pair. To illustrate:

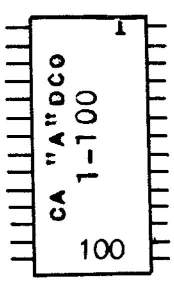
Reliable type, 50pr protector strip



Metal plate on side of protector strip

FRONT SIDE

6. Marking of Cables Terminated on Pin Blocks: Cables terminated on pin blocks on the vertical CDF will be stencilled thus:



7. Distant End: The frame or terminal at the distant end of ICS CDF to eliminate confudion in identifying cables and pairs. This will usually be the responsibility of the base telephone agency.

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0610-02

SUBJECT: Records and Reports for Outside Plant-in-Place (PIP) Cable

1. Background. The use of a standardized identification system for outside cables terminating on the combined distribution frame (CDF) in the tech control building is required for efficient cable maintenance and for record purposes for future planning. S&P Item 0601 outlines in detail the cable numbering system to be used at all ICS sites. This item describes the cable records to be maintained at ICS sites and the cable reports required by this Headquarters.

2. Purpose. the purpose of this item is to establish the procedures to be followed for preparing ICS site cable records and reports.

3. Cable Records.

a. PIP records will be maintained for all cables of 25 pairs or more which terminate on an IDF, MDF, or CDF under control of RCG. Five (5) types of PIP records are to be utilized:

(1) Technically drafted "As Built" drawings which will be supplied by the organization that installed the cable.

(2) A PIP sketch drawn by the site wire personnel to show the overall cable layout.

(3) A PIP Information Table prepared by the site wire personnel to show pertinent characteristics of each cable.

(4) A CDF Diagram prepared by TCG personnel to show how the cable is arranged on the CDF. (See NOTE 1).

(5) A CDF Table prepared by TCG personnel to show pertinent characteristics of the CDF with regard to cable. (See NOTE 1).

NOTE 1: Similar diagrams will be prepared for IDF's and MDF's, if such frames are in use and under control of RCG.

b. PIP records will provide the basic source of information for cable maintenance and planning future rearrangements and expansion. Site maintenance personnel will use these records primarily in locating and clearing cable trouble.

c. Explanation of Information to be Included in PIP Records.

(1) As-Built drawings will indicate, in detail, complete cable information including route, length, gauge, type, number of pairs, type of construction (i.e. buried or aerial), location of cable route markings, number of splices, building entrance details, transmission loss, and loop resistance.

(2) The PIP sketch (Incl 1) will include the EE building and other buildings or vans to which cables are routed. Cable will be indicated by lines drawn between the proper buildings and vans. The sketch need not be drawn to scale, and specific cable paths are not necessary; however, buildings and vans must be shown in their relative positions and be clearly labelled. A cable-line drawn in the proper direction with an arrow at its end will suffice for distant points. Every line drawn to represent cables from one point to another will be marked to indicate the number of different cables that are represented.

(3) The PIP Information Table will include information in a form which is illustrated in Inclosure 2.

(4) The CDF Diagram will be prepared as shown in the example illustrated in Inclosure 3 (these instructions also apply to IDF and MDF diagrams). The CDF diagram is explained as follows:

(a) The diagram will be used to present a rough picture of the entire vertical side of the CDF. The positions (shelves) for all verticals will be illustrated. Each block on the illustration represents a shelf position. As many pages as necessary will be used in order to illustrate the entire CDF.

(b) All existing verticals (columns) will be properly numbered.

(c) Where no cross-arm has been installed for a shelf on a particular vertical, the shelf position will be left blank.

(d) Where cross-arms exist without holding either terminal boards (pin-blocks) or protector blocks, a vertical line will be drawn in the middle of the shelf position.

(e) Where non-wired pin-blocks are installed on cross-arms, a diagonal line will be drawn from the lower right-hand corner to the upper left-hand corner of the shelf position.

(f) Where wired pin-blocks for equipment are installed on cross-arms, a diagonal line will be drawn from the lower left-hand corner to the upper right-hand corner.

(g) Where a pin-block (terminal board) terminates an entire cable (all the cable pairs of one cable), a horizontal line will be drawn at the top and bottom of the shelf position, and pertinent information will be included, as illustrated on CDF shelves 3-6 and 3-H. If one cable is terminated on more than one pin-block or less than one pin-block, horizontal lines will be drawn with information included as shown on the CDF Diagram shelves 3-D, 3-E, 2-F, 2-G, and 2-H.

(h) Shelf positions where protector mounting bars are installed will be indicated as in vertical 06 of the CDF illustration.

(i) Shelf positions which hold protectors that do not currently terminate cable will be indicated as on the CDF Diagram vertical 05 and shelves 04-A and 04-B.

(j) Shelf positions which hold protectors that terminate cable will be indicated as on the CDF Diagram verticals 04, 03, 02, and 01.

(k) If protectors are cross-connected to a polehouse, the indication will be made as on the CDF Diagram verticals 04-E, 04-F, 04-G, and 04-H.

(5) The CDF (IDF, MDF) Table(s) (See Incl 4 for example) will include:

(a) Number of verticals (columns) and the numbered sequence, e.g. 33 verticals, sequence 27-06.

(b) Number of cross-arms actually installed.

(c) Number of installed protector mounting bars.

(d) Number of protector mounting bars which hold protectors.

(e) Number and type of installed protectors not currently in use.

(f) Number of vertical terminal boards (pin-blocks) installed and used for equipment.

(g) Number of vertical terminal boards (pin-blocks) installed and used for cable.

(h) Number of installed vertical terminal boards, currently not wired.

(i) Number of empty cross-arms.

d. Maintenance of PIP Records. The OIC of the ICS site will be responsible for the maintenance of the PIP record file to ensure that:

(1) The file is complete and current, and maintained at the TCG in an easily accessible location.

(2) Any changes affecting the PIP Records (i.e., new base construction, road changes, cable rearrangement, etc.) by local base agencies are noted in detail on a marked copy of the As-Built PIP drawings and forwarded to the responsible engineering agency (contractor or military) for updating the permanent records. (The responsible engineering agency in the one who installed the cable).

4. Cable Reports.

a. Each ICS site within this command will prepare a report to be forwarded to RCG Hq's Networks Branch by the 15th of each month. This report will contain as a minimum the following information for all cables connecting the ICS building with other facilities such as a DCO, DTE, TIP, MDF or other ICS buildings:

(1) Code name of the cable.

(2) Terminal points of the cable i.e., TCG to DTE, TCG to TIP, etc.

(3) Number of cable pairs.

(4) Number of used cable pairs.

(5) Number of bad cable pairs.

(6) Number of unused cable pairs.

(7) Transmission loss and loop resistance.

b. In addition, said report will also contain the following information on vertical strips and protector blocks:

(1) Number of vertical blocks and terminals alloted to exterior cable which are unused.

(2) Number of vertical blocks and terminals reported in 'b-1' which have protector blocks.

(3) Number of unused terminals on the pole box (or junction box) of the ICS building.

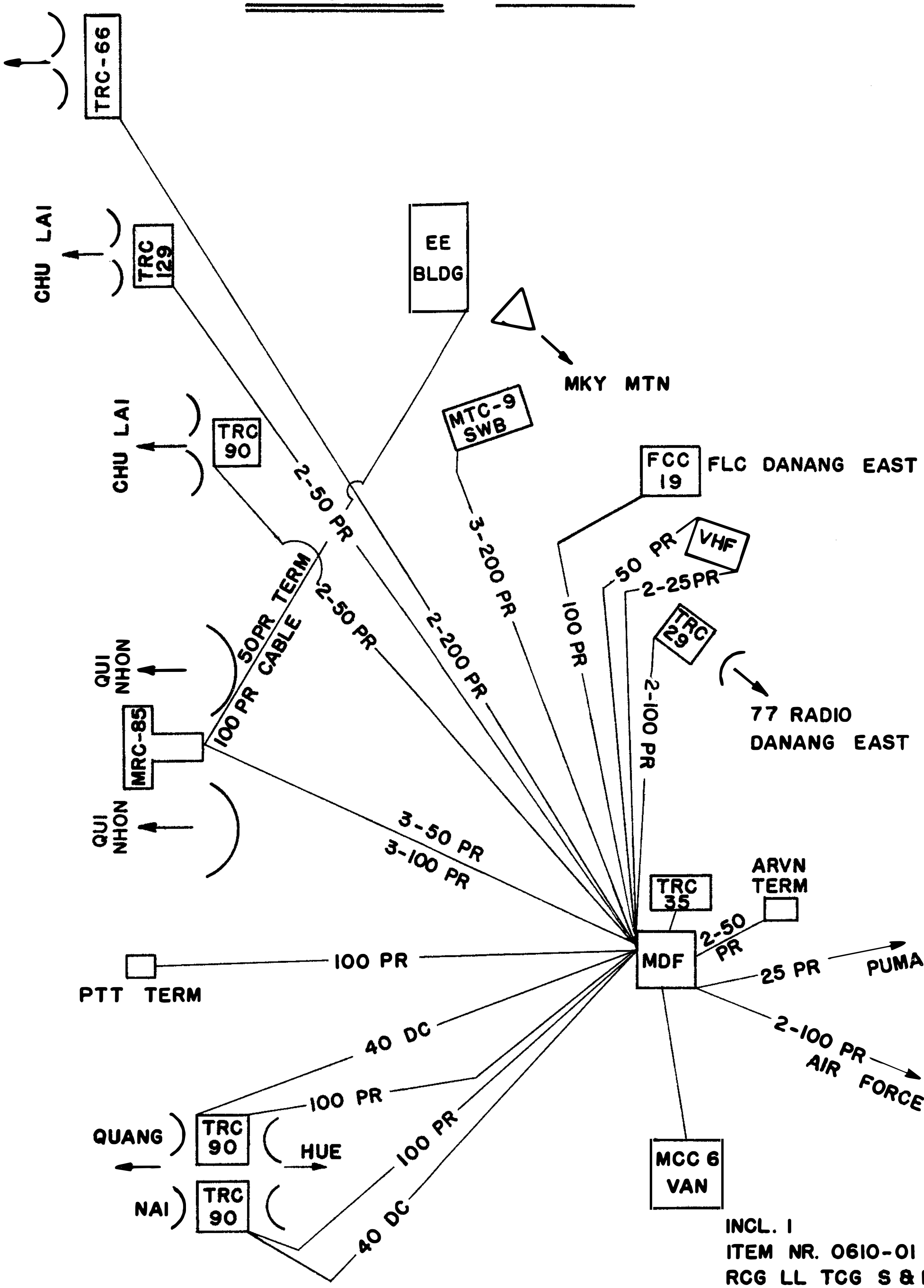
c. Site OIC's are to transmit this information via teletype.

d. An example of a typical monthly cable report is presented in Incl 5.

e. Other PIP records will be sent whenever a new cable is added or deleated or as required. PIP records will be sent to Headquarters, US Army Regional Communications Group, ATTN: Networks Branch, APO 96243.

NOTE 2: There are five (5) enclosures in this S&P Item Nr. 0610-01.

PIP SKETCH — DA NANG



INCL. I
ITEM NR. 0610-01
RCG LL TCG S & P

PIP INFORMATION TABLE (With Explanation Column)

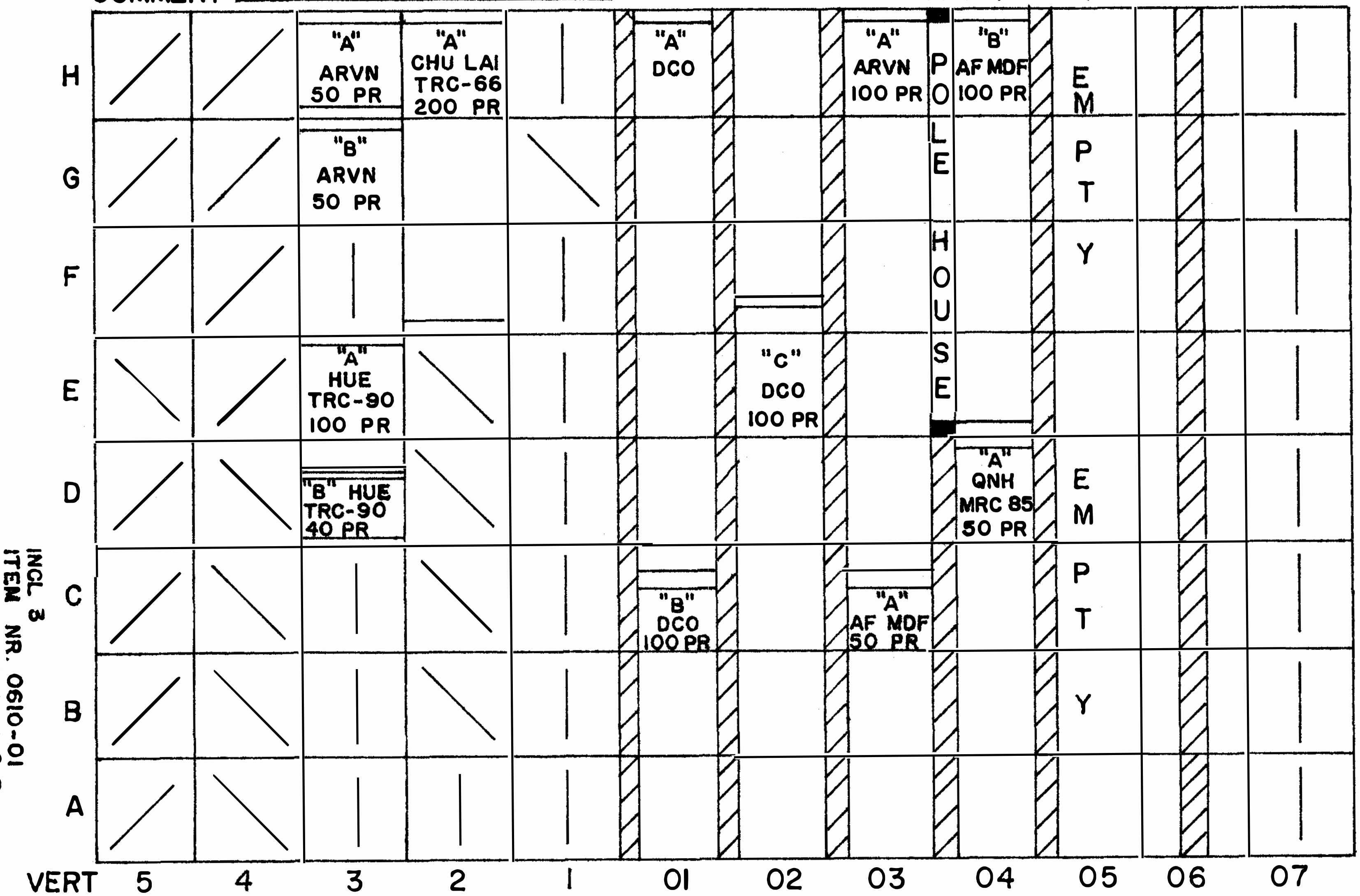
	EXPLANATION COLUMN				
LABEL	According to S&P Item 0601	"A"	"A"	"A"	
DESTINATION	From TCG to where	ARVN	Hue TRC-90	DCO	
PAIRS	Number of pairs	50	100	100	
TYPE	Cloth covered, lead shielded, etc.	Plythlne cppr shld	Clth Cvr Ld shld	Plythlne cppr shld	
GUAGE	19, 21, 22 etc.	19	22	19	
LENGTH	In feet	375	225	3750	
1 KHz LOSS	1/2 loss measured using 2 pr looped back from distant terminal	.15	.2	2.3	
LOOP RES	DC resistance meas. at CDF with the pair shorted at dist. end	6	8	60	
PROTECTED?	(Are protector blks used?) Yes or No	No	No	Yes	
LOADED?	Yes or No	No	No	No	
CONSTRUCTION	Aerial or Buried	Buried	Aerial	Buried	
INSTALLED BY	Organization which laid cable	178th Sig CD	AF	Page	
VERT & SHELF	Position on the CDF	3-H	3-E	01-D,E,F,G,H	
BLOCK TYPE	Give capacity of pin-block Give name of protector block	6 X 25	8 X 25	Cook	

INCL 2
ITEM NR 0610-02
RCG LL TCG S&P

CDF DIAGRAM

SITE ____________ DATE ____________

COMMENT ____________ PAGE ______ OF ______ PAGES



INCL 3
ITEM NR. 0610-01
RCG LL TCG S & P

DATE

CDF TABLE SITE

A. Number of verticals (columns) and the number of sequence.	37; 36-01
B. Number of cross-arms actually installed.	296
C. Number of installed protector mounting bars.	2
D. Number of protector mounting bars which hold protectors.	2
E. Number and type of installed protectors not currently in use.	0
F. Number of vertical terminal boards (pin-blocks) installed and used for equipment.	200
G. Number of vertical terminal boards (pin-blocks) installed and used for cable.	0
H. Number of installed vertical terminal boards currently not wired.	14
I. Number of empty cross-arms.	66

Incl 4
Item Nr. 0610-01
RCG LL TCG S&P
1 Feb 69

SUBJECT: Cable Report for Feb 68

The following information on cables terminating in the EE is provided:

CABLE DESIGNATOR	FROM	PAIRS	IN USE	SPARE	BAD	LOSS / RESISTANCE
09	RLT	600	440	60	100	2db/100 Ohms
1402	SWC	300	0	300	20	9db/2.5k Ohms
TRC	TRC	25	19	6	0	3db/1k Ohms
15	AFT	200	150	0	50	1db/50 Ohms
P7	DCO	300	248	8	44	1db/50 Ohms

RLT - Old Control

SWC - Tandem Switch Building

TRC - TRC-132

AFT - Air Force Frame

DCO - Dial Central Office

Frame space with terminal pin-blocks to terminate cable pairs:

A. With protector blocks 290

B. Without protector blocks 600

Incl 5
Item Nr. 0610-01
RCG LL TCG S&P
1 Feb 69

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0620-01

SUBJECT: Testing Cables and Cable Conductors

1. Purpose: Throughout Vietnam, bad cables have been a major problem to the communicator. To make things worse, little was known on how to test cable reliability. This S&P provides step by step cable test procedures that can be applied to any new cable.

2. General: The following tests are discussed in this S&P:

a. Test for AC potential on the cable sheath.

b. Test for cable sheath leak to ground or high resistance short to ground.

c. Test for condition of the cable sheath isolating capacitor.

d. Test for AC potential on the cable conductors.

e. Test for DC potential on the cable conductors.

f. Test for conductor continuity and cable identity.

g. Test for insulation resistance between conductors in the same cable.

h. Test for insulation resistance between the conductor and its cable sheath.

3. Test for Alternating Current (AC) Potential on the Cable Sheath.

a. Purpose.

(1) This test determines that the metallic cable sheath, which is an integral part of and surrounds the whole cable, is free of any foreign AC potential.

(2) Particular care should be taken by all personnel while making this test to assure that no part of the body touches the bare cable sheath. Also, only insulated tools and test leads should be used while making this test.

b. Test Equipment Required at Both of the Cable Terminal Sites: AC Voltmeter or Volt-Ohm-Milliammeter (VOM).

c. Test Procedures.

(1) At both the measuring and non-measuring sites.

(a) Disconnect the sheath grounds at both ends of the cable. Also disconnect the line terminal of the sheath capacitor, if installed.

(b) Set the Voltmeter or VOM "AC Range" to any range greater than 440V.

(c) Each site (not concurrently) connect one of the Voltmeter or VOM test leads to ground and the other to the line side of the capacitor associated with the cable sheath under test. If no capacitor is installed, connect this lead directly to the cable sheath.

(d) Lower the Voltmeter or VOM "AC Range", if necessary, until a significant reading is obtained. Record this reading.

(e) If the reading obtained in (d) above by either office is 60V or greater, discontinue testing, tape the exposed portion of the cable sheath with electrical tape, tag it as "Hazardous Voltage", and refer this as a hazardous condition to the appropriate maintenance personnel.

(f) If the reading obtained in (d) above is less than 60V, continue testing.

(2) At both sites (not concurrently).

(a) Reconnect the far end cable sheath ground and the line terminal of the sheath capacitor.

(b) Connect one of the Voltmeter or VOM test leads to ground and the other to the bare cable sheath or the line terminal of the sheath capacitor, if installed, at the non-grounded end.

(c) Lower the Voltmeter or VOM "AC Range", if necessary, until a significant reading is obtained. Record this reading.

(d) The reading obtained in (c) above should be less than 30V. If it is not, discontinue testing and refer this condition to the appropriate maintenance personnel.

(e) If the reading obtained in (c) above is less than 30V, reconnect the cable sheath ground at both sites and verify that the AC meter reading drops to less than 1.5V. If it does not, confirm the ground connections at both the cable sheath and the site ground bus and refer to the appropriate maintenance personnel for correction if necessary.

4. Test for Cable Sheath Lead to Ground or High Resistance Short to Ground.

a. Purpose.

(1) This test determines that there has been no breakdown in the insulation between the cable sheath and ground external to the sheath grounds at the two cable terminal sites.

(2) This test will not be made if the cable sheath has not met all requirements of the "Test for Alternating Current (AC) Potential on the Cable Sheath".

(3) Care should be exercised by all test personnel to assure that no part of the body comes in contact with the cable sheath while the Megohmmeter generator crank is being operated.

b. Test Equipment Required at Both the Measuring and Non-Measuring Sites (but not concurrently): The Winslow Co. Model No. 5G1000SV Megohmmeter, or its equivalent.

c. Test Procedures.

(1) At both the measuring and non-measuring sites (but not concurrently).

(a) Disconnect the cable sheath grounds at both ends.

(b) Connect a test lead from the LINE terminal of the Megohmmeter to the Line side of the capacitor associated with the cable sheath under test. If no capacitor is installed, connect this lead directly to the cable sheath.

(c) Connect a test lead from the GROUND terminal of the Megohmmeter to the site ground.

(d) Set the Megohmmeter range switch to 250V.

(e) Operate the generator crank handle until the clutch begins to slip. Keep the operation constant at this speed and observe the reading on the 250V Megohmmeter scale. Record this reading. CAUTION - Operate the crank handle only long enough to obtain an accurate reading.

(f) The reading obtained in (e) above should be greater than 500 divided by the length of the sheath in miles. If the reading is lower than this figure the sheath may have either leak to ground or a high resistance short to ground. A zero reading will indicate a direct short to ground. Refer any of these conditions to the appropriate maintenance personnel.

(2) At both the measuring and non-measuring sites. Discharge the sheath and reconnect the sheath grounds and the sheath capacitors, if installed.

5. Test for Condition of the Cable Sheath Isolating Capacitor.

a. Purpose.

(1) This test determines that the cable sheath isolating capacitor is neither shorted, open or leaky and that it is within the tolerances for its rated capacitance.

(2) Particular care should be taken by all personnel while making this test to assure that no part of the body touches the bare capacitor terminals nor the wires connected thereto. Also, only insulated tools should be used if it becomes necessary to remove the wires from the capacitor terminals.

(3) This test will not be made if the cable sheath has not met all requirements of the "Test for Alternating Current (A.C.) Potential on the Cable Sheath".

b. Test Equipment Required at both Sites: Volt-ohm-Milliammeter (VOM).

c. Test Procedures.

(1) Disconnect both leads from the capacitor terminals.

(2) Discharge the capacitor by shorting out its terminals momentarily.

(3) Set the VOM "Resistance Range" on R x 1000 and zero the meter.

(4) Connect the VOM test leads across the capacitor terminals. Leave connected for approximately 10 seconds, then reverse the leads and observe the capacitor "kick" on the VOM. Repeat this process until a consistent reading is obtained.

(5) The reading obtained in (4) above should be within $\pm1/2$ of one meter scale division from zero. If it is not within these limits, replace the capacitor.

(6) If the reading obtained in (4) above does not leak off and stays at any point on the VOM scale except between infinity and the 1000 meter division point, replace the capacitor.

(7) If the capacitor meets the above requirements reconnect its terminals to the cable sheath. If it does not, leave it disconnected until a replacement is obtained.

6. Test for Alternating Current (A.C.) Potential on the Cable Conductors.

a. Purpose.

(1) This test determines whether there is any foreign A.C. voltage on the conductors under test.

(2) **Particular** care should be taken by all personnel while making this test to assure that no part of the body touches the bare conductors or the bare terminal block lugs. Also, only insulated tools should be used if it becomes necessary to remove the wires from the terminal blocks. These two conditions should apply until this test is completed and the test personnel are assured that no dangerous A.C. potential exists on the conductors under test.

b. Test Equipment Required at the Measuring Site:

A.C. Voltmeter or Volt-ohm-milliammeter (VOM).

c. Test Procedures.

(1) At the non-measuring site.

Remove the protector assembly associated with the conductors under test. If no protector is associated with the conductors, remove the wires from the terminal block lugs and spread them apart to assure that the bare conductors do not touch each other.

(2) At the measuring site.

(a) Remove the protector assembly associated with the conductors under test. If no protector is associated with the conductors, remove the wires from the terminal block lugs and spread them apart to assure that the bare conductors do not touch each other.

(b) Set the Voltmeter or VOM "A.C. Range" to any range higher than 440V.

(c) Connect one of the Voltmeter or VOM test leads to ground and the other to the conductor under test.

(d) Lower the Voltmeter or VOM "A.C. Range", if necessary, until a significant reading is obtained. Record this reading.

(e) If the reading obtained in (d) above is 60V or greater, discontinue testing, tape the bare conductors or terminal block lugs with electrical tape at both sites, tag them as "Hazardous Voltage", and refer this as a hazardous condition to the appropriate maintenance personnel.

(f) If the reading obtained in (d) above is less than 60V, continue testing.

(3) At the non-measuring site.

Short the two conductors under test.

(4) At the measuring site.

(a) Set the Voltmeter or VOM "A.C. Range" to any range higher than 440V.

(b) Connect the Voltmeter or VOM test leads to the conductors under test.

(c) Lower the Voltmeter or VOM "A.C. Range", if necessary, until a significant reading is obtained. Record this reading.

(d) If the reading obtained in (c) above is 60V or greater, discontinue testing, tape the bare conductors or terminal block lugs with electrical tape at both sites, tag them as "Hazardous Voltage", and refer this as a hazardous condition to the appropriate maintenance personnel.

(e) If the reading obtained in (c) above is less than 60V, continue testing.

(5) At the non-**measuring** site.

(a) Remove the short from the two conductors under test.

(b) Ground the tip conductor of the pair under test.

(6) At the measuring site.

(a) Set the Voltmeter or VOM "A.C. Range" to any range higher than 440V.

(b) Ground one of the Voltmeter or VOM test leads and connect the other test lead to the tip conductor of the pair under test.

(c) Lower the Voltmeter or VOM "A.C. Range", if necessary, until a significant reading is obtained. Record this reading.

(d) If the reading obtained in (c) above is 60V or greater, discontinue testing, tape the bare conductors or terminal block lugs with electrical tape at both sites, tag them as "Hazardous Voltage", and refer this as a hazardous condition to the appropriate maintenance personnel.

(e) If the reading obtained in (c) above is less than 60V, continue testing.

(7) At the non-measuring site.

Remove the ground from the tip conductor of the pair under test and apply it to the ring conductor.

(8) At the measuring site.

(a) Set the Voltmeter or VOM "A.C. Range" to any range higher than 440V.

(b) Ground one of the Voltmeter or VOM test leads and connect the other test lead to the ring conductor of the pair under test.

(c) Lower the Voltmeter or VOM "A.C. Range", if necessary, until a significant reading is obtained. Record this reading.

(d) If the reading botained in (c) above is 60V or greater, discontinue testing, tape the bare conductors or terminal block lugs with electrical tape at both sites, tag them as "Hazardous Voltage", and refer this as a hazardous condition to the appropriate maintenance personnel.

(e) If the reading obtained in (c) above is less than 1.5V, continue testing.

(f) If the reading obtained in (c) above is greater than 1.5V, refer this condition to the appropriate maintenance personnel.

(9) At the non-measuring site.

Remove the ground from the ring conductor of the pair tested.

(10) This test should be repeated on all conductors in the cable.

7. Test for Direct Current (D.C.) Potential on the Cable Conductors.

a. Purpose.

(1) This test determines whether there is any foreign D.C. voltage on the conductors under test.

(2) This test will not be made on any conductors which did not meet the tests for A.C. potential.

b. Test Equipment Required at the Measuring Site.

DC Voltmeter or a Volt-ohm-milliammeter (VOM). The test procedures will reference both as Voltmeter.

c. Test Procedures.

(1) At the non-measuring site.

Remove the protector assembly associated with the conductors under test. If no protector is associated with the conductors, remove the wires from the terminal block lugs and spread them apart to assure that the bare conductors do not touch each other.

(2) At the measuring site.

(a) Remove the protector assembly associated with the conductors under test. If no protector is associated with the conductors, remove the wires from the terminal block lugs and spread them apart to assure that the bare conductors do not touch each other.

(b) Set the Voltmeter "DC Range" to any range higher than 300V.

(c) Connect one of the Voltmeter test leads to ground and the other to the conductor under test.

(d) Lower the Voltmeter "DC Range", if necessary, until a significant reading is obtained. Record this reading.

(e) Repeat test steps (b) - (d) for the other conductor of the pair.

(f) If the reading obtained in (d) above is greater than 1.5V, refer this condition to the appropriate maintenance personnel.

(3) This test should be repeated on all conductors in the cable.

8. Test for Conductor Continuity and Conductor Identity.

a. Purpose.

(1) This test assures that each conductor tested has continuity from end to end and that it is the same conductor at both the measuring and non-measuring sites.

(2) This test will not be made on any conductors which did not meet the tests for AC and DC potential.

b. Test Equipment Required at the Measuring Site.

Volt-ohm-milliammeter (VOM).

c. Test Procedures.

(1) At the non-measuring site.

Ground the tip conductor of the pair under test.

(2) At the measuring site.

(a) Set the VOM "Resistance Range" to Rx100.

(b) Ground one of the VOM test leads.

(c) Connect the other VOM test lead to the tip conductor of the pair under test and obtain a reading. Reset the VOM " Resistance Range", if necessary, until a significant reading is obtained. Record this reading.

(d) If a reading is obtained in (c) above, request the non-measuring site to momentarily remove his ground. The measuring site should completely lose his VOM reading when the ground is removed. If such is not the case, record this conductor as "Grounded". If such is the case, request the non-measuring site to reapply his ground to this conductor.

(e) If the reading obtained in (c) above successfully meets the test of (d) the reading obtained should be approximately 1/2 (loop resistance for type of conductor under test) x (length of the conductor in miles).

(f) If no reading is obtained in (c) above, move the VOM test lead from the tip conductor to the ring conductor and repeat the procedures of paragraphs (a) - (d) above.

(g) If no reading is obtained in (f) above, the tip conductor of the pair under test should be recorded as "Open". Subsequent tests must be made to determine whether it is truly open or has been spliced to some other conductor in the same cable.

(3) At the non-measuring site.

Remove the ground from the tip conductor of the pair under test and apply it to the ring conductor.

(4) At the measuring site.

(a) Set the VOM "Resistance Range" to R x 100.

(b) Ground one of the VOM test leads.

(c) Connect the other VOM test lead to the ring conductor of the pair under test and obtain a reading. Reset the VOM "Resistance Range", if necessary, until a significant reading is obtained. Record this reading.

(d) If a reading is obtained in (c) above, request the non-measuring site to momentarily remove his ground. The measuring site should completely lose his VOM reading when the ground is removed. If such is not the case, record this conductor as "Grounded". If such is the case, request the non-measuring site to reapply his ground to this conductor.

(e) If the reading obtained in (c) above successfully meets the test of (d) above, the reading obtained should be approximately 1/2 (loop resistance for type of conductor under test) x (length of conductor in miles).

(f) If no reading is obtained in (c) above, move the VOM test lead from the ring conductor to the tip conductor and repeat the procedures of paragraphs (a) - (d) above.

(g) If no reading is obtained in (e) above, the ring conductor of the pair under test should be recorded as "Open". Subsequent tests must be made to determine whether it is truly open or has been spliced to some other conductor in the same cable.

(5) At the non-measuring site.

Remove the ground from the ring conductor of the pair under test.

(6) This test should be repeated on all conductors in the cable.

(7) Upon completion of the above tests the conductors recorded as "Open" should be checked in a similar manner to determine whether they are truly "Open" or are spliced to supposedly other "Open" conductors. All conductors recorded as "Open" in the previous tests should be tested for continuity to all other "Open" conductors in the same cable.

9. Test for Insulation Resistance Between Conductors in the same Cable.

a. Purpose.

(1) This test determines that there has been no breakdown in the insulation of the cable conductors.

(2) This test will not be made on any pair of conductors which did not meet the "Test for Alternating Current (A.C.) Potential on the Conductors".

(3) Care should be exercised by all test personnel to assure that no part of the body comes in contact with the cable conductors under test while the Megohmmeter generator crank is being turned.

b. Test Equipment Required.

At the measuring site.

The Winslow Co. Model No. 5G1000SV Megohmmeter, or its equivalent.

c. Test Procedures.

(1) At the non-measuring site.

Remove the protector assembly associated with the conductors under test. If no protector is associated with the conductors, remove the wires from the terminal block lugs and spread them apart to assure that the bare conductors do not touch each other.

(2) At the mearsuring site.

(a) Remove the protector assembly associated with the conductors under test. If no protector is associated with the conductors, remove the wires from the terminal block lugs and spread them apart to assure that the bare conductors do not touch each other.

(b) Connect a test lead from the LINE terminal of the Megohmmeter to the tip conductor of the pair under test.

(c) Connect a test lead from the GROUND terminal of the Megohmmeter to the ring conductor of the pair under test.

(d) Set the Megohmmeter range switch to 250V.

(e) Operate the generator crank handle until the clutch begins to slip. Keep the operation constant at this speed and observe the reading on the 250V Megohmmeter scale. Record this reading. CAUTION - Operate crank handle only long enough to obtain an accurate reading.

(f) The reading obtained in "e." above should be greater than 500 divided by the length of the pair under test in miles. This will be in Megohms. If the reading is less than this figure, the conductors have either leak or a high resistance short between them. If the reading is less than the calculated resistance of the conductors then the pair is shorted. In either case refer this to the appropriate maintenance personnel.

(3) At both the measuring and non-measuring sites.

Remove all test leads, discharge the conductors to ground, and reinsert the protector assembly or reconnect the two conductors.

(4) This test should be repeated on all conductors in the cable.

10. Test for Insulation Resistance Between the Conductor and Its Cable Sheath.

a. Purpose.

(1) This test determines that there has been no breakdown in the insulation between the conductors and their cable sheath.

(2) This test will not be made on any conductor which did not meet the "Test for Alternating Current (A.C.) Potential on the Conductors".

(3) Care should be exercised by all test personnel to assure that no part of the body comes in contact with the cable conductor under test or the cable sheath while the Megohmmeter generator crank handle is being turned.

b. Test Equipment Required at the Measuring Site:

The Winslow Co. Model No. 5G1000SV Megohmmeter, or its equivalent.

c. Test Procedures.

(1) At the non-measuring site.

(a) Remove the protector assembly associated with the conductor under test. If no protector is associated with the conductor, remove the wires from the terminal block lugs.

(b) Disconnect the sheath ground or the Line terminal of the sheath capacitor, if installed.

(2) At the measuring site.

(a) Remove the protector assembly associated with the conductor under test. If no protector is associated with the conductor, remove the wires from the terminal block lug.

(b) Disconnect the sheath ground or the Line terminal of the sheath capacitor if installed.

(c) Connect a test lead from the LINE terminal of the Meghommeter to the conductor under test.

(d) Connect a test lead from the GROUND terminal of the Megohmmeter to the cable sheath on the Line side of the sheath capacitor, if installed.

(e) Set the Megohmmeter range switch to 250V.

(f) Operate the Megohmmeter generator crank handle until the clutch begins to slip. Keep the operation constant at this speed and observe the reading on the 250V Megohmmeter scale. Record this reading. CAUTION - Operate the generator crank handle only long enough to obtain an accurate reading.

(g) The reading obtained in "f." above should be greater than 500 divided by the length of the conductor in miles. This will be in Megohms. If the reading is less than this figure, the conductor has either leak or a high resistance short to the cable sheath. If the reading is less than the calculated resistance of the conductor then the conductor is shorted to the cable sheath. In either case refer this condition to the appropriate maintenance personnel.

(3) At both the measuring and non-measuring sites.

Remove all test leads, discharge both the conductor and the sheath to ground, reinsert the conductor protector or reconnect the conductor, and reconnect the cable sheath ground and/or Line capacitor, if installed, upon completion of the tests.

(4) This test should be repeated on all conductors in the cable.

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TECHNICAL CONTROL

STANDARD AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0701-01

SUBJECT: Distributing Frame Cross-Connections

1. General:

a. Distributing frame cross-connections permit most of the equipment wiring to be arranged in permanent cabled form. The cable conductors are soldered to the terminal boards fastened to the distributing frame. Relatively short lengths of distributing frame wire, commonly called jumper wire, cross-connect the terminals as required. These jumpered cross-connections may be changed whenever necessary without disturbing the permanent cabling. This also permits maximum flexibility of equipment arrangement on circuits.

b. When running jumpers, do not allow the wires to kink. Disengage carefully any jumpers that have become caught on terminals. Try to prevent damaging jumpers or bending terminals. Avoid any practice that will cause jumpers to tangle, restrict working space, or produce an untidy frame. Avoid any practice that produces or scatters lint or dust particles, such as dragging wire over terminals or sharp edges of the frame, allowing jumpers to pull against clothing, or dropping coined wire from a height. Do not stand or climb on the frames. A neatly kept frame is an efficient frame.

2. Discussion:

a. Running jumpers-General: The jumpered side of the terminal boards and the protectors is always the opposite of the cabled side.

(1) On the horizontal side, run jumpers to the upper portion of the terminal boards.

(2) On the vertical side, run jumpers to the right side of the terminal boards and the protectors.

b. Jumper running procedure

(1) Always start running a jumper from the horizontal side of the frame. If the horizontal side of the frame is not involved, the jumper may be started from either vertical. Run jumpers in the most direct way and on top of jumpers already in place.

(a) Unreel the wire for each jumper and pass it through the fanning strip hole located behind the horizontal side terminal to which the jumper is to be connected. Extend the wire along the frame and pass it through the fanning strip hole behind the other terminal to which the jumper is to be connected. Loop the wire loosely around the second fanning strip to hold it in place. Allow sufficient length for the connections to the terminal.

(b) Cut off the wire at the first fanning strip and loop it loosely around the strip. At this end (horizontal side), allow sufficient length for connecting to the terminal, plus 2 to 3 inches of slack.

(c) Unreel the wire for the next jumper, and repeat procedure (a) and (b) above. During an installation, when large numbers of jumpers are to be run, it saves time to run and loop a sizeable group of jumpers, connecting them to the terminals at a later time. When more than 1 jumper is to be placed in a single fanning strip hole, time and confusion will be saved by identifying each unconnected jumper as follows: for the first or front jumper in the hole tie a simple knot in the loose end of the jumper, for jumper #2, 2 knots, etc. toward the rear of the terminal block or fanning strip. This will ensure the correct jumper being placed on the correct terminal lug.

(2) Routing of the jumper

(a) Horizontal-to-vertical jumper. Run a horizontal-to-vertical jumper along the shelf on which the horizontal terminals are located, then through the jumper ring at the specified vertical, and then up or down the vertical to the proper terminals.

(b) Horizontal-to-horizontal jumper (terminals on different shelves). Run a horizontal-to-horizontal jumper through the jumper ring behind the terminals, then up or down the vertical, then through the jumper ring at the other horizontal shelf, and then to the proper terminals.

(c) Horizontal-to-horizontal jumper (terminals on same shelf). Run a horizontal-to-horizontal jumper through the jumper ring immediately behind either terminal and then along the same shelf to the other terminal.

(d) Vertical-to-vertical jumper (terminals on different verticals). Run a vertical-to-vertical jumper through the nearest jumper ring, then along the horizontal shelf to the other vertical, then through the second jumper ring, and up or down to the proper terminals.

(e) Vertical-to-vertical jumper (terminals on the same vertical). Run a jumper between terminals on the same vertical, starting with either set of terminals, then through a jumper ring midway between the sets of terminals, and then to the other set of terminals.

(3) Slack in jumpers. Jumpers should never be pulled tight between terminal blocks but neither should too much slack be left. A maximum of 3 inches of slack is sufficient for long jumpers and 2 inches for relatively short ones. After connecting the jumpers, dress this slack directly back from the terminal boards. Avoid excessive slack in jumpers along the shelves. Do not however, pull any jumpers too tightly. Tight jumpers are difficult to change in position, and are hard to trace, cause excessive pile-ups in jumper rings, and may lead to damaged insulation or open circuits.

c. Jumper connections

(1) Untwisting jumper conductors. Jumper conductors normally are twisted together. Untwist the portion of the jumper conductor which is to remain within the fanning strip so that it will remain untwisted after the jumper is connected to the terminals. Note, however, that the jumper conductors should be twisted immediately back of the fanning strip.

(2) Removing Insulation. Determine the point on each wire at which the insulation is to be removed. Gripping the jumper firmly behind the fanning strip with one have, pull the wire taut and remove approximately 1 inch of insulation with wire stripper or diagonal pliers, being very careful not to nick the wire.

(3) Connections to Terminals (figs 1&2). Complete each connection on the vertical side before connecting on the horizontal side. Grip the jumper back of the fanning strip. Adjust the wire so that the insulation just comes up to but does not touch the terminal. Wrap the skinned wire one turn around the terminal and cut or break off the excess wire. Do not allow cut or broken excess wire to fall on terminal boards or protectors.

(a) To connect a wire to a terminal on a horizontal board, bring the wire along the left side of the terminal and through the notch, making one complete turn around the terminal.

(b) To connect a wire to a terminal on a vertical board, bring the wire in underneath the terminal and through the notch, making one complete turn around the terminals. Pull taut and cut or break off the excess wire.

d. Soldering Cross-Connections on CDF

(1) Soldering is by far the most important single operation on a telephone distributing frame. Extreme care and approved soldering practices must be used. Poorly soldered connections cause circuit troubles very difficult to locate. A neat, properly soldered connection results in the best possible electrical contact and improves the appearance of the enitre CDF.

(2) The pre-requisites of good soldering are:

(a) A thorough knowledge of the principles and practices of good soldering as outlined in detail in TM 11-471. Para 83-88.

(b) Sufficient practice on actual connections to perform a professional job using (a) as a guide.

(c) A hot iron with properly shaped and well-tinned tip. (see para 84 of TM 11-471).

(d) Clean surfaces on all elements to be soldered. (This is very important).

(3) CDF soldering ordinairly involves only 2 types of terminal lugs horizontal and vertical, with solder placed as shown in Fig. 3. Solder should be placed on <u>only one side</u> of terminal lug.

(a) After jumper wire has been placed on terminal lug IAW instructions in para. c (3) (a) & (b), heat wire and terminal by applying soldering iron tip (tinned side) as shown in Fig. 4. Care must be taken to avoid heating terminal excessively beyond the immediate soldering area so that other wires, such as straps, already soldered will not be loosened. The length of time required to heat a wire and terminal correctly will soon be learned from practice.

(b) Apply solder sparingly as shown in Fig. 4. Excessive solder is difficult to remove, adds nothing to the quality of the joint and presents a very sloppy appearance. Here again practice is the best guide to follow. Only sufficient solder is required to completely cover the wire and area on the lug immediately adjacent to the wire.

(c) Rub the iron tip on the wire and terminal while exerting a slight pressure in order to spread the solder evenly over all portions of the connection.

(d) Withdraw iron along the wire to remove excess solder. The soldered connection should have a smooth, bright appearance. The wire should be fused to terminal and completely covered, but the form of the wire should still be visible underneath the solidified solder. See Fig. 5.

e. Removing Cross-Connections. All dead jumpers should be removed promptly from the distributing frame. When disconnecting jumpers, about 2 inches of wire should be left attached to the terminal lugs abd should be pulled out from the terminal strip, so that they may be seen readily. The jumpers should then be pulled clear of the terminal strip. The ends should be removed with a soldering iron, and both the terminal lugs and the notches in the lugs should be cleared of all excess solder. Take care to avoid spattering solder on terminals or other equipment. A piece of canvas should be used to protect the equipment on the shelves below.

f. References.

(1) TM 11-2102, "Installation Instructions, Step-by-Step Dial Central Office Equipment", paras. 185-188.

(2) TM 11-471, "Manual Telephone Central Office Installation", paras 125-133.

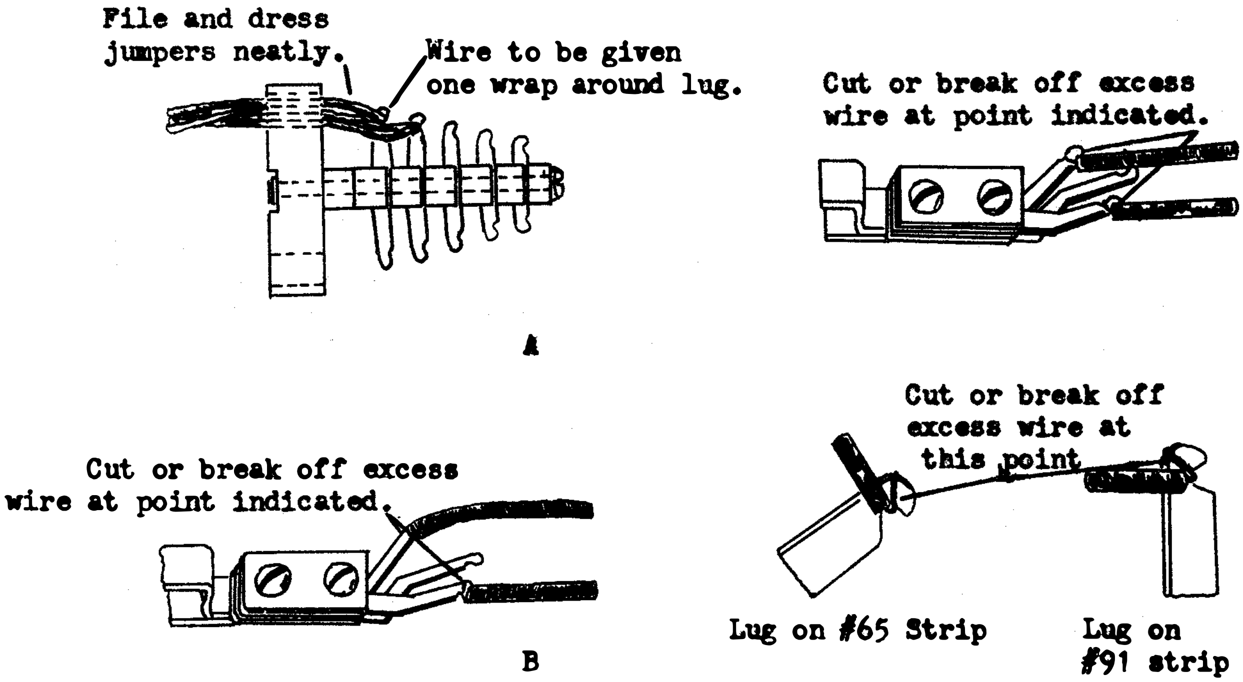
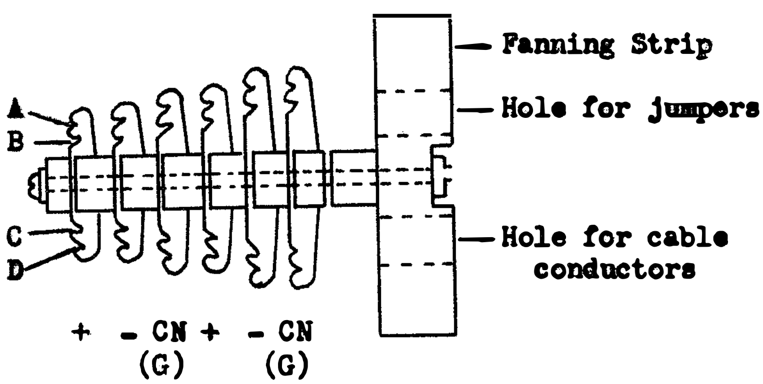


Figure 1. Proper method of terminating wires on various terminals.



Term. Notches

A Jumper Conductors
B Straps
C Cable Conductors
D Cable Conductors

Figure 2. HCDF terminal board, cross-section.

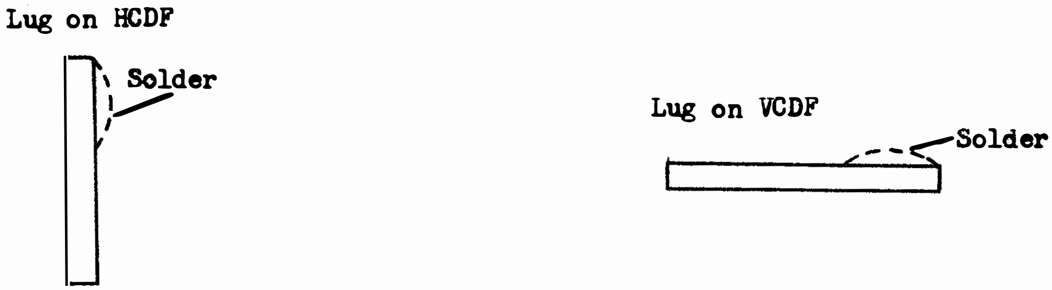


Fig 3. Application of solder to CDF terminal lugs

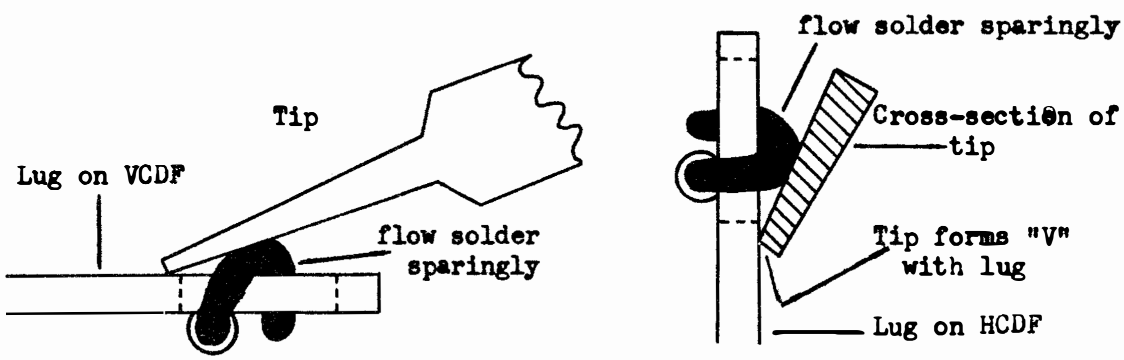


Fig 4. Application of Iron and Solder to wire and terminal lugs

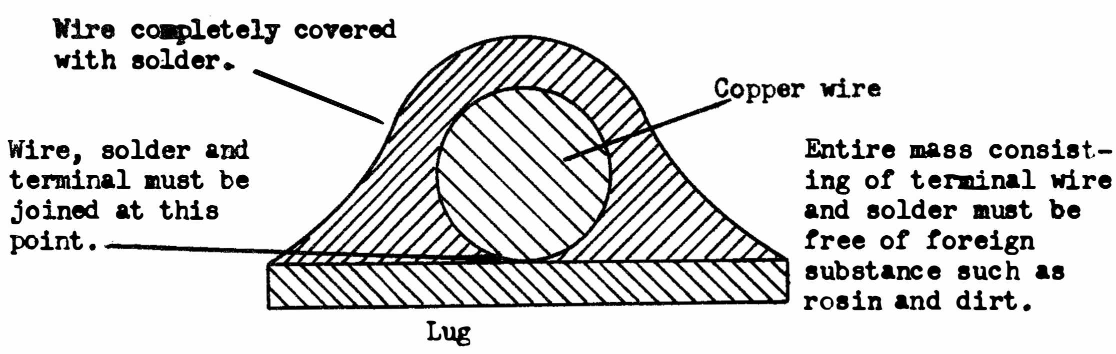


Fig 5. Cross-section of a properly soldered connection

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0710-02

SUBJECT: Patch Cord Identification

1. Background: Review of Station Operational Summaries (OPSUMS) indicate a percentage of system/circuit outages are attributed to the premature removal of patch cords established for altroutes and restorations.

2. Purpose: The purpose of developing a standard method of identifying established patches is to prevent service interruptions. The patch tag and its associated trouble ticket provides the tech controller with a written record of all data pertaining to a specific patch, date established, reason patched and by whom.

3. Execution:

a. Utilize colored patch tags, Form E 5132-R, B, G and W, or coded patch tags, RCG Form 61-R (copy attached) to identify all patches (Figure 1).

b. The following code is standard for all communications restoral:

(1) Restoration priority 1-red, pink, or solid tail

(2) Restoration priority 2-blue or striped tail

(3) Restoration priority 3-green or dotted tail

(4) Restoration priority 4 and 00-light yellow or plain tail.

c. Number the patches to correspond to the control number on the trouble ticket, record data on the patch tag, on the trouble ticket, and in the station log. When the patch is taken down close out the trouble ticket and enter it in the station log.

LOOP PATCH TAG AROUND THE PATCH CORD AND FASTEN WITH EITHER SELF-ADHESIVE OR STAPLE AS SHOWN BELOW

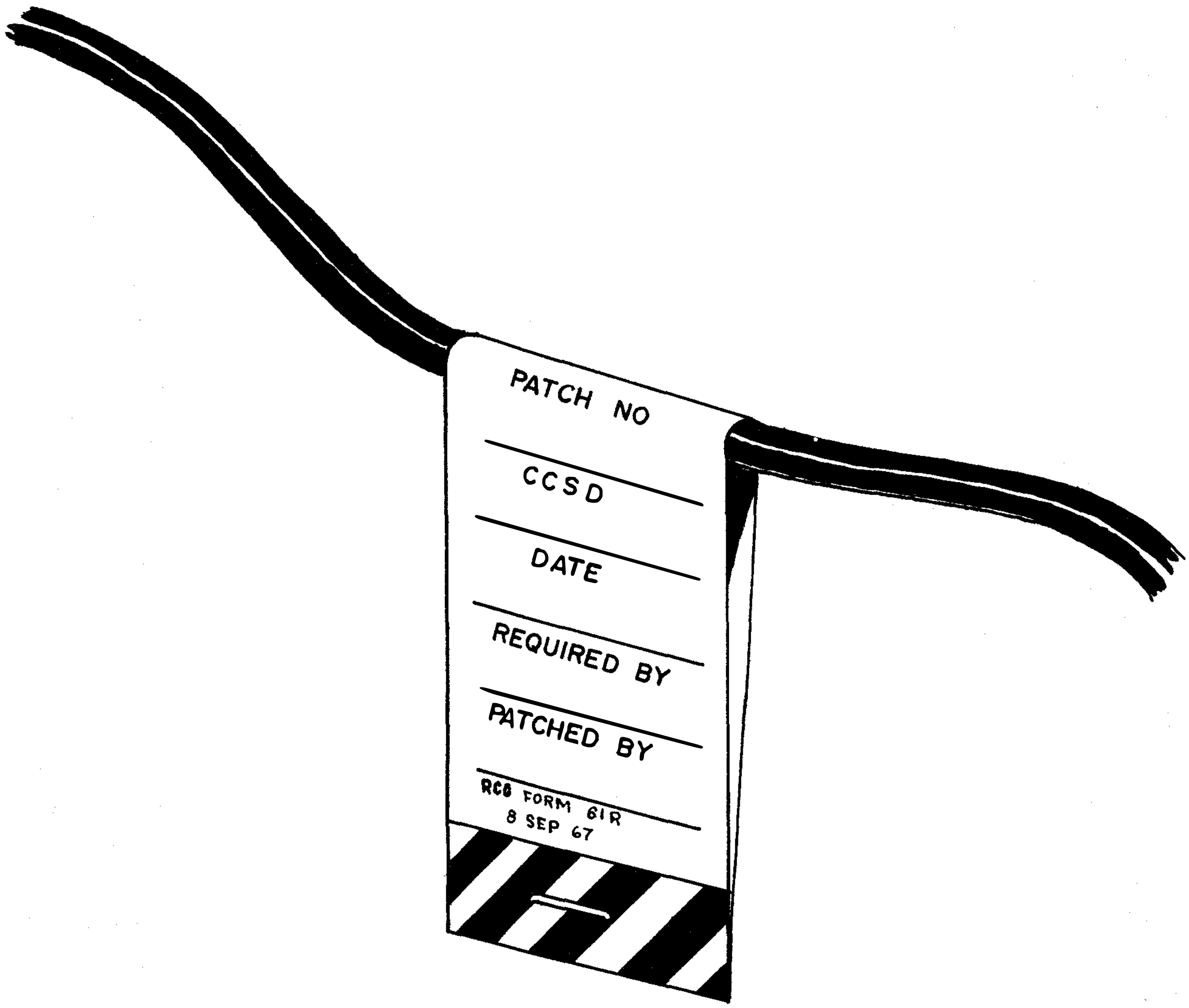

FIGURE #1: USE OF PATCH CORD TAG

Figure 1
Item Nr. 0710-02
RCG LL TCG S&P
7 May 1968

PATCH TAG	PATCH TAG	PATCH TAG	PATCH TAG	PATCH TAG	PATCH TAG
REASON	REASON	REASON	REASON	REASON	REASON
PATCH NO	PATCH NO	PATCH NO	PATCH NO	PATCH NO	PATCH NO
CCSD	CCSD	CCSD	CCSD	CCSD	CCSD
DATE	DATE	DATE	DATE	DATE	DATE
REQ BY	REQ BY	REQ BY	REQ BY	REQ BY	REQ BY
PATCHED BY	PATCHED BY	PATCHED BY	PATCHED BY	PATCHED BY	PATCHED BY
RCG FORM 61 R 8 SEP 67	RCG FORM 61 R 8 SEP 67	RCG FORM 61 R 8 SEP 67	RCG FORM 61 R 8 SEP 67	RCG FORM 61 R 8 SEP 87	RCG FORM 61 R 8 SEP 87

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0720-02

SUBJECT: Labelling of ICS Jacks

1. Background. In order for the technical controller to be able to readily identify supergroups, groups, channels, and circuits, as well as circuit restoration priorities on his patching bays, a standard method of labelling the jacks is needed. With all of the jacks labelled by a standard method, the alternate routing and restoration of circuits can be accomplished both easily and quickly.

2. Purpose. The purpose of this item is to provide instruction for the labelling of supergroups, groups, channels, and circuits on the patching bays and to assign circuit priority colors in accordance with DCA standards.

3. Preliminary Procedures.

a. Definitions:

(1) Supergroup: Normally 60 voice channels of a wideband path or 5 groups of 12 voice channels each occupying the 312-552 kHz frequency band.

(2) Group: A subdivision containing a number of voice channels, either within a supergroup or separately, normally comprised of up to 12 voice channels occupying the 60-108 kHz frequency band.

(3) Channel: A means of one-way transmission. Several channels may share a common path as in carrier systems; in this case each channel is allocated a partcular frequency band. Voice channels may be multiplexed for teletypewriter operation.

(4) Circuit: An electronic path between two or more points capable of providing teletype, data or voice communications.

(5) Destination Site: The distant terminal of a supergroup, group, or circuit that traverses one or more communications links to reach a specific destination.

b. Color Codes.

(1) Priority:

(a) Priority (1) circuits - RED

(b) Priority (2) circuits - BLUE

(c) Priority (3) circuits - GREEN

(d) Priority (4) circuits - WHITE

(e) Spare circuit - BROWN

(2) Data circuits-red with diagonal white "candy" stripes.

(3) Talk quick-blue with diagonal white "candy" stripes.

(4) As a further aid to the Tech Controller a color will be selected for each destination site of groups breaking down to VF and appearing on the 4 wire VF board. Colors used for each destination site will be determined locally by the Site Senior Controller.

4. Procedure.

a. Labelling of 4 Wire VF Patch Bay.

(1) System Identification.

(a) Refer to Inclosure 1, Note 1.

(b) Using 3/8" embossing tape of a selected color (for destination site), print system number. Affix identifying system number parallel to the MOD and EQPT OUT jack.

(2) Supergroup Identification.

(a) Refer to Inclosure 1, Note 2.

(b) Remove the hole plugs occupying the space immediately above or below the associated jack identification. Using 3/8" embossing tape of a selected color (for destination site), print the supergroup information on 2 separate pieces of tape. Affix tapes to area exposed by removing plugs.

(3) Group Identification.

(a) Refer to Incl 1, Note 3.

(b) The baseband is identified by using the supergroup baseband number (Example: 101-112 or 201-212). Using 3/8" embossing tape of a selected color (for the destination site), print the baseband group information on tape. Apply directly to metal on unit number one of associated jack identification strip.

(4) Circuit Channel Identification Strip.

(a) Refer to Inclosure 1, Note 4.

(b) Determine the type and priority of circuit to be designated in accordance with DCA. All channels that are hardwired and not allocated will be designated as spares. Using the appropriately colored paper for the assigned priority, type the circuit designation in the left section of the card unit and the designated priority on the right side of the diagonal line. Place the colored card unit behind the plastic holder on the jack identification strip corresponding to designated channels.

(5) Jack Field Identification.

(a) Refer to Inclosure 1, Note 5 and 6.

(b) Utilizing a standard stecil kit, number each individual set of jacks using WHITE paint. Number each associated channel at the monitor jack using ORANGE paint.

(6) Through-Group Identification.

(a) Refer to Inclosure 1, Note 7.

(b) When a through-group is brought to the VF board on an individual channel basis, the group is identified with a designated number. The jack identification strip card unit will be labelled with the baseband channel number, prefixed by zero (0).

(7) Jack Equipment Unit Separation Strips.

(a) Refer to Inclosure 1, Note 8.

(b) A jack field unit or module is composed of 6 rows of jacks, sufficient for two groups of 12 channels each. Scotch tape ½" wide in colors WHITE and ORANGE will be used to identify and separate these modules.

(8) Destination Site Identification.

(a) Refer to Inclosure 2, Note 9

(b) Using 3/8" embossing tape of color selected, print the destination site name. Apply tape as shown in Inclosure 2.

b. Labelling of the Circuit Patch Jack Bay.

(1) Identification and Priority of Circuit.

(a) Refer to Inclosure 3, Note 1.

(b) Follow procedures outlined in paragraph 4 a (4).

(2) Destination Site Identification.

(a) Refer to Inclosure 3, Note 2 and Paragraph 3 b (4).

(b) Using 3/8" embossing tape of color selected, print the destination site name or abbreviation. Apply the tape directly to the metal edges of the adjoining jack strips.

(3) Reference Number of Associated Primary Jacks.

(a) Refer to Inclosure 3, Note 1.

(b) Primary jack numbers are assigned for convenience in order to facilitate the location of certain jacks for testing purposes. Using 3/8" embossing tape of a predetermined color, print numbers for primary jacks and align the number vertically with associated jack numbers.

(4) Identification (Number) of Jacks.

(a) Refer to Inclosure 3, Note 2.

(b) Utilizing a standard stencil kit; number each individual set of jacks using WHITE paint.

c. Labelling of 2-Wire Primary VF Patch Bay.

(1) Site Destination Identification.

(a) Refer to Inclosure 4, Note 1 and paragraph 3 b (4).

(b) Use 3/8" embossing tape of the selected color, cut tapes in uniform lengths, sufficient to adequately identify the associated jacks. Apply tapes directly to the metal strip on the jack module.

(2) Identification and Priority of Circuit.

(a) Refer to Inclosure 4, Note 2; sketches 1, 2, and 3; and Paragraph 4 a.

(b) The 2-Wire primary jacks utilize a single row of three vertical jacks for each circuit. The jack strip designator units are designed to identify a double row of 6 vertical jacks. The jack designators are utilized by cutting them in half vertically as illustrated in sketches 1, 2, and 3.

(3) Jack-Field Identification.

(a) Refer to Inclosure 4, Note 3.

(b) Utilizing a standard stencil kit, number each set of jacks using WHITE paint as illustrated in Inclosure 4. Stencil numbers to the left center of line and equipment jacks.

d. Labelling of DC Patch Bay.

(1) Identification and Priority of Circuit.

(a) Refer to Inclosure 5, Note 1.

(b) Follow procedures outlined in paragraph 4 a (4)b.

(2) Destination Site Identification.

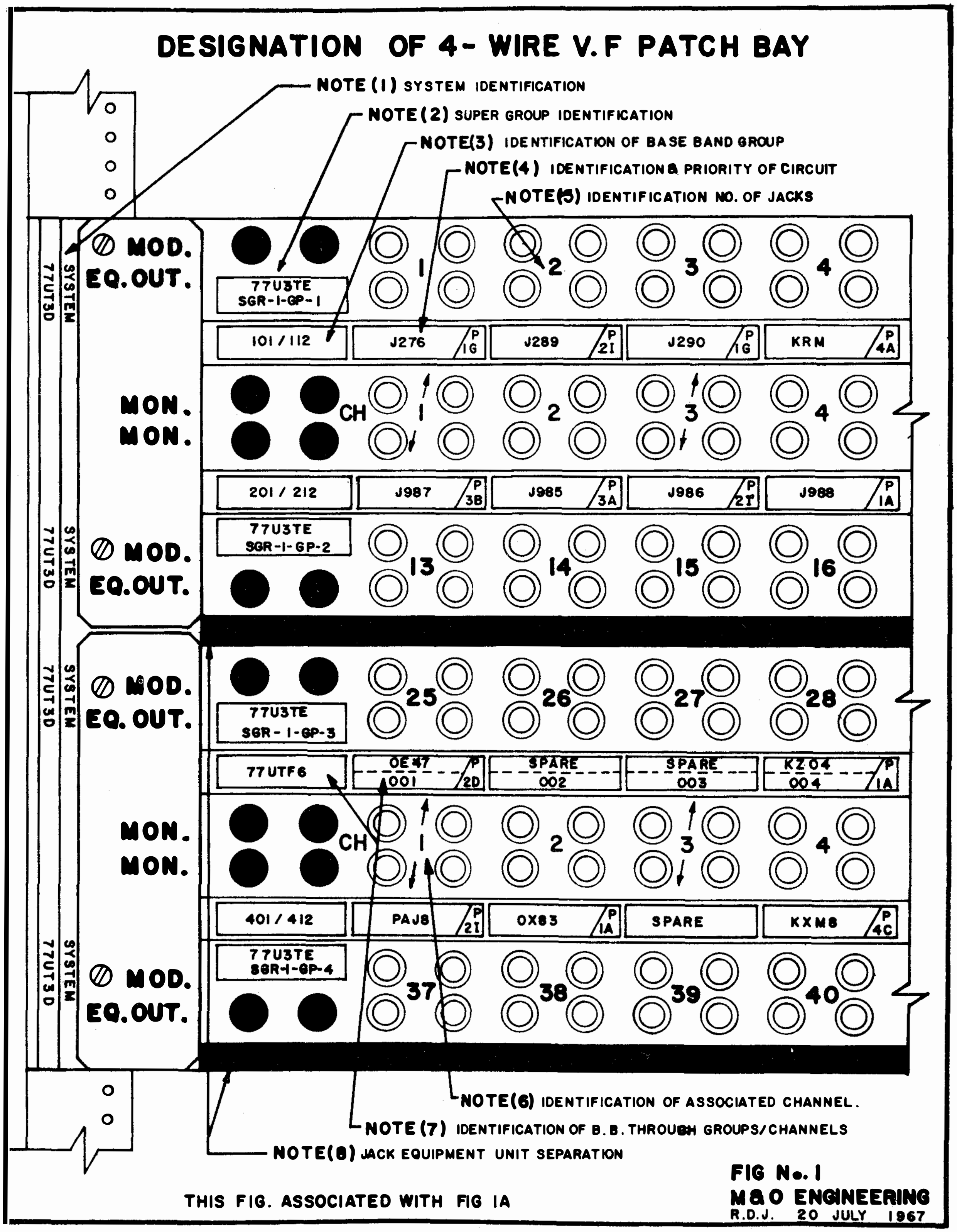
(a) Refer to Inclosure 5, Note 2 and paragraph 3b (4).

(b) Using 3/8" embossing tape of color selected, print the destination site name or abbreviation. Apply the tape directly to the metal edges of the adjoining jack strips.

(3) Channel Number.

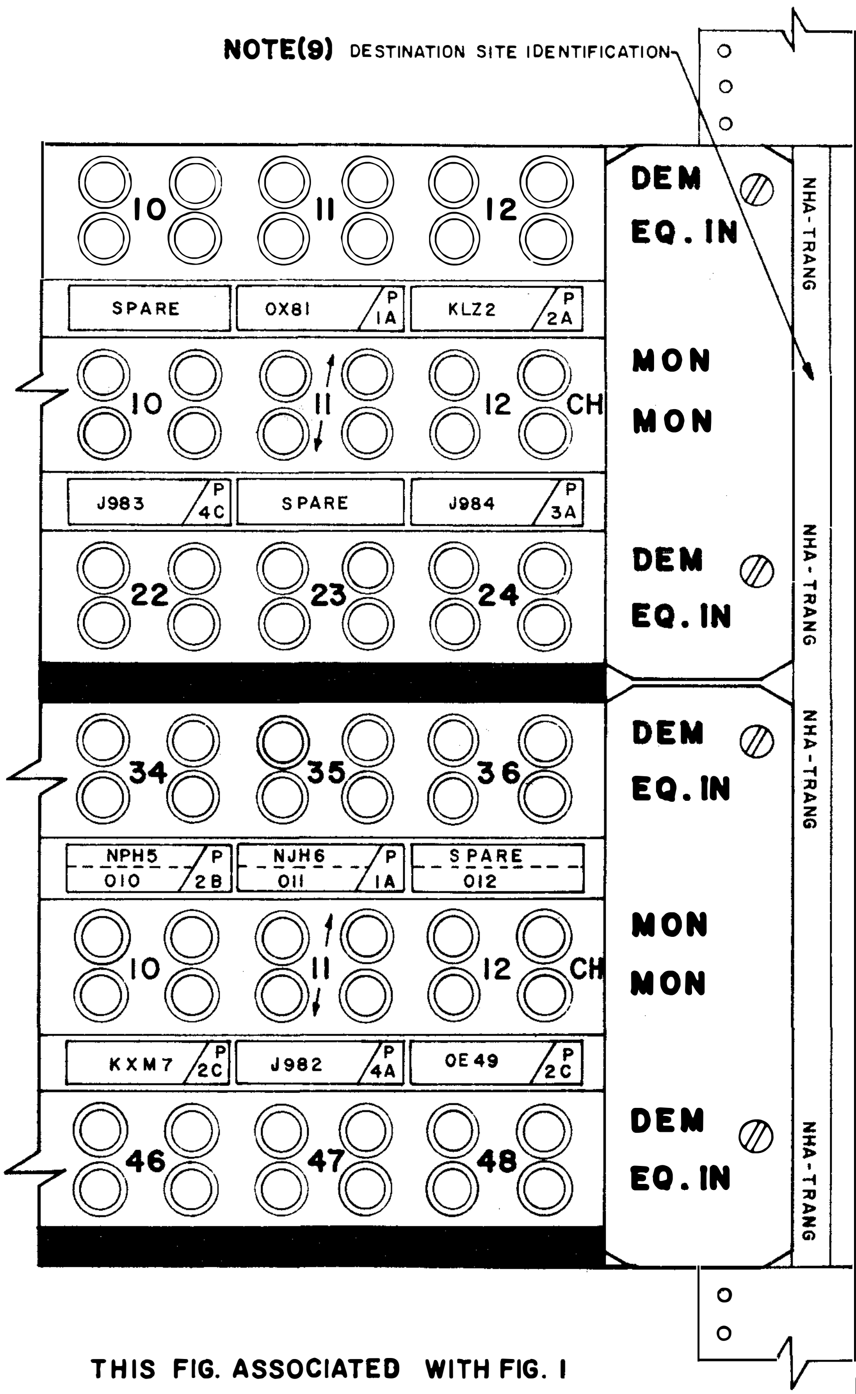
(a) Refer to Inclosure 5, Note 3.

(b) Utilizing a standard stencil kit, number each send and respective receive jack set in WHITE according to channel number.



Incl 1, Item Nr. 0720-02, RCG LL TCG S&P

DESIGNATION OF 4-WIRE V.F PATCH BAY



THIS FIG. ASSOCIATED WITH FIG. 1

FIG. No. 1A
M & O ENGINEERING
R. D. J 20 JULY 1967

Incl 2, Item Nr. 0720-02, RCG LL TCG S&P

DESIGNATION OF CIRCUIT PATCH JACK BAY

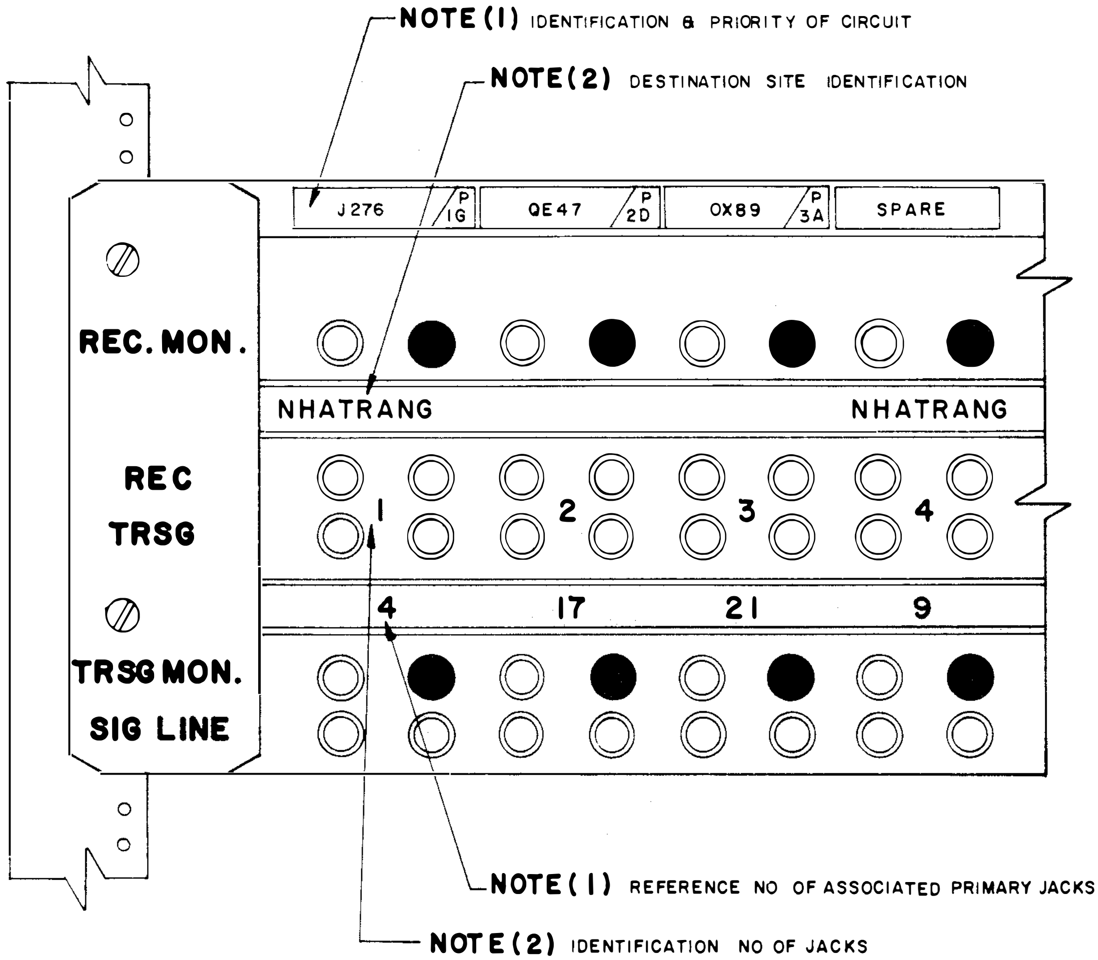
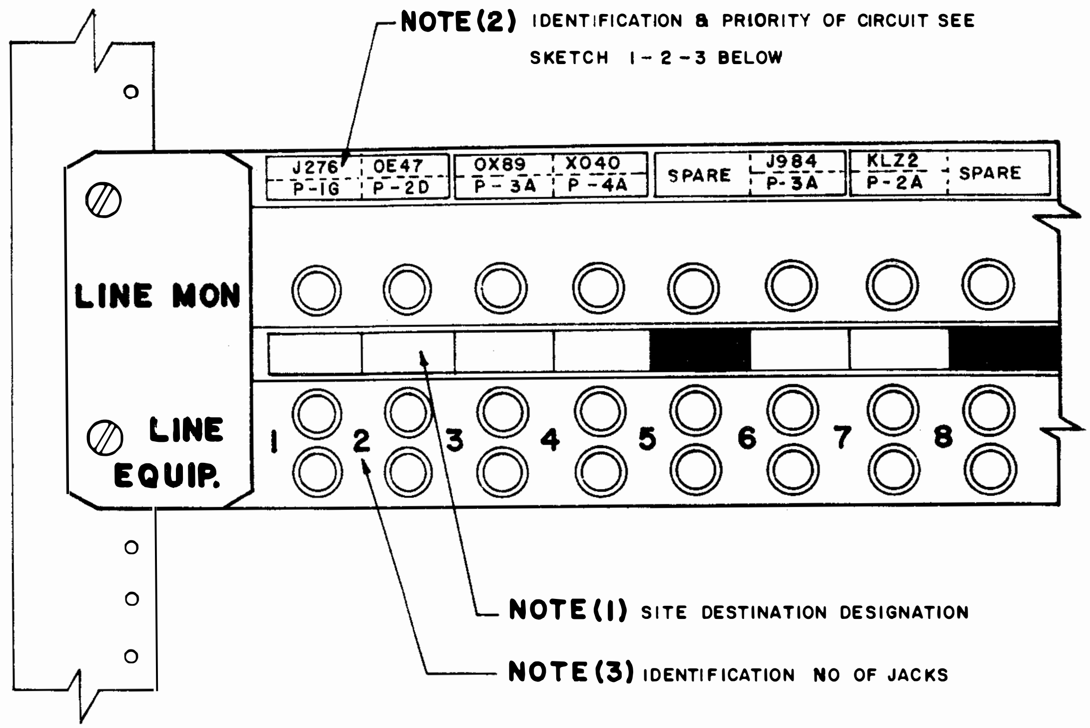


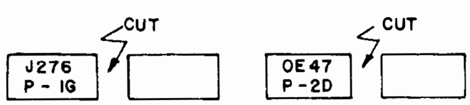
FIG. No. 2
M & O ENGINEERING
R. D. J. 20 JULY 1967

Incl 3, Item Nr. 0720-02, RCG LL TCG S&P

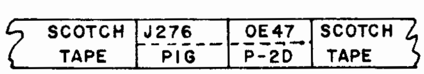
DESIGNATION OF 2-W PRIMARY V. F. PATCH BAY



SKETCH (1). TYPE CIRCUIT NO & PRIORITY ON CORRECT CATAGORY, COLORED PAPER AND CUT OUT.



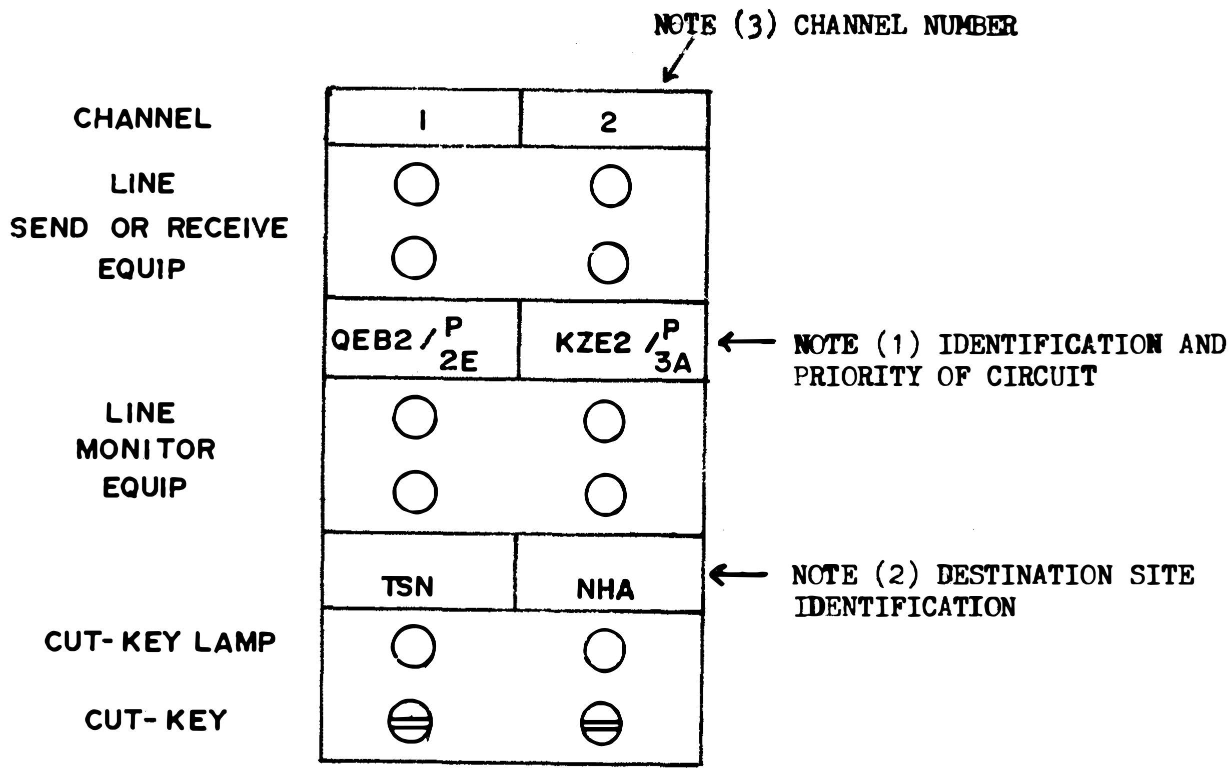
SKETCH (2). CUT INDIVIDUAL JACK STRIP DESIGNATOR CARDS EXACTLY IN HALF, TAKING CARE THE ENDS ARE SQUARE.



SKETCH (3). LAY PROPERLY IDENTIFIED ENDS OF CARDS END TO END ON A SMOOTH SURFACE (PREFERABLY GLASS). OVERLAY ENTIRE CARD WITH TRANSPARENT SCOTCH TAPE. PULL TAPE & CARD FROM SMOOTH SURFACE & TRIM WITH SCISSORS.

FIG. No. 3
M & O ENGINEERING
R. D. J. 20 JULY 1967

Incl 4, Item Nr. 0720-02, RCG LL TCG S&P



Incl 5, Item Nr. 0720-02, RCG LL TCG S&P

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 0820-02

SUBJECT: Technical Control Records

1. Background. Proper records are the only means operating personnel have of maintaining information on past events. Without records we cannot gain on experience because we do not know what our experience has been. Records are used for many reasons. It is sufficient to say that without adequate records we cannot operate properly. They are required to provide the operating agency with current information and to provide higher headquarters with feeder information on a variety of subjects. They are essential to provide the quality of service our subscribers expect.

2. Purpose. This item specifies and describes the records that will be maintained in each ICS Technical Control.

3. Types of Records. The following types of records will be maintained within each ICS technical control:

a. Circuit History File

b. Equipment Utilization Records

c. Station Log

d. Trouble Ticket

e. Circuit Layout Record (2nd Copy)

f. Pending Circuit File

g. Immediate Pre-Print

h. Cable Records (see S & P Item Nr. 0812)

i. Outside Cable Plant-in-Place Records (see S & P Item Nr. 0610)

4. Description of Records. The records listed above will be maintained current and up-to-date in the following manner.

a. Circuit History File. This will consist of a separate manila file maintained on each circuit passing through the particular ICS technical control. The complete eight (8) character CCSD will be indicated at the top. Circuits for which this technical control is coordinator will be coded by colored tape at the top of the folder. These folders will be filed alphanumerically by the last four (4) characters of the CCSD. Each folder will be a complete chronological history of that circuit and will contain all pertinent documents pertaining to the circuit. This information will be arranged as shown in Figure 1. The right hand side of the folder will be the activation side and will contain copies of each CEO issued by DCA-SAM on the circuit. Filed immediately on top of the CEO will be status card (see 4f below) and the DCA 55-1 reports pertaining to that circuit as submitted by the coordinating stations. The CLR will be mounted on the bottom half of the folder as shown. Both CLR's and CEO's will be filed chronologically so as to provide a clear history of the circuit's evolution. The left side of the folder will be the circuit history side and contain copies of miscellaneous correspondence pertaining to the circuit in addition to a circuit history form (see Incl 1). These will also be filed in chronological order.

b. Equipment Utilization Records: These records will reflect the status of each item of circuit conditioning equipment used in the ICS Technical Controls. These will be maintained in a hard bound record book (Book, Memorandum -- Record Ruled 144 pgs. 7530-286-6843 Federal Service Supply or equivalent) and will reflect utilization by sequence number, for the following items of equipment:

	Type of Equipment	EAM Code
(1)	Pri JK 4 Wire	2
(2)	Pri JK 2 Wire	3
(3)	2600 SF Unit	4
(4)	1600 SF Unit	5
(5)	RD Conv	6
(6)	Pad	7
(7)	VF Amplifier	8
(8)	Hybrid	9
(9)	Misc DC JK	13

(10)	Isol Relay	14
(11)	Thru Gp Filter	15
(12)	EAC Adapter	16
(13)	VF limiter	17
(14)	4/4 Bridge	18
(15)	Echo Sup (SCES)	19
(16)	FCC-19 16 Chan	20
(17)	FCC-19 08 Chan	21
(18)	FCC-25 16 Chan	22
(19)	FCC-25 32 Chan	23
(20)	Hub Repeater	25
(21)	Repeat Coil	26
(22)	Regn Repeater	27
(23)	Pulse Link RPTR	28
(24)	Dial Extenders (DX-2)	31

As equipment is allocated by the issue of Circuit Layout Record or Circuit Orders, the assignments will be entered in each station's Equipment Record (see Incl 2) indicating the authority for the assignment IAW the following code:

Circuit Layout Record	CLR
Circuit Order	CO#________
Vocal Order	VO________

c. Station Log. A station log will be maintained by the tech control at each ICS station on DA Form 11-193 or suitable substitute IAW DCA Circular 310-70-1 Volume II.

d. Trouble Ticket. A trouble ticket (Incl 3) will be initiated by the tech control for each circuit outage. They will be referenced in the station log. Each trouble ticket will be given a control number starting with one (1) at 0001Z each day. A complete status of each outage will be recorded, to include the time out, reason logged out (i.e. negative contact, no ring, high distortion), steps taken to isolate and correct the fault, time the circuit is restored to service, and reason for outage. The trouble ticket will also include any alt-routing.

action when necessary. The trouble ticket will be filed dialy in the circuit history file and kept for at least ninety (90) days.

e. Circuit Layout Card (2nd Copy) These are perhaps the most valuable files the station can maintain and should be treated with exteme care. They must be accessible to the tech controller at all times as they are the only documents that indicate the equipment wiring configuration for each circuit. These cards should be filed in a visual "KARDEX" type file, alphanumerically by CCSD. If a KARDEX is not available, supply action will be initiated to obtain one. In the meantime, these cards should be filed in a covered (free from dust) 5" X 8" card file, again alphanumerically by CCSD. The visual portion of the CLR will reflect the CCSD, terminal stations, control station, and circuit restoration priority. Any changes in equipment wiring MUST be immediately posted to the CLR first and then to the Equipment Utilization Records. Technical Control Personnel must be educated concerning the use and maintenance of these cards to insure that the are not lost or misplaced.

f. Pending Circuit File. This will be a separate 5" X 8" card file for CLR's and related data on circuits not yet activated or realigned. This file should consist of a small manila folder, 5" X 8", which contains the CLR and status card (Incl 4) on all pending circuits actions. The status card should clearly indicate, in chronological order, what steps have been taken to activate the circuit and what problem areas have been encountered. Upon activation, the CLC will be filed in the CLC file (e above), and another CLR and Status Card filed in the Circuit History File (a bove).

g. Immediate Pre-print. When a circuit action is telephonically ordered the Pre-print record will replace the CLR.in all cases stated above . Upon receipt of the CLR card such Pre-printswill be pulled and replaced by the card form CLR.

5. Records Inspections. The records described here will be subject to inspection during any staff visit. It is the responsibility of the site OIC ot insure that records are accurate, well kept, and maintained IAW this item.

CIRCUIT HISTORY

SAMPLE

CCSD X123 FROM DNG TO PLM

COORDINATOR PLM LOCAL SUB PLM DRA TP PLM 55

DATE OF ENTRY	CURRENT CEO NO.	CURRENT CLR DATE	REQUIRED ACTION	CEO COMPLETED	REMARKS
1 May 68	81234	15 Apr 68	Establish	061530ZMay	
15 May 68	81972	12 May 68	Engr change	160310ZMay	Change Pri levels to (-9/-9
1 June 68	82743	22 May 68	Change Type Sub	081240ZJune	Change to 2W HOX CKT

Incl 1
Item Nr. 0820-02
RCG LL TCG S&P

RCG FORM 37R
REVISED 9 Sep 67

EQUIPMENT UTILIZATION RECORD

Type Equipment Ringdown Converters

NR	CCSD	AUTH	NR	CCSD	AUTH
102	KTD8	CLR			
103	K497	CLR			
104	KTQ2	CO #4			
105	TEST	VO 1LT Cleary			
106	OV32	CLR			
107	KSC5	CLR			
108	TEST	VO CW3 Jansen			
109	Z465	CLR			

Incl 2
Item Nr. 0820-02
RCG LL TCG S&P

TROUBLE TICKET

DATE	CNTL NO	STA GRP CKT	PRIORITY	TERMINALS

REPORTED TROUBLE

TIME	CORRECTIVE ACTION TAKEN	INT

TROUBLE FOUND AND CORRECTION

TIME IN	CNTL INT	SUB INT
TIME OUT	CNTL INT	SUB INT
TOTAL	SR CONT SIGNATURE	

RCG Form 65 R Incl 3, Item Nr. 0820-02, RCG LL TCG S&P

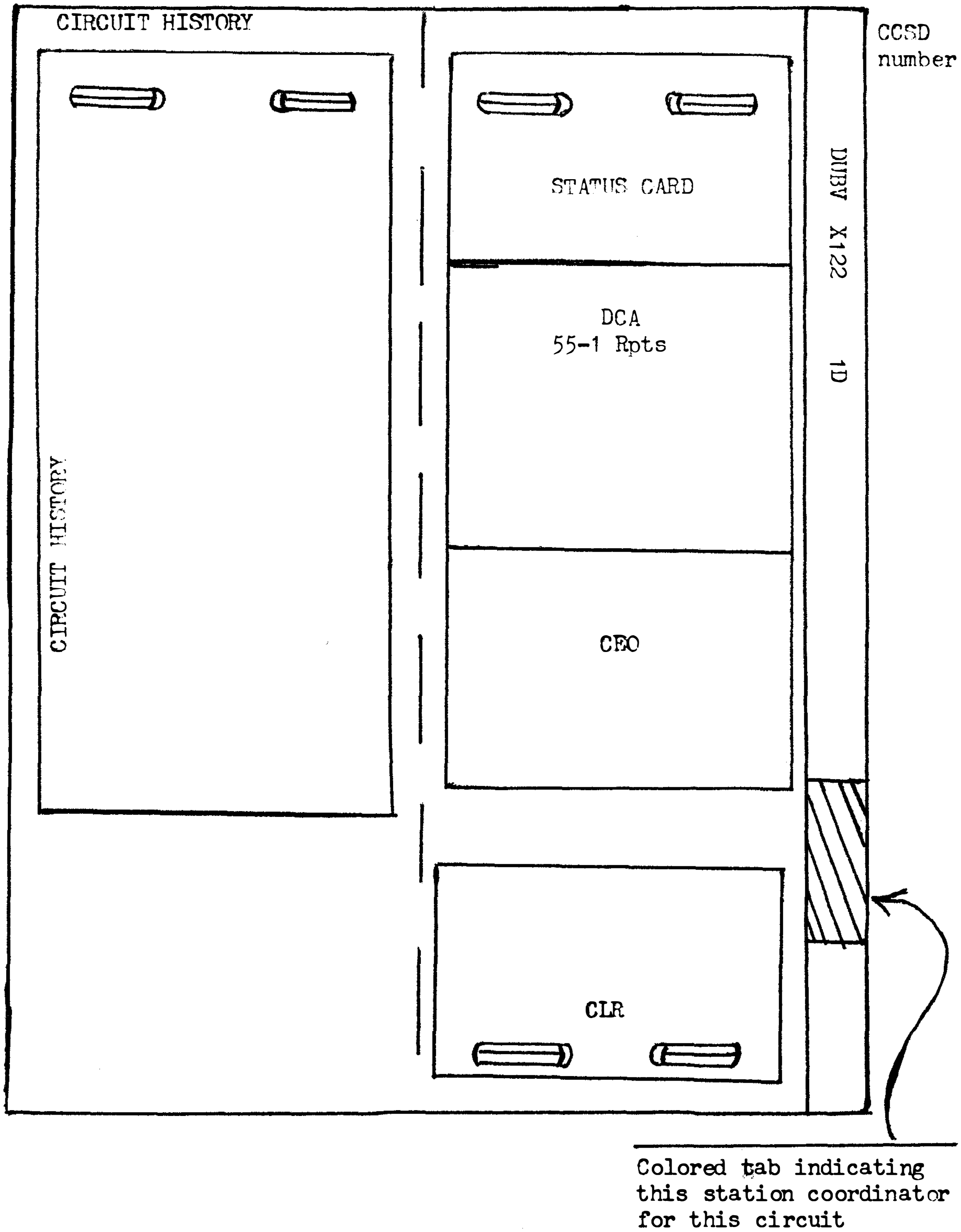


FIGURE 1 CIRCUIT HISTORY FILE

Figure 1
Item Nr 0820-02
RCG LL TCG S&P

PENDING CIRCUIT STATUS

CCSD ____________ CEO NR ____________ CLR DATE ____________

<u>Initials</u>		<u>Date</u>
________	In-House Wiring completed	________
________	In-House Line-up completed	________
________	End-to-End Line-up completed	________
	CEO completed	____________

Accepted by ______________________________ Subs initials

DATE	TIME	STATUS	INT
		(FRONT)	

DATE	TIME	STATUS	INT
		(BACK)	

RCG Form 64R

Incl 4
Item Nr. 0820-02
RCG LL TCG S&P

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 0901-01

SUBJECT: ICS Power Plant and Stand by Power Plant Operation.

1. Background: Due to unusual conditions that exist in the Republic of Vietnam it is necessary to include in the Technical Control Standards and Practices a maintenance and operation procedure for power plants. The following M&O procedures apply to power sources or stand by power sources at all RVN ICS Sites.

This item does not supersede procedures established for Contractor operated power sources. The following procedure is to be utilized by Technical Control Personnel only in Emergency or Extreme conditions.

2. Purpose: The purpose of this item is to prevent or minimize outages in the ICS network due to hostile action, power failures or other unusual circumstances.

3. General:

This procedure discribes normal and emergency operation of ICS Caterpillar and White Superior Power Plants.

Note: Steps marked with * apply to White Superior Power Plants only. Steps marked ** apply to White Superior Air Starting Systems only.

4. Preliminary

A. Prior to starting the engine, the following steps must be performed:

(1) Check the switchgear to verify that the INCOMING engine breaker is OPEN.

(2) Check the master control switch on the engine control panel (off position).

(3) Check the governor lube oil level in the sight glass.

(4) Set the governor controls;

(a) Speed drop to zero.

(b) Load limit to five (5)

(5) Check the fuel level in the day tank (Minimum 3/4 full).

(6) Check the water level in the surge tank (Minimum 3/4 full).

(7) Check the engine lube oil level, using dipstick, the oil shall be at the full line.

(8) Check about the engine/generator set for foreign objects (tools, wiping rags, etc.)

*(9) Open the indicator cocks to relieve compression, and bar the engine (by hand) thru two revolutions, close the indicator cocks.

(10) Check all fuel, water, lube oil and air valves. These should be open.

*(11) Check the starting air pressure at the engine control panel (Minimum 210 psi).

*(12) Check the radiator fan control switch position. This should be in "AUTO"

5. <u>STARTING ENGINE</u>

(a) Turn the start switch on engine control panel to the "AUTO" position (engine starts).

(b) Check the lube oil pressure (30/35 psi full RPM).

(c) Check the fuel pressure (15/20 psi full RPM).

(d) Set the governor load limit to 10.

(e) Allow a ten (10) minute warm up period.

(f) Make a visual check of the engine including accessories and radiator.

6. SWITCHGEAR OPERATION (Single engine)

*(a) Place the voltage regulator toggle switch in the "on" position.

*(b) Place the unit/parallel toggle switch in the "unit" position.

(c) Adjust the speed control lever until the frequency meter indicates 60 cycles.

(d) Adjust the voltage rheostat knob on the panel until the AC volt meter reads 208 Volts AC (the voltage selector handle in position 1).

(e) Place the synchroscope knob in the "ON" position on the panel being energized.

(f) Turn the circuit breaker control lever to the "close" position (the control lever located under red box).

(g) Check the red indicator light on the panel to assure breaker closure.

(h) Place the synchoroscope knob in the "OFF" position.

(i) Close the feeder breakers individually, checking voltage/ frequency, and adjusting as necessary.

7. SWITCHGEAR OPERATION (Parallel, two engines)

(a) Set the governor speed drop of the INCOMING engine to 50.

*(b) Place the voltage regulator toggle switch in the "on" position.

*(c) Place the unit/parallel switch in the "PARALLEL" position on both the running and incoming engines.

(d) Adjust the speed control lever until the frequency meter indicates 60 cycles.

(e) Adjust the voltage rheostat knob on the panel until the AC Voltmeter reads 208 volts.

(f) Place the synchroscope knob in the "ON" position on the incoming engine panel.

(g) Adjust the incoming engine voltage to match the bus voltage (208).

(h) Adjust the speed control lever until the synchronizing pointer rotates <u>slowly</u> in the "FAST" (clockwise) direction.

(i) As the synchoroscope pointer slowly reaches 12 o'clock (synchronizing lamps out) close the circuit breaker control lever (under red box).

(g) Immediately increase the incoming engine speed slightly.

(k) As the load transfers, adjust the voltage of incoming and running engines to maintain proper power factor.

(l) Distribute the load equally between the paralleled units.

(m) Place the synchroscope knob in the "OFF" position.

8. <u>TRANSFERING ENGINE GENERATOR SETS</u>

(a) Start the standby engine

(b) Place the governor drop to "O".

(c) Slowly adjust the governor drop to 30, on the engine to be removed from the bus.

(d) Parallel the units.

(e) Slowly transfer the load to incoming engine, adjusting voltage of both units to maintain proper power factor.

(f) Trip the main breaker of engine being removed when KW and AC ammeter read zero.

(g) Place the unit-parallel switches (both panels) in the "UNIT" position.

(h) Switch the voltage regulator toggle switch (out-going unit) to the "OFF" position.

(i) After a 10 min. cooling period, stop the engine by turning the start switch (on the engine control panel) from the "AUTO" to the "OFF" position.

9. <u>PARALLELING A & B BUSSES</u>

Paralleling the two busses will be accomplished in the same manner as paralleling two engines. The sole exception will be the closure of the tie breaker instead of the main engine breaker.

10. EMERGENCY PARALLELING PROCEDURES

(a) Set the governor load limit of the engine to be placed on the line to 10.

(b) Open the starting air valve.

(c) Turn the start switch on the engine control panel to the "AUTO" position.

(d) Place the incoming and running unit parallel toggle switches in the parallel position.

(e) Set the voltage regulator switch on the incoming engine to the "ON" position.

(f) Energize the synchroscope.

(g) Adjust the speed of the "INCOMING" engine until the synchroscope pointer is moving slowly in the "FAST" (clock-wise) direction.

(h) Adjust the voltage of the INCOMING engine to match the voltage of the RUNNING engine.

(i) As the synchroscope pointer slowly reaches the 12 o'clock (lamps out) position, close the main breaker.

(j) Increase the engine speed of INCOMING unit to assume the load. Adjust the voltage/frequency of the INCOMING engine only.

(k) Upon completion of the load transfer, trip the breaker on the malfunctioning unit.

11. TOTAL POWER FAILURE, EMERGENCY

(a) Start the STANDBY engine.

(b) Adjust the frequency to 60 cycles, the voltage to 208V.

(c) Energize the synchroscope (main breaker can not be closed unless this step is taken).

(d) Close the main breaker.

** 12. Air System for the White Superior Power Plant.

A. ICS White Superior Air Starting equipment consists of one air compressor, one electric motor, one gasoline engine, two air receivers and associated valves and piping.

** 13. PRELIMINARY PROCEDURE

A. Standard operation of air system

(1) Use the electric motor to operate the air compressor except during a total power failure with subsequent loss of air pressure, failure of the electric motor or scheduled maintenance.

(2) The valve between the compressor and the air receivers will remain open at all times.

(3) One air receiver will be isolated from the system at all times, except when re-charging. The "standby" receiver will be recharged when the receiver pressure drops to 200 psi.

(4) The control valves for the operational and standby air receivers shall be clearly marked "OPEN" and "CLOSE" respectively.

(5) The control valves on the operating engines shall remain open at all times.

(6) The control valves on non-operating engines shall remain closed at all times.

B. Emergency operation of air system

(1) Prevention of imminent power failure - block the shutdown air solenoid valve in the up position.

CAUTION: Blocking the shutdown air solenoid valve prevents all engine shutdown devices from shuting down the engine in case of an emergency. This method of preventing a power failure should be used only in extreme emergency.

(2) Total loss of air pressure resulting in a power failure - Connect drive belts between air compressor and gasoline engine, assure that the control valve to one air receiver is closed.

(3) Air system pressure loss-Close the control valve for the operational air receiver before opening the control valve for the standby air receiver.

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 1050-02

SUBJECT: Quality Assurance/Operational Evaluation Guide and Checklist-Technical Control

1. Background: Defense Communications Agency and Regional Communications Group teams will make periodic quality assurance and operational evaluation inspections of DCS Facilities. Site OIC's should also conduct inspections to review the status of their own station.

2. Checklist: Attached as Inclosure 1 is an inspection checklist for Tech Control. Inclosure 2 is a checklist for RF equipment.

TECHNICAL CONTROL CHECKLIST

1. DATE_____________

2. SITE_____________

3. LOCATION________________

4. AREA COMMANDER__________________

5. DET. COMMANDER__________________ DET NCOIC__________________

6. OIC TECH CONTROL__________________

7. NUMBER OF PERSONNEL AUTHORIZED__________________

8. NUMBER OF PERSONNEL ASSIGNED__________________

9. NUMBER OF SCHOOL TRAINED PERSONNEL IN MOS 32D______________

OJT 32D______________

10. AUTHORIZED MOS 32D___________ ON HAND 32D_______________

11. NUMBER OF SHIFTS__________

12. TECH CONTROL CAPACITY VF_______ IN USE VF_________

DC_______ IN USE DC_________

13. DAILY NOTICE:

a. IS A DAILY NOTICE PROGRAM IN USE? YES____ NO____

b. IS IT ADEQUATE? YES____ NO____

14. TECHNICAL CONTROL REFERENCE LIBRARY:

a. IS THE LIBRARY LOCATED WHERE CONTROLLERS HAVE QUICK AND EASY ACCESS? YES____ NO____

b. IS A MASTER INDEX OF PUBLICATIONS ATTACHED TO FRONT OF BOOKCASE OR CONTAINER? YES____ NO____

c. ARE INDIVIDUAL BINDERS INDEXED? YES____ NO____

d. DOES EACH PUBLICATION HAVE A COVERSHEET TO RECORD THE FOLLOWING INFORMATION:

(1) CHANGE NUMBER? YES____ NO____

(2) AUTHORITY FOR CHANGE? YES____ NO____

(3) DATE CHANGE POSTED? YES____ NO____

(4) INITIALS OF PERSON POSTING CHANGE? YES____ NO____

e. ARE SUPERVISORY PERSONNEL FAMILIAR WITH THE PROPER METHOD OF POSTING CHANGES? YES____ NO____

f. ARE ALL DOCUMENTS RELATIVE TO CLASSIFIED OPERATIONAL MATTER AND SPECIAL CATEGORY TEST CIRCUITS AVAILABLE TO PERSONNEL WHOSE DUTIES REQUIRE THEM? YES____ NO____

g. IS A COPY OF THE FOLLOWING PUBLICATIONS AVAILABLE? YES____ NO____

(SEE INCL. #1)

IDENTIFICATION	TITLE	YES	NO
AR 380	Military Security Safeguarding Defense Information	___	___
DCAN 210-0-1	DCA Numbered Publications	___	___
DCAC 310-40-1	Communications Support for Specified Officials when Traveling	___	___
DCAC 310-55-1	Operational Directional Manual of the DCS W/Ch 1-12	___	___
DCAC 310-65-1	Directory Data Base Manual of the DCS W/Ch 1-3	___	___
DCAC 310-70-1	DCS Technical Control (Vols 1-4)	___	___
DCAC 310-70-6	Anti-Jamming Procedure for DCS Telecommunications Stations	___	___
DCAC 310-85-2	Reports of Jamming and Sabotage	___	___
DCAC 310-140-1	Emergency Activation or Restoral of Leased Private Line Circuits	___	___
DCAC 310-175-1	DCS Circuit Operating Standards DCA-PAC Supplement 1 W/Ch 1-2	___	___
DCAC 330-10-1	Communications - Electronic Terms	___	___
DCAC 330-175-1	Engineering - Installation Standards Manual W/Ch 1-7	___	___
ACP 126	Communications Instruction for Teletypwriter (Teleprinter) Procedures	___	___
ACP 131	Comm: Signal Operating Instructions	___	___

<u>1st Signal Brigade Regulations</u>:

105-7	Circuit Control Requests	___	___
Cir: 105-15	Utilization of Brigade Teletype Circuits	___	___
1st Sig Bde	Standing Signal Instructions W/Ch 1-8	___	___
RCG S&P		___	___
ICS Orientation		___	___

15. REROUTE PLAN:

a. IS A REROUTE PLAN FOR 1 & 2 PRIORITY CIRCUITS AVAILABLE? YES___ NO___

b. ARE CONTROLLERS FAMILIAR WITH PLANS FOR REROUTING CIRCUITS AND TRUNKS FOR WHICH FACILITY IS RESPONSIBLE? YES___ NO___

c. ARE REROUTE PLANS POSTED, OR IMMEDIATELY AVAILABLE WHEN REQUIRED? YES___ NO___

d. ARE LISTINGS MAINTAINED INDICATING RESTORATION PRIORITIES FOR EACH CIRCUIT? YES___ NO___

e. IS REROUTE PLAN USED TO FULL ADVANTAGE? YES___ NO___

f. IS REROUTE PLAN UP TO DATE? YES___ NO___

16. EMERGENCY ACTION SOP's:

a. ARE DETAILED SOP's AVAILABLE FOR THE FOLLOWING:

(1) GROUP OR SYSTEM FAILURE? YES___ NO___

(2) POWER FAILURE? YES___ NO___

(3) AIR CONDITIONING FAILURE? YES___ NO___

(4) JAMMING? YES___ NO___

(5) INTERFERENCE? YES___ NO___

(6) NATURAL DISASTERS? YES___ NO___

(7) ENEMY ATTACK? YES___ NO___

(8) CABLE FAILURE OR LOSS? (LIST CABLES) YES___ NO___

17. PATCH PANELS:

a. ARE PATCH PANELS LABLED IAW RCG S&P, ITEM 0720-01? YES___ NO___

b. ARE SPARE CHANNELS LABLED? YES___ NO___

c. IS CORRECT COLOR CODING USED? YES___ NO___

d. CHECK PATCH PANEL AGAINST DCA CIRCUIT DIRECTORY, USING INCL #" AS A WORKSHEET.

NOTE: Where a discrepancy in CCSD or priority is noted between in-house labeling and the DCA Circuit Directory, consult the latest CEO for the particular circuit. Depending on the date of the CEO and/or the Circuit Directory either could be in error. Consult the local DCA Det for further information.

18. QUALITY CONTROL:

a. IS A SCHEDULE AVAILABLE FOR ALL QC PERIODS? YES___ NO___

b. ARE SPARE CHANNELS INCLUDED IN THE TEST SCHEDULES: YES___ NO___

c. SPOT CHECK CHANNELS, USING WORKSHEET SHOWN AS INCL #3.

d. IS A DD FORM 11-193 LOG USED TO RECORD CORRECTIVE ACTIONS AS PRESCRIBED BY DCAC 31-70-1, VOL 2 PAGE 11-16? YES___ NO___

19. TROUBLE TICKETS:

a. ARE TROUBLE TICKETS BEING FILED IN THE CIRCUIT HISTORY FILE? YES___ NO___

b. ARE TROUBLE TICKETS BEING MAINTAINED FOR THE REQUIRED 90 DAY PERIOD? YES___ NO___

c. IS THE CIRCUIT PRIORITY SHOWN ON EACH TROUBLE TICKET? YES___ NO___

d. DOES DET. USE IT'S OWN NUMBERING SYSTEM? YES___ NO___

e. IS DCA 55-1 OUT AND IN REPORT NUMBERS INCLUDED ON ALL TROUBLE TICKETS? YES___ NO___

f. HOW OFTEN IS FOLLOW UP INITIATED ON PRIORITY 1&2 CIRCUITS EXPERIENCING OUTAGE. TIEM_________

g. DOES THE CONTROLLER COMPLETING THE TROUBLE TICKET SUPPLY THE REPORTING CLERK THE RFO ON EACH OUTAGE? YES___ NO___

h. IS A MASTER TROUBLE TICKET LOG IN USE? YES___ NO___

20. GENERAL:

a. HOW MANY GENERATORS DOES DET HAVE? ____________

b. HOW OFTEN ARE THEY ROTATED? ____________

c. IS MAINTENANCE BEING PERFORMED ON GENERATORS AS REQUIRED ____________

d. HAS TEST EQUIPMENT BEEN CALIBRATED WITHIN THE LAST 180 DAYS YES___ NO___

e. WHAT IS THE GENERAL CONDITION OF THE CDF? GOOD______ FAIR_______ POOR_____

f. IS THERE AN EFFECTIVE ON-THE-JOB TRAINING PROGRAM? YES___ NO___

g. IS THE WORK AREA NEAT AND UNCLUTTERED? YES___ NO___

h. ARE PROPER BREAK AREAS DESIGNATED? (NO FOOD OR DRINK IN TECH CONTROL AREA). YES___ NO___

i. IS STATION CLEAN AND WELL KEPT? YES___ NO___

QUALITY CONTROL

Inspection is made of three random channels per group.

GROUP	CHANNEL	ICN		LEVELS		GROUP	CHANNEL	ICN		LEVELS	
		House	D/E	House	D/E			House	D/E	House	D/E

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RCG LL TCG S&P
23 Mar 69

LABELING OF PATCH PANELS (VF)

IN HOUSE LABELING					DCA CIRCUIT DIRECTORY		
GROUP	CHANNELS	CCSD	PRI	CEO	CCSD	PRI	REMARKS

Incl 1 Page 8
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23 Mar 69

SITE INSPECTION REPORT

SITE NO. ______________ SITE NAME________________ DATE______________

Terminals Inspected: 1. ________________ by________________________

2. ________________ by________________________

3. ________________ by________________________

4. ________________ by________________________

5. ________________ by________________________

6. ________________ by________________________

7. ________________ by________________________

8. ________________ by________________________

9. ________________ by________________________

10. ________________ by________________________

Copies sent or received by:

1. Quality Assurance Engineer ________________________________

2. Sector Supervisor ____________________________________

3. Site Supervisor ______________________________________

4. Others: ____

____

____

AN/FRC 109 CHECKLIST

DC Power Supply

	Nominal Value	Meter Reading	A Readings	B Readings
AC Line V	115/230V	103-127 / 207-253	______	______
DC Line V	24/48V	22-28 / 44-56	______	______
Klystron Fil				
Xmtr	6.3V	6.2-6.4	______	______
Rec	6.3V	6.2-6.4	______	______
High Voltage				
TP1	-300V	29.0-30.1	______	______
TP2	-750V	72.0-78.0	______	______
TP3	-1225V	122.5	______	______
Low Voltage				
+10V	+10V	+10V	______	______
-10V	-10V	-10V	______	______
25V	25V	25V	______	______
-30V	-30V	-30V	______	______
-75V	-75V	-75V	______	______

REL EXCITER AN/FRC-39

1. High Frequency Deviation	Exciter # 1	Exciter " 2
Level at J8		
Set Level		
Carrier Dropout		
70 MC B-B Level at J23		
Frequency		
2. Low Frequency Deviation		
Level at J25		
70 NC B-B Baseband Level		
3. Modulator Balance		
4. Exciter Transfer		
5. 60KC Pilot Balance & Level		
6. L.O. Frequency		
7. 60KC Pilot Frequency		
8. Cathode Currents		
Position # 3		
Position # 5		
Position # 7		
9. Output Forward Motor Calibration		
10. Output Back Motor Calibration		
11. Overall Bandwidth		
12. Air Filter Cleaniness		
13. Air Interlock Operation		
14. Overall Cleaniness		

REL RECEIVERS AN/FRC-39 & 2600 SERIES

		2. Intervan Cable Attenuation							
1. HP 612 Output Calibration									
3. Receiver Quieting		Rx #1		Rx #2		Rx #3		Rx #4	
	T. E.	In	Out	In	Out	In	Out	In	Out
No Signal	Noise Cont. V								
10 DB Quieting	Input DB Cont. V								
20 DB Quieting	Input DB Cont. V								
30 DB Quieting	Input DB Cont. V.								
4. 1.5 MC Filter bypassed									
5. DC Control Voltage	At -100DB Inp.								
6. Threshold Transfer Level	RF Inp. Lev.(DB)								

7. Exciter/Receiver Inter-mod	Slot RHZ	T. E.	Ex #2 Rx #1	Rx #1	Rx #2	Rx #3	Rx #4
	15	in					
		out					
	55	in					
		out					
	80	in					
		out					
	263	in					
		out					
	475	in					
		out					
	905	in					
		out					

8. Preselector Loss				
9. Preselector BP 3 db pt.				
10. Parametric Amp. Gain				
11. Parametric B. P.				
12. Conv. Preselector Gain				
13. Conv. Preselector B. P. 3db pt.				
14. Conv. L. O. Frequency				
15. Cleanliness of Air Filters				
			Incl 2 ~~Item Nr.~~ RCG LL	Page 4 ~~1050-03~~ TCG S&P

REL POWER AMPLIFIER 10KW

	PA #1		PA #2	
1. Beam Voltage				
2. Beam Current				
3. Calibration of RF Meter	Meter Reading	Actual Power	Meter Reading	Actual Power
Output Forward				
Output Back				
3rd Cavity Load				
2nd Cavity Load				
4. Efficiency %				
5. Amplifier Tuning				
3rd Cavity				
Output Coupling				
6. Output Forward Alarm Indication				
7. Output Back Alarm Indication				
8. Coolant Flow Switch Oper.				
9. Klystron Air Switch Oper.				
10. Cabinet Air Switch Oper.				
11. Coolant Flow (GPH)				
12. Dehumidifier Operation				
13. Air Filter Cleanliness				
14. Amplifier Power Supply Interior				
15. Dessicant Condition				
16. Transtet & Brushes				
17. Heat Exchanger Radiator & Interior				
18. Heat Exchanger Belts				
19. Surge Tank Condition			Incl 2 Page 5	
20. Water Temperature			Item Nr. 1050-03 RCG LL TCG S&P	
21. Spare Carriage				

AN/FCC 17

Modulator Side

System	SGp	Gp	Ch Mod In	Ch Mod Out	Gp Mod In	Gp Mod Out	SGp Mod In	SGp Mod Out	Alt Line Jack	
Termination			600 Ohms B	75 Ohms T	75 Ohms T	75 Ohms T	75 Ohms T	75 Ohms T	75 Ohms B	
Standard			-26 NTL TT	-70 NTL TT	-70 NTL TT	-70 NTL TT	-70 NTL TT	-70 NTL TT	-50 NTL TT	-56 Gp Pilot

AN/FCC 17

Demodulator Side

System Termination	SGp	Gp	Alt Line Jack 75 B	SGp Demod In 75 T	SGp Demod Out 75 T	Gp Demod In 75 T	Gp Demod Out 75 T	Ch Demod In 75 T	Ch Demod Out 600 B
Standard			-28 Test Tone	-70 Test Tone	-70	-70	-70	-70	-3

MISCELLANEOUS MRC-85 EQUIPMENT

1. Performance Bay Status: ______________________________

____

____

2. Test Equipment Status: ______________________________

____

____

3. Condition and Quality of Test Cards: ______________________________

4. Air Conditioner Operation: ______________________________

5. Air Conditioner Filter Cleanliness: ______________________________

6. Air Conditioner Interior: ______________________________

7. Strip Chart Recorder Operation: ______________________________

8. Time on Strip Charts: ______________________________

9. Time on Station Clocks: ______________________________

10. Chart Preparation: ______________________________

11. Log Book: ______________________________

12. SOP's On Hand: ______________________________

13. TO's On Hand: ______________________________

14. Orderwire Operation: ______________________________

15. Baseband Squelch: ______________________________

16. Floor Condition: ______________________________

17. Van Neatness: ______________________________

18. Tools and Tool Boxes: ______________________________

19. Sand Bag Condition: ______________________________

20. Fire Hazards: ______________________________

21. Routine Maintenance (Up-to-date): ______________________________

REMARKS: ______________________________

____

____

TRANSMIT

System	______	______	______	______
Klystron Activity (15% max change)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Deviation				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Klystron Linearity				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Xmtr Mon Cal (same as labelled)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Xmtr Mon Radio Pilot (3db below test tone)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Power Output (+27 dbm minimum)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Frequency (0.02%)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______

TRANSMIT

Panel Meter Readings

System		______	______	______	______
Xmtr Power	A	______	______	______	______
	B	______	______	______	______
Beam I	A	______	______	______	______
	B	______	______	______	______
Beam V.	A	______	______	______	______
	B	______	______	______	______
Repeller V.	A	______	______	______	______
	B	______	______	______	______

Alarms

Pilot	A	______	______	______	______
	B	______	______	______	______
Power	A	______	______	______	______
	B	______	______	______	______
AFC Drift	A	______	______	______	______
	B	______	______	______	______

RECEIVE

Panel Meter Readings

System		______	______	______	______
Low Freq	A	______	______	______	______
	B	______	______	______	______
XTal #1 I.	A	______	______	______	______
	B	______	______	______	______
XTal #2 I.	A	______	______	______	______
	B	______	______	______	______
AGC	A	______	______	______	______
	B	______	______	______	______
Rep V.	A	______	______	______	______
	B	______	______	______	______
Beam V.	A	______	______	______	______
	B	______	______	______	______
Beam I.	A	______	______	______	______

Alarms

Mute	A	______	______	______	______
	B	______	______	______	______
Pilot	A	______	______	______	______
	B	______	______	______	______
Noise	A	______	______	______	______
	B	______	______	______	______
AFC Drift	A	______	______	______	______
	B	______	______	______	______

RECEIVE

System				
Klystron Activity (15% max change)				
Rec A				
Rec B				
Baseband Linearity (±0.5 db)				
Rec A				
Rec B				
Carrier Intensity				
Rec A				
Rec B				
Mute Level (-79 dbm)				
Rec A				
Rec B				
Threshold (-79 dbm min.)				
Rec A				
Rec B				

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1051-02

SUBJECT: Operational Evaluation Guide-Electric Power

1. Background: A Defense Communications Agency team will make periodic quality assurance and operational evaluation inspections of DCS Facilities. Site OIC's should conduct inspections to review the status of their own station.

2. Checklist: Attached as Inclosure 1 is the DCA checklist (reference DCAC 350-195-1).

ELECTRIC POWER

Operational Evaluation Guide

1. Facilities.

a. Determine adequacy of installed equipment to quantitatively and qualitatively satisfy operational requirements.

b. Are dummy loads available and adequate to check out equipment without assuming the station load?

c. Determine the availability and adequacy of repair tools and materials for minor emergency repairs. Request simulated demonstrations of their use.

d. Are there known, near future increases in power requirements and have proper programming actions been taken to support this?

e. Are circuit breakers identified as to assignments?

f. Determine availability of one-line diagrams for electrical fuel and compressed air starting systems. Are they readily available to operating and maintenance personnel?

g. Determine adequacy of electrical grounding system.

2. Operations.

a. Are logs being accurately maintained? Have necessary coordination channels and procedures been established (with operations and commercial suppliers) to isolate reasons for, and properly report electric power disturbances in a timely manner?

b. Check power regulation for adequacy.

c. Under authority of paragraph 8c, basic, observe an electrical power exercise. In the event extenuating circumstances preclude actual utilization of auxiliary power, request a simulated (walk-through) exercise.

(1) Observe operator proficiency.

(2) Are operating procedures (from prime to auxiliary and back to prime power) adequate?

(3) Observe equipment operation.

(4) Check for excessive vibration.

(5) Observe function of automatic controls if installed.

d. Check station load restoration plan.

e. Determine ability to synchronize auxiliary power with primary power.

f. Are facilities and instructions available for synchronizing bypass of no-break power source?

3. Logistic Support.

a. Is a preventative maintenance schedule followed and is it current?

b. Check on outward appearance of equipment and surrounding area.

c. Determine number of running hours of each unit since last overhaul.

d. Is depot level maintenance scheduled?

e. Is spare parts support adequate?

f. Check for excessive delays of parts requisitions.

4. DCS Facilities Data Manual. Are the contents of the power section in the DCS Facilities Data Manual exactly as the true configuration? If not, has a change sheet been submitted?

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

ITEM NR: 1052-02

SUBJECT: Operational Evaluation Guide/Quality Assurance Testing-
Broadband Systems

1. Background: Defense Communications Agency and Regional Communications Group teams will make periodic quality assurance and operational evaluation inspections of DCS Facilities. Site OIC's should conduct inspections to review the status of their own station.

2. Checklist:

a. Attached as Inclosure 1 is the DCA checklist for Broadband.

b. Attached as Inclosure 2 is the RCG checklist for Operational Evaluation of the AN/MRC-85 and AN/MRC-98. (Checklist for REL-2600 is in preparation.)

c. Attached as Inclosure 3 is the RCG checklist for Quality Assurance Testing of RF Room checklist.

DEFENSE COMMUNICATIONS AGENCY
Southeast Asia Mainland Region

OPERATIONAL EVALUATION GUIDE - BROADBAND SYSTEMS

	YES	NO
1. **Facilities.**		
a. Is equipment adequate to satisfy the assigned mission, tasks and functions?	___	___
b. Are signal line patching facilities adequate?	___	___
c. Are there adequate repair tools and antenna repair material immediately available for emergency antenna repair?	___	___
d. Is equipment configured for fail-safe operation?	___	___
2. **Procedures:**		
a. Do station SOP's provide adequate instructions for the following?		
(1) Preventive maintenance, including:		
(a) Radio transmitter;		
1 Power supplies?	___	___
2 Output power of transmitter?	___	___
3 Frequency?	___	___
4 Deviation?	___	___
5 Klystron linearity adjustment?	___	___
6 AFC?	___	___
7 Exciter output power?	___	___
(b) Radio receiver:		
1 Power supplies?	___	___
2 Quieting check?	___	___
3 Receiver threshold check?	___	___
4 Received signal level check?	___	___
5 AFC check?	___	___

	YES	NO
6 DC control voltage check?	___	___

(c) Radio System:

1 Power supplies?	___	___
2 Group pilot checks?	___	___
3 Carrier leak?	___	___
4 Channel signal level?	___	___
5 Channel noise level?	___	___
6 Crosstalk level?	___	___

*Note all questions will apply to any one type of equipment. Those questions which do not apply may be marked N/A.

(2) Corrective maintenance?	___	___
(3) Tuning Procedures?	___	___
(4) Routine and/or periodic calibration of test equipment?	___	___
(5) Routine test of spare and mobile equipment?	___	___
(6) Efficiency checks of linking facilities?	___	___

b. Are individual procedures prescribed for each emergency action involving:

(1) Line or link failure?	___	___
(2) Power failures?	___	___
(3) Air conditioning and/or other cooling system failures?	___	___
(4) Antenna failures?	___	___
(5) Disasters?	___	___
(6) Hostile actions?	___	___

3. Operations.

a. Observe the following:

(1) The cooperation and coordination effected with distant stations.

(2) The cooperation and coordination effected with components within the station. YES NO

b. Is terminology consistent? ___ ___

c. Are control actions timely? ___ ___

d. Are operating personnel familiar with equipment and facilities? ___ ___

e. Are equipment meter readings logged on schedule? ___ ___

f. Are receive and transmit frequencies checked on schedule? ___ ___

g. Do equipment record cards indicate adequate routine sensitivity checks? ___ ___

h. Does receive sensitivity meet the standards prescribed in the T.O. or Manufacturer's Manual? ___ ___

4. Operations Support.

a. What is the percentage of inoperative (deadlined) equipment?__________

b. From station records, determine the average percentage of "down" equipment over the past three months.__________

c. What is the major cause of lengthy down time (over 24 hours)?______________________________

d. Is spare parts support adequate?__________

e. Is adequate follow-up action taken on spare parts requisitions? ___ ___

f. Is test equipment readily available where and when x needed? ___ ___

g. Is test equipment repaired and/or calibrated promptly? ___ ___

h. Are maintenance personnel properly trained in the use of test equipment? ___ ___

i. Does manning appear adequate for effective maintenance including emergencies? ___ ___

j. Does the station training program appear adequate? ___ ___

k. Do any other support problems exist which have an effect on station operations? ___ ___

OPERATIONAL EVALUATION - BROADBAND SYSTEMS
(AN/MRC-85, AN/MRC-98)

1. SITE ____________________ VAN ____________________

2. DATE ____________________

3. NAME OF PERSON(S) MAKING CHECK ____________________

4. TEST EQUIPMENT

(1) Type	(2) Serviceability	(3) Date of last Calibration	(4) Frequency of Calibration

5. AIR CONDITIONER STATUS

DATE OF LAST OVERHAUL ________

6. POWER GENERATOR VAN STATUS

DATE OF LAST OVERHAUL ____________

ENGINE HOUR METER READING __________

RUNNING HOURS SINCE OVERHAUL ________

7. 10KW DUMMY LOAD

OPERATIONAL YES ____ NO ____

CALIBRATION POSSIBLE YES ____ NO ____

LAST CALIBRATION OF METERS USING DUMMY LOAD IAW PCE PROCEDURES __________

8. MUX CHANNEL LEVEL LINE UP

WEEKLY YES ____ NO ____

DATE OF LAST LINE UP __________

9. COMPLETE RECEIVER LINE UP

WEEKLY YES ____ NO ____

DATE OF LAST LINE UP _________

RECEIVER QUIETING TEST

W/EXT PAN ____ W/O EXT PAN ____

10. COMBINERS OPERATING PROPERLY ______________________

11. PILOT TONE FREQUENCY AND LEVELS ADJUSTED WEEKLY YES ____ NO ____

12. RANDOM CHANNEL LEVEL CHECK:

CHAN A	________	D	________	LEVEL A	________	D	________
B	________	E	________	B	________	E	________
C	________	F	________	C	________	F	________

13. EXCITER/RECEIVER INTERMOD

SLOT KHZ	TE	EX #2	RX #4	RX #1	RX #2	RX #3	RX #4
	IN						
15	OUT						
	IN						
55	OUT						
	IN						
80	OUT						
	IN						
265	OUT						
	IN						
475	OUT						
	IN						
905	OUT						
PRESELECTOR LOSS							
PARAMETRIC AMP GAIN							
PARAMETRIC B. P.							

MISCELLANEOUS EQUIPMENT

14. PERFORMANCE BAY STATUS ______________________________

____

15. CONDITION AND QUALITY OF TEST CORDS ______________________

16. STRIP CHART RECORDER OPERATION ______________________

17. TIME ON STRIP CHARTS ______________________

18. TIME ON STATION CLOCKS ______________________

19. CHART PREPARATION ______________________

20. LOG BOOK ______________________________

21. SOP's ON HAND ______________________________

22. TO's ON HAND ______________________________

23. ORDERWIRE OPERATION ______________________________

24. BASEBAND SQUELCH ______________________________

25. FLOOR CONDITION ______________________________

26. VAN NEATNESS ______________________________

27. TOOLS AND TOOL BOXES ______________________________

28. FIRE HAZARDS ______________________________

29. ROUTINE MAINTENANCE (Up-to-date) ______________________________

REMARKS ______________________________

____

RML POWER AMPLFIER 10 KW

30. MAXIMUM POWER OUTPUT	
31. AMPLIFIER TUNING	
OUTPUT FWD	
OUTPUT BACK	
3rd CAV. LEAD	
2nd CAV. LOAD	
33. % EFFICIENCY	
34. HOURS ON KLYSTRON	
35. DESSICANT	
36. TRANSTAT & BRUSHES	
37. AIR FILTER CLEANLINESS	
38. AMPLIFIER INTERIOR	

39. HEAT EXCHANGE BELTS
40. SURGE TANK CONDITION
41. COOLENT FLOW
42. WATER TEMPERATURE
43. COOLENT FLOW SWITCHES
44. HEAT EXCHANGER INTERIOR
45. DEHUMIDIFIER OPERATION

RF ROOM CHECKLIST

1. Date ______________________

2. Site Number ______________

3. Location _________________

4. Radio Officer _______________________ Radio NCOIC _____________________

5. Page Site Supervisor ______________________

6. Authorized MOS 26V _____________________ On Hand 26V __________________

7. Number School Trained in MOS 26V ______________

OJT 26V ______________

8. Number Shifts ______________

9. Systems: REL 2600 FRC 109 MRC 85

________	_______	______
________	_______	______
________	_______	______
________	_______	______

10. Number of Groups in use ________________ Capacity ________________

AN/FRC 109 CHECK LIST

DC Power Supply

	Nominal Value	Meter Reading	A Readings	B Readings
AC Line V	115/230V	103-127 / 207-253	________	________
DC Line V	24/48V	22-28 / 44-56	________	________
Klystron Fil				
Xmtr	6.3V	6.2-6.4	________	________
Rec	6.3V	6.2-6.4	________	________
High Voltage				
TP1	-300V	29.0-30.1	________	________
TP2	-750V	72.0-78.0	________	________
TP3	-1225V	122.5	________	________
Low Voltage				
+10V	+10V	+10V	________	________
-10V	-10V	-10V	________	________
25V	25V	25V	________	________
-30V	-30V	-30V	________	________
-75V	-75V	75V	________	________

TRANSMIT

Panel Meter Readings

SYSTEM					
Xmtr Power	A				
	B				
Beam I	A				
	B				
Beam V	A				
	B				
Repeller V	A				
	B				
Alarms					
Pilot	A				
	B				
Power	A				
	B				
AFC Drift	A				
	B				

RECEIVE

Panel Meter Readings

SYSTEM					
Low Freq	A				
	B				
XTal #1 I.	A				
	B				
XTal #2 I.	A				
	B				
AGC	A				
	B				
Rep V.	A				
	B				
Beam V.	A				
	B				
Beam Ma	A				
	B				

Alarms

Mute	A				
	B				
Pilot	A				
	B				
Noise	A				
	B				
AFC Drift	A				
	B				

TRANSMIT

System	______	______	______	______
Klystron Activity (15% max change)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Deviation				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Klystron Linearity				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Xmtr Mon Cal (same as labeled)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Xmtr Mon Radio Pilot (3 db below test tone)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Power Output (+27 dbm minimum)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______
Frequency (0.02%)				
Xmtr A	______	______	______	______
Xmtr B	______	______	______	______

RECEIVE

System				
Klystron Activity (15% max change)				
Rec A				
Rec B				
Baseband Linearity (±0.5 db)				
Rec A				
Rec B				
Carrier Intensity				
Rec A				
Rec B				
Mute Level (-79 dbm)				
Rec A				
Rec B				
Threshold (-79 dbm min)				
Rec A				
Rec B				

AN/FCC 17

Modular Side

System	SGp	GP	Ch Mod In	Ch Mod Out	Gp Mod In	Gp Mod Out	SGp Mod In	SGp Mod Out	Alt Line Jack	
Termination			600 Ohms B	75 Ohms T	75 Ohms T	75 Ohms T	75 Ohms T	75 Ohms T	75 Ohms B	
Standard			-26	-70	-70	-70	-70	-70	-50	-56
			NTL TT	NTL TT	NTL TT	NTL TT	NTL TT	NTL TT	NTL TT	Gp Pilot

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1060-01

SUBJECT: Circuit Quality Assurance Testing

1. Background: Defense Communications Agency, Area Communications Operations Center, and Regional Communications Group teams will conduct periodic quality assurance and operational evaluation inspections of RCG Facilities.

2. General: During these QA inspections spot checks of systems and circuits will be performed using organizational test equipment. Whenever installation personnel are unable to perform basic tests, on the spot instruction will be provided by the team.

3. Purpose: To prescribe policies, procedures and responsibilities for implementing an effective program of circuit quality assurance testing at ICS and other sites within the jurisdiction of Regional Communications Group.

4. Mission: To maintain quality circuits and channels of communications as engineered to DCA standards and operational standards of Regional Communications Group.

5. Duties and Responsibilities: It will be the duty of each site commander to insure that the program set forth in this S&P on quality assurance is implemented at his site. The maintenance of records as set forth in this S&P will be subject to inspection during QA visits. It shall be the duty of the site commander to personally insure that the quality control tests set forth in this S&P are accurately carried out. He will insure that all additions, changes, and deletions to his testing schedule are coordinated with the distant station.

6. Quality Assurance for Pilot Levels:

a. Signal Test Level

(1) Test equipment used:

(a) Sierra Frequency Selective Voltmeter 128A

(b) Telephone Test Set FCM-8

(2) Test Procedures:

(a) Place the jack from the Frequency Selective Voltmeter into the transmit or receive side of the FCC-17 multiplex equipment or a terminal block that monitors the FCC-17.

(b) Set the Frequency Selective Voltmeter for the desired frequency and the correct db range. Transmit -50db and receive -30db. When you approach the desired frequency the Sierra Voltmeter will lock and you know you will be on frequency when the green indicator light remains on.

(c) Then mark the correct reading you get, by adding the number of db you read on the scale to the range you are on.

(d) If you use the Telephone Test Set FCM-8, you will set it to your super groups and put your FCM-8 co-axial jack into the female jacks for the individual groups on the FCC-17 super group drawers.

(e) Test results will be recorded on RCG form 96.

b. Standards:

(1) The standard levels used by ICS stations for normal pilot levels are: send at -56db; receive at -34db.

(2) To remain in tolerance on the pilot levels it is not permissible to go over ±1db.

c. Scheduling of tests:

Pilot levels should be conducted daily, at approximately the same time each day.

7. Quality Assurance for Channels in Service

a. Signal Level Test:

(1) Test equipment used:

(a) Daven Transmission Measuring set (12B)

(b) H.P. Vacuum Tube Voltmeter (400p)

(2) Test Procedures:

(a) Coordinate with the distant end as prescribed in the schedule.

(b) Monitor the specific channel to be tested to insure that the test will not interrupt traffic. If the channel is clear, proceed. If not, go to another channel and return later to the busy channel or altroute the channel. When testing a channel on which there is a tone pack, secure voice, or data circuit always altroute the channel before testing.

(c) Set the test set oscillator for a 1KHZ tone at -16db. Have the distant end do the same.

(d) Plug the tone into the MOD jack in the VF board of the circuit being tested. A standard tip-ring sleeve plug should be used. Have the distant end do the same.

(e) Put the plug from the test set meter into the DEMOD jack of the circuit being tested. The distant end will do the same.

(f) Read the receive level from the test set db meter. Have the distant end do the same.

(g) Test results will be recorded on RCG form 60

(3) Standards:

(a) The standard levels used by IWCS stations for normal voice circuits are: send at -16db; receive at -7db. **Composite level is -15 dbm.**

(b) When measuring composite tones the standard level for a VF channel carrying a tone pack is: send at -29db; receive at -6db when the test meter is plugged into the VF MON send or receive jack.

(c) Deviation from the standard level is allowed only at the rate of $\pm$.5db.

(d) It is noted that the normal voice transmission takes less tolerance than $\pm$ .5db, but in a contingency situation, data traffic, which required a much greater tolerance than a voice circuit, may have to be put on any voice channel. Therefore, all voice channels should be kept at a tolerance of $\pm$.5db.

(4) Scheduling of tests:

(a) Signal level tests should be conducted daily. Obviously, every voice channel cannot be checked every day, but a least every circuit should be checked weekly.

(b) It is suggested that night shifts take these tests since channel traffic is normally decreased at night.

b. Noise Level Test:

(a) Daven Transmission Measuring set (12B)

(b) H. P. Vacuumm Tube Voltmeter (400LR).

(2) Test Procedures:

(a) Coordinate with the distant end according to test schedule.

(b) Monitor the specific channel to be tested to be sure that the test will not interrupt traffic. If the channel is clear proceed. If not, go to another channel and return later to the busy channel. When testing a channel on which there is data, secure voice, or a tone pack, always altroute the circuit before testing.

(c) Have the distant end terminate the channel to be tested with a 600 ohm termination plug placed in the MOD side of the channel in the VF board.

(d) Plug the test set meter into the DEMOD side of the channel being tested.

(e) Read the level from the test set db meter.

(f) Test results will be recorded on RCG form 60.

(3) Standards:

For preliminary ICS trunking (ie., no tactical or interfacing equipment appears between your VF board and the D/E VF board) the accepted level for idle channel noise is -55dbm.

(4) Scheduling of tests

(a) Channel idle noise tests should be conducted daily. Again it is obvious that all channels cannot be checked daily, but every channel should be checked weekly.

(b) It is suggested that the channel idle noise test be conducted similtaneously with the signal level test, thereby receiving the greatest use from one coordinated effort.

c. Listening (audible) test:

(1) Test equipment used:

Head set equipped with a standard tip-ring sleeve plug.

(2) Test procedures:

(a) Plug the headset into the MON jack of the circuit being tested and listen for cross talk or high distortion and noise while the channel is in use.

(b) Test results will be recorded on RCG form 60.

Note: This list is only applicable for normal voice circuits.

(3) Standard:

The audible check is the most informal of the quality assurance tests. It's results, though, give a good indication of the quality of the circuit. Action should be taken if high noise, distortion, or cross talk is heard on the circuit to eliminate these unwanted characteristics.

(4) Scheduling:

The audible test should be performed weekly on all of the voice circuits at each site.

8. Quality Assurance for DC Circuits in Service:

a. Current Level Test:

(1) Test equipment used:

Northern Radio Current Level Indicator (Milliammeter)

(2) Test procedure:

(a) Plug the test meter into the DC jack board LINE-MON jack of the DC circuit to be tested.

(b) Take the reading from the milliammeter.

(c) Test results will be recorded on RCG Form 95.

(3) Standards:

Depending upon the type of DC circuit and the type of intelligence transmitted over the circuit, there are several readings that can be taken from the milliammeter.

(a) Mark:

60 mils for a 60 mil loop
20 mils for a 20 mil loop (tactical)

(b) Space 0 mils

(c) Normal keying

10 to 50 mils fluctuating for a 60 mil loop

5 to 17 mils fluctuating for a 20 mil loop

(d) BI

8 to 11 mils fluctuating for a 60 mil loop.

20 to 5 mils fluctuating for a 20 mil loop.

(e) Phase

48 to 60 mils fluctuating for a 60 mil loop.

2 to 12 mils fluctuating for a 20 mil loop.

(f) AC reversals

30 mils for a 60 mil loop.

15 mils for a 20 mil loop.

(4) Schedule of testing:

All of the DC circuits at each site should be given a current level test weekly. This test is easy to perform as it does not interrupt traffic and does not require coordination with the distant end.

b. Bias Distortion Test and Characteristic and Fortuitous Distortion

Test.

(1) Test equipment used:

Radiation Inc. Data Analyzer (DAS-10)

(2) Test procedures (using the A-Scan for bias, characteristic, and fortuitous distortion tests).

(a) With a standard patch cord, plug the DAS-10 into the DC board MON-LINE jack of the circuit being tested.

(b) With the A-Scan power applied, a wave form should appear on the A-Scan.

(c) Test results will be recorded on RCG form 95.

(3) Standards

(a) For normal keying a normal square wave should appear on the A-Scan with the mark and space elements of a uniform length.

(b) If there is bias distortion, it will appear as uniform lengthening or the shortening of the mark or space elements one at the expense of the other.

(c) If there is characteristic distortion it appears on the A-Scan as making or spacing bias of individual characters. (See DCAC 310-70-1, Jan 67 Vol III pp.2-20 and 2-21).

(d) If there is fortuitous distortion it appears on the A-Scan as non-uniform shortening or lengthning of the mark or space elements. (See DCAC 310-70-1 Jan 67 Vol III pp. 2-18 and 2-19).

(4) Test Procedures (using Distortion Selector and Meter for bias distortion test only).

(a) With a standard patch cord, plug the DAS-10 into the DC board MON-LINE jack of the circuit being tested.

(b) With the distortion meter turned on, put the distortion selector switch in the "average peak" position.

(c) Place the polarity switch in the "Minus" position.

(d) Turn the transition switch in the "space mark" position.

(e) Test results will be recorded on RCG form 95.

(5) Standards:

(a) Look at the signal input light. If it flashes on and off, you are receiving manual keying. If it stays on steadily, you are receiving a steady mark. If it stays off, you are receiving a space. When the signal input light is flashing, you can take the mark-space bias test.

(b) With the distortion meter switch in the "average-peak" position, take a reading from the distortion meter. At the same time, look at the "Early-Late" lights under the meter.

(c) If the distortion meter shows less than 12% distortion and the "Early-Late" lights are switching steadily, the circuit being tested is good and has no mark or space lines.

(d) If there is a steady late light or the late light stays on longer than the early light and the meter shows more than 12% distortion, than a marking bias exists.

(e) If there is a steady early light or the early lights stays on longer than the late light and the meter shows more than 12% distortion, than a spacing bias exists.

(6) Scheduling of Testing:

All of the DC circuits at each site should be checked for distortion, characteristic and fortuitous bias weekly. No coordination with the distant end is needed for this test, and no circuit interruptions will occur if the test is conducted properly.

c. Test Equipment used:

Radiation Inc. Distortion Analyzer (DAS-10)

Distortion selector switch and distortion meter

(2) Test Procedures:

(a) With a standard patch cord, plug the DAS-10 into the DC board MON-LINE jack of the circuit being tested.

(b) With the distortion meter turned on, put the distortion selector switch to the total peak position. Take the total peak reading from the distortion meter.

(c) Test results will be recorded on RCG Form 95.

(3) Standards:

Total peak distortion should not read over 15% distortion.

(4) Scheduling of tests:

(a) All of the DC circuits at each site should be tested for total peak weekly.

(b) It is suggested that the total peak test be given at the same time as the current test or the bias tests since the DC test equipment is centralized.

9. Quality Assurance For Data Circuits In Service

a. Signal Level Test

(1) Test Equipment used:

H.P. Vacuum Tube Voltmeter (400LR)

(2) Test Procedure

(a) Coordinate with the distant end.

(b) Alt-route the channel to a spare.

(c) Plug the VTVM in to the REC-MON jack in the VF board of the circuit to be tested.

(d) Take the reading from the VTVM.

(e) Test results will be recorded on RCG form 60.

(3) Standards:

The proper data circuit composite level is -13 dbmo for FSK and -10 dbmo for AM.

Deviation from the standard level is allowed only at the rate of ± .5db.

(4) Scheduling of tests:

Test should be conducted on a weekly basis.

10. Quality Assurance for Narrow Band Secure Voice Circuits In Service:

(a) Signal test level:

(1) Test equipment used:

H.P. Vacuum Tube Voltmeter (400 LR)

(2) Test Procedure:

(a) Coordinate with the distant end.

(b) Plug the VTVM into the REC-MON jack in the VF board of the circuit to be tested, using a tip-ring sleeve plug.

(c) Take the reading from the VTVM.

(d) Test results will be recorded on RCG form 60

(3) Standards:

(a) The proper secure voice circuit receive level is 20db below the normal recieve level. Therefore the correct secure voice level for receive is -13db.

Deviation from the standard level is allowed only at the rate of $\pm$ .5db. Therefore, the reading in the meter should have been -13 $\pm$.5db.

(b) The proper transmit level for secure voice circuits is -36db $\pm$.5db. Therefore when checking transmit, put the plug in the transmit MON jack and take the reading.

(4) Scheduling of tests:

Follow the schedule initiated by the site, which should be scheduled weekly.

11. Quality Assurance for Space DC Channels:

(a) AC - Reversal Test:

(1) Test Equipment used:

Radiation Inc. Distortion Analyzer (DAS-10)

(2) Test Procedures:

(a) Call the distant end and coordinate as to which spare DC channels are to be tested.

It is suggested that the spare DC channel to be tested at the same time as the VF circuit on which it appears is tested for correct level so that coordination is necessary only once.

(b) Set the DAS-10 to send RY's at 75 baud making sure that both the baud rate switches on the Data Analyzer and the Data Transmitter are at the same rate. Have the distant end do the same.

(c) Take the output from the Data Analyzer and run it through a 60 mil loop on the miscellaneous jack strip. Have the distant and do the same.

(d) Take the output from the 60 mil loop from the miscellaneous jack strip and plug it into the send-line side of the DC circuit to be tested. Have the distant end do the same.

(e) Plug another patch cord into the Data Analyzer input plug and terminate it on the rec-line jack of the circuit to be tested. Have the distant end do the same.

(f) Now follow the items outlined in steps 4b through 5c above to find marking and spacing bias on the spare channels.

(g) Test results will be recorded on RCG Form 95.

(3) Scheduling of Tests:

(a) The spare channels should be tested at least once a week.

(b) Testing spare DC channels will insure a quality circuit for altrouting purposes.

12. Files Disposition:

Circuit quality assurance files will be cut off at the end of each quarter, held through additional months in the current files area, and then destroyed (AR 345-210 File 1420-26).

13. Forms:

a. Group Pilot Level Form - RCG Form 96; 4 Jan 67

(1) Group levels for all systems will be checked for accuracy before other quality assurance tests are made.

(2) The form is self-explanatory. All incorrect levels should be circled in red and appropriate corrections made.

b. VF Group Test Form - RCG Form 60 Revised 29 Feb 68

The form is self-explanatory with the appropriate standards printed on it. All incorrect levels should be circled in red and appropriate corrections made.

c. Tone Packs Test Form - RCG Form 95 Revised 29 Feb 68

The form is self-explanatory with the appropriate standards printed on it. All incorrect levels should be circled in red and appropriate corrections made.

14. Tech Controllers are required to maintain the above mentioned standards. Only through an aggressive quality assurance program can this Group continue

to provide outstanding communications for the Free World Forces in the Republic of Vietnam.

15. Schedules for testing, both active and spare equipment, should be published for all sites and distributed for use/and or info to all sites. Site commanders should extract the necessary information and distribute to their subs to insure their knowledge of the testing to be performed.

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1061-01

SUBJECT: Daily System Condition Report

1. Purpose: The purpose of this S&P item is to establish procedures for preparation of the Daily System Condition Report currently being prepared by Page Communications and Engineering (PCE) technicians.

2. General: The intent of this S&P item is to familuarize military personnel with the test procedures used in gathering data for the Daily System Condition Report. Site OIC's are responsible for insuring that the tests are carried out in coordination with the PCE Site Supervisor.

3. Procedures:

a. All sites must perform applicable test procedures on all operational radio links between 0600Z and 0800Z hours daily (1400 and 1600 hours local time). Test data obtained will be entered in a "Daily System Condition Report" worksheet M&O SKA-443-147, Incl 1 furnished by PCE personnel at each site. An explanation of the information required for the Daily System Condition Report is contained in Incl 2.

b. In addition, the readings will be reported via express teletype orderwires to the STRATCOM Operations Center (SOC) at 1600Z daily in the format shown in Incl 3.

c. In taking readings, the term "dBm0", which refers to measured power back to the zero transmission level point, will be used. In other words measurement adjusted to dBm0 indicates what the power would have been had it been measured at the zero transmission level point. For example, an ICN measurement at the +7 dBm level point with a meter reading -51, is equal to -58 dBm0. However, it is important to note at this point that most meters used in the telephone industry are calibrated for measurements of voltage appearing across a 600 ohm termination (Standard Transmission Line Impedance). If the circuit to be measured is of a different impedance, conversion of measured values must be made in accordance with Incl 4.

d. Special entries to be used in the MEAS portion of the applicable column are listed below with an explanation of each.

(1) MET: The required meter is not available, uncalibrated or inoperative.

(2) REC: To be used when the required chart recorder is unavailable, inoperative or uncalibrated.

(3) N/A: Measurement is not required or not applicable.

(4) Test: Any link that has not been accepted by th government <u>and</u> is not carrying ANY traffic on the MESSAGE BAND.

(5) SPEC: Any measurement that cannot be taken for reasons other than those given above.

e. The step-by-step procedures that must be followed to perform the tests associated with the Daily System Condition Report is attached as Incl 5.

DAILY SYSTEM CONDITION REPORT

DATE______________ SITE NAME______________

	EQUIPMENT TYPE	PATH LENGTH (NAUT.MILES)	CHANNEL CAPACITY	TYPE PATH	FREQ. DIVR. MULTIPLEX GROUP PILOT LEVELS (RECEIVE) (dBm)			OUTPUT FORWARD POWER (WATTS)		DISTANT END BASE BAND LOADING (TRANSMIT) (dBmO)		RECEIVED CARRIER INTENSITY (dBm)		VOICE CHANNEL NOISE (dBmO)		RECEIVE TEST TONE STABILITY (+dB)-(-dB)		TELETYPE ERROR RATE (COUNT)	
	(A)	(B)	(C)	(D)	(1)			(2)		(3)		(4)		(5)		(6)		(7)	
LINK					pilot	spec	meas	spec	meas	max	meas	norm	meas	max	meas	max	meas	max	meas

INCL 1, PAGE 1 RCG LLTCG S & P
ITEM NR 1061-01

TECHNICIAN INITIALS

SITE NO:

DAILY SYSTEM CONDITION REPORT

References: ICS Link Specifications, ICS MOP 1.5.1; Daily System Condition Report, ICS MOP 2.3.5; Link Monitor System (Calib), ICS MOP 8.6.4.

Column

A. Equipment Type - Nomenclature of Radio Equipment associated with each link.

B. Path Length - Path length is entered to the nearest nautical mile. To convert this figure to statute miles, multiply by 1.1507.

C. Channel Capacity - Channel capacity has been entered as the number of Group Modems times twelve programmed under Phase III.

D. Type Path - This column indicates the type of path (D, S, L or SD), basic frequency group (1, 2 or 7 gHz), and the Diversity (D or Q).

Example: D2D Diffraction Path, 2 gHz, Dual Diversity

L7D Line of Sight Path, 7 gHz, Dual Diversity

S1Q Troposcatter Path, 1 gHz, Quad Diversity

Column

1. Multiplex Group Pilot Levels - Record level of one low frequency and one high frequency Receive Group Pilot as an indication of System Equipment alignment.

2. Output Forward Power - Record the output level in watts of Power Amplifiers (or Exciters). Not applicable for the AN/FRC-109.

   NOTE: Data recorded in columns 3 through 7 is obtained directly from the PCE Link Performance and Channel Quality Monitoring System (LP & CQMS) where so equipted.

3. Distant End Baseband Loading - Record wideband traffic loading to control system overloading by subscribers.

4. Receiver Carrier Intensity - Record the Carrier Intensity Medians for use in evaluation of Voice Channel Noise Medians. Not applicable for the AN/FRC-109.

5. Voice Channel Noise - Record the noise present in an Idle Channel as an indication of system performance.

6. Receiver Test Tone Stability - Record maximum test tone excursions as an indication of Radio System Operation.

7. Teletype Error Rate - Record the number of TTY errors counted on the LP & CQMS in a 24-hour period. Maximum specifications allow for a 10^{-4} error rate plus one out-of-sync condition.

NOTE: Readings on reports must be taken between 1400-1600 hours local time (0600-0800Z) so as to reflect system conditions during maximum loading.

SAMPLE TELETYPE FORMAT

PAGE
DE APES MO-99
RR 08/1600Z SEP 68
ZNR UUUUU

TO : XSOC
FROM : SITE 64 MONKEY MOUNTAIN
SUBJ : DAILY CONDITION REPORT

BT

(A) A/C STATUS : A/C NO. 1 OUT FOR REPAIR
(B) MFG STATUS : MAJOR ALARM, AWTG PARTS
(C) GEN STATUS : GEN. NO. 2 DEADLINED, AWTG PARTS
(D) CONDITION REPORT BY LINK:

LINK	(1)-a	(1)-b	(2)-a	(2)-b	(3)	(4)-a	(4)-b	(5)	(6)	(7)
64-09	42.0	42.1	7010	7000	+5.4	64	70	55	4.2	380
64-12	41.5	42.5	7100	MET	+6.8	71	81	41	1.5	154
64-14	34.1	34.5	N/A	N/A	-4.3	N/A	N/A	60	N/A	N/A
64-65	Spec.	34.0	650	700	REC	65	70	57	1.9	450

(E) STATION OUTAGES:

LINK	TIME OUT/IN	CCSD	NO. OF CHAN	TOTAL MIN
64-09	0116Z/0127Z	77UZF4	60	11

(F) RFO : PERSONNEL ERROR
(G) 10 KW SHOTS:

LINK	EXC OUT	PA IN	BEAM CURR	BEAM VOLTS	PA OUT
64-09	12/11	8.5/9.0	1.5/1.6	15.2/15.0	7.0/7.0
64-12	11/10	3.5/3.5	1.5/1.5	15.0/15.0	7.1/MET

(H) STATION DEADLINE OR DEGRADED EQUIPMENT:

LINK (SITE)	DATE DEAD	MAJOR EQUIP.	NOMENCLATURE AND PART NO.	MILSTRIP OR 2407 NO.
64-14	8251	TEST	A-SCAN, DAS-10	P99999

(J) HOT LEVELS:

TIME	CCSD	PEAK LEVEL	B/B LOADING	ACTION TAKEN
0230Z	77BMV3	-5 DBMO	+7DBM	NOTIFIED SUB

(K) VEHICLE STATUS: OPERATIONAL
(L) XOW/TTY STATUS: OPERATIONAL
(M) INITIALS: DRC AND FRT

BT

END OF REPORT

CONVERSION FORMULA

If the circuit to be measured has an impedance other than 600 ohms, the measured values can be converted to the correct values using the following relationships:

$$\text{dBm (corrected)} = \text{dBm (indicated)} + 10 \log \frac{600 \text{ ohms}}{\text{circuit impedance}}$$

For Example, a -54 dBm reading on a 600 ohm hi-Z meter connected across a 75 ohm line is corrected as follows:

$$\text{dBm} = -54 + (10 \log \frac{600}{75})$$

$$\text{dBm} = -54 + (10 \log 8.0)$$

$$\text{dBm} = -54 + 9.03$$

$$\text{dBm} = -45$$

Therefore, the correction factor for a 600 ohm meter connected to a 75 ohm line is +9.03 dB.

PROCEDURE

A. Multiplex Group Pilot Levels (Receive) - Column 1

1. Measurement

a. AN/LRC-3 Links: Set the FS VTVM (Sierra 125A) for a 600 ohm BRIDGING INPUT and connect this VTVM to Pin "C" at the rear of the AN/FCC-18 Multiplex on the BASEBAND RECEIVE AMPLIFIER. This is a 75 ohm test point. Make the meter reading 9 dB more positive and record iaw para. A.2. of this inclosure.

b. AN/FRC-39, AN/FRC-109 and REL 2600 Links except 11A-24A, 11B-24B, 09-64 and 12B-09B: Set the FS VTVM (Sierra 128A) for a 75 ohm BRIDGING INPUT and connect this VTVM to the HF IN (or ALT LINE RCV) jack on the SGR DEMOD COMB NETWORK (or LINE CONNECTOR PANEL) at the AN/FCC-17 Multiplex.

c. Links 11A-24A, 11B-24B, 09-64 and 12B-09B: Set the FS VTVM (Sierra 128A) for a 75 ohm BRIDGING INPUT and connect this VTVM to the HF IN jack on the LINE CONNECTOR PANEL at the AN/FCC-17 Multiplex.

2. Record the level of the HIGH and LOW FREQ GROUP PILOTS (RECEIVE) in dBm. Use the MEAS portion of Column 1 on the Dailt System Condition Report.

B. Output Forward Power - Column 2

1. AN/FRC-39, AN/LRC-3 and REL 2600 Links: Read the OUTPUT FORWARD POWER on both Power Amplifiers if so equipped. If not so equipped, read the OUTPUT FORWARD POWER on both exciters.

2. AN/FRC-109 Links: Not applicable. N/A has been entered in the MEAS portion of Column 2.

3. Record the level of OUTPUT FORWARD POWER in WATTS. Use the MEAS portion of Column 2 on the Daily System Condition Report.

C. Distant End Baseband Loading (Transmit) - Column 3

1. Links equipped with the PCE Link Monitor System: Call the distant site and obtain the PEAK value of Baseband Loading for the past two hours (one inch of chart paper). This reading is taken directly from the Baseband Loading Recorder in dBm0.

2. Links NOT equipped with the PCE Link Monitor System: Call the distant site and obtain the level of Baseband Loading as follows:

a. AN/FRC-39, AN/FRC-109 and REL 2600 Links:

(1) Connect the AC Voltmeter (HP 400 EL) to the HF OUT jack (or ALT LINE-XMTG) on the SGR MOD COMB NETWORK (or LINE CONNECTOR PANEL) at the AN/FCC-17 Multiplex.

(2) Note the PEAK value observed during a ten minute interval. This peak value, as read on the VTVM, should be between -69 dBm and -39 dBm.

(3) To convert this reading to dBm0, make it 49 dB more positive. This new value should be between -20 dBm0 and +10 dBm0.

b. AN/LRC-3 Links:

(1) Connect the AC Voltmeter (HP 400 EL) to Pin "C" at the rear of the AN/FCC-18 Multiplex on the BASEBAND SEND AMPLIFIER.

(2) Note the PEAK value observed during a ten minute interval. This peak value, as read on the VTVM, should be between -64 dBm and -34dBm.

NOTE: Para C.2.b.(3) below includes the correction for a reading across a 75 ohm line with a 600 ohm meter.

(3) To convert this reading to dBm0, make it 44 dB more positive. The new value should be between -20 dBm0 and +10 dBm0.

c. Record the PEAK value of Baseband Loading from the distant terminal in dBm0. Use the MEAS portion of Column 3 on the Daily System Condition Report. Plus (+) or minus (-) signs MUST be used.

D. Received Carrier Intensity - Column 4

1. AN/LRC-3, AN/FRC-39 and REL 2600 Links: Note the Highest and Lowest levels in dBm of Recieved Carrier intensity for the last two hours as shown on the chart recorders. Enter these two dBm values in the MEAS portion of Column 4 on the Daily System Condition Report.

2. AN/FRC-109 Links: Not applicable. "N/A has been entered in the MEAS portion of Column 4.

E. Voice Channel Noise - Column 5

1. All links, INCLUDING those equipped with the PCE Link Monitor System:

a. Obtain a spare Voice Channel in the highest group in the link Baseband Frequency Spectrum that is not a thru-group. The proper channel should be established by the site supervisor or lead maintenance technician. The same channel should then be used each day.

NOTE: Perform a Net Loss Test and Adjustment (tone out and adjust) on the test channel prior to making the ICN measurement.

NOTE: Recommend channels, provided the indicated group is not a thru-group, are:

Channel Capacity		Test Channel	
	SGR	GRP	CHAN
48	1A	2	1-3
60	1A	1	1-3
72	1	1	1-3
120	2	5	1-3
180	3	1	1-3
240	4	1	1-3
300	5	1	1-3

b. Request that the tech control at the Distant End terminate both MOD IN (-16) and DEMOD OUT (+7) jacks of the test channel in 600 ohms.

c. Terminate the MOD IN (-16) jack at the local tech control in 600 ohms.

d. Ajust the Daven 12B for FIA WEIGHED, 600 ohms TERMINATED, measurements.

e. Connect the Daven 12B into the DEMOD OUT jack of the Channel to be tested and obtain a FIVE MINUTE mental average of Idle Channel Noise. This va lue is in dBm. To convert this value to dBm0, make it 7 dB LESS positive.

3. Record the AVERAGE value od Idle (Voice) Channel Noise in dBmo. Use the MEAS portion of Column 5 on the Daily System Condition Report.

F. Received Test Tone Stability - Column 6

1. Links equipped with the PCE Link Monitor System:

a. Note the most POSITIVE excursion of the link Monitor Test Tone from the 0 reference level. This reading is obtained directly from the Test Tone Stability Recorder in dB.

b. Note the most NEGATIVE excursion of the Link Monitor Test Tone from the 0 reference level. This reading is also obtained directly from the Test Tone Stability Recorder in dB.

c. Subtract the Maximum Negative Excursion from the Maximum Positive Excursion.

Example: (1)

MAX POS	+1dB
(-)MAX NEG	-1dB
TT Stability =	2dB

(2)

MAX POS	+2dB
(-)MAX NEG	-1dB
TT Stability =	1dB

(3)

MAX POS	-1dB
(-)MAX NEG	-3dB
TT Stability =	2dB

(4)

MAX POS	+2.5dB
(-)MAX NEG	+0.2dB
TT Stability =	2.3dB

d. Enter the DIFFERENCE obtained in para F.1.c. (above) in the MEAS portion of Column 6 on the Daily System Condition Report.

2. All links NOT equipped with the PCE Link Monitor System: Not applicable. "N/A" has been entered in the MEAS portion of column 6.

G. Teletype Error Rate - Column 7

1. All links equipped with the PCE Link Monitor System:

a. Record the number of errors registered on the BINARY ERROR RATE counter in the MEAS portion of Column 7 on the Daily System Condition Report.

b. Reset the counter to zero by depressing the switch next to the highest order digit on the face of the counter.

2. All links NOT equipped with the PCE Link Monitor System: Not applicable. "N/A" has been entered in the MEAS portion of Column 7 on the Daily System Condition Report.

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APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1101-03

SUBJECT: Required Reports on CEO Status

1. Background:

a. The CEO status report is the primary means of keeping commanders at all echelons informed on the progress of circuit activations. The contents of this report also provides basic information on problem areas, thus assisting various agencies in coordinating their solution.

b. Networks Branch of P&O Division has been designated the responsible agency for maintaing control and staff supervision over all CEO's for which this command is responsible. To properly coordinate CEO actions within ICS and the tactical communications system, it is imperative that accurate and timely reports be received from the coordinating station on all circuit actions for which that station is responsible.

2. Purpose: The purpose of this document is to define what reports will be made, and by whom, on the status of pending CEO's issued by DCA-SAM. This document supersedes all previous guidance issued on this subject by USA Regional Communications Group.

3. Guidance in DCA Reporting: There are two circuit status reports required by DCA-SAM. These reports are the exception report and the in-effect report. The DCA-SAM regulations concerning these reports are covered in DCAC 310-70-1, para 9-5 and 9-6. The following additional guidance is provided:

a. In-effect Reports: This report will be submitted by the coordinating station immediately upon completion of the direct action. This Hqs and Chief, ACCC will be info addressees on all such reports. In order to preclude activated circuits being carried as pending by DCA or this Hqs, a constant check should be made to insure all completed circuit actions have a copy of the in-effect report maintained in the circuit history file.

b. Exception reports: This report will be submitted whenever requested communication cannot be established, or when it is determined that DCA assistance in solving the problem is necessary. A quick guideline can be found in S&P Item 0211. It must be remembered that the statement of the difficulty must be complete in order that analysis of the problem can be made and corrective action be taken. This Headquarters will be info addressee on all exception reports.

4. Headquarters, Regional Communications Group Reporting:

a. A daily teletype message, subject: CEO Status, will be sent by each DCS Coordinating Station to this Hq, ATTN: Networks Branch.

(1) It is necessary that the CEO Status Report reach Networks Branch on time to be of any use. Therefore the CEO Status Reports will not go through the regular chain of command channels. The report must go directly to RCG Networks Branch. Information (Info) copies may be sent to area commands and battalions.

(2) Each day the CEO Status Report will be sent via the Express Order Wire thru SOC-TSN or via the DCA Order Wire thru TSN. Sites will (1) file their report for transmission over the Express Order Wire or (2) file their report to their associated DCS Reporting Station, for transmission over the DCA Order Wire. The DCA Order Wire Network is shown on inclosure 1, "DCS Reporting Network".

(3) This report will be submitted daily between 0030Z and 0200Z for the previous RADAY. A negative report will be submitted for each paragraph or the report as a whole, when applicable.

b. Purpose of this report:

(1) For this Hqs to quickly determine problems beyond the control of the coordinating station and action them to produce a solution.

(2) For this Hqs to have an up-to-date status on all circuit actions in order to accurately answer any question on same. This will relieve all concerned of the burden of submitting status of circuits at a time which might be inopportune.

(3) To formulate a basic system where one report will contain all the necessary information for proper coordination and efficient operation of the necessary information for proper coordination and efficient operation of the entire system.

c. Format: The report will consist of five baisc paragraphs:

(1) Para 1 will consist of a listing of circuit activations, deactivations, realignments, or other circuit actions completed during the reporting period. The list will be by CCSD and will include the from and to stations, CEO number, the date time group completed, and the type action. The completion of this Paragraph does not relieve the coordinating station of the responsibility for submitting an in-effect report.

EXAMPLE:

CCSD	FM-TO	CEO	DTG	ACTION TAKEN
KZG1	TSN-BKK	92542	250445Z Apr	Reroute
X895	TSN-BNH	92488	250130 Apr	Reterminated
XLM1	TSN-QTA	92648	250940Z Apr	Established

(2) Para 2 will consist of a listing of all CEO's received for which no CLR's have been received and no due date has been established. This list will be by CCSD, and will include the from and to stations, and CEO number.

EXAMPLE:

CCSD	FM-TO	CEO
ZKL3	PHB-LBN	92561

(3) Para 3 will consist of all circuits upon which CLR's have been received and a due date has been established but not yet reached. This will be a listing by CCSD consisting of from and to stations, CEO number, the due date, and the status of the circuit to include any problems requiring action in order to meet the scheduled due date.

EXAMPLE:

CCSD	FM-TO	CEO	DUE DATE	STATUS
KZY4	TSN-DNG	92442	27 Apr 69	PHB TCM not wired (RLB)*
SGT8	BTY-TSN	92554	1 May 69	CTO TCG no CLR's (PHA)*

*Initials of individual from whom status was obtained.

(4) Para 4 will consist of a listing of all circuits for which the due date was the prior raday and the action directed was not completed. This listing will be by CCSD consisting of from and to station, CEO number, the due date, and a complete status on the circuit.

EXAMPLE:

CCSD	From-To	CEO	DUE DATE	STATUS
ZKK8	GDH-CTO	92450	26 Apr 69	The GDH subscribers, MIBARS, does not yet have his equipment and does not expect it to be installed and ready until at least 15 July (MLC).

(5) Para 5 will consist of a listing of circuits beyond the due date with the action directed not having been completed. This listing will be by CCSD consisting of from and to station, CEO number, the due date, and a complete status of the circuit. The daily report will consist of an explanation on all circuits for which a change has occurred. Those circuits upon which no change in status has occurred will state "No Change".

EXAMPLE:

CCSD	FM-TO	CEO	DUE DATE	STATUS
XWN3	TSN-BKK	91304	2 Apr 69	BKK

Subscriber has now received his equipment. An installation team is expected to arrive in 3 days (RJC).

CCSD	FM-TO	CEO	DUE DATE	STATUS
SHH4	TSN-BKK	93026	18 May 69	No Change

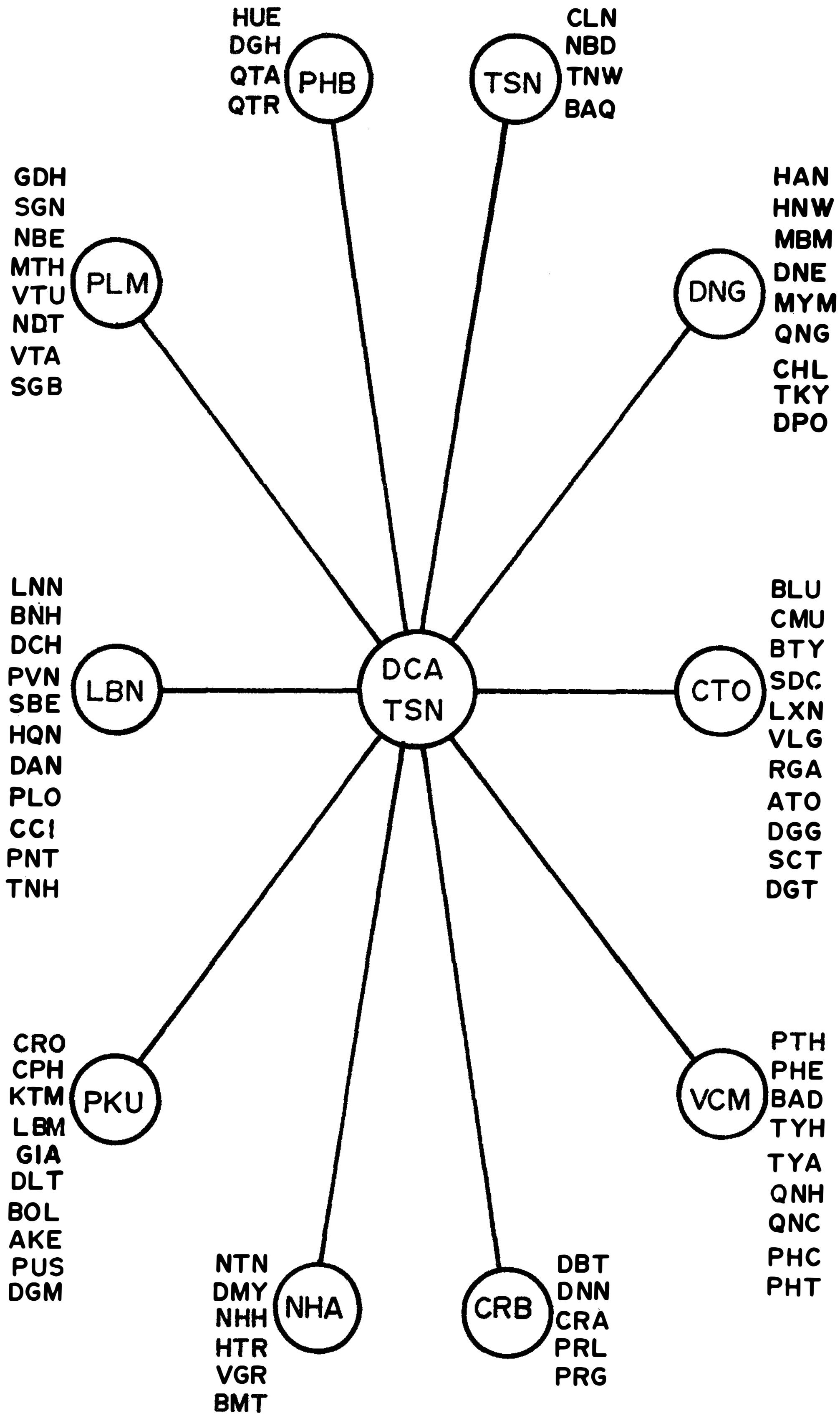
(6) The CEO Status Report for Sunday will contain a complete explanation on the status of each overdue circuit regardless of whether or not the status changed from the previous Sunday. The following example would not be valid for a Sunday report since it has a "no change" status.

EXAMPLE:

CCSD	FM-TO	CEO	DUE DATE	STATUS
1J38	HUE-CTO	90131	13 Feb 69	No Change (INCORRECT)
1J38	HUE-CTO	90131	13 Feb 69	CTO sub has no

terminal equipment. (CORRECT for Sunday report)

DCS REPORTING NETWORK



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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1110-02

SUBJECT: ICS Equipment Inventory

1. Purpose: The purpose of the ICS Equipment Inventory is to provide Networks Branch, Hq, RCG with the current status of ICS multiplex, patch bay and circuit conditioning equipment at each site. This information must be timely and accurate not only to provide adequate information for the assignment of equipment to circuits traversing the ICS, but also to provide a single central source of information absolutely necessary to determine the operational capabilities of each ICS site and the system as a whole.

2. General: The report is constructed so as to provide a breakout of the quantity of each different type of ICS equipment and also the status of that equipment: ie, bay installed but not wired, bay installed and wired, or bay installed, wired and equipped with plug-in modules. Furthermore, since ICS equipment, in the case of plug-in modules, is assigned to circuits by equipment locations, this report is essential in that it provides the exact location of all the plug-in units. By having this information on IBM punched-cards for each and every ICS site, it is possible to reduce to a minimum circuit equipment assignment errors such as assignment of non-existent or unwired equipment. It is vital that the report be completed accurately in order that Networks Branch, Hq, RCG can maintain the ability to know exactly what additional equipment must be provided to the site if the need for immediate expansion arises. The following general procedures will be followed to insure efficient system operation:

a. When the contractor installs or wires new bays or other items of equipment, a report of such activity will be sent, within 24 hours of completion of same, to Networks Branch.

b. Plug-in modules will always be placed in the lowest numbered positions. This greatly simplifies records maintenance.

c. Site OIC's will insure that situations affecting the status of equipment, but not reflected specifically in another section of the report, will be entered in detail in the Remarks Section of the report. An example of such a situation would be an SF bay that is installed, wired and equipped, but with a defective master oscillator. A statement to this effect must be entered in the Remarks Section. In this case it would be appropriate to also include the estimated repair or replacement data.

3. Reports: The initial report for each site is made by personnel from Networks Branch, Hq, RCG. Site OIC's will maintain a completed copy of the ICS Equipment Inventory Report. This report will be updated by Site OIC's each month, but reports will not be submitted to Networks Branch on a scheduled basis. Individual sites will be requested to submit an updated report as the necessity of an update is determined by Chief, Networks Branch. The only exception to this policy is as indicated in paragraph "a.

4. Format: The standard ICS Equipment Inventory format is shown as Inclosure I. All personnel involved with inventory of equipment at the site should be thoroughly familiar with this format. All entries are self-explanatory; however any questions should be directed to Networks Branch, Hq, RCG.

ICS EQUIPMENT INVENTORY

JACK SETS	Total Number of Jack sets to be installed Phase I&II and Mods 6, 26 & 27	Sequence Nr's of Jack Sets ready to go now.
VF Jack Sets (4-wire; Send/Rec). 12 sets to a strip, 120 sets to a bay.		
Circuit Jack Sets (6-wire; Send/Rec, sig). 12 sets to a strip, 84 sets to a bay		
Primary Jack Sets (2-wire). 12 sets to a strip, 192 sets to a bay.		
Primary Jack Sets (4-wire) 6 sets to a strip 96 sets to a bay.		
DC Jack Sets (4-wire). 48 sets to a bay. Misc DC Jack Sets (4-wire). 12 sets to a strip		

Equipment Wired and Ready to Use Now

Split Control Echo Suppressors

EAC Adapters

AN/FCC-17 Channel Modems (VF, 12 Channels)

THRU-GROUP Filter Pairs

4-Way, 4-Wire Bridges (Not on Page Contract)

VFCT Terminals: FCC-19 16 Channel 8 Channel

VFCT Terminals: FCC-25 16 Channel 32 Channel

Isolation Relays (Mounted below DC patch panels in strips of 9 each)

Pole Box Termination*: Capacity in pairs
Cable pairs to CDF
Cable pairs protected

Regenerative Repeater

Hub Repeaters

Repeat Coil

Pulse Link Repeater (PLR)

* (Write "no pole box" if none installed)

Incl 1 Page 1
Item Nr. 1110-02
RCG LL TCG S&P

PLUG-IN-MODULES PRESENT FIGURES: READY TO USE NOW.	2600 HZ SF Units	1600 HZ SF Units	RD Converter (Triple Unit)	VF Amplifiers
Number of servicable modules on hand.				
Number of unservicable modules on hand.				
Number of modules turned in for repair.				
Sequence number of spaces for modules wired and ready to go. (Usually this exceeds the number of modules on hand).				
Sequence number of present location of modules on hand.				
Sequence number of defective positions.				
FINAL FIGURES; PHASE I, II; 6, 26, 27.				
Number of modules to be supplied.				
Total number of spaces for modules to be provided.				

NOTES: 2600 HZ SF UNITS Bay Capacity 60 Units
Shelf Capacity 12 Units

1600 HZ SF UNITS Bay Capacity 60 Units
Shelf Capacity 12 Units

Ring Down Converters (Each Module contains 3 converters)

Bay Capacity 120 Units (40 modules)
Shelf Capacity 24 Units (8 modules)

VF Amplifier Bay Capacity 180 Units
Shelf Capacity 10 Units

HARD WIRE UNITS

PRESENT FIGURES: READY TO USE NOW.	2W/4W Termination Sets	VF Attenuatiors
Sequence number of units wired in equipment bays and connected to CDF.		
Sequence number of spaces for additional units in equipment bays. Cabling installed to CDF.		
Sequence number of defective positions.		
FINAL FIGURES: PHASE I, & II; MODS 6, 26, 27		
Total number of units to be wired in.		
Number of spaces for additional units in equipment bays with cabling installed to CDF.		

NOTES: Terminating Sets, 4W/2W

Bay Contains 120 Units
Shelf Contains 5 Units

Attenuators, VF;

Bay Contains 120 Units
Shelf Contains 5 Units

REMARKS:

Site OIC / Date

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1210-02

SUBJECT: Express Order Wires-IWCS Technical Controls

1. Background: In addition to circuit restoration order wires from technical control to technical control, there are also other order wires intended primarily for system maintenance. These are:

a. Local Order Wires.

b. Express Voice Order Wires.

c. Express Digital Order Wires.

2. Local Order Wires: There is a local order wire connecting the two terminals of each IWCS radio system; LOS, scatter, or diffraction. These order wires, often called the "engineering channels", are used primarily for the engineering maintenance of the system. They are terminated in the radio and multiplex equipment room at several handy locations, usually at the end of a row of bays. Since each site usually has more than one radio system connecting it to other sites, the various local order wires are terminated on a multi-position jack strip and the maintenance man selects the desired one by merely inserting his headset plug in the proper jack.

3. Express Voice Order Wire: The express order wires found in the ICS represent a rather unique type of engineering channel. Equipment is provided at each ICS site to permit selective signalling over the express order wire by dialing a two-digit number. One drawback to this system however, is that each network is effectively a party line. Therefore, there have been six different express order wire networks established.

The first of these is the Major Technical Control Express Order Wire. This connects the technical control stations shown in the boxes in Figure 1 (Phase 3 configuration shown in Figure 3). The other station in the network is the "SOC", the DCS/STRATCOM Operations Center located adjacent to the EE building at Tan Son Nhut. Figures 1 and 3 also show the routing of this order wire circuit. It can be seen that it makes a complete loop that is open at the SOC. If something should happen to disable one of the links in this network, it would still be possible to contact all the stations by going around the loop the other way. This applies for all of the major technical controls except Nha Trang Wet Wash and Can Tho which have only a single access route.

The other five express order wire networks are the Area Networks shown in Figures 2 and 4. The SOC is a member of each of these networks. A major technical control therefore is a member of two networks and will have two express order wire control panels, whereas a minor station will have only the one and the SOC will have eight (note, there is one for each direction of the major network).

The express order wires may be used to call other stations in the same network only. Therefore, Phu Bai would not be able to call Nha Trang or Cam Ranh Bay. Note, however, that the SOC can dial directly to call <u>any site</u>.

The primary purpose for the express order wire systems is to provide communications for the SOC. These channels are intended primarily for system maintenance, control, and reporting of maintenance activities.

4. <u>Express Digital Order Wire</u>: Associated with each voice express order wire system is a selective-call digital order wire network which permits passing teletype traffic to specific locations. It operates in a manner similar to the voice system.

The call signs used on the digital order wire networks are also given in Figures 1 - 4.

5. <u>Signalling and Switching-Voice Networks</u>:

a. There is no switching of the audio circuit in any of the express voice order wire networks. All stations are connected to the networks at all times in a party-line fashion.

b. The use of the dial is for selective signalling only.

6. <u>Conference Calls-Voice Networks</u>:

a. It is possible to set up a conference call <u>within a network</u> of as many stations as desired. Since all stations are always connected to the audio circuit, the stations desired in the conference call are signalled by successively dialing the call digits of each station.

b. If a two-digit code ending in 2 is dialed, all stations in that group will be signalled; e.g. dial "32" on the Major Tech Control Network and stations TSN (33), NHA-BP (34), NHA-WW (35) and PLM (36) will be signalled.

7. Signalling and Switching-Digital Networks:

a. Although all teletypes in a network are connected to the line at all times, the machines are normally in a "locked" condition and do not operate until unlocked.

b. To send a message over a digital network, the appropriate machines must be placed in the "operate" condition.

(1) To place the local machine in "operate".

Hit BREAK key twice.

Hit FIGS key twice.

Hit LTRS key twice.

Type out local station call sign.

This unlocks the keyboard.

(2) To call up other machines in the network.

Hit FIGS key twice.

Hit LTRS key twice.

Type out distant station call sign.

Now ready for traffic.

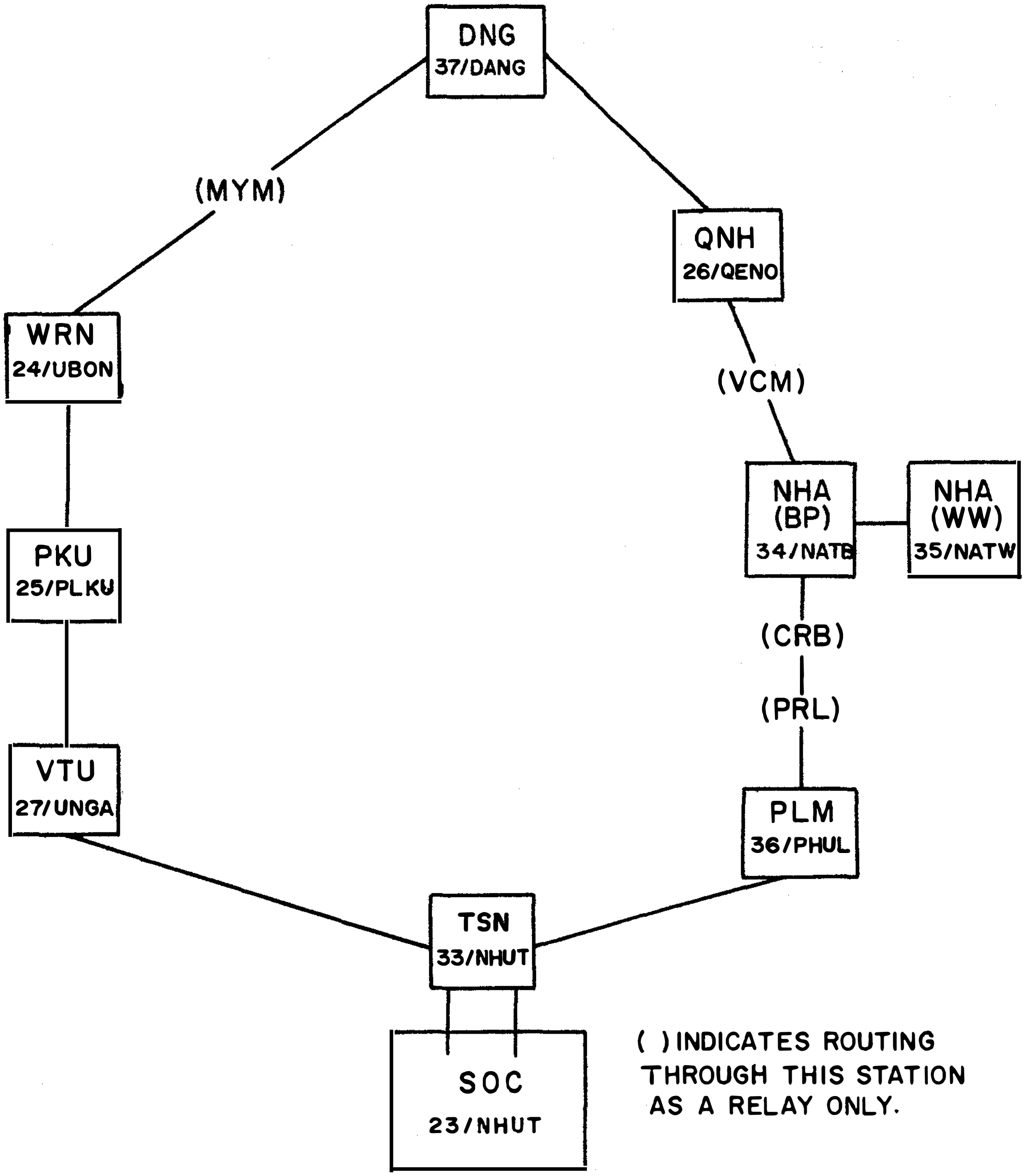
(3) Each transmission must be followed by BLANK, BLANK, BLANK.

c. When the transmission is completed all stations are automatically returned to the "locked" condition one minute after transmission of last character.

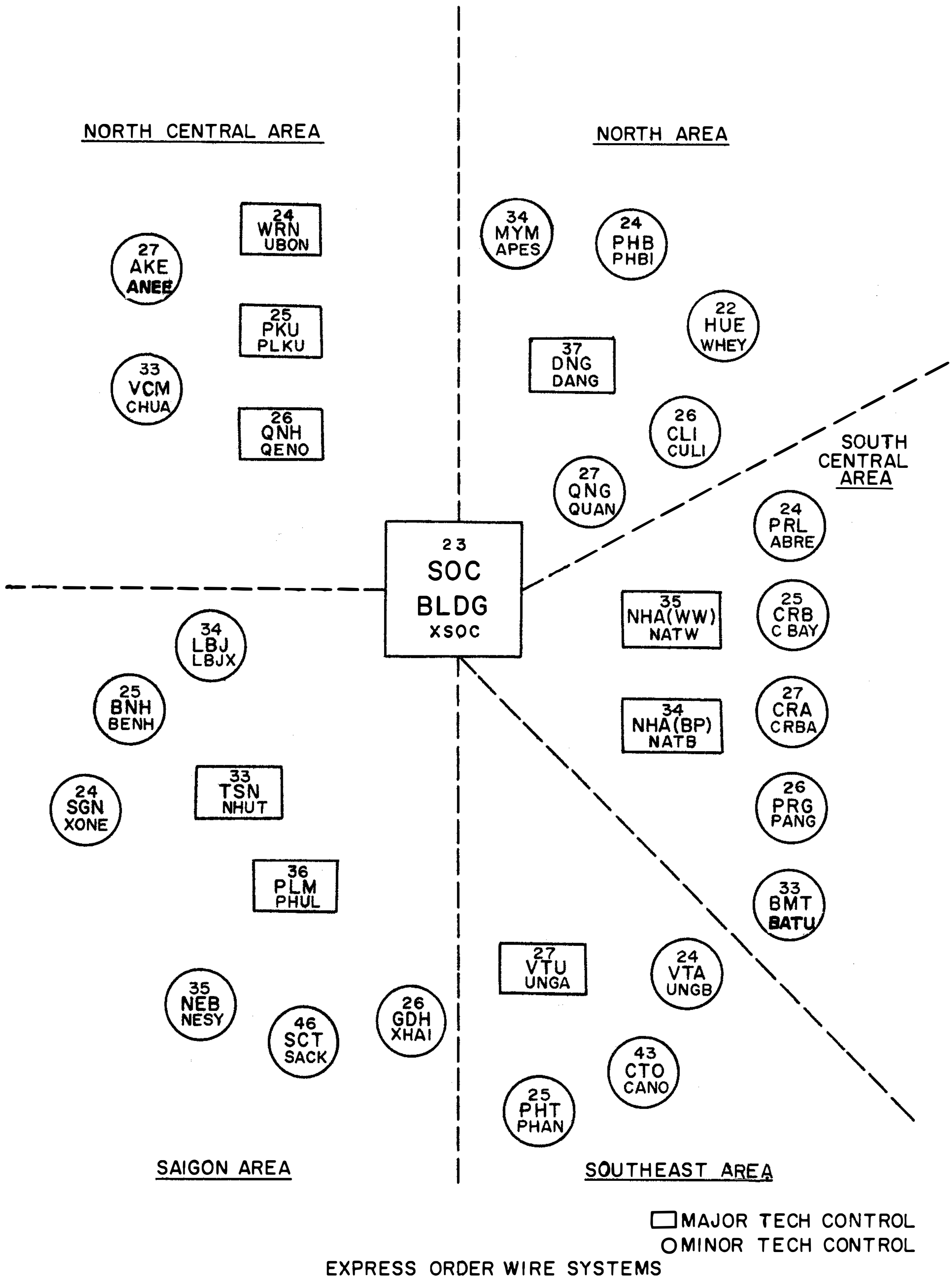
8. Conference Calls-Digital Networks:

a. A conference call of any number of stations within a network may be established by signalling each station in turn.

b. A conference call of all stations within a network may be established by using the group call sign "UUUU" once the local keyboard is unlocked.

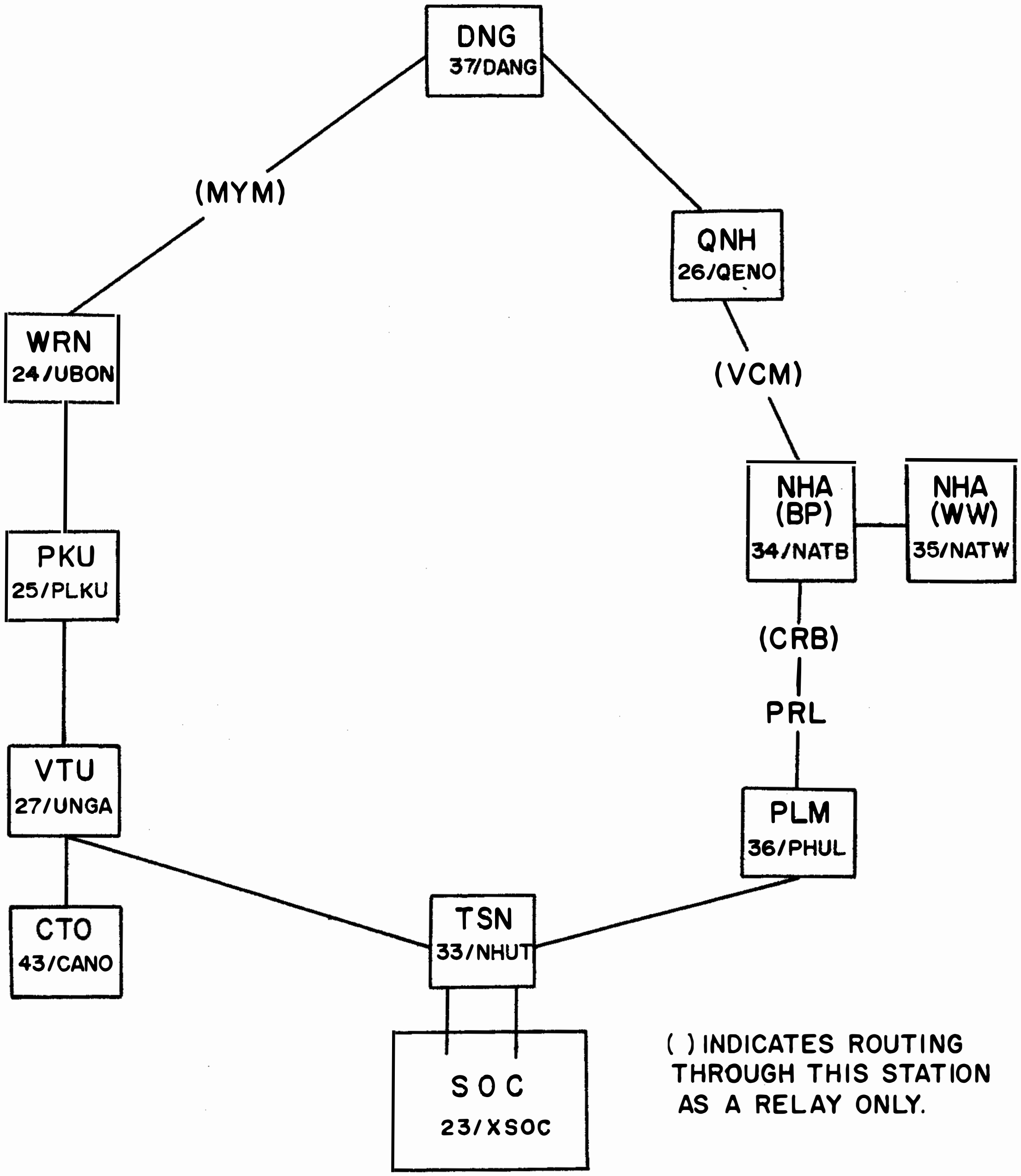


ROUTING OF MAJOR TECHNICAL CONTROL
EXPRESS ORDER WIRE
VOICE CALL CODE/DIGITAL CALL CODE
(APPLIES TO PHASE 2/MOD 6)
FIG I



EXPRESS ORDER WIRE SYSTEMS

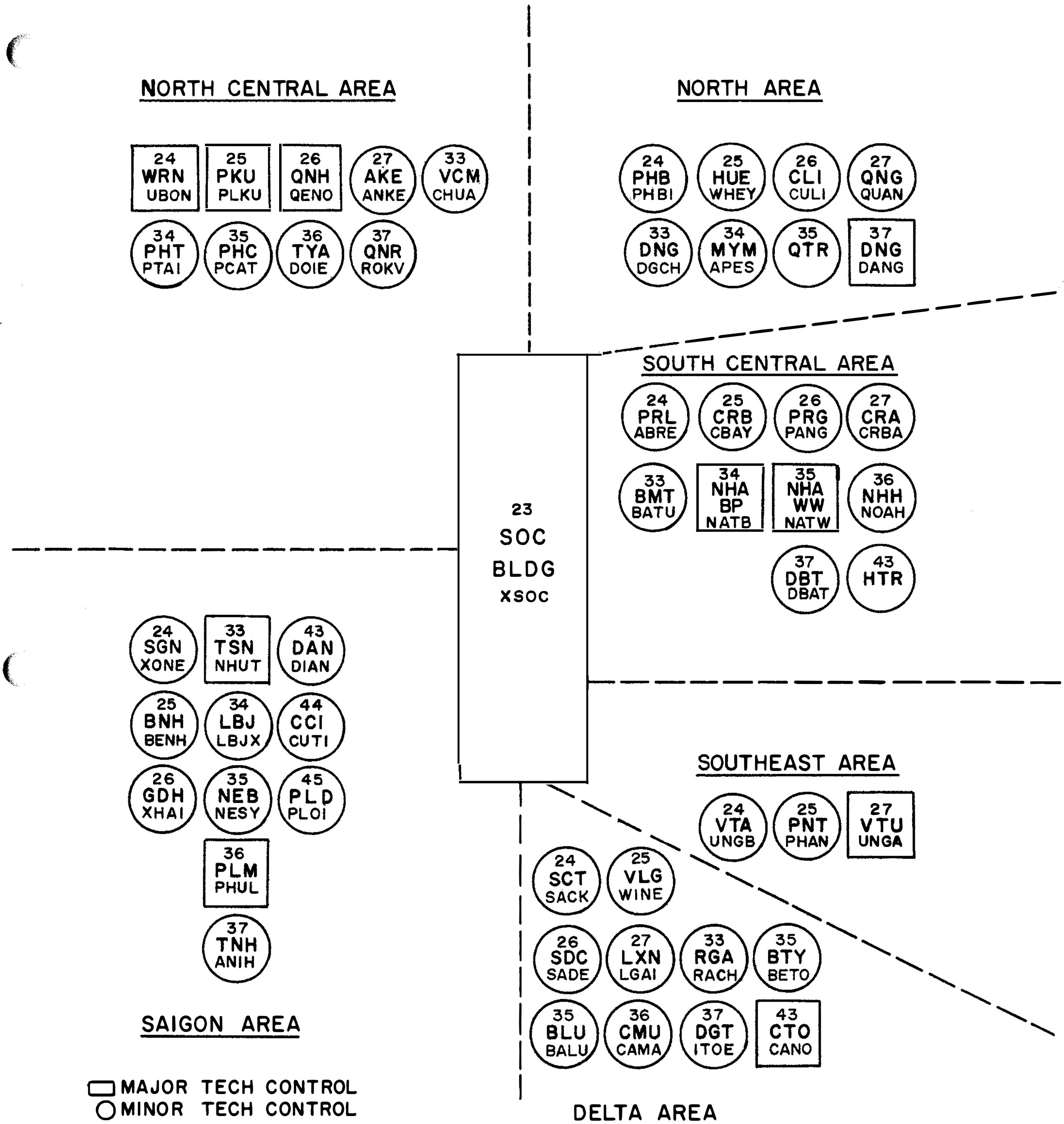
VOICE CALL CODE/DIGITAL CALL CODE
(APPLIES TO PHASE 2/MOD 6)
FIG. 2



( ) INDICATES ROUTING THROUGH THIS STATION AS A RELAY ONLY.

ROUTING OF MAJOR TECHNICAL CONTROL EXPRESS ORDER WIRE

VOICE CALL CODE/DIGITAL CALL CODE
(APPLIES TO PHASE 3)
FIG 3



AREA EXPRESS ORDER WIRE SYSTEMS
VOICE CALL CODE/DIGITAL CALL CODE
(APPLIES TO PHASE 3)
FIG 4

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ITEM NR: 1220-02

SUBJECT: Strapping for ICS Attenuators and 4-Wire Terminating Sets (Hybrids)

1. Background: It is necessary to install straps on the attenuators and the 4-wire terminating sets to establish the proper loss. Spot checks of ICS EE Buildings have disclosed a large number of incorrectly strapped units.

2. VF Attenuators: (Figure 1)

a. The loss of the VF attenuator is adjustable from 0 to 31 db in 1 db increments.

b. The proper loss is selected by shorting out the sections of the attenuator that are not used and cross connecting those used.

c. The deficiency normally noted is failing to place the required straps on the bottom row of lugs.

3. 4-Wire Terminating Sets (Hybrids): (Figures 2, 3, 4)

a. The ICS 4-wire term sets have an attenuator in each leg of the 4-wire side, adjustable from 0 to 7.75 db in 0.25 db increments. There is also a varistor in the transmit side which has a loss of 6 db. (Figure 2) The varistor is used to remove dial pulse transients. The loss in the hybrid itself is 3.5 db in each direction.

b. The standard ICS configuration of the term set is:

(1) Varistor in transmit pair.

(2) 16 db loss in transmit pair.

(3) 4 db loss in receive pair.

c. There may or may not be a Ringdown Converter in the 2-wire leg; therefore there are two different sets of values possible for the adjustable attenuators (Figure 3).

d. The "standard strapping" for both the front and rear of the unit is shown in Figure 4, C & D.

4. All ICS 4-wire terminal sets are pre-wired for the standard ICS configuration by the installing contractor.

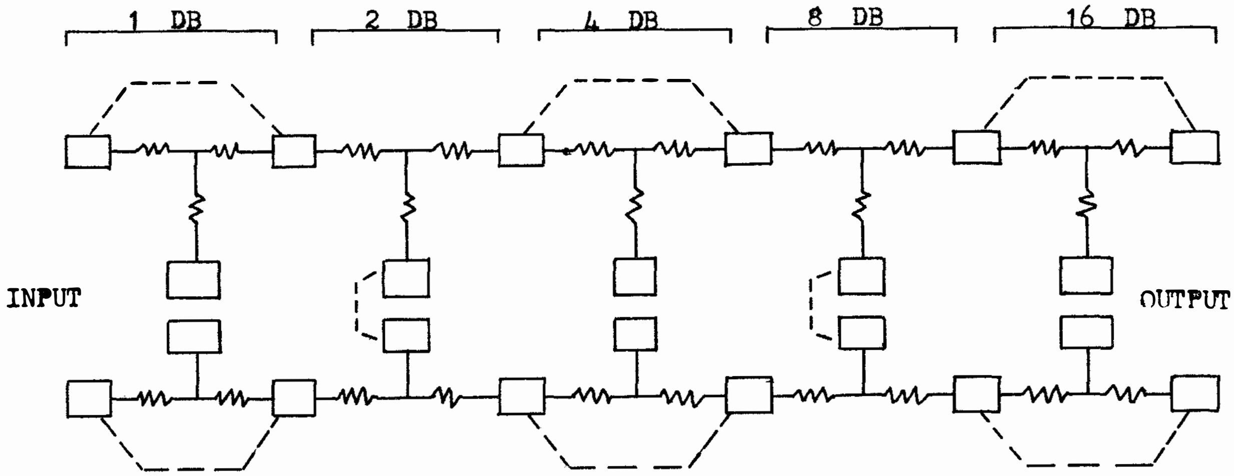
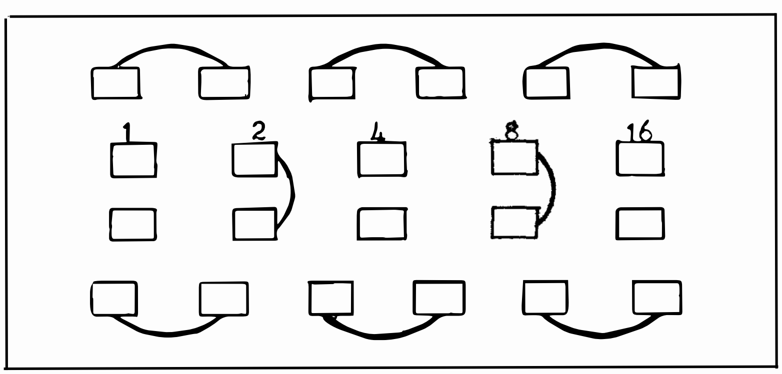


FIGURE A. ATTENUATOR SCHEMATIC
(DOTTED LINES—STRAPS FOR 10DB)



B. FRONT VIEW (STRAPS FOR 10DB LOSS).

FIGURE 1 VF ATTENUATOR

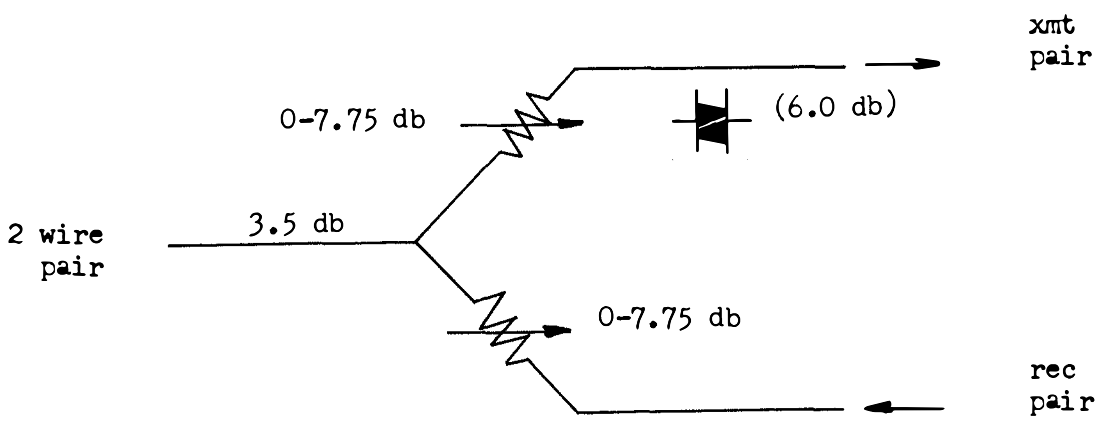
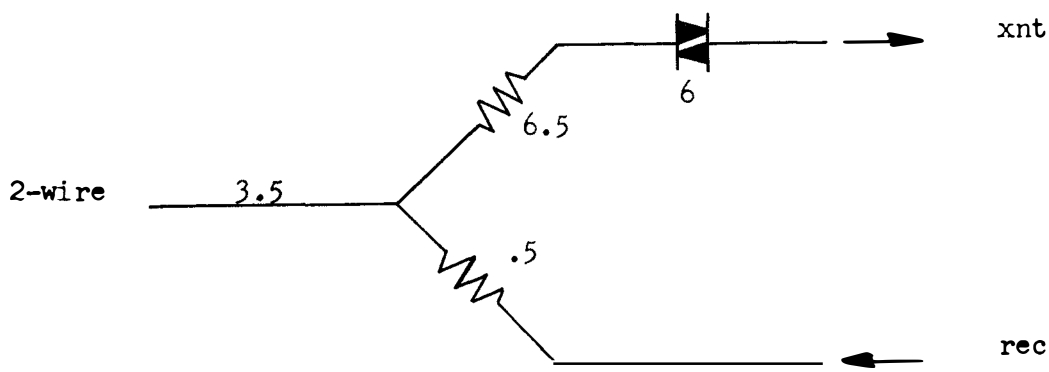
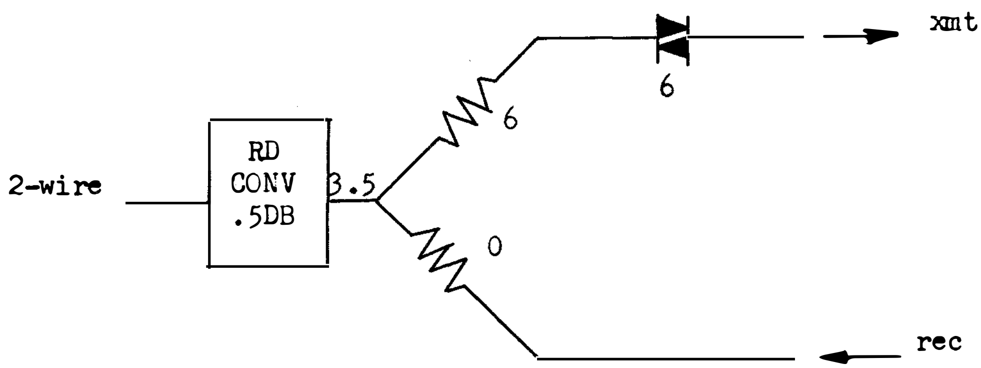


Figure 2 4-wire Terminating Unit



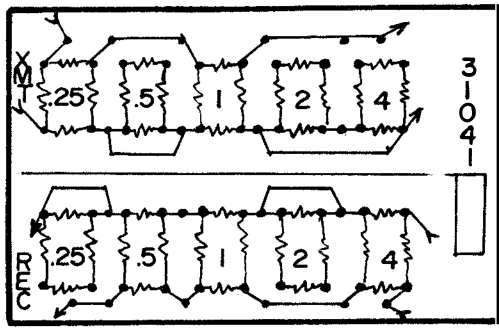
A. Without Ringdown Converter



B. With Ringdown Converter

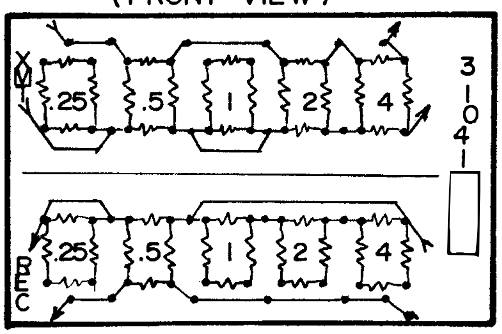
Figure 3 "IWCS Standard" 4-Wire Term Set

(FRONT VIEW)



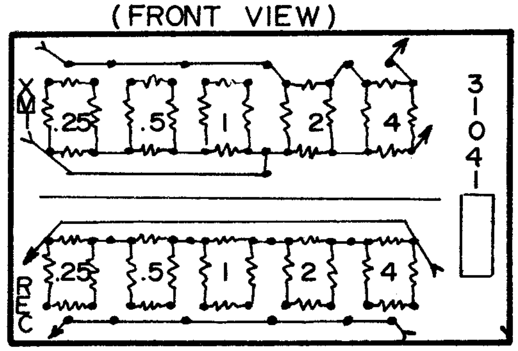
A. Heavy line indicates typical strapping
XMT shows strapped for 1.25 DB
REC shows strapped for 5.5 DB

(FRONT VIEW)



Without ringdown converter
XMT 6.5 DB
REC 0.5 DB

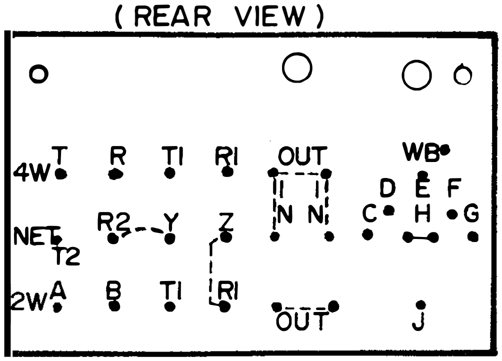
(FRONT VIEW)



With ringdown converter
XMT 6.0 DB
REC 0.0 DB

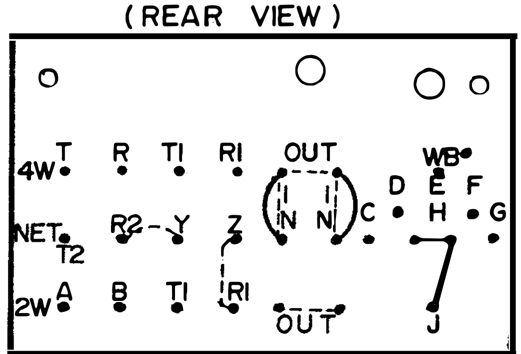
B. "IWCS Standard" strapping

(REAR VIEW)



C. No strapping

(REAR VIEW)



D. "IWCS Standard" strapping
Varistor IW
Comp Net IW

FIG. 4. LENKURT 4-WIRE TERMINATING SET, STRAPPING

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCVRG-PO

ITEM NR: 1230-01

SUBJECT: Fixed-Plant and Tactical VFCT Interface

1. Background. Operational requirements may necessitate establishing a teletype trunk utilizing fixed plant equipment at one end (AN/FGC-60; AN/FCC-19, -25) and tactical equipment at the other terminal (AN/TCC-4, -20). Such a procedure will function quite satisfactorily; however, the assignment of carrier tones to each channel differs in the two types of equipment.

2. Purpose. This S & P item presents a method for operating the two terminals that will remove the confusion caused by the frequency difference on each channel.

3. Discussion.

a. An examination of the appropriate references discloses that both the fixed-plant and the tactical teletype carrier system make use of the 32 basic tones, 2 for each channel, to transmit marks and spaces. The lowest frequency pair has a mean value of 425 Hz and subsequent pairs are separated by 170 Hz. The two tones actually transmitted are 42.5 Hz above and below the mean values.

b. Fixed-plant terminals are basically four-wire systems, and each channel transmits and receives using the same two tones. The 16 channels in a standard system such as the AN/FCC-19 or the AN/FGC-60 are numbered sequentially from the 425 Hz channel to the 2975 Hz channel.

c. The tactical terminals, AN/TCC-4, -20 were designed to be capable of either four-wire or two-wire operation. In two-wire operation, it would be impractical to use the same frequencies for both transmitting and receiving; therefore, each channel of the TH-15, the basic channel MODEM of the AN/TCC-4, -20, uses one set of tones for transmitting and one set for receiving. The exact ones used by each channel are selected by the setting of several switches.

d. The incompatibility is: a teletype machine connected to channel 5 of the fixed-plant terminal might be transmitting to channel 7 of the AN/TCC-4 but receiving from channel 11 of the tactical terminal. The solution described below has permitted highly efficient operation with no problems attributable to the frequency interface.

4. <u>Solution to Interface</u>. The channel MODEMS of the AN/TCC-4 are integral units, and it is not possible to physically separate the TRANSMIT and RECEIVE positions of the channel. However, the TRANSMIT and RECEIVE circuitry in the AN/FCC-19 and AN/FGC-60 are completely separate; and further, each individual TRANSMIT tone keyer and RECEIVER tone converter is a plug-in module that may be inserted in <u>any</u> channel position in the transmit and receive sections respectively. By rearranging the fixed-plant modules, it is possible to establish a tone pack that operates in all respects as if the two terminals were identical. Table 1 show the rearrangement of modules necessary if the AN/TCC-4 is set up as prescribed on the table. For less than 16 channels, only a portion of the table is used.

Tactical Terminal AN/TCC-4			Fixed-Plant Terminal		Tactical Terminal AN/TCC-4			Fixed-Plant Terminal	
Chnl Nr.	Mean Transmit Tone, Hz	Mean Receive Tone, Hz	Conv Chnl Nr.	Keyer Chnl Nr.	Chnl Nr.	Mean Transmit Tone, Hz	Mean Receive Tone, Hz	Conv Chnl Nr.	Keyer Chnl Nr.
1	2975	595	16	2	9	425	2805	1	15
2	2635	935	14	4	10	765	2465	3	13
3	2295	1275	12	6	11	1105	2125	5	11
4	1955	1615	10	8	12	1445	1785	7	9
5	2805	425	15	1	13	595	2975	2	16
6	2465	765	13	3	14	935	2635	4	14
7	2125	1105	11	5	15	1575	2295	6	12
8	1785	1445	9	7	16	1615	1955	8	10

NOTE: The AN/TCC-4 is arranged as in Fig 15 of TM 11-5805-250-10. The four stacks are lettered A, B, C, D, left to right. The channels are numbered left to right, top to bottom, in each stack. Switch settings are given in the table below.

Panel	Switch Designation	Stack A	Stack B	Stack C	Stack D
TH-14	Line Send Freq	HI	None used	LO	None Used
AM-683	Send Frequency	LO	HI	HI	LO
	Channels	16	16	16	16
	Line	4W	4W	4W	4W
TH-17	Send Frequencies	LO	HI	LO	HI
TH-16	Send Frequencies	LC	HI	LO	HI

TABLE I

SOLUTION FOR FIXED-PLANT AND TACTICAL
VOICE FREQUENCY CARRIER TELETYPE INTERFACE

Table 1
Item Nr. 1230-01
ECG LL TCG S&P

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 1231-01

SUBJECT: TA-182/U Interface

1. Background: The basic interface signaling unit for tactical systems is the TA-182/U signal converter which converts the 20 HZ ringing signal received from the subscriber to 1600 HZ for transmission over the tactical channel and thence into ICS. The normal 1600 HZ output level from the TA-182/U is a nominal 0 dbm. This causes severe channel overloading problems in the ICS and in addition will not be accepted by the 1600 HZ SF unit in the ICS without special adjustment.

2. Purpose: The normal 1600 HZ receive level for ICS at the SF unit is -16 dbm. To make the TA-182/U compatible with ICS, DCA-PAC has directed that all TA-182/U's used in systems identified as part of SEAWBS or systems which interface with SEAWBS be modified to ensure that the ringing level does not exceed -10 dbm. Modification will be accomplished IAW TO 314W4-2U-501.

3. Modification Procedures:

a. This is a temporary modification only and if modified equipment is returned to the supply system it will first be restored to its origional configuration.

b. When making modification use caution to avoid excessive bend or possible break in wiring. Do not destroy bonding of elastic slip nuts attached to chassis.

c. The only part required to accomplished modification is a 1.2 megohm, ½ watt resistor of 5% tolerance (FSN 5905-190-8874).

d. Proceed as follows:

(1) Locate terminal board YZ

(2) Remove R27 (390,000 ohms) and R43 (560,000 ohms) from between

terminals Z11 and Y11 on terminal board YZ. Note that some models purchased in 1950, 1951, and 1952 will not have resistor R43.

(3) Neatly solder the 1.2 megohm resistor between terminals Z11 and Y11 of terminal board YZ.

(4) Mark the front panel of the chassis, using one-half (½) inch letters, centered as follows:

MWO USASCC M-MOD 1-66

(5) Submit DA Form 2407, citing USASCC M-MOD 1-66 as authorization.

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR. 1240-01

SUBJECT: Dial Telephone Circuits

1. Background: Past experience has shown that some of the difficulties that have been encountered in the activation and restoration of dial circuits have been due to lack of familiarity with the principles behind these circuits on the part of the technical controller. In coming months these circuits will become much more predominant as the primary type of telephone trunk. Due to the impending presence of large numbers of these circuits ICS personnel must become thoroughly familiar with the principles of dial trunks and the proper configuration of same.

2. PURPOSE: This S&P Item provides the technical controller with the basic principles of operation of dial telephone circuits.

3. SINGLE FREQUENCY DIAL CIRCUITS: There are two types of long haul dial circuits that will be encountered in Vietnam: single frequency pulsing and multi frequency pulsing. The former is by far the most common and will be considered first.

Dialing will originate at either a users telephone or at a switchboard. Regardless of the source, the dial signals end up in a trunk circuit located in the DCO (dial central office). One relay in that trunk circuit is of interest to tech controllers, the "pole changer" relay. The pole changer relay is operated, and released, by the dial signals generated in the user's telephone or a switchboard. The output of a pole changer relay is passed from the DCO to the EE building on the M lead (Figure 1).

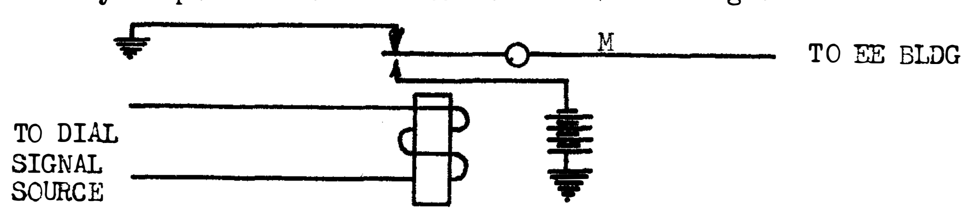

Figure 1: Pole Changer Relay

Now let's regress. We have skimmed over a lot of territory and should elaborate on a few ideas.

When the pole changer relay is first operated by the user or switchboard operator, the circuit is said to be "seized". No dialing has been done, but a signal has been passed over the circuit to the distant end. This seizure signal is one of several types called "supervisory signals". To better understand dial circuits it is necessary to understand the difference between dial signals (pulses) and supervisory signals. A supervisory signal is any signal other than dial signals, sometimes called address signals. Another example of supervision is a busy signal. A telephone user will hear the busy signal, but a switchboard operator monitors a call visually not audibly. A busy signal is passed back over the long haul dial circuit on the M lead. It is received on the E lead and causes the switchboard cord lamp to flash.

Refer again to Figure 1 and note that in an idle condition there is ground on the M lead which causes the single frequency signal set in the EE building to transmit 2600 Hz tone to the distant end. At the distant end the SF set changes the received 2600 Hz tone to an open E lead (Figure 2).

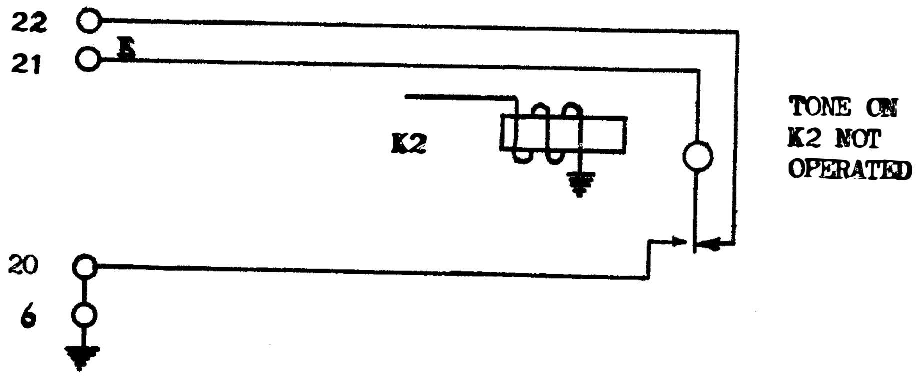

Figure 2: Collins SF set K2 Relay (Simplified)

Bear in mind this idle circuit condition exists in both directions of transmission. Each end of the circuit has a grounded M lead, an open E lead and 2600 Hz tone is being transmitted in both directions. Another name for the idle condition is "on hook".

When the circuit is seized the pole changer operates and applies -48 volts to the M lead which causes the SF set to stop transmitting the 2600 Hz tone. At the distant end the lack of a tone causes the K2 relay in the Collins SF set to operate which grounds the E lead in Figure 2. The seized condition is called "off hook". The E lead ground is passed to the DCO trunk circuit where it operates a relay and seizes an incoming selector or equivalent depending on the type of switching equipment (Figure 3).

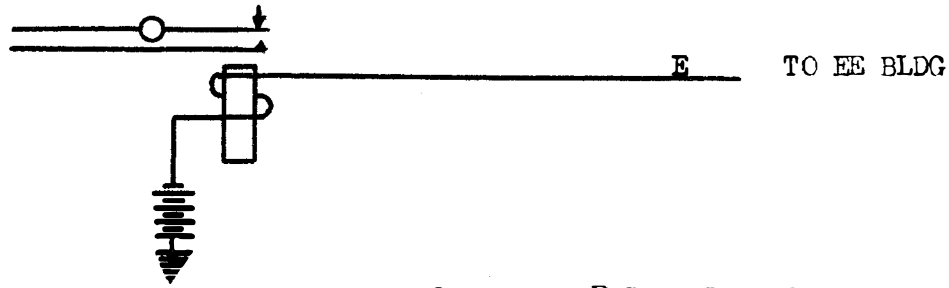

Figure 3: DCO Trunk Circuit - E Lead Detail

Note that the E lead has battery standing on it at all times. Figure 4A is the conventional schematic for 48 Volt battery and 4B for 24 Volt battery

Figure 4: Battery Schematics

After seizure the circuit is ready to receive dial pulses. Let's first consider the pulses generated by a dial and transmitted over a cable pair to the DCO. When the telephone is lifted from its cradle, a switch (hook-switch) closes the circuit from the DCO through the tel set transmitter and dial back to the DCO (Figure 5). In Figure 5, all contacts are shown in the off-hook condition.

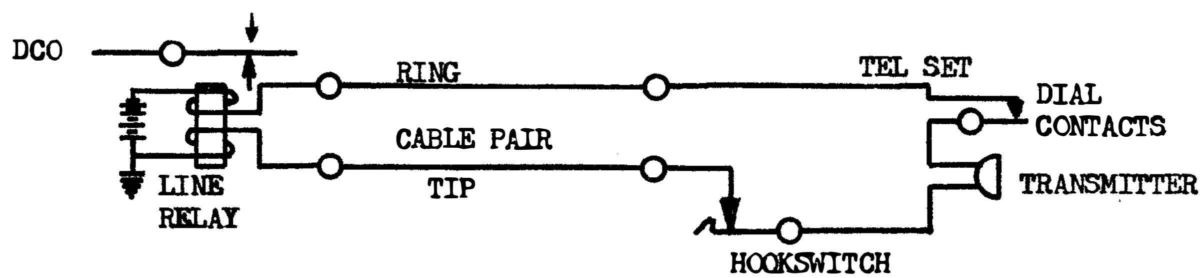

Figure 5: DCO-Subscriber Configuration

The cable pair is frequently referred to as a "loop" and when the tel set is off hook the loop is said to be "closed". On hook, then would be an "open loop" condition. Under the closed loop or off hook condition, current flows from the battery in the DCO, through the line relay winding, over the ring side of the cable pair through the dial pulsing contacts, the transmitter, hookswitch, and back over the tip through the line relay to ground. The line relay will operate, and in a DCO, cause the line to be found and send a dial tone. The important thing to realize is that the DCO will send battery and ground to the tel set at all times during a call.

Operation of the dial will open and close the loop. Suppose a 6 is dialed, loop current will look like this (Figure 6):

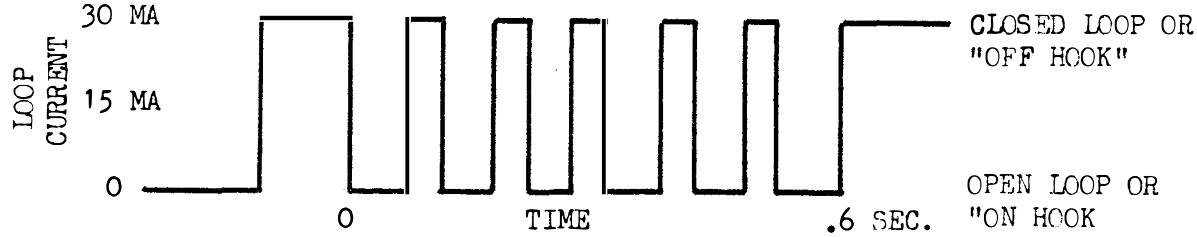

Figure 6: Dial Pulse Train

The dial "pulse" will cause the DCO switching equipment to select a 6, then it will remain seized and wait for the next dial pulse. One pulse consists of a transition from closed thru open loop and back to closed loop condition. Note that the open loop period is longer than the closed. Figure 7 represents one pulse.

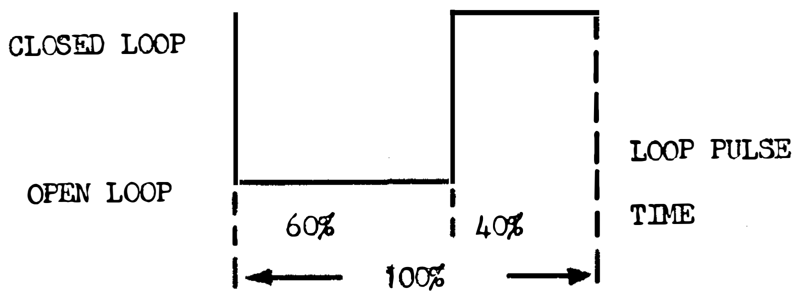

Figure 7: Dial Pulse Conditions

If the total time of the pulse (about .1 sec) is designated 100%, the open loop period can be referred to as a percentage of the total and is usually about 60%, as shown. This is referred to as "percent break" and is measured with the Lenkhurt signal test set when aligning and testing dial circuits. A DCO will function with distorted dial pulses but its ability to handle marginal signals is limited and reliable service depends as much on delivery of a good signal to the DCO as good maintenance of the switching equipment. Another dial pulse characteristic that is measured with the Lenkurt signal test set is pulse speed, usually 10 to 12 pulses per second.

In Vietnam a telephone user dials a code (usually three digits) to select a trunk to another DCO. The three digit code is taken by the DCO switching equipment and seizes a trunk to the desired distant DCO. From this point on the loop dial signals are changed to M lead signals by the pole changer to key the SF set in the EE building. The dial signal seen by EE Building personnel is not a loop signal.

The M lead signal consists of battery and ground pulses toward the SF set corresponding to closed and open loop pulses. The M lead pulses have the same percent break characteristic as the loop pulses, assuming proper adjustment of the pole changer relay. E lead pulses consist of grounds and opens, toward the DCO, corresponding to loop pulse closures and opens. Figure 8 shows the relationship between loop, M, and E lead pulses.

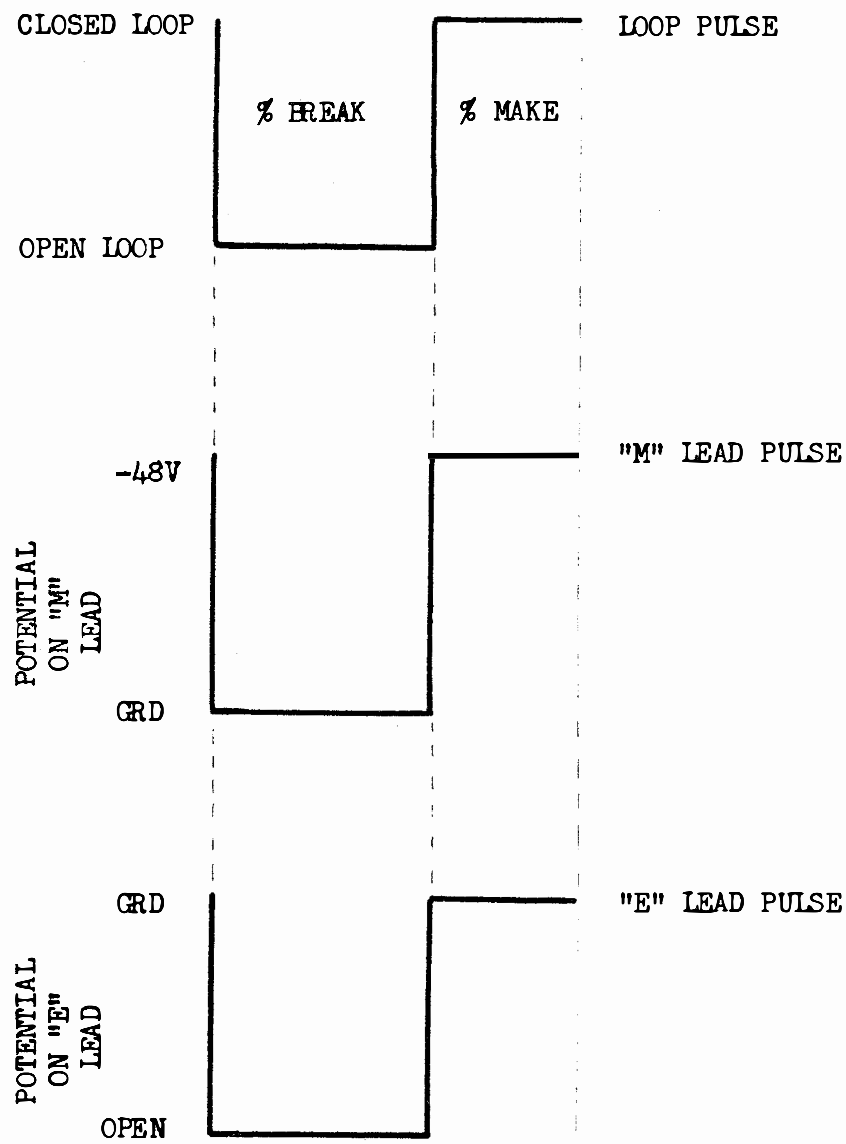

Figure 8: E and M Lead Pulse Relationships.

Figure 9 illustrates the relationship of dial circuit on and off hook conditions.

	LOOP	M	E	2600 TONE
ON HOOK	OPEN	GRD	OPEN	ON
OFF HOOK	CLOSED	BATT	GRD	OFF

Figure 9: Relationship between Dial Circuit on-off Hook Conditions.

IWCS Collins SF sets were strapped when installed, for ring down circuits (Figure 2) and must be modified for dial operation. Figure 2 illustrates dial circuit strapping. On the back of the SF set mounting is a vertical terminal strip. The terminals shown on Figure 2 (6,20,21 and 22) will be found there. An SF set used for ring down operation has a strap, 6 to 22. To convert for dial operation the strap should be from 6 to 20.

4. MULTI FREQUENCY DIAL CIRCUITS: Multi frequency pulsing dial circuits function in the same manner as single frequency pulsing circuits except that address signals (dial pulses) are replaced with a series of "tone pairs" of different frequencies. For instance, referring to Figure 10, a 6 is transmitted over the carrier channel as 700 and 1100 HZ tones.

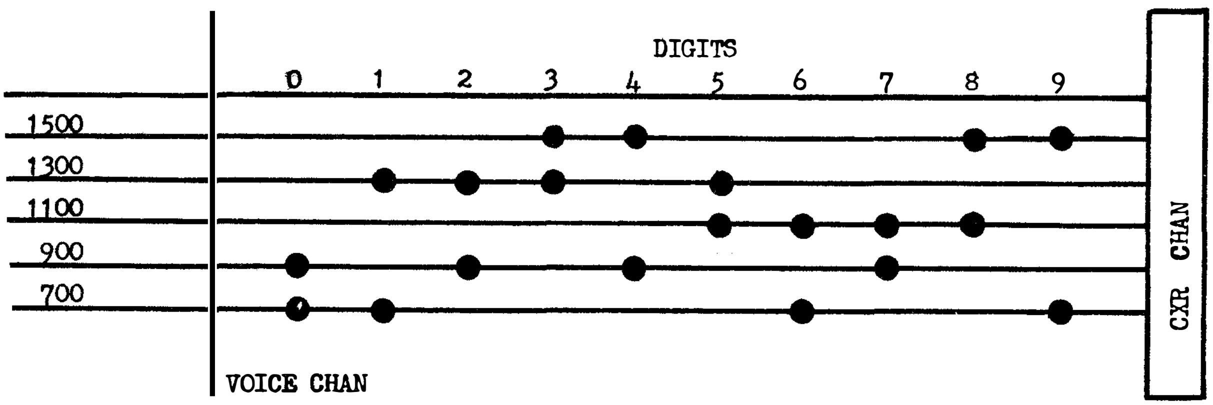

Figure 10: Multi Frequency Signalling

A multi frequency trunk circuit is required **at each** end **to translate** dial pulses to multi frequency tones and vice versa (Figure 11).

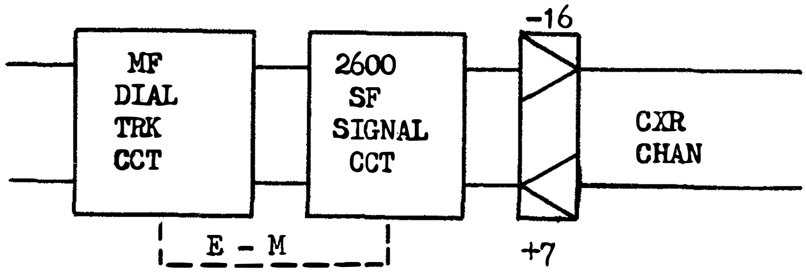

Figure 11: Multi Frequency Trunk

Note that an SF set is still required to perform supervisory functions.

Another type of multi frequency signalling is used on AUTOVON and, in Vietnam, on some EAC (Emerquency Action Console) circuits. A special tel set called a touch tone set is required. The touch tone set has 15 push buttons instead of a dial. Pushing any one of the buttons transmits a pair of locally generated tones to the DCO where a trunk circuit changes the tones to dial pulses or MF pulses for transmission over a carrier channel to a distant DCO.

There are eight tones generated in the touch tone set. The 4x4 grid of Figure 12 indicates the eight frequencies and the pairing necessary to produce any digit from 0 to 9 and four supervisory signals used only by AUTOVON switching machines.

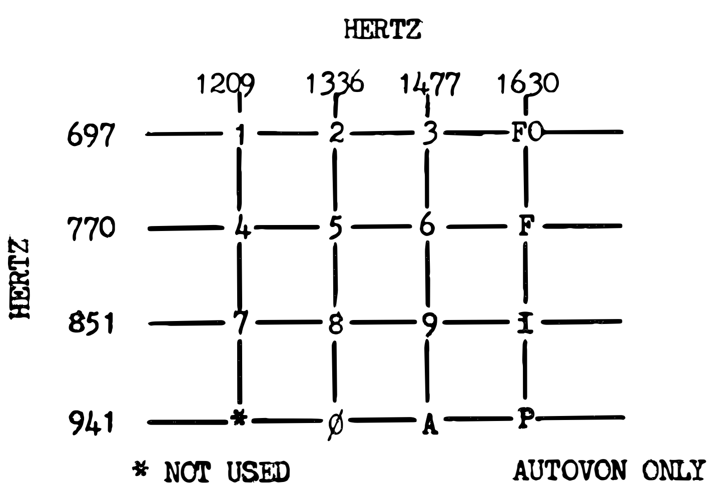

Figure 12: Touch Tone Tel Set Frequency Pairing

The AUTOVON signals **control only** pre-emption priority and "A" controls conference call set ups. The touch tone system is now in commercial use in several U. S. cities.

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TECHNICAL CONTROL

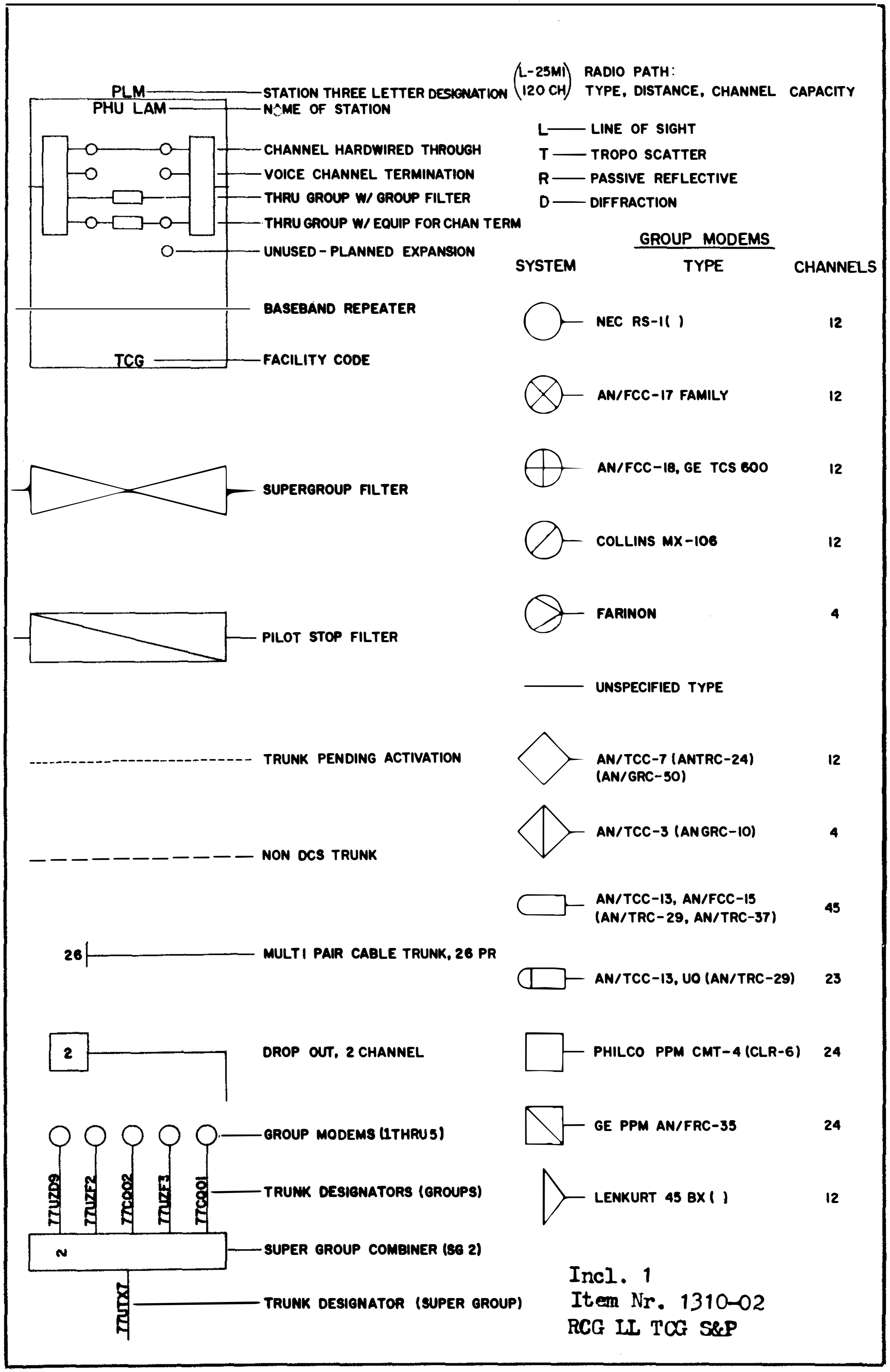
STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1310-02

SUBJECT: Symbols used on SEAWBS Trunk Diagrams

Attached as Inclosure 1 is a chart showing the various symbols used on the DCA-SAM Trunk Diagrams for the Southeast Asia Mainland Wideband System.



SYMBOLS USED ON SEAWBS TRUNK DIAGRAMS

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TECHNICAL CONTROL

STANDARDS AND PRACTICES

ITEM NR. 1320-02

SUBJECT: DCA Designator Codes for Trunks and Circuits

DCA Designation Codes are alpha-numeric codes assigned by DCA to identify all DCS trunks and circuits. The following information is correct as of 1 March 1968. However, changes in these codes occur quite often; consult an up-to-date copy of DCAC 310-65-1 for latest changes.

1. Trunk Designation Codes-a six position alpha-numeric code is assigned to each trunk. In addition, each group which traverses more than one trunk (i.e. it is through-grouped) will have a Trunk Designation Code. VFCT's (Voice Frequency Carrier Telegraph or "Tone Packs") will have a Trunk Designation Code and also a CCSD, the CCSD identifying the voice frequency circuit which the VFCT traverses.

a. First Position-identifies the DCA geographic region in which the "from" end of the trunk is located, using the following code:

1 USA and Central and South America

2 Canada and Greenland

3 Great Britain and Scandinavia

4 European Mainland

5 West Africa

6 Middle East and East Africa

7 Western Pacific

8 Eastern Pacific

9 Alaska

b. Second Position-identifies the DCA geographic region in which the "to" end of the trunk is located using the same code as the first digit.

c. Third Position-this indicates the agency (s) providing the trunk:

A Dept of State

B Dept of the Navy (includes Marines)

C Joint Army/Air Force

D Other agencies not listed, including foreign governments

E Joint Air Force/Navy

F Joint Army/Navy

G General Service Administration

H Diplomatic Telecommunications System

I Allied Governments

J Dept of the Air Force

K Commercial leased by DOD other than Army, Navy or Air Force

L Federal Aviation Agency

M National Aeronautics and Space Administration

N Commercial leased by Dept of State

O Host Country Agencies

P Commercial leased by General Services Administration

Q Commercial leased by Diplomatic Telecommunications System

R Commercial leased by the Federal Aviation Agency

S Commercial leased by National Aeronautics and Space Administration

T Commercial leased by the Federal Aviation Agency

U Dept of the Army

V Commercial leased by Dept of the Army

W Commercial leased by Dept of the Air Force

Y Commercial leased by Dept of the Army

Z Commercial leased by Dept of the Navy

d. Fourth Position-identifies the type of trunk:

A Single Channel Radio

B Sideband

C Time Division Multiplex

D AUTODIN in-plant Cable Mode I

E AUTODIN in-plant Cable Mode V

G Satellite Relay (Passive)

H Point-to-Point Radio Relay

J Radiotelegraph (CW)

M Microwave (Wideband)

P Landline Cable (other than on-base)

Q Submarine Cable (a composite trunk routed on a submarine cable for any of its path will use this code)

R Landline Cable (other than on base)

S Satellite Relay (Active)

T Forward Propagation Tropospheric Scatter (FPTS)

V Forward Propagation Ionospheric Scatter (FPIS)

W Microwave (narrowband)

X VFCT

Y VFCT (HF/SSB)

Z Composite system (i.e. trunk with segments of non-similar media, other than submarine cable)

e. Fifth and Sixth Positions-alpha-numeric combination assigned by DCA to identify the particular trunk.

Following is an example of a trunk designator code:

7	7	U	T	47
GEOGRAPHIC AREA ("from" end)	GEOGRAPHIC AREA ("to"end)	AGENCY PROVIDING TRUNK	TYPE OF TRUNK	DCA NUMBER

The number on Page 3 indicates that the trunk is provided by the Army and is on a tropospheric scatter system. Both ends of the trunk are in the Western Pacific Area and DCA has assigned number 47 to it.

2. Command Communications Service Designator (CCSD).- an eight position alpha-numeric code assigned to each voice frequency circuit.

a. First Position-identifies the agency requiring the circuit:

A Dept of State

B Dept of the Navy

C Joint Army Air Force

D Other agencies not listed, including foreign governments

E Joint Air Force/Navy

F Joint Army/Navy

G General Services Administration

H Diplomatic Telecommunications Service

I Allied Governments

J Dept of the Air Force

L Federal Aviation Agency

M National Aeronautics and Space Administration

O Host Country Agencies

U Dept of the Army

b. Second and Third Positions-this identifies the DCS network. A partial listing follows (complete listing is found in DCA 310-65-1).

AG Federal Aviation Agency
BP Naval Special Administrative and Logistics Network
BD Fleet Broadcast Access Network
CA Air Force Air Defense Command Network
CC PACAF Air Defense Voice Network
CF PACFLT Command and Control
DD DCA Operations Network
DF Navy Direction Finding Network
DI Defense Intelligence Agency Network
DR Army Security Agency

DS Diplomatic Telecommunications System Network
EA Air Force Security Service
FO Fleet Operations Control Network
GU US Coast Guard
JE SAC Teletypewriter Network
JG SAG Telephone Network
JP Pacific Command Joint Network
KK Army Command and Control Network
KL Keying Lines
KV Army Aviation Network
MC US Marine Corps
MV US Military Assistance Network
NK Foreign Broadcast Information Service
NS Navy Security Group
CO DCS Order Wire
PC AF Command Net
PD Pacific Air Forces Defense Network
PH Army Continuity of Operations Network
PS Commercial Press Services
QA MAC Teletype Communications Network
QE Weather, TTY, Civil, FAA
QG Weather, TTY, DCS/USAF
QI Facsimile Civil US Weather Bureau, FAA
QJ Weather Fascimile DCS/USAF
QM MAC Operational System Network
RA Pacific Air Forces Teletype Network
RF FACAF Command and Control Network
RS Armed Forces Radio and TV Service and Stars and Stripes Network
SO Spare Channel
SP Spare Patch/Interconnect
TF Department of State
TE Army, Air Force, Navy Temporary
TU VFCT PRO Data Network
TX VFCT Trunk
TY AFTAC Zip Data Network
TZ AFTAC Teletypewriter Network
UA DCS Teletypewriter Network
UB DCS Voice Network
UC Command and Control AUTOVON
UD Secure Voice
UJ Automatic/Manual Telephone Switching Network
UL DCS Digital Data Network
UM Special Purpose Voice Network
UO Air Force Air Operations Network
UW Inter-Departmental Dial Telephone Network
WX Navy Weather Network
YA Fleet Ship-Shore Access Network
ZM Military Air Traffic Control & Flight Facilities Network
ZY DCA Commercial Carrier Network

c. Fourth Position-indicates the type of service and speed of the circuit:

A 60 WPM (TTY) (Includes 66 WPM)

B 75 WPM (TTY)

C 100 WPM (TTY)

D 75 BAUD (5 CPM DATA)

E 2000 WPM (TTY)

F 1200 BAUD (100 CPM DATA) 3 kHz HF or LL

G 2400 BAUD (200 CPM DATA) 3 kHz HF or LL

H 4800 BAUD (400 CPM DATA) 6 kHz LL

J Graphics (FAC)

K CW

L 20,000 Bits/Sec (48 kHz)

M 50,000 Bits/Sec (120 kHz)

N 100,000 Bits/Sec (240 kHz)

P 500,000 Bits/Sec (1000 kHz)

Q 150 BAUD (12 CPM Data)

R 300 BAUD (25 CPM Data)

S 600 BAUD (50 CPM Data)

T 750 BAUD

U 066-068 IBM (10-40 CPM Data)

V Voice

W Alternate Voice/Data

X Tone Signalling

Y TTY (45 Baud or less)

Z AUTODIN In-station Equipment

d. Fifth, Sixth, Seventh and Eigth Positions:

These are assigned by DCA to identify the particular circuit.

Following is an example of a CCSD:

J	UA	C	KAZ9
AGENCY REQUIRING CIRCUIT	DCS NETWORK	TYPE OF SERVICE AND CENTER SPEED	DCA IDENTIFICATION

The above CCSD indicates that this is an Air Force circuit on the DCS Teletypewriter network. It is a 100 wpm circuit and is identified by KAZ9.

The DCA identification code normally will tell you nothing about the circuit, but in some cases it will. The following code is used on certain types of circuits:

1 - - -	CRITICOM circuit
P A - -	Temporary circuit
6 - - -	Audio path VFCT

The letters "O" and "I" are <u>never</u> used in a DCA identification code.

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO SAN FRANCISCO 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

ITEM NR. 1321-02

SUBJECT: DCA 3-LETTER GEOGRAPHICAL DESIGNATION CODES

ADA	AP DANGIA
AGU	AGUINALDO
AKE	AN KHE
ALI	ALIAMANU
ALX	ALEXANDRIA
ARL	ARLINGTON
ARW	ANDREWS
ASM	ASMARA
ASN	ANDERSEN
BAD	BA DI
BAQ	BA QUEO
ATO	AN THOI
BGK	BUNG KAN
BKK	BANGKOK
BKN	BANG KHEN
BLU	BAC LIEU
BMT	BAN ME THUOT
BNH	BIEN HOA
BNL	BIEN LOI
BOL	BAO LOC
BPA	BANG PLA
BPG	BANG PING
BRA	BARIA
BSA	BASE-A (CONSECUTIVE)
BTY	BINH THUY
CBP	CUBI PT
CCI	CU CHI
CCK	CHING CHUAN KANG
CHI	CHITOSE
CHL	CHU LAI
CHO	CHACHOENSAO
CLK	CLARK
CLN	CHOLON
CLR	CU LAO RE
CLT	CHELTENHAM
CMI	CHIANG MAI
CMU	CA MAU
CPD	CP DRAKE
CPH	CP HOLLOWAY
CPS	CP SMITH
CPZ	CP ZAMA
CRA	CAM RANH AB
CRB	CAM RANH BAY
CRO	CHEO REO
CSF	CMDR 7TH FLEET
CTO	CAN THO
DAN	DI AN
DAU	DAU
DAV	DAVIS
DBT	DONG BA THIN
DCH	DUC HOA
DGG	DUONG DONG
DGH	DONG HA
DGM	DRAGON MT
DGN	DA NANG NORTH
DGT	DONG TAM
DGP	DONG PHUOC
DGW	DA NANG WEST
DLT	DALAT
DMG	DON MUANG
DMY	DUC MY
DNE	DA NANG EAST
DNG	DA NANG
DNN	DONG BA THIN NORTH
DPO	DUC PHO
ELT	EL TORO
FIN	FINEGAYAN
FMH	FM HILL
FMM	FT MONMOUTH
FTB	FT BUCKNER

FTD	FT DETRICK
FTM	FT MEADE
FTS	FT SHAFTER
FUC	FUCHU
GDH	GIA DINH
GIA	GIA NGHIA
GNH	GREEN HILL
GUA	AGANA
HAN	HOI AN
HAZ	HANZA
HEL	HELEMANO
HIK	HICKAM
HNI	HO NAI
HNL	HONOLULU
HNW	HOI AN WEST
HQN	HON QUAN
HTR	HON TRE ISLAND
HUE	HUE
JHY	CP JOHN HAY
JZM	JUZON MT
KAD	KADENA
KAU	KAUAI
KCA	KANCHANABURI
KHK	KHON KAEN
KKG	KHANH KUNG
KKT	KOKE KATHIEM
KLT	KLONG TOUEY
KNE	KANEOHE
KPT	KINGSPORT
KRT	KORAT
KSH	KHE SANH
KTM	KON TUM
LBM	LANG BIAN MT
LBN	LONG BINH
LKE	LAI KHE
LMS	LAM SON
LNN	LONG THANH NORTH
LNT	LOENG NAK THA
LOS	LOS ANGELES
LPB	LOP BURI
LPG	LAM PANG
LTH	LONG THANH
LXN	LONG XUYEN
MAN	MANILA
MBM	MARBLE MT
MCC	MC CLELLAN DIN
MID	MIDWAY
MKD	MUKDAHAN
MTH	MY THO
MYM	MONKEY MT
NBD	NUI BA DEN
NBE	NHA BE
NHA	NHA TRANG
NHH	NINH HOA
NIC	NICHOLS
NPN	NAKHON PHANOM
NTN	NHA TRANG NORTH
OAK	OAKLAND
PGN	PENTAGON
PHB	PHU BAI
PHC	PHU CAT
PHE	PHU HIEP
PHT	PHU TAI
PKN	PLEIKU NORTH
PKO	PHU KHIEO
PKU	PLEIKU
PLM	PHU LAM
PLO	PHU LOI
PMU	PHU MU
PNS	PHANOM SARAKHAM
PNT	PHAN THIET
PRG	PHAN RANG
PRL	PR'LINE
PSL	PHITSANULOK
PSW	PESHAWAR
PTH	PHU THANH
PTY	PATTAYA
PUS	PLEIKU SOUTH
PVN	PHUOC VINH
PYK	PHON YANG KHAM
QNC	QUI NHON CAPITOL
QNG	QUANG NGAI
QNH	QUI NHON
QTR	QUANG TRI
RDP	RITIDIAN PT
QTA	QUANG TRI AB
RGA	RACH GIA
RIT	SANTA RITA
ROB	ROBINS
SAC	SACRAMENTO
SBE	SONG BE
SCH	SCHOFIELD BKS

SCT	SOC TRANG
SDC	SADEC
SEO	SEOUL
SGA	SAIGON OLD AEB
SGB	SAIGON NEW AEB
SGN	SAIGON
SGY	SANGLEY PT
SHP	SATTAHIP
SIN	SINGAPORE
SKN	SAKON NAKHON
SMG	SAN MIGUEL
SOB	SOBE
SRA	SIRACHA
STK	STOCKTON
TAE	TAEGU
TAI	TAINAN
TAN	TUY HOA NORTH
TBU	TOBARU
TCH	TACHIKAWA
TKL	TAKHLI
TKO	TOKYO
TKY	TAM KY
TMH	TUNG MANHOMEK
TNH	TAY NINH
TNW	TAY NINH WEST
TPI	TAIPEI
TRI	TRAI MAT MT
TSN	TAN SON NHUT
TSP	TRANG SUP
TYA	TUY HOA AB
TYH	TUY HOA
TYN	TAO YUAN
UBN	UBON
UDN	UDORN
UPT	U-TAPAO
VCM	VUNG CHUA MT
VGR	VUNG RO
VLG	VINH LONG
VNT	VIENTIANE
VTA	VUNG TAU AB
VTU	VUNG TAU
WAH	WAHIAWA
WAL	CP WALLACE
WAS	WASHINGTON
WKE	WAKE
WRN	WARIN
WRP	WRIGHT PAT AFB
XNL	XUAN LOC
YOK	YOKOTA AB
YUK	YOKOSUKA
ZUK	ITAZUKE

ADA	AP DANGIA
AGU	AGUINALDO
AKE	AN KHE
ALI	ALIAMANU
ALX	ALEXANDRIA
ARL	ARLINGTON
ARW	ANDREWS
ASM	ASMARA
ASN	ANDERSEN
ATO	AN THOI
BAD	BA DI
BAQ	BA QUEO
BGK	BUNG KAN
BKK	BANGKOK
BKN	BANG KHEN
BLU	BAC LIEU
BMT	BAN ME THUOT
BNH	BIEN HOA
BNL	BINH LOI
BOL	BAO LOC
BPA	BANG PLA
BPG	BANG PING
BRA	BARIA
BSA	BASE-A(CONSECUTIVE)
BTY	BINH THUY
CBP	CUBI PT
CCI	CU CHI
CCK	CHING CHUAN KANG
CHI	CHITOSE
CHL	CHU LAI
CHO	CHACHOENSAO
CJH	CP JOHN HAY
CLK	CLARK
CLN	CHOLON
CLR	CU LAO RE
CLT	CHELTENHAM
CMI	CHIANG MAI
CMU	CA MAU
CPD	CP DRAKE
CPH	CP HOLLOWAY
CPS	CP SMITH
CPZ	CP ZAMA
CRA	CAM RANH AB
CRB	CAM RANH BAY
CRO	CHEO REO
CSF	CMDR 7TH FLEET
CTO	CAN THO
DAN	DI AN
DAU	DAU
DAV	DAVIS
DBT	DONG BA TRIN
DCH	DUC HOA
DGG	DUONG DONG
DGH	DONG HA
DGM	DRAGON MT
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DGP	DONG PHUOC
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DMG	DON MUANG
DMY	DUC MY
DNE	DA NANG EAST
DNG	DA NANG
DNN	DONG BA THIN NORTH
DPO	DUC PHO
ELT	EL TORO
FIN	FINEGAYAN
FMH	FM HILL
FMM	FT MONMOUTH
FTB	FT BUCKNER
FTD	FT DETRICK
FTM	FT MEADE
FTS	FT SHAFTER
FUC	FUCHU
GDH	GIA DINH
GIA	GIA NGHIA
GLE	GIA LE
GNH	GREEN HILL
GUA	AGANA
HAN	HOI AN
HAZ	HANZA
HEL	HELEMANO
HIK	HICKAM
HNI	HO NAI
HNL	HONOLULU
HNW	HOI AN WEST
HQN	HON QUAN
HTR	HON TRE ISLAND
HUE	HUE
JUZ	JUZON MT
KAD	KADENA
KAU	KAUAI
KCA	KANCHANABURI
KHK	KHON KAEN
KKG	KHANH KUNG
KKT	KOKE KATHIEM
KLT	KLONG TOUEY
KNE	KANEOHE
KPT	KINGSPORT
KRT	KORAT
KSH	KHE SANH
KTM	KON TUM
KUN	KUNIA
LBM	LANG BIAN MT
LBN	LONG BINH
LKE	LAI KHE
LMS	LAM SON —
LNN	LONG THANH NORTH
LNT	LOENG NAK THA
LOS	LOS ANGELES
LPB	LOP BURI
LPG	LAM PANG
LTH	LONG THANH
LXN	LONG XUYEN
MAN	MANILA
MBM	MARBLE MT
MCC	MC CLELLAN
MCL	MC CLELLAN DIN
MID	MIDWAY
MKD	MUKDAHAM
MTH	MY THO
MYM	MONKEY MT
NAH	NAHA
NBD	NUI BA DEN
NBE	NHA BE
NHA	NHA TRANG
NHH	NINH HOA
NIC	NICHOLS
NPN	NAKHON PHANOM
NTN	NHA TRANG NORTH
OAK	OAKLAND
PGN	PENTAGON
PHB	PHU BAI
PHC	PHU CAT
PHE	PHU HIEP
PHT	PHU TAI
PKN	PLEIKU NORTH
PKO	PHU KHIEO
PKU	PLEIKU
PLM	PHU LAM
PLO	PHU LOI
PMU	PHU MU
PNS	PHANOM SARAKHAM
PNT	PHAN THIET
PRG	PHAN RANG
PRL	PR LINE
PSL	PHITSANULOK
PSW	PESHAWAR
PTH	PHU THANH
PTL	PT LOMA
PTY	PATTAYA
PUS	PLEIKU SOUTH
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QNG	QUANG NGAI
QNH	QUI NHON
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QTR	QUANG TRI
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SCH	SCHOFIELD BKS
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SGA	SAIGON OLD AEB
SGB	SAIGON NEW AEB
SGN	SAIGON
SGY	SANGLEY PT
SHP	SATTAHIP
SIN	SINGAPORE
SKN	SAKON NAKHON
SMG	SAN MIGUEL
SPP	SATTAHIP PORT
SOB	SOBE
SRA	SIRACHA
STK	STOCKTON
TAE	TAEGU
TAI	TAINAN
TAN	TUY HOA NORTH
TBU	TOBARU
TCH	TACHIKAWA
TKL	TAKHLI
TKO	TOKYO
TKY	TAM KY
TMK	TUNG MAHOMEK
TNH	TAY NINH
TNW	TAY NINH WEST
TPI	TAIPEI
TRI	TRAI MAT MT
TSN	TAN SON NHUT
TSP	TRANG SUP
TYA	TUY HOA AB
TYH	TUY HOA
TYN	TAO YUAN
UBN	UBON
UDN	UDORN
UTP	U-TAPAO
VCM	VUNG CHUA MT
VGR	VUNG RO
VLG	VINH LONG
VNT	VIENTIANE
VTA	VUNG TAU AB
VYA	CAMP VAYAMA
VTU	VUNG TAU
WAH	WAHIAWA
WAL	CP WALLACE
WAS	WASHINGTON
WKE	WAKE
WRN	WARIN
WRP	WRIGHT PAT AFB
XNL	XUAN LOC
YKT	YOKOTA AB
YUK	YOKOSUKA
ZUK	ITAZUKE

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

ITEM NR: 1322-02

SUBJECT: DCA User Terminal and Enroute Facility Codes

The following terminal and facility codes are a few of the more common ones that a technical controller will encounter. A more complete list is given in DCAC 310-65-1.

CODE	DESCRIPTION
AAV	Army Aviation Terminal
ACA	Army Communications Center
ACF	Fwd Air Control Post
ACG	American Consulate General
ACO	American Consulate
ACP	Air Component Command Post
AEB	American Embassy
AER	Aeronautical Station
AFB	Air Force Base
AFC	Air Force Communications Center
AFD	Air Force Communications Service
AFL	Air Field
AFN	Armed Forces Network
AGN	Naval Advisory Group
ALO	Air Liaison Center
AMA	Air Movement Information Section
AOB	Army Overseas Switchboard
AOC	Air Force Overseas Relay Center
ASC	Air Support Op Cen/Dasc or Asoc
ASF	Advisor Special Forces
ATC	Air Route Traffic Control Center
AVN	Army of Vietnam
BBD	Base Post Camp Station Switchboard
BCA	Communications Office
BCC	Navy Communications Center
BCO	Base Communications Center
BFC	Navy Facilities Control
BOP	Base Operations
BOR	On-Line Relay Facility
CBC	Construction Battalion Center
CCC	Command Communications Control Center
CCF	CRITICOMM Technical Control Facility
CCO	CRITICOMM Operations
CCT	Communications Center
CIN	Combat Intell Center
CKA	Communications Squadron
COC	Command/Combat Operations Center
COM	Commercial Switchboard
COV	Comm Opns Van

CODE	DESCRIPTION (Cont'd)
CPA	Command Post
CRC	Control Reporting Point (Cmd & Control)
CRP	Control Reporting Post
CSU	AUTODIN Automatic Relay Ckt Sw Unit
CTC	Commercial Cable/Radio Carr Tech Cont Fac
CTP	Circuit Tie Point
CXR	Cable Radio Carrier Tech Cont Fac
CXX	Cable Radio Carrier Tech Cont WO DEMOD
CXL	Cable Carrier Sys at Tech Control
DAC	Defense Communications Agency Area Operations Center
DAR	Dept of Army
DCA	Defense Communications Agency Operations Center
DCO	Division Communications Office
DCR	Defense Communications Agency Regional Operations Center
DIS	Dispatch
DOD	Dept of Defense
DPA	DCS AUTODIN Computer Terminal
DPC	DCS AUTODIN General Purpose Terminal
DPE	DCS AUTODIN Magnetic Tape Terminal
DRA	DCS AUTODIN Manual Relay
DRC	DCS AUTODIN Automatic Relay
DTC	AUTODIN Auto Relay Tech Control
DTE	Dial Telephone Exchange
ENG	Corps of Engineers
ESO	Electronic Supply Office
FAC	Forward Air Controller
FAX	Facsimile Center
FCA	Federal Communications Commission
FCM	Marine Facilities Control
FFH	Field Forces Command Hq
FFO	Flight Following Office
FOC	Fighter Opns Center
FPA	Forward Propagation Ionosphere Scatter Bldg
FRP	Field Representative Far East
FSB	FTS Switchboard
FSF	FTS Class 4 Terminal Switch
FSH	FTS Class 3 Switching Facility
FSI	FTS Class 1 Switching Facility
FST	FTS Class 2 Switching Facility
FWC	Fleet Weather Control
FWF	Fleet Weather Facility
GBA	Global Communications Bldg
GCA	Ground Controlled Approach
GWC	Global Weather Center
ION	Ionospheric Monitoring Station
JCC	Joint Communications Center
JCR	Joint CRITICOMM RElay Center
JGS	Joint General Staff
JOC	Joint Operations Centers
LCC	Communications Long Lines Central Control

CODE	DESCRIPTION (Cont'd)
MAG	Military Assistance Advisory Group
MAR	MARS (Army)
MAS	Marine Corps Air Station
MAW	Marine Aircraft Wing
MBC	Marine Command Center
MCB	Marine Corps Base
MCC	Army Message Center
MCD	Air Force Message Center
MCE	Navy Message Center
MCF	Message Center Facility
MCH	Movement Report Control Center
MCO	Main Control Center
MCP	USMC CMD Post or Opns Cen
MCR	Master Control Center Station
MCS	Main Control Station (Radio Relay or Wire)
MDF	Main Distribution Frame
MFC	Military Flight Service Center (MFSC)
MFU	Missile Fire Unit
MRA	Army Minor Relay Station
MRB	Air Force Minor Relay Station
MRC	Navy Minor Relay Station
MRP	Movement Report Center
MRS	Microwave Repeater Site
MSU	AUTODIN Auto Relay Msg Sw Unit
MTL	MATS Liaison Office
MXA	Mobile Radio
NAF	Naval Air Facility
NAS	Naval Air Station
NBA	Naval Base
NCF	Naval Communication Facility
NCS	Naval Communication Station
NCU	Naval Communication Unit
NEL	Naval Electronic Laboratory
NFA	Naval Facility
NHQ	Naval Communications Systems Hq
NIC	Naval Information Center
NOB	Naval Operating Base
NRA	Naval Radar
NRD	Naval Radio Office
NVN	Vietnamese Naval Terminal
NYA	Fleet Action Control
OCA	Operations Center
OCN	Overseas Connection
OPA	Operations Bldg
OPF	Operations Office
OPV	Operations Van
ORC	Operations Research Control Group
OSA	Overseas Supply Agency (Army)
OSS	Overseas Switchboard
POC	CINC Pacific Operations Center

CODE	DESCRIPTION (Cont'd)
PRF	Peripheral Site
PRS	Army Major Primary Relay Station
PRT	Air Force Major Primary Relay Station
PRU	Navy Major Primary Relay Station
PSB	Press Switchboard
PYO	Public Information Office
RAC	Naval River Assault Center
RAN	Radio Vietnam
RAP	RAPCON
RAS	Radar Site
RAT	Radar Air Traffic Control Center
RCC	Rescue Coordination Center
RCE	Army Receiver Station
RCN	Remote Combat Center
RCO	Remote Communications Outlet
RCV	Air Force Receiver Station
RCW	Navy Receiver Station
RFA	Reports Center
RLT	Radio Terminal (W/O Tech Control)
RMA	Radio Room
RNA	Operations Radio Naval Air Station
RNZ	Royal New Zealand Navy Message Center
ROC	Reconnaissance Operations Center
ROK	Korean Forces Command
RRC	Remote Control Center
RRF	Regional Relay Facility
RRS	Radio Relay Station
RSA	Radio Site
RSE	Receiver Site
RVN	Republic of Vietnam
SAC	SAC Headquarters
SAR	Sea - Air - Rescue Unit
SBA	SAC Composite Bldg
SBK	Switchboard, Korean
SBL	Signal Building
SBU	Switchboard, Army
SCA	AUTOVON Switching Facilities
SCC	SAC Communications Center
SCP	SAC Command Post
SDP	Signal Depot
SDT	SCAN Data Terminal
SIG	Signal Corps
SOC	Squadron Operations Center
SPI	Spintcom Relay/Terminal
SSA	Signal Supply Agency
SSO	Special Security Office
STC	Staff Communications Office
STE	Satellite Control Center
STO	Satellite Operations Center
STT	SAC Tech Control

CODE	DESCRIPTION (Cont'd)
SWB	Switchboard
SWC	Switching Center other than AUTOVON
SWF	MATS Switchboard
SYT	SYNCOM Terminal (Def Sat Comm Sys Earth Terminal)
TAC	Tactical Air Control Center
TBD	Command Switchboard
TBS	Tributary Station
TBX	Air Force Tributary Station
TBZ	Navy Tributary Station
TB2	Telephone Swbd (Tact)
TB3	Telephone Swbd (Tact)
TCA	Traffic Control Agency
TCC	Transport Control Center
TCF	Air Force Technical Control Facility
TCG	Army Facilities Control (STARCOM)
TCL	Technical Control
TCM	Tech Control Fac - Limited Capability
TCT	Comm Center/Term (Tact)
TCU	Traffic Control Unit
TC2	Comm Center/Term (Tact)
TGX	Tech Control Fac without DEMOD Capability
THA	Cdr Tactical Air Command (TAC)
TIC	Technical Intelligence Center
TIP	DCS/Tactical Interface Point
TOC	Tactical Operations Center
TMC	Transport Movement Center
TMT	Transportable MW/Tropo/VHF Fac (W/Tech Control)
TRS	Transmitter Site
TSM	Telephone Toll Sw (Manual)
TTC	Transportation Traffic Coordinator
TTF	Telecon Terminal Facility
TUC	Command Post/Op Cen (Tact)
TUN	Transportation Unit
TWR	Control Tower
TXL	Army Transmitter Station
TXM	Air Force Transmitter Station
TXO	Navy Transmitter Station
UTS	Unattended Transceiver Site
VAF	Vietnamese Air Force
WFC	Weather Forecast Center
WOA	Wing Communications Office
WOC	Wing Operations Center
WRC	Weather Relay Center
WSA	Weather Station
WSS	Wing Command Post
YAA	Subscriber (NCMC) to AUTOVON
YAB	Data (NCMC SSB) to AUTOVON
YAC	Voice (NCMC SSB) to AUTOVON
YAJ	Voice to CC and DC
YBD	Combat Center Primary Data
YBG	Combat Center PBX Access

CODE	DESCRIPTION (Cont'd)
YBH	Combat Center T2 Conditioned PBX
YBJ	Combat Center Receiving Voice Alert (DC)
YBK	Combat Center Commanders Conf.
ZAR	American Red Cross
ZBG	Dept of Army (Overseas Swbd)

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1340-02

SUBJECT: Comparison of Voice Frequency Carrier Telegraph (VFCT/VFTG) Channel Frequencies

Attached as inclosure 1 is a chart showing the channel frequencies and internal loop battery capabilities of some of the more common VFCT equipments.

Non-diversity Systems		425	595	765	935	1105	1275	1445	1615	1785	1955	2125	2295	2465	2635	2805	3230
AN/FCC-3,-7,-8 (Note 1)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
AN/FCC-19,-25,FGC-60		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NRC-235					1	2	3	4	5	6	7	8	9	10	11	12	
AN/TCC-4 Term "A" (2W)	SEND									8	4	7	3	6	2	5	1
	RECV	5	1	6	2	7	3	8	4								
AN/TCC-4 Term "A" (4W)	SEND	9	13	10	14	11	15	12	16	8	4	7	3	6	2	5	1
	RECV	5	1	6	2	7	3	8	4	12	16	11	15	10	14	9	13
AN/TCC-20 Term "A"	SEND		1		2		3		4								
	RECV	1		2		3		4									

Diversity: All even numbered channels are inverted (Mark freq. below center freq.)

AN/FGC-29,-61,-61A	2	4	6	8	10	12	14	16	1	3	5	7	9	11	13	15

INTERNAL BATTERY CAPABILITIES

	neut	polar	rec	snd
AN/FCC-3	60ma 20ma	30ma	x	
AN/FCC-7	60ma 20ma	30ma	x	
AN/FCC-8	60ma 20ma	30ma	x	
AN/FCC-19	60ma	20ma		
AN/FCC-25	60ma	20ma		
AN/FGC-29	60ma		x	x
AN/FGC-60	60ma		x	
AN/FGC-61	60ma 20ma		x	x
AN/FGC-61A	60ma 20ma		x	x
NRC-235	60ma		x	
AN/TCC-4	20ma		x	x
AN/TCC-20	20ma		x	x
TH-5	20ma		x	x

TH-5 center freq 1275 Hz, shift ± 50 Hz

Note 1: The FCC-3 contains only channels 1 thru 8 plus an additional four (4) wideband channels which are not compatible with any other system presently in use. The center frequencies of these additional channels are;

9-1955 (± 85 Hz) 11-2805 (± 85 Hz)
10-2380 (± 85 Hz) 12-3230 (± 85 Hz)

The first 8 channels of 2 each FCC-3's will form a 16 channel system utilizing channel converters provided. The FCC-8 contains only channels one thru eight. The FCC-7 contains channels one thru eight and channel converters which may be used with an FCC-8 to form a 16 channel system.

Note 2: All channels shift ± 42.5 Hz unless otherwise indicated.

Incl 1
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Item Nr. 1340-01
RCG LL TCG S&P

DEPARTMENT OF THE ARMY
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APO SAN FRANCISCO 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

ITEM NR. 1350-02

SUBJECT: ICS NUMERICAL SITE DESIGNATIONS

SITE NO.	SITE NAME	SITE NO.	SITE NAME
09	UBON/WARIN	51	QUI NHON CABLE TERMINAL
11	VUNG TAU	61(16WW)	NHA TRANG (WET WASH AREA)
12	PLEIKU	62	QUANG TRI
13	PHU BAI	63	HON TRE ISLAND
14	DA NANG	64	MONKEY MOUNTAIN
15	QUI NHON	65	VUNG CHUA MOUNTAIN
16(16BP)	NHA TRANG(BACK PORCH AREA)	66	NEW MACV (GIA DINH)
		67	HONG CONG MOUNTAIN
17	PHU LAM	68	DONG HA
18	TAN SON NHUT	69	DA NANG EAST
19	BIEN HOA	70	PHU TAI
22	MACV II	71	PHU CAT
23	PR'LINE	72	NINH HOA
24	CAM RANH BAY	73	DONG BA THIN
25	VUNG TAU AIR BASE	74	DONG TAM
26	CAN THO	75	LONG BINH
27	HUE	76	TAY NINH
28	CHU LAI	77	DI AN
29	PHAN THIET	78	CU CHI
30	MACV I	79	PHU LOI
31	AMERICAN EMBASSY	81	VINH LONG
33	TUY HOA	82	SA DEC
34	NEW AMERICAN EMBASSY	83	LONG XUYEN
35	PHAN RANG	85	RACH GIA
36	CAM RANH BAY AIR BASE	86	BINH THUY
39	QUANG NGAI	87	KORAT SOC
40	SOC TRANG	88	TAN SON NHUT SOC
41	DA NANG CABLE TERMINAL	89	BAC LIEU
42	CAM RANH CABLE TERMINAL	90	CA MAU
44	VUNG TAU CABLE TERMINAL	92	QUI NHON ROK
45	BAN ME THUOT		
47	AN KHE		
50	SATTAHIP CABLE TERMINAL		

DEPARTMENT OF THE ARMY
HEADQUARTERS USA REGIONAL COMMUNICATIONS GROUP (VIETNAM)
APO San Francisco 96243

TECHNICAL CONTROL

STANDARDS AND PRACTICES

SCCPV-RG-PO-NW

ITEM NR: 1371-01

SUBJECT: Standard Jack Details-Reference Data

1. Background. There are numerous types of jack assemblies in common use in military communications facilities. Detailed information on their configurations and wiring is difficult to locate. This item provides schematics and other data on 11 different types of details.

2. Data Given on Details.

a. Table I gives the nomenclature, FSN, and description of each detail.

b. Schematics and sketches of the jack details are also given.

3. Use of DC Details. Several applications of DC Details are given in figures 16-24. The cabinet shown in Figure 16 is the Cabinet CY-3397A/G, 5975-892-9272, with Shelf Telephone FN-28/G, 5840-313-3561.

TABLE I: Jack Details - Reference Data

Common Name	Nomenclature	Description	FSN	Fig Nr.
		General View, D.C. Jack Detail		1
"A" Detail	Indicator Lamp Ass'y Detail "A", MX-4457/G	Two rows of 24 lamps each. One row white; one red. Designation strips for each row.	5815-086-8343	2
"B" Detail	Switch Key and Lamp Ass'y Detail "B", MX-4456/G	One row 24 red lamps with designation strip. One row 24 key switches, DPDT	5815-086-8342	3
"C" Detail	Jack Ass'y Detail "C", J-2110/G	Two row of 24 each series jacks for miscellaneous use	5815-086-8350	4
"D" Detail	Jack Ass'y Detail "D", J2109/G	24 Sets of D.C. Jacks-one "Set" and one "looping" jack in each set	5815-086-8358	5
"E" Detail	Switch Key and Lamp Ass'y Detail "E" MX-4455/G	Two rows of 24 each key switches-DPDT. Two rows of lamps-one white, one red.	5815-086-8352	6
"F" Detail	Switch Key and Lamp Ass'y Detail "F", MX-4427/G	One row of 24 each key switches-DPDT. Two rows of lamps-one white, one red.	5805-973-3544	7
"G" Detail	Jack Ass'y Detail "G", J-2102/G	24 sets of DC jacks. Each set with 2 cut-off jacks and 2 series looping jacks.	5935-973-3542	8

"H" Detail	Jack Ass'y Detail "H", J-2101/G	24 sets of DC Jacks. Each set with 2 cut-off jacks.	5935-973-3541	9
"I" Detail	Jack Ass'y Detail "I", J-2101/G	24 sets of DC Jacks. Each set with 1 cut-off jack and 3 series looping jacks.	5935-974-1521	10
"J" Detail	Key & Lamp Ass'y, Detail "J" MX-4426/G	24 sets of one lamp and one DPDT switch each	8505-973-3543	11
"K" Detail	Jack Ass'y Detail "K", J-2099/G	24 sets of DC jacks. Each set with 2 cut-off set jacks and 2 series looping jacks.	5935-974-1520	12
"L" Detail	Jack Ass'y Detail "L", TH-46/G		5805-957-4649	None
"M" Detail	Jack Ass'y Detail "M", J-2098/G	Twelve sets of single wire VF Jacks, 6 jacks in each set.	5935-974-1519	13&14
"N" Detail	Jack Ass'Y Detail "N", J-2097/G	24 sets of single wire miscellaneous VF Jacks; 2 jacks in each sets.	5935-973-3545	15

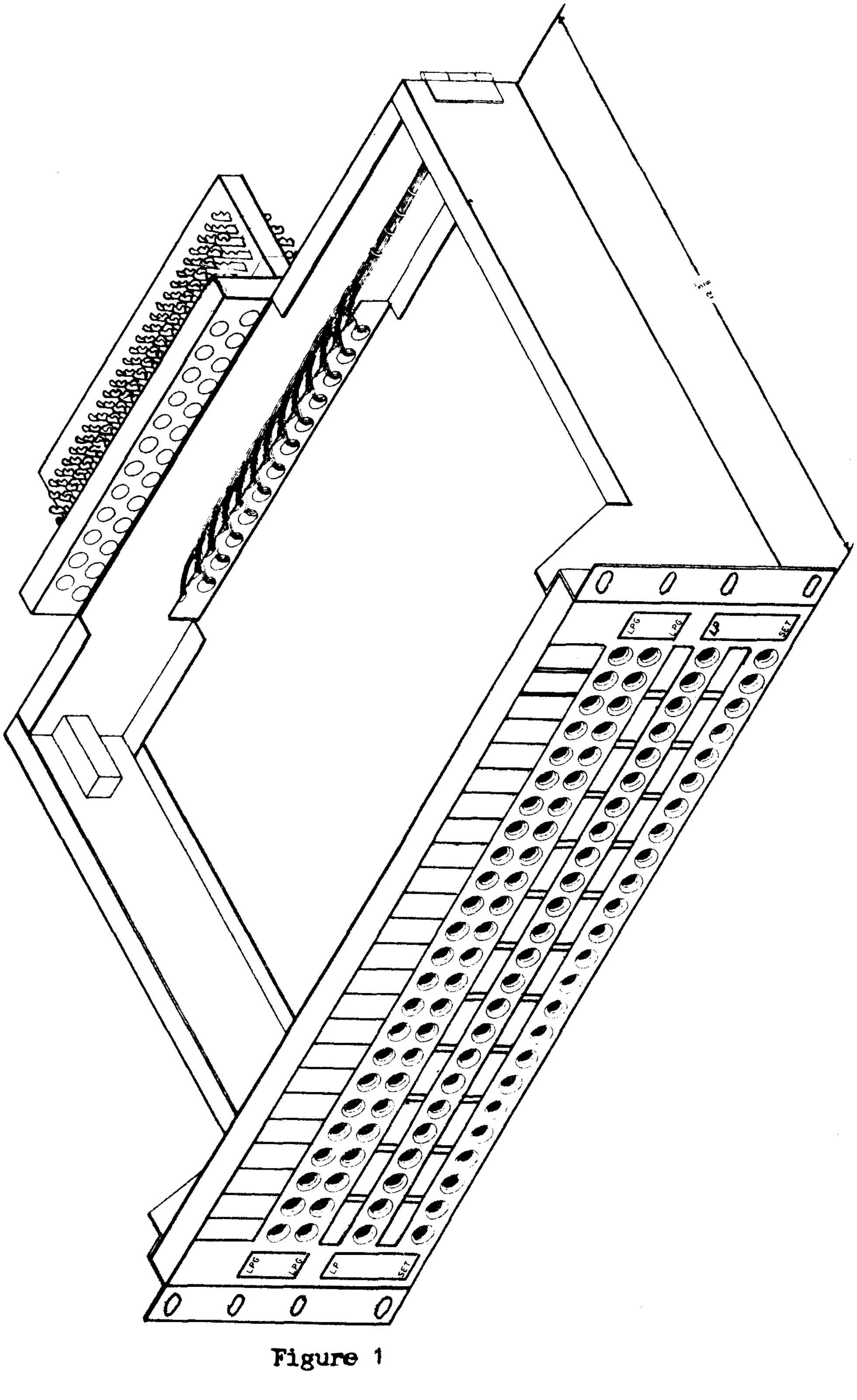
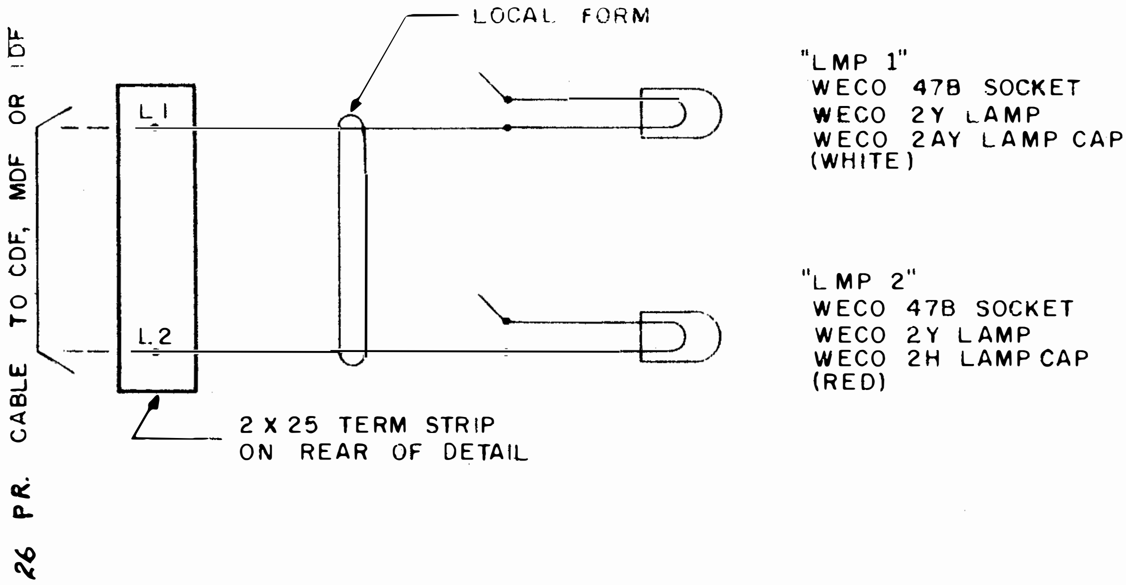


Figure 1

General View, D. C. Jack Detail



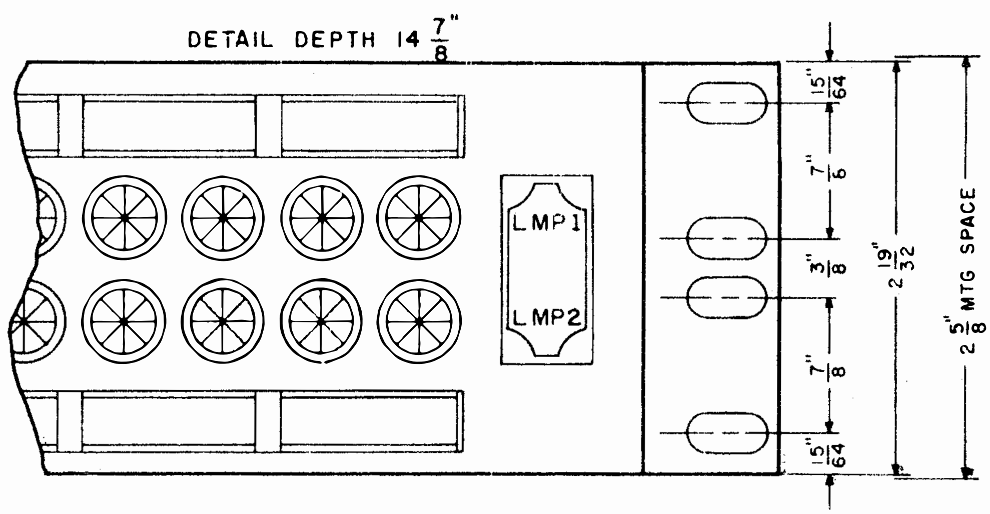
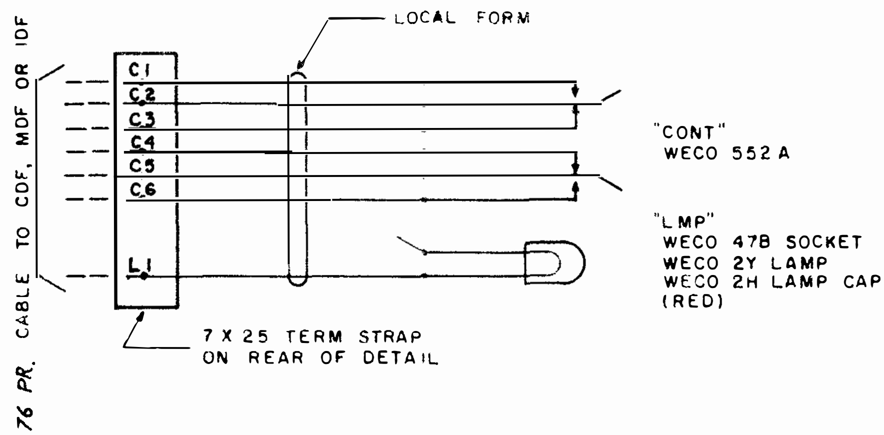


Figure 2

D. C. Detail A



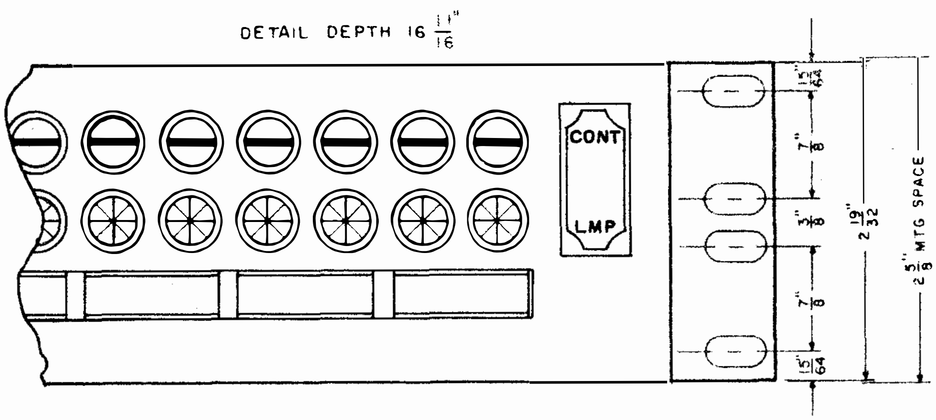
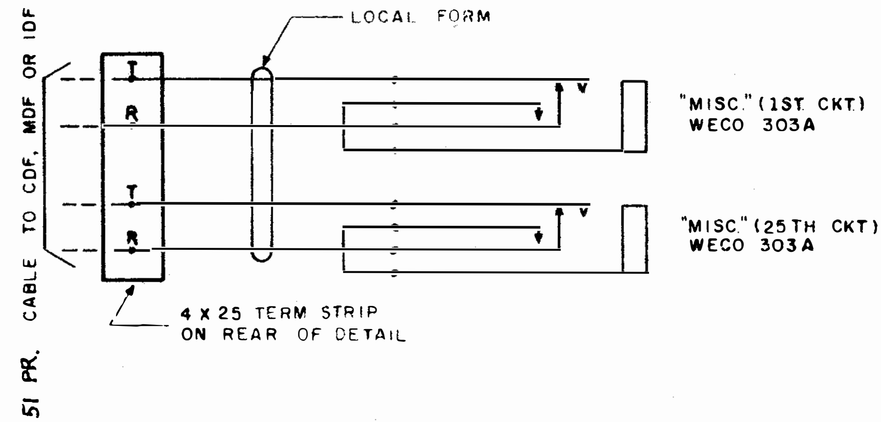


Figure 3

D. C. Detail B



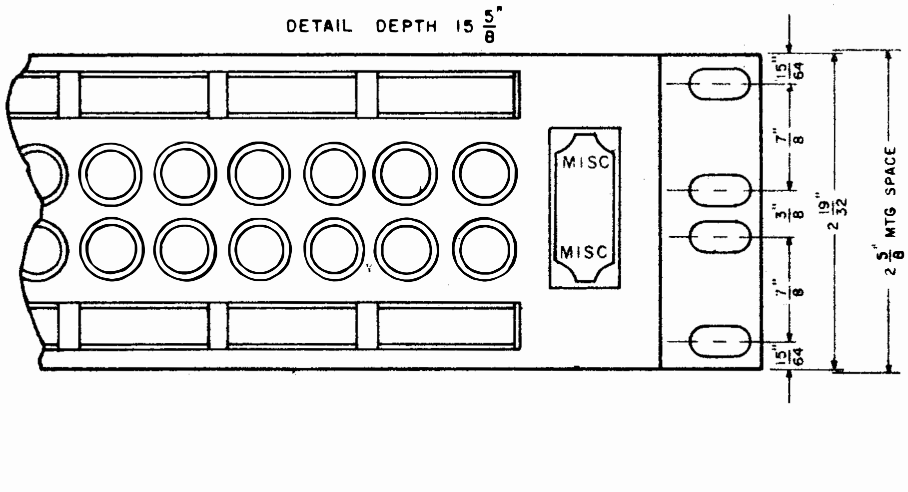


Figure 4

D. C. Detail C

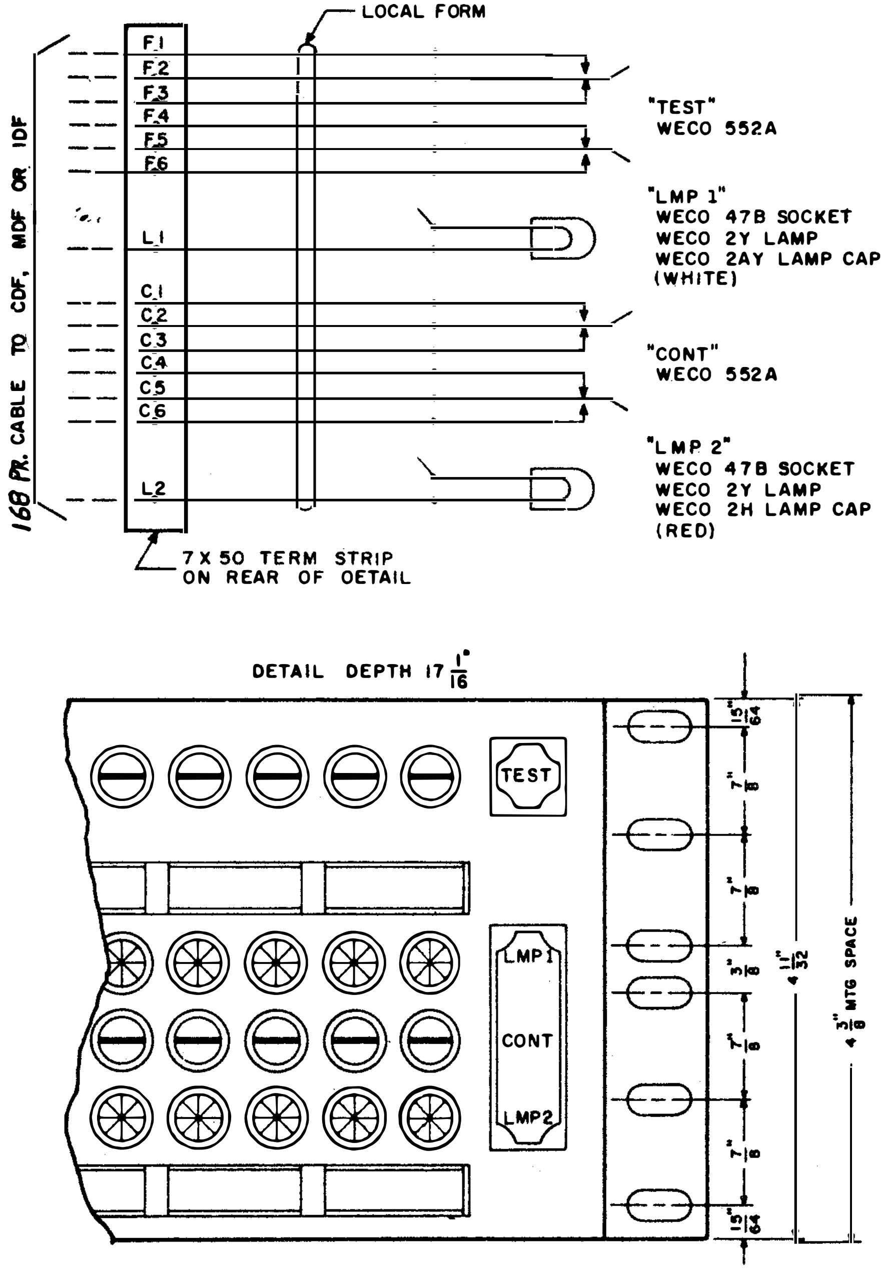
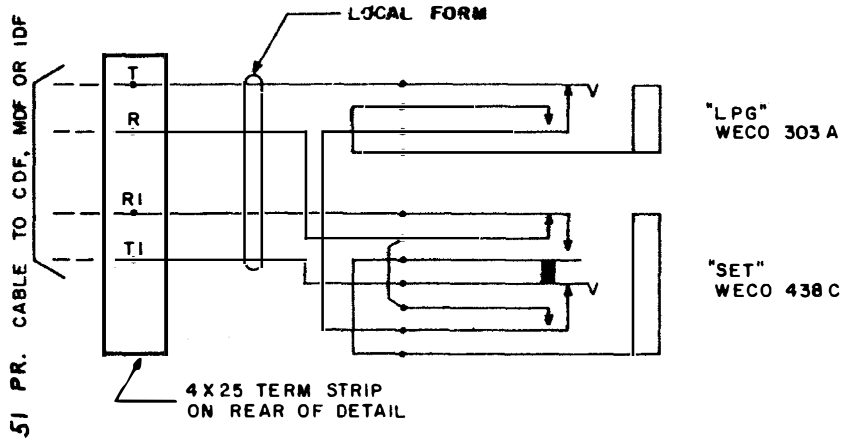


Figure 5

D. C. Detail D



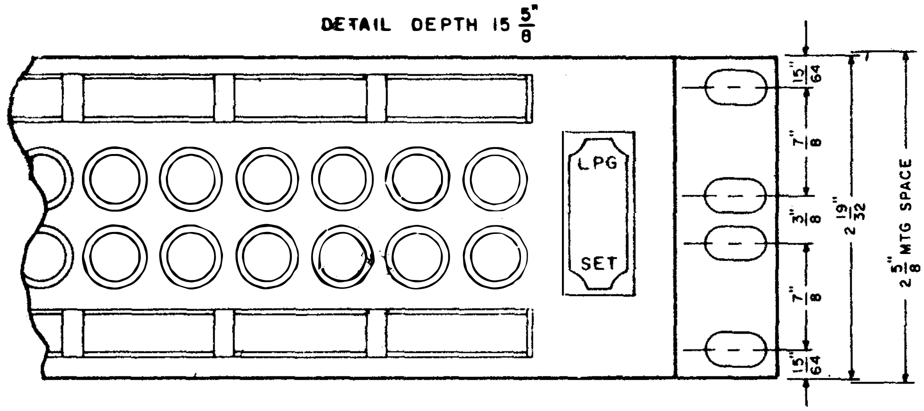
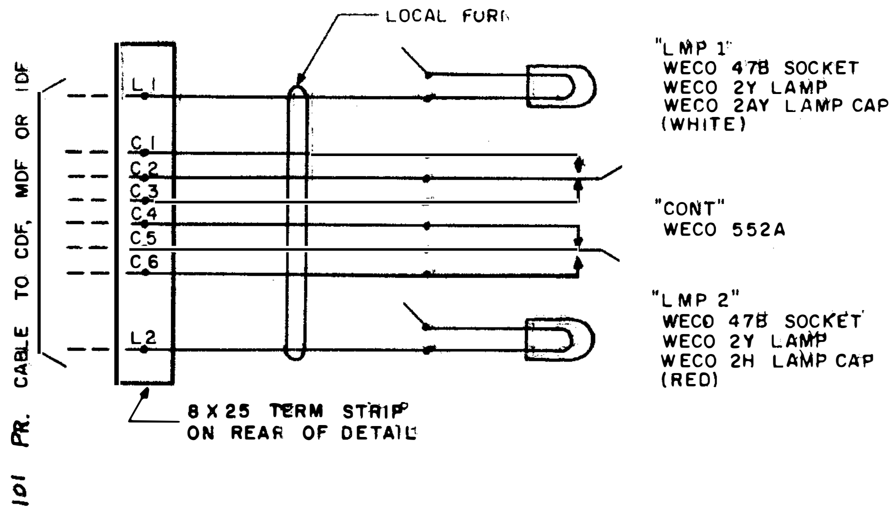


Figure 6

D. C. Detail E



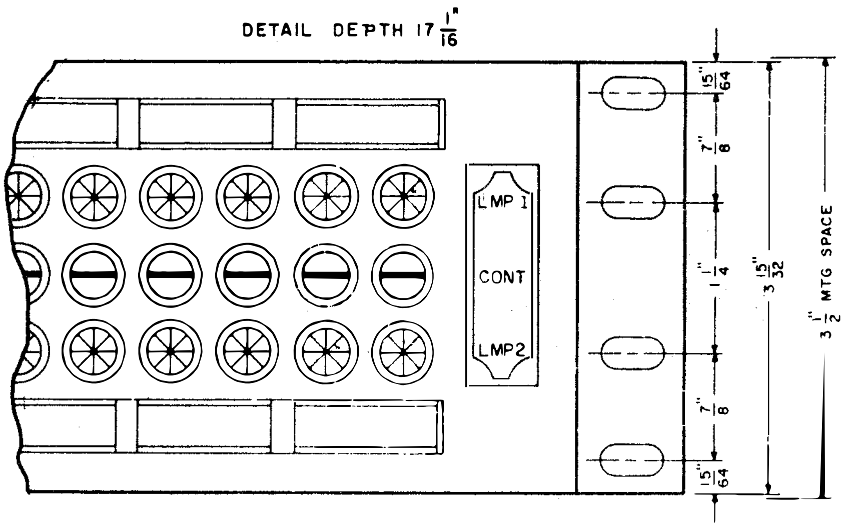
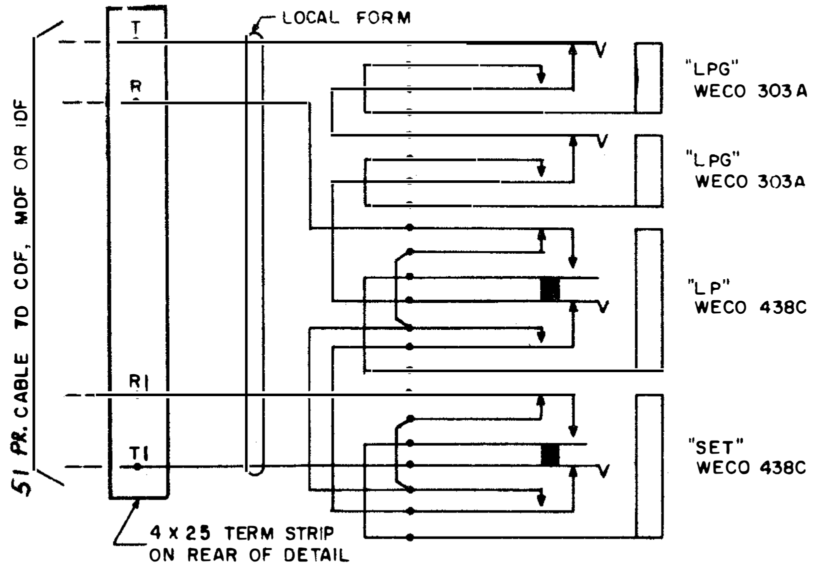


Figure 7

D. C. Detail F



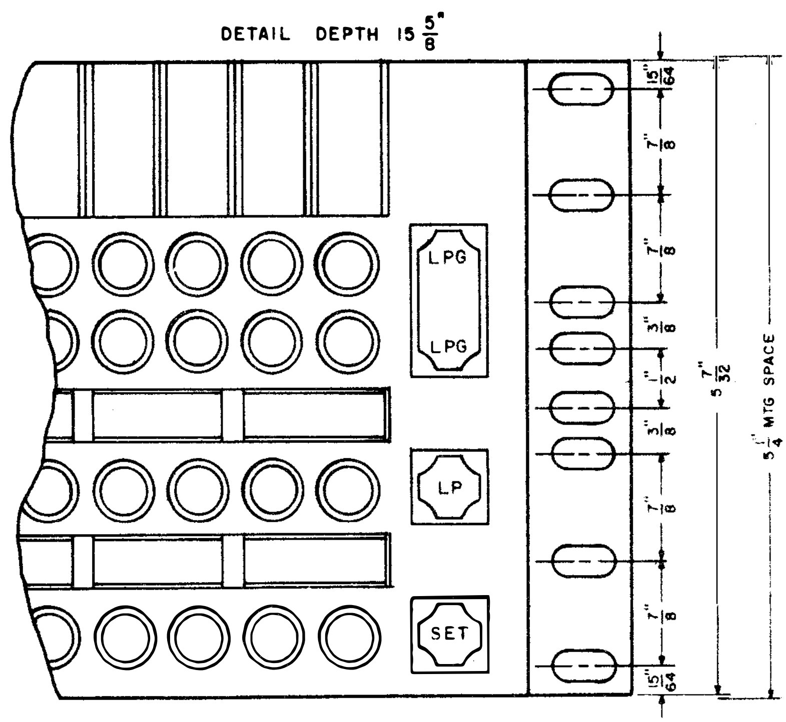


Figure 8

D. C. Detail G

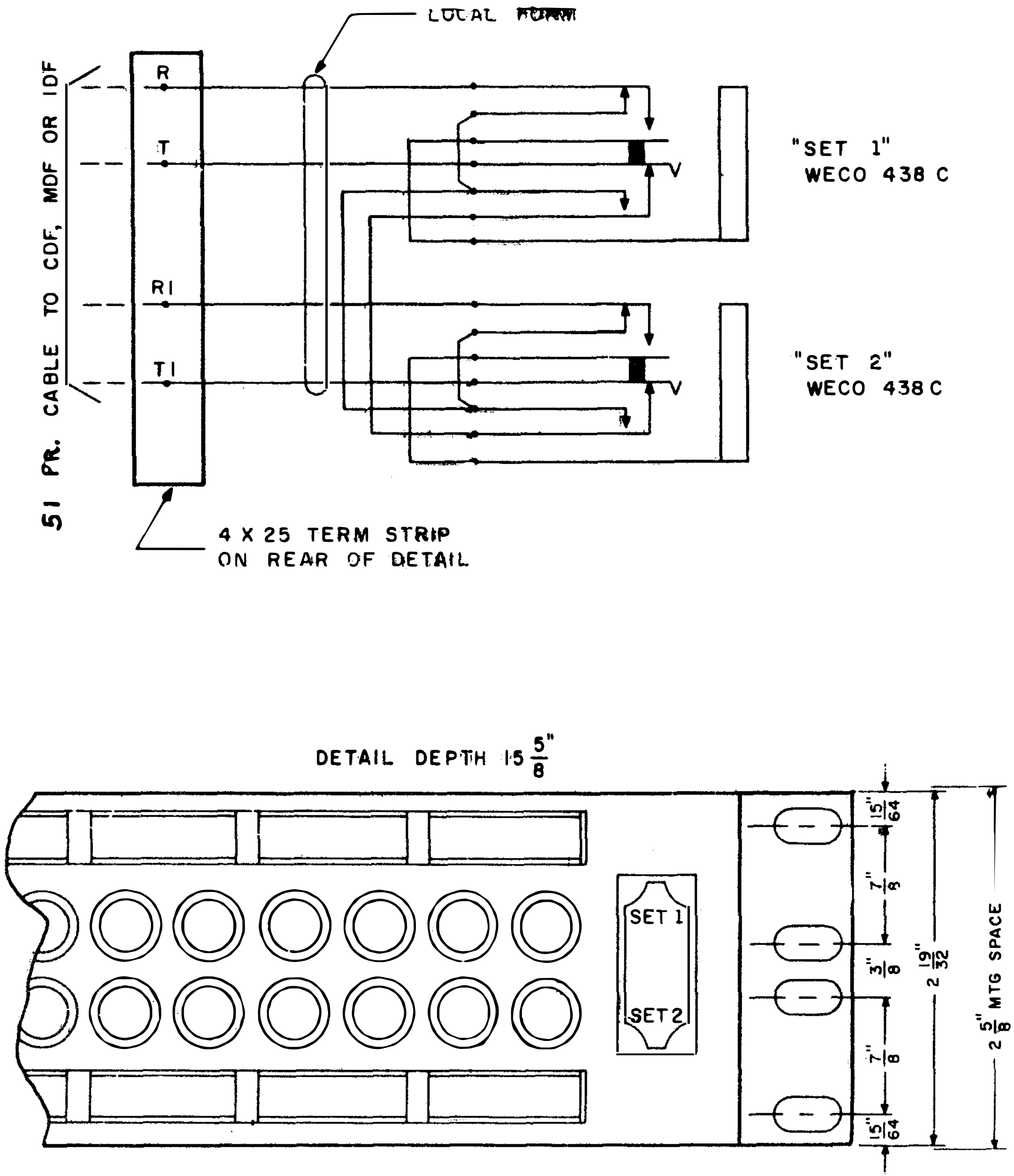
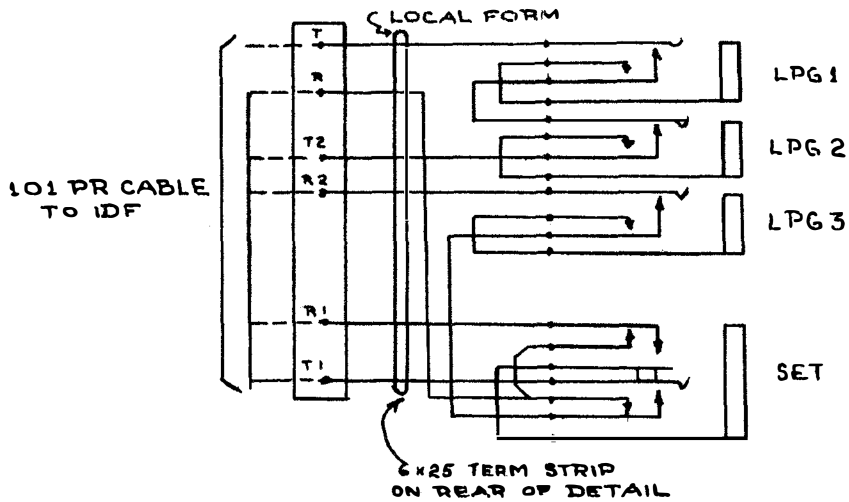


Figure 9

D. C. Detail H



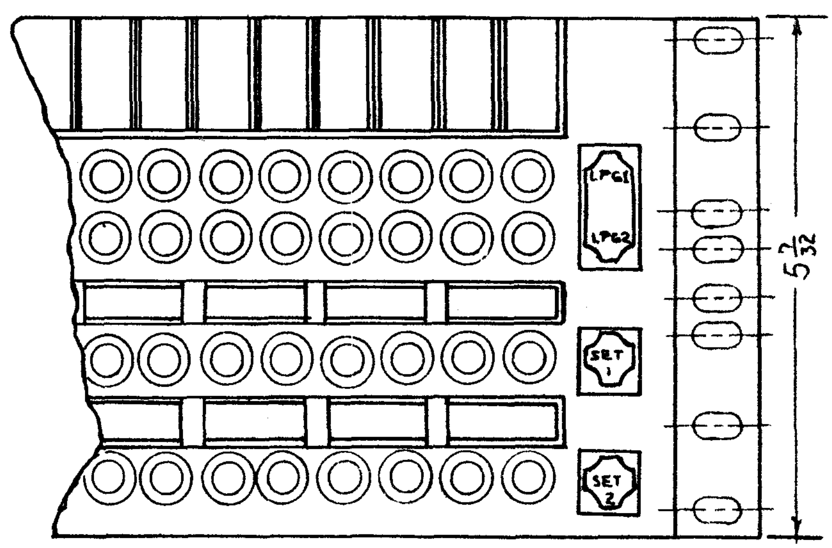
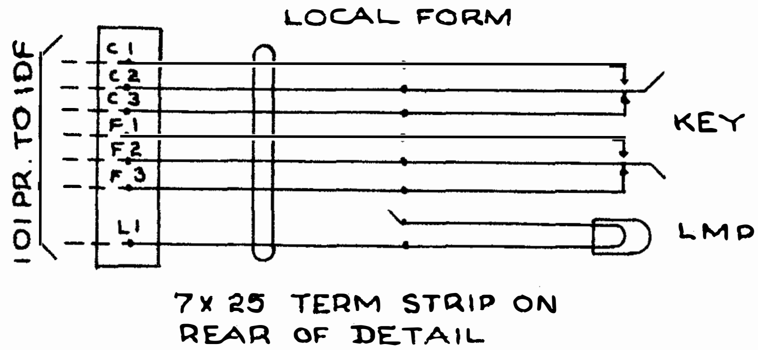


Figure 10

D. C. Detail I



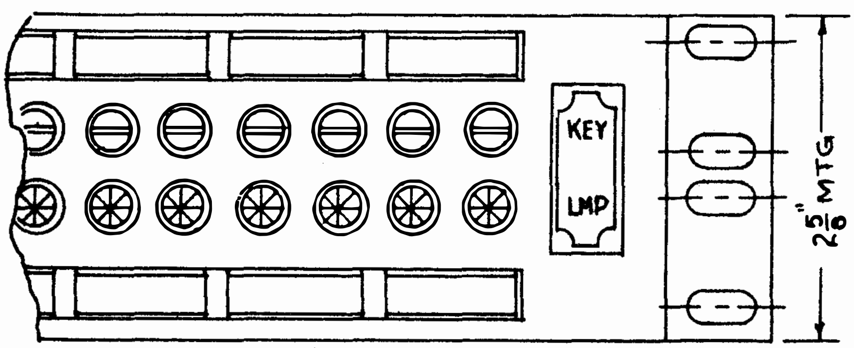


Figure 11

D. C. Detail J

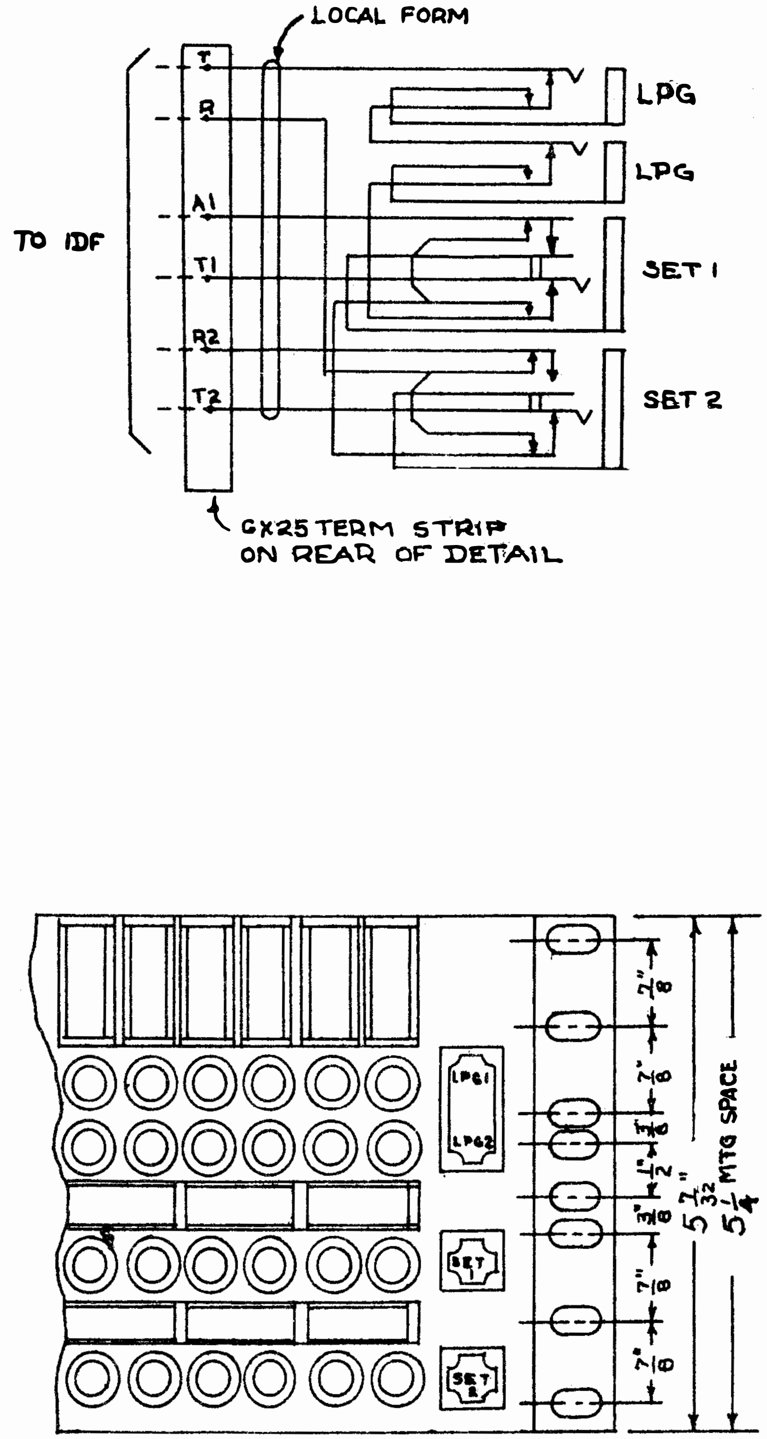
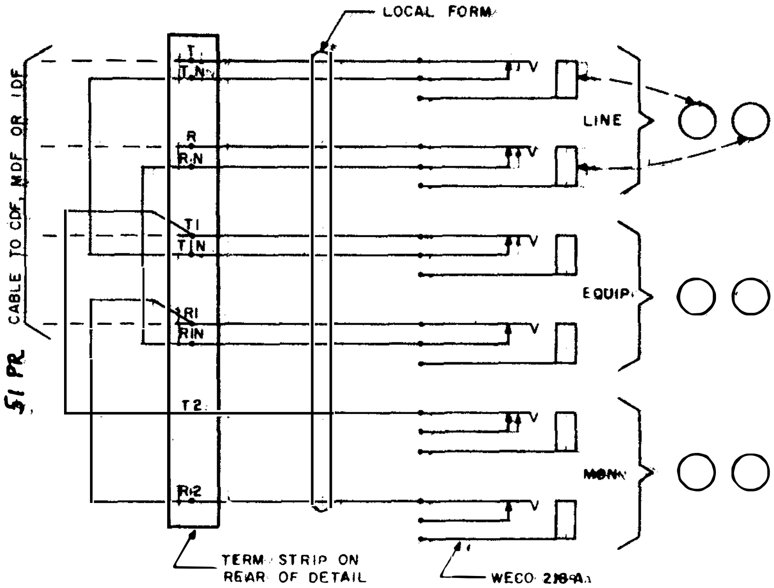


Figure 12

D. C. Detail K



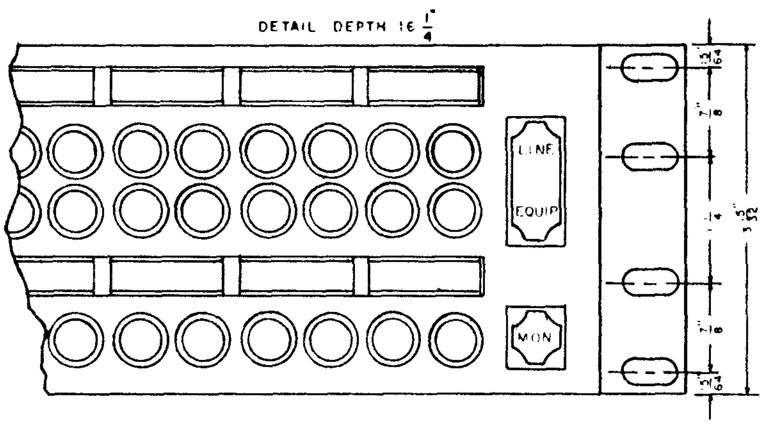
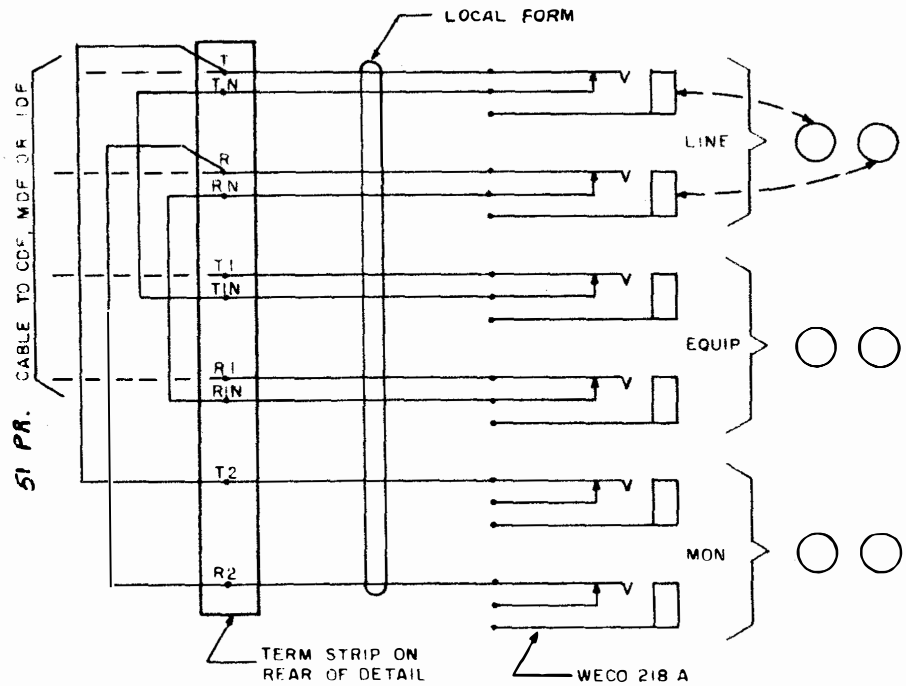


Figure 13

V. F. Detail M



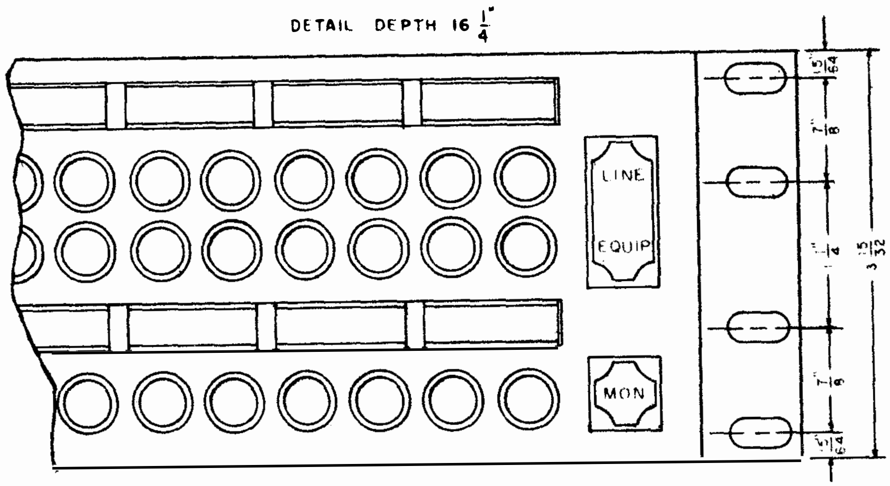
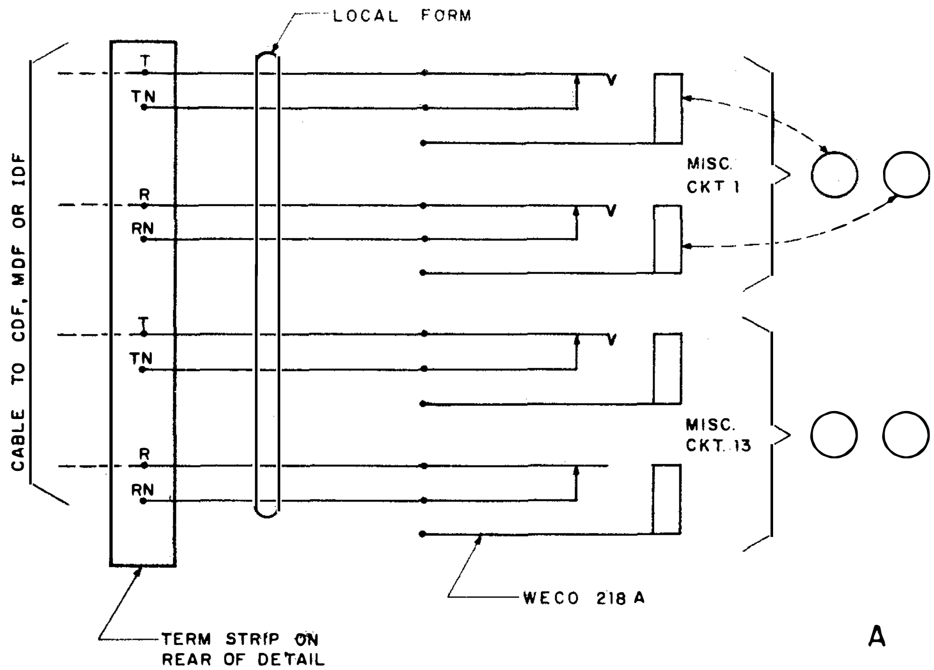


Figure 14

V. F. Detail M



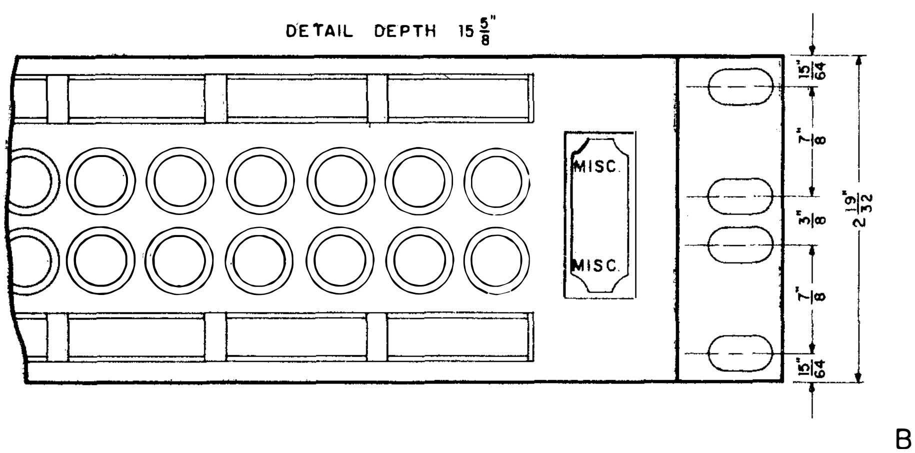


Figure 15

V. F. Detail N

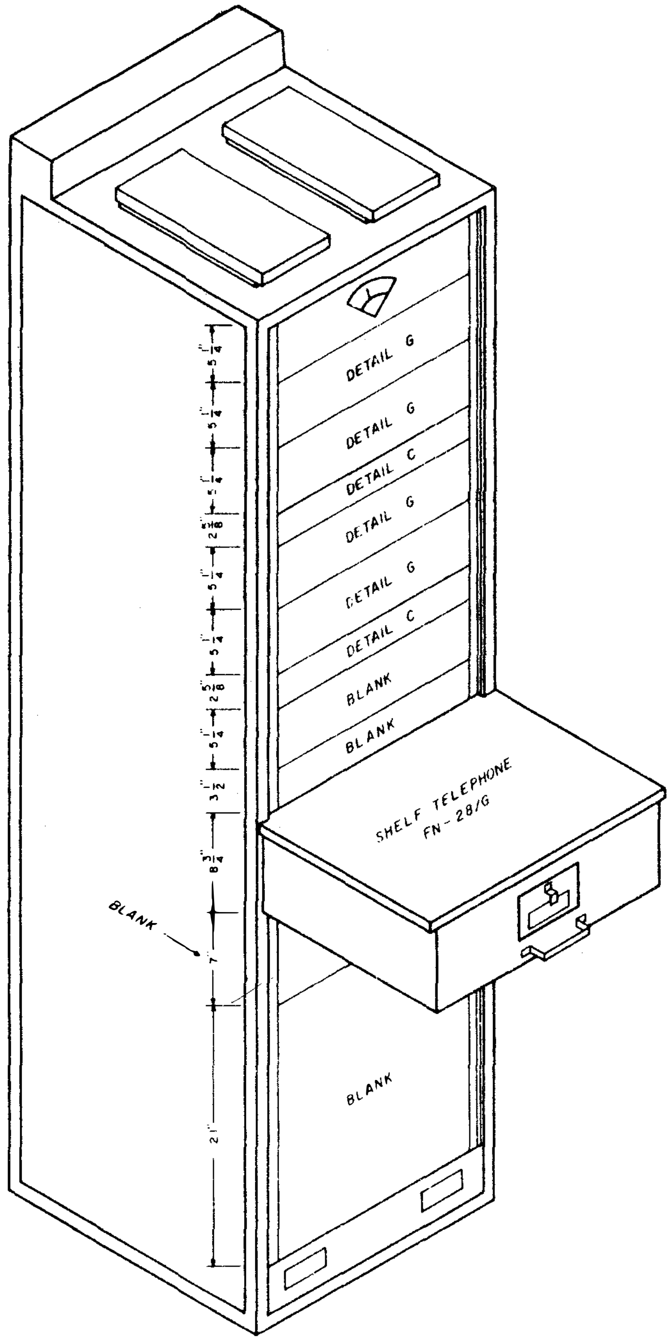


Figure 16

TELEGRAPH SWITCHBOARD ASSEMBLY
(SUBSTITUTE FOR TELEGRAPH SWBD, SB-65/FGC)

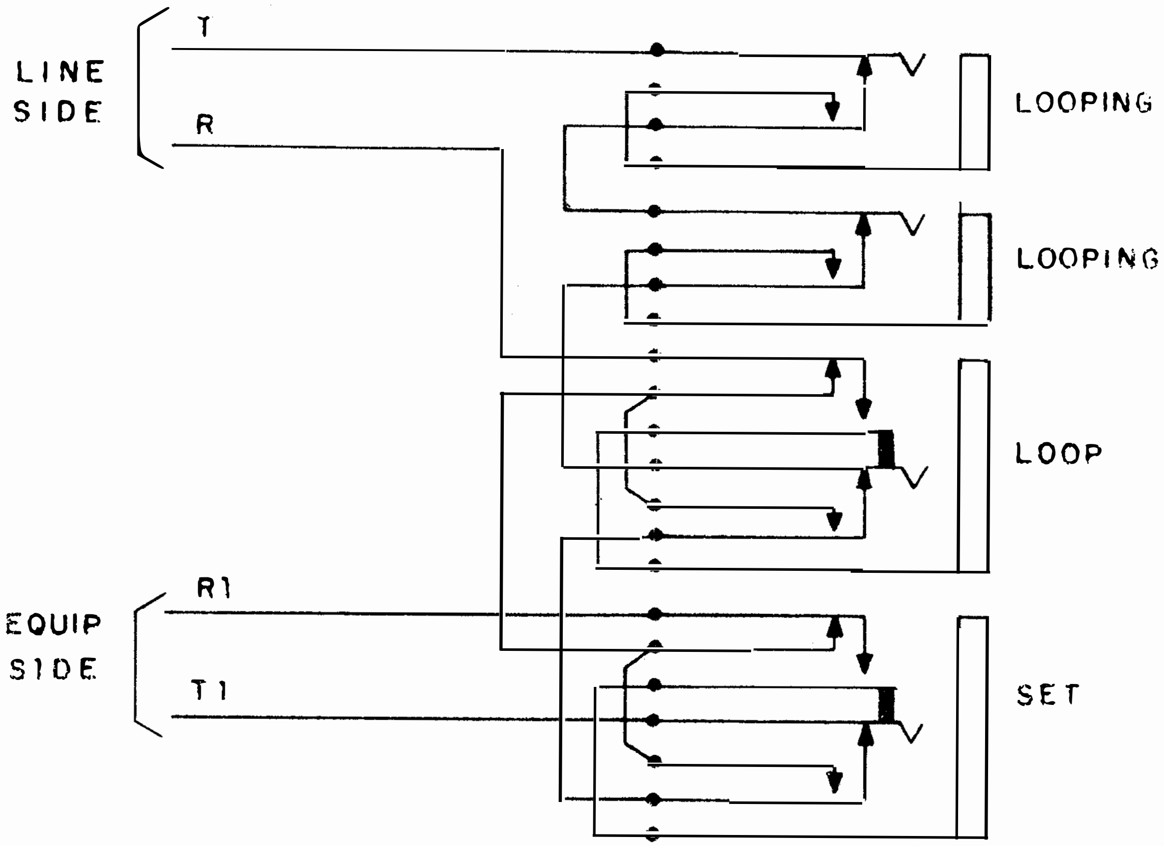


Figure 17

TYPICAL BLACK SEND AND RECEIVE DETAIL "G" (SEE FIG 16)

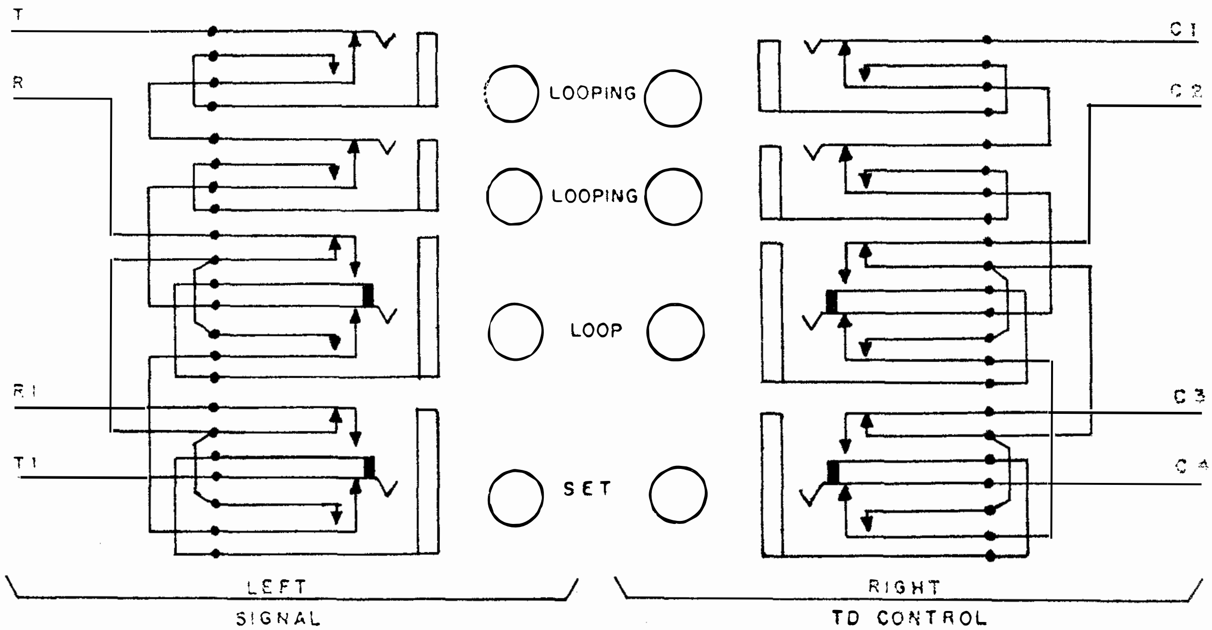


Figure 18

TYPICAL RED SEND DETAIL "G"

UTILIZING TWO STANDARD DC JACK DETAILS

(SEE FIG 16)

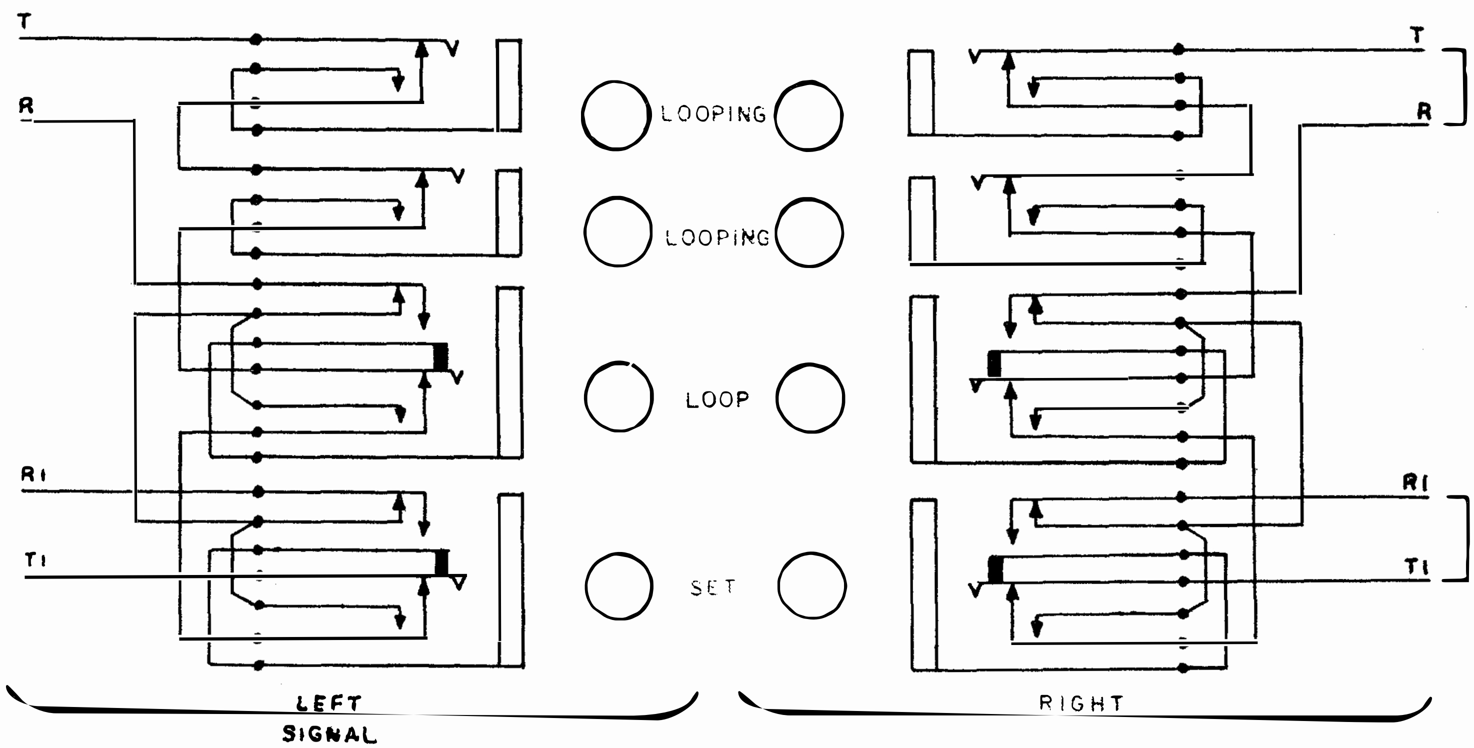
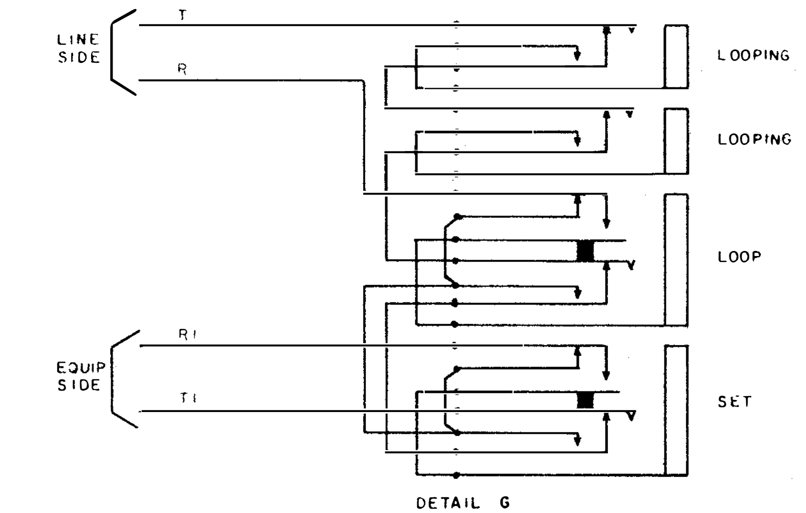


Figure 19

TYPICAL RED REC DETAIL "G"

UTILIZING TWO STANDARD DC JACK DETAILS
(SEE FIG 16)



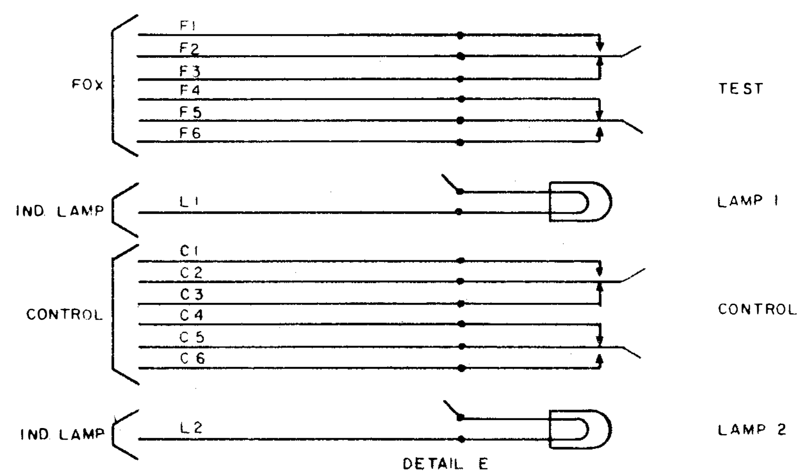
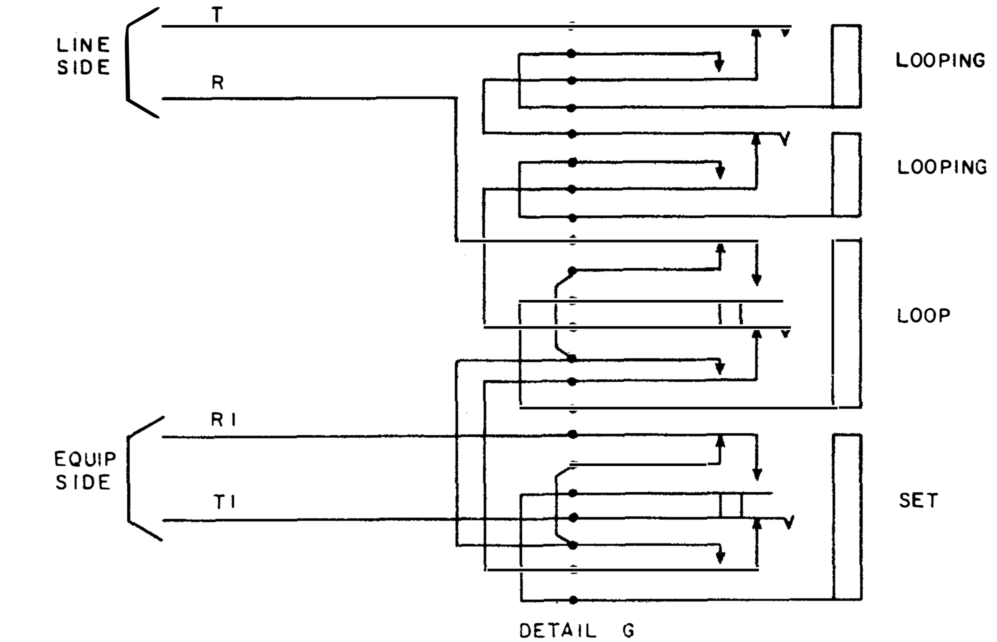


Figure 20

FACILITIES CONTROL SEND DETAIL UTILIZING G & E DETAILS (SEE FIG 22)



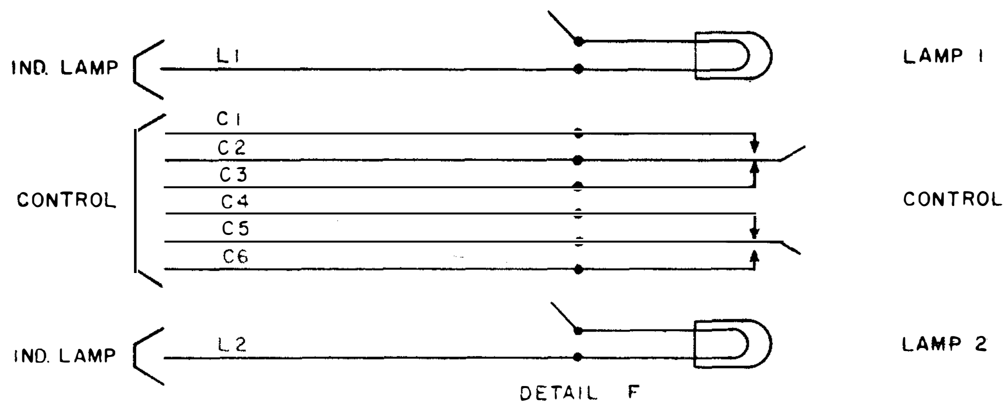


Figure 21

**FACILITIES CONTROL RECEIVE DETAIL
UTILIZING G & F DETAILS
(SEE FIG 22)**

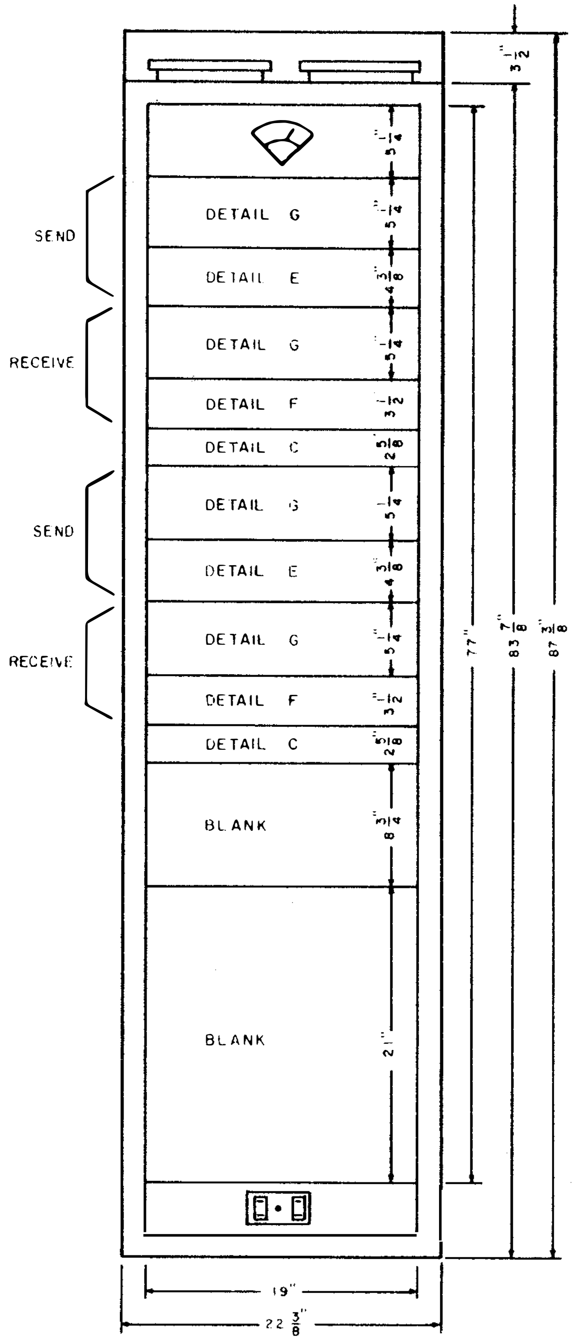
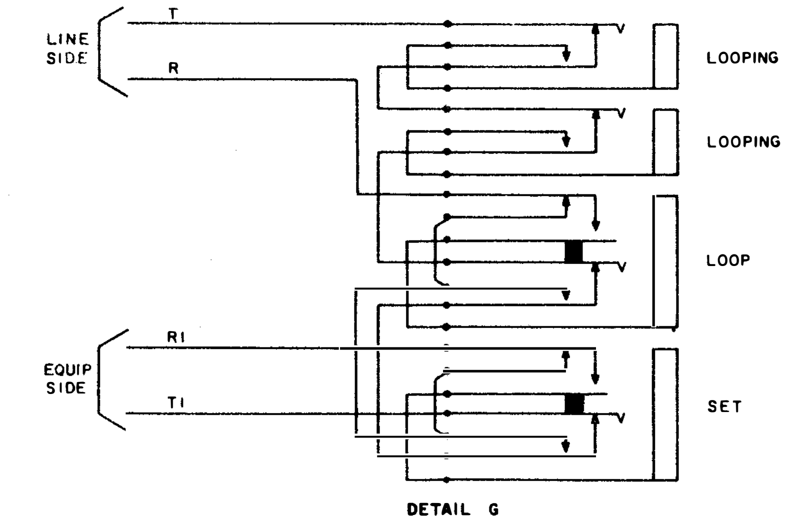


Figure 22

FACILITIES CONTROL BOARD



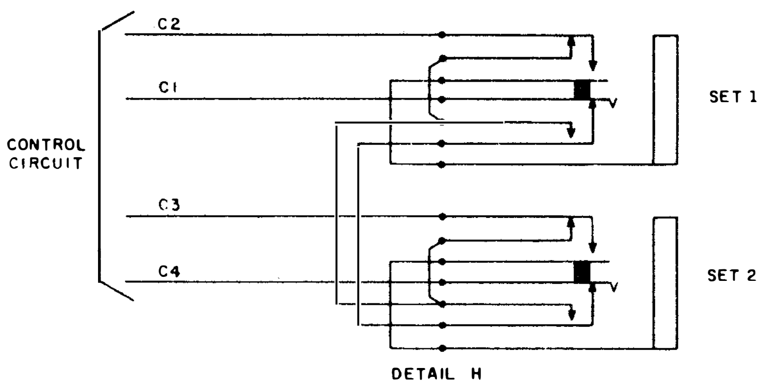


Figure 23

RED SEND OR RECEIVE DETAIL
UTILIZING G & H JACK DETAILS
(SEE FIG 24)

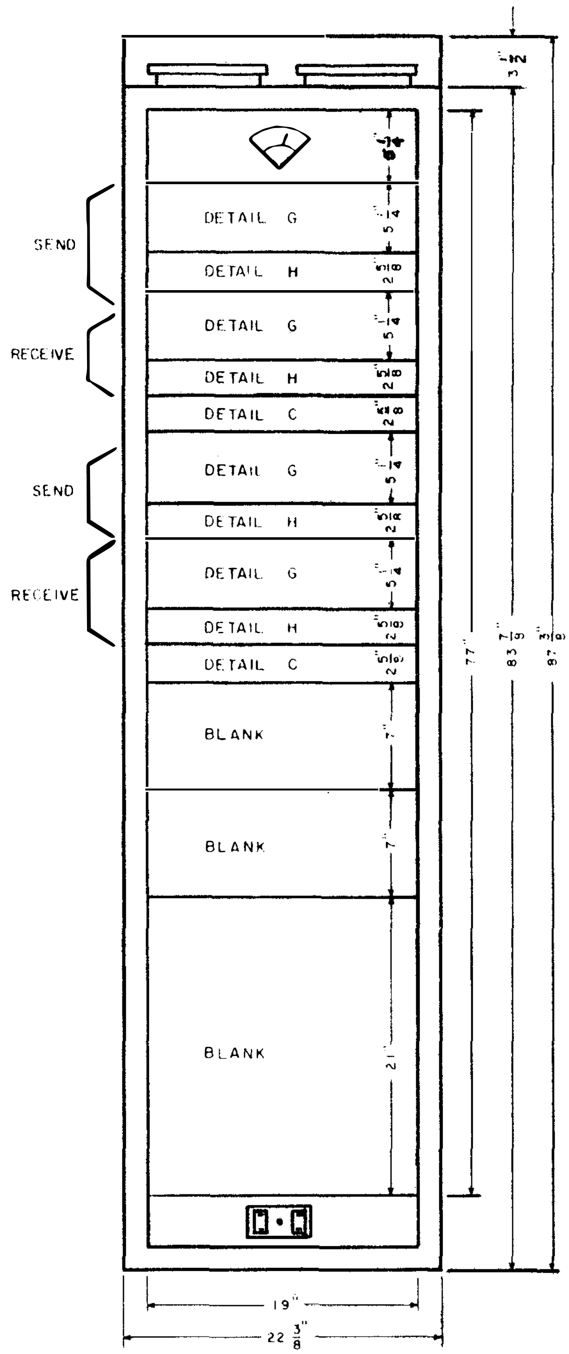


Figure 24

RED TELEGRAPH SWITCHBOARD

Page 27 Item Nr. 1371-02 RCG LL TCG S&P

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TECHNICAL CONTROL

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