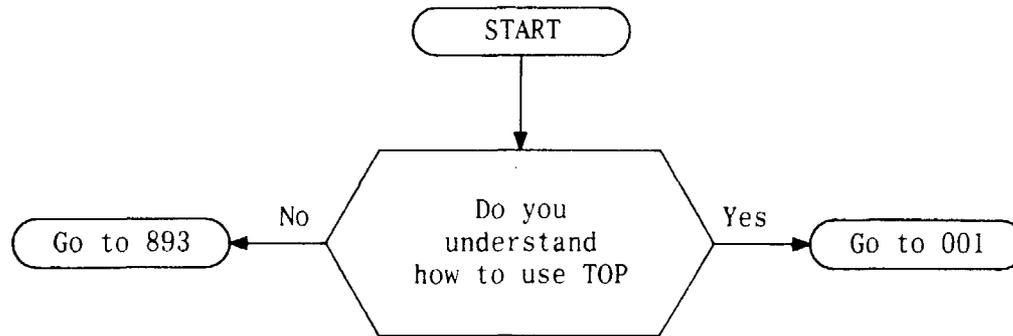


Task Oriented Practice
(TOP)

D4 CHANNEL BANK



365-170-000

NOTICE

This document is either
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Pursuant to Judge Greene's Order of August 5, 1983,
beginning on January 1, 1984, AT&T will cease to use
"Bell" and the Bell symbol, with the exceptions as set
forth in that Order. Pursuant thereto, any reference to
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AT&TCo Standard

**Task Oriented Practice
(TOP)**

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TITLE PAGE	000

FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Acceptance	NTP-002
Alarm - AR Lamp Lighted, AY, LOC, and REM Lamps Not Lighted - Clear	TAP-101
Alarm - AY and AR Lamps Lighted, LOC and REM Lamps Not Lighted - Clear	TAP-101
Alarm - AY Lamp Lighted, AR, LOC, and REM Lamps Not Lighted - Clear	TAP-102
Alarm - LOC or REM, AR and/or AY Lamps Lighted (Modes 2 or 4 Only) - Clear	TAP-128
Alarm - No AR or AY Lamp Lighted - Clear	TAP-129
AR Lamp - Lighted, LOC, AY, or REM Lamps Not Lighted - Clear	TAP-101
Attenuator Settings - Back-to-Back Tandem Channel Units - Determine	DLP-527
Attenuator Settings - 4E&MER Channel Units - Determine	DLP-622
Attenuator Settings - Message Service Channel Units - Determine	DLP-540
Attenuator Settings - Special Service Channel Units - Determine	DLP-529
AY and AR - Lamps Lighted, LOC and REM Lamps Not Lighted - Clear	TAP-101
AY Lamp - Lighted, LOC, AR, or REM Lamps Not Lighted - Clear	TAP-102
Capacitance Tests - Connections For - Make	DLP-525
Channel(s) - Service - Discontinue	NTP-007
Channel Unit - Test in Maintenance Bank	DLP-514
Channel Unit Dataport - Test in Maintenance Bank	DLP-626
Channel Bank - Facility/System at Terminal Office - Establish	NTP-005
Crosstalk - Channel - Clear	TAP-109
Crosstalk - System (Digroup) - Clear	TAP-113
DACS - Testport Facility at D4 Channel Bank - Establish	NTP-010
Data Errors - Clock Signal - Verify	DLP-627
Data Errors - Dataport - Clear	TAP-118

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FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Data Errors Voiceband - Channel - Clear	TAP-109
Data Errors Voiceband - System (Digroup)	TAP-113
Dataport Channel Unit - Test in D4 Maintenance Bank	DLP-626
Dataport - CHAN Loopback Test From DSODP - Perform	DLP-604
Dataport - CHAN Loopback Test From OCUDP - Perform	DLP-601
Dataport - Clock Signal - Verify	DLP-627
Dataport - DSODP Loopback Test From DSODP - Perform	DLP-606
Dataport - DSODP Loopback Test From OCUDP - Perform	DLP-607
Dataport - DSU Loopback Test From DSODP - Perform	DLP-603
Dataport - DSU Loopback Test From OCUDP - Perform	DLP-600
Dataport - OCU Loopback Test From DSODP - Perform	DLP-605
Dataport - OCU Loopback Test From OCUDP - Perform	DLP-602
Dataport Service - Channel Bank - Condition	NTP-009
Discontinue - Facility/System at Terminal Office	NTP-008
Discontinue - Service on Channels	NTP-007
Distortion - Channel - Clear	TAP-109
Distortion - System (Digroup) - Clear	TAP-113
Drop Side Testing - Connections - Make	DLP-623
DX - Signaling Resistance - Measure	DLP-524
Echo Return Loss Test - Connections For - Make	DLP-525
E&MER Channel Unit - Attenuator Settings - Determine	DLP-622
Equalizer Settings - Determine	DLP-528
Establish - DACS Testport Facility at D4 Channel Bank	NTP-010
Establish - Facility/System at Terminal Office	NTP-005

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FIND YOUR JOB IN THE LIST BELOW THEN GO TO

Establish or Add - Channel Service	NTP-006
Facility/System - Terminal Office - Discontinue	NTP-008
Facility/System - Terminal Office - Establish	NTP-005
Levels Out of Limits - Channel - Clear	TAP-109
Levels Out of Limits - System (Digroup) - Clear	TAP-113
LOC or REM - Lamp Lighted (Mode 2 or 4 Only), AR and/or AY Lamps Lighted - Clear	TAP-128
Maintenance Bank - Channel Unit Test - Perform	DLP-514
Maintenance Bank - Dataport Channel Unit Test - Perform	DLP-626
Maintenance Bank - Distortion Test - Perform	DLP-536
Maintenance Bank - Idle Circuit Noise Test - Perform	DLP-535
Maintenance Bank - Receiver Gain and Net Loss Test - Perform	DLP-534
Maintenance Bank - Signaling Test - Perform	DLP-537
Maintenance Philosophy	TAD-100
MBA Lamp - Lighted, Maintenance Bank - Clear	TAP-111
Message Service Channel Units - Attenuator Settings for - Determine	DLP-540
Noise - Channel - Clear	TAP-109
Noise - System (Digroup) - Clear	TAP-113
PBN Settings - Determine	DLP-526
Phase Jitter - Channel - Clear	TAP-109
Phase Jitter - System (Digroup) - Clear	TAP-113
Precision Balance Network (PBN) Settings - Determine	DLP-526

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FIND YOUR JOB IN THE LIST BELOW THEN GO TO

REM or LOC Lamp - Lighted (Modes 2 or 4 Only), AR and/or AY Lamps Lighted - Clear TAP-128

Resistance - DX Signaling - Measure DLP-524

Service - Channel(s) - Discontinue NTP-007

Signaling Trouble - Channel - Clear TAP-115

Signaling Trouble - System (Digroup) - Clear TAP-116

Singing Point Test - Connections For - Make DLP-525

Special Service Channel Units - Attenuator Settings - Determine DLP-529

Tandem Channel Units - Attenuator Settings for Back-to-Back - Determine DLP-527

Testport Facility DACS - D4 Channel Bank - Establish NTP-010

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The D4 channel and maintenance banks are acceptance tested to verify proper installation of the banks and to test factory wired power circuits. Any defects found and not corrected during acceptance testing should be referred to the installation group for correction.

Equipping the banks with plug-ins, performing transmission tests, and establishing service are accomplished during circuit order activities to establish the facility/system or to establish service on the facility/system and, therefore, are not a part of acceptance testing.

ACCEPTANCE TASKS	PROCEDURE NUMBER
Accept D4 Channel Bank	NTP-003
Accept D4 Maintenance Bank	NTP-004

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

	NOTE: Any Defects Found and Not Corrected During Performance of This Procedure Should Be Referred to Installation Group for Correction	
1	Visually Inspect D4 Channel Bank for Bowed Shelves, Misfitted Connectors, Wiring, Etc	DLP-500
2	Check Incoming Voltages To Channel or Maintenance Bank	DLP-501
3	Test Power Wiring Using Voltage Indicators (Verifies Correct Voltages and Grounds on Pins)	DLP-503

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

	NOTE: Any Defects Found and Not Corrected During Performance of This Procedure Should Be Referred to Installation Group for Correction	
1	Visually Inspect D4 Maintenance Bank for Bowed Shelves, Misfitted Connectors, Wiring, Etc.	DLP-502
2	Check Incoming -48 Volts at Power Distribution Unit Subassembly and 20 Hz Voltage at TP2	DLP-501
3	Test Power Wiring Using Voltage Indicators (Verifies Correct Voltages and Grounds on Pins)	DLP-530

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

1	Make/Verify Cross-Connections Between Channel Bank and Line Cross-Connect Facility	
	A. At DSX Patch and Cross-Connect Bay	DLP-504
	B. At Office Repeater Bay	DLP-505
	C. At ED-97446-11 Carrier Central Cross-Connect Field	DLP-506
INSTALLATION OF PLUG-IN UNITS AND TESTS FOR CHANNEL BANK		
NOTE: Two D4 Channel Banks Work Together in Mode 4 Operation. Therefore to Establish Mode 4, All Channel Bank Applicable Items Must Be Performed on Both Banks (Four Digroups)		
2	If System (Digroup) Is Being Established in Bank Having an Existing Digroup In Service, Go to Item 13 and Perform as Necessary. Then Resume Procedure at Item 15. If Bank Has No Digroup In Service, Continue Procedure at Item 3	
3	Remove -48 MAIN ALM , -48 MAIN 10A , and -48ABS Fuses From PDU Subassembly (Both Banks Mode 4)	DLP-547
4	Install PDU . For Mode 4, Install PDU in Both Banks	DLP-523
5	Install -48 MAIN 10A , -48 MAIN ALM , and -48ABS Fuses on PDU Subassembly if Not Already Installed	-
6	Verify That Fuses Are Installed in PDU (Both PDUs for Mode 4)	DLP-548
7	Measure Voltage Between -48V Jack and GRD Jack on PDU (Both PDUs for Mode 4) Requirement: -43 VDC to -53 VDC	DLP-549
8	Verify Operation of Fuse Alarm Circuits	DLP-560
9	With Switch on PCU Set to OFF , Install PCU in PCU Slot and Set Switch to ON	DLP-550
10	Measure Voltages at PCU Test Points Requirements: +12V = 11.4 to 13 VDC +5V = 4.5 to 6 VDC -12V = 11.4 to 13 VDC	DLP-551
11	Install TPU Equalizers	DLP-552
12	Set Channel Counting Options on TPU and Install TPU (Both TPUs for Mode 4)	DLP-553

ESTABLISH FACILITY (SYSTEM) AT TERMINAL OFFICE HAVING D4 CHANNEL BANK

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DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

	NOTE: Some Plug-ins Will Be Installed if Bank Has Existing Digroup In Service	
13	Install RUS, TUS, ACUs, LIU (or LIU/SU)	DLP-554
14	If OIU Is Provided, Make/Verify Timing Options and Install OIU: Otherwise Continue With Item 15	DLP-555
15	Install One Channel Unit (Any Type) Into Any Slot of Digroup(s) To Be Tested	-
16	Measure Voltages at PCU Test Points Requirements: +12V = 11.4 to 12.6 VDC +5V = 4.5 to 5.5 VDC -12V = 11.4 to 12.6 VDC	DLP-556
	<i>CAUTION: If Bank Contains Existing Digroup In Service, Care Should Be Taken Not To Disrupt Service On That Digroup When Performing Items 17 Through 23</i>	
	NOTE: Tests of Items 17 Through 23 Are To Be Performed on Digroup(s) Specified on Circuit Order. If Only One Digroup Is Specified on Circuit Order, Tests May Be Performed on Both Digroup(s) in Bank Per Local Company Option	
17	Test Bank Alarms On ACU Corresponding to Digroup(s) To Be Tested	DLP-557
18	Loop Digroup(s) To Be Tested By Inserting Pin Plug Into Applicable LP Jack on LIU	DLP-516
	Note: If Trunks Are Connected to Bank At This Time, They Must Be Busied Out as TPU Will Not Process Trunks When Bank Is Looped At LIU	
19	Perform Looped Receiver Gain and Net Loss Test on One Channel in Digroup(s) To Be Tested. Requirement: CAU Indicates in Black Area for Receiver Gain and in Green-Black-Green Area for Net Loss	DLP-507
20	Perform Looped Idle Circuit Noise Test on One Channel in Digroup(s) To Be Tested. Requirement: 23 dBrcn or Less	DLP-508
	(Continued on Page 3)	

**ESTABLISH FACILITY (SYSTEM) AT TERMINAL OFFICE HAVING
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DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

21	Perform Looped Distortion Test on One Channel in Digroup(s) To Be Tested. Requirements: TABLE A	DLP-509																					
<table border="1"> <thead> <tr> <th colspan="3">TABLE A</th> </tr> <tr> <th>SWITCH</th> <th>POSITIONS</th> <th>REQUIREMENTS</th> </tr> </thead> <tbody> <tr> <td></td> <td>0</td> <td>56 dBrnc or less</td> </tr> <tr> <td>Send level</td> <td>10</td> <td>46 dBrnc or less</td> </tr> <tr> <td>dB</td> <td>20</td> <td>36 dBrnc or less</td> </tr> <tr> <td>on CAU</td> <td>30</td> <td>26 dBrnc or less</td> </tr> <tr> <td></td> <td>40</td> <td>22 dBrnc or less</td> </tr> </tbody> </table>			TABLE A			SWITCH	POSITIONS	REQUIREMENTS		0	56 dBrnc or less	Send level	10	46 dBrnc or less	dB	20	36 dBrnc or less	on CAU	30	26 dBrnc or less		40	22 dBrnc or less
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dB	20	36 dBrnc or less																					
on CAU	30	26 dBrnc or less																					
	40	22 dBrnc or less																					
22	Perform Looped Crosstalk Test on One Channel in Digroup(s) To Be Tested. Requirement: 27 dBrnc Or Less	DLP-510																					
23	Perform Looped Signaling Test on One Channel in Digroup(s) To Be Tested	DLP-559																					
INSTALLATION AND TESTS FOR MAINTENANCE BANK																							
24	If Maintenance Bank Is Not Provided or Is Already Equipped With Plug-in Units, Skip Items 25 Through 43 and Continue With Item 44, Page 5	-																					
25	Remove -48 MAIN ALM, -48 MAIN 10A, and -48ABS Fuses From PDU Assembly in Maintenance Bank	DLP-547																					
26	Install PDU	DLP-523																					
27	Install -48 MAIN 10A, -48 MAIN ALM, and -48ABS Fuses in PDU Assembly in Maintenance Bank	-																					
28	Verify That Fuses Are Installed in PDU	DLP-548																					
29	Measure Voltage Between -48V Jack and GRD Jack on PDU Requirement: -43 VDC to -53 VDC	DLP-549																					
30	Verify Operation of Fuse Alarm Circuits	DLP-560																					
31	With PCU Switch Set to OFF, Install PCU in PCU Slot and Set Switch to ON	DLP-550																					
32	Measure Voltages at PCU Test Points Requirements: +12V = 11.4 to 13 VDC +5V = 4.5 to 6 VDC -12V = 11.4 to 13 VDC	DLP-551																					

**ESTABLISH FACILITY (SYSTEM) AT TERMINAL OFFICE HAVING
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DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

33	Install TPU Equalizers and Set Channel Counting Option to SEQ	DLP-531																					
34	Get 4E&M Channel Unit and Set Both T and R Attenuators to 0 (Plugs and Toggle Switches to 0 Side)	-																					
35	Install 4E&M Channel Unit in 4E&M Slot in Maintenance Bank	-																					
36	Install Maintenance Bank Plug-ins	DLP-532																					
37	Test Maintenance Bank Alarms	DLP-557																					
38	Prepare Maintenance Bank	DLP-533																					
39	Perform Receiver Gain and Net Loss Test on Digroups A and B of Maintenance Bank. Requirement: CAU Indicates in Black Area for Receiver Gain and in Green-Black-Green Area for Net Loss	DLP-534																					
40	Perform Idle Circuit Noise Test on Digroups A and B of Maintenance Bank. Requirement: 23 dBrc or Less	DLP-535																					
41	Perform Distortion Test on Digroups A and B of Maintenance Bank. Requirements: TABLE B	DLP-536																					
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42	Perform Signaling Test on Digroups A and B of Maintenance Bank	DLP-537																					
43	Test Maintenance Bank Test Set and Monitor Alarm	DLP-515																					
(Continued on Page 5)																							

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

	END-TO-END TRANSMISSION TESTS ON CHANNEL BANK	
	NOTE: Tests of Items 46 Through 57 Are Not Required to Verify Operation of D4 Channel Bank but May Be Performed per Local Option on Digroup(s) Specified on Circuit Order	
	NOTE: Looping at LIU Extinguishes All Lights On Bank. This Is Desirable When Bank Must Sit Idle for Extended Period of Time Not Connected to Far End. When Connection to Far End Is Desirable, Plug Must Be Removed From LIU	
44	If End-to-End Tests Are Not To Be Performed at This Time, Leave Digroup(s) Looped at LIU and Perform Items 45 and 58. Otherwise Proceed to Item 45	
45	Verify That Line Facility Has Been Established	-
46	Contact Far End and Verify That Far End Is Ready for End-to-End Tests	-
47	At Line Side Cross-Connect Facility Such As DSX-1, Remove (if Present) QRSS Signal and 386B Termination Plug Associated With Bank To Be Tested. Verify Far End Has Done Likewise	-
48	Install Any Type D4 Channel Unit in One Slot Other Than Channel 1 or 24 in Digroup(s) To Be Tested and Unseat Any Other Installed Channel Units. Verify Far End Has Done Likewise	
49	Unloop Digroup(s) To Be Tested By Removing Pin Plug From LT Jack on LIU	-
50	Verify Far End Is Unlooped	-
51	Perform End-to-End Alarm Test on Digroup(s) To Be Tested	DLP-511
52	Perform End-to-End Signaling Test	DLP-629
53	Perform End-to-End Net Loss Test on Channel Selected in Item 48 on Digroup(s) To Be Tested. Requirement: CAU Indicates In Green-Black-Green Area	DLP-512
54	Perform End-to-End Idle Circuit Noise Test on Channel Selected in Item 48 on Digroup(s) To Be Tested	DLP-513
55	Perform End-to-End Distortion Test on Channel Selected in Item 48 on Digroup(s) To Be Tested	DLP-620
	NOTE: Two Additional Channel Units Must Be Installed Into Interfering Channel Slots to Perform Crosstalk Test	
56	Perform End-to-End Crosstalk Test on Channel Selected in Item 48 on Digroup(s) To Be Tested	DLP-621
57	Perform End-to-End Impulse Noise Test on Channel Selected in Item 48 on Digroup(s) To Be Tested	DLP-619
58	Update Office Records	-

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DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

1	Get Channel Unit(s) for Channels Assigned to Service	-
2	Set Channel Unit Options, Attenuators, and Other Controls	
	A. J98726 BA DPO	DLP-568
	B. J98726 BB DPT	DLP-569
	C. J98726 BC 4E&M	DLP-570
	D. J98726 BD 2FXS	DLP-571
	E. J98726 BE 2FXO	DLP-572
	F. J98726 BF RPO	DLP-573
	G. J98726 BG RPT	DLP-574
	H. J98726 BH SDPO	DLP-575
	I. J98726 BJ 2E&M	DLP-576
	J. J98726 BK 2FXSLS	DLP-577
	K. J98726 BL 2FXOLS	DLP-578
	L. J98726 BM DPMO	DLP-579
	M. J98726 BN PLR	DLP-580
	N. J98726 BP 4E&MER	DLP-581
	O. J98726 BR ES2T	DLP-582
	P. J98726 BS ES2O	DLP-583
	Q. J98726 BT 2E&M6	DLP-584

ESTABLISH OR ADD CHANNEL SERVICE - D4 CHANNEL BANK

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DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

2 (Contd)	R. J98726 BU ES3	DLP-585
	S. J98726 BW RSCO	DLP-567
	T. J98726 BY 4LSXO	DLP-586
	U. J98726 CH DPT 600	DLP-569
	V. J98726 DA DSODP	DLP-587
	W. J98726 DB OCUDP	DLP-588
	X. J98726 DC DSUDP	DLP-589
	Y. J98726 DD DSODP 56KB	DLP-617
	Z. J98726 DE OCUDP 56KB	DLP-618
	AA. J98726 GA SEC STA	DLP-630
	AB. J98726 GB SEC OFF	DLP-631
	AC. J98726 SB 4FXS	DLP-590
	AD. J98726 SC 4FXO	DLP-591
	AE. J98726 SD 2DXGT	DLP-592
	AF. J98726 SE 4DX	DLP-593
	AG. J98726 SF 4TDM	DLP-594
	AH. J98726 SG 2FXSGT	DLP-595
AI. J98726 SH 4TO	DLP-596	
AJ. J98726 SJ 2TO	DLP-597	
AK. J98726 SK 2FXOGT	DLP-598	

ESTABLISH OR ADD CHANNEL SERVICE – D4 CHANNEL BANK

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DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

2 (Contd)	AL. J98726 SQ 4ETO	DLP-599
	AM. J98726 SR 2FXS 600	DLP-572
	AN. J98726 SS 2FXO 600	DLP-571
3	Test Channel Unit(s) in Maintenance Bank	
	NOTE: Test Cards Needed To Test All Channel Units Except Dataport	
	A. All Channel Units Except Dataport	DLP-514
	B. Dataport Channel Units	DLP-626
4	If Channel Unit Requires 72 Volt Option Per Word or CLRC, Verify -72 Volts Present At D4 Bank	DLP-628
5	Install Channel Unit(s) in Assigned Slot(s)	-
6	If Channel Unit Is DSODP or OCUDP , And If You Are Control Office for Stand-Alone Dataport Operation, Perform DSU Loopback Test NOTE: In Many Cases Dataport Will Be Tested Remotely. The DSUDP Is Always Tested Remotely	
	A. From OCUDP	DLP-600
	B. From DSODP	DLP-603
	NOTE: End-to-End Test of Item 7 Is Not Required to Verify Operation of D4 Channel Bank but May Be Performed per Local Company Option	
7	Make End-to-End Net Loss Test on Channel(s) Except Dataport Being Put Into Service. Requirement: CAU Indicates in Green-Black-Green Area. If Dataport, Go To Item 8	DLP-512
8	Verify That Drop-Side Cross-Connections Have Been Made	DLP-561
9	Update Office Records	

TCF Library: www.telephonerecollectors.info

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

1	Remove Channel(s) From Service	-
2	Remove Channel Unit(s) (Optional)	-
3	Update Office Records	-

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

1	Contact Far End and Request Their Assistance in Turning Down System	-
2	Verify That All Circuits Are Disconnected or Busied Out	-
3	Verify Line or Multiplex Facility Is Turned Down at Near and Far End of System	-
4	Remove Power From Bank (When Required)	DLP-517
5	Remove Plug-in Units (When Required)	-
6	Update Office Records	-

DISCONTINUE FACILITY (SYSTEM) AT TERMINAL OFFICE HAVING D4 CHANNEL BANK

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

1	If Bank Has OIU-2 Installed, Go to Step 3. Otherwise Read NOTE and Continue With Step 2	-
	NOTE: An OIU-1 Can Be Installed, Removed, or Replaced Without Interrupting Service. However, When Replacing OIU-1 With OIU-2 , Slipping Errors Can Occur When OIU-1 Is Removed. Therefore OIU-2 Should Be Installed As Soon As Possible When OIU-1 Is Removed	
2	Option and Install OIU-2	DLP-555
3	If Office Records Require External Timing, Verify External Clock Signal Is Present At Bank	
	A. Using Voltmeter	DLP-608
	B. Using Oscilloscope	DLP-627
4	Verify That Subscriber Loop Qualification Tests Have Been Performed	-
	NOTE: Subscriber Loop Tests Can Be Performed From Channel Bank Using J98726MF Channel Unit Extender to Gain Access to Subscriber Loop	
5	Update Office Records	-

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

1	Obtain Test Apparatus Listed Below: <ul style="list-style-type: none"> • Voltmeter (KS-20599 DVM or KS-14510 VOM or Equivalent) • D3/D4 Portable Test Set - J98718AL • Noise Measuring Set - J94003C or Equivalent • Patch Cords - 3P6A(2), P6AD(2), 3P6D(1) • Two Pin Plugs - KS-19531 	-
2	Make/Verify Cross-Connections Between Channel Bank and DSX Patch and Cross-Connect Bay	DLP-504
INSTALLATION OF PLUG-IN UNITS AND TESTS FOR CHANNEL BANK		
3	If System (Digroup) Is Being Established in Bank Having an Existing Digroup In Service, Go to Item 14 and Perform as Necessary. Then Resume Procedure at Item 16. If Bank Has No Digroup in Service, Continue Procedure at Item 4	
4	Remove -48 MAIN ALM , -48 MAIN 10A , and -48ABS Fuses From PDU Subassembly	DLP-547
5	Install PDU	DLP-523
6	Install -48 MAIN 10A , -48 MAIN ALM , and -48ABS Fuses on PDU Subassembly if Not Already Installed	-
7	Verify That Fuses Are Installed in PDU	DLP-548
8	Measure Voltage Between -48V Jack and GRD Jack on PDU Requirement: -43 VDC to -53 VDC	DLP-549
9	Verify Operation of Fuse Alarm Circuits	DLP-560
10	With Switch on PCU Set to OFF , Install PCU in PCU Slot and Set Switch to ON	DLP-550
11	Measure Voltages at PCU Test Points Requirements: +12V = 11.4 to 13 VDC +5V = 4.5 to 6 VDC -12V = 11.4 to 13 VDC	DLP-551
12	Install TPU Equalizers For Mode 3 (T1) Operation	DLP-552
13	Set Channel Counting Options on TPU to SEQ For Digroup Being Equipped and Install TPU	DLP-553

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ESTABLISH DACS TESTPORT FACILITY AT D4 CHANNEL BANK

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

	NOTE: Some Plug-ins Will Be Installed if Bank Has Existing Digroup In Service	
14	Install RUS , TUS , ACUs , and LIU , for Mode 3 Operation, Into Digroup Specified on Work Order	DLP-554
15	Option OIU for Loop Timing Using Either Digroup As Reference, And Install OIU	DLP-555
16	Obtain Channel Units for Testport Operation and Install in Channel Bank	DLP-624
17	Measure Voltages at PCU Test Points Requirements: +12V = 11.4 to 12.6 VDC +5V = 4.5 to 5.5 VDC -12V = 11.4 to 12.6 VDC	DLP-556
	CAUTION: If Bank Contains Existing Digroup In Service, Care Should Be Taken Not To Disrupt Service On That Digroup When Performing Items 18 Through 24	
	NOTE: Tests of Items 18 Through 24 Are To Be Performed on Digroup(s) Specified on Circuit Order. If Only One Digroup Is Specified on Circuit Order, Tests May Be Performed on Both Digroup(s) in Bank Per Local Company Option	
18	Test Bank Alarms On ACU Corresponding to Digroup(s) To Be Tested	DLP-557
19	Loop Digroup(s) To Be Tested By Inserting Pin Plug Into Applicable LP Jack on LIU-3	DLP-516
20	Perform Looped Receiver Gain and Net Loss Test on One Channel in Digroup(s) To Be Tested. Requirement: CAU Indicates in Black Area for Receiver Gain and in Green-Black-Green Area for Net Loss	DLP-507
21	Perform Looped Idle Circuit Noise Test on One Channel in Digroup(s) To Be Tested. Requirement: 33 dBrnc or Less	DLP-508
22	Perform Looped Distortion Test on One Channel in Digroup(s) To Be Tested. Requirements: TABLE A	DLP-509

TABLE A		
SWITCH	POSITIONS	REQUIREMENTS
	0	56 dBrnc or less
Send level	10	46 dBrnc or less
dB	20	36 dBrnc or less
on CAU	30	26 dBrnc or less
	40	22 dBrnc or less

DO THE ITEMS BELOW IN THE ORDER LISTED FOR DETAILS, GO TO

23	Perform Looped Crosstalk Test on One Channel in Digroup(s) To Be Tested. Requirement: 27 dBrc Or Less	DLP-510
24	Perform Looped Signaling Test on One Channel in Digroup(s) To Be Tested	DLP-559
	NOTE: Looping at LIU-3 Will Extinguish All Lamps on Bank	
25	If Facility Is Ready for End-To-End Connection, DACS to D4 Bank, Unloop Bank by Removing Pin Plug From LIU-3, If Not, Leave Bank Looped At LIU-3	-
26	Update Office Records	-

TROUBLE ANALYSIS

Trouble procedures in this document involve replacing suspected plug-in units. Except for lamps the plug-in unit is the smallest replaceable item considered in the trouble clearing procedures. Assumptions made in trouble clearing are:

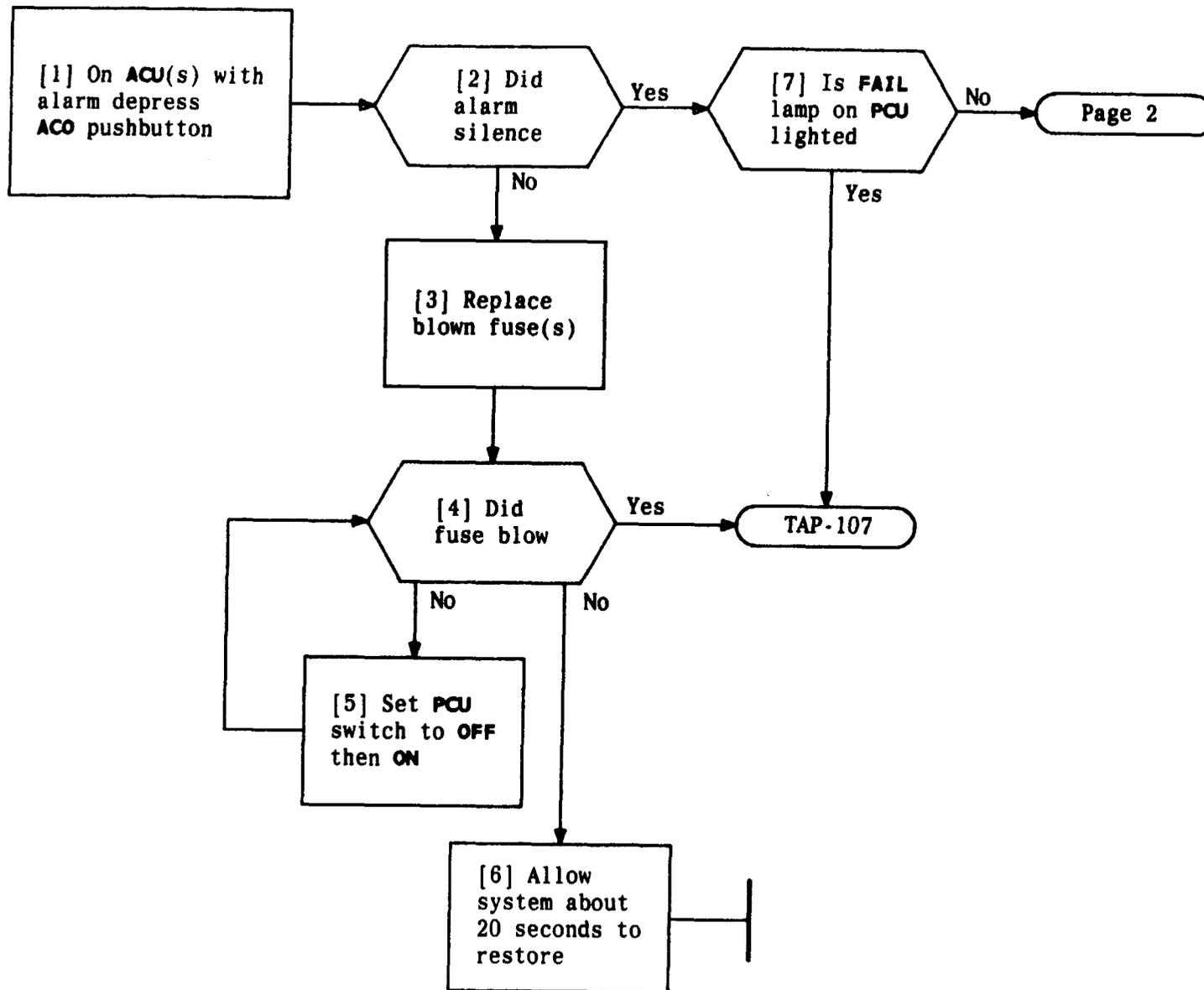
- (1) Only one trouble is addressed at a time.
- (2) Replacement units are in good working order. (Most units can be tested in the maintenance bank. Maintenance bank transmission tests are listed in the IXL.)
- (3) Test equipment is in good working order.

LOOPING

During trouble analysis the bank is looped at the ACU and not at the LIU. Modes 2 and 4 have a "fast loop" capability which is also used during trouble analysis.

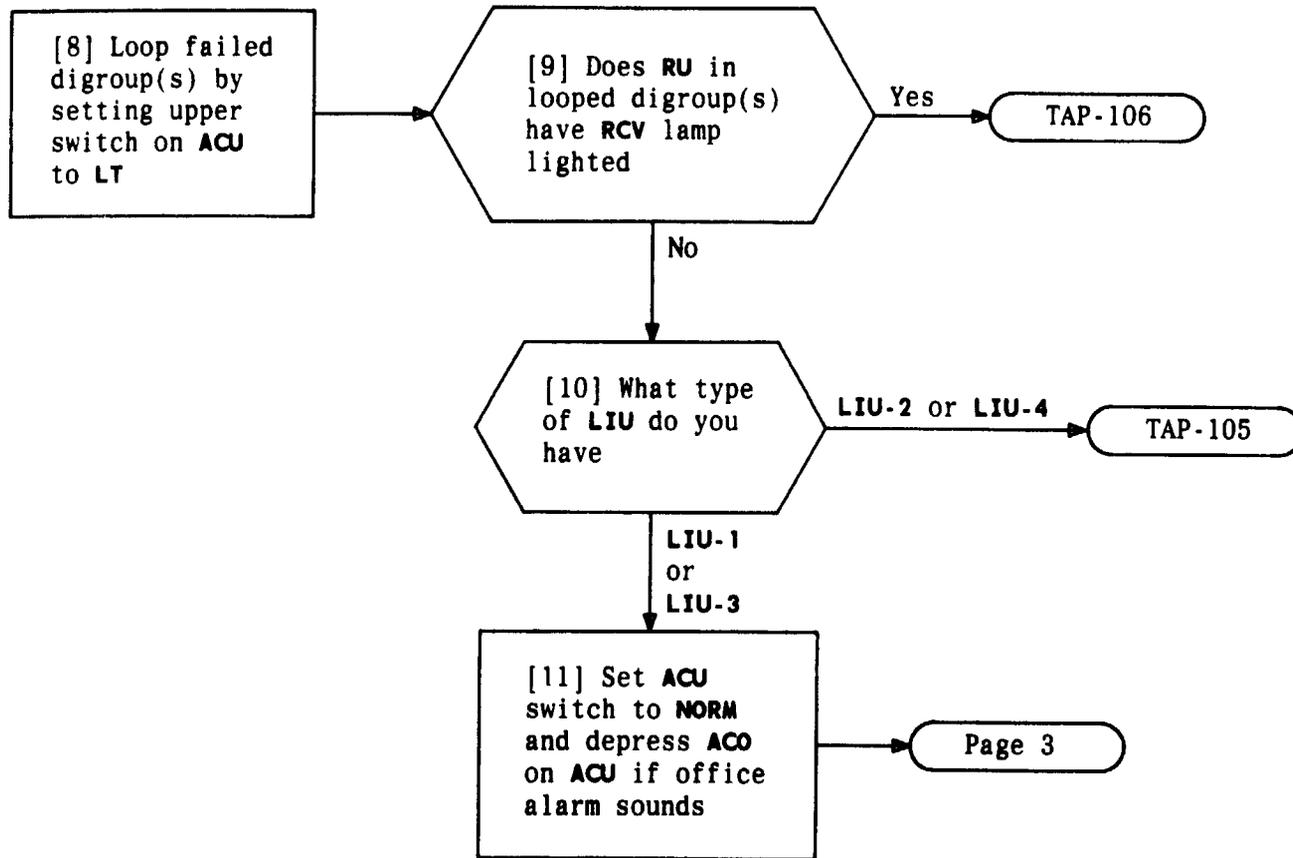
CHANNEL UNIT TEST CARDS

Test cards normally ordered with and stored in the maintenance bank are used to test channel units in the maintenance bank.



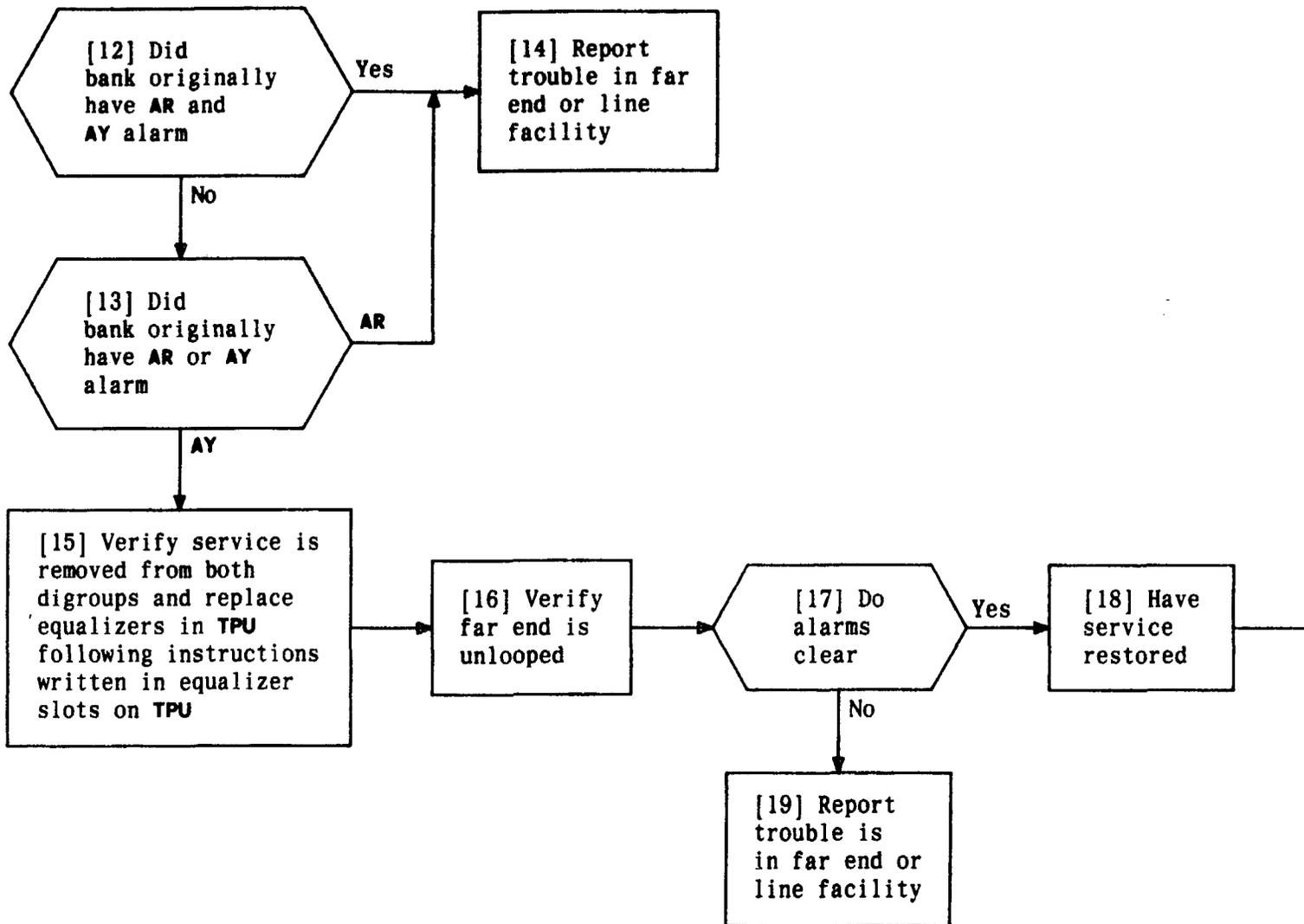
ISOLATE AR OR FUSE ALARM

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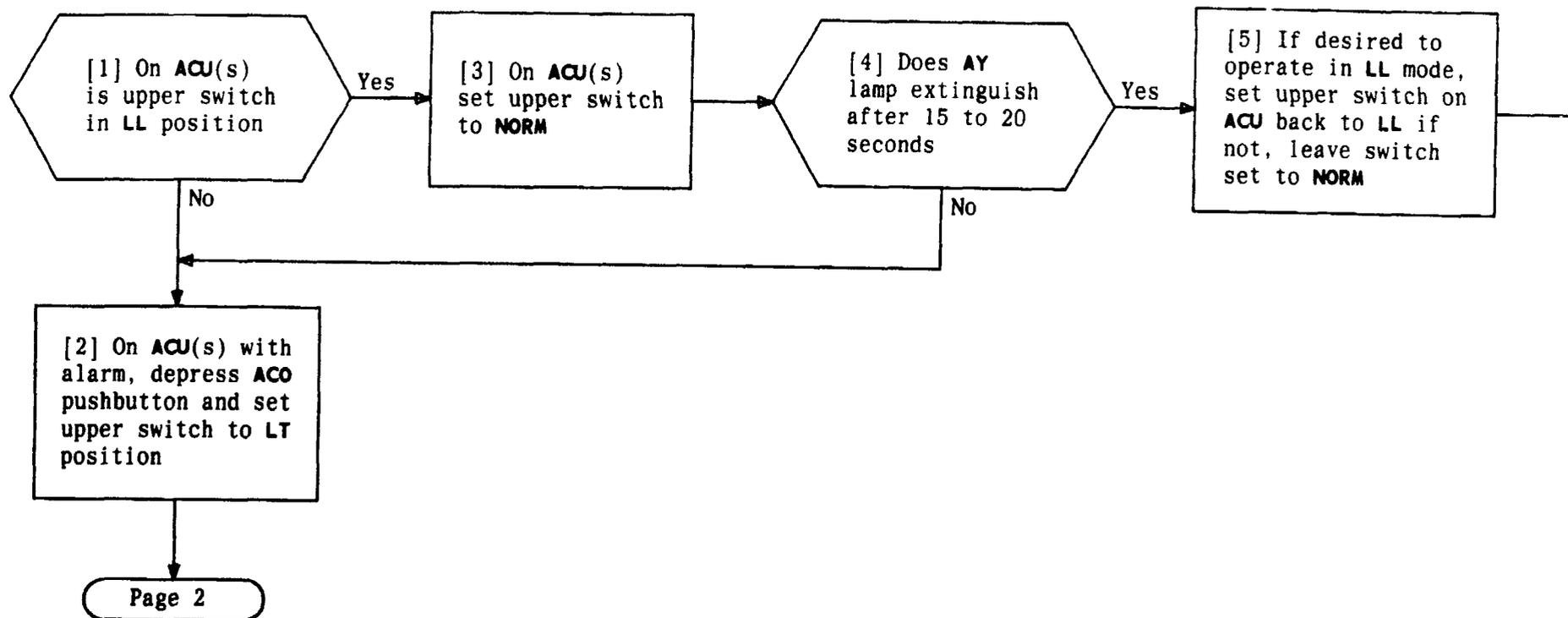
ISOLATE AR OR FUSE ALARM

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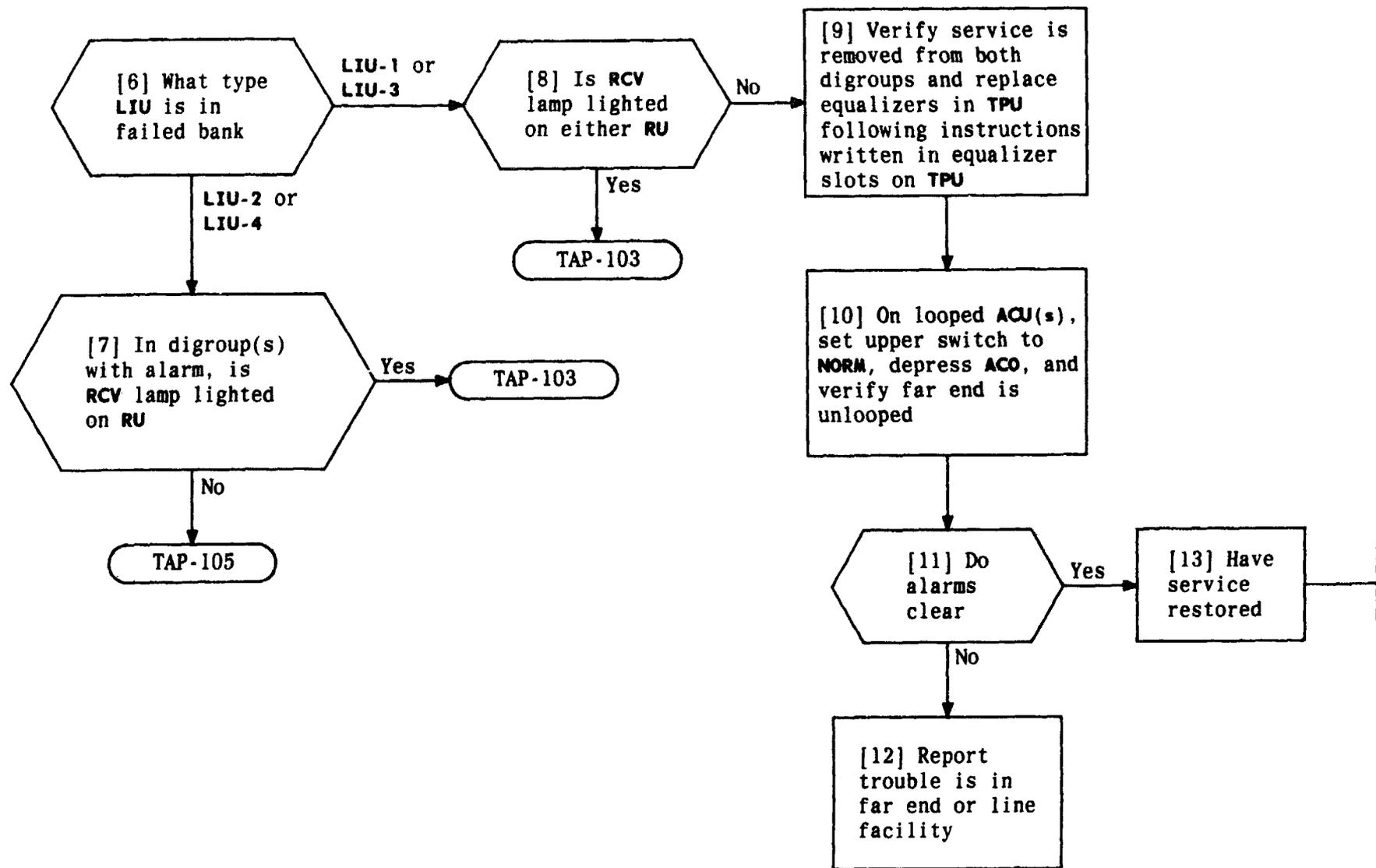
ISOLATE AR OR FUSE ALARM

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ISOLATE AY ALARM

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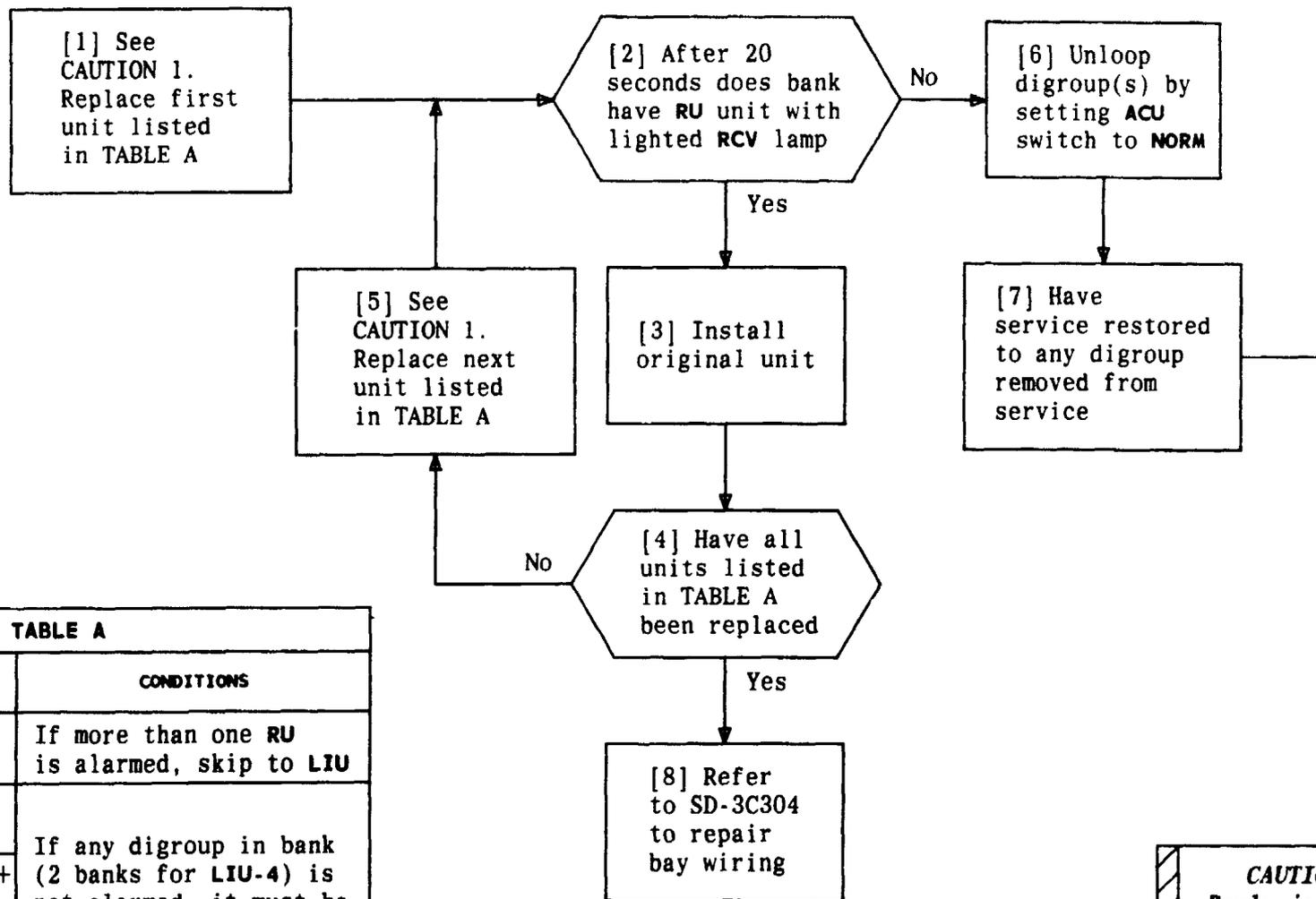


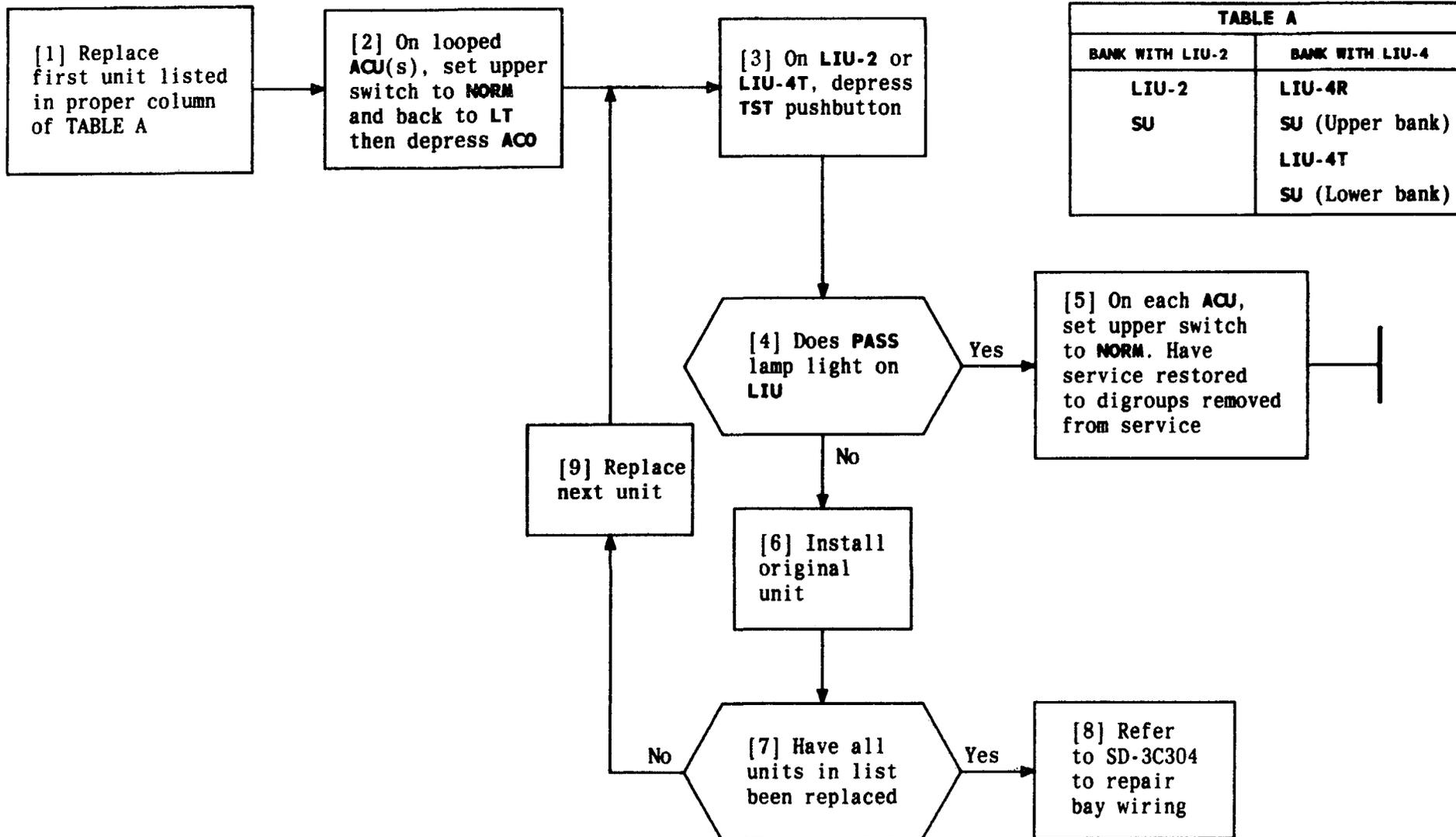
TABLE A		
UNIT*	REPLACEMENT PROCEDURE	CONDITIONS
TU	-	If more than one RU is alarmed, skip to LIU
ACU	-	
LIU(s)	-	If any digroup in bank (2 banks for LIU-4) is not alarmed, it must be removed from service to replace these units
SU(s)†	-	
TPU	DLP-552 + DLP-553	
RU	-	
OIU†	DLP-555	

* ACO must be depressed on ACU to silence alarm after replacing some units
 † If installed in bank

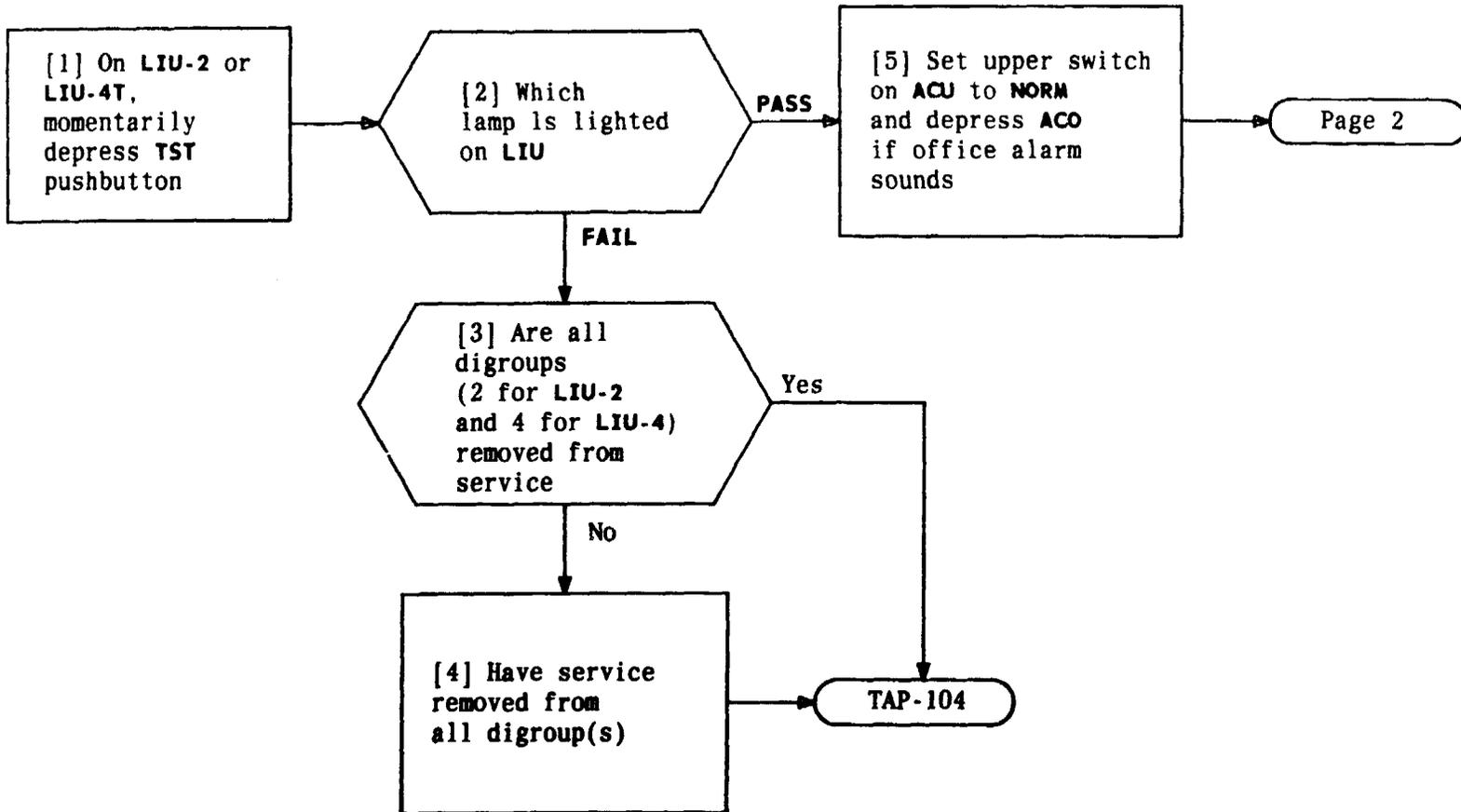
CAUTION 1
 Replacing LIU, SU, TPU, or OIU will affect service in both digroups (4 digroups for LIU-4)

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REPAIR BY ALARM CAUSED BY COMMON EQUIPMENT

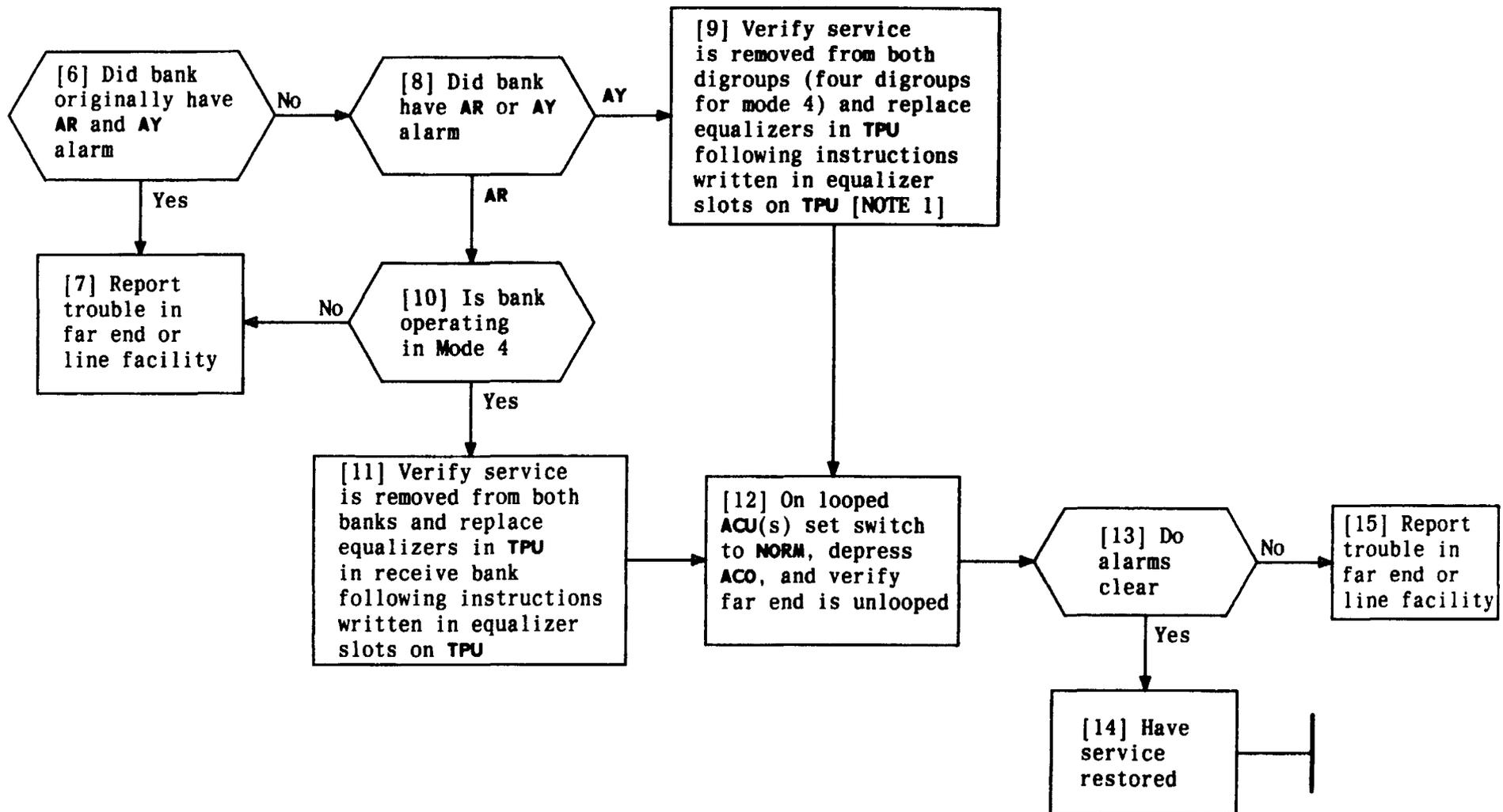


REPAIR LIU FAIL CONDITION



VERIFY LIU AND SU OPERATION

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NOTE 1
 Equalizers should be replaced in TPU for transmit bank only for Mode 4

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VERIFY LIU AND SU OPERATION

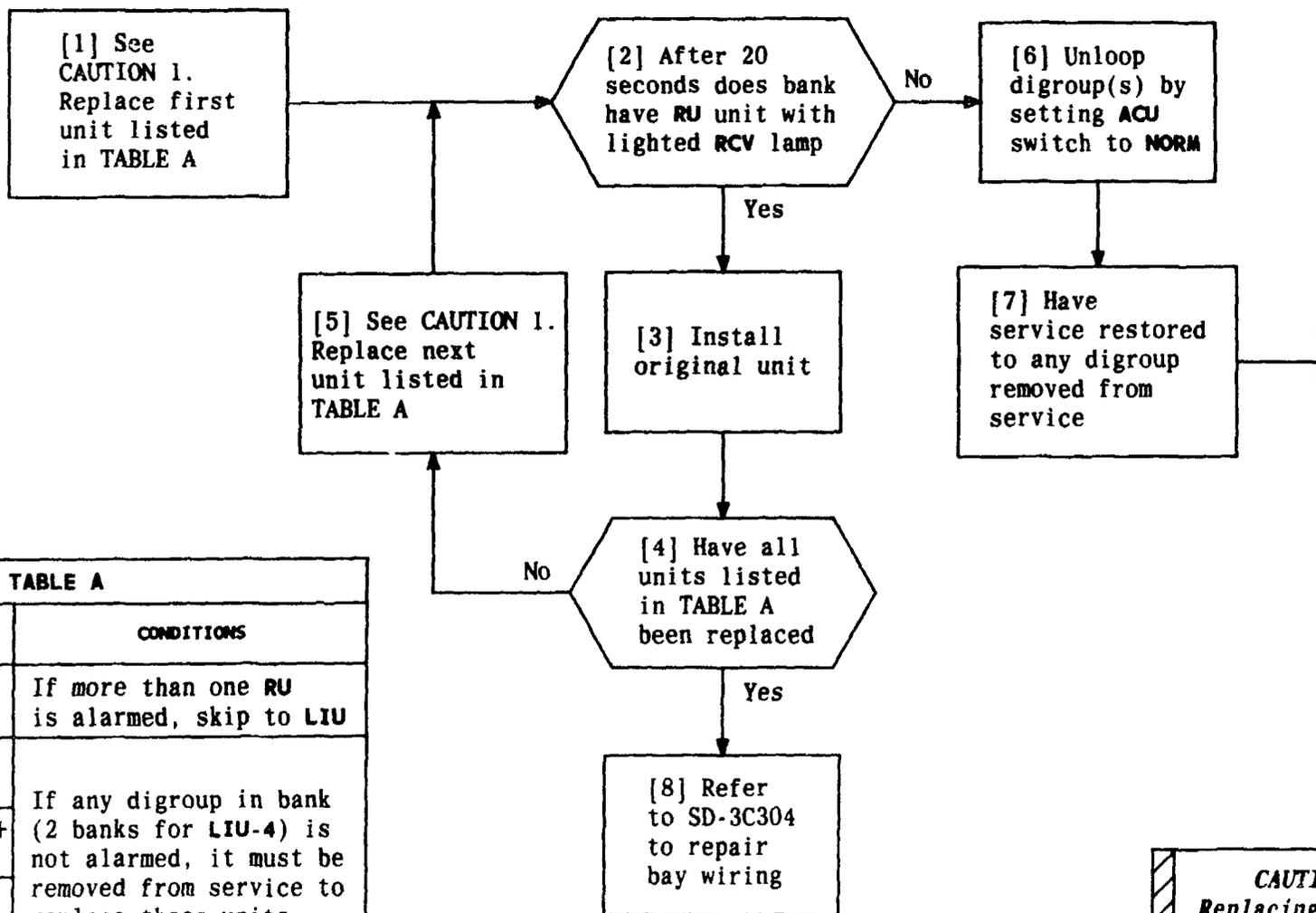
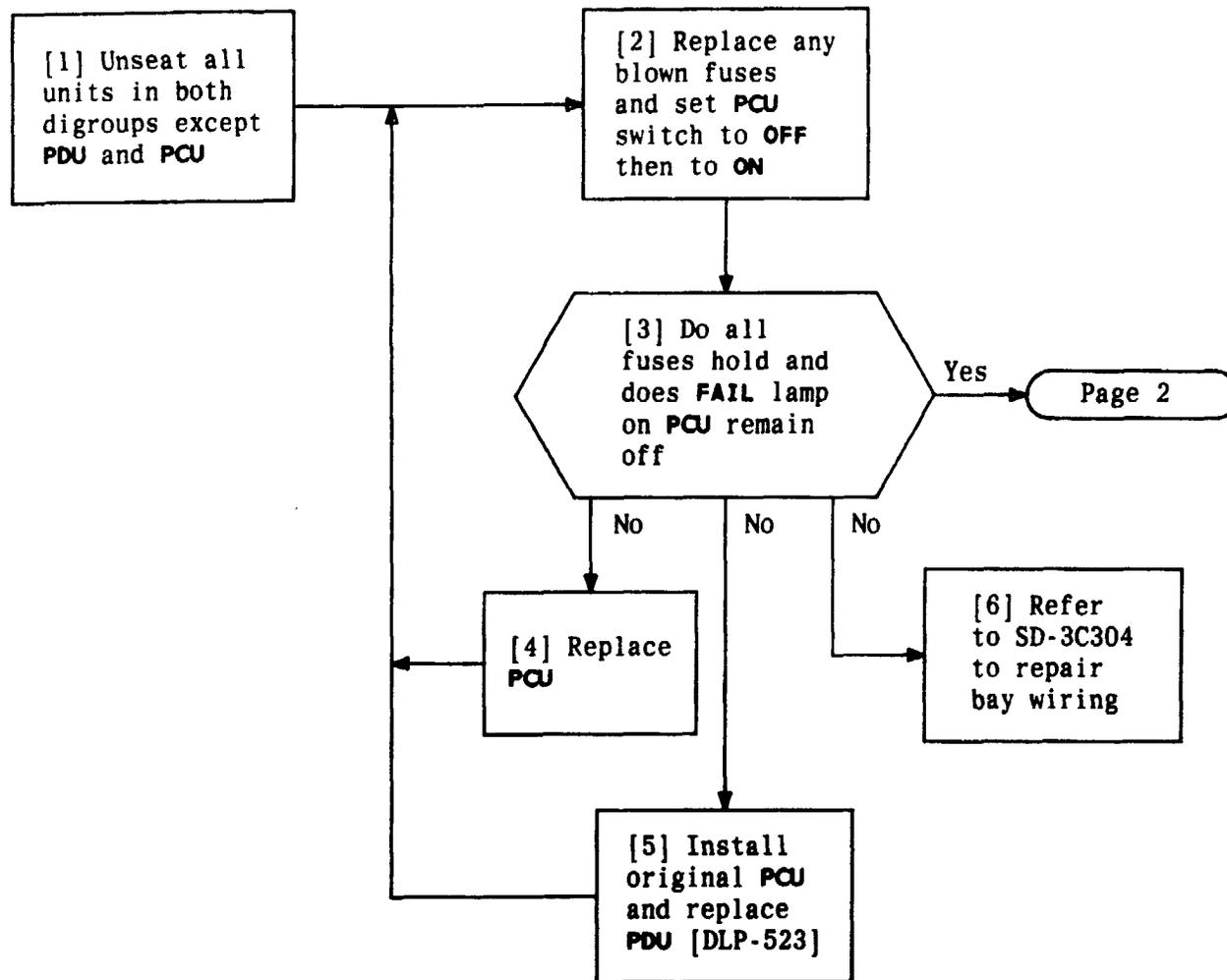


TABLE A		
UNIT*	REPLACEMENT PROCEDURE	CONDITIONS
RU	-	If more than one RU is alarmed, skip to LIU
ACU	-	
LIU(s)	-	If any digroup in bank (2 banks for LIU-4) is not alarmed, it must be removed from service to replace these units
SU(s)†	-	
TPU	DLP-552 + DLP-553	
TU	-	
OIU†	DLP-555	

* ACO must be depressed on ACU to silence alarm after replacing some units
 † If installed in bank

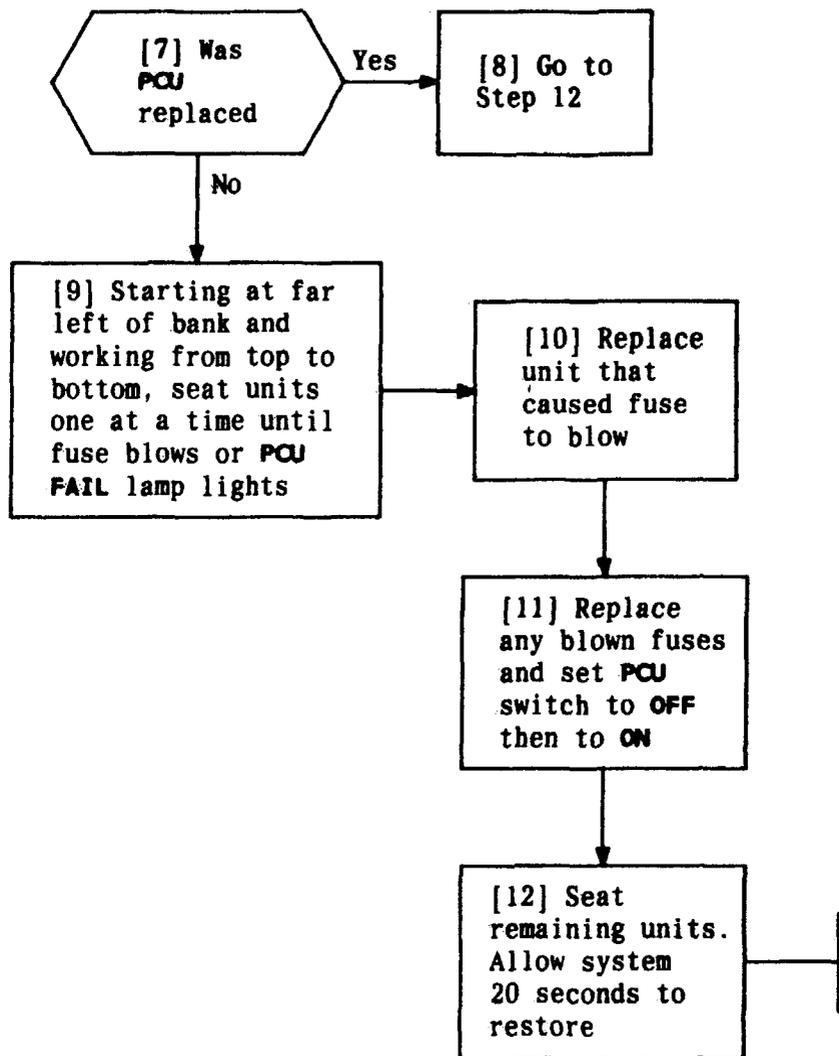
CAUTION 1
 Replacing LIU, SU, TPU, or OIU will affect service in both digroups (4 digroups for LIU-4)

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REPAIR AR ALARM CAUSED BY POWER TROUBLE

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REPAIR AN ALARM CAUSED BY POWER TROUBLE

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[1] Contact far end and request help in performing end-to-end test

[2] Refer to TABLE A and perform first choice test for reported trouble. See TABLE B, Page 2.

TABLE A				
TROUBLE REPORTED	TESTS USED TO FIND TROUBLE			
	FIRST CHOICE	SECOND CHOICE	THIRD CHOICE	FOURTH CHOICE
Noise	Idle Circuit Noise	Distortion	Crosstalk	Impulse Noise
Level - Hi or Low	Net Loss	-	-	-
Crosstalk	Crosstalk	Idle Circuit Noise	-	-
Distortion	Distortion	Idle Circuit Noise	Crosstalk	-
Voice Band Data Errors	Idle Circuit Noise	Impulse Noise	Crosstalk	-
Phase Jitter	Distortion	Idle Circuit Noise	-	-

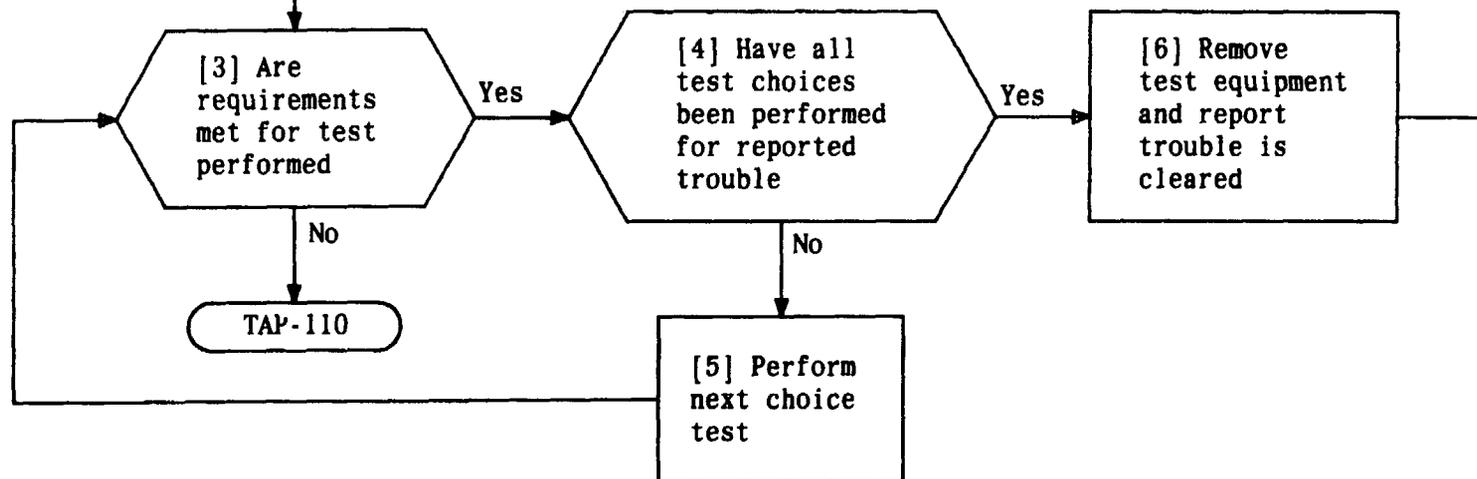
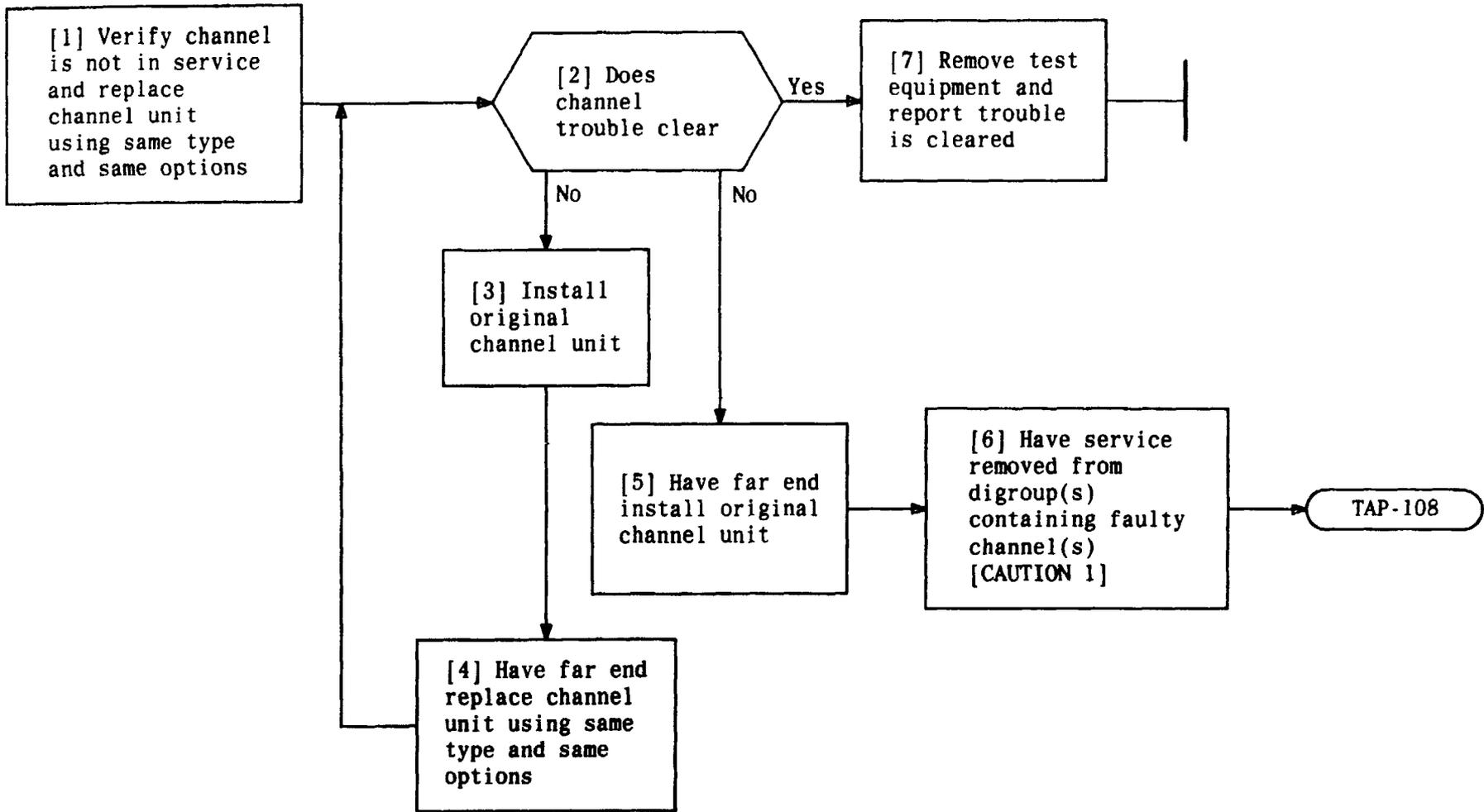


TABLE B END-TO-END TESTING				
TEST	REFERENCE	NEAR-END (D4) REQUIREMENT	FAR-END BANK	FAR-END REQUIREMENT
Net Loss	DLP-542	CAU indicates -0.25 to +0.25 dBm	D3 or D4	-0.25 to +0.25 dBm
			D2	+6.75 to +7.25 dBm
			D1D	+2.5 dBm
Idle Circuit Noise	DLP-543	23 dBrnc or less	D3 or D4	23 dBrnc or less
		28 dBrnc or less	D2	35 dBrnc or less
		26 dBrnc or less	D1D	28 dBrnc or less
Distortion	DLP-544	0 dB-56 dBrnc or less	D3 or D4	0 dB-56 dBrnc or less
		10 dB-46 dBrnc or less		10 dB-46 dBrnc or less
		20 dB-36 dBrnc or less		20 dB-36 dBrnc or less
		30 dB-26 dBrnc or less		30 dB-26 dBrnc or less
	DLP-544	40 dB-22 dBrnc or less	40 dB-22 dBrnc or less	
		Pad out - 56 dBrnc or less Pad A - 36 dBrnc or less Pad B - 24 dBrnc or less	D2	0 dB-56 dBrnc or less 10 dB-46 dBrnc or less 20 dB-36 dBrnc or less 30 dB-28 dBrnc or less 40 dB-26 dBrnc or less
DLP-544	0 dB-56 dBrnc or less 10 dB-46 dBrnc or less 20 dB-36 dBrnc or less 30 dB-26 dBrnc or less 40 dB-22 dBrnc or less	D1D	0 dB-56 dBrnc or less 10 dB-46 dBrnc or less 20 dB-36 dBrnc or less 30 dB-26 dBrnc or less 40 dB-22 dBrnc or less	
Crosstalk	DLP-545	27 dBrnc or less	D3 or D4	27 dBrnc or less
		27 dBrnc or less*	D2	27 dBrnc or less*
		32 dBrnc or less	D1D	32 dBrnc or less
Impulse Noise	DLP-546	At 63 dBrn: 1 count (or none) in 5 minutes At 58 dBrn: 5 counts (or less) in 5 minutes	D3 or D4	At 63 dBrn: 1 count (or none) in 5 minutes At 58 dBrn: 5 count (or less) in 5 minutes
			D2	
			D1D	

*29 dBrnc is allowable for first interfering channel test



CAUTION 1
If D4 bank has LIU-1, both digroups must be removed from service

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CHECK CHANNEL UNIT FOR CHANNEL TROUBLE

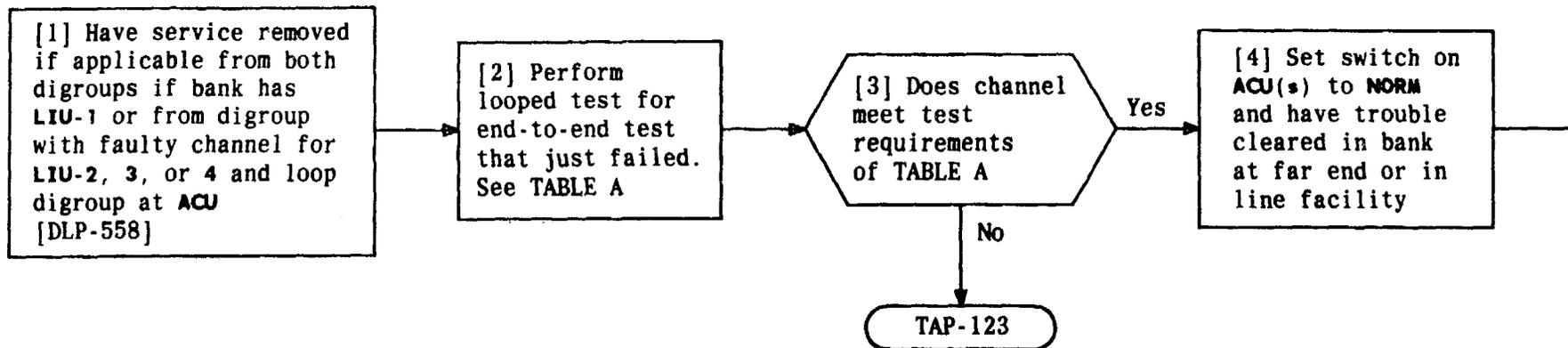
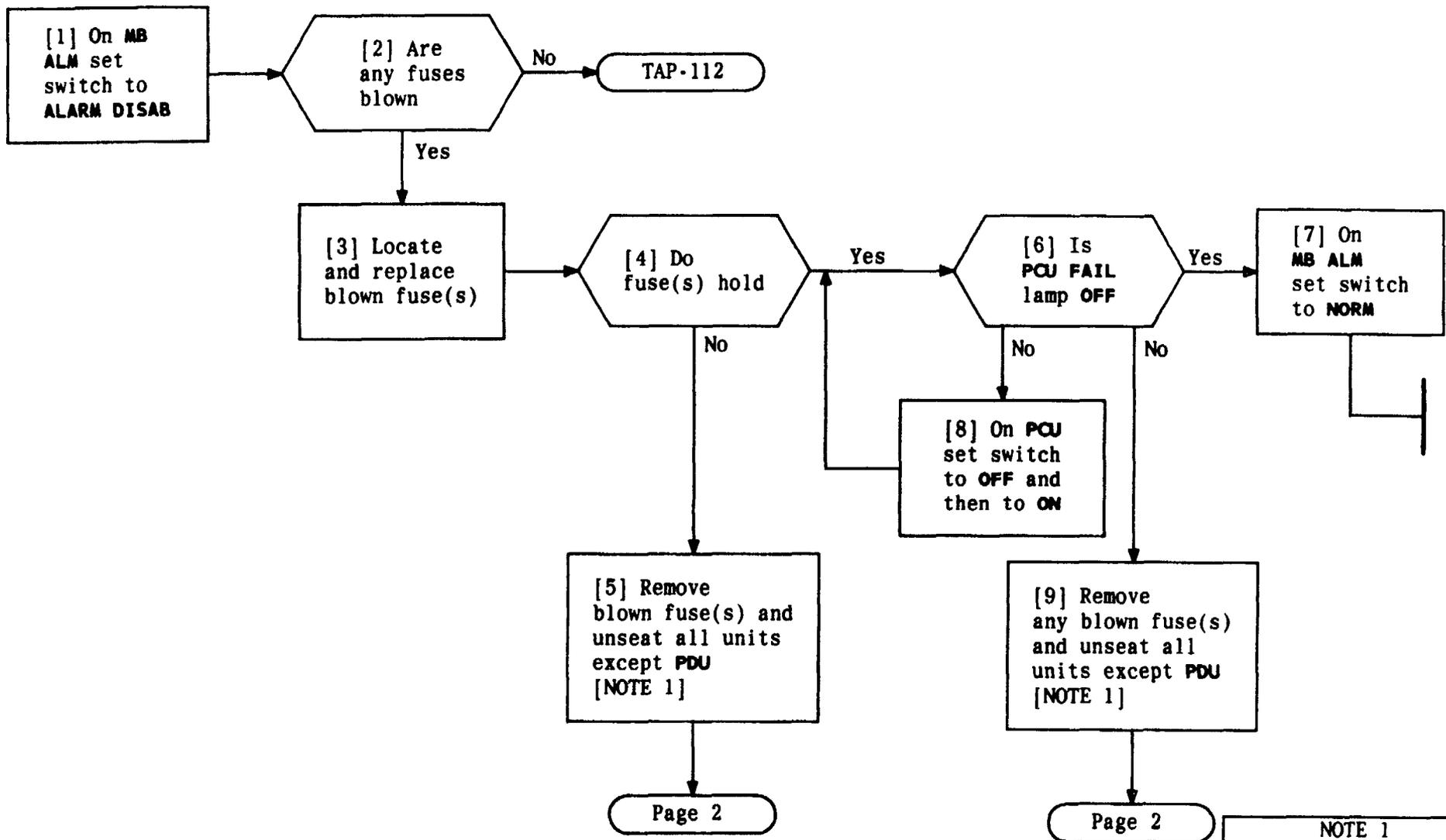


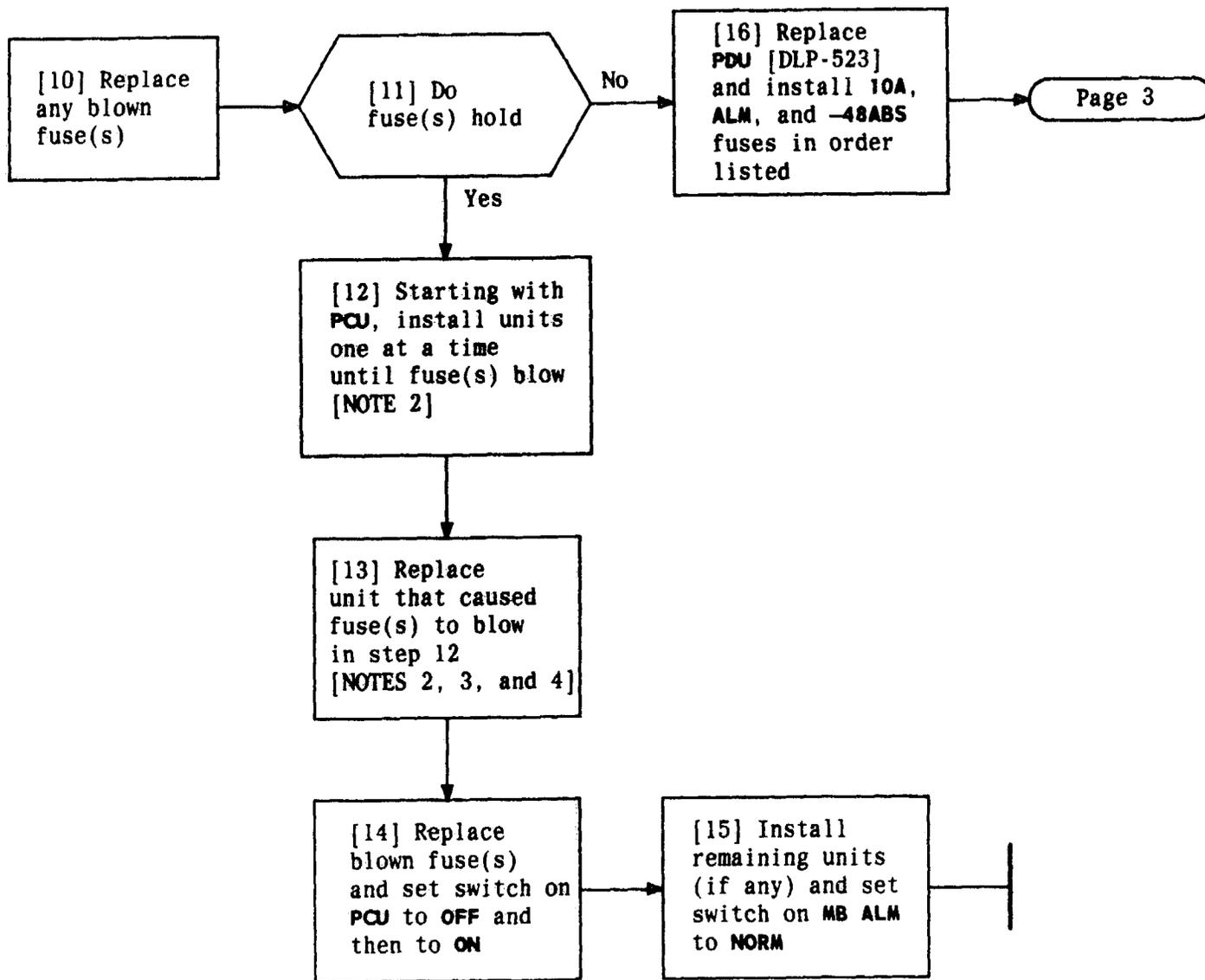
TABLE A		
LOOPED TESTS	PROCEDURES	REQUIREMENTS
Distortion	DLP-609	SEND LEVEL DB at 0 = 56 dBrc or less SEND LEVEL DB at 10 = 46 dBrc or less SEND LEVEL DB at 20 = 36 dBrc or less SEND LEVEL DB at 30 = 26 dBrc or less SEND LEVEL DB at 40 = 22 dBrc or less
Crosstalk	DLP-610	27 dBrc or less
Net Loss	DLP-611	Green-Black-Green area
Impulse Noise	DLP-612	0-1 count in 5 minutes
Idle Circuit Noise	DLP-613	23 dBrc or less



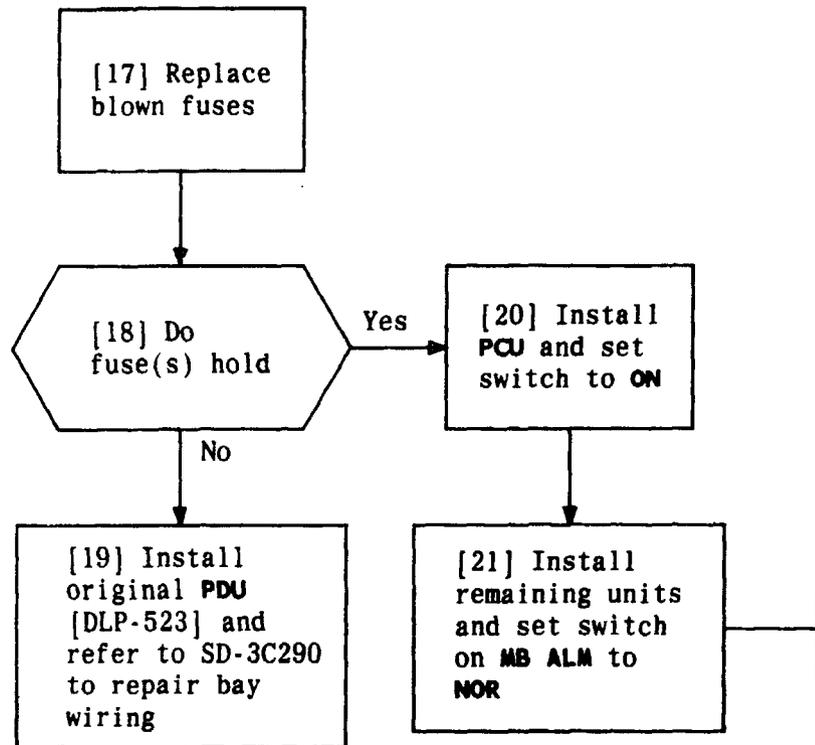
NOTE 1
 To unseat 1A or 1B MBTS units, screws must be loosened at rear of bank

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CLEAR D4 MAINTENANCE BANK ALARMS



NOTES	
2.	Switch on PCU must be set to ON after PCU is installed
3.	If 4E&M unit is replaced, XMT and RCV attenuators must be set to match original
4.	If 1A or 1B MBTS is replaced, panel switches must be set to match original
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CLEAR D4 MAINTENANCE BANK ALARMS

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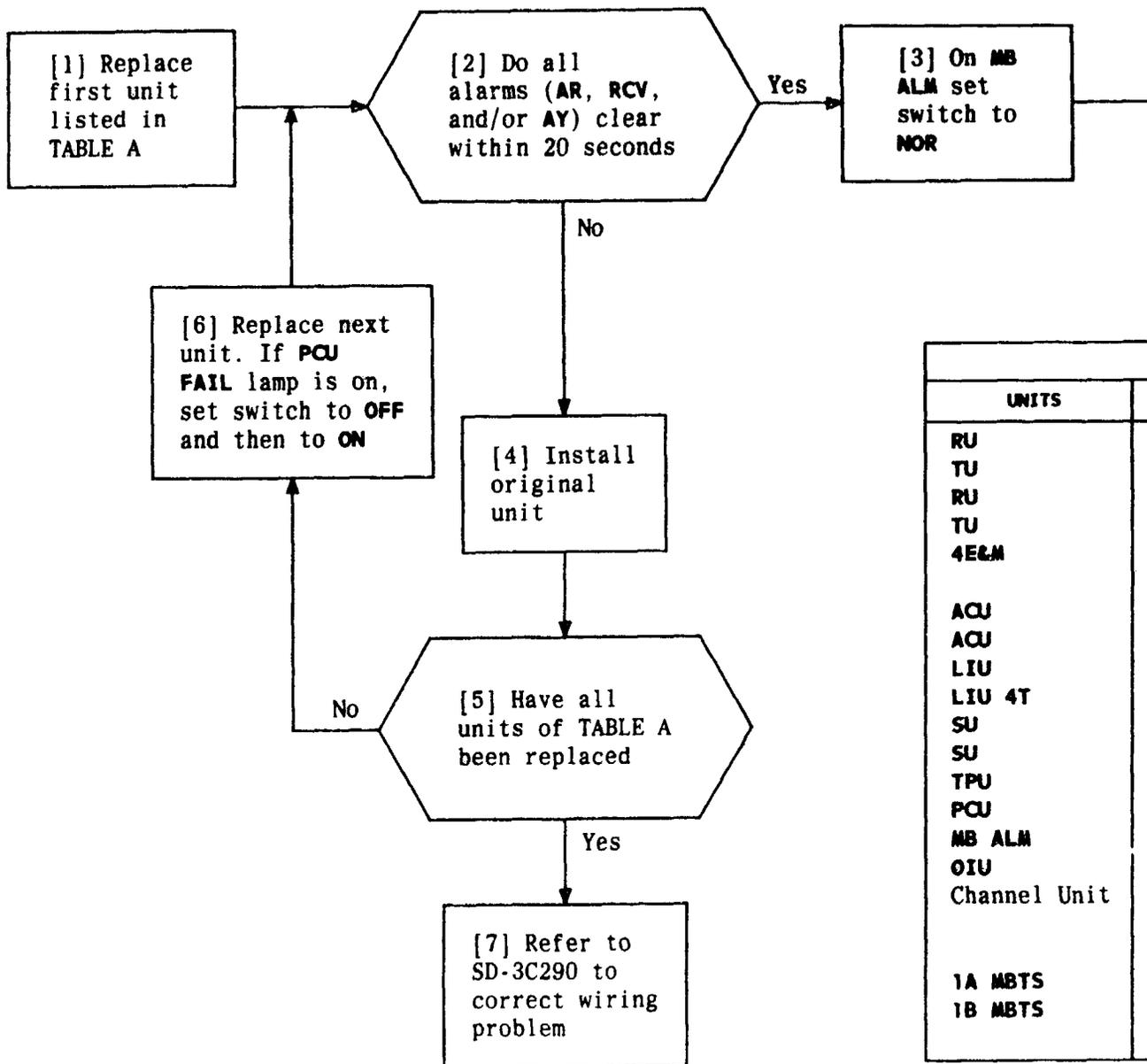


TABLE A	
UNITS	CONDITIONS
RU	In Digroup with AR alarm on ACU
TU	In Digroup with AR alarm on ACU
RU	In other Digroup
TU	In other Digroup
4E&M	T & R attenuators must have plugs in 0 side
ACU	In Digroup A
ACU	In Digroup B
LIU	In LIU slot
LIU 4T	If installed in LIU 4T slot
SU	Right side slot
SU	Left side slot
TPU	[DLP-531]
PCU	Set switch to ON
MB ALM	
OIU	If installed in OIU slot
Channel Unit	Installed in CUT slot. T & R attenuators must have plugs set to match original channel unit
1A MBTS	Has locking screw in rear of bank
1B MBTS	Has locking screw in rear of bank

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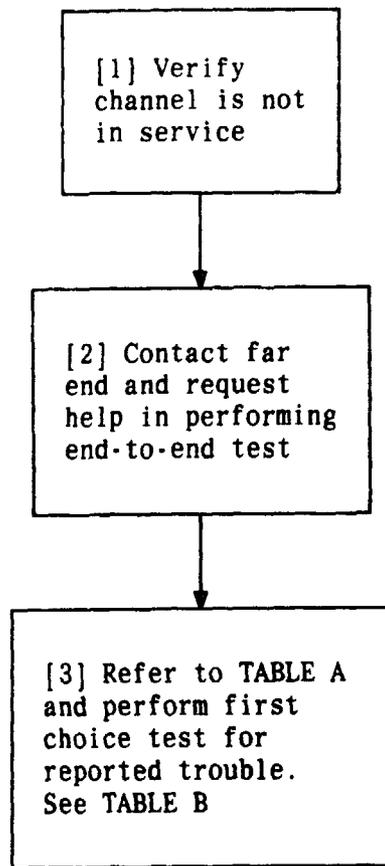


TABLE A				
TROUBLE REPORTED	TESTS USED TO FIND TROUBLE			
	FIRST CHOICE	SECOND CHOICE	THIRD CHOICE	FOURTH CHOICE
Noise	Idle Circuit Noise	Distortion	Crosstalk	Impulse Noise
Level - Hi or Low	Net Loss	-	-	-
Crosstalk	Crosstalk	Idle Circuit Noise	-	-
Distortion	Distortion	Idle Circuit Noise	Crosstalk	-
Voice Band Data Errors	Idle Circuit Noise	Impulse Noise	Crosstalk	-
Data Errors	Idle Circuit Noise	Impulse Noise	Crosstalk	-
Phase Jitter	Distortion	Idle Circuit Noise		-

**TABLE B
END-TO-END TESTING**

TEST	REFERENCE	NEAR-END (D4) REQUIREMENT	FAR-END BANK	FAR-END REQUIREMENT
Net Loss	DLP-542	CAU indicates -0.25 to +0.25 dBm	D3 or D4	-0.25 to +0.25 dBm
			D2	+6.75 to +7.25 dBm
			D1D	+2.5 dBm
Idle Circuit Noise	DLP-543	23 dBrc or less	D3 or D4	23 dBrc or less
		28 dBrc or less	D2	35 dBrc or less
		26 dBrc or less	D1D	28 dBrc or less
Distortion	DLP-544	0 dB-56 dBrc or less	D3 or D4	0 dB-56 dBrc or less
		10 dB-46 dBrc or less		10 dB-46 dBrc or less
		20 dB-36 dBrc or less		20 dB-36 dBrc or less
	DLP-544	30 dB-26 dBrc or less	D2	30 dB-26 dBrc or less
		40 dB-22 dBrc or less		40 dB-22 dBrc or less
		Pad out - 56 dBrc or less Pad A - 36 dBrc or less Pad B - 24 dBrc or less		0 dB-56 dBrc or less 10 dB-46 dBrc or less 20 dB-36 dBrc or less 30 dB-28 dBrc or less 40 dB-26 dBrc or less
DLP-544	0 dB-56 dBrc or less	D1D	0 dB-56 dBrc or less	
	10 dB-46 dBrc or less		10 dB-46 dBrc or less	
	20 dB-36 dBrc or less		20 dB-36 dBrc or less	
Crosstalk	DLP-545	27 dBrc or less	D3 or D4	27 dBrc or less
		27 dBrc or less*	D2	27 dBrc or less*
		32 dBrc or less	D1D	32 dBrc or less
Impulse Noise	DLP-546	At 63 dBrc: 1 count (or none) in 5 minutes	D3 or D4	At 63 dBrc: 1 count (or none) in 5 minutes
		At 58 dBrc: 5 counts (or less) in 5 minutes	D2	At 58 dBrc: 5 count (or less) in 5 minutes
			D1D	

*29 dBrc is allowable for first interfering channel test

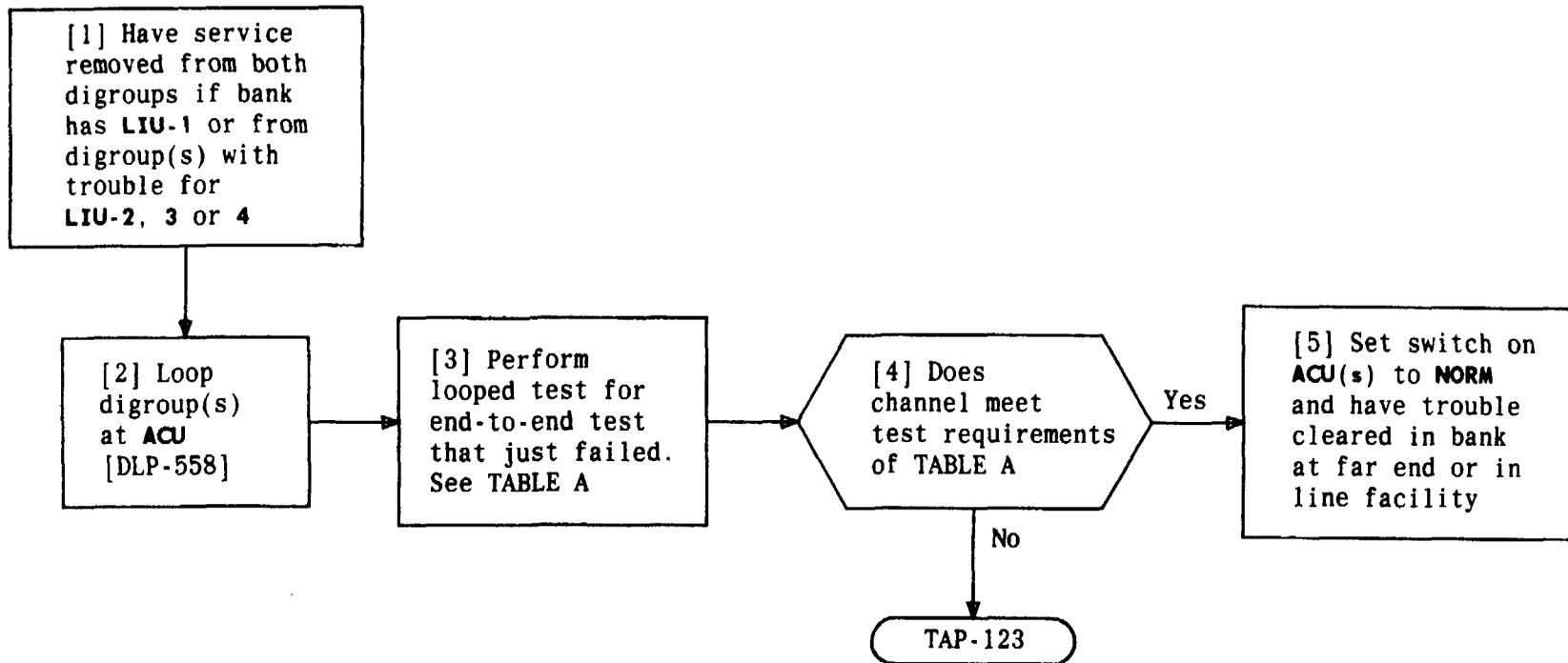
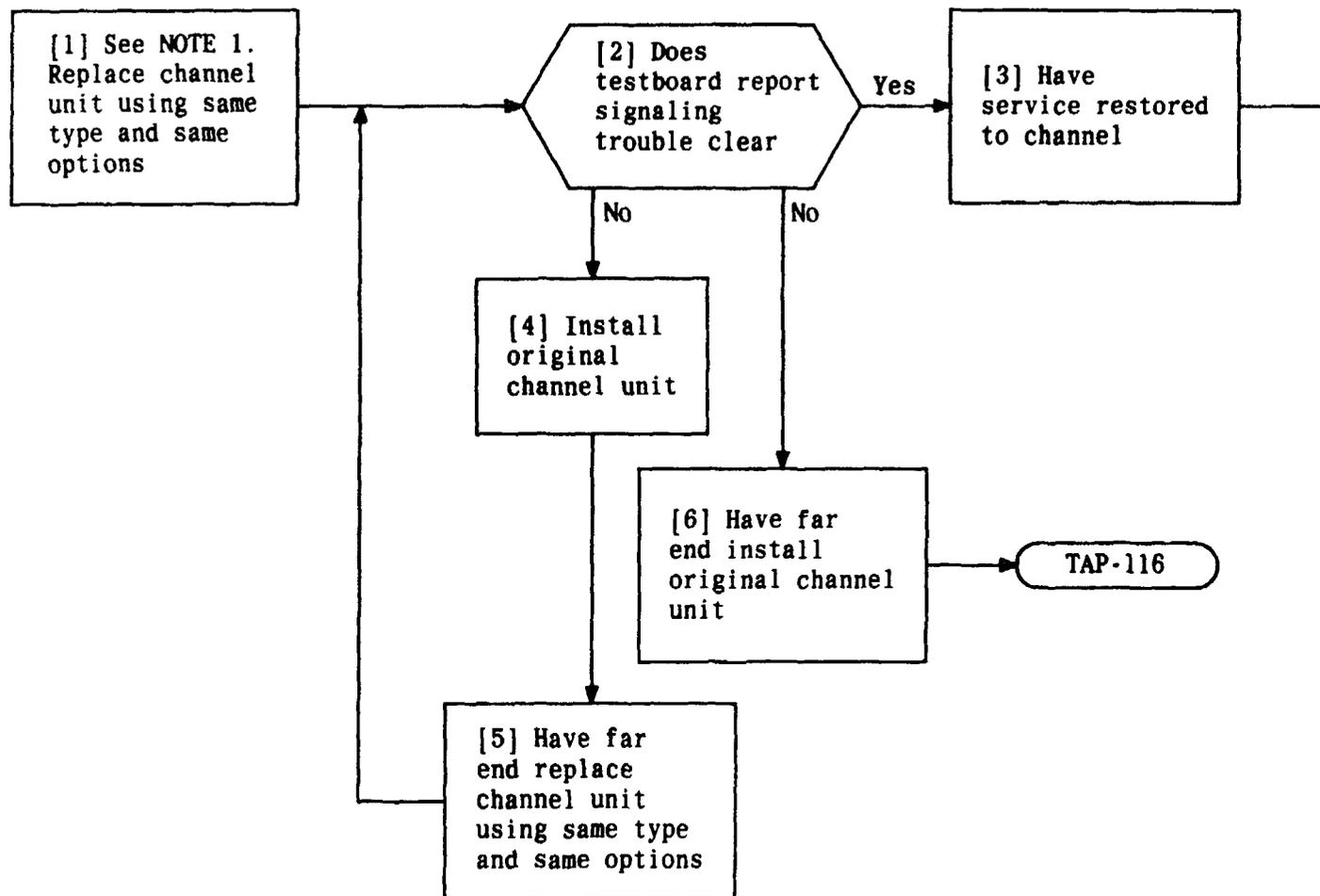


TABLE A		
LOOPED TESTS	PROCEDURES	REQUIREMENTS
Distortion	DLP-609	SEND LEVEL DB at 0 = 56 dBrnc or less SEND LEVEL DB at 10 = 46 dBrnc or less SEND LEVEL DB at 20 = 36 dBrnc or less SEND LEVEL DB at 30 = 26 dBrnc or less SEND LEVEL DB at 40 = 22 dBrnc or less
Crosstalk	DLP-610	27 dBrnc or less
Net Loss	DLP-611	Green-Black-Green area
Impulse Noise	DLP-612	0-1 count in 5 minutes
Idle Circuit Noise	DLP-613	23 dBrnc or less

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ISOLATE SYSTEM TROUBLE



NOTE 1	
Proper signaling conditions to channel unit may be verified by connecting P6AC SIG cord to channel unit and measuring expected signaling conditions (voltage, ground, or open) at black 310 plug, using VOM	
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CHECK CHANNEL UNIT FOR SIGNALING TROUBLE

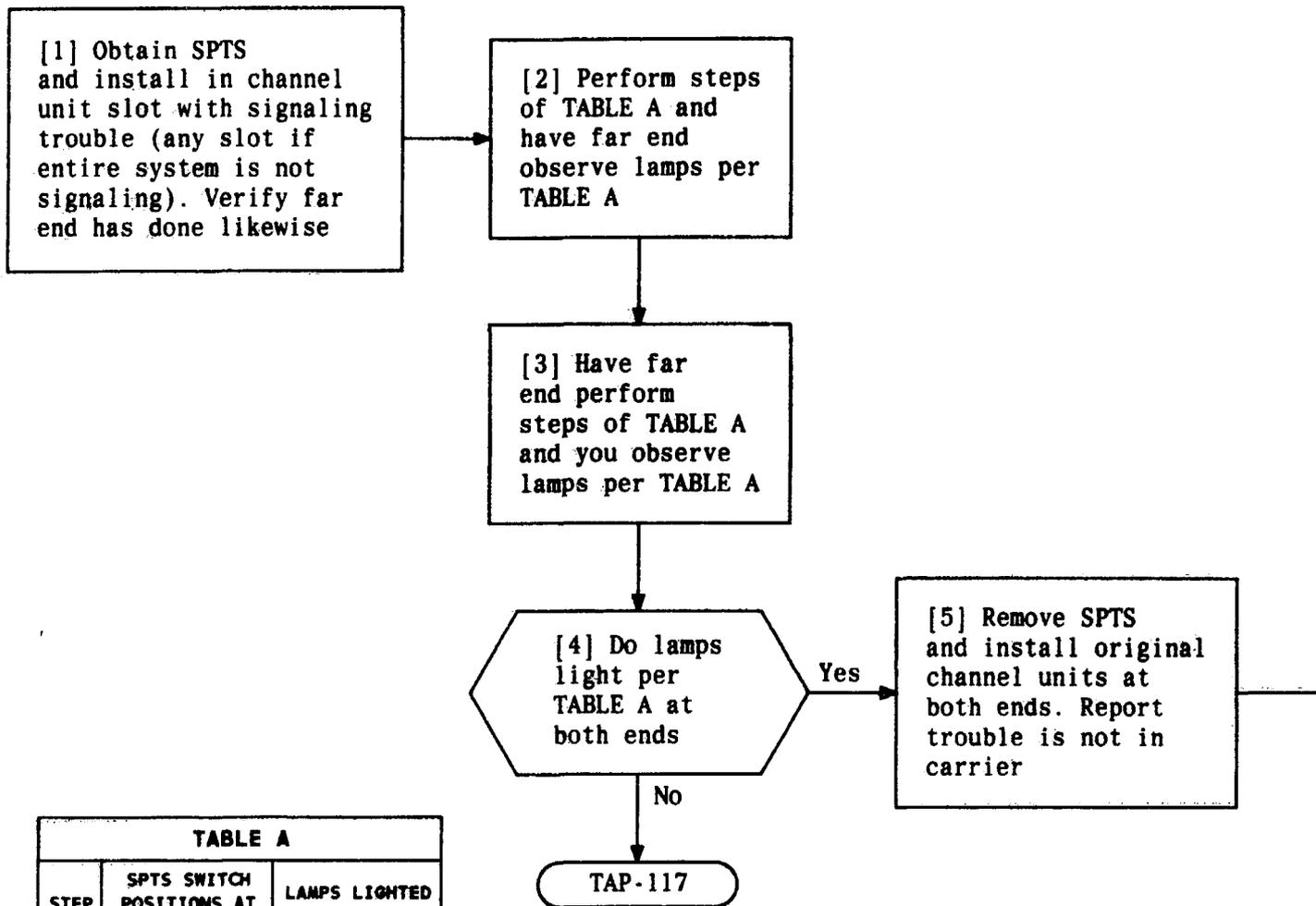


TABLE A		
STEP	SPTS SWITCH POSITIONS AT ONE END	LAMPS LIGHTED AT OTHER END
1	A to 1 B to 0	A only
2	A to 0 B to 1	B only

CHECK SYSTEM FOR SIGNALING TROUBLE

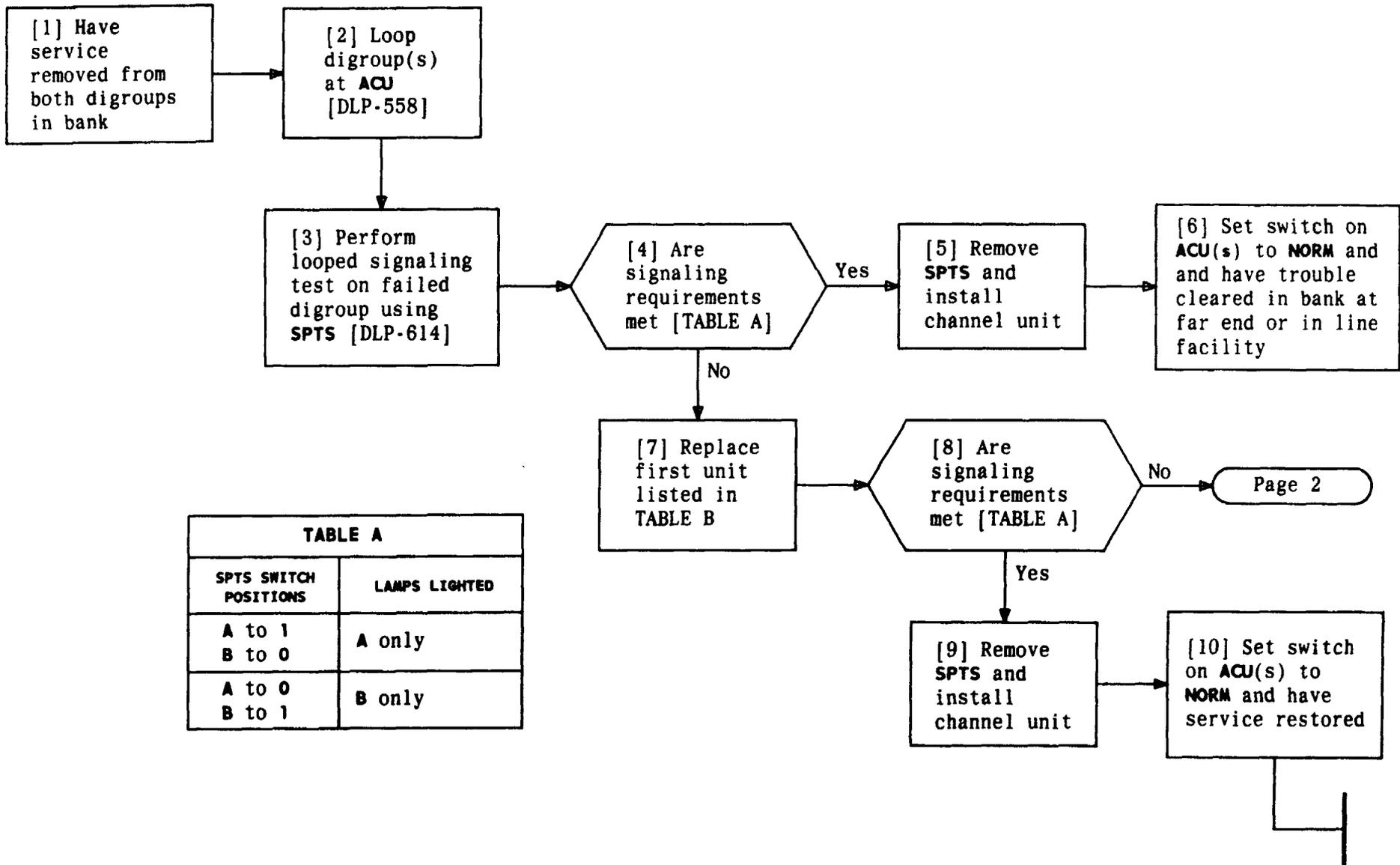


TABLE A	
SPTS SWITCH POSITIONS	LAMPS LIGHTED
A to 1 B to 0	A only
A to 0 B to 1	B only

CLEAR CHANNEL BANK SIGNALING TROUBLE

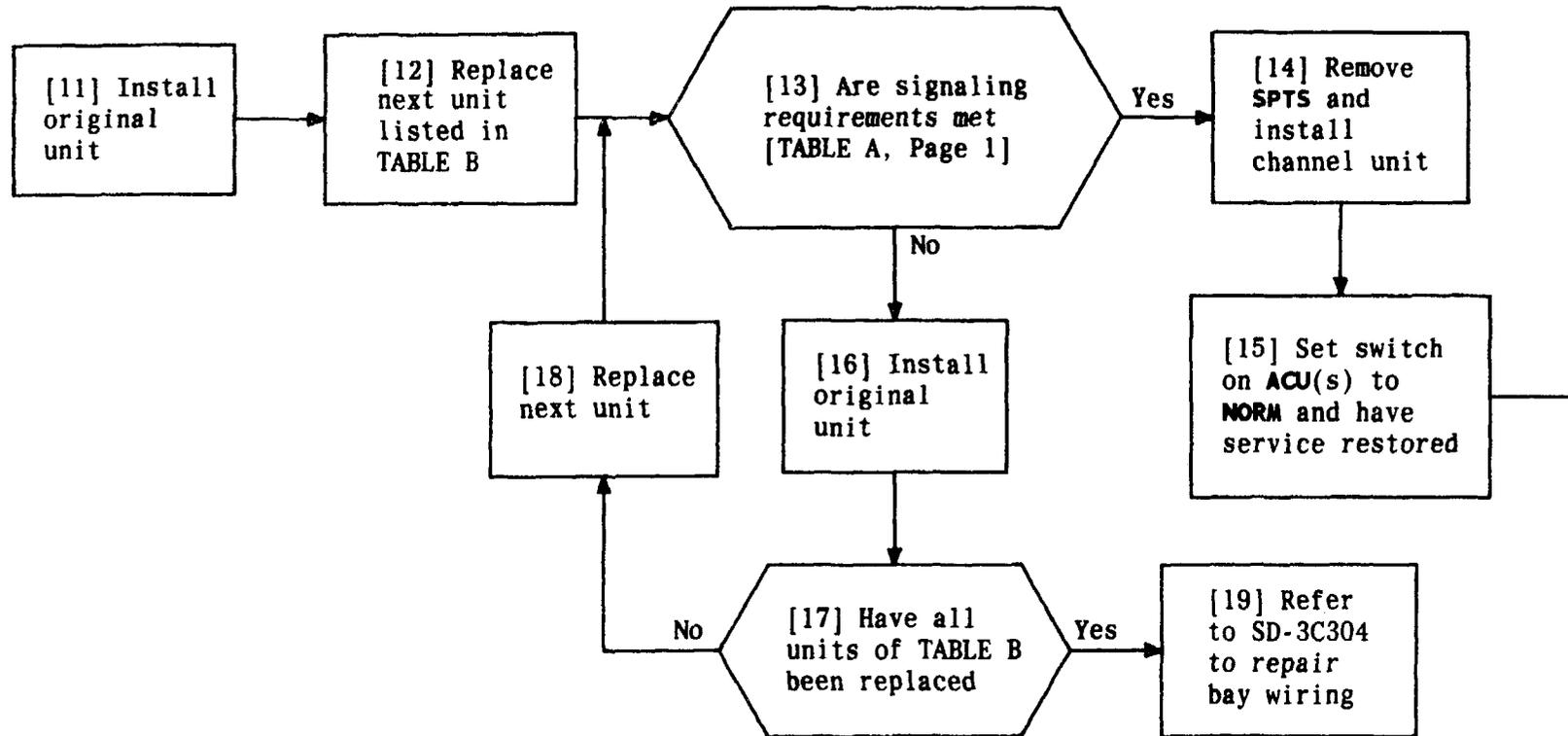
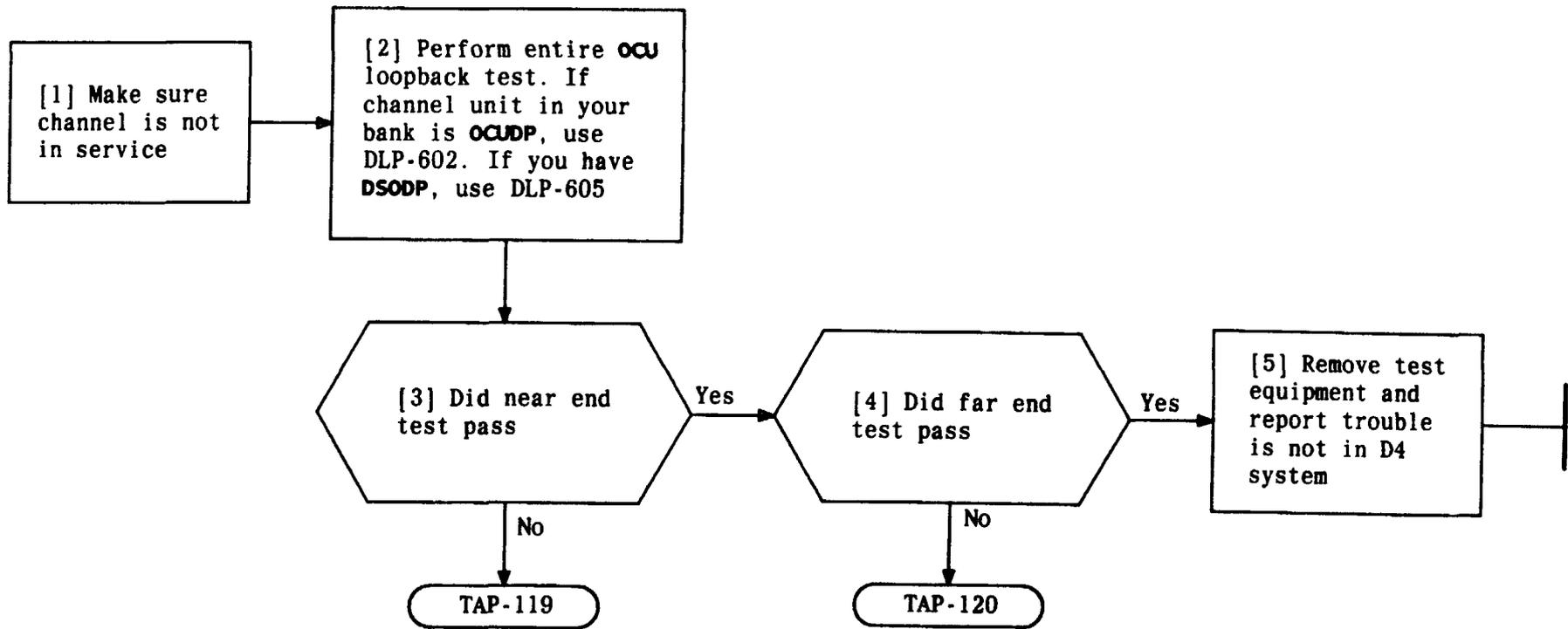


TABLE B	
UNIT*	CONDITIONS
TPU	One per bank [DLP-552] and [DLP-553]
ACU	In digroup under test (one per bank in Mode 1)
LIU	
SU	If contained in bank
OIU	If contained in bank
SPTS	

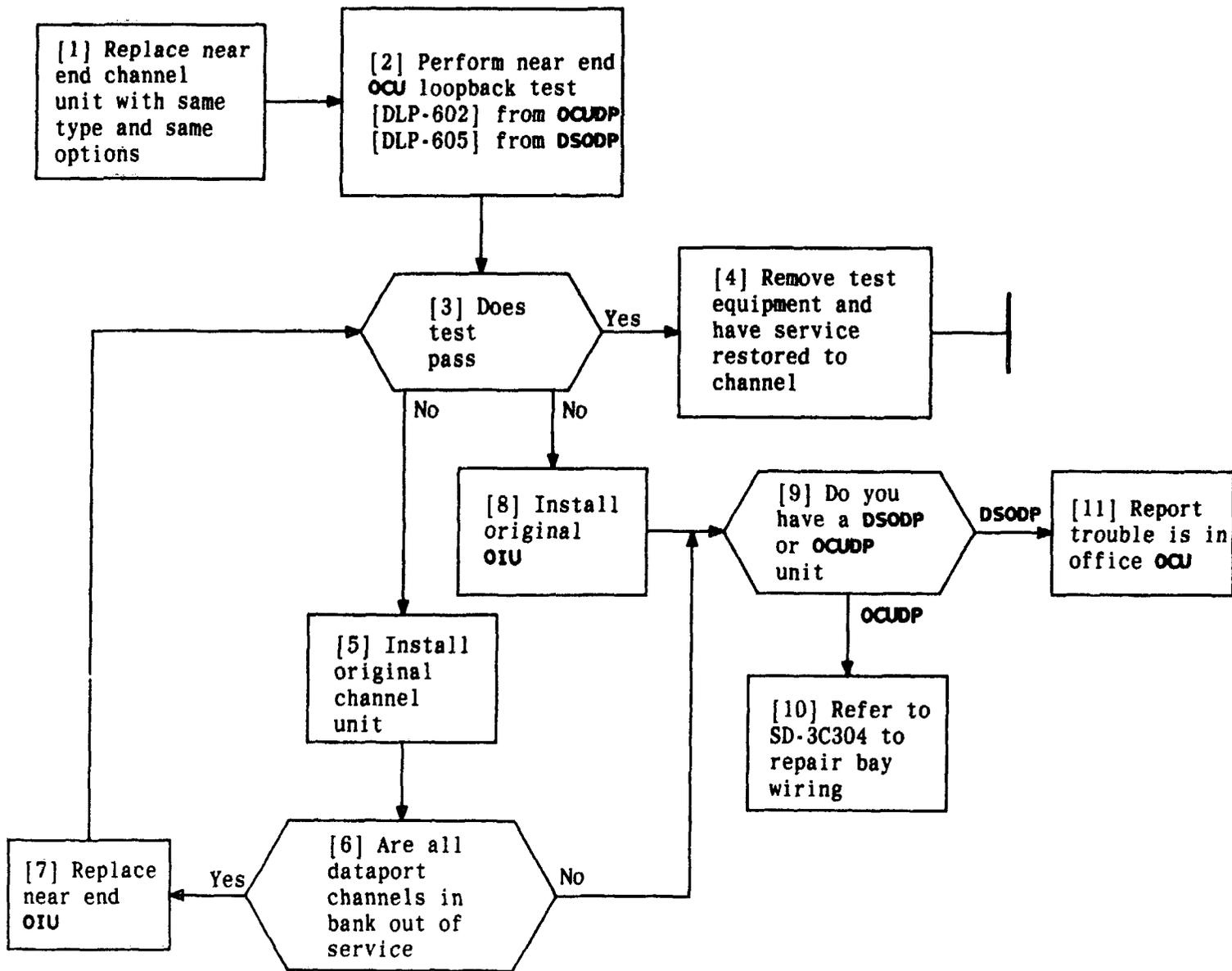
* ACO on ACU must be depressed to silence alarm after replacing some units

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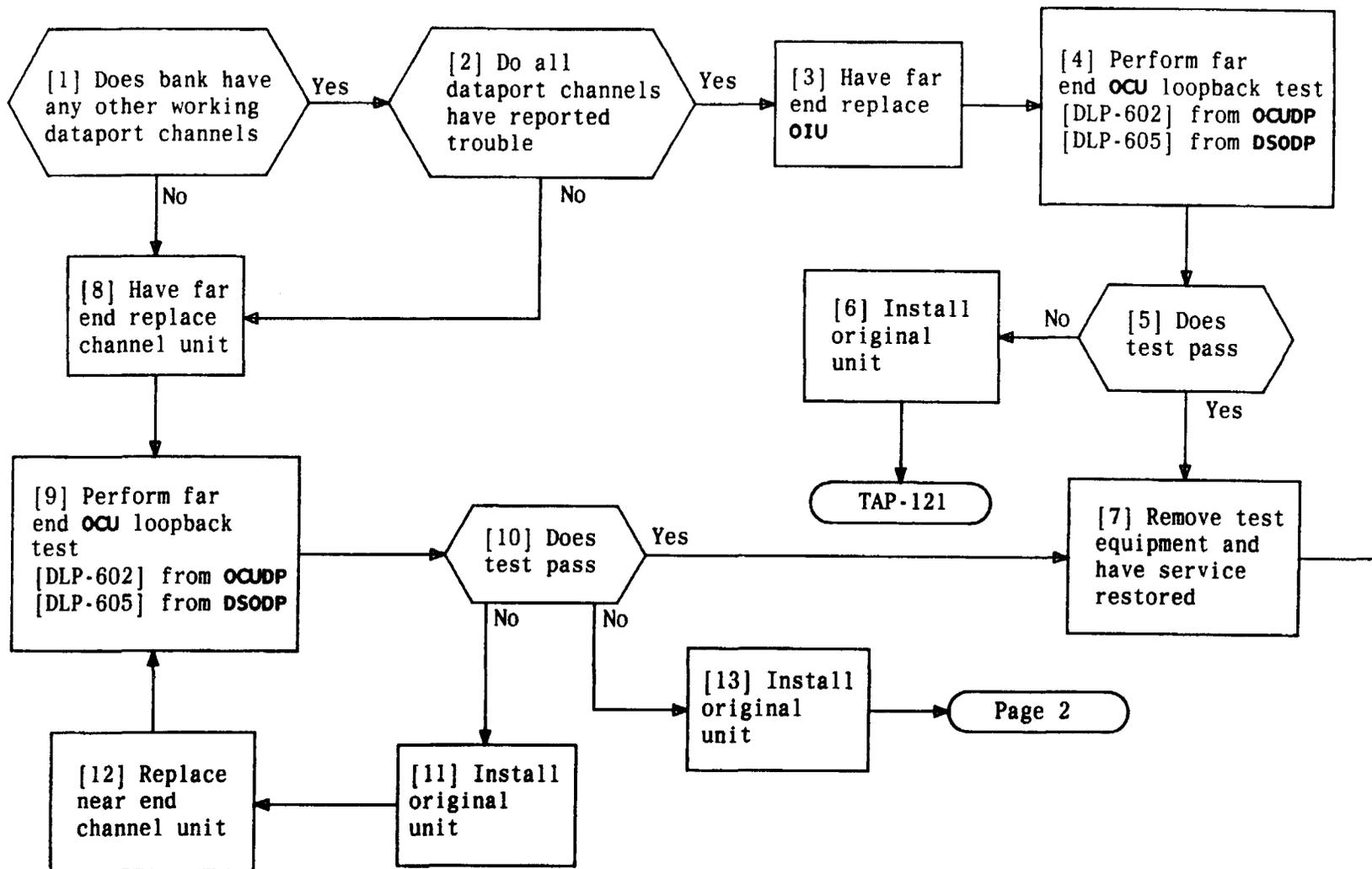
DETERMINE LOCATION OF DATAPORT TROUBLE

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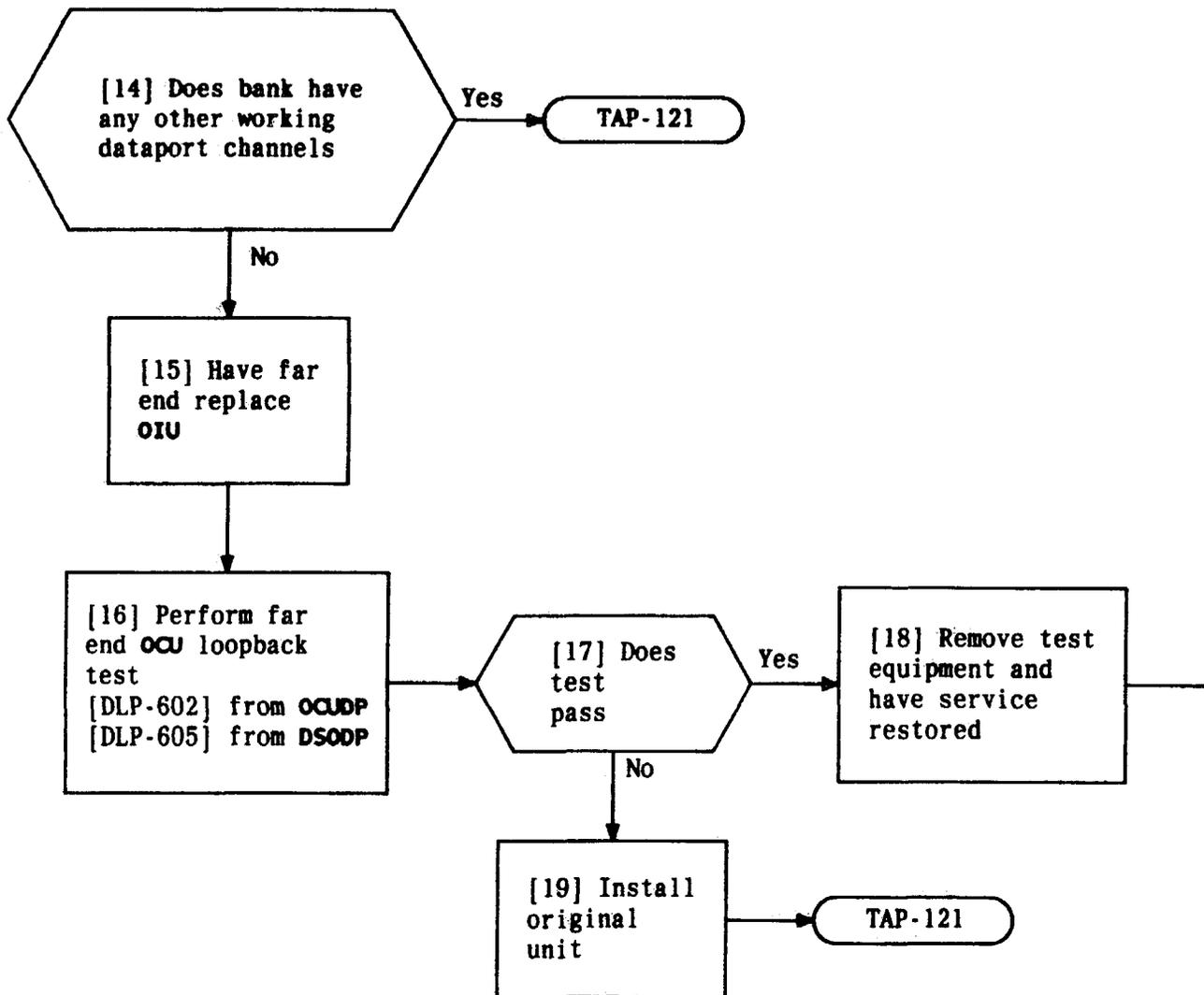
DETERMINE IF NEAR END CHANNEL UNIT IS CAUSING DATAPORT TROUBLE

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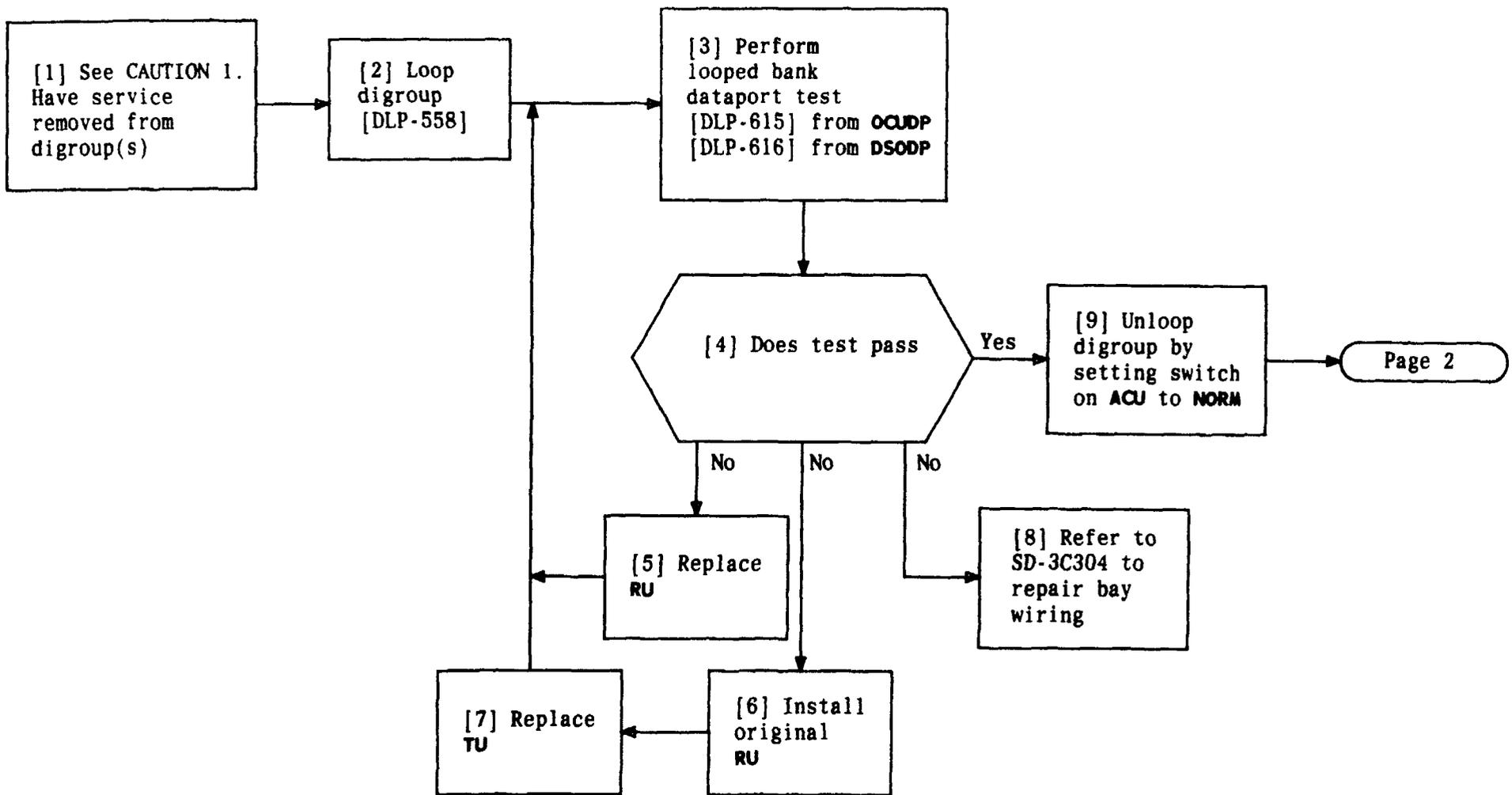
DETERMINE IF CHANNEL UNITS OR OIU AT FAR END IS CAUSING DATAPORT TROUBLE

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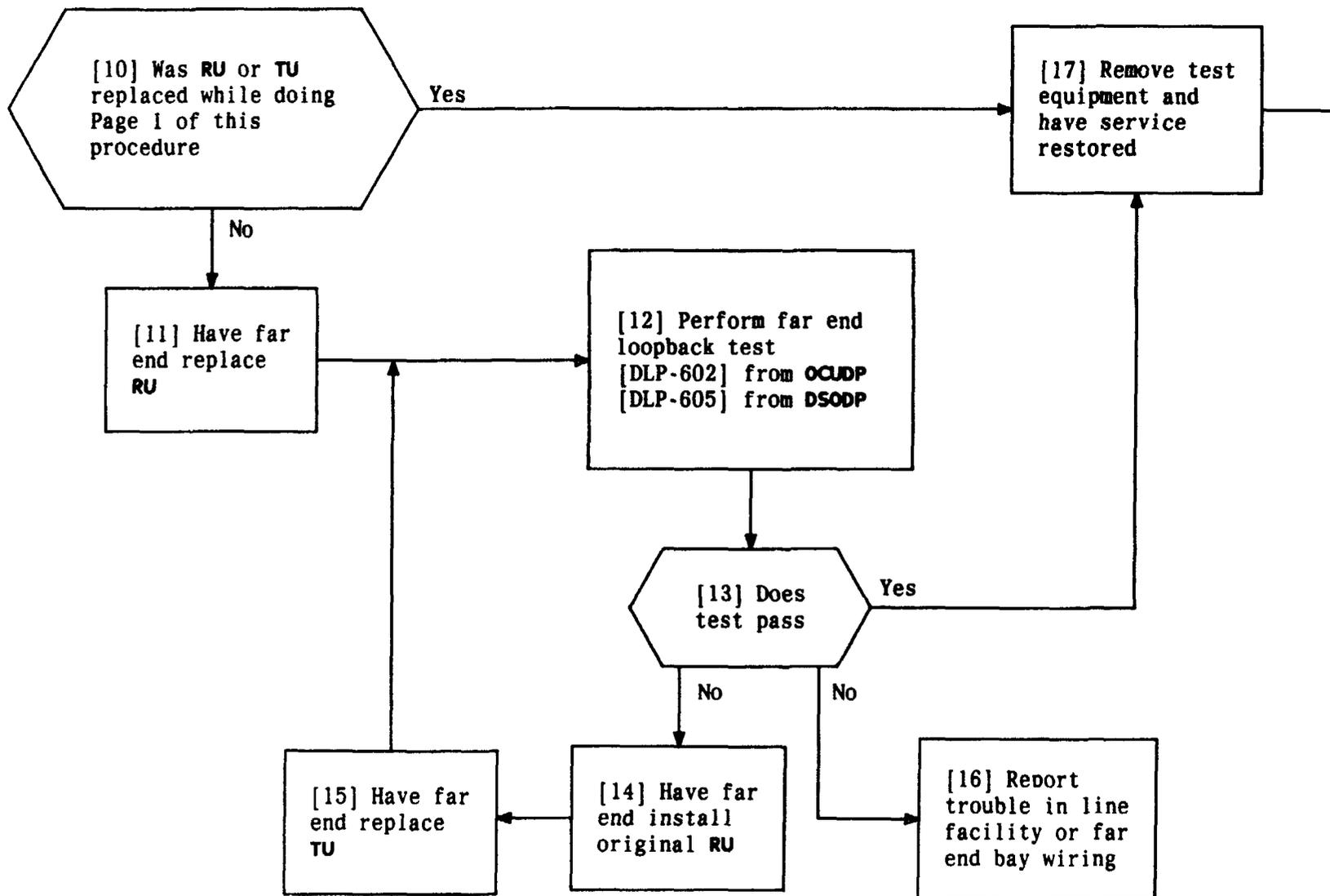
DETERMINE IF CHANNEL UNITS OR OIU AT FAR END IS CAUSING DATAPORT TROUBLE

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CAUTION 1	
<i>If bank has LIU-1 both digroups loose service when bank is looped</i>	
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DETERMINE IF COMMON UNIT IS CAUSING DATAPORT TROUBLE



DETERMINE IF COMMON UNIT IS CAUSING DATAPORT TROUBLE

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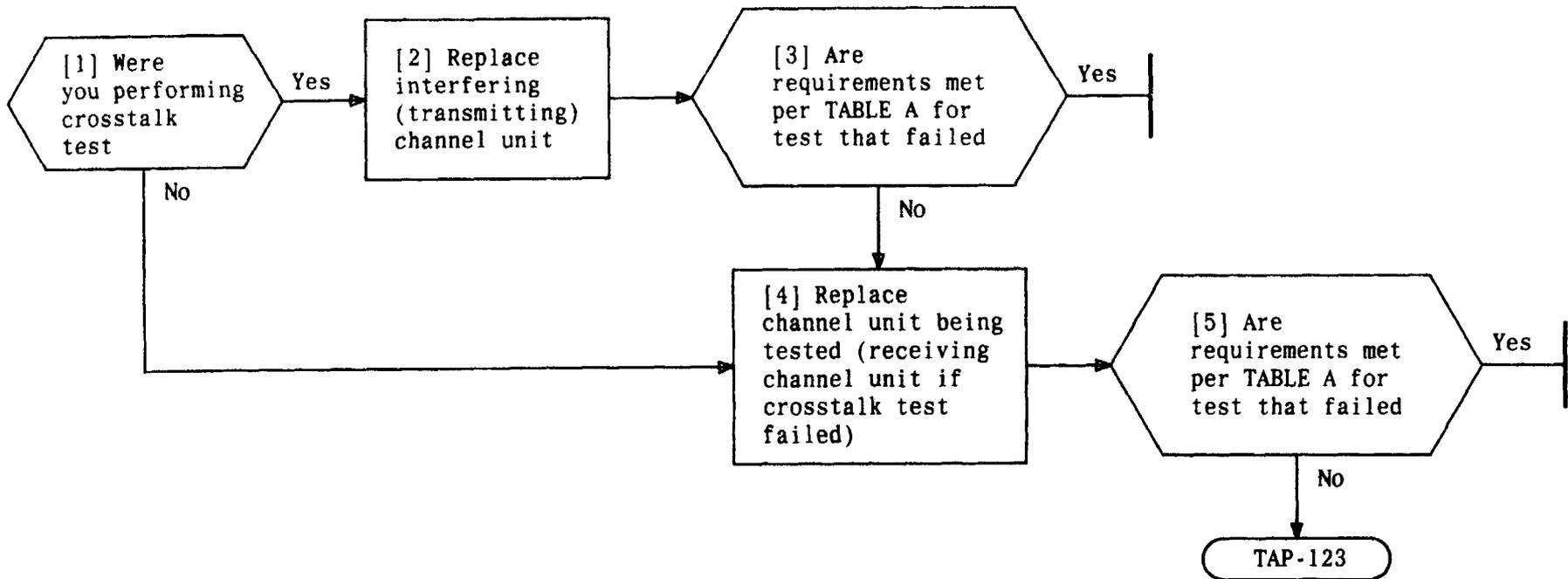
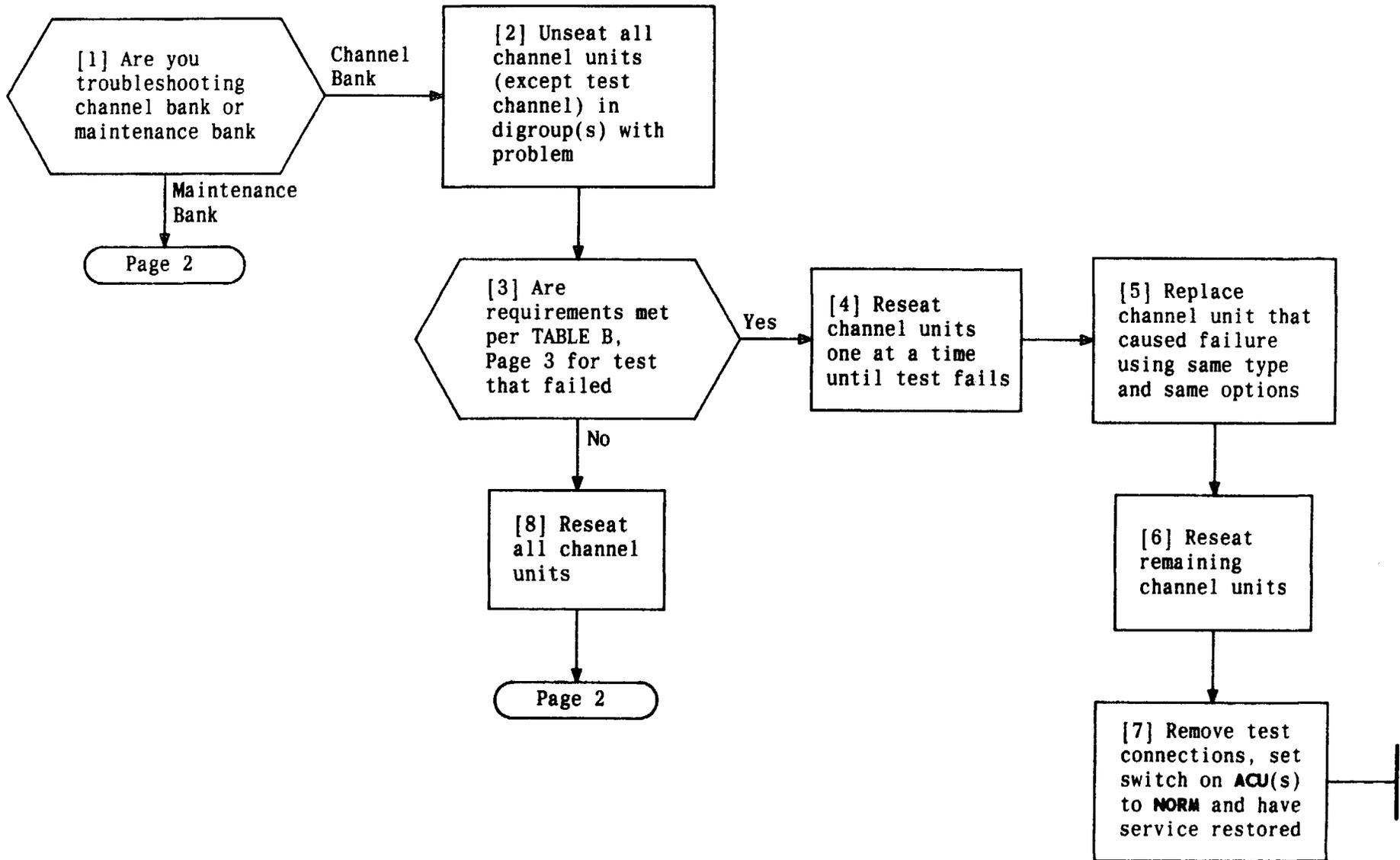


TABLE A	
FAILED TEST	REQUIREMENTS
Receiver Gain	CAU in black area
Net Loss	CAU in green-black-green area
Idle Circuit Noise	23 dBrnc or less
Distortion	56 dBrnc or less - SEND LEVEL DB at 0 46 dBrnc or less - SEND LEVEL DB at 10 36 dBrnc or less - SEND LEVEL DB at 20 26 dBrnc or less - SEND LEVEL DB at 30 22 dBrnc or less - SEND LEVEL DB at 40
Crosstalk	27 dBrnc or less

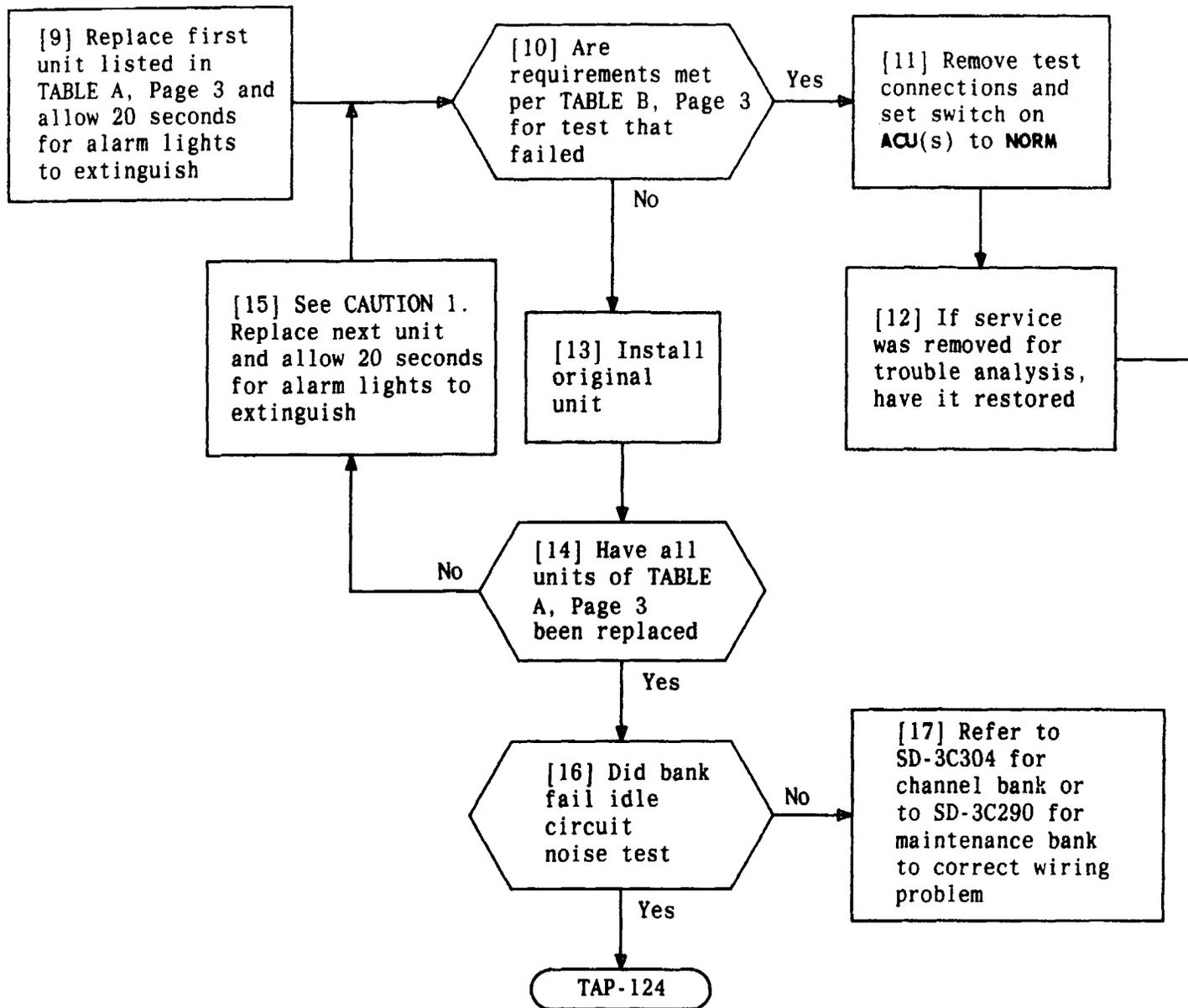
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CHECK CHANNEL UNIT FOR LOOPED TEST TROUBLES



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CLEAR D4 CHANNEL OR MAINTENANCE BANK LOOPED TEST TROUBLES



CAUTION 1
Both digroups of channel bank must be removed from service before replacing LIU, SU, OIU, TPU, PCU, or PDU

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CLEAR D4 CHANNEL OR MAINTENANCE BANK LOOPED TEST TROUBLES

TABLE A	
UNIT*	CONDITIONS
RU	In digroup under test
TU	In digroup under test
ACU	In digroup under test (one per bank in Mode 1)
LIU	One per bank. Pin plug must be in LP jack
TPU	One per bank. [DLP-552] and [DLP-553] for channel bank. [DLP-531] for maintenance bank
SU	If contained in bank
OIU	If contained in bank [DLP-555]
PCU	Set switch to OFF and then to ON
PDU	Replace for noise trouble only [DLP-523]
SPTS	Signaling test only
4E&M	Maintenance bank only
1A MBTS	Maintenance bank only. Release screw in rear of bank
1B MBTS	Maintenance bank only. Release screw in rear of bank
* ACO must be depressed on ACU to silence alarm after replacing some units	

TABLE B		
FAILED TEST	REQUIREMENTS	
Receiver Gain	CAU in black area	
Net Loss	CAU in green-black-green area	
Idle Circuit Noise	23 dBrnc or less	
Distortion	56 dBrnc or less - SEND LEVEL DB at 0	
	46 dBrnc or less - SEND LEVEL DB at 10	
	36 dBrnc or less - SEND LEVEL DB at 20	
	26 dBrnc or less - SEND LEVEL DB at 30	
	22 dBrnc or less - SEND LEVEL DB at 40	
Crosstalk	27 dBrnc	
Signaling	Switch A to 1	Switch A to 0
	Switch B to 0 A lamp lights	Switch B to 1 B lamp lights
Impulse Noise	0 to 1 count in 5 minutes	
Alarm	- - -	

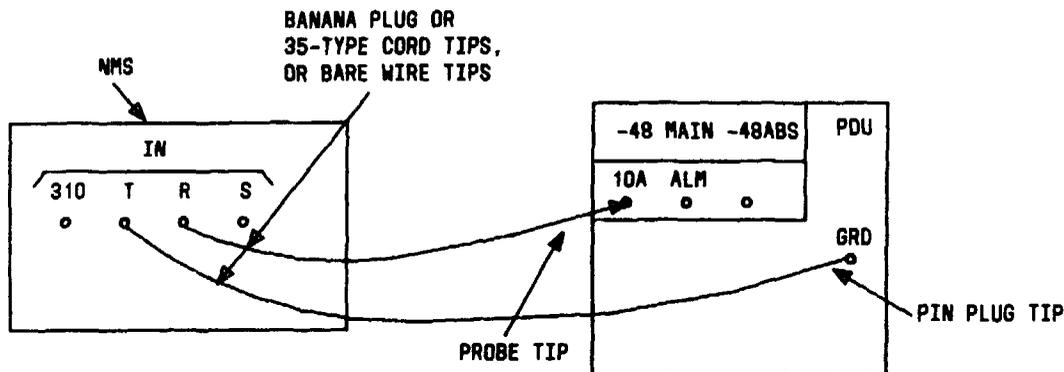
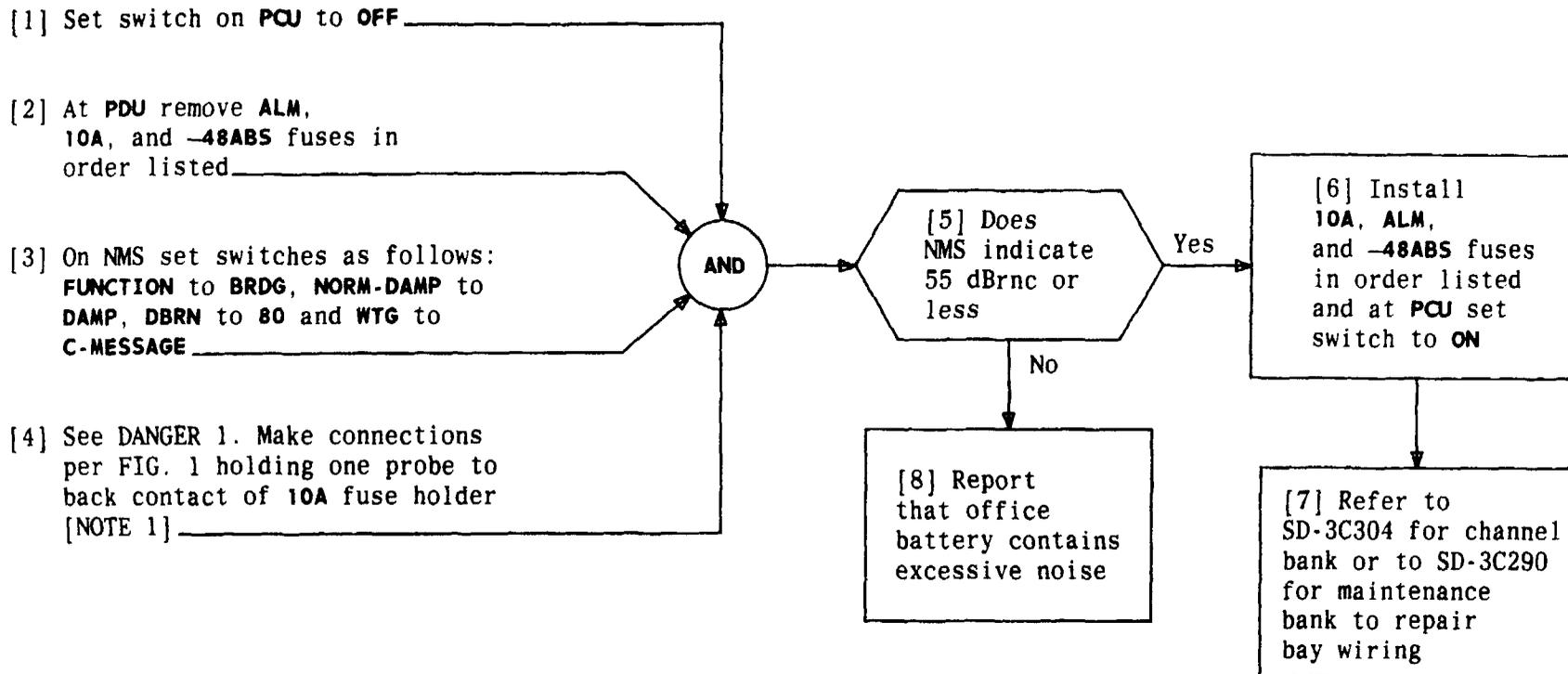


FIG. 1

CHECK OFFICE BATTERY SUPPLY FOR EXCESSIVE NOISE

NOTE 1
Test cords must be made up locally

DANGER 1
Office battery (-48 volts) is present at fuse holders

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[1] See NOTE 1.
 Replace lamp
 that did not light
 as specified in test.
 If lamps lighted
 that should not have,
 go to Step 3

[2] Does
 lamp light
 as required
 in test

[3] Refer to
 TABLE A and
 replace first
 unit listed for
 lamp under test
 [NOTE 2]

[4] Does
 lamp light
 as required
 in test

[7] Replace
 next unit

[5] Install
 original
 unit

[6] Have all
 units of TABLE A
 been replaced for
 lamp under test

[8] Refer
 to SD-3C290
 to repair
 bay wiring

NOTES
 1. Long nose pliers
 may be used to
 pull lamp out of
 slot
 2. 1A MBTS and
 1B MBTS units
 contain holding
 screws that must
 be loosened at
 back of bank

TABLE A			
LAMP	FIRST UNIT	SECOND UNIT	THIRD UNIT
CAL	1A MBTS *	1B MBTS *	—
MON	Unit in 4E&M slot	1B MBTS *	1A MBTS *
VF TRMT or VF RCV	Unit in † CUT slot	1A MBTS *	1B MBTS *
MC FAIL or MC PASS	1B MBTS *	1A MBTS *	—
MBA	MB ALM	1A MBTS *	1B MBTS *

* Push switches must be set to match those of original unit
 † Attenuators must be set to match those of original unit

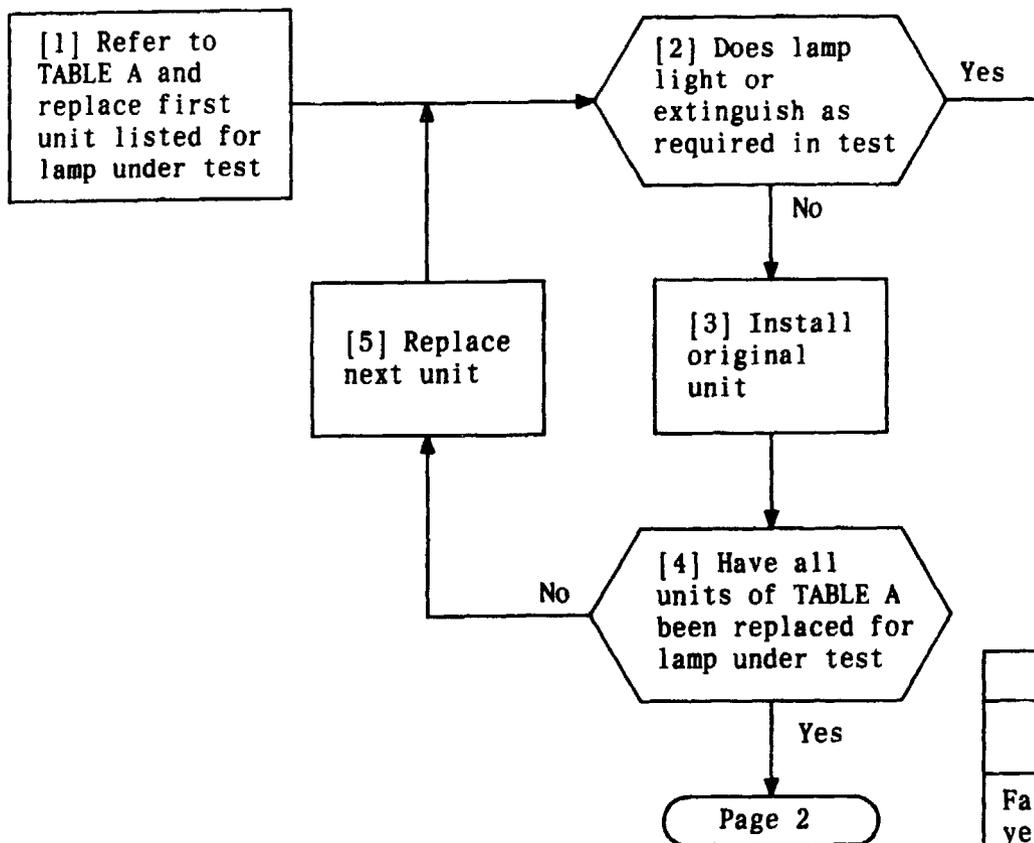


TABLE A				
LAMP	FIRST UNIT	SECOND UNIT	THIRD UNIT	FOURTH UNIT
Far end yellow not lighting	Far end lamp DLP-520	Near end TU	Far end ACU	-
Yellow stays lighted at either end	Near end ACU	Far end ACU	-	-
Near end yellow not lighting	Near end lamp DLP-520	Near end ACU	Far end TU *	Far end ENC (D1D)
* Far end ACU for D2 or XMTG CONV SIG for D1D				

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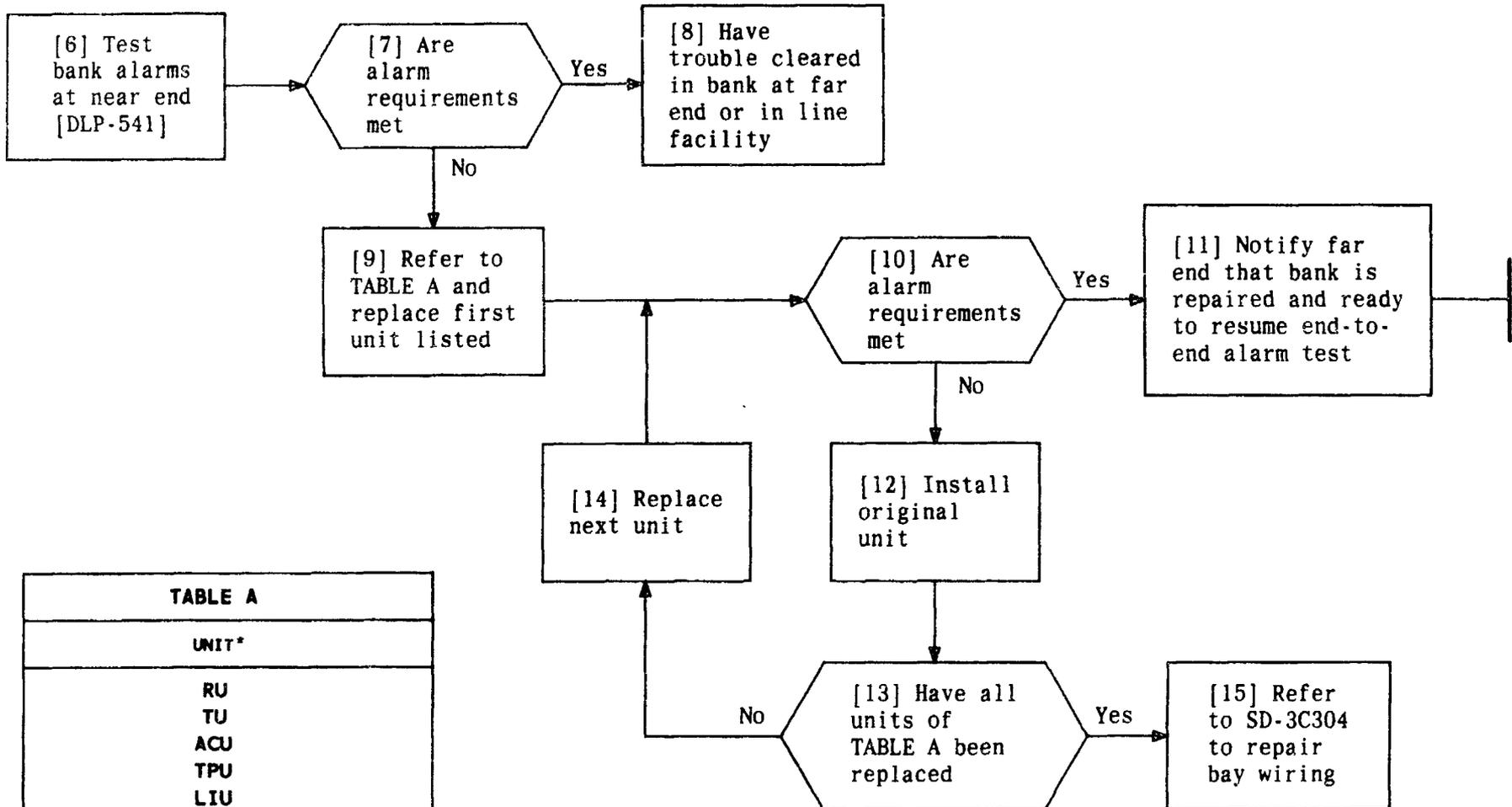
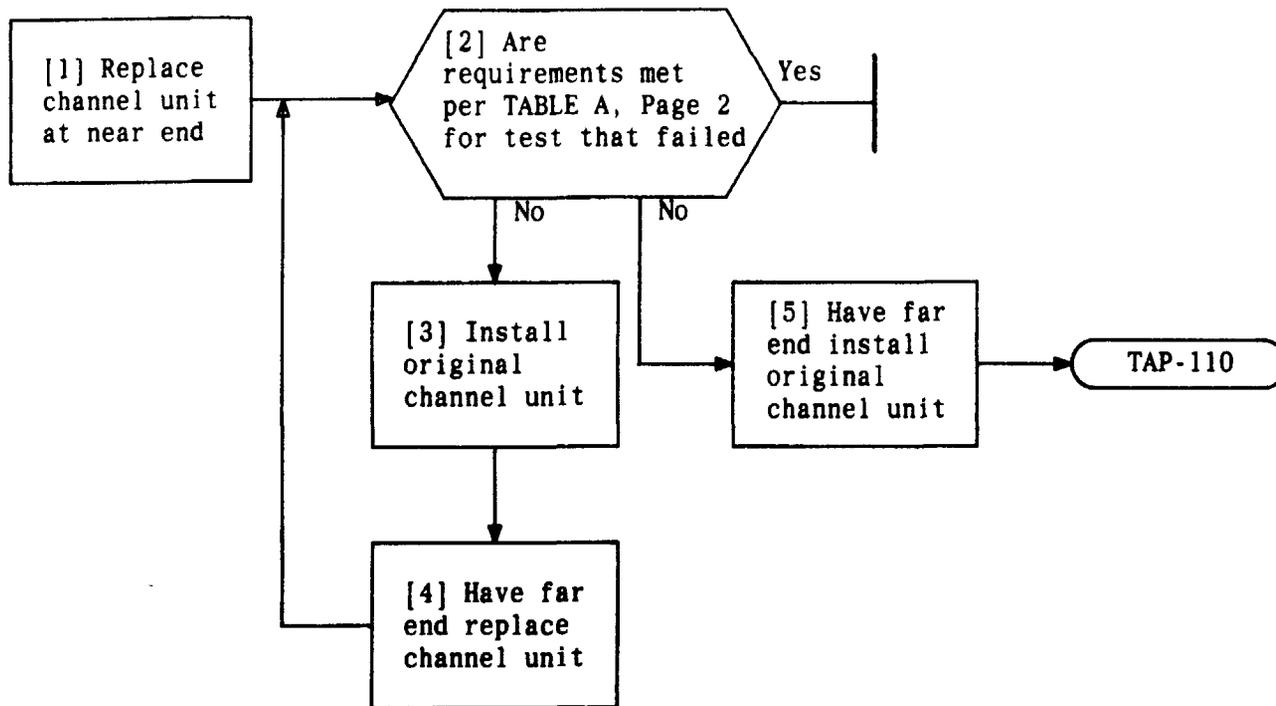


TABLE A
UNIT*
RU
TU
ACU
TPU
LIU
SU

* ACO on ACU must be depressed to silence alarm when replacing some units



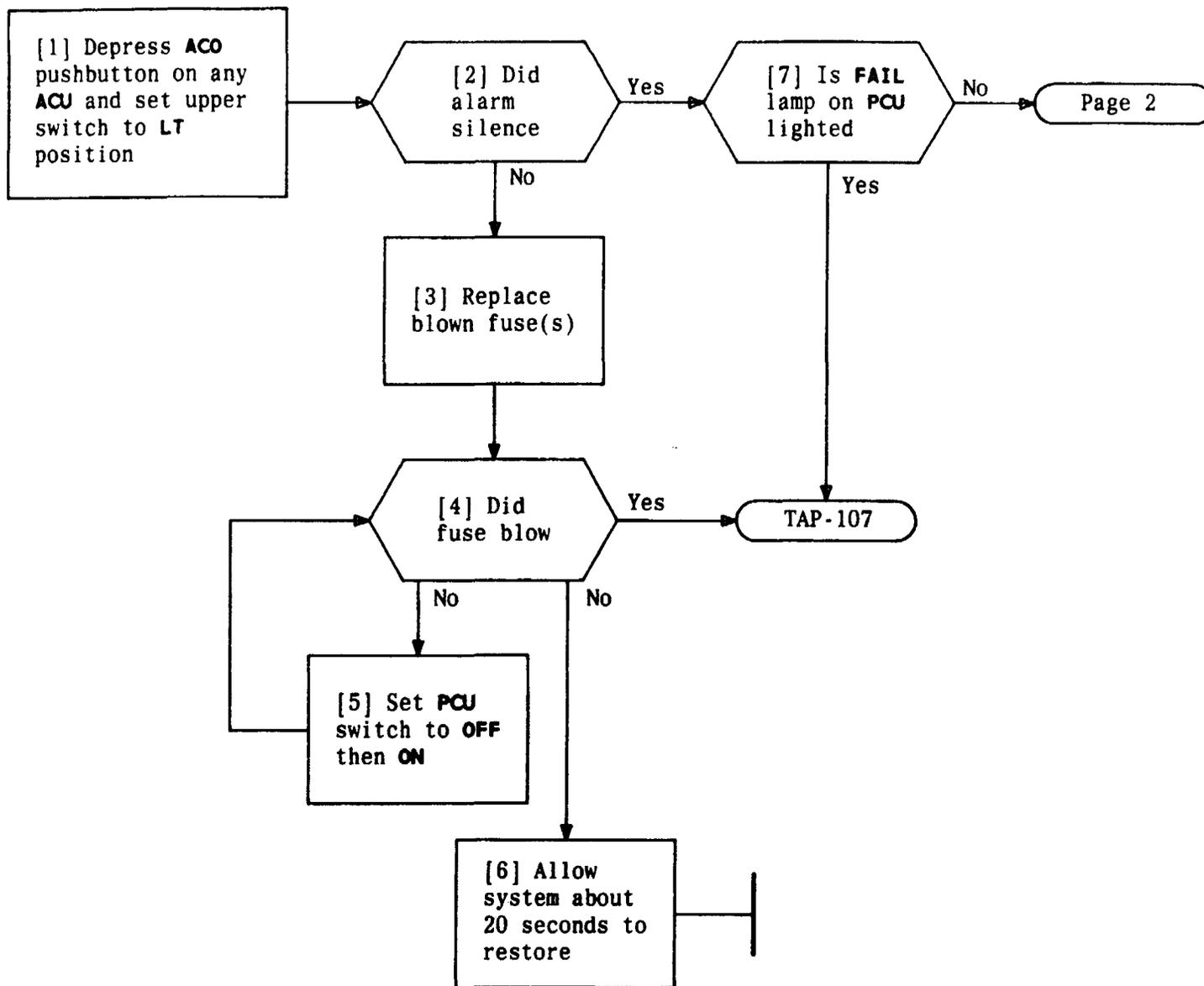
CHECK CHANNEL UNIT FOR END-TO-END TEST TROUBLE

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TABLE A
END-TO-END TESTING

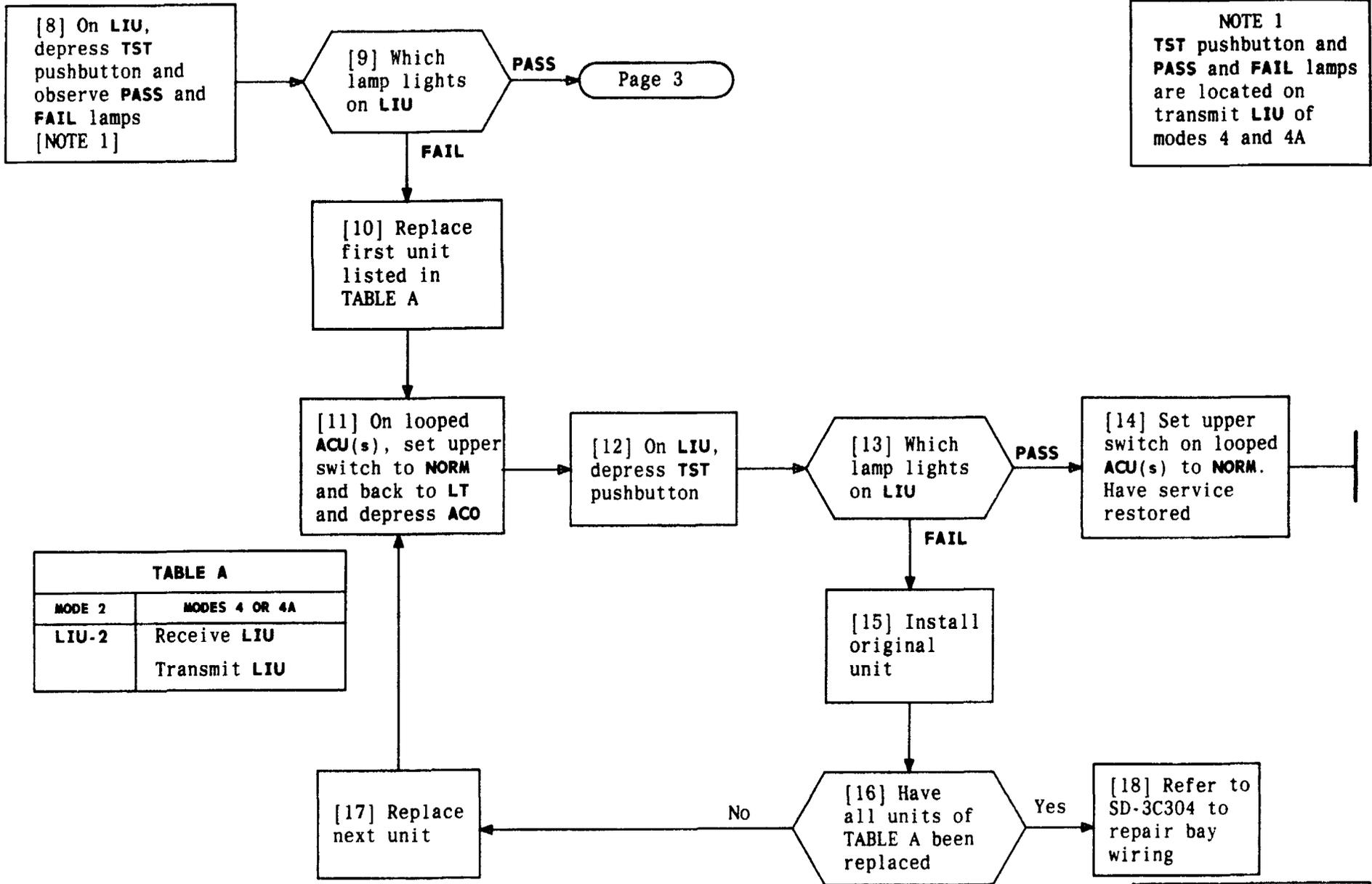
TEST	NEAR-END (D4) REQUIREMENT	FAR-END BANK	FAR-END REQUIREMENT
Net Loss	CAU indicates -0.25 to +0.25 dBm	D3 or D4	-0.25 to +0.25 dBm
		D2	+6.75 to +7.25 dBm
		D1D	+2.5 dBm
Idle Circuit Noise	23 dBrnc or less	D3 or D4	23 dBrnc or less
	28 dBrnc or less	D2	35 dBrnc or less
	26 dBrnc or less	D1D	28 dBrnc or less
Distortion	0 dB-56 dBrnc or less	D3 or D4	0 dB-56 dBrnc or less
	10 dB-46 dBrnc or less		10 dB-46 dBrnc or less
	20 dB-36 dBrnc or less		20 dB-36 dBrnc or less
	30 dB-26 dBrnc or less		30 dB-26 dBrnc or less
	40 dB-22 dBrnc or less		40 dB-22 dBrnc or less
	Pad out - 56 dBrnc or less Pad A - 36 dBrnc or less Pad B - 24 dBrnc or less	D2	0 dB-56 dBrnc or less 10 dB-46 dBrnc or less 20 dB-36 dBrnc or less 30 dB-28 dBrnc or less 40 dB-26 dBrnc or less
Crosstalk	0 dB-56 dBrnc or less	D1D	0 dB-56 dBrnc or less
	10 dB-46 dBrnc or less		10 dB-46 dBrnc or less
	20 dB-36 dBrnc or less		20 dB-36 dBrnc or less
	30 dB-26 dBrnc or less		30 dB-26 dBrnc or less
	40 dB-22 dBrnc or less		40 dB-22 dBrnc or less
Impulse Noise	27 dBrnc or less	D3 or D4	27 dBrnc or less
	27 dBrnc or less*	D2	27 dBrnc or less*
	32 dBrnc or less	D1D	32 dBrnc or less
Impulse Noise	At 63 dBrn: 1 count (or none) in 5 minutes At 58 dBrn: 5 counts (or less) in 5 minutes	D3 or D4	At 63 dBrn: 1 count (or none) in 5 minutes At 58 dBrn: 5 count (or less) in 5 minutes
		D2	
		D1D	

*29 dBrnc is allowable for first interfering channel test



REPAIR LOC OR REM ALARM DISPLAYED ON LIU

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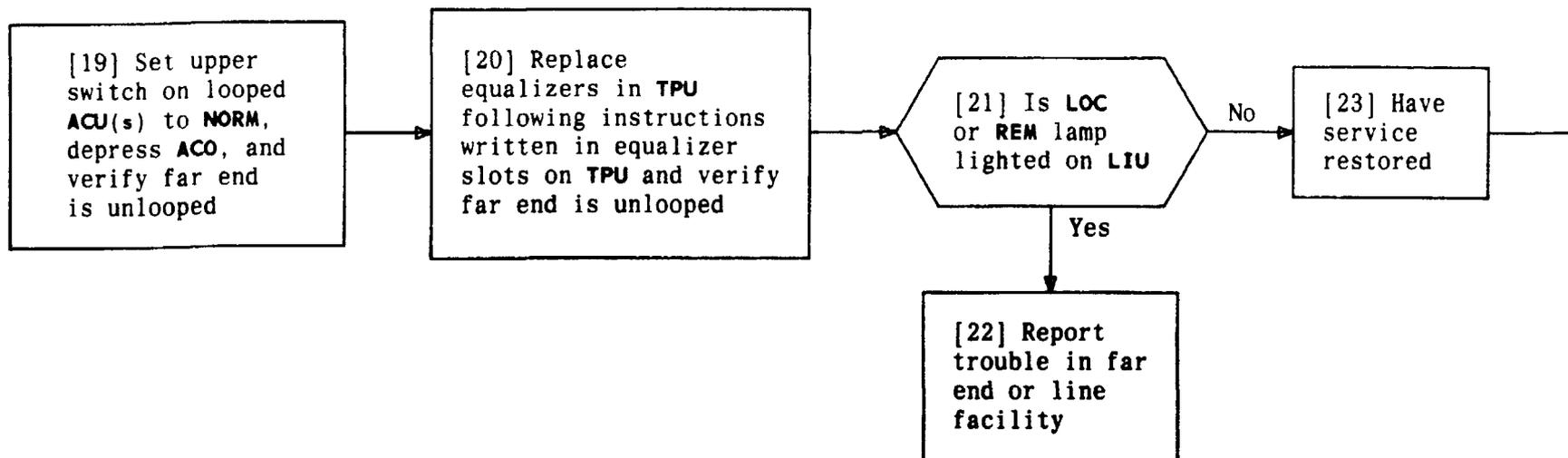


NOTE 1
 TST pushbutton and PASS and FAIL lamps are located on transmit LIU of modes 4 and 4A

TABLE A	
MODE 2	MODES 4 OR 4A
LIU-2	Receive LIU Transmit LIU

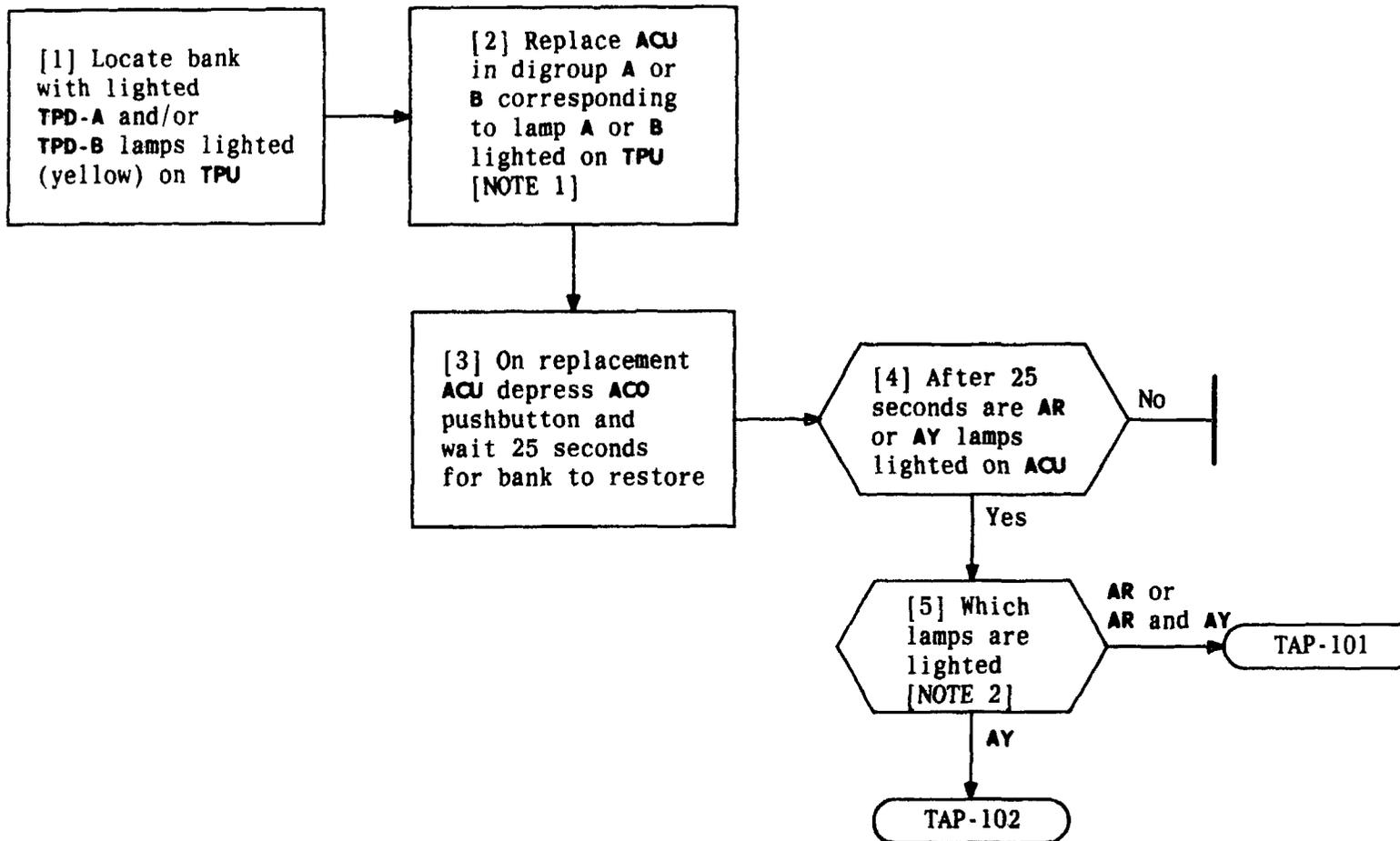
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REPAIR LOC OR REM ALARM DISPLAYED ON LIU



REPAIR LOC OR REM ALARM DISPLAYED ON LIU

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NOTES

- In Mode 1 operation there is only one ACU per bank that can be replaced. It is installed in digroup A
- Original ACU may have faulty LED lamps. It can be checked by installing into maintenance book and inserting pin plug into RCODE on RU. AR or AY lamp that does not light, may be replaced per DLP-520

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CLEAR AUDIBLE WITH NO AR OR AY LAMP LIGHTED ON ACU

[1] Record any defects found in the following steps so that they may be referred to installation group if necessary

[2] Locate the four shelves that will mount D4 equipment in the bay [FIG. 1]

[3] Verify that shelves are tightly secured and free of defects or damage

[4] Verify that PDU subassembly is intact and secured [FIG. 1]

[5] Verify that all electrical connectors inside the shelves are vertical and secured

[6] Verify that no connectors are broken or have bent or broken contacts [NOTE 1]

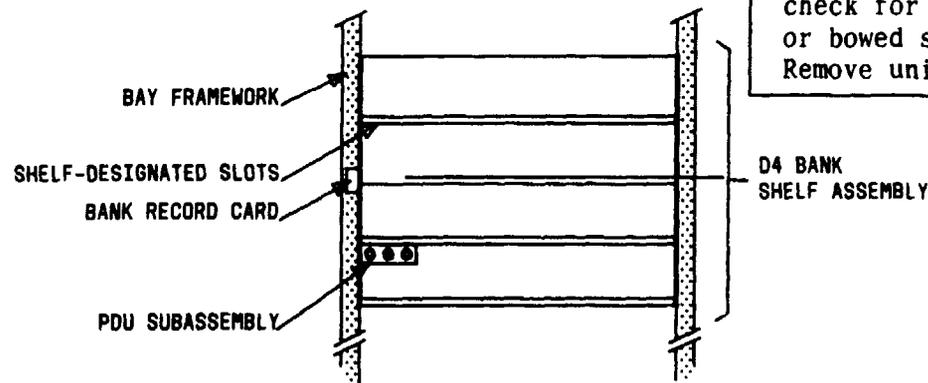


FIG. 1 - Bank Shelf Assembly

AND

Shelves, PDU subassembly, and connectors checked

[7] Is one D4 channel unit plug-in of any type available

No

[8] Inspect for misaligned or bowed equipment shelves

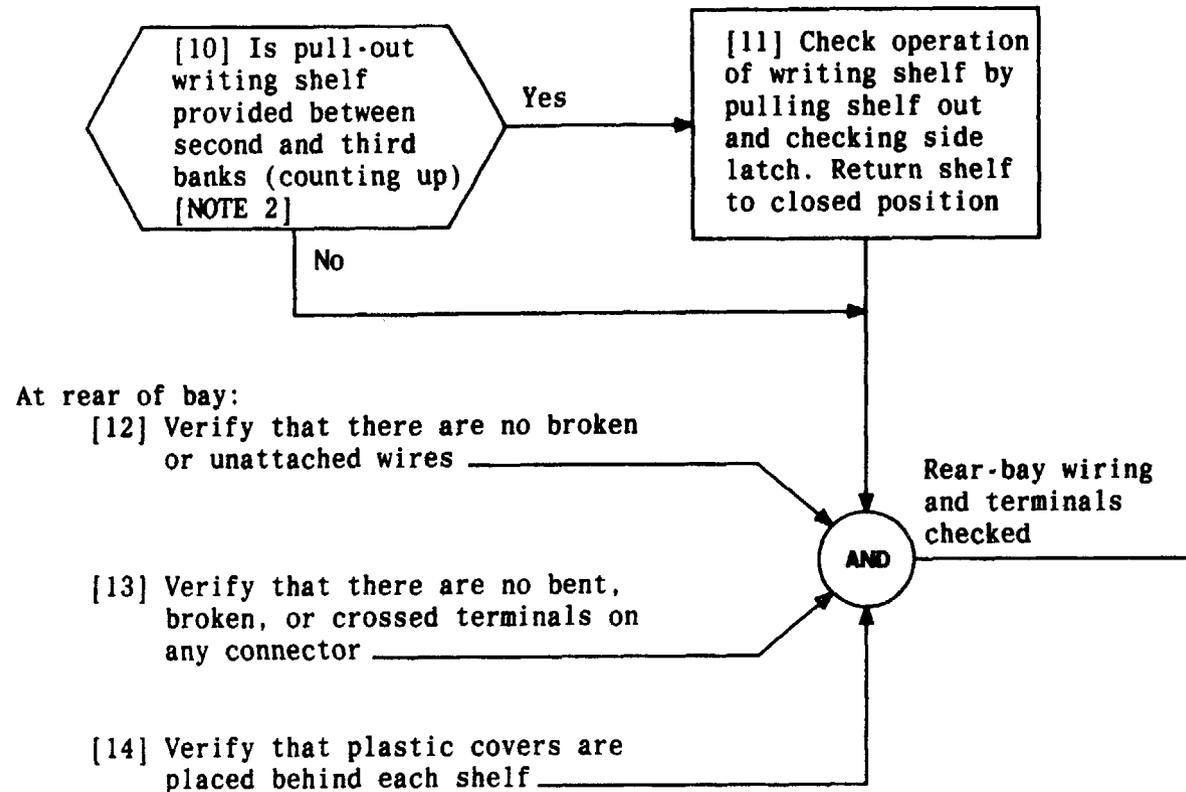
Yes

[9] Try channel unit in slots labeled 1B, 7B, and 12B on top shelf and 14B, 19B, and 24B on next ... etc, to check for misaligned or bowed shelves. Remove unit

Page 2

NOTE 1
Careful inspection should be performed on each connector for bent or broken contacts

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NOTE 2	
The space between banks 2 and 3 in some bays may also be used to mount either a D4 maintenance bank or an ED-3C660 communications panel	
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[1] At front of bay remove fuses from power distribution subassembly [FIG. 1]

[2] Obtain KS-14510 voltmeter (VOM) or equivalent and condition to measure dc volts [DLP-521] [NOTE 1]

[3] Touch + red lead to ground (chassis)

[4] Insert - black lead into 10A fuse holder, ensuring that it touches back contact of fuse holder

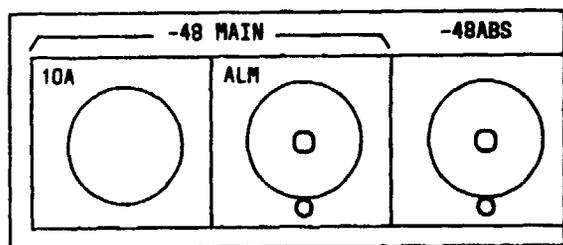
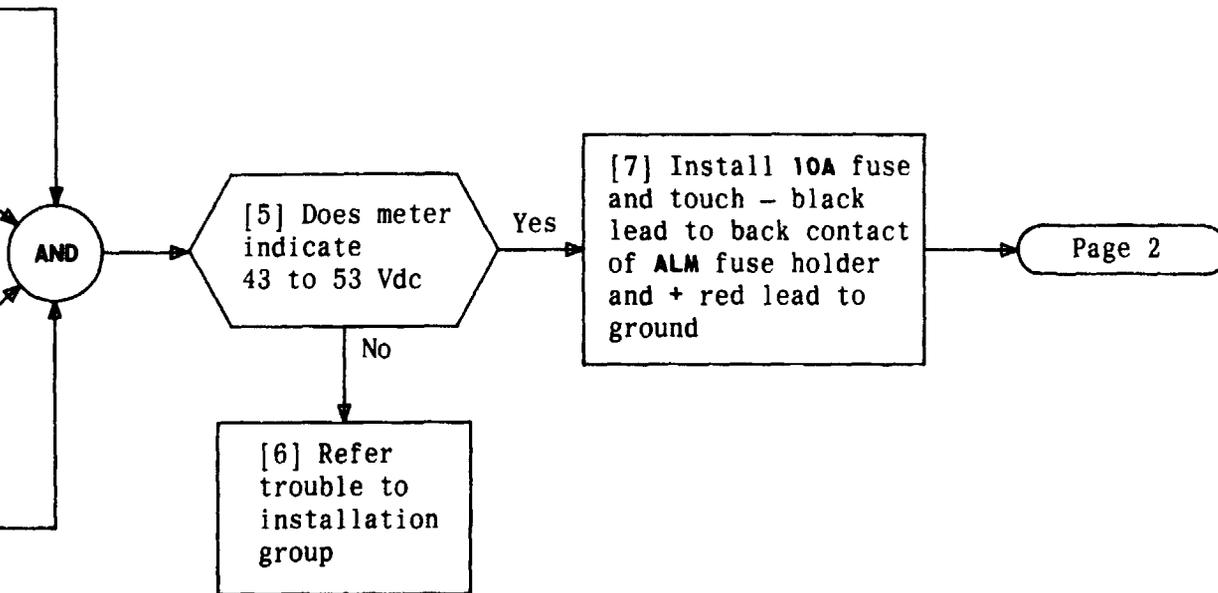
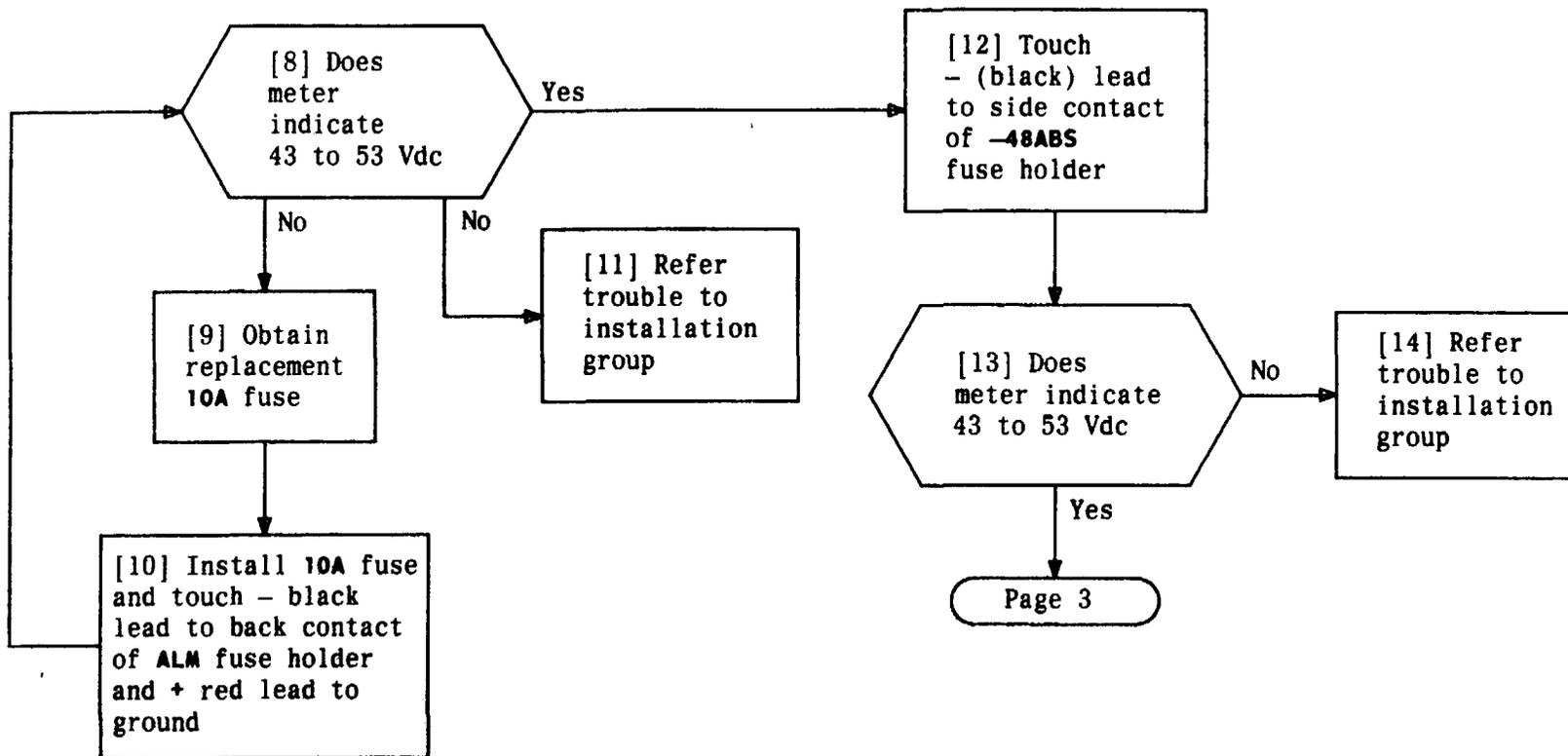


FIG. 1 - Power Distribution Subassembly

NOTE 1	
KS-20599 digital voltmeter or equivalent may be used	
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CHECK INCOMING VOLTAGES TO CHANNEL OR MAINTENANCE BANK



CHECK INCOMING VOLTAGES TO CHANNEL OR MAINTENANCE BANK

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[15] Remove test connections and install fuses (match color bead with dot)

At rear of PDU subassembly:

[16] Locate terminal strip, remove plastic cover, and notice holes in plastic shield [FIG. 2]

[17] See DANGER 1. Touch + (red) lead to terminal 4

[18] Touch - (black) lead to terminal 3 then to terminal 2 and observe meter each time

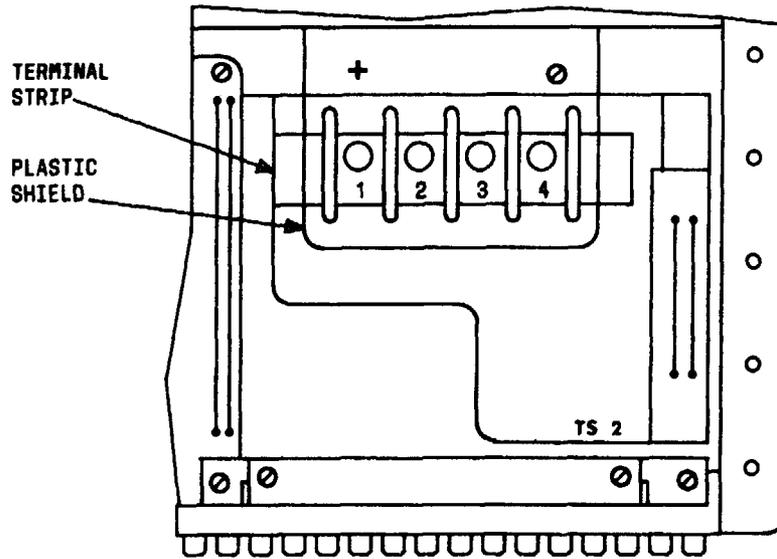
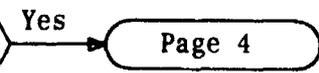
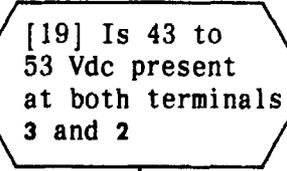
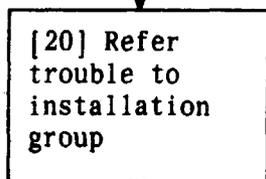


FIG. 2



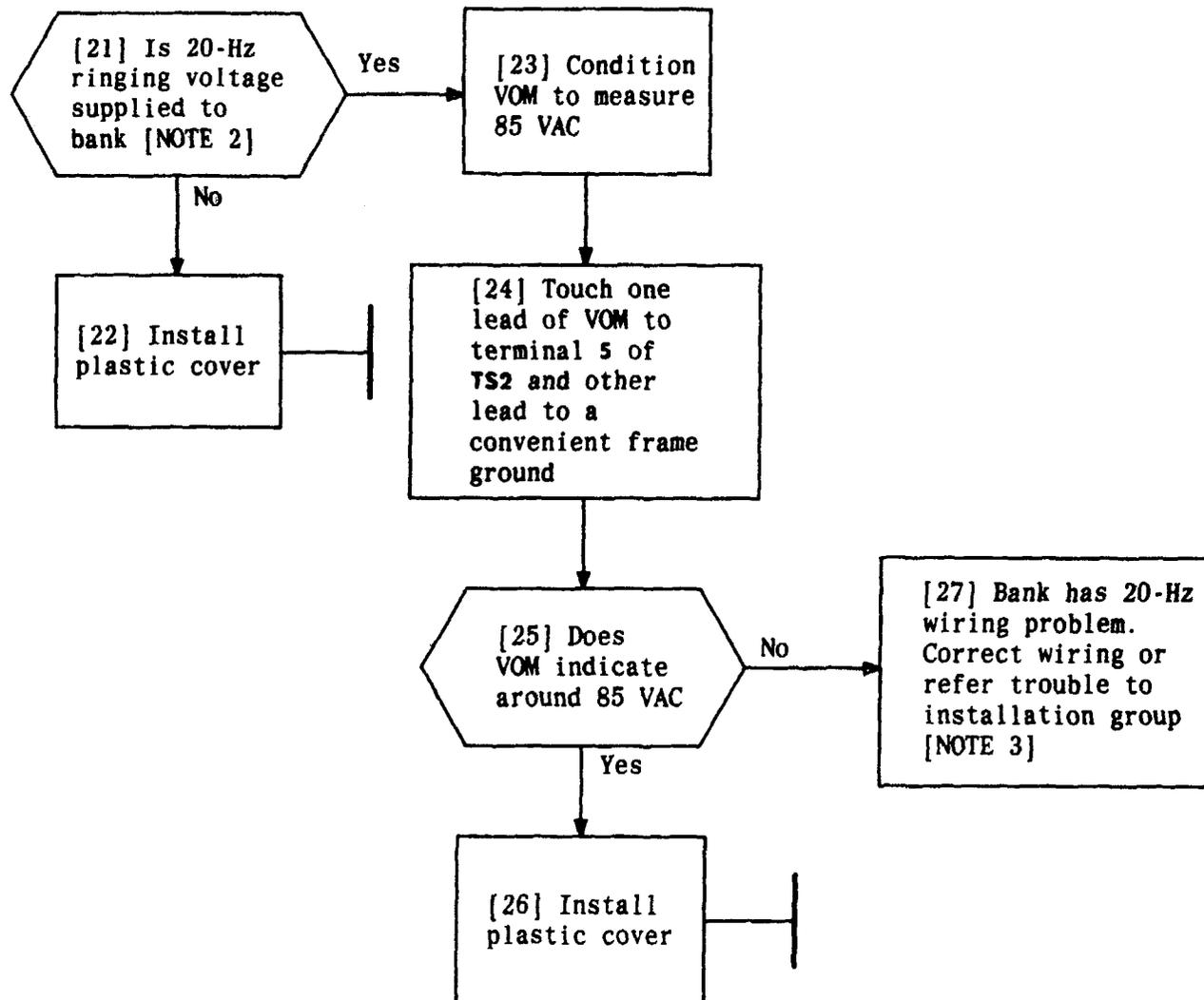
No



DANGER 1
85 VAC ringing voltage may be present on TS2 terminals 4 and 5 behind PDU slot

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CHECK INCOMING VOLTAGES TO CHANNEL OR MAINTENANCE BANK



NOTES	
2. If supplied, 20-Hz wiring appears at TS2 terminals 5 and 6 at rear of bank [FIG. 2, Page 3]	
3. 20-Hz should be wired as follows to TS2: 85 VAC to terminal 5 85 VAC ground to terminal 6	
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[1] Record any defects found in the following steps so that they may be referred to installation group if necessary

[2] Locate two shelves that will mount equipment in bay [FIG. 1]. Normally these are between second and third channel banks (counting up)

[3] Verify that shelves are tightly secured and free of defects or damage

[4] Verify that PDU subassembly is intact and secured [FIG. 1]

[5] Verify that all electrical connectors inside the shelves are vertical and secured

[6] Verify that no connectors are broken or have bent or broken contacts [NOTE 1]

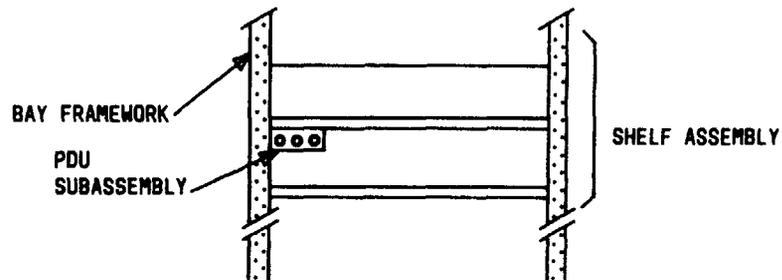
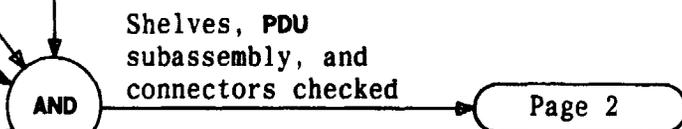


FIG. 1

NOTE 1	
Careful inspection should be performed on each connector for bent or broken contacts	
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VISUALLY INSPECT D4 MAINTENANCE BANK

At rear of bay:

[7] Verify that there are no broken or unattached wires _____

[8] Verify that there are no bent, broken, or crossed terminals on any connector _____

[9] Verify that plastic covers are placed behind each shelf _____



Rear-bay wiring and terminals checked

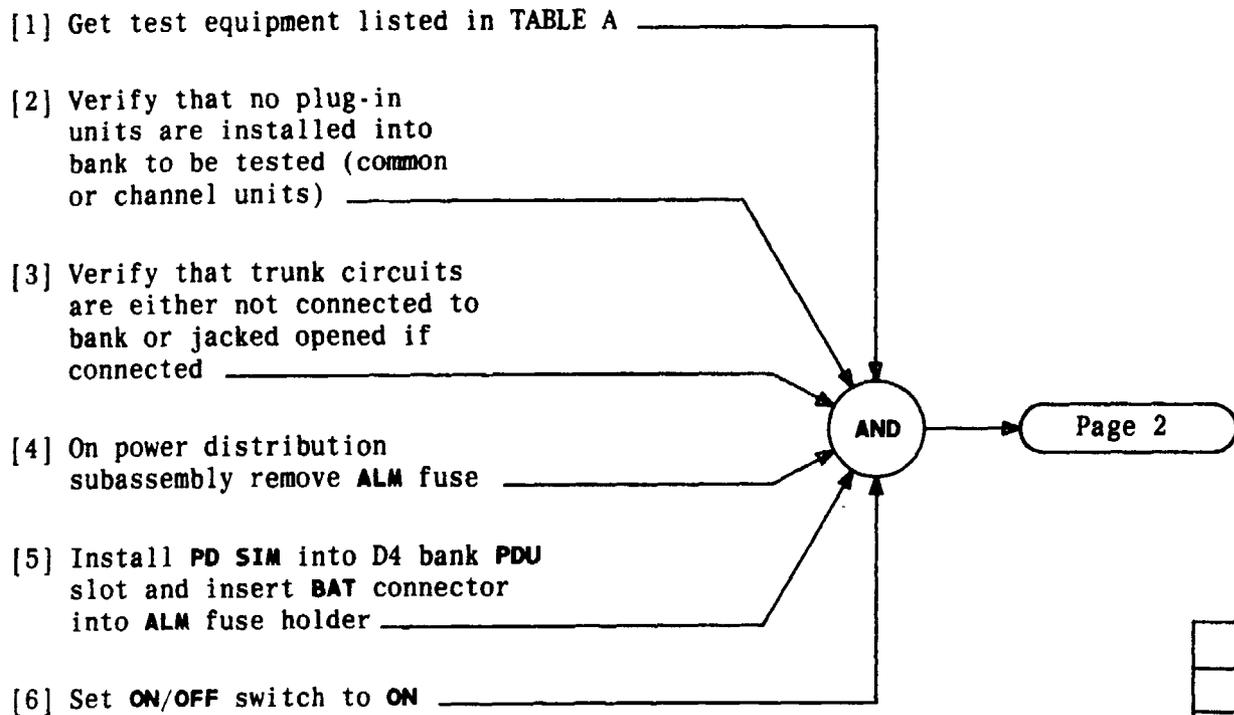
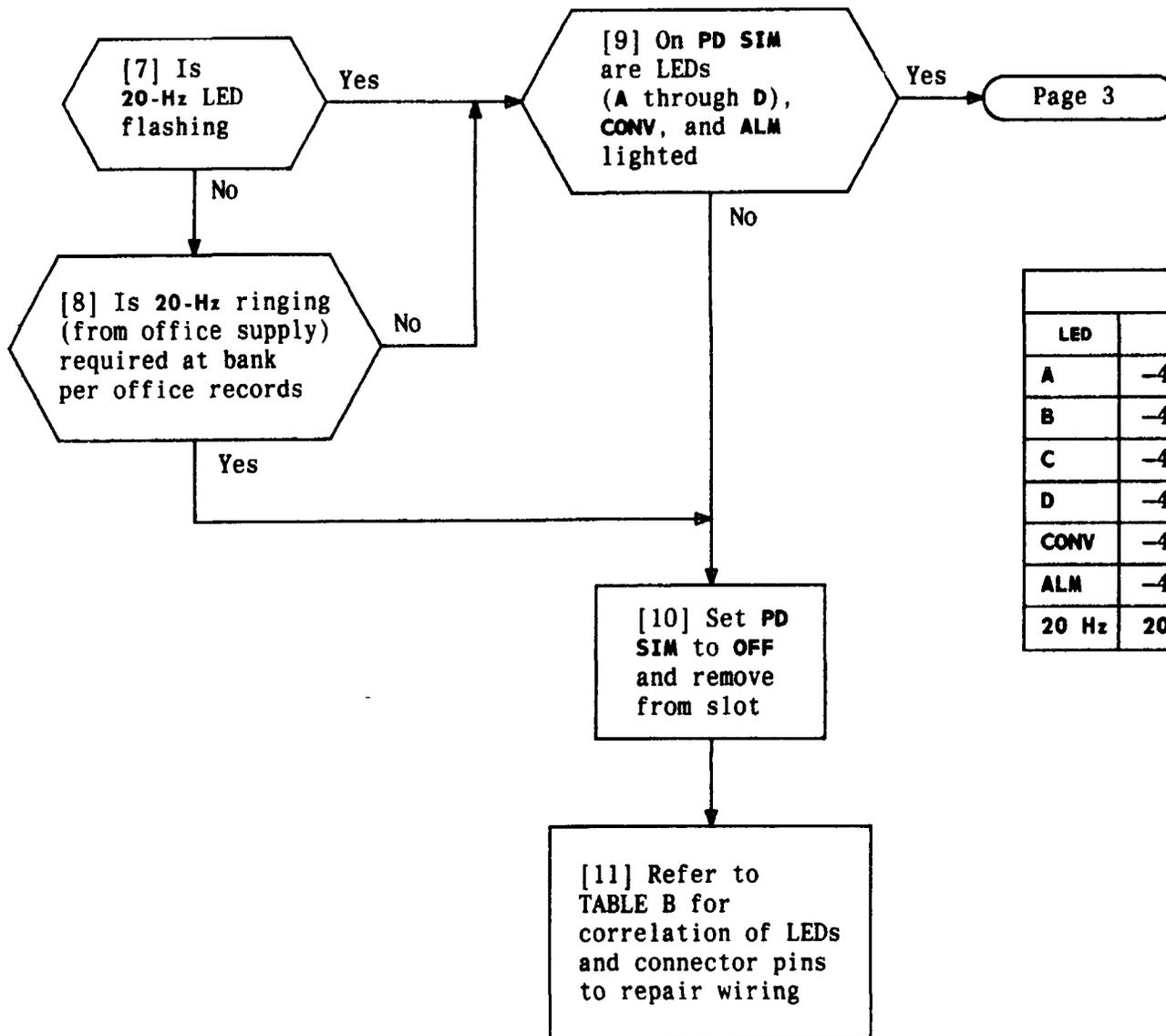


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Common Equipment Voltage Indicator (CEVI)	J98726MA
Power Distribution Simulator (PD SIM)	J98726MB
PWR CONV SIM	J98726MC
Channel Unit Voltage Indicator (CUVI)	J98726MD
Connector Access Unit	ED-3C766

PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS

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LED	FUNCTION	PIN
A	-48V output	50,51
B	-48V output	12,14
C	-48V output	11,13
D	-48V output	10
CONV	-48V PCU	15,16
ALM	-48V alarm	47
20 Hz	20 Hz input to bank	23,54

PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS

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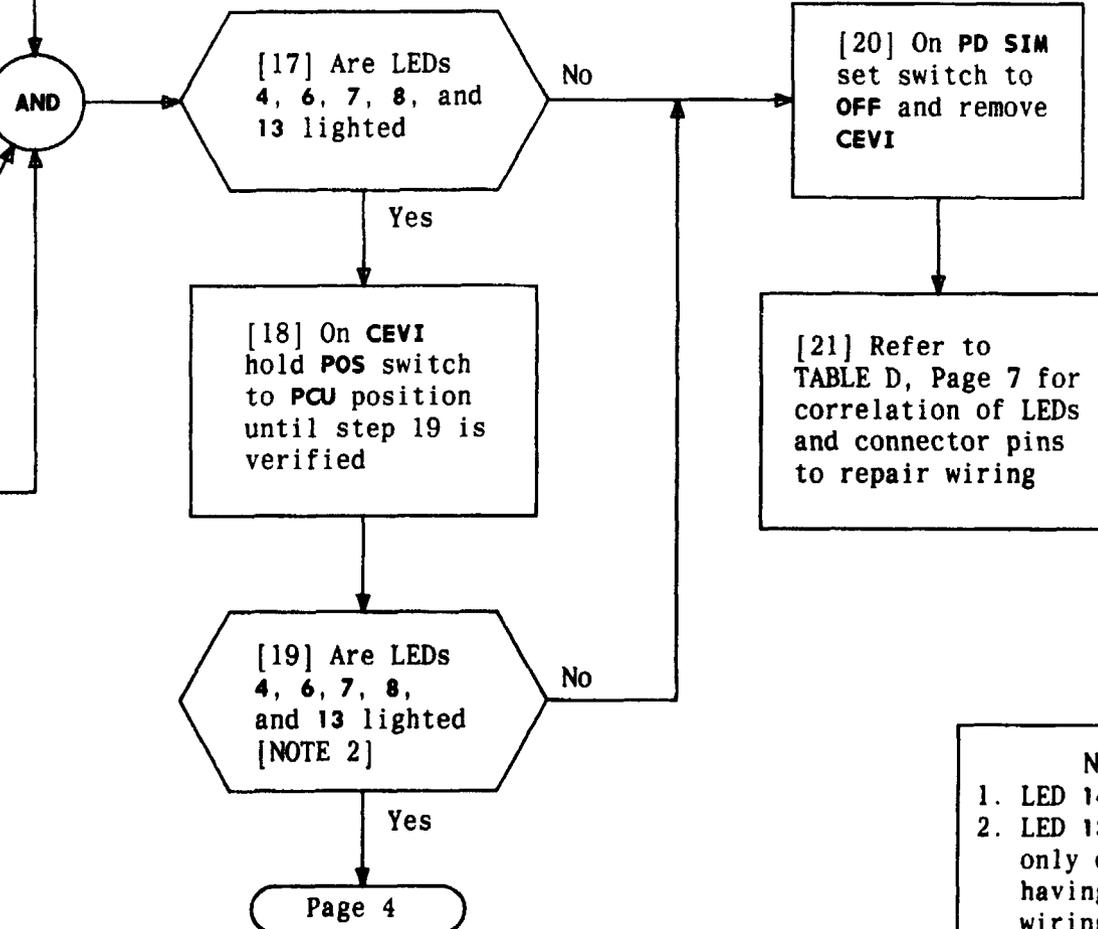
[12] Connect cord marked **CEVI** (supplied with test equipment) to **-20V IN** jack on **CEVI** and install **CEVI** unit into **PCU** slot

[13] Connect other end of cord of step 12 to **CEVI** jack on **PD SIM**

[14] Verify **CU** switch on **CEVI** is in center position

[15] Operate silver toggle switch on **top** of **CEVI** and observe that all LEDs except 14 are lighted. Replace any LEDs that do not light [DLP-520]
[NOTE 1]

[16] Release toggle switch of step 15



NOTES
 1. LED 14 may light
 2. LED 13 lights only on banks having printed wiring backplane

PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS

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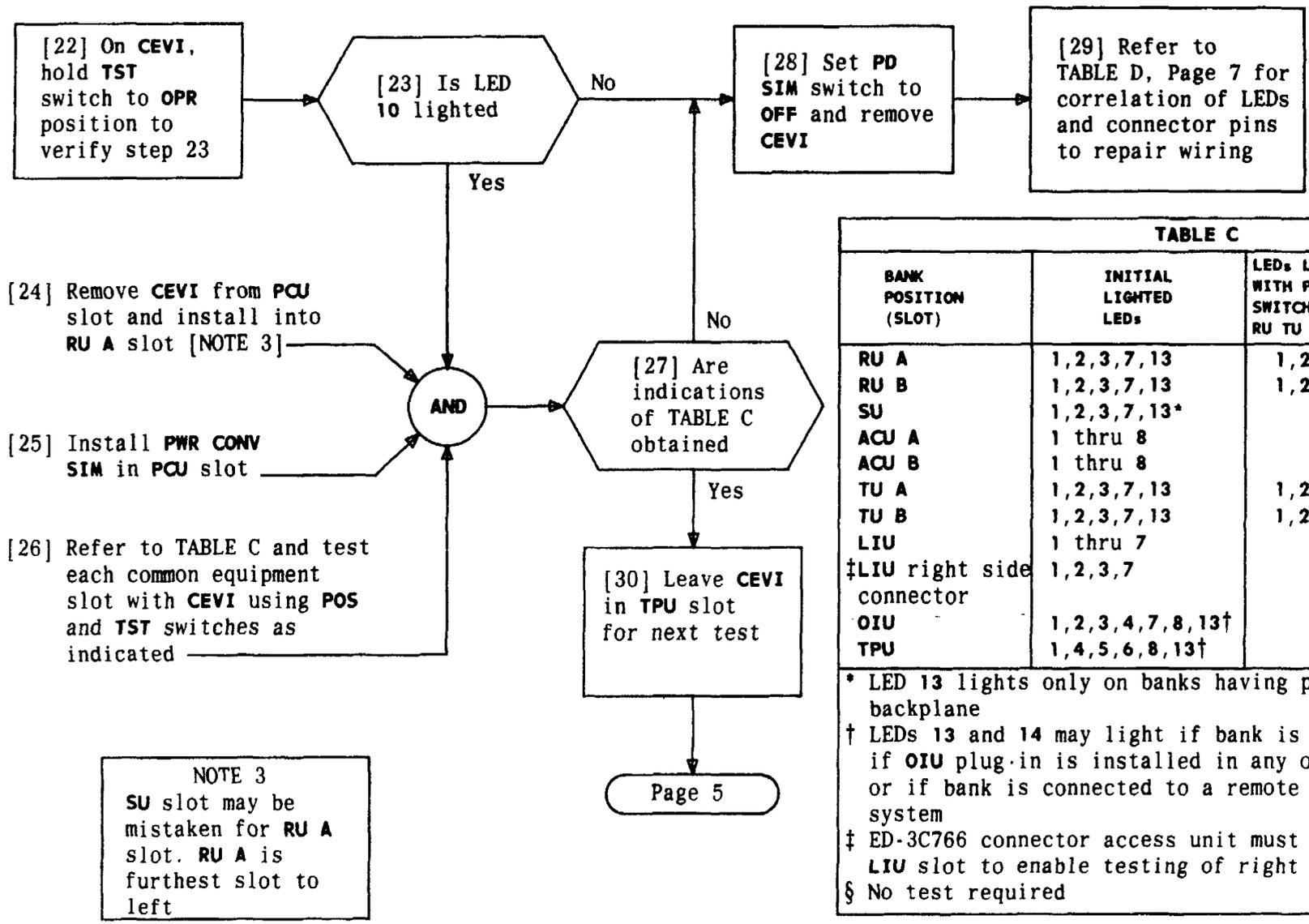


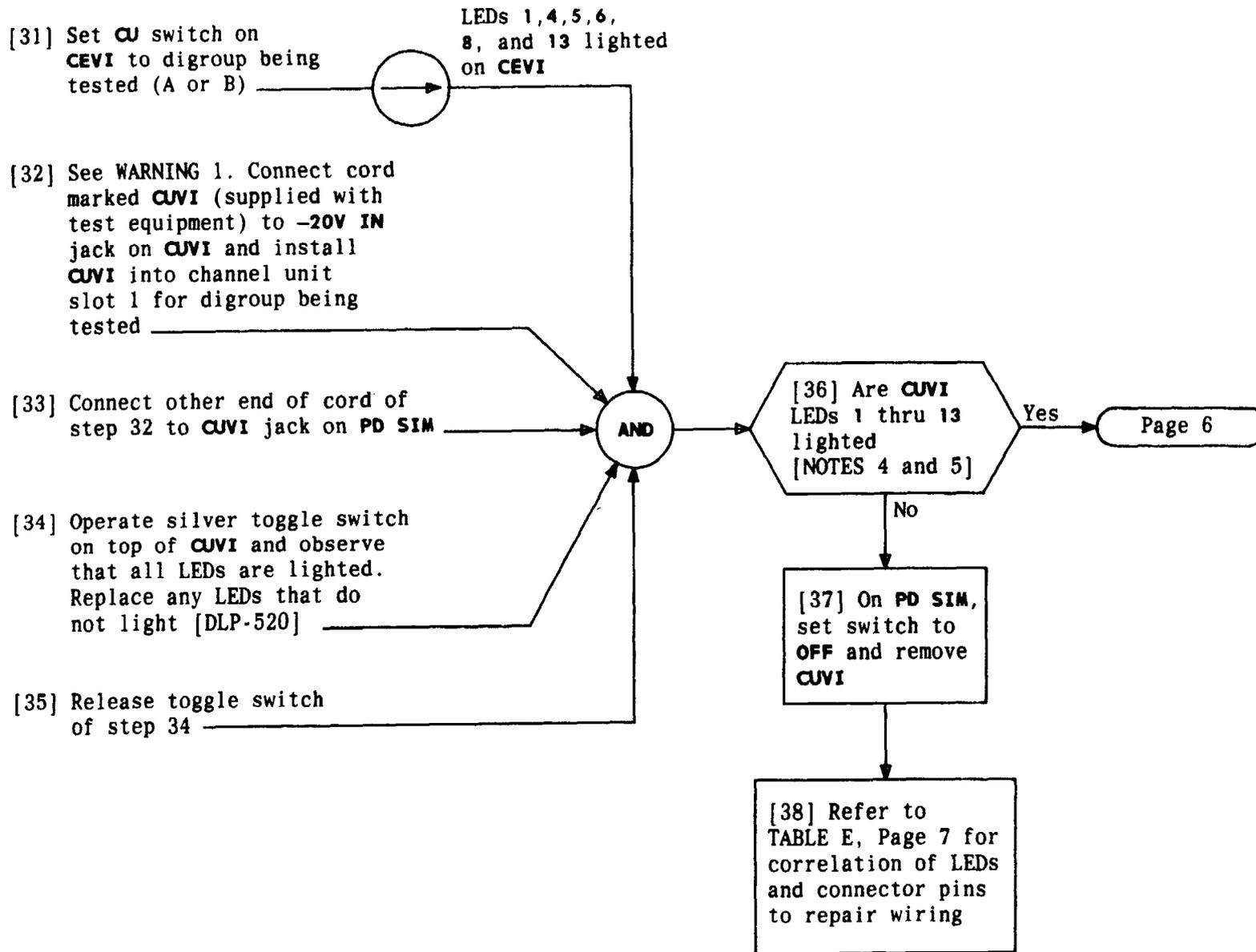
TABLE C

BANK POSITION (SLOT)	INITIAL LIGHTED LEDs	LEDs LIGHTED WITH POS SWITCH IN RU TU POSITION	LEDs LIGHTED WITH TST SWITCH IN OPR POSITION
RU A	1, 2, 3, 7, 13	1, 2, 3, 7	9, 10, 14
RU B	1, 2, 3, 7, 13	1, 2, 3, 7	9, 10, 14
SU	1, 2, 3, 7, 13*	§	9, 10
ACU A	1 thru 8	§	9, 10
ACU B	1 thru 8	§	9, 10
TU A	1, 2, 3, 7, 13	1, 2, 3, 7	9, 10
TU B	1, 2, 3, 7, 13	1, 2, 3, 7	9, 10
LIU	1 thru 7	§	9
‡LIU right side connector	1, 2, 3, 7	§	9, 10
OIU	1, 2, 3, 4, 7, 8, 13†	§	9, 10, 14†
TPU	1, 4, 5, 6, 8, 13†	§	9, 10, 14†

* LED 13 lights only on banks having printed wiring backplane
 † LEDs 13 and 14 may light if bank is connected to TCAS, if OIU plug-in is installed in any other bank in bay, or if bank is connected to a remote alarm display system
 ‡ ED-3C766 connector access unit must be installed into LIU slot to enable testing of right side connector
 § No test required

NOTE 3
 SU slot may be mistaken for RU A slot. RU A is furthest slot to left

PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS



NOTES

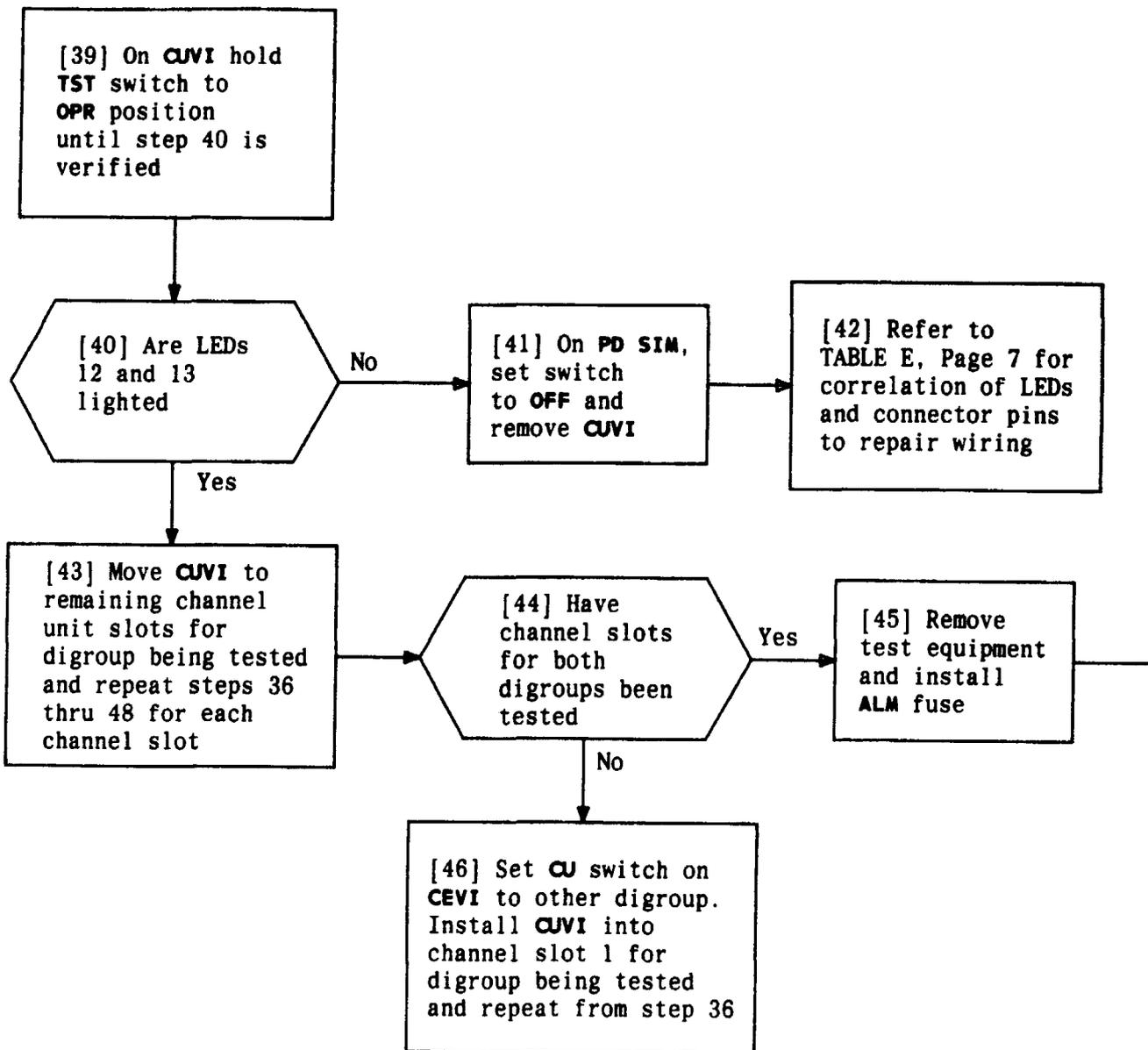
4. LED 12 should not light on banks with printed wiring backplane unless bank is connected to 2ESS.

5. LED 16 will light if 24 volts is supplied to bank from 2ESS

WARNING 1
Care should be taken when installing CUVI into channel slot to protect wiring on CUVI

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PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS



PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS

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TABLE D - CEVI LEDs		
LED	FUNCTION *	PIN
1	+5V circuit	29
2	-12V circuit	50
3	+12V circuit	23
4	-48V circuit	19
5	-48V circuit	20
6	-48V circuit	46
7	12V GRD	24
8	48V GRD	22
9	5V GRD	2
10	Frame GRD	1
11	5V over voltage circuit	29
12	12V over voltage circuit	50
13	Foreign voltage or GRD	All leads except power and GRD leads
14	Foreign voltage	All leads except power and GRD leads
15	12V GRD (indicates foreign voltage on GRD lead)	24
16	48V GRD (indicates foreign voltage on GRD lead)	22
17	5V GRD (indicates foreign voltage on GRD lead)	2

*When PD SIM and PWR CONV SIM are in bank, voltage circuits are as follows: +5V = -15V, +12V = -8V, -12V = -32V, and -48V = -36V

TABLE E - CUVI LEDs		
LED	FUNCTION *	PIN
1	+5V circuit	30
2	-12V circuit	2
3	RU lead	39
4	+12V circuit	4
5,6	-48V circuit	43,54
7,8,9,10	TPU leads	26,44,50,53
11	12V GRD	3
12	SIG GRD (TST switch in normal position)/ 5V GRD (TST switch operated)	21 5
13	SIG GRD (TST switch in normal position)/ Frame GRD (TST switch operated)	17 1
14	5V over voltage circuit	26,30,44,50,53
15	12V over voltage circuit	2,39
16	Foreign voltage or GRD	All leads except power and GRD leads
17	Foreign voltage	All leads except power and GRD leads
18	5V and 12V GRD (indicates foreign voltage or open circuit)	5,3
19	SIG GRD (indicates foreign voltage or open circuit)/ frame GRD	21,17 1
20	48V GRD (indicates voltage on these GRDs)	15,27

*When PD SIM and PWR CONV SIM are in bank, voltage circuits are as follows: +5V = -15V, +12V = -8V, -12V = -32V, and -48V = -36V

PERFORM POWER WIRING TEST ON D4 CHANNEL BANK USING VOLTAGE INDICATORS

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[1] Locate DSX-() panels and jack circuits for channel bank and span line or multiplexer which are to be cross-connected

[2] Insert 258-type dummy plugs in MON jack for D4 bank and MON jack for span line or multiplexer [FIG. 1, Page 2]

[3] Get equipment per TABLE A and make cross-connections (TL lights can be seen from behind panels). See FIG. 1, 2, 3, 4, and 5 for DSX-1 and DSX-1C, and FIG. 1, 2, 6, and 7 for DSX-2

TL lamp lights for each dummy plug

AND

[4] Remove dummy plug from one MON jack

[5] Do both TL lamps remain lighted

Yes

[8] Remove dummy plug from second MON jack

No

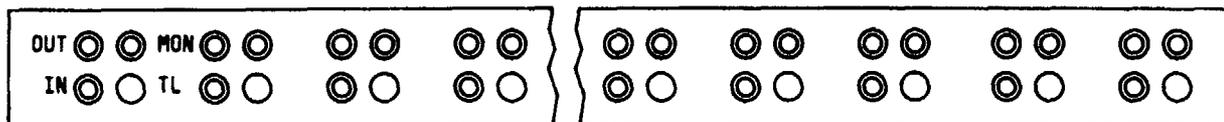
[6] Reinsert dummy plug in MON jack

[9] Verify that designation cards on DSX-() have been filled out [FIG. 8, Page 9]

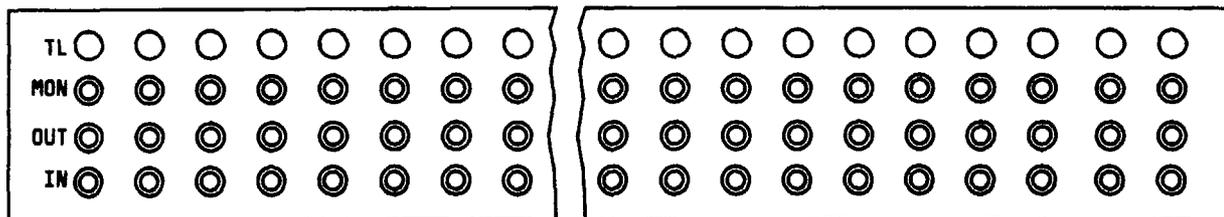
[7] Correct wiring just installed

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Bulk Cross-Connect Wire	3-Pair twisted, Y1 type (for DSX-1 and DSX-1C) 3-Pair shielded-RCN1261, Gore and Associates (DSX-2)
Skinning Tool	
Wire Wrapping Tool	

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FRONT VIEW - 2-INCH PATCH AND CROSS-CONNECT PANEL



FRONT VIEW - 4-INCH PATCH AND CROSS-CONNECT PANEL

FIG. 1

MAKE CROSS-CONNECTIONS AT DSX- () BAYS

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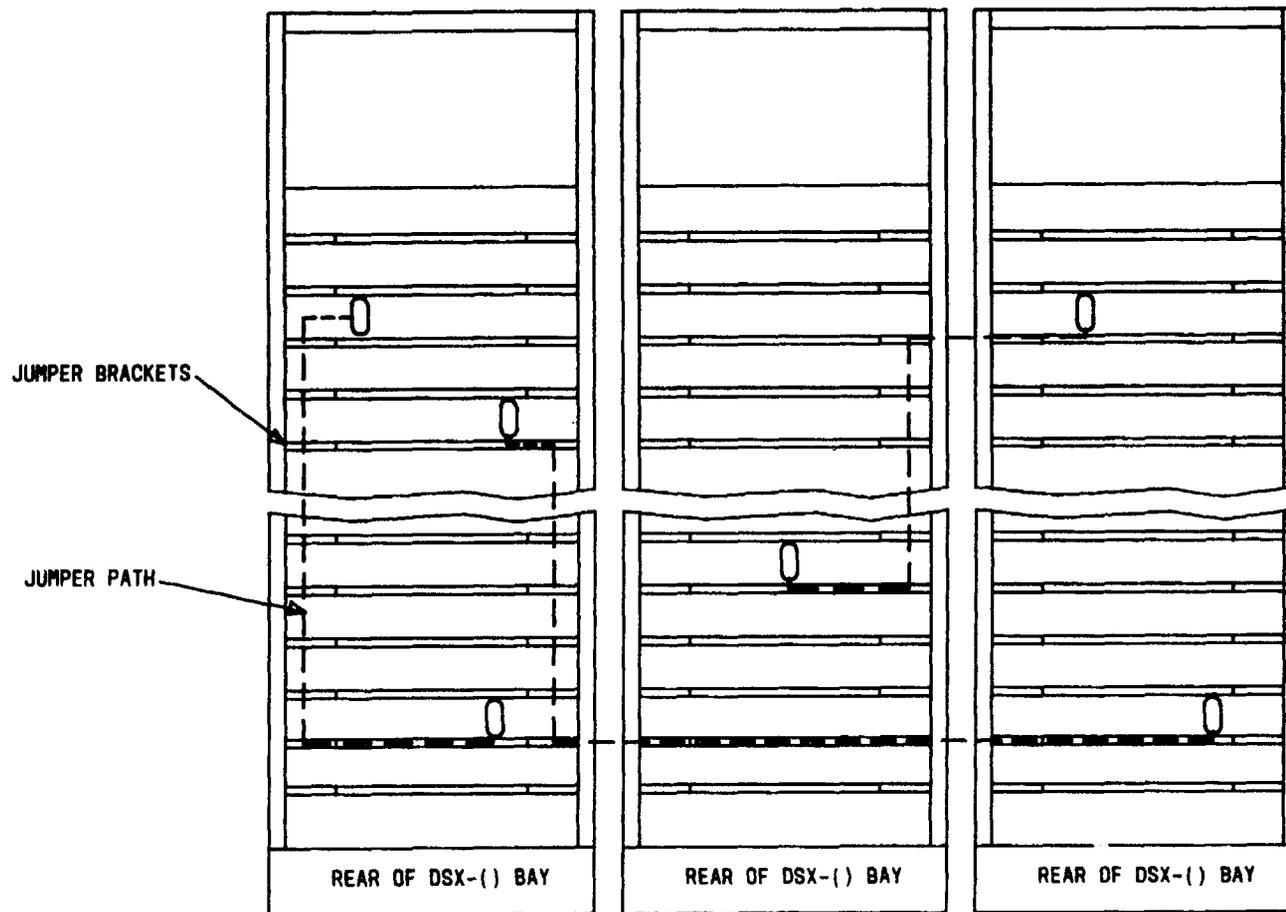


FIG. 2 - Typical Cross-Connect Runs

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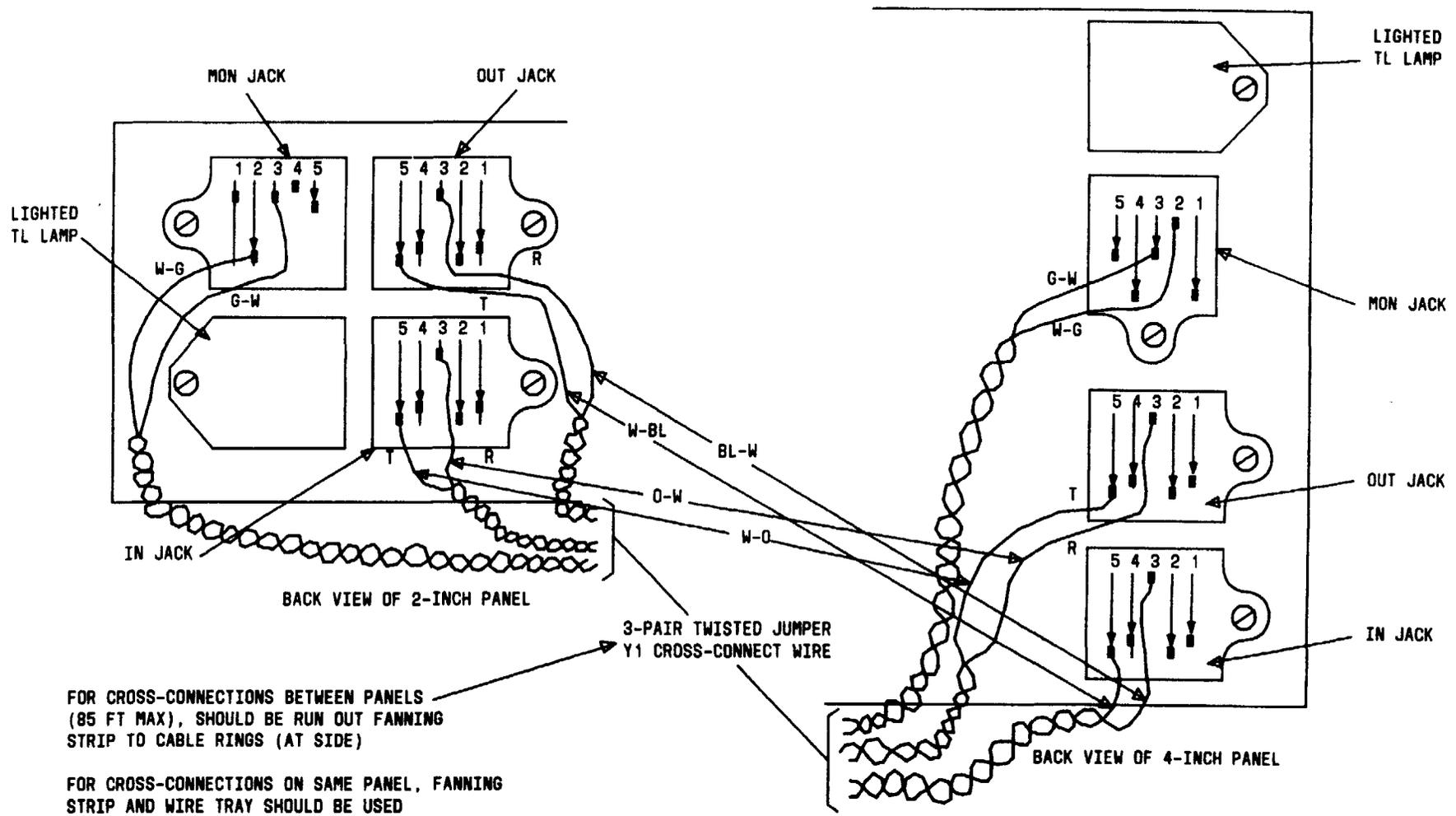


FIG. 3 - Cross-Connections (DSX-1 or DSX-1C)

MAKE CROSS-CONNECTIONS AT DSX-() BAYS

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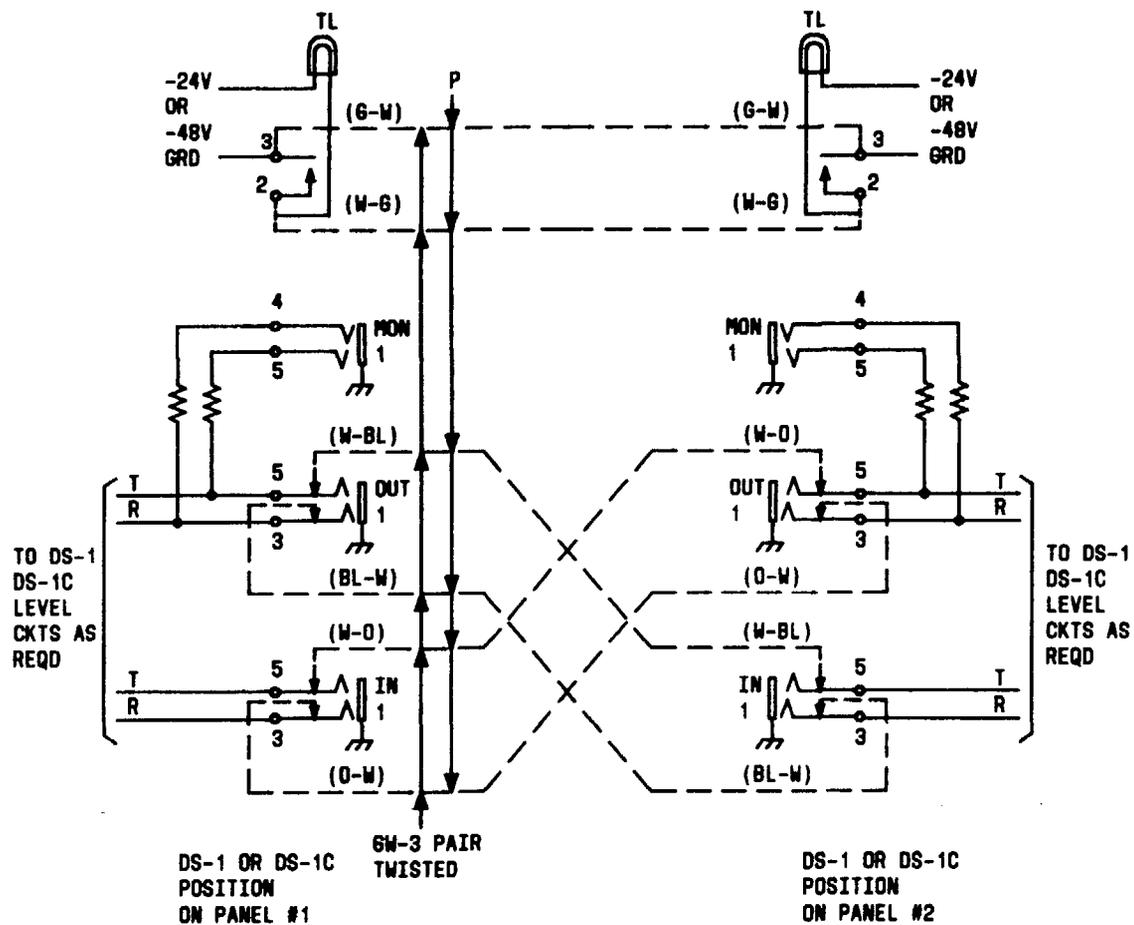


FIG. 4 - Cross-Connections Schematic (DSX-1 or DSX-1C)

MAKE CROSS-CONNECTIONS AT DSX- () BAYS

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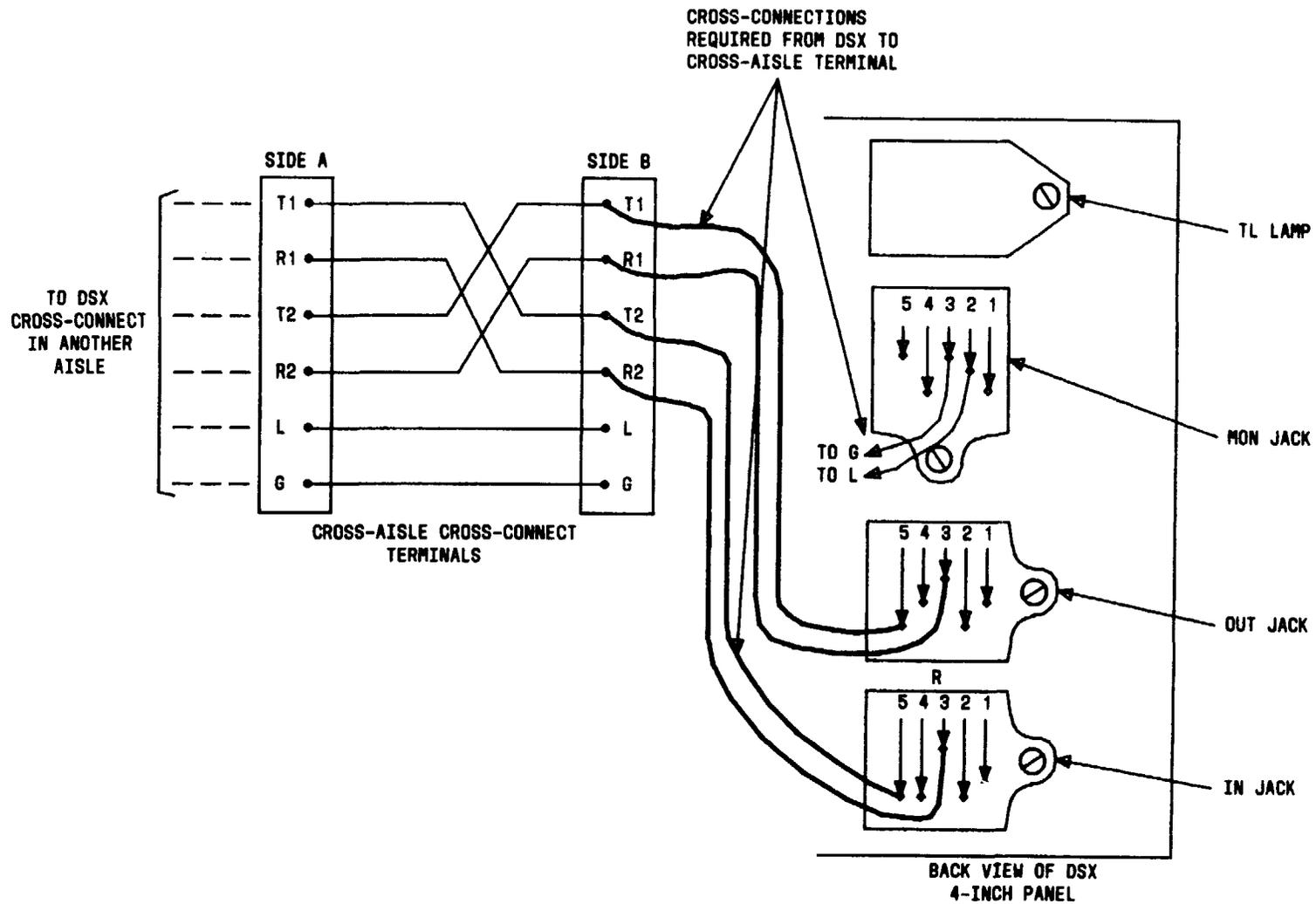


FIG. 5 - Multiple Lineup Cross-Connects

MAKE CROSS-CONNECTIONS AT DSX-() BAYS

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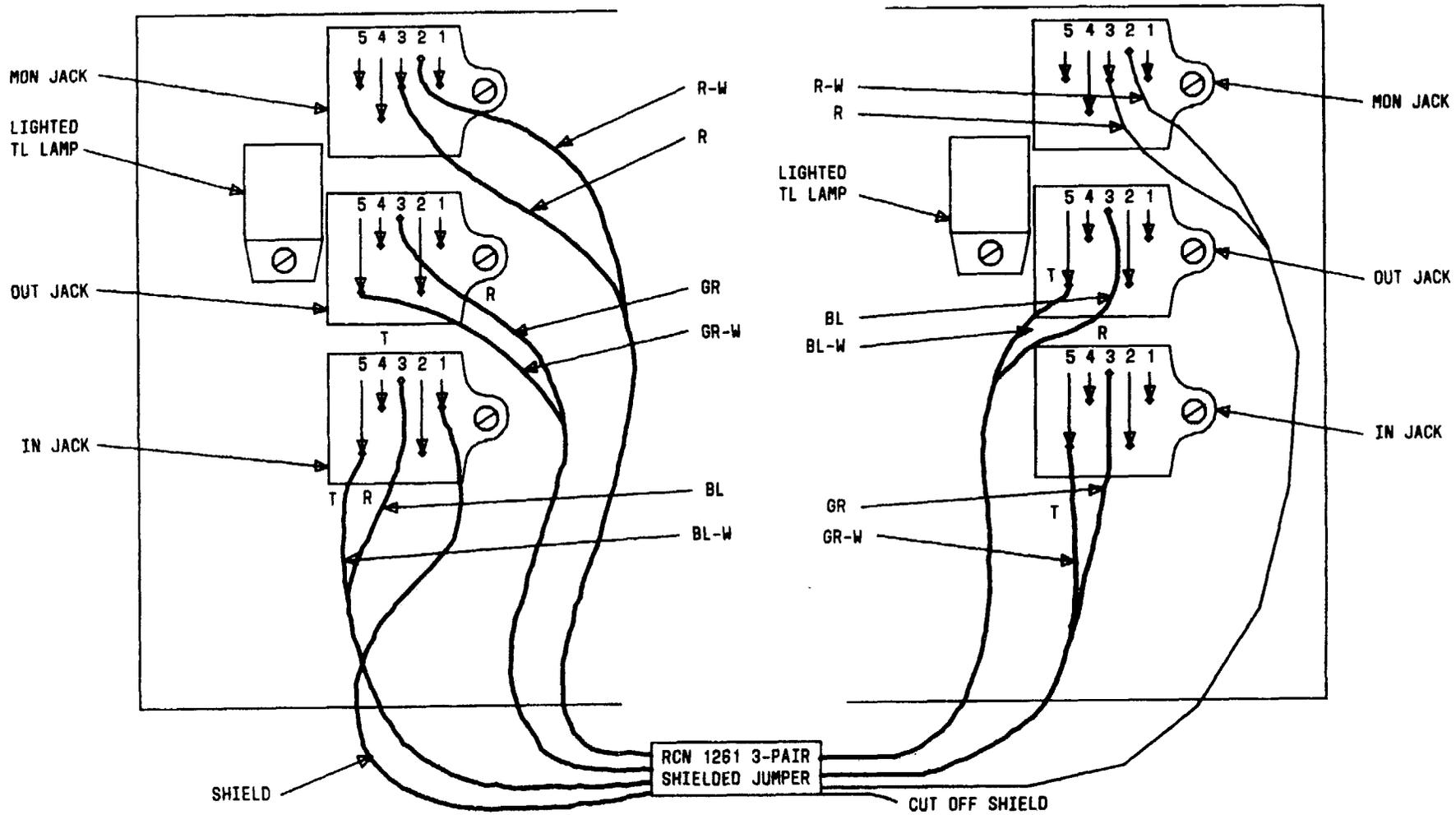
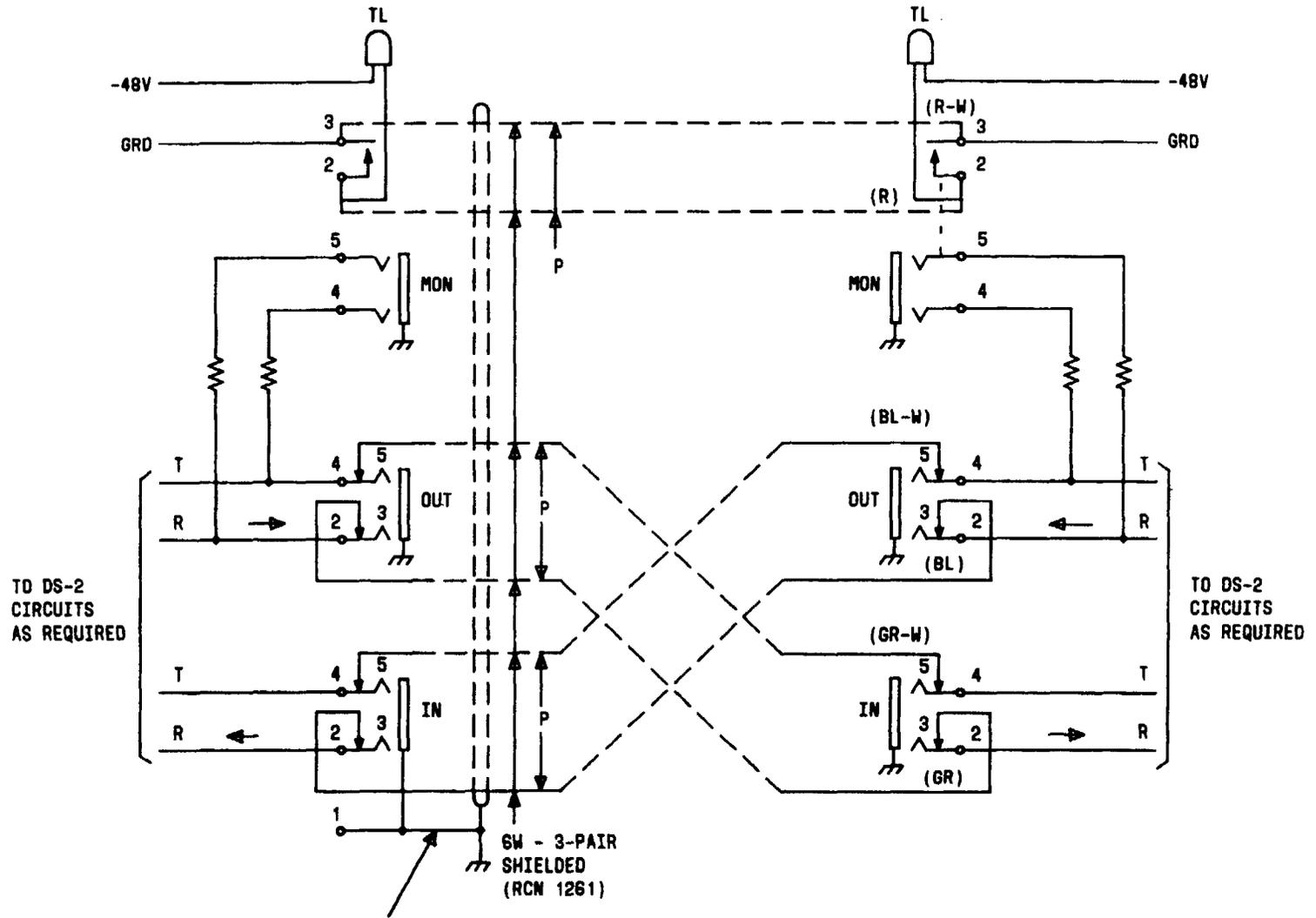


FIG. 5 - DSX-2 Cross-Connections

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THE SHIELD MUST BE TERMINATED AT THE IN JACK HAVING THE BL AND BL-W PAIR.

FIG. 6 - DSX-2 Cross-Connections

MAKE CROSS-CONNECTIONS AT DSX-() BAYS

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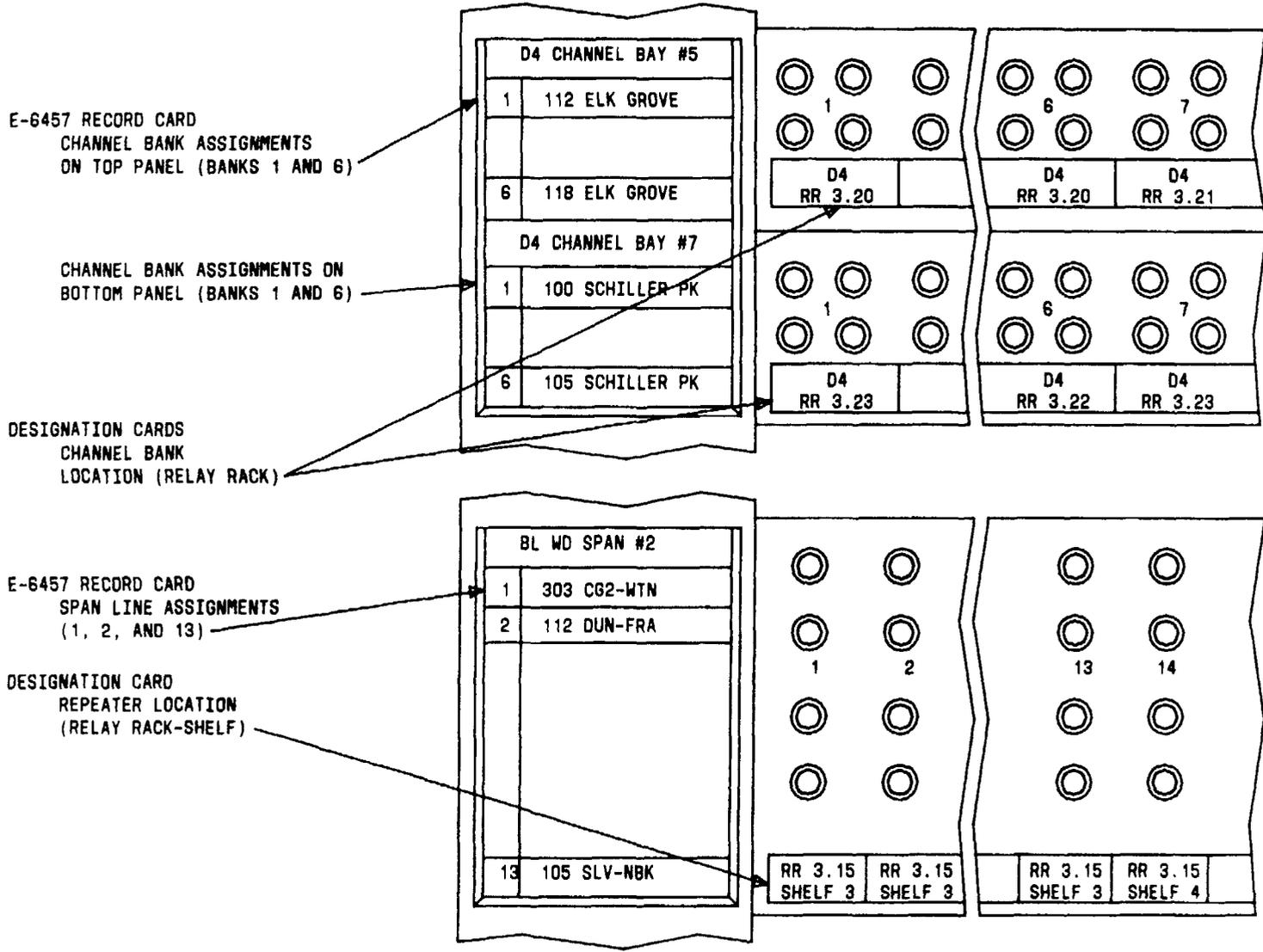


FIG. 7 - Designation Cards (Examples)

MAKE CROSS-CONNECTIONS AT DSX-() BAYS

[1] On front of repeater bay, remove cover for span and bay cross-connect strips [FIG. 1, Page 2 (220/221 type), or FIG. 3, Page 3 (206 type)]

[2] Use office records and equipment stenciling to locate D4 bank at bay cross-connect strip and span line at span X-CONN [FIG. 2, Page 2 (220/221 type), or FIG. 4, Page 3 (206 type)]

[3] Get equipment per TABLE A and make required cross-connections between bay and span cross-connect strips. [See FIG. 2 or FIG. 4 for examples]

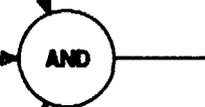


TABLE A
EQUIPMENT REQUIRED
Bulk Cross-Connect Wire
Skinning Tool
Wire-Wrapping Tool

MAKE CROSS-CONNECTIONS AT OFFICE REPEATER BAY

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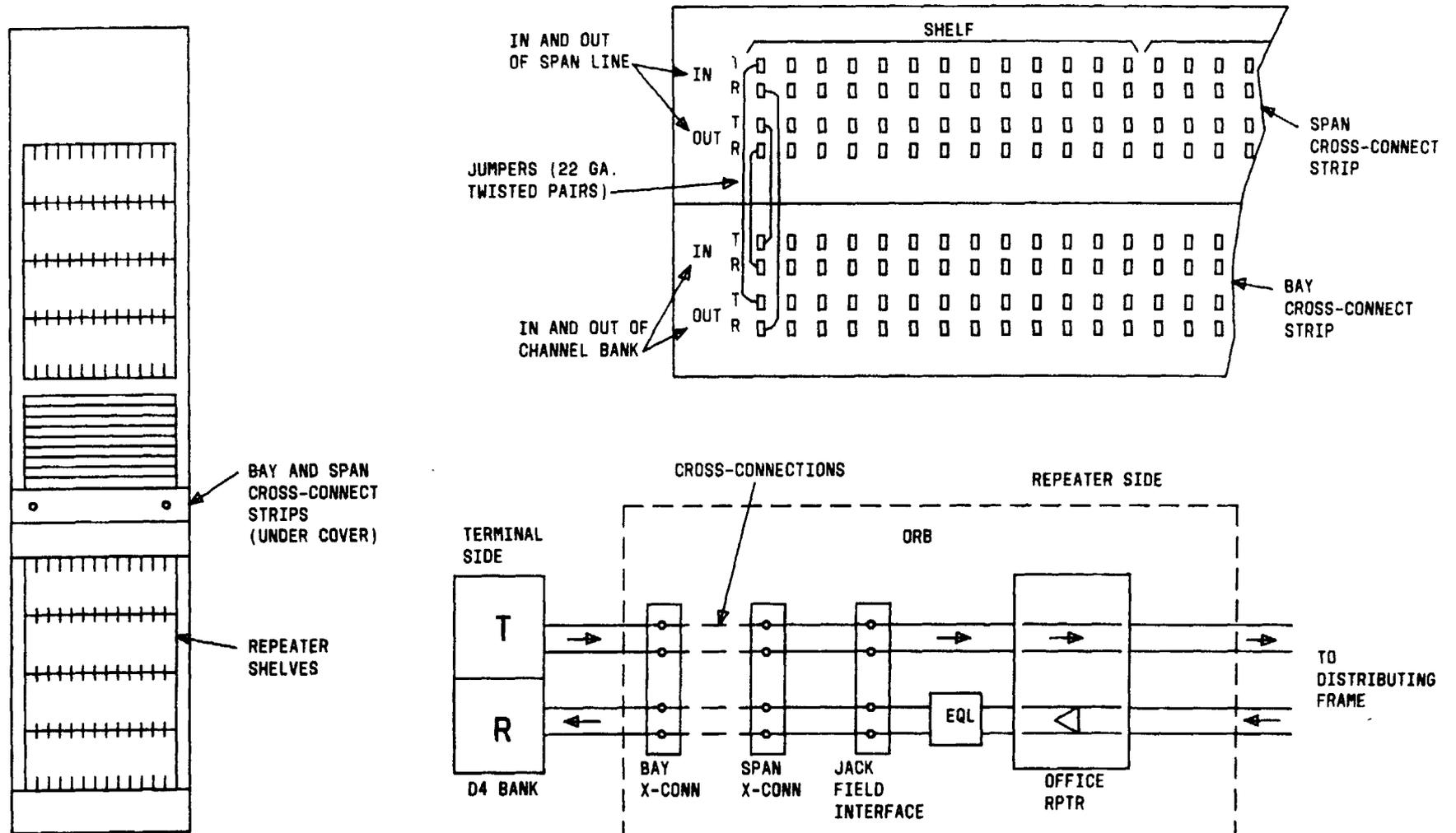


FIG. 1 - Location of Cross-Connects on 220/221 Office Repeater Bay

FIG. 2 - Cross-Connects at 220/221 Repeater Bay (Examples)

MAKE CROSS-CONNECTIONS AT OFFICE REPEATER BAY

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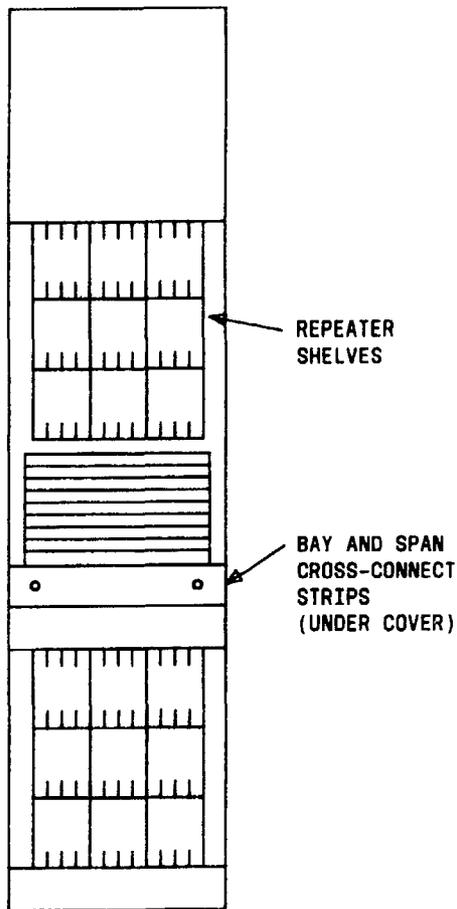


FIG. 3 - Location of Cross-Connects on 206 Office Repeater Bay

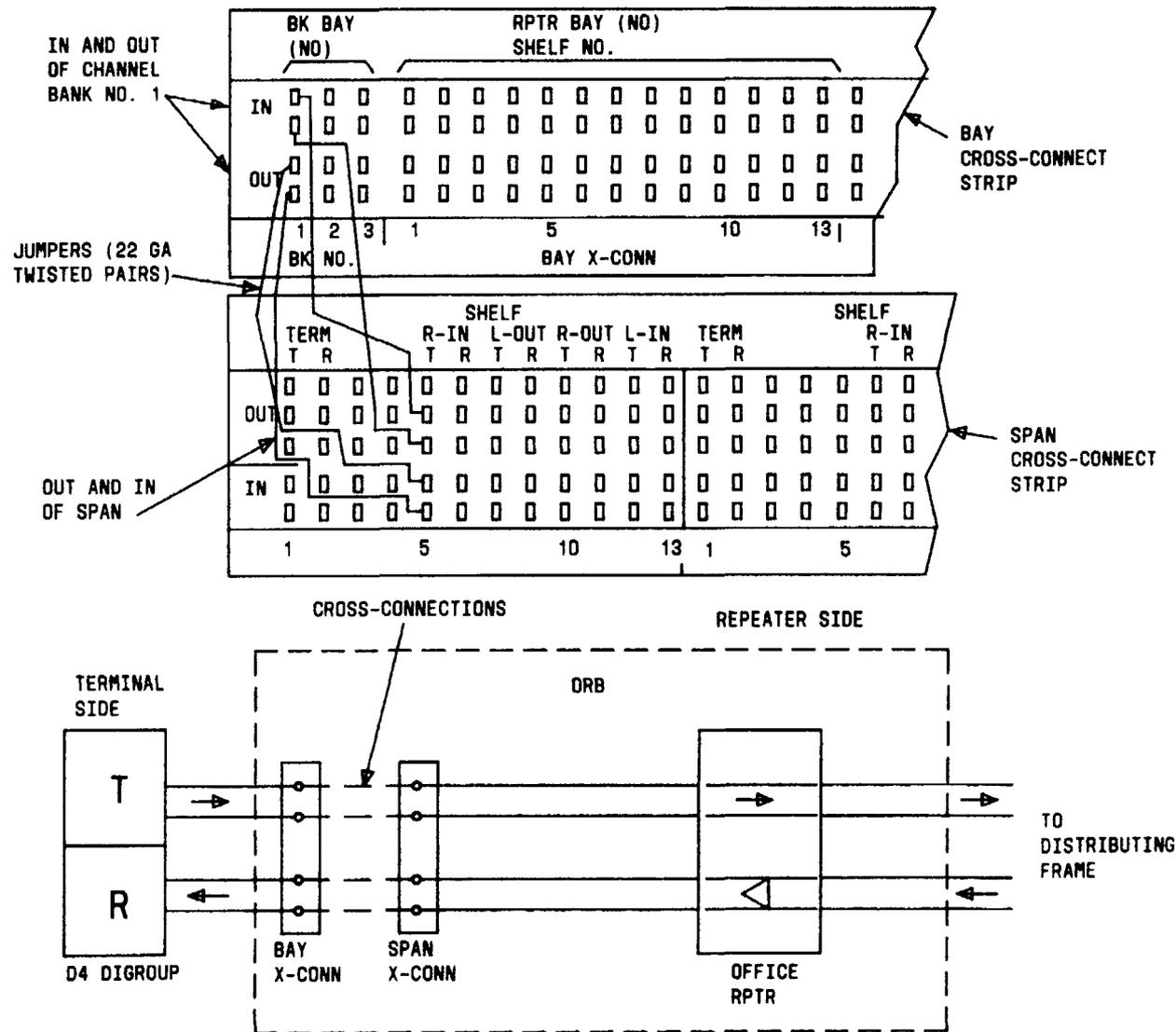


FIG. 4 - Cross-Connections at 206 Repeater Bay (Examples)

MAKE CROSS-CONNECTIONS AT OFFICE REPEATER BAY

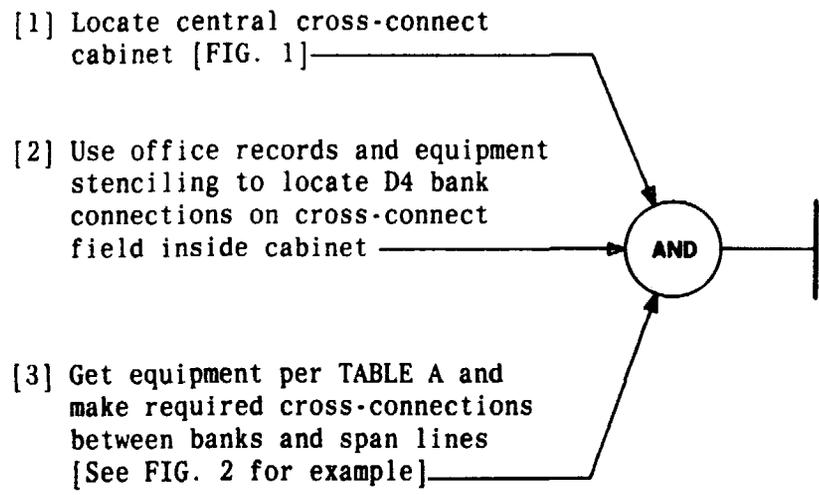


TABLE A	
EQUIPMENT REQUIRED	
Bulk Cross-Connect Wire	
Skinning Tool	
Wire-Wrapping Tool	

MAKE CROSS-CONNECTIONS AT CENTRAL CROSS-CONNECT FIELD

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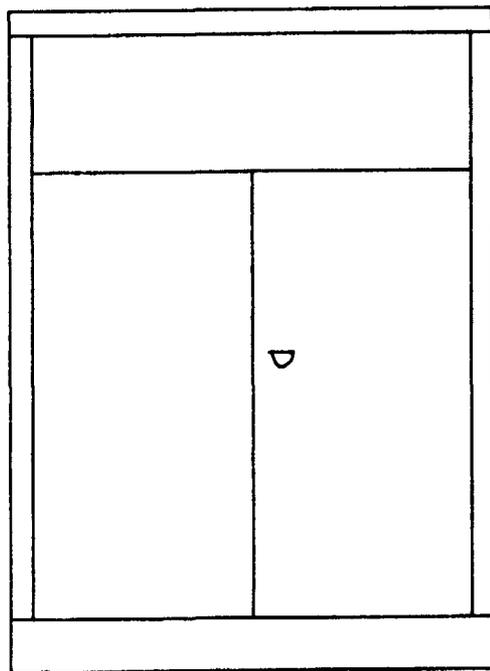


FIG. 1 - Central Cross-Connect Cabinet

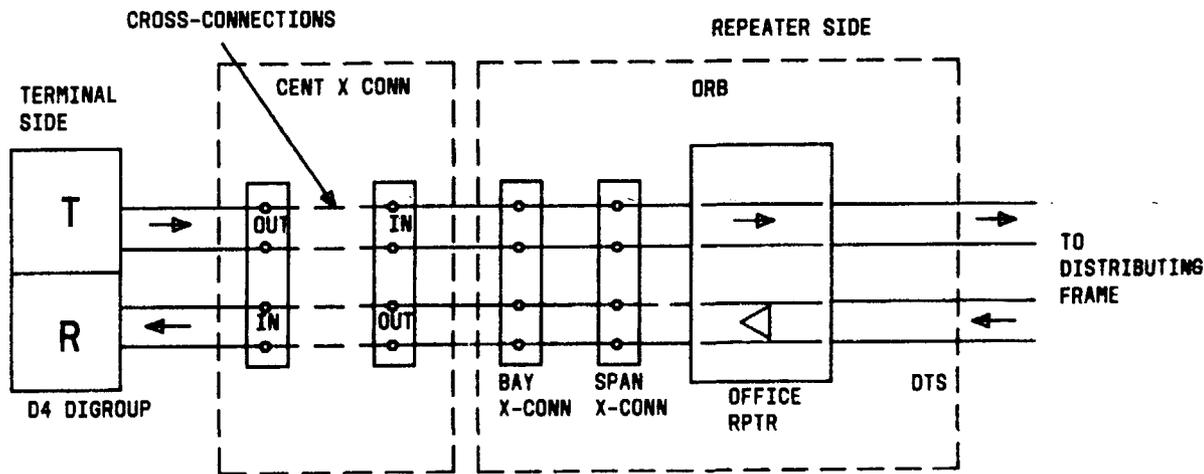
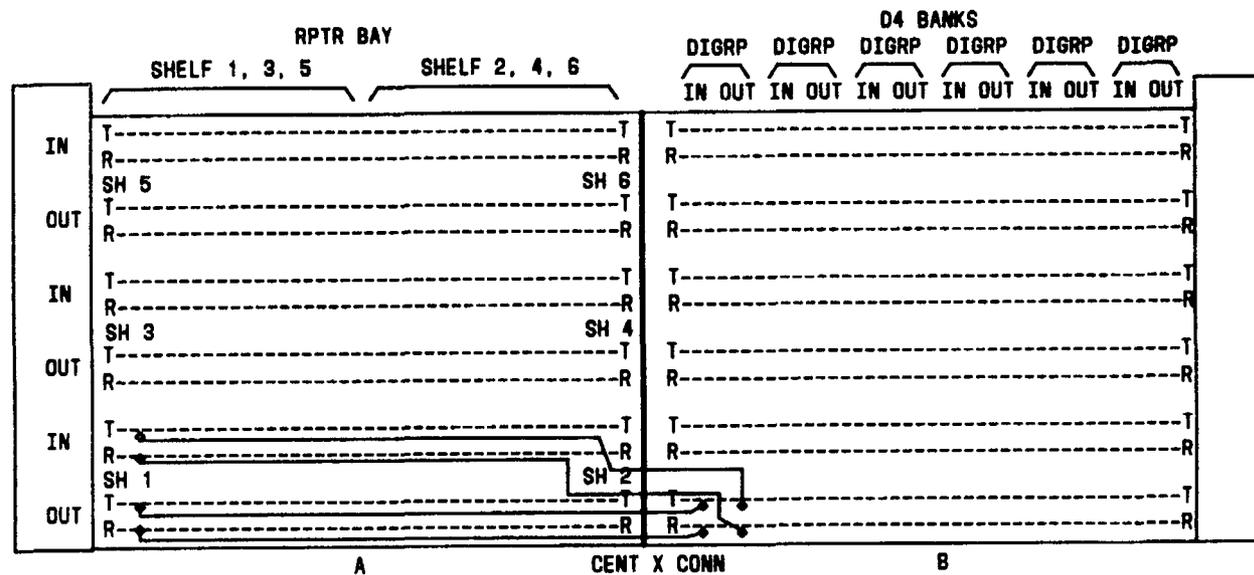


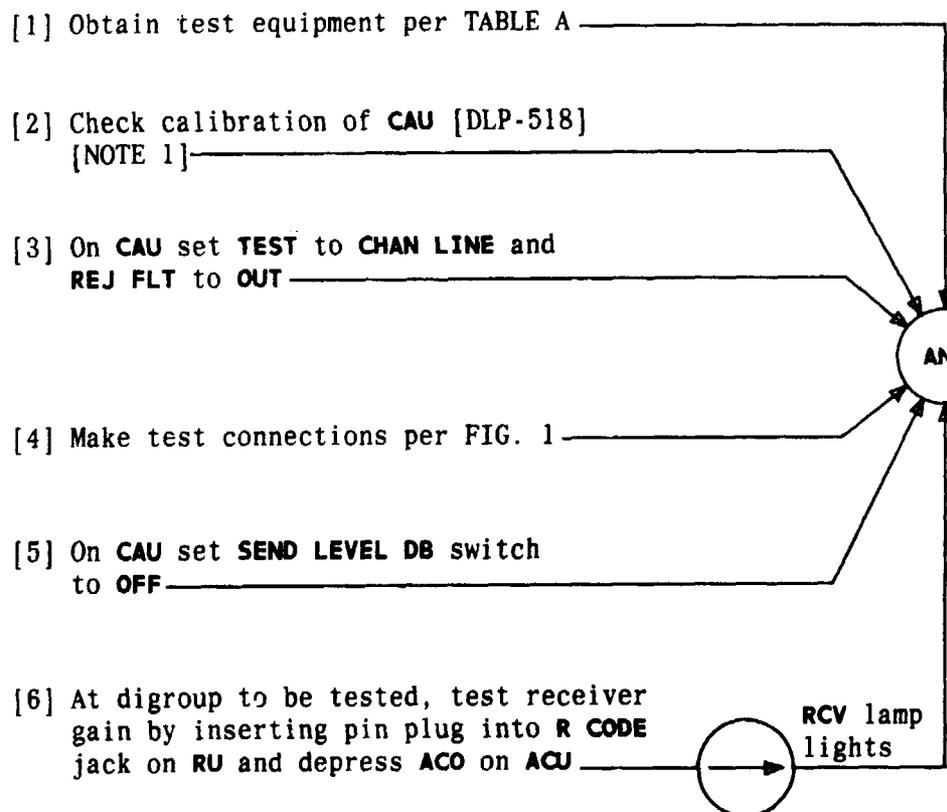
FIG. 2 - Cross-Connections at Central Cross-Connect Field (Example)

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SUMMARY

Make test connections per FIG. 1. Insert pin plug into **R CODE** on **RU** to test receiver gain. **CAU** must indicate in black area for receiver gain or green-black-green area for net loss

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
1 Patch Cord	P6AD
Pin Plug	KS-19531



[1] Obtain test equipment per TABLE A

[2] Check calibration of CAU [DLP-518]
[NOTE 1]

[3] On CAU set TEST to CHAN LINE and REJ FLT to OUT

[4] Make test connections per FIG. 1

[5] On CAU set SEND LEVEL DB switch to OFF

[6] At digroup to be tested, test receiver gain by inserting pin plug into R CODE jack on RU and depress ACO on ACU

[7] Does CAU indicate in black area

[8] Repeat steps 3 thru 7

NOTE 1
When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble

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PERFORM LOOPED D4 CHANNEL BANK RECEIVER GAIN AND NET LOSS TEST

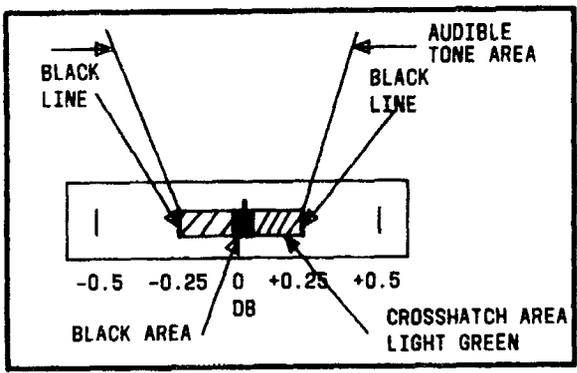
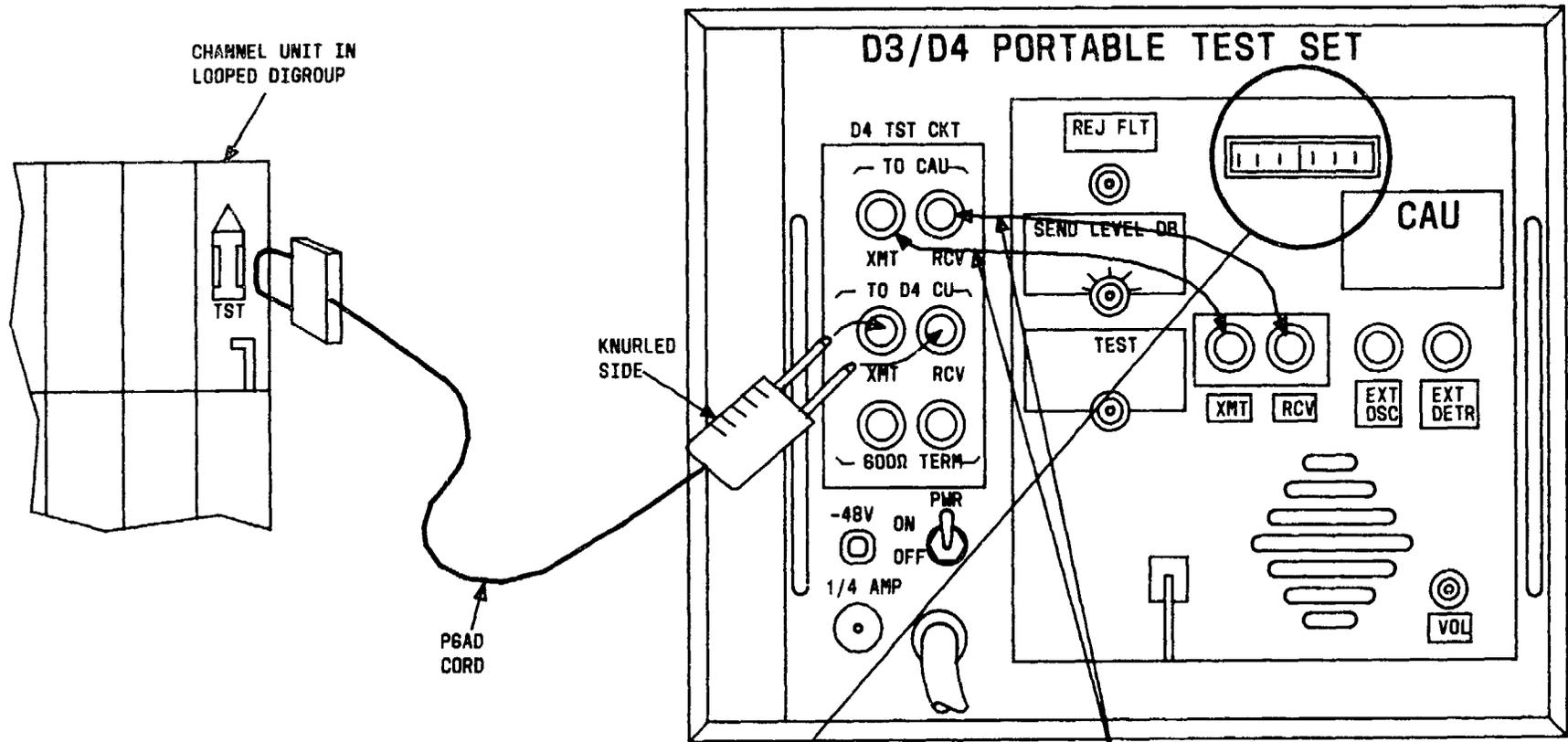
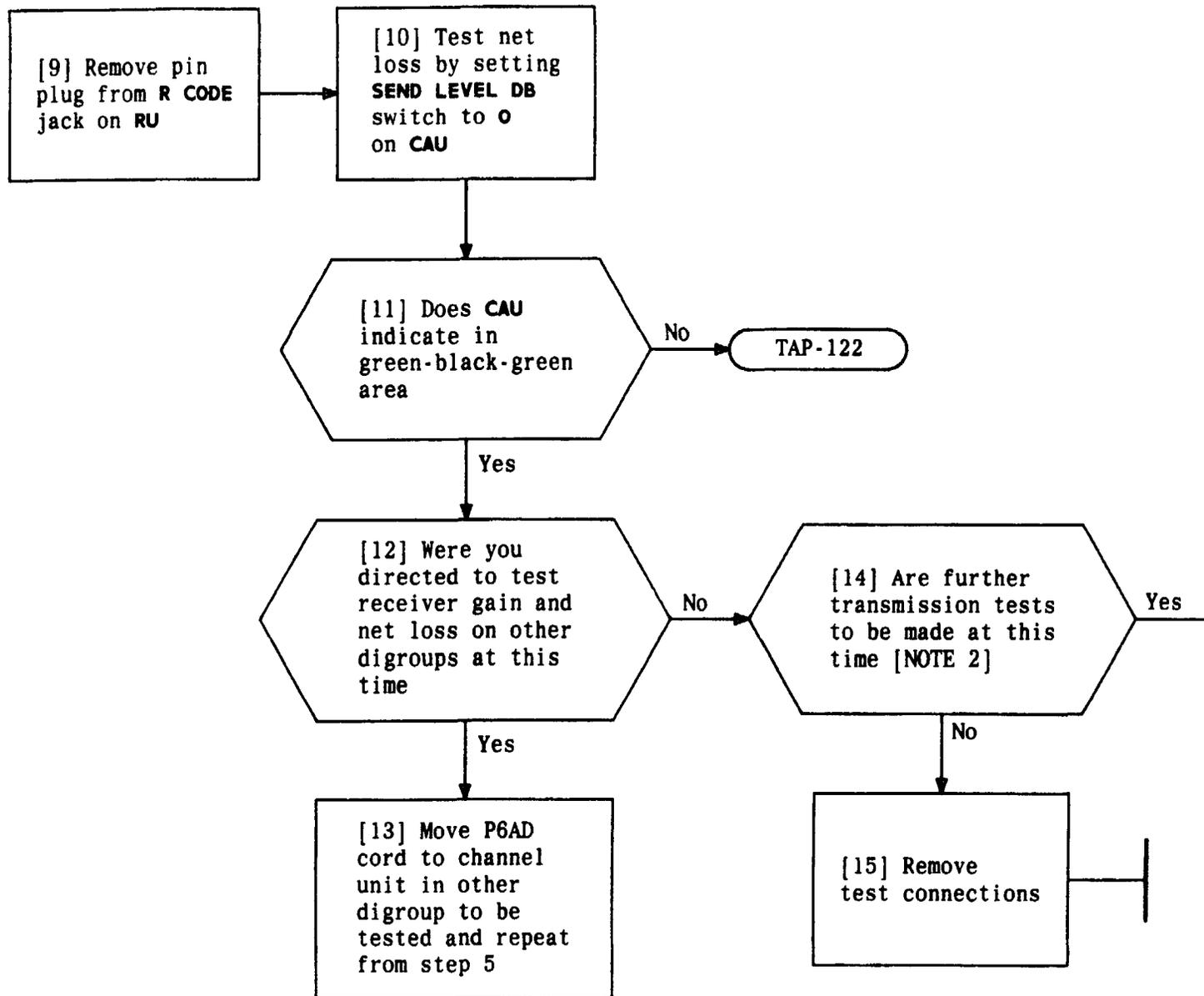


FIG. 1

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PERFORM LOOPED D4 CHANNEL BANK RECEIVER GAIN AND NET LOSS TEST



NOTE 2	
All transmission tests can be performed on looped bank before removing connections	
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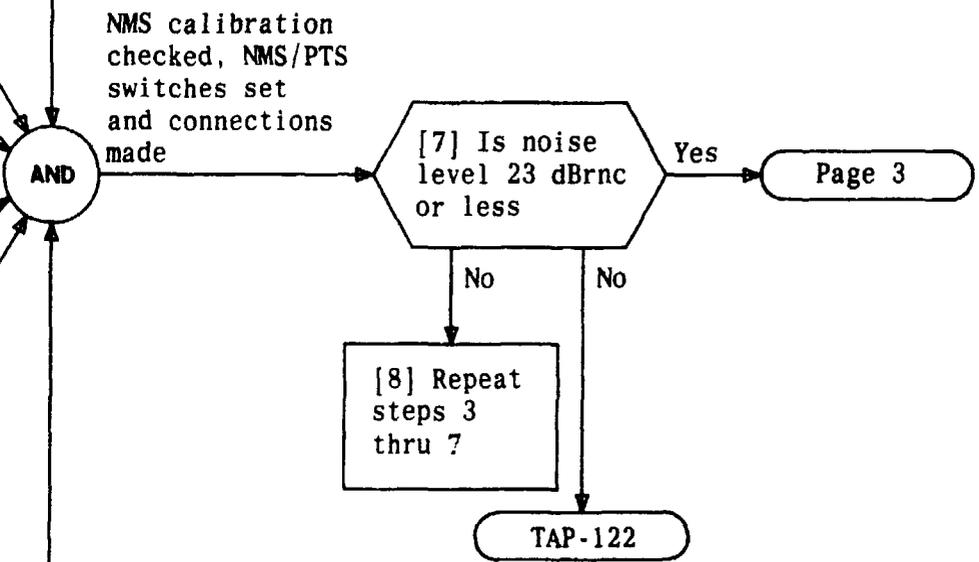
PERFORM LOOPED D4 CHANNEL BANK RECEIVER GAIN AND NET LOSS TEST

SUMMARY

Make test connections per FIG. 1 and measure noise. Level should be 23 dBrnc or less

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003 C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
1 Patch Cord	P6AD
2 Patch Cords	3P6A
1 Patch Cord for NMS	3P6D

- [1] Get test equipment per TABLE A
- [2] Check calibration of noise measuring set (NMS) [DLP-519]
- [3] Make test connections per FIG. 1
- [4] On PTS-CAU set REJ FLT switch to **OUT**, SEND LEVEL DB to **OFF**, and TEST switch to **CHAN LINE**
- [5] On NMS, set **FUNCTION** switch **NM 600/900**, **NORM-DAMP** switch to **DAMP**, **DBRN** switch to **85**, and weighting network so that **C-MESSAGE** is aligned with **WTG**
- [6] On NMS rotate **DBRN** switch counterclockwise for on-scale reading



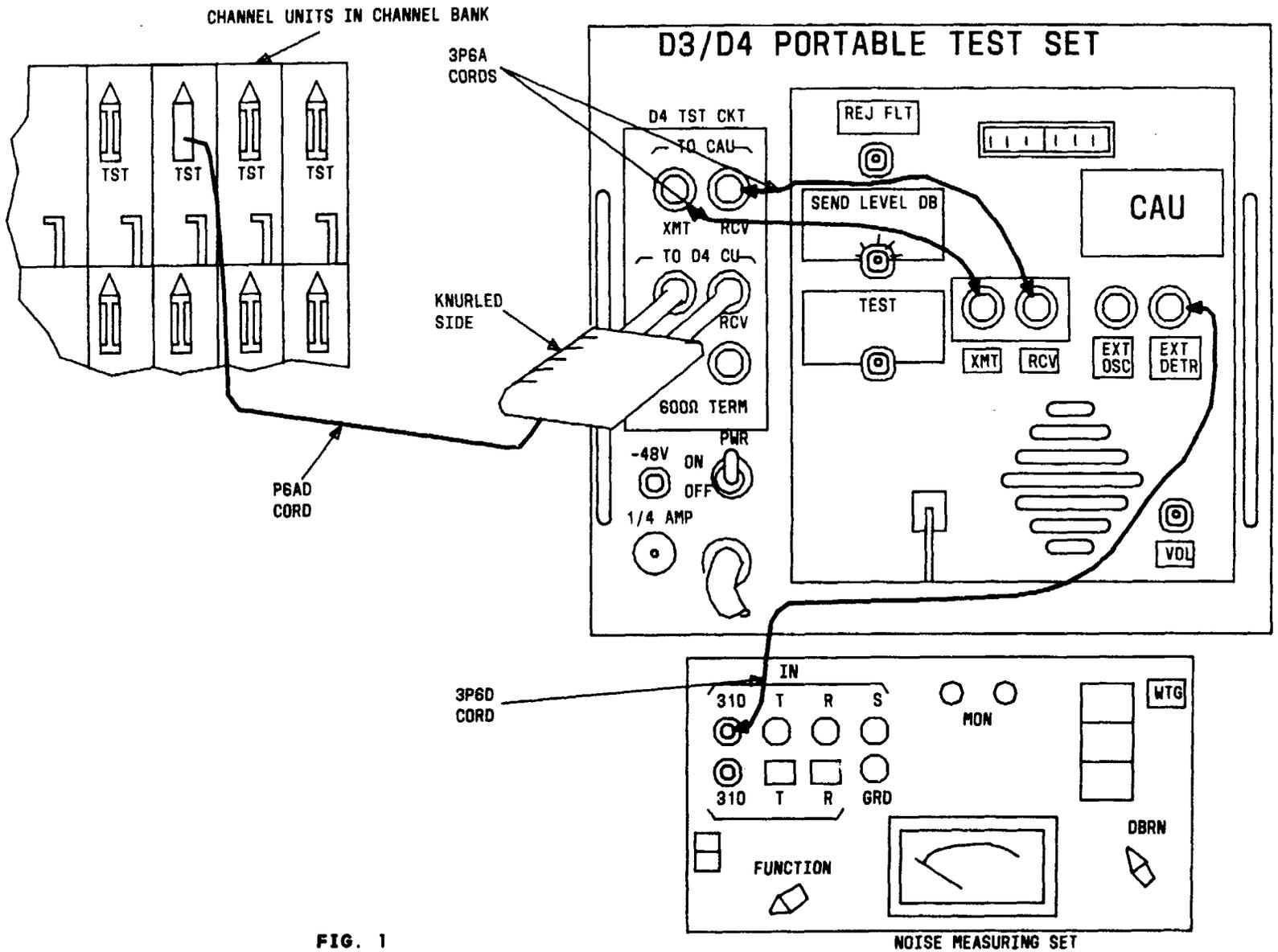
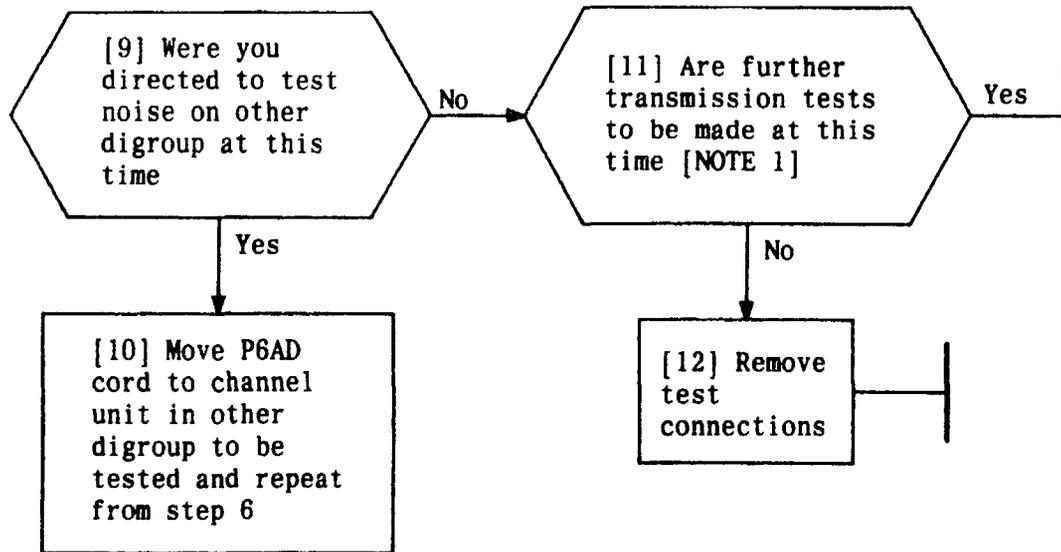


FIG. 1

PERFORM LOOPED D4 CHANNEL BANK IDLE CIRCUIT NOISE TEST

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NOTE 1	
All transmission tests can be performed on looped bank before removing test connections	
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PERFORM LOOPED D4 CHANNEL BANK IDLE CIRCUIT NOISE TEST

SUMMARY

Make test connections per FIG. 1 and measure noise for requirements per TABLE B

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
1 Patch Cord	P6AD
2 Patch Cords	3P6A
1 Patch Cord For NMS	3P6D

- [1] Obtain test equipment per TABLE A
- [2] Check calibration of CAU [DLP-518] [NOTE 1]
- [3] Check calibration of noise measuring set (NMS) [DLP-519]
- [4] On NMS set **FUNCTION** switch to **N/M 600/900**, **NORM-DAMP** switch to **DAMP**, **DBRN** switch to **85**, and weighting network for **C-MESSAGE** weighting
- [5] On PTS-CAU set **REJ FLT** switch to **IN**, **TEST** switch to **CHAN LINE**, and **SEND LEVEL DB** switch to **0**
- [6] Make test connections per FIG. 1
- [7] See TABLE B. Measure for requirements for each position of **SEND LEVEL DB** switch. NMS **DBRN** switch must be rotated counterclockwise for on-scale reading each time

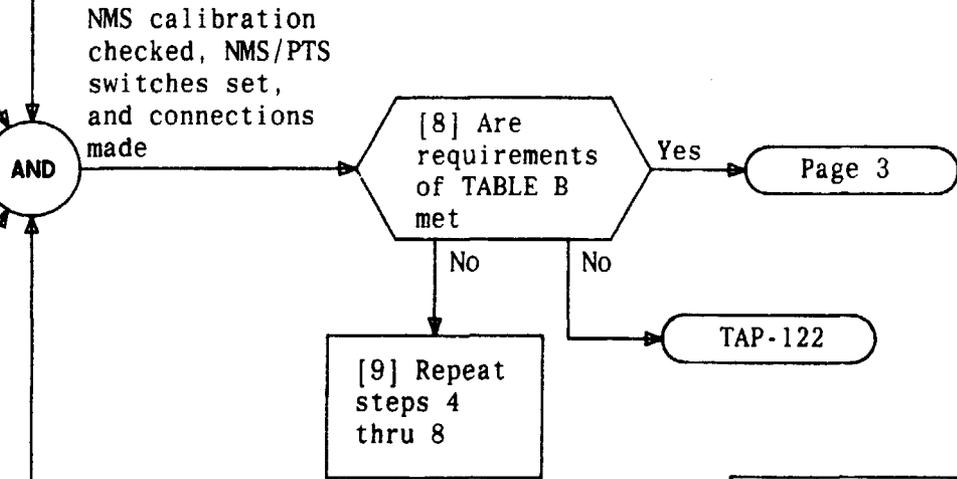


TABLE B		
SWITCH	POSITIONS	REQUIREMENTS
Send level dB on CAU	0	56 dBrc or less
	10	46 dBrc or less
	20	36 dBrc or less
	30	26 dBrc or less
	40	22 dBrc or less

NOTE 1
When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble

PERFORM LOOPED D4 CHANNEL BANK DISTORTION TEST

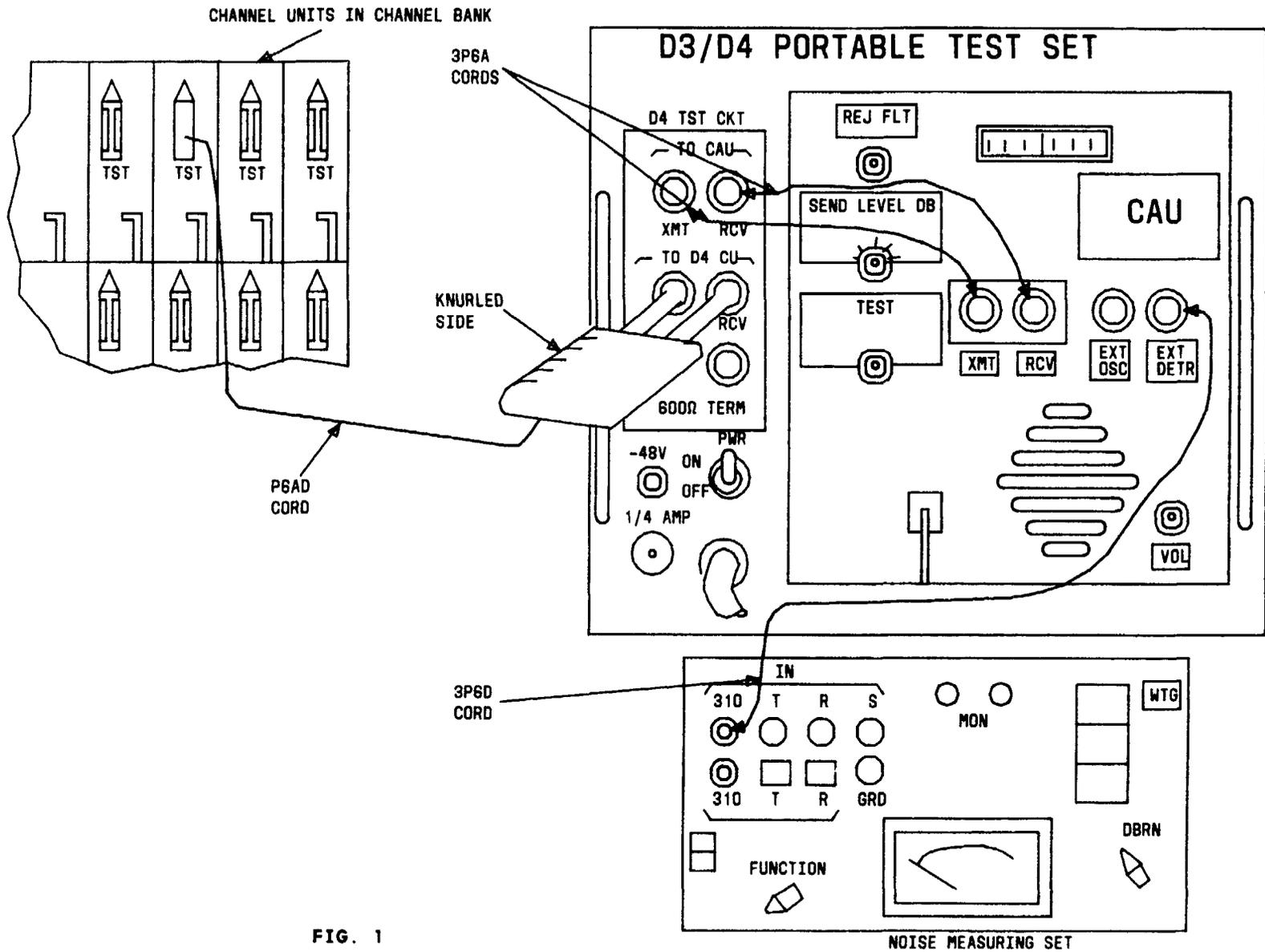
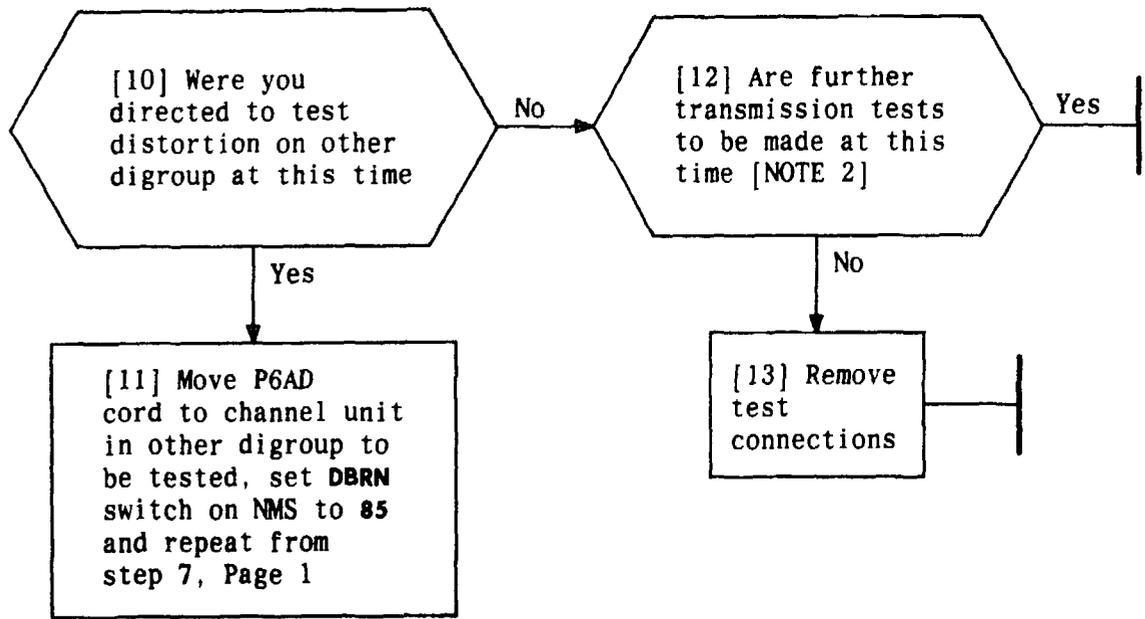


FIG. 1

PERFORM LOOPED D4 CHANNEL BANK DISTORTION TEST



NOTE 2	
All transmission tests can be performed on looped bank before removing test connections	
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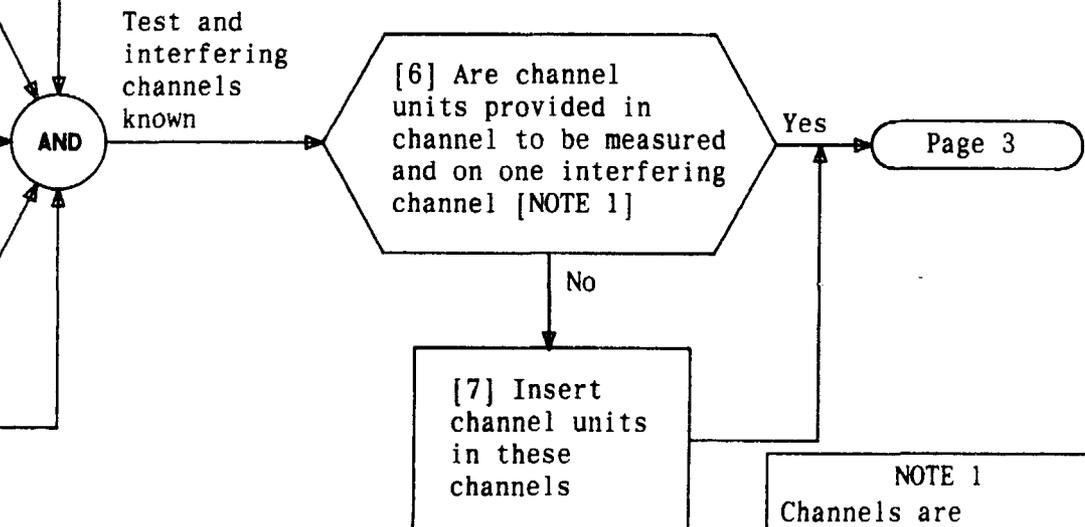
PERFORM LOOPED D4 CHANNEL BANK DISTORTION TEST

SUMMARY

Make test connections per FIG. 1. Measure crosstalk on one channel while sending tone into one interfering channel (TABLE B). Then measure again while sending tone into second interfering channel. Requirement is 27 dBrnc or less

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise Measuring Set (NMS)	J94003C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
2 Patch Cords	P6AD
1 Patch Cord For NMS	3P6D

- [1] Obtain test equipment per TABLE A
- [2] On TPU locate option stamping for digroup to be tested [FIG. 1]
- [3] Determine which option (D1D, SEQ, or D2) has been selected by location of white plug
- [4] Go to portion of TABLE B for that option and select channel to be measured
- [5] Using TABLE B, determine two most likely interfering channels



NOTE 1
Channels are identified by number designations below slots; A or B indicates digroup. Test and interfering channels must be in same digroup

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PERFORM LOOPED D4 CHANNEL BANK CROSSTALK TEST

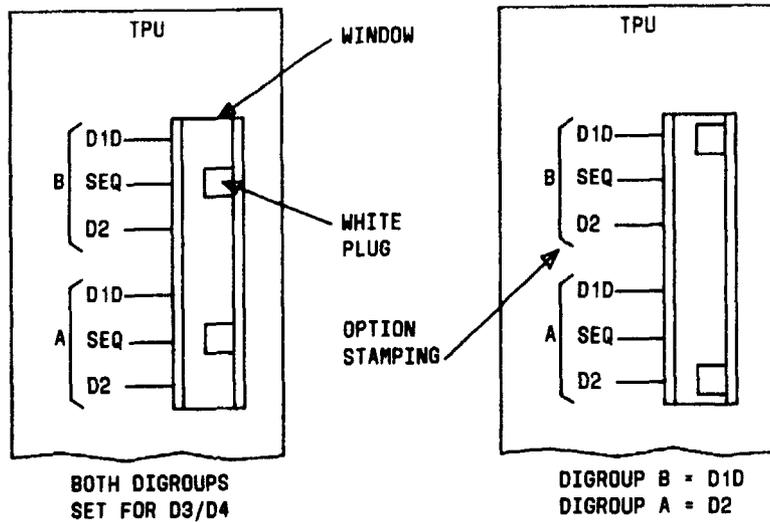


FIG. 1 - Examples

TABLE B						
CHANNEL COUNTING OPTION	CHANNEL TO BE MEASURED (1-12)	MOST LIKELY INTERFERING CHANNELS		CHANNEL TO BE MEASURED (13-24)	MOST LIKELY INTERFERING CHANNELS	
D1D	1	24	12	13	1	24
	2	13	1	14	2	13
	3	14	2	15	3	14
	4	15	3	16	4	15
	5	16	4	17	5	16
	6	17	5	18	6	17
	7	18	6	19	7	18
	8	19	7	20	8	19
	9	20	8	21	9	20
	10	21	9	22	10	21
	11	22	10	23	11	22
	12	23	11	24	12	23
D2	1	13	12	13	12	24
	2	14	11	14	11	23
	3	15	9	15	9	21
	4	16	10	16	10	22
	5	17	1	17	1	13
	6	18	2	18	2	14
	7	19	3	19	3	15
	8	20	4	20	4	16
	9	21	5	21	5	17
	10	22	6	22	6	18
	11	23	7	23	7	19
	12	24	8	24	8	20
D4 OR D3 (SEQ)	1	24	23	13	12	11
	2	1	24	14	13	12
	3	2	1	15	14	13
	4	3	2	16	15	14
	5	4	3	17	16	15
	6	5	4	18	17	16
	7	6	5	19	18	17
	8	7	6	20	19	18
	9	8	7	21	20	19
	10	9	8	22	21	20
	11	10	9	23	22	21
	12	11	10	24	23	22

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PERFORM LOOPED D4 CHANNEL BANK CROSSTALK TEST

On CAU:

- [8] Check calibration of CAU [DLP-518] [NOTE 2]
- [9] Set TEST switch to CHAN LINE
- [10] Set REJ FLT switch to OUT
- [11] Set SEND LEVEL switch to 0

On NMS:

- [12] Check calibration of NMS [DLP-519]
- [13] Verify that weighting network is installed with C-MESSAGE designation aligned with WTG
- [14] Set FUNCTION switch to NM 600/900
- [15] Set NORM-DAMP switch to DAMP
- [16] Set DBRN switch to 50



CAU ready



CAU and NMS ready

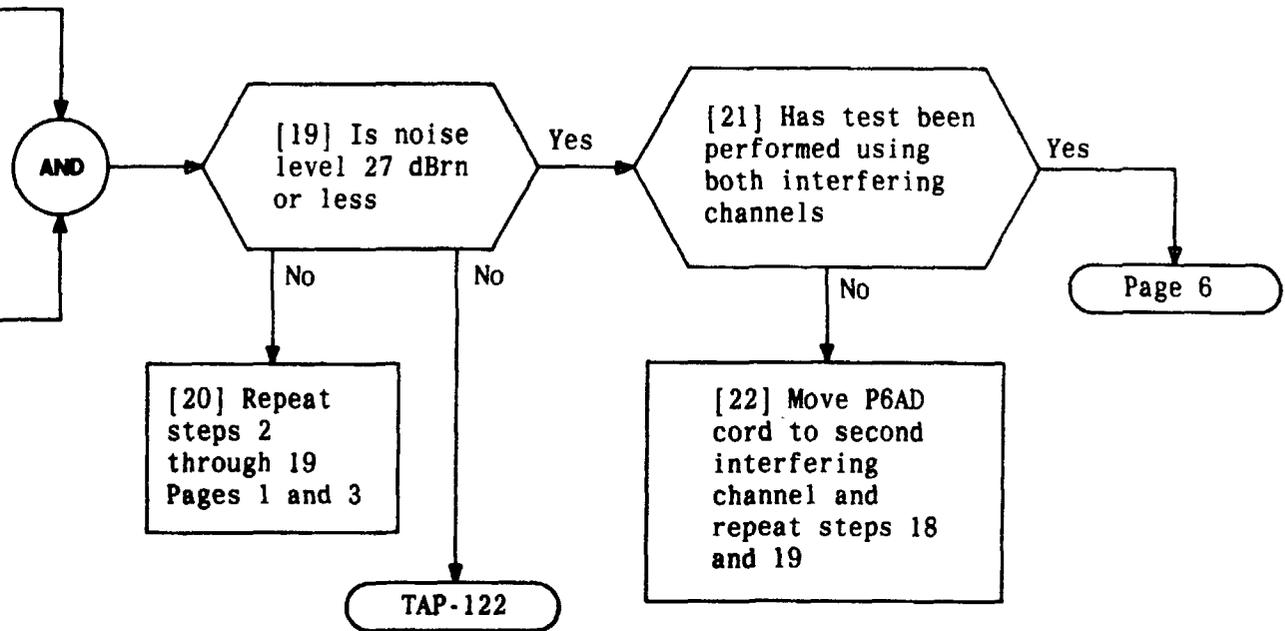
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NOTE 2	
When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble	
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PERFORM LOOPED D4 CHANNEL BANK CROSSTALK TEST

[17] Make test connections per FIG. 2, Page 5. Connect to channel to be measured and connect to one interfering channel [TABLE B]

[18] Rotate DBRN switch on NMS counterclockwise for on-scale reading



PERFORM LOOPED D4 CHANNEL BANK CROSSTALK TEST

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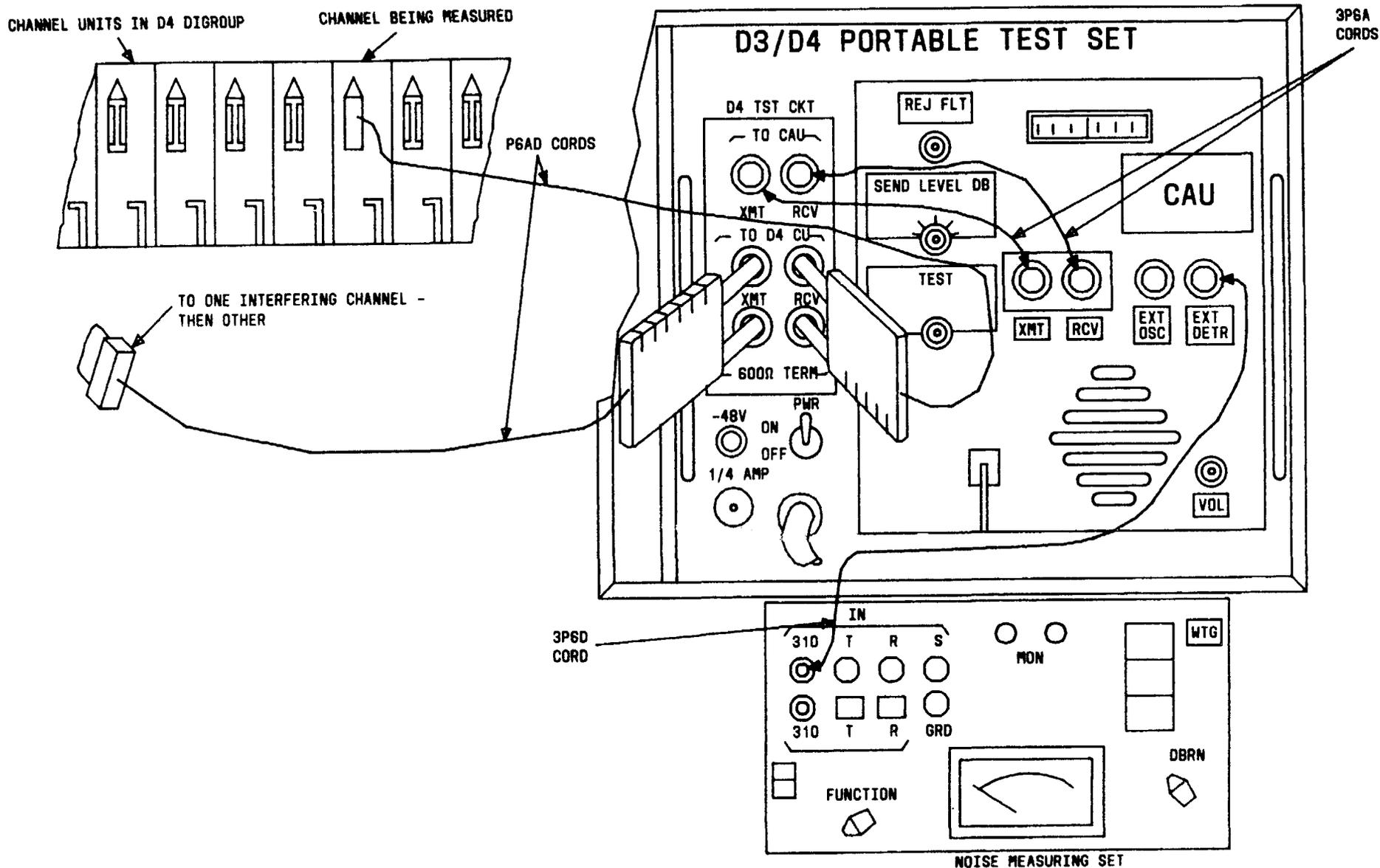
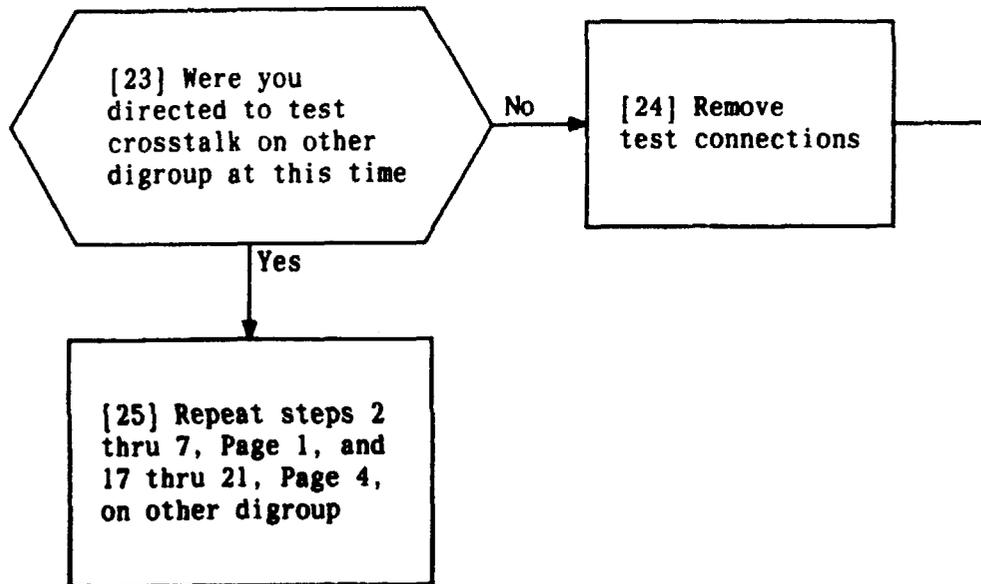


FIG. 2

PERFORM LOOPED D4 CHANNEL BANK CROSSTALK TEST

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PERFORM LOOPED D4 CHANNEL BANK CROSSTALK TEST

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SUMMARY

Alarm the system, first in one direction then in the other. This is done on D4 by plugging the R CODE jack on RU to produce the red AR alarm. The other end will display a yellow alarm. Alarms at both ends will clear after the red alarm condition is removed

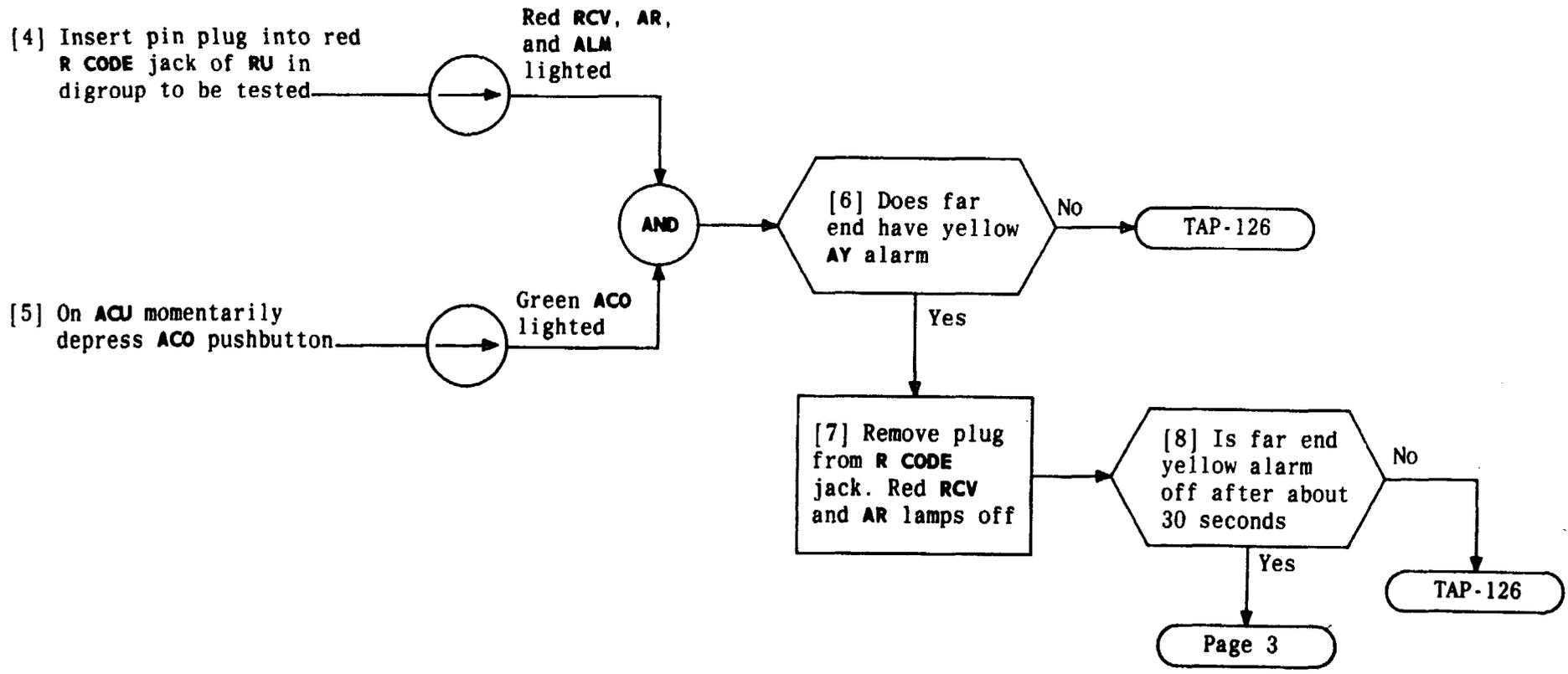
[1] Establish communications with far office and establish which digroup is to be tested _____

[2] Verify 3-position switch, on ACU for digroup to be tested, is in NORM position and there is no plug in LP jack on LIU _____

[3] Obtain pin plug (such as KS-19531) which will fit jacks on D4 common equipment _____

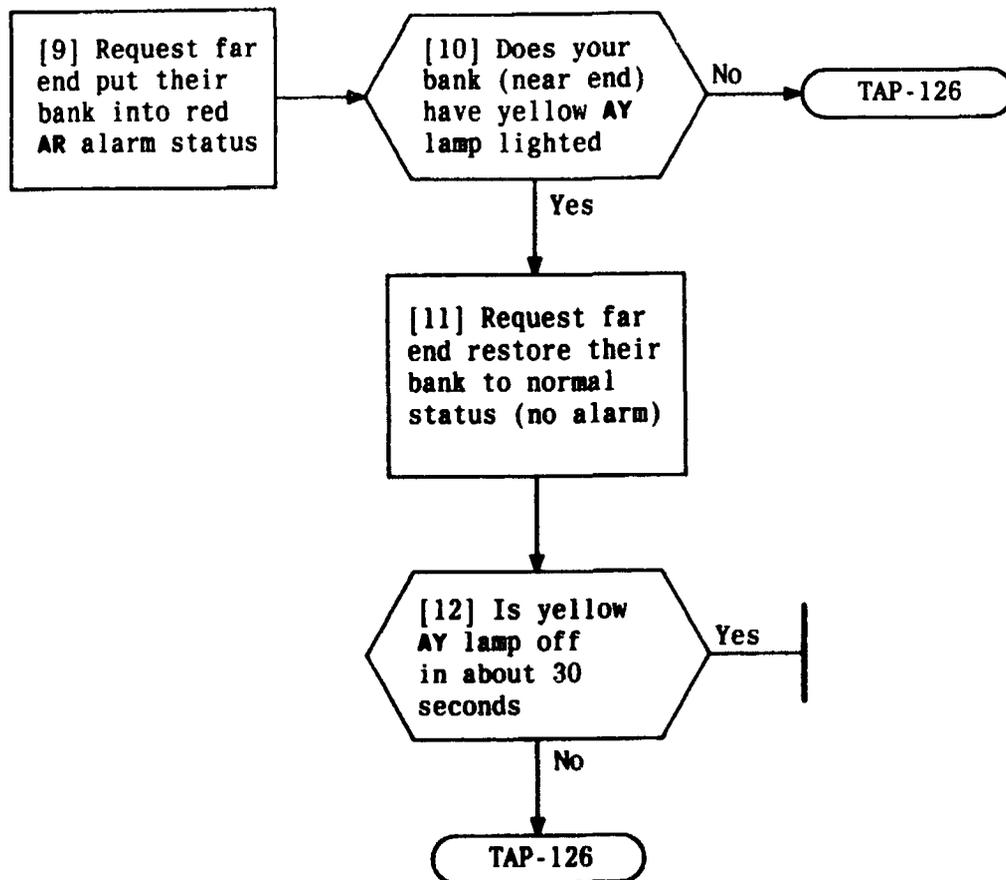


Page 2



PERFORM END-TO-END ALARMS TEST

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PERFORM END-TO-END ALARMS TEST

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SUMMARY

Make test connections per Fig. 1 to test channel. Verify connections are made at far end. CAU indication should be between -0.25 and +0.25. Verify that test indications at far end are within specified limits

- [1] Establish communications with carrier tester at far end
- [2] Determine channel to be tested
- [3] Obtain test equipment per TABLE A. See NOTE 1

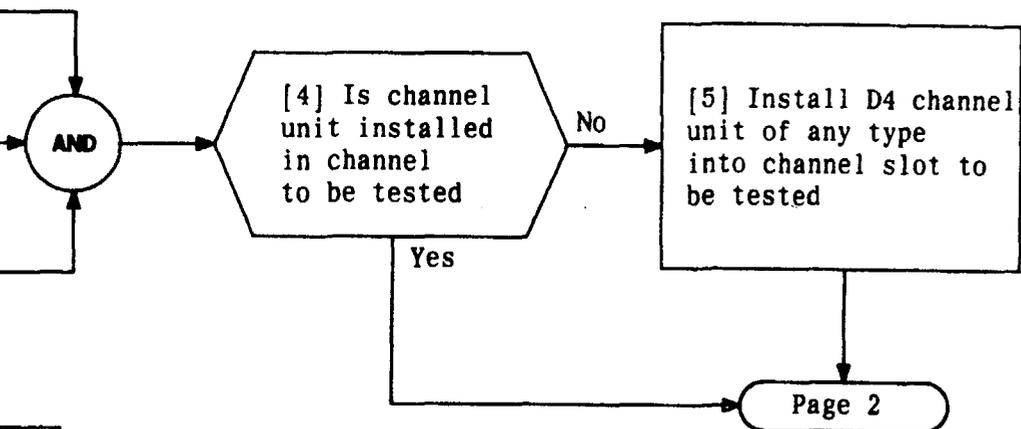


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
1 Patch Cord	P6AD

NOTE 1
 Test equipment and procedures for D1D, D2, and D3 banks are given in BSPs for those banks.

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PERFORM END-TO-END NET LOSS TEST

On D3/D4 PORTABLE TEST SET (PTS):

[6] Check calibration of CAU [DLP-518]

[7] Set TEST switch to CHAN LINE

[8] Set REJ FLT switch to OUT

[9] Set SEND LEVEL DB switch to 0

CAU calibrated and switches set on CAU

AND

[10] Make test connections per FIG. 1, Page 3

[11] Verify that test equipment is connected at other office and that test is ready to be performed

AND

Test set connected to channel unit

[12] Does CAU meter indicate between -0.25 and +0.25 dB. See FIG. 1, Page 3. (Preferred meter indication black area) [NOTE 2]

Yes

Page 4

No

No

TAP-127

[13] Verify that test connections are correct according to steps 10 and 11, then repeat step 12

NOTE 2

If far end is D1D and not using 438B plug in MATCH NET; receive level will be .25 dB hot and read on right side of CAU

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PERFORM END-TO-END NET LOSS TEST

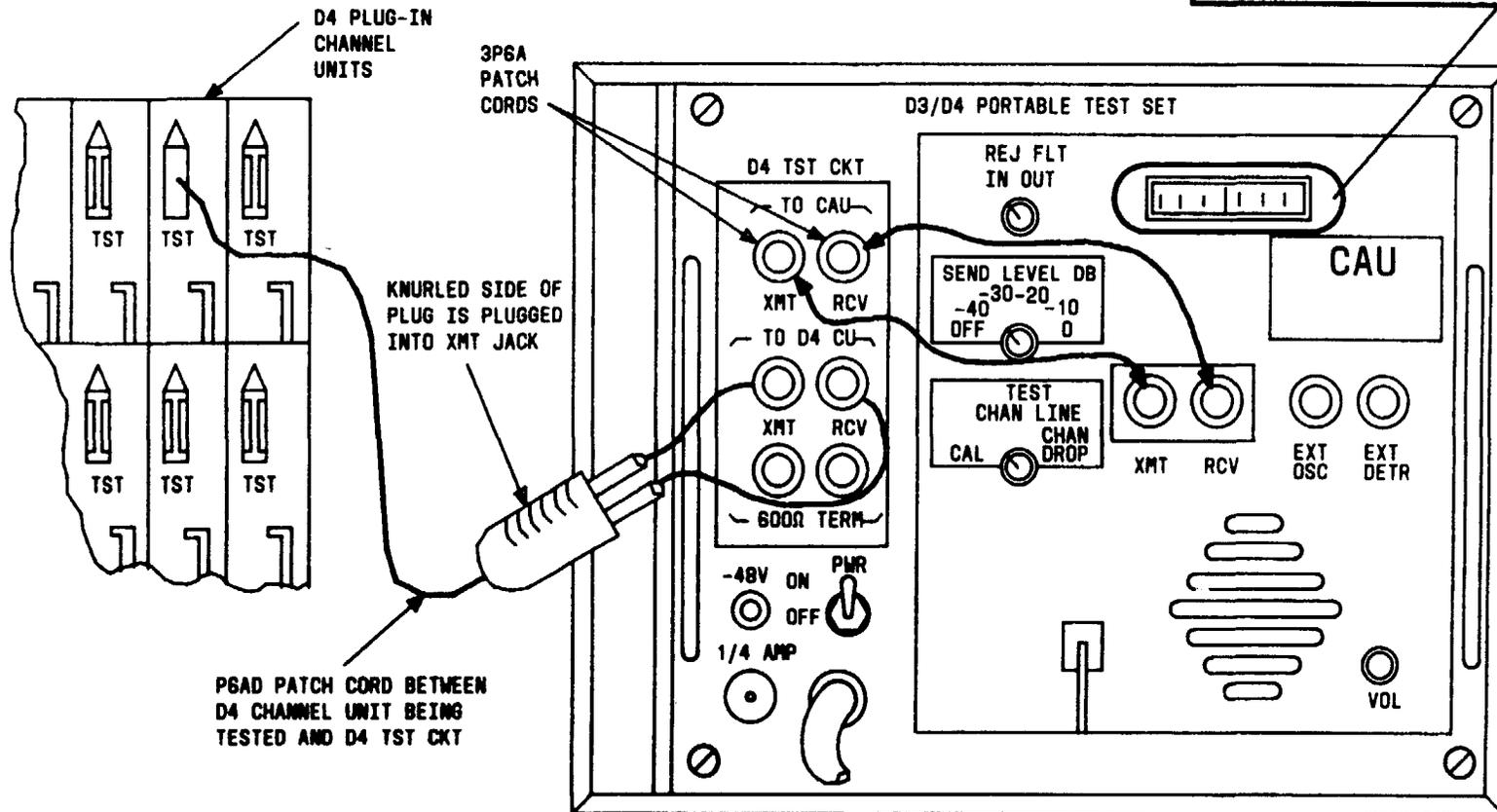
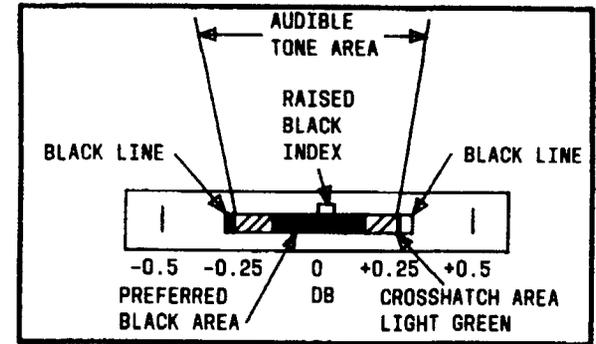
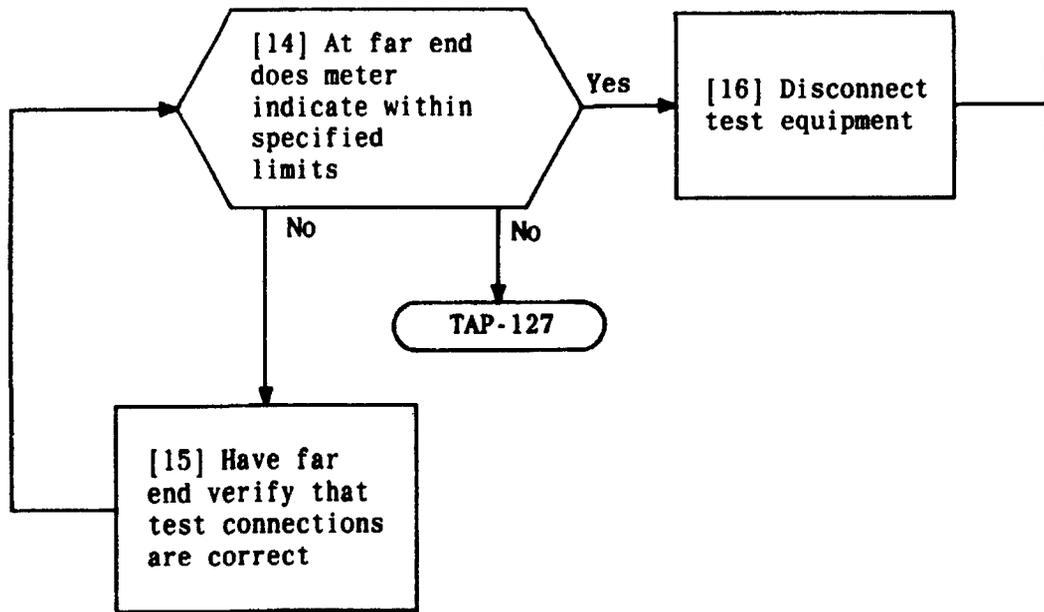


FIG. 1

PERFORM END-TO-END NET LOSS TEST

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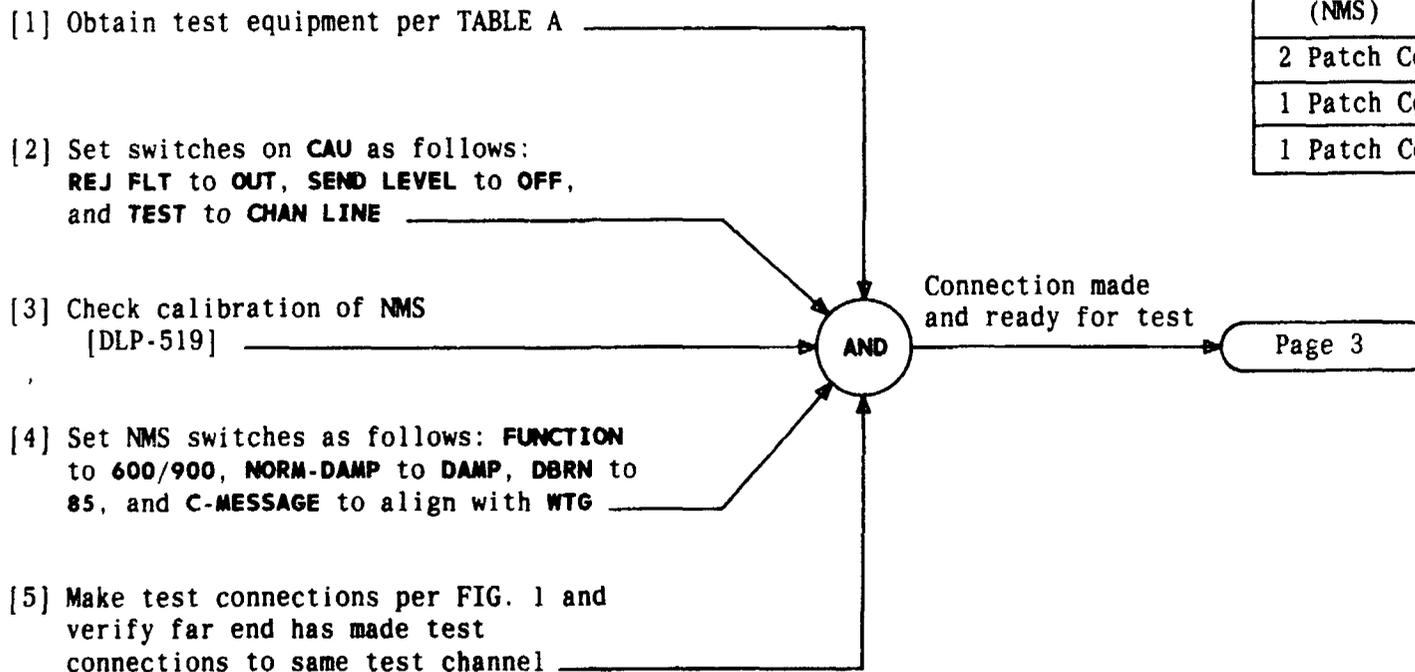
PERFORM END-TO-END NET LOSS TEST

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SUMMARY

Make test connections per FIG. 1, Page 2. Verify far end has made test connections to same test channel. Verify D4 bank meets noise requirement of 23 dBrnc or less

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
Noise Measuring Set (NMS)	J94003C or equivalent
2 Patch Cords	3P6A
1 Patch Cord	P6AD
1 Patch Cord	3P6D



PERFORM END-TO-END IDLE CIRCUIT NOISE TEST

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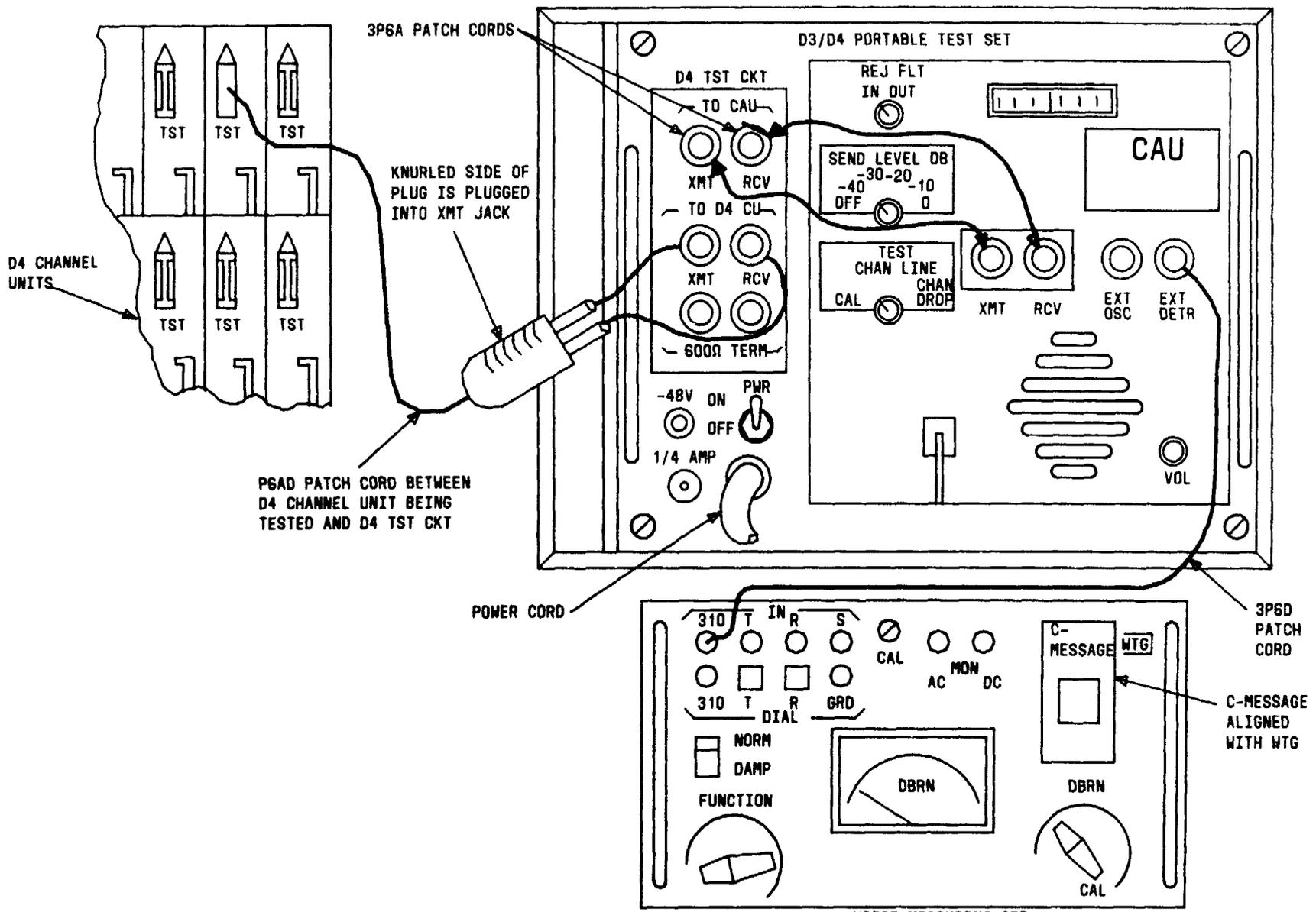


FIG. 1

NOISE MEASURING SET

PERFORM END-TO-END IDLE CIRCUIT NOISE TEST

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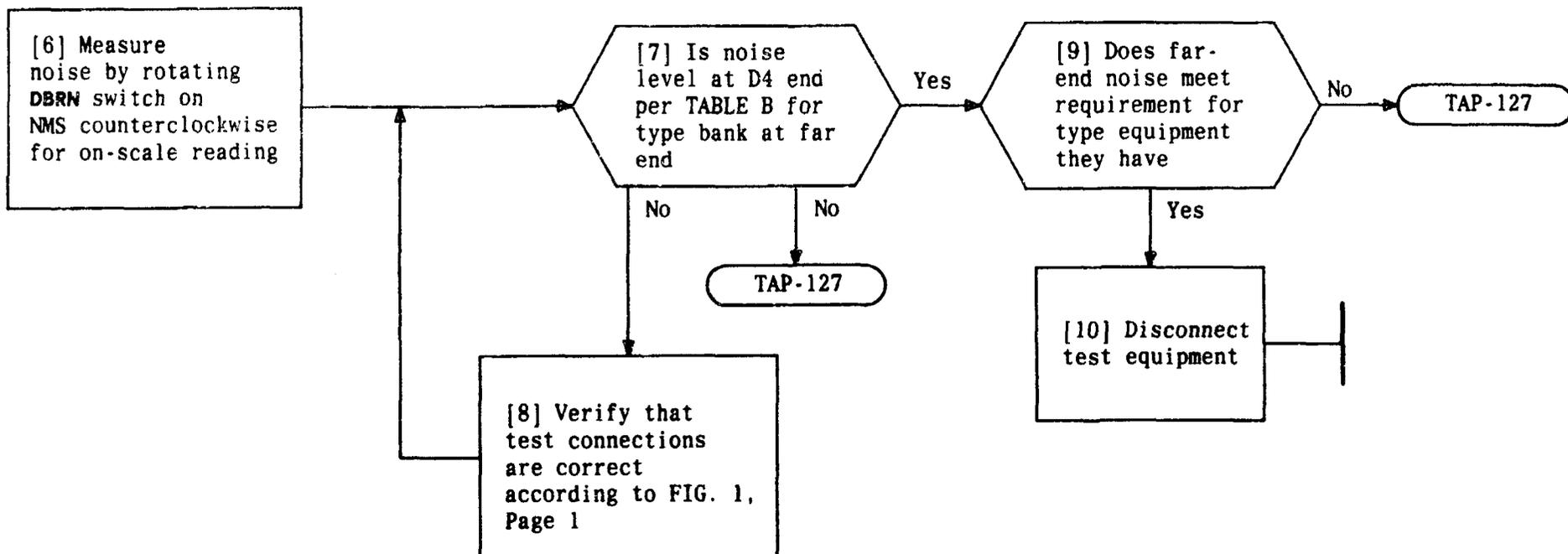


TABLE B	
BANK AT FAR END	D4 REQUIRMENTS
D1D	26 dBrnc or less
D2	28 dBrnc or less
D3	23 dBrnc or less
D4	23 dBrnc or less

PERFORM END-TO-END IDLE CIRCUIT NOISE TEST

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SUMMARY

Set switch on **MB ALM** to **ALARM DISAB**. Install **J98726MM** or **MN** extender to test **ES2** or **ES3** units. Perform test per

VF TESTS or **SIG TESTS** card. Release settings for one test before performing next test. Remove channel unit, set **MB ALM** to **NOR**, and depress switches **9** and **17** on **1B MBTS**

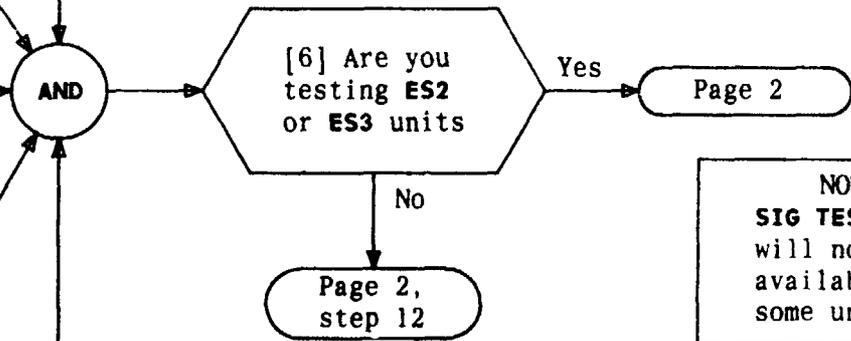
[1] See **WARNING 1**. Perform maintenance bank **VF** calibration and signaling test check [DLP-538]

[2] Verify switch on **MB ALM** is set to **ALARM DISAB**

[3] Verify all switches on **1B MBTS** are out (black showing)

[4] Obtain **VF TESTS** and **SIG TESTS** cards for unit to be tested and verify that **SIG TESTS** card(s) correspond to signaling options selected on unit [NOTE 1]

[5] Read instructions on test cards and set options on channel unit and **ATTEN** switches on **1AMBTS** per card



NOTE 1
SIG TESTS cards will not be available for some units

WARNING 1
Dataport units will be damaged when tested in maintenance bank if 48V is supplied to pin 31 of SPTS or CUT slots

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TEST CHANNEL UNIT IN MAINTENANCE BANK (EXCEPT DATAPORT)

[7] Obtain test extender (J98726MM-1,L1 for ES2 or J98726MM-1,L1 for ES3) and install ES2 extender into SPTS slot or ES3 extender into CUT slot [FIG. 1 or 2]

[8] Obtain test card for test extender and perform test per instructions on card

[9] Does extender pass test

[10] Obtain another extender, install in SPTS slot, and repeat from step 8

[11] If using ES3 extender, install into CUT slot

[12] Install channel unit into CUT slot or if ES2 or ES3, into extender

[13] Perform VF tests per instructions on VF TESTS card

AND

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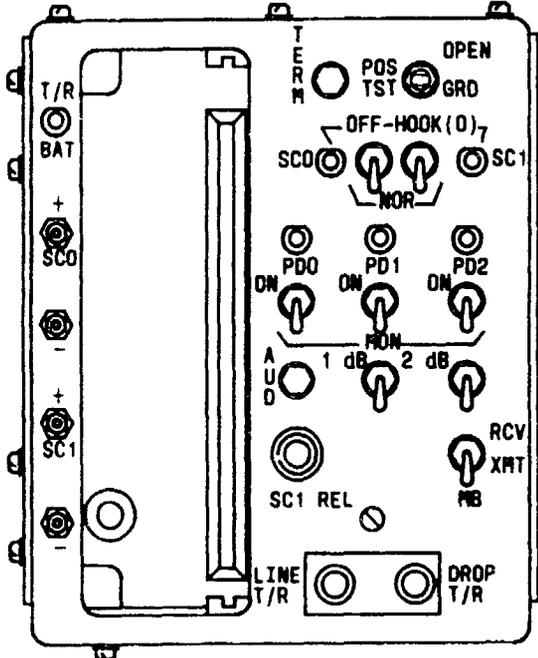


FIG. 1 - ES2 Extender

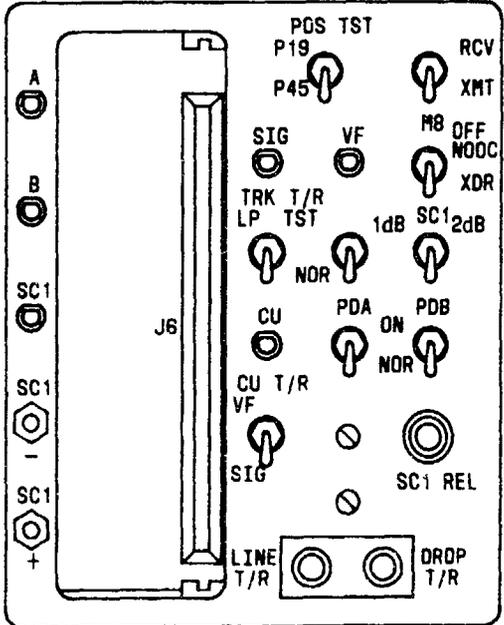
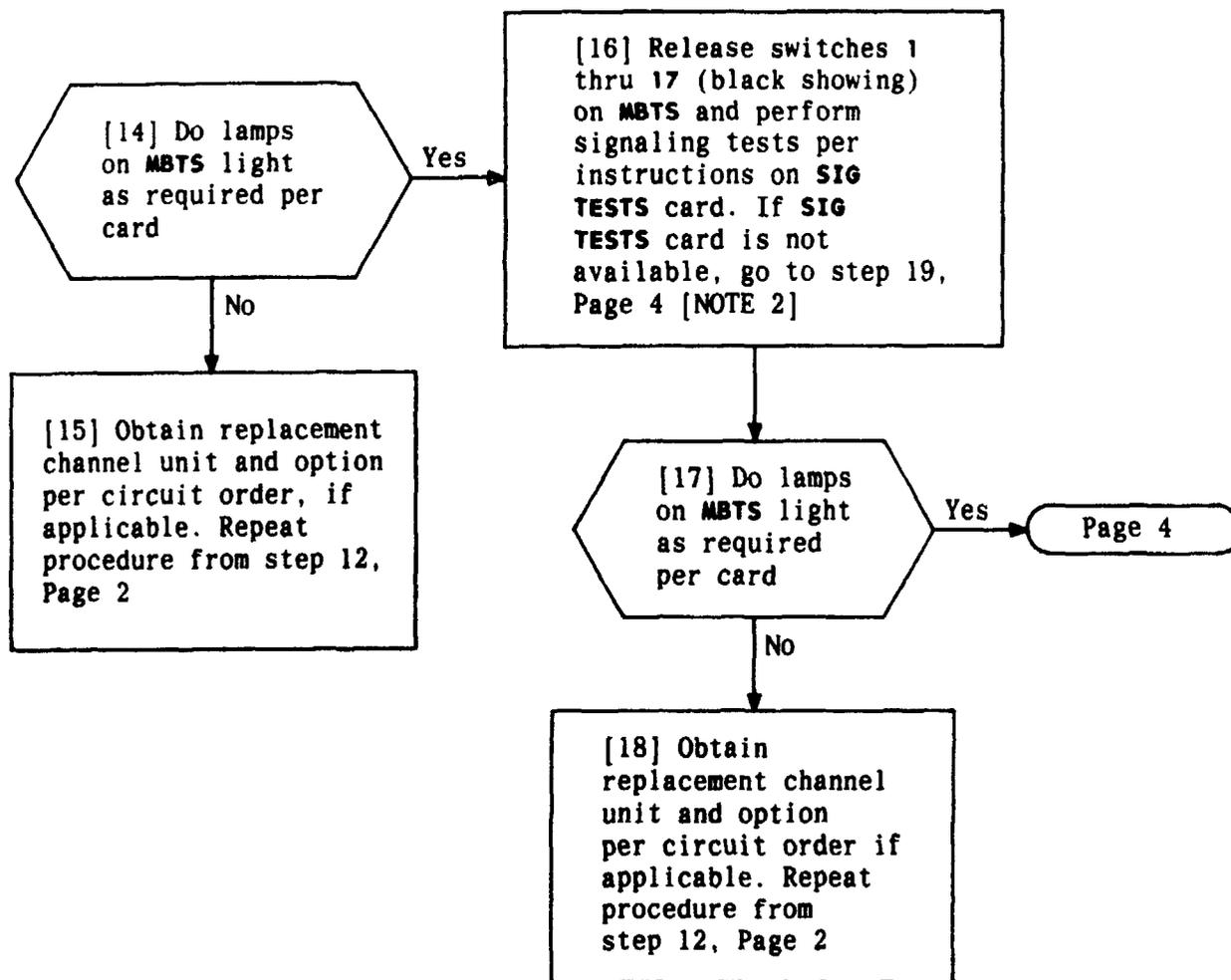


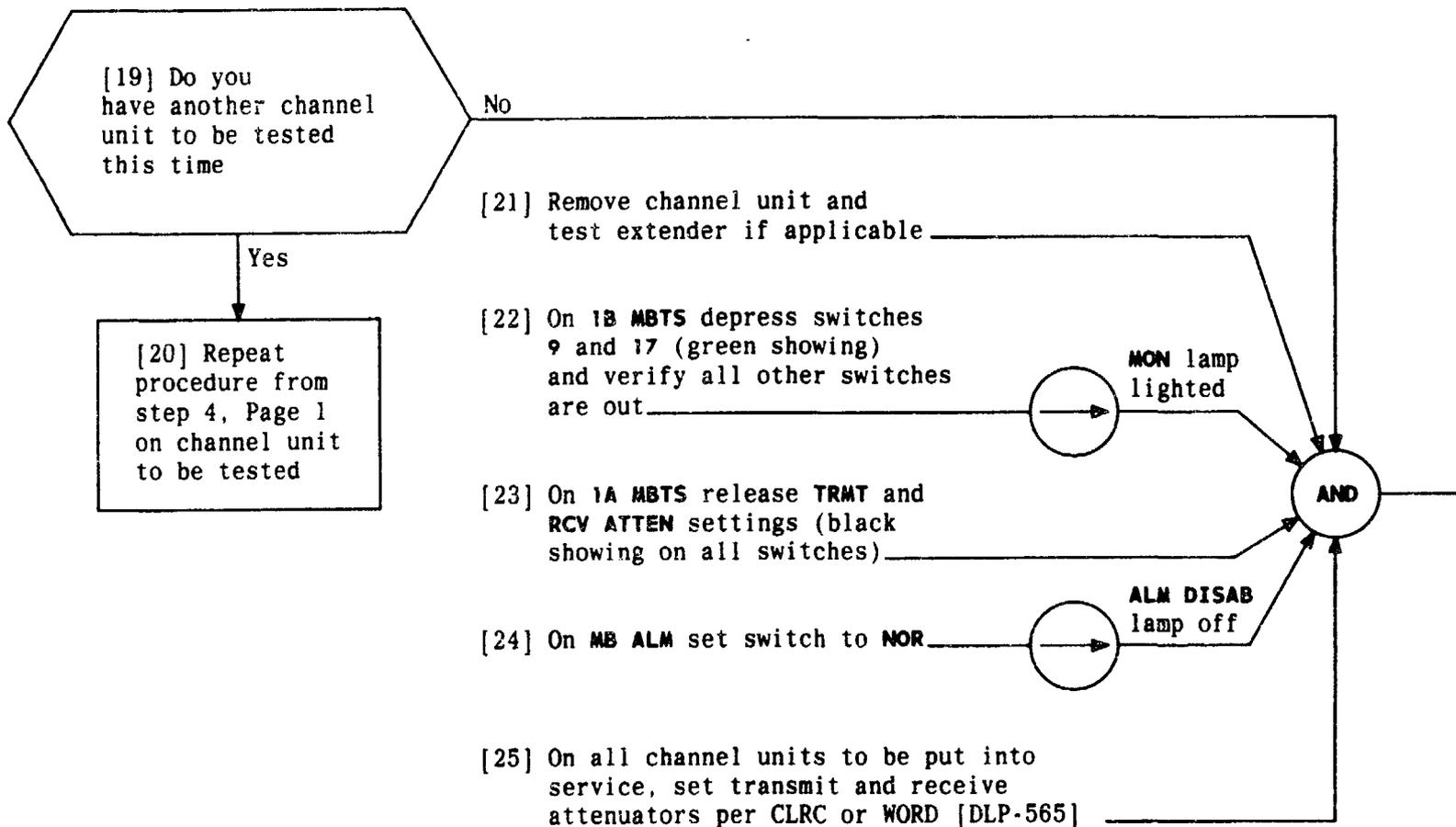
FIG. 2 - ES3 Extender

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NOTE 2	
If testing ES2 or ES3 unit, extender and unit must be moved to SPTS slot for signaling tests per instruction on signaling test card	
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TEST CHANNEL UNIT IN MAINTENANCE BANK (EXCEPT DATAPORT)



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TEST CHANNEL UNIT IN MAINTENANCE BANK (EXCEPT DATAPORT)

[1] On MB ALM unit, verify that switch is in **ALARM DISAB** position

[2] Verify that push switches 1 thru 17 on 1B MBTS are extended (black showing) and there is no unit in **CUT** position

[3] Perform tests 1 thru 8 of TABLE A by depressing required push switches on 1B MBTS and observing lamps. Release setting for each test before going to next one in sequence

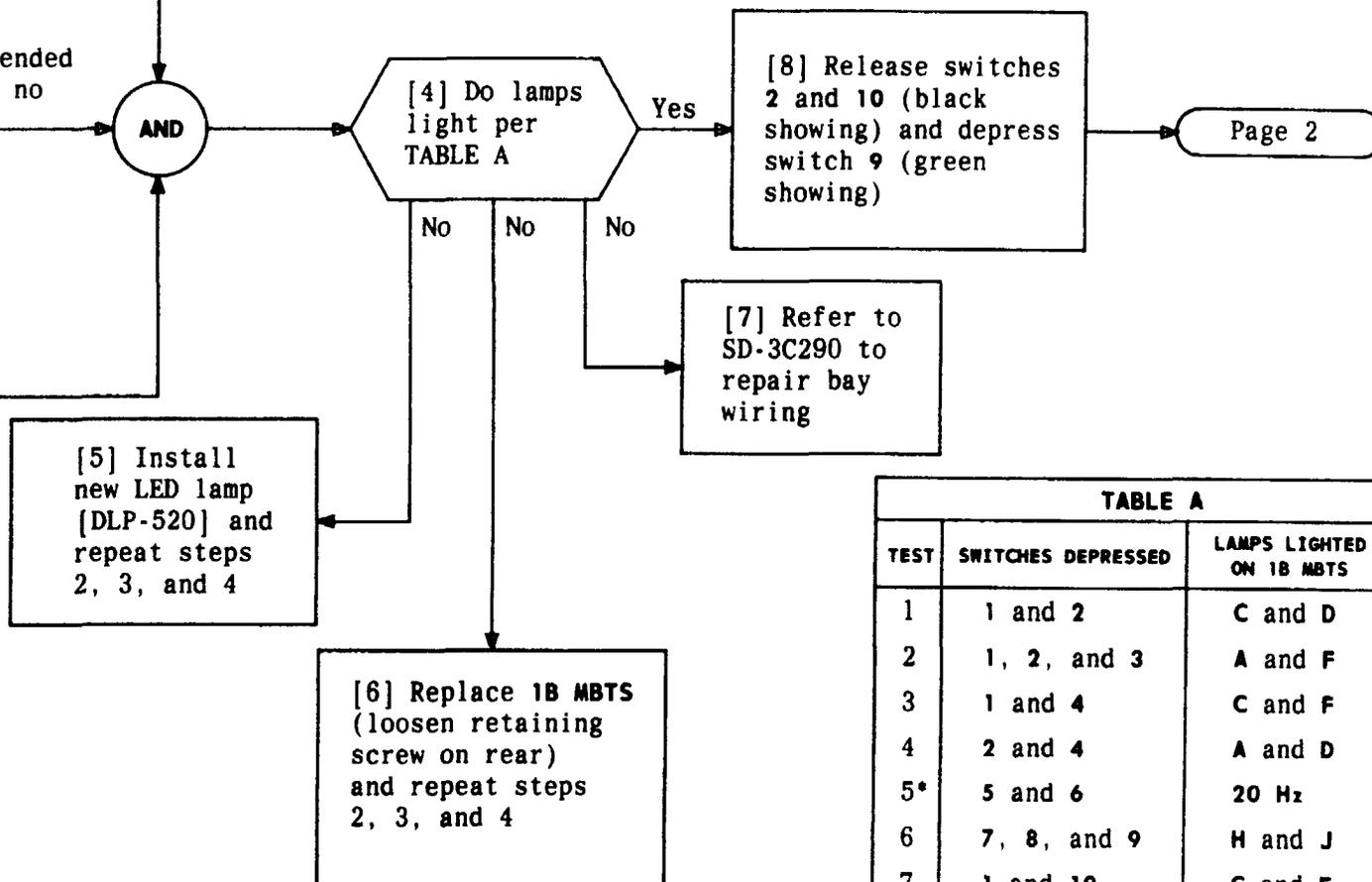
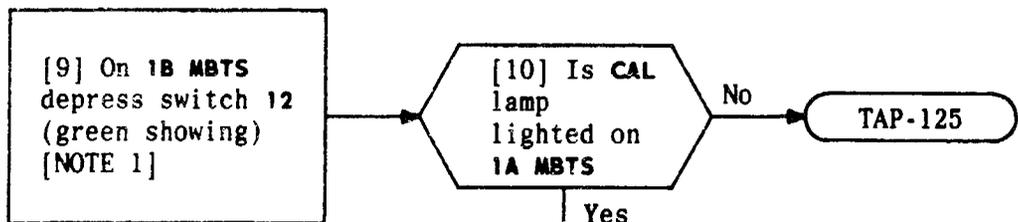


TABLE A		
TEST	SWITCHES DEPRESSED	LAMPS LIGHTED ON 1B MBTS
1	1 and 2	C and D
2	1, 2, and 3	A and F
3	1 and 4	C and F
4	2 and 4	A and D
5*	5 and 6	20 Hz
6	7, 8, and 9	H and J
7	1 and 10	C and F
8	2 and 10	A and D

* Applicable if 20-Hz fuses are provided on PDU

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TEST MAINTENANCE BANK TEST SET AND MONITOR ALARM



[11] Remove 4E&M unit from 4E&M slot

[12] Verify that all white plugs are placed on zero side of T and R attenuators (inside 4E&M) [DLP-565] and install unit into CUT slot

[13] See FIG. 1. Depress switches 18 and 19 on 1A MBTS to provide 4W and 600Ω

[14] See FIG. 1. Depress all TRMT ATTN and RCV ATTN switches (green showing) on 1A MBTS

4E&M in CUT slot; 1A MBTS - 4W, 600Ω, and .1-12.8 in

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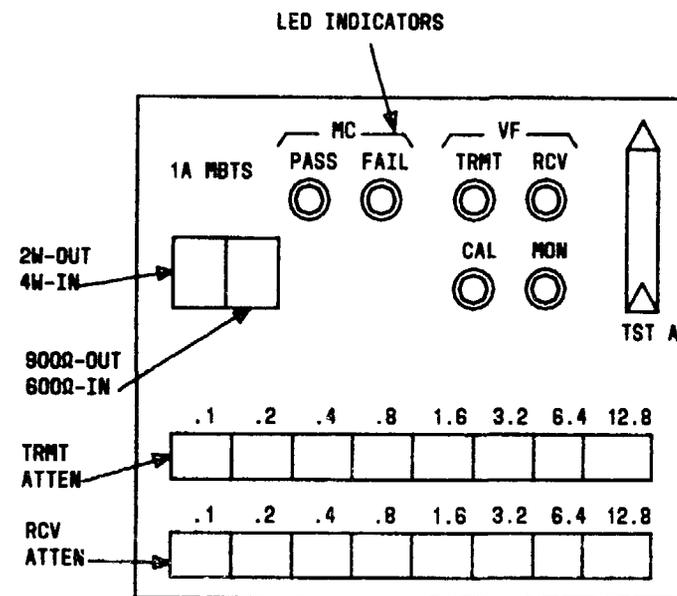
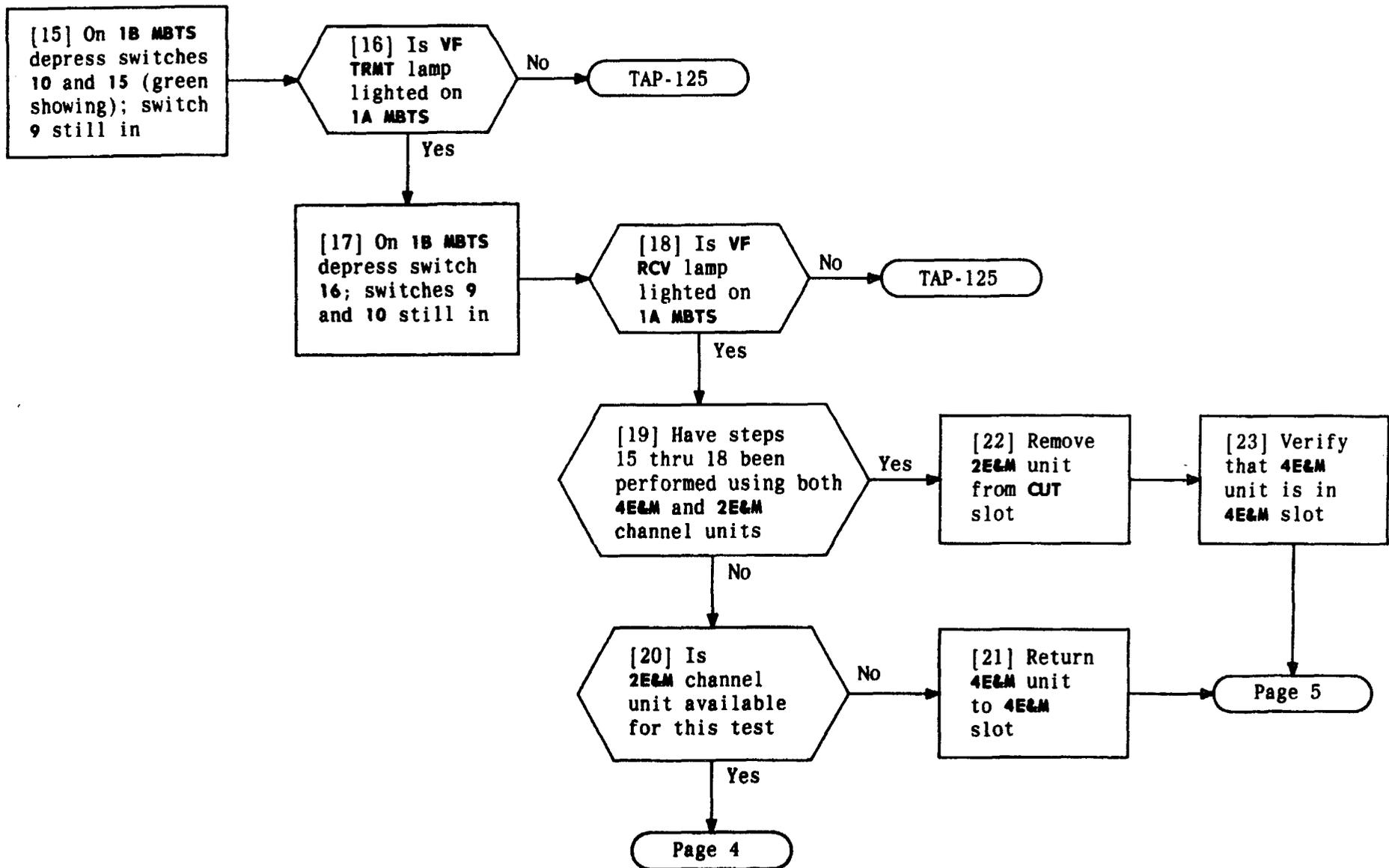


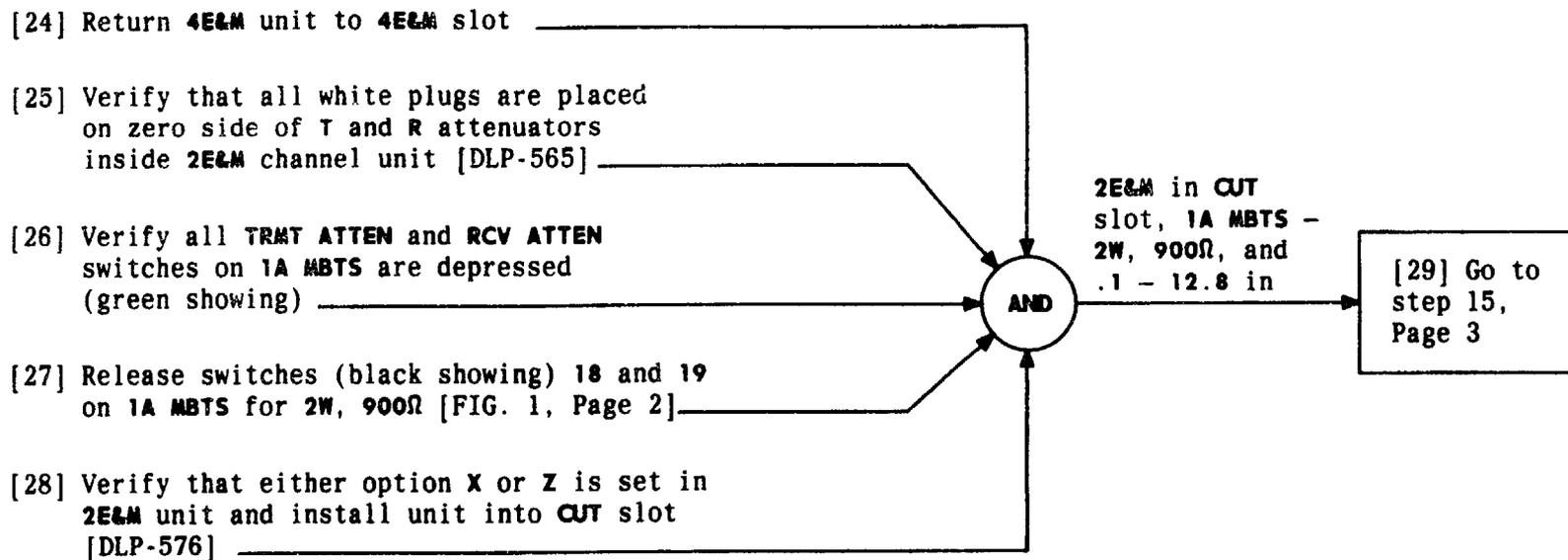
FIG. 1 - 1A MBTS Switches

NOTE 1	
Switches 10 and 11 operate independent of one another but 12 thru 17 interact. Pressing one will release prior setting	
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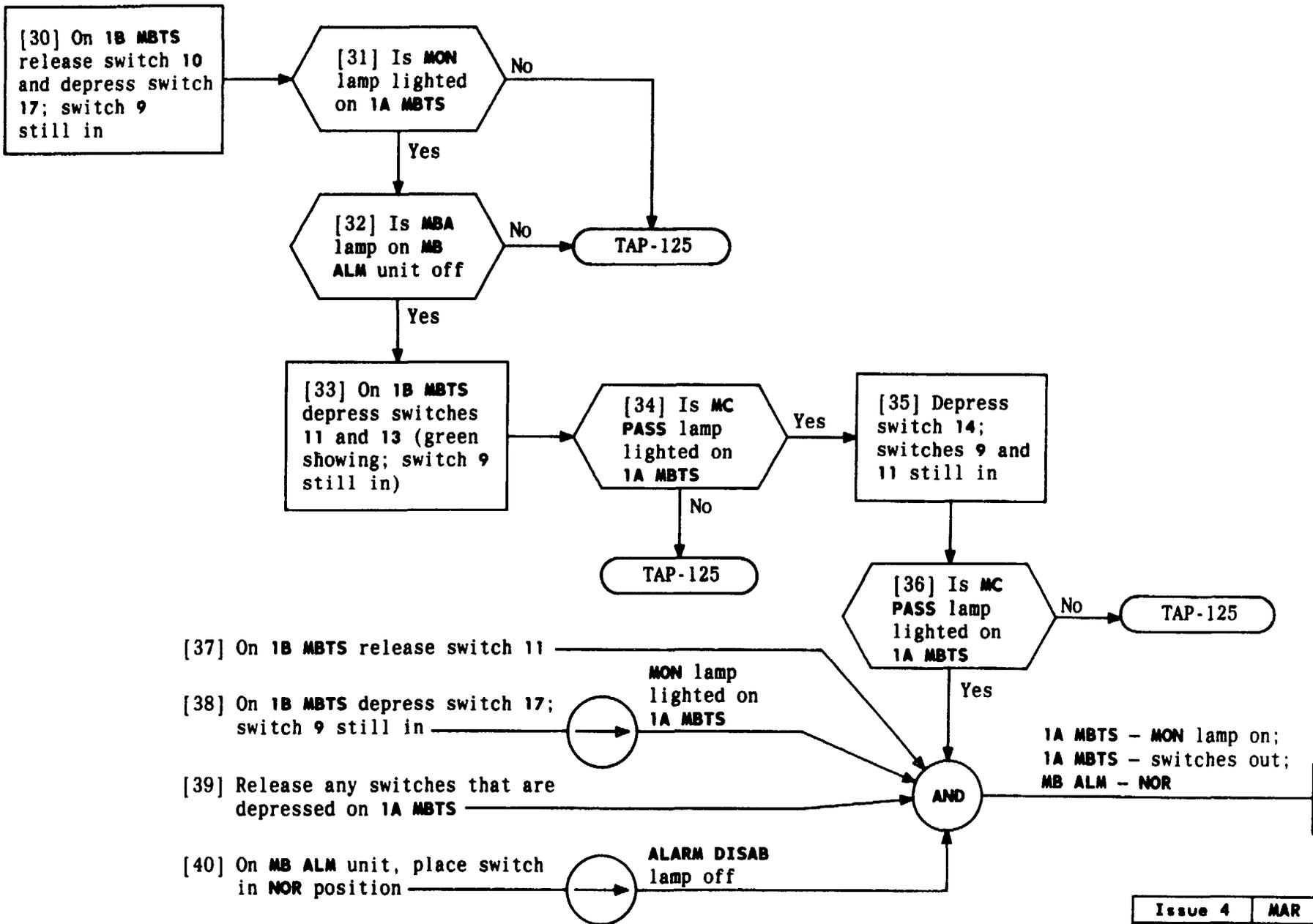
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TEST MAINTENANCE BANK TEST SET AND MONITOR ALARM



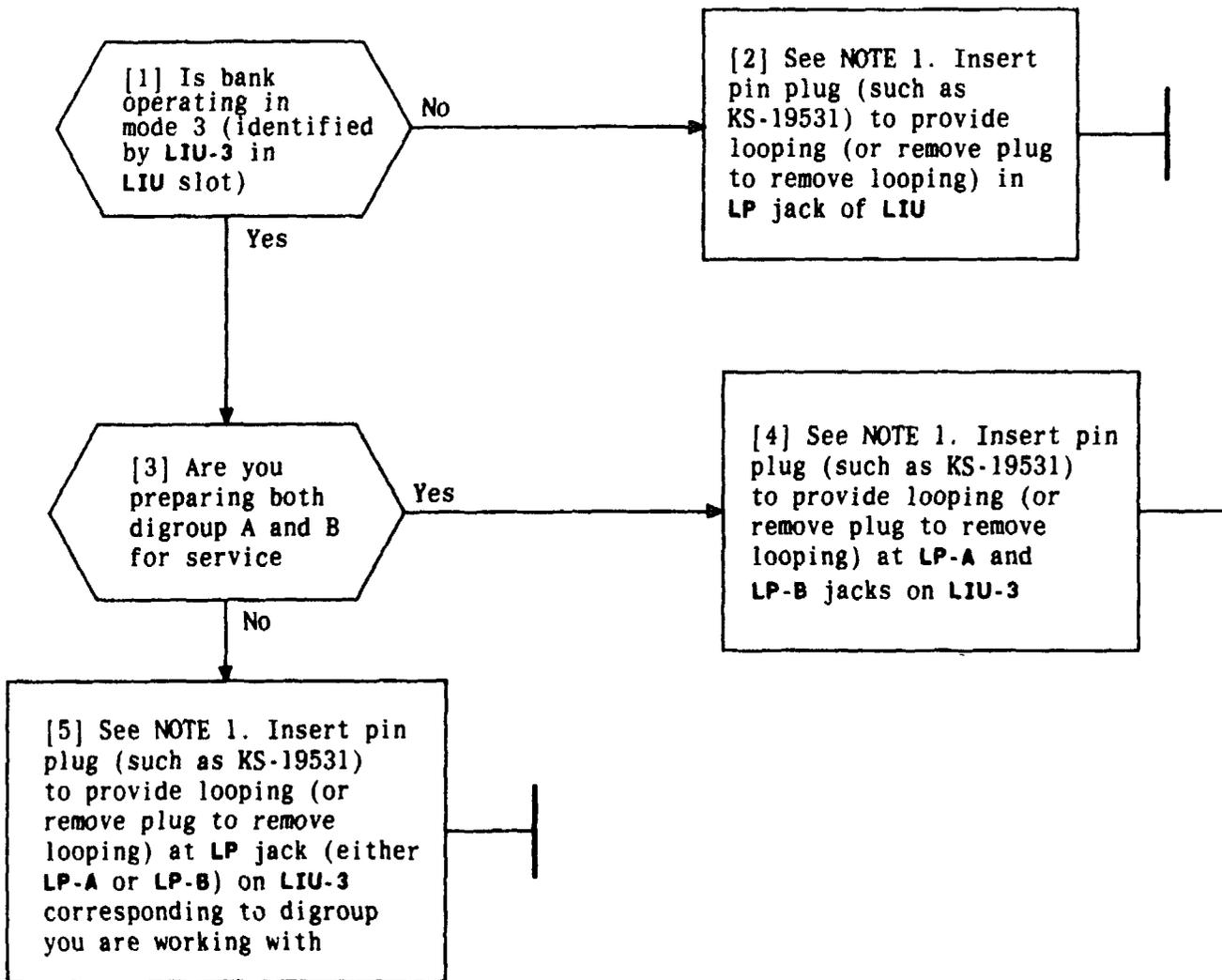
TEST MAINTENANCE BANK TEST SET AND MONITOR ALARM

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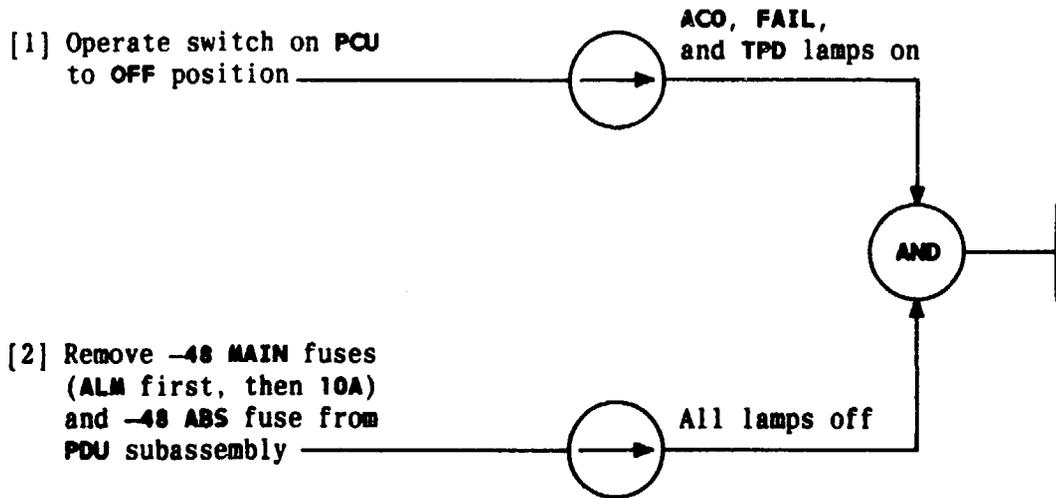
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TEST MAINTENANCE BANK TEST SET AND MONITOR ALARM



NOTE 1
 Trunk circuits (if connected already) may begin pumping while the bank is in preservice loop. This is recognized by relay chatter in channel units and is stopped by plugging FTP (force trunk processing) jack(s) on ACU

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REMOVE POWER FROM BANK

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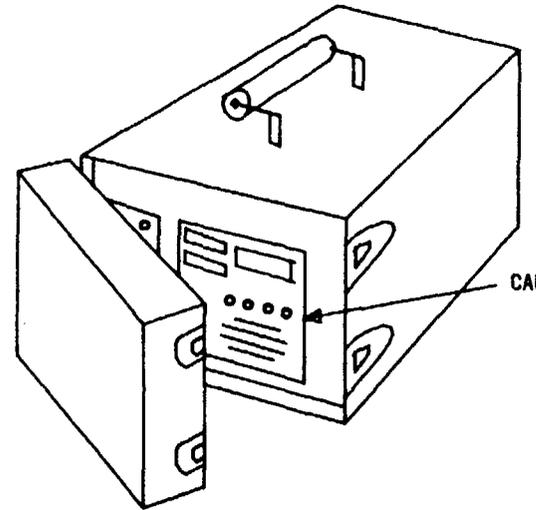
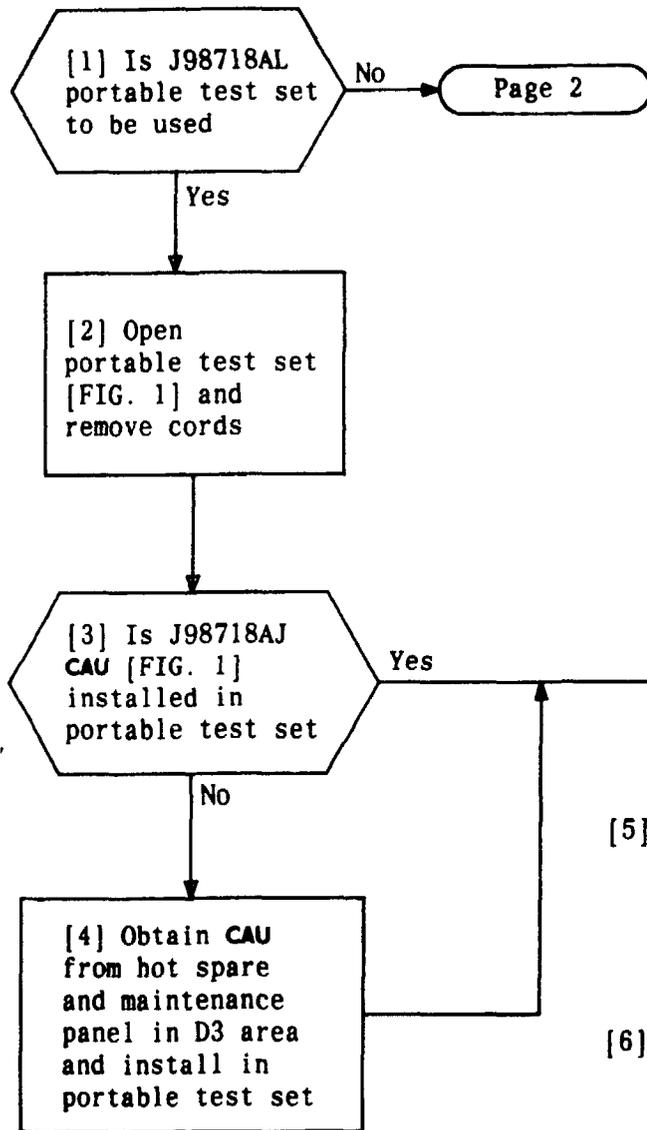


FIG. 1 - Portable Test Set Equipped With CAU

CHECK CALIBRATION OF CHANNEL ACCESS UNIT (CAU)

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ON CAU:

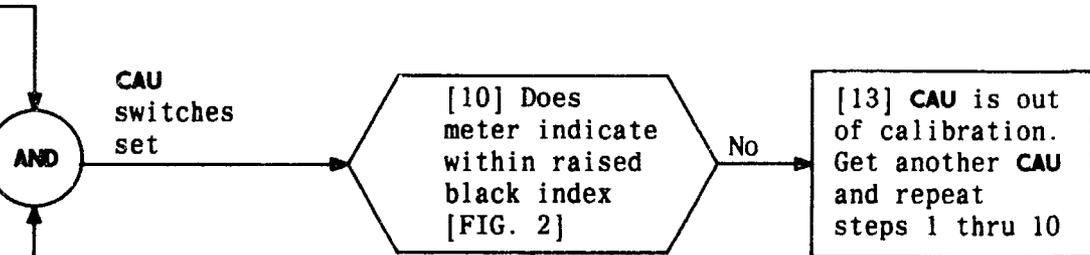
[7] Set REJ FLT switch to OUT

[8] Set SEND LEVEL DB switch to OFF

[9] Set TEST switch to CAL

Meter pointer is at left end of scale

CAU switches set



[13] CAU is out of calibration. Get another CAU and repeat steps 1 thru 10

[14] Set TEST switch to CHAN LINE and rotate VOL control counterclockwise if sound is not desired

[12] Rotate VOL control clockwise

[15] Get another CAU and repeat steps 1 thru 11

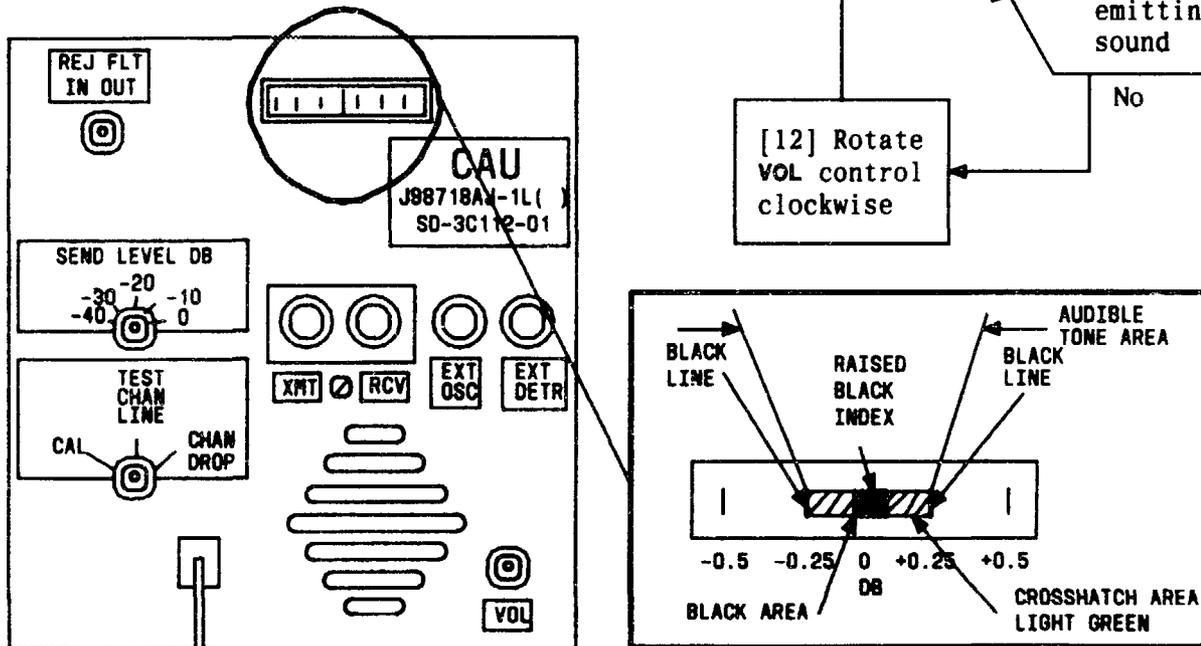
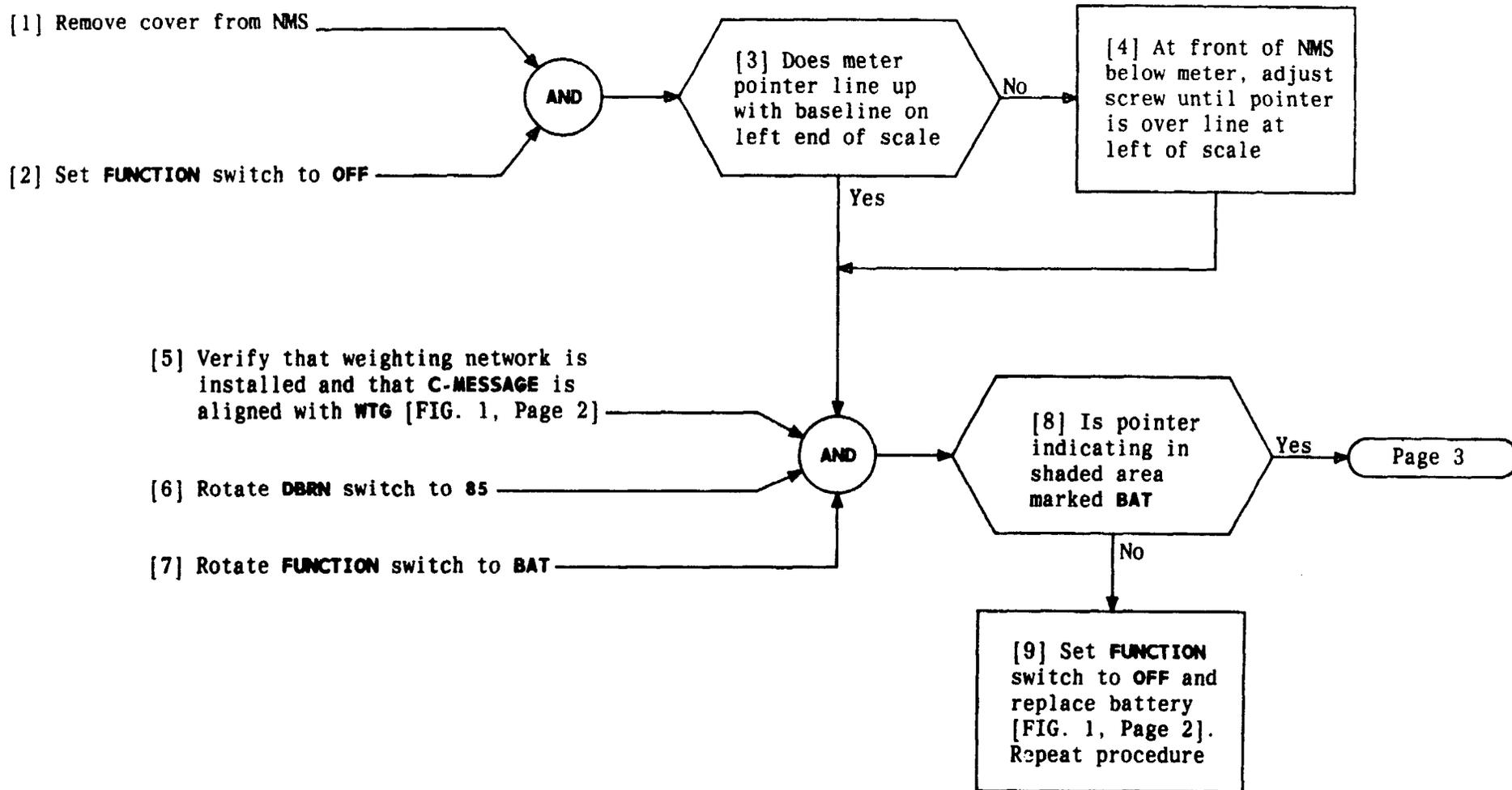


FIG. 2

CHECK CALIBRATION OF CHANNEL ACCESS UNIT (CAU)

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CHECK CALIBRATION OF 3-TYPE NOISE MEASURING SET

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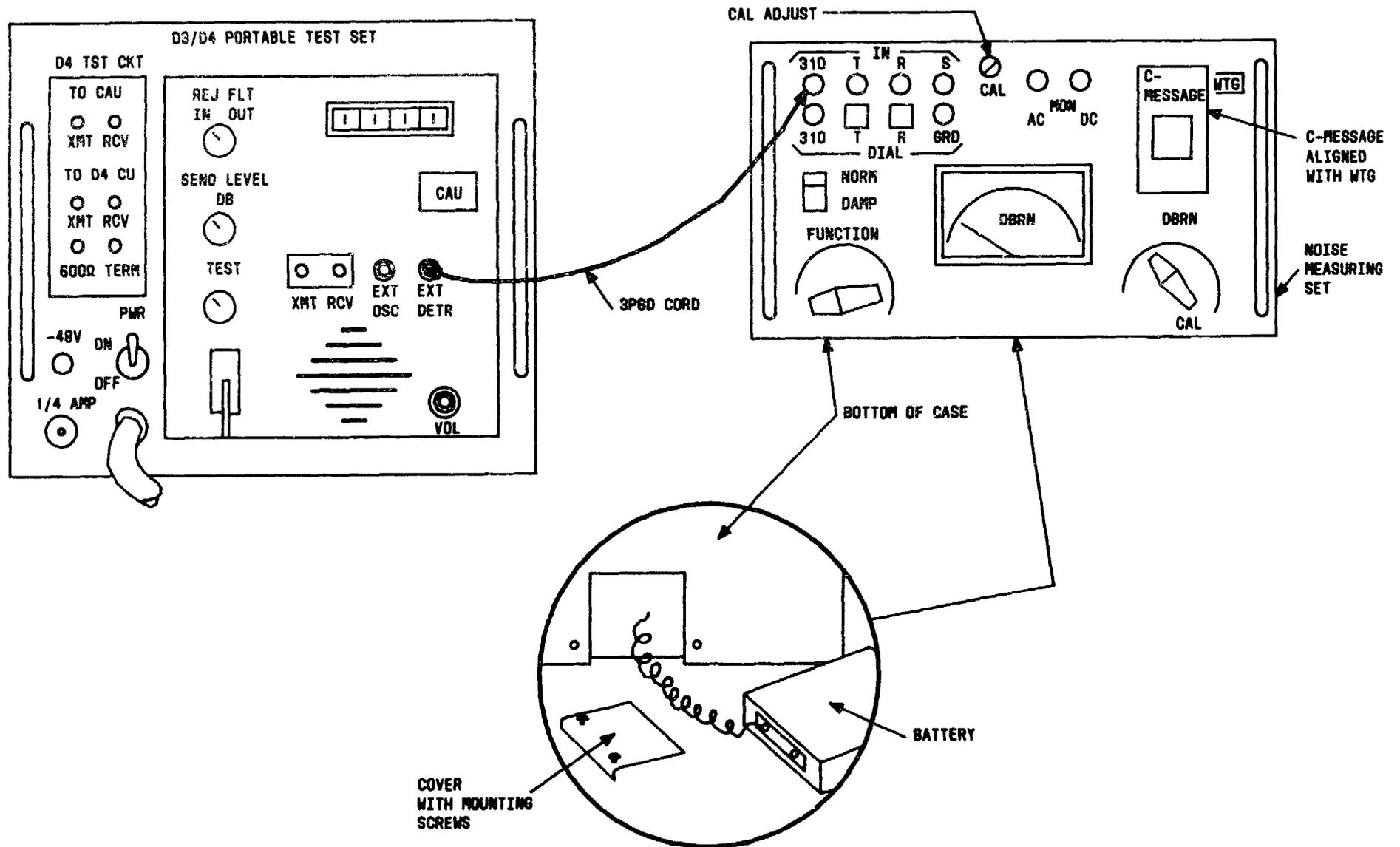
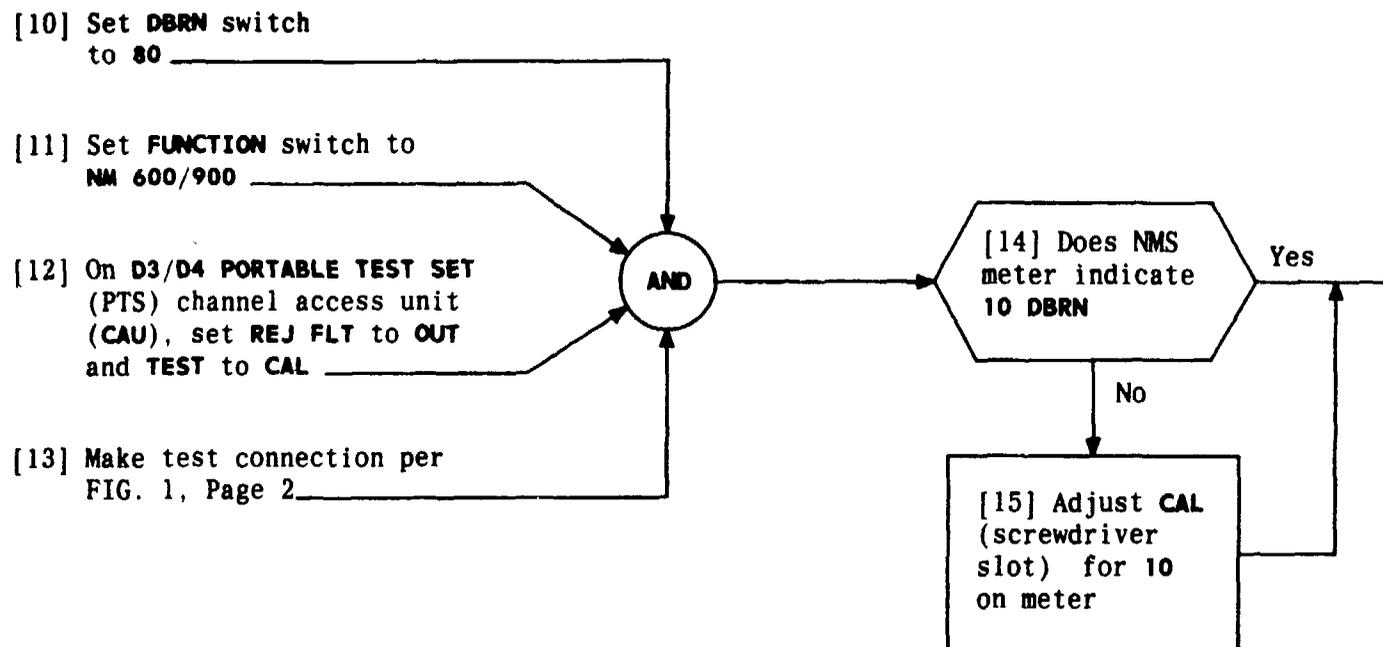


FIG. 1

CHECK CALIBRATION OF 3-TYPE NOISE MEASURING SET

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CHECK CALIBRATION OF 3-TYPE NOISE MEASURING SET

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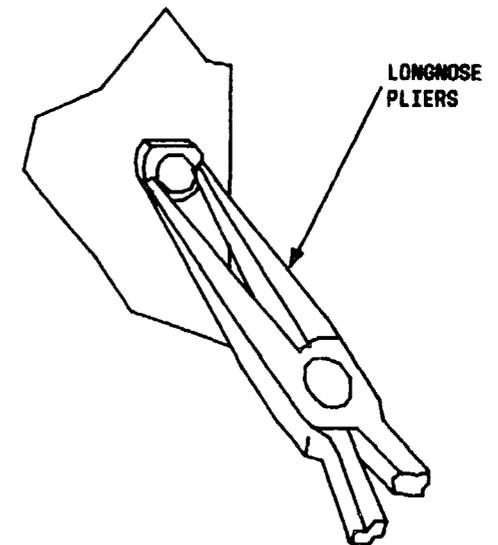
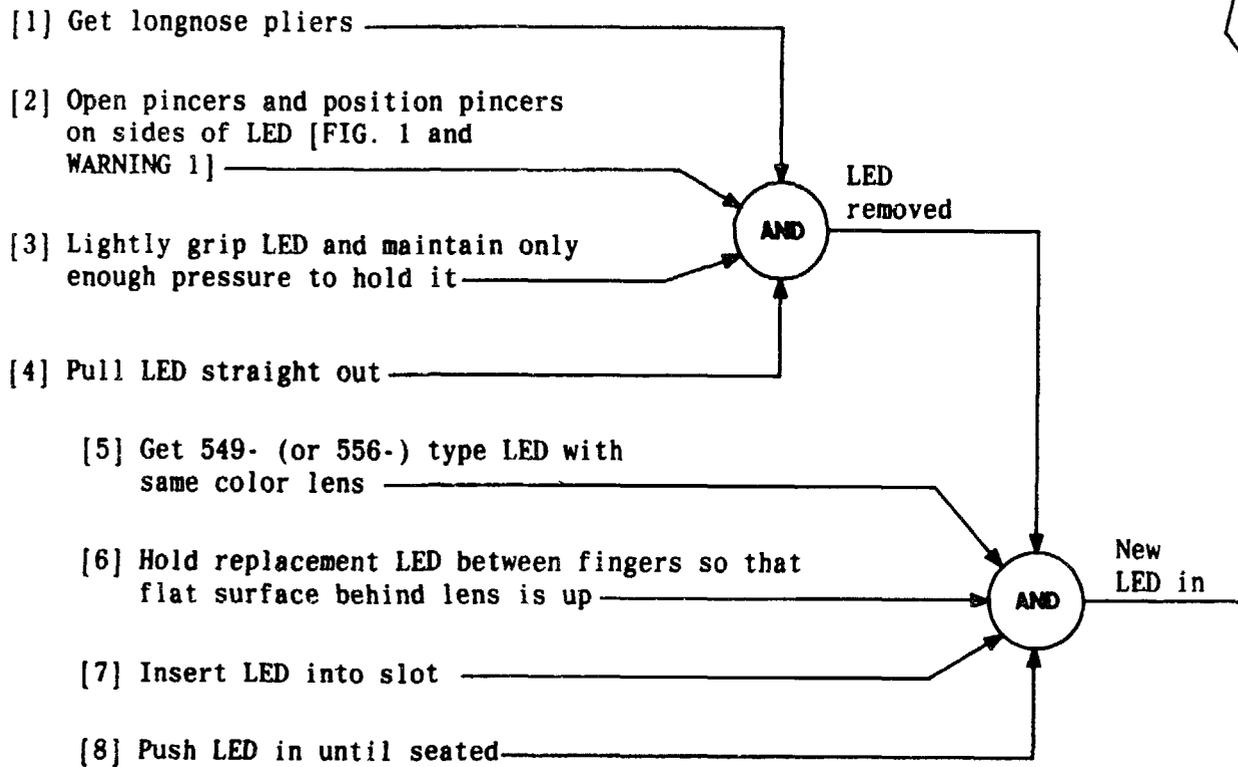


FIG. 1

WARNING 1	
<i>LEDs can be damaged by squeezing pliers too tightly or inserting LED the wrong way in slot</i>	
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REPLACE LED

[1] Place meter on horizontal surface with face of meter up [NOTE 1]

[2] Set function switch to OFF [FIG. 1]

[3] Adjust meter zero screw for zero indication

[4] Verify that red test lead goes to meter + jack

[5] Verify that black test lead goes to meter - jack

[6] See FIG. 1. Set function switch for required measurement and range

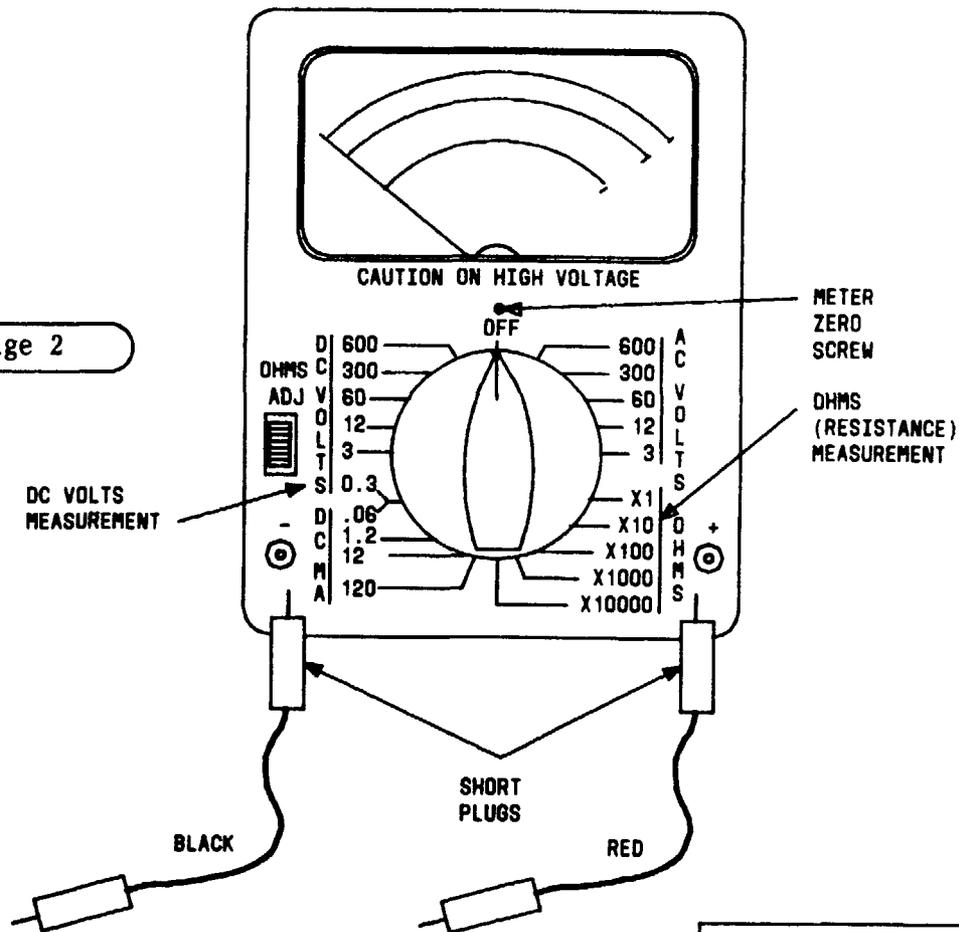
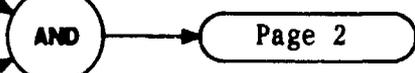
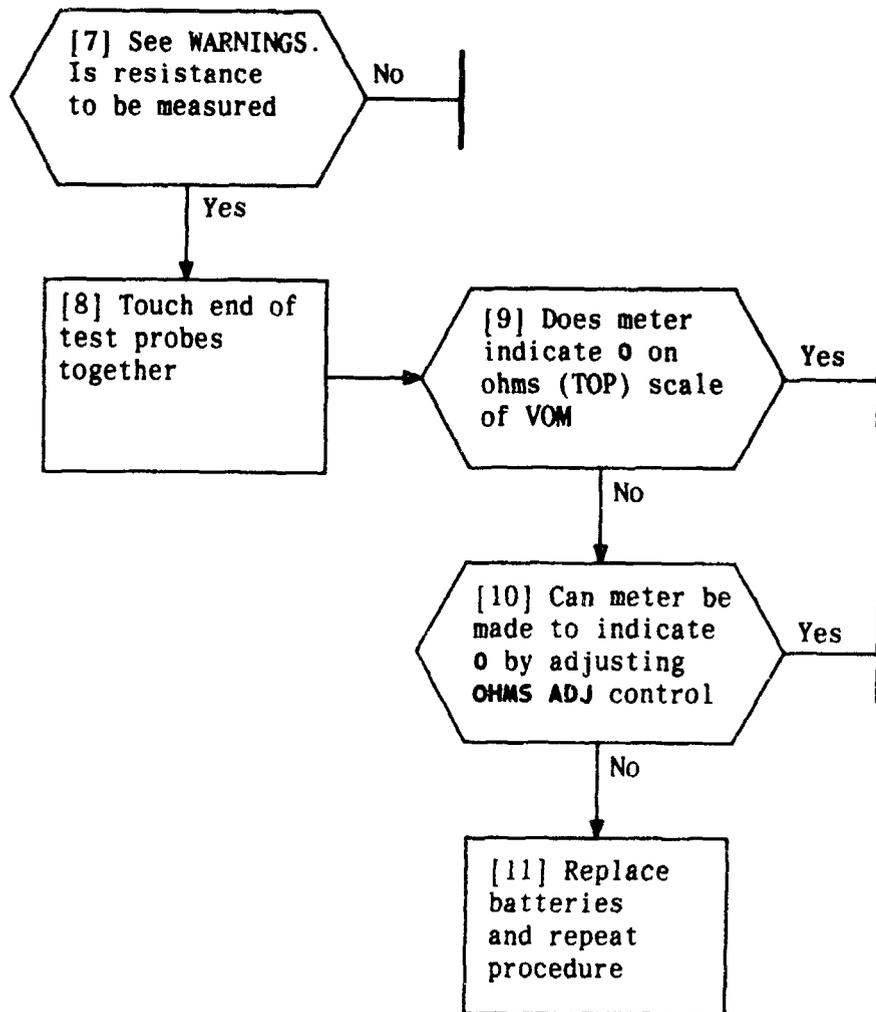


FIG. 1

NOTE 1	
Meter should not be placed on a magnetic surface or other location where meter movement will be subject to influence of magnetic fields	
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CONDITION KS-14510 VOLT-OHM-MILLIAMETER (VOM)



WARNINGS

1. Resistance measurement should not be made to circuit with power applied, as damage to meter will result
2. To prevent damage to meter when making either current or voltage measurements, function switch should be set to proper range before making contact with test probes to the circuit being measured. If there is any doubt as to the approximate value of the voltage or current to be measured, function switch should be set to highest range and then decreased step by step for on-scale indication

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CONDITION KS-14510 VOLT-OHM-MILLIAMETER (VOM)

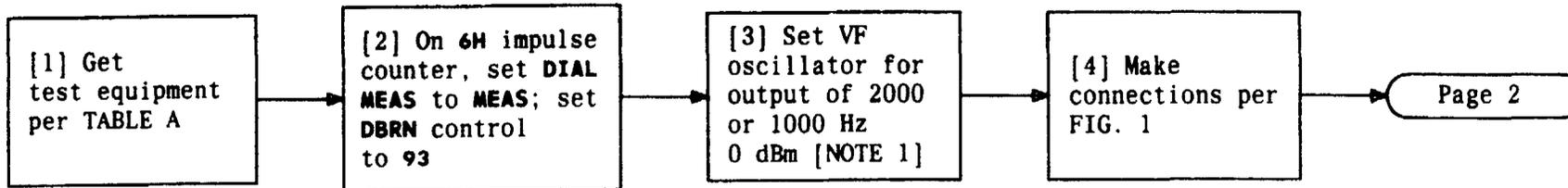


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Volt-ohm-millammeter (VOM)	KS-14510 or equivalent
Patch Cord	3P6D
VF oscillator	HP3550B or equivalent

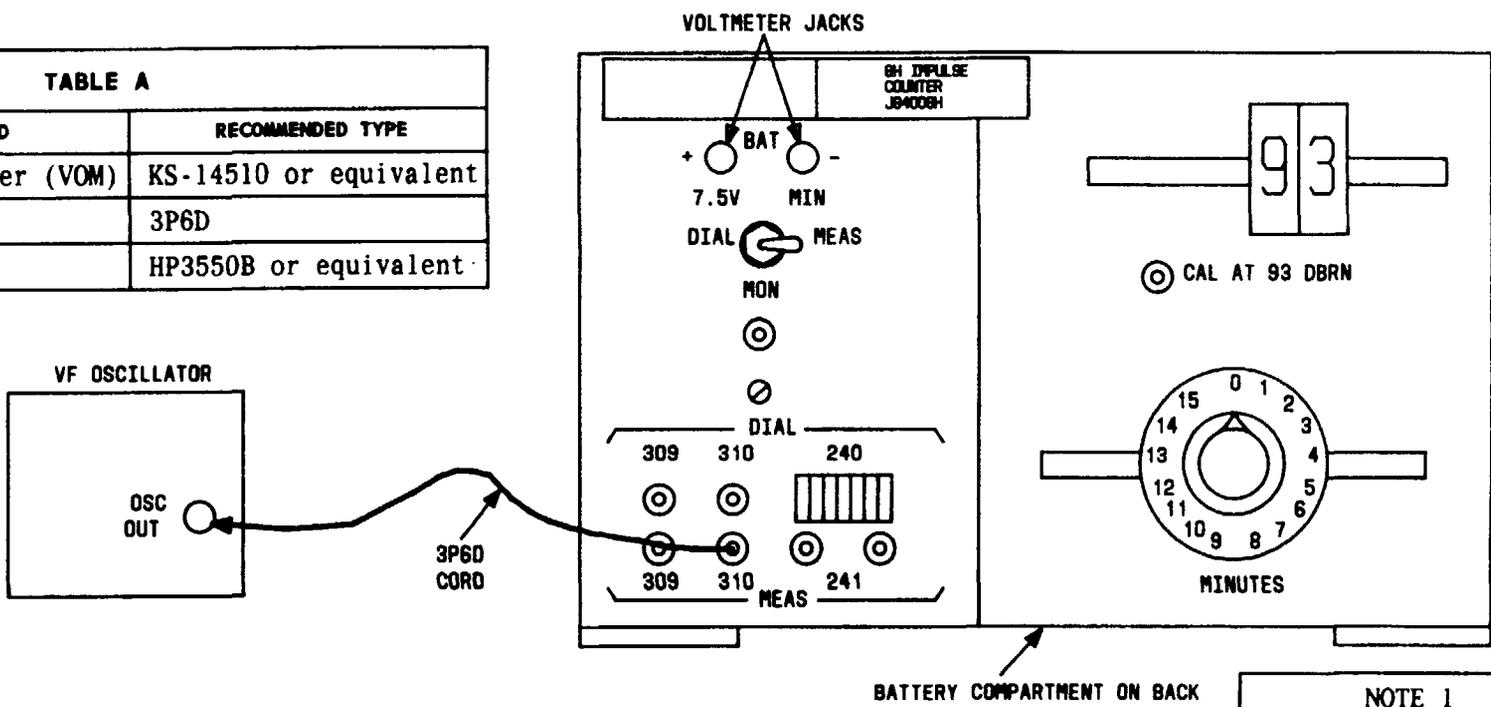


FIG. 1

NOTE 1
 If impulse counter has KS-21567, L2 C notch network, oscillator should be set for 2000 Hz. If counter has 497G C notch network, oscillator should be set for 1000 Hz

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CHECK CALIBRATION OF 6H IMPULSE COUNTER

[5] Condition VOM to measure +15 volts dc

[6] Observing + and - polarity of VOM, connect + and - VOM leads to + and - BATT leads on 6H

[7] Rotate timer control on 6H to 5 MINUTE interval

AND

[8] Does VOM indicate at least 7.5 volts dc

Yes

[11] Adjust CAL counter until 6H counter is on verge of counting (registers occasional count)

No

[9] Disconnect equipment from 6H; replace batteries in 6H (compartment on back); repeat calibration check

No

[12] Rotate MINUTES control fully counterclockwise; remove all test equipment connections

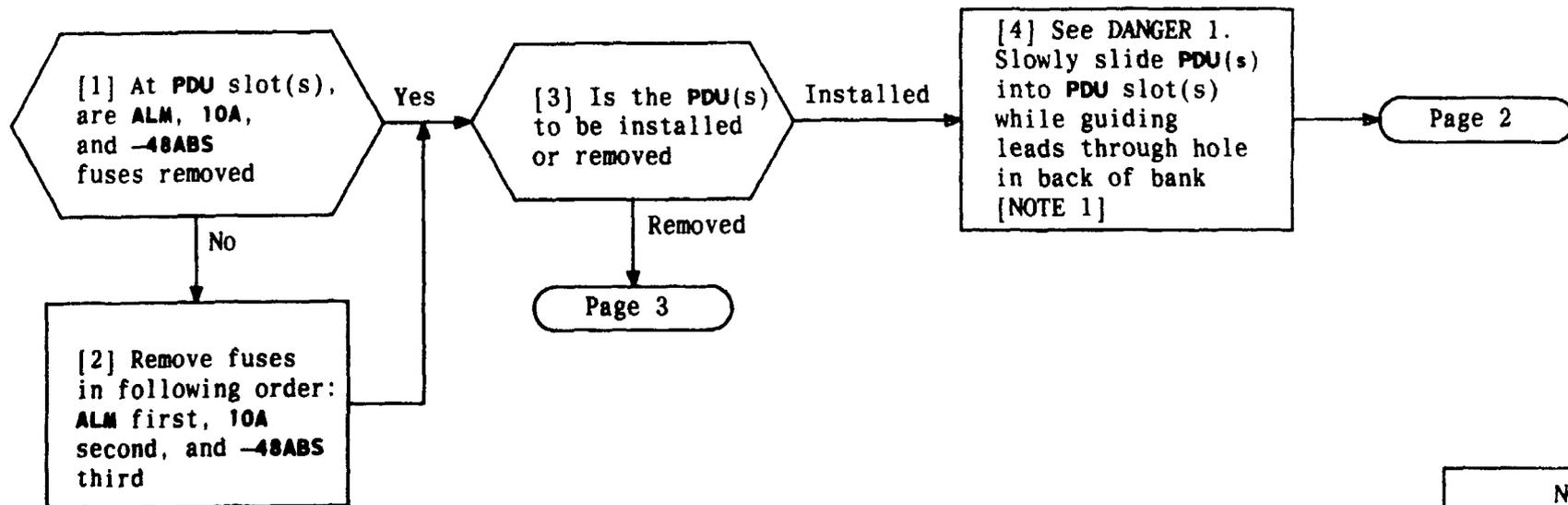
[10] Get another 6H impulse counter; repeat calibration check

CHECK CALIBRATION OF 6H IMPULSE COUNTER

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SUMMARY

To install power distribution unit (PDU), straighten leads and slide PDU into slot. At rear of bank connect spade lugs for leads 2, 3, and 4 to same terminals under plastic shield at top of slot [FIG. 1, Page 2]. Screw fastener into hole on back of PDU. To remove PDU, reverse these operations



NOTE 1
Mode 4 requires a PDU in both banks

DANGER 1
85 VAC ringing voltage may be present on TS 2 terminals 4 and 5 behind PDU slot

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At rear of bank:

- [5] Remove large plastic cover from back of bank
- [6] Screw fastener into hole on back of PDU(s) and loosen screws 2, 3, and 4 on terminal strip [FIG. 1]
- [7] See DANGER 2. Connect PDU leads to terminals (match lead and terminal numbers) [TABLE A]
- [8] Tighten terminal screws
- [9] Install large plastic cover on back of bank removed in Step 5
- [10] At front of bank, install -48 MAIN 10A, -48 MAIN ALM, and -48ABS fuses

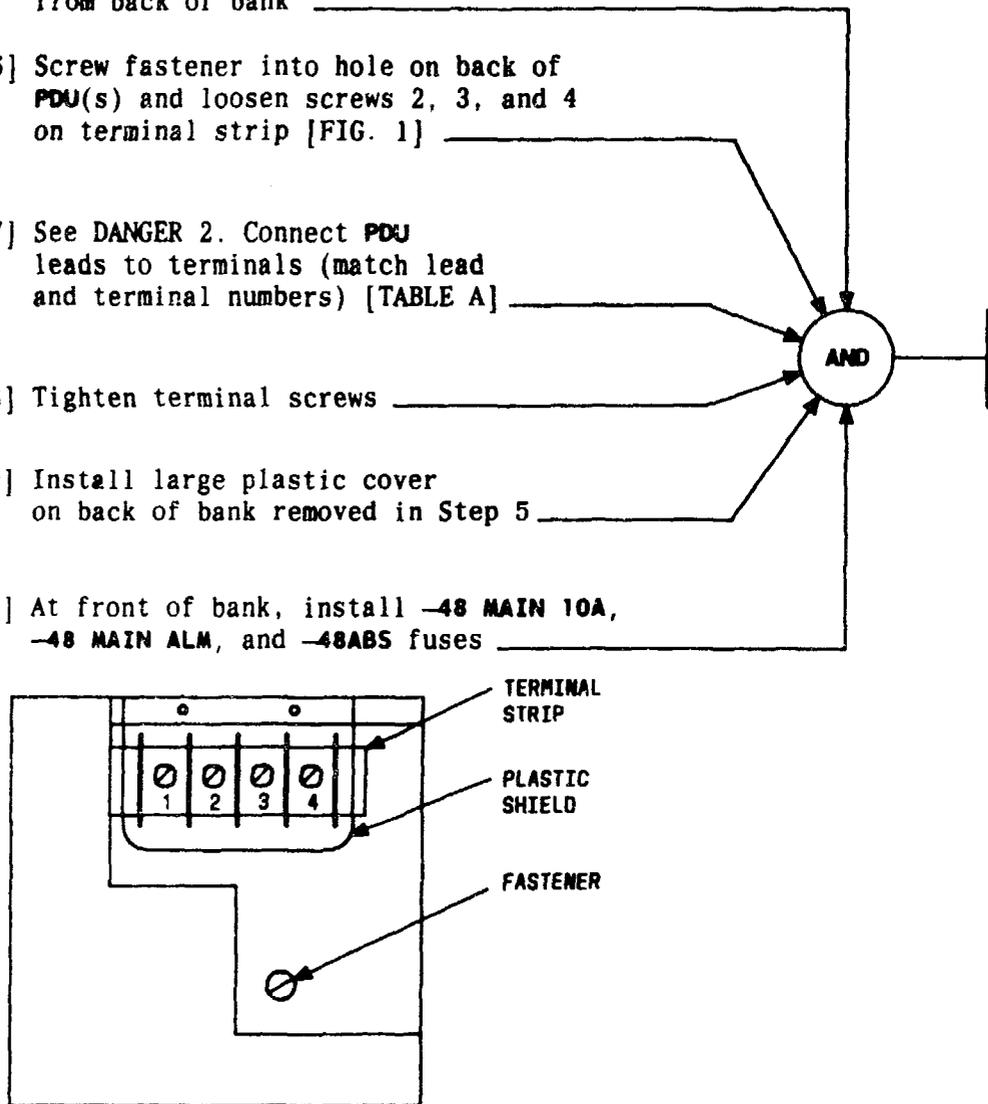


FIG. 1 - Rear View of PDU Slot

TABLE A	
LEAD COLOR*	LEAD NUMBER
Pink	2
Green	3
Gray	4

* Colors may vary on some installations but each lead will be numbered to correspond with terminal strip number

DANGER 2 85 VAC ringing voltage may be present on TS 2 terminals 4 and 5 behind PDU slot	
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INSTALL OR REMOVE POWER DISTRIBUTION UNIT

At rear of bank:

[11] Remove large plastic cover
on back of bank

[12] See DANGER 3. Disconnect spade
lugs from terminal and push cables
away from terminal strip [FIG. 2]

[13] Using screwdriver unscrew
fastener holding PDU(s)
in slot

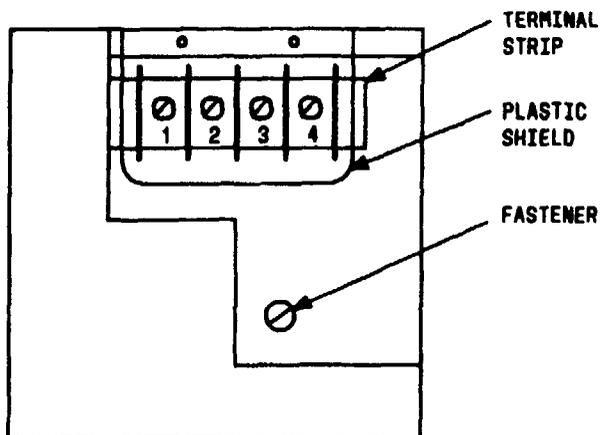
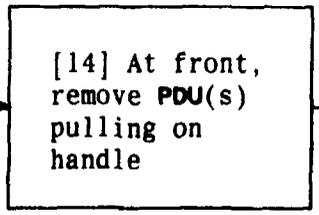
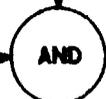


FIG. 2 - Rear View of PDU Slot

DANGER 3 85 VAC ringing voltage may be present on TS 2 terminals 4 and 5 behind PDU slot	
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INSTALL OR REMOVE POWER DISTRIBUTION UNIT

SUMMARY

Have installer at far DX set short T and R leads. Connect VOM to terminals 24 and 51 using J98726ME connector extender. On 2-wire circuits measure loop resistance to obtain RLP setting. On 4-wire circuit measure loop resistance and divide by 2 for RLP setting

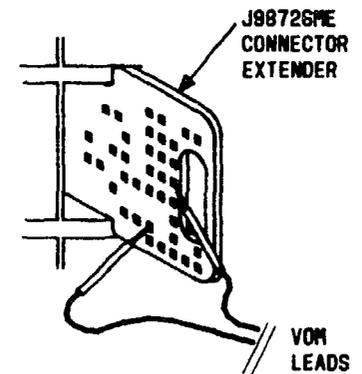


FIG. 1

[1] Verify channel to be tested is removed from service

[2] Get KS-14510 VOM or equivalent and condition it to measure resistance [DLP-521]

[3] Have technician in field short T and R leads at far DX set (one pair for 4-wire)

[4] Obtain extender (FIG. 1) and install into assigned channel slot

[5] Connect VOM to connector extender terminals 24 and 51

AND

Extender installed;
VOM connected
[FIG. 1]

[6] Measure resistance. This equals RLP setting in 2 DX/GT. Divide by 2 for 4 DX

[7] Remove all test connections

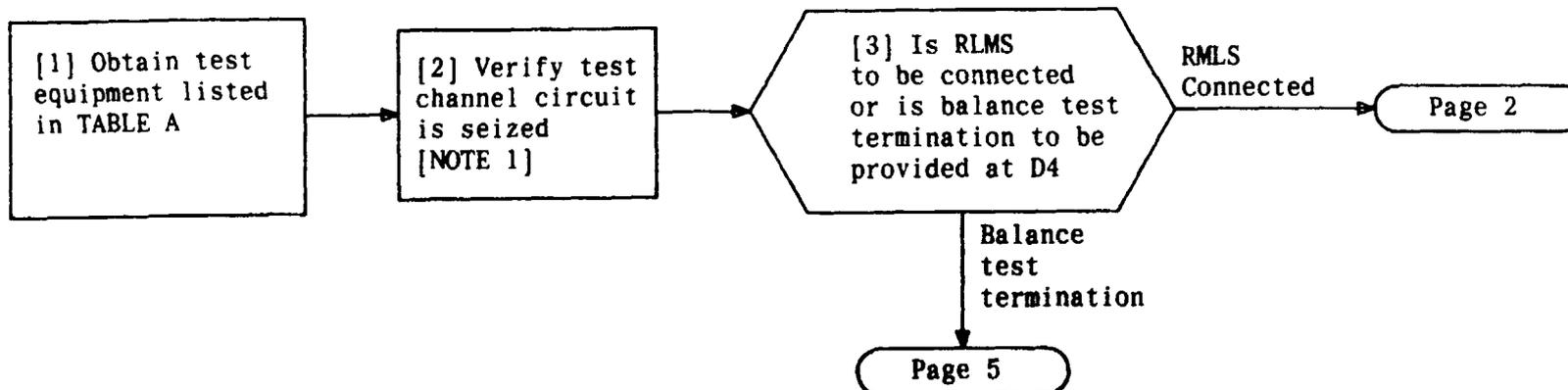


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Channel Access Unit (CAU) in D3/D4 PORTABLE TEST SET (PTS)	J98718AJ CAU in J98718AL PTS
RETURN LOSS MEASURING SET (RLMS)	KS-20501
1 Patch Cord	P6AD
2 Patch Cords	3P6A

NOTE 1
 Circuit can be seized and held for testing 2-wire FXO units by installing SPTS in far end bank (same channel slot) and setting switches A and B to 0. Circuit can be seized and held for testing 2-wire FXS units by installing SPTS in far end bank (same channel slot) with switch A set to 1 and B to 0 and using TMS with holding coil at station end equipment

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MAKE CONNECTIONS FOR ECHO RETURN LOSS, SINGING POINT, OR OFFICE CAPACITANCE TESTS

Per FIG. 1, Page 3:

[4] Connect signal output of test set to EXT OSC jack on CAU

[5] Connect signal input of test set to EXT DETR jack on CAU

[6] Connect CAU XMT jack to D4 TST CKT XMT jack [NOTE 2]

[7] Connect CAU RCV jack to D4 TST CKT RCV jack [NOTE 2]

[8] Connect P6AD cord between channel to be tested and D4 TST CKT (knurled side to left) [NOTE 2]

[9] Connect power cord of portable test set to 115V, 60-Hz power outlet

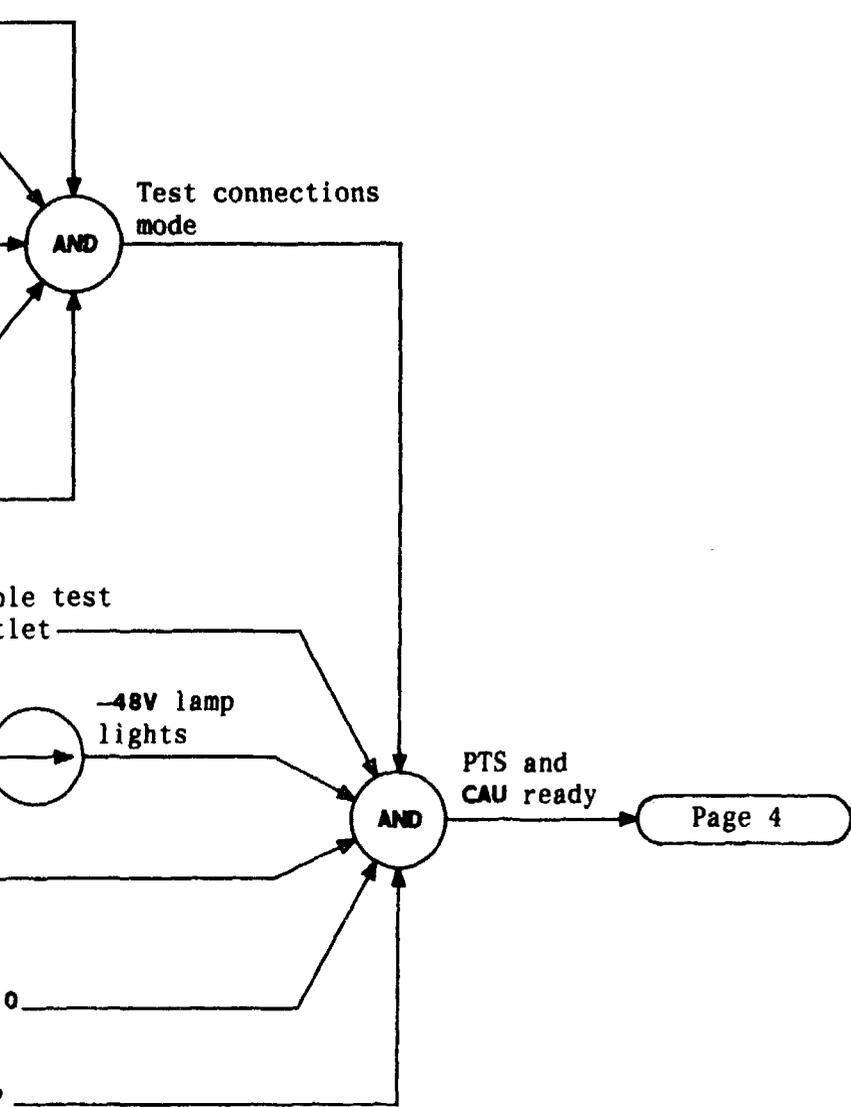
[10] Set PWR switch on portable test set to ON

On CAU:

[11] Set REJ FLT switch to OUT

[12] Set SEND LEVEL dB switch to 0

[13] Set TEST switch to CHAN DROP



NOTE 2
 Noise due to crosstalk in D4 TST CKT of portable test set can cause erroneous measurements. If this occurs, P6AD test cord can be connected from channel unit directly to CAU thus eliminating D4 TST CKT for this test

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MAKE CONNECTIONS FOR ECHO RETURN LOSS, SINGING POINT, OR OFFICE CAPACITANCE TESTS

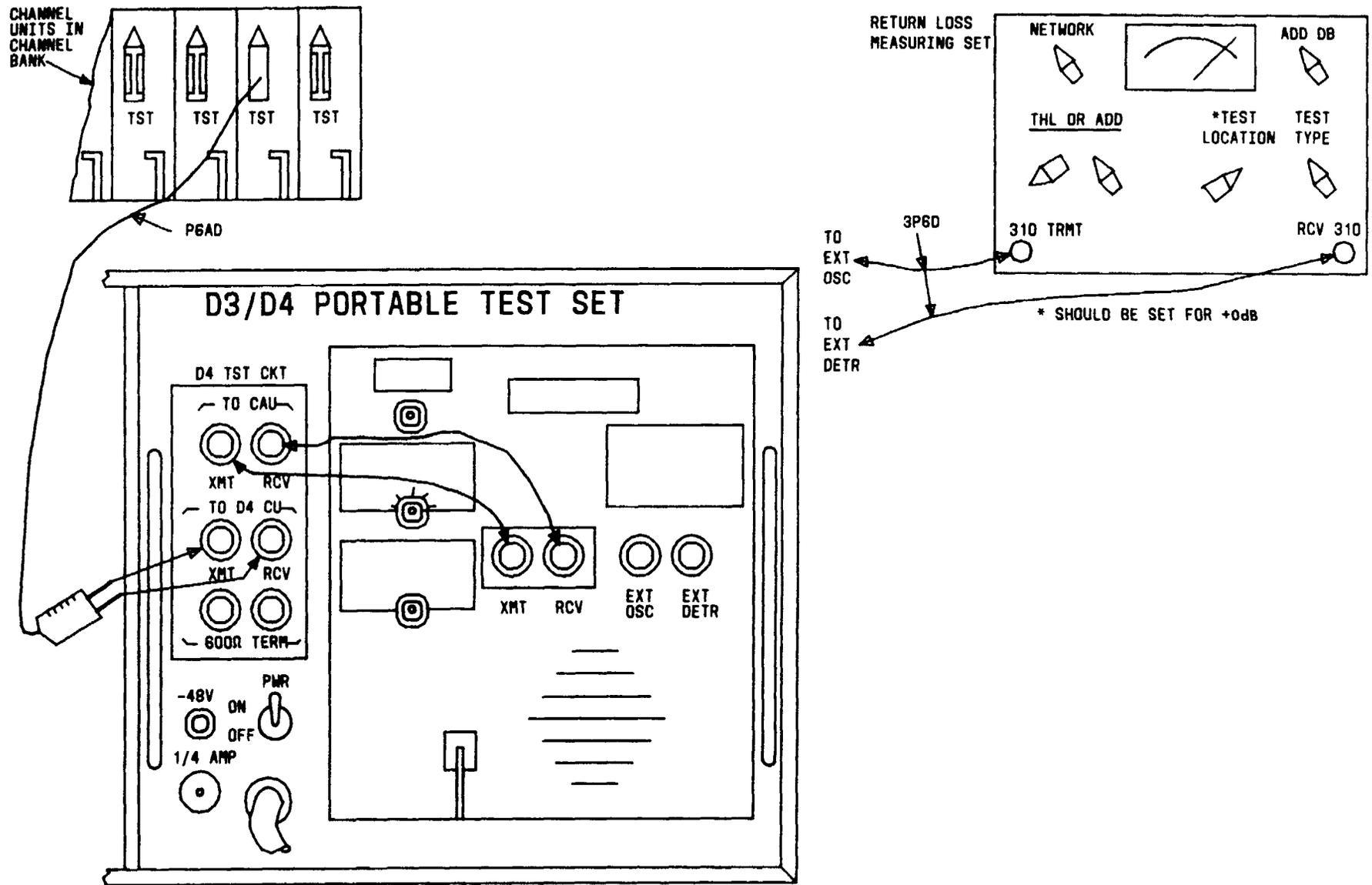


FIG. 1

**MAKE CONNECTIONS FOR ECHO RETURN
LOSS, SINGING POINT, OR OFFICE CAPACITANCE TESTS**

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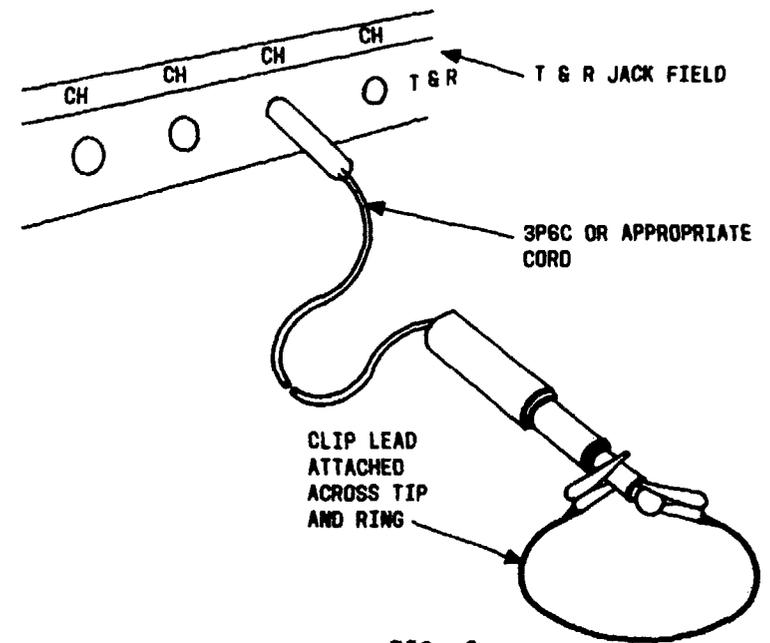
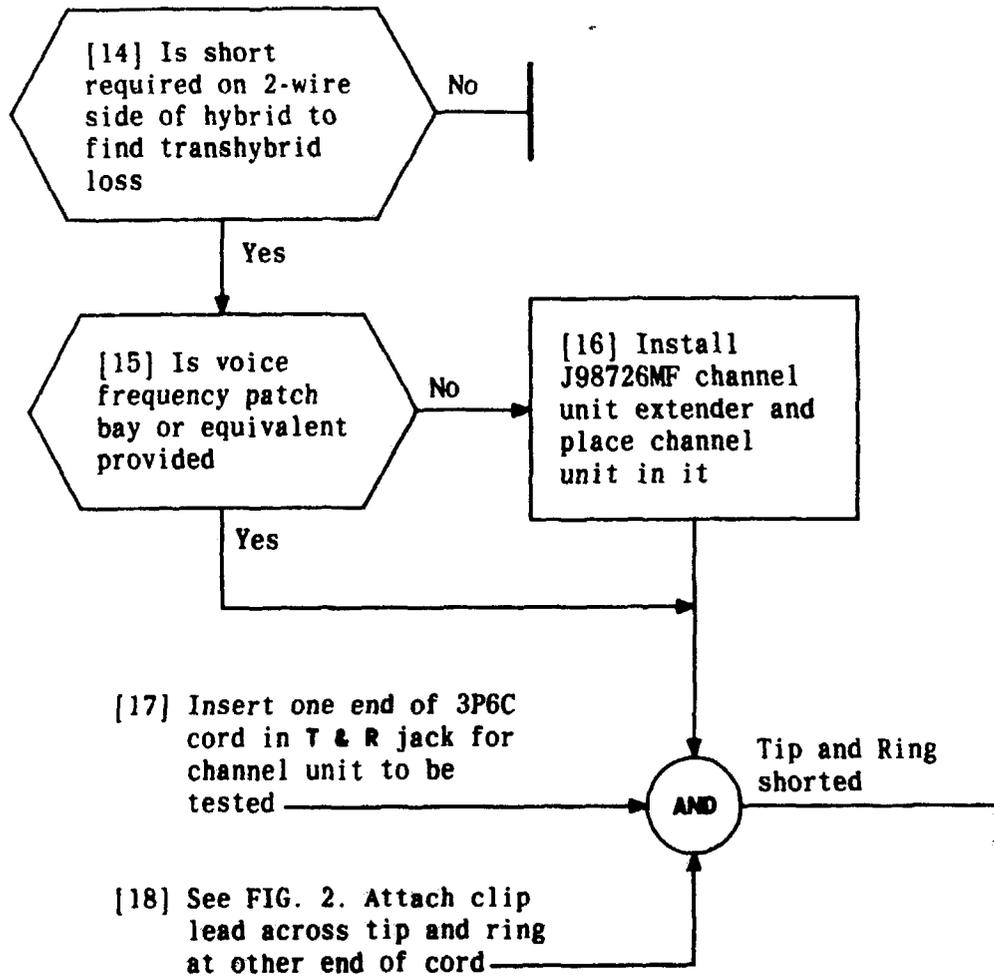


FIG. 2

**MAKE CONNECTIONS FOR ECHO RETURN
LOSS, SINGING POINT, OR OFFICE CAPACITANCE TESTS**

On portable test set/CAU:

[19] Connect power cord of portable test set to 115V, 60-Hz power outlet

[20] Set PWR switch on portable test set to ON

[21] On CAU, set REJ FLT switch to OUT; SEND LEVEL DB to 0; and TEST to CHAN LINE

Per FIG. 3:

[22] Connect CAU XMT jack to D4 TST CKT XMT jack

[23] Connect CAU RCV jack to D4 CKT RCV jack

[24] Connect P6AD cord between channel to be tested and D4 TST CKT (knurled side to left)

[25] Place 262B plugs in EXT OSC and EXT DETR jacks on CAU

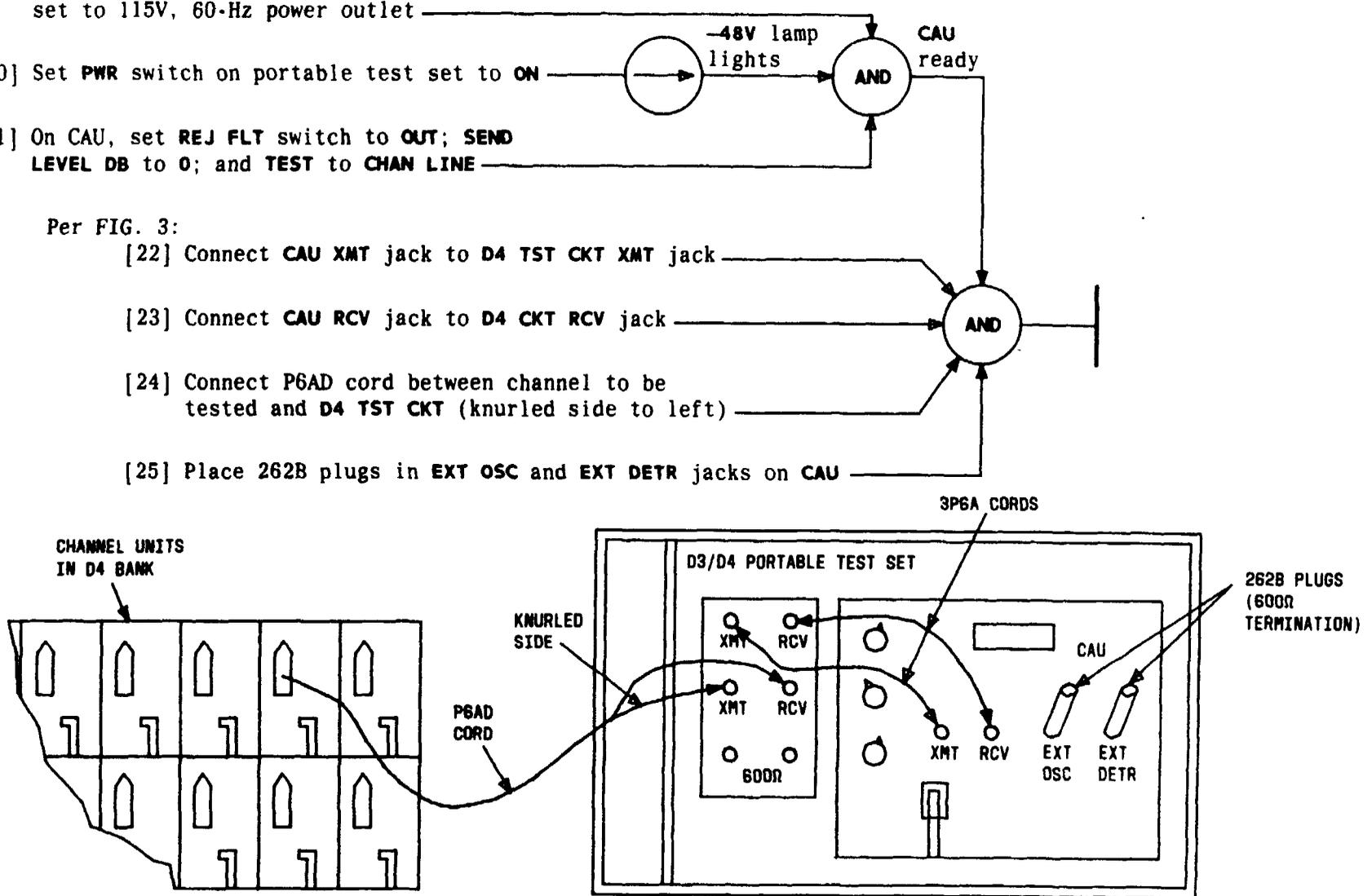


FIG. 3

MAKE CONNECTIONS FOR ECHO RETURN LOSS, SINGING POINT, OR OFFICE CAPACITANCE TESTS

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[1] Obtain test equipment per TABLE A and install channel unit extender into channel slot

[2] Verify test channel circuit is seized [NOTE 1]

[3] Check calibration of CAU [DLP-518]

[4] Set CAU switches as follows:
 REJ FLT to OUT
 SEND LEVEL to 10
 TEST to CHAN DROP



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TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) with Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
1 Patch Cord	P6AD
RETURN LOSS MEASURING SET (RLMS)	KS-20501
2 Patch Cords	3P6D
Channel Unit Extender	J98726MF, List 2
1 Patch Cord	3P6C

NOTE 1
 Circuit can be seized and held for testing 2-wire FXO units by installing SPTS in far end bank (same channel slot) and setting switches A and B to 0. Circuit can be seized and held for testing 2-wire FXS units by installing SPTS in far end bank (same channel slot) with switch A set to 1 and B to 0 and using TMS with holding coil at station end equipment

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On Channel Unit:

- [5] Set N/L switch as follows:
N for nonloaded customer loop
L for loaded customer loop
- [6] Set L switch on R/R1 control [FIG. 3] as follows: L showing for MAT; L not showing for other cable
- [7] Set LBOC (S1) as follows if not previously set:
LBOC in (white) 0.056 μ f [FIG. 1] for loaded;
LBOC out (black) for nonloaded [DLP-564]
- [8] Record S2 control setting then temporarily set S2 control to 0 [FIG. 2]
- [9] Set PBN controls (R/R1, R2, and Z) for trial values per TABLE B [NOTE 2 and FIG. 3]



N/L set; SL to 0;
trial LBOC and
PBN settings
made

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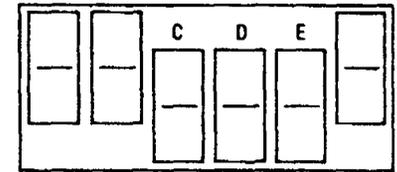


FIG. 1 - LBOC Control (Example 0.056 μ f = CDE Selected)

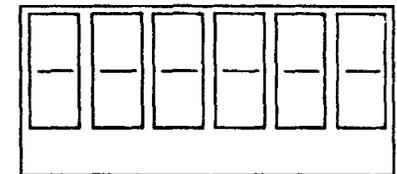


FIG. 2 - S2 Control (Example 0 Selected)

TABLE B					
CABLE TYPE	GAUGE KNOWN			GAUGE UNKNOWN	
Loaded	19 ga	R = 0	Z = 2	R2 = 0	R = 4
	22 ga	2	2	0	Z = 3
	24 ga	4	3	0	R2 = 0
	25 ga	6	1	0	
	26 ga	7	4	0	
Nonloaded	19 ga	R1 = 5	R2 = 8	Z = 15	R1 = 4
	22 ga	5	8	10	R2 = 8
	24 ga	5	7	7	Z = 8
	25 ga	5	7	5	
	26 ga	5	6	5	

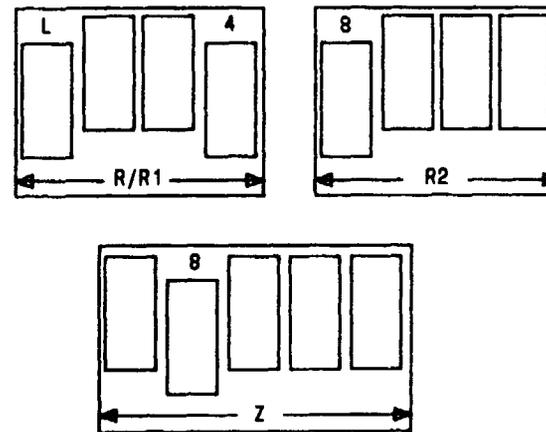


FIG. 3 - PBN Controls (Sample Settings R/R1 = 4 and L showing, R2 = 8, and Z = 8)

NOTE 2
Only R and Z controls are used for loaded cable; R1 stamping and R2 control can be ignored. R1 stamping and R2 and Z controls are all used for nonloaded cable

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DETERMINE PRECISION BALANCE NETWORK (PBN) SETTINGS

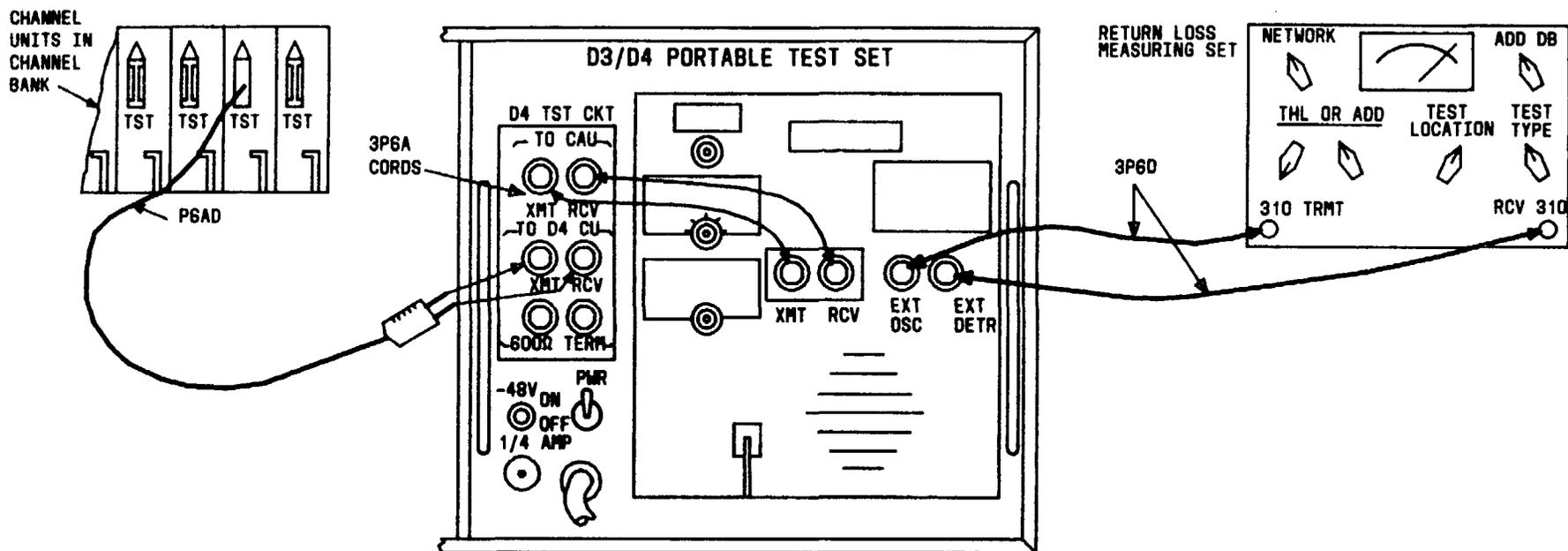
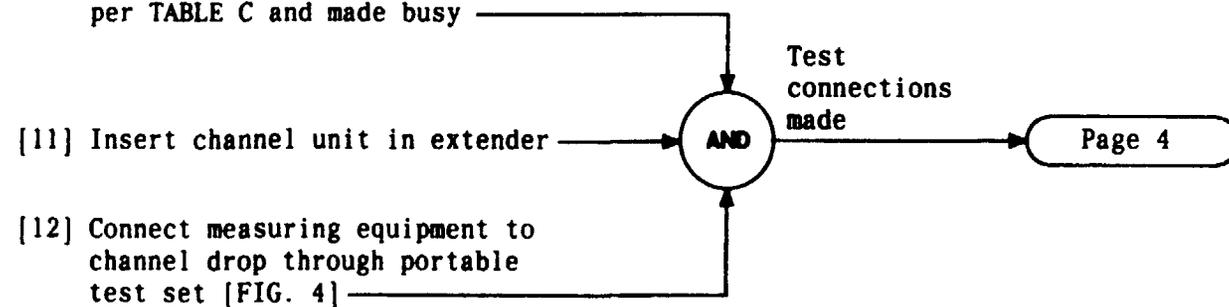


FIG. 4

[10] At customer end verify that customer loop is terminated per TABLE C and made busy

[11] Insert channel unit in extender

[12] Connect measuring equipment to channel drop through portable test set [FIG. 4]



FAR-END EQUIPMENT	TERMINATION
600Ω PBX	600Ω +2.15μF
900Ω PBX	900Ω +2.15μF
Telephone Set	Off-hook, loop current

At voice frequency patch bay or equivalent:

[13] Insert one end of 3P6C cord into T & R jack for channel unit to be tested

[14] See FIG. 5. Attach clip lead across tip and ring of other end of cord

[15] On RLMS set switches as follows:
ADD dB to 0
TEST TYPE to ERL
TEST LOCATION to +0 dB
 (HYBRID TESTS on List 1)

[16] Adjust **THL** (**THL** or **ADD** on List 1 or 3) switches for 0 indication on meter

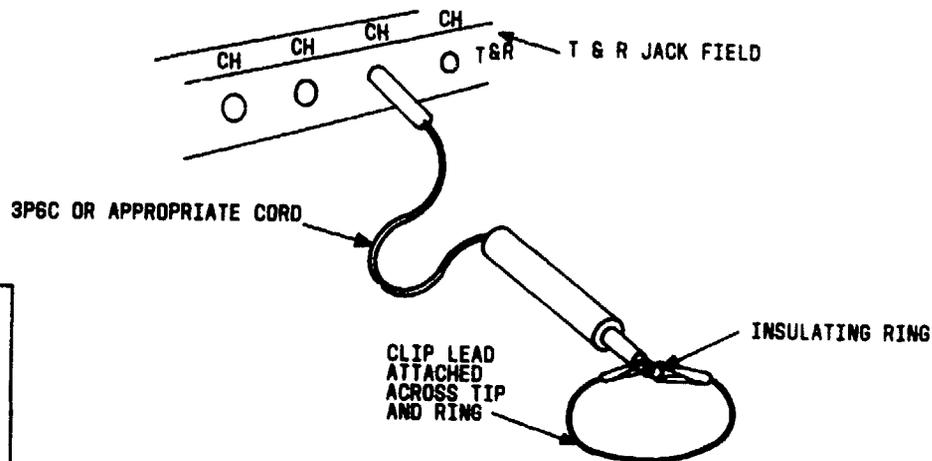
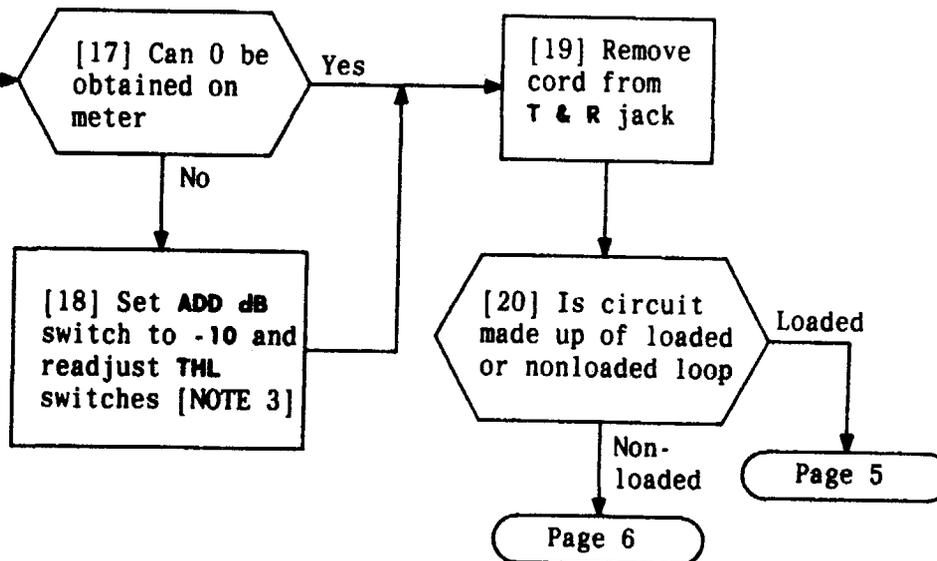


FIG. 5

NOTE 3
 With **ADD dB** switch to -10, 10 dB must be added to meter reading



DETERMINE PRECISION BALANCE NETWORK (PBN) SETTINGS

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[21] Measure SRL-HI (**TEST TYPE SRL-HI**) and maximize reading by changing **LBOC** (in channel unit). Record reading on top half of worksheet (TABLE D)

[22] Measure SRL (**TEST TYPE SRL**) and maximize by changing **R**. Record reading

[23] Measure ERL and maximize by changing **R**. Record reading

[24] Measure SRL-HI and maximize by changing **Z**. Record reading

LBOC, R, and Z settings made (loaded cable)

AND

[25] Measure SRL and ERL again. Record reading on bottom of worksheet

[26] Calculate difference between SRL readings (bottom minus top) and between ERL readings (bottom minus top)

AND

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TABLE D	
STEP	READING
21	SRL-HI _____
22	SRL _____
23	ERL _____
24	SRL-HI _____
25	SRL _____
25	ERL _____

DETERMINE PRECISION BALANCE NETWORK (PBN) SETTINGS

[27] Measure SRL (TEST TYPE SRL), ERL (TEST TYPE ERL), and SRL-HI (TEST TYPE SRL-HI). Record readings in top part of worksheet (TABLE E)

[28] Maximize SRL by changing R1 (in channel unit). Record final reading on worksheet

[29] Maximize ERL by changing R2. Record final reading on worksheet

[30] Maximize SRL-HI by changing Z. Record final reading on worksheet

R1, R2 and Z settings made (nonloaded cable)



[31] Calculate difference between SRL readings (bottom minus top)

[32] Calculate difference between ERL readings (bottom minus top)

[33] Calculate difference between SRL-HI readings (bottom minus top)

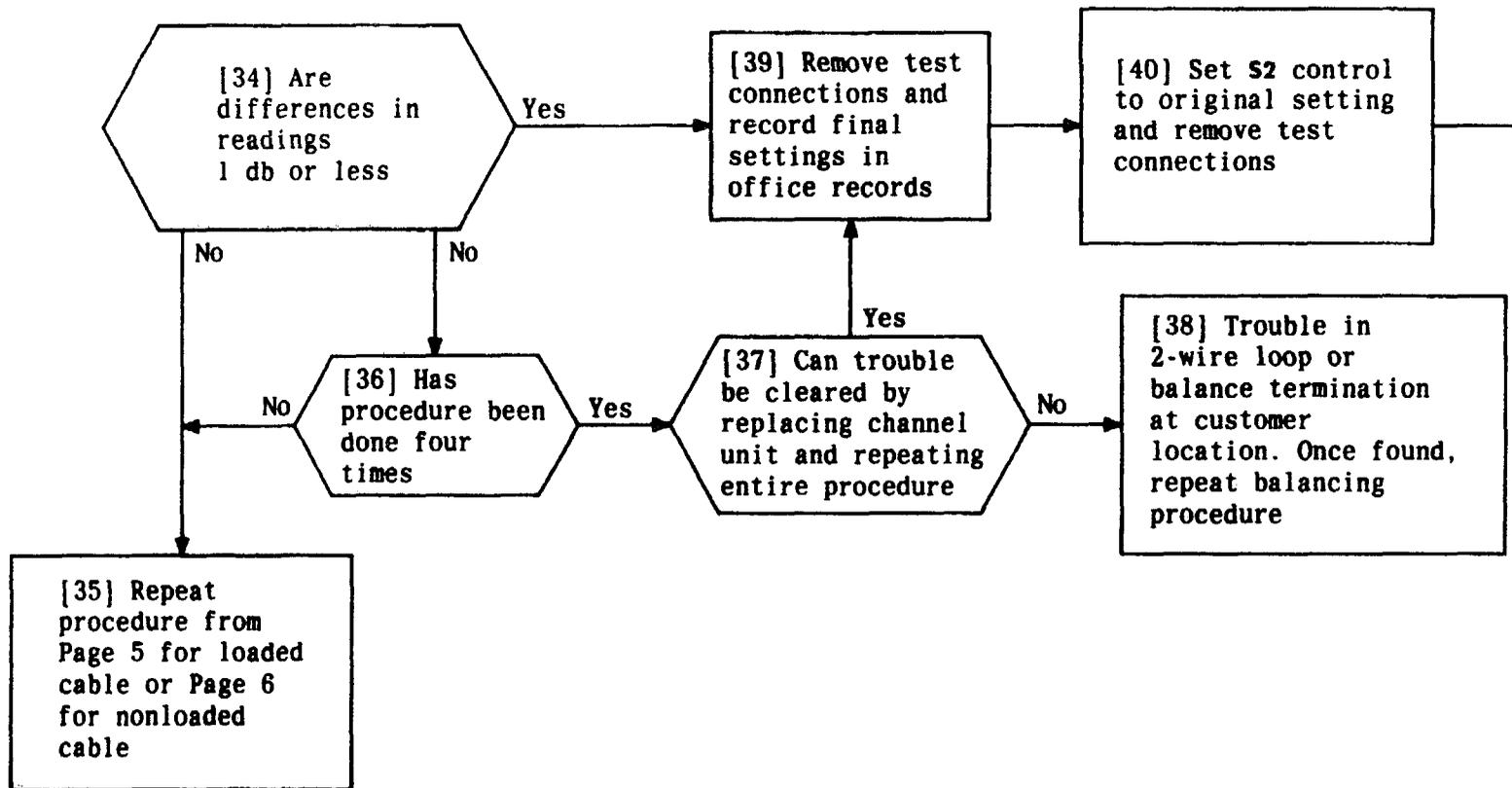


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TABLE E	
STEP	READING
27	SRL _____
27	ERL _____
27	SRL-HI _____
28	SRL _____
29	ERL _____
30	SRL-HI _____

DETERMINE PRECISION BALANCE NETWORK (PBN) SETTINGS

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DETERMINE PRECISION BALANCE NETWORK (PBN) SETTINGS

[1] See NOTE 1. Obtain test equipment per TABLE A and verify service is removed from test channel.

[2] Check calibration of CAU [DLP-518]

[3] Set attenuators in your unit per circuit layout card or trial values per TABLE B [DLP-565]

[4] Verify that attenuators on connecting channel unit have been set per circuit layout card or per TABLE B

[5] Set CAU switches as follows:
REJ FLT to OUT
SEND LEVEL to 0
TEST to CHAN DROP

[6] Install channel unit extender into slot and insert channel unit into it

[7] Make test connections per FIG. 1

Trial channel unit settings and tone toward connecting channel

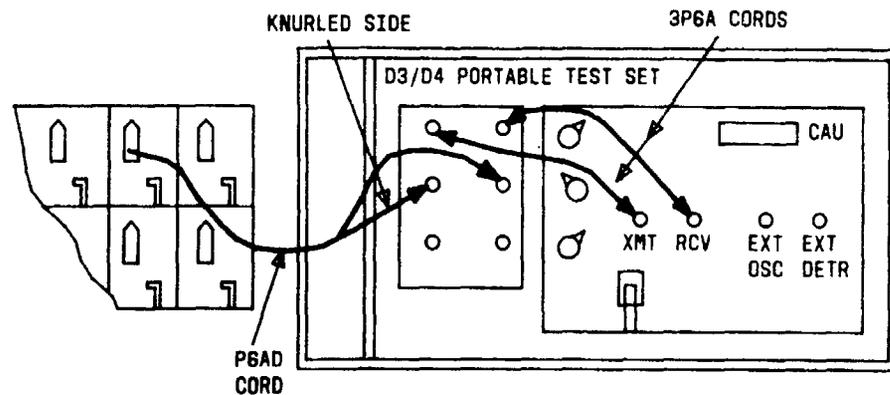
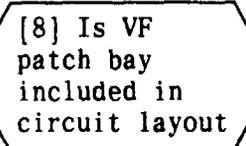


FIG. 1



Yes → Page 3

No → Page 4

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Channel Access Unit (CAU) In D3/D4 PORTABLE TEST SET (PTS)	J98718AJ CAU in J98718AL PTS
1 Patch Cord	P6AD
2 Patch Cords	3P6A
Channel Unit Extender	J98726MF, List 2

NOTE 1
 Attenuator settings in this procedure are based on standard transmit and receive carrier levels. Other levels may be required by WORD or engineering. If so, external oscillator and detector must be used

DETERMINE ATTENUATOR SETTINGS FOR BACK-TO-BACK (TANDEM) CHANNEL UNITS

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TABLE B				
CHANNEL UNIT	FIG.	BANK	TRANSMIT ATTEN	RECEIVE ATTEN
TDM	2A	D4	1.5 dB	Fixed
		D3	AT1 = 1.0 dB	Fixed
		D1	2.5 dB	1 dB
PLR	2B	D4	3.7 dB	5 dB
		D3	AT1 = 0.8 dB, AT3 = 7 dB	AT2 = 1 dB,
		D1	2 dB	3 dB
4TO (+7, -16 interface)	2C	D4	TRMT GAIN (black showing), TRMT ATTEN = 15 dB	RCV GAIN (black showing), RCV ATTEN = 15 dB
		D3	AT1 = 0.2 dB; AT2 = 12 dB	AT3 = 1 dB; AT4 = 15 dB
		D1	ATT1 OUT ATT2 IN	ATT1 OUT ATT2 IN
4TO (Connected with another 4TO)	2D	D4	TRMT GAIN (white showing), TRMT ATTEN = 15 dB	RCV GAIN (white showing), RCV ATTEN = 8 dB
		D3	AT1 = 0.8 dB; AT2 = 5 dB	AT3 = 0.8 dB; AT4 = 0 dB
		D1	ATT1 OUT ATT2 IN	ATT1 IN ATT2 OUT
E&M	2B	D4	1 dB	1 dB
		D3	1 dB	1 dB
		D1	Halfway	Halfway
		Analog	Halfway	Halfway

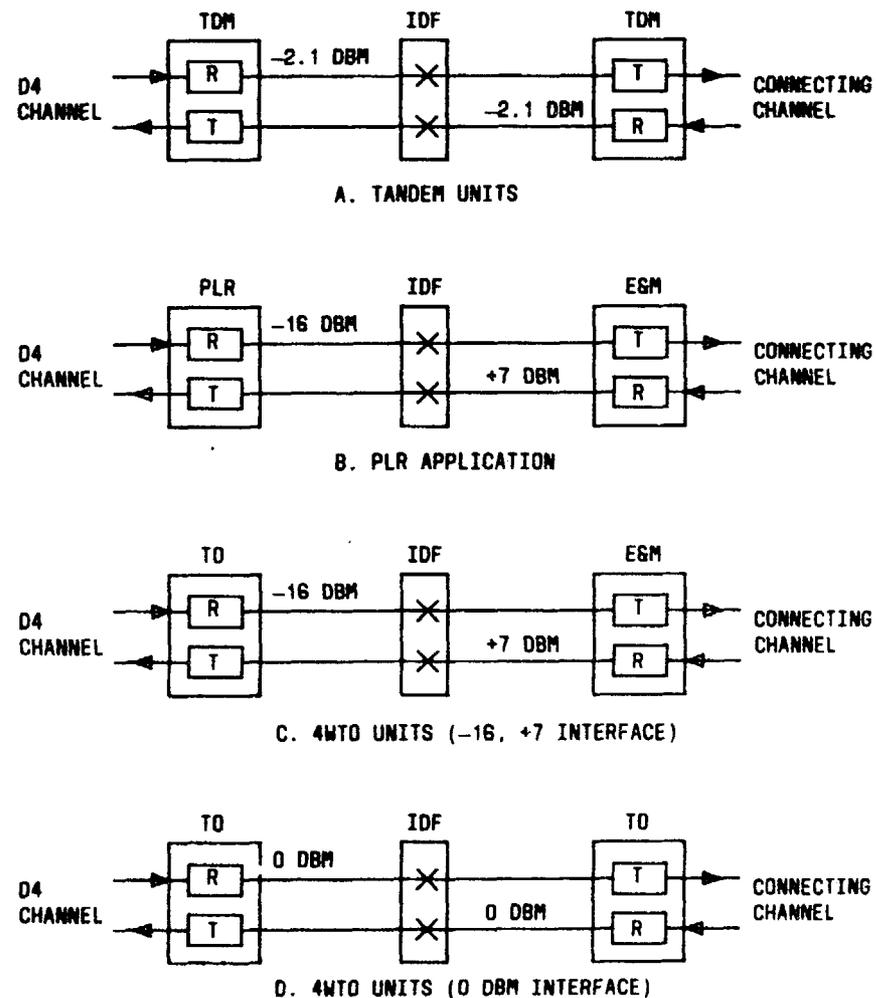


FIG. 2

**DETERMINE ATTENUATOR SETTINGS FOR BACK-TO-BACK (TANDEM)
CHANNEL UNITS**

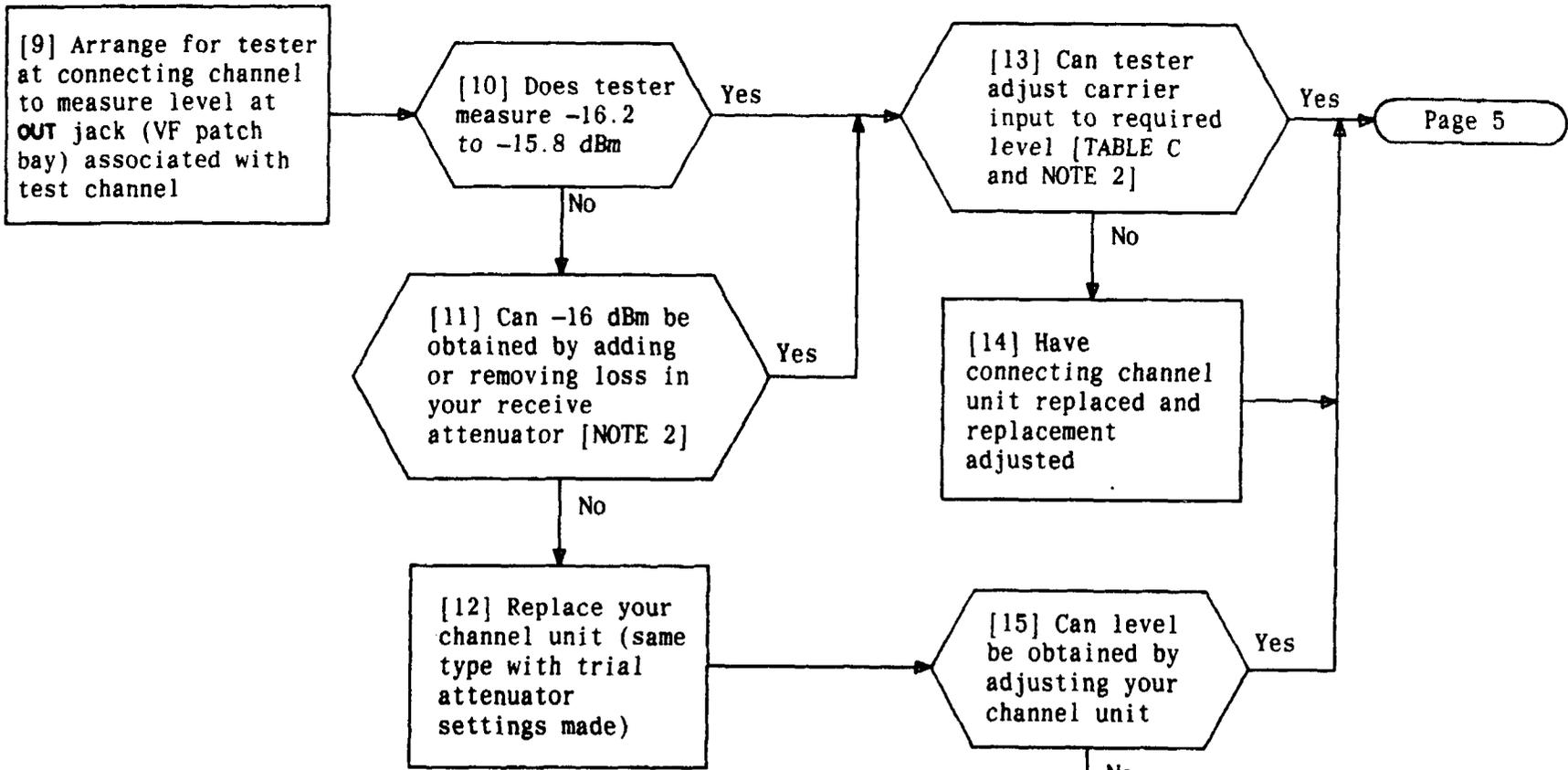
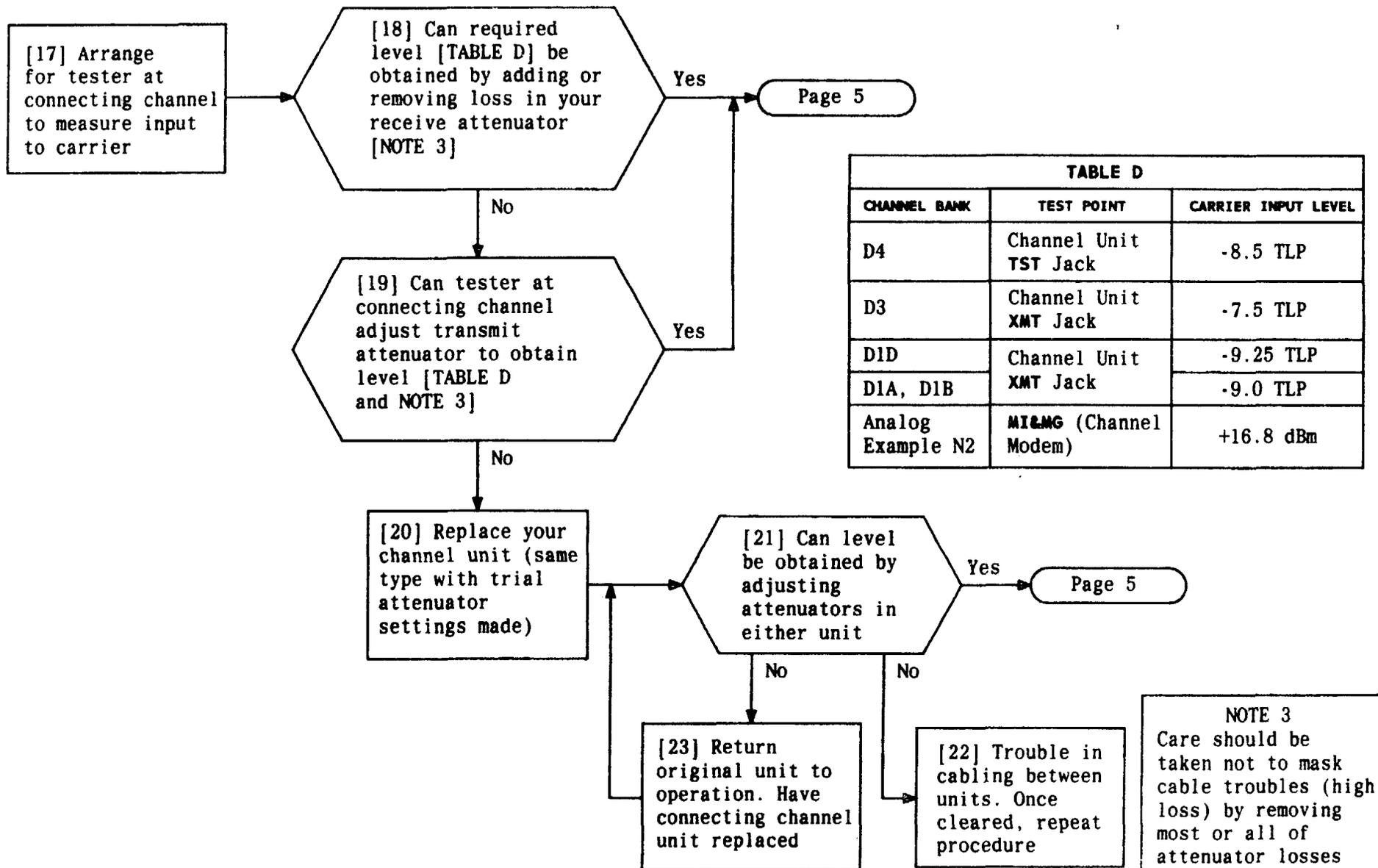


TABLE C		
CHANNEL BANK	TEST POINT	CARRIER INPUT LEVEL
D4	Channel unit TST jack	-8.5 TLP
D3	Channel unit XMT jack	-7.5 TLP
D1D	Channel unit XMT jack	-9.25 TLP
D1A, D1B		-9.0 TLP
Analog Example N2	MI&MG (channel modem)	+16.8 dBm

DETERMINE ATTENUATOR SETTINGS FOR BACK-TO-BACK (TANDEM) CHANNEL UNITS

NOTE 2
 Care should be taken not to mask high-loss cable troubles by removing most or all of attenuator losses in the channel units

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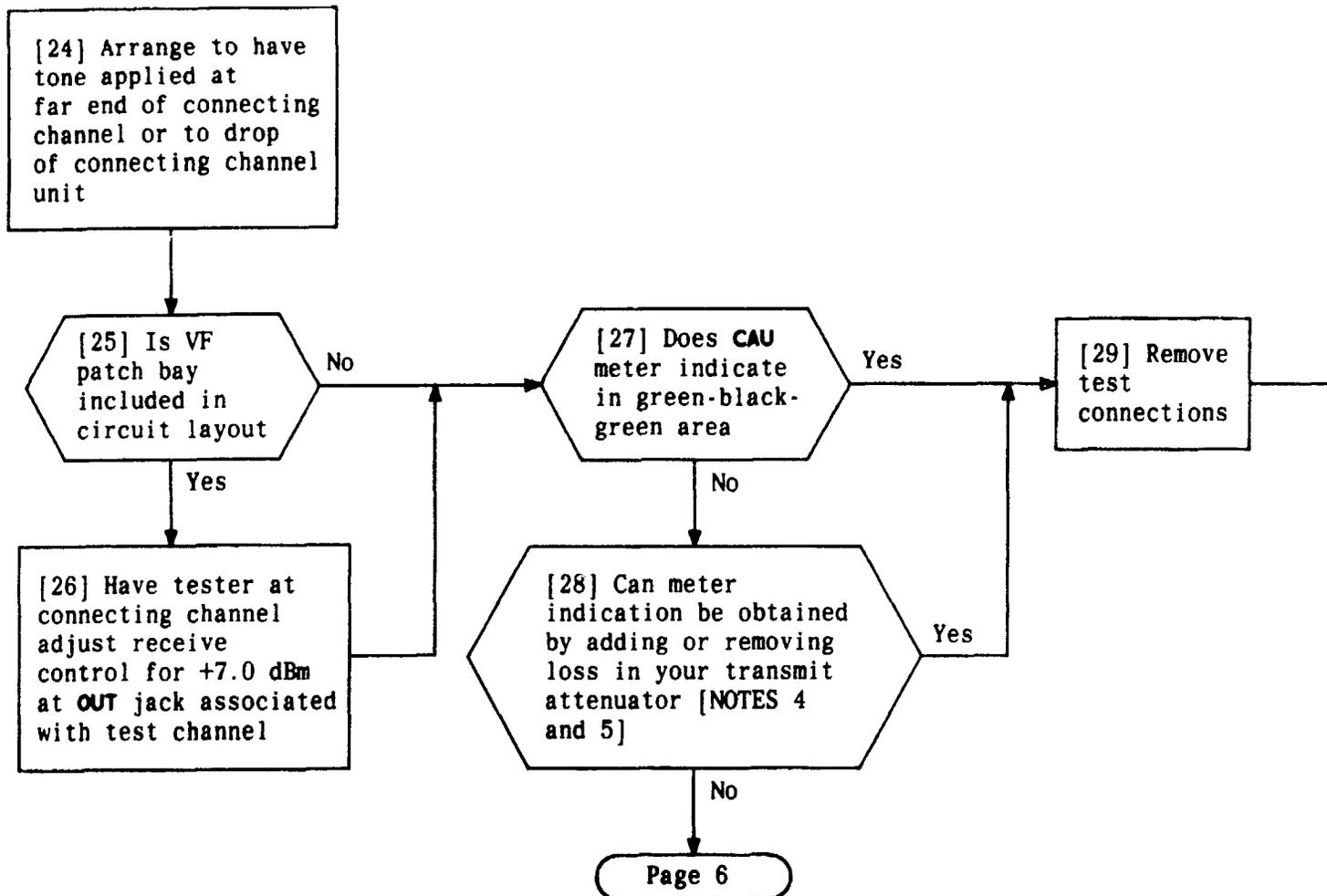


CHANNEL BANK	TEST POINT	CARRIER INPUT LEVEL
D4	Channel Unit TST Jack	-8.5 TLP
D3	Channel Unit XMT Jack	-7.5 TLP
D1D	Channel Unit XMT Jack	-9.25 TLP
D1A, D1B		-9.0 TLP
Analog Example N2	MI&MG (Channel Modem)	+16.8 dBm

NOTE 3
Care should be taken not to mask cable troubles (high loss) by removing most or all of attenuator losses in the channel units

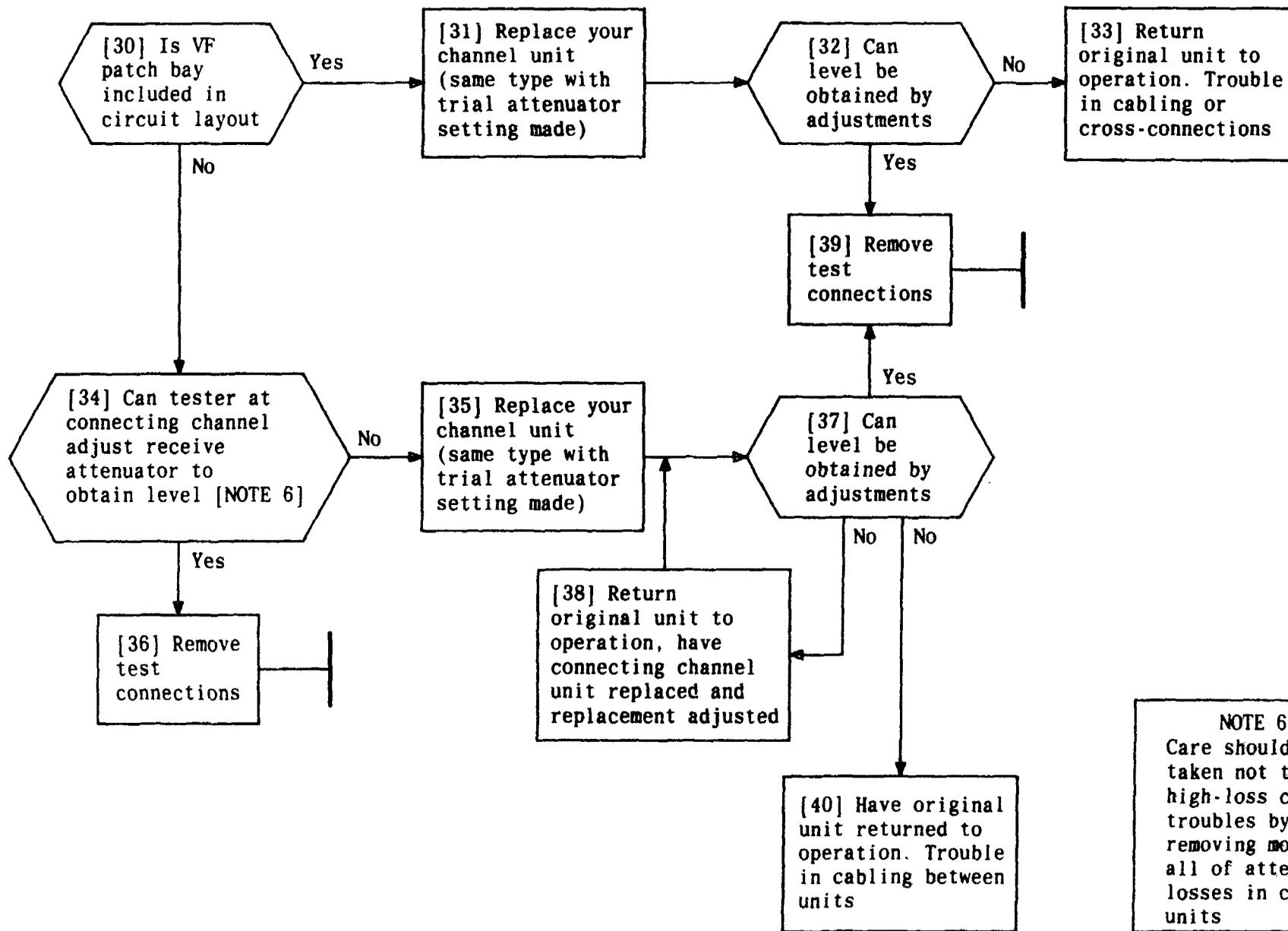
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DETERMINE ATTENUATOR SETTINGS FOR BACK-TO-BACK (TANDEM) CHANNEL UNITS



NOTES	
4. An external meter can be connected to EXT DETR jack (on CAU) to measure deviations greater than $\pm 0.5\text{dB}$. The portable test set introduces 8.5 dB gain for channel drop measurements; thus -8.5 at the channel unit will appear as 0 dBm at the EXT DET jack	
5. Care should be taken not to mask high-loss cable troubles by removing most or all of attenuator losses in channel unit	
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DETERMINE ATTENUATOR SETTINGS FOR BACK-TO-BACK (TANDEM) CHANNEL UNITS



NOTE 6
 Care should be taken not to mask high-loss cable troubles by removing most or all of attenuator losses in channel units

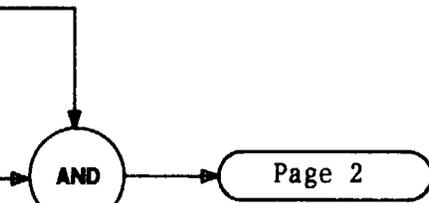
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DETERMINE ATTENUATOR SETTINGS FOR BACK-TO-BACK (TANDEM) CHANNEL UNITS

[1] See FIG. 1 and circuit layout information.
 Arrange for frequency response test out to
 customer station equipment _____

[2] Obtain test equipment per TABLE A and
 verify circuit is seized
 [NOTE 1] _____

[3] Install channel unit extender into channel
 slot and insert channel unit into it _____



NOTE 1
 Circuit can be seized and held
 for setting equalizers on 2-wire
FXO units by installing **SPTS** in far
 end bank (same channel slot) and
 setting switches **A** and **B** to **O**.
 Circuit can be seized and held
 for setting equalizers on 2-wire
FXS units by installing **SPTS** in far
 end bank (same channel slot) with
 switch **A** set to **1** and **B** to **O**
 and using TMS with holding coil
 at station end equipment

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET with Channel Access Unit (CAU)	J98718AL PTS with J98718AJ CAU
Transmission Measuring Set (TMS)	TTS4BNH or equivalent
2 Patch Cords	3P6A
1 Patch Cord	P6AD
1 Patch Cord	3P6D
Channel Unit Extender	J98726MF, List 2

2-WIRE CHANNEL UNIT WITH GAIN TRANSFER

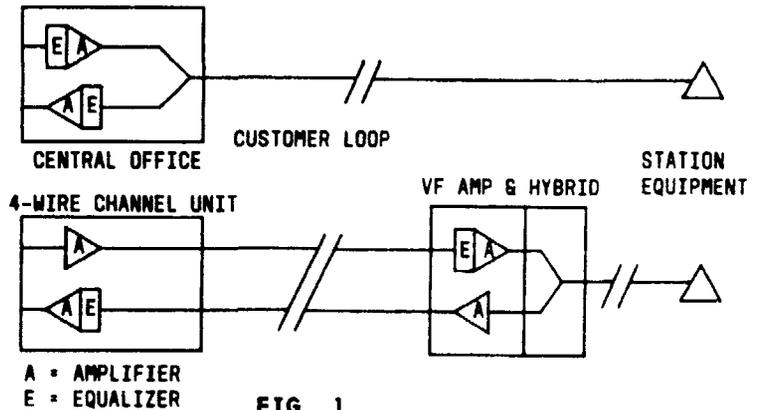


FIG. 1

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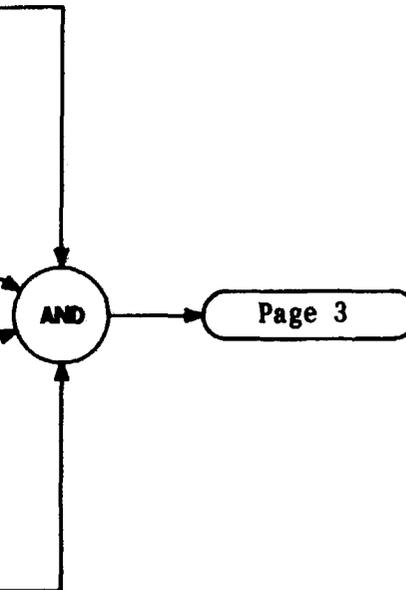
DETERMINE EQUALIZER SETTINGS

[4] Connect power cord on PTS
to ac outlet and set PWR
switch to ON

[5] Set switches on CAU
as follows:
REJ FLT to OUT
SEND LEVEL db to 0
TEST to CHAN DROP

[6] Condition TMS
[DLP-539]

[7] Verify TMS controls are set
as follows:
FUNCTION to SEND+TALK+REC,
LINE to REC, REC IMP to 6000,
and REC LEVEL to 0



DETERMINE EQUALIZER SETTINGS

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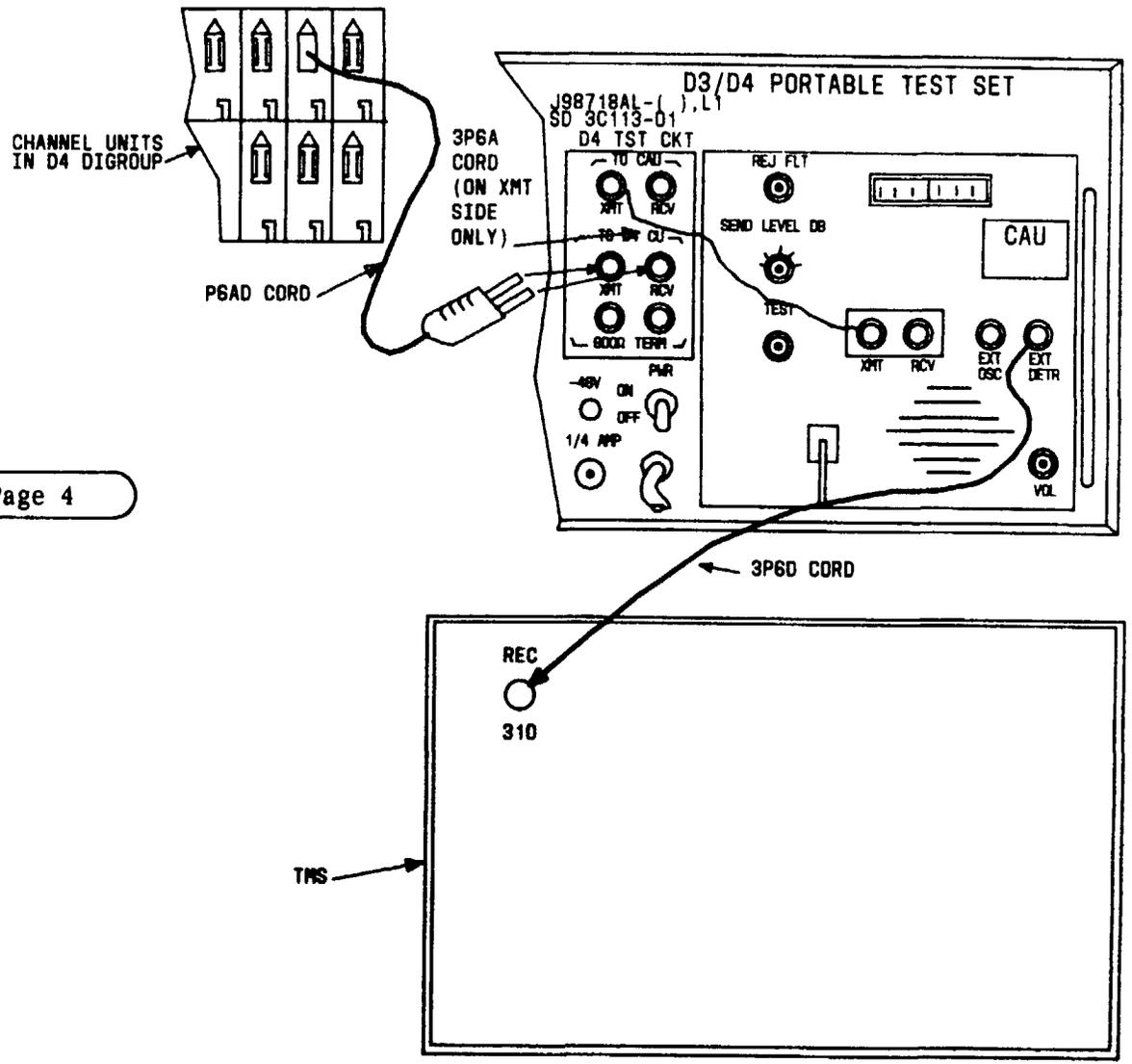
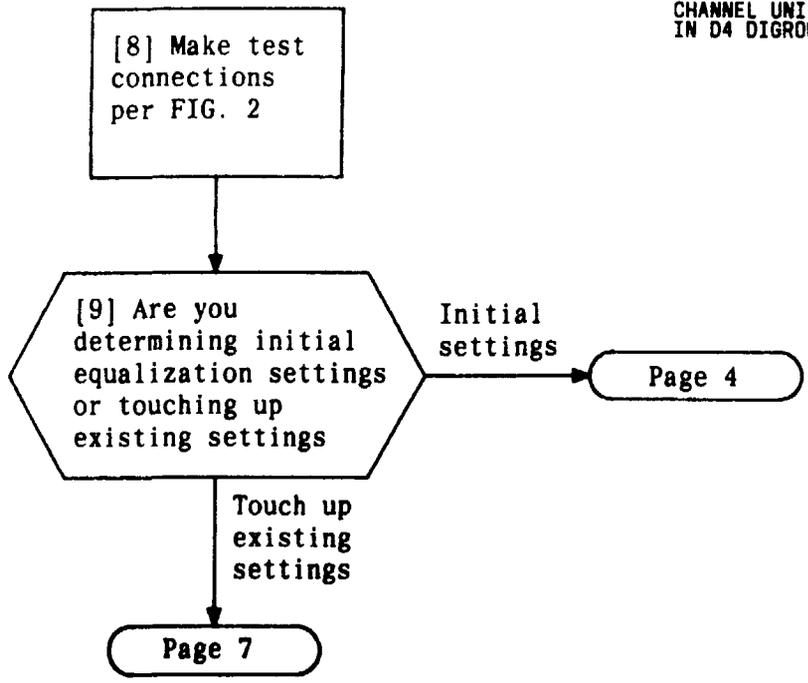


FIG. 2

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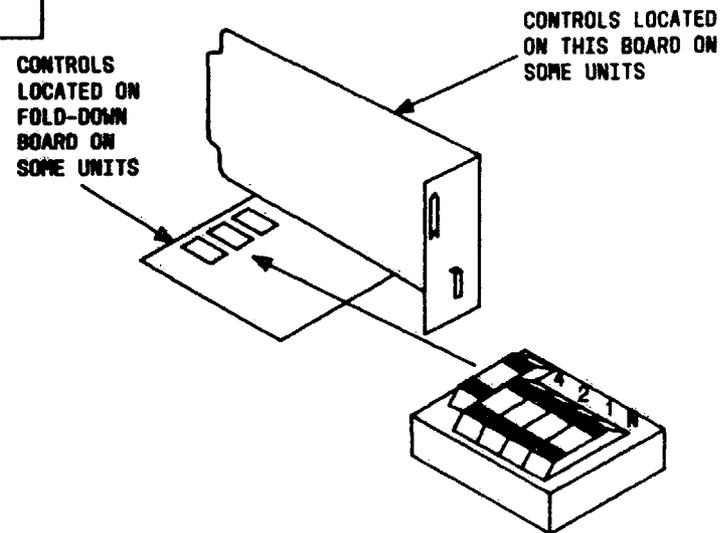
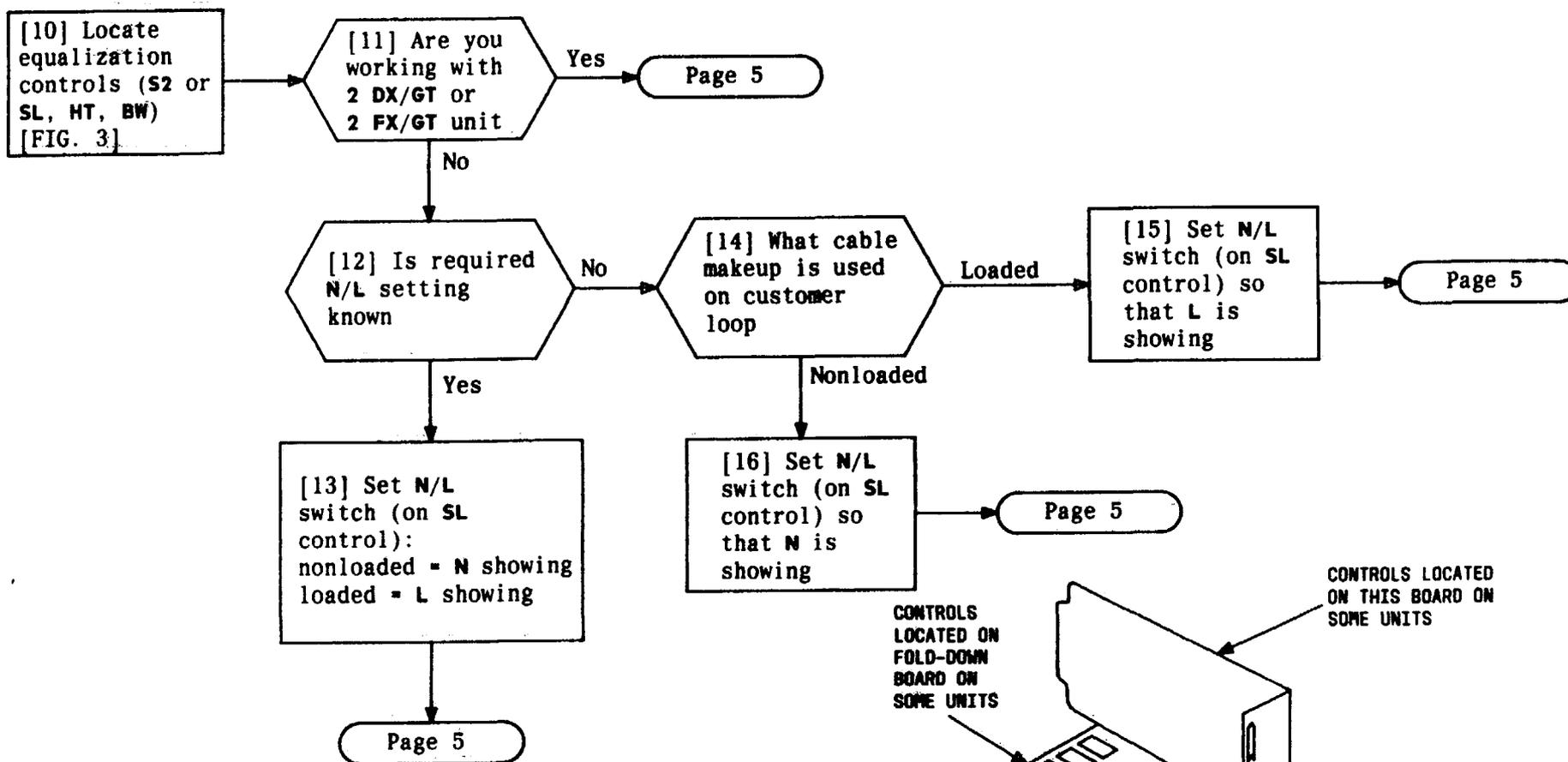


FIG. 3 - Equalization Control

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[17] Have tester at customer end send 400 Hz at test level for that location

[18] Record received level

[19] Have tester send 1000 Hz

[20] Record received level

400 and 1000 Hz tone received

AND

[21] Is difference between 400 Hz and 1000 Hz levels within limits per FIG. 5 (2-wire) or FIG. 6 (4-wire) [NOTE 2]

Yes

Page 6

No

[22] Attempt to get difference between 400 Hz and 1000 Hz levels per FIG. 5 or 6 by adjusting SL on 4-wire units or S2 (SL) on 2-wire units [FIG. 4], while tester sends 400- and 1000-Hz tones as applicable as many times as necessary [NOTE 3]

[23] Can levels per FIG. 5 or 6 be obtained [NOTE 2]

No

Page 8 step 38

Yes

Page 6

SLIDE SWITCHES:
COVER NUMBERS
TO REMOVE,
EXPOSE NUMBERS
TO ADD

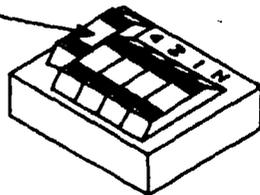


FIG. 4

NOTES

2. FIG. 5 and 6 show objectives and not necessarily requirements. Response limits are determined by overall circuit
3. Control on 2-wire units is stamped S2 or SL

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[24] Have tester send 2000 Hz and you record level

[25] Have tester send 2800 Hz and you record level

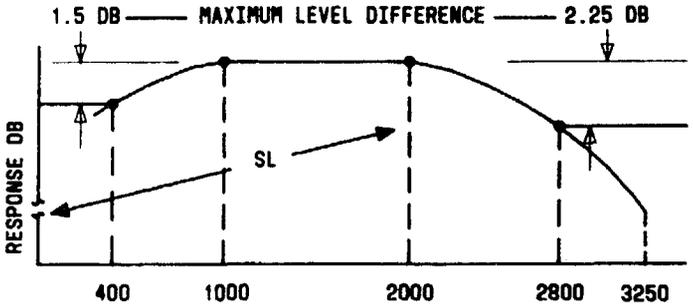
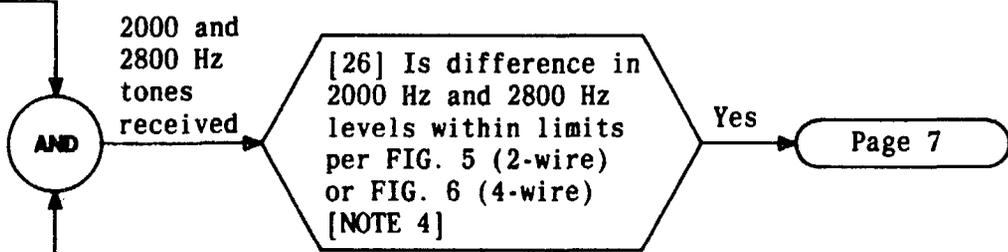


FIG. 5 - 2-Wire Response

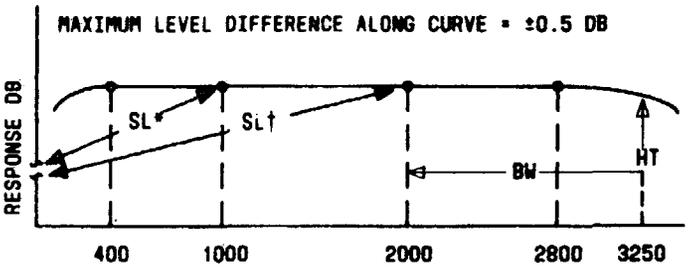
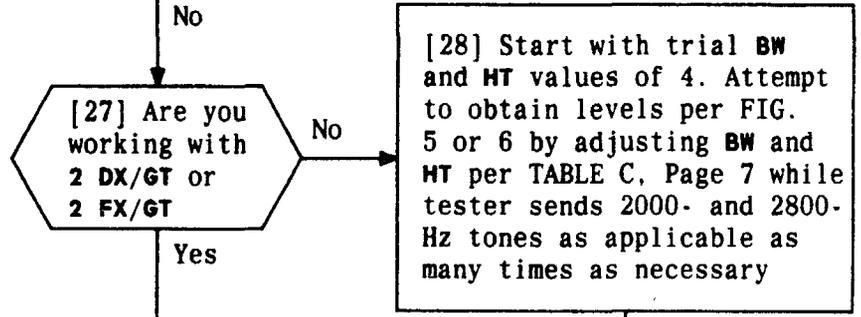


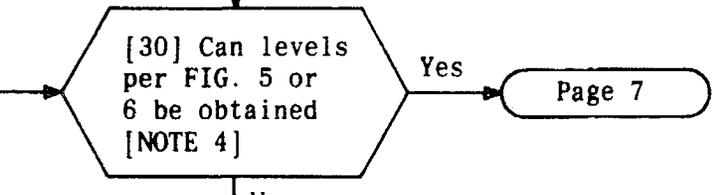
FIG. 6 - 4-Wire Response

* RANGE OF SL CONTROL WITH M/L SWITCH TO L
 † RANGE OF SL CONTROL WITH M/L SWITCH TO M



[29] Attempt to readjust S2 (SL) to obtain difference

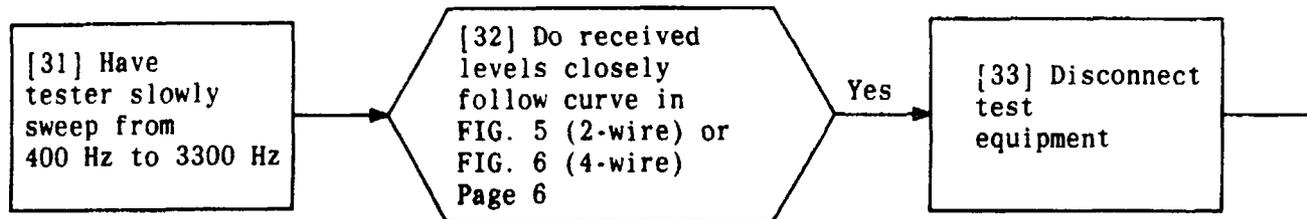
[28] Start with trial BW and HT values of 4. Attempt to obtain levels per FIG. 5 or 6 by adjusting BW and HT per TABLE C, Page 7 while tester sends 2000- and 2800-Hz tones as applicable as many times as necessary



NOTE 4
 FIG. 5 and 6 show objectives and not requirements. Response limits are determined by overall circuit

DETERMINE EQUALIZER SETTINGS

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[34] Attempt to obtain proper levels adjusting S2 (SL) only on 2-wire GT units, or SL for lows and BW and HT for highs on 4-wire units (See TABLE C)

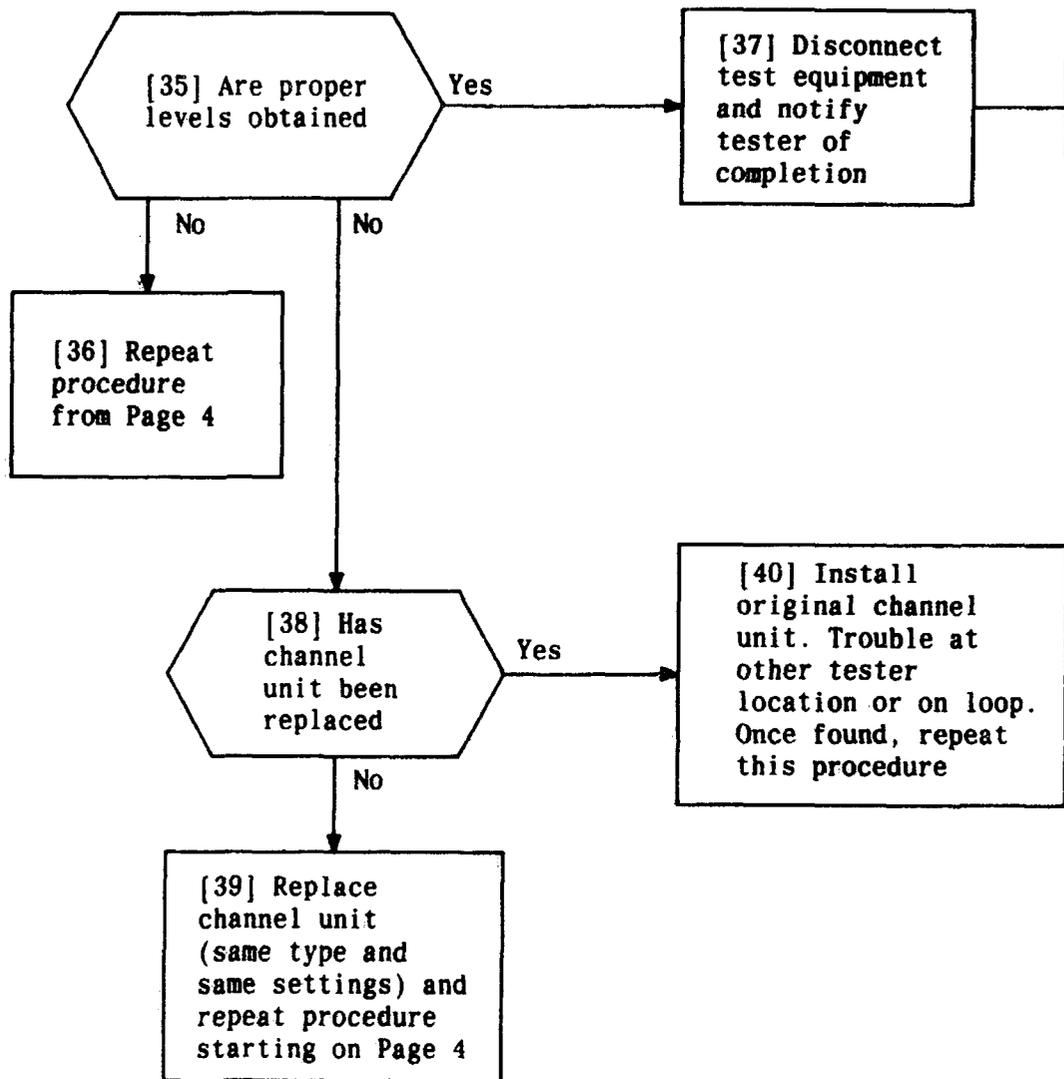
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TABLE C		
TROUBLE		ADJUSTMENT
2.4 - 3.0 kHz	3.0 - 3.2 kHz	
Too much loss	OK	Increase BW; increase HT if necessary
Too much loss	Too much loss	Increase BW; adjust HT if necessary
Too much loss	Too much gain	Increase BW; decrease HT
OK	Too much loss	Increase HT; adjust BW*
OK	Too much gain	Decrease HT; adjust BW
Too much gain	OK	Decrease BW; adjust HT
Too much gain	Too much loss	Decrease HW; increase HT if necessary
Too much gain	Too much gain	Decrease BW; decrease HT

* With small BW values, HT has almost no effect on midband, but with larger BW values it does

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DETERMINE EQUALIZER SETTINGS

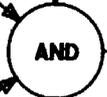
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SUMMARY

See NOTE 1. With tester at station end, arrange to measure transmission level in both directions (to and from channel drop). Make connections per FIG. 2. Have tone applied in only one direction at a time to prevent

interference on 2-wire circuits. Set channel unit attenuators to produce required TLP at channel and at station end. Gain of any voice amplifiers at station end can also be adjusted

- [1] See NOTE 1, FIG. 1, and circuit layout information. Arrange for loss test with tester at customer station equipment
- [2] Obtain test equipment per TABLE A and verify service is removed from test channel
- [3] Install channel unit extender into channel slot and insert channel unit into it
- [4] Condition TMS [DLP-539] and verify controls are set as follows:
FUNCTION to SEND+TALK+REC, LINE to REC, REC IMP to 600Ω, and REC LEVEL to 0



Page 2

NOTE 1
 Equalization of customer loop at channel unit, if desired, should be accomplished per [DLP-528] before setting attenuators per this procedure

2-WIRE CHANNEL UNIT WITH GAIN TRANSFER

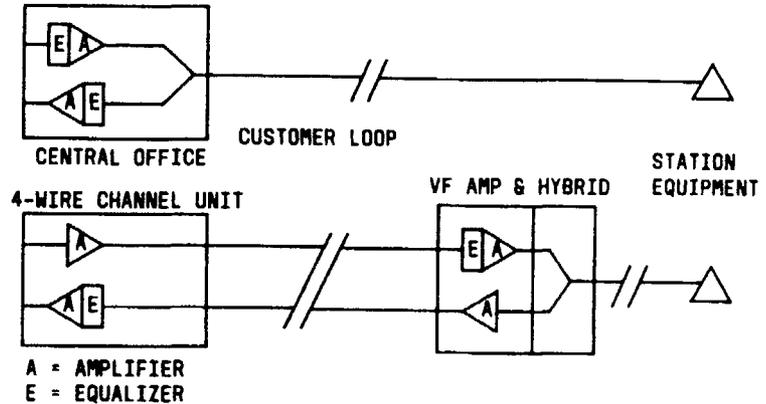


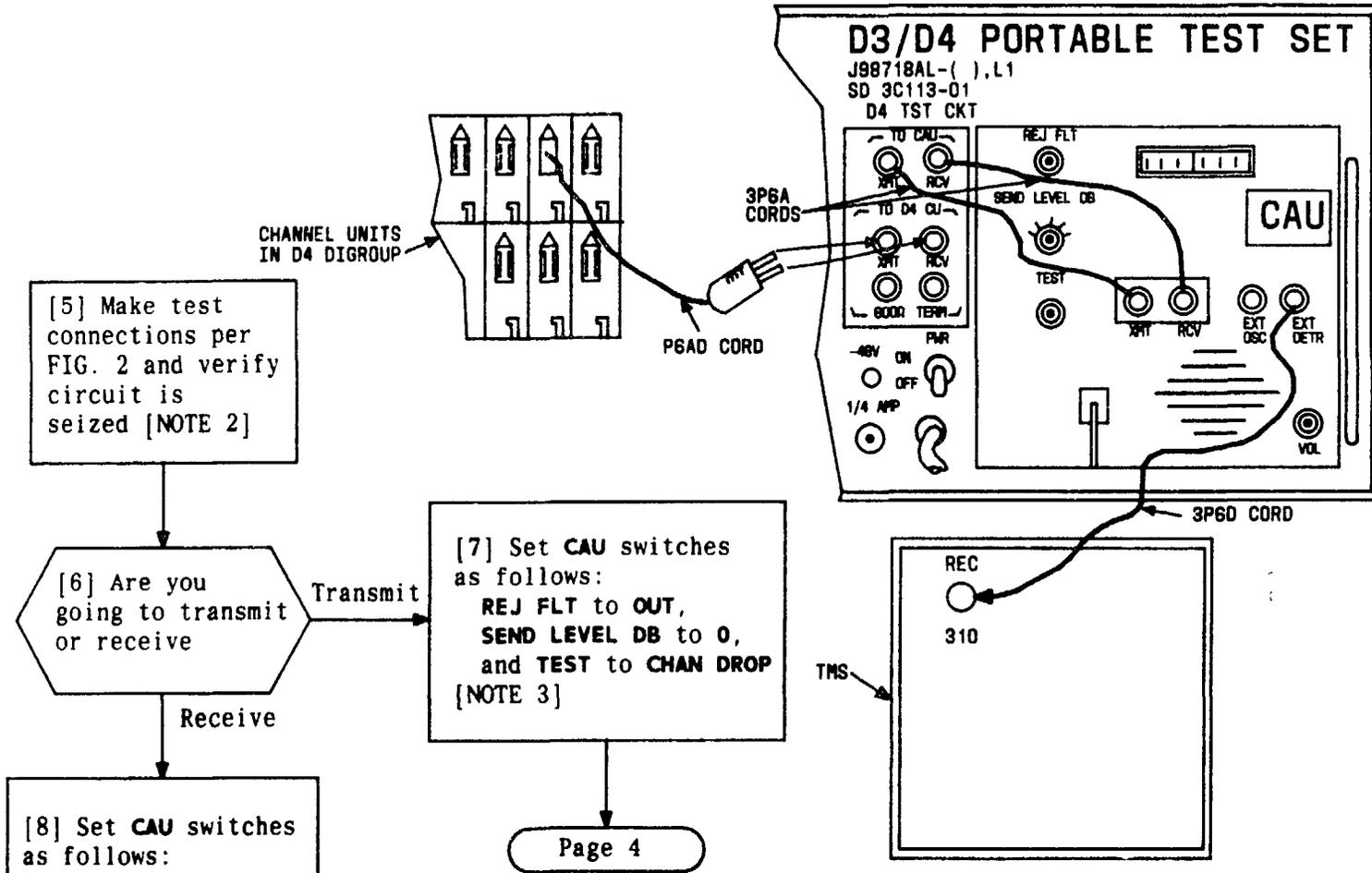
FIG. 1

TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET with Channel Access Unit (CAU)	J98718AL PTS with J98718AJ CAU
Transmission Measuring Set (TMS)	TTS4BNH or equivalent
2 Patch Cords	3P6A
1 Patch Cord	P6AD
1 Patch Cord	3P6D
Channel Unit Extender	J98726MF, List 2

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[5] Make test connections per FIG. 2 and verify circuit is seized [NOTE 2]

[6] Are you going to transmit or receive

Transmit

Receive

[7] Set CAU switches as follows:
 REJ FLT to OUT,
 SEND LEVEL DB to 0,
 and TEST to CHAN DROP
 [NOTE 3]

[8] Set CAU switches as follows:
 REJ FLT to OUT
 SEND LEVEL DB to OFF
 and TEST to CHAN DROP

Page 3

Page 4

FIG. 2

NOTES

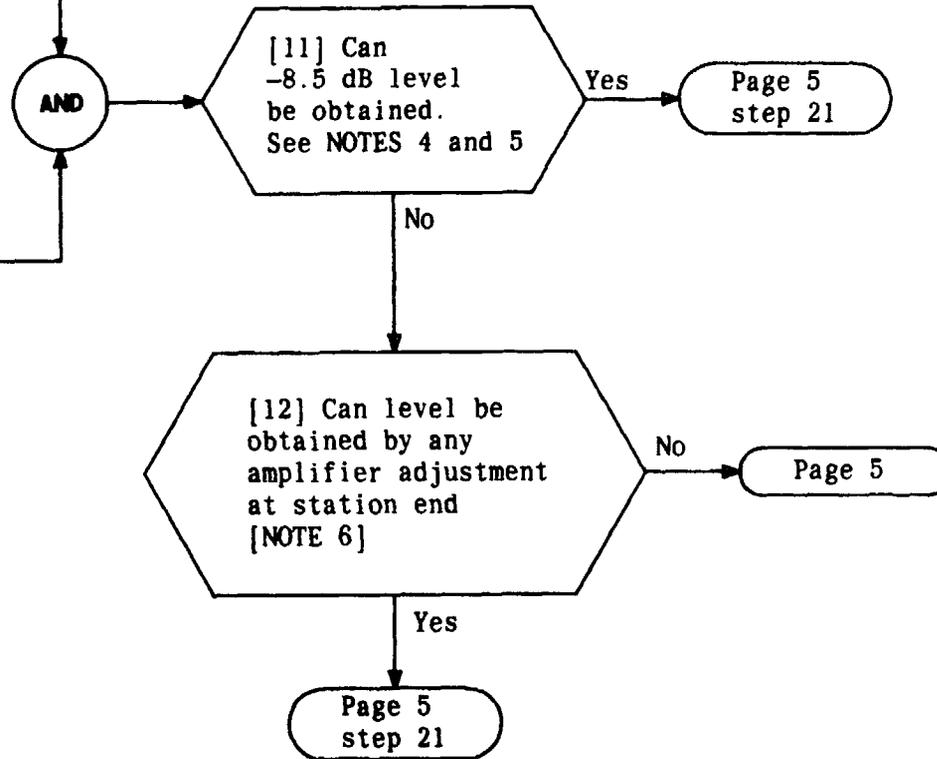
2. Circuit can be seized and held for setting attenuators on 2-wire FXO by installing SPTS in far end bank (same channel slot) and setting switches A and B to 0. Circuit can be seized and held for setting attenuators on 2-wire FXS by installing SPTS in far end bank (same channel slot) with switch A set to 1 and B to 0 and using TMS with holding coil at station end equipment

3. In this configuration, the PTS/CAU applies +4 dBm (normal TLP) back thru channel unit toward drop. If different level is required for circuit, external oscillator must be used and set 4 dBm lower than desired level.

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[9] Have tester at station equipment or intermediate amplifier equipment send 1000 Hz at TLP for that location

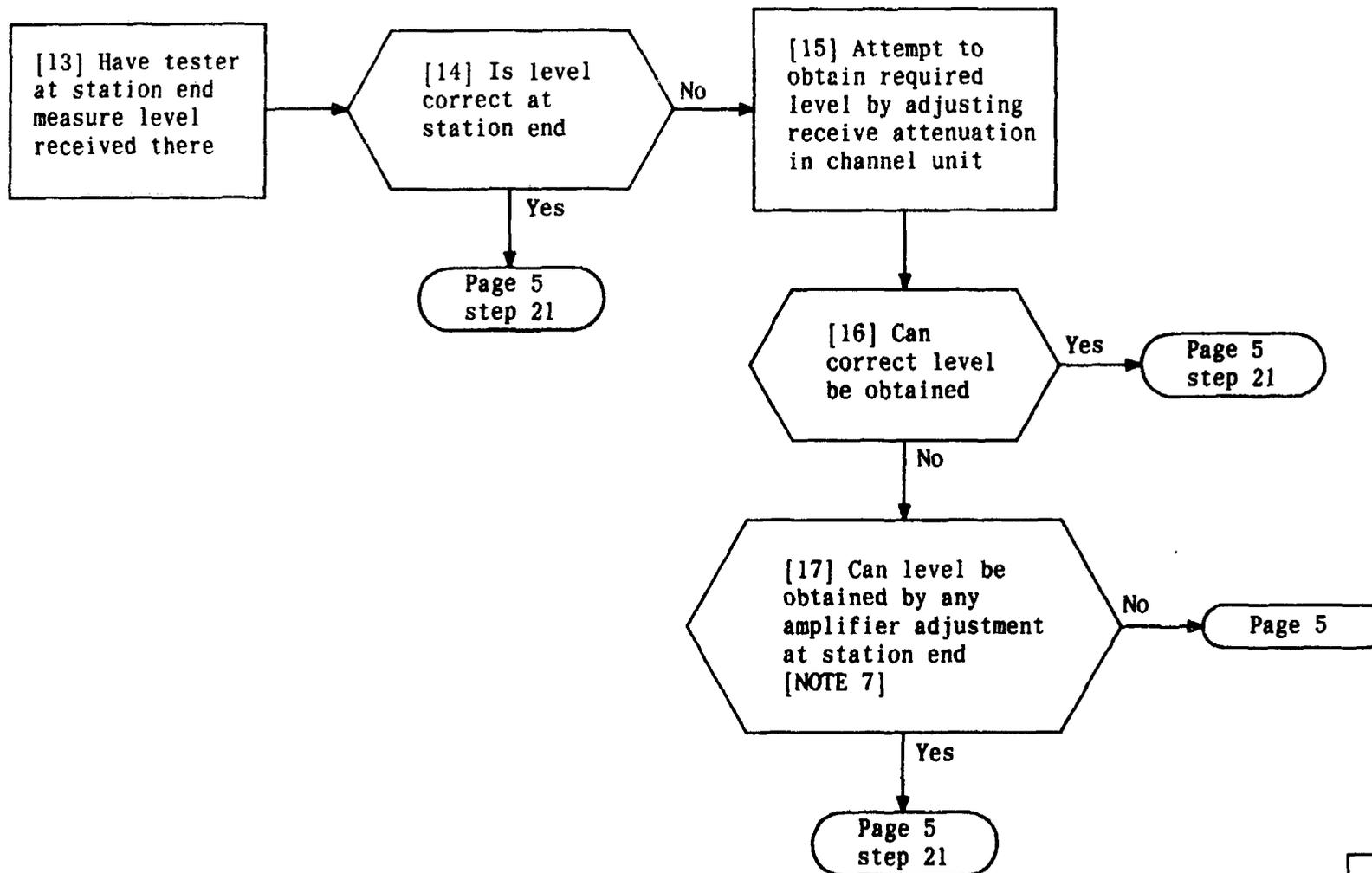
[10] Measure level with TMS and attempt to obtain required level by adjusting transmit attenuation in channel unit



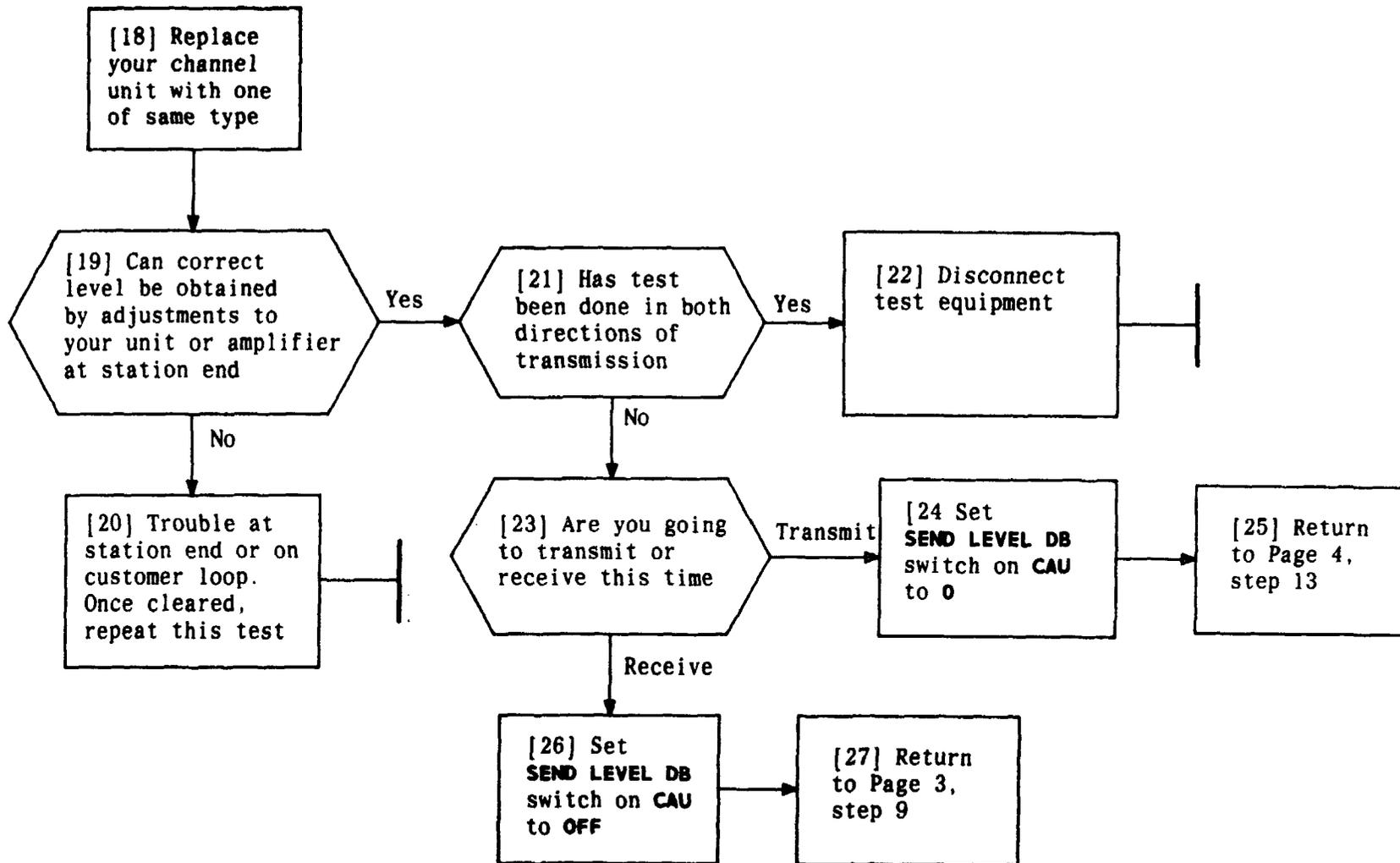
NOTES

4. The portable test set introduces 8.5 dB gain for chan drop measurement; thus -8.5 at the channel unit will appear as 0 dBm at the external TMS
5. Level other than -8.5 dB may be required by WORD document or by engineering. This level, when obtained, will be indicated 8.5 dB higher on external TMS
6. Using near max gain may indicate need to examine circuit for trouble

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NOTE 7	
Using near max gain may indicate the need to examine the circuit for trouble	
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DETERMINE ATTENUATOR SETTINGS FOR SPECIAL SERVICE CHANNEL UNITS

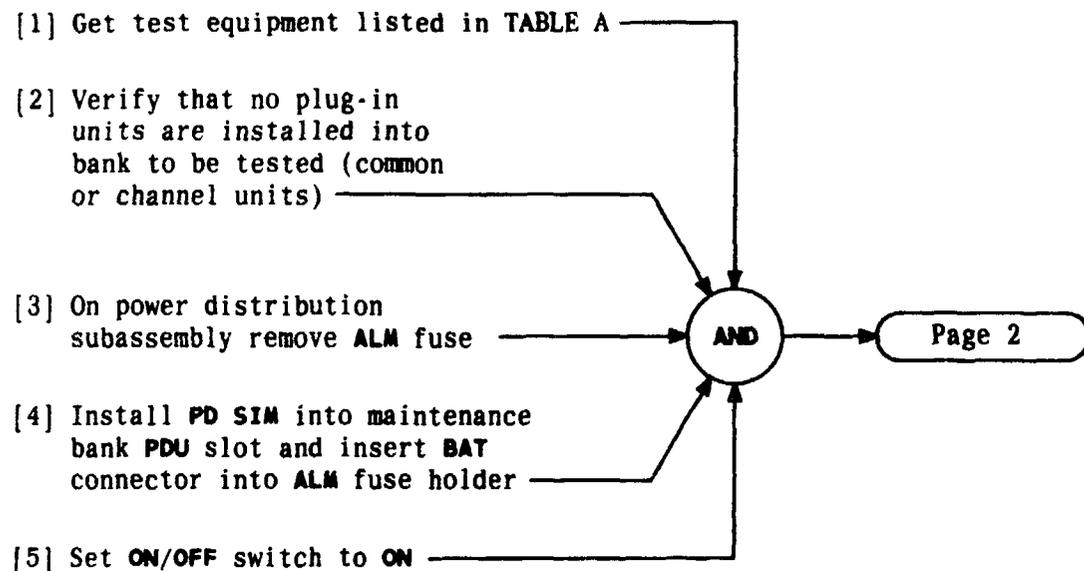


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Common Equipment Voltage Indicator (CEVI)	J98726MA
Power Distribution Simulator (PD SIM)	J98726MB
PWR CONV SIM	J98726MC
Channel Unit Voltage Indicator (CUVI)	J98726MD
Connector Access Unit	ED-3C766

PERFORM POWER WIRING TEST ON D4 MAINTENANCE BANK USING VOLTAGE INDICATORS

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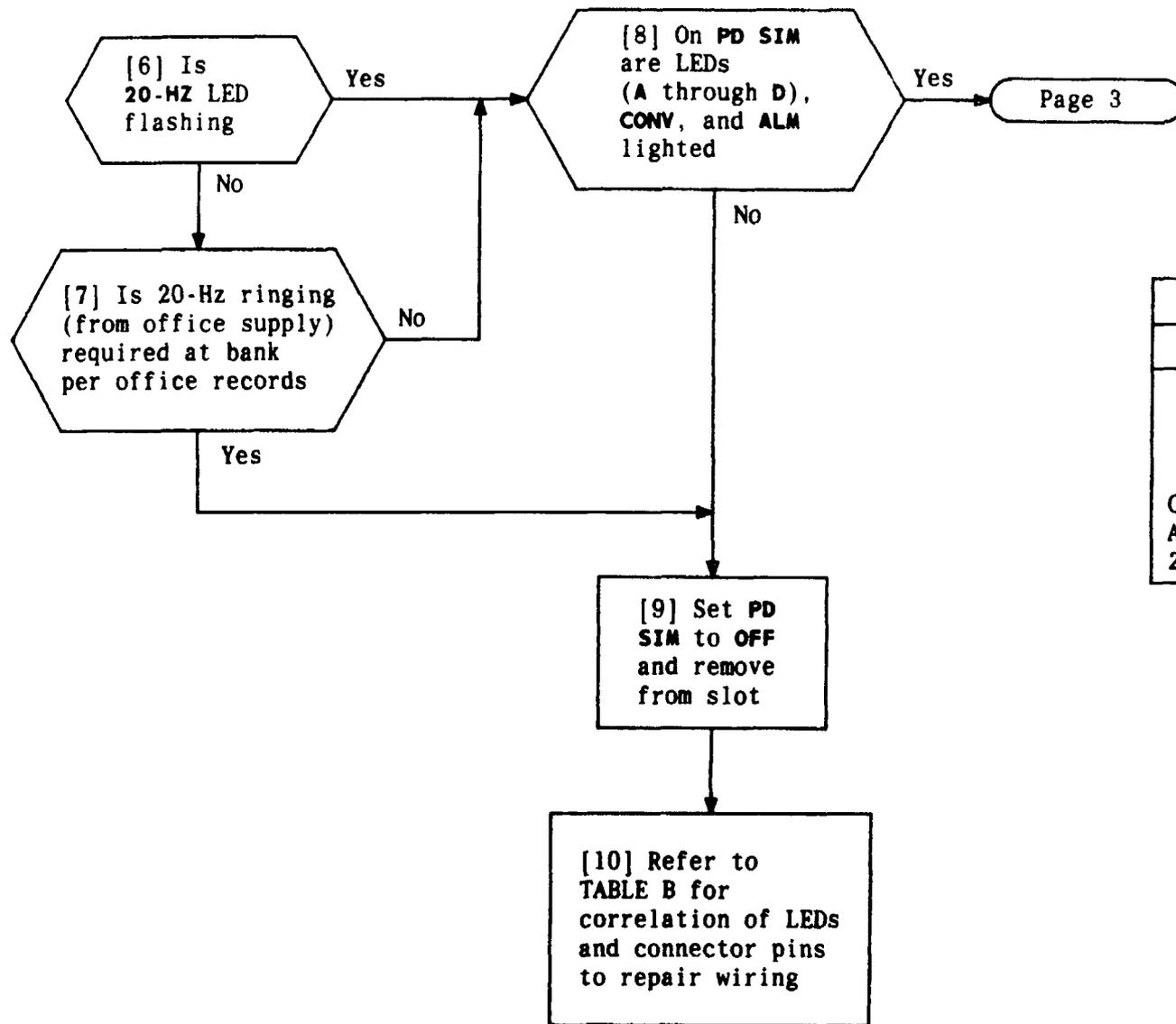


TABLE B		
LED	FUNCTION	PIN
A	-48V output	50, 51
B	-48V output	12, 14
C	-48V output	11, 13
D	-48V output	10
CONV	-48V PCU	15, 16
ALM	-48V alarm	47
20 HZ	20 Hz input to bank	23, 54

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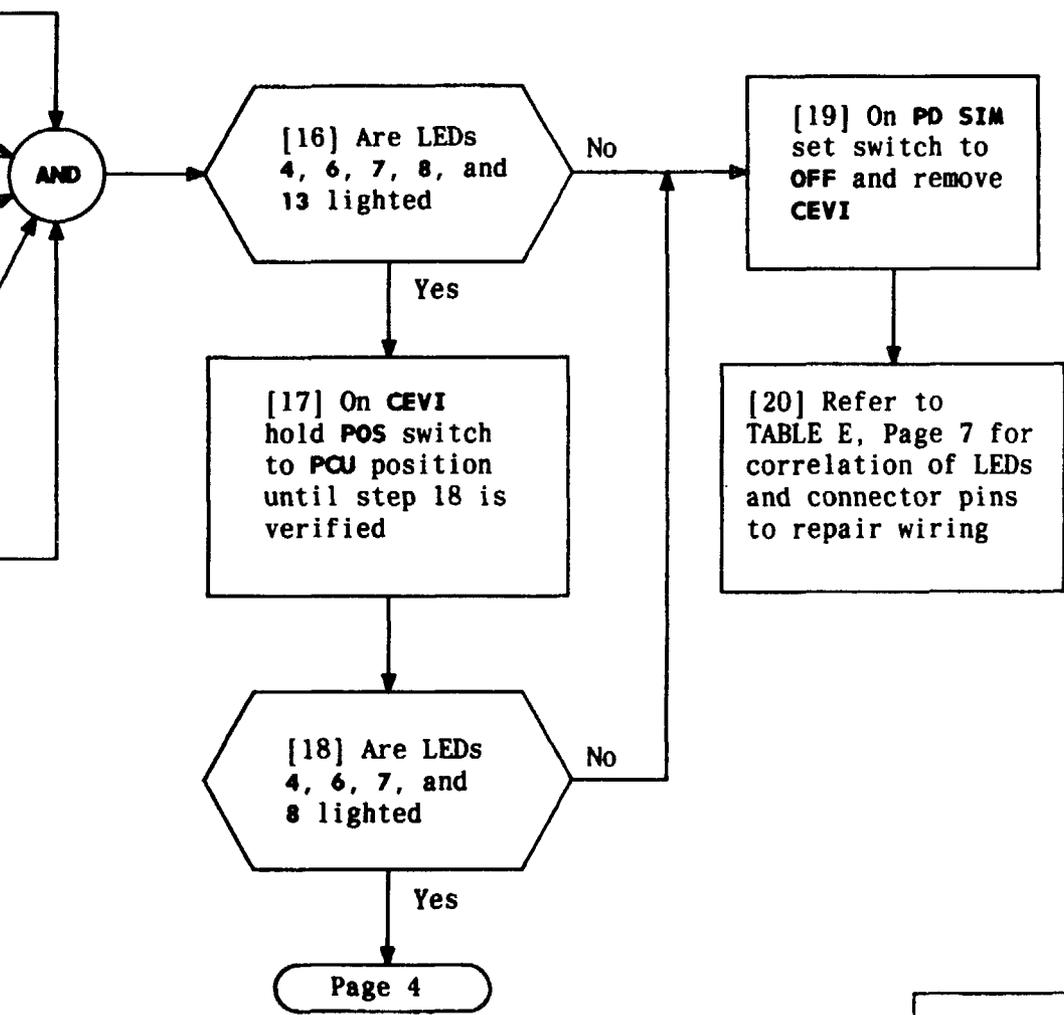
[11] Connect cord marked **CEVI** (supplied with test equipment) between **-20V IN** jack on **CEVI** and **CEVI** jack on **PD SIM**

[12] Install **CEVI** unit into **PCU** slot

[13] Verify **CU** switch is in center position

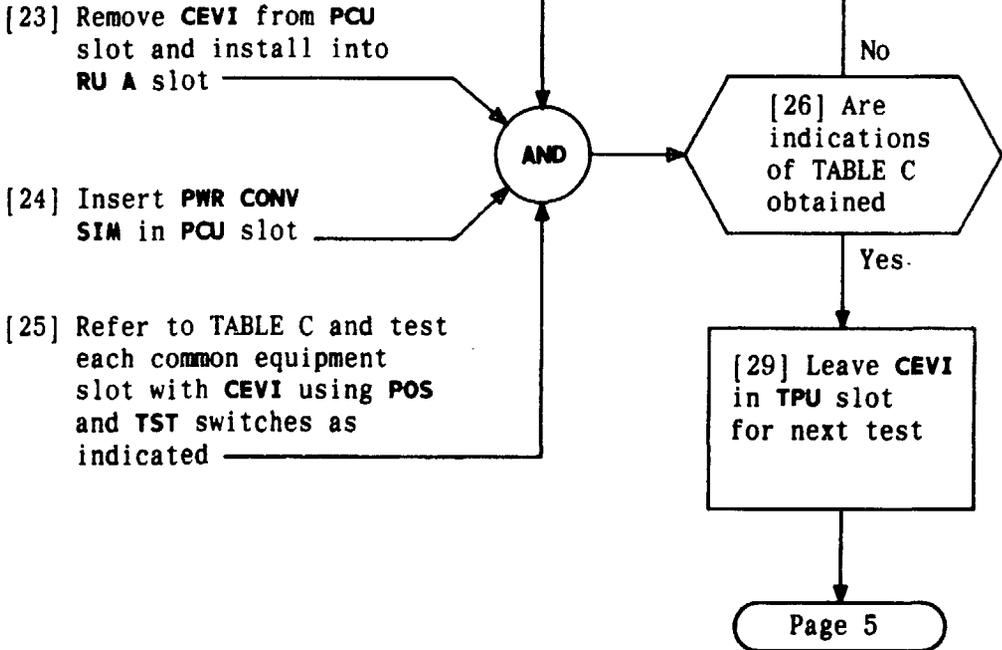
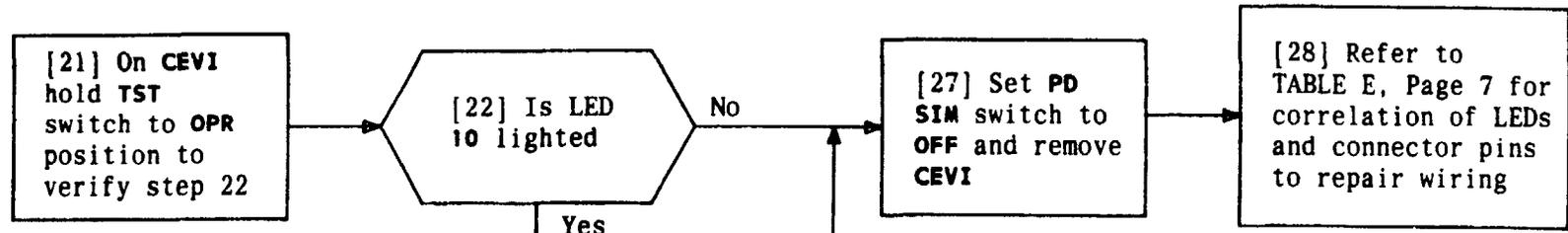
[14] Operate silver toggle switch on top of **CEVI** and observe that all LEDs except 14 are lighted. Replace any LEDs that do not light [DLP-520] [NOTE 1]

[15] Release toggle switch of step 14



NOTE 1 LED 14 may light	
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PERFORM POWER WIRING TEST ON D4 MAINTENANCE BANK USING VOLTAGE INDICATORS



BANK POSITION (SLOT)	INITIAL LIGHTED LED _s	LED _s LIGHTED WITH POS SWITCH IN RU TU POSITION	LED _s LIGHTED WITH TST SWITCH IN OPR POSITION
RU A	1, 2, 3, 7, 13	1, 2, 3, 7	9, 10, 14
RU B	1, 2, 3, 7, 13	1, 2, 3, 7	9, 10, 14
SU (2 slots)	1, 2, 3, 7	§	9, 10
ACU A	1 thru 8	§	9, 10
ACU B	1 thru 8	§	9, 10
TU A	1, 2, 3, 7, 13	1, 2, 3, 7	9
TU B	1, 2, 3, 7, 13	1, 2, 3, 7	9
LIU	1 thru 7	§	9
*LIU right side connector	1, 2, 3, 7	§	9, 10
OIU	1, 2, 3, 4, 7, 8	§	9, 10
LIU 4T	1, 7	§	9
*LIU 4T right side connector	1, 2, 3, 7	§	9, 10
TPU	1, 4, 5, 6, 8	§	9, 10

*ED-3C766 connector access unit must be installed into LIU and LIU 4T slots to enable testing of right side connectors
 § No test required

PERFORM POWER WIRING TEST ON D4 MAINTENANCE BANK USING VOLTAGE INDICATORS

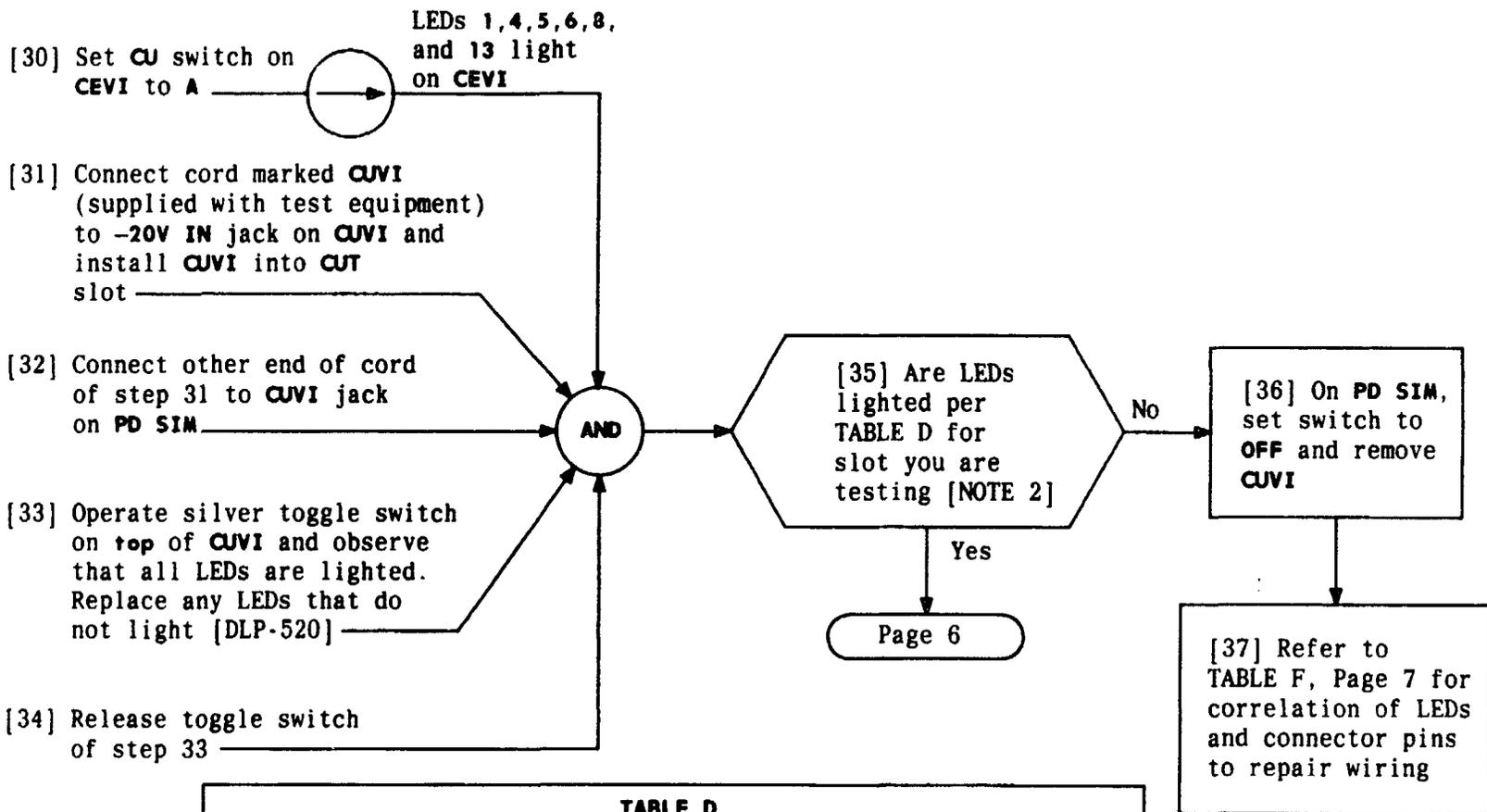
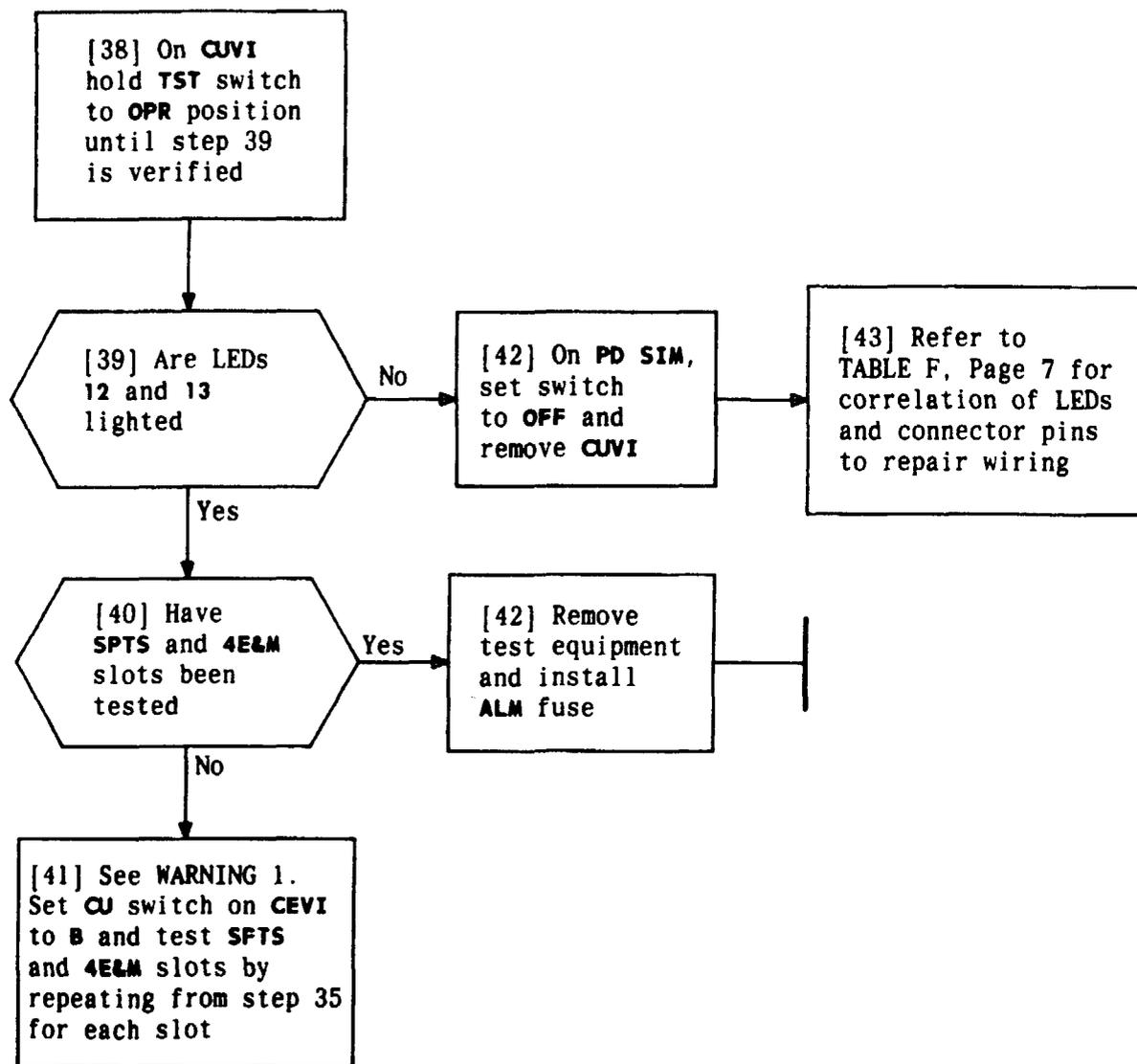


TABLE D	
SLOT	LED LIGHTED
CJT	1 thru 13 and 16*
SPTS	1 thru 13*†
4E&M	1, 2, 3, 4, 7, 8, 9, 10, 11, 13, and 16
* LEDs 2 thru 6, 11, 12, 13, and 16 will light if A and B options are in bank and +24V is supplied from 2ESS	
† LED 16 will light in SPTS slot only if 48V is supplied to pin 31 by V option	

NOTE 2	
Steps 35 thru 39, test CUT slot first, SPTS second, and 4E&M third	
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PERFORM POWER WIRING TEST ON D4 MAINTENANCE BANK USING VOLTAGE INDICATORS



PERFORM POWER WIRING TEST ON D4 MAINTENANCE BANK USING VOLTAGE INDICATORS

WARNING 1	
<i>Care should be taken when installing CUVI into 4E&M slot to protect wiring on CUVI and CEVI units</i>	
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TABLE E - CEVI LEDs		
LED	FUNCTION *	PIN
1	+5V circuit	29
2	-12V circuit	50
3	+12V circuit	23
4	-48V circuit	19
5	-48V circuit	20
6	-48V circuit	46
7	12V GRD	24
8	48V GRD	22
9	5V GRD	2
10	Frame GRD	1
11	5V over voltage circuit	29
12	12V over voltage circuit	50
13	Foreign voltage or GRD	All leads except power and GRD leads
14	Foreign voltage	All leads except power and GRD leads
15	12V GRD (indicates foreign voltage on GRD lead)	24
16	48V GRD (indicates foreign voltage on GRD lead)	22
17	5V GRD (indicates foreign voltage on GRD lead)	2

* When PD SIM and PWR CONV SIM are in bank, voltage circuits are as follows: +5V = -15V, +12V = -8V, -12V = -32V, and -48V = -36V

TABLE F - CUVI LEDs		
LED	FUNCTION *	PIN
1	+5V circuit	30
2	-12V circuit	2
3	RU lead	39
4	+12V circuit	4
5,6	-48V circuit	43,54
7,8,9,10	TPU leads	26,44,50,53
11	12V GRD	3
12	SIG GRD (TST switch in normal position)/ 5V GRD (TST switch operated)	21
13	SIG GRD (TST switch in normal position)/ Frame GRD (TST switch operated)	5 17
14	5V over voltage circuit	1
15	12V over voltage circuit	26,30,44,50,53 2,39
16	Foreign voltage or GRD	All leads except power and GRD leads
17	Foreign voltage	All leads except power and GRD leads
18	5V and 12V GRD (indicates foreign voltage or open circuit)	5,3
19	SIG GRD (indicates foreign voltage or open circuit)/ frame GRD	21,17 1
20	48V GRD (indicates voltage on these GRDs)	15,27

* When PD SIM and PWR CONV SIM are in bank, voltage circuits are as follows: +5V = -15V, +12V = -8V, -12V = -32V, and -48V = -36V

PERFORM POWER WIRING TEST ON D4 MAINTENANCE BANK
USING VOLTAGE INDICATORS

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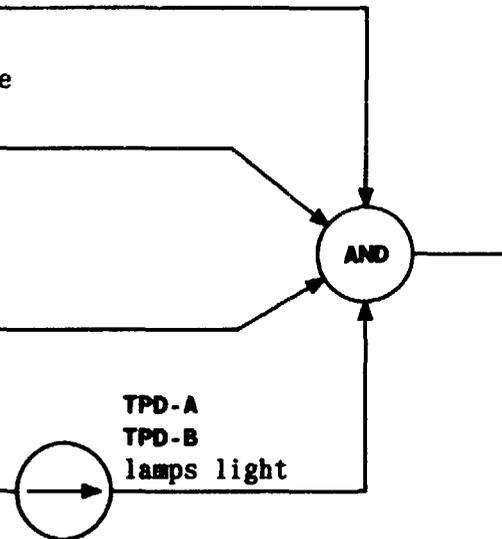
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[1] Obtain KS-21838, L1 extractor or longnose pliers

[2] In window on TPU plug-in, place white plugs in SEQ position for each digroup [FIG. 1], using tool

[3] Get two equalizers per TABLE A for type LIU to be installed in bank and install equalizers

[4] Install TPU plug-in in TPU slot



LIU TYPE	EQUALIZER CODE
1, 2, or 3	ED-3C655-30, G1
4	ED-3C656-30, G1
4A	ED-3C656-30, G7

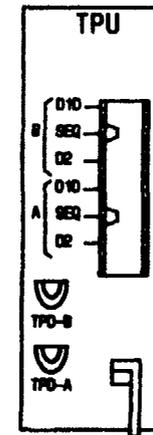


FIG. 1

INSTALL TPU EQUALIZERS AND SET CHANNEL COUNTING OPTION - D4 MAINTENANCE BANK

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[1] Install MB ALM in ALM slot (upper shelf) and set switch to ALARM DISAB [NOTES 1 and 2]

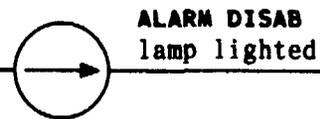
[2] Remove plastic cover from rear of bank

[3] Install 1A MBTS and 1B MBTS, tighten retaining screws on rear, and install plastic cover removed in step 2

[4] Set all switches on 1A MBTS and 1B MBTS to out position (black showing)

[5] Install any other units for upper shelf [FIG. 1, Page 2]

[6] Refer to TABLE A and install plug-ins in designated slots [FIG. 1]



Plug-ins installed; ALARM DISAB on

TABLE A			
MODE 1	MODE 2	MODE 3	MODE 4
(2) TU	(2) TU	(2) TU	(2) TU
(2) RU	(2) RU	(2) RU	(2) RU
(1) ACU (Digroup A)	(2) ACU	(2) ACU	(2) ACU
(1) LIU-1	(1) LIU-2	(1) LIU-3	(2) LIU-4 (T and R)
	(1) SU		(2) SU

NOTES

- Modes 1, 2, and 3 require J98726MG MB ALM unit. Modes 4 and 4A require J98726ML MB ALM unit.
- List 9 Maintenance Bank requires J98726MG-2, L2 MB ALM unit. List 1 Maintenance Bank can accept J98726MG-1, L1 or L2 MB ALM unit.

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INSTALL PLUG-INS IN D4 MAINTENANCE BANK

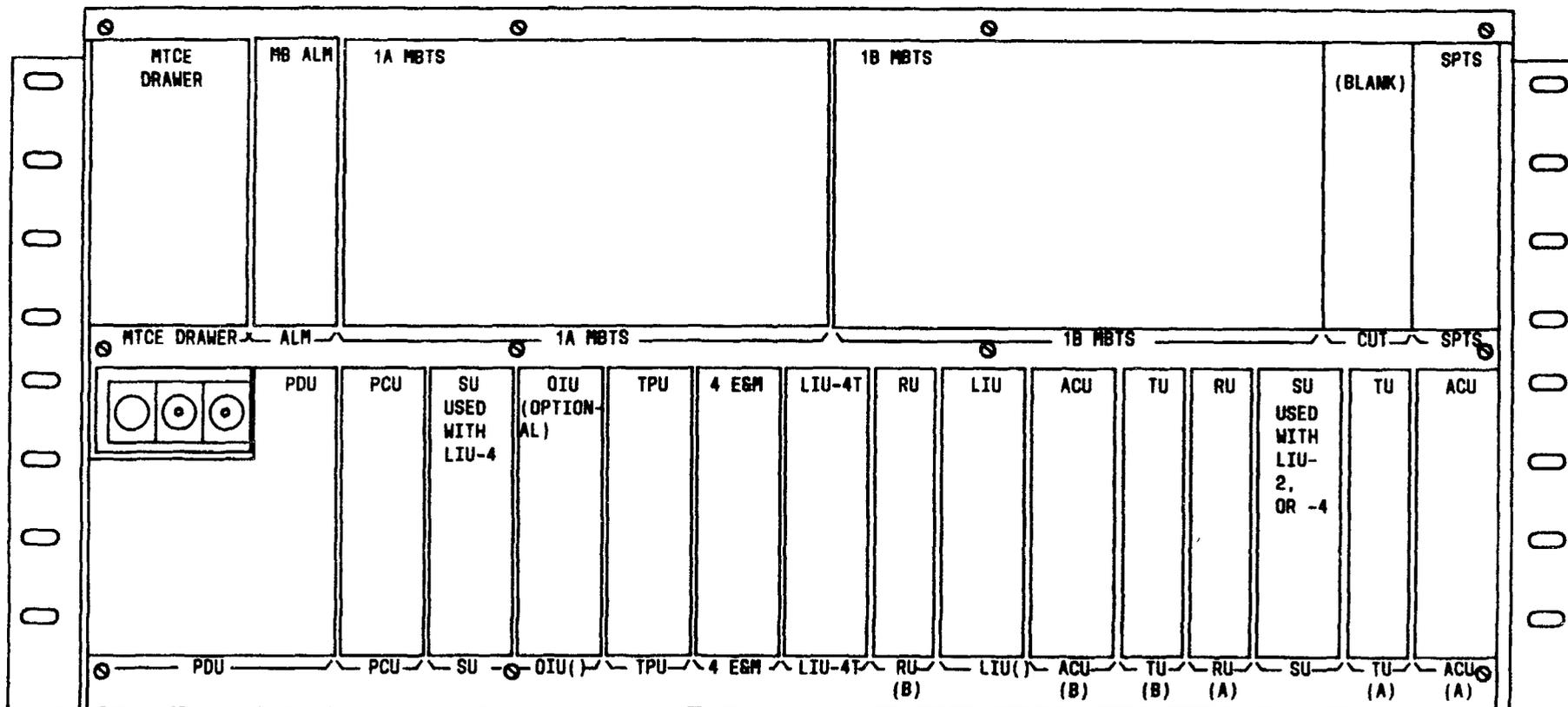


FIG. 1

INSTALL PLUG-INS IN D4 MAINTENANCE BANK

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[1] On MB ALM unit set switch to ALARM DISAB position

[2] On 1B MBTS depress switch 9 so that green surface shows

[3] On 1B MBTS verify that switches 1 thru 8 and 10 thru 17 are extended (black showing)

[4] Refer to FIG. 1 and identify digroup positions of maintenance bank [NOTE 1]

[5] Move SPTS from SPTS position to CUT position (digroup A)

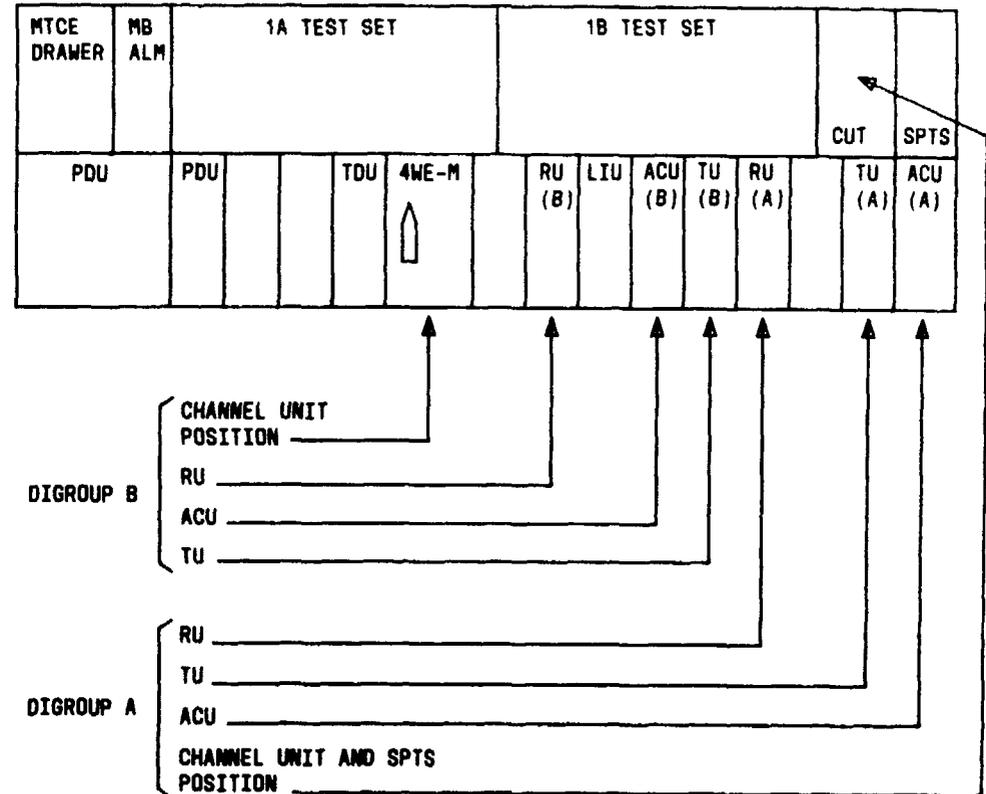


FIG. 1

NOTE 1
 Identity of each digroup is necessary because transmission tests are required on both digroups

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PREPARE D4 MAINTENANCE BANK FOR TRANSMISSION TESTS

SUMMARY

Make test connections per FIG. 1. Insert pin plug into R CODE on RU to test receiver gain. The meter CAU must indicate in black area for receiver gain or green-black-green area for net loss

- [1] Obtain equipment listed in TABLE A and check calibration of CAU [DLP-518] [NOTE 1]

On CAU:

- [2] Set TEST switch to CHAN LINE
- [3] Set REJ FLT switch to OUT
- [4] Make test connections per FIG. 1
- [5] Set SEND LEVEL DB switch to OFF
- [6] See NOTES 2 and 3. At digroup to be tested, insert pin plug into R CODE jack on RU

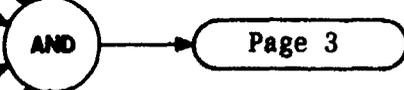


TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
1 Patch cord	P6AD
Pin Plug	KS-19531

NOTES

1. When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble
2. Switch on MB ALM should be set to ALARM DISAB
3. On 1B MBTS, switch 9 should be depressed showing green and all others showing black

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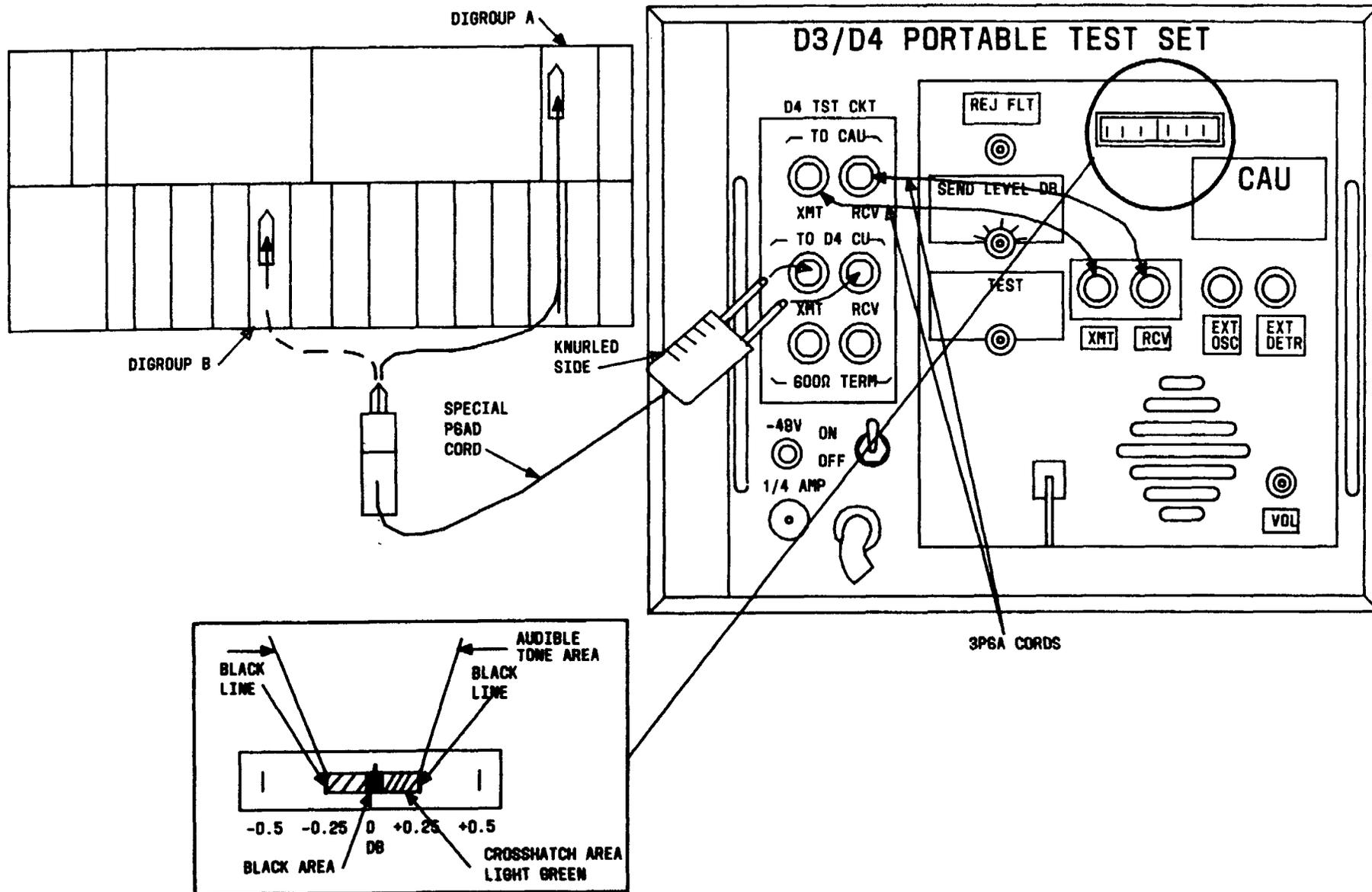
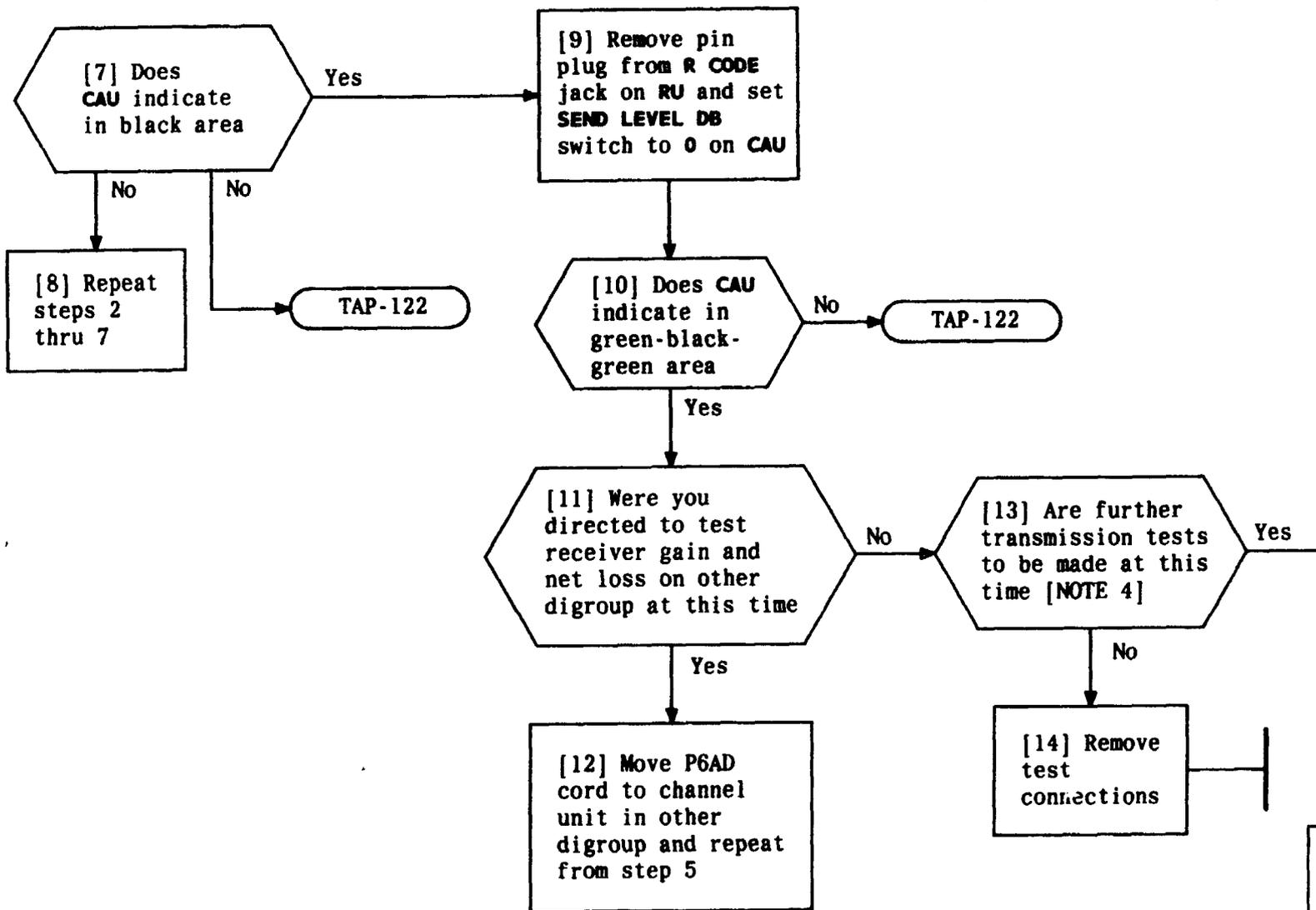


FIG. 1

PERFORM D4 MAINTENANCE BANK RECEIVER GAIN AND NET LOSS TEST

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NOTE 4
 All transmission tests can be performed on looped bank before removing connections

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SUMMARY

Make test connections per FIG. 1 and measure noise. Level should be 23 dBrnc or less

- [1] Get test equipment per TABLE A and check calibration of NMS [DLP-519]
- [2] Verify switches are set as follows; switch on MB ALM to ALARM DISAB and switch 9 on 1B MBTS depressed green showing
- [3] Make test connections per FIG. 1, Page 2
- [4] On PTS-CAU, set REJ FLT switch to OUT, SEND LEVEL DB to OFF, TEST switch to CHAN LINE
- [5] On NMS, set FUNCTION switch to 600/900, NORM-DAMP switch to DAMP, DBRN switch to 85; and weighting network so that C-MESSAGE is aligned with WTG
- [6] On NMS, rotate DBRN switch counterclockwise for on-scale reading
- [7] Verify switch on MB ALM is set to ALM DISAB position and that switch 9 on 1B MBTS is showing green and all others are showing black

AND

NMS calibration checked, NMS/PTS switches set, and connections made

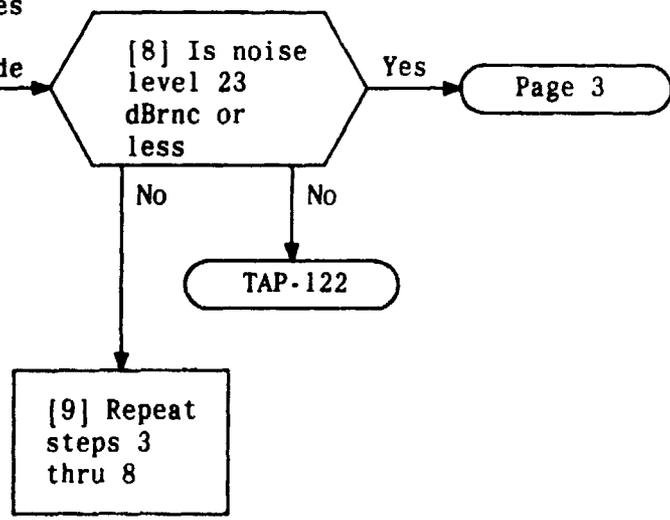


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise Measuring Set (NMS)	J94003C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
1 Patch Cord	P6AD
2 Patch Cords	3P6A
1 Patch Cord for NMS	3P6D

PERFORM D4 MAINTENANCE BANK IDLE CIRCUIT NOISE TEST

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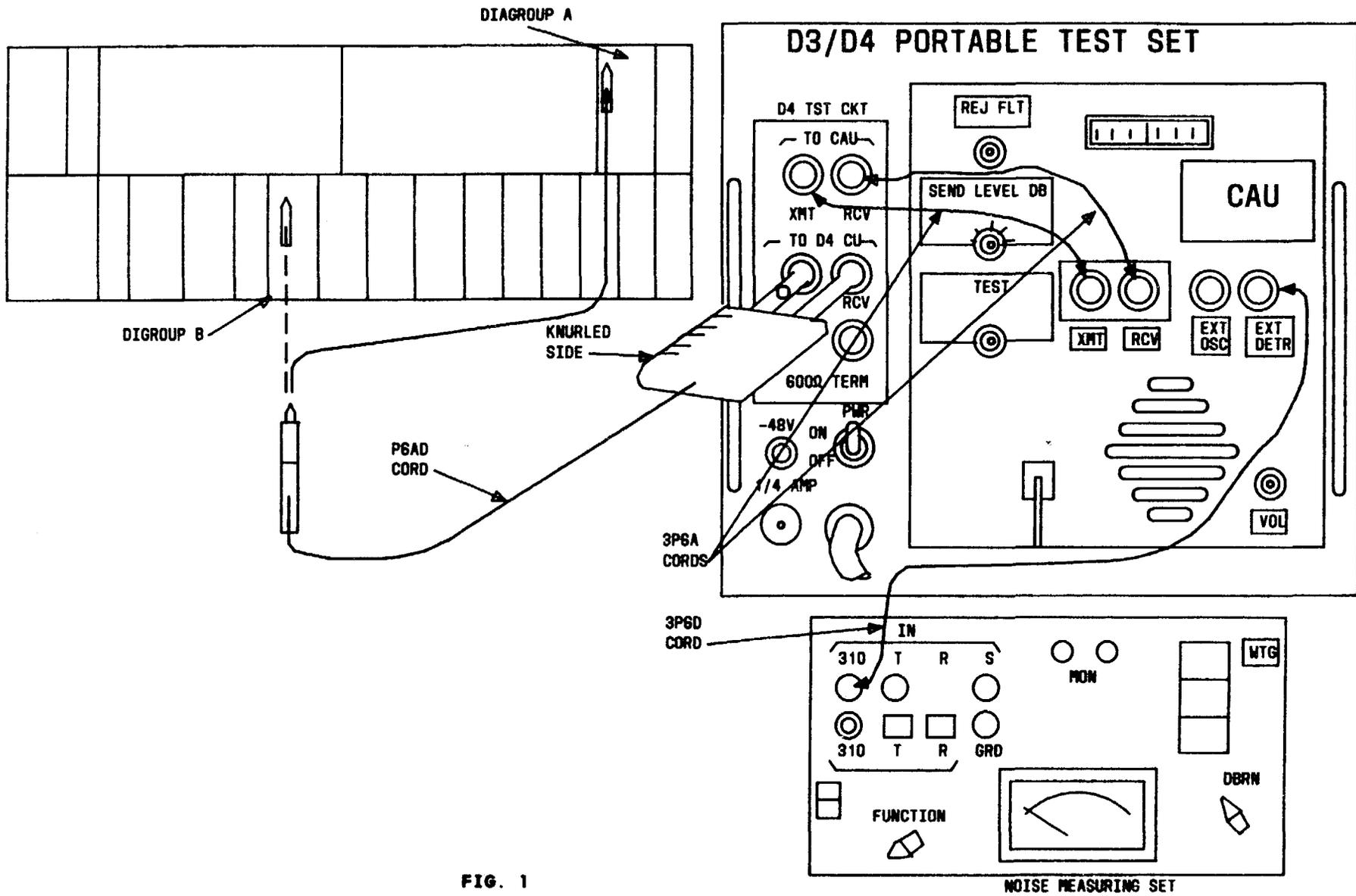
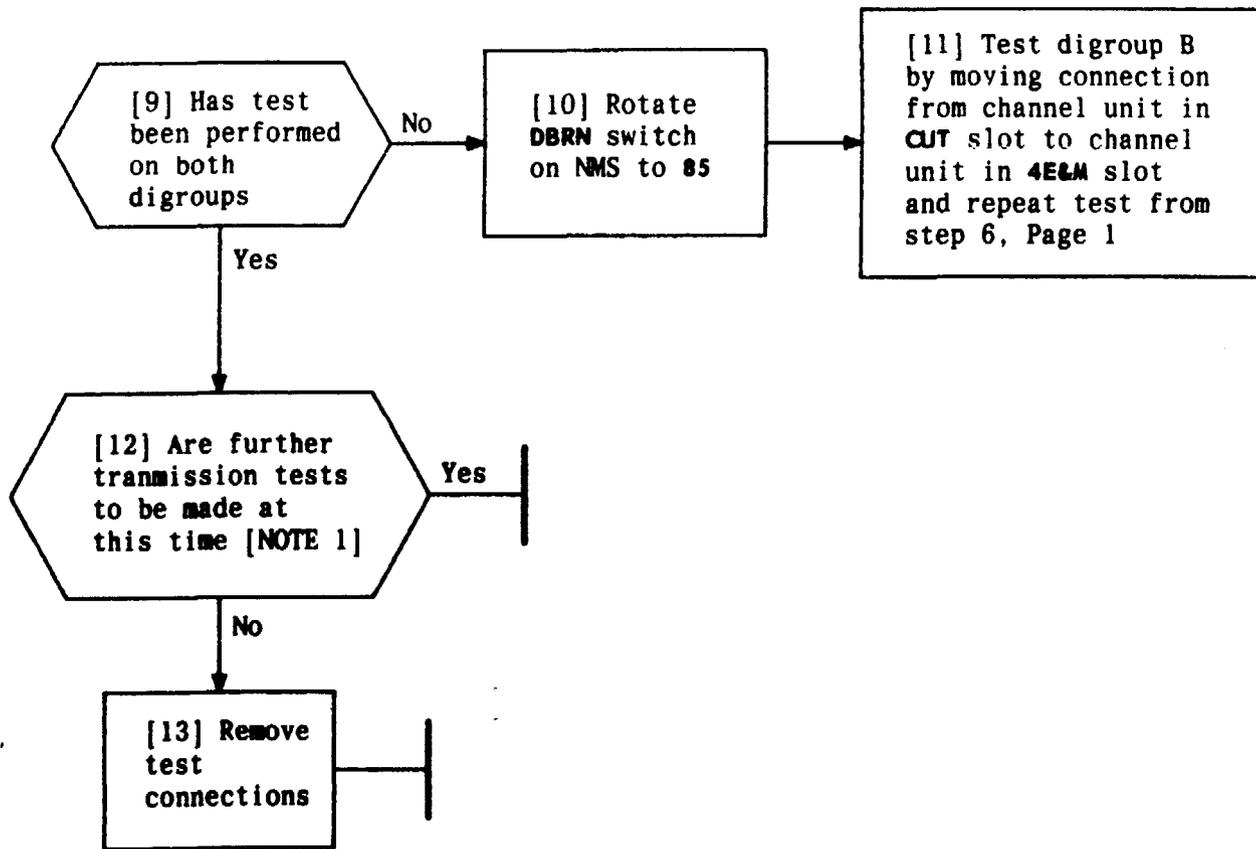


FIG. 1

PERFORM D4 MAINTENANCE BANK IDLE CIRCUIT NOISE TEST

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NOTE 1	
All transmission tests can be performed on bank before removing test connections	
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PERFORM D4 MAINTENANCE BANK IDLE CIRCUIT NOISE TEST

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
1 Patch Cord	P6AD
2 Patch Cords	3P6A
1 Patch Cord For NMS	3P6D

[1] Obtain test equipment per TABLE A and check calibration of CAU [DLP-518] [NOTE 1]

[2] Verify switches are set as follows: switch on MB ALM to ALARM DISAB and switch 9 on 1B MBTS depressed green showing

[3] Check calibration of noise measuring set (NMS) [DLP-519]

[4] On NMS, set FUNCTION switch to N/M 600/900, NORM-DAMP switch to DAMP, DBRN switch to 85, and weighting network for C-MESSAGE weighting

[5] On PTS-CAU, set REJ FLT switch to IN, TEST switch to CHAN LINE, and SEND LEVEL DB switch to 0

[6] See NOTES 2 and 3. Make test connections per FIG. 1, Page 2

[7] See TABLE B, Page 3. Measure for requirements for each position of SEND LEVEL DB switch. NMS DBRN switch must be rotated counterclockwise for on-scale reading each time

NMS calibration checked, NMS/PTS switches set, and connections made

AND

Page 3

NOTES

1. When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble
2. Switch on MB ALM should be set to ALARM DISAB position
3. On 1B MBTS switch 9 should be depressed showing green and all others showing black

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PERFORM D4 MAINTENANCE BANK DISTORTION TEST

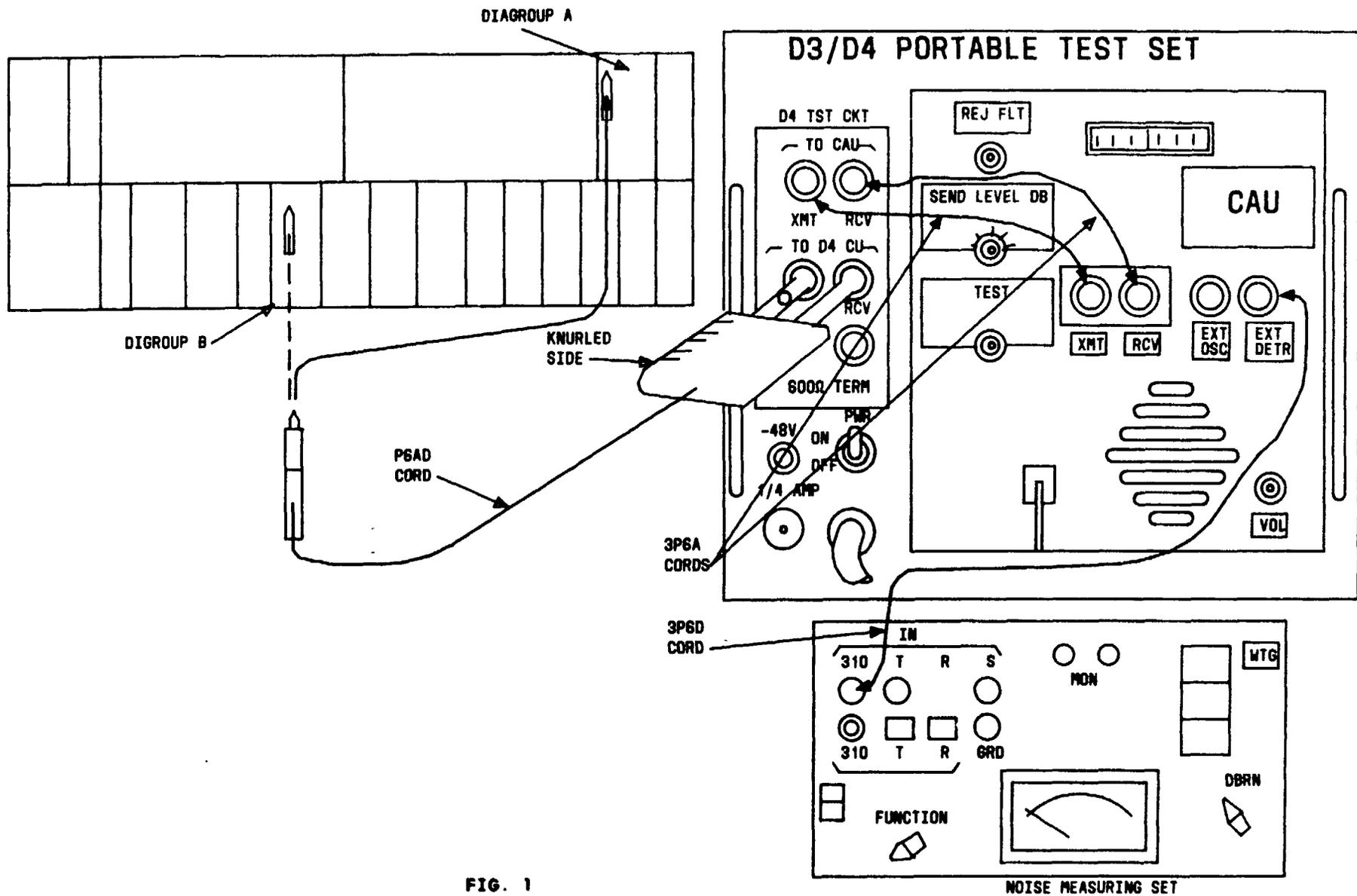


FIG. 1

PERFORM D4 MAINTENANCE BANK DISTORTION TEST

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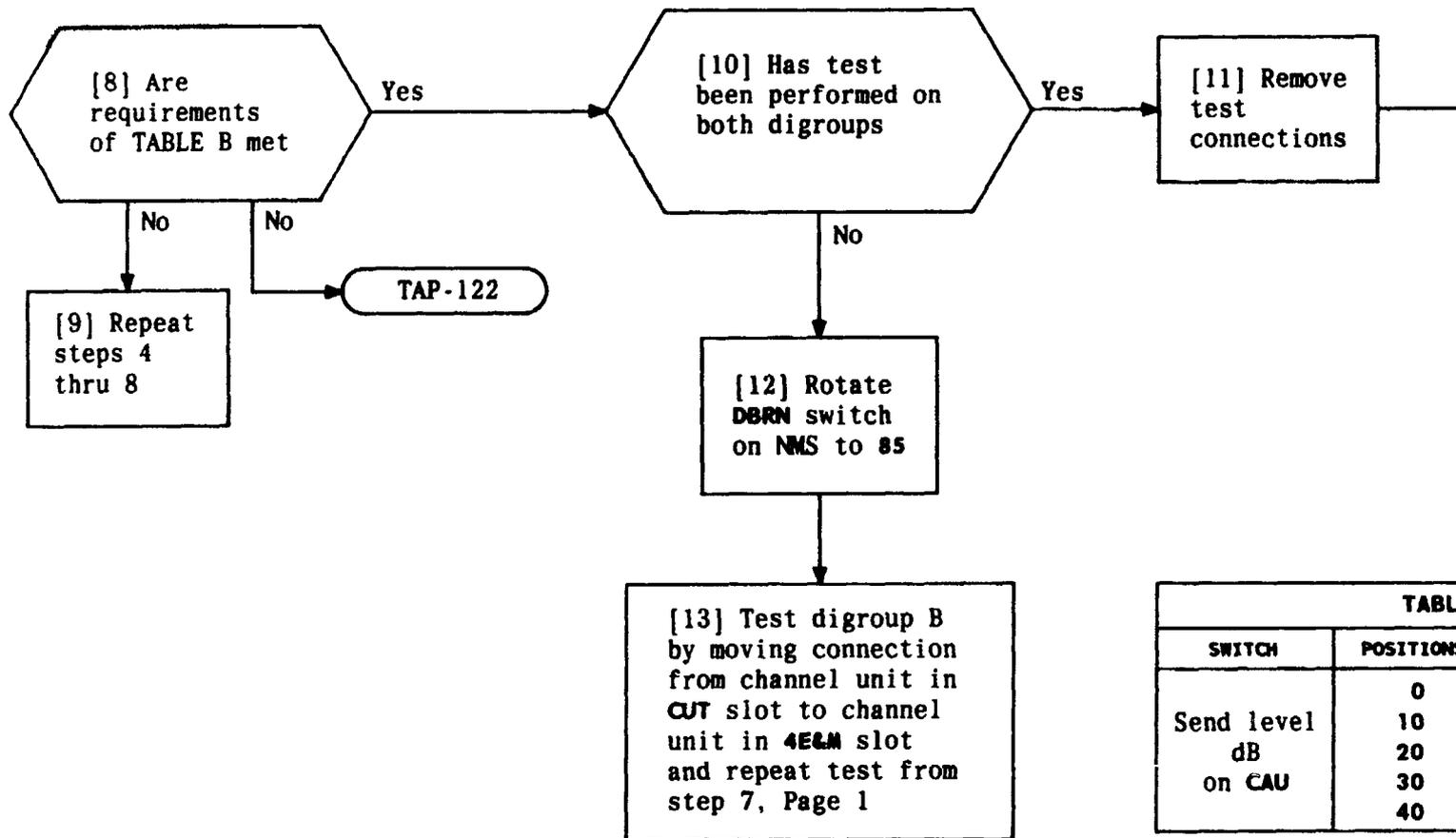


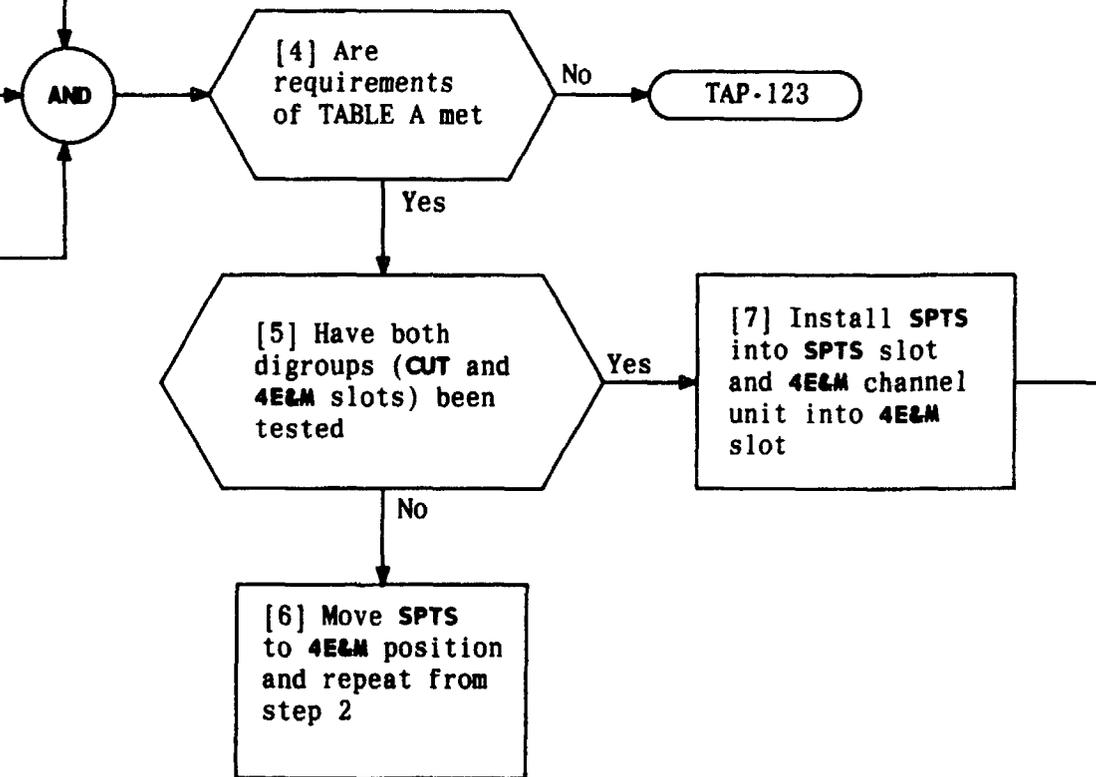
TABLE B		
SWITCH	POSITIONS	REQUIREMENTS
Send level dB on CAU	0	56 dBrnc or less
	10	46 dBrnc or less
	20	36 dBrnc or less
	30	26 dBrnc or less
	40	22 dBrnc or less

[1] Install **SIGNALING PATH TEST SET (SPTS)** into **CUT** position of maintenance bank

[2] Verify switch on **MB ALM** is set to **ALARM DISAB** and that switch **9** on **1B MBYS** is showing green and all others are showing black

[3] See **TABLE A** and perform tests 1 and 2 setting switches to positions as indicated

TABLE A			
TEST	SWITCH	POSITION	SPTS LAMPS LIGHTED
1	A	1	A only
	B	0	
2	A	0	B only
	B	1	



PERFORM SIGNALING TEST ON D4 MAINTENANCE BANK

SUMMARY

Set switch on MB ALM to ALARM DISAB position. Perform switch operations and check that appropriate lamps are lighted per TABLES A and B

[1] On MB ALM unit set switch to ALM DISAB position _____

[2] Verify that switches 1 thru 17 on 1B MBTS are extended (black showing) and that there is no unit in CUT position _____

[3] Perform tests and check for appropriate lamps lighted per TABLE A. Release setting for each test before going to next test in sequence _____

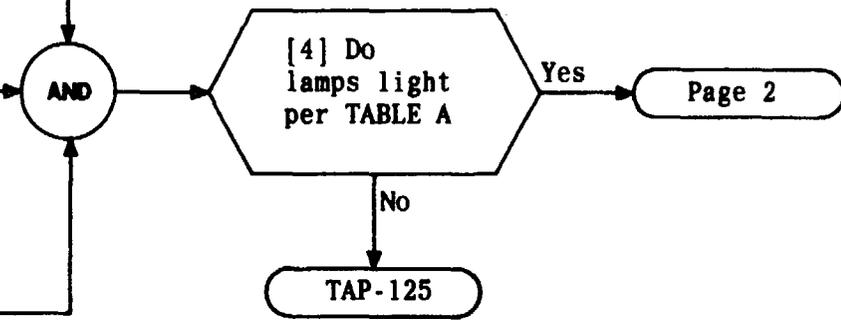


TABLE A - VF CALIBRATION		
TEST	SWITCHES DEPRESSED ON 1B MBTS	LAMPS LIGHTED ON 1A MBTS
1	9 and 12	CAL
2	9, 11, and 13	MC PASS
3	9, 11, and 14	MC PASS
4	9 and 17	MON

MAKE D4 MAINTENANCE BANK VOICE FREQUENCY CALIBRATION AND SIGNALING TEST CHECK

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[5] Depress all switches on 1B MBTS to extended (out black showing) position

[6] On 1B MBTS perform tests and check for appropriate lamps lighted per TABLE B. Release setting for each test before going to next test in sequence

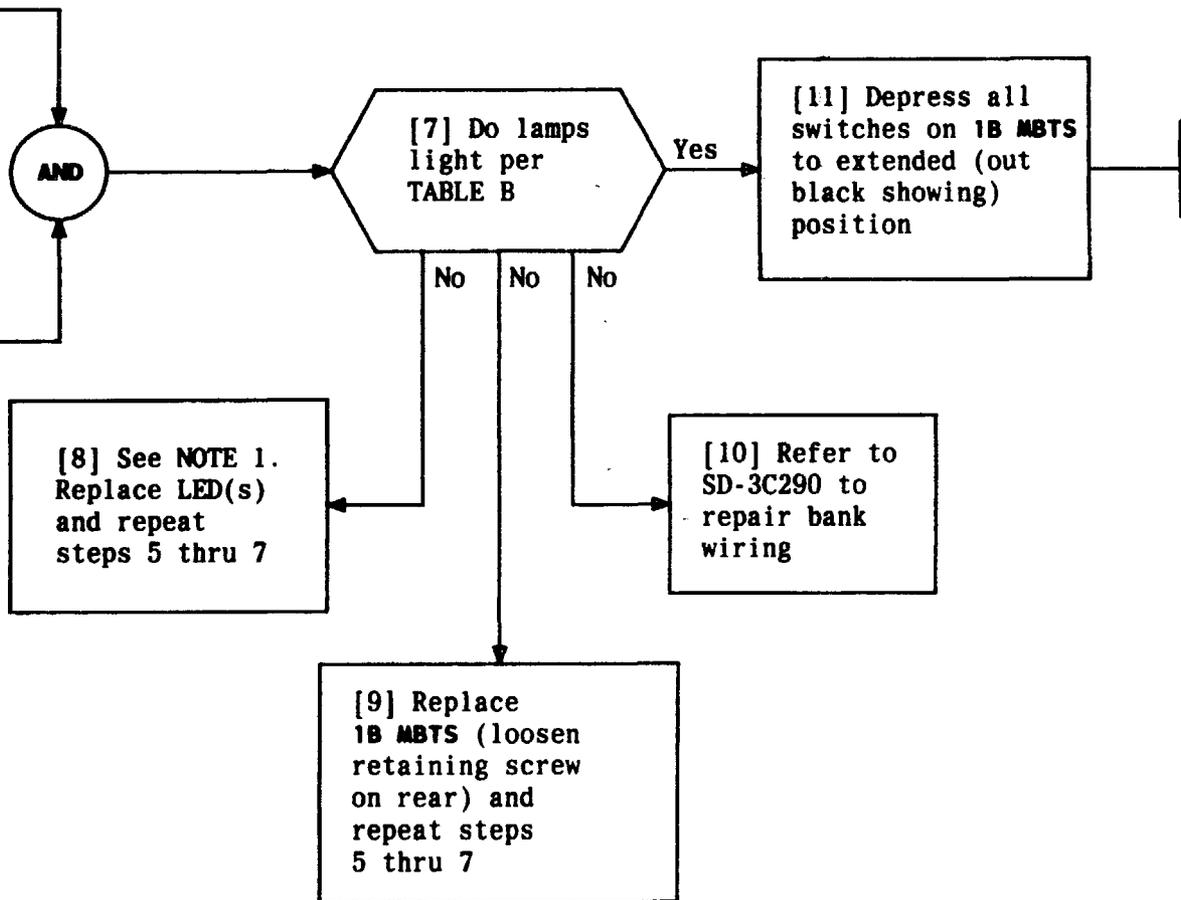
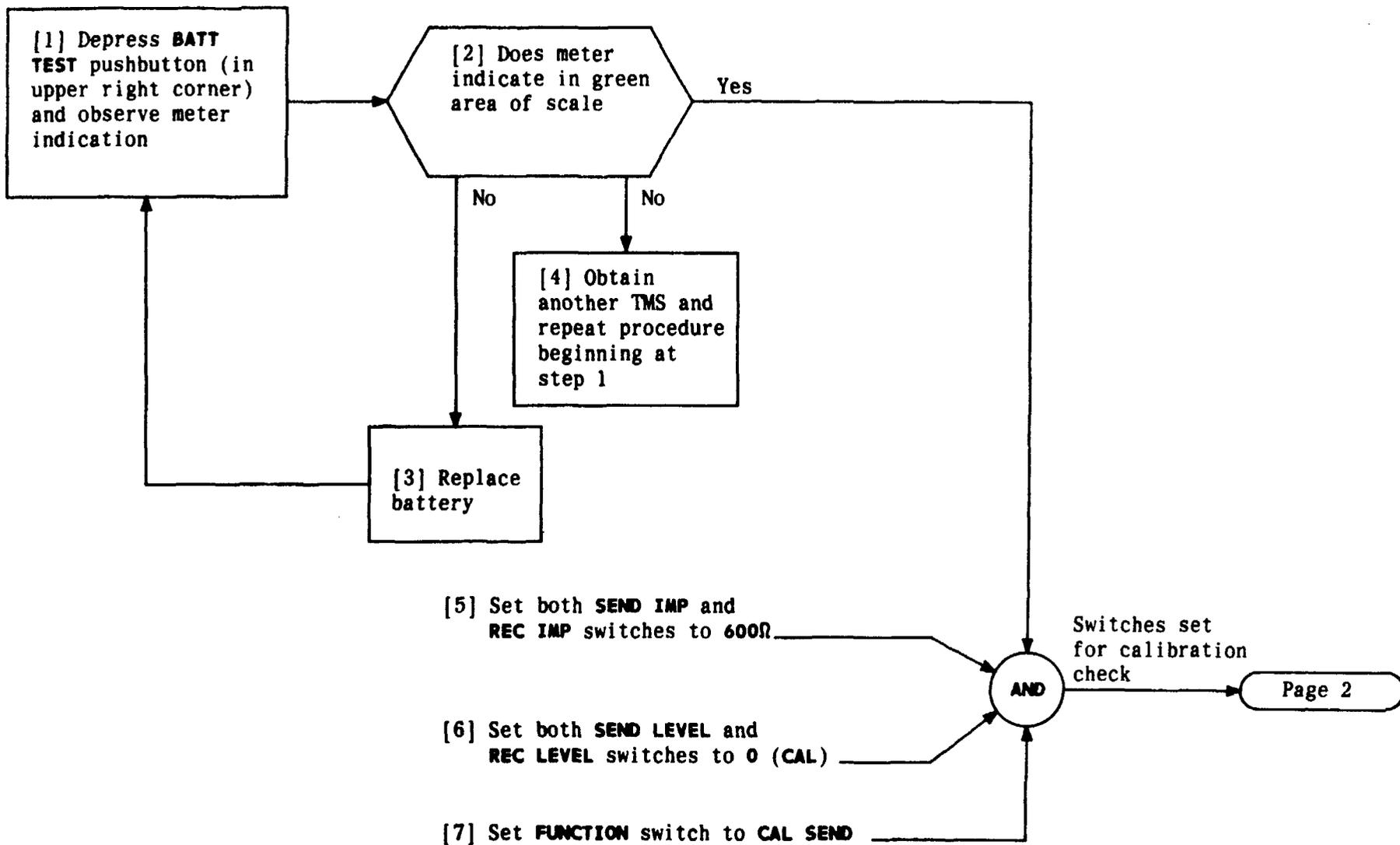


TABLE B		
TEST	SWITCHES DEPRESSED	LAMPS LIGHTED
1	1 and 2	C and D
2	1, 2, and 3	A and F
3	1 and 4	C and F
4	2 and 4	A and D
5*	5 and 6	20-Hz
6†	7, 8, and 9	H and J
7	1 and 10	C and F
8	2 and 10	A and D

* Applicable if 20-Hz fuses are provided on PDU
 † Lamp B may light

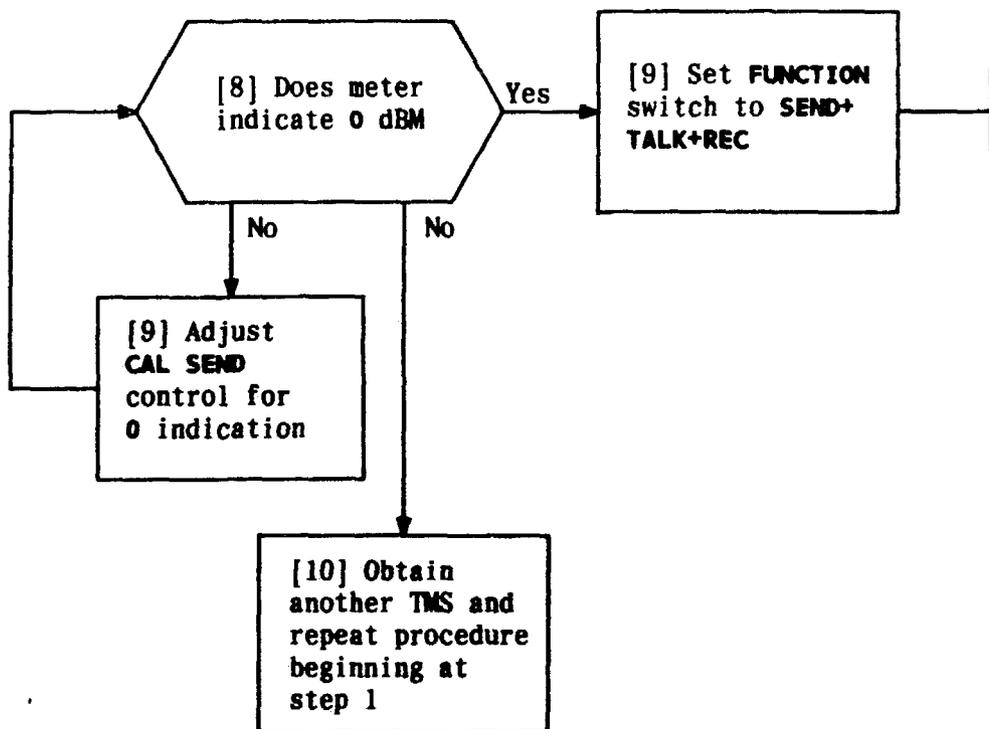
NOTE 1	
LED may be removed by pulling straight out using long nose pliers	
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MAKE D4 MAINTENANCE BANK VOICE FREQUENCY CALIBRATION AND SIGNALING TEST CHECK



CONDITION TTS 4BNH TRANSMISSION MEASURING SET

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CONDITION TTS 4BNH TRANSMISSION MEASURING SET

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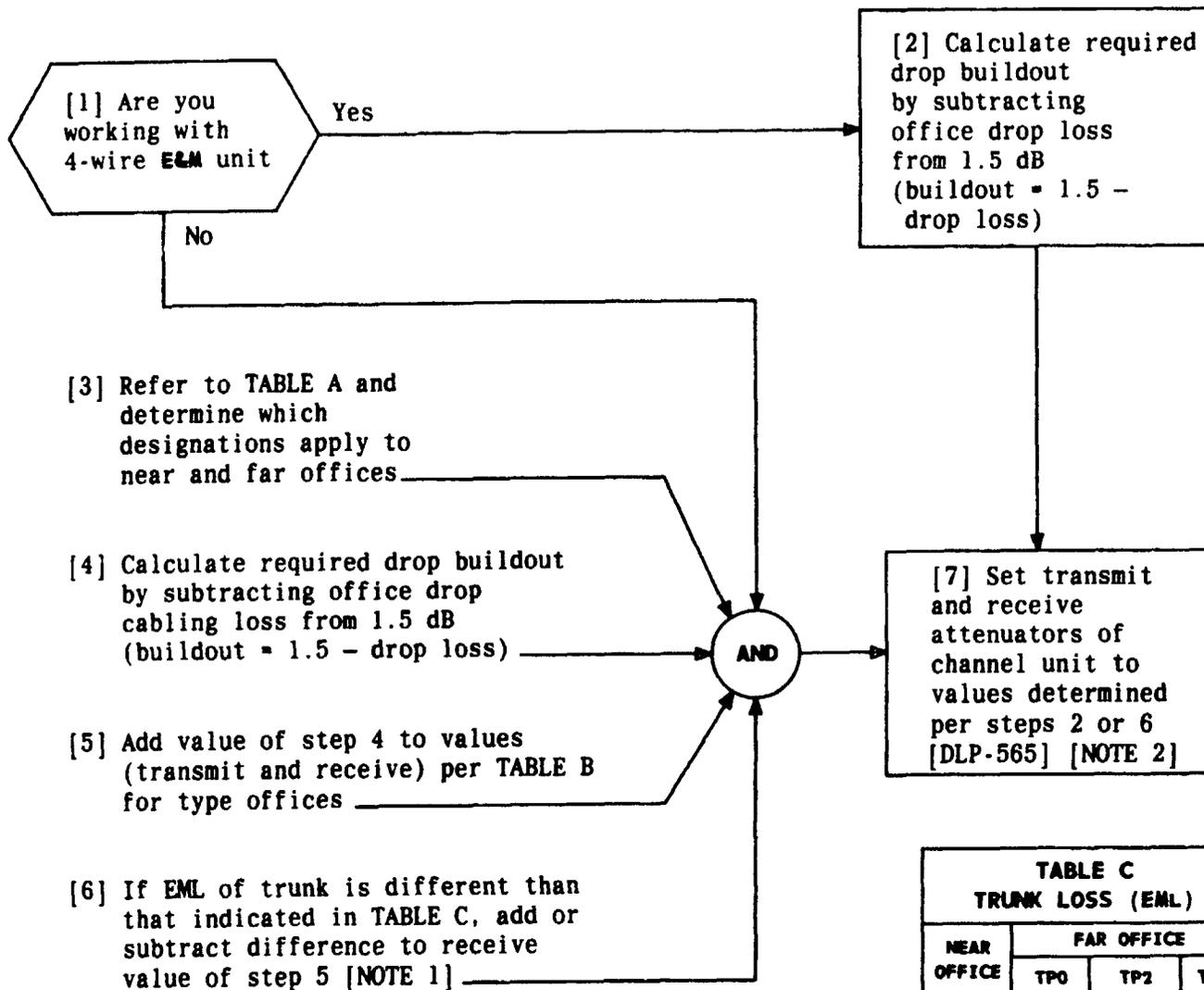


TABLE A	
DESIGNATION	DESCRIPTION
TP0	End Office (Class 5)
TP2	Analog Toll Office
TP3	Digital Toll Office

TABLE B ATTENUATOR SETTINGS			
NEAR OFFICE	FAR OFFICE		
	TP0	TP2	TP3
TP0	3T, 1.5R	3T, 3.5R	3T, 4.5R
TP2	1T, 1.5R	1T, 1.0R	1T, 2.5R

TABLE C TRUNK LOSS (EML)			
NEAR OFFICE	FAR OFFICE		
	TP0	TP2	TP3
TP0	3dB	5dB	6dB
TP2	5dB	4.5dB	6dB

- NOTES**
1. If EML is greater than that of TABLE C, difference should be added; if smaller, difference should be subtracted
 2. If setting 2E&M6, receive attenuator must be set for 1.4 dB more than value determined in step 7

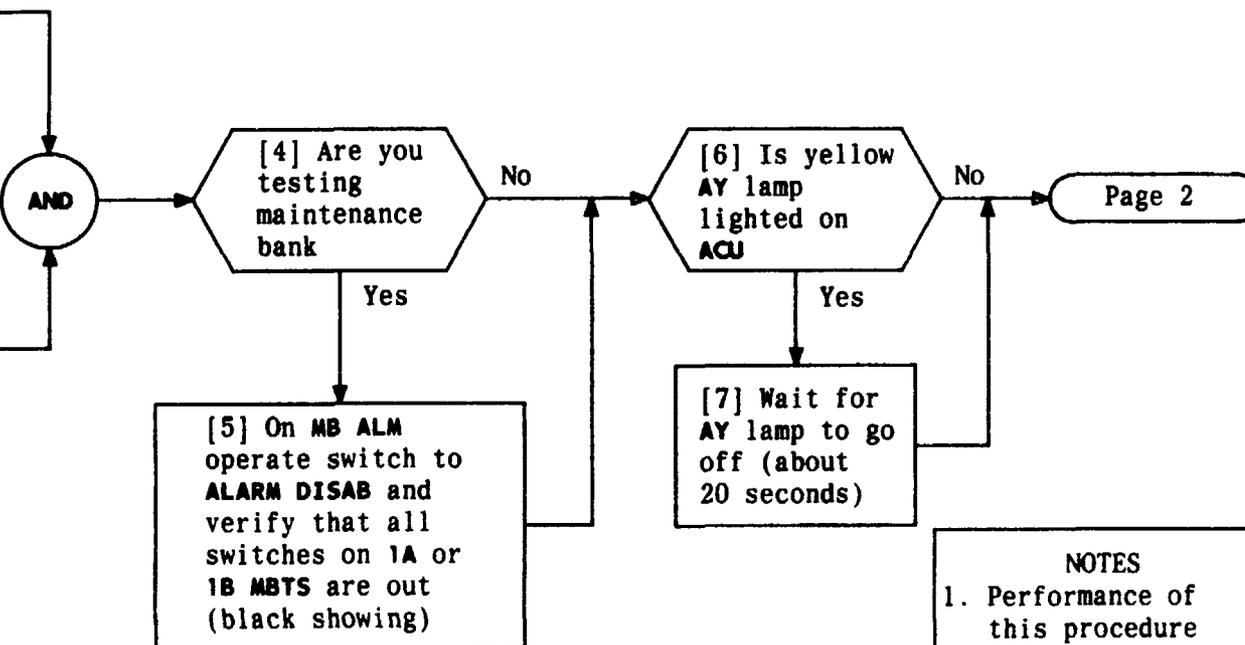
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DETERMINE ATTENUATOR SETTINGS FOR MESSAGE SERVICE CHANNEL UNIT

[1] See NOTE 1. Get two
KS-19531 or equivalent
pin plugs that fit pin jacks on
RU and LIU

[2] On ACU to be tested, set
3-position switch to
NORM and set MEM
switch to OFF

[3] On LIU, insert pin plug into
LP jack [NOTE 2]



NOTES

1. Performance of this procedure should be stopped any time lamps do not light or extinguish as indicated and user should return to trouble analysis procedure.
2. For Mode 3, pin plug should be inserted into LP jack corresponding to digroup being tested(LPA or LPB)

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PERFORM BANK ALARMS TROUBLE TEST

[8] Familiarize yourself with steps 9 and 10 before proceeding

[9] Insert pin plug into red R CODE jack on RU for digroup being tested



[10] Observe that lamps light per TABLE A

[11] On ACU momentarily depress ACO pushbutton

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TABLE A
LAMP
RCV on RU
AR on ACU
TP on ACU
TPD on TPU

PERFORM BANK ALARMS TROUBLE TEST

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[12] Remove pin plug from
R CODE jack on RU

[13] On ACU set 3-position
switch to LL (LL lamp
lights)

AND

[14] Observe
that AY lamp on
ACU lights and
remains lighted
after 20 seconds

[15] On ACU,
set TP MEM
switch to MEM

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PERFORM BANK ALARMS TROUBLE TEST

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[16] Familiarize yourself with steps 17 through 20; timing is important (less than 20 seconds between steps 17 and 19)

[17] On ACU set 3-position switch to **NORM**

[18] Insert plug into **R CODE** on **RU**

[19] Remove pin plug from **LP jack** on **LIU**

AND

[20] Observe that **AR** and **AY** lamps on **ACU** are lighted after 20 seconds

Page 5

PERFORM BANK ALARMS TROUBLE TEST

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[21] Familiarize yourself with steps 22 through 24 before proceeding

[22] Remove pin plug from R CODE jack on RU

[23] Insert pin plug into LP jack on LIU

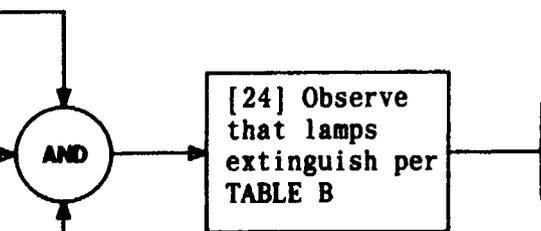


TABLE B
LAMP
RCV on RU
AR on ACU
ACD on ACU
TPD on TPU
AY on ACU

PERFORM BANK ALARMS TROUBLE TEST

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SUMMARY

Make test connections per Fig. 1 to test channel. Verify connections are made at far end. CAU indication should be between -0.25 and +0.25. Verify that test indications at far end are within specified limits

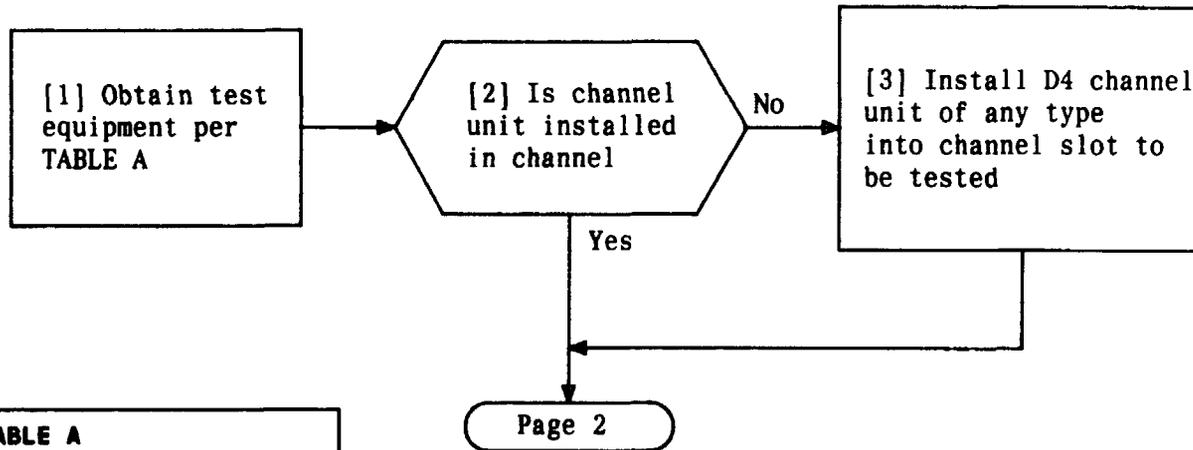


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
1 Patch Cord	P6AD

PERFORM END-TO-END NET LOSS TROUBLE TEST

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On D3/D4 PORTABLE TEST SET (PTS):

[4] Check calibration of CAU
[DLP-518]

[5] Set TEST switch to
CHAN LINE

[6] Set REJ FLT switch
to OUT

[7] Set SEND LEVEL DB
switch to 0

CAU
calibrated
and switches
set on CAU

AND

[8] Make test connections per FIG. 1

[9] Verify that test equipment is
connected at other office and
that test is ready to be performed

Test set
connected
to channel
unit

AND

[10] Observe CAU
meter. It should
be in green-black-
green area
[NOTE 1]

NOTE 1

If far end is D1D
and not using 438B
plug in MATCH NET,
receive level will
be .25 dB hot and
read to right of
green level on CAU

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PERFORM END-TO-END NET LOSS TROUBLE TEST

SUMMARY

Make test connections per FIG. 1. Verify far end has made test connections to same test channel. Verify D4 bank meets noise requirement of 23 dBrnc or less

- [1] Obtain test equipment per TABLE A
- [2] Set switches on CAU as follows:
REJ FLT to OUT, SEND LEVEL to OFF,
and TEST to CHAN LINE
- [3] Check calibration of NMS
[DLP-519]
- [4] Set NMS switches as follows: FUNCTION
to 600/900, NORM-DAMP to DAMP, DBRN to
85, and C-MESSAGE to align with WTG
- [5] Make test connections per FIG. 1 and
verify far end has made test
connections to same test channel

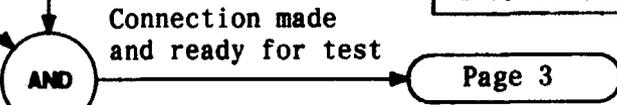


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
Noise Measuring Set (NMS)	J94003C or equivalent
2 Patch Cords	3P6A
1 Patch Cord	P6AD
1 Patch Cord	3P6D

PERFORM END-TO-END IDLE CIRCUIT NOISE TROUBLE TEST

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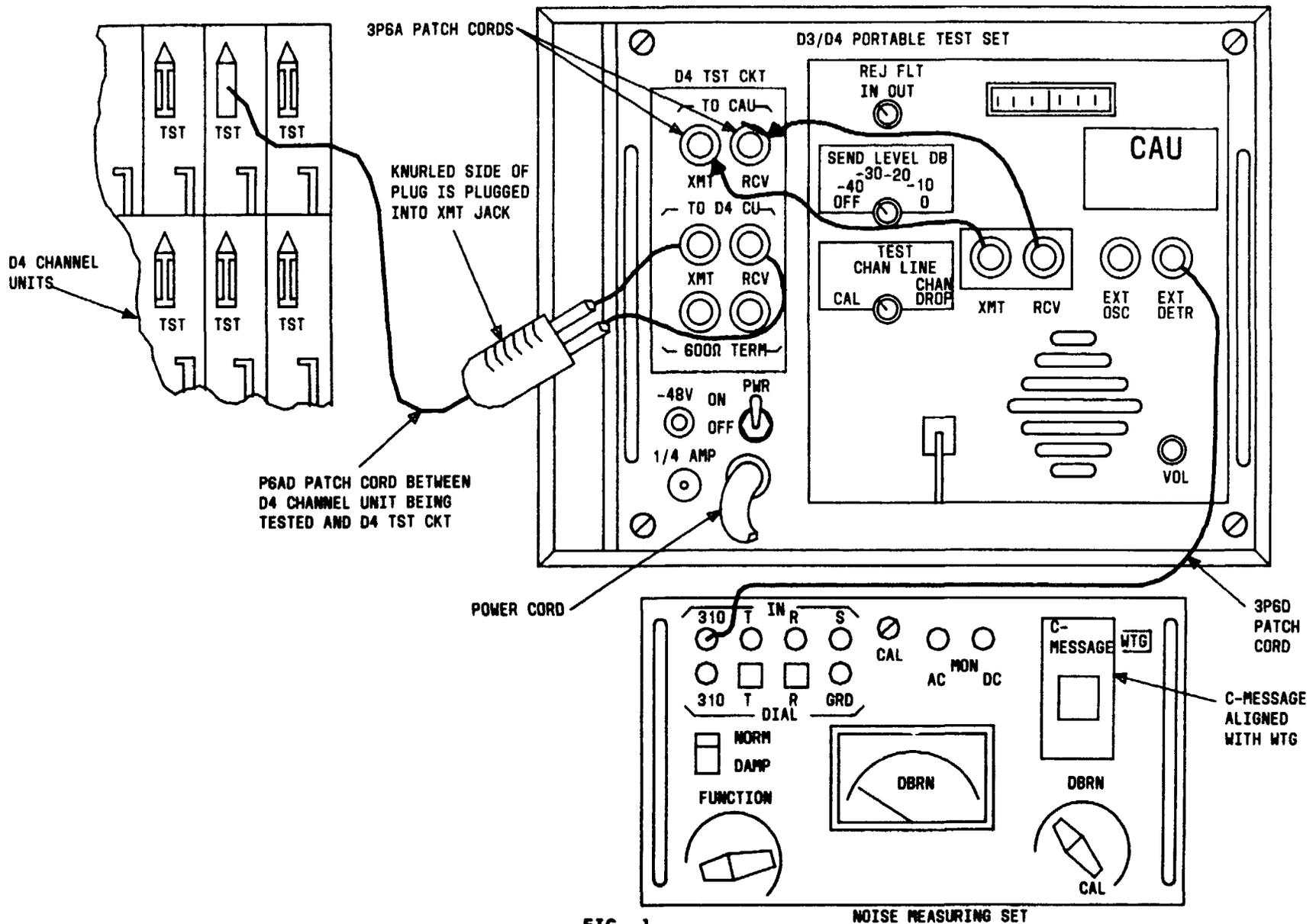


FIG. 1

NOISE MEASURING SET

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PERFORM END-TO-END IDLE CIRCUIT NOISE TROUBLE TEST

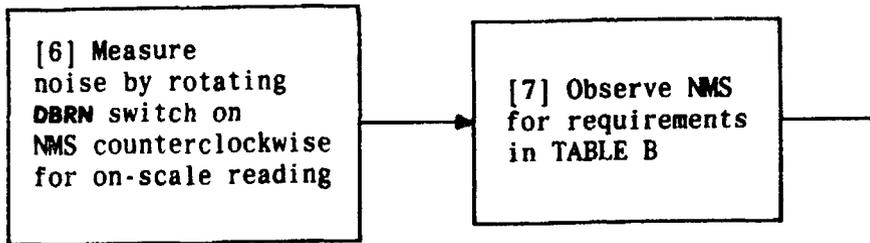


TABLE B	
BANK AT FAR END	D4 REQUIREMENTS
D1D	26 dBrnc or less
D2	28 dBrnc or less
D3	23 dBrnc or less
D4	23 dBrnc or less

PERFORM END-TO-END IDLE CIRCUIT NOISE TROUBLE TEST

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SUMMARY

Make test connections per FIG. 1, Page 3.
Verify that test equipment is connected at other office for channel being tested. Requirements are given in TABLE B, Page 4. Verify that test indications at other office are within specified limits

[1] Obtain test equipment per TABLE A [NOTE 1]

Page 2

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) with Channel Access Unit (CAU)	J98718AL (PTS) J98718AJ (CAU)
Noise Measuring Set (NMS)	J94003C or Equivalent
2 Patch cords	3P6A
1 Patch Cord	P6AD
1 Patch Cord	3P6D

NOTE 1	
Test equipment and procedures for DID, D2, and D3 banks are given in BSPs for those banks	
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PERFORM END-TO-END DISTORTION TROUBLE TEST

[2] On D3/D4 PTS
 set switches as follows:
 REJ FLT to IN
 SEND LEVEL DB to 0
 TEST to CHAN LINE

[3] Check calibration of
 NMS [DLP-519]

[4] Set NMS switches as follows:
 FUNCTION to 600 or
 to 600/900 (on 3C NMS)
 NORM-DAMP to DAMP
 DBRN to 85
 C-MESSAGE to align with WTG

NMS calibrated
 and switches
 set on NMS and
 D3/D4 PTS

[5] Make test connections per
 FIG. 1, page 3 [See NOTE 2]

[6] Verify that test equipment is
 connected at other office and
 test is ready to be performed

Test equipment
 connected at
 each office

Page 4

NOTE 2
 With test equipment
 connected as shown
 in FIG. 1, you can
 transmit and receive
 at same time;
 therefore, the plug
 need not be
 moved between
 transmit and receive
 positions

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PERFORM END-TO-END DISTORTION TROUBLE TEST

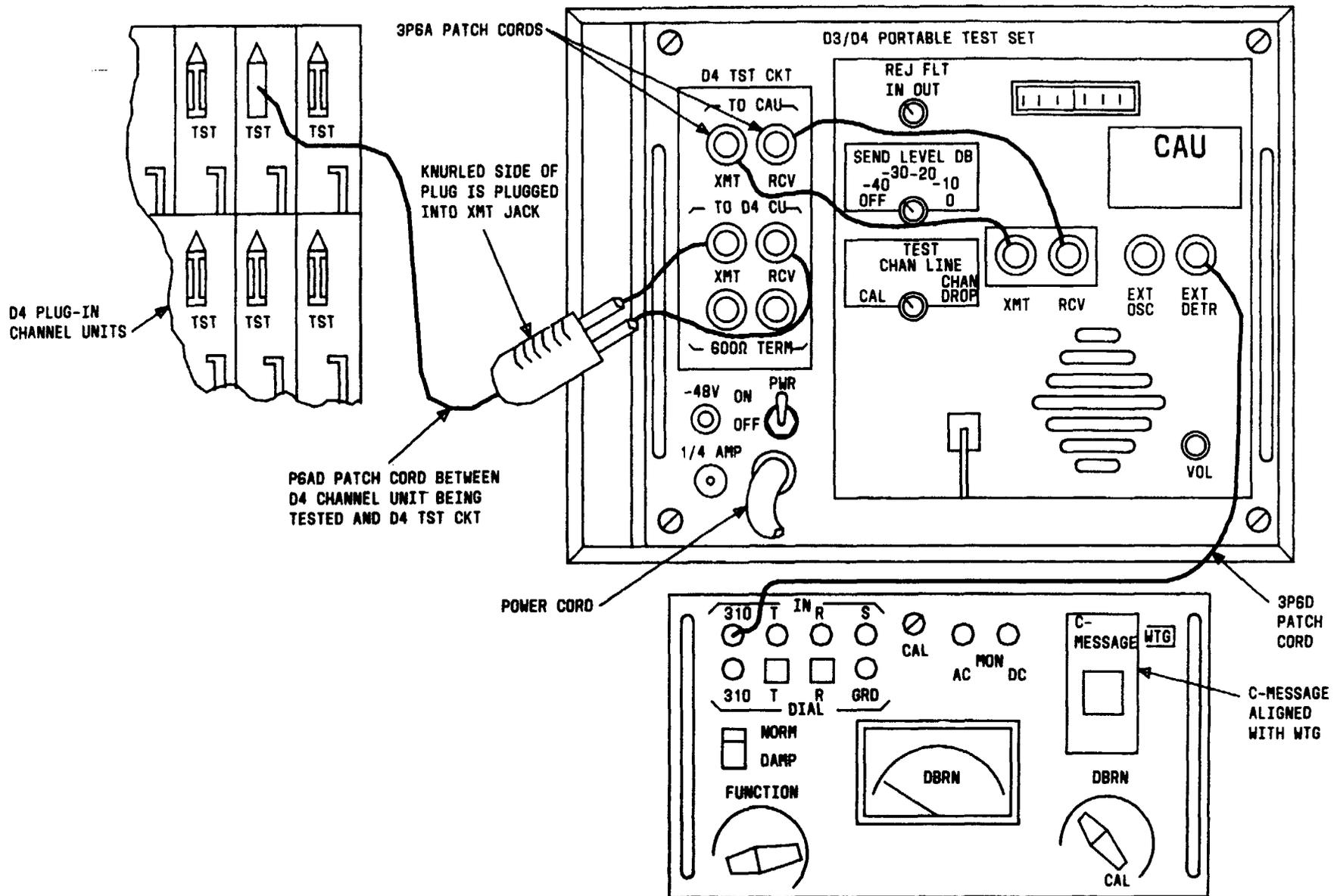


FIG. 1

PERFORM END-TO-END DISTORTION TROUBLE TEST

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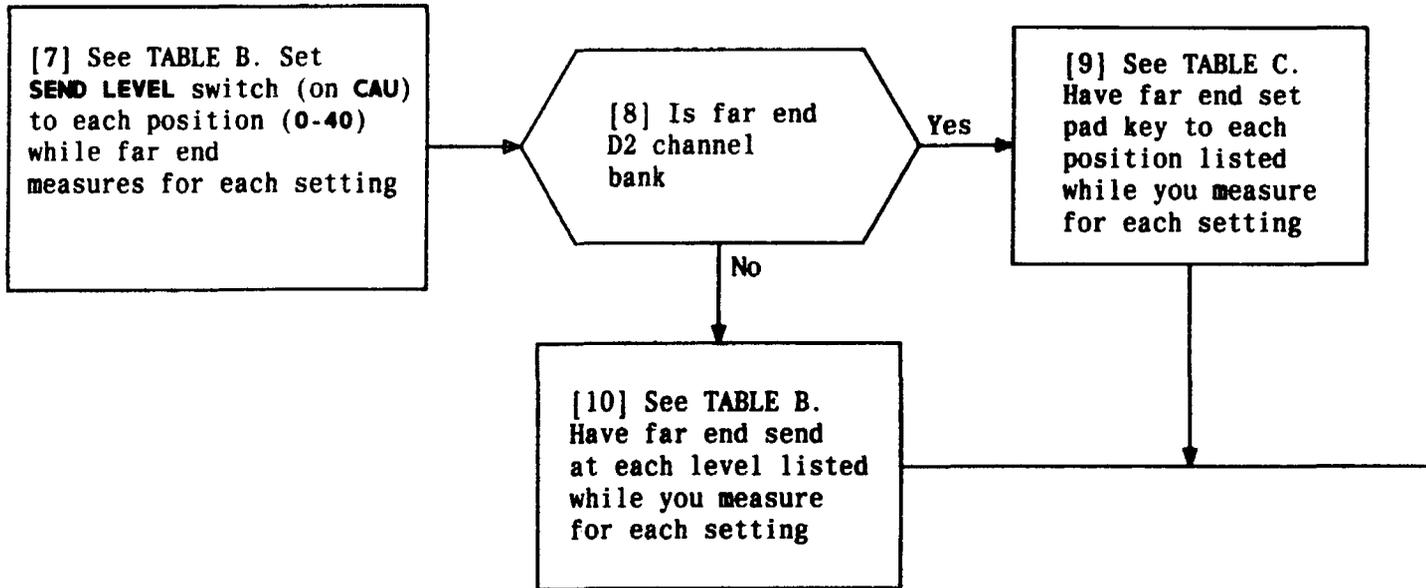


TABLE B	
SEND LEVEL DB	D4 DBRM METER REQUIREMENTS
0	56 or less
10	46 or less
20	36 or less
30	* 26 or less
40	† 22 or less
*28 if far end is D2 bank †26 if far end is D2 bank	

TABLE C	
PAD KEY SETTING	D4 DBRM METER REQUIREMENTS
CTR	56 or less
A	36 or less
B	24 or less

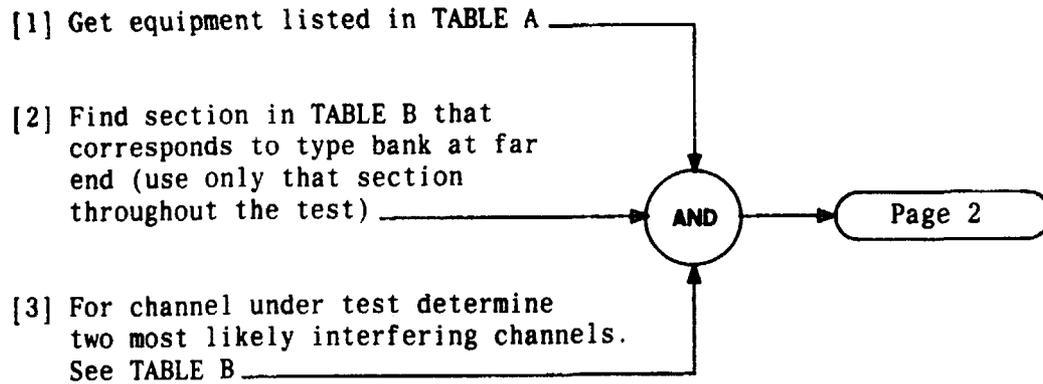


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003A, B, or C
D3/D4 PORTABLE TEST SET with channel access Unit (CAU)	J98718AL PTS - J98718AJ CAU
2 Patch Cords	3P6A
2 Patch Cords	P6AD

TABLE B						
FAR-END BANK	CHANNEL BEING MEASURED (1-12)	MOST LIKELY INTERFERING CHANNELS		CHANNEL BEING MEASURED (13-24)	MOST LIKELY INTERFERING CHANNELS	
D1D	1	24	12	13	1	24
	2	13	1	14	2	13
	3	14	2	15	3	14
	4	15	3	16	4	15
	5	16	4	17	5	16
	6	17	5	18	6	17
	7	18	6	19	7	18
	8	19	7	20	8	19
	9	20	8	21	9	20
	10	21	9	22	10	21
	11	22	10	23	11	22
	12	23	11	24	12	23
D2	1	13	12	13	12	24
	2	14	11	14	11	23
	3	15	9	15	9	21
	4	16	10	16	10	22
	5	17	1	17	1	13
	6	18	2	18	2	14
	7	19	3	19	3	15
	8	20	4	20	4	16
	9	21	5	21	5	17
	10	22	6	22	6	18
	11	23	7	23	7	19
	12	24	8	24	8	20
D3 OR D4	1	24	23	13	12	11
	2	1	24	14	13	12
	3	2	1	15	14	13
	4	3	2	16	15	14
	5	4	3	17	16	15
	6	5	4	18	17	16
	7	6	5	19	18	17
	8	7	6	20	19	18
	9	8	7	21	20	19
	10	9	8	22	21	20
	11	10	9	23	22	21
	12	11	10	24	23	22

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PERFORM END-TO-END CROSSTALK TROUBLE TEST

On CAU:

[4] Check calibration
of CAU [DLP-518]

[5] Set switches
as follows:
REJ FLT to OUT
SEND LEVEL to 0
TEST to CHAN LINE

On noise measuring set (NMS):

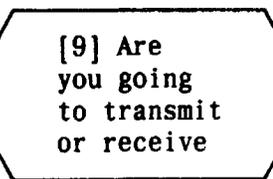
[6] Check calibration
of NMS [DLP-519]

[7] Make sure 497A network
is installed with
C-MESSAGE designation
aligned with WTG

[8] Set switches as follows:
FUNCTION to NM 600/900 for 3C
(or NM 600 for 3A)
NORM-DAMP to NORM
DBRM to 50



CAU and
NMS ready



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Page 4

PERFORM END-TO-END CROSSTALK TROUBLE TEST

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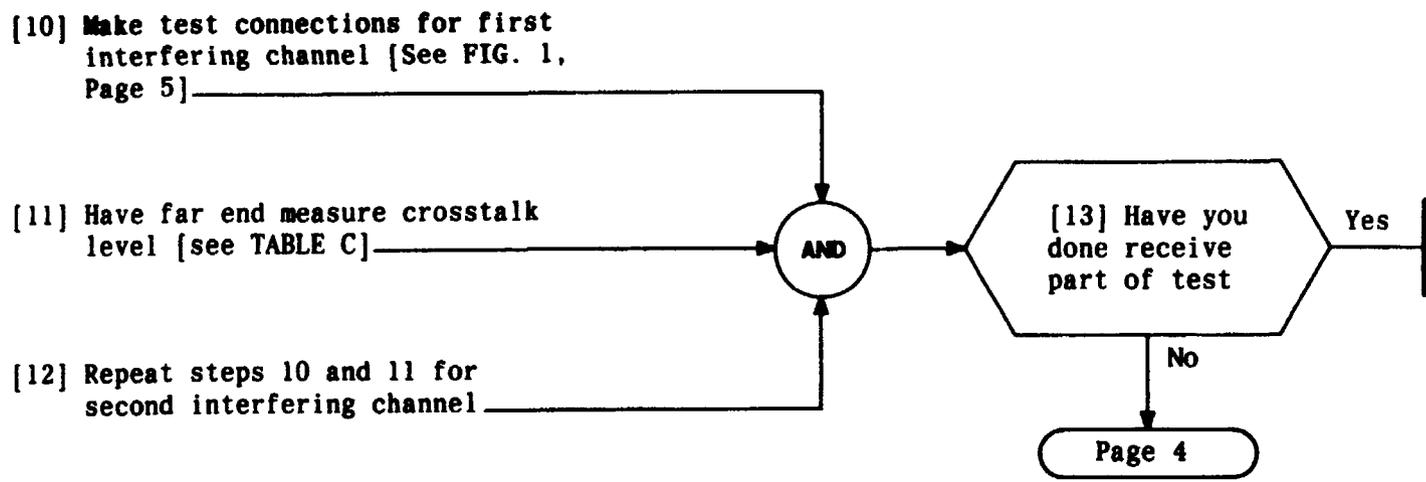


TABLE C	
TYPE BANK AT FAR END	D4 REQUIREMENTS
D3 or D4	27 dBrnc or less
D2	27 dBrnc or less *
D1D	32 dBrnc or less
* First interfering channel is allowed 29 dBrnc or less	

PERFORM END-TO-END CROSSTALK TROUBLE TEST

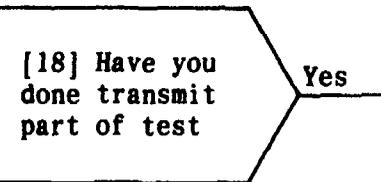
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[14] Make test connections per FIG. 1, Page 5 to channel being measured

[15] Verify far end is connected to first interfering channel

[16] Measure and note crosstalk level by rotating DBRN switch for on-scale reading [See TABLE D]

[17] Verify far end is connected to second interfering channel while you measure level. See TABLE D



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TYPE BANK AT FAR END	D4 REQUIREMENTS
D3 or D4	27 dBrc or less
D2	27 dBrc or less*
D1D	32 dBrc or less

* First interfering channel is allowed 29 dBrc or less

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PERFORM END-TO-END CROSSTALK TROUBLE TEST

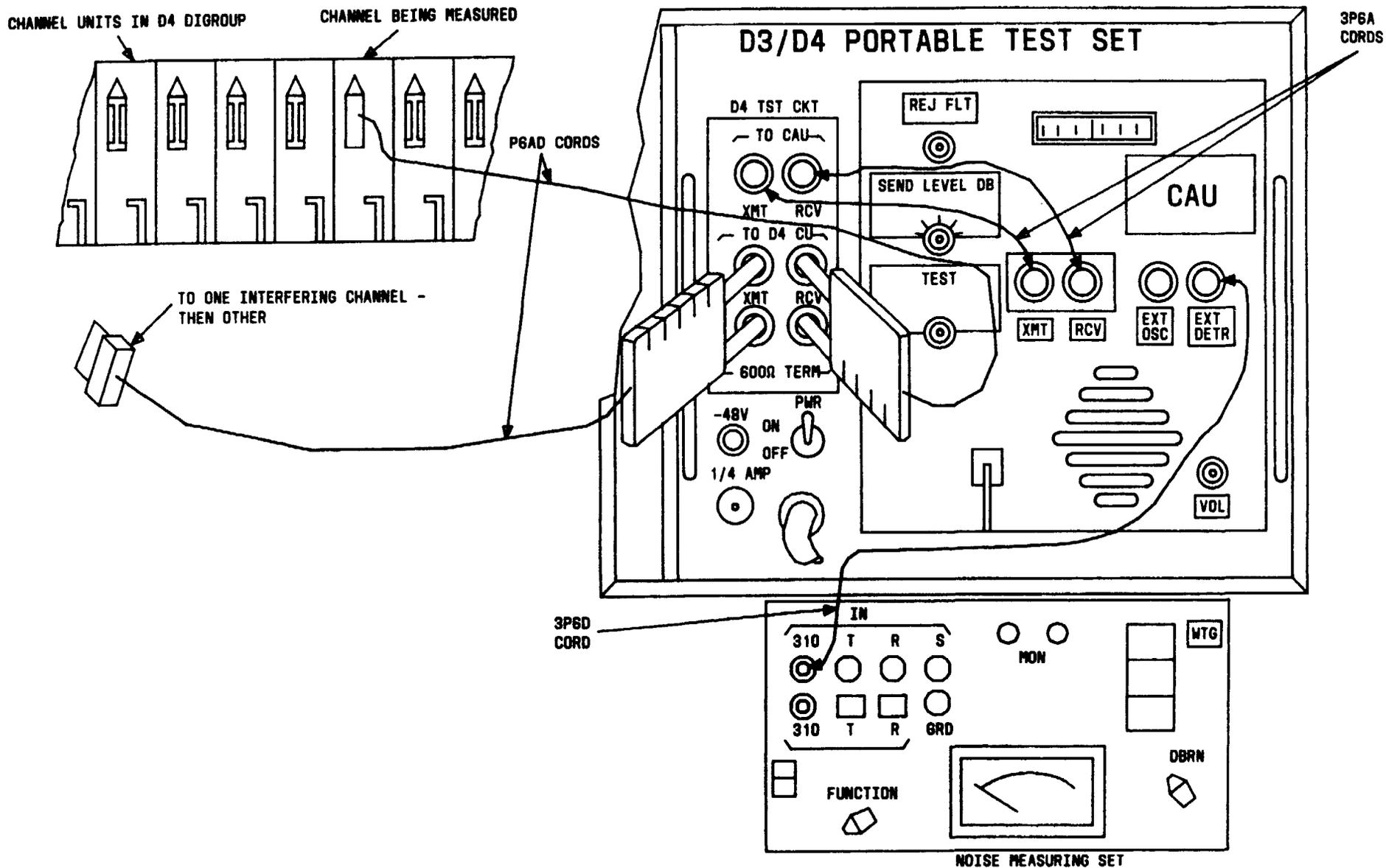


FIG. 1

PERFORM END-TO-END CROSSTALK TROUBLE TEST

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SUMMARY

Make test connections per FIG. 1. Verify that test equipment is connected at other office for channel being tested. Requirements are no more than 1 count in 5 minutes

at 63 dBrnc and no more than 5 counts at 58 dBrnc. Verify that test indications at other office are within specified limits

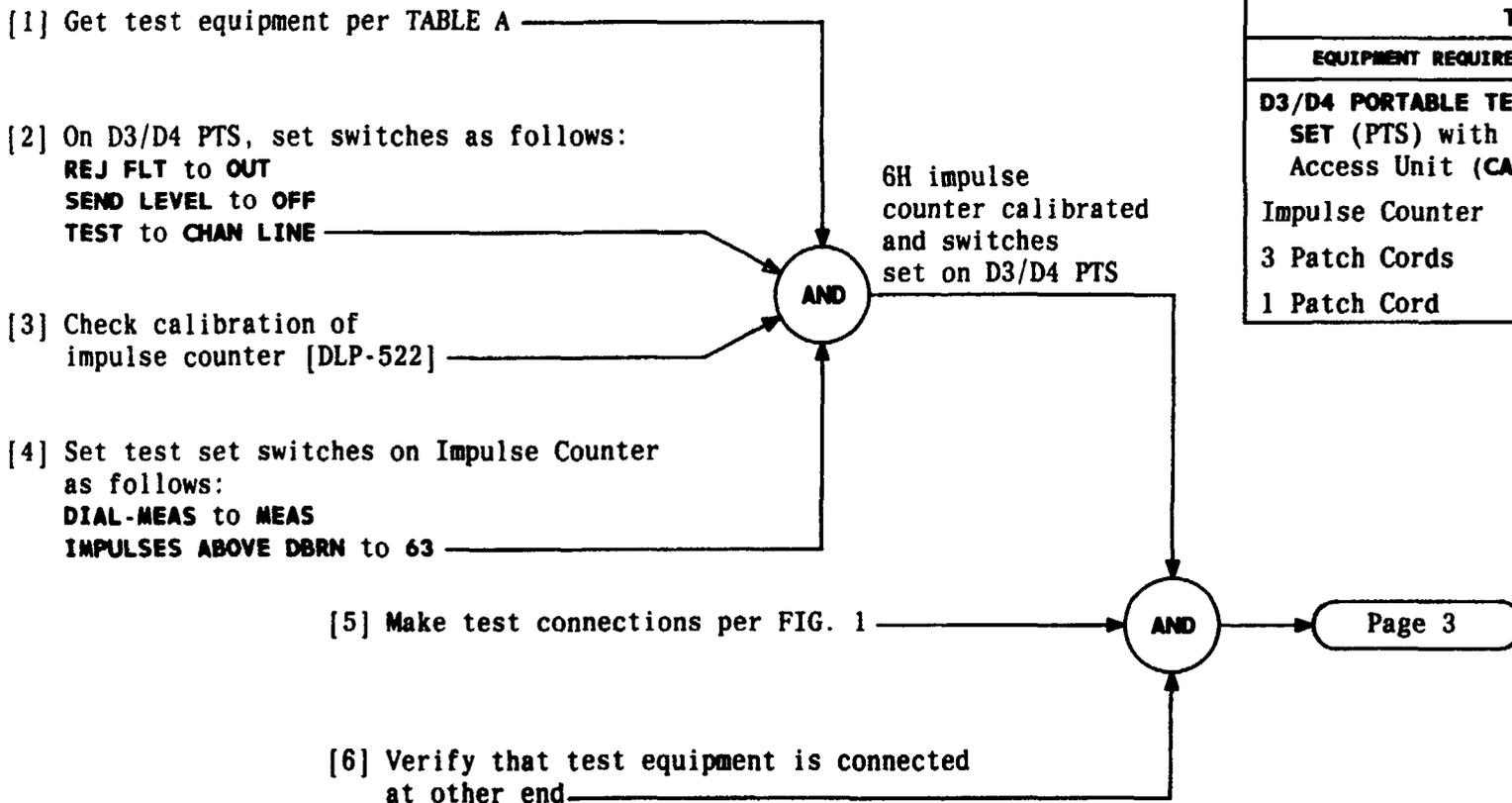


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) with Channel Access Unit (CAU)	J98718AL (PTS) J98718AJ (CAU)
Impulse Counter	J94006H
3 Patch Cords	3P6A
1 Patch Cord	P6AD

PERFORM END-TO-END IMPULSE NOISE TROUBLE TEST

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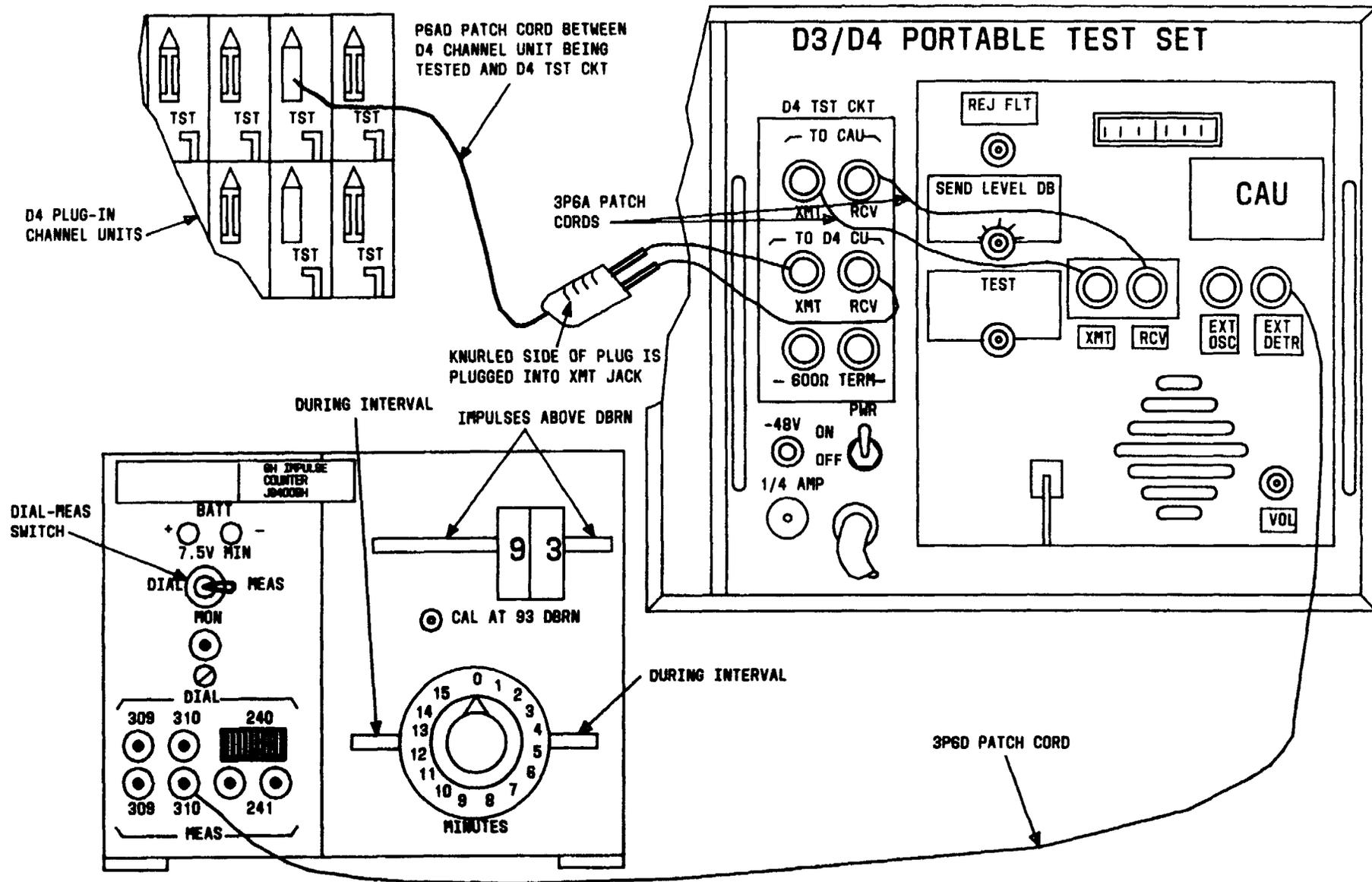


FIG. 1

PERFORM END-TO-END IMPULSE NOISE TROUBLE TEST

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On 6H Impulse Counter:

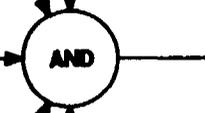
[7] Rotate **DURING INTERVAL** fully clockwise and then counterclockwise to 5 MINUTES

[8] Observe that counter indicates 0 or 1 after 5 minutes

[9] Set **IMPULSE ABOVE DBRN** switch to 58

[10] Rotate **DURING INTERVAL** fully clockwise and then counterclockwise to 5 MINUTES

[11] Observe that counter indicates 5 or less after 5 minutes



PERFORM END-TO-END IMPULSE NOISE TROUBLE TEST

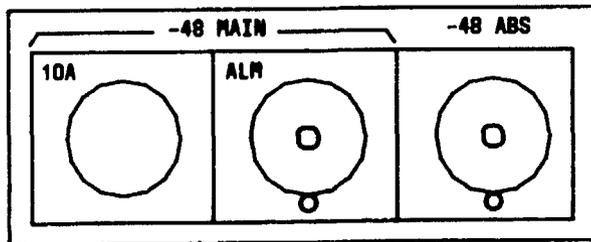
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[1] Locate PDU subassembly
[FIG. 1]

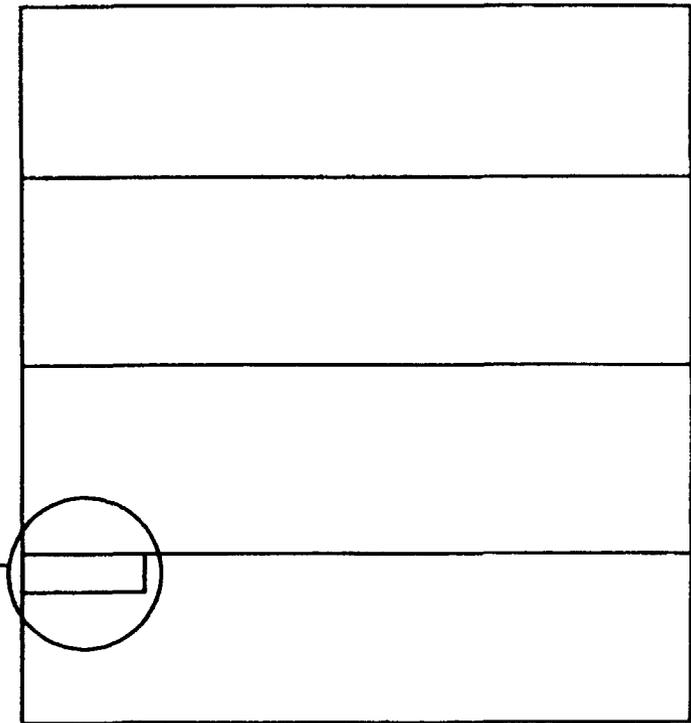
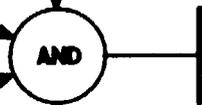
[2] Remove -48 MAIN ALM fuse

[3] Remove -48 MAIN 10A fuse

[4] Remove -48 ABS fuse



PDU Subassembly



D4 Bank or
Maintenance Bank

FIG. 1

REMOVE FUSES FROM PDU SUBASSEMBLY

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On PDU:

[1] See FIG. 1. Verify that -48S A and B fuses are 70A (white bead) or 70C (blue bead) fuses

[2] Verify that -48F A and B fuses are 70C fuses (blue bead) [NOTE 1]

[3] Verify that -48V fuse is 70B fuse (orange bead)

[4] Verify that 20 HZ fuse is 70F fuse (violet bead) [NOTE 2]

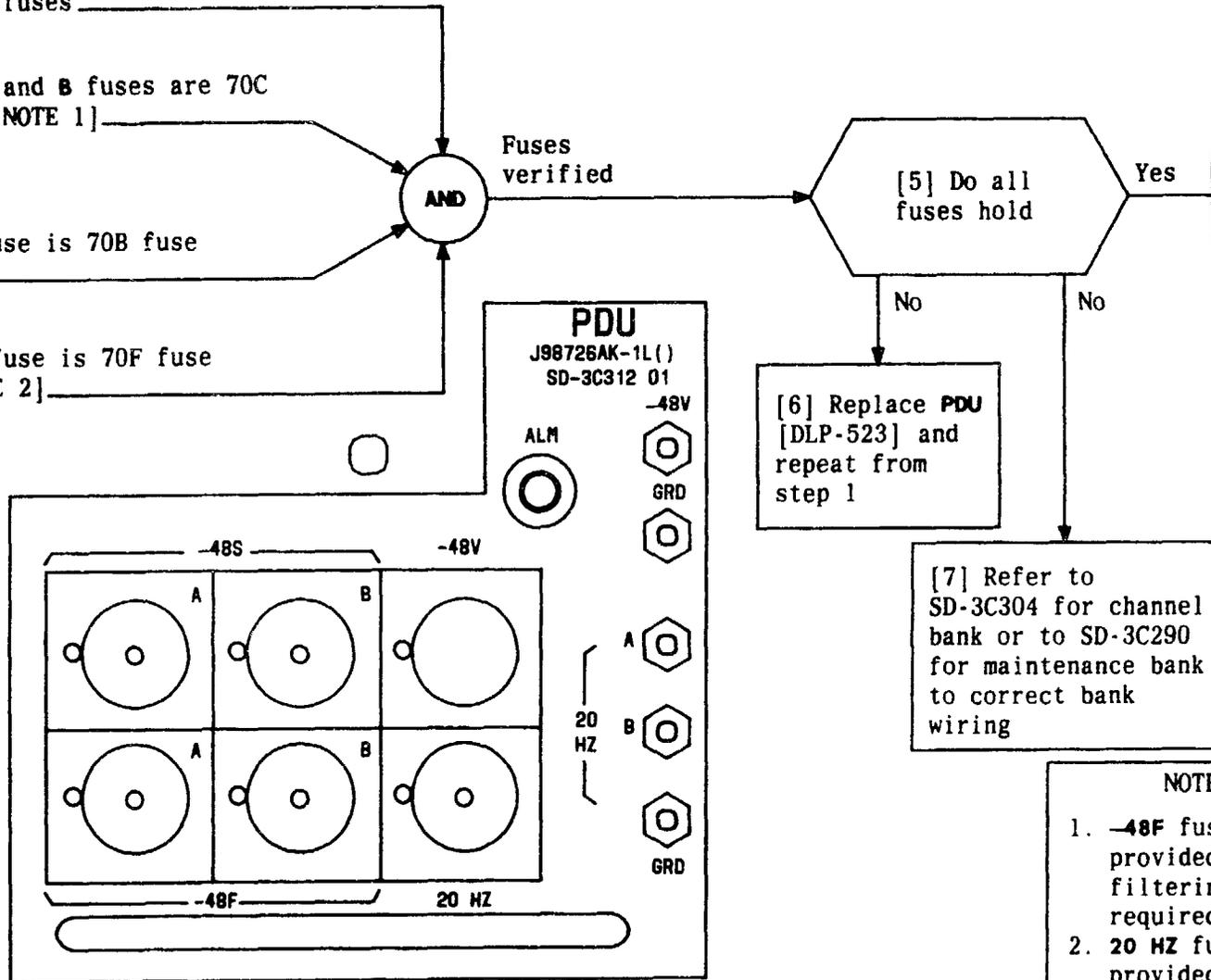
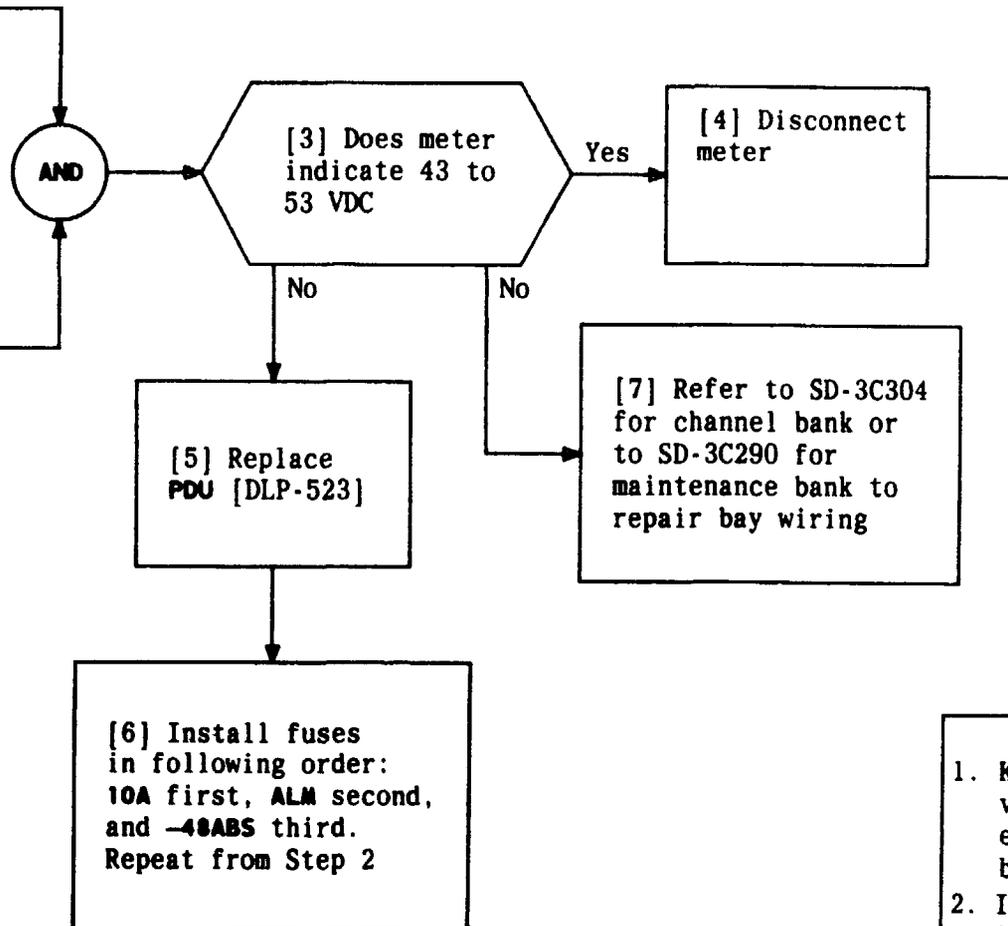


FIG. 1

NOTES	
1. -48F fuses provided when filtering is required	
2. 20 HZ fuse provided when 20 HZ is required	
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[1] Obtain KS-14510 VOM or equivalent and condition it to measure dc volts [DLP-521]
[NOTE 1]

[2] See NOTE 2. At PDU, connect + (red) lead to black GRD jack and - (black) lead to red -48V jack



NOTES	
1. KS-20599 digital voltmeter or equivalent may be used	
2. If channel bank is operating in Mode 4, Steps 2 and 3 must be performed on both banks	
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MEASURE VOLTAGE AT PDU -48V JACK

[1] See FIG. 1. Set switch on PCU to OFF and insert PCU into PCU slot [NOTE 1]

FAIL and ACO lamps on PCU lighted

[2] Set switch on PCU to ON

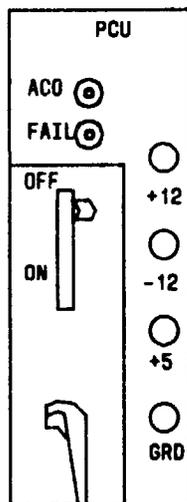
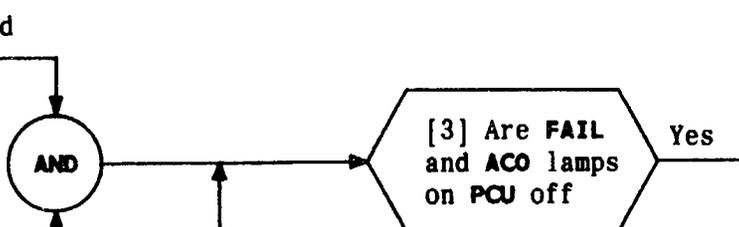


FIG. 1 - PCU



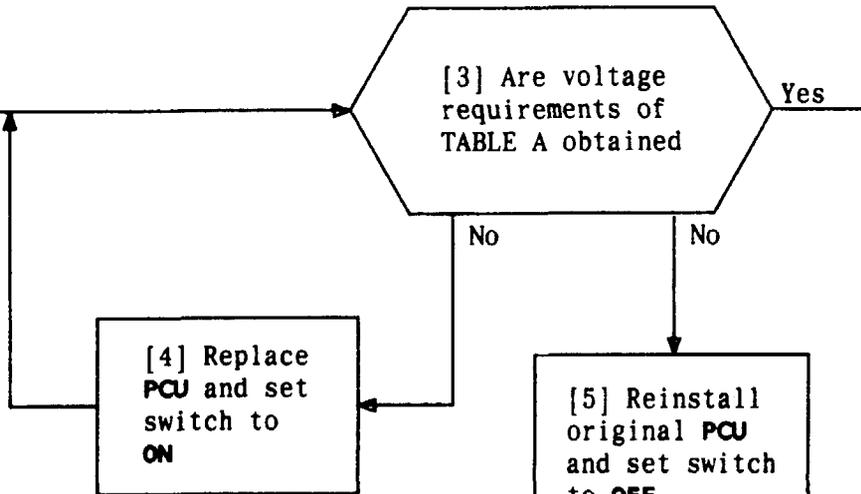
[6] Refer to SD-3C304 for channel bank or to SD-3C290 for maintenance bank to correct wiring problem

NOTE 1	
If channel bank is operating in Mode 4, PCU must be installed into both banks	
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INSTALL PCU

[1] Get KS-14510 VOM or equivalent and condition it to measure dc volts [DLP-521] [NOTE 1]

[2] See NOTE 2. At PCU, make connections and measure voltages per TABLE A



[4] Replace PCU and set switch to ON

[5] Reinstall original PCU and set switch to OFF

[6] Refer to SD-3C304 for channel bank or SD-3C290 for maintenance bank to repair bay wiring

TABLE A			
PCU TEST POINTS	CONNECTIONS		NO LOAD VOLTAGE REQUIREMENTS (VDC)
	+ RED LEAD	- BLACK LEAD	
+12V	+12V	GRD	11.4 to 13
+ 5V	+ 5V	GRD	4.5 to 6
-12V	GRD	-12V	11.4 to 13

NOTES	
1. KS-20599 digital voltmeter or equivalent may be used.	
2. If channel bank is operating in Mode 4, Steps 2 and 3 must be performed to both ends	
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MEASURE VOLTAGES AT PCU TEST POINTS

SUMMARY

Determine type and number equalizers needed from TABLE B.
Obtain equalizers and install on TPU(s).

[1] Determine D4 mode of operation from office records or from type LIU to be installed in bank [TABLE A]

[2] See TABLE B and determine number and type equalizers needed for D4 bank

[3] Obtain required equalizer(s)

[4] Get TPU plug-in, note equalizer placement instructions printed on circuit board, and install equalizers

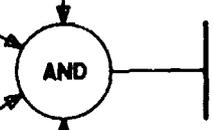


TABLE A	
TYPE LIU	MODE
LIU-1	1
LIU-2	2
LIU-3	3
LIU-4T	4
LIU-4R	4

TABLE B			
D4 MODE	EQUALIZER		CABLE LENGTH TO BE EQUALIZED* (FEET)
	NUMBER REQUIRED	TYPE	
1	1	ED-3C655-30,G1 or G6	0 - 133
2	1	ED-3C655-30,G2	133 - 267
		ED-3C655-30,G3	267 - 400
3 †	2 ‡	ED-3C655-30,G4	400 - 533
		ED-3C655-30,G5	533 - 655
3 †	2 ‡	ED-3C585-30,G1	0 - 220
		ED-3C585-30,G2	220 - 440
		ED-3C585-30,G3	440 - 655
4	1 (in each TPU)	ED-3C656-30,G1	0 - 90
		ED-3C656-30,G2	91 - 250
		ED-3C656-30,G3	251 - 410
		ED-3C656-30,G4	411 - 570
		ED-3C656-30,G5	571 - 730
		ED-3C656-30,G6	731 - 890
		ED-3C656-30,G7	891 - 1050
4A	1 (in each TPU)	ED-3C656-30,G7	25

* Cable length from D4 bank to DSX-() cross-connect or to office repeater bay, if DSX-() is not used
 † Either 3C655 or 3C585 equalizers may be used for Mode 3
 ‡ When service on one digroup will precede service on other digroup in Mode 3, equalizers for both digroups should be installed to prevent service interruption later

[1] See NOTES 1 and 2. From circuit order information determine what equipment will be connected at far end of each digroup

[2] Locate option stamping alongside TPU window [FIG. 1]

[3] Get KS-21838, L1 extractor or longnose pliers

[4] For each digroup (A and B), position (with tool) white plug inside unit to match far end equipment [FIG. 1]

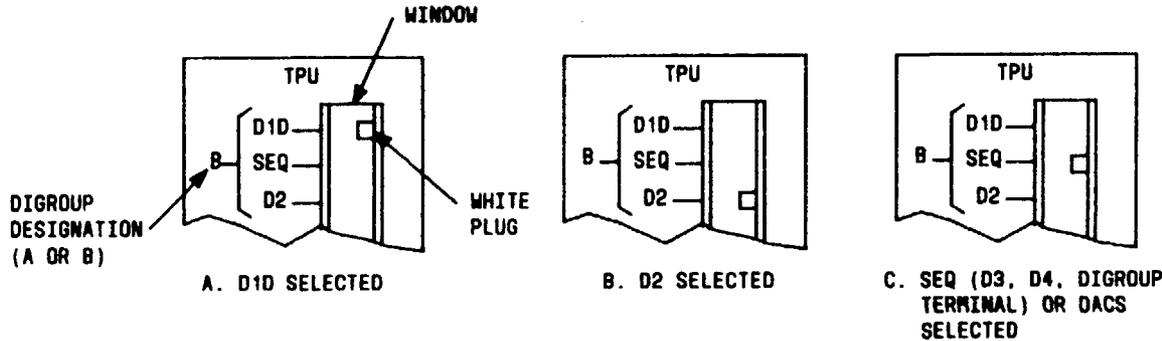
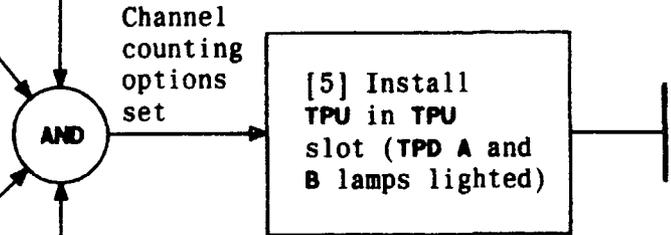


FIG. 1 - Channel Counting Options

NOTES

1. When service on one digroup will precede other in Mode 3, options in TPU for both digroups should be set to prevent service interruption later.
2. If channel bank is operating in Mode 4, this procedure must be performed on both banks

SET CHANNEL COUNTING OPTIONS ON TPU AND INSTALL TPU - D4 CHANNEL BANK

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SUMMARY

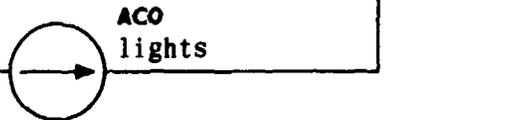
Determine required plug-ins and install per FIG. 1

[1] Observe stamping under each slot for required plug-in unit.

[2] Install TUs and RUs in designated slots
[NOTE 1]

[3] Install plug-ins shown per FIG. 1, Page 2 to produce required mode

[4] Depress ACO pushbutton on alarmed ACU(s)



NOTE 1

Modes 1 and 2 require one bank or two digroups to be loaded. Mode 3 requires one digroup. Modes 4 and 4A require two banks or four digroups to be loaded

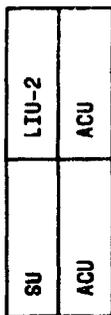
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INSTALL TUs, RUs, ACUs AND LIU (OR LIU/SU) - D4 CHANNEL BANK

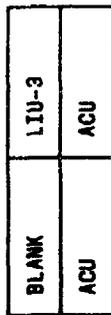
MODE 1 MODE 2 MODE 3 MODE 4
 (OR 4A)



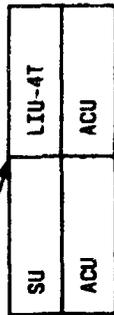
DS1C
 SIGNAL
 FROM
 BANK



DS1C
 SIGNAL
 FROM
 BANK



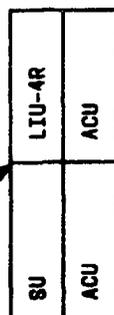
DS1
 SIGNAL
 FROM
 BANK



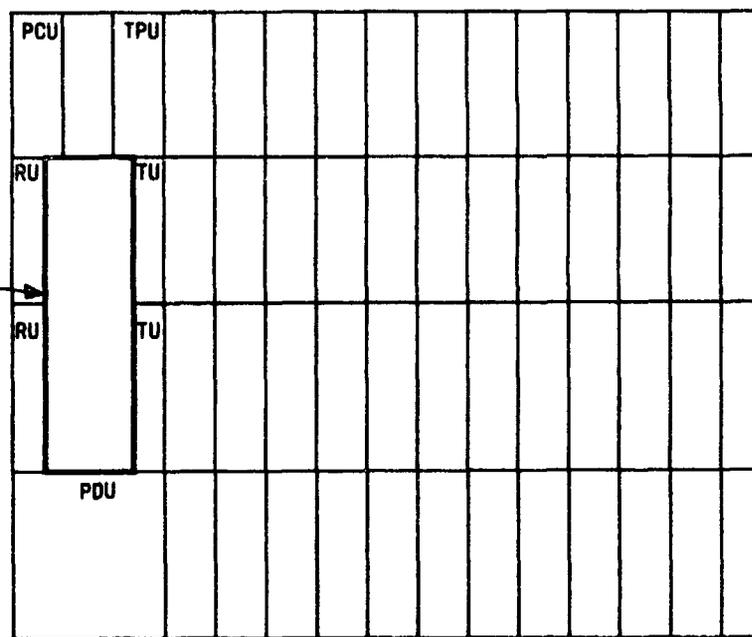
DS2
 SIGNAL
 FROM
 BANK

MODE 4 (4A)
 ARRANGEMENT:
 LIU-4T (OR 4TA)
 IN TRMT BANK
 (TOP BANK)

LIU-4R (OR 4RA)
 IN RCV BANK
 (BOTTOM BANK)



IN RCV BANK
 (BOTTOM BANK) WHICH IS
 WIRED TO TRMT BANK (TOP BANK)
 TO PRODUCE 4 DIGROUPS



DIGROUP B

DIGROUP A

FIG. 1 - D4 Channel Bank

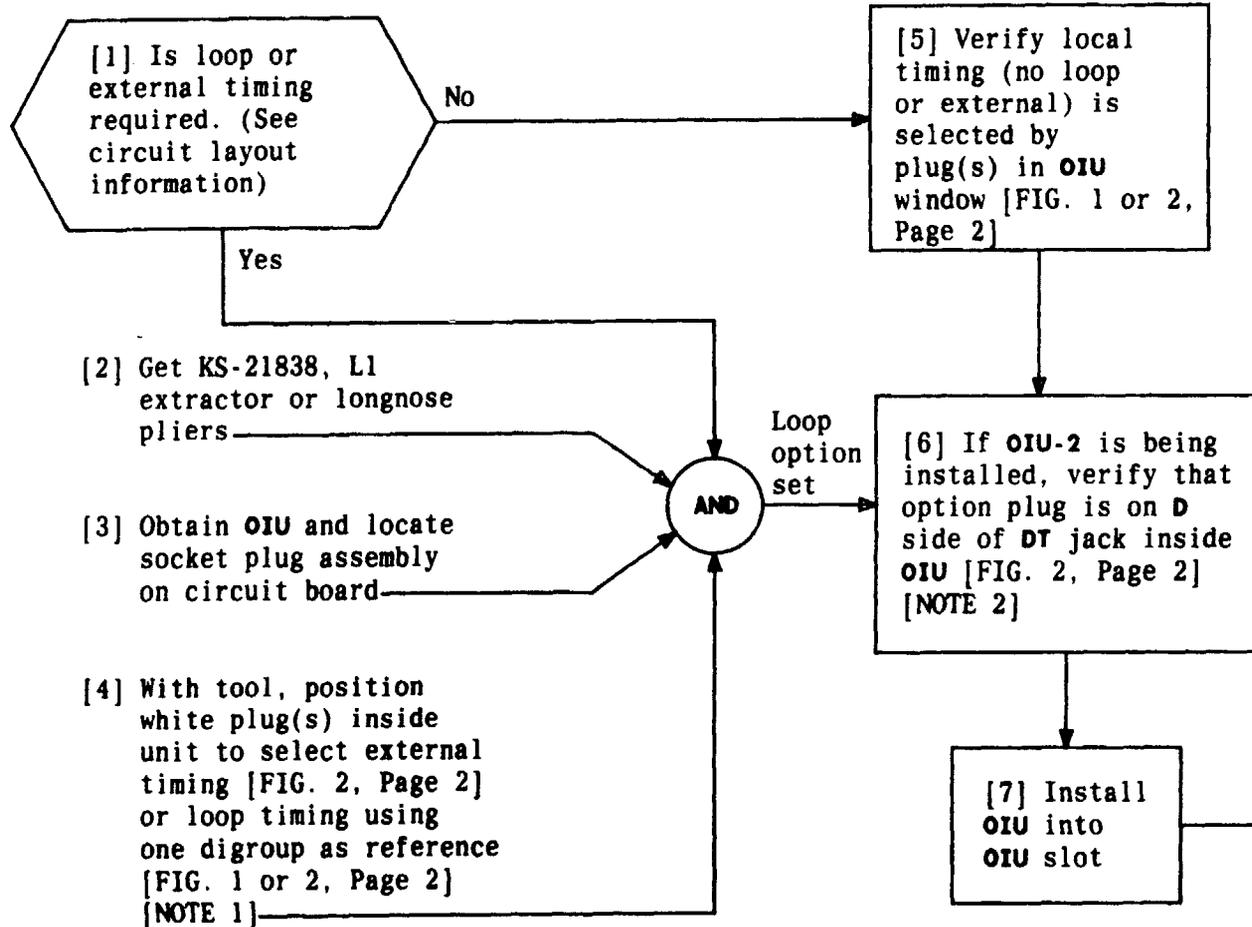
INSTALL TUs, RUs, ACUs, AND LIU (OR LIU/SU) - D4 CHANNEL BANK

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SUMMARY

Determine required timing from circuit order. Set timing options on **OIU** per FIG. 1 and 2, Page 2. Install **OIU**



NOTES

1. Both digroups will be loop timed to reference digroup which must go to either No. 4 ESS or DDS equipment
2. **OIU-2**, List 2 does not contain **D T** option plug

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MAKE TIMING OPTION ON OIU

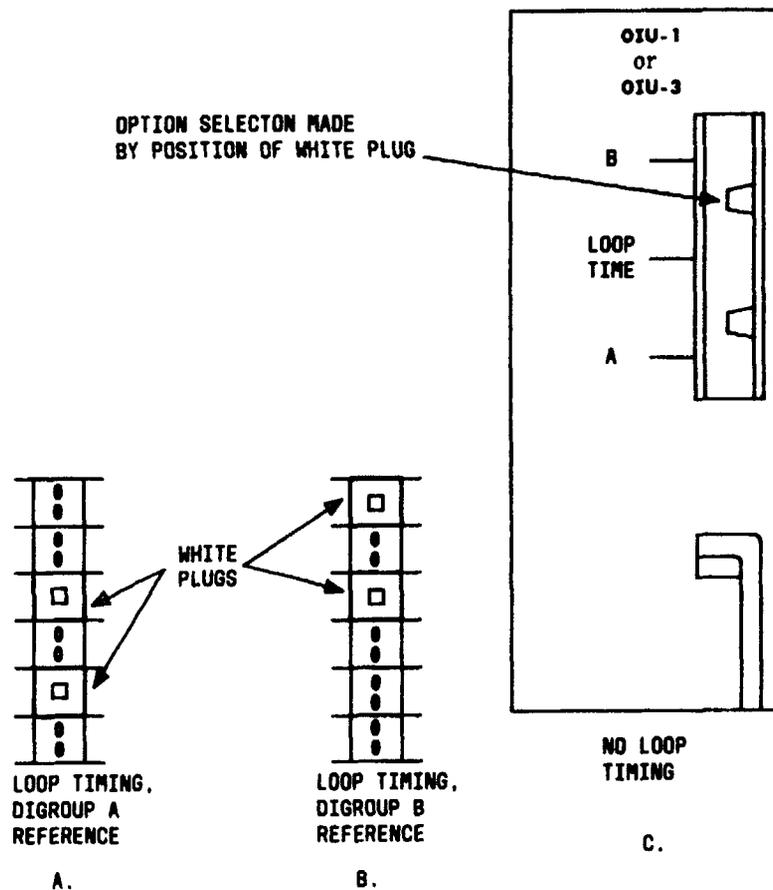


FIG. 1 - OIU-1 OR OIU-3

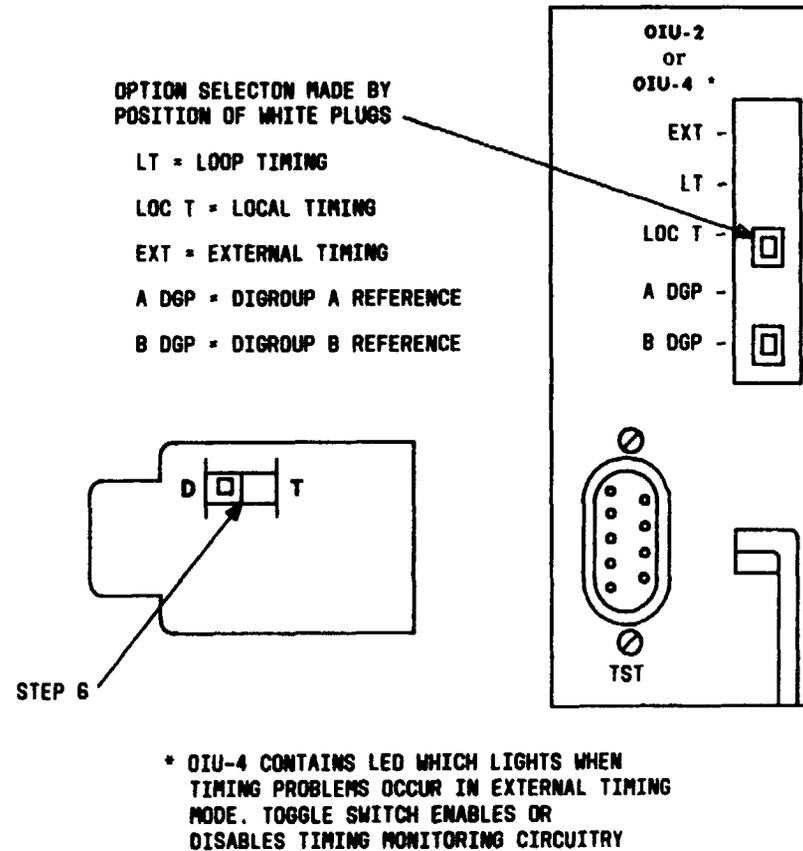


FIG. 2 - OIU-2 (Example = Local Bank Timing Digroup B)

[1] Get KS-14510 or equivalent VOM and condition VOM to measure volts dc [DLP-521] [NOTE 1]

[2] See NOTE 2. See TABLE A. Measure dc voltages at PCU test points

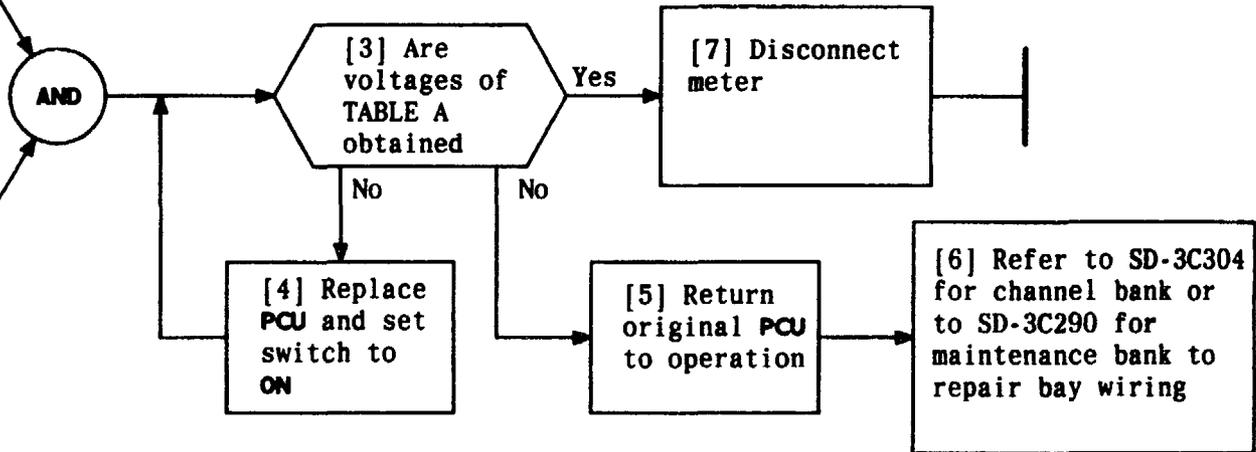


TABLE A			
PCU TEST POINTS	CONNECTIONS		VOLTAGE REQUIREMENTS (VDC)
	+ RED LEAD	- BLACK LEAD	
+12V	+12V	GRD	11.4 to 12.6
+5V	+5V	GRD	4.5 to 5.5
-12V	GRD	-12V	11.4 to 12.6

NOTES

- KS-20599 digital voltmeter or equivalent may be used.
- If channel bank is operating in Mode 4, Steps 2 and 3 must be performed on both banks

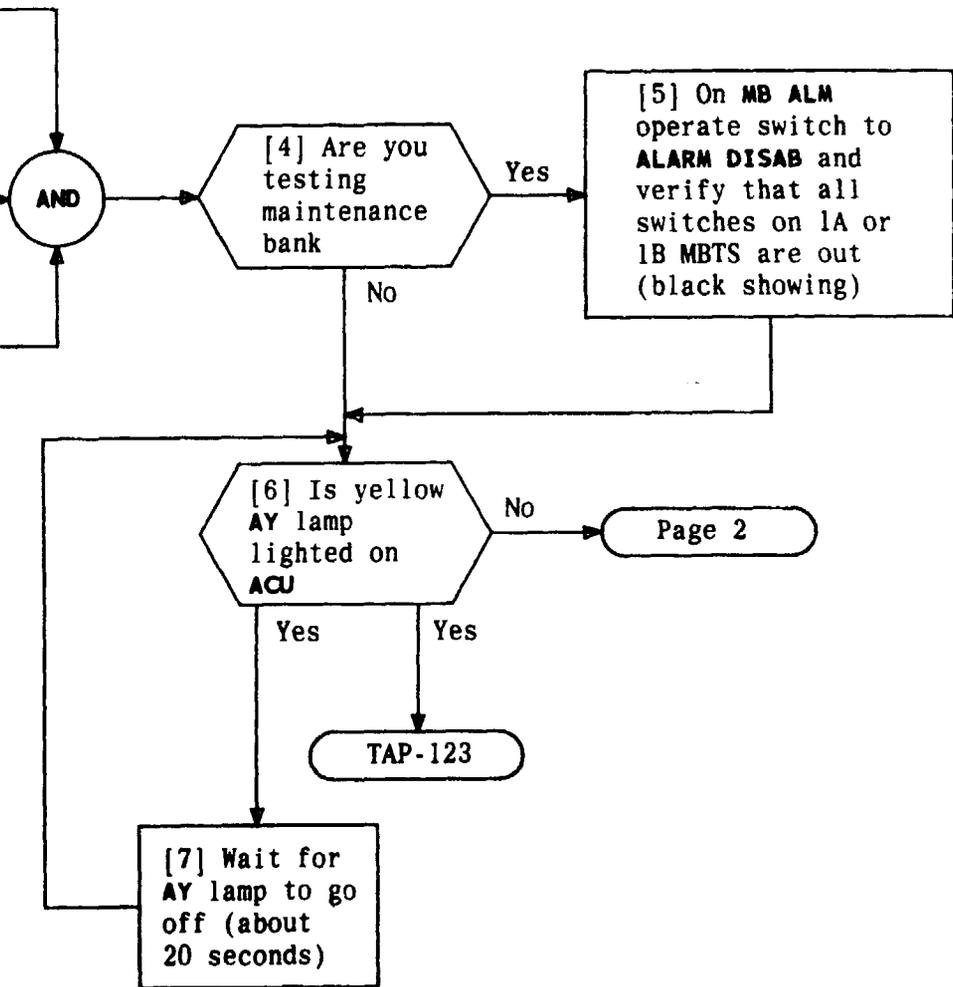
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MEASURE VOLTAGES AT PCU TEST POINTS – UNDER LOAD

[1] Get two KS-19531 or equivalent pin plugs to fit pin jacks on RU and LIU [NOTES 1 and 2]

[2] On ACU to be tested, set 3-position switch to NORM and set MEM switch to OFF

[3] On LIU, insert pin plug into LP jack [NOTE 3]



NOTES

1. If channel bank is connected to a remote E2 alarm system, proper operation of that system can be verified during performance of this procedure by having personnel at E2 equipment monitor alarms
2. This procedure should be performed as follows:
Maintenance Bank - one time on each ACU installed.
Channel Bank -
Mode 1 - one time
Mode 2 - two times (once on each ACU)
Mode 3 - one time on ACU in digroup being turned up
Mode 4 - Four times (once on each ACU).
3. For Mode 3, pin plug should be inserted into LP jack corresponding to digroup being tested (LPA or LPB)

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[8] Familiarize yourself with steps 9 and 10 before proceeding

[9] Insert pin plug into red R CODE jack on RU for digroup being tested

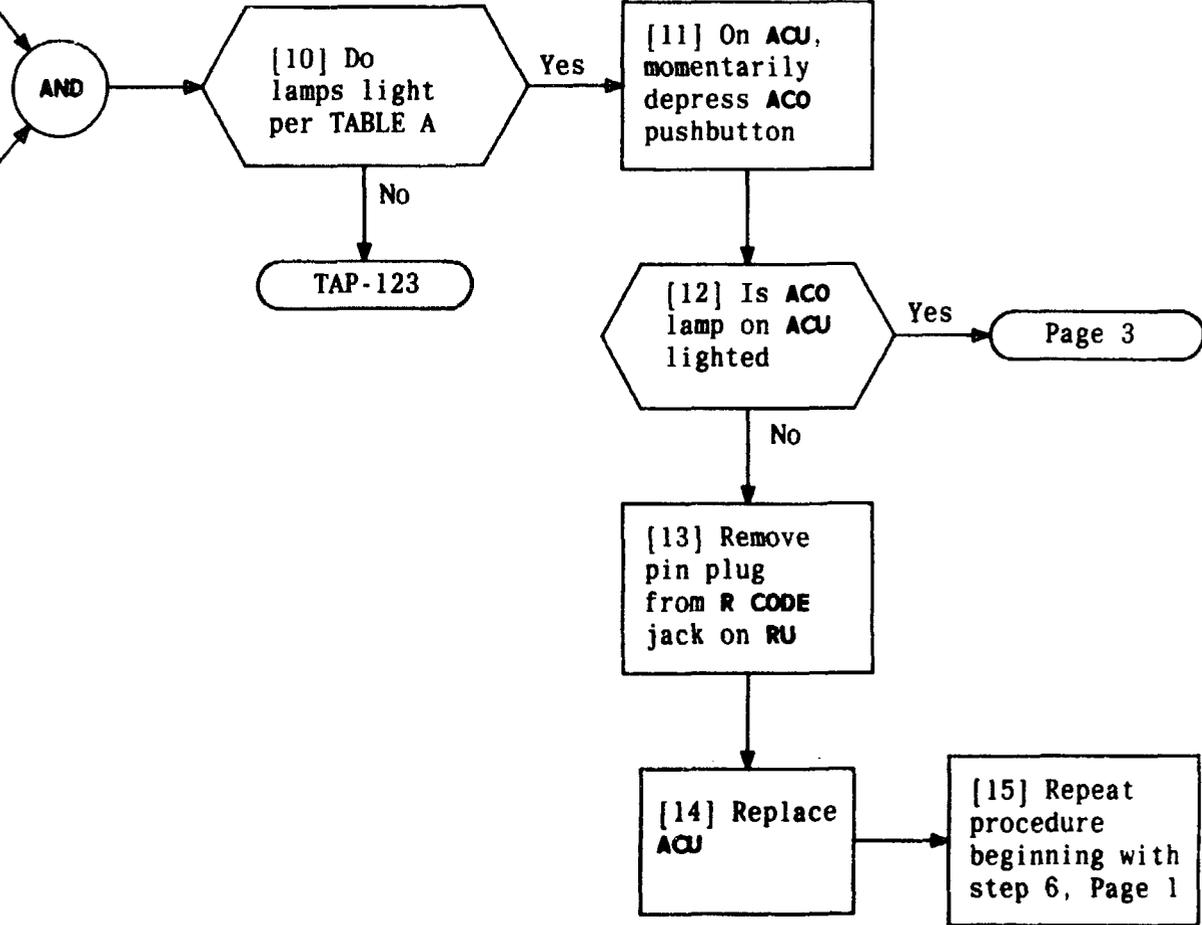
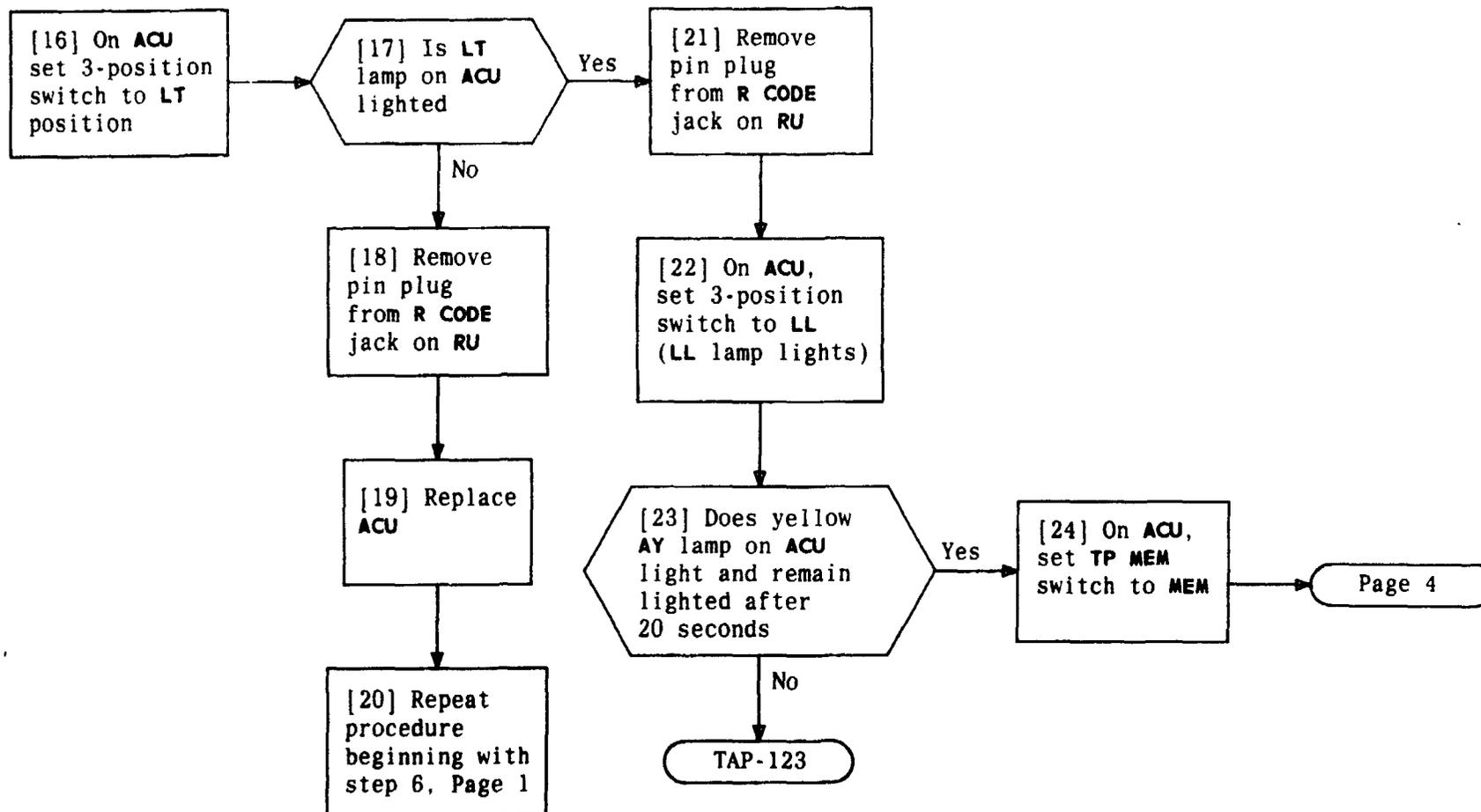


TABLE A
LAMP
RCV on RU
AR on ACU
TP on ACU
TPD on TPU



TEST BANK ALARMS

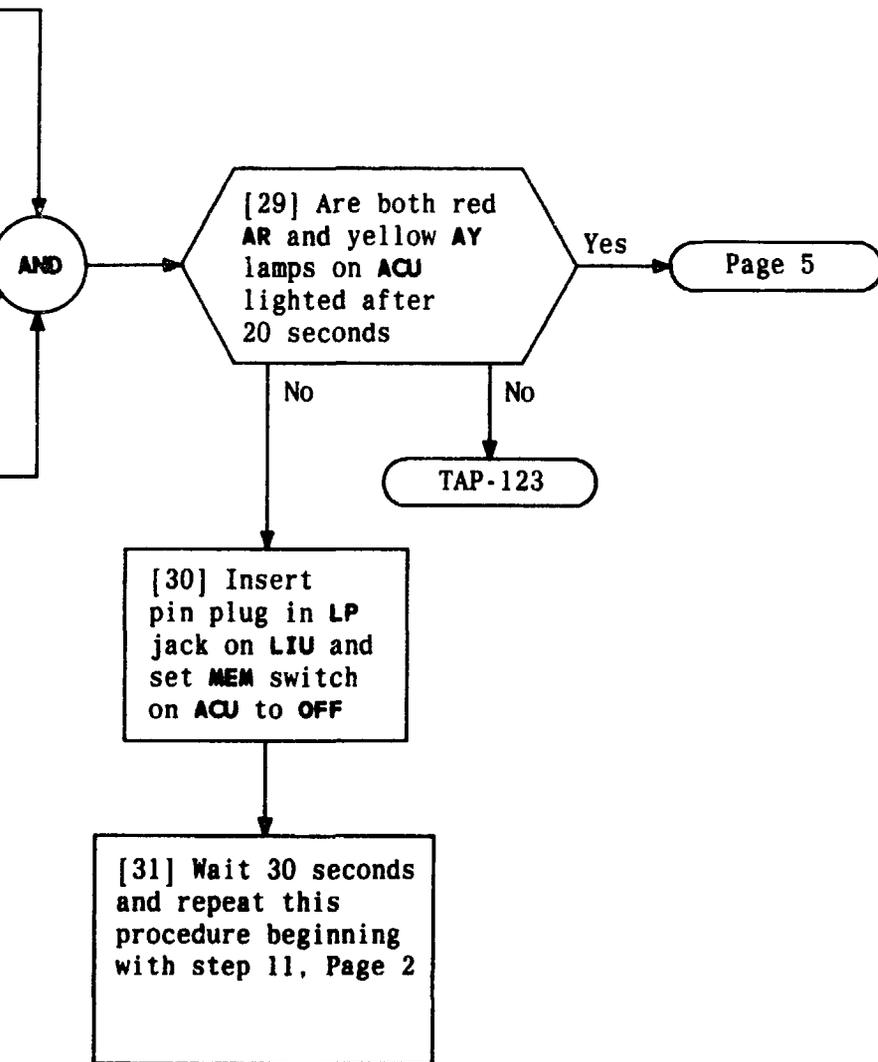
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[25] Familiarize yourself with steps 26 through 29; timing is important (less than 20 seconds between steps 26 and 28)

[26] On ACU set 3-position switch to LT, pause for at least 2 seconds, then set to NORM

[27] Insert plug into R CODE on RU

[28] Remove pin plug from LP jack on LIU



[32] Familiarize yourself with steps 33 through 35 before proceeding

[33] Remove pin plug from R CODE jack on RU

[34] Insert pin plug into LP jack on LIU

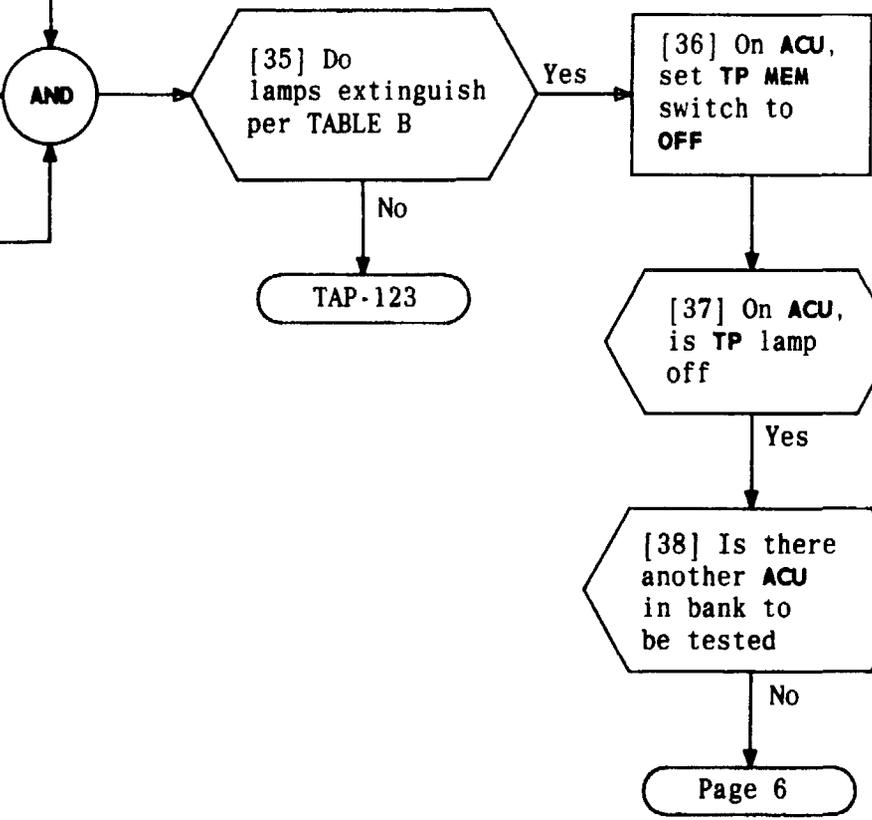
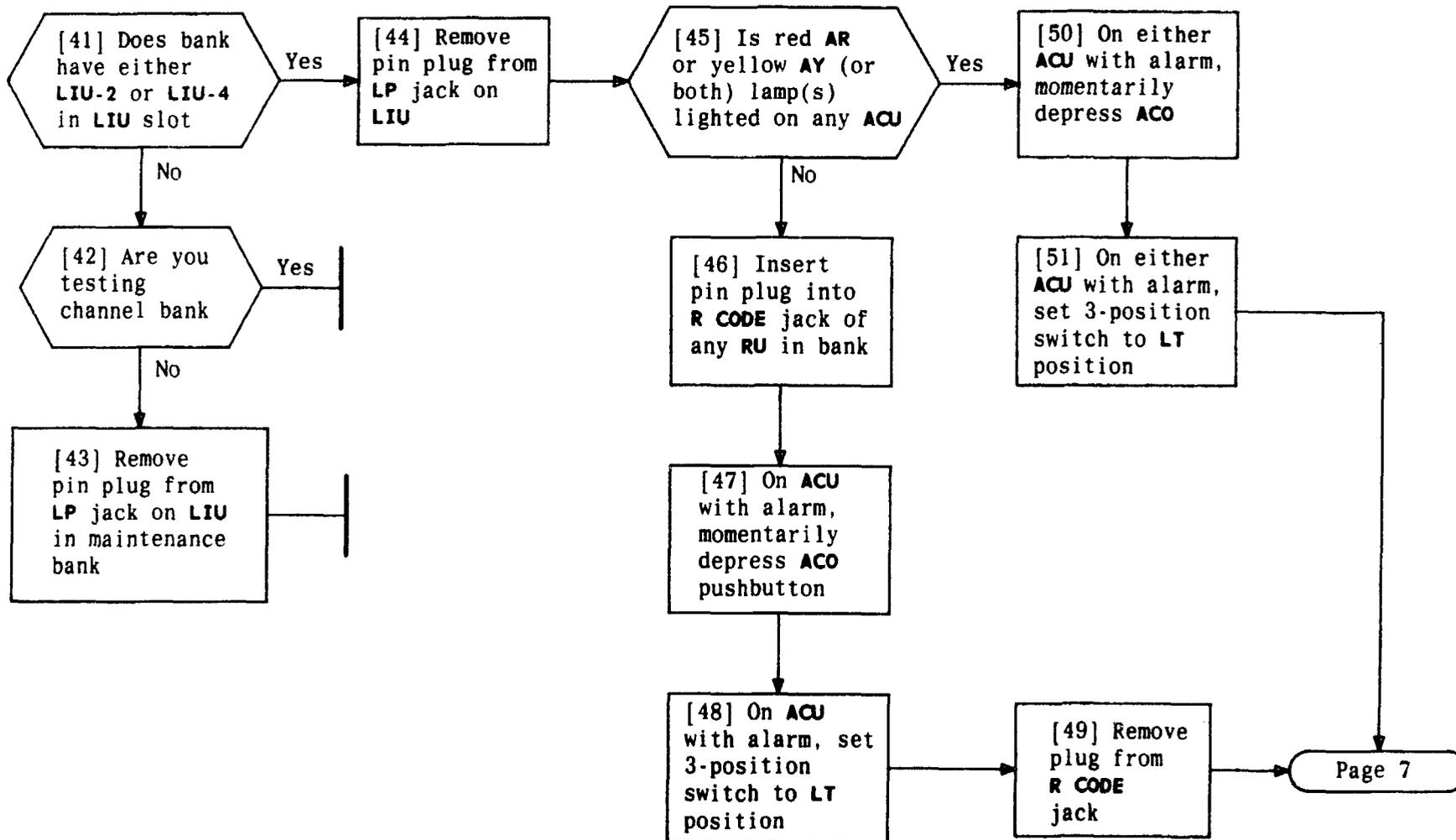


TABLE B
LAMP
RCV on RU
AR on ACU
ACO on ACU
TPD on TPU
AY on ACU

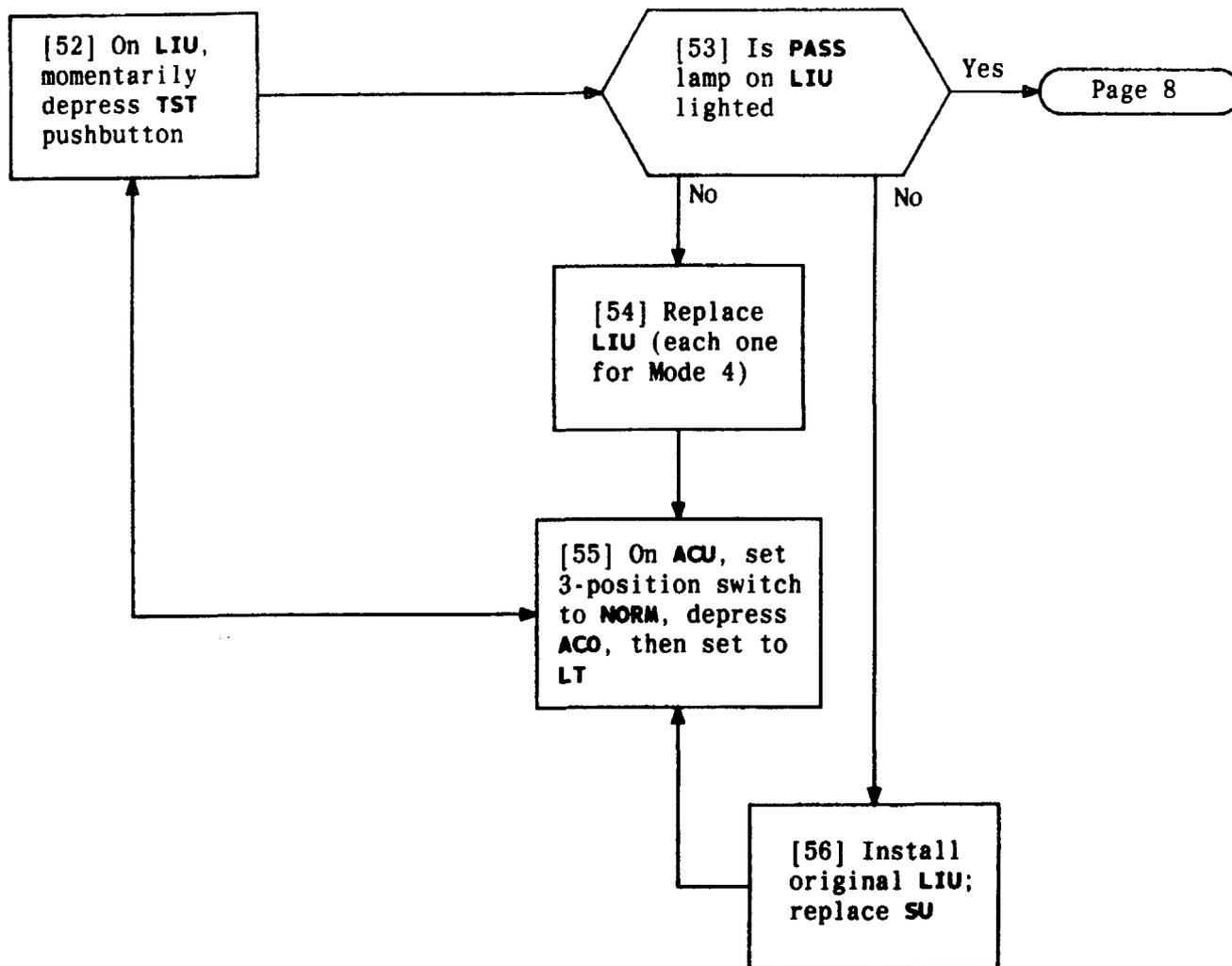
TEST BANK ALARMS

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TEST BANK ALARMS

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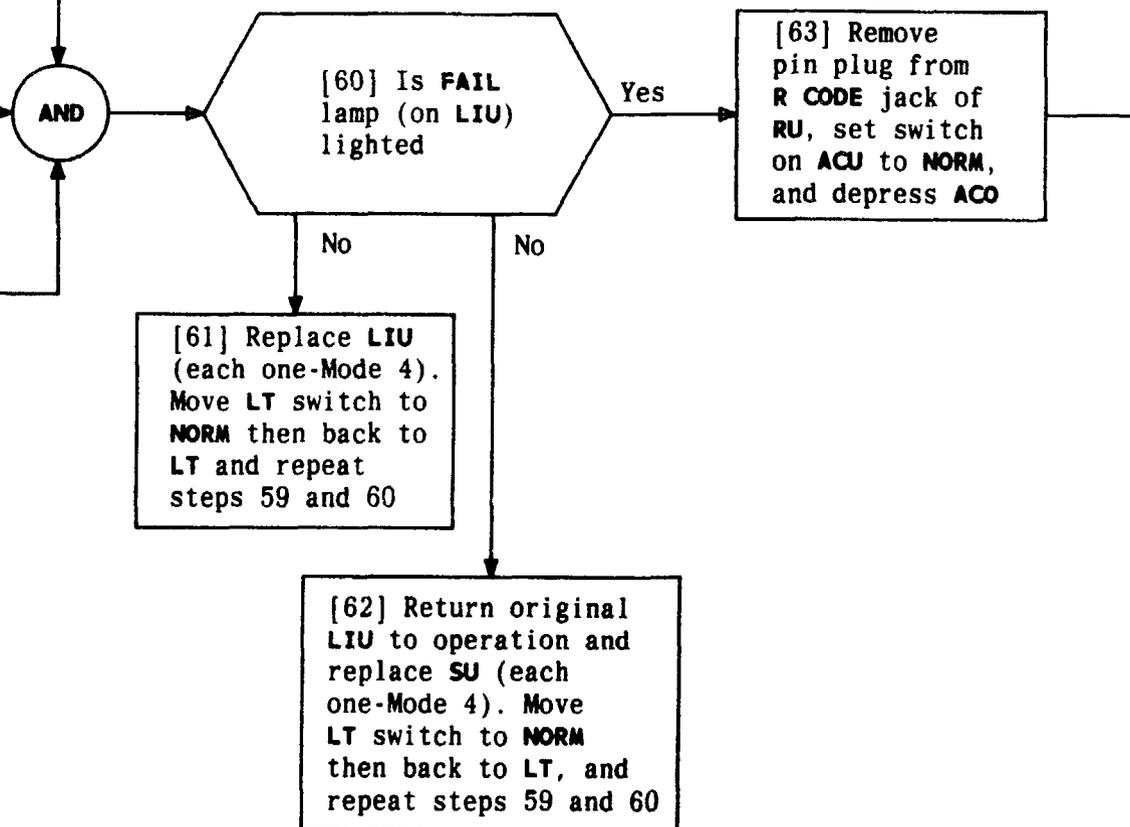
TEST BANK ALARMS

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[57] On ACU, set 3-position switch to **NORM**, depress **ACO**, then set to **LT**

[58] Insert pin plug into **R CODE** jack on either **RU** in bank

[59] Momentarily press **TST** button on **LIU**



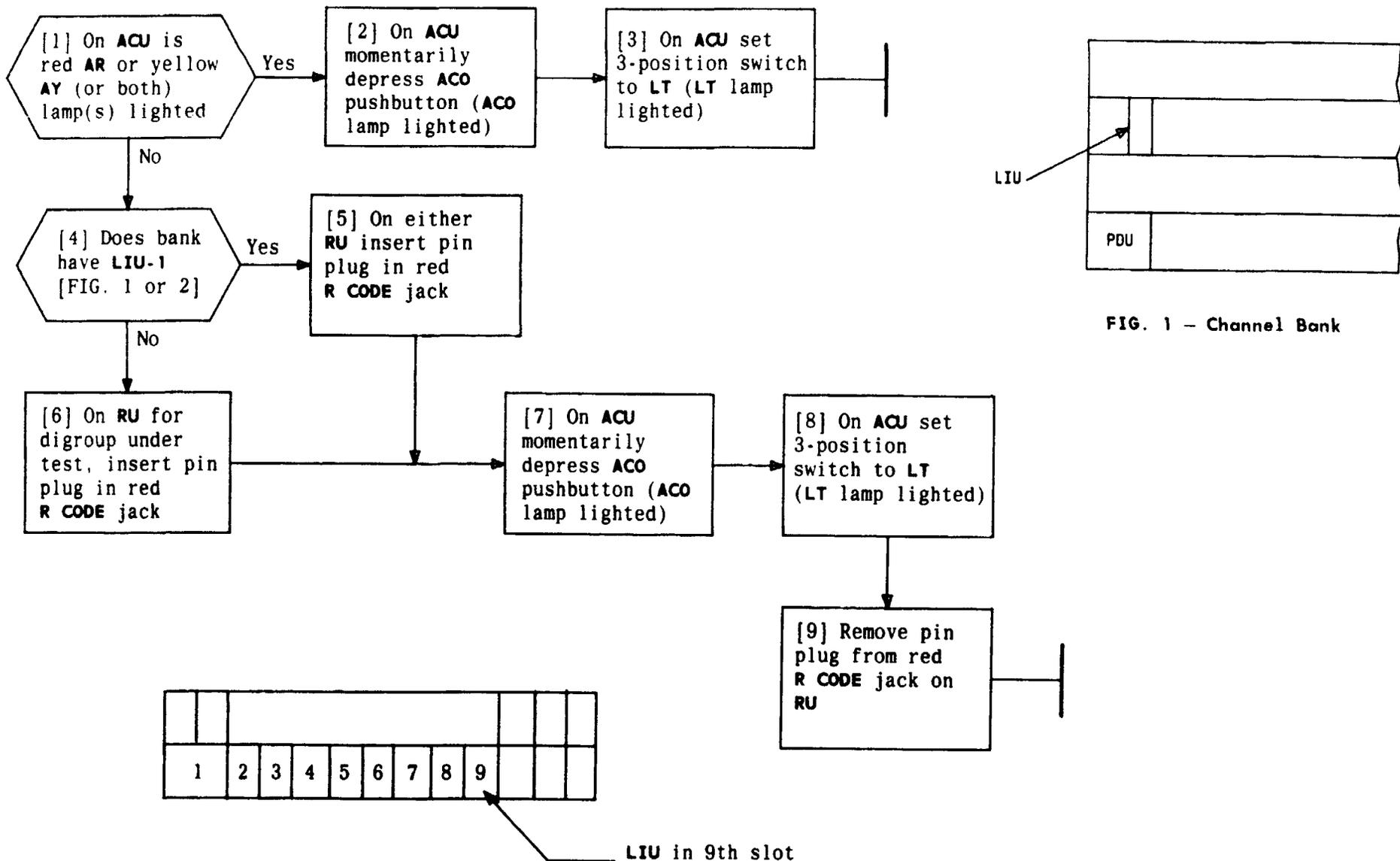


FIG. 2 - Maintenance Bank

FIG. 1 - Channel Bank

LOOP D4 CHANNEL BANK DIGROUP(S) OR MAINTENANCE BANK

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[1] Obtain D4 **SIGNALING PATH TEST SET (SPTS)** from SPTS slot in maintenance bank

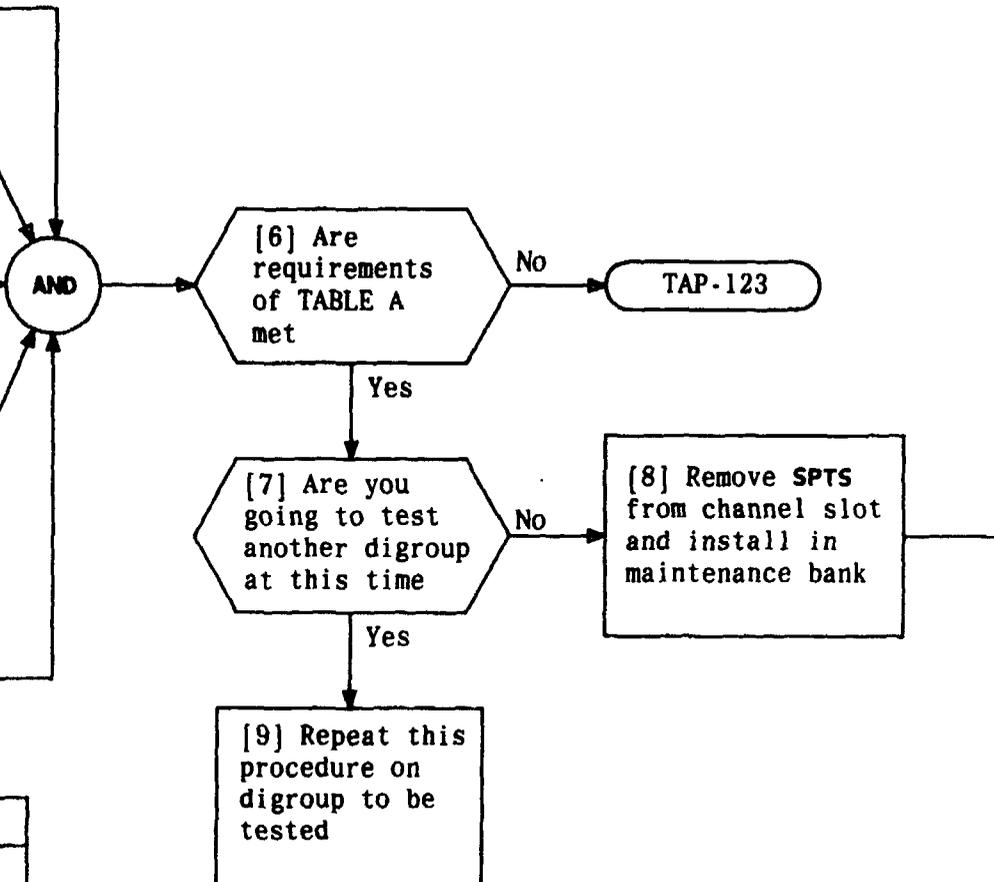
[2] Select test channel in digroup under test

[3] Remove channel unit (if installed)

[4] Insert SPTS in channel slot selected in step 2

[5] See TABLE A and perform tests 1 and 2 setting switches to positions indicated

TABLE A			
TEST	SWITCH	POSITION	LAMP LIGHTED
1	A	1	A only
	B	0	
2	A	0	B only
	B	1	



[1] Obtain blown fuse and spare fuse holder cap

[2] Insert fuse into fuse holder cap

[3] Substitute assembly of step 2 into each fuse slot listed in TABLE A and observe for requirements [NOTES 1 and 2]

AND

[4] Are requirements of TABLE A met

Yes

[5] Install all removed fuses into their proper fuse slots

No

No

[6] Replace PDU [DLP-523] and install 10-amp fuse into 10A slot. Repeat steps 3 and 4

[7] Refer to SD-3C304 for channel bank or to SD-3C290 for maintenance bank to repair bay wiring

TABLE A

FUSE SLOT	LOCATION	REQUIREMENTS	
		CHANNEL BANK	MAINTENANCE BANK
		ALM	Power Distribution Subassembly *
-48ABS	Power Distribution Subassembly *		
-48S A	Power Distribution Unit (PDU)	Office alarm sounds and ALM lamp lights on PDU for each fuse slot	ALM lamp lights on PDU for each fuse
-48S B	Power Distribution Unit (PDU)		
-48F A	Power Distribution Unit (PDU)		
-48F B	Power Distribution Unit (PDU)		
-48V	Power Distribution Unit (PDU)		
20 HZ	Power Distribution Unit (PDU)		

* Power Distribution Subassembly is panel stamped -48 MAIN and -48ABS

NOTES

1. If channel bank is operating in Mode 4, test of TABLE A must be performed on both banks
2. Office alarm will not sound when testing maintenance bank because no plug-ins are installed

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CHECK OPERATION OF FUSE ALARM CIRCUITS - D4 CHANNEL OR MAINTENANCE BANK

[1] See FIG. 1 for all leads that appear at distributing frame. See TABLE A for connection of trunk processing leads 1 and 2 or A1, A2, B1, and B2 to office leads

[2] Verify cross-connections at distributing frame

TABLE A				
OFFICE	LEAD DESIGNATION FROM BANK			
	1	2	A1 or B1	A2 or B2
No. 4A Crossbar	MS	*		
No. 5 Crossbar	B2	B1		
Panel	S	*		
No. 1 Crossbar or Crossbar Tandem	S1	*		
ESS offices	*	*	A†	B†
Step-By-Step	S Switch Side	S Line Side		
* Individual channel connection not required † Connection required to ESS A and B leads from A1 and A2 leads of digroup A and from B1 and B2 leads of digroup B				

CROSS-CONNECT TO OFFICE TRUNK CIRCUITS AS REQUIRED

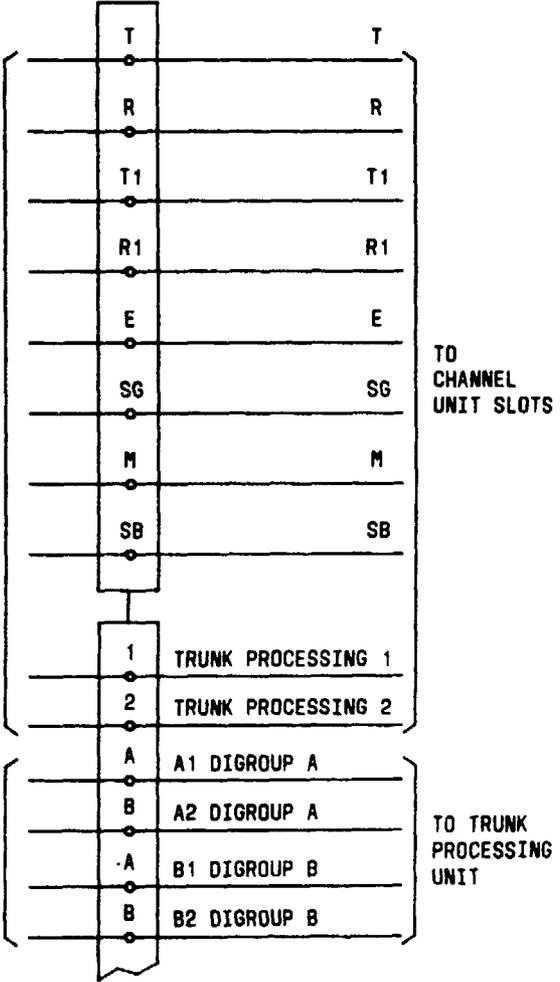


FIG. 1 - Universal Channel Wiring To 8-Point Terminal Block

[1] Align front edge of switch with notch corresponding to desired setting [FIG. 1], [NOTE 1]

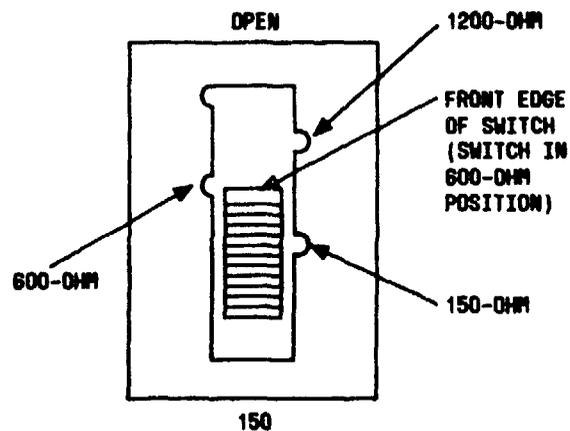
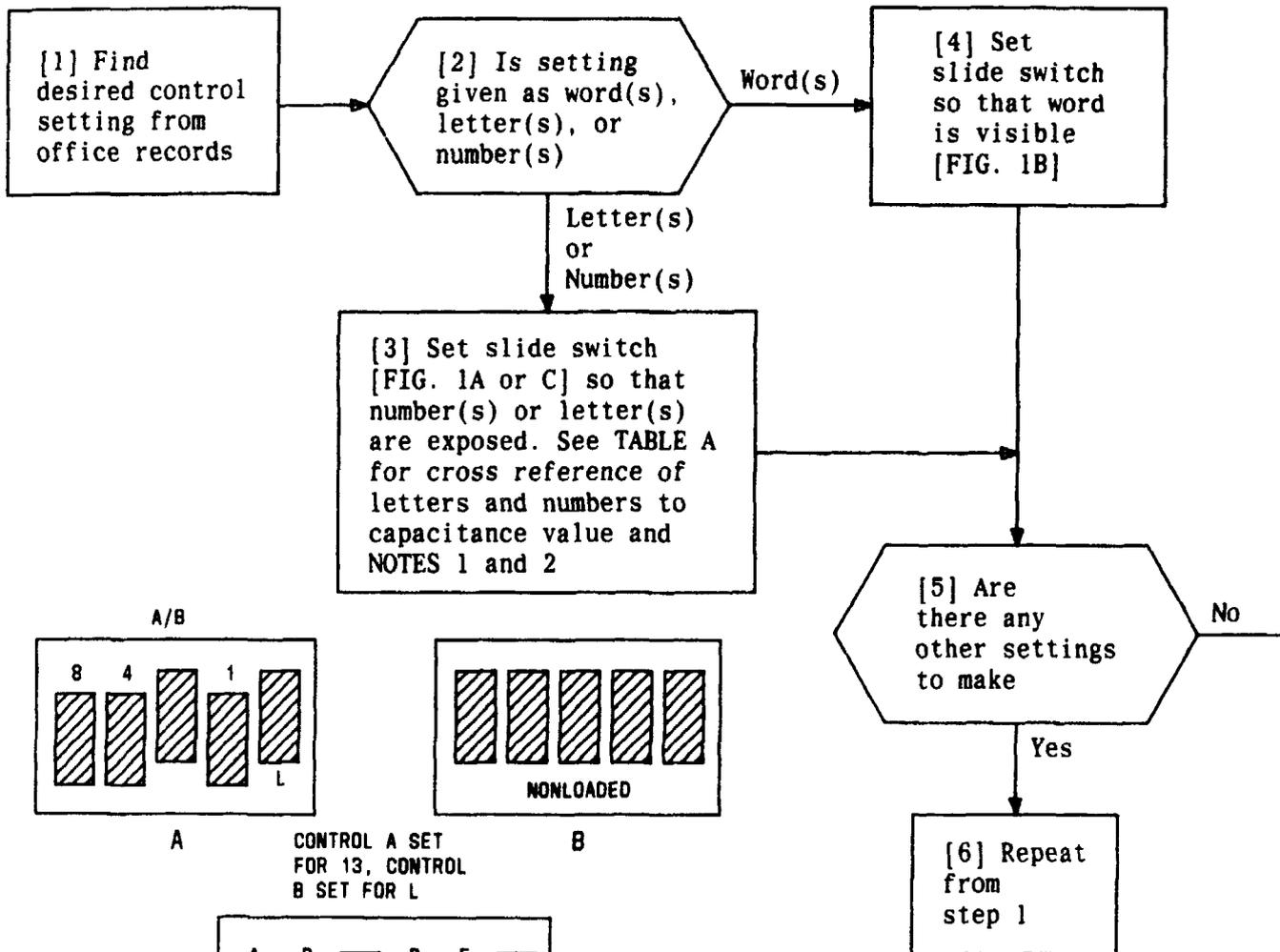


FIG. 1

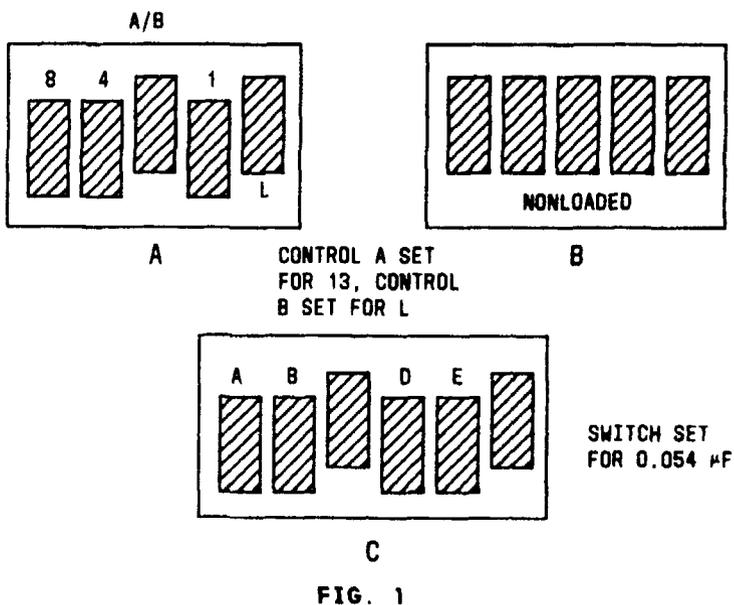
NOTE 1
Switch may be mounted so 150 position is at top instead of bottom

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SELECT TERMINATING IMPEDANCE ON CHANNEL UNIT



CAPACITOR VALUE (µF)	LETTER OR NUMBER
0.002	A or 2
0.004	B or 4
0.008	C or 8
0.016	D or 16
0.032	E or 32
0.064	F or 64



NOTES

- Switch of FIG. 1A contains two controls - numbers are A side and letter is B side
- If single number is given that does not appear on switch, then combination of numbers or letters (TABLE A) must be exposed to add up to that single number

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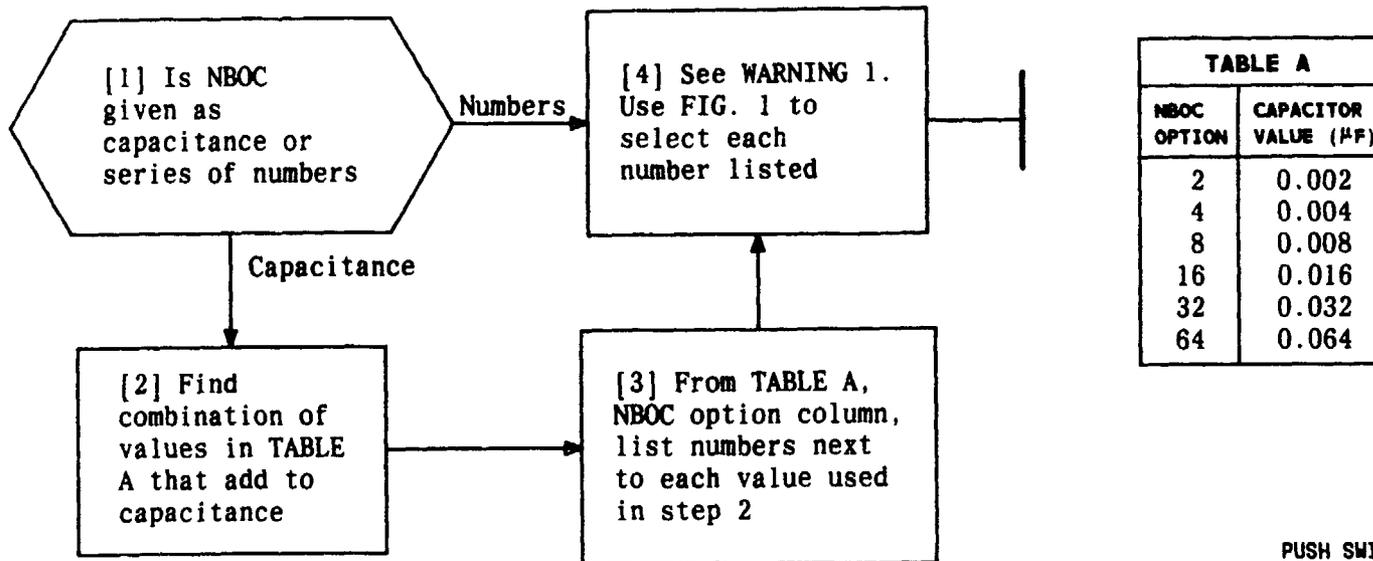


TABLE A	
NBOC OPTION	CAPACITOR VALUE (µF)
2	0.002
4	0.004
8	0.008
16	0.016
32	0.032
64	0.064

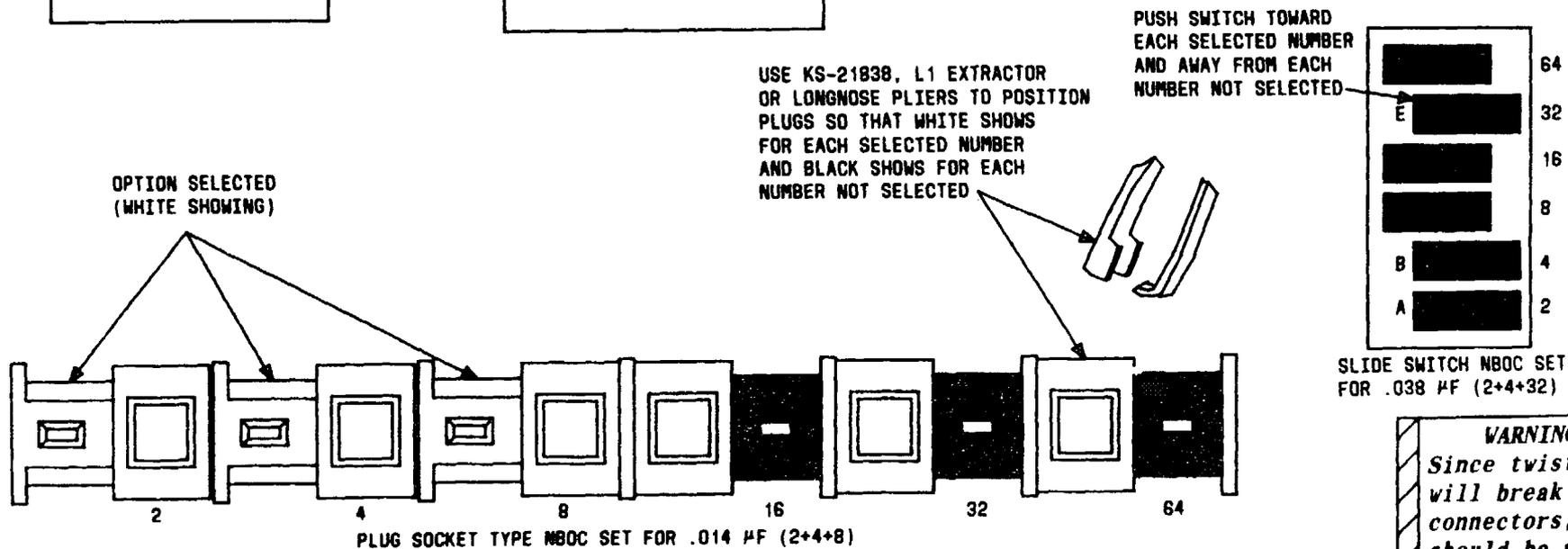


FIG. 1

WARNING 1
 Since twisting will break connectors, plugs should be pulled straight out

[1] Which type of attenuator are you going to option? See FIG. 1, 2, and 3

- Socket and plug [FIG. 1] → Page 2
- Rocker switch [FIG. 2 or 3] → Page 3
- Slide switch [FIG. 4] → Page 4

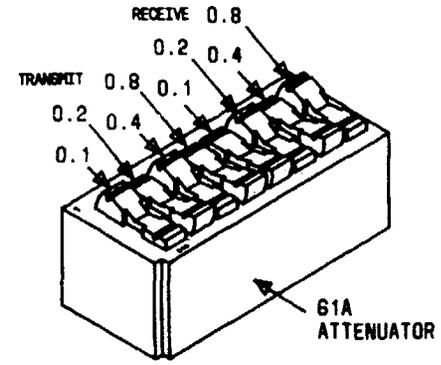
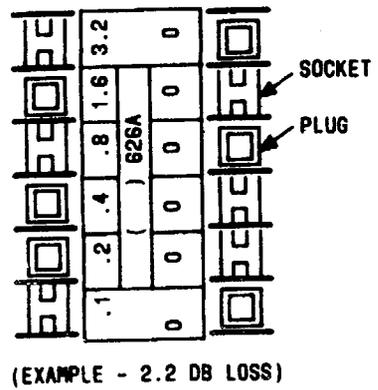


FIG. 3



(EXAMPLE - 2.2 DB LOSS)

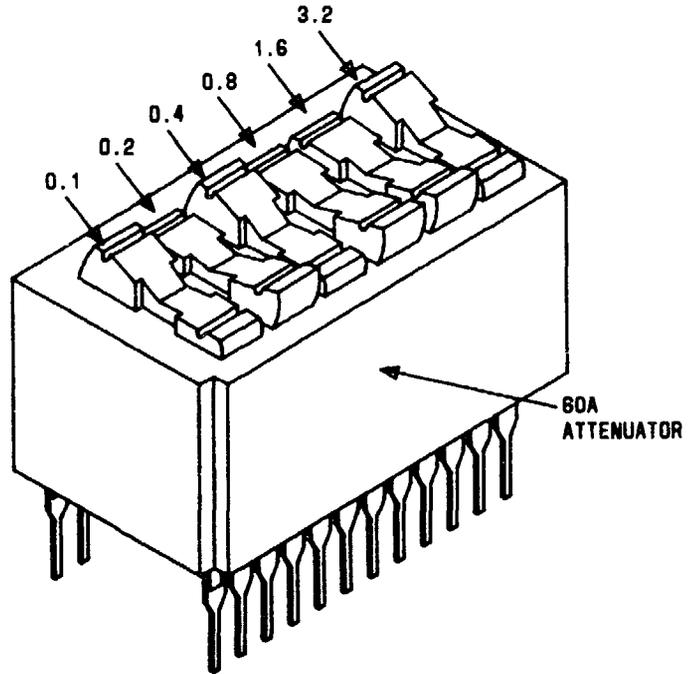


FIG. 2

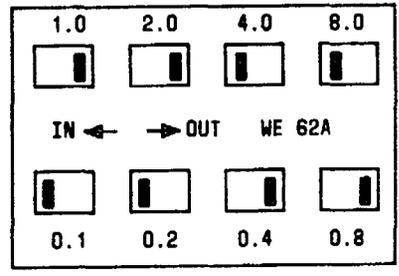
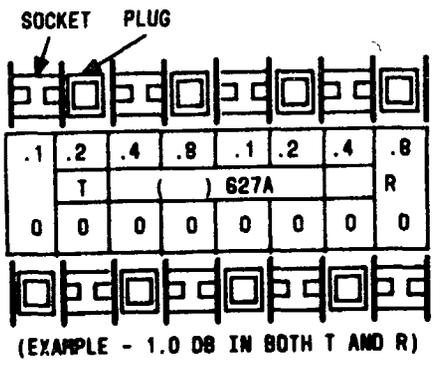


FIG. 4



(EXAMPLE - 1.0 DB IN BOTH T AND R)

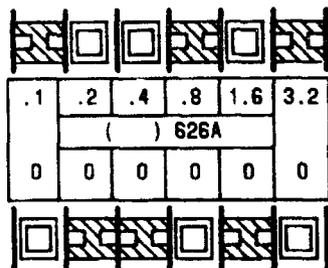
FIG. 1

SET ATTENUATOR OPTIONS

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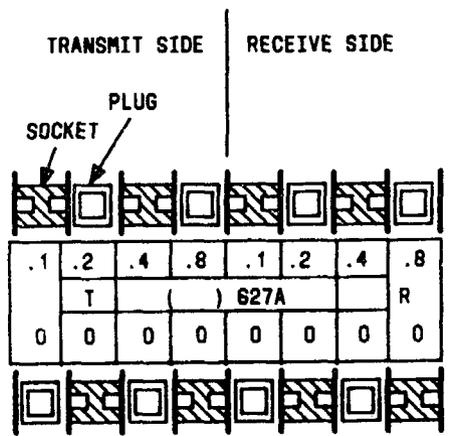
[2] Find combination of numbers on attenuator that adds to desired transmit and receive settings. Refer to FIG. 5 for single (T or R) attenuator or to FIG. 6 for dual (T and R) attenuator

[3] See WARNING 1. Use KS-21838, L1 extractor [FIG. 7] or longnose pliers to position plugs beside each number used in step 2. Position other plugs beside 0 used in step 2. See NOTE 1



PLUGS IN .2, .4, AND 1.6
SET THIS ATTENUATOR FOR 2.2 DB

FIG. 5



BOTH T AND R SIDE SHOW .2 AND .8 FOR
TOTAL OF 1.0 DB IN BOTH DIRECTIONS

FIG. 6

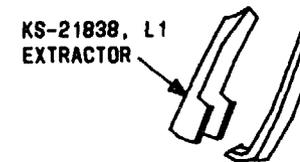


FIG. 7

NOTE 1
For each section on attenuator there must be a plug, either on numbered side or 0 side

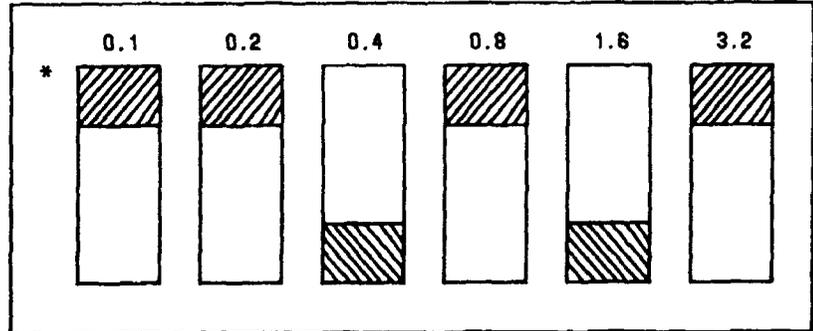
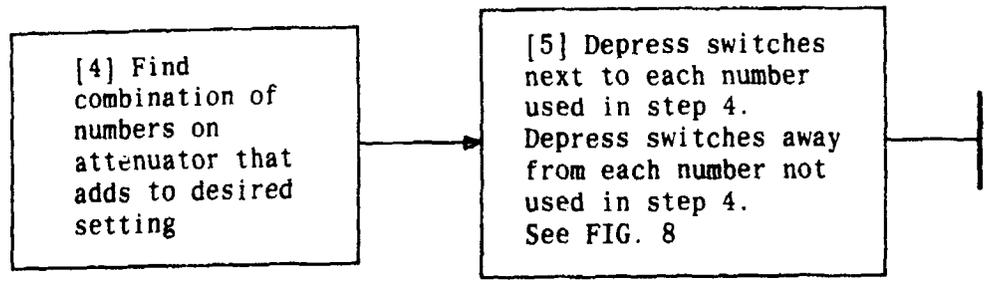
WARNING 1
Since twisting will break connectors, plugs should be pulled straight out

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SET ATTENUATOR OPTIONS

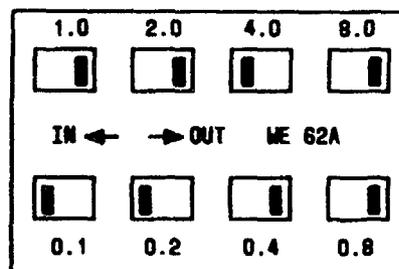
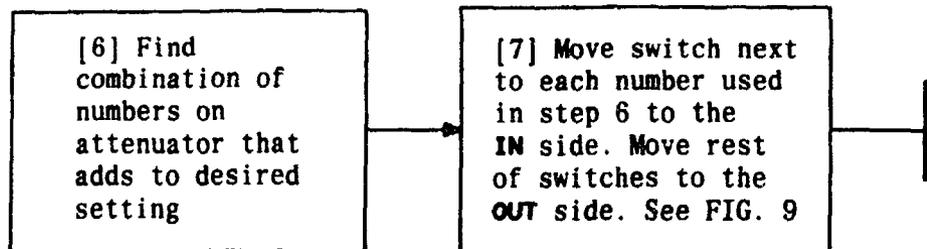


* SHADED AREA REPRESENTS SWITCH DEPRESSED AT THAT SIDE. ATTENUATOR IS SET FOR 4.3 DB (3.2 + 0.8 + 0.2 + 0.1)

FIG. 8

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SET ATTENUATOR OPTIONS



DARK AREA ON SWITCH INDICATES POSITION. ATTENUATOR IS SET FOR 4.3 DB (4.0+0.2+0.1)

FIG. 9

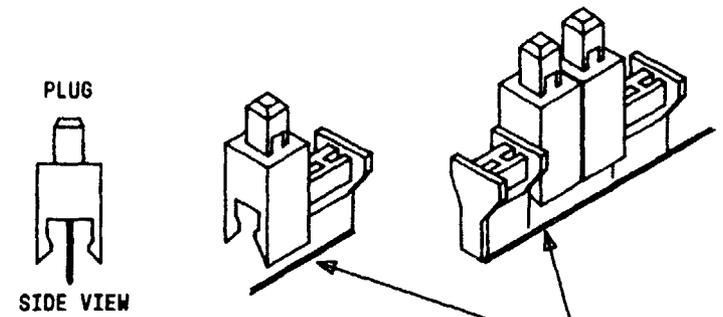
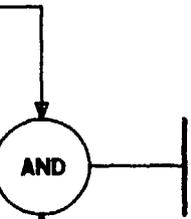
SET ATTENUATOR OPTIONS

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[1] Get KS-21838, L1 extractor
[FIG. 1] or longnose pliers

[2] Use FIG. 2 as guide and example
to determine location of connector
plug(s)

[3] See WARNING 1. Use extractor or
pliers on connector plugs that
need to be repositioned. Pull plug
straight out and push straight
in at new location



CONNECTOR PLUGS MAY APPEAR AS
SINGLE OPTIONS OR AS GROUP
OF OPTIONS

PLUG IS INSERTED INTO SLOT
CORRESPONDING TO DESIRED
OPTION. AS SHOWN, OPTIONS
E AND H SELECTED

* BLACK SHOWING
OPTION NOT SELECTED * WHITE SHOWING
OPTION SELECTED

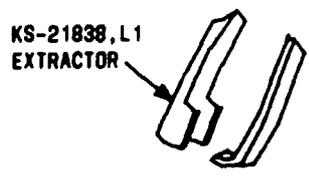
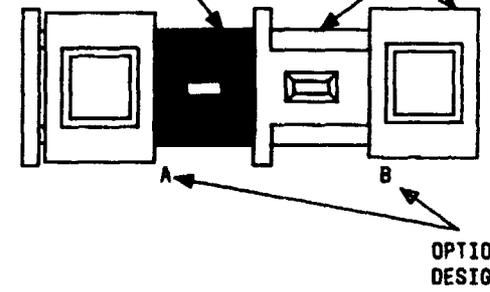
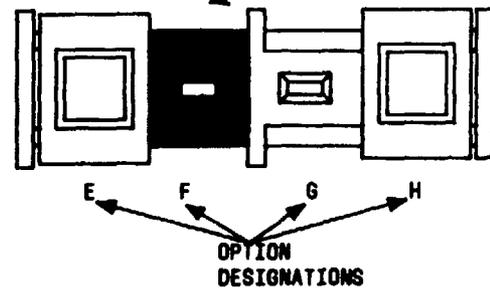


FIG. 1

* ON SOME UNITS, AN OPTION IS SELECTED BY BLACK SHOWING
INSTEAD OF WHITE SHOWING. EXAMPLE: 4-WIRE TANDEM UNIT -
OPTION E IS SELECTED BY BLACK SHOWING

FIG. 2

SET CONNECTOR PLUG OPTIONS

WARNING 1 Twisting will break connectors	
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[1] From information
on WORD or CLRC,
set T and R
attenuators [FIG. 1]
[DLP-565]

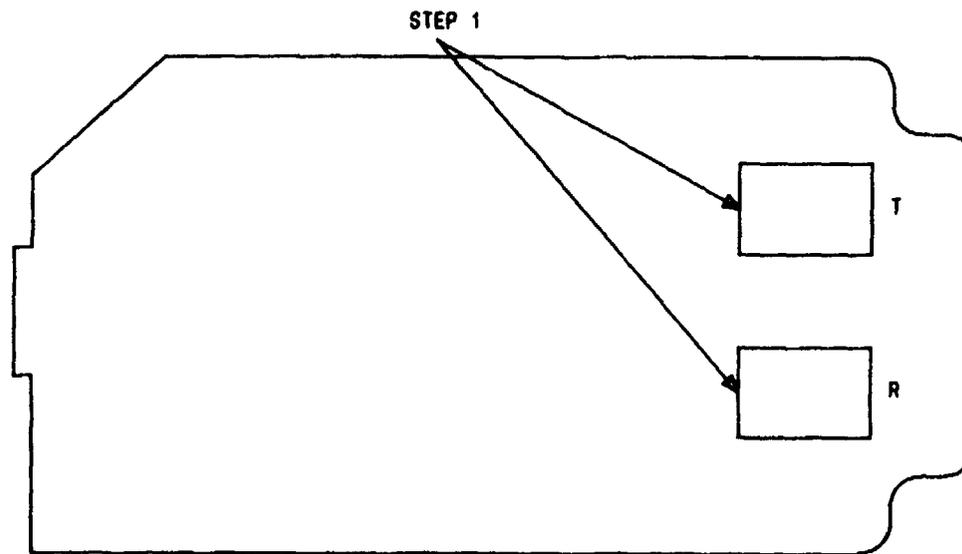


FIG. 1

SET OPTIONS RSCO CHANNEL UNIT (J98726BW)

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[1] From information on WORD or CLRC,
set NBOC on channel unit [NOTE 1]
[FIG. 1] [DLP-564]

[2] From information on WORD or
CLRC, set transmit and
receive attenuators, T and
R [FIG. 1] [DLP-565]

[3] From information on WORD or
CLRC, set options 1G, SD, L, S
[NOTE 1] [FIG. 1] [DLP-566]

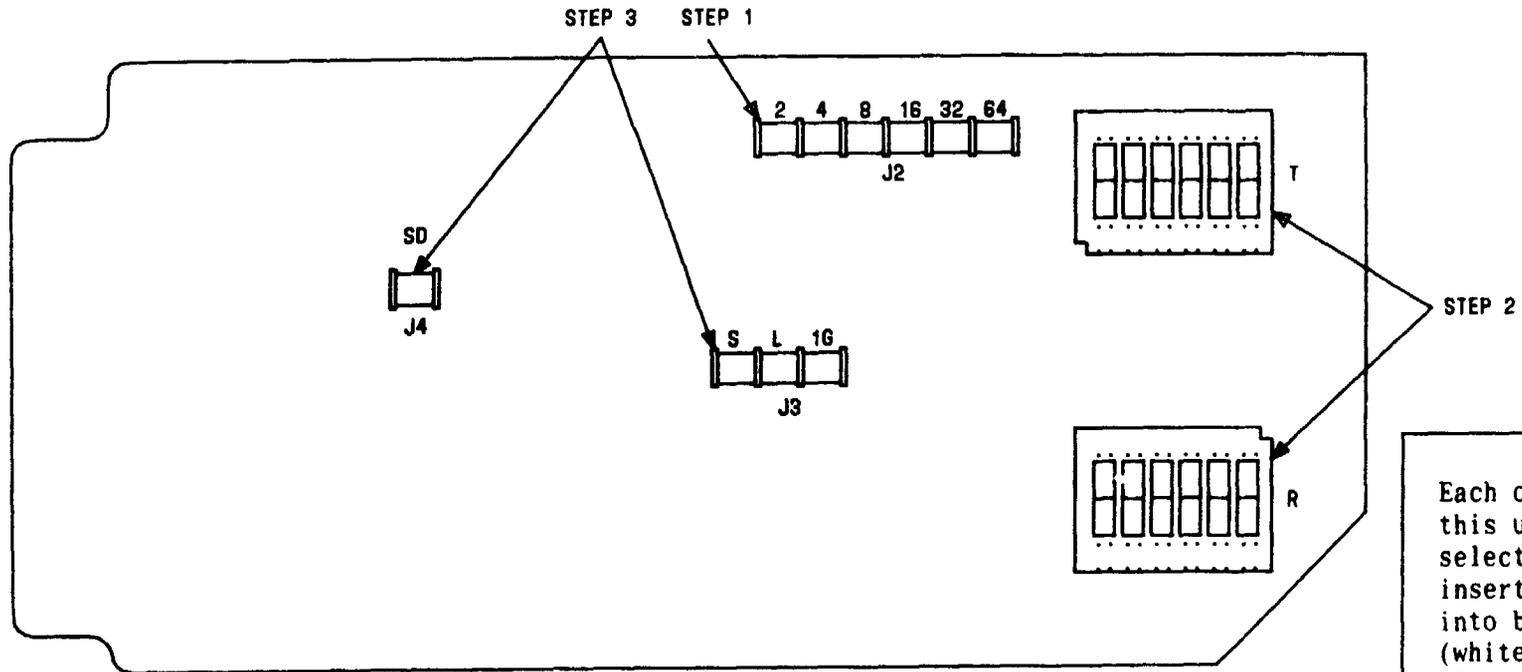


FIG. 1

NOTE 1
Each option on
this unit is
selected by
inserting plug
into black side
(white showing)
of applicable
connector section

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SET OPTIONS DPO CHANNEL UNIT (J98726BA)

[1] From information on WORD or CLRC,
set NBOC [FIG. 1] [NOTE 1]
[DLP-564]

[2] From information on WORD or
CLRC, set transmit and
receive attenuators, T and
R [FIG. 1] [DLP-565]

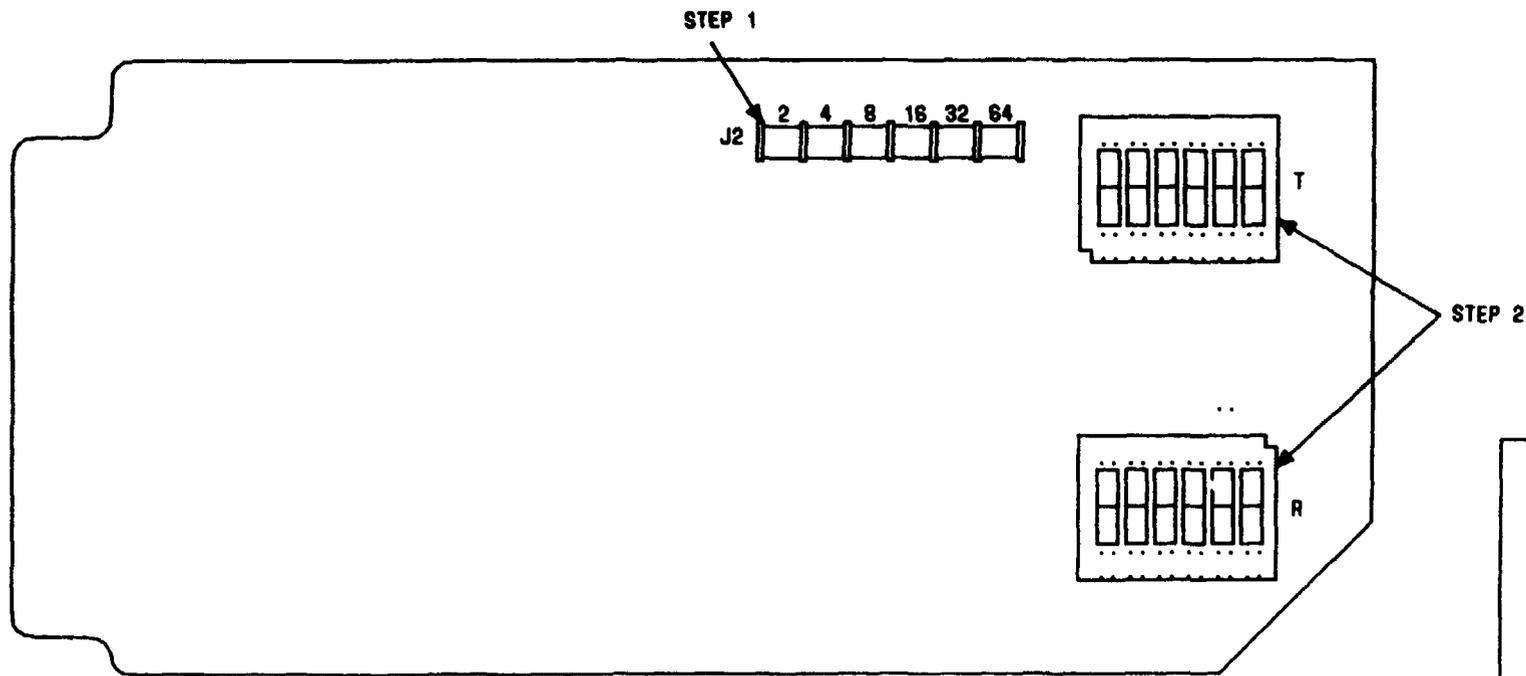
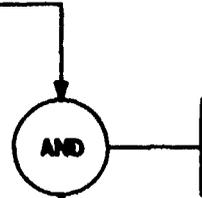


FIG. 1

NOTE 1	
Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section	
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SET OPTIONS DPT CHANNEL UNIT (J98726BB) 900 OHM
OR (J98726CH) 600 OHM

[1] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options EPD, EPI EG, and 1G [FIG. 1] [NOTE 1] [DLP-566]

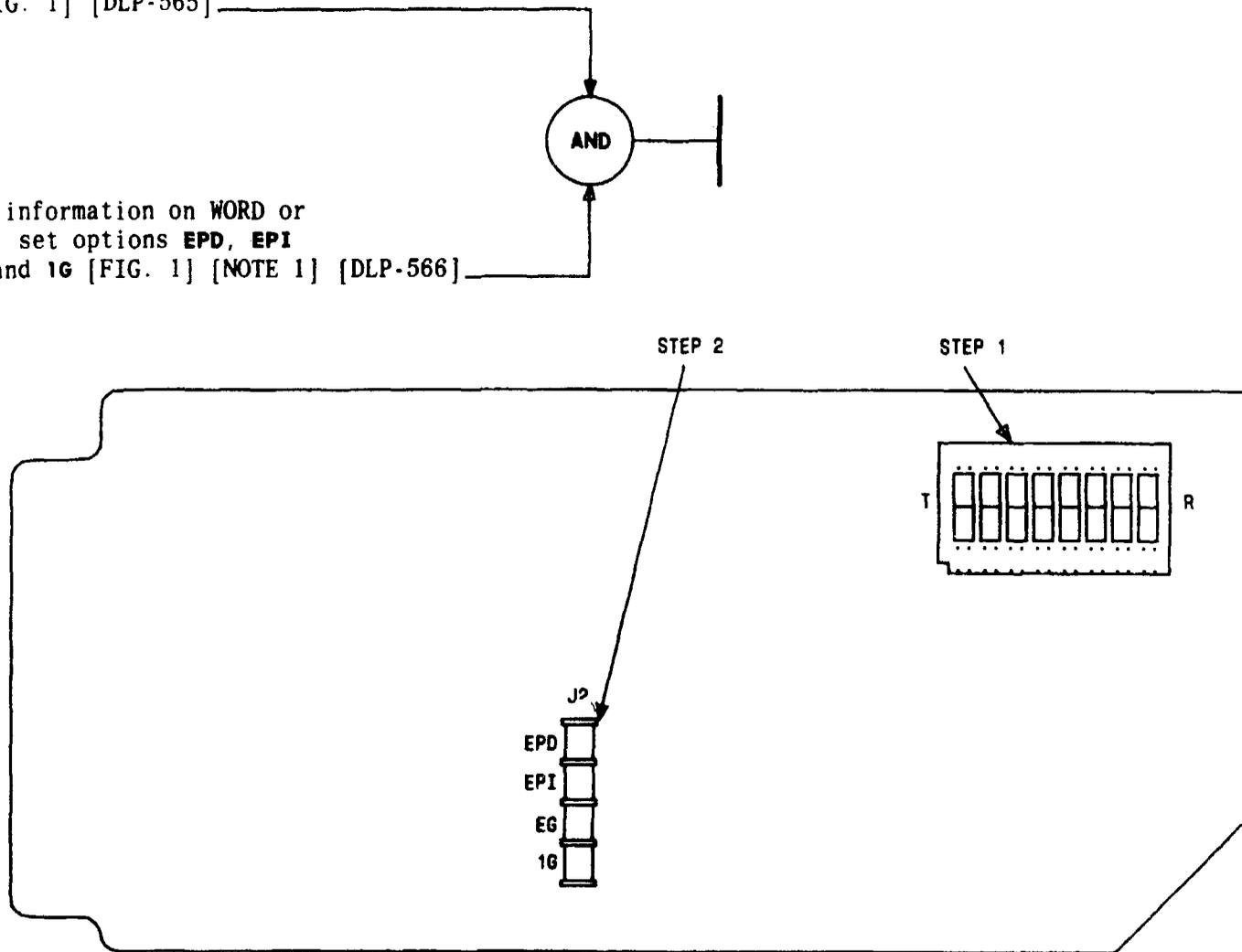


FIG. 1

NOTE 1	
Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section	
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SET OPTIONS 4E&M CHANNEL UNIT (J98726BC)

[1] From information on WORD or CLRC,
set NBOC on channel unit [NOTE 1]
[FIG. 1] [DLP-564]

[2] From information on WORD or
CLRC, set transmit and
receive attenuators, T and
R [FIG. 1] [DLP-565]

[3] From information on WORD or CLRC,
set options CN6, CN9, SD, SL1, and
SL2 [NOTE 1][FIG. 1] [DLP-566]

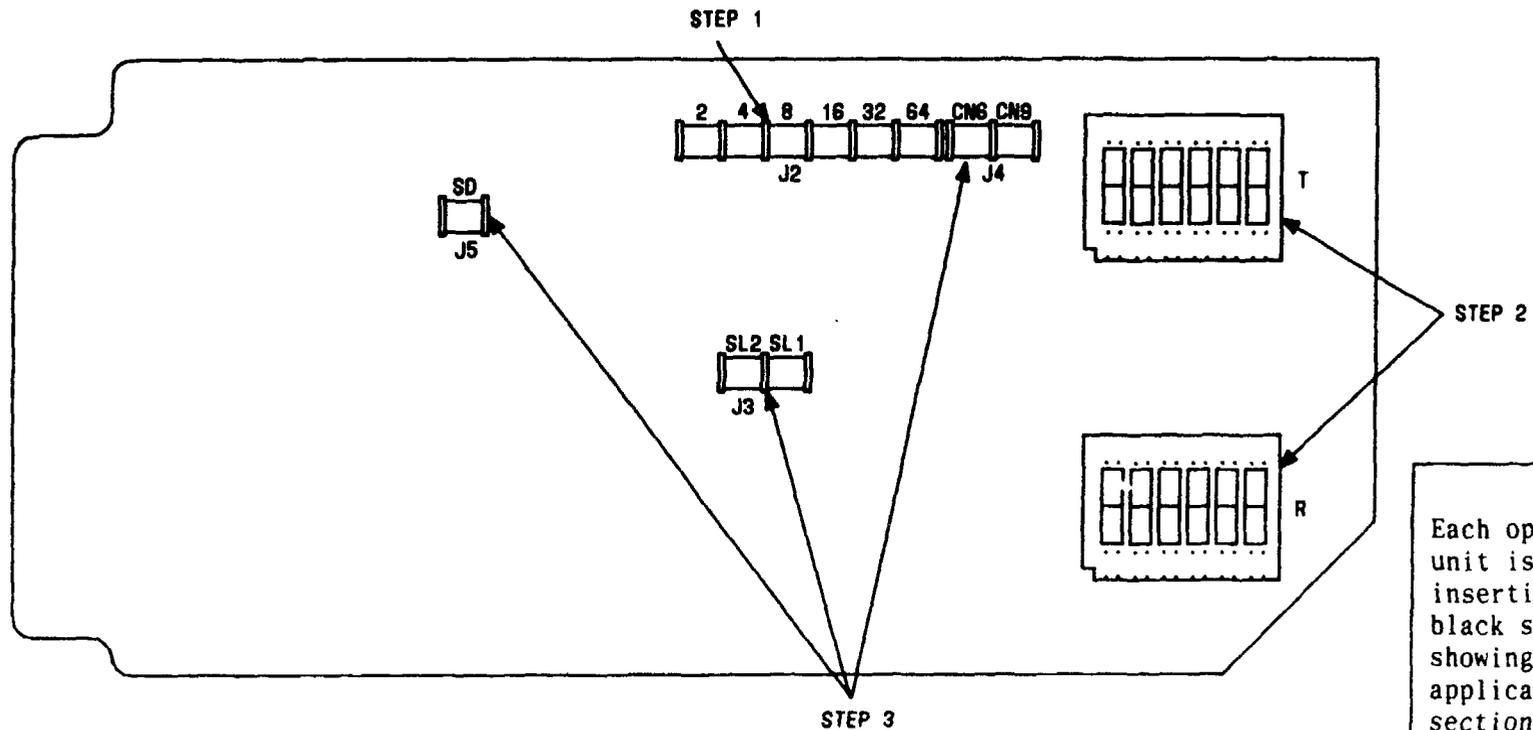


FIG. 1

NOTE 1
Each option on this
unit is selected by
inserting plug into
black side (white
showing) of
applicable connector
section

SET OPTIONS 2FXS CHANNEL UNIT (J98726BD) 900 OHM
OR (J98726SR-1) 600 OHM

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- [1] Read NOTES 1 and 2
- [2] From information on WORD or CLRC, set NBOC on channel unit [FIG. 1] [DLP-564]
- [3] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]
- [4] From information on WORD or CLRC, set options LX1, LX2, CN9, RG, LS, and J9 (or GS) [FIG. 1] [DLP-566]

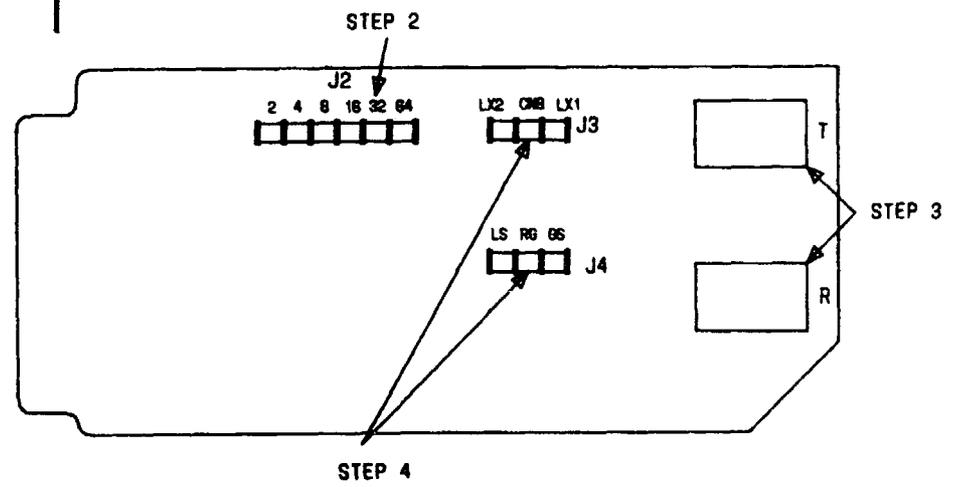
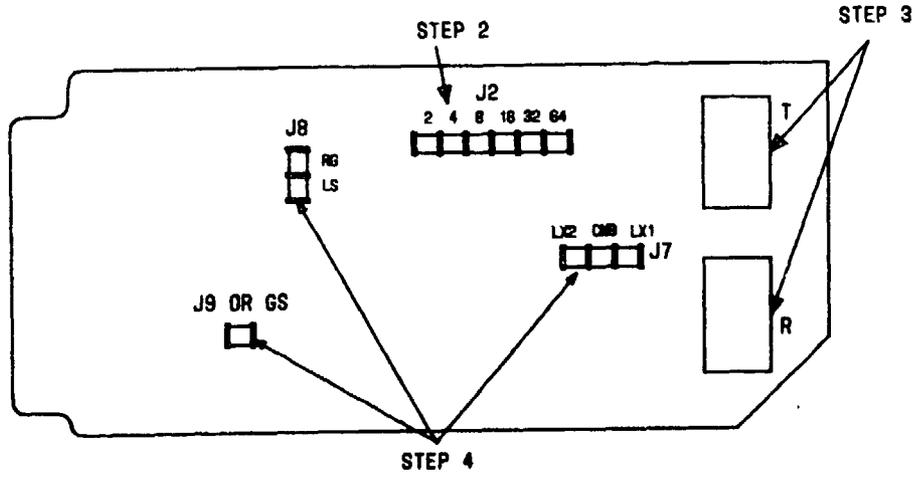
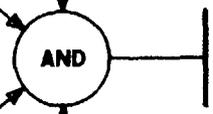


FIG. 1

- NOTES**
1. The two channel units shown in FIG. 1 represent different list numbers of 2FXO
 2. Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

SET OPTIONS 2FXO CHANNEL UNIT (J98726BE) 900 OHM
OR (J98726SS-1) 600 OHM

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[1] From information on WORD or CLRC, set transmit (T) and receive (R) attenuators [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set NBOC [NOTE 1] [FIG. 1] [DLP-564]

[3] From information on WORD or CLRC, set options 1G and SD [NOTE 1]

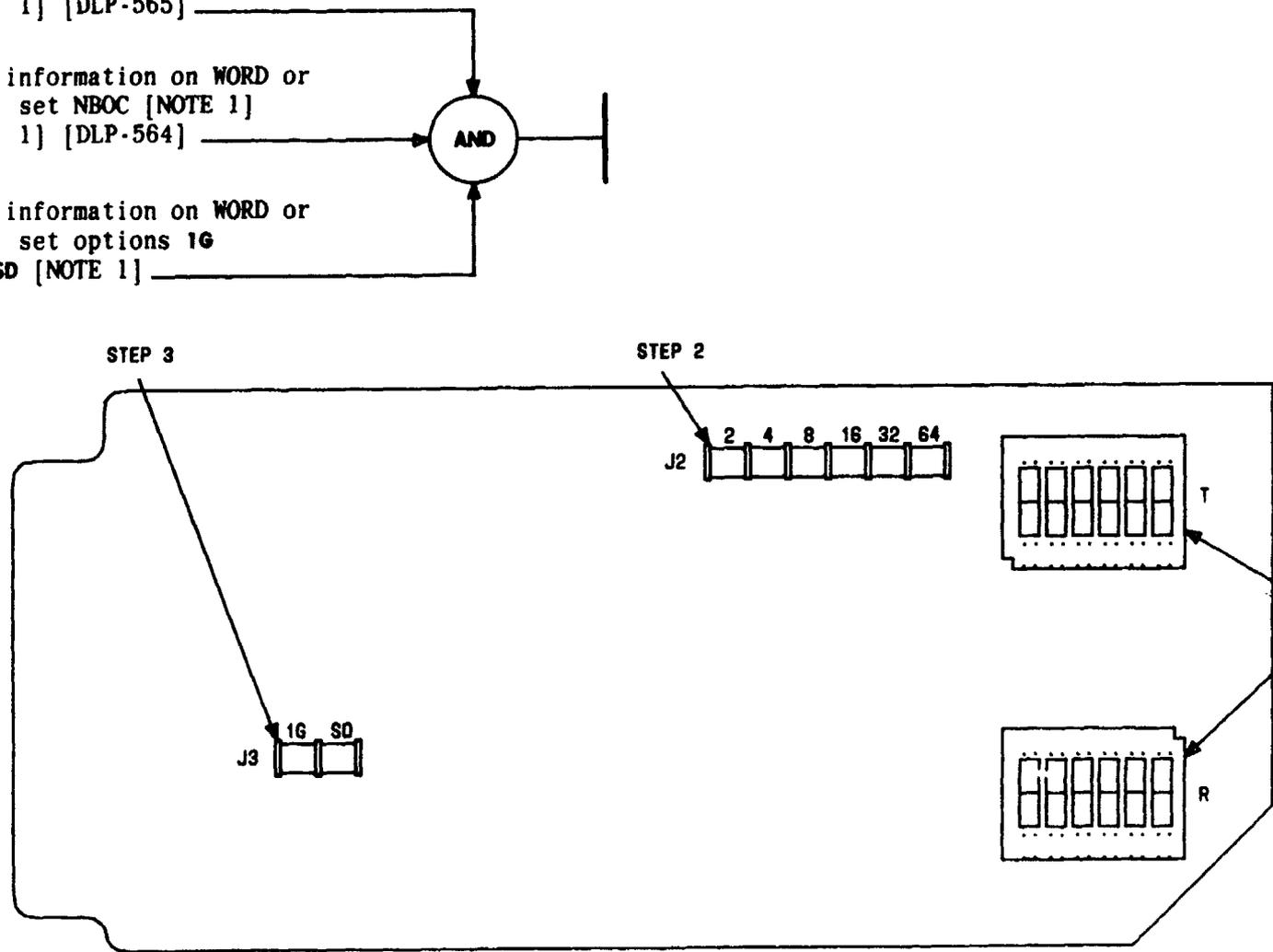


FIG. 1

NOTE 1
 Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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[1] From information on WORD or CLRC, set transmit (T) and receive (R) attenuators [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set NBOC [NOTE 1] [FIG. 1] [DLP-564]

[3] From information on WORD or CLRC, set option BT [NOTE 1] [FIG. 1] [DLP-566]

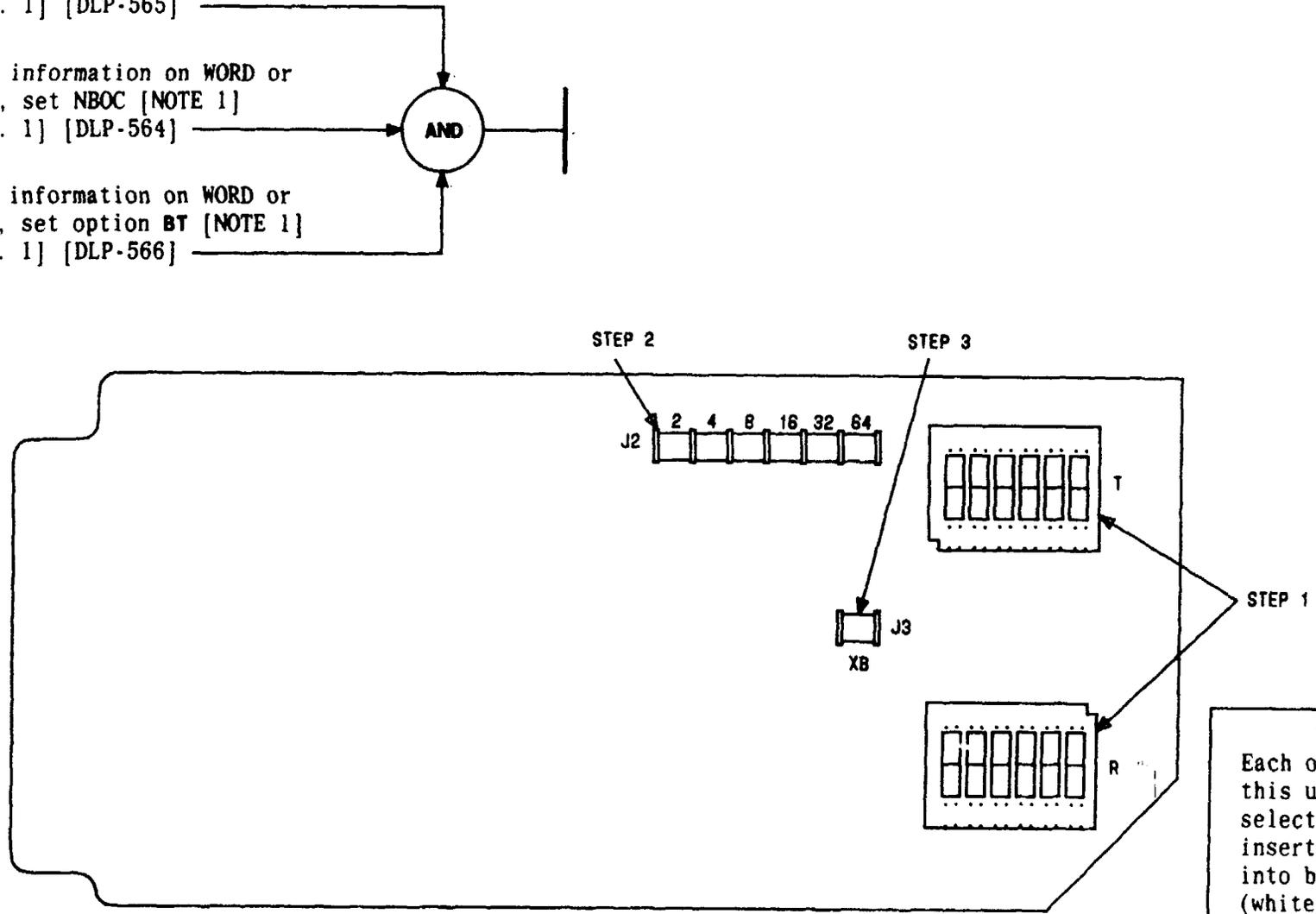


FIG. 1

NOTE 1
 Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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SET OPTIONS RPT CHANNEL UNIT (J98726BG)

[1] From information on WORD or CLRC,
set NBOC on channel unit [NOTE 1]
[FIG. 1] [DLP-564]

[2] From information on WORD or
CLRC, set transmit and
receive attenuators, T and
R [FIG. 1] [DLP-565]

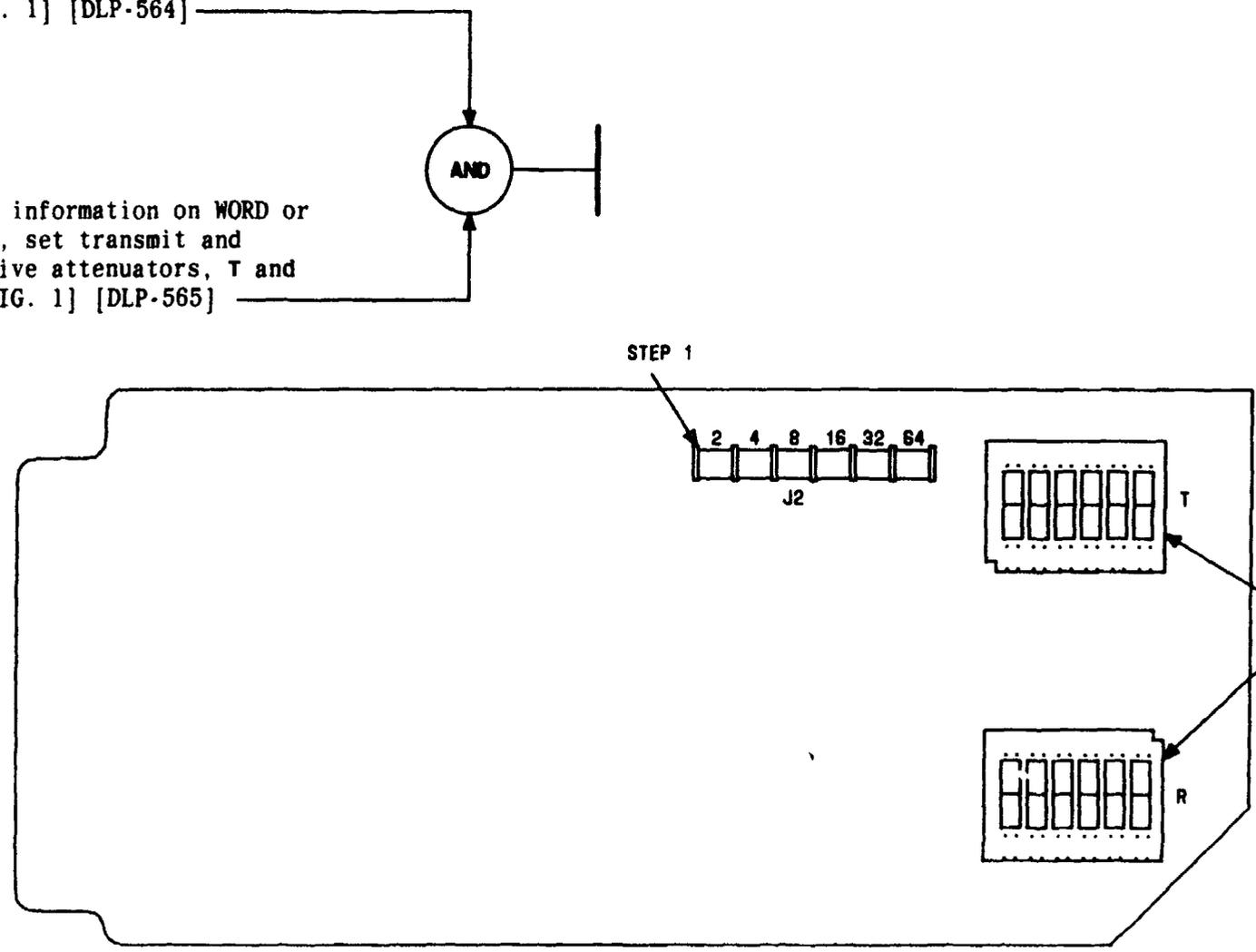


FIG. 1

NOTE 1
Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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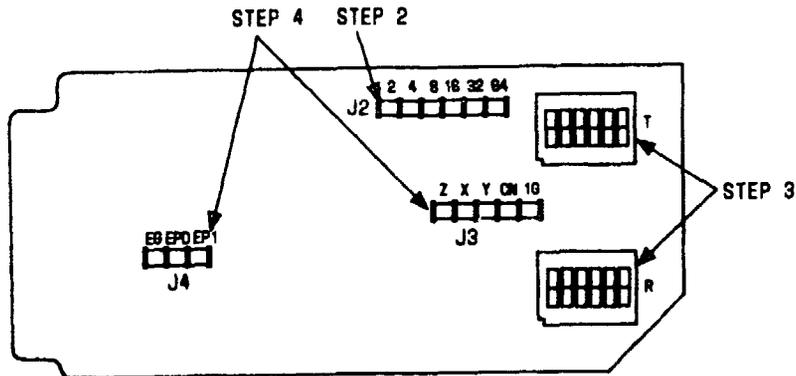
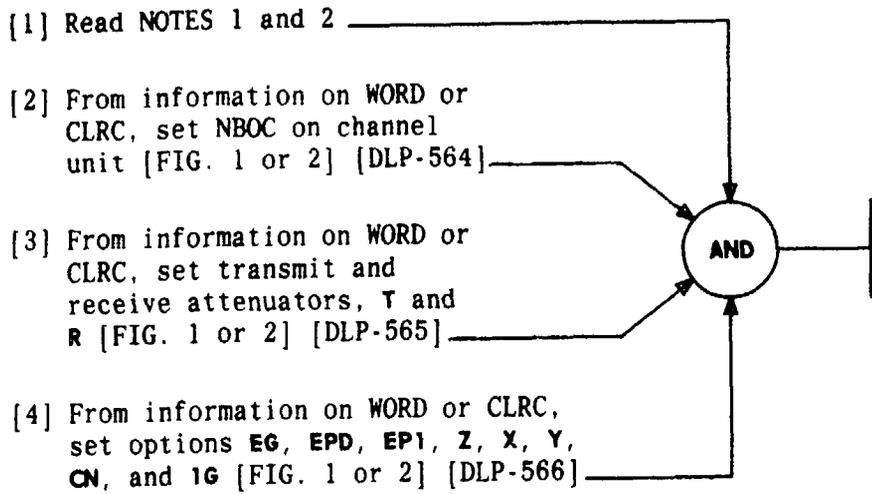
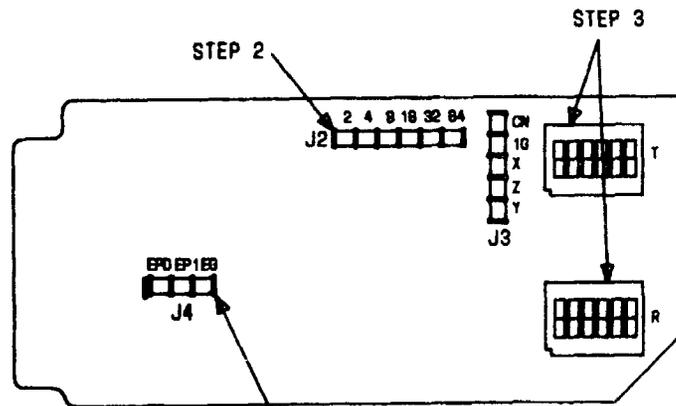


FIG. 1



STEP 4
FIG. 2

NOTES	
1. The two channel units shown in FIG. 1 and 2 represent different list numbers of 2E&M	
2. Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section	
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SET OPTIONS 2E&M CHANNEL UNIT (J98726BJ)

- [1] From information on WORD or CLRC, set NBOC [FIG. 1] [NOTE 1] [DLP-564]
- [2] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]
- [3] From information on WORD or CLRC, set options 4ESS, STA, CN6, CN9, SL1, and SL2 [FIG. 1] [NOTE 1] [DLP-566]

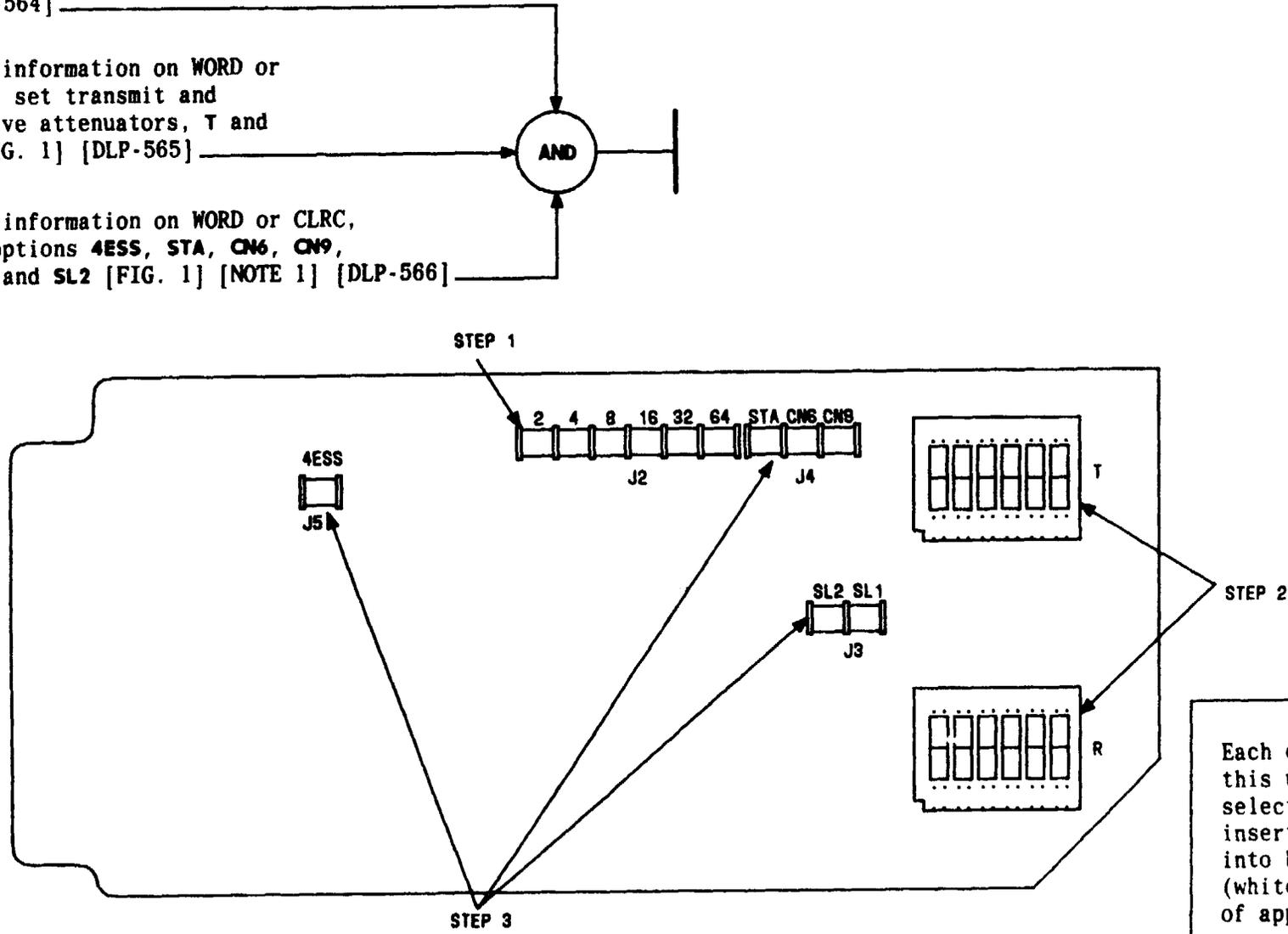


FIG. 1

NOTE 1
 Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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[1] From information on WORD or CLRC, set NBOC [FIG. 1] [NOTE 1] [DLP-564]

[2] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]

[3] From information on WORD or CLRC, set options LXI, CN9, LX2, LS, and 4ESS [FIG. 1] [NOTE 1] [DLP-566]

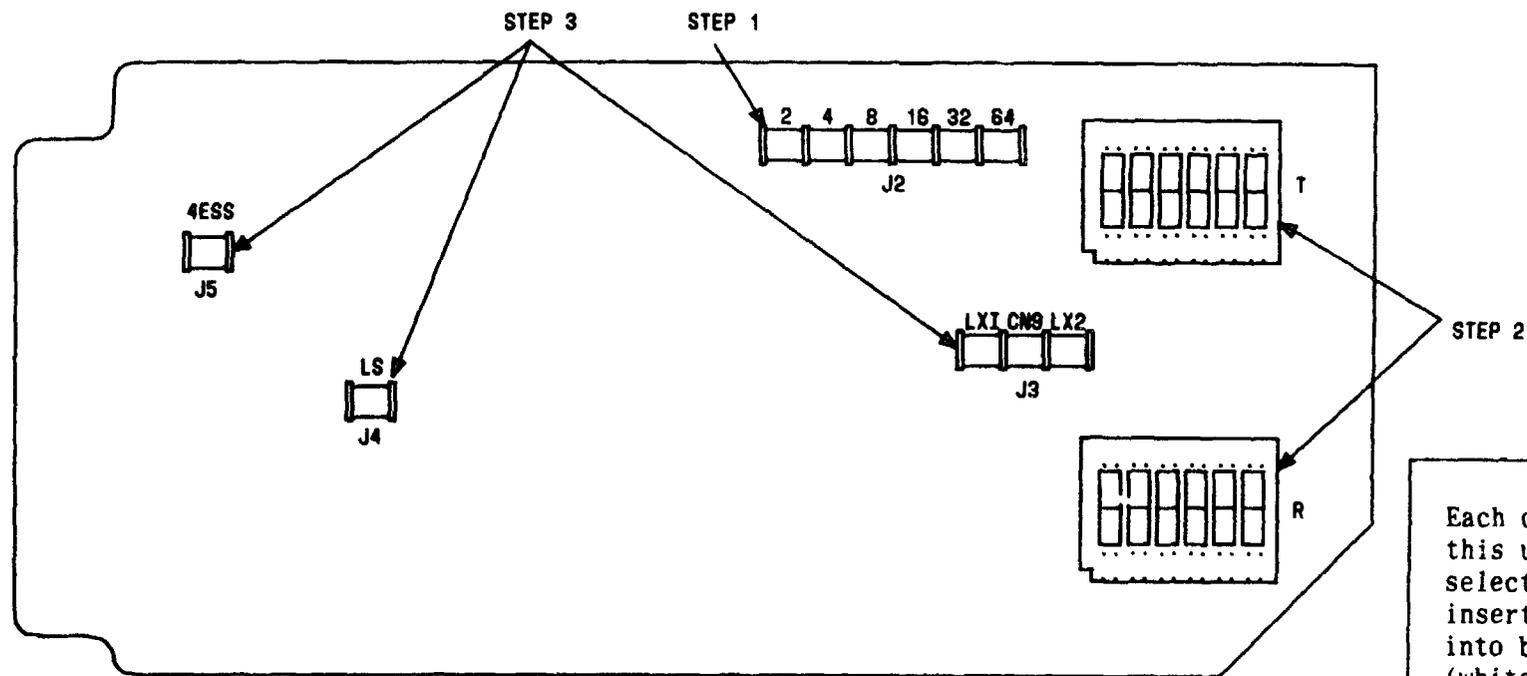


FIG. 1

NOTE 1
 Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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SET OPTIONS 2FXOLS CHANNEL UNIT (J98726BL)

[1] From information on WORD or CLRC, set NBOC [FIG. 1] [NOTE 1] [DLP-564]

[2] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]

[3] From information on WORD or CLRC, set options DP, 1G, and SD [FIG. 1][NOTE 1] [DLP-566]

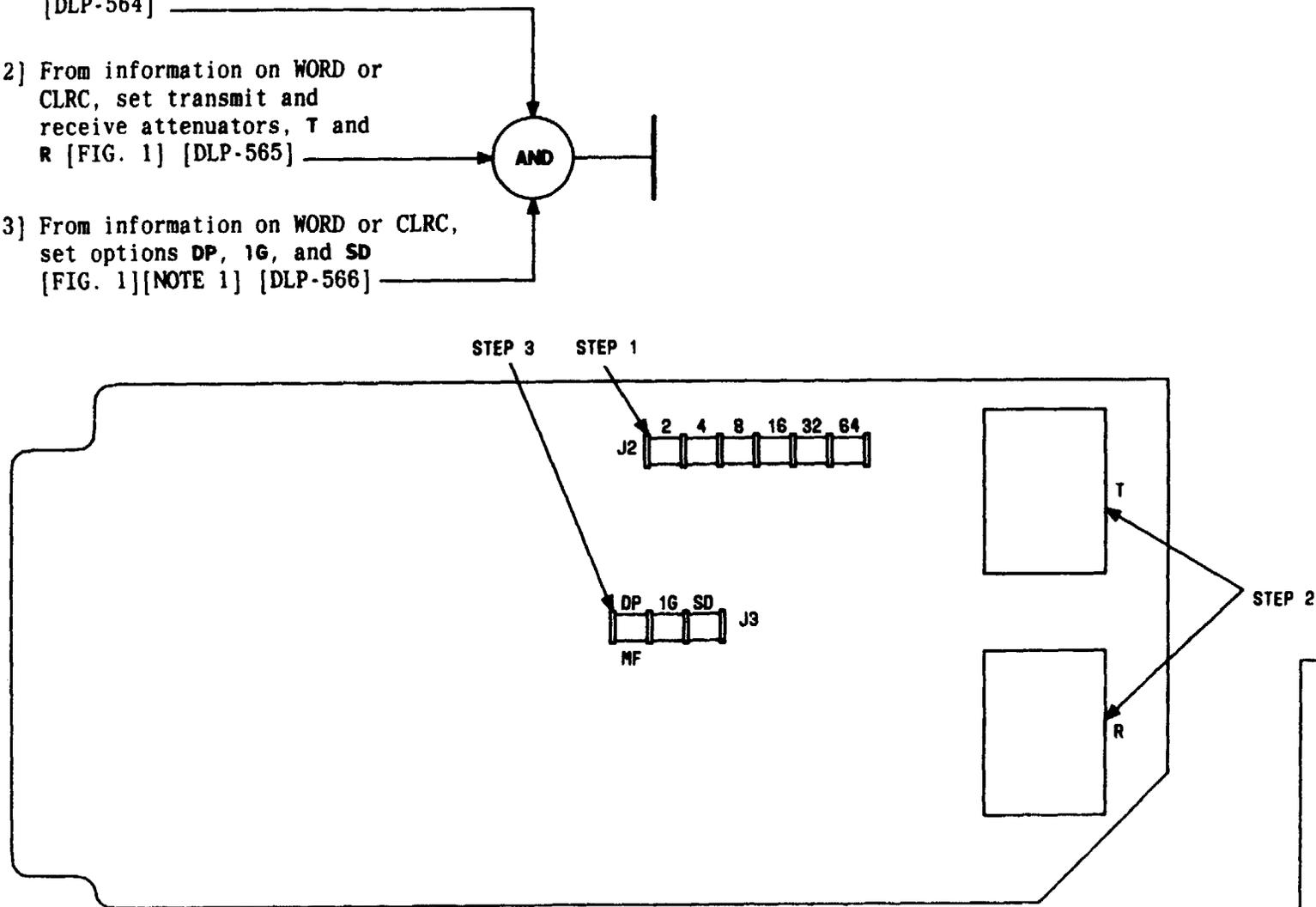


FIG. 1

NOTE 1
 Each option on this unit (except DP) is selected by inserting plug into black side (white showing) of applicable connector section. Option DP is selected white side (black showing)

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[1] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options MB, MPD, and MG [NOTE 1] [FIG. 1] [DLP-566]

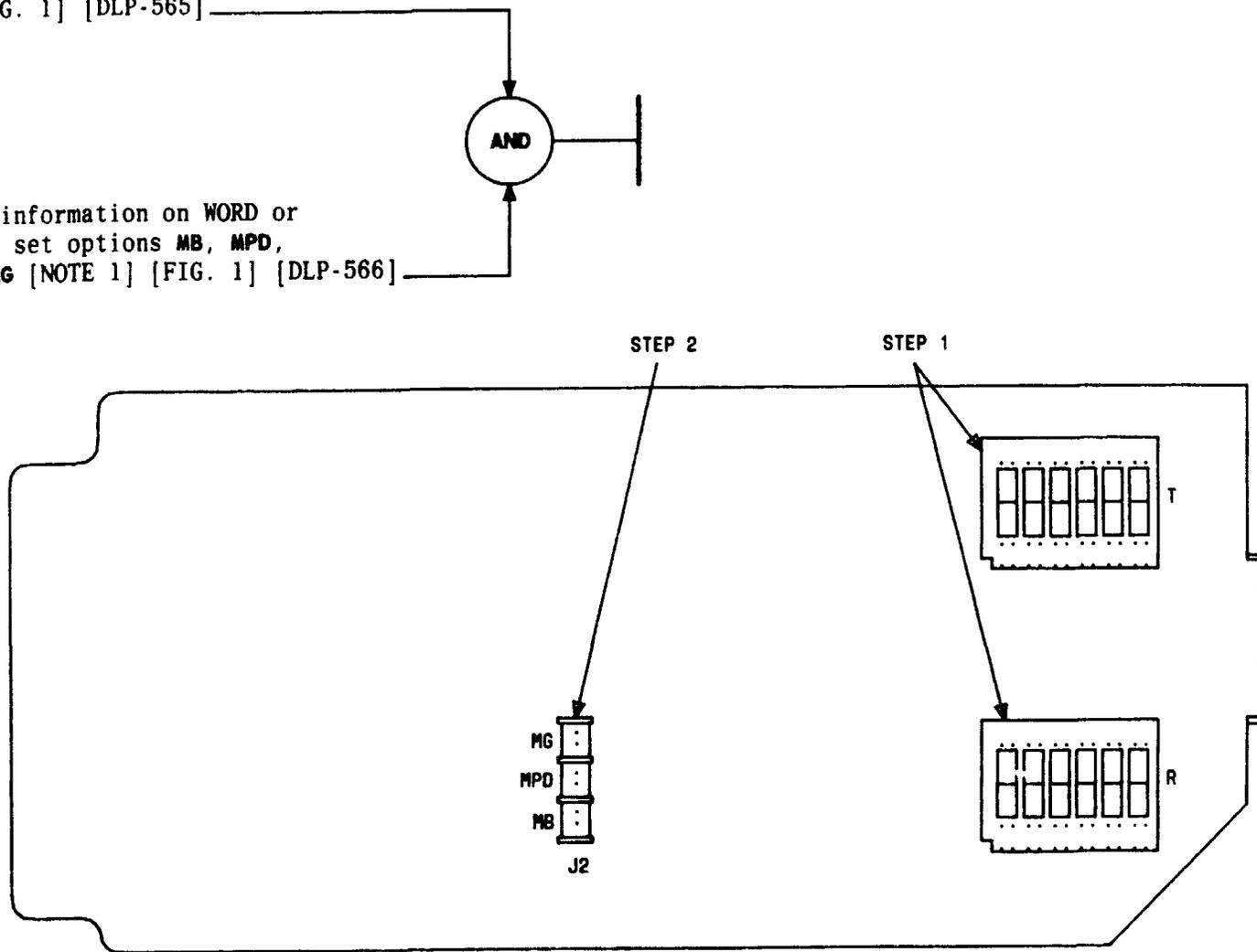


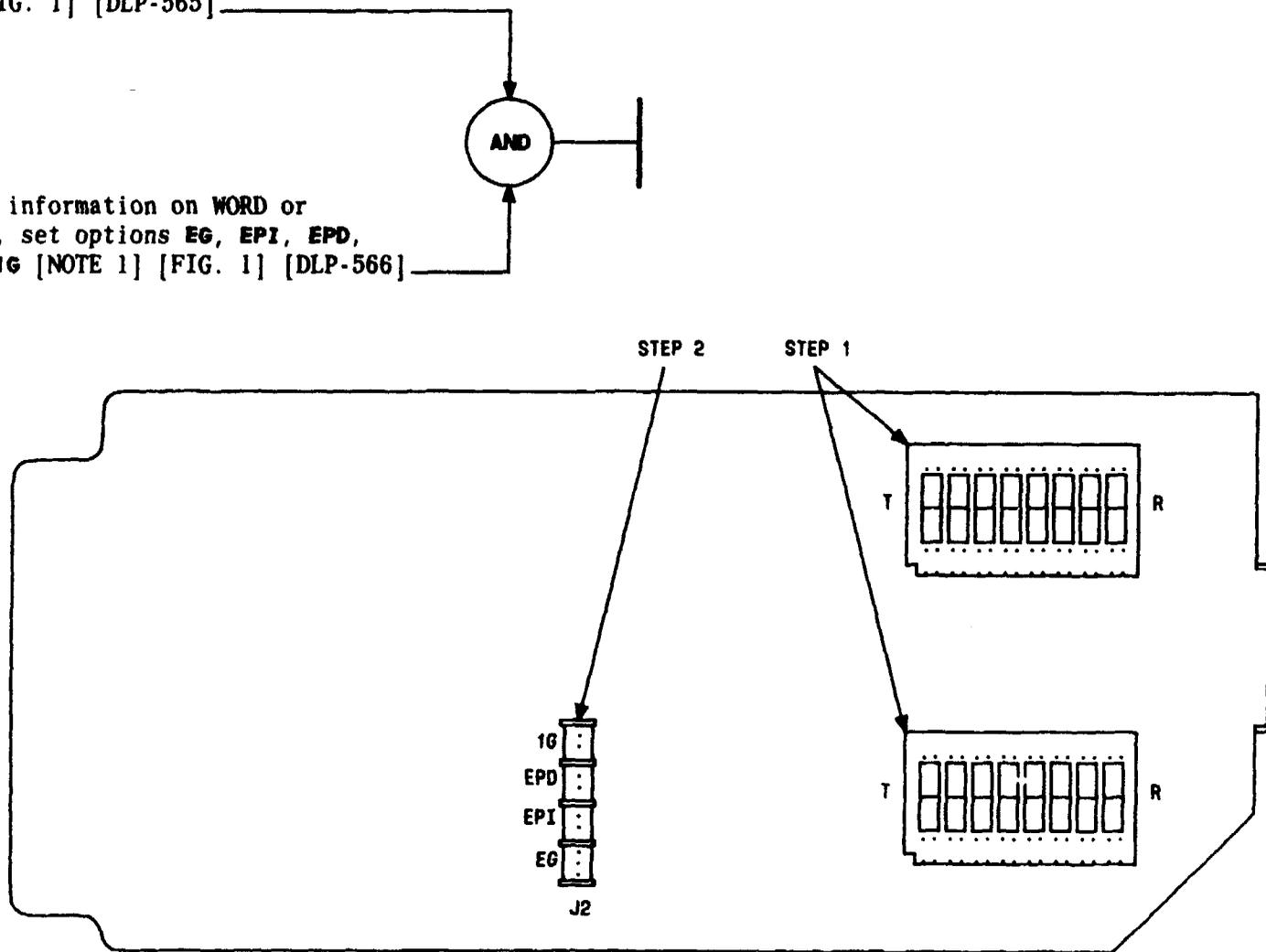
FIG. 1

NOTE 1	
Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section	
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SET OPTIONS PLR CHANNEL UNIT (J98726BN)

[1] From information on WORD or CLRC, set transmit and receive attenuators, T and R [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options EG, EPI, EPD, and 1G [NOTE 1] [FIG. 1] [DLP-566]



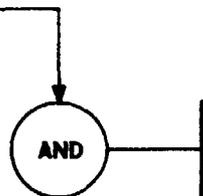
* DIFFERENT LIST NUMBERS OF THIS CHANNEL UNIT MAY DIFFER SLIGHTLY FROM FIG.

FIG. 1

NOTE 1
 Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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[1] From information on WORD or CLRC, set NBOC [FIG. 1] [NOTE 1] [DLP-564]



[2] From information on WORD or CLRC, set attenuators (T and R) [FIG. 1] [DLP-565]

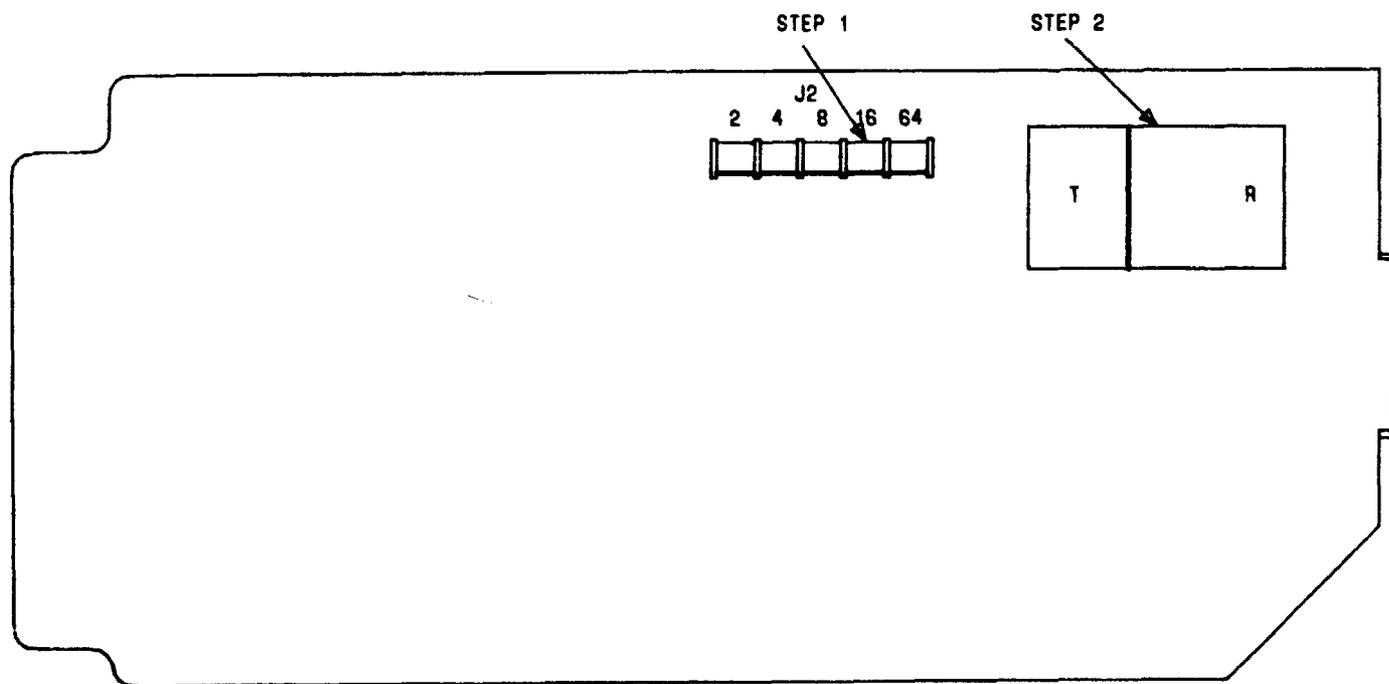


FIG. 1

NOTE 1	
Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section	
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SET OPTIONS ES2T CHANNEL UNIT (J98726BR)

[1] From information on WORD or CLRC, set NBOC [FIG. 1] [NOTE 1] [DLP-564]

[2] From information on WORD or CLRC, set attenuators T and R [FIG. 1] [DLP-565]

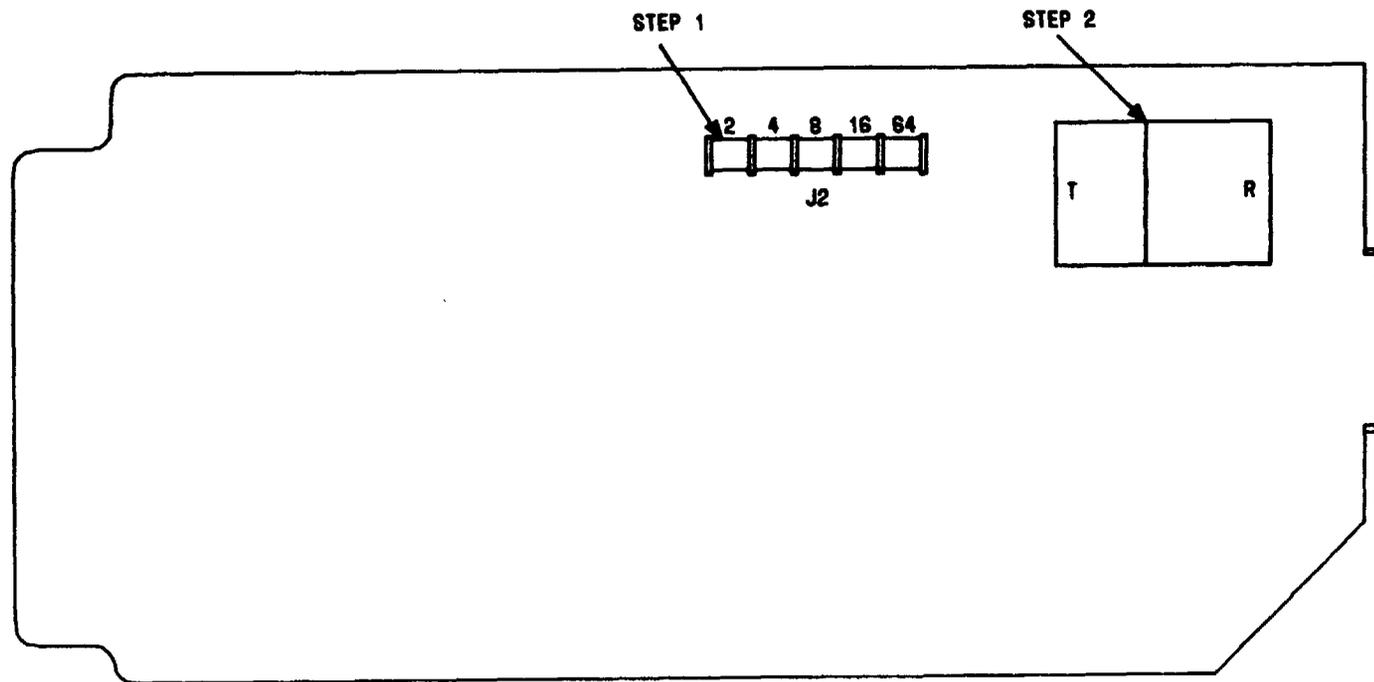


FIG. 1

NOTE 1	
Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section	
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- [1] From information on WORD or CLRC, set NBOC [NOTE 1] [FIG. 1] [DLP-564]
- [2] From information on WORD or CLRC, set attenuators AT1 and AT2 [FIG. 1] [DLP-565]
- [3] From information on WORD or CLRC, set options CN, X, Z, Y, IG, EPD, EPI and EG [NOTE 1] [FIG. 1] [DLP-566]

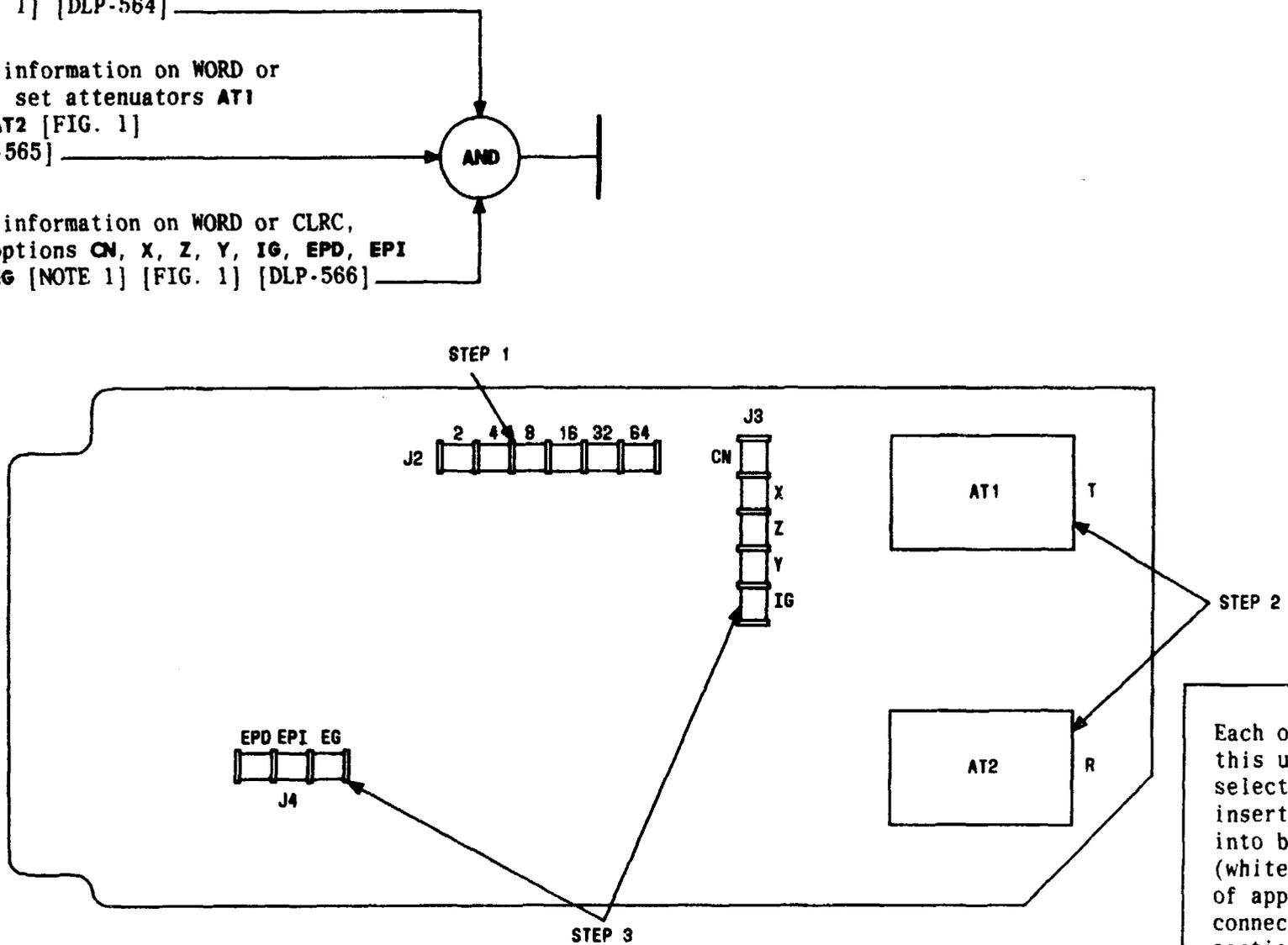


FIG. 1

NOTE 1
 Each option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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SET OPTIONS 2E&M6 CHANNEL UNIT (J98726BT)

[1] From information on WORD or
CLRC, set T and R
attenuators [FIG. 1]
[DLP-565]

[2] From information on WORD or
CLRC, set option J2 (SD)
[NOTE 1] [FIG. 1] [DLP-566]

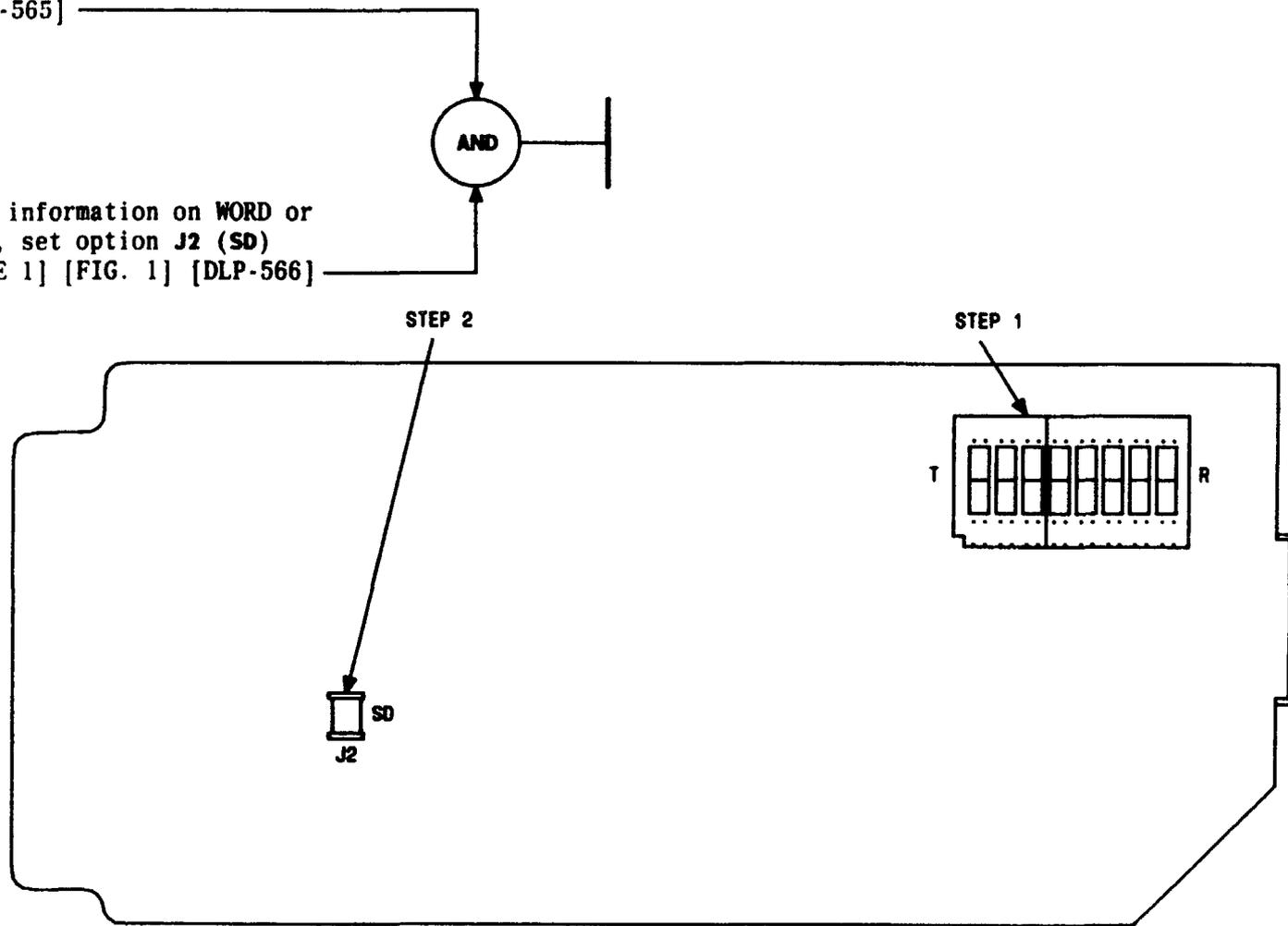


FIG. 1

NOTE 1	
Option SD is selected by inserting plug into black side (white showing) of J2	
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SET OPTIONS ES3 CHANNEL UNIT (J98726BU)

[1] From information on WORD or CLRC, set T and R attenuators [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options SD, MF, and SX-SX [NOTE 1] [FIG. 1] [DLP-566]

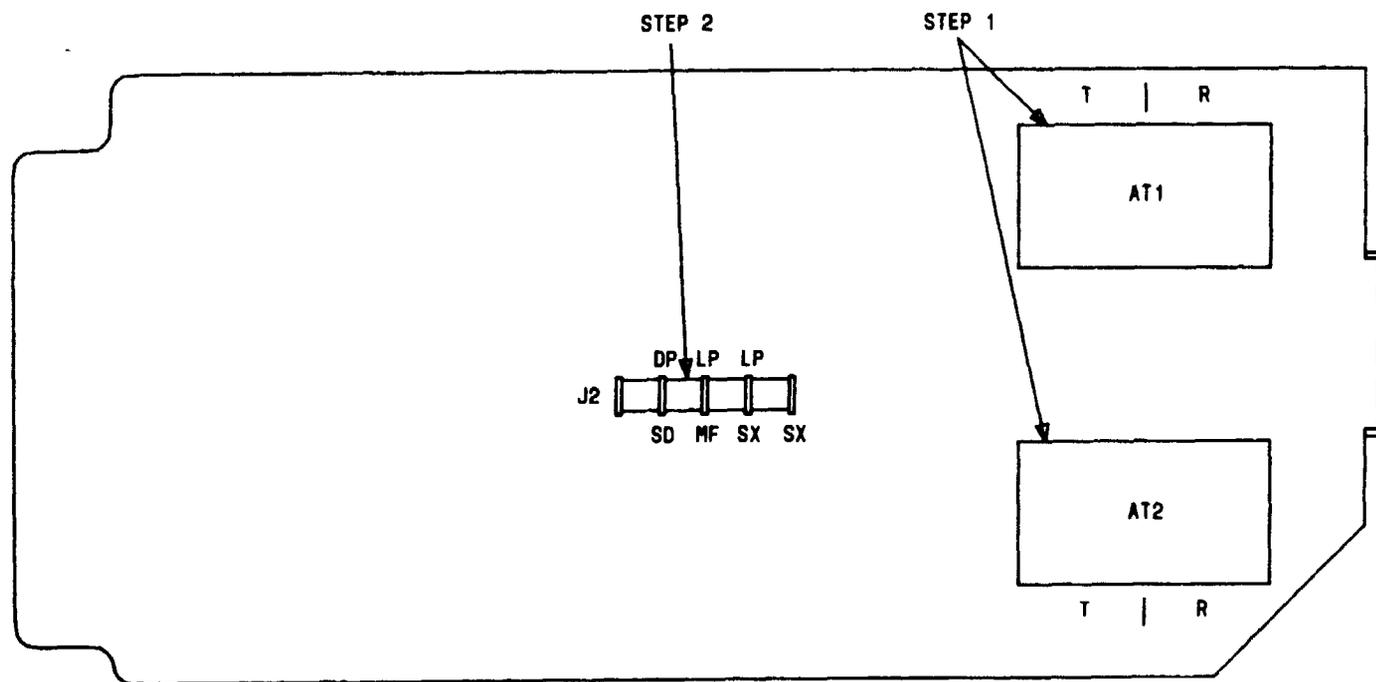
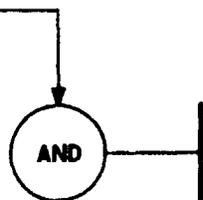


FIG. 1

NOTE 1
Options SD, MF, and SX are selected by inserting plug into black side (white showing) of applicable J2 section. Options DP and LP are selected by inserting plug into white side (black showing)

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[1] Install option plug on D side of J3 jack [FIG. 1]

[2] From information on WORD or CLRC, option J2 to select desired option per faceplate stamping. See FIG. 1 and NOTE 1

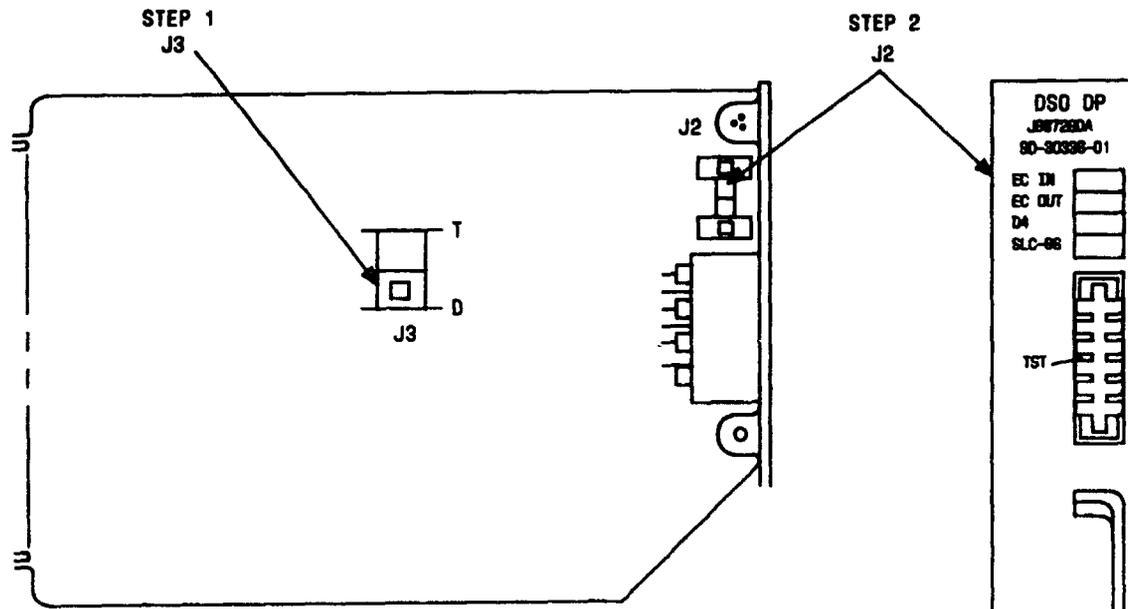
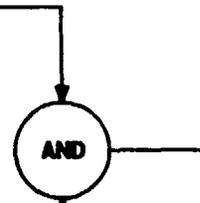


FIG. 1

NOTE 1
 Top to bottom plug positions of J2 correspond to top to bottom stamping on faceplate. As shown, EC IN and SLC-96 have been selected

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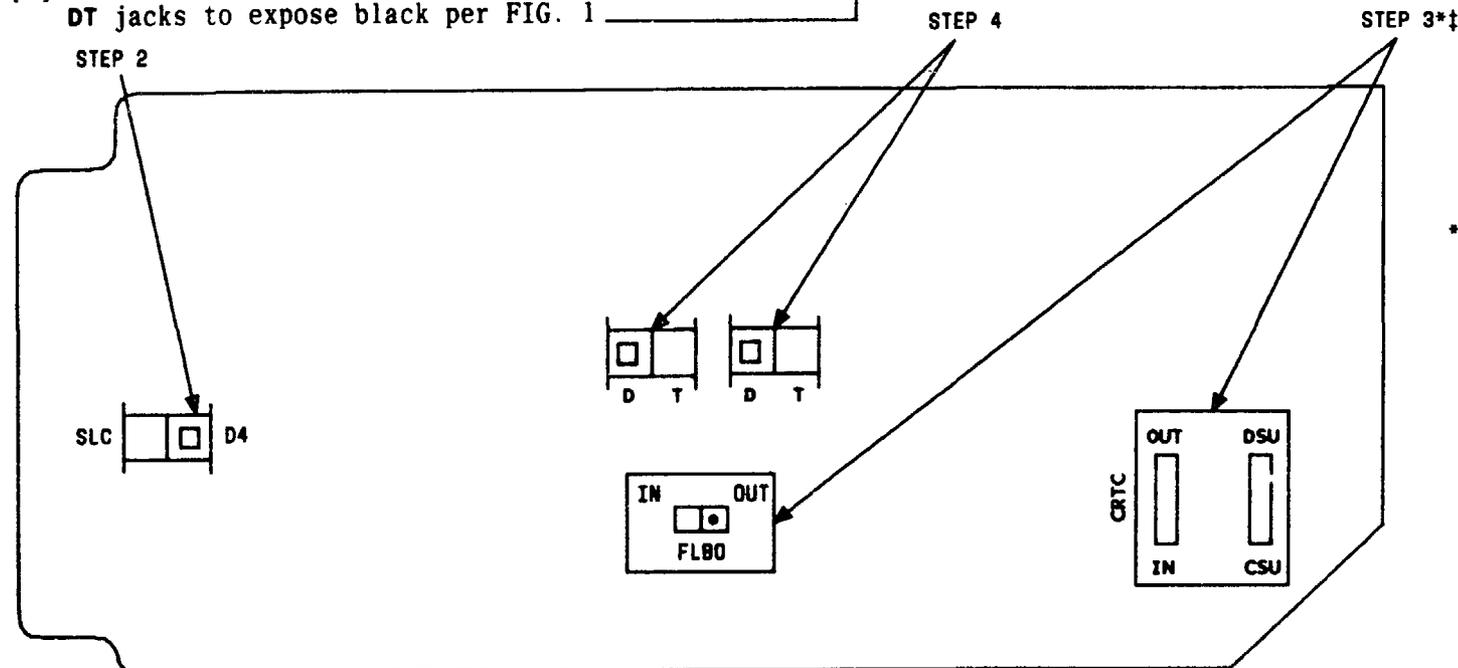
[1] Verify **OCU** has correct list number [see **TABLE A**]

[2] Install option plug on **D4** side of **SLC/D4** jack to expose white [FIG. 1]

[3] From information on **WORD** or **CLRC**, set options **FLBO**, **DSU/CSU**, and **CRTC** [FIGS. 1 and 2]

[4] Install option plug on **D** side of **DT** jacks to expose black per FIG. 1

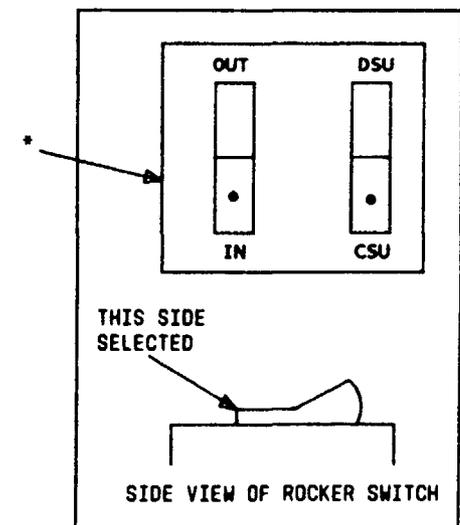
TABLE A	
LIST NUMBER	DATA RATE IN KILOBITS
1	2.4
2	4.8
3	9.6



* AS SHOWN, **FLBO** OUT IS SELECTED

‡ **CRTC** (S103) WILL NOT EXIST ON LATER UNITS

FIG. 1



* AS SHOWN, **CSU** IN IS SELECTED

FIG. 2

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SET OPTIONS OCUDP CHANNEL UNIT (J98726DB)

[1] Use screwdriver to set all switches in S1 next to numbers on switch [see FIG. 1]

[2] From information on WORD or CLRC, set pointer on S2 to 5 for 2.4 kilobit rate, or 6 for 4.8 kilobit rate, or 8 for 9.6 kilobit rate [see FIG. 1]

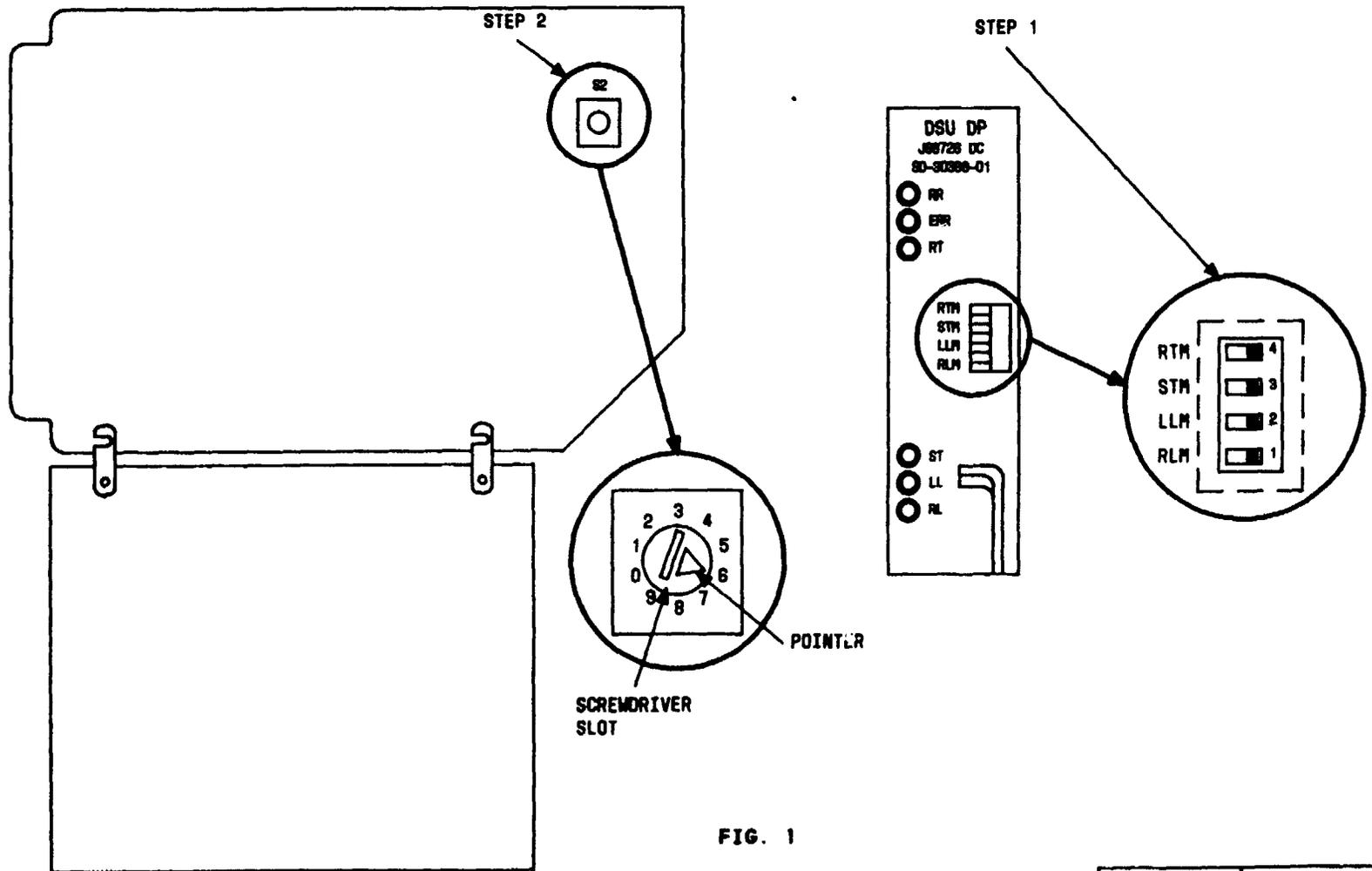


FIG. 1

[1] From information on WORD or CLRC, set TRMT and RCV attenuators [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options J2, J3, J4, SD, J6, and J7 [TABLE A] [FIG. 1] [DLP-566]

[3] From information on WORD or CLRC, set slide switches SL, BW, and HT [FIG. 1] [DLP-563]

[4] From information on WORD or CLRC, set terminating impedance for TRM (S1) and RCV (S2) [FIG. 1] [DLP-562]

TABLE A

OPTION	WHITE SHOWING	BLACK SHOWING
J2	-72V	-48V
J3 & J4	Always selected up to 1300 ohms -48V up to 2000 ohms -72V	Not required
J6 Tip Signaling Lead	Connected to T-R	Connected to T1-R1
J7 Ring Signaling Lead	Connected to T1-R1	Connected to T-R
SD	Make busy after 2.5 seconds of idle	No conditioning

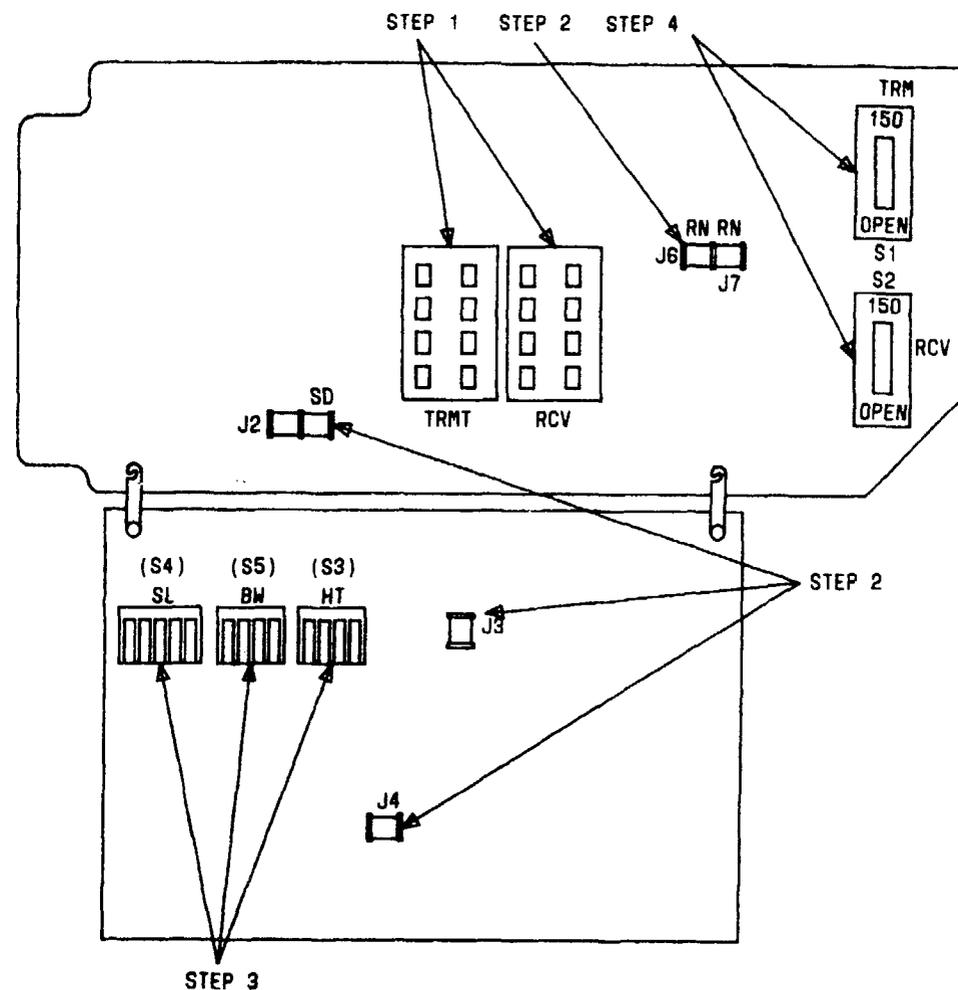


FIG. 1

SET OPTIONS 4FXS CHANNEL UNIT (J98726SB)

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[1] From information on WORD or CLRC, set TRMT and RCV attenuators [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options J4, J5, LX1, GS, RG, and LS [FIG. 1] [DLP-566]

[3] From information on WORD or CLRC, set slide switches HT, BW, and SL [FIG. 1] [DLP-563]

[4] From information on WORD or CLRC, set terminating impedance for S1 and S2 [FIG. 1] [DLP-562]

AND

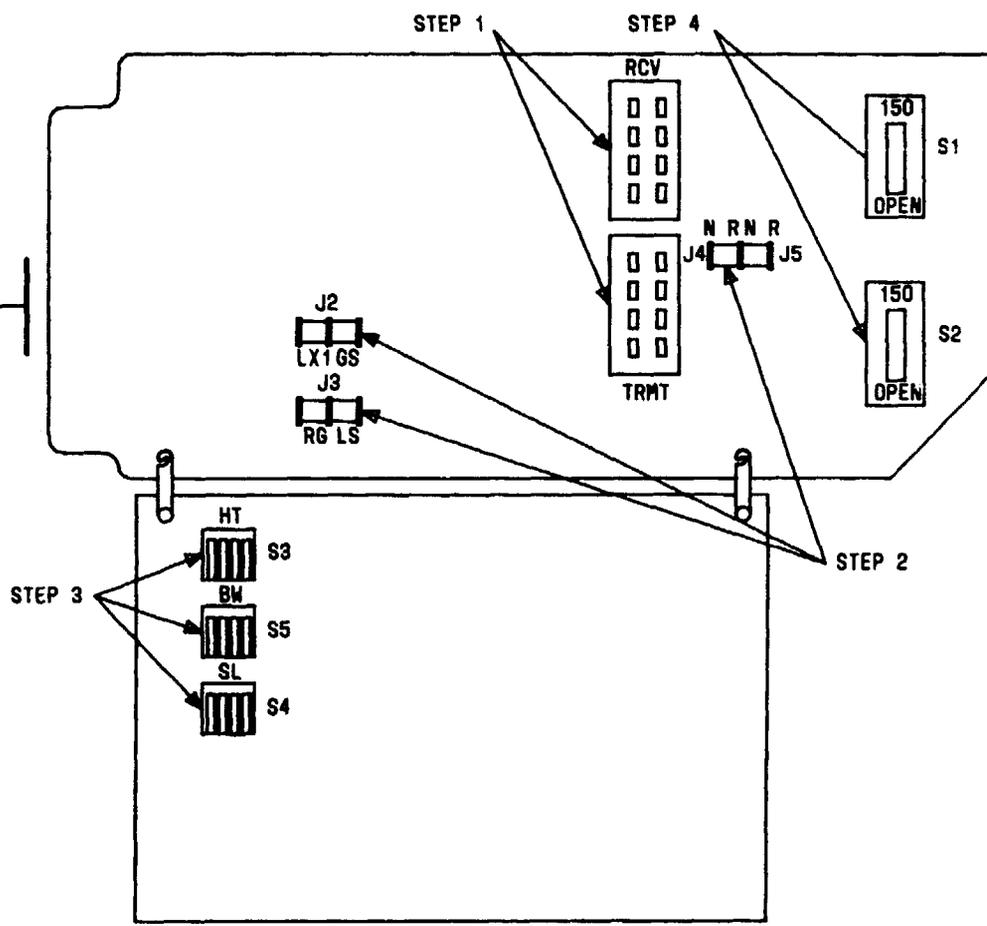


FIG. 1

NOTE 1
 Each connector option (except J4 and J5) is selected by inserting plug into black side (white showing) of applicable connector section. J4 and J5 with black showing reverses simplex tip and ring leads

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[1] From information on WORD or CLRC,
set TRMT and RCV attenuators
[FIG. 1] [DLP-565]

[2] From information on WORD or CLRC,
set options J2, J3, J4, A, and B
[TABLE A] [FIG. 1] [DLP-566]

[3] From information on WORD or CLRC,
set slide switches S1, S2, S5, R/R1,
R2, and Z [FIG. 1] [DLP-563]

[4] From information on WORD or CLRC,
set switch NR [FIG. 1]

[5] From information on WORD or CLRC,
set RLP balancing potentiometer
[FIG. 1]

TABLE A		
OPTION	WHITE SHOWING	BLACK SHOWING
J3	Precision network selected	Compromise network selected
J4	Make busy after 2.5 seconds	No conditioning
J5 (A/B)	Capacitors selected	Capacitors not selected
J2*	LBOC In	LBOC Out
* J2 may exist on some earlier units		

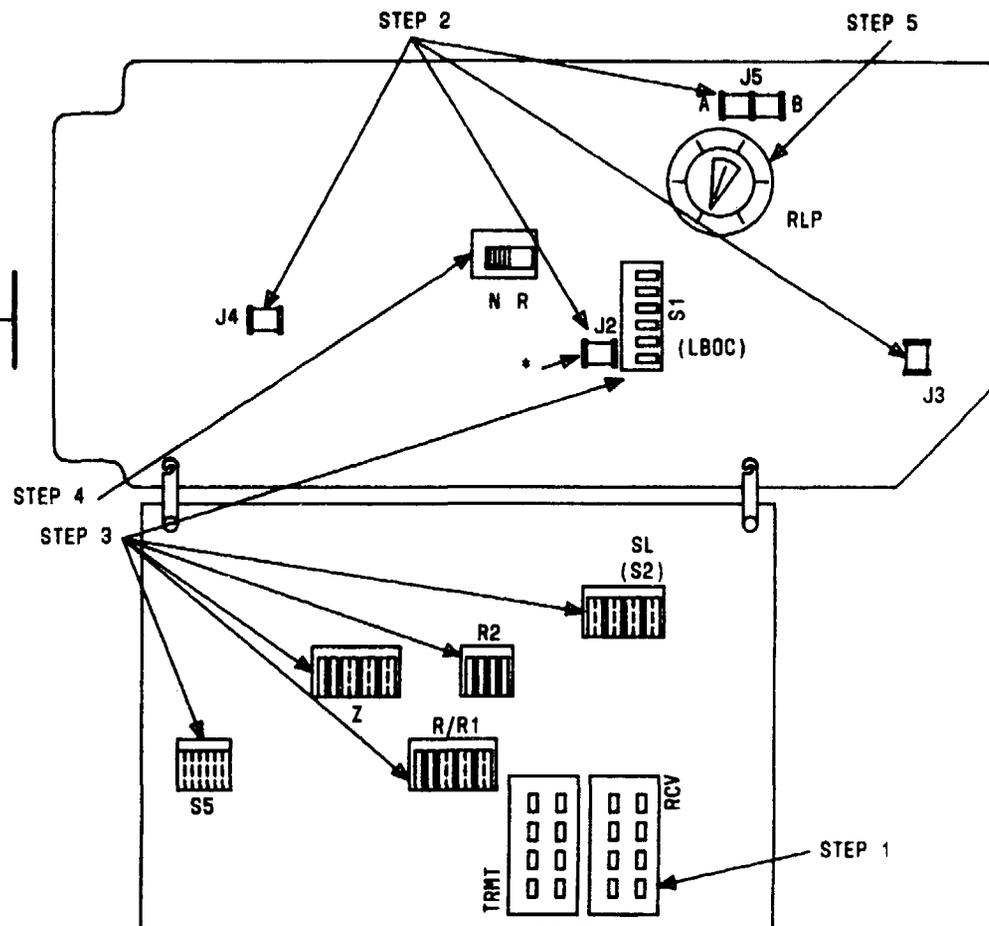


FIG. 1

SET OPTIONS 2DX/GT CHANNEL UNIT (J98726SD)

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- [1] From information on WORD or CLRC, set TRMTG and RCVG attenuators [FIG. 1] [DLP-565]
- [2] From information on WORD or CLRC, set options A, B, and C [FIG. 1] [NOTE 1] [DLP-566]
- [3] From information on WORD or CLRC, set slide switches SL, BW, and HT [FIG. 1] [DLP-563]
- [4] From information on WORD or CLRC, set NOR-REV switch [FIG. 1]
- [5] From information on WORD or CLRC, set DX balancing potentiometer RLP [FIG. 1]
- [6] From information on WORD or CLRC, set terminating impedance for T and R [FIG. 1] [DLP-562]

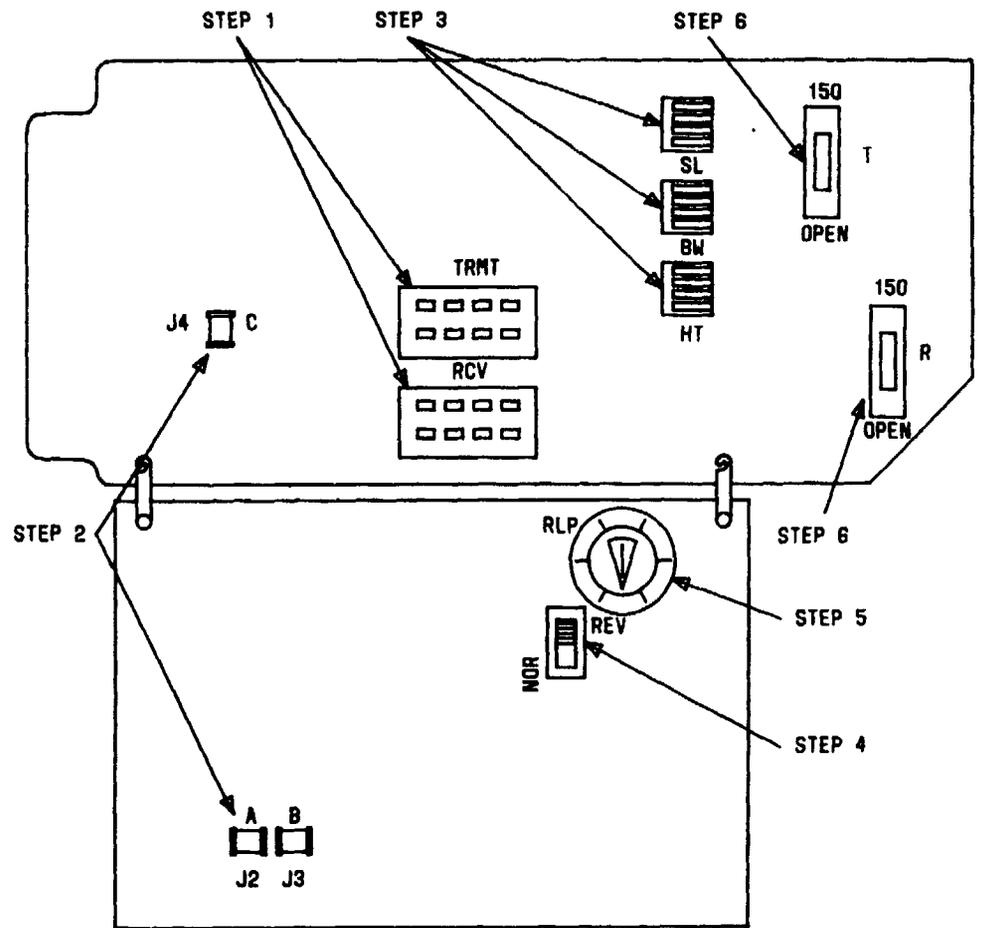


FIG. 1

NOTE 1
 Each plug option on this unit is selected by inserting plug into black side (white showing) of applicable connector section

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[1] From information on WORD or CLRC,
set transmitter attenuator
[FIG. 1] [DLP-565]

[2] From information on WORD or
CLRC, set options Y, Z, EG,
S, T, R, E, W, and V [FIG. 1]
[TABLE A] [DLP-566]

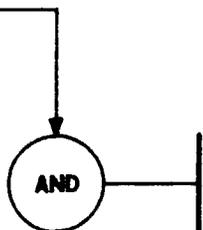


TABLE A		
OPTION	WHITE SHOWING	BLACK SHOWING
W-J4	IN	OUT
V-J5	IN	OUT
E-J6	OUT	IN
T, R, S-J7	T and R IN	S IN
Z, EG, Y-J8	Z and EG IN	Y IN

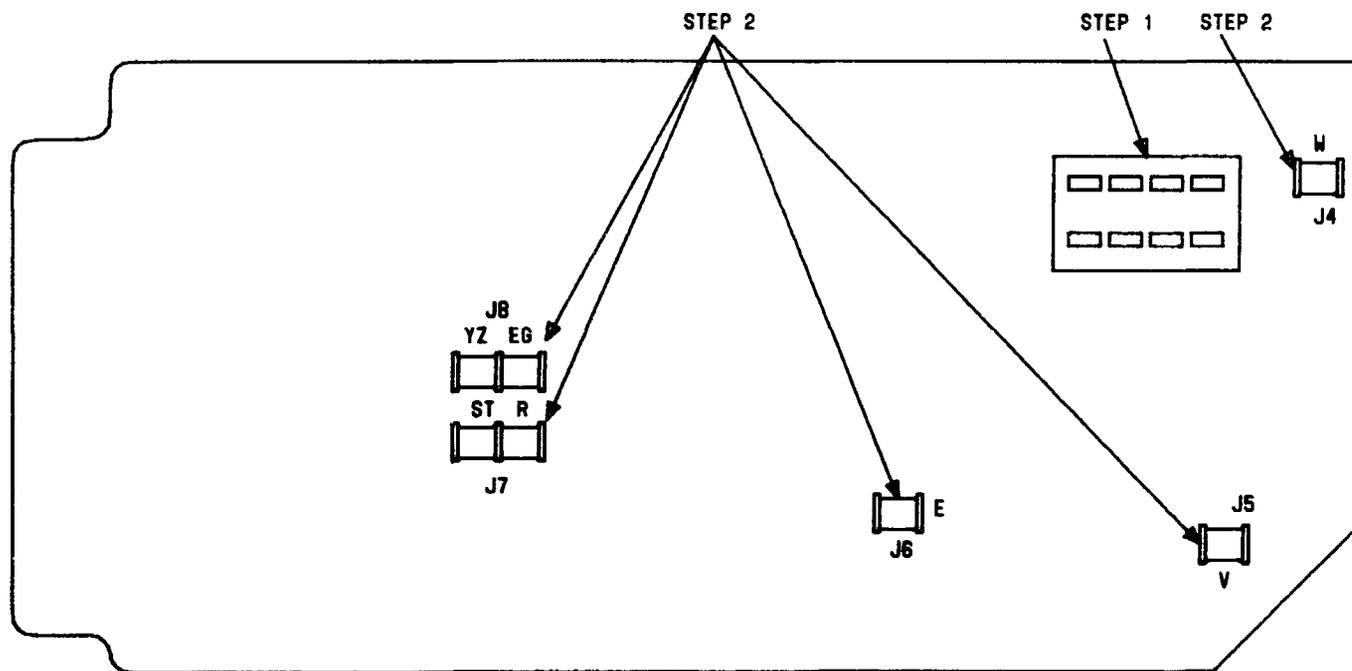


FIG. 1

SET OPTIONS 4TDM CHANNEL UNIT (J98726SF)

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- [1] From information on WORD or CLRC, set XMT and RCV attenuators [FIG. 1] [DLP-565]
- [2] From information on WORD or CLRC, set options J2, J3, J4, J5, and J6 [TABLE A] [FIG. 1] [DLP-566]
- [3] From information on WORD or CLRC, set slide switches S1, S2, S4, R/R1, R2, and Z [FIG. 1] [DLP-563]

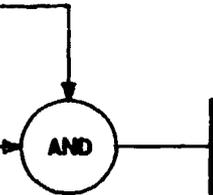


TABLE A		
OPTION	WHITE SHOWING	BLACK SHOWING
J2	1300 Ohm Range -48V 2000 Ohm Range -72V	Not Required
J3	Precision Network selected	Compromise Network selected
J4	Make Busy Line Trunk	No Conditioning
J5*	LBOC IN	LBOC OUT
J6	-72V	-48V

* J5 may exist on some earlier units

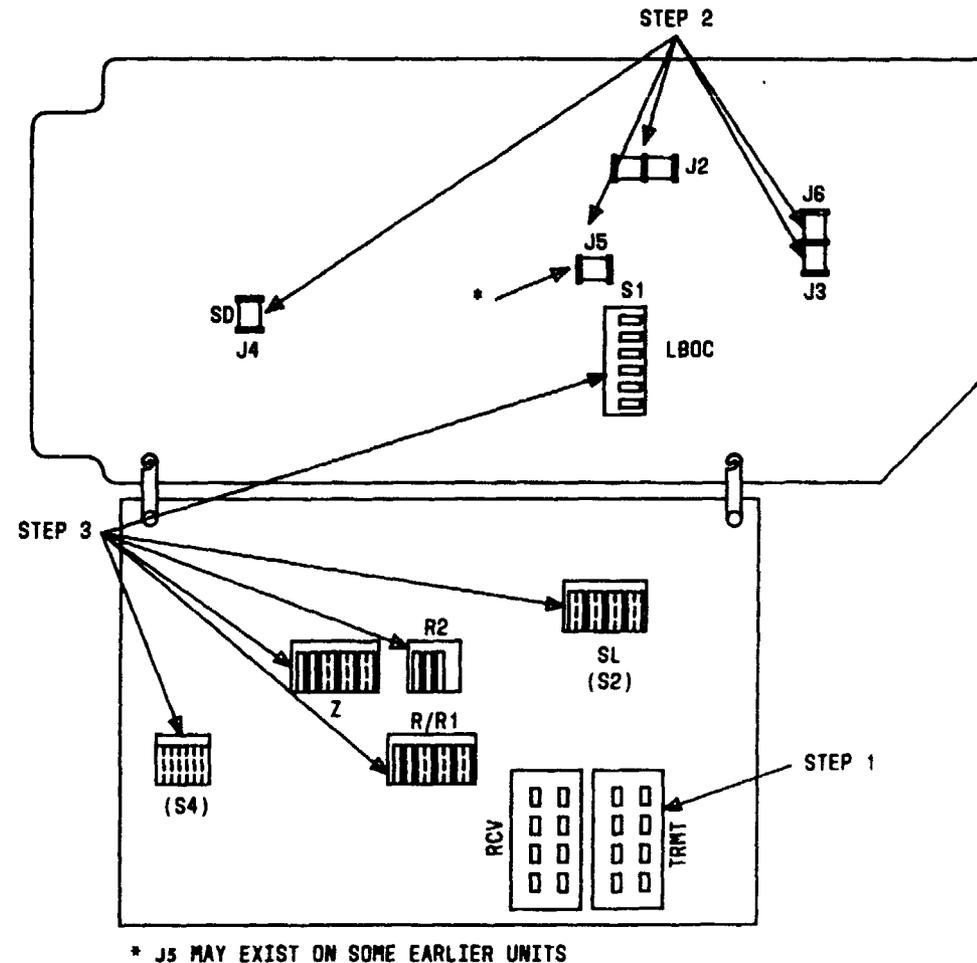


FIG. 1

[1] From information on WORD or CLRC, set TRMT ATTEN and RCV ATTEN [FIG. 1] [DLP-565]

[2] From information on WORD or CLRC, set options TRMT GAIN, RCV GAIN, and J4 [FIG. 1] [TABLE A] [DLP-566]

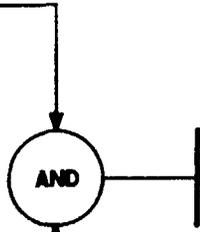


TABLE A		
OPTION	WHITE SHOWING	BLACK SHOWING
J2	Receive Amplifier Gain = 5 dB	Receive Amplifier Loss = 2 dB
J3	Transmit Amplifier Gain = 8.8 dB	Transmit Amplifier Gain = 1.7 dB
J4	30 MA Sealing Current to T-R/T1-R1	No Sealing Current

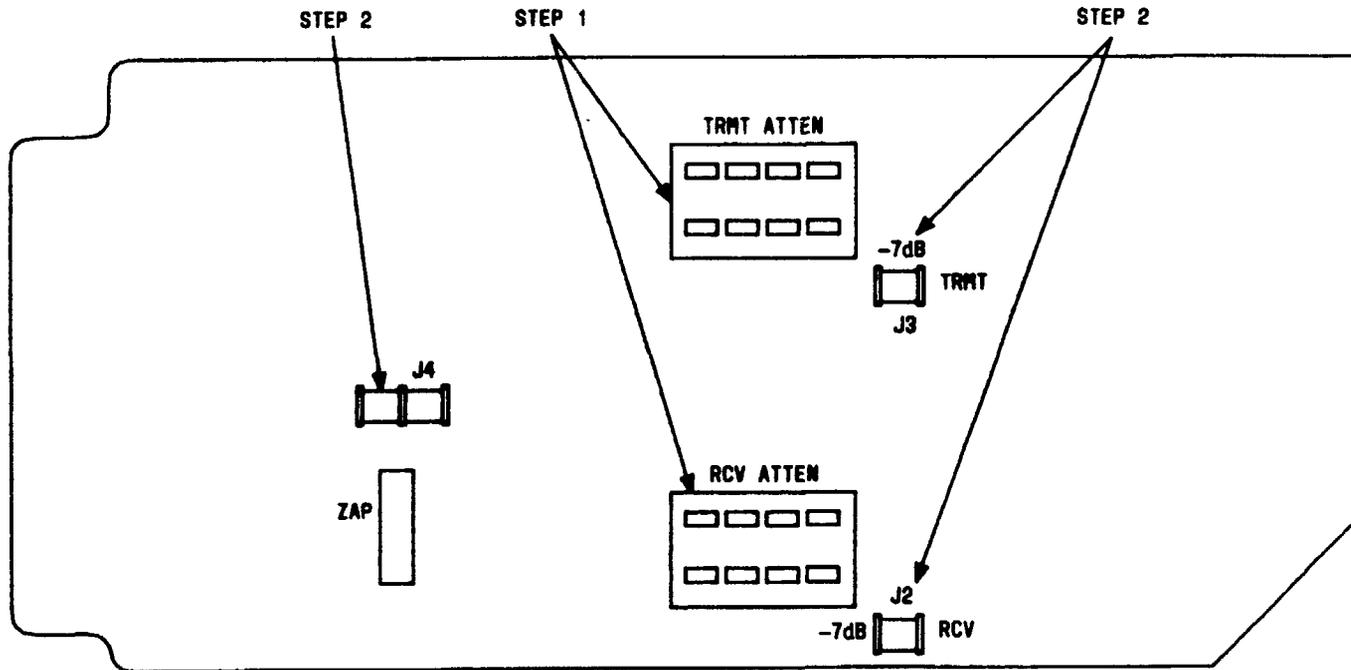


FIG. 1

SET OPTIONS 4TO CHANNEL UNIT (J98726SH)

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[1] From information on WORD or CLRC,
set TRMT and RCV attenuators
[FIG. 1] [DLP-565]

[2] From information on WORD or
CLRC, set J2 option [NOTE 1]
[FIG. 1] [DLP-566]

[3] From information on WORD or
CLRC, set slide switch
S1 [FIG. 1] [DLP-563]

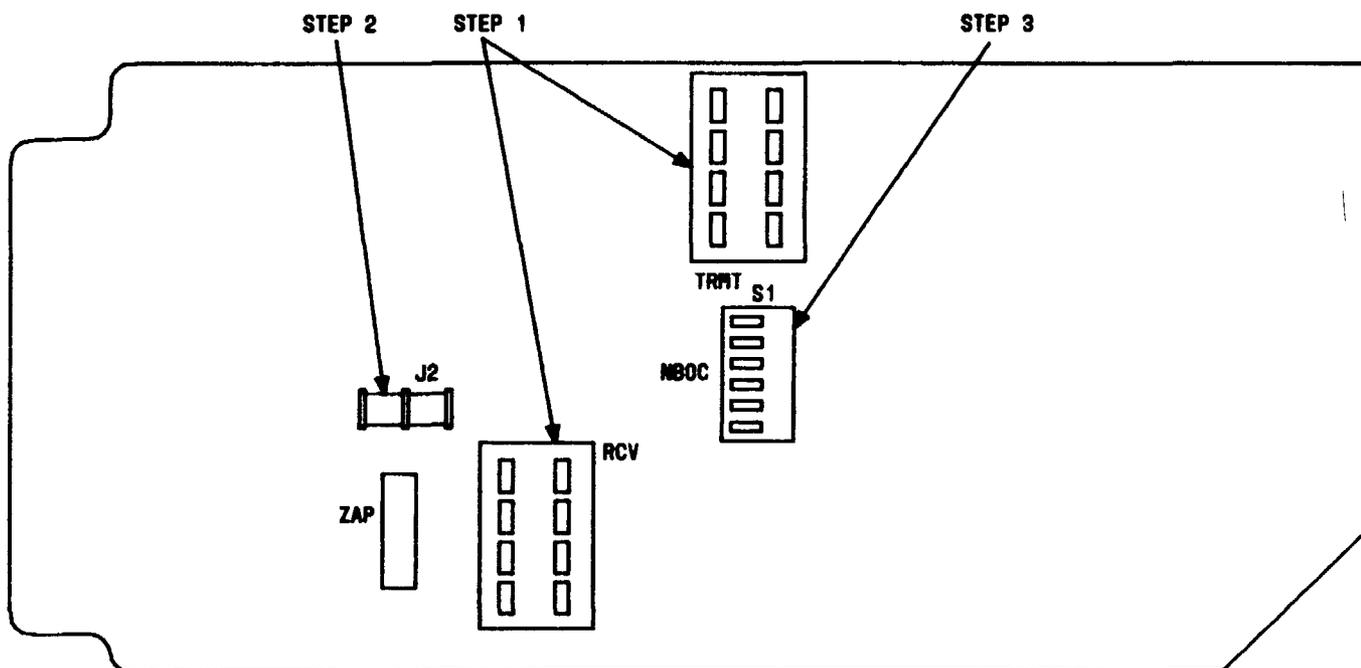


FIG. 1

NOTE 1
J2 option is
selected (30 mA
sealing current) by
inserting plugs into
black sides (white
showing)

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[1] From information on WORD or CLRC,
set TRMT and RCV attenuators
[FIG. 1] [DLP-565]

[2] From information on WORD or CLRC,
set options J2, J3, J4, J6 and LS
[TABLE A] [FIG. 1] [DLP-566]

[3] From information on WORD or CLRC,
set slide switches S1, S2, S4 (loaded
or nonloaded), R/R1, R2, and Z [FIG. 1]
[DLP-563]

TABLE A		
OPTION	WHITE SHOWING	BLACK SHOWING
J2	Loop Resistance greater than 600 ohms	Loop Resistance less than 600 ohms
J3, RG	Make Busy (ring ground)	No Conditioning
J4	Ground Start	Loop Start
J6	Precision Network selected	Compromise Network selected
J3, LS	Make Busy (loop closure)	No Conditioning

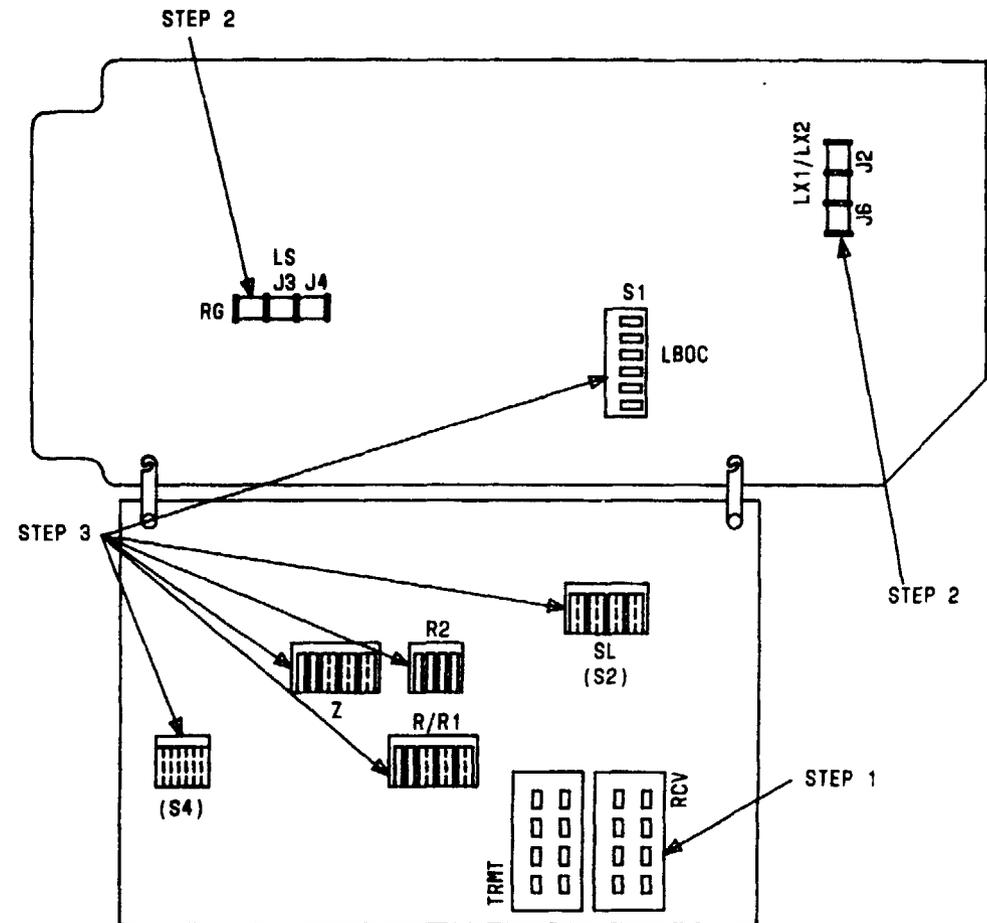


FIG. 1

SET OPTIONS 2FXO/GT CHANNEL UNIT (J98726SK)

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- [1] From information on WORD or CLRC, set TRMT GAIN and RCV GAIN attenuators [FIG. 1] [DLP-565]
- [2] From information on WORD or CLRC, set options J2 and J3 [FIG. 1] [TABLE A] [DLP-566]
- [3] From information on WORD or CLRC, set slide switches SL, BW, and HT [FIG. 1] [DLP-563]
- [4] From information on WORD or CLRC, set terminating impedance for TRMT and RCV [FIG. 1] [DLP-562]

TABLE A		
OPTION	WHITE SHOWING	BLACK SHOWING
J2	30 mA sealing current to T-R/T1-R1	No Sealing Current
J3	Attenuation In Transmit Path of 7dB	No 7dB Attenuation

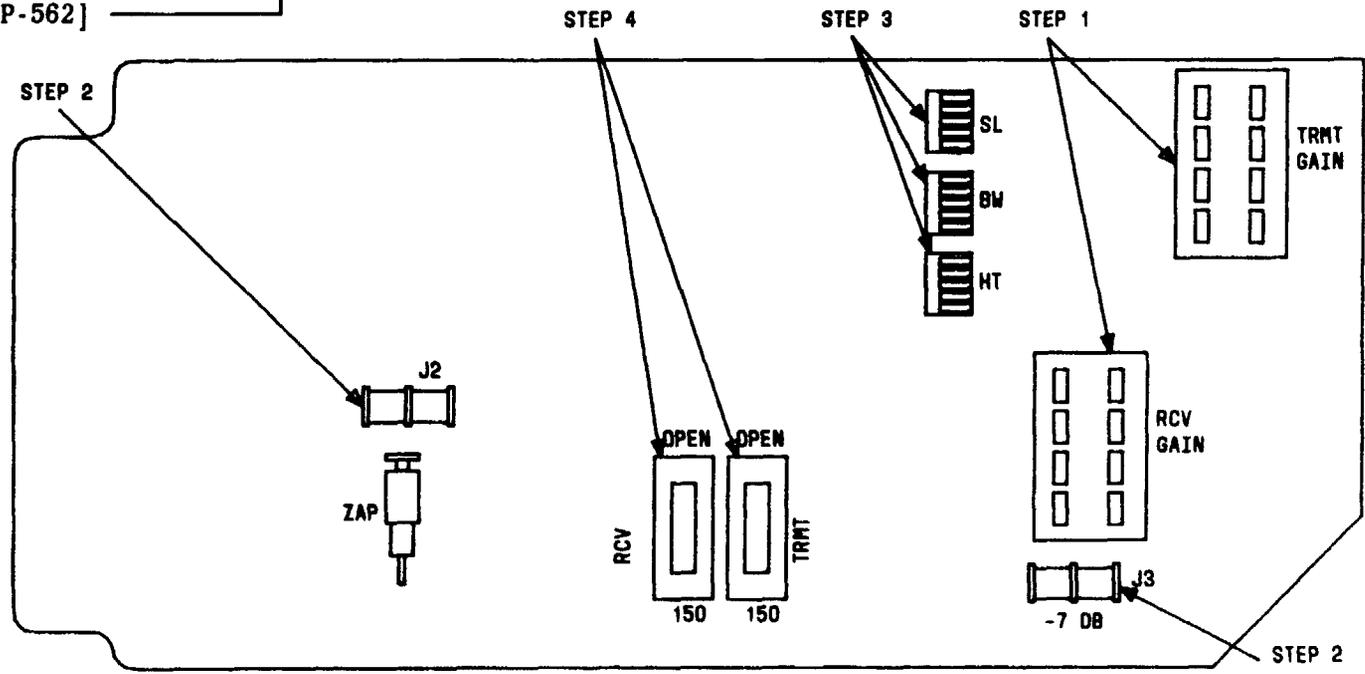


FIG. 1

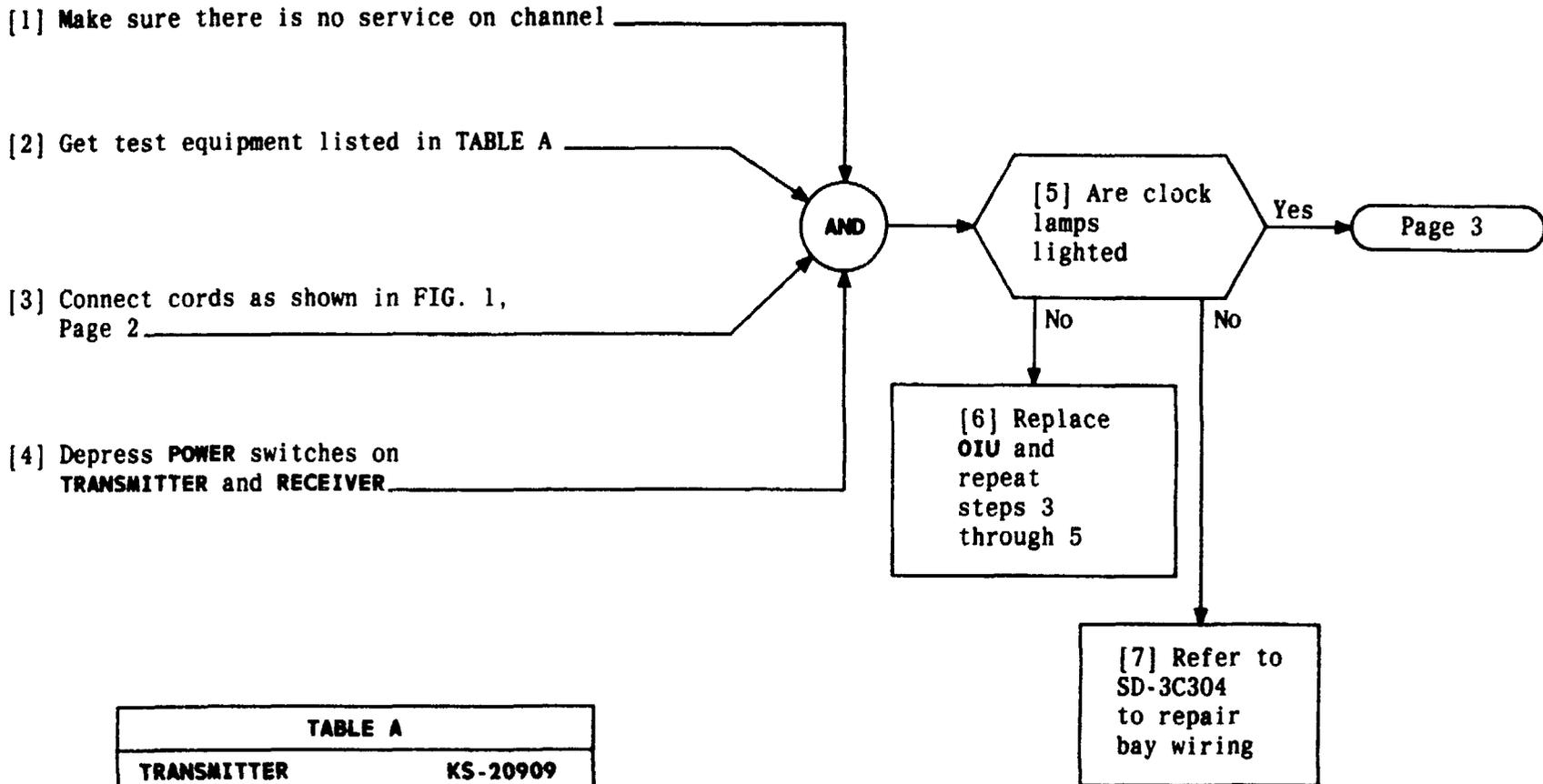


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

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PERFORM DSU LOOPBACK TEST FROM OCUDP

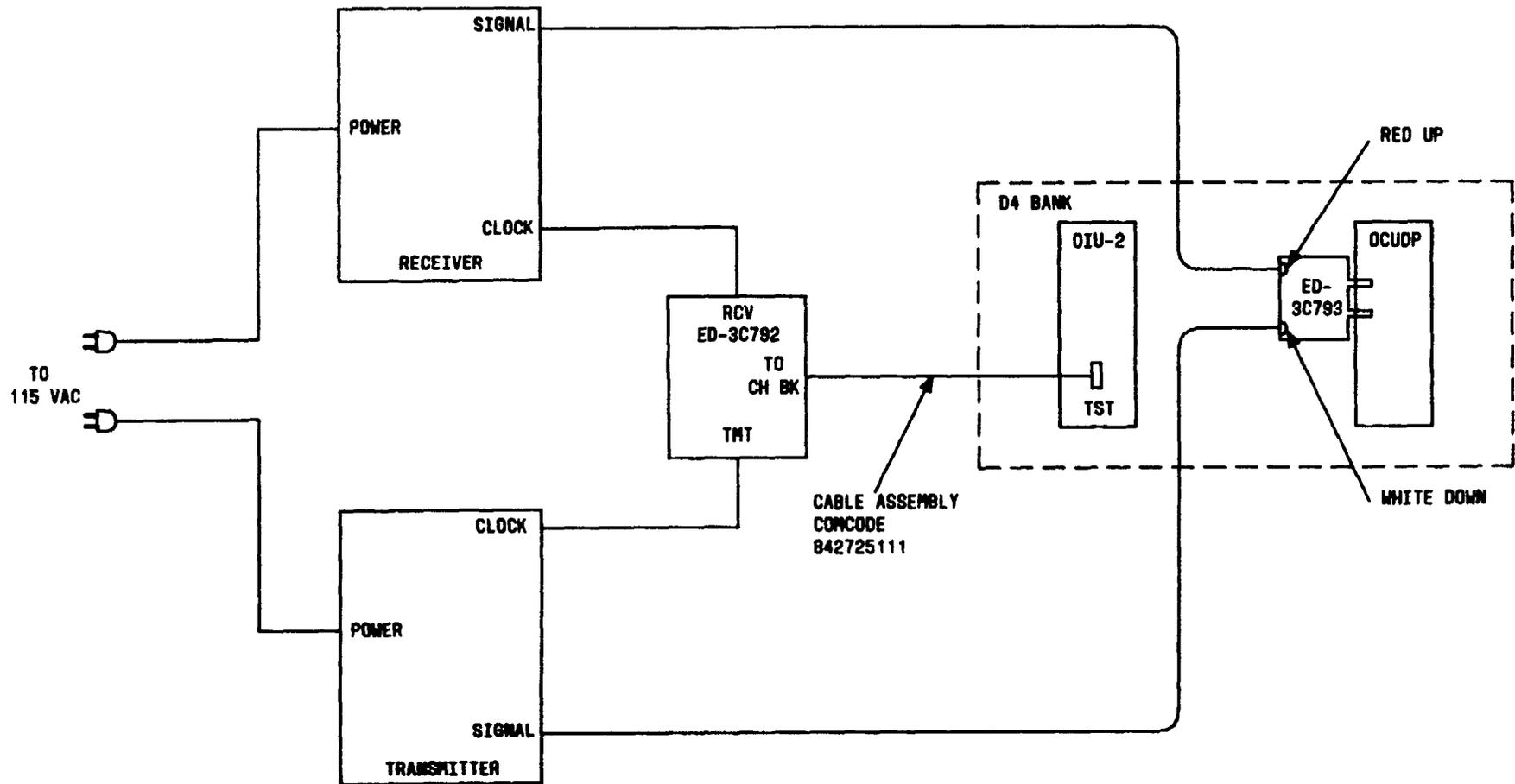


FIG. 1

PERFORM DSU LOOPBACK TEST FROM OCUDP

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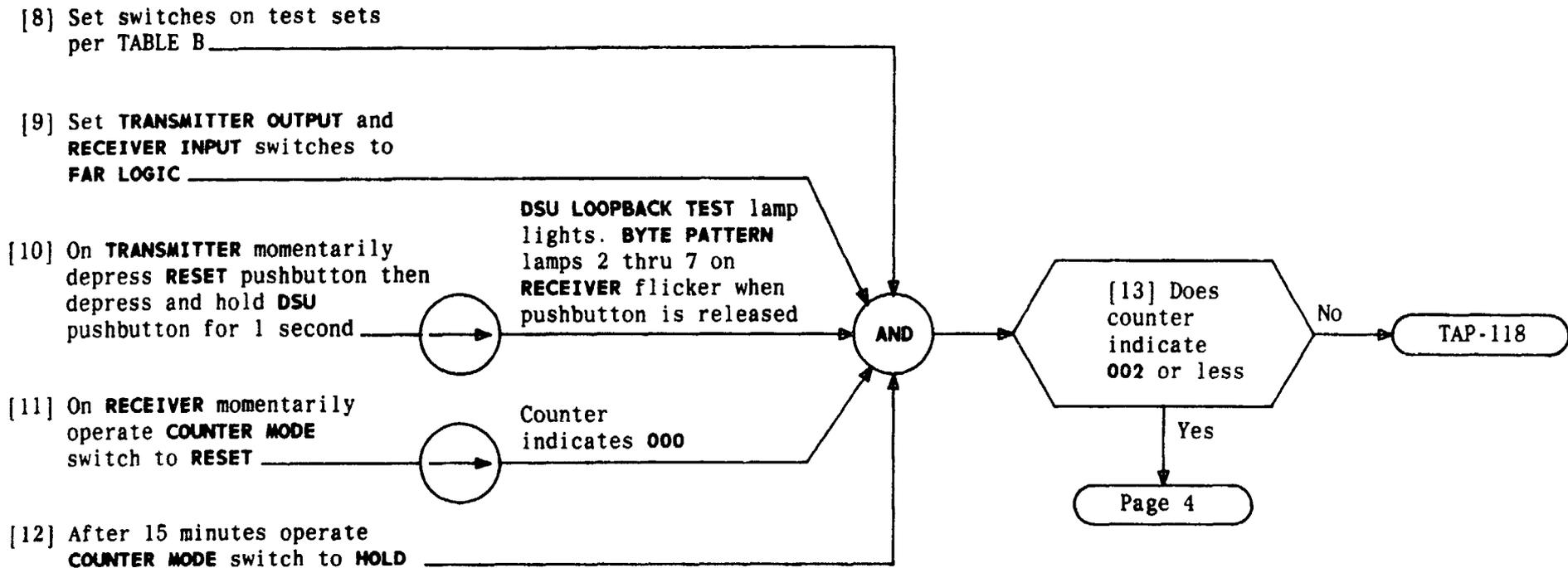


TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	Same as customer	DATA RATE	Same as customer
FUNCTION	LOOPBACK TEST	COUNTER TEST WORD	BLOCK ERRORS LOOPED
MODE	REPEAT	CHANNEL OR SUBRATE CHANNEL	SINGLE

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PERFORM DSU LOOPBACK TEST FROM OCUDP

[14] Set TRANSMITTER OUTPUT and RECEIVER INPUT switches to NEAR LOGIC

[15] On TRANSMITTER momentarily depress RESET pushbutton then depress and hold DSU pushbutton for 1 second

[16] On RECEIVER momentarily operate COUNTER MODE switch to RESET

[17] After 15 minutes operate COUNTER MODE switch to HOLD

DSU LOOPBACK TEST lamp lights. BYTE PATTERN lamps 2 thru 7 on RECEIVER flicker when pushbutton is released

Counter indicates 000

AND

[18] Does counter indicate 002 or less

No

TAP-118

Yes

[19] Disconnect and put away test equipment

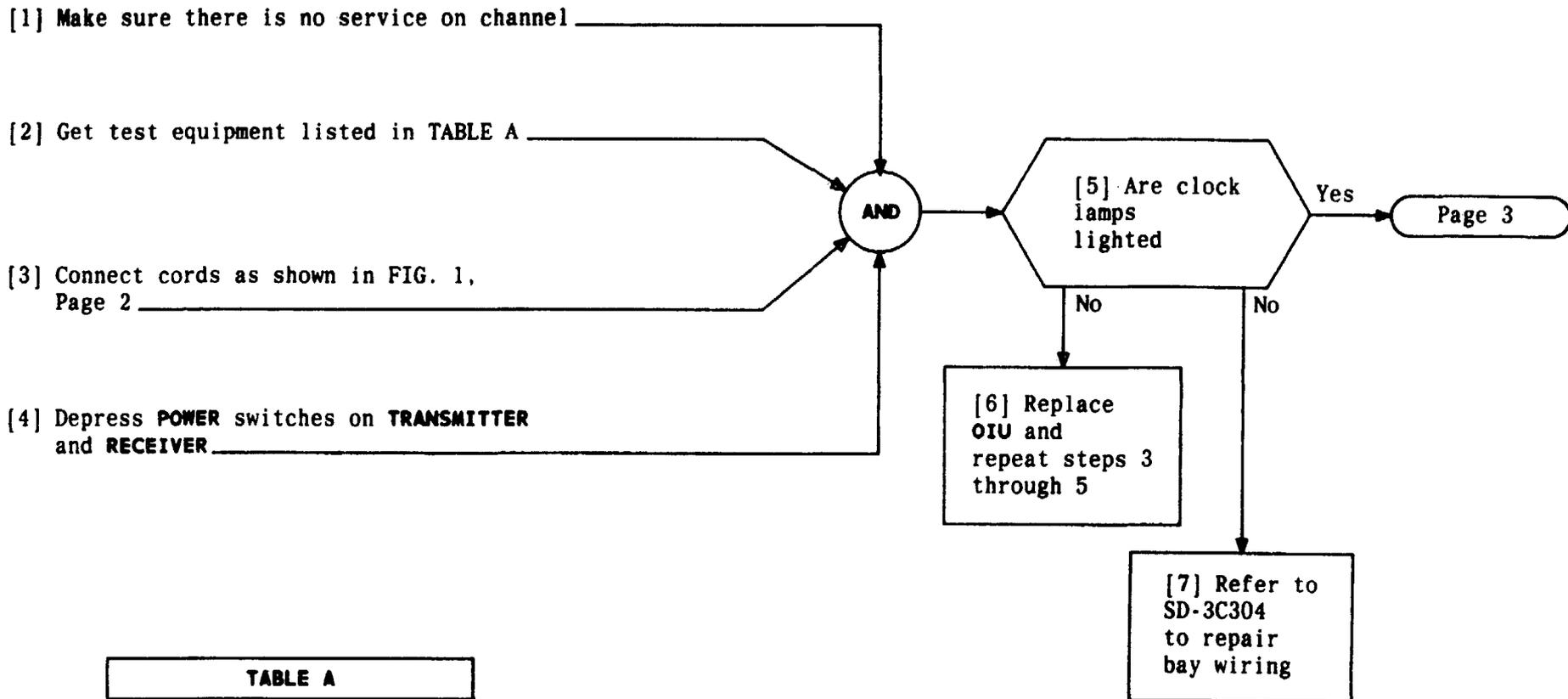


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATA PORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

PERFORM CHAN LOOPBACK TEST(S) FROM OCUDP

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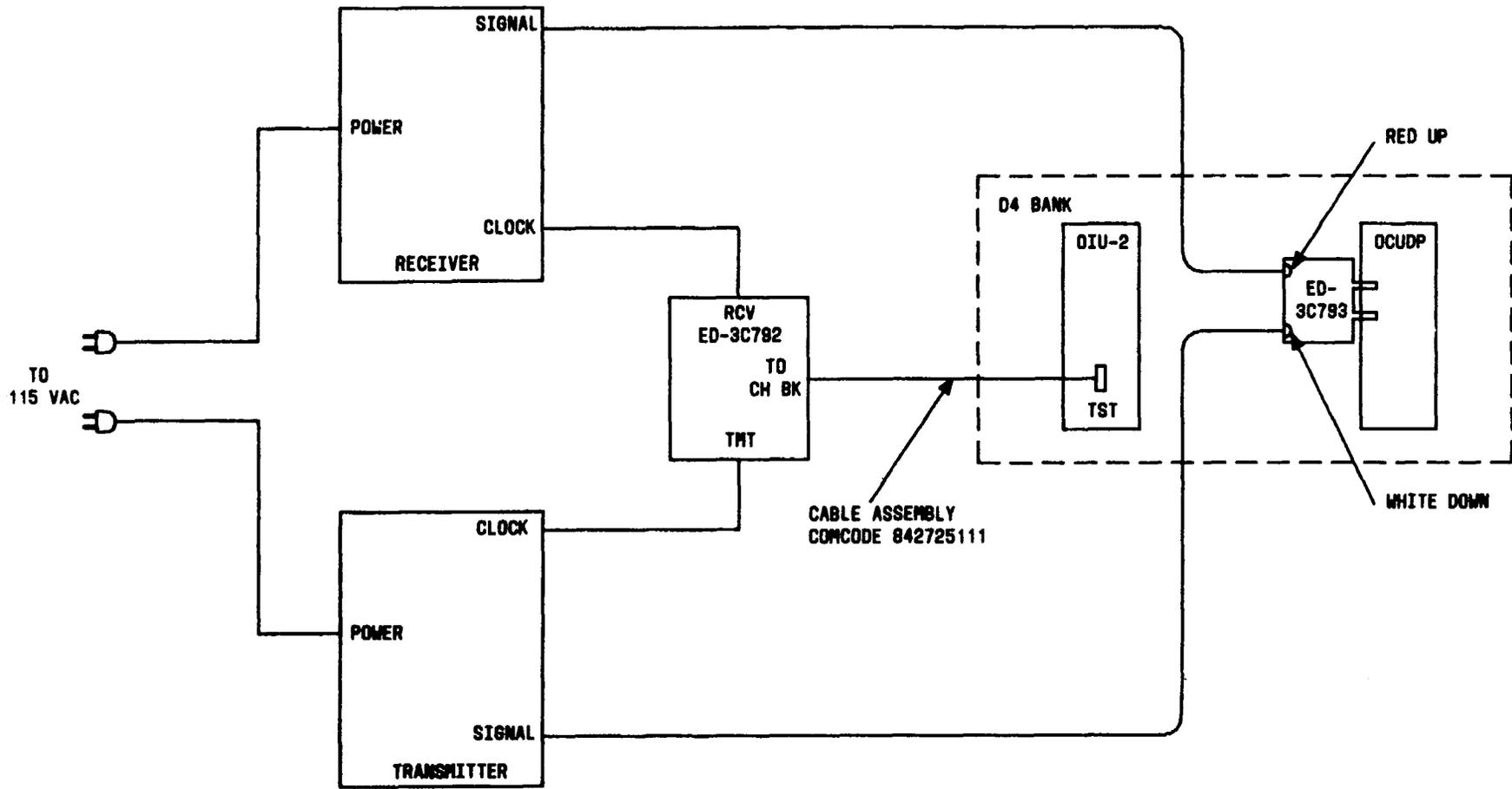


FIG. 1

PERFORM CHAN LOOPBACK TEST(S) FROM OCUDP

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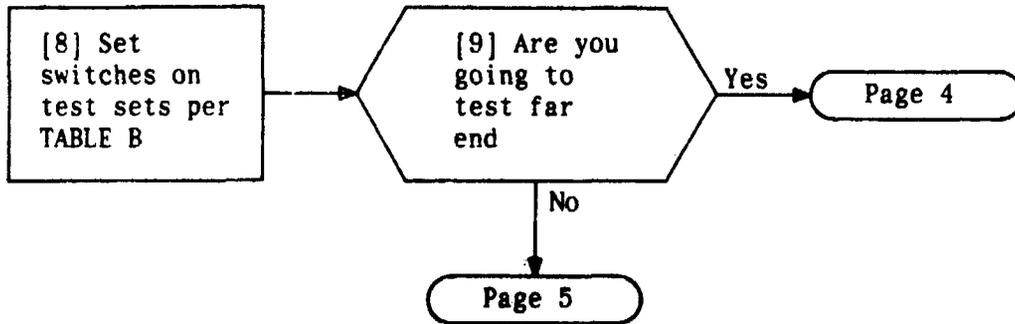


TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	Same as customer	DATA RATE	Same as customer
FUNCTION	LOOPBACK TEST	COUNTER TEST WORD	BIT ERRORS LOOPED
MODE	REPEAT	CHANNEL or SUBRATE CHANNEL	SINGLE

PERFORM CHAN LOOPBACK TEST(S) FROM OCUDP

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[10] Set **TRANSMITTER OUTPUT** and **RECEIVER INPUT** switches to **FAR LOGIC**

[11] On **TRANSMITTER** momentarily depress **RESET** pushbutton then depress and hold **CHAN** pushbutton for 1 second

[12] On **RECEIVER** momentarily operate **COUNTER MODE** switch to **RESET**

[13] After 15 seconds operate **COUNTER MODE** switch to **HOLD**

CHAN LOOPBACK TEST
lamp lights. **BYTE PATTERN** lamps 2 thru 7 on **RECEIVER** flicker when pusbutton is released

Counter indicates 000

AND

[14] Counter should indicate 000

[15] Are you going to test near end **CHAN**

Page 5

[16] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM CHAN LOOPBACK TEST(S) FROM OCUDP

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[17] Set **TRANSMITTER OUTPUT** and **RECEIVER INPUT** switches to **NEAR LOGIC**

[18] On **TRANSMITTER** momentarily depress **RESET** pushbutton then depress and hold for 1 second **CHAN** pushbutton

[19] On **RECEIVER** momentarily operate **COUNTER MODE** switch to **RESET**

[20] After 15 seconds operate **COUNTER MODE** switch to **HOLD**

CHAN LOOPBACK TEST
lamp lights. **BYTE PATTERN** lamps 2 thru 7 on **RECEIVER** flicker when pushbutton is released

Counter indicates 000

AND

[21] Counter should indicate 000

[22] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM CHAN LOOPBACK TEST(S) FROM OCUDP

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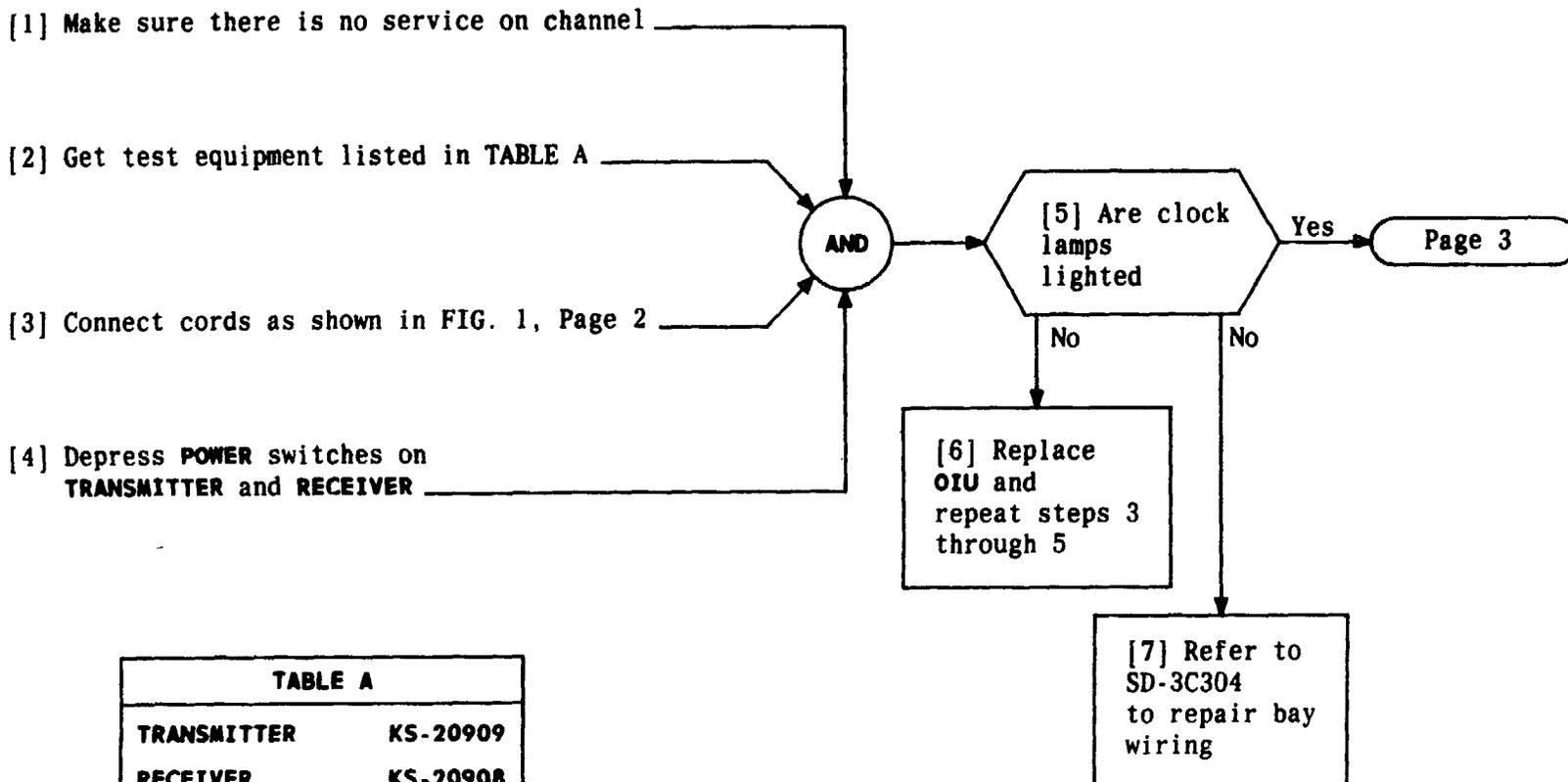


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

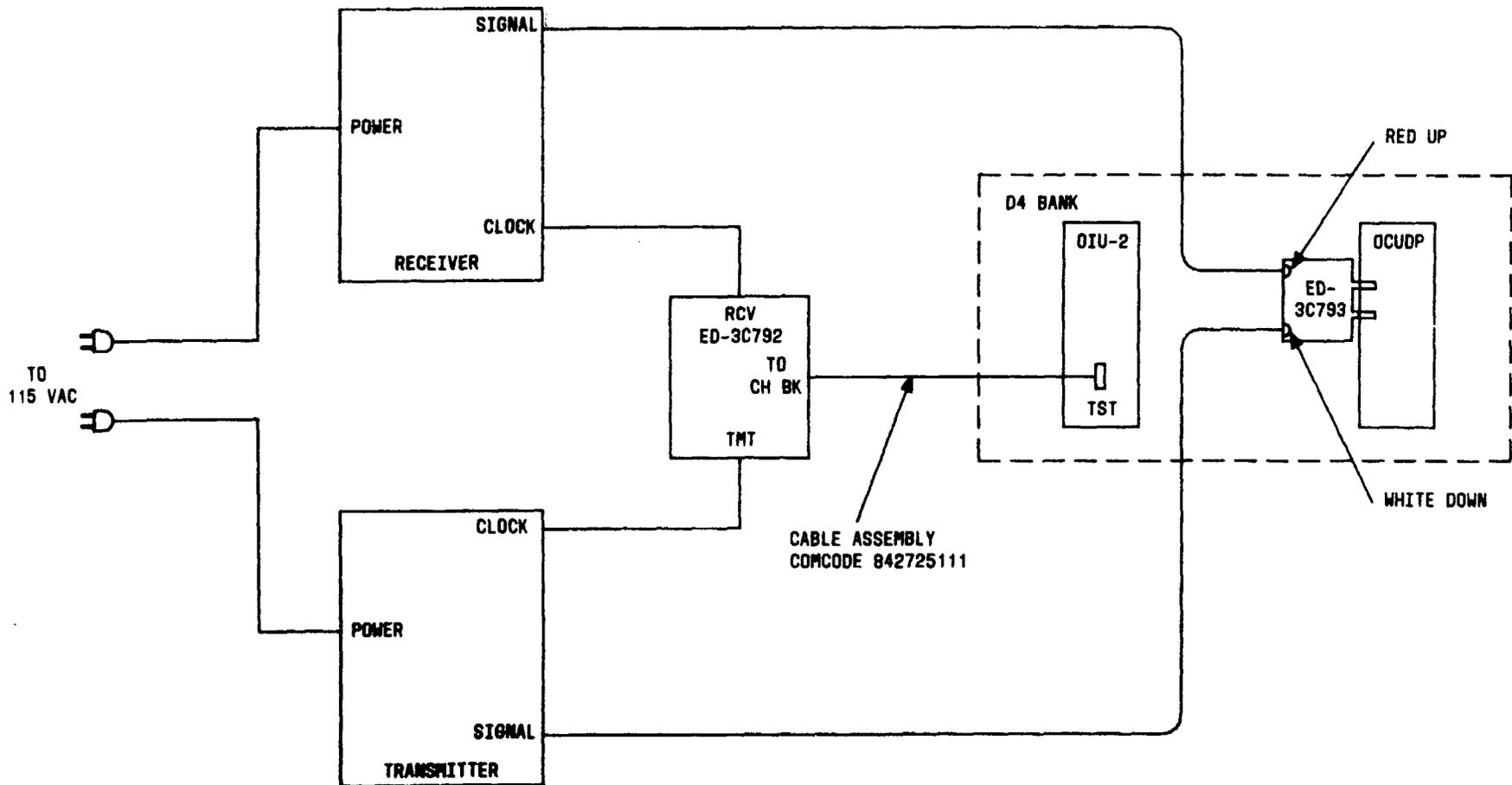


FIG. 1

PERFORM OCU LOOPBACK TEST(S) FROM OCUDP

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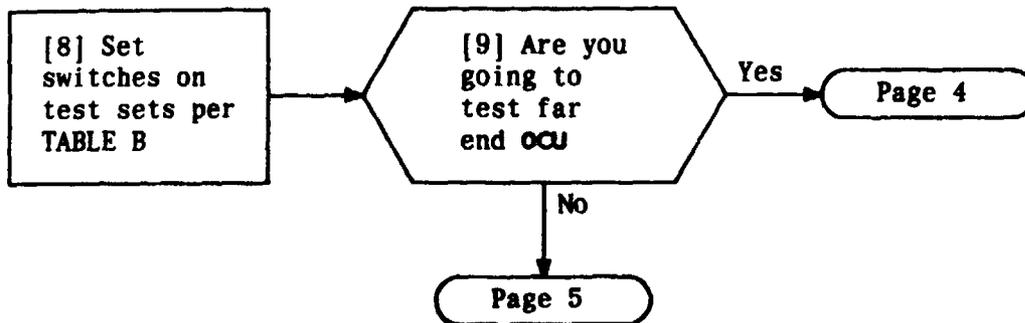


TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	Same as customer	DATA RATE	Same as customer
FUNCTION	LOOPBACK TEST	COUNTER TEST WORD	BIT ERRORS LOOPED
MODE	REPEAT	CHANNEL or SUBRATE CHANNEL	SINGLE

[10] Set **TRANSMITTER OUTPUT** and **RECEIVER INPUT** switches to **FAR LOGIC**

[11] On **TRANSMITTER** momentarily depress **RESET** pushbutton then depress and hold **OCU** pushbutton for 1 second

[12] On **RECEIVER** momentarily operate **COUNTER MODE** switch to **RESET**

[13] After 15 seconds operate **COUNTER MODE** switch to **HOLD**

OCU LOOPBACK TEST
lamp lights, **BYTE PATTERN** lamps 2 thru 7 on **RECEIVER** flicker when pushbutton is released

Counter indicates 000

AND

[14] Counter should indicate 000

[15] Are you going to test near end **OCUDP**

Yes

Page 5

No

[16] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM OCU LOOPBACK TEST(S) FROM OCUDP

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[17] Set **TRANSMITTER OUTPUT** and **RECEIVER INPUT** switches to **NEAR LOGIC**

[18] On **TRANSMITTER** momentarily depress **RESET** pushbutton then depress and hold **OCU** pushbutton for 1 second

[19] On **RECEIVER** momentarily operate **COUNTER MODE** switch to **RESET**

[20] After 15 seconds operate **COUNTER MODE** switch to **HOLD**

OCU LOOPBACK TEST
lamp lights
BYTE PATTERN lamps
on **RECEIVER** flicker

Counter
indicates **000**

AND

[21] Counter
should
indicate **000**

[22] If no further
dataport tests are
needed, disconnect
and put away test
equipment

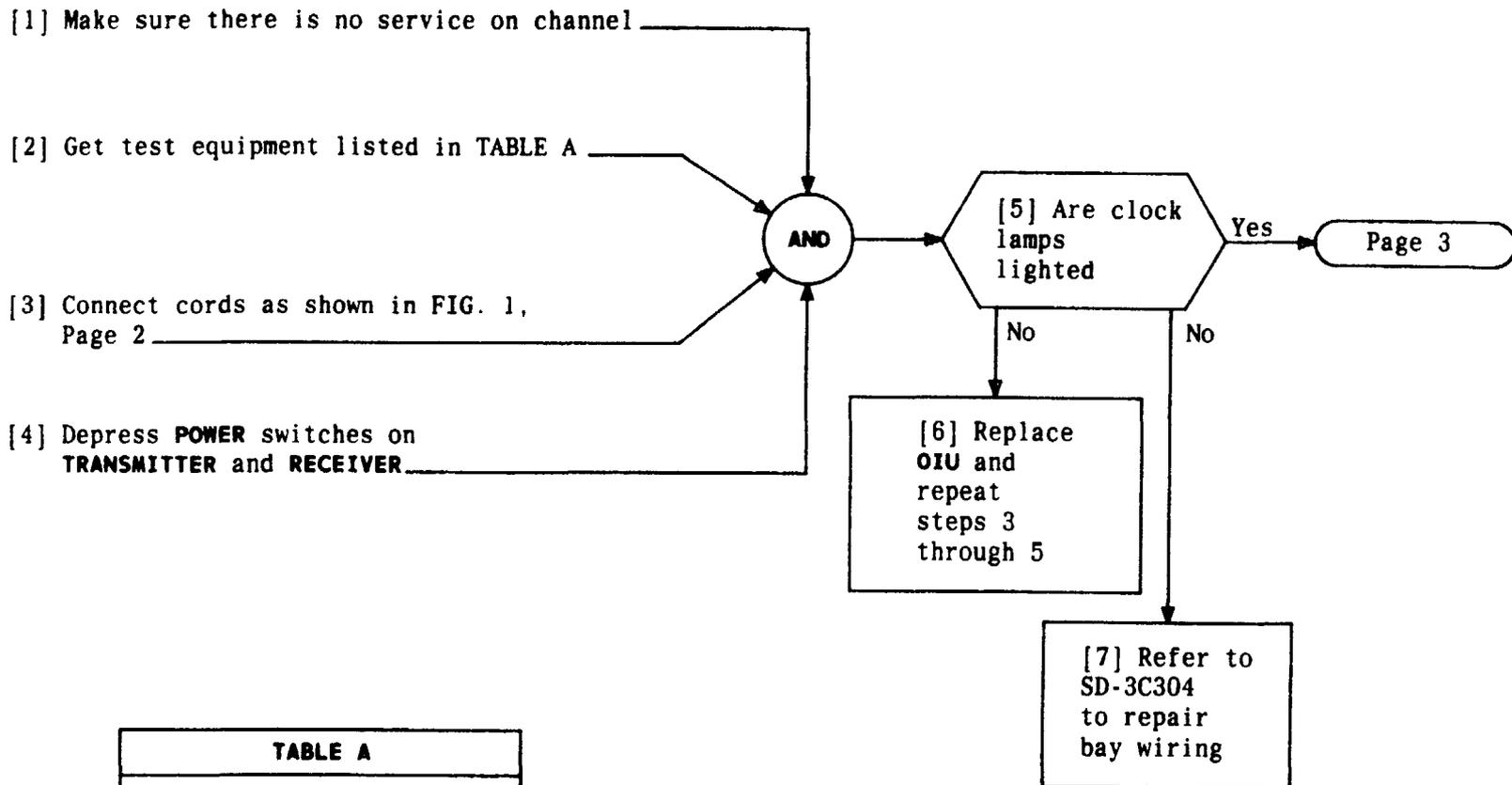


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

PERFORM DSU LOOPBACK TEST FROM DSODP

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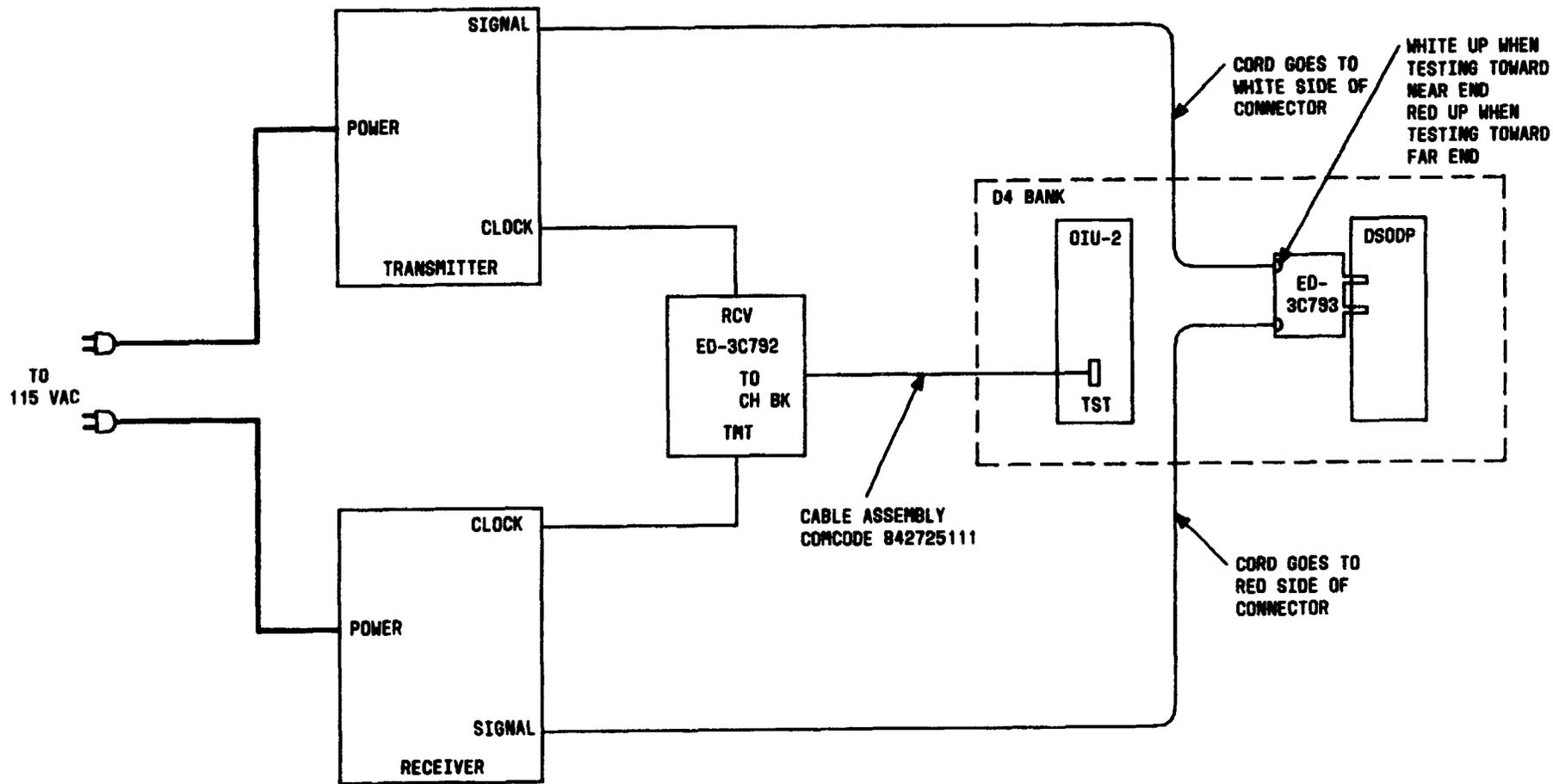


FIG. 1

PERFORM DSU LOOPBACK TEST FROM DSODP

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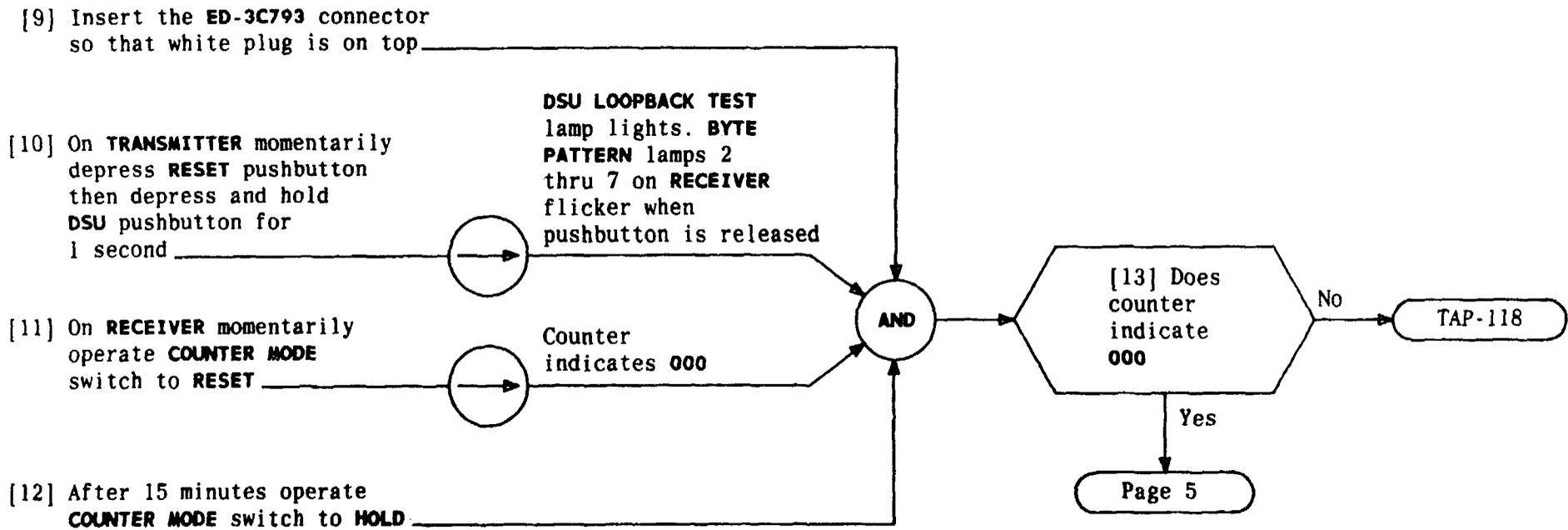
[8] Set switches on test sets per TABLE B and depress **TERMINATE** switch if available on **RECEIVER**. **TERMINATED** lamp lights if available

Page 4

TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	Same as customer	DATA RATE	Same as customer
FUNCTION	LOOPBACK TEST	COUNTER TEST WORD	BLOCK ERRORS LOOPED
OUTPUT	BIPOLAR	CHANNEL or SUBRATE CHANNEL	SINGLE
MODE	REPEAT	INPUT	BIPOLAR

PERFORM DSU LOOPBACK TEST FROM DSODP

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[14] Insert the **ED-3C793** connector so that red plug is on top

[15] On **TRANSMITTER** momentarily depress **RESET** pushbutton then depress and hold **DSU** pushbutton for 1 second

[16] On **RECEIVER** momentarily operate **COUNTER MODE** switch to **RESET**

[17] After 15 minutes operate **COUNTER MODE** switch to **HOLD**

DSU LOOPBACK TEST
lamp lights. **BYTE PATTERN** lamps 2 thru 7 on **RECEIVER** flicker when pushbutton is released

Counter indicates 000

AND

[18] Does counter indicate 000

No

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Yes

[19] Disconnect and put away test equipment

PERFORM DSU LOOPBACK TEST FROM DSODP

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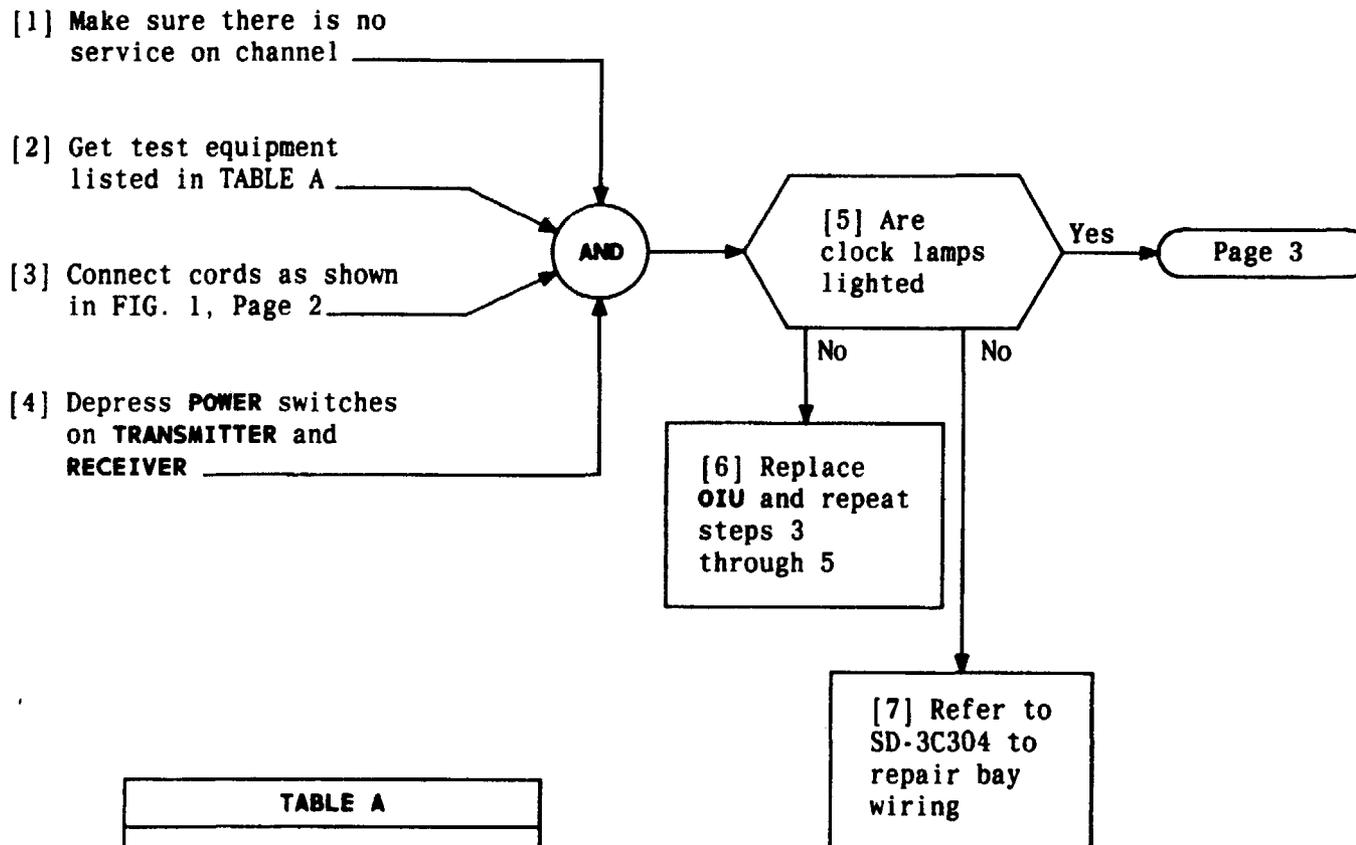


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

PERFORM CHAN LOOPBACK TEST(S) FROM DSODP

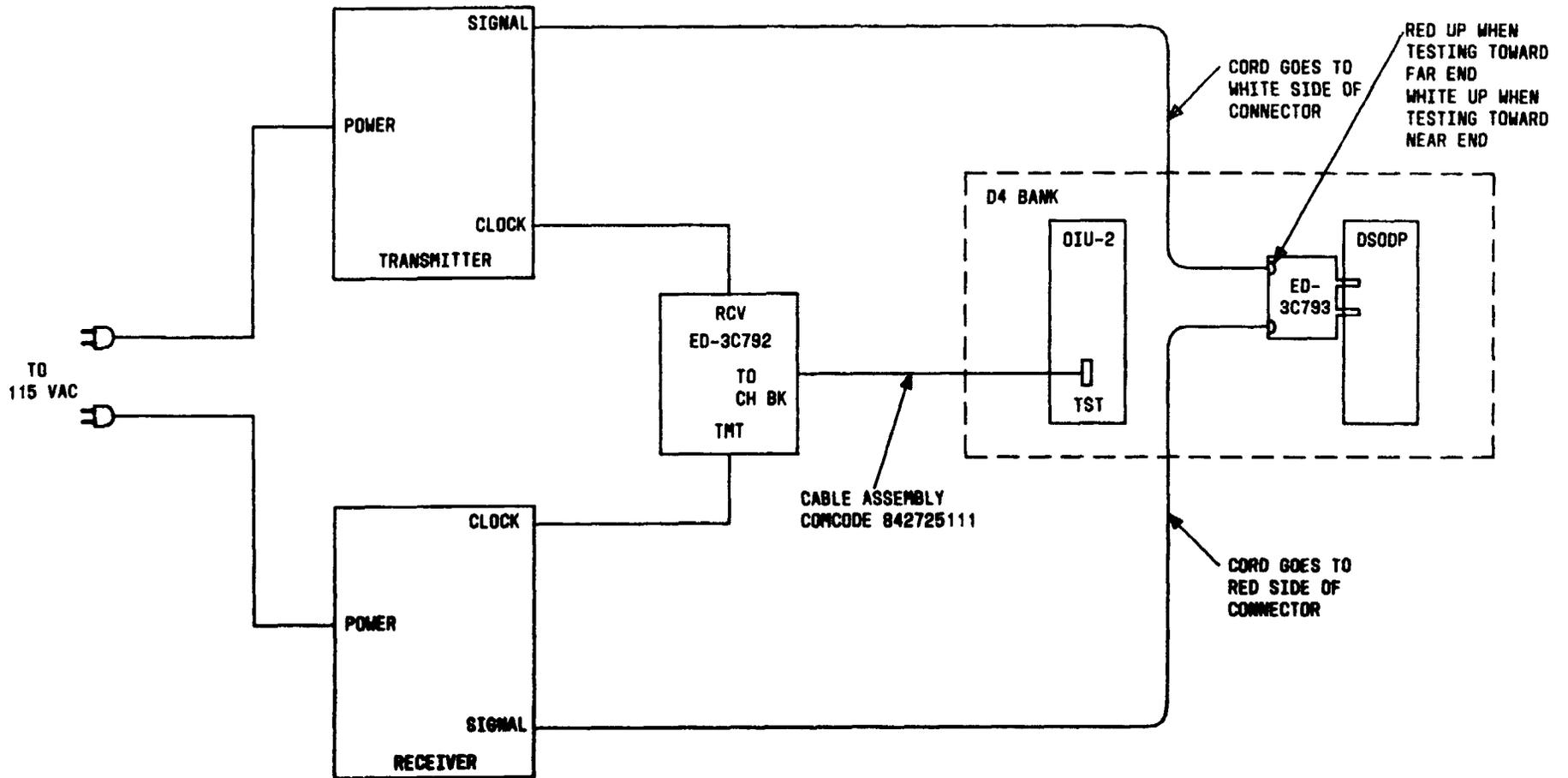


FIG. 1

PERFORM CHAN LOOPBACK TEST(S) FROM DSODP

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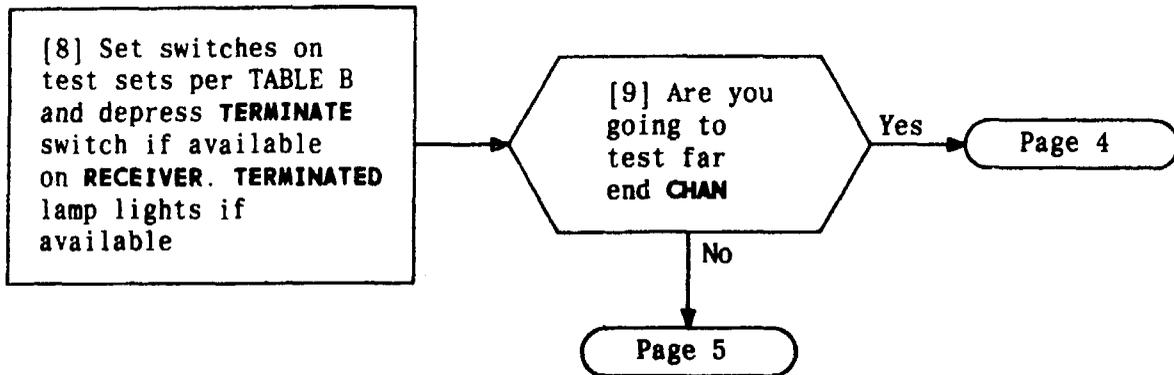


TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	Same as customer	DATA RATE	Same as customer
FUNCTION	LOOPBACK TEST	COUNTER TEST WORD	BIT ERRORS LOOPED
OUTPUT	BIPOLAR	CHANNEL OR SUBRATE CHANNEL	SINGLE
MODE	REPEAT	INPUT	BIPOLAR

PERFORM CHAN LOOPBACK TEST(S) FROM DSODP

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[10] Insert the ED-3C793 connector so that red plug is on top

[11] On TRANSMITTER momentarily depress RESET pushbutton then depress and hold CHAN pushbutton for 1 second

CHAN LOOPBACK TEST lamp lights. BYTE PATTERN lamps 2 thru 7 on RECEIVER flicker when pushbutton is released

[12] On RECEIVER momentarily operate COUNTER MODE switch to RESET

Counter indicates 000

[13] After 15 seconds operate COUNTER MODE switch to HOLD

AND

[14] Counter should indicate 000

[15] Are you going to test near end CHAN

Yes

Page 5

No

[16] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM CHAN LOOPBACK TEST(S) FROM DSODP

[17] Insert the **ED-3C793** connector so that white plug is on top

[18] On **TRANSMITTER** momentarily depress **RESET** pushbutton then depress and hold **CHAN** pushbutton for 1 second

[19] On **RECEIVER** momentarily operate **COUNTER MODE** switch to **RESET**

[20] After 15 seconds operate **COUNTER MODE** switch to **HOLD**

CHAN LOOPBACK TEST
lamp lights. **BYTE PATTERN** lamps 2 thru 7 on **RECEIVER** flicker when pushbutton is released

Counter indicates **000**

AND

[21] Counter should indicate **000**

[22] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM CHAN LOOPBACK TEST(S) FROM DSODP

[1] Make sure there is no service on channel

[2] Get test equipment listed in TABLE A

[3] Connect cords as shown in FIG. 1, Page 2

[4] Depress POWER switches on TRANSMITTER and RECEIVER

AND

[5] Are clock lamps lighted

Yes

Page 3

No

[6] Replace OIU and repeat steps 3 through 5

No

[7] Refer to SD-3C304 to repair bay wiring

TABLE A

TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

PERFORM OCU LOOPBACK TEST(S) FROM DSODP

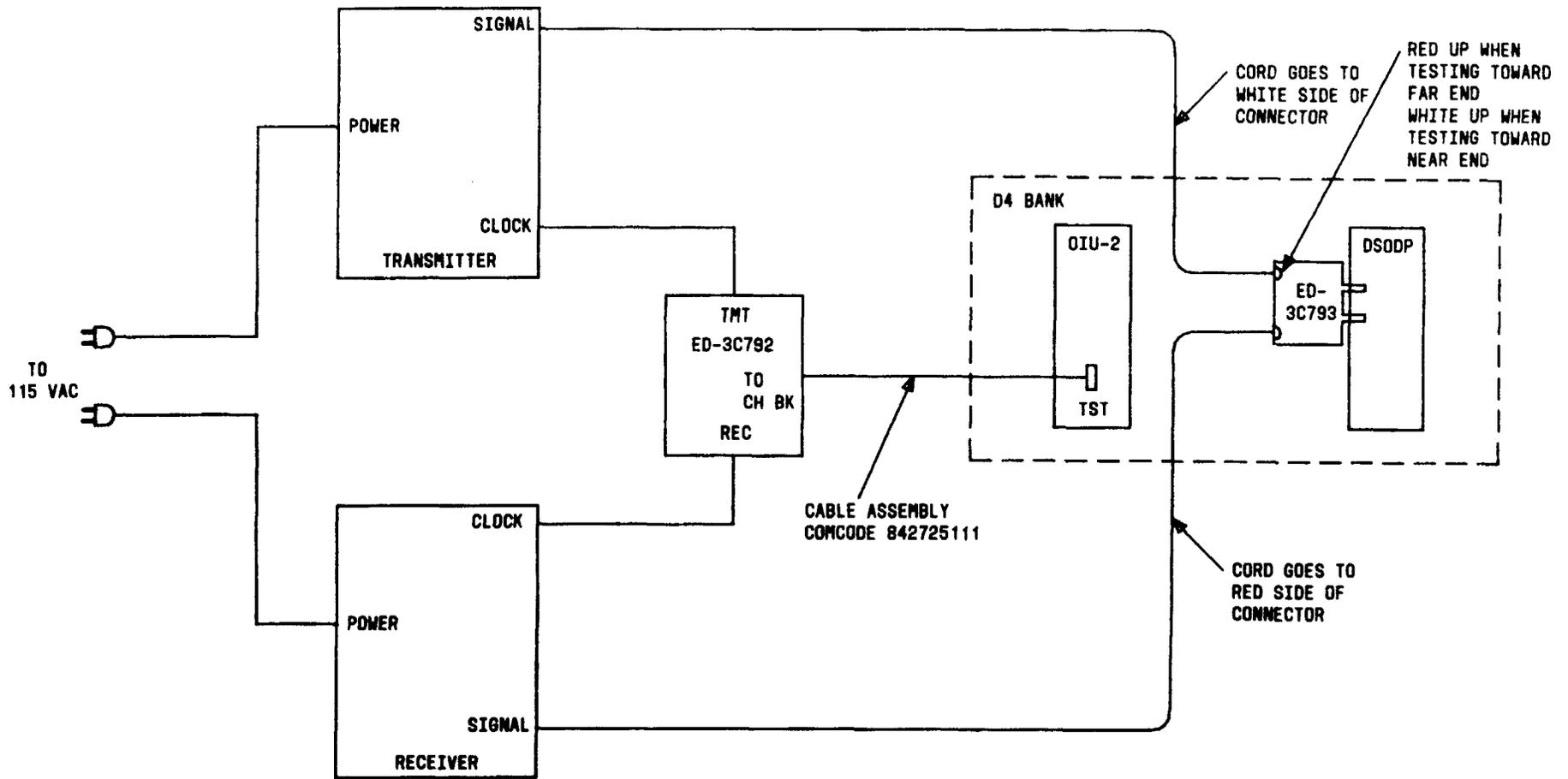


FIG. 1

PERFORM OCU LOOPBACK TEST(S) FROM DSODP

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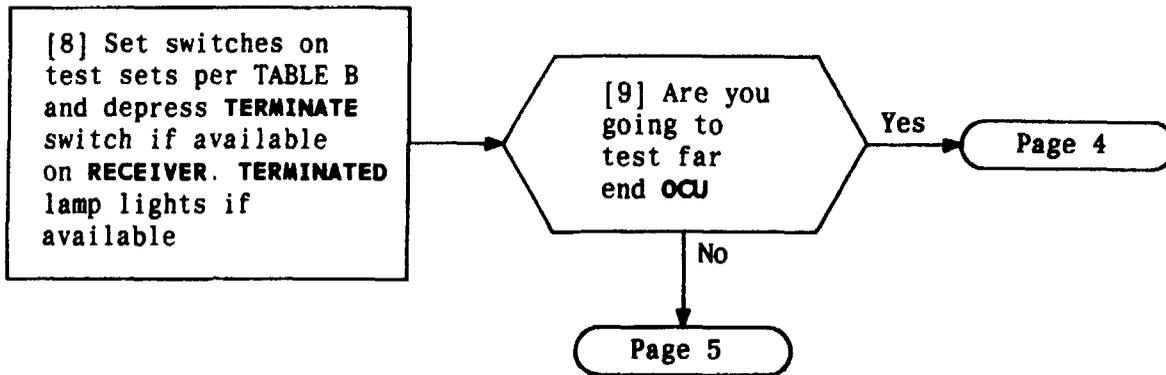


TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	Same as customer	DATA RATE	Same as customer
FUNCTION	LOOPBACK TEST	COUNTER	BIT ERRORS
OUTPUT	BIPOLAR	TEST WORD	LOOPED
MODE	REPEAT	CHANNEL or SUBRATE CHANNEL	SINGLE
		INPUT	BIPOLAR

PERFORM OCU LOOPBACK TEST(S) FROM DSODP

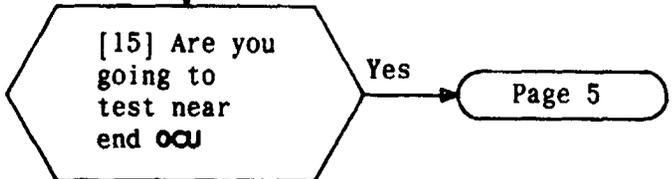
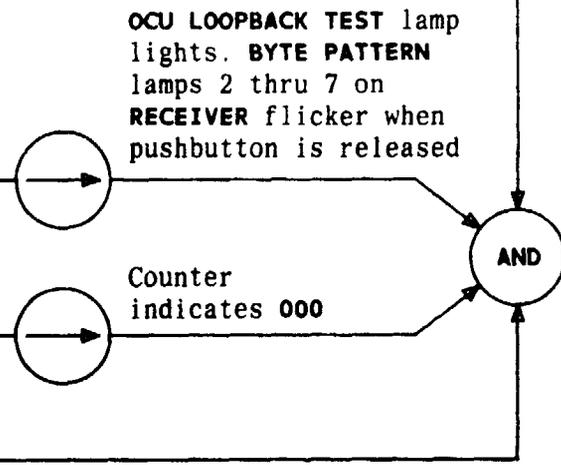
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[10] Insert the ED-3C793 connector so that red plug is on top

[11] On TRANSMITTER momentarily depress RESET pushbutton then depress and hold OCU pushbutton for 1 second

[12] On RECEIVER momentarily operate COUNTER MODE switch to RESET

[13] After 15 seconds operate COUNTER MODE switch to HOLD



[16] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM OCU LOOPBACK TEST(S) FROM DSODP

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[17] Insert the ED-3C793 connector so that white plug is on top

[18] On TRANSMITTER momentarily depress RESET pushbutton then depress and hold OCU pushbutton for 1 second

[19] On RECEIVER momentarily operate COUNTER MODE switch to RESET

[20] After 15 seconds operate COUNTER MODE switch to HOLD

OCU LOOPBACK TEST lamp lights
BYTE PATTERN lamps on RECEIVER flicker

Counter indicates 000

AND

[21] Verify counter indicates 000

[22] If no further dataport tests are needed, disconnect and put away test equipment

PERFORM OCU LOOPBACK TEST(S) FROM DSODP

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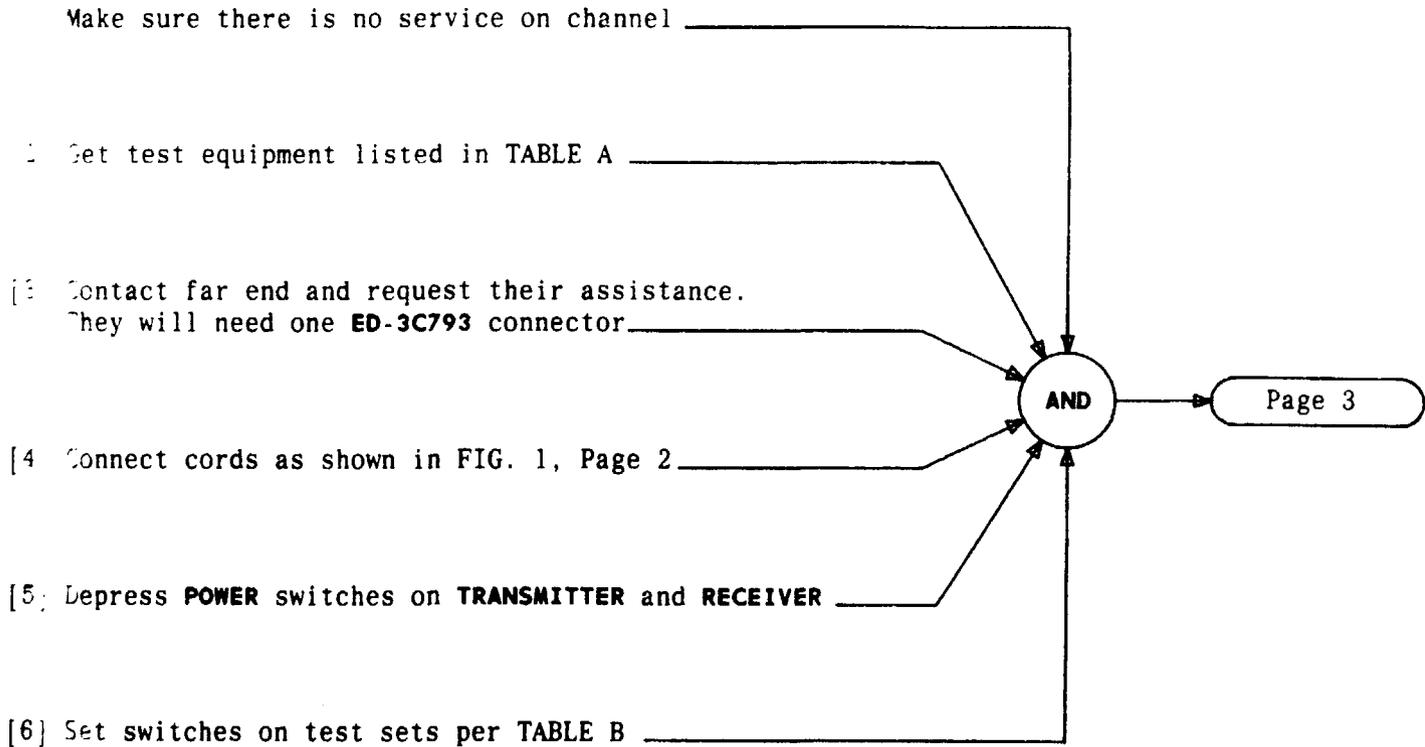


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	9.6	DATA RATE	9.6
OUTPUT FUNCTION	BIPOLAR LOOPBACK TESTS	INPUT COUNTER	BIPOLAR BIT ERRORS
MODE	REPEAT	TEST WORD	LOOPED
		CHANNEL or SUBRATE CHANNEL	SINGLE

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PERFORM DSODP LOOPBACK TEST FROM DSODP

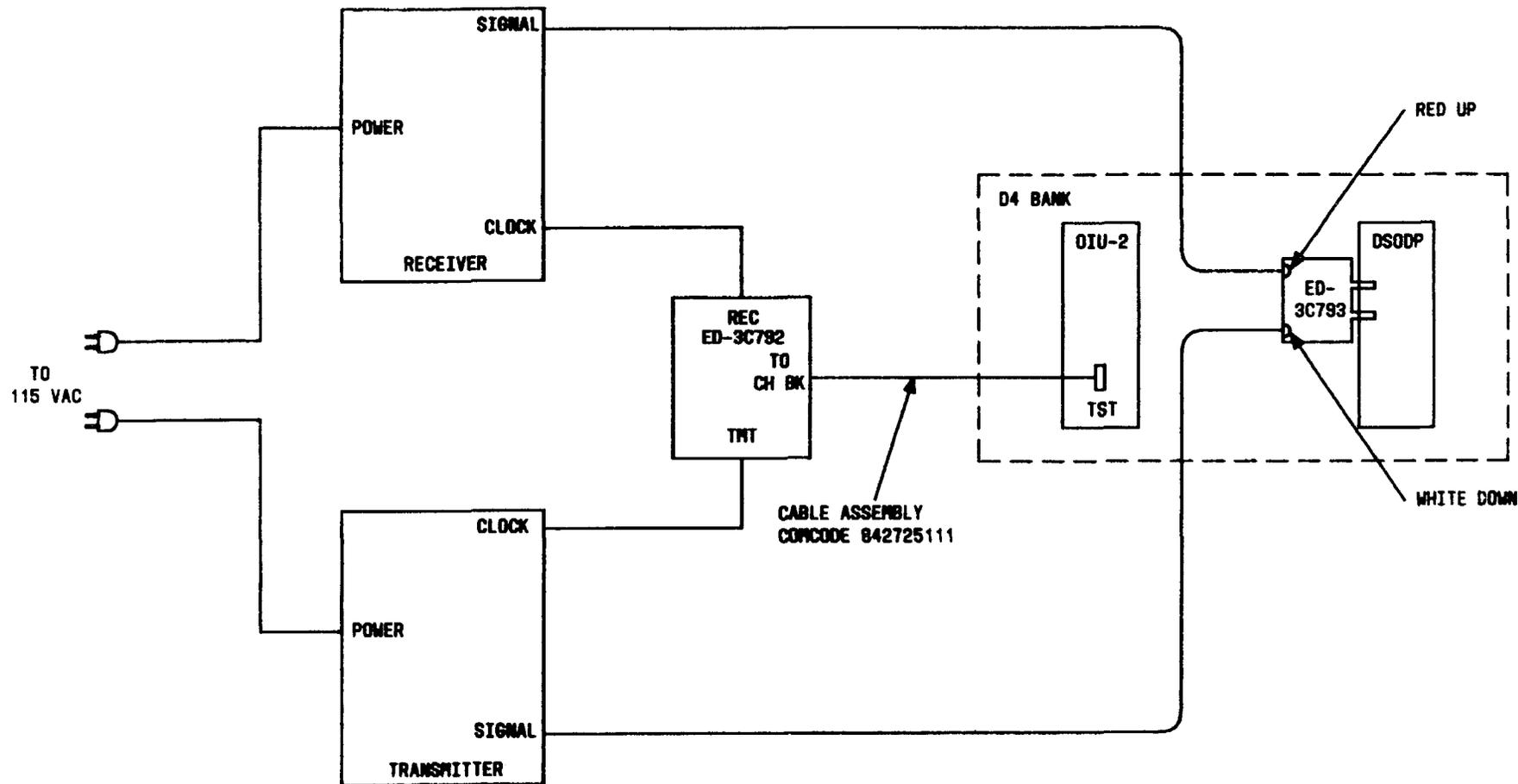
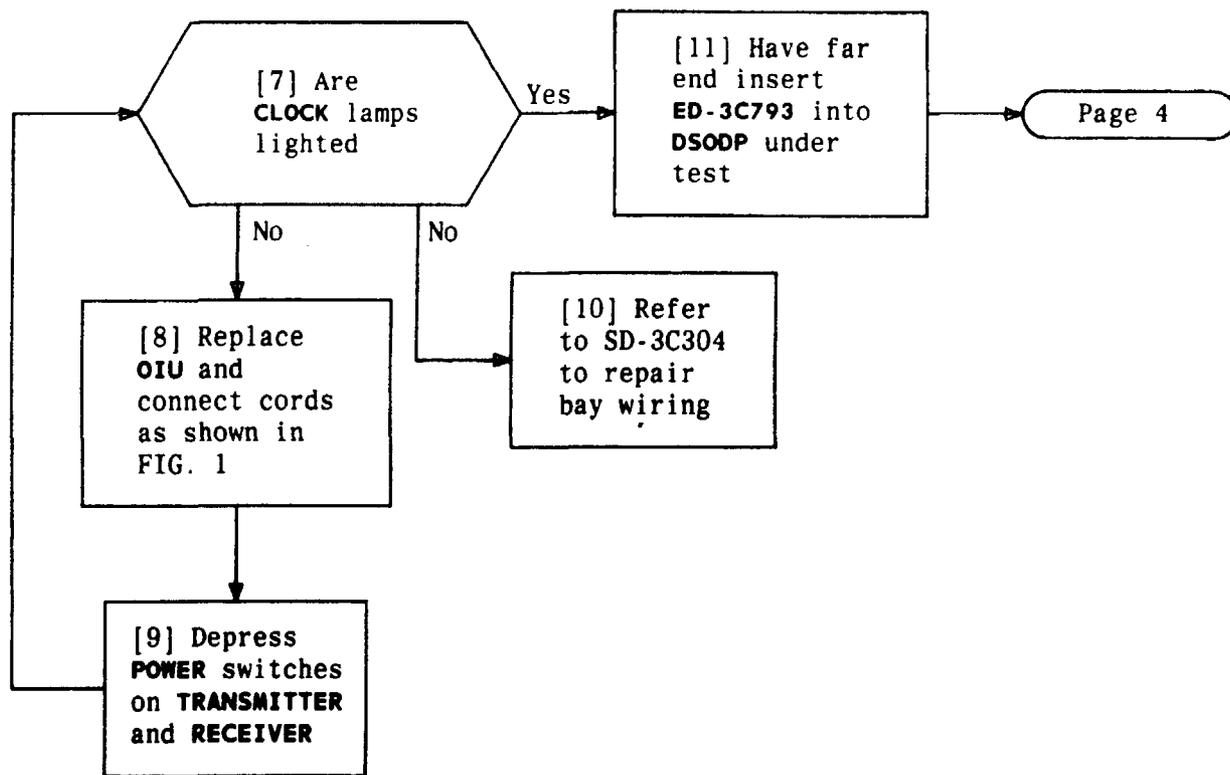


FIG. 1

PERFORM DSODP LOOPBACK TEST FROM DSODP

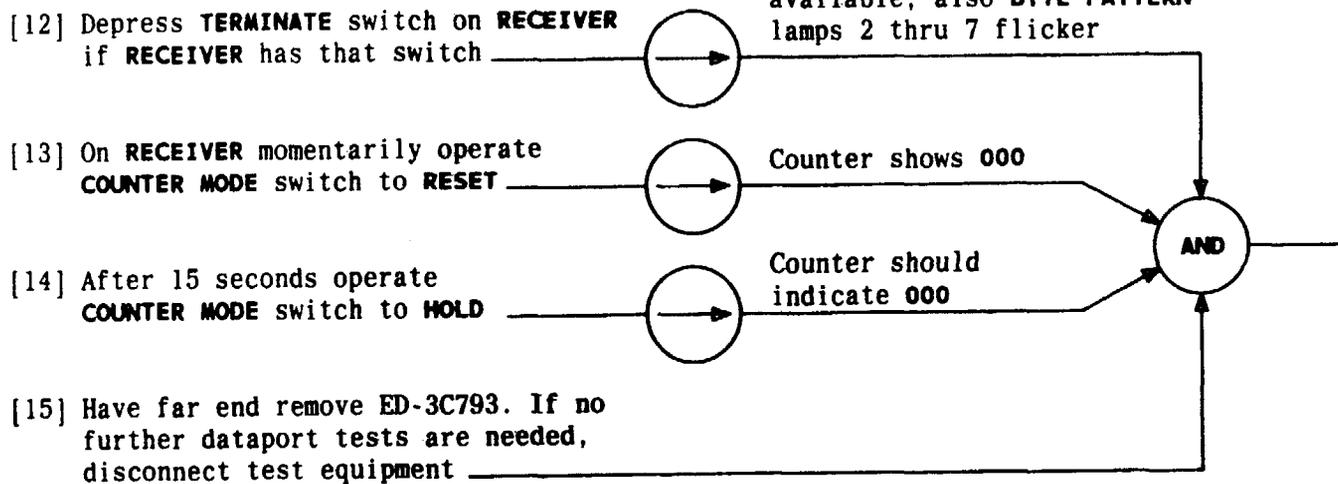
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PERFORM DSODP LOOPBACK TEST FROM DSODP

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TERMINATED lamp lights if available, also **BYTE PATTERN** lamps 2 thru 7 flicker



PERFORM DSODP LOOPBACK TEST FROM DSODP

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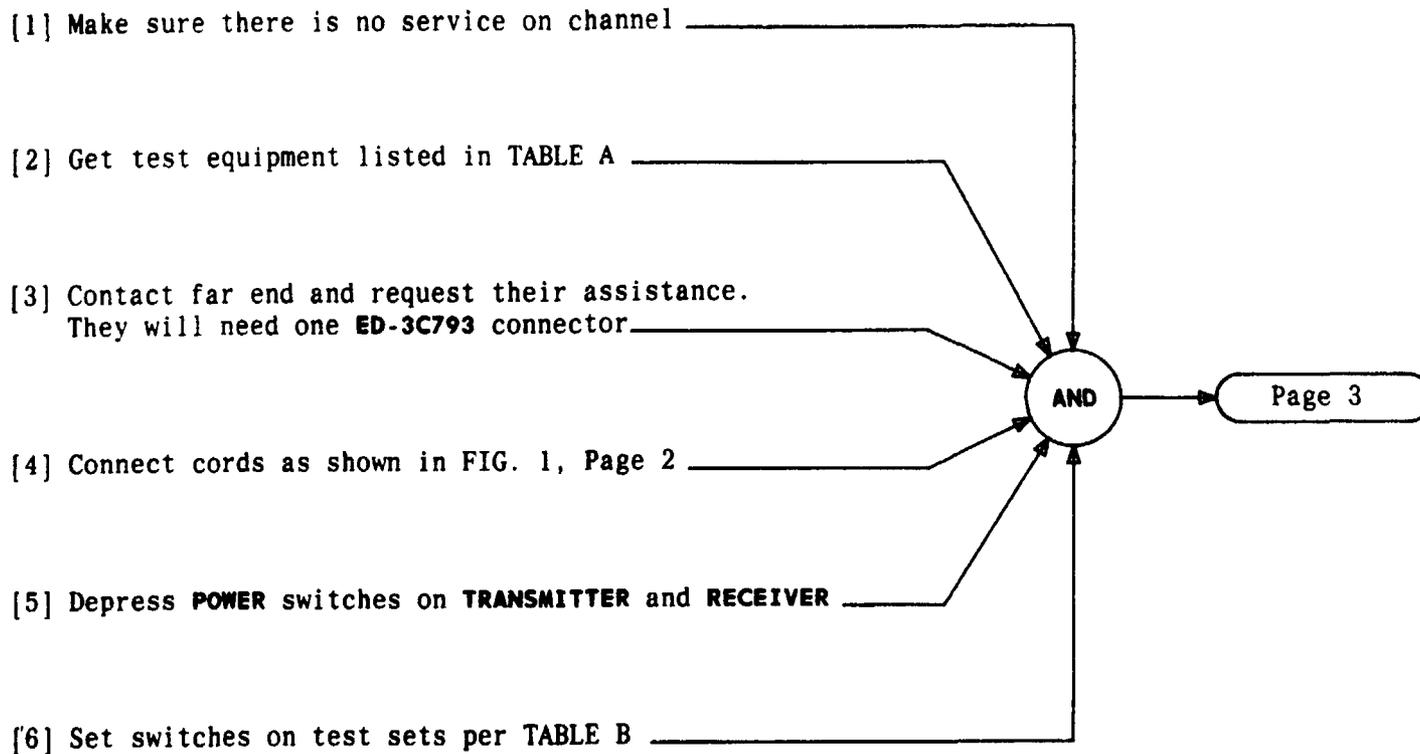


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	9.6	DATA RATE	9.6
OUTPUT FUNCTION	FAR LOGIC 2047	INPUT COUNTER	FAR LOGIC BIT ERRORS
MODE	REPEAT	TEST WORD	2047
		CHANNEL or SUBRATE CHANNEL	SINGLE

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PERFORM DSODP LOOPBACK TEST FROM OCUDP

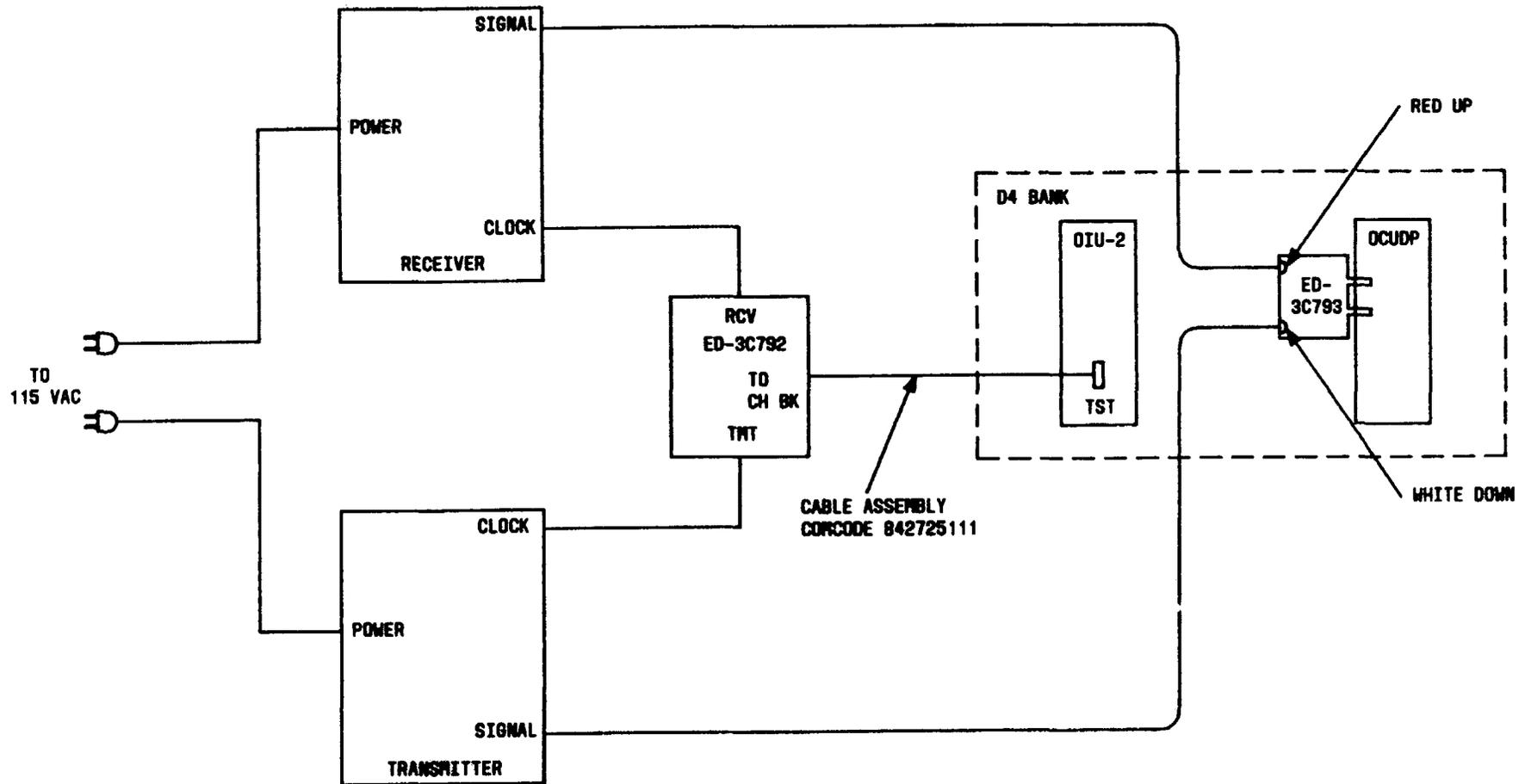
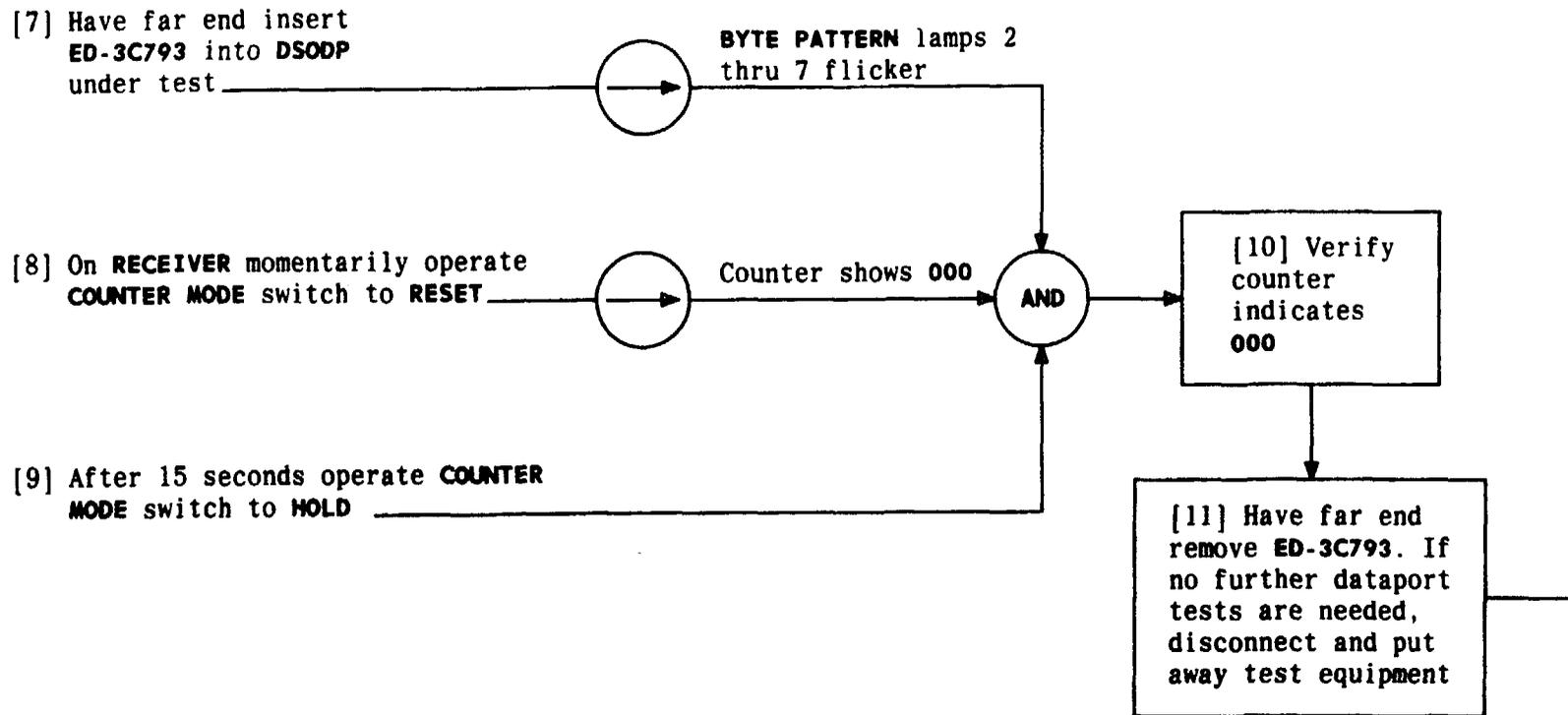


FIG. 1

PERFORM DSODP LOOPBACK TEST FROM OCUDP

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PERFORM DSODP LOOPBACK TEST FROM OCUDP

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[1] Get and condition KS-14510 volt-ohm-milliammeter [DLP-521] or equivalent (may also use KS-20599 digital voltmeter)

[2] Prepare meter to measure up to 5V dc

[3] Connect one meter lead to frame ground and other lead to OIU as shown in FIG. 1

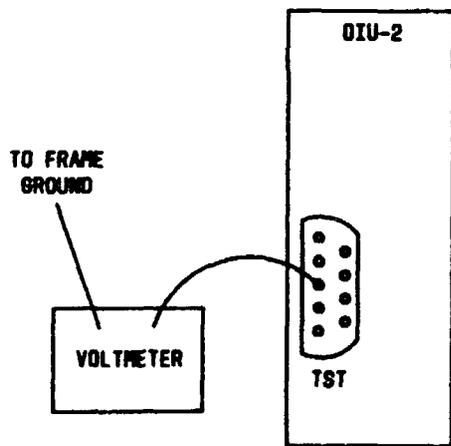
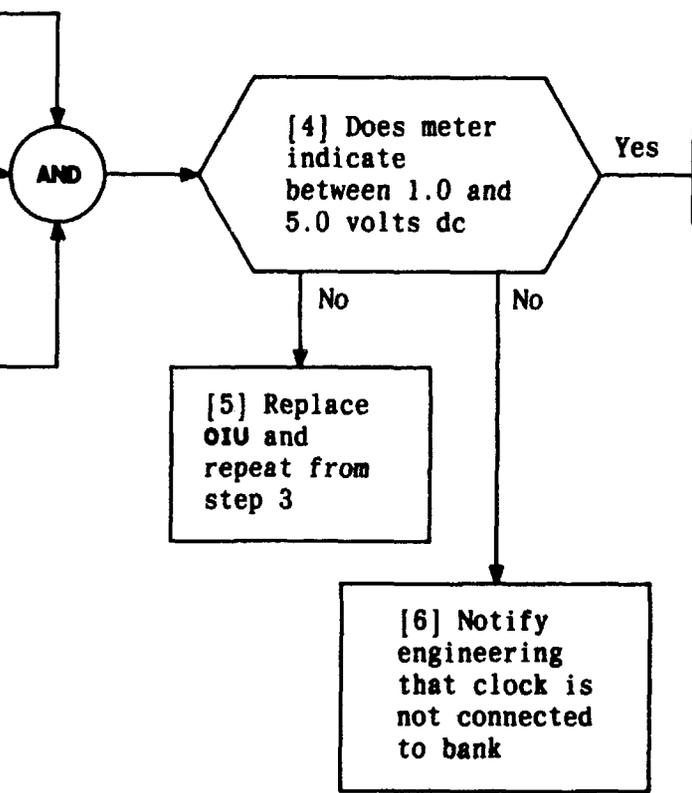


FIG. 1



VERIFY EXTERNAL CLOCK IS PRESENT AT BANK, USING VOLTMETER

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SUMMARY

Make test connections per FIG. 1 and measure noise for requirements per TABLE B.

- [1] Obtain test equipment per TABLE A _____
- [2] Check calibration of CAU [DLP-518] [NOTE 1] _____
- [3] Check calibration of noise measuring set (NMS) [DLP-519] _____
- [4] On NMS set FUNCTION switch to N/M 600/900, NORM-DAMP switch to DAMP, DBRN switch to 85, and weighting network for C-MESSAGE weighting _____
- [5] On PTS-CAU set REJ FLT switch to IN, TEST switch to CHAN LINE, and SEND LEVEL DB switch switch to 0 _____
- [6] Make test connections per FIG. 1 _____
- [7] See TABLE B. Measure for requirements for each position of SEND LEVEL DB switch. NMS DBRN switch must be rotated counterclockwise for on-scale reading each time _____

AND

NMS calibration checked, NMS/PTS switches set, and connections made

[8] Observe NMS for requirements of TABLE B

TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
1 Patch Cord	P6AD
2 Patch Cords	3P6A
1 Patch Cord	3P6D

TABLE B

SWITCH	POSITIONS	REQUIREMENTS
Send level dB on CAU	0	56 dBrnc or less
	10	46 dBrnc or less
	20	36 dBrnc or less
	30	26 dBrnc or less
	40	22 dBrnc or less

NOTE 1

When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble

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PERFORM LOOPED CHANNEL BANK DISTORTION TROUBLE TEST

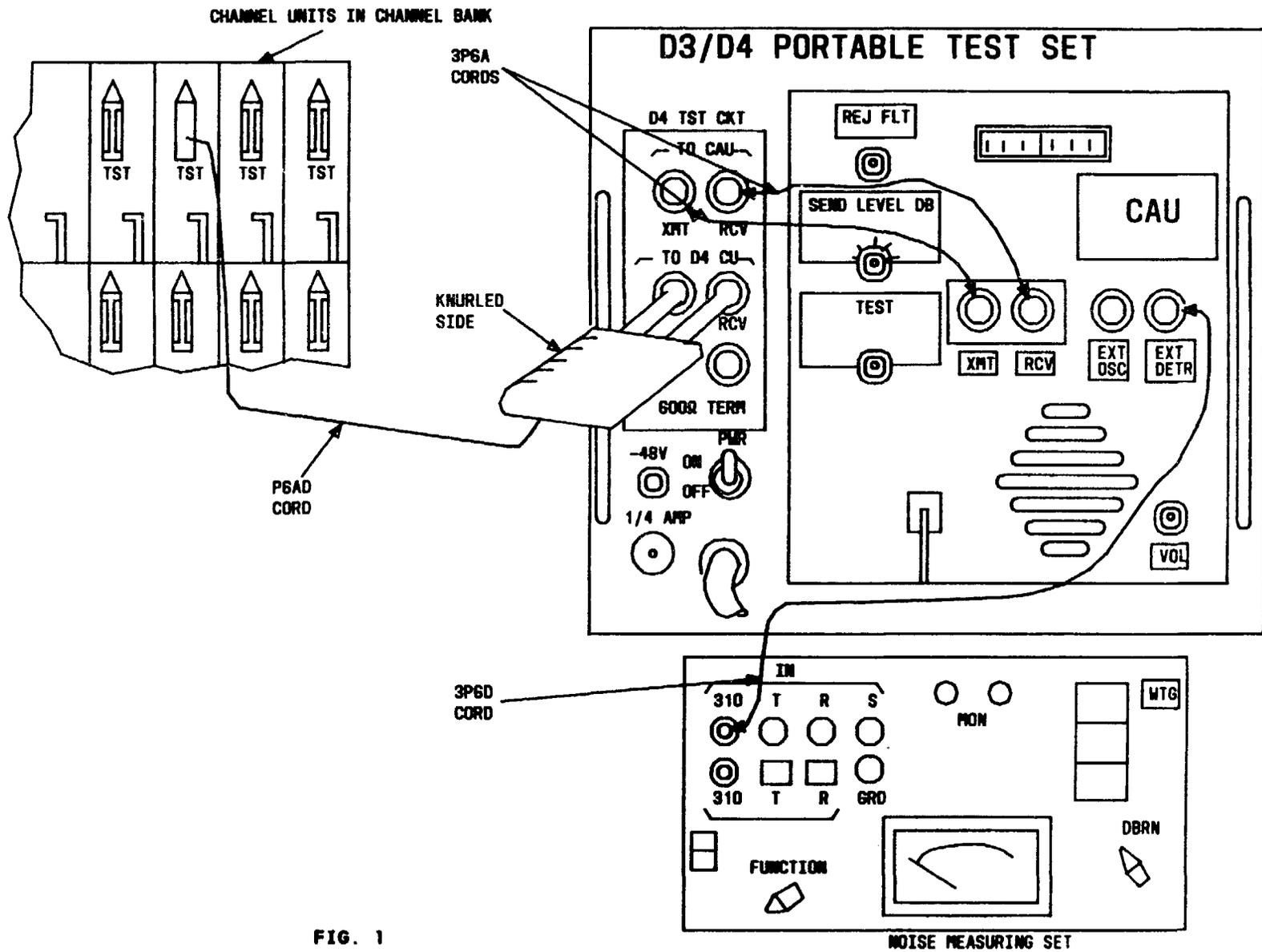


FIG. 1

PERFORM LOOPED CHANNEL BANK DISTORTION TROUBLE TEST

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SUMMARY

Make test connections per FIG. 1. Measure crosstalk on one channel while sending tone into one interfering channel (TABLE B). Then measure again while sending tone into second interfering channel. Requirement is 27 dBrc or less.

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise Measuring Set (NMS)	J94003C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
2 Patch Cords	P6AD
1 Patch Cord	3P6D

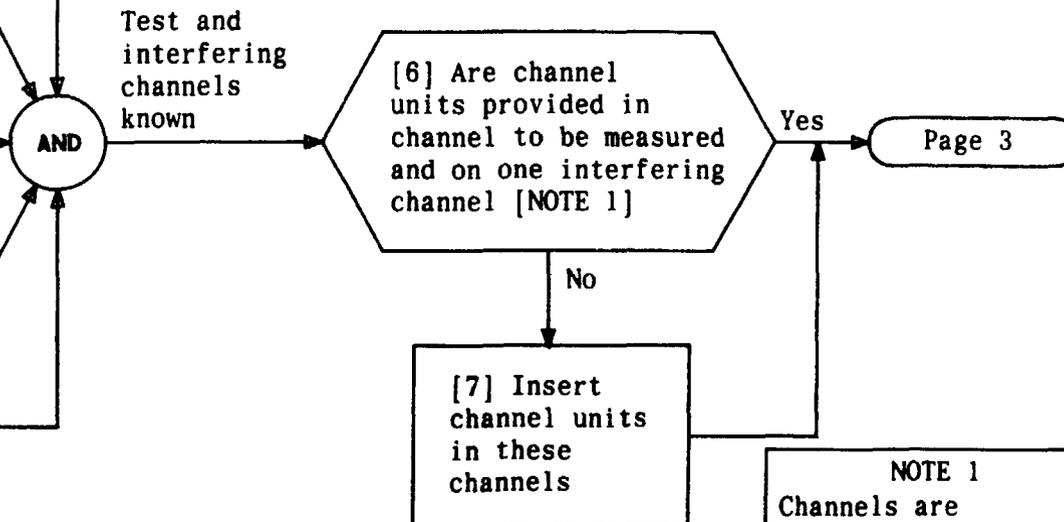
[1] Obtain test equipment per TABLE A

[2] On TPU locate option stamping for digroup to be tested [FIG. 1]

[3] Determine which option (D1D, SEQ, or D2) has been selected by location of white plug

[4] Go to portion of TABLE B for that option and select channel to be measured

[5] Using TABLE B, determine two most likely interfering channels



NOTE 1
Channels are identified by number designations below slots; A or B indicates digroup. Test and interfering channels must be in same digroup

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PERFORM LOOPED CHANNEL BANK CROSSTALK TROUBLE TEST

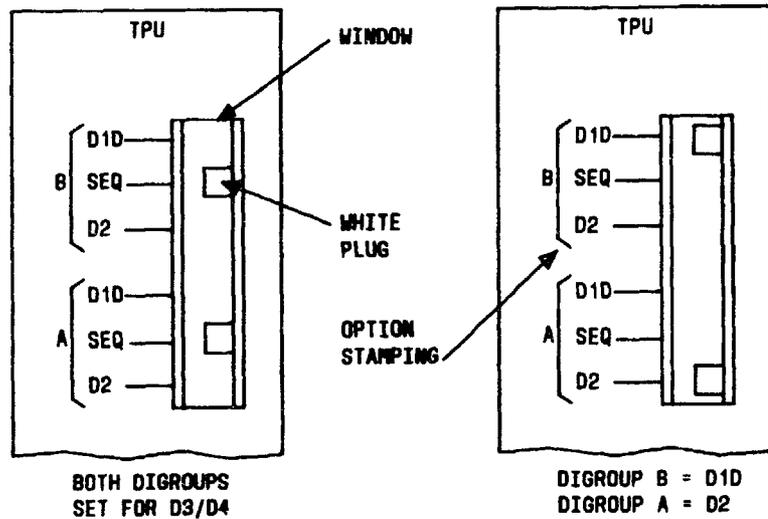


FIG. 1 - Examples

TABLE B						
CHANNEL COUNTING OPTION	CHANNEL TO BE MEASURED (1-12)	MOST LIKELY INTERFERING CHANNELS		CHANNEL TO BE MEASURED (13-24)	MOST LIKELY INTERFERING CHANNELS	
D1D	1	24	12	13	1	24
	2	13	1	14	2	13
	3	14	2	15	3	14
	4	15	3	16	4	15
	5	16	4	17	5	16
	6	17	5	18	6	17
	7	18	6	19	7	18
	8	19	7	20	8	19
	9	20	8	21	9	20
	10	21	9	22	10	21
	11	22	10	23	11	22
	12	23	11	24	12	23
D2	1	13	12	13	12	24
	2	14	11	14	11	23
	3	15	9	15	9	21
	4	16	10	16	10	22
	5	17	1	17	1	13
	6	18	2	18	2	14
	7	19	3	19	3	15
	8	20	4	20	4	16
	9	21	5	21	5	17
	10	22	6	22	6	18
	11	23	7	23	7	19
	12	24	8	24	8	20
D4 OR D3 (SEQ)	1	24	23	13	12	11
	2	1	24	14	13	12
	3	2	1	15	14	13
	4	3	2	16	15	14
	5	4	3	17	16	15
	6	5	4	18	17	16
	7	6	5	19	18	17
	8	7	6	20	19	18
	9	8	7	21	20	19
	10	9	8	22	21	20
	11	10	9	23	22	21
	12	11	10	24	23	22

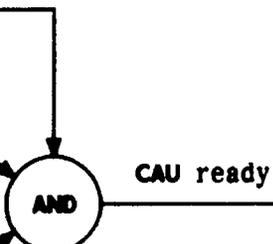
On CAU:

[8] Check calibration of CAU [DLP-518] [NOTE 2]

[9] Set TEST switch to CHAN LINE

[10] Set REJ FLT switch to OUT

[11] Set SEND LEVEL switch to 0



On NMS:

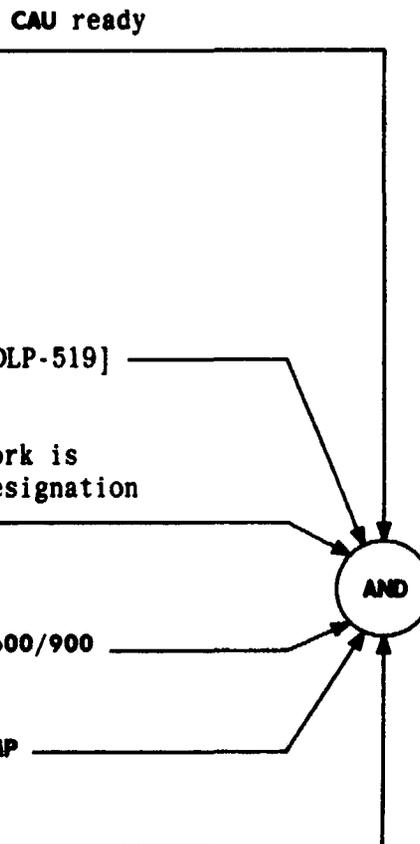
[12] Check calibration of NMS [DLP-519]

[13] Verify that weighting network is installed with C-MESSAGE designation aligned with WTG

[14] Set FUNCTION switch to NM 600/900

[15] Set NORM-DAMP switch to DAMP

[16] Set DBRN switch to 50



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NOTE 2
When using CAU for a series of tests, the calibration requires checking only once unless CAU is suspected of causing trouble

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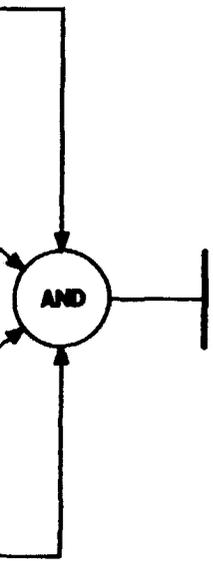
PERFORM LOOPED CHANNEL BANK CROSSTALK TROUBLE TEST

[17] Make test connections per FIG. 2, Page 5. Connect to channel to be measured and connect to one interfering channel [TABLE B, Page 2]

[18] Rotate DBRN switch on NMS counterclockwise for on-scale reading

[19] Observe NMS for level of 27 dBrnc or less

[20] Connect to other interfering channel and observe NMS for level of 27 dBrnc or less



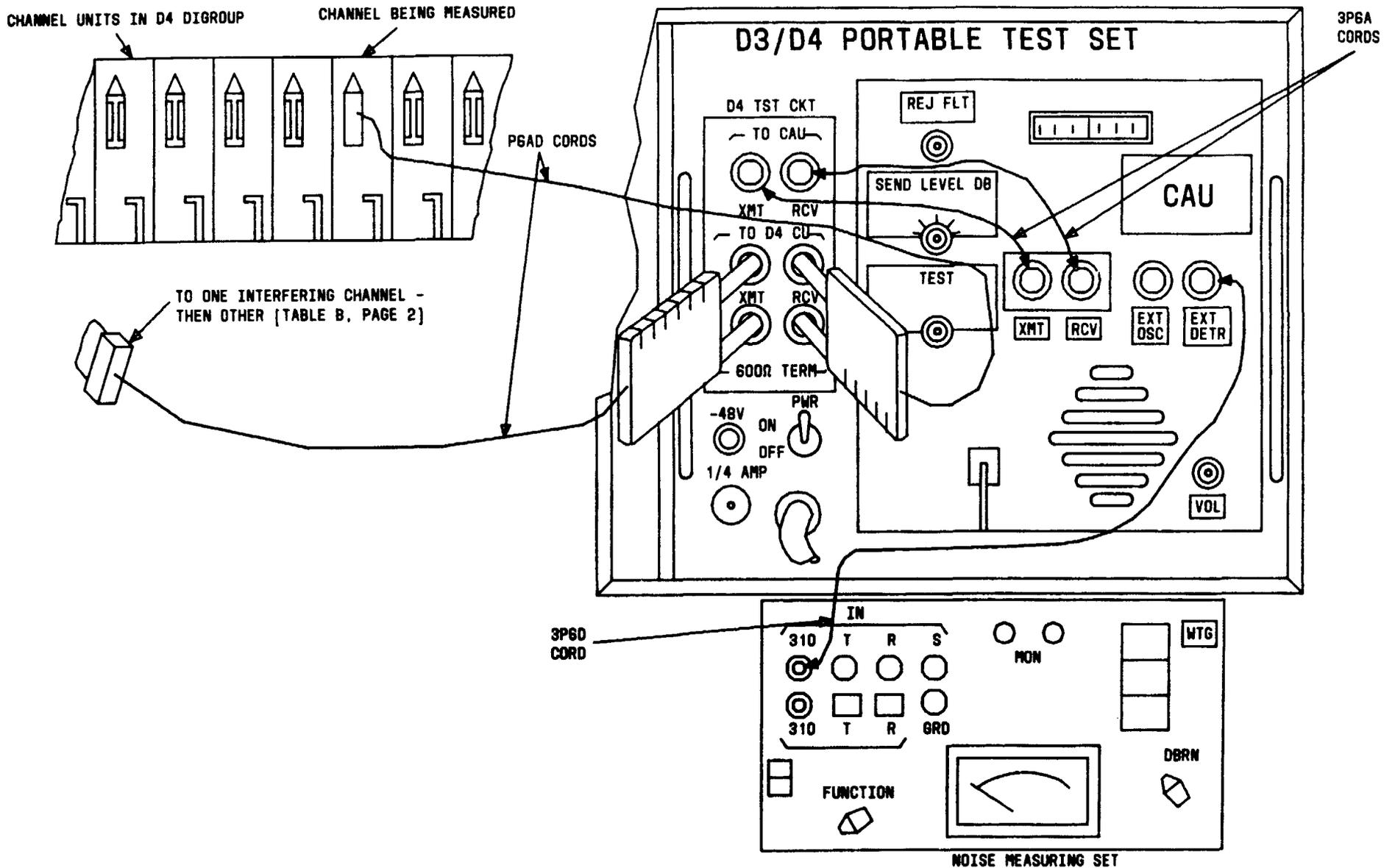


FIG. 2

PERFORM LOOPED CHANNEL BANK CROSSTALK TROUBLE TEST

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SUMMARY

Make test connections per FIG. 1. Insert pin plug into **R CODE** on **RU** to test receiver gain. **CAU** must indicate in black area for receiver gain or green-black-green area for net loss

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
2 Patch Cords	3P6A
1 Patch Cord	P6AD
Pin Plug	KS-19531

[1] Obtain test equipment per TABLE A

[2] Check calibration of **CAU** [DLP-518]
[NOTE 1]

[3] On **CAU** set **TEST** to **CHAN LINE** and **REJ FLT** to **OUT**

[4] Make test connections per FIG. 1

[5] On **CAU** set **SEND LEVEL DB** switch to **OFF**

[6] At digroup to be tested, test receiver gain by inserting pin plug into **R CODE** jack on **RU** and depress **ACO** on **ACU**

RCV lamp lights

AND

[7] Observe **CAU** for indication in black area

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NOTE 1
When using **CAU** for a series of tests, the calibration requires checking only once unless **CAU** is suspected of causing trouble

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PERFORM LOOPED CHANNEL BANK RECEIVER GAIN AND NET LOSS TROUBLE TEST

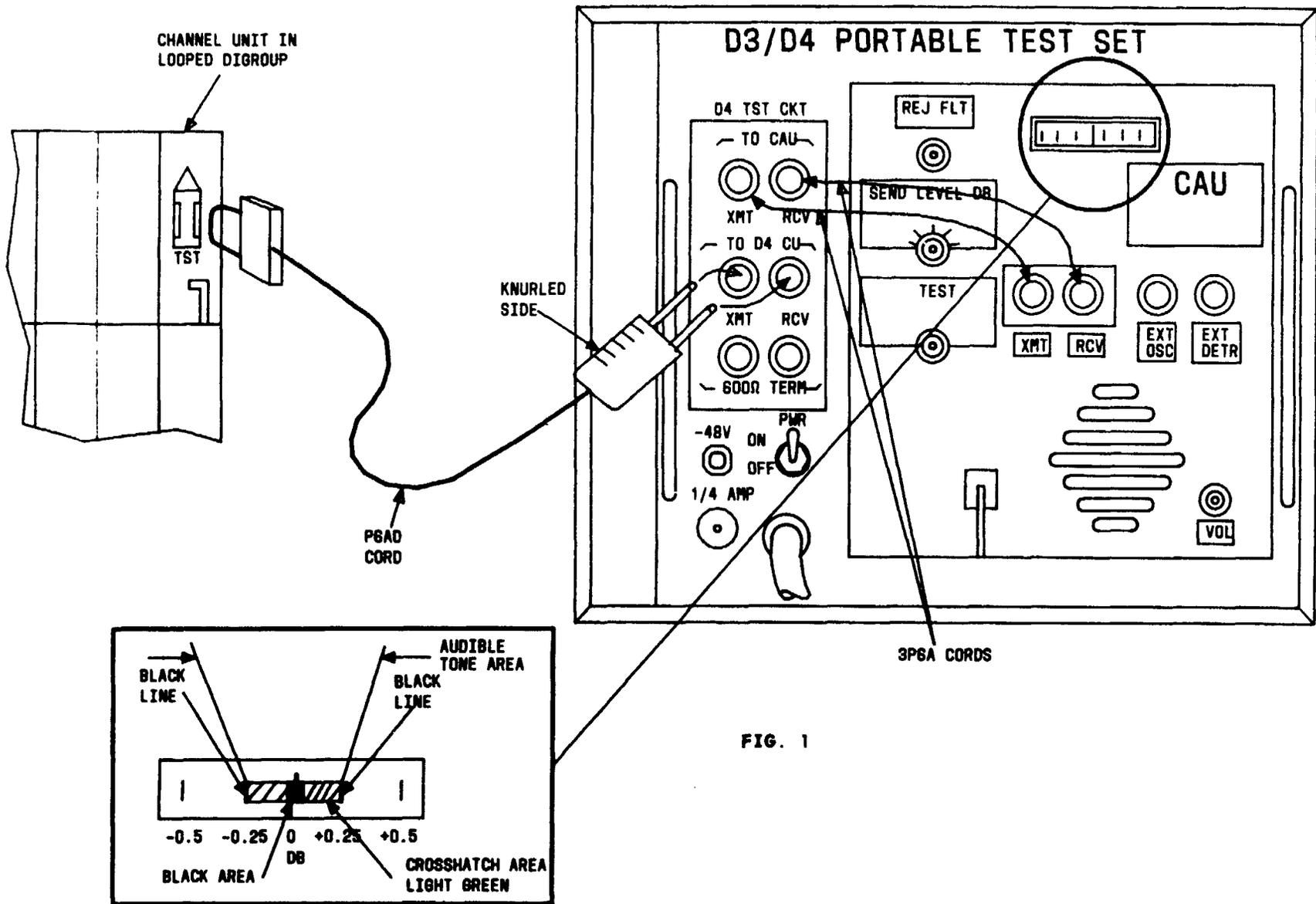
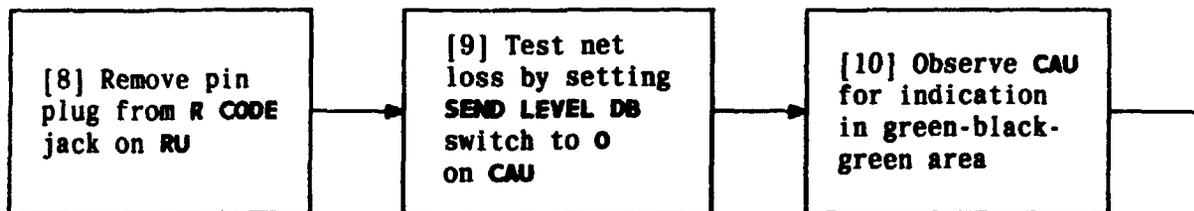


FIG. 1

PERFORM LOOPED CHANNEL BANK RECEIVER GAIN AND NET LOSS TROUBLE TEST

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PERFORM LOOPED CHANNEL BANK RECEIVER GAIN AND NET LOSS TROUBLE TEST

NOTE 2	
All transmission tests can be performed on looped bank before removing connections	
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SUMMARY

Make test connections per FIG. 1. Verify that test equipment is connected at other office for channel being

tested. Requirements are 1 count in 5 minutes at 63 dBrnc and no more than 5 counts at 58 dBrnc. Verify that test indications at other office are within specified limits.

[1] Get test equipment per TABLE A

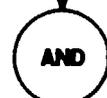
[2] On D3/D4 PTS, set switches as follows:
REJ FLT to **OUT**
SEND LEVEL to **OFF**
TEST to **CHAN LINE**

[3] Check calibrations of impulse set [DLP-522]

[4] Set test set switches as follows:
DIAL-MEAS to **MEAS**
IMPULSES ABOVE DBRN to **63**

[5] Make test connections per FIG. 1

6H impulse counter calibrated and switches set on D3/D4-PTS



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TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) with Channel Access Unit (CAU)	J98718AL (PTS) J98718AJ (CAU)
Impulse Counter	J94006H
3 Patch Cords	3P6A
1 Patch Cord	P6AD

PERFORM LOOPED IMPULSE NOISE TROUBLE TEST

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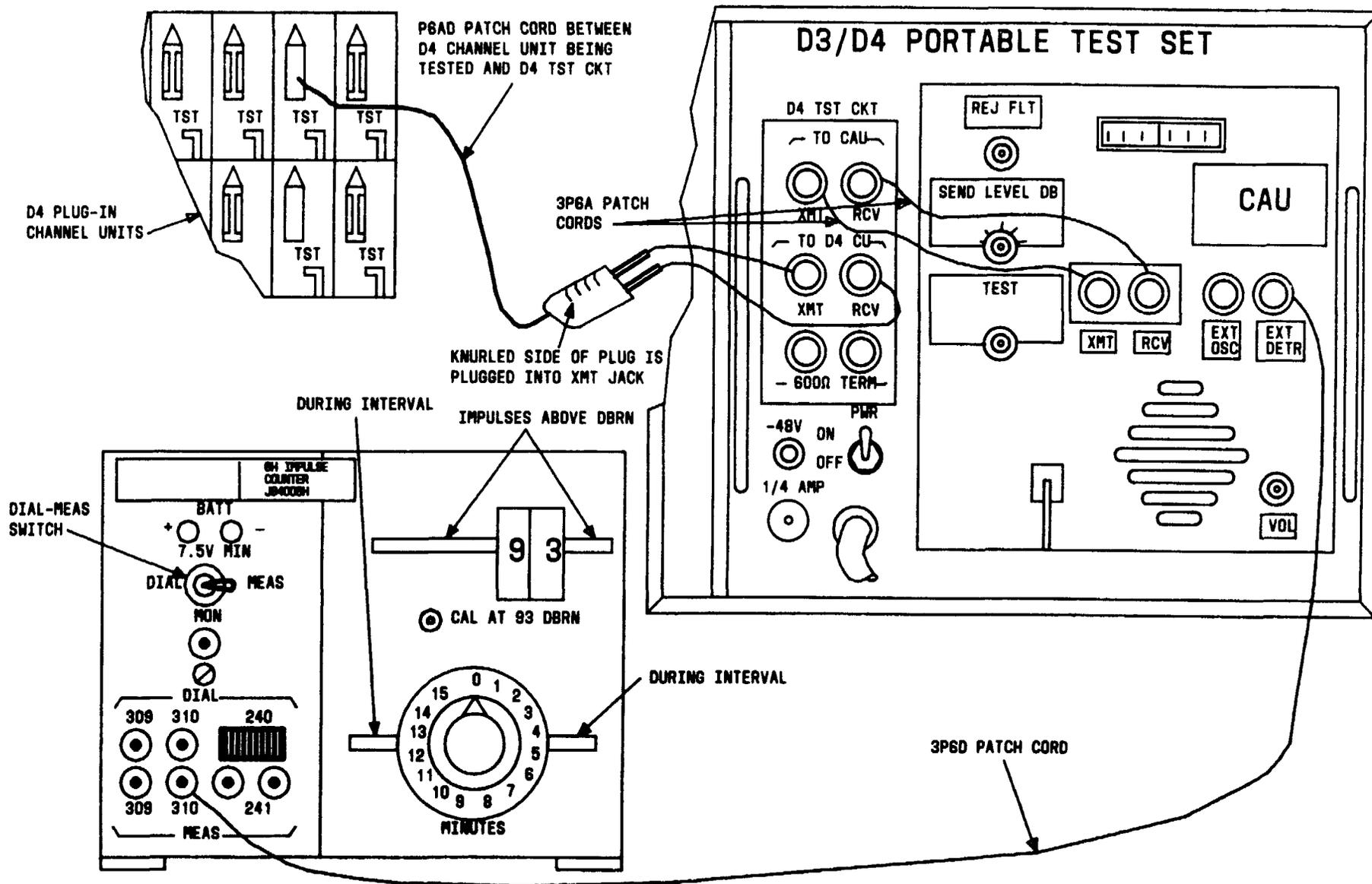
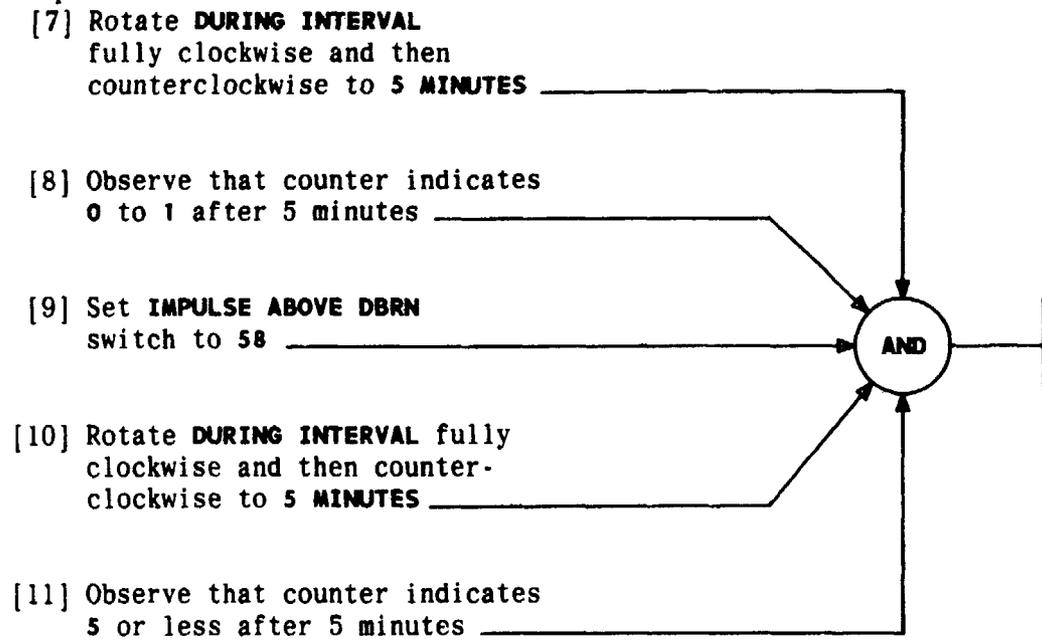


FIG. 1

PERFORM LOOPED IMPULSE NOISE TROUBLE TEST

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On 6H Impulse Counter:



PERFORM LOOPED IMPULSE NOISE TROUBLE TEST

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SUMMARY

Make test connections per FIG. 1 and measure noise. Level should be 23 dBrc or less

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003 C
D3/D4 PORTABLE TEST SET (PTS) With Channel Access Unit (CAU)	J98718AL PTS J98718AJ CAU
1 Patch Cord	P6AD
2 Patch Cords	3P6A
1 Patch Cord for NMS	3P6D

[1] Get test equipment per TABLE A

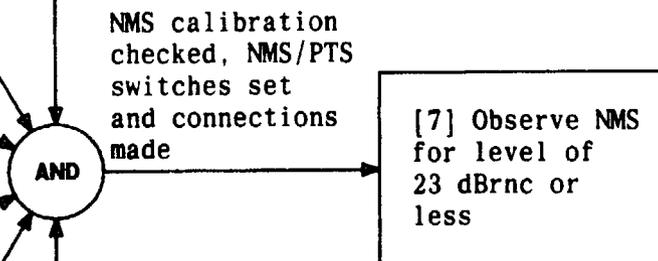
[2] Check calibration of noise measuring set (NMS) [DLP-519]

[3] Make test connections per Fig. 1

[4] On PTS-CAU set REJ FLT switch to OUT, SEND LEVEL DB to OFF, and TEST switch to CHAN LINE

[5] On NMS, set FUNCTION switch NM 600/900, NORM-DAMP switch to DAMP, DBRN switch to 85, and weighting network so that C-MESSAGE is aligned with WTG

[6] On NMS rotate DBRN switch counterclockwise for on-scale reading



[7] Observe NMS for level of 23 dBrc or less

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PERFORM LOOPED IDLE CIRCUIT NOISE TROUBLE TEST

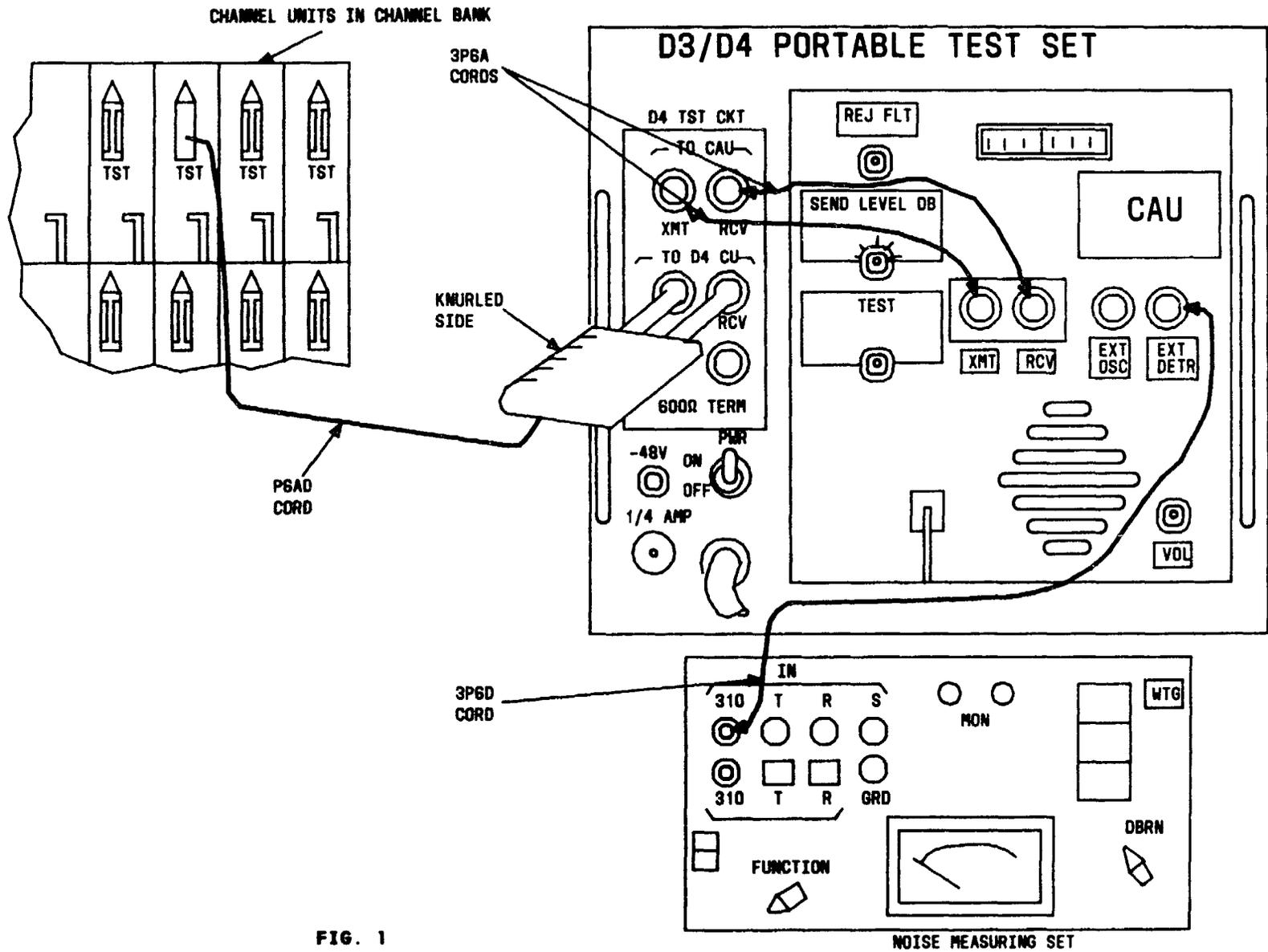


FIG. 1

PERFORM LOOPED IDLE CIRCUIT NOISE TROUBLE TEST

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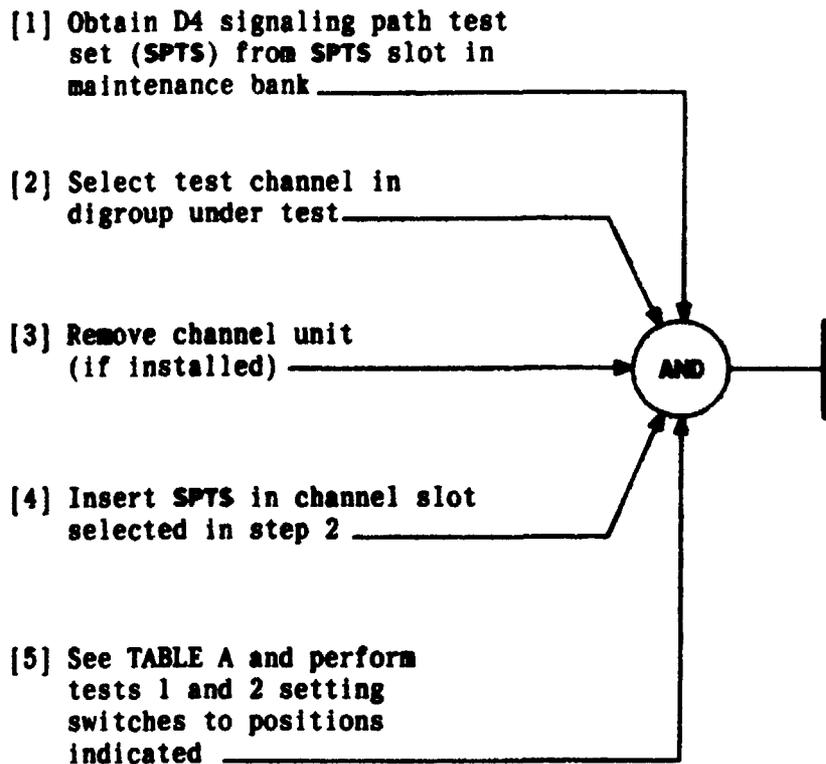


TABLE A			
TEST	SWITCH	POSITION	LAMPS LIGHTED
1	A B	1 0	A only
2	A B	0 1	B only

PERFORM LOOPED SIGNALING TROUBLE TEST

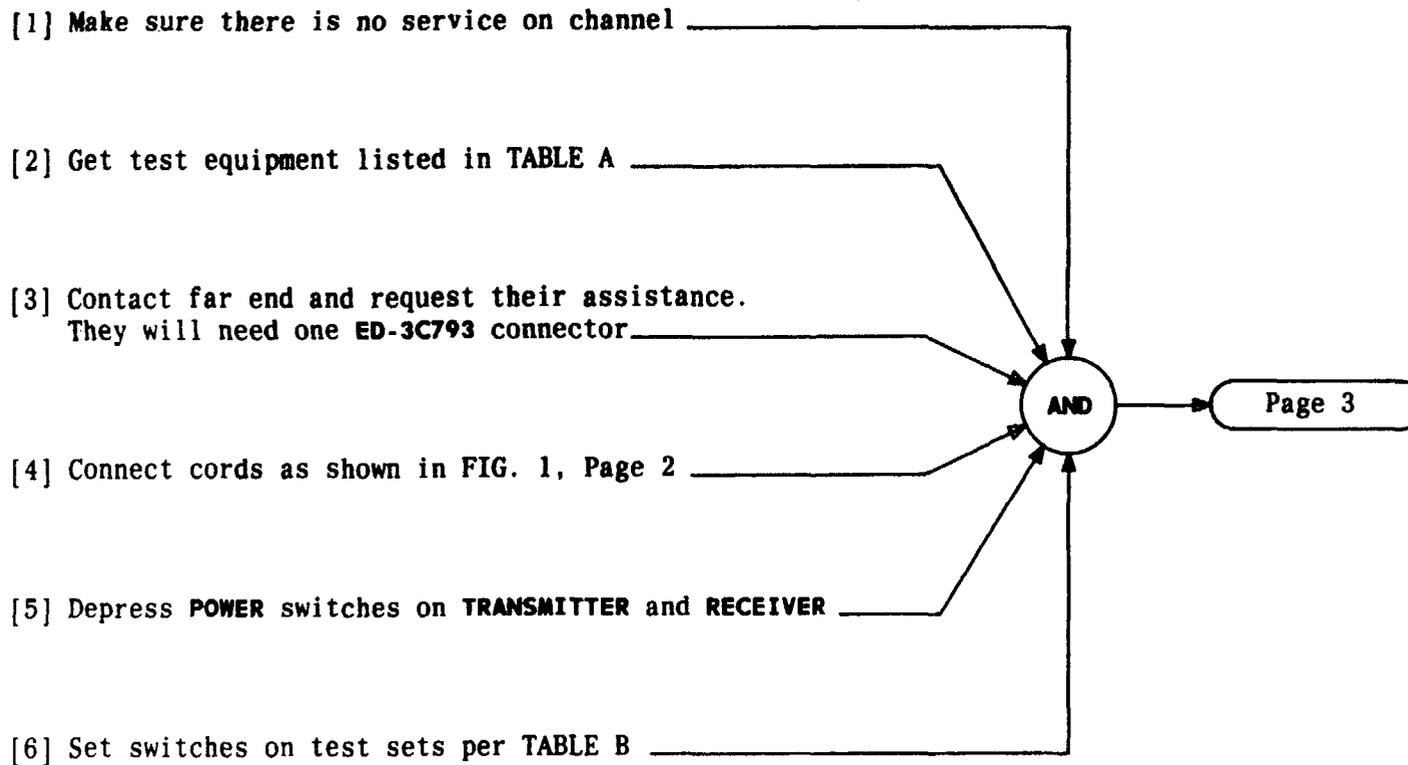


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
CABLE ASSEMBLY	COMCODE 842725111
LOOPBACK CONNECTOR	ED-3C793

TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	9.6	DATA RATE	9.6
OUTPUT	FAR LOGIC	INPUT	FAR LOGIC
FUNCTION	2047	COUNTER	BIT ERRORS
		TEST WORD	2047
MODE	REPEAT	CHANNEL or SUBRATE CHANNEL	SINGLE

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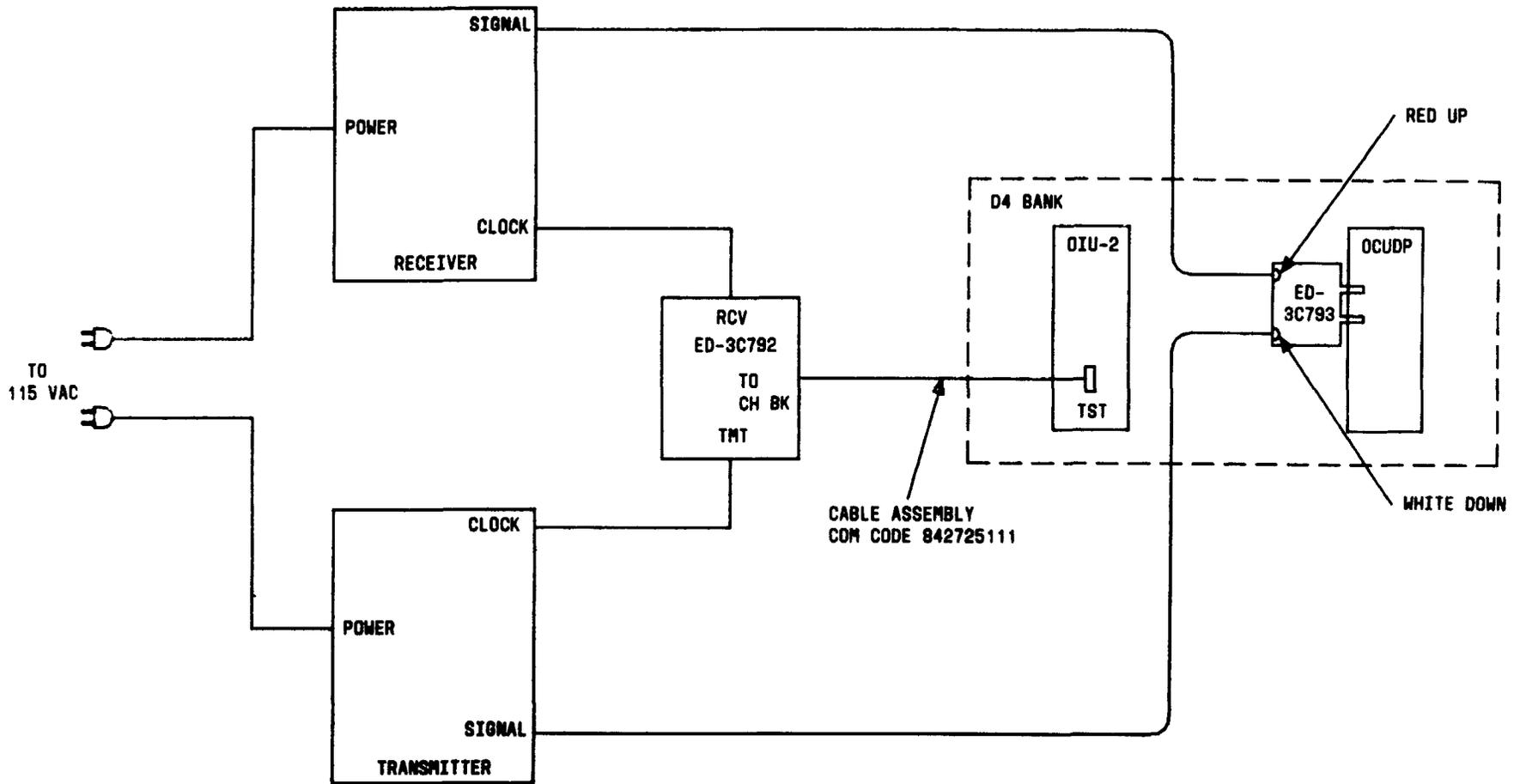
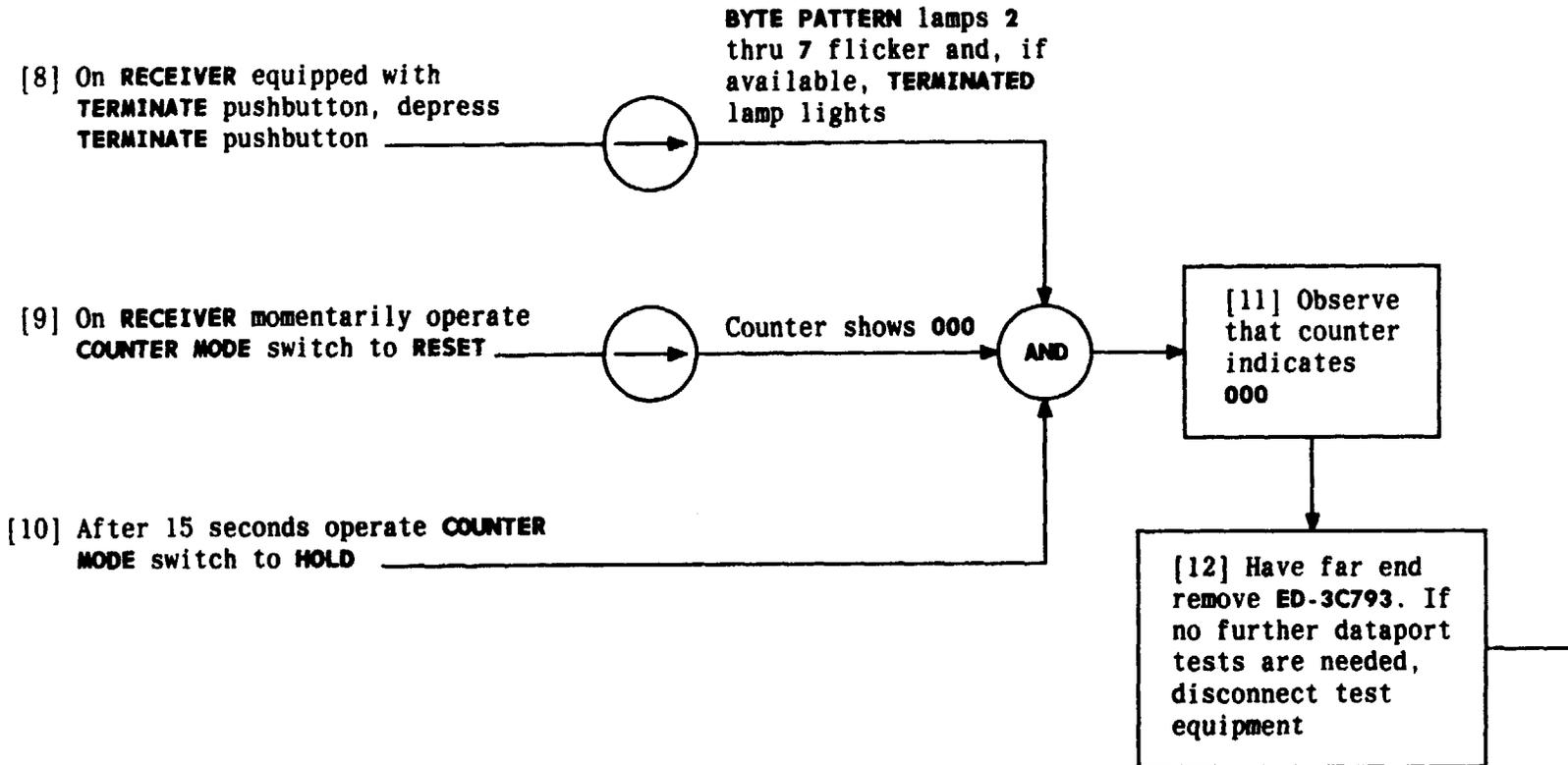


FIG. 1

PERFORM LOOPED D4 CHANNEL BANK TEST FROM OCUDP

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PERFORM LOOPED D4 CHANNEL BANK TEST FROM OCUDP

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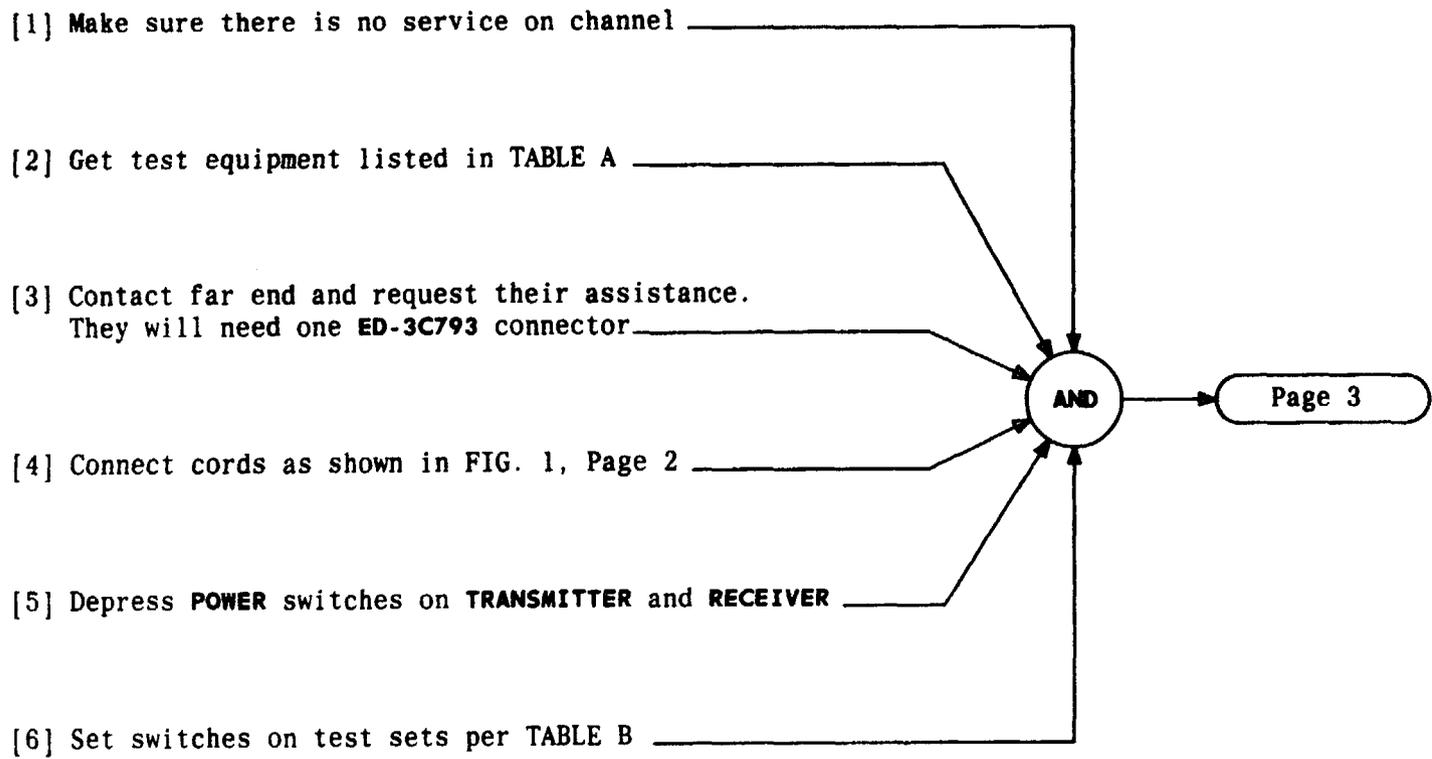


TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
D3/D4 DATAPORT TEST INTERFACE UNIT	ED-3C792
CABLE ASSEMBLY	COMCODE 842725111
LOOPBACK CONNECTOR	ED-3C793

TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
DATA RATE	9.6	DATA RATE	9.6
OUTPUT FUNCTION	BIPOLAR LOOPBACK TESTS	INPUT COUNTER	BIPOLAR BIT ERRORS
MODE	REPEAT	TEST WORD	LOOPED
		CHANNEL or SUBRATE CHANNEL	SINGLE

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PERFORM LOOPED D4 CHANNEL BANK TEST FROM DSODP

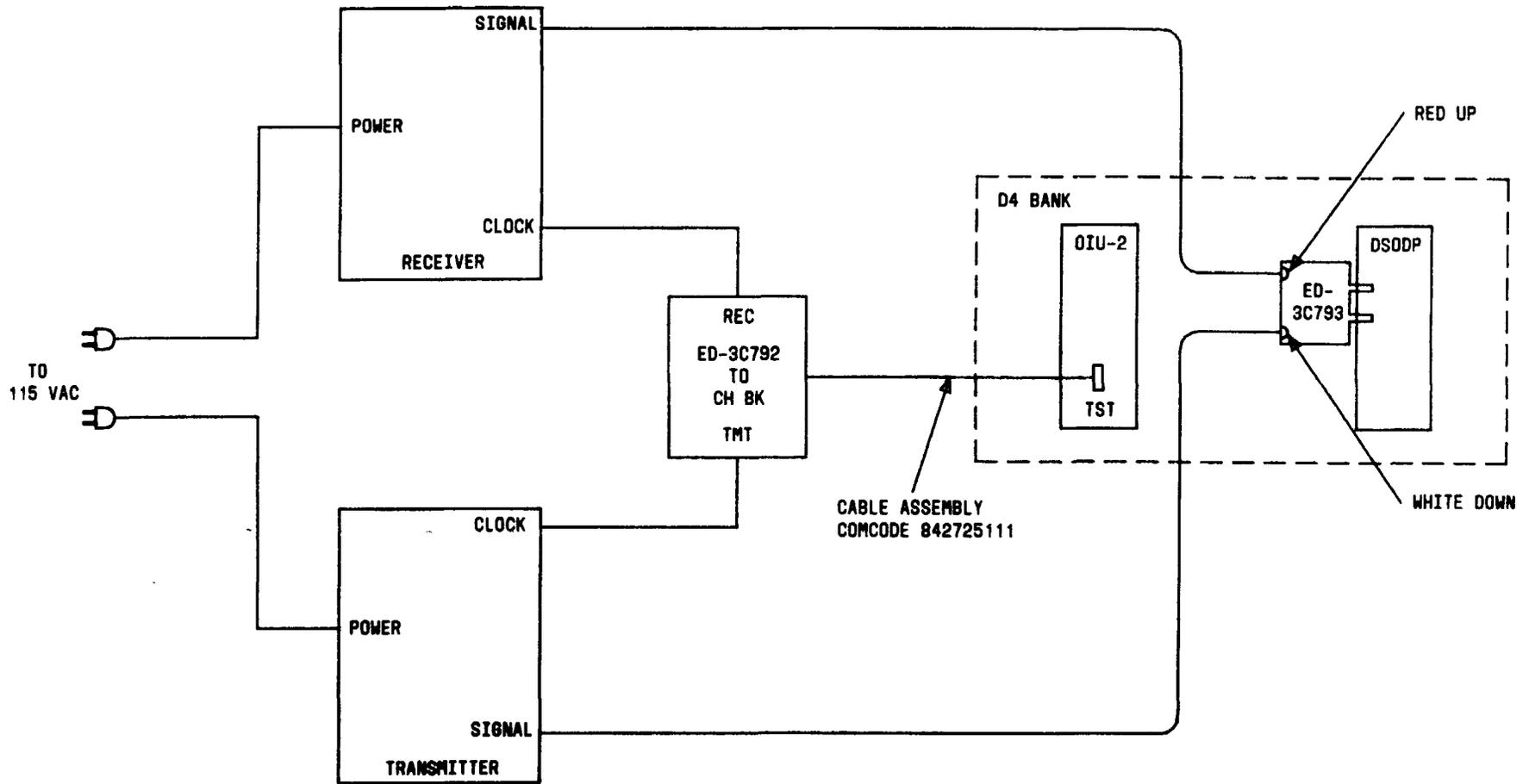
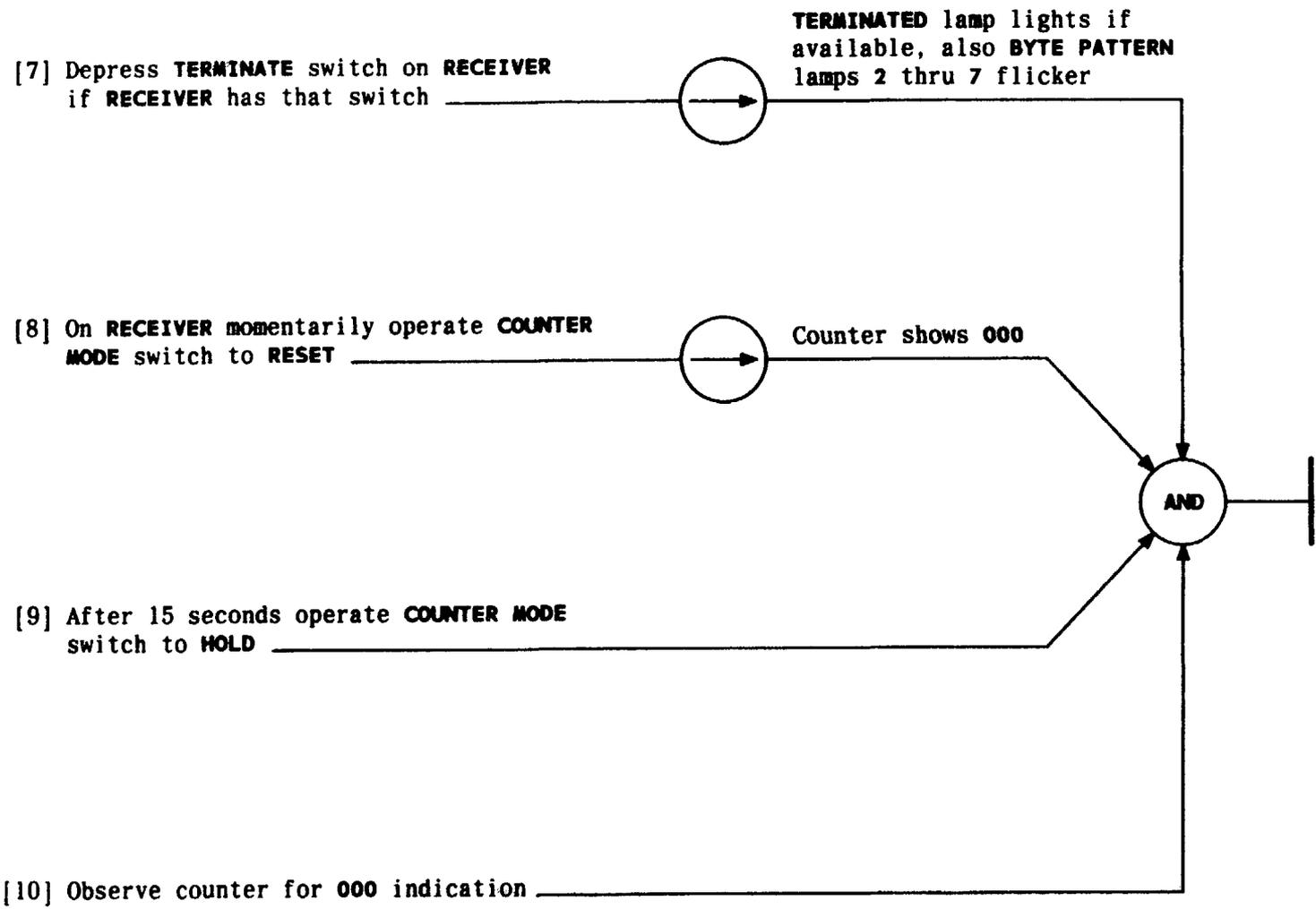


FIG. 1

PERFORM LOOPED D4 CHANNEL BANK TEST FROM DSODP

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PERFORM LOOPED D4 CHANNEL BANK TEST FROM DSODP

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DECAL LOCATED
ON BACK OF
FACEPLATE

MODE SELECT		
M1	M2	
0	0	EC: D4
0	1	EC: SLC-96, MODE II
1	0	NON EC: D4, SLC-96 MODE I, III
1	1	EC: SLC-96, MODE I, III

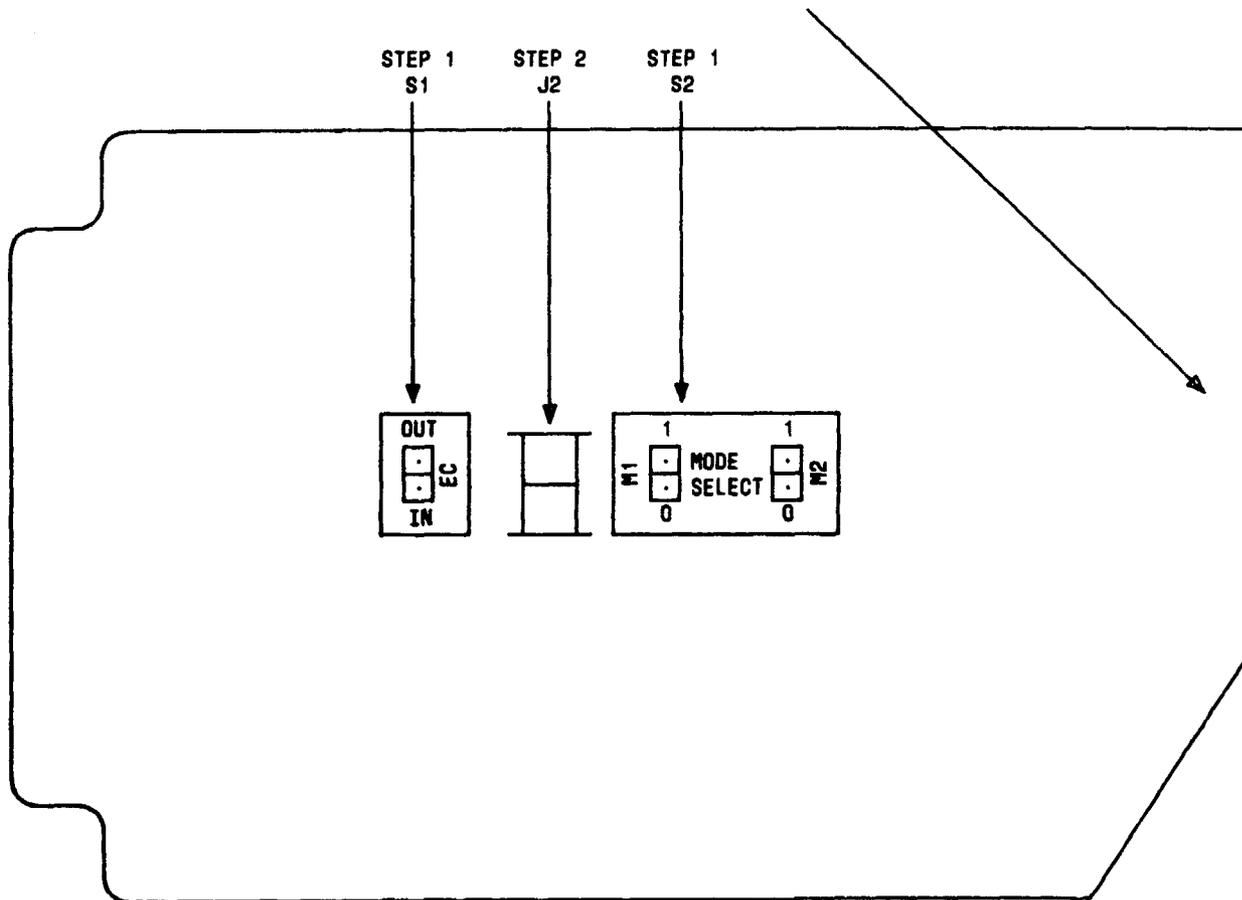


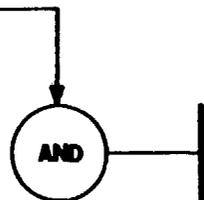
FIG. 1

SET OPTIONS - DSODP 56KB CHANNEL UNIT (J98726DD)

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[1] From information in office records,
 set rocker switches S1 (EC IN/OUT)
 and S2 (MODE SELECT M1/M2).
 [See FIG. 1 and 2]



[2] From information in office records,
 set plug option J2 (EC IN/OUT).
 See NOTES 1 and 2 and DLP-566

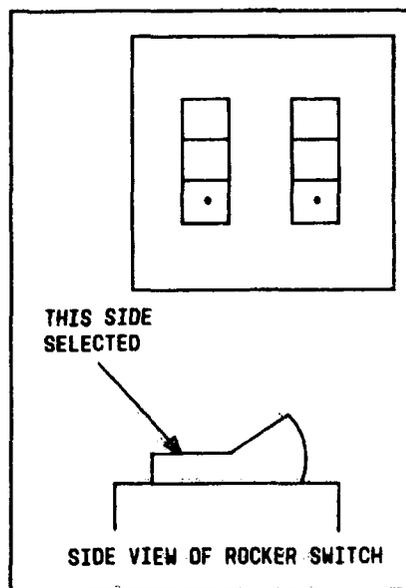


FIG. 2

NOTES

1. On early versions of channel unit J2 (EC IN/OUT) will be factory wired option.
2. Plug should be in top (white showing) for EC IN and in bottom (black showing) for EC OUT

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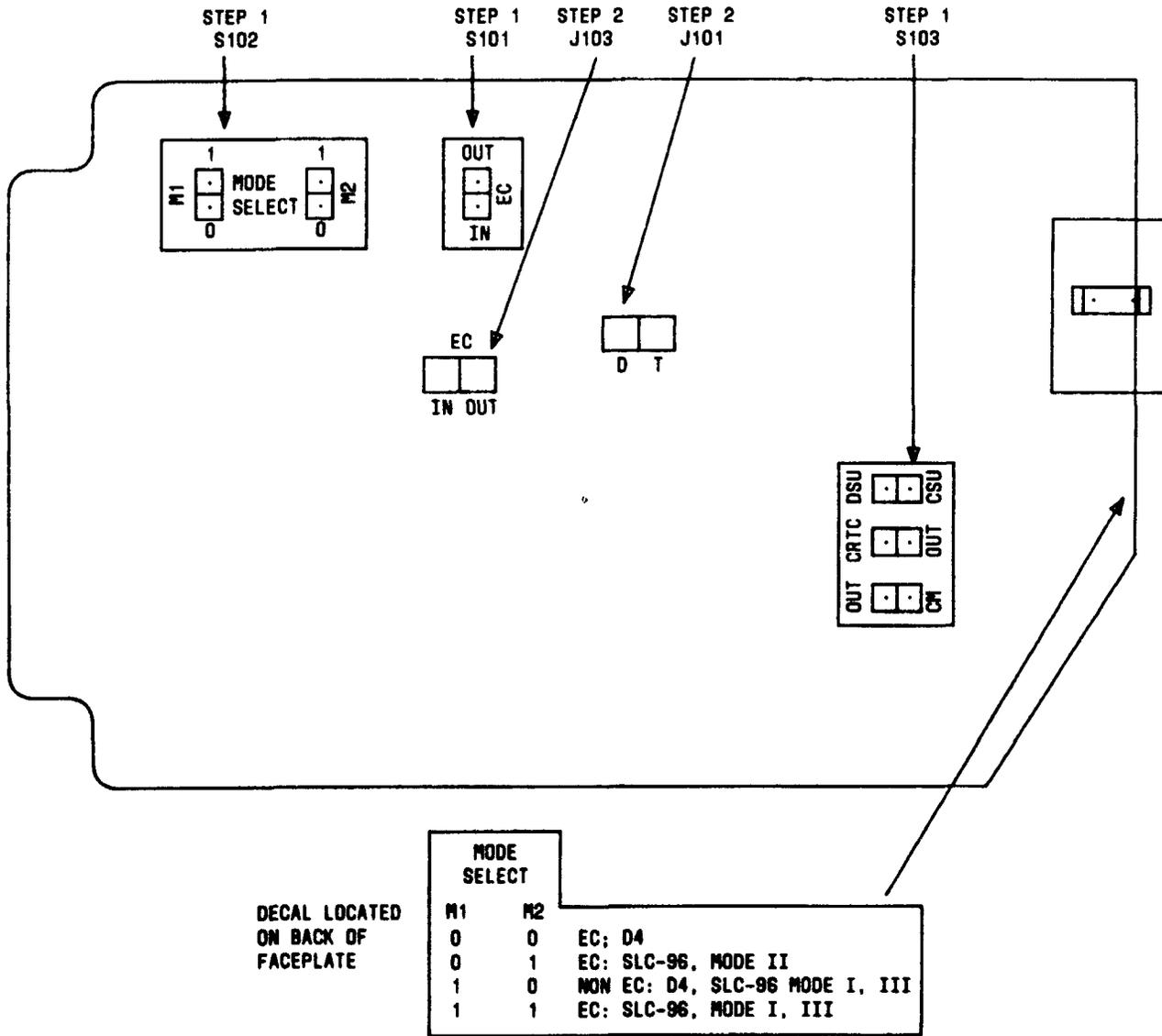


FIG. 1

SET OPTIONS – OCUDP 56KB CHANNEL UNIT (J98726DE)

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[1] From information in office records,
set rocker switches listed in TABLE A.
See FIG. 1 and 2

[2] From information in office records,
set plug options J101 D/T and
J103 EC - IN/OUT. See NOTE 1, FIG. 1,
and DLP-566

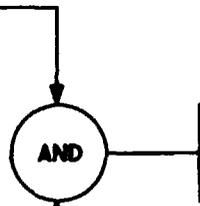


TABLE A		
SWITCH	NAME	POSITIONS
S101	EC	IN/OUT
S102	MODE SELECT	
	M1	I/O
	M2	I/O
S103* (3 switches)		DSU/CSU CRTC/OUT OUT/CM
* S103 will not exist on later units		

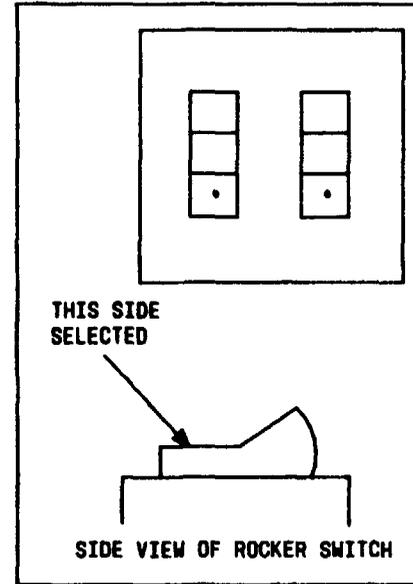


FIG. 2

NOTE 1	
J103 (EC - IN/OUT) will be factory wired option on early versions of channel unit	
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SUMMARY

Make test connections per FIG. 1, Page 2. Verify that test equipment is connected at other office for channel being tested. Requirements are no more than 1 count in 5 minutes

at 63 dBrnc and no more than 5 counts at 58 dBrnc. Verify that test indications at other office are within specified limits

[1] Get test equipment per TABLE A

[2] On D3/D4 PTS, set switches as follows:
REJ FLT to **OUT**
SEND LEVEL to **OFF**
TEST to **CHAN LINE**

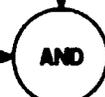
[3] Check calibration of impulse counter [DLP-522]

[4] Set test set switches on Impulse Counter as follows:
DIAL-MEAS to **MEAS**
IMPULSES ABOVE DBRN to **63**

[5] Make test connections per FIG. 1

[6] Verify that test equipment is connected at other end

6H impulse counter calibrated and switches set on D3/D4 PTS



Page 3

TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) with Channel Access Unit (CAU)	J98718AL (PTS) J98718AJ (CAU)
Impulse Counter	J94006H
3 Patch Cords	3P6A
1 Patch Cord	P6AD

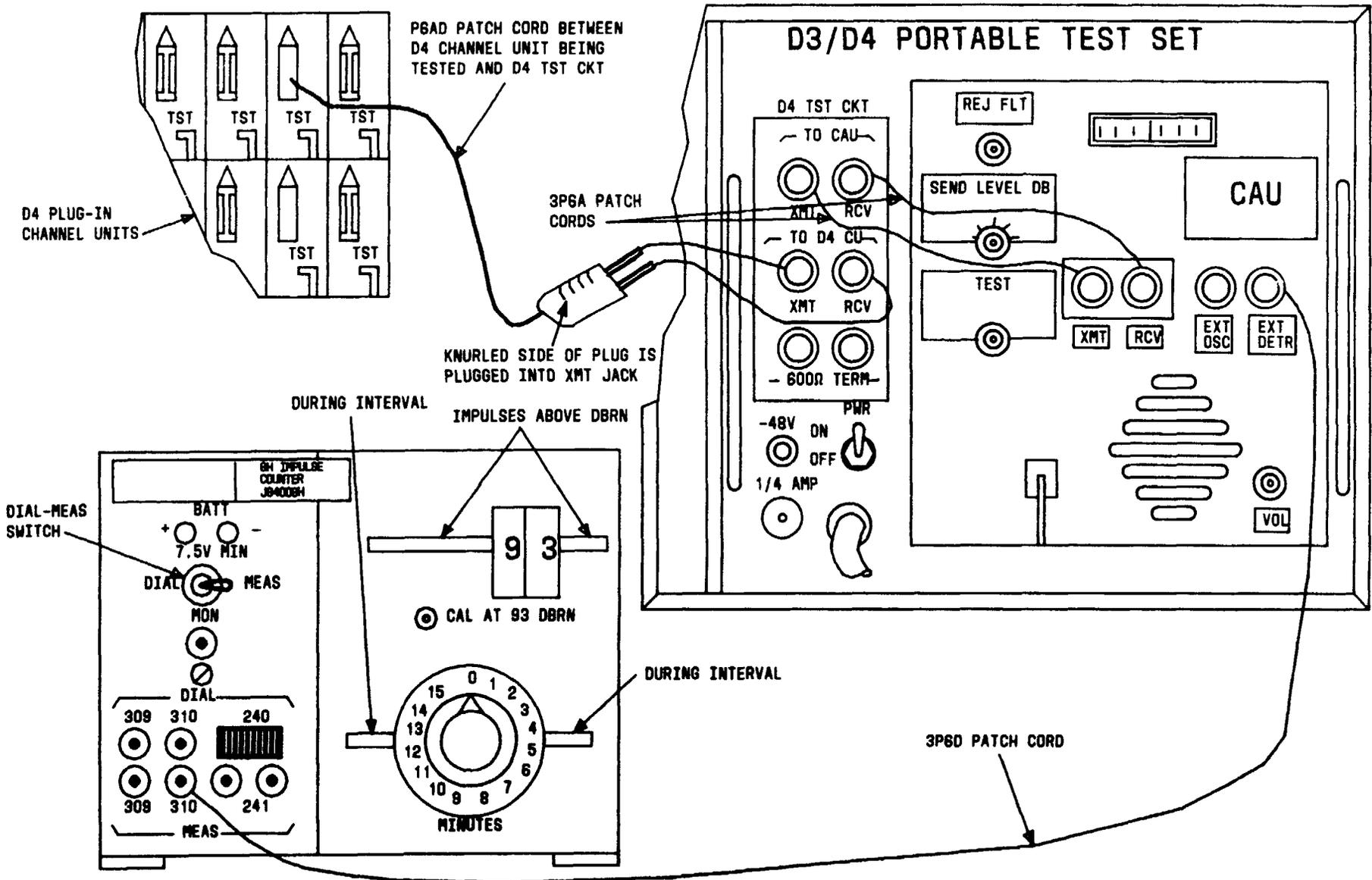


FIG. 1

PERFORM END-TO-END IMPULSE NOISE TEST

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On 6H Impulse Counter:

[7] Rotate **DURING INTERVAL** fully clockwise and then counterclockwise to **5 MINUTES**

[8] Observe that counter indicates **0 or 1** after 5 minutes

[9] Set **IMPULSE ABOVE DBRN** switch to **58**

[10] Rotate **DURING INTERVAL** fully clockwise and then counterclockwise to **5 MINUTES**

[11] Observe that counter indicates **5 or less** after 5 minutes

AND

[12] Are requirements met at both ends

No

TAP-127

Yes

[13] Remove test connections

PERFORM END-TO-END IMPULSE NOISE TEST

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SUMMARY

Make test connections per FIG. 1, Page 3.
Verify that test equipment is connected at other office for channel being tested. Requirements are given in TABLE B, Page 4. Verify that test indications at other office are within specified limits

[1] Obtain test equipment per TABLE A [NOTE 1]

Page 2

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
D3/D4 PORTABLE TEST SET (PTS) with Channel Access Unit (CAU)	J98718AL (PTS) J98718AJ (CAU)
Noise Measuring Set (NMS)	J94003C or Equivalent
2 Patch cords	3P6A
1 Patch Cord	P6AD
1 Patch Cord	3P6D

NOTE 1	
Test equipment and procedures for D1D, D2, and D3 banks are given in BSPs for those banks	
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PERFORM END-TO-END DISTORTION TEST

[2] On D3/D4 PTS
 set switches as follows:
 REJ FLT to IN
 SEND LEVEL DB to 0
 TEST to CHAN LINE

[3] Check calibration of
 NMS [DLP-519]

[4] Set NMS switches as follows:
 FUNCTION to 600 or
 to 600/900 (on 3C NMS)
 NORM-DAMP to DAMP
 DBRN to 85
 C-MESSAGE to align with WTG

NMS calibrated
 and switches
 set on NMS and
 D3/D4 PTS

[5] Make test connections per
 FIG. 1, Page 3 [See NOTE 2]

[6] Verify that test equipment is
 connected at other office and
 test is ready to be performed

Test equipment
 connected at
 each office

Page 4

NOTE 2	
With test equipment connected as shown in FIG. 1, you can transmit and receive at same time; therefore, the plug need not be moved between transmit and receive positions	
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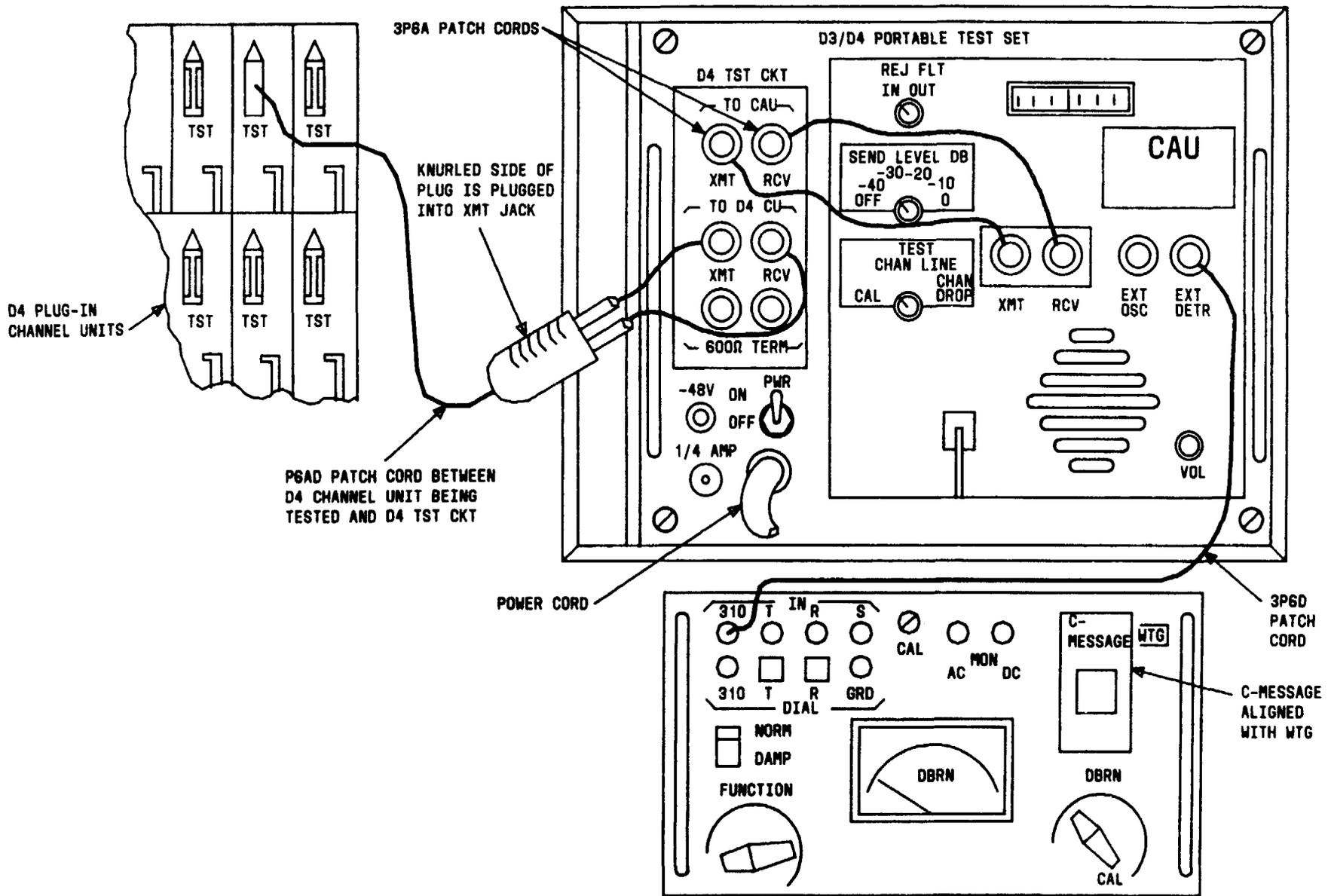


FIG. 1

NOISE MEASURING SET

PERFORM END-TO-END DISTORTION TEST

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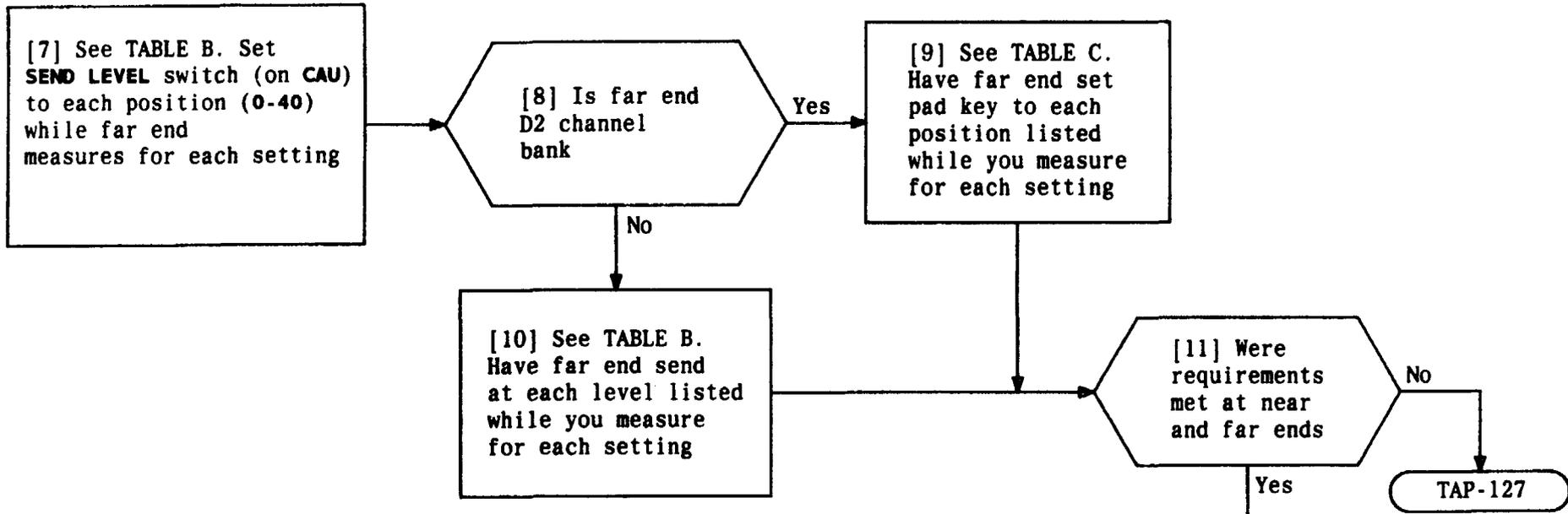


TABLE B	
SEND LEVEL DB	D4 DBRN METER REQUIREMENTS
0	56 or less
10	46 or less
20	36 or less
30	* 26 or less
40	† 22 or less
*28 if far end is D2 bank †26 if far end is D2 bank	

TABLE C	
PAD KEY SETTING	D4 DBRN METER REQUIREMENTS
CTR	56 or less
A	36 or less
B	24 or less

[12] Disconnect test equipment

[1] Get equipment listed in TABLE A

[2] Find section in TABLE B that corresponds to type bank at far end (use only that section throughout the test)

[3] For channel under test determine two most likely interfering channels. See TABLE B

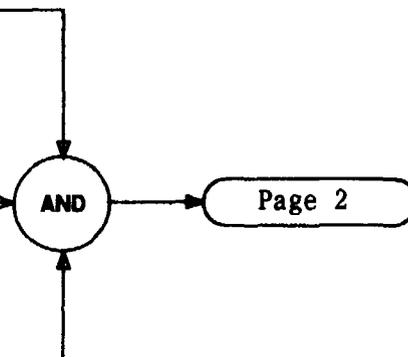


TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Noise measuring set (NMS)	J94003A, B, or C
D3/D4 PORTABLE TEST SET with channel access Unit (CAU)	J98718AL PTS - J98718AJ CAU
2 Patch Cords	3P6A
2 Patch Cords	P6AD

TABLE B						
FAR-END BANK	CHANNEL BEING MEASURED (1-12)	MOST LIKELY INTERFERING CHANNELS		CHANNEL BEING MEASURED (13-24)	MOST LIKELY INTERFERING CHANNELS	
D1D	1	24	12	13	1	24
	2	13	1	14	2	13
	3	14	2	15	3	14
	4	15	3	16	4	15
	5	16	4	17	5	16
	6	17	5	18	6	17
	7	18	6	19	7	18
	8	19	7	20	8	19
	9	20	8	21	9	20
	10	21	9	22	10	21
	11	22	10	23	11	22
	12	23	11	24	12	23
D2	1	13	12	13	12	24
	2	14	11	14	11	23
	3	15	9	15	9	21
	4	16	10	16	10	22
	5	17	1	17	1	13
	6	18	2	18	2	14
	7	19	3	19	3	15
	8	20	4	20	4	16
	9	21	5	21	5	17
	10	22	6	22	6	18
	11	23	7	23	7	19
	12	24	8	24	8	20
D3 OR D4	1	24	23	13	12	11
	2	1	24	14	13	12
	3	2	1	15	14	13
	4	3	2	16	15	14
	5	4	3	17	16	15
	6	5	4	18	17	16
	7	6	5	19	18	17
	8	7	6	20	19	18
	9	8	7	21	20	19
	10	9	8	22	21	20
	11	10	9	23	22	21
	12	11	10	24	23	22

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On CAU:

[4] Check calibration of CAU [DLP-518]

[5] Set switches as follows:
REJ FLT to OUT
SEND LEVEL to 0
TEST to CHAN LINE

On noise measuring set (NMS):

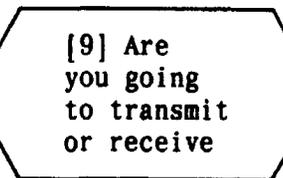
[6] Check calibration of NMS [DLP-519]

[7] Make sure 497A network is installed with C-MESSAGE designation aligned with WTG

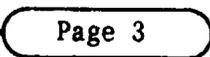
[8] Set switches as follows:
FUNCTION to NM 600/900 for 3C (or NM 600 for 3A)
NORM-DAMP to NORM
DBRN to 50



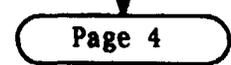
CAU and NMS ready



Transmit



Receive



PERFORM END-TO-END CROSSTALK TEST

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[10] Make test connections for first interfering channel [See FIG. 1, Page 5]

[11] Have far end measure crosstalk level [see TABLE C]

[12] Repeat steps 10 and 11 for second interfering channel

AND

[13] Does far end meet requirements

No

TAP-127

Yes

[14] Have you done receive part of test

Yes

[15] Remove test connections

No

Page 4

TABLE C

TYPE BANK AT FAR END	FAR END REQUIREMENTS
D3 or D4	27 dBrnc or less
D2	27 dBrnc or less *
D1D	32 dBrnc or less
* First interfering channel is allowed 29 dBrnc or less	

PERFORM END-TO-END CROSSTALK TEST

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[16] Make test connections per FIG. 1, Page 5 to channel being measured

[17] Verify far end is connected to first interfering channel

[18] Measure and note crosstalk level by rotating DBRN switch for on-scale reading [See TABLE D]

[19] Verify far end is connected to second interfering channel while you measure level. See TABLE D

AND

[20] Are requirements met at near (D4) end

No

TAP-127

Yes

[21] Have you done transmit part of test

Yes

[22] Remove test connections

No

Page 3

TABLE D

TYPE BANK AT FAR END	D4 REQUIREMENTS
D3 or D4	27 dBrnc or less
D2	27 dBrnc or less*
D10	32 dBrnc or less
* First interfering channel is allowed 29 dBrnc or less	

PERFORM END-TO-END CROSSTALK TEST

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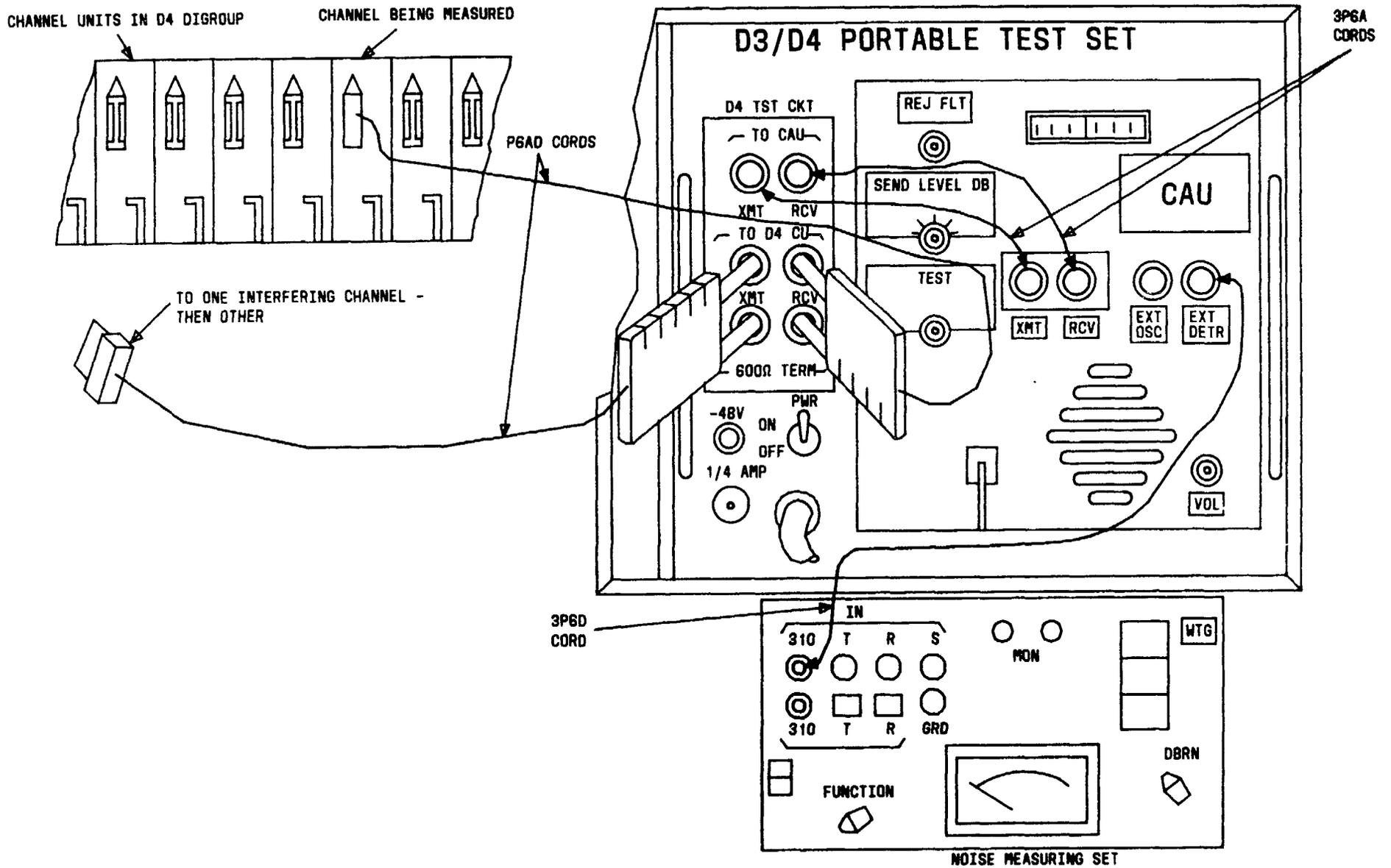


FIG. 1

PERFORM END-TO-END CROSSTALK TEST

SUMMARY

Loop bank by inserting pin plug in appropriate LP jack at LIU and insert pin plug into R CODE jack on RU. Remove TPU and make connections per FIG. 1. Adjust receive attenuators in channel unit for -3.0 ± 0.1 dBm

indication on TMS. Remove pin plug from R CODE jack on RU and adjust signal generator for -3.0 ± 0.05 dBm output. Adjust transmit attenuators for -3.0 ± 0.1 dBm indication on TMS

[1] Obtain equipment per TABLE A and condition TMS [DLP-539]

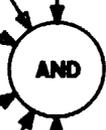
[2] Verify TMS controls are set as follows:
FUNCTION to SEND + TALK + REC,
LINE to REC, REC IMP to 600 ohms, and
REC LEVEL to 0

[3] Verify channels to be adjusted are out of service

[4] Insert pin plug into R CODE jack on RU and depress ACO switch on ACU

[5] On LIU, insert pin plug into LP-A or LP-B jack corresponding to digroup containing test channels

[6] Unseat TPU from slot



[7] Install channel unit extender into test channel slot and insert 4E&MER channel unit into extender

Page 2

TABLE A

EQUIPMENT REQUIRED	RECOMMENDED TYPE
Transmission Measuring Sets (TMS)	TTS 4BNH or Equivalent
Signal Generator	HP3550 or Equivalent
Channel Unit Extender	J98726MF
2 Patch Cords	3P6D
2 Pin Plugs	KS-19531

DETERMINE ATTENUATOR SETTINGS FOR 4 WIRE E&MER CHANNEL UNIT

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- [8] Make test connections per FIG. 1
- [9] Set signal generator impedance to 600 ohms and output to send -3.0 ± 0.05 dBm 1004 Hz tone
- [10] Adjust receiver attenuators on channel unit for -3.0 ± 0.1 dBm indication on TMS
- [11] Remove pin plug from R CODE jack on RU
- [12] Adjust transmit attenuators on channel unit for -3.0 ± 0.1 dBm indication on TMS
- [13] Remove test connections and channel unit extender
- [14] Install TPU and 4E&MER channel unit into bank
- [15] Remove pin plug from LP jack

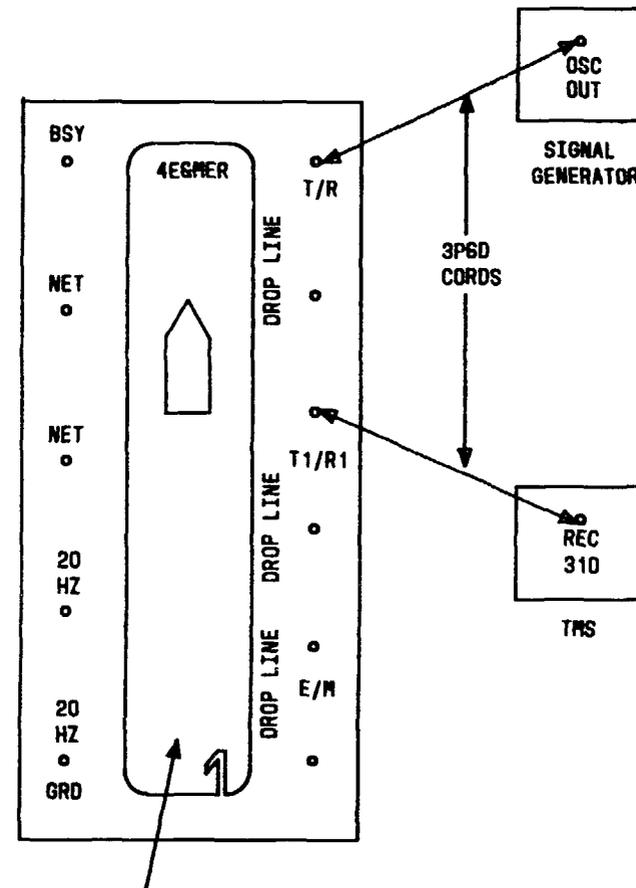
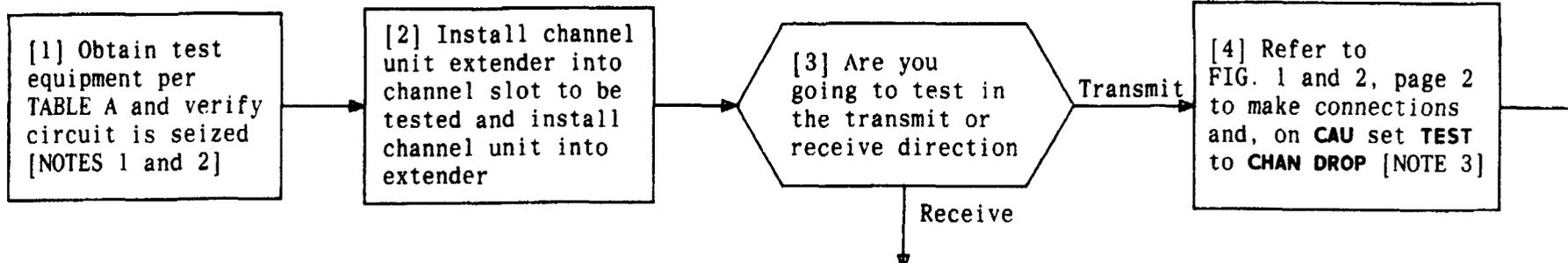


FIG. 1 - 4E&MER Channel Unit Inserted into Extender



[5] Refer to FIG 3 and 4, Page 3 to make connections and set CAU controls as follows: TEST to CHAN DROP and SEND LEVEL DB to 0 [NOTE 3]

TABLE A	
EQUIPMENT REQUIRED	RECOMMENDED TYPE
Channel Access Unit (CAU) in D3/D4 Portable Test Set (PTS)	J98718AJ CAU in J98718AL PTS
Channel Unit Extender	* J98726 MF, List 2
Test Cords	P6AD, 3P6A, and 3P6D (2)
Transmission Measuring Set	TTS4BNH or equivalent
Signal Generator (oscillator)	HP3550B or equivalent
* Channel unit extenders used for ES2 and ES3 channel units are as follows: ES2 - J98726MM ES3 - J98726MN	

- NOTES**
1. Circuit can be seized and held for testing 2-wire FXO units by installing SPTS in far end bank (same channel slot) and setting switches A and B to 0. Circuit can be seized and held for testing 2-wire FXS by installing SPTS in far end bank (same channel slot) with switch A set to 1 and switch B set to 0 and using TMS with holding coil at FXS end
 2. P6AD cord should be connected before seizing circuit.
 3. TMS or OSC connected to channel unit extender will indicate or should be set for actual circuit level. Connected to PTS, TMS will indicate 0 dBm for -8.5 dBm carrier XMT TLP and OSC should be set for 0 dBm for +4.0 dBm carrier RCV TLP

MAKE CONNECTIONS AT D4 CHANNEL BANK FOR DROP SIDE TESTING

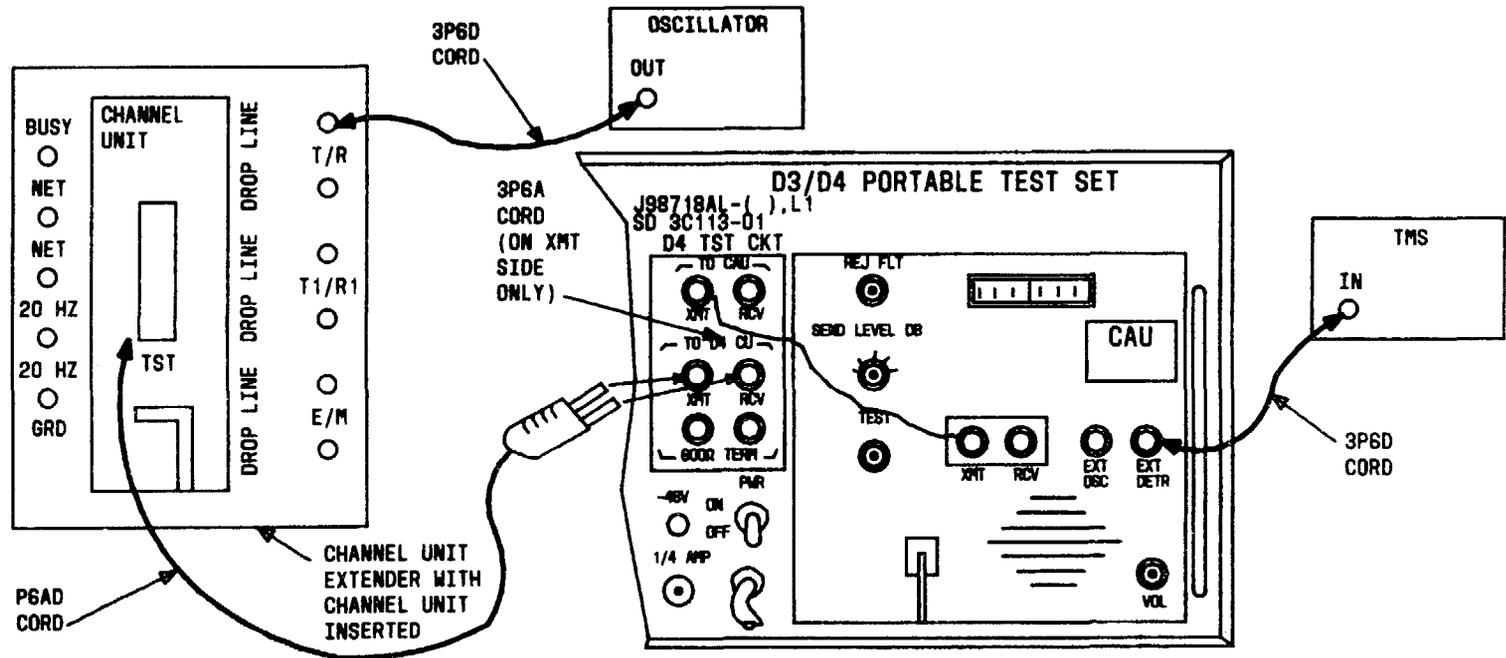


FIG. 1 - Connections for Transmit Direction

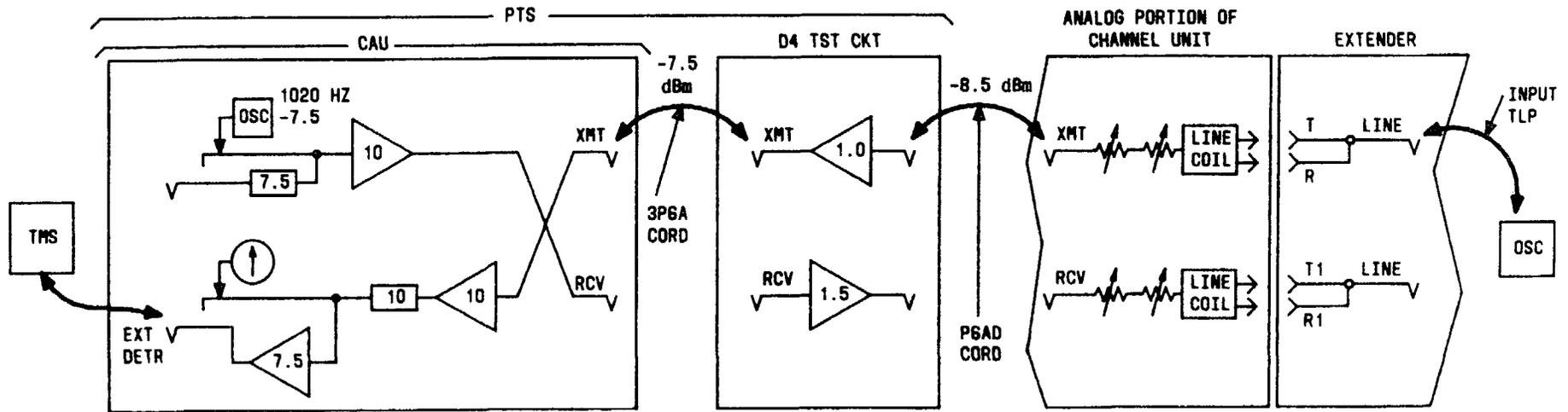


FIG. 2 - Testing in Transmit Direction

MAKE CONNECTIONS AT D4 CHANNEL BANK FOR DROP SIDE TESTING

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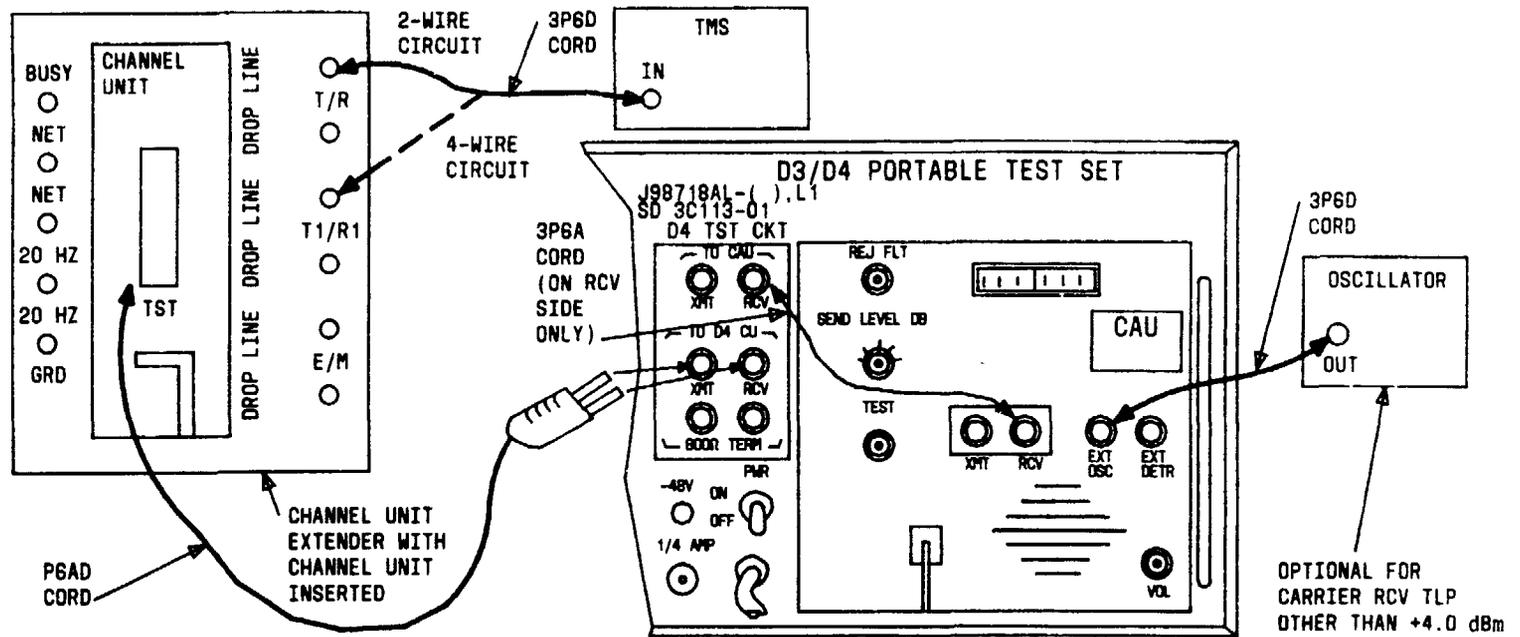


FIG. 3 - Connections for Receive Direction

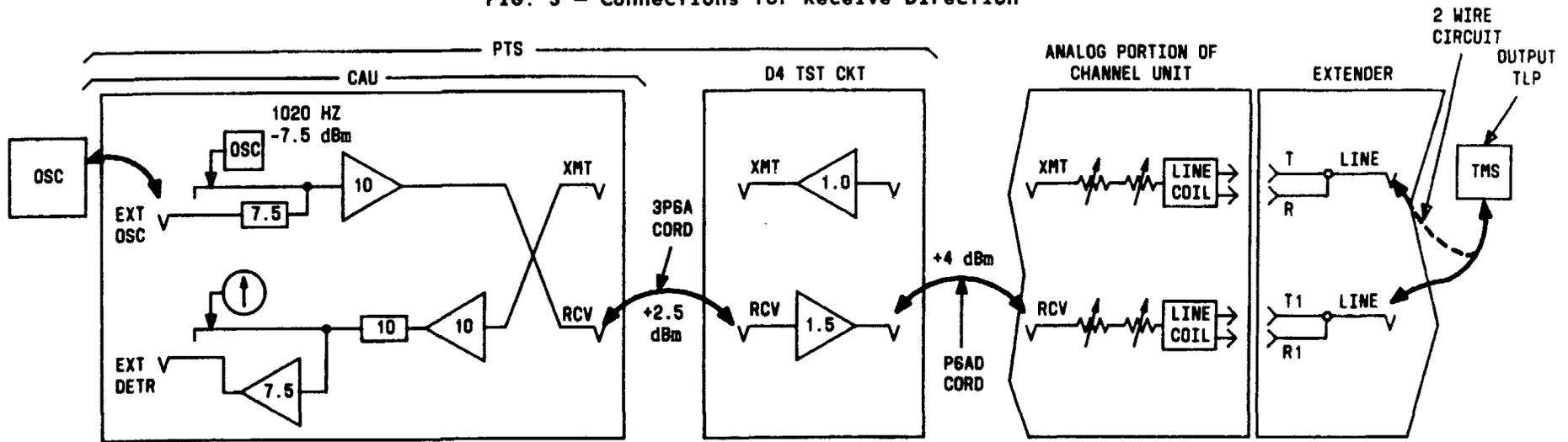
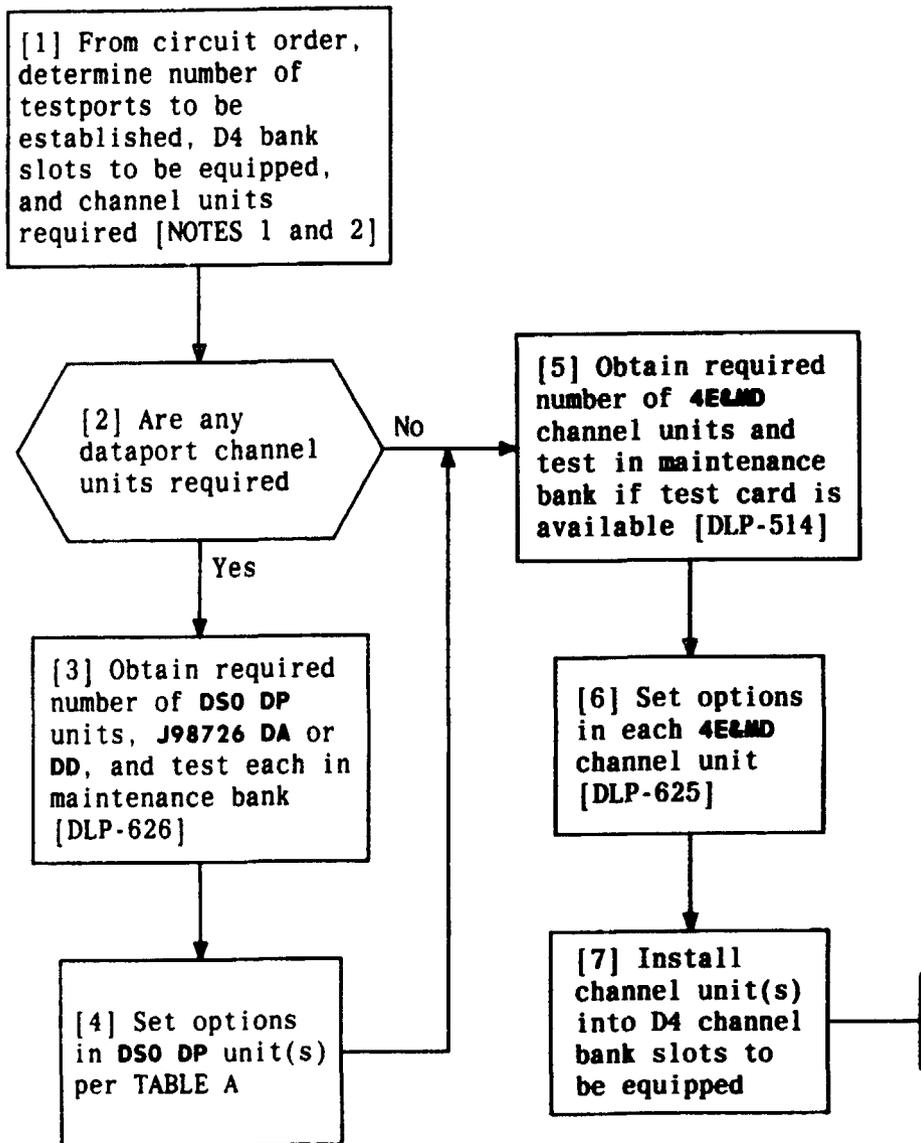


FIG. 4 - Testing in Receive Direction

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MAKE CONNECTIONS AT D4 CHANNEL BANK FOR DROP SIDE TESTING



CHANNEL UNIT	OPTIONS REQUIRED
DSO DP J98726 DA	J2 to EC IN and D4 (white concealed) and J3 to D (white showing)
56 DSO DP J98726 DD	J101 to D (white showing) S1 - EC OUT, and S2 - M1 = 1 and M2 = 0 *

* For testport operation, 56 DSO DP should not have error correction options selected

NOTES	
1. Each testport requires two channel slots to be equipped in a D4 bank for a maximum of twelve testports per D4 digroup	
2. Three types of channel units may be required for DACS testport operation. They are: OCU DP or 56 OCU DP for dataport and 4E&MD for all other types of circuits	
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[1] See NOTE 1. From information on work order set transmit and receive (T & R) attenuator [FIG. 1] [DLP-565]

[2] Set option plug J2 to select E1G and E2G options (white showing) [FIG. 1] [DLP-566]

[3] Verify X option straps are removed [FIG. 1]

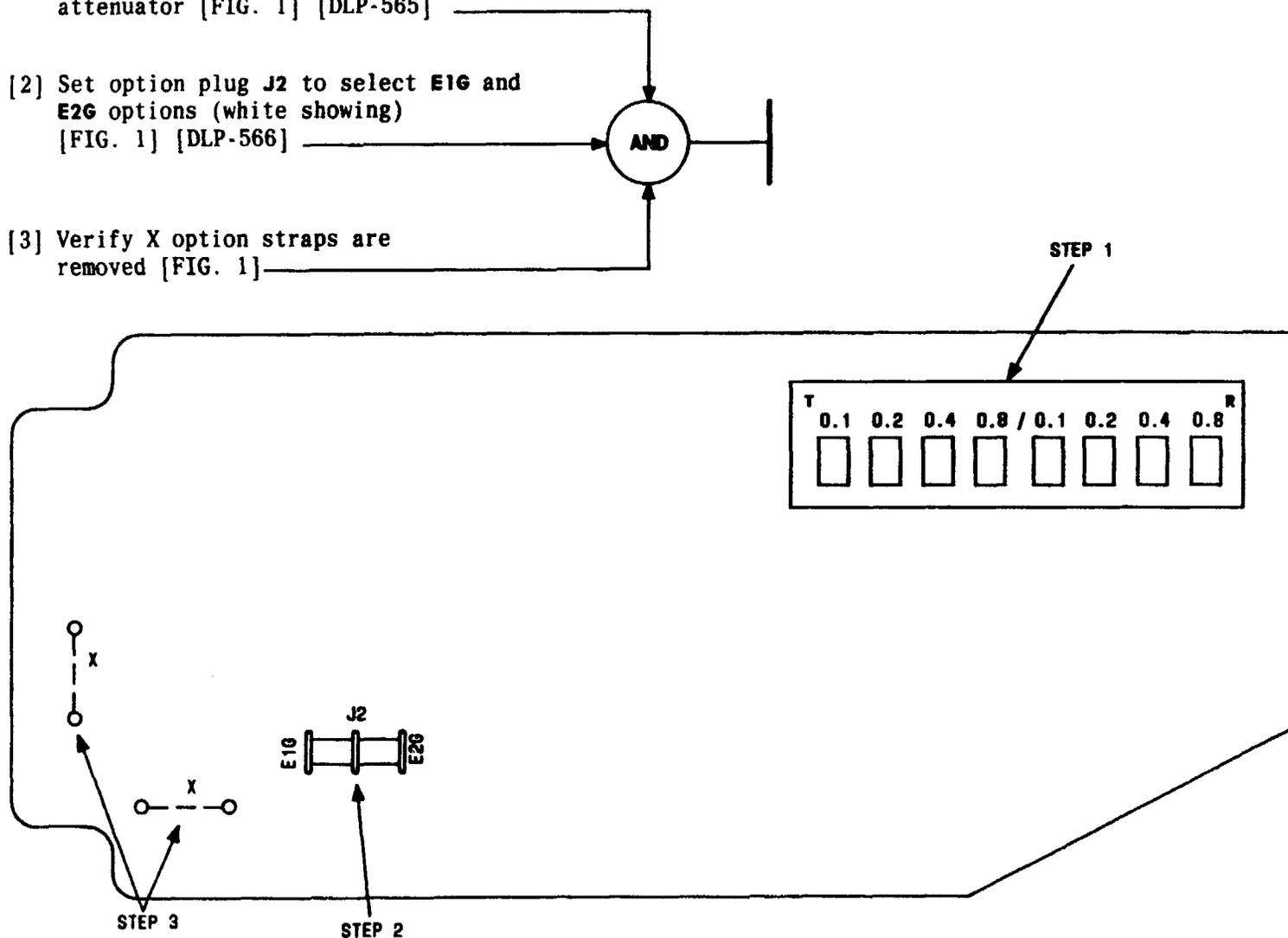


FIG. 1

NOTE 1	
If drop side measurements are required at this time to set T and R attenuators, DLP-623 may be used	
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- [1] See WARNING 1. Verify maintenance bank is List WD or WE [NOTE 1]
- [2] Option OCU channel unit as required per CLRC or WORD document for intended service. For DSO Units, set switches as follows:
J98726DA - J2 to EC OUT, J98726DD - S1 to EC OUT and S2 to M1 = 1 and M2 = 0
- [3] Set switch on MB ALM to ALARM DISAB and install channel unit into CUT slot
- [4] On 1B MBTS, depress button 9 (green showing) and verify all other buttons have black showing
- [5] Option OIU-2 for local timing (LOC T) and install in OIU slot of maintenance bank
- [6] Obtain equipment per TABLE A and make connections per FIG. 1



[7] What kind of dataport unit are you testing

OCU → Page 2

DSO → Page 4

TABLE A	
TRANSMITTER	KS-20909
RECEIVER	KS-20908
TEST INTERFACE UNIT	ED-3C792
LOOPBACK CONNECTOR	ED-3C793
CABLE ASSEMBLY	COMCODE 842725111

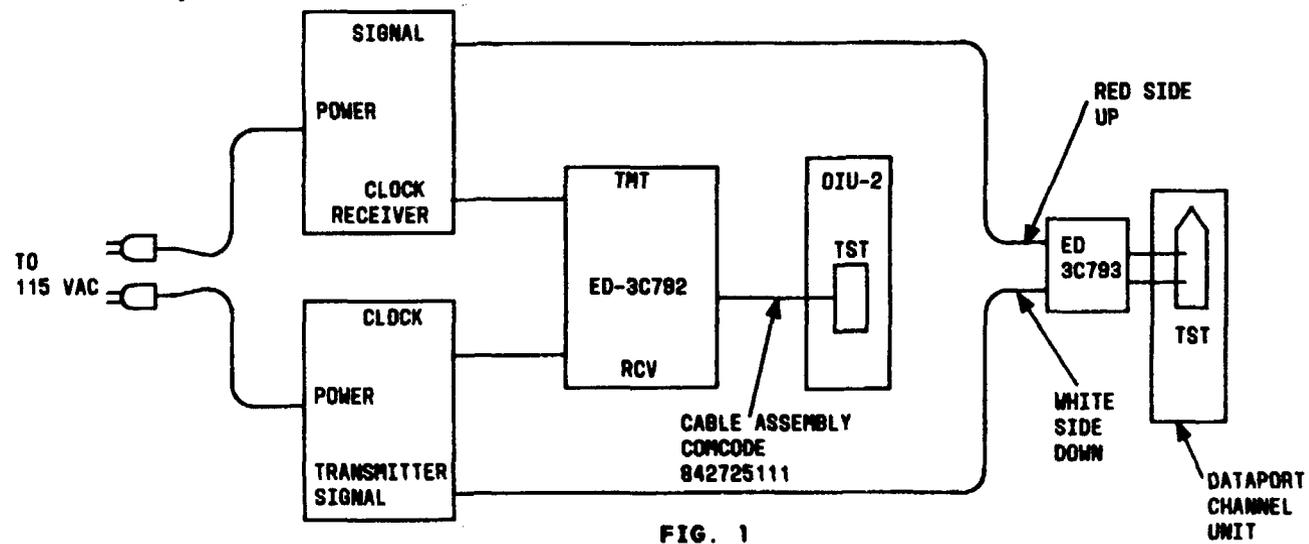


FIG. 1

NOTE 1
List WD or WE banks do not have -48 volts on pin 31 of CUT slot

WARNING 1
Insertion of dataport channel unit into an unmodified bank (without List WD or WE) will damage the channel unit

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TEST DATAPORT CHANNEL UNITS IN D4 MAINTENANCE BANK

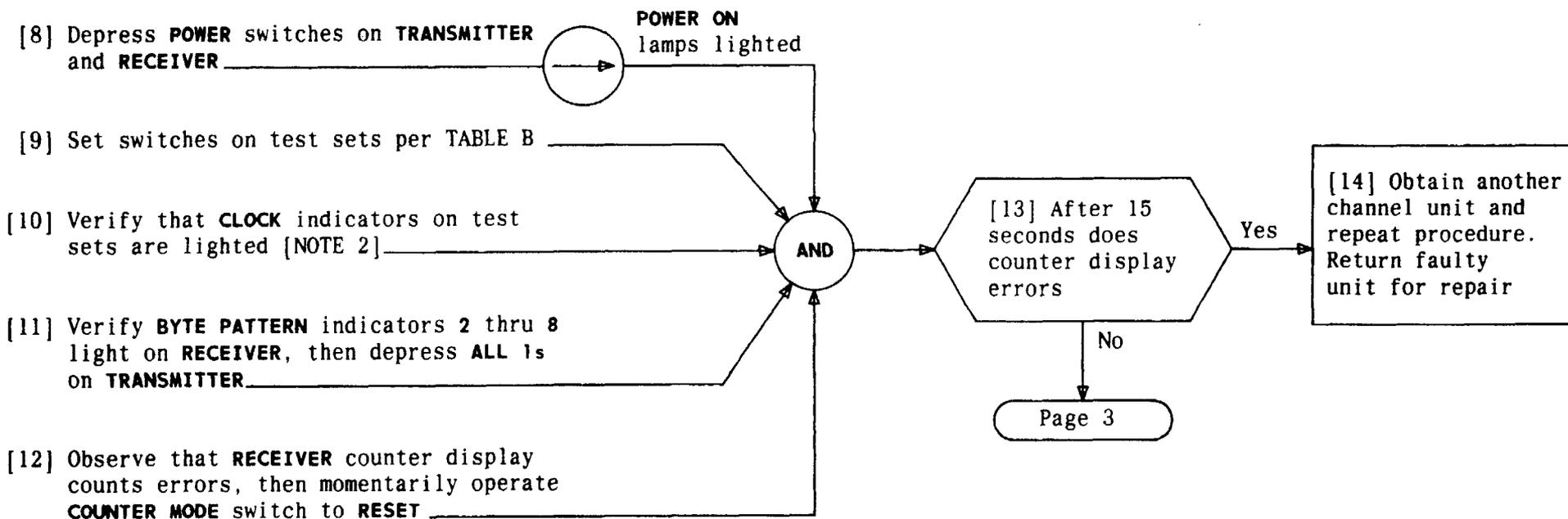


TABLE B			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
RESET	Depress	COUNTER MODE	COUNT
MODE	REPEAT	COUNTER	ERRORS BIT
FUNCTION	TEST WORD 2047	TEST WORD	2047
OUTPUT	LOGIC FAR	INPUT	LOGIC FAR
DATA RATE	2.4 - J98726DB L1 4.8 - J98726DB L2 9.6 - J98726DB L3 56 - J98726DE	DATA RATE	Same as setting for TRANSMITTER

NOTE 2
If clock indicators do not light, test connections and **OIU-2** should be checked

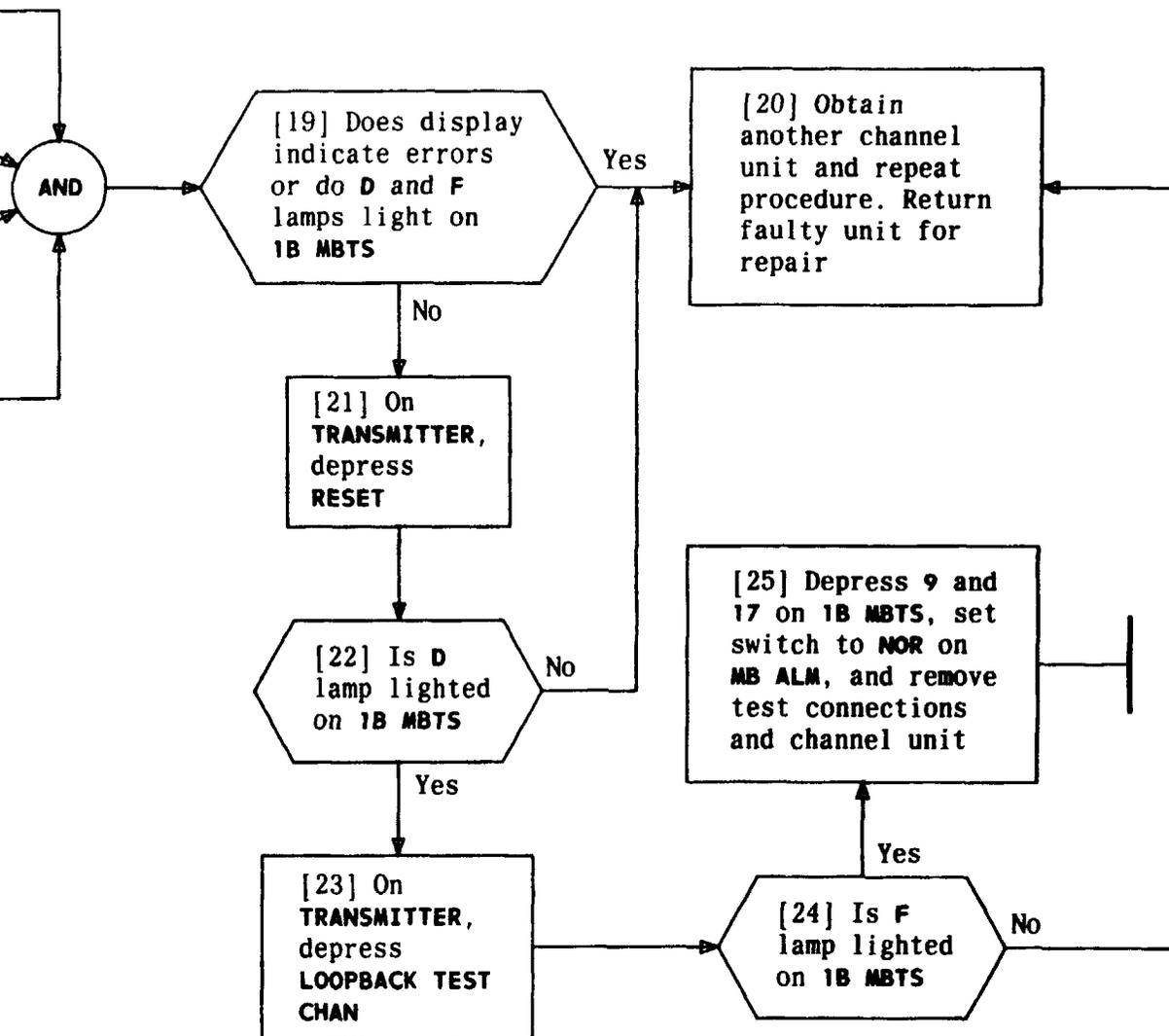
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[15] On TRANSMITTER, set switches as follows: **FUNCTION** to **LOOPBACK TEST** and **OUTPUT** to **LOGIC NEAR**

[16] On TRANSMITTER, depress **RESET** then **LOOPBACK TEST OCU**

[17] On RECEIVER, set switches as follows: **TEST WORD** to **LOOPED** and **INPUT** to **LOGIC NEAR**

[18] On RECEIVER, momentarily operate **COUNTER MODE** to **RESET** and observe counter for 15 seconds



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TEST DATAPORT CHANNEL UNITS IN D4 MAINTENANCE BANK

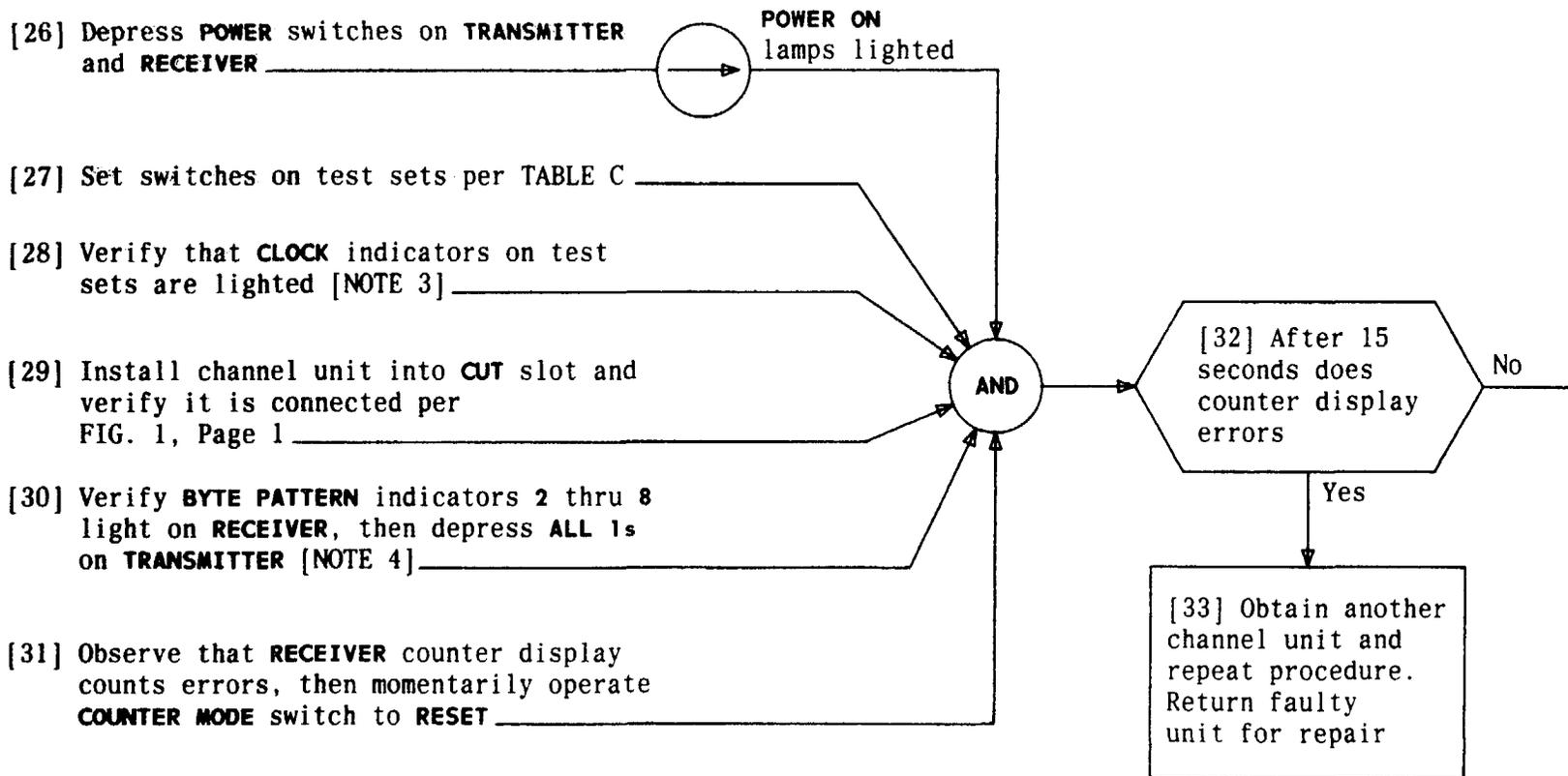


TABLE C			
TRANSMITTER		RECEIVER	
SWITCH	POSITION	SWITCH	POSITION
RESET	Depress	COUNTER MODE	COUNT
MODE	REPEAT	COUNTER	ERRORS BIT
FUNCTION	TEST WORD 2047	TEST WORD	2047
OUTPUT	BIPOLAR	INPUT	BIPOLAR
DATA RATE	56 for DD, 9.6 for DA	DATA RATE	56 for DD, 9.6 for DA

NOTES	
3. If clock indicators do not light, test connections and OIU-2 should be checked	
4. BYTE PATTERN: indicator 1 will light when testing J98726DD unit	
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SUMMARY

Using dual channel oscilloscope, monitor clock signal at OIU connector terminals 11 and 12 for EXT timing or at terminals 51 and 52, and 53 and 54 for LOC or LT timing.

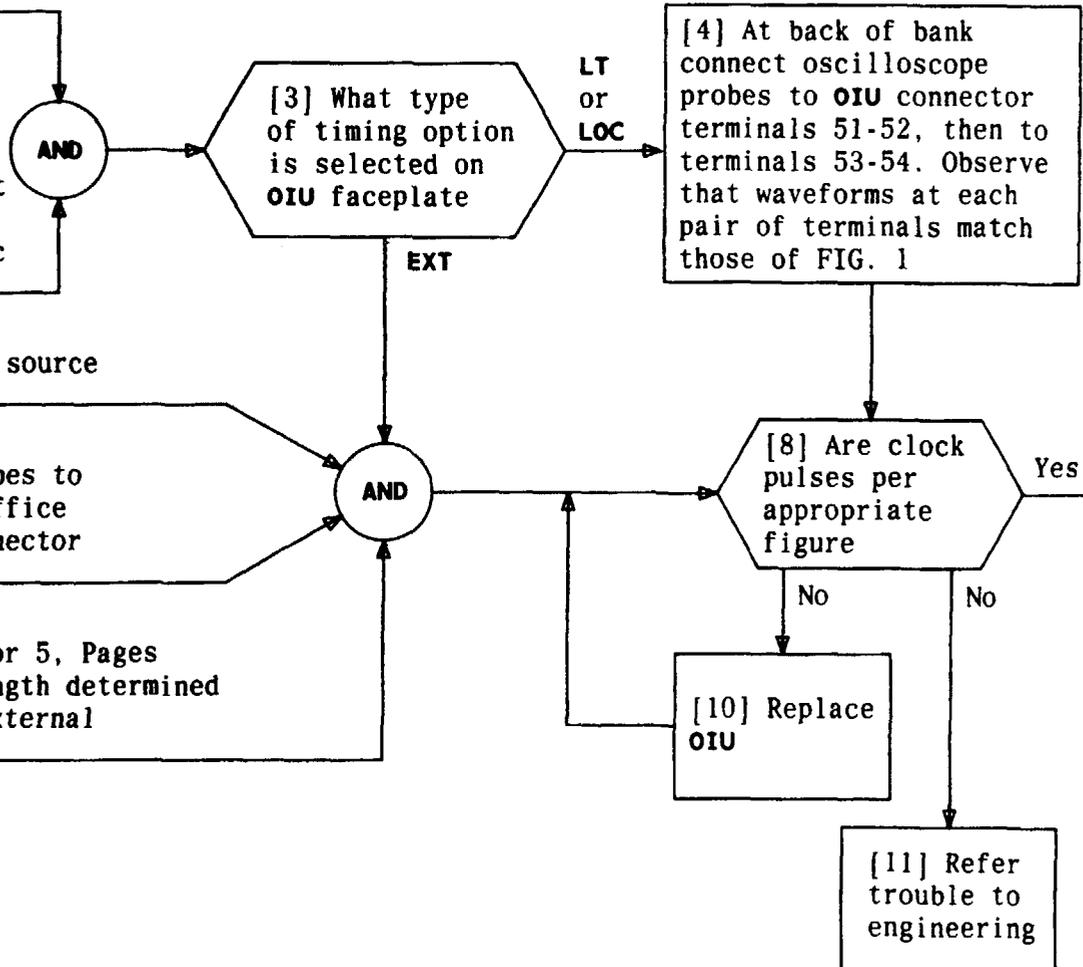
[1] Obtain dual channel oscilloscope with invert switch on one channel and an add display mode

[2] Energize oscilloscope and set each channel to 5 volts per vertical division and 20 #sec per horizontal division

[5] Determine external clock source cable length to bank

[6] Connect oscilloscope probes to terminals 11 and 12 of office interface unit (OIU) connector at back of bank

[7] Refer to FIG. 2, 3, 4, or 5, Pages 2, 3, and 4 for cable length determined in Step 5, and monitor external clock pulses [NOTE 1]



NOTE 1
 FIGS. 2 thru 5 give waveforms for four lengths of cables. Monitored waveform should reasonably match one shown for cable length closest to actual cable length determined in Step 5

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VERIFY CLOCK SIGNAL IS PRESENT AT BANK, USING OSCILLOSCOPE

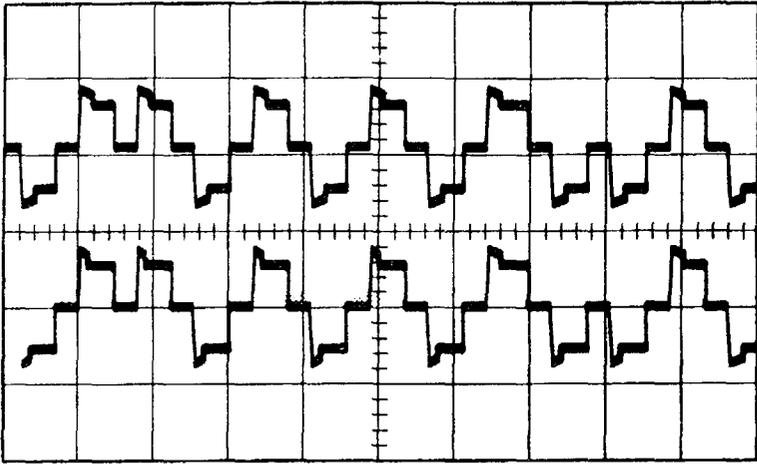
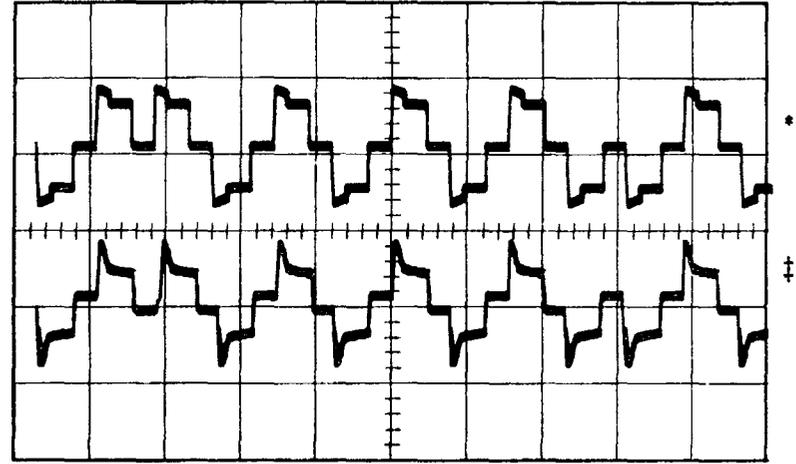


FIG. 1 - Clock Pulses at OIU Output Terminals
51-52 and 53-54 With 133 ohm Termination



* 133 ohm resistor plus 0 to 6 J98726AL-1, L2 OIU-2^S
‡ 133 ohm resistor plus one J98726AL-1, L1 or one
J98726AL-1, L1, Mod A and 0 to 5 J98726AL-1, L2
OIU^S

FIG. 2 - Clock Pulses - Cable Length 50 Feet or Less

VERIFY CLOCK SIGNAL IS PRESENT AT BANK, USING OSCILLOSCOPE

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- * 133 ohm resistor plus 0 to 6
J98726AL-1, L2 OIU-2^S
- ‡ 133 ohm resistor plus one
J98726AL-1, L1 or one
J98726AL-1, L1, mod A and 0 to 5
J98726AL-1, L2 OIU-2^S

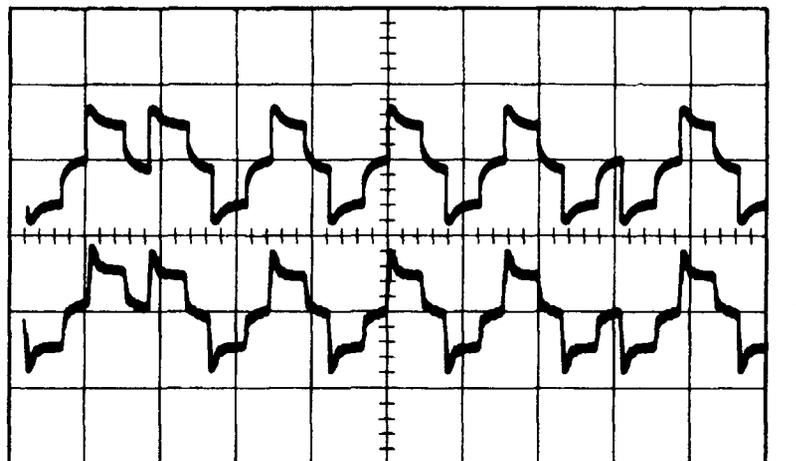


FIG. 3 - Clock Pulses - Cable Length 500 Feet

- * 133 ohm resistor plus 0 to 6
J98726AL-1, L2 OIU-2^S
- ‡ 133 ohm resistor plus one
J98726AL-1, L1 or one
J98726AL-1, L1, mod A and 0 to 5
J98726AL-1, L2 OIU-2^S

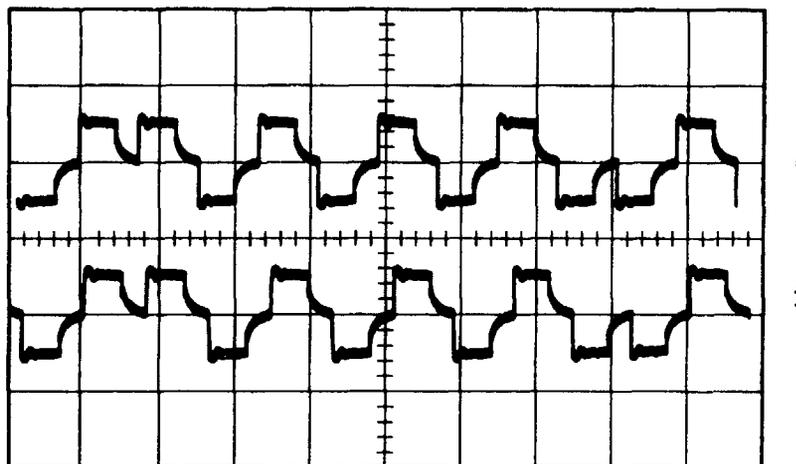
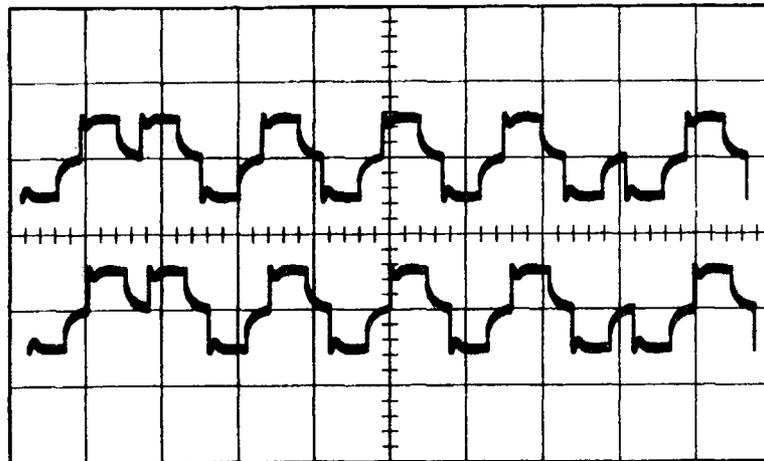


FIG. 4 - Clock Pulses - Cable Length 1000 Feet

VERIFY CLOCK SIGNAL IS PRESENT AT BANK, USING OSCILLOSCOPE

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• 133 ohm resistor plus 0 to 6 J98726AL-1, L2 OIU-2^S
 ‡ 133 ohm resistor plus one J98726AL-1, L1 or one
 J98726AL-1, L1, mod A and 0 to 5 J98726AL-1, L2
 OIU-2^S

FIG. 5 - Clock Pulses - Cable Length 1500 Feet

VERIFY CLOCK SIGNAL IS PRESENT AT BANK, USING OSCILLOSCOPE

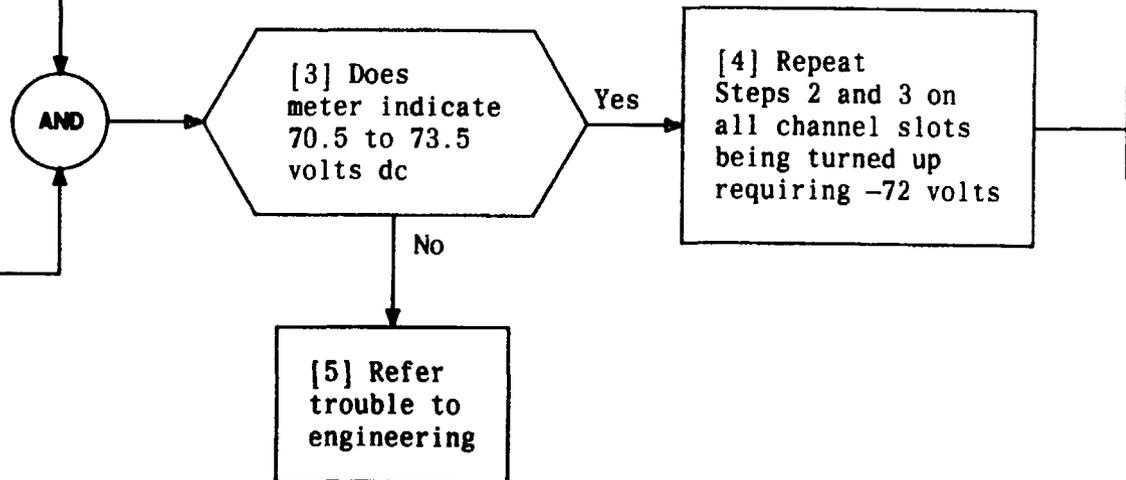
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SUMMARY

Using voltmeter at rear of bank, measure for -72 volts at pin 16 of each channel unit slot connector that requires channel unit with 72 volt option.

[1] Obtain KS-14510 VOM or KS-20599 digital voltmeter, or equivalent and prepare meter to read -72 volts dc

[2] At rear of bank, measure between ground (with VOM red lead) and pin 16 (with VOM black lead) of channel slot containing channel unit requiring 72 volt option



VERIFY -72 VOLTS PRESENT AT D4 CHANNEL BANK

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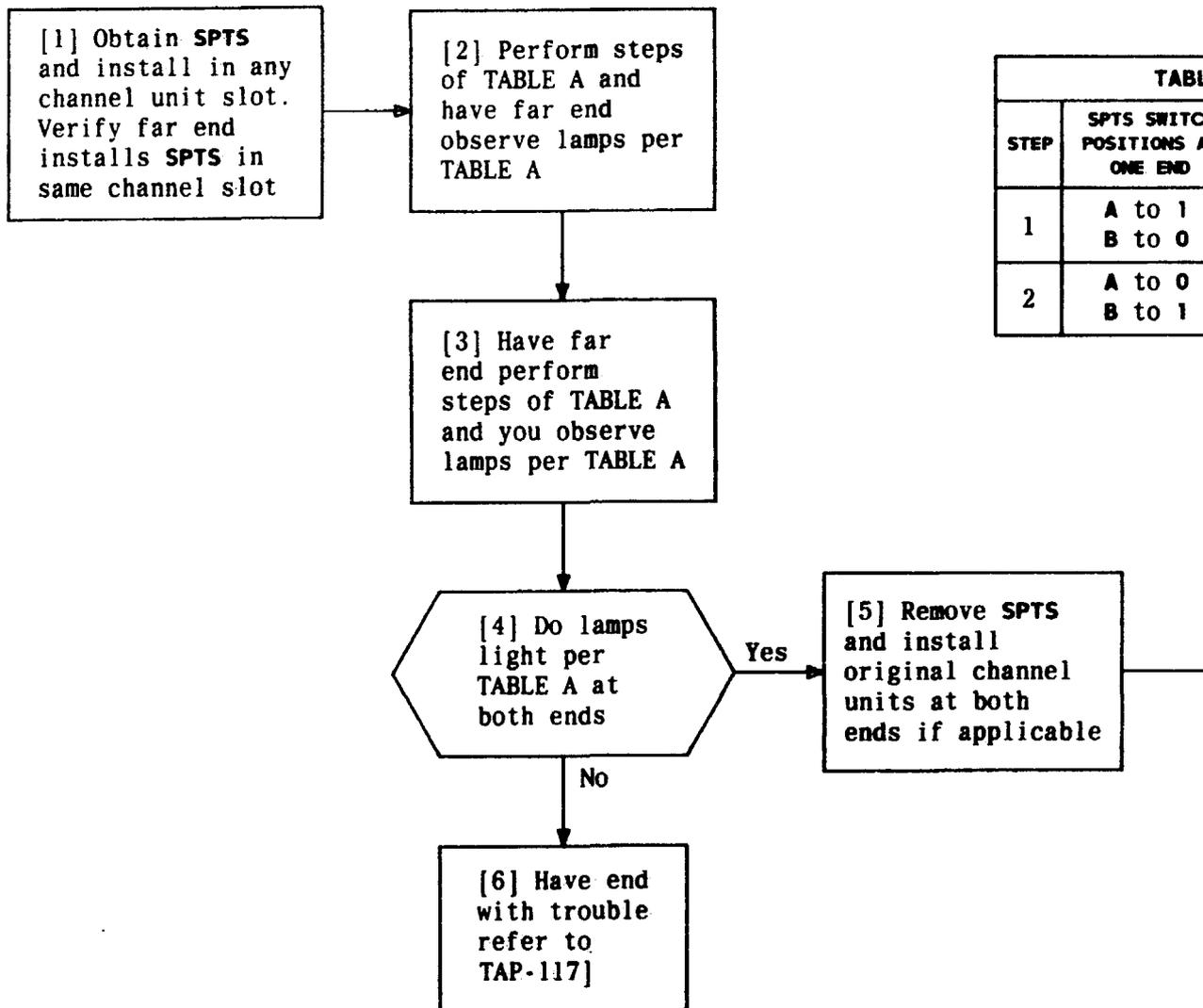


TABLE A		
STEP	SPTS SWITCH POSITIONS AT ONE END	LAMPS LIGHTED AT OTHER END
1	A to 1 B to 0	A only
2	A to 0 B to 1	B only

PERFORM END-TO-END SIGNALING TEST

[1] From information on WORD or CLRC, set options J1 and J2 [NOTE 1] [FIG. 1] [DLP-565]

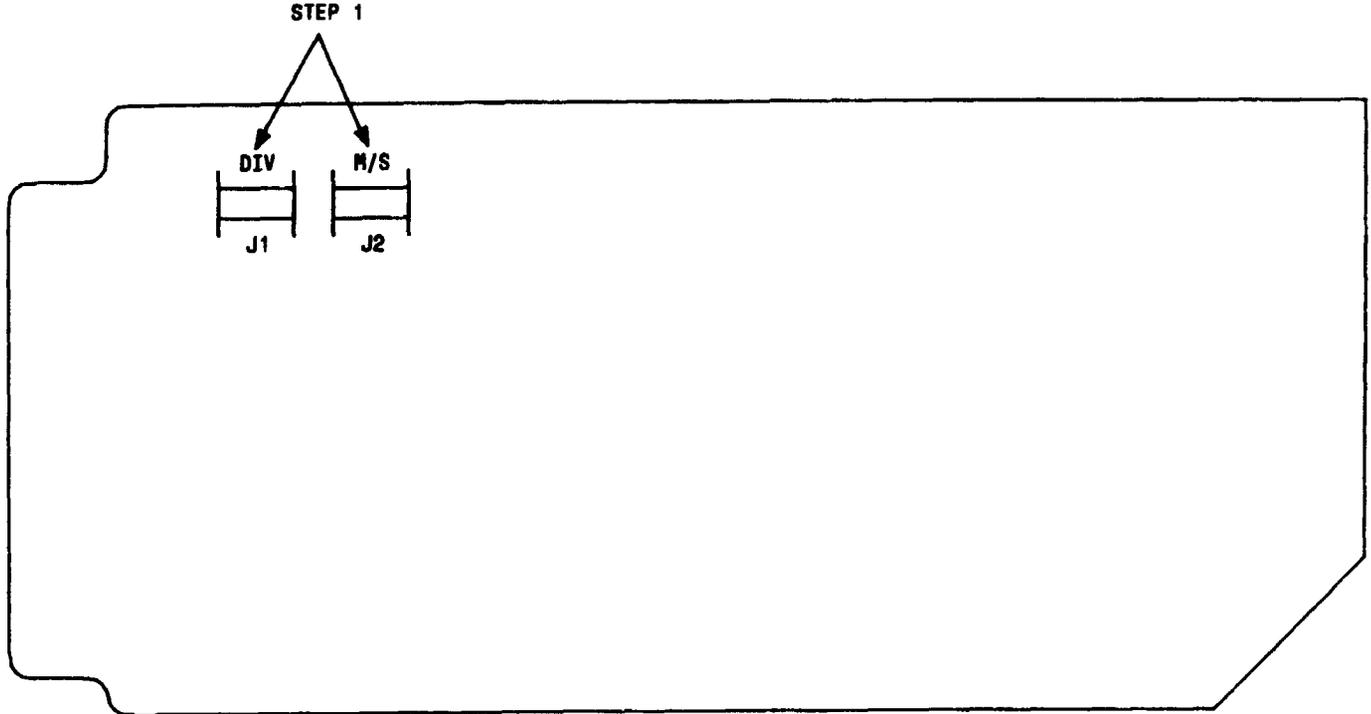


FIG. 1

NOTE 1
 Option J1 (DIV) is selected by inserting plug into black side (white showing).
 Option J2 (M/S) is selected by inserting plug into applicable side of connector

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SET OPTIONS SEC STA CHANNEL UNIT (J98726GA)

[1] From information on WORD or CLRC, set options J1, J2, J4, J5, and J9 [NOTE 1] [FIG. 1] [DLP-565]

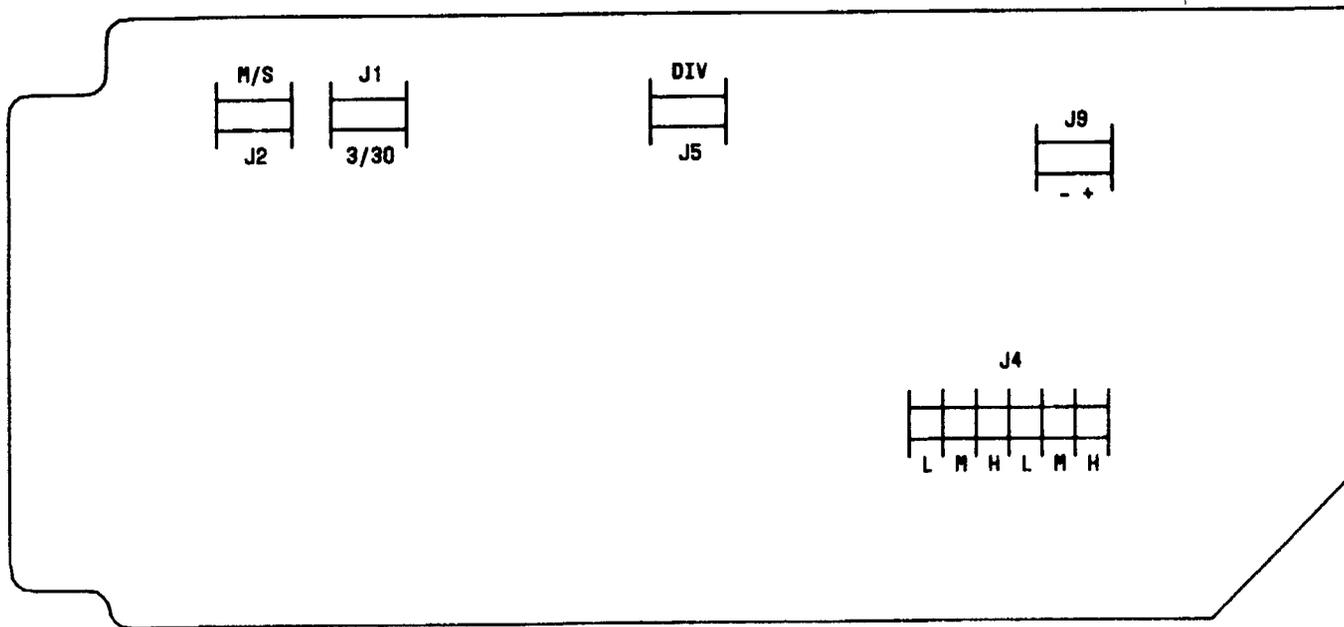


FIG. 1

NOTE 1	
Option J5 (DIV) is selected by inserting plug into black side (white showing). Options J1 (3/30), J2 (M/S), and J9 (+/-) are selected by inserting plugs into applicable side of connectors. Option J4 is selected by inserting both plugs into applicable positions. Example: Both in H, both in M, or both in L	
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ITEM	ISSUE	ITEM	ISSUE								
• TPG-000		TAP-124		DLP-529		DLP-564		• DLP-599		DPL-895	
• IXL-001		TAP-125		• DLP-530		• DLP-565		• DLP-600			
• NTP-002		• TAP-126		DLP-531		• DLP-566		• DLP-601			
• NTP-003		TAP-127		• DLP-532		• DLP-567		• DLP-602			
• NTP-004		• TAP-128		DLP-533		• DLP-568		• DLP-603			
• NTP-005		• TAP-129		DLP-534		• DLP-569		• DLP-604			
• NTP-006		DLP-500		DLP-535		• DLP-570		• DLP-605			
NTP-007		DLP-501		DLP-536		• DLP-571		• DLP-606			
NTP-008		DLP-502		DLP-537		• DLP-572		• DLP-607			
• NTP-009		• DLP-503		DLP-538		• DLP-573		• DLP-608			
• NTP-010		DLP-504		DLP-539		• DLP-574		DLP-609			
TAD-100		DLP-505		DLP-540		• DLP-575		DLP-610			
TAP-101		DLP-506		DLP-541		• DLP-576		DLP-611			
TAP-102		DLP-507		DLP-542		• DLP-577		DLP-612			
• TAP-103		DLP-508		DLP-543		• DLP-578		DLP-613			
• TAP-104		DLP-509		DLP-544		• DLP-579		DLP-614			
TAP-105		DLP-510		• DLP-545		• DLP-580		• DLP-615			
• TAP-106		DLP-511		DLP-546		• DLP-581		• DLP-616			
• TAP-107		DLP-512		DLP-547		• DLP-582		DLP-617			
TAP-108		DLP-513		• DLP-548		• DLP-583		DLP-618			
TAP-109		• DLP-514		DLP-549		• DLP-584		DLP-619			
TAP-110		DLP-515		DLP-550		• DLP-585		DLP-620			
• TAP-111		DLP-516		DLP-551		• DLP-586		• DLP-621			
• TAP-112		DLP-517		DLP-552		• DLP-587		DLP-622			
TAP-113		DLP-518		DLP-553		• DLP-588		DLP-623			
TAP-114		DLP-519		DLP-554		• DLP-589		• DLP-624			
TAP-115		DLP-520		• DLP-555		• DLP-590		• DLP-625			
TAP-116		DLP-521		DLP-556		• DLP-591		• DLP-626			
• TAP-117		DLP-522		DLP-557		• DLP-592		• DLP-627			
TAP-118		DLP-523		DLP-558		• DLP-593		• DLP-628			
• TAP-119		DLP-524		DLP-559		• DLP-594		• DLP-629			
TAP-120		• DLP-525		DLP-560		• DLP-595		DLP-630			
• TAP-121		DLP-526		DLP-561		• DLP-596		DLP-631			
TAP-122		• DLP-527		DLP-562		• DLP-597		• CKL-891			
TAP-123		DLP-528		DLP-563		• DLP-598		TNG-893			

• REVISED OR ADDED ITEM

□ CANCELED ITEM

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CKL

CHECKLIST

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This book is called a Task Oriented Practice or "TOP". It is a special type of Bell System Practice (BSP). It is a programmed document that gives step-by-step instructions to enable you to do a job (or task). A TOP can be a very useful aid in doing your everyday work if you use it correctly.

An important thing to remember about TOP is that it is a programmed document giving step-by-step instructions to do a job. Since the instructions are given in the order that they must be done, you cannot enter a procedure except at the beginning. You *must* do the step-by-step instructions in the order given. Failure to follow the instructions in the proper order may cause service interruptions.

Another thing to remember about TOP is that it contains all the instructions that you need to do a job. If you are experienced on a particular job, TOP will provide you with just that information you need to do the job. If you are doing the job for the first time, you will be given step-by-step instructions with enough detail so that you will not have to guess or remember where to find the necessary details. Remember that TOP can provide you with just that information you need regardless of your experience in doing a job.

The work that you do can be classified into two broad job categories - *Trouble Clearing* and *Non Trouble Clearing*. This is how TOP defines these two types of work:

Trouble Clearing

Trouble clearing is simply what it says - that work you do to clear and repair troubles in the system. Trouble clearing may be done in answering a customer complaint or in responding to an office alarm, a trouble report, or an abnormal TTY printout, etc.

Non Trouble Clearing

Non trouble clearing is simply what it says - that work you do which is not connected with trouble clearing. This type is work that you do to accept a system after it has been installed, turn up a system for service, maintain a system according to a controlled maintenance plan, etc.

Now glance briefly at the front cover. In the upper right corner is a 9-digit number. This number is the BSP number for the volume. Near the center is the title of the volume which tells you something about the contents, such as the system (or subsystem) name and perhaps what kind of jobs are included in the volume. Next is the decision-action-logic diagram which directs you either to this training package or to 001 depending on your ability to use TOP.

Now turn to FIG. 1 which shows a typical page of 001. In the lower left is the title, "TASK INDEX LIST" which tells you something about this list, such as it is a listing of tasks arranged in alphabetical order. This list is actually a listing of the tasks included in the volume. The tasks are listed in alphabetical order and permuted on key words to simplify locating a task. On the right side of the page is a column of reference numbers under the heading "THEN GO TO." To use this list, locate the job to be done and turn to the reference number in the "THEN GO TO" column.

Now assume that you have been assigned the task of performing a system test on a system covered by a TOP. On 001 in FIG. 1, locate the job "System Test." Notice that this entry tells you to go to NTP-016 under the "THEN GO TO" column. Next you will have to locate the procedure, NTP-016. All procedures in a TOP are arranged in numerical sequence. In actual use of TOP, you would simply turn to

FIND YOUR JOB IN THE LIST BELOW	THEN GO TO
Alert, External - Horn, Ringer, Etc - Remove	NTP-028
Amplifiers; Channel - Recorded Announcement Frame - Test	NTP-009
ARO3 PWR ALM RA bb - bb = 16-30	TAP-105
BRDG LED - Does Not Light - Correct	TAP-117
Bridging Controller; Trunk - J1C015MB - Replace	DLP-572
Channel Amplifiers - Recorded Announcement Frame - Test	NTP-009
Drum Wiper - Common Systems Recorded Announcement Frame - Inspect	NTP-010
Extended Station Capability - Nonkey Set Only - Reported Failure	TAP-123
External Alert - Horn, Ringer, Etc. - Remove	NTP-028
Interchange Two Working Station Numbers	NTP-081
LED; BRDG - Does Not Light - Correct	TAP-117
Loudspeaker Paging - Add	NTP-059
Loudspeaker; SPOKESMAN® - Remove	NTP-006
SPOKESMAN® Loudspeaker - Remove	NTP-006
Station Capability; Extended - Nonkey Set Only - Reported Failure	TAP-123
System Test - Perform	NTP-016
Trunk Bridging Controller - J1C015MB - Replace	DLP-572
TTY Printout - ARO3 PWR ALM RA bb - bb = 16-30	TAP-105
Wiper; Drum - Common Systems Recorded Announcement Frame - Inspect	NTP-010
TASK INDEX LIST (Contd)	Issue 1 DEC 1980
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FIG. 1

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the procedure. Look over the following example which shows a typical page of NTP-016. Note that the items are numbered in the left column. They *must* be completed in that order. You will also note that in item 2 there are some lettered (A, B, C) items. These lettered items are optional ways to do an item, that is you only have to do one of the lettered items.

Remember that this procedure gives you all the items that must be done and the order in which they must be done to complete the job. If you know how to do an item, you

should go ahead and do it without going to the referenced details in the "FOR DETAILS, GO TO" column. If, on the other hand, you need additional details on how to do the item, then you should turn to the procedure listed in the "FOR DETAILS, GO TO" column. In either case, after completing an item, you should continue with the next item.

A TOP is designed so that you have to read only what is necessary to get your job done. If you know how to do an item, look no further for the "how to" information - just

DO THE ITEMS BELOW IN THE ORDER LISTED		FOR DETAILS, GO TO
1	Obtain Support Apparatus Listed Below: • Hewlett-Packard 3531A Transmission Measuring Set • 2P4C Patching Cord	-
2	Place SEC/SEB in Off-Line Mode	-
	A. If in On-Line Mode, Change System From On-Line to Off-Line	DLP-509
	B. If Powered Down, Condition System for Off-Line Operation as Follows:	-
	1. Power up Minicomputer	DLP-503
	2. Power up Line Printer	DLP-528
	3. Power up Maintenance Terminal	DLP-510
7	Run Computer Display Terminal Test for All Positions	DLP-513
8	Mount Tape	DLP-500
PERFORM SYSTEM TEST		Issue 1 DEC 1980
		123-456-789 NTP
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do the item and go on to the next item. This idea is called "bypassing" in TOP. In addition to not having to look further for details, three other ways of "bypassing" are provided in TOP to help you bypass reading information you already know (see FIG. 2):

Summary Statement

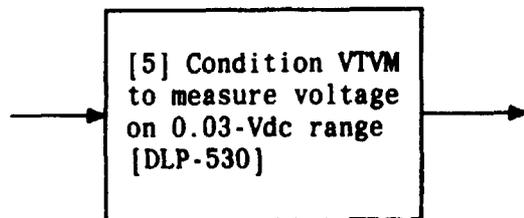
A summary statement is used with a procedure to tell you briefly how to do the procedure and what type measurement or result can be observed. If you can do the procedure after reading the summary, go ahead and do it without reading any further. Simple procedures may not have summaries.

Result Statement

A result statement may be used in a flow-charted procedure along with the AND symbol. If, after reading the results statement, you know how to do the action indicated, go ahead and do it without reading the steps associated with the AND symbol.

Support Procedures

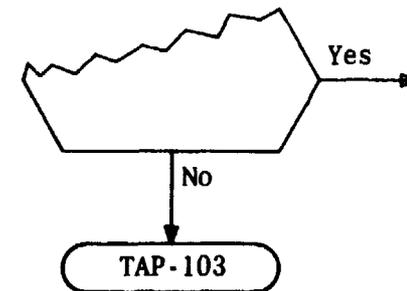
When you see the following kind of reference in TOP it refers to a support procedure:



The support procedure [DLP-530] provides the information on how to operate the VTVM. Here again, if you already know how to operate the VTVM, go ahead and do it without looking up any further information.

Now assume that you are doing a system test on a system covered by a TOP. In the process of doing this test you are instructed to mount a tape. For the purposes of this example, assume that you do not know how to mount the tape and must look up additional details. Figure 2 on Page 5 shows you examples of bypassing that can be used. Take a few moments to examine this figure and make sure you understand the techniques of bypassing.

While using a TOP, you will probably run across a reference similar to this:



This reference to TAP-103 indicates that the equipment is not operating correctly, and that you should refer to TAP-103 and clear this trouble condition. After clearing the trouble, you should reenter the flowchart at the beginning (Step 1).

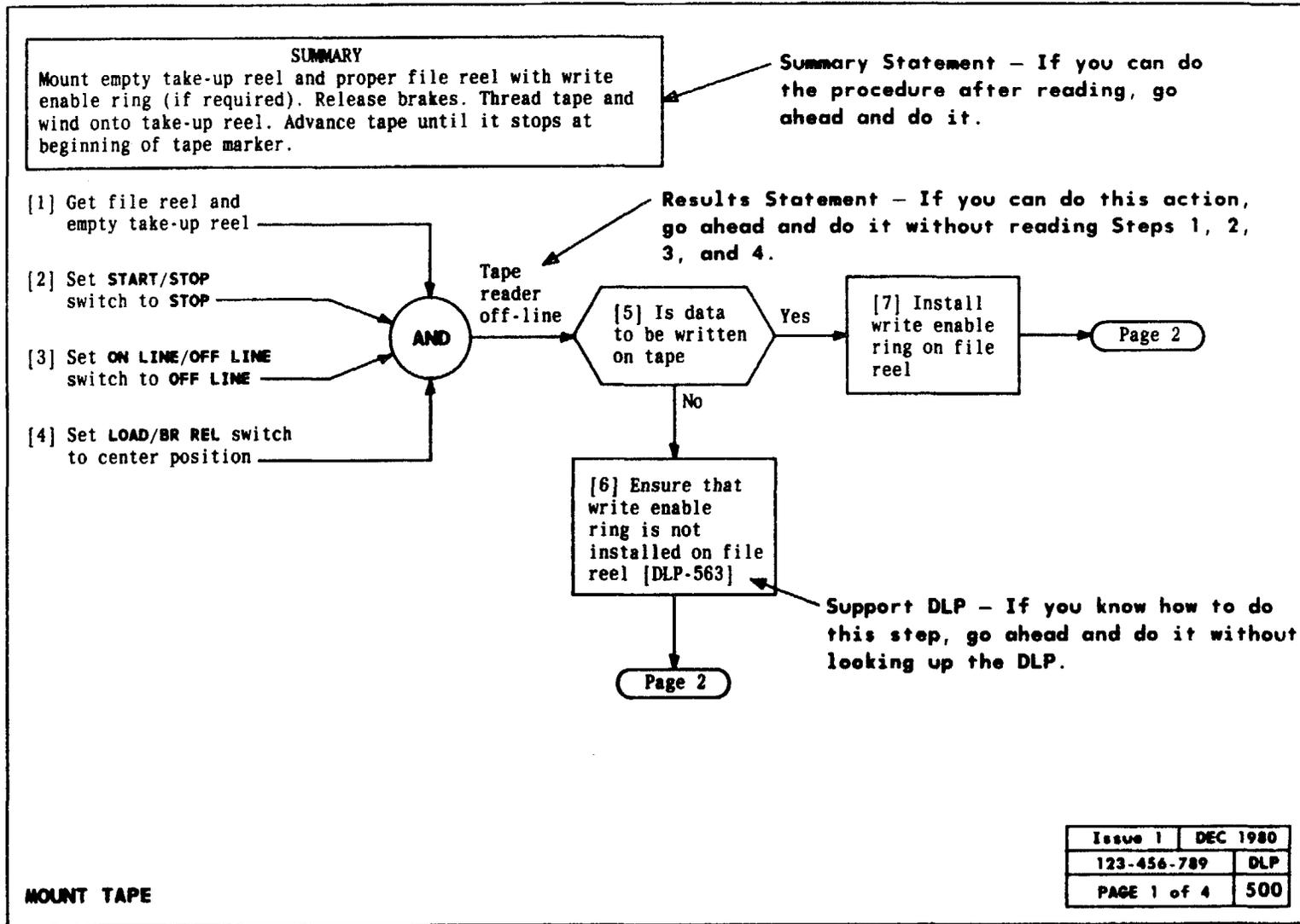
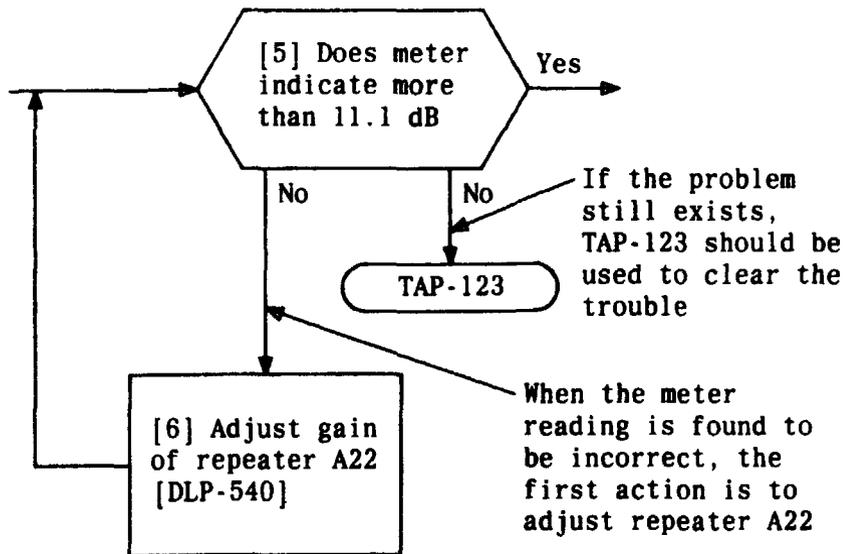


FIG. 2

This idea can be carried further. In some cases, a decision block may have more than one abnormal output. This means that you should try more than one solution to the problem. See the example below.

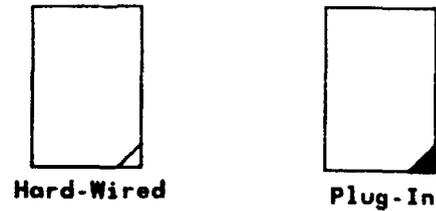


Trouble-clearing information in TOP is used basically the same way as non trouble-clearing information. When an alarm or trouble report requires you to troubleshoot a system covered by a TOP, the TASK INDEX LIST (IXL-001) is the place to start. After locating your job on IXL-001 you will be referenced to a Trouble Analysis Procedure (TAP) to find the information to aid in the location of the trouble. The TAP may reference to other information, such as Trouble Analysis Data (TAD) or Isolation Diagram (ISD) as an aid in the trouble-clearing process.

Now assume that you have to clear a major alarm on a terminal in a system covered by a TOP. Figure 3 on Page 7 shows how to access and how to use trouble-clearing information.

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A TOP shows hard-wired and plug-in units on Isolation Diagrams (ISD) in the following manner:



Always do a job safely. Below are three things you should heed in TOP:

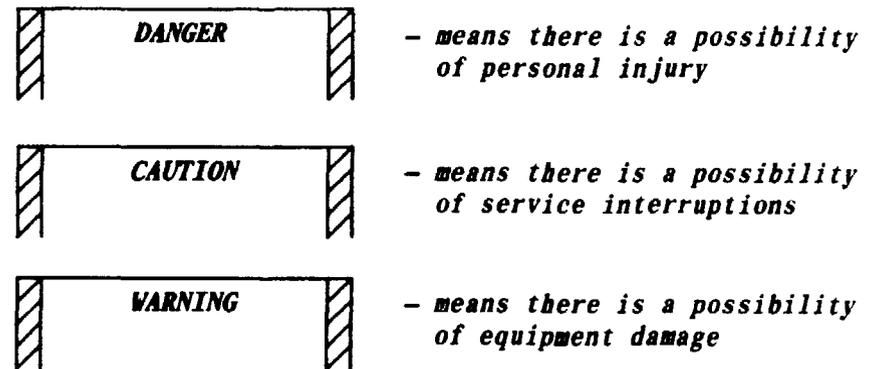


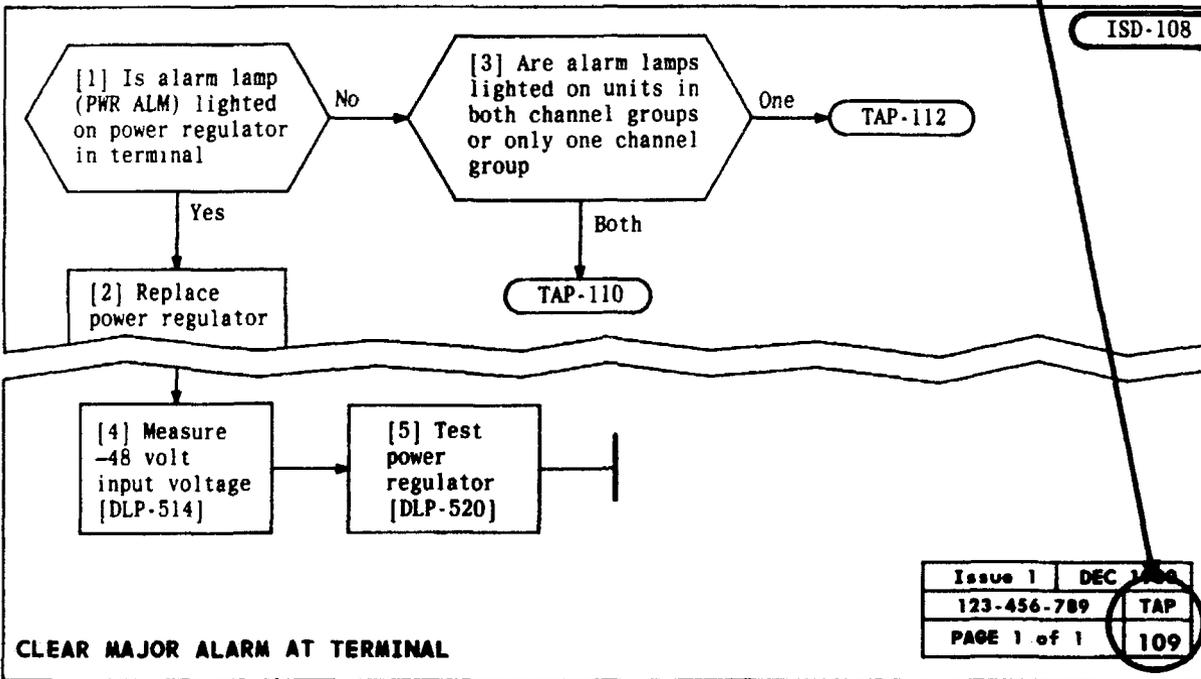
TABLE A on Page 8 shows some of the more important symbols and definitions.

While using TOP, if you find errors, or if a procedure is inadequate or missing, call the TOP HOTLINE number shown on the front cover. Your comments are greatly needed to help prepare better documentation. Comments may also be forwarded using form E3973 which is available through your company.

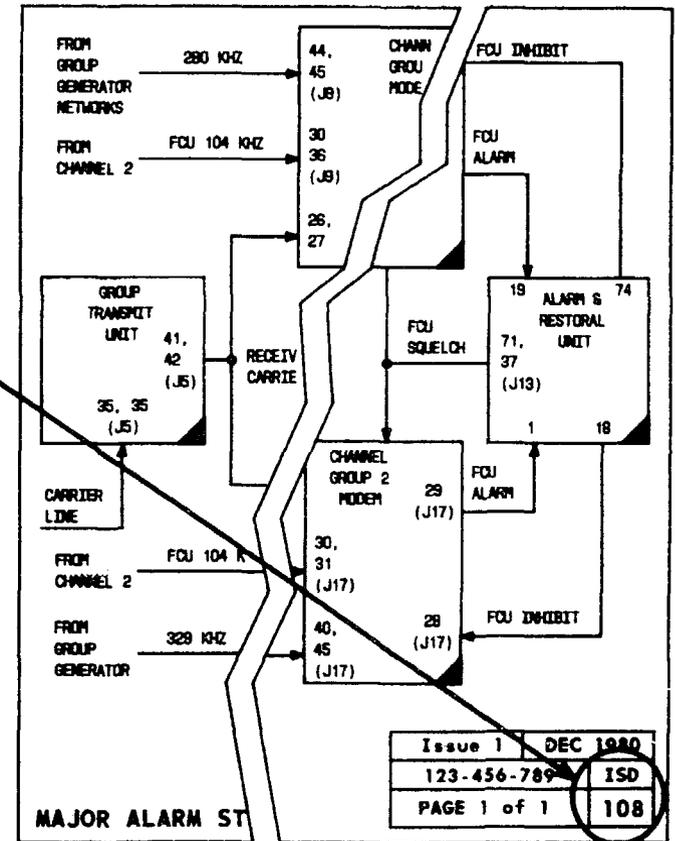
Now that you know how to use TOP, return to IXL-001 and find the job you need to do.

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FIND YOUR JOB IN THE LIST BELOW THEN GO TO						
Alert; External - Horn, Ringer, Etc. - Remove	NTP-028						
Alarm - Major - Clear	TAP-109						
TTY Printout - AR03 PWR ALM RA bb - bb = 16-30	TAP-105						
Wiper; Drum - Common Systems Recorded Announcement Frame	NTP-010						
<table border="1"> <tr> <td>Issue 1</td> <td>DEC 1980</td> </tr> <tr> <td>123-456-789</td> <td>IXL</td> </tr> <tr> <td>PAGE 2 of 2</td> <td>001</td> </tr> </table>		Issue 1	DEC 1980	123-456-789	IXL	PAGE 2 of 2	001
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PAGE 2 of 2	001						
TASK INDEX LIST (Contd)							



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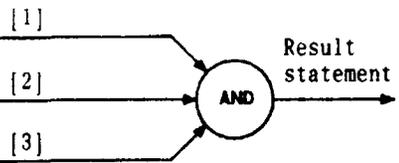
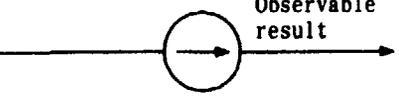


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FIG. 3

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TABLE A IMPORTANT TOP SYMBOLS AND DEFINITIONS	
SYMBOL	DEFINITION
	<p>The AND operation symbol is used where the successful completion of a group of instructions accomplishes a meaningful result that can be defined. The symbol indicates that each input instruction must be performed in the order given to accomplish the output (result statement). In instances where results cannot be defined, results statements are not provided.</p>
	<p>The flow-through symbol relates graphically a single instruction to the expected observable result(s).</p>
	<p>The end-of-procedure symbol denotes that the procedure has been completed.</p>
	<p>The reference bubble symbol indicates an exit from a page (either to a continuation page or to trouble-clearing data) or indicates the starting point of a procedure.</p>
<p>Acceptance (NTP-002)</p>	<p>Acceptance gives an overview of the acceptance techniques and facilities.</p>
<p>Maintenance Philosophy (TAD-100)</p>	<p>The maintenance philosophy, when provided, gives an overview of the considerations designed into the trouble-clearing procedures.</p>
<p>Checklist (CKL-891)</p>	<p>The checklist reflects the volume content (inventory) at any given time, the issue identifier of each data element therein, those data elements revised and/or added, and those data elements deleted from a previous issue.</p>
<p>Documentation Plan (DPL-895)</p>	<p>The documentation plan gives a bird's-eye view of all the TOP volumes covering a system. This plan can help you to quickly determine the correct volume.</p>

D4 CHANNEL BANK TOP DOCUMENTATION

