Task Oriented Practice
(TOP)

D4 CHANNEL BANK

TERMINAL INTERFACE EQUIPMENT

4 *ESS*™ SWITCH APPLICATION

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Issue 4	AUG 1991
234-151-048	TPG
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FIND YOUR JOB IN THE LIST BELOW	THEN GO TO
Acceptance	NTP-002
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Alarm; Audible – ALM, LED Lighted, –48MAIN 10A/ALM Fuse Blown – Clear	TAP-103
Alarm; Audible – ALM, LED Lighted, –48V Fuse Blown – Clear	TAP-104
Alarm; Audible – ALM, LED Lighted, –48S A Fuse Blown – Clear	TAP-105
Alarm; Audible – ALM, LED Lighted, –48S B Fuse Blown – Clear	TAP-106
Alarm; Audible – ALM, LED Lighted, –48F A Fuse Blown – Clear	TAP-107
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Calibration – 3-Type Noise Measuring Set (NMS) – Check	DLP-505
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FIND YOUR JOB IN THE LIST BELOW	THEN GO TO
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No acceptance test procedures are required for this frame. Readiness of frame to become part of working system was established by successful completion of Installation Handbook test procedures.

GENERAL

The maintenance philosophy contained in this volume is based on the design of equipment (hardware), diagnostic software and test equipment employed. Procedures are intended to aid personnel in performing trouble-clearing tasks. The degree to which these procedures accomplish this depends upon input and feedback from the user. Submittals of additions, corrections, and improvements to data are encouraged. Manufacturer, engineering and software documentation such as D4 manuals, SDs, etc, which are available to the operating telephone company offices, are referenced where applicable rather than duplicating information in the TOP. Some portions of those documents may be utilized in procedures, but only as examples for the purpose of explanation. Test equipment (oscilloscopes, voltmeters, etc) and parameters involved in circuits being tested, adjusted, or checked are usually prescribed. However, setup and method of operation are not described, unless it is unusual or unique in some manner.

IXL PHILOSOPHY

The IXL is structured to provide fast access to procedures pertinent to symptoms identified. Within the IXL, data is accessed via automatic devices (power alarms, blown fuses, etc). Trouble reports are used as a stimulus for performing maintenance. It is assumed that the user can locate a frame with a power fault by reading the **REPT:PA** printout which would identify the frame or by locating the frame that was automatically powered down (1A power switch with **PWR OFF** lamp lighted and **OFF NORM** lamp off).

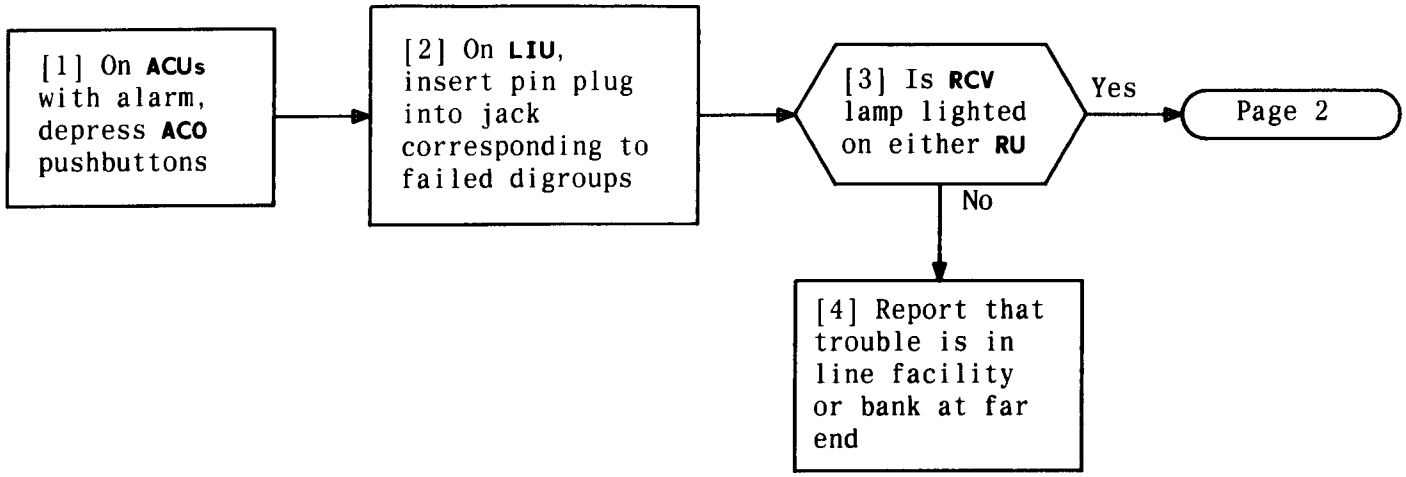
The symptoms described in the IXL reflect these assumptions and indicate other conditions that are observable at the frame that would enable the user to access the proper trouble-clearing procedure. These conditions are blown fuses, and/or lighted LEDs on converters or power function circuit packs.

TAP PHILOSOPHY

When documenting a procedural approach to trouble clearing, certain assumptions are made. It is assumed that only one fault is being cleared at a time and the user performs all actions correctly. Similarly, when directed to make replacements, the replacement part and equipment used for testing, both built-in (hardware and software) and commercial, are assumed to be good. Where applicable, procedures for calibrating test equipment are provided. These assumptions and the fact that trouble-clearing procedures are designed for faults with consistent fault signatures provide procedures with a clean straightline approach to trouble clearing.

ALTERNATE METHODS

The more knowledgable and experienced personnel may access TOP documents at a point in trouble clearing where analyzation is completed (faulty component determined) and only repair or replacement is required. In many instances, access to these procedures may be obtained by locating procedural data provided on the Task Index List. Most DLPs are built to support TAPs and NTPs with preconditioning and system restoration steps covered in those level procedures (TAPs, NTPs). Therefore, access to data (DLPs) on a hunt-and-find basis is a threat to equipment operation and may compound trouble-clearing problems.



CLEAR AUDIBLE ALARM, AY LAMP LIGHTED, ALARM CONTROL UNIT (ACU)

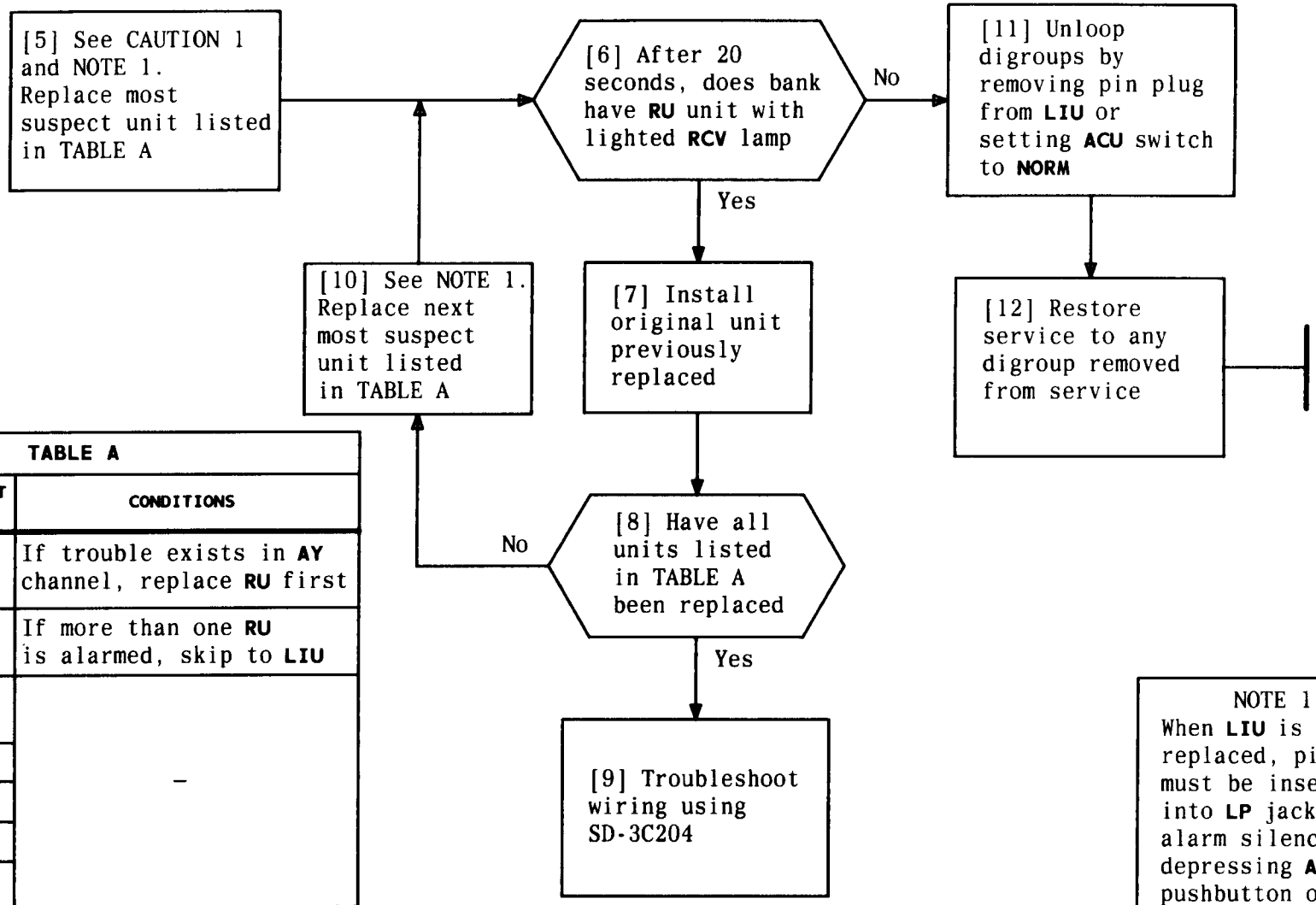


TABLE A

UNIT*	REPLACEMENT PROCEDURE	CONDITIONS
TU	DLP-500	If trouble exists in AY channel, replace RU first
RU ACU	DLP-500	If more than one RU is alarmed, skip to LIU
LIU	DLP-500	–
TPU	DLP-503	
PU†	DLP-501	
OIU	DLP-500	
PDU	DLP-502	

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

† Switch must be set to ON after PU is replaced

NOTE 1

When LIU is replaced, pin plug must be inserted into LP jack and alarm silenced by depressing ACO pushbutton on ACU

CAUTION 1
Conditions in TABLE A affect service

CLEAR AUDIBLE ALARM, AY LAMP LIGHTED, ALARM CONTROL UNIT (ACU)

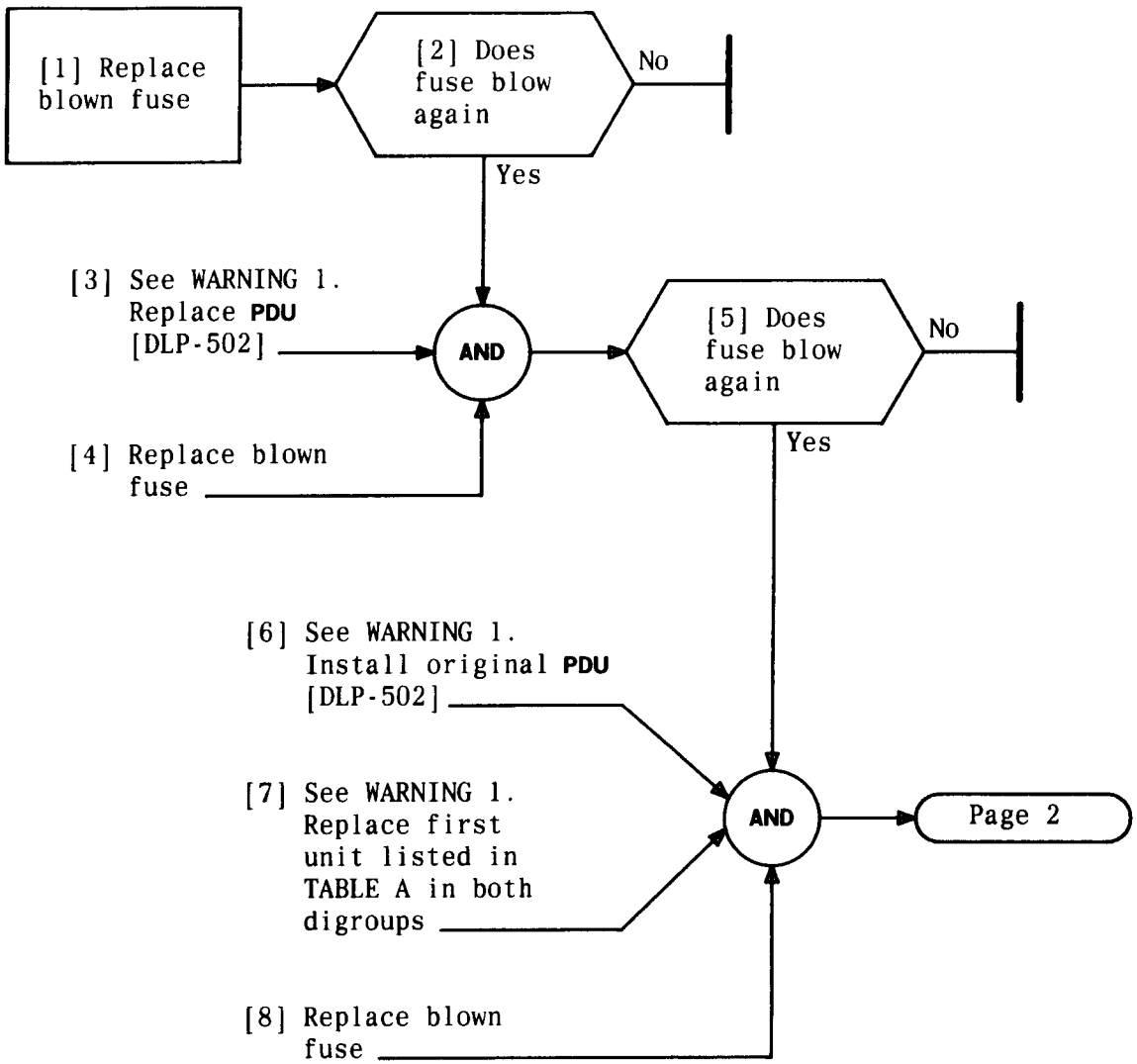
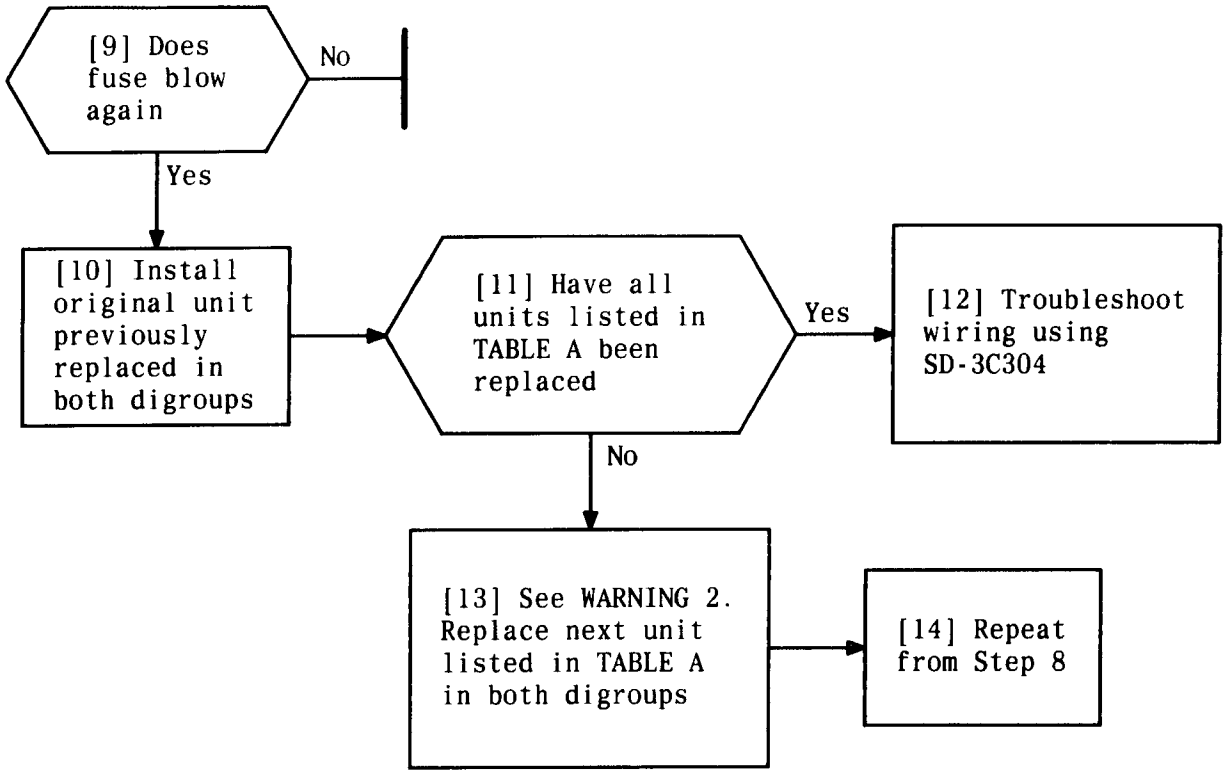


TABLE A	
AFFECTED UNITS	REPLACEMENT PROCEDURE
ACU (A)	DLP-500
ACU (B)	
TPU	DLP-503
OIU	DLP-500

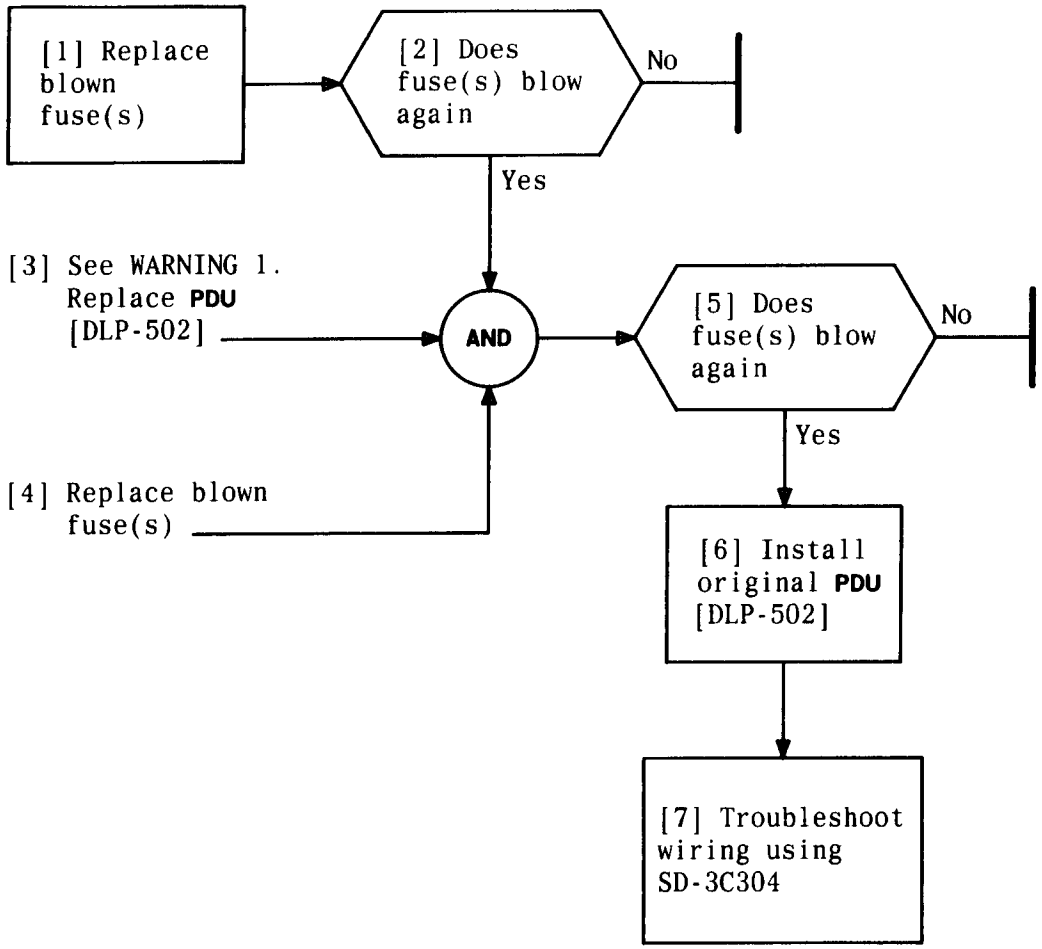
WARNING 1
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48ABS FUSE BLOWN



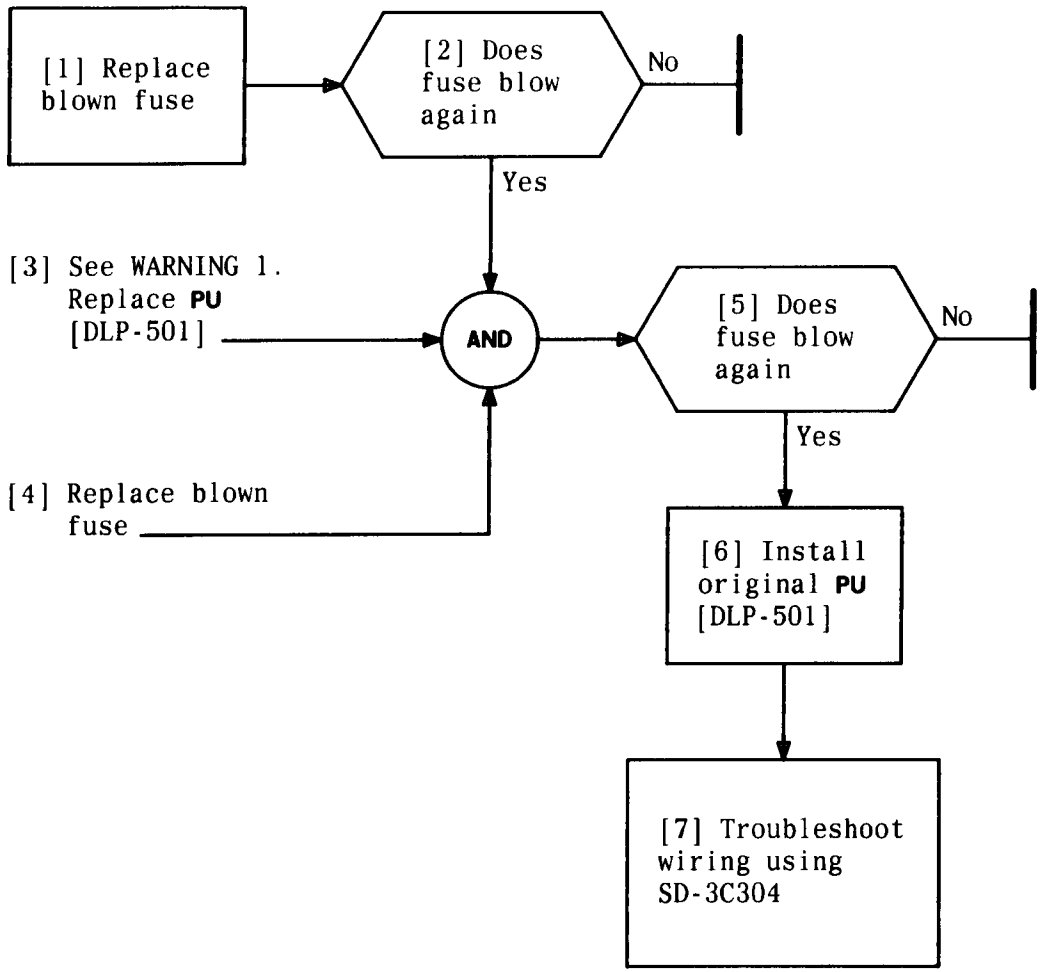
WARNING 2
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48ABS FUSE BLOWN



WARNING 1
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48V MAIN 10A/ALM FUSE BLOWN



WARNING 1
Misaligned unit may cause circuit malfunction

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CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48V FUSE BLOWN

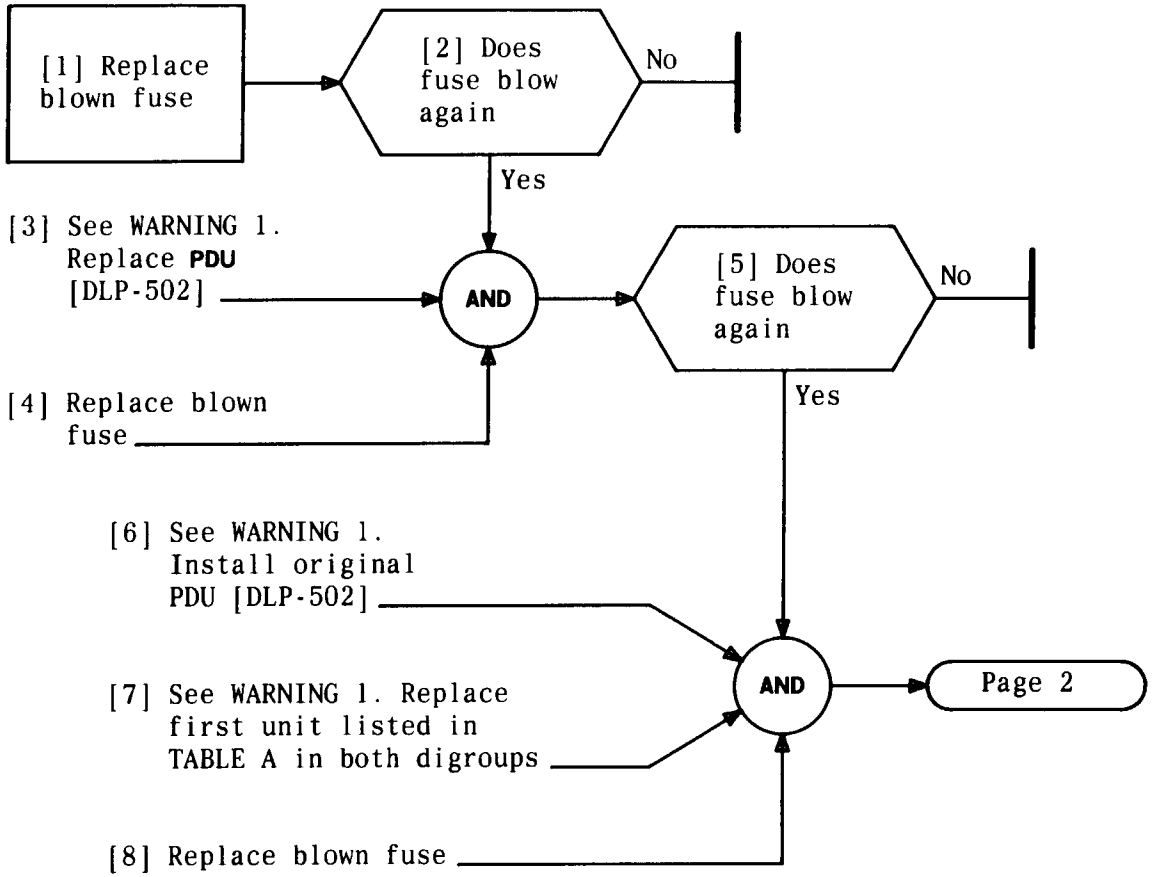
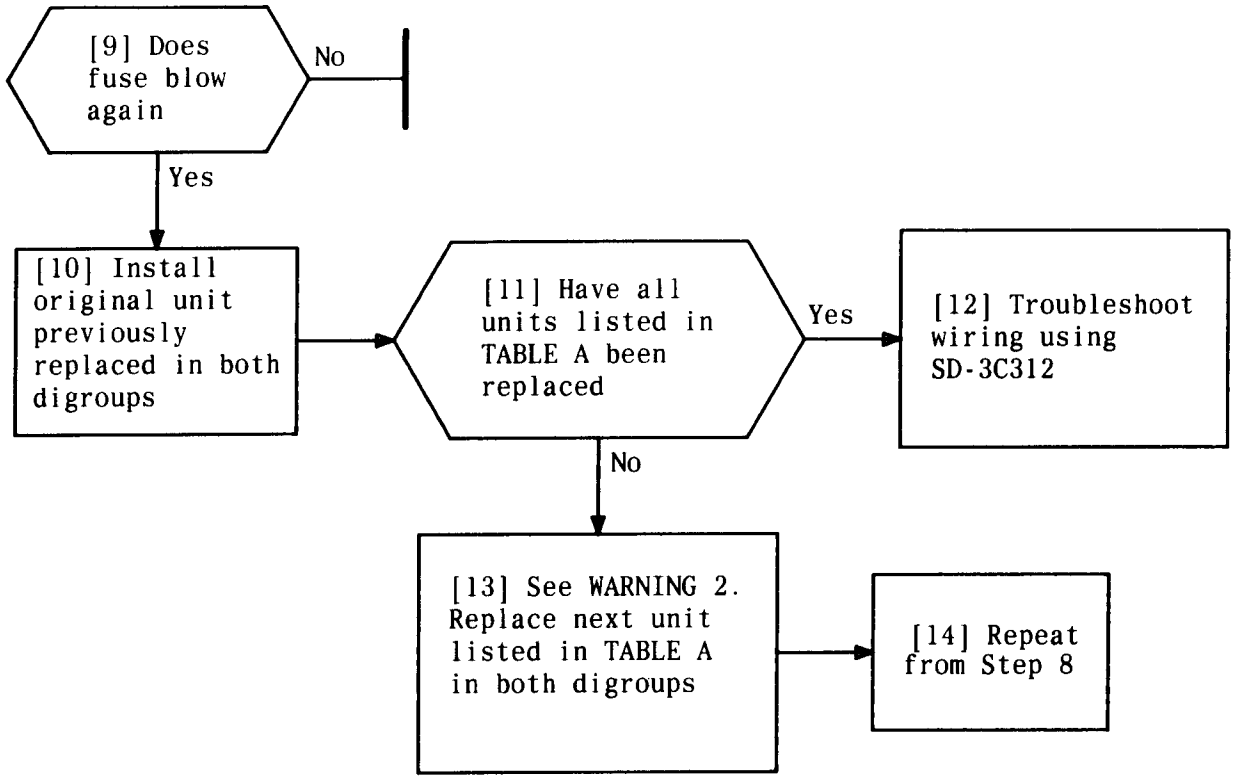


TABLE A	
AFFECTED UNITS	REPLACEMENT PROCEDURE
ACU (A)	DLP-500
TPU	DLP-503
LIU	DLP-500

WARNING 1
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48S A FUSE BLOWN



WARNING 2
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48S A FUSE BLOWN

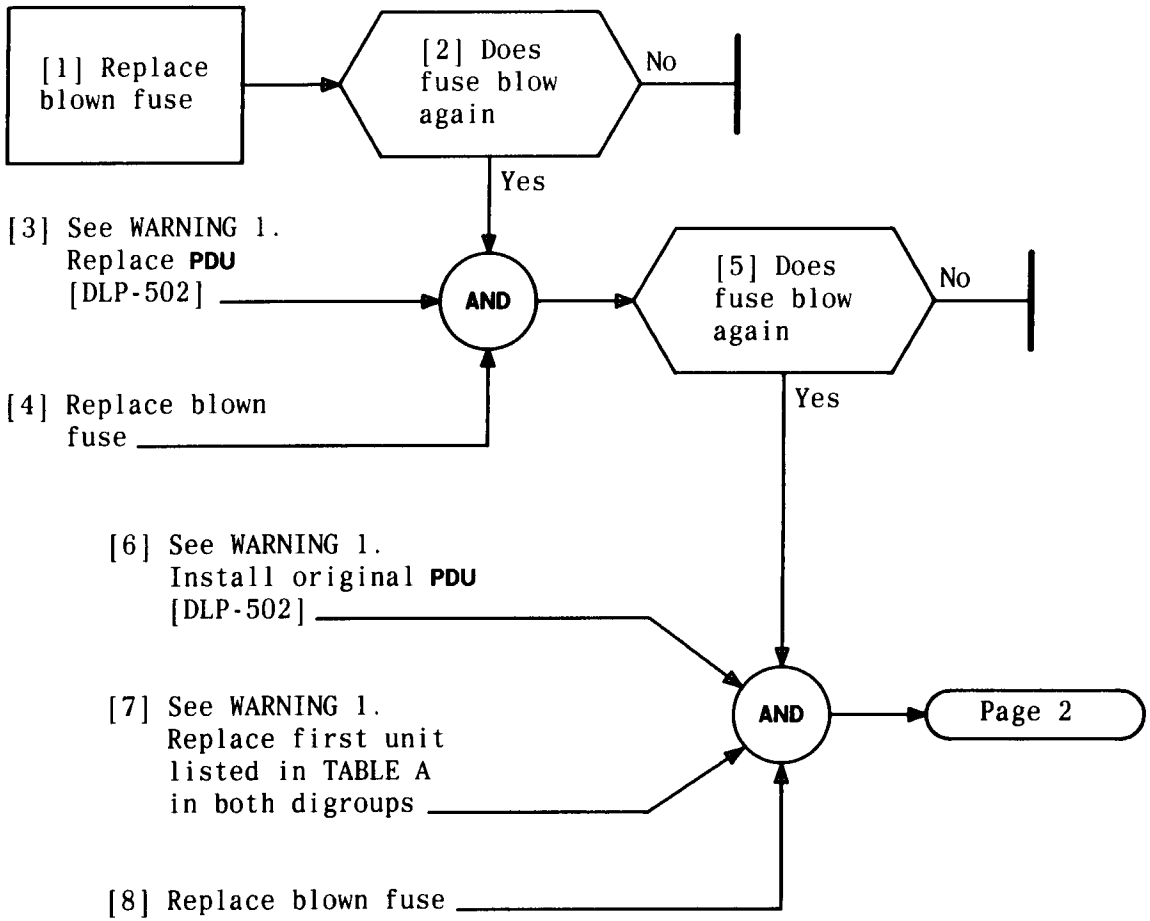
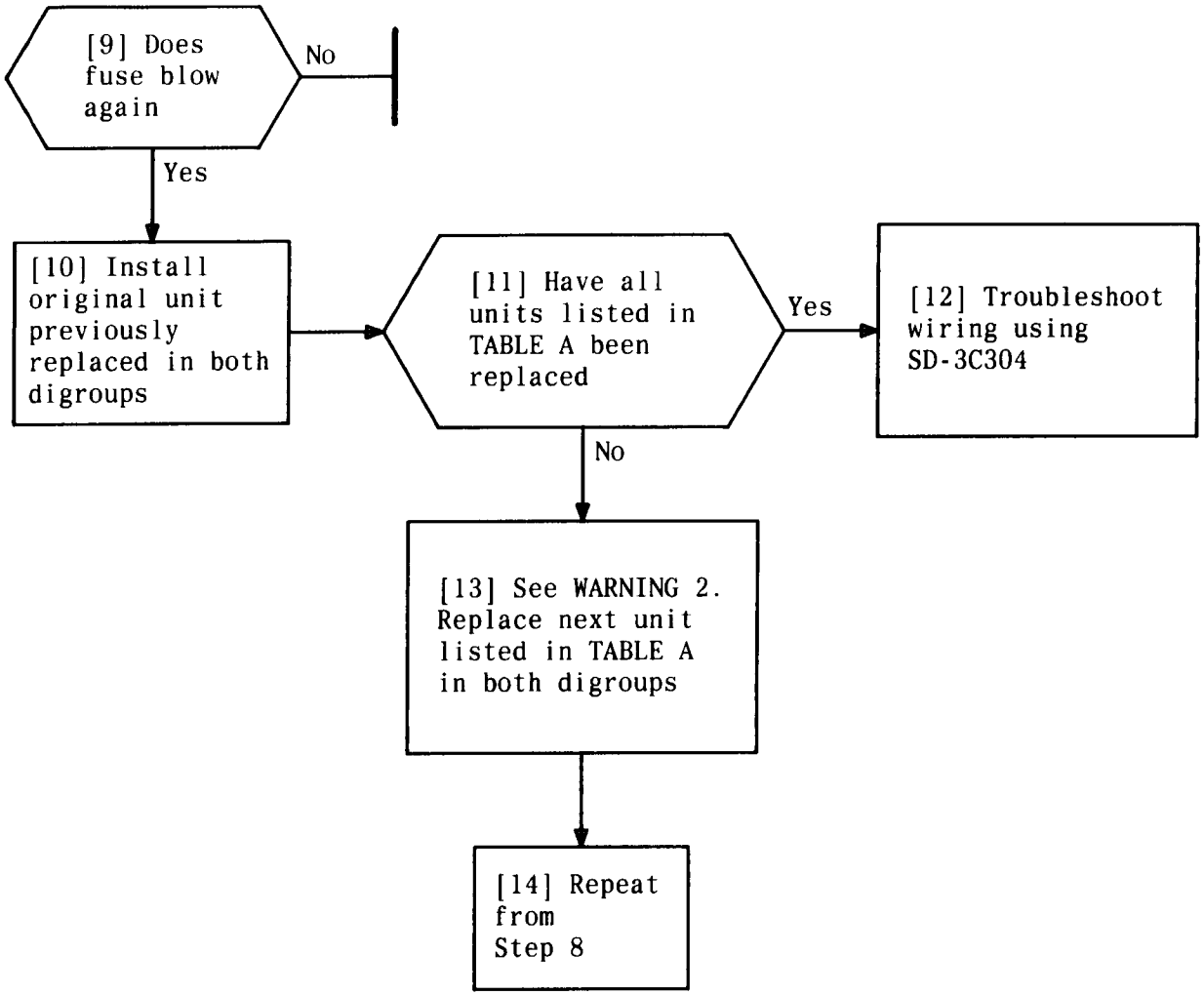


TABLE A	
AFFECTED UNITS	REPLACEMENT PROCEDURE
ACU (B)	DLP-500
TPU	DLP-503
LIU	DLP-500

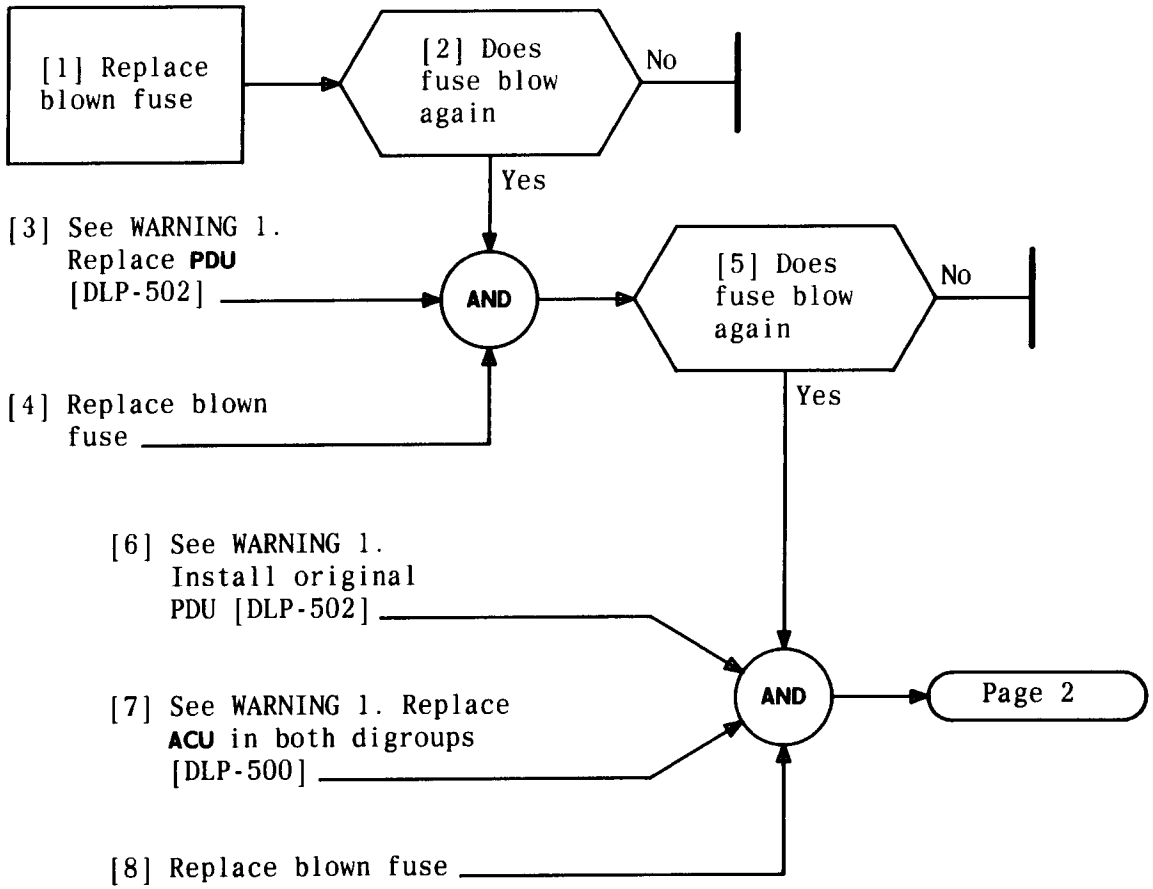
WARNING 1
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48S B FUSE BLOWN



WARNING 2
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48S B FUSE BLOWN



CLEAR AUDIBLE ALARM, ALM LED LIGHTED, -48F A FUSE BLOWN

WARNING 1 *Misaligned unit may cause circuit malfunction*	
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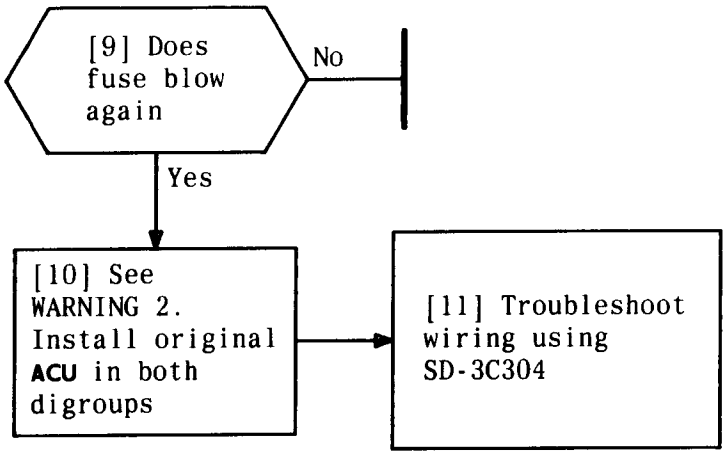


WARNING 2
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48F A FUSE BLOWN

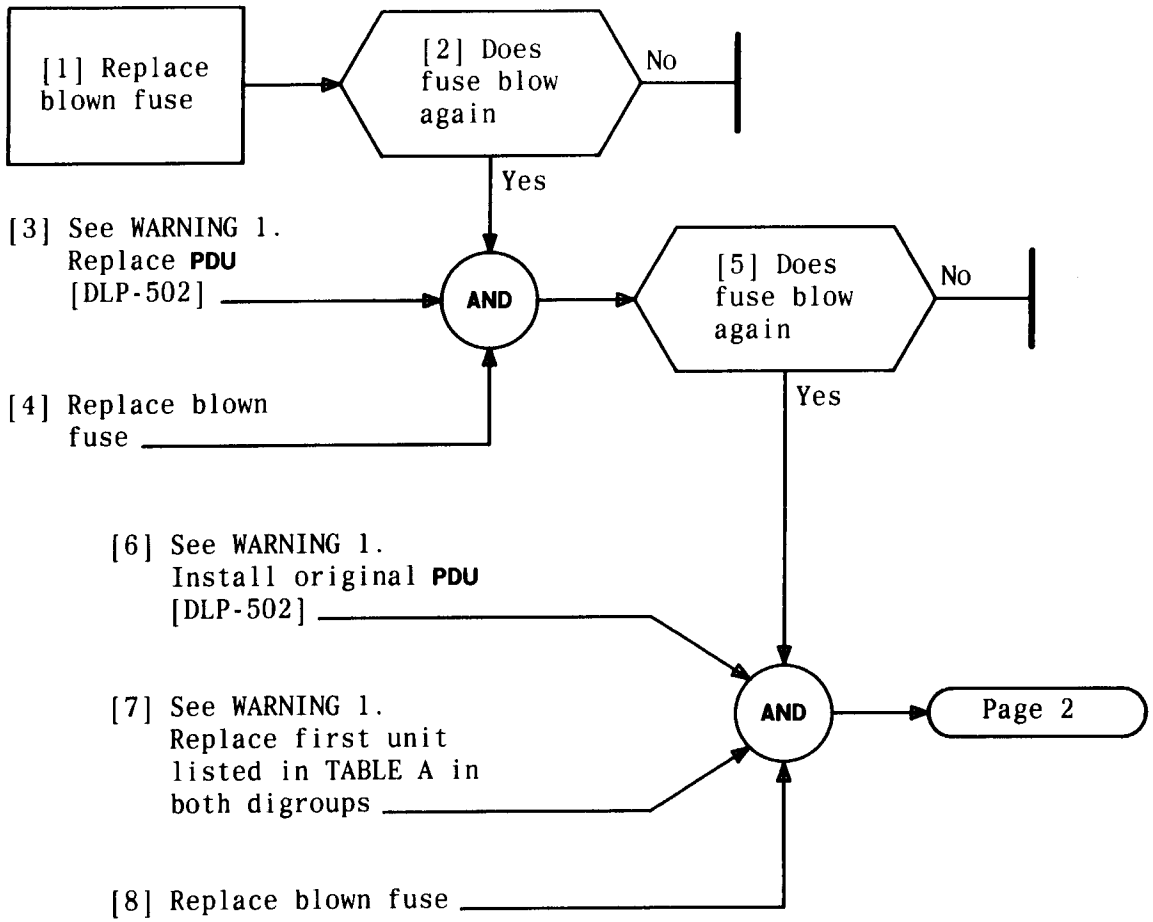
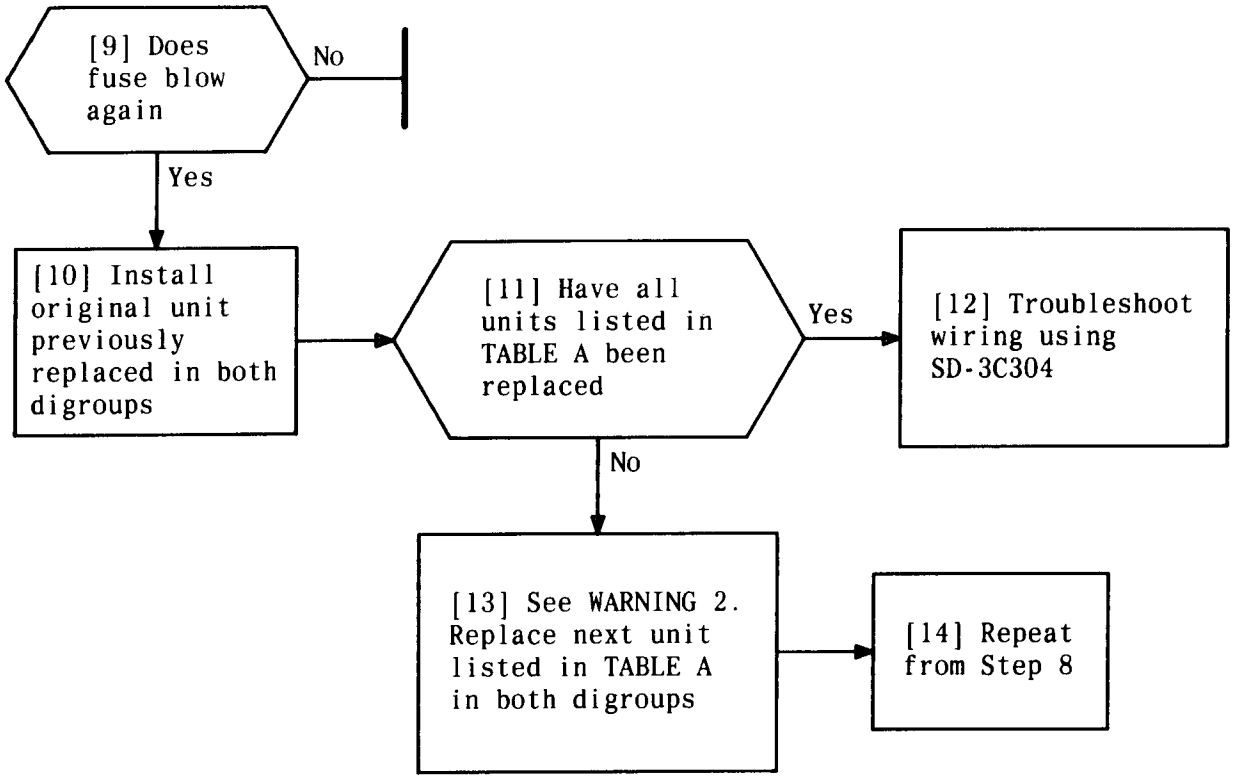


TABLE A	
AFFECTED UNITS	REPLACEMENT PROCEDURE
ACU (B)	DLP-500
TPU	DLP-503
LIU	DLP-500

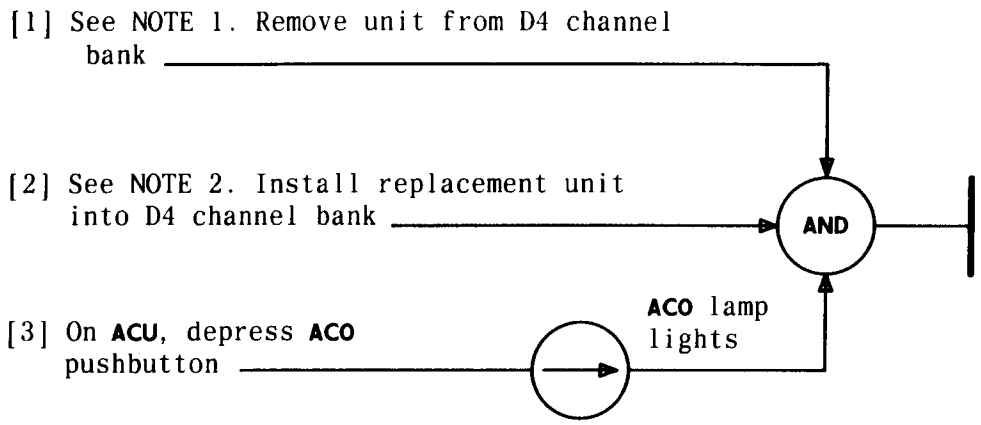
WARNING 1
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48F B FUSE BLOWN



WARNING 2
Misaligned unit may cause circuit malfunction

CLEAR AUDIBLE ALARM, ALM LED LIGHTED, –48F B FUSE BLOWN



NOTES

1. Removal of power is not necessary to remove these units from D4 channel banks
2. Holding latch down while installing unit results in smooth insertion

REPLACE PLUG-IN UNITS (TU, RU, ACU, LIU, OIU), D4 CHANNEL BANK

[1] On **PU**, set **ON/OFF** switch to **OFF** and remove power converter unit [FIG. 1]

[2] On replacement **PU**, set **ON/OFF** switch to **OFF** and insert into **D4** channel bank

FAIL and **ACO** lamps light

[3] On **PU**, set **ON/OFF** switch to **ON**

FAIL and **ACO** lamps go off

AND

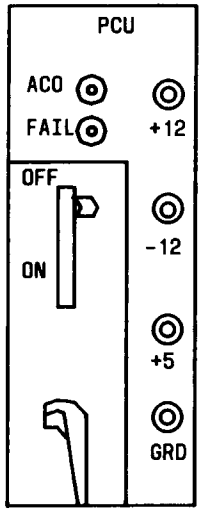


FIG. 1 – Power Converter Unit

REPLACE POWER UNIT (PU)

[1] On **PDU**, remove **–48 MAIN** fuses (**ALM** first, then **10A**) and **–48ABS** fuse

[2] At rear of D4 channel bank, unscrew fastener holding **PDU** [FIG. 1]

[3] Remove plastic shield and loosen terminal strip screws 2, 3, and 4 [FIG. 1]

[4] See DANGER 1. Remove spade lugs from terminal strip

[5] Remove **PDU**, using handle

AND

[6] See DANGER 1. Insert and fasten replacement **PDU**

[7] See TABLE A. Connect spade lugs to terminal strip and replace plastic shield

[8] Replace fuses removed

AND

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

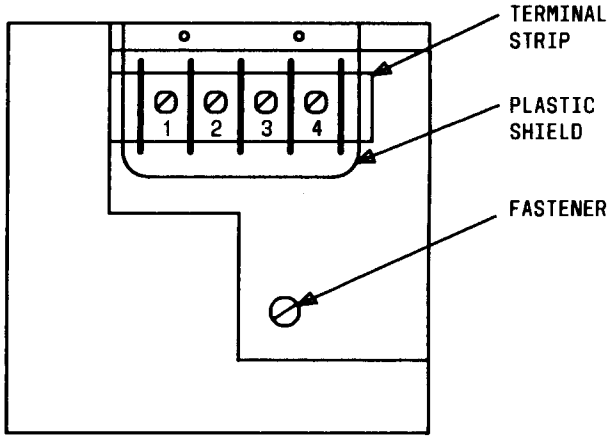


FIG. 1 – Rear View of PDU Slot

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

REPLACE POWER DISTRIBUTION UNIT (PDU)

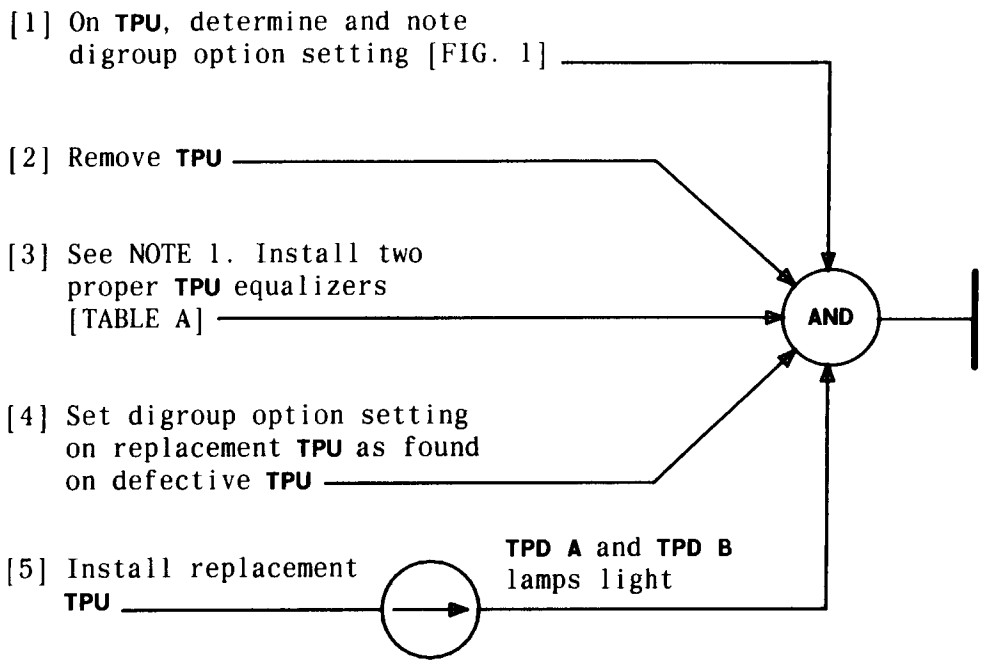


TABLE A						
LIU-3	LIU-3B OR LIU-3 ESF					
EQUALIZER CARD	SWITCH S1 POSITIONS (NOTE)					
	DIGROUP A			DIGROUP B		
	1	2	3	4	5	6
ED-3655-( ) G1 or G6	0	0	0	0	0	0
ED-3655-( ) G2 or G8	0	0	C	0	0	C
ED-3655-( ) G3	0	C	0	0	C	0
ED-3655-( ) G4	0	C	C	0	C	C
ED-3655-( ) G5	C	0	0	C	0	0

Note: 0 = Switch Open (Depressed toward OPEN)
C = Switch Closed (depressed toward switch number)

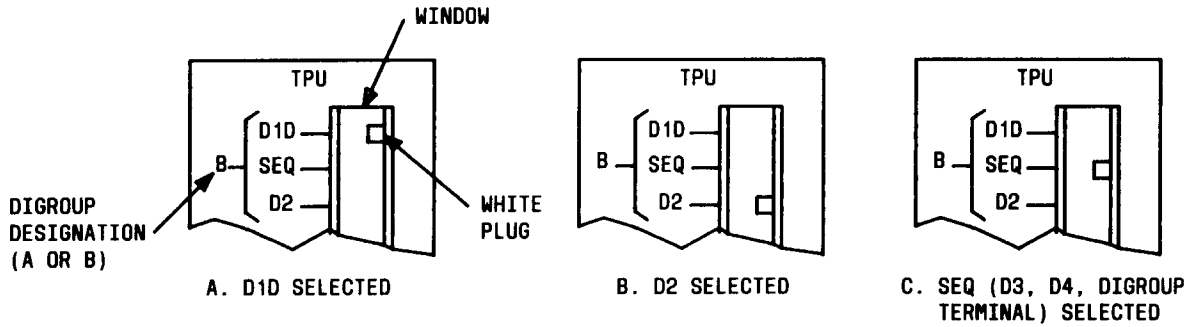


FIG. 1 – Digroup Option Settings

NOTE 1

Equalizers may be taken from TPU removed from channel

REPLACE TRUNK PROCESSING UNIT (TPU)

[1] Is J98718AL portable test set to be used

No → Page 2

Yes

[2] Open portable test set and remove cords

[3] Is J98718AJ **CAU** [FIG. 1] installed in portable test set

Yes

No

[4] Obtain **CAU** and install in portable test set

[5] Connect power cord to 115V, 60 Hz power outlet

[6] On portable test set [FIG. 1], set **PWR** switch to **ON**

AND

Portable test set powered → Page 2

-48V lamp lights

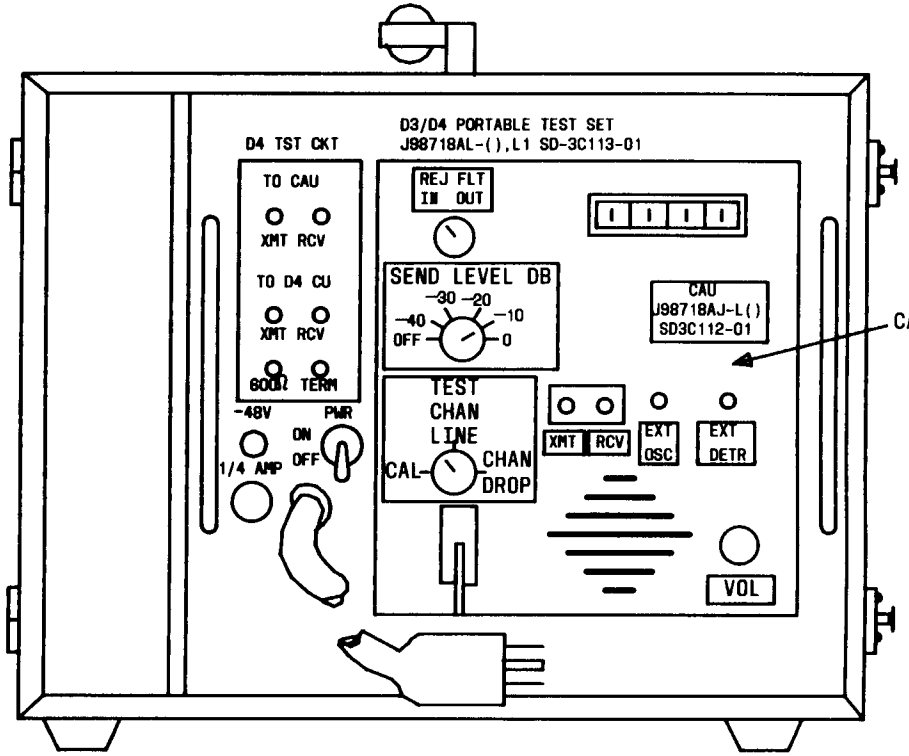


FIG. 1 – Portable Test Set Equipped With CAU (Front View)

CHECK CALIBRATION, CHANNEL ACCESS UNIT (CAU)

On **CAU** [FIG. 2]:

[7] Set **REJ FLT** switch to **OUT**

[8] Set **SEND LEVEL DB** switch to **OFF**

[9] Set **TEST** switch to **CAL**

Meter pointer at left side of scale

AND

[10] Does meter pointer indicate within **RAISED BLACK INDEX** of scale [FIG. 2]

No → [11] **CAU** is out of calibration. Obtain another **CAU** and repeat from Step 5

Yes → [12] Is **CAU** speaker emitting sound

Yes → [15] Set **TEST** switch to **CHAN LINE** and rotate **VOL** control counterclockwise if sound is not desired

No → [13] Rotate **VOL** control clockwise

No → [14] Obtain another **CAU** and repeat from Step 1

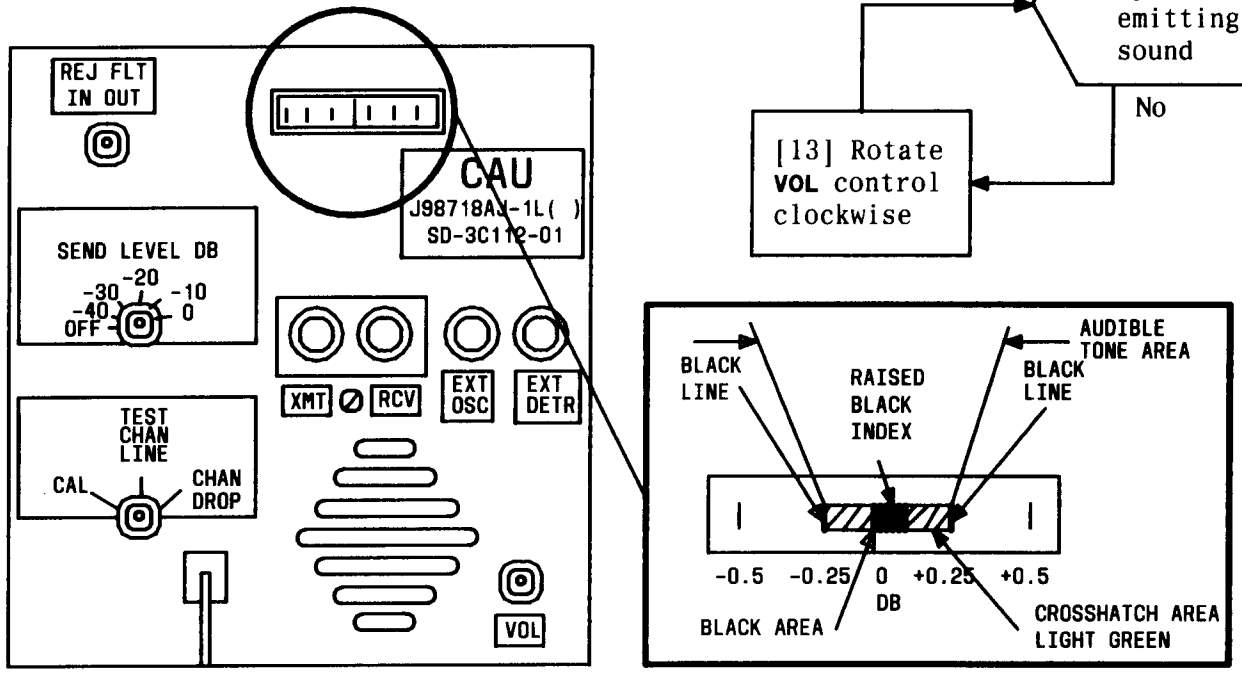
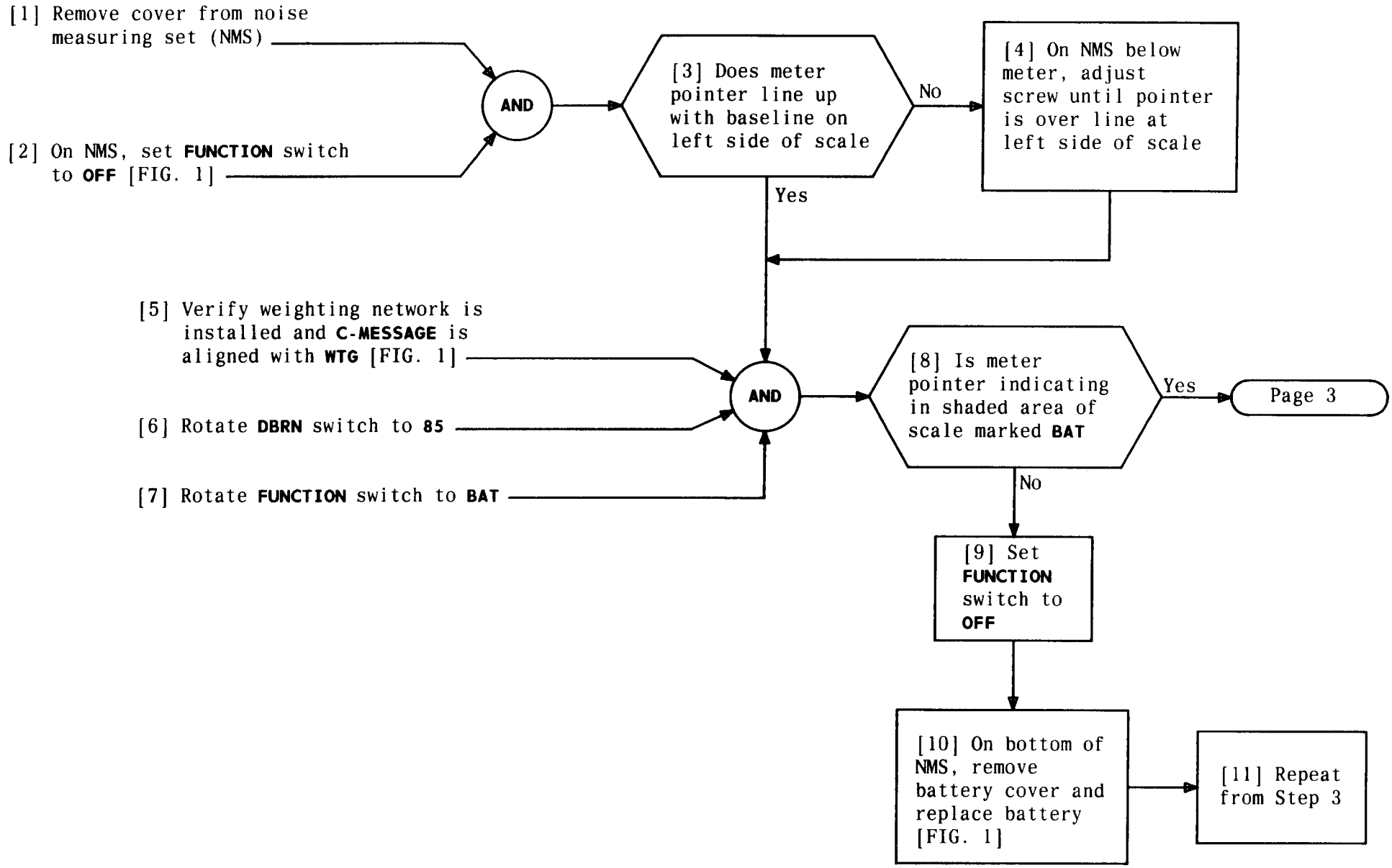


FIG. 2 – CAU Controls

CHECK CALIBRATION, CHANNEL ACCESS UNIT (CAU)



CHECK CALIBRATION, 3-TYPE NOISE MEASURING SET (NMS)

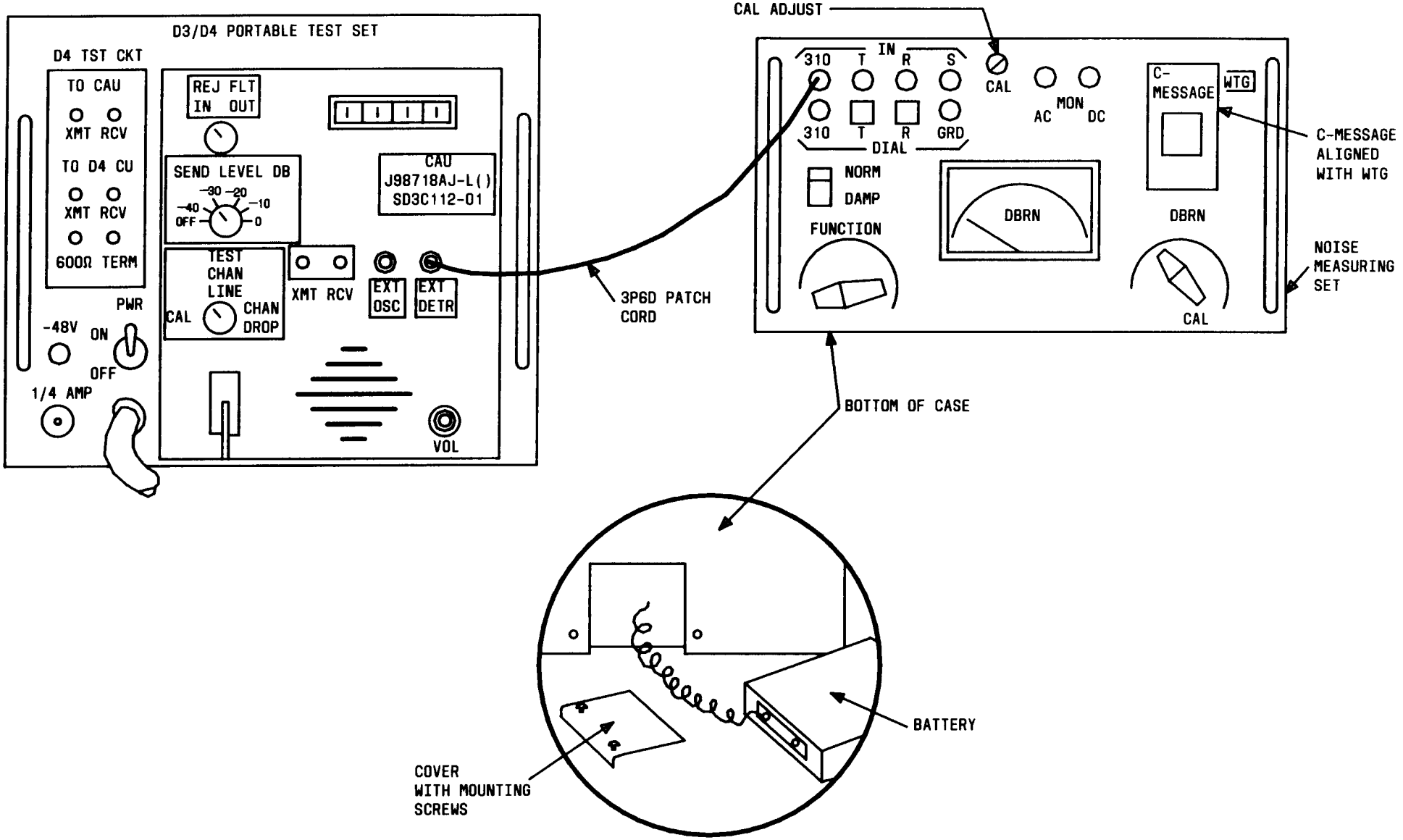
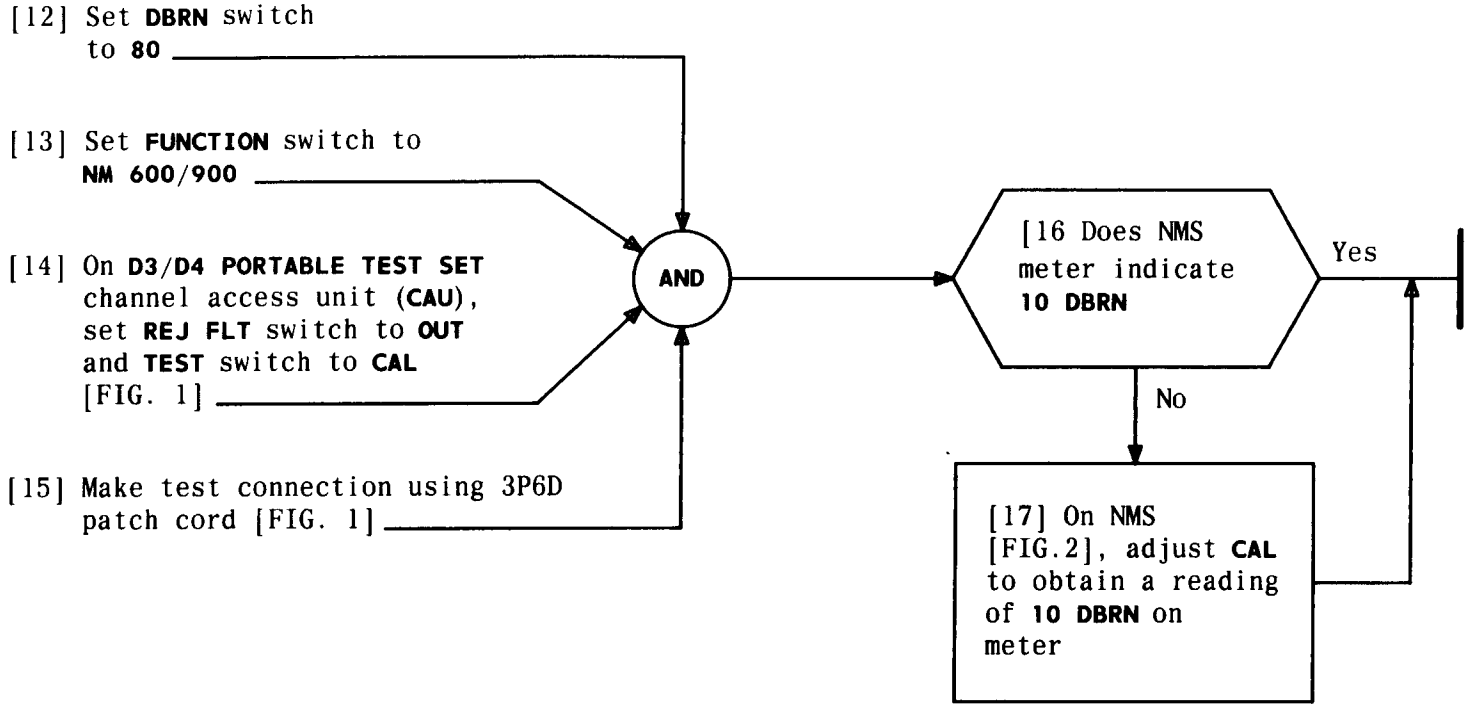


FIG. 1 – Noise Measuring Set and Portable Test Set – Controls and Patch Cord Connections

CHECK CALIBRATION, 3-TYPE NOISE MEASURING SET (NMS)



CHECK CALIBRATION, 3-TYPE NOISE MEASURING SET (NMS)

TEST GAIN AND NET LOSS, LOOPED D4 CHANNEL BANK RECEIVER

SUMMARY

Make test connections using patch cords [FIG. 1]. Insert pin plug into **R CODE** jack 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 With Channel Access Unit (**CAU**)	J98718AL PTS and J98718AJ CAU
2 Patch Cords	3P6A
1 Patch Cord	P6AD
Pin Plug	KS-19531

[1] Obtain test equipment [TABLE A]

[2] See NOTE 1. Check calibration of CAU [DLP-504]

[3] On **CAU**, set **TEST** switch to **CHAN LINE** and **REJ FLT** switch to **OUT** [FIG. 1]

[4] Make test connections using appropriate patch cords [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** pushbutton on **ACU**

RCV lamp lights

AND

[7] Is **CAU** meter pointer indicating in black area of meter

Yes → Page 3

No

[8] Replace **RU [DLP-500]**

[9] Repeat from Step 4

NOTE 1

When using **CAU** for series of tests, calibration is required only once; unless **CAU** is suspected of causing trouble

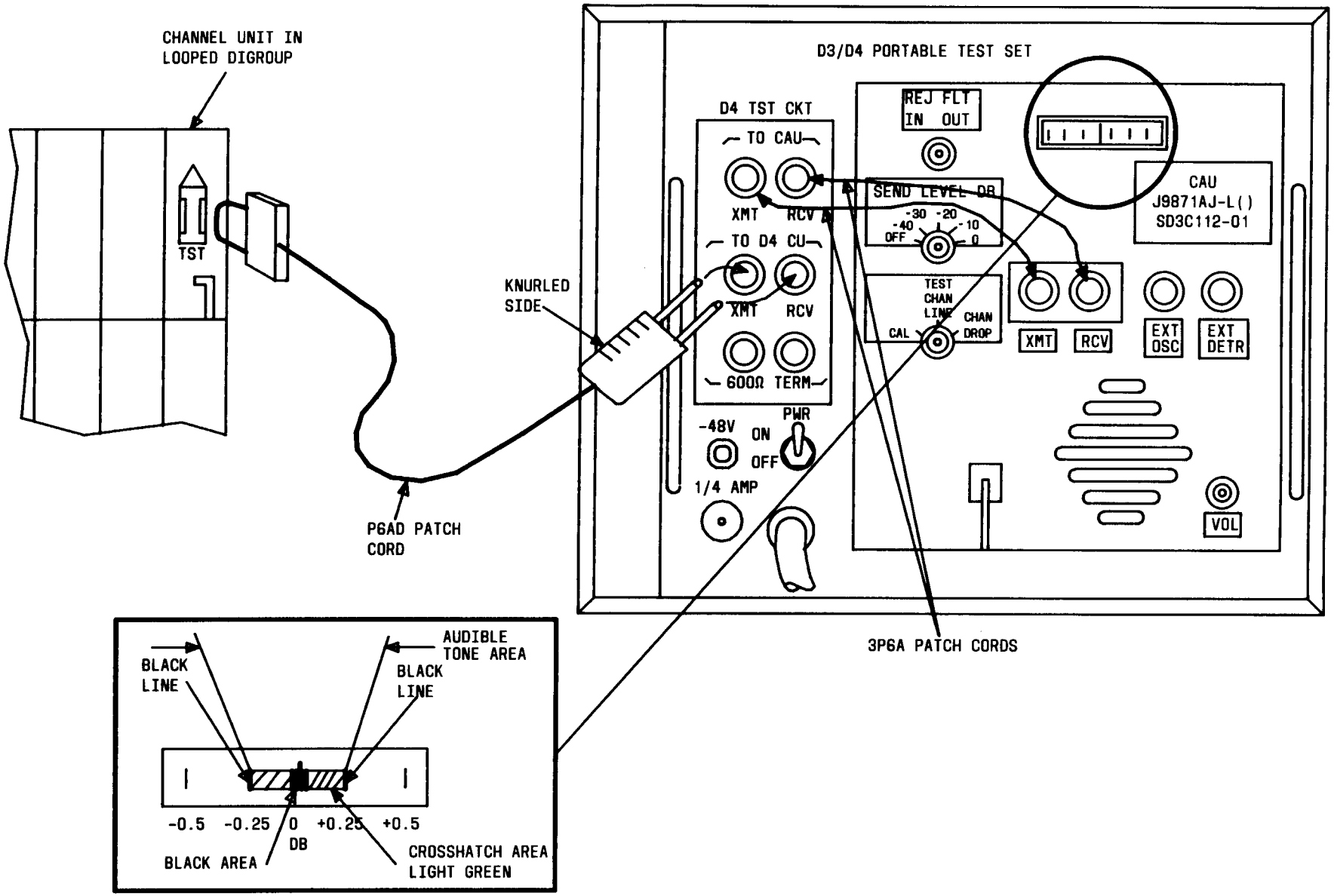
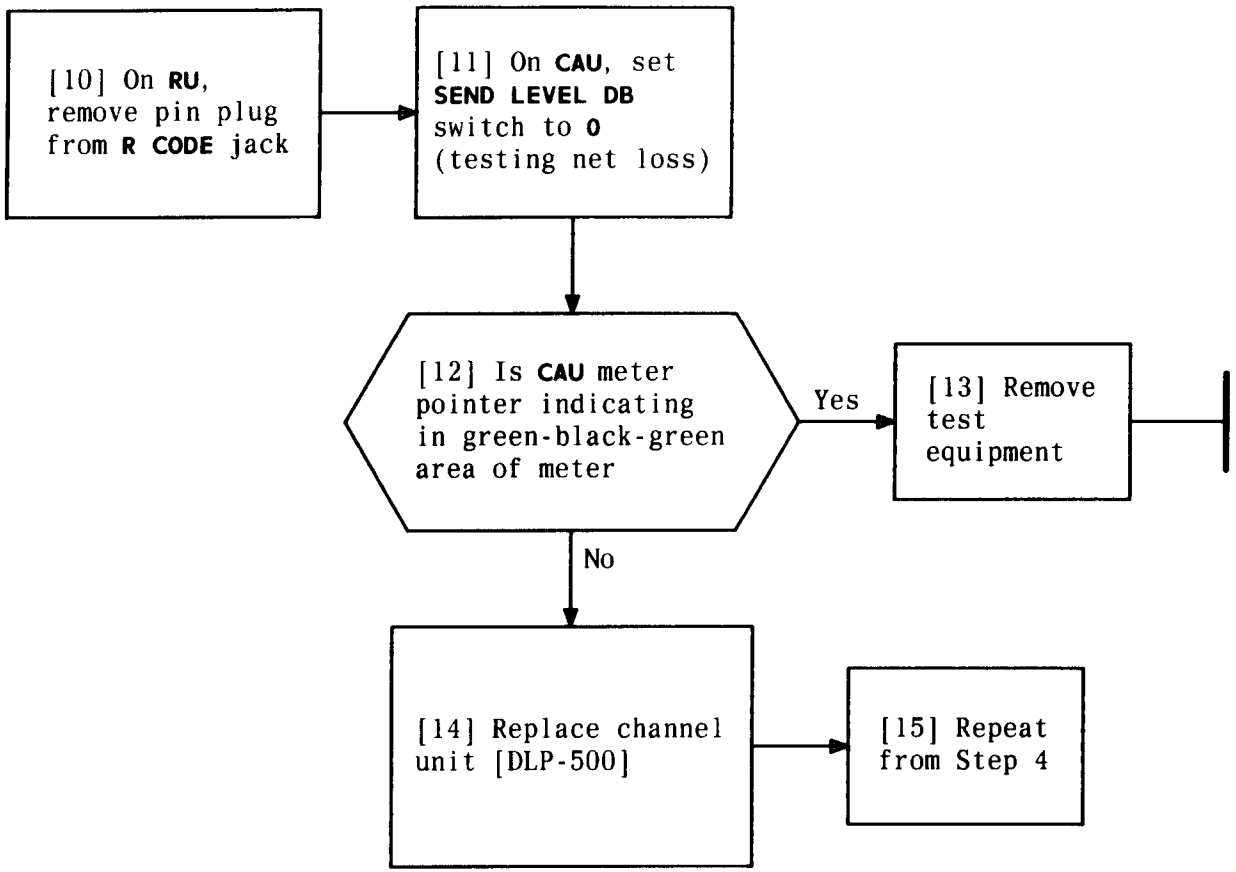


FIG. 1 – Looped D4 Channel Bank Receiver Gain and Net Loss Test Connections

TEST GAIN AND NET LOSS, LOOPED D4 CHANNEL BANK RECEIVER

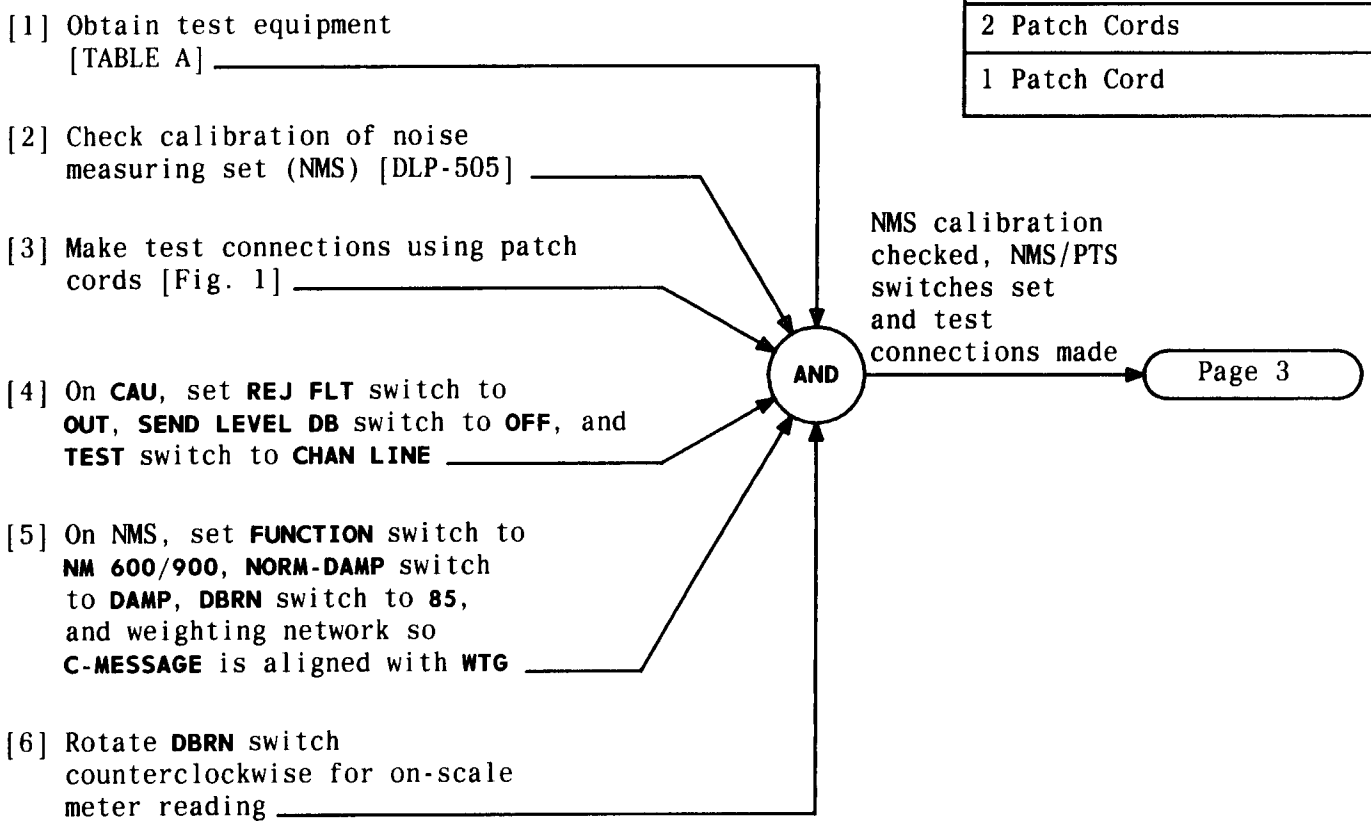


TEST GAIN AND NET LOSS, LOOPED D4 CHANNEL BANK RECEIVER

SUMMARY

Make test connections using patch cords [FIG. 1], and measure noise level. Level should be 23 dBrn 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	3P6D



TEST LOOPED IDLE CIRCUIT FOR NOISE

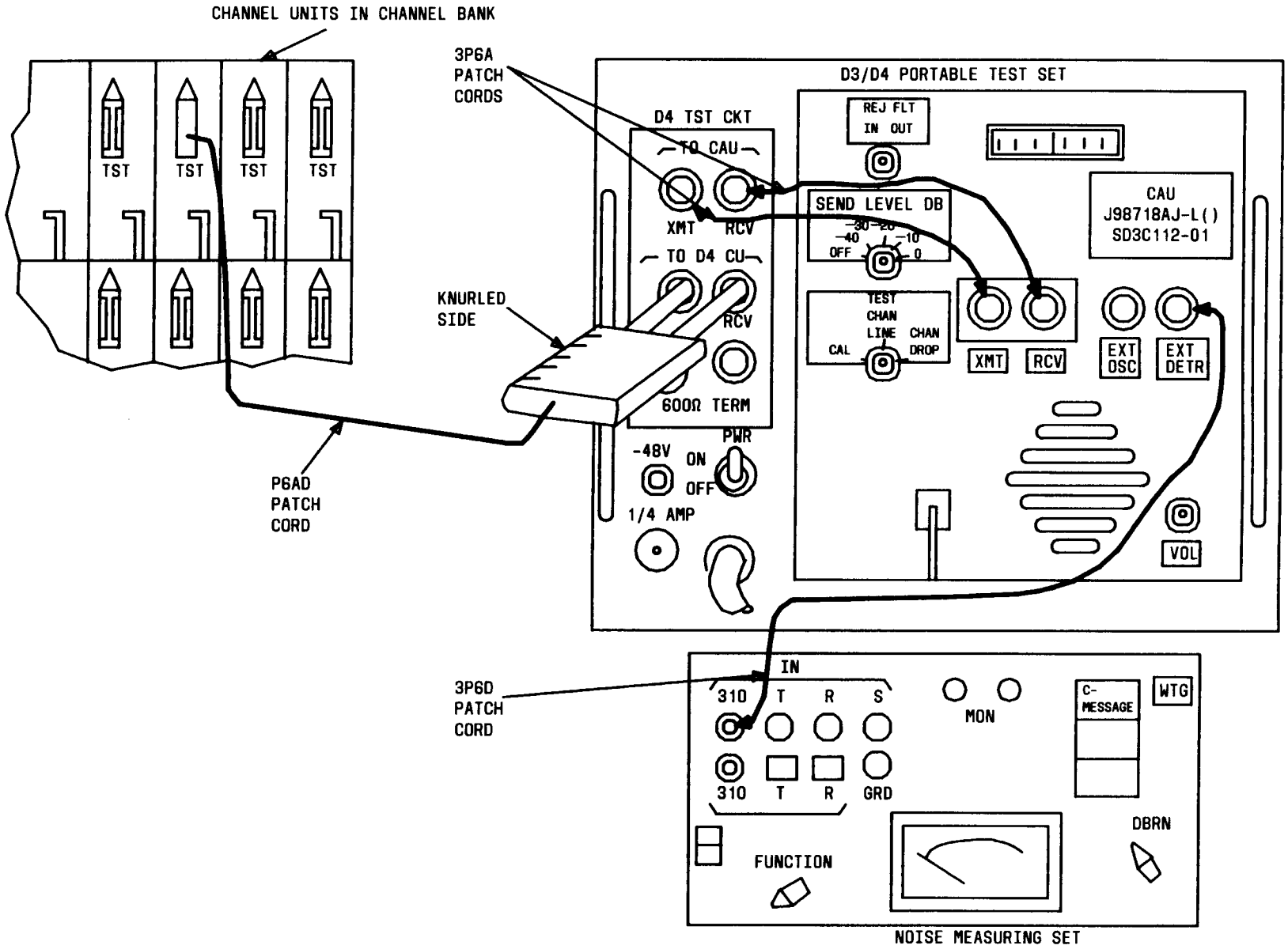


FIG. 1 – Noise Test Connections

TEST LOOPED IDLE CIRCUIT FOR NOISE

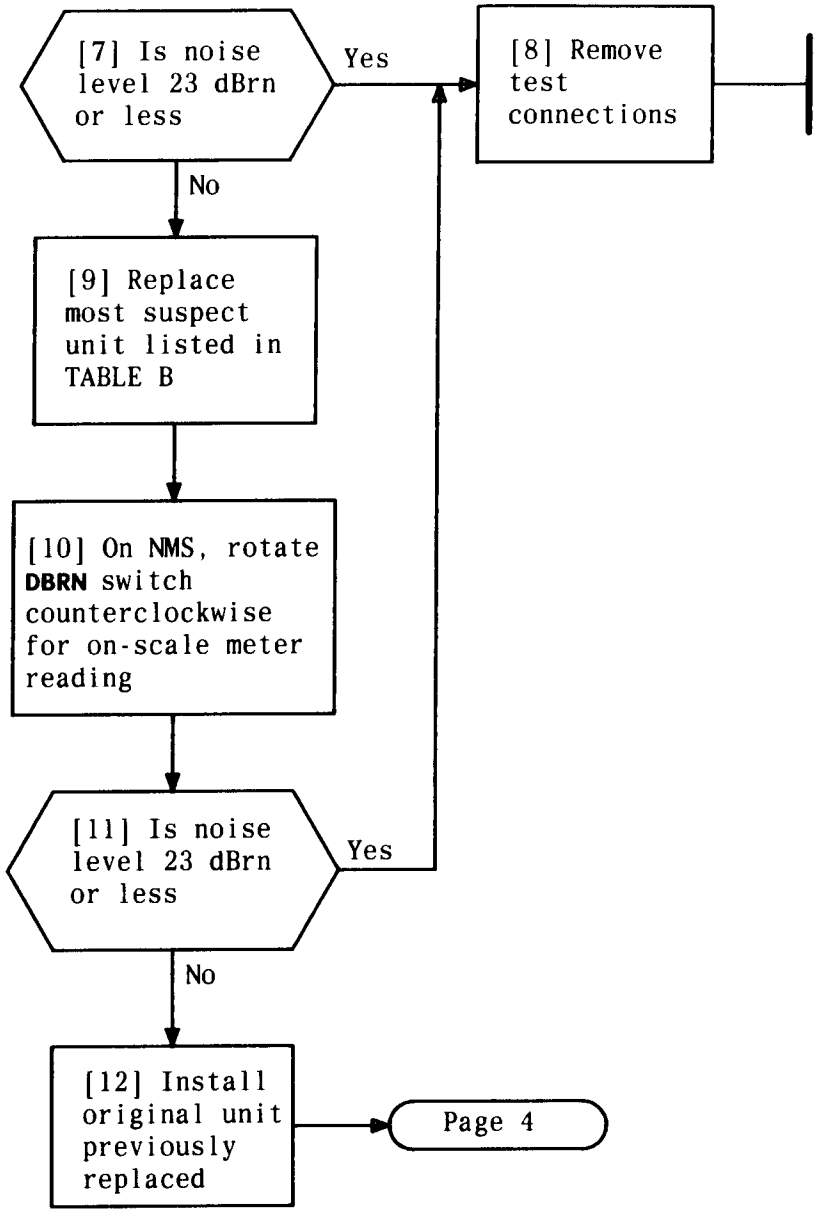
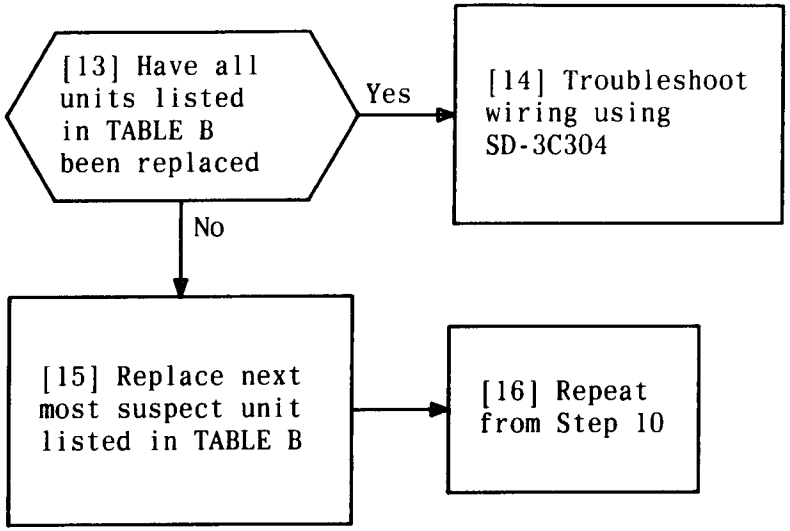


TABLE B		
UNIT*	**REPLACEMENT PROCEDURE**	**CONDITIONS**
CU	DLP-500	Channel unit under test
TU	DLP-500	If trouble exists in **AY** channel, replace **RU** first
RU ACU	DLP-500	If more than one **RU** is alarmed, skip to **LIU**
LIU	DLP-500	Pin plug must be inserted in **LP** jack and alarm silenced by depressing **ACO** pushbutton on **ACU**
TPU	DLP-503	–
PU†	DLP-501	
OIU	DLP-500	
PDU	DLP-502	

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

† Switch must be set to **ON** after **PU** is replaced

TEST LOOPED IDLE CIRCUIT FOR NOISE



TEST LOOPED IDLE CIRCUIT FOR NOISE

TEST LOOPED CHANNEL BANK FOR DISTORTION

SUMMARY

Make test connections using patch cords [FIG. 1] and measure noise for proper requirements [TABLE B].

[1] Obtain test equipment [TABLE A]

[2] See NOTE 1. Check calibration of **CAU** [DLP-504]

[3] Check calibration of noise measuring set (NMS) [DLP-505]

[4] On NMS, set **FUNCTION** switch to **NM 600/900**, **NORM-DAMP** switch to **DAMP**, **DBRN** switch to **85**, and weighting network so **C-MESSAGE** is aligned with **WTG** [FIG. 1]

[5] On **CAU**, set **REJ FLT** switch to **IN**, **TEST** switch to **CHAN LINE**, and **SEND LEVEL DB** switch to **0** [FIG. 1]

[6] Make test connections using patch cords [FIG. 1]

[7] See TABLE B. On NMS, measure for requirements at each position of **SEND LEVEL DB** switch. NMS **DBRN** switch must be rotated counterclockwise each time for on-scale meter reading

AND

Page 3

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

CAU SWITCH	POSITION	NMS METER INDICATION
SEND LEVEL DB	**0**	56 **DBRN** or less
	10	46 **DBRN** or less
	20	36 **DBRN** or less
	30	26 **DBRN** or less
	40	22 **DBRN** or less

NOTE 1

When using **CAU** for series of tests, calibration is required only once unless **CAU** is suspected of causing trouble

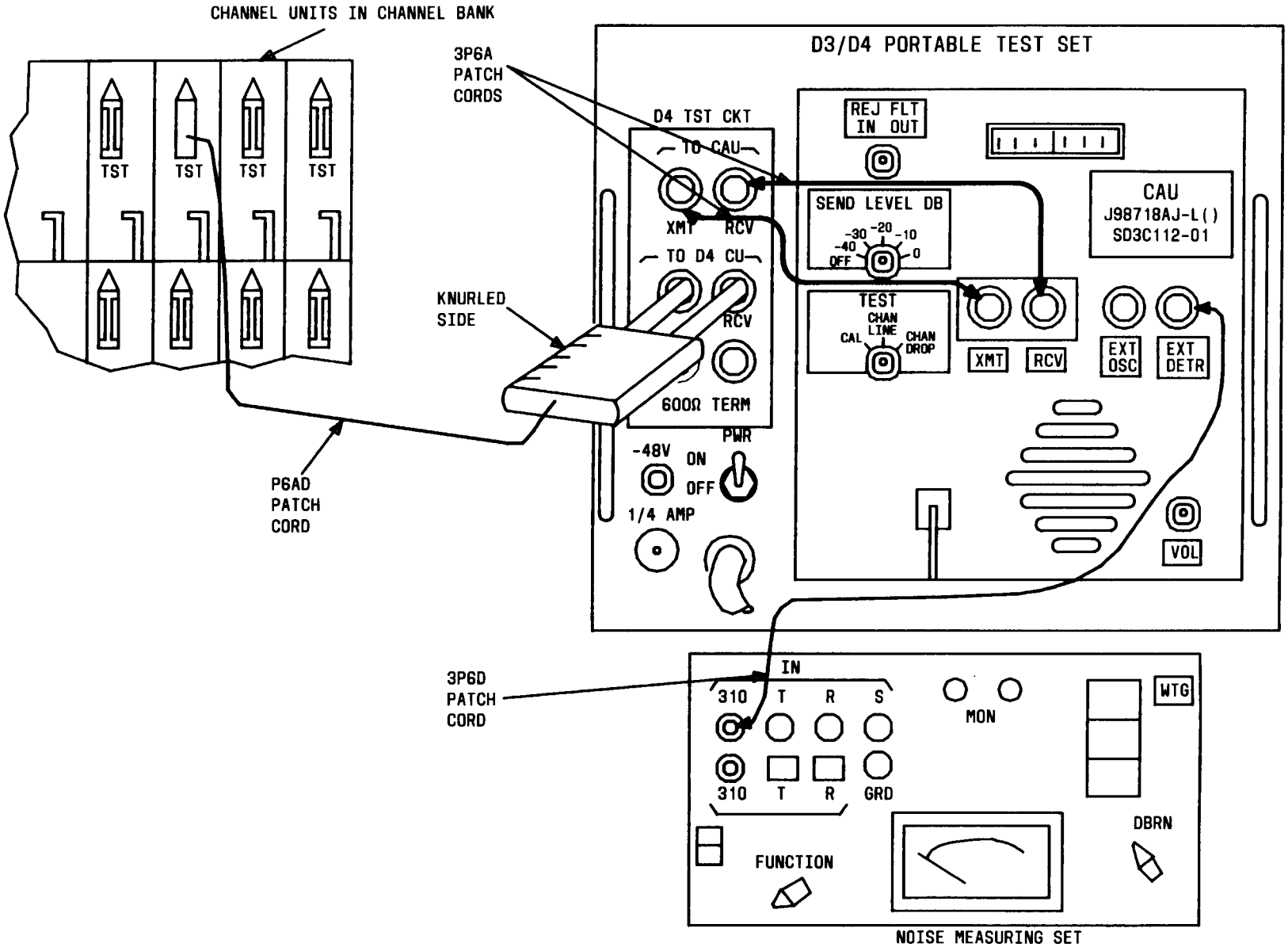


FIG. 1 – Distortion Test Connections

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TEST LOOPED CHANNEL BANK FOR DISTORTION

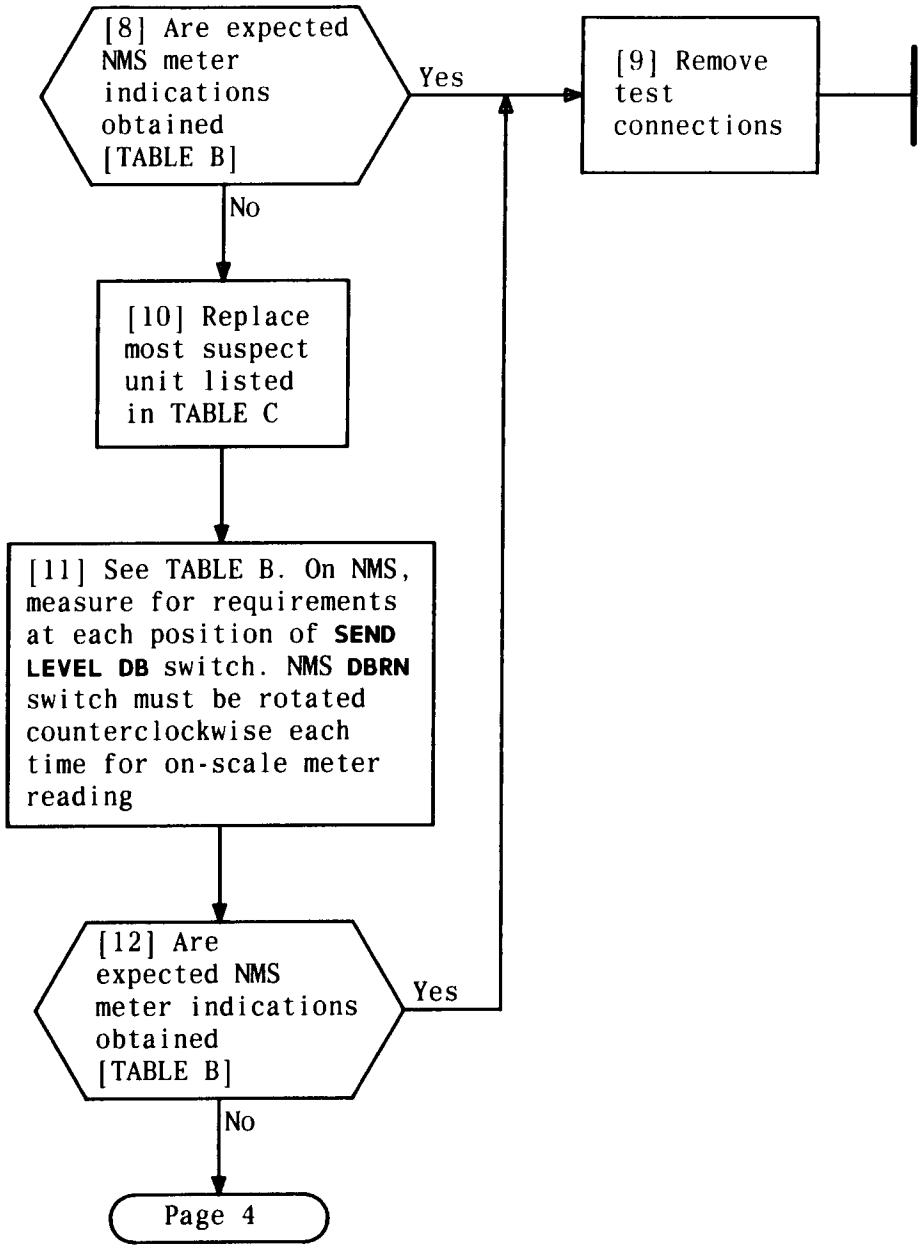


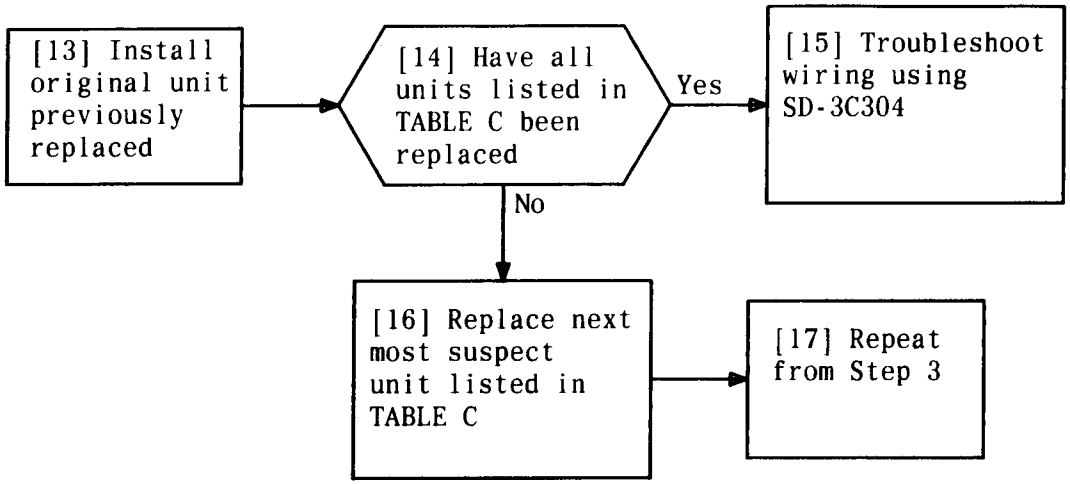
TABLE C

UNIT*	REPLACEMENT PROCEDURE	CONDITIONS
CU	DLP-500	Channel unit under test
TU	DLP-500	If trouble exists in **AY** channel, replace **RU** first
RU **ACU**	DLP-500	If more than one **RU** is alarmed, skip to **LIU**
LIU	DLP-500	Pin plug must be inserted in **LP** jack and alarm silenced by depressing **ACO** pushbutton on **ACU**
TPU	DLP-503	–
PU†	DLP-501	
OIU	DLP-500	
PDU	DLP-502	

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

† Switch must be set to **ON** after **PU** is replaced

TEST LOOPED CHANNEL BANK FOR DISTORTION



TEST LOOPED CHANNEL BANK FOR DISTORTION

TEST LOOPED CHANNEL BANK FOR CROSSTALK

SUMMARY

Make test connections using patch cords [FIG. 2]. Measure crosstalk on one channel while sending tone into one interfering channel [TABLE B]. Measure again while sending tone into second interfering channel. Requirement is 27 dBrn 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 [TABLE A]

[2] On **TPU**, locate digroup option setting for digroup to be tested [FIG. 1]

[3] Determine which option (**D1D**, **SEQ**, or **D2**) has been selected by location of white plug

[4] Select channel to be measured per identified digroup option [TABLE B]

[5] Determine two most likely interfering channels for channel being measured [TABLE B]

AND

[6] See NOTE 1. Are channel units provided in channel to be measured and interfering channels

Yes → Page 3

No → [7] Insert channel units in these 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

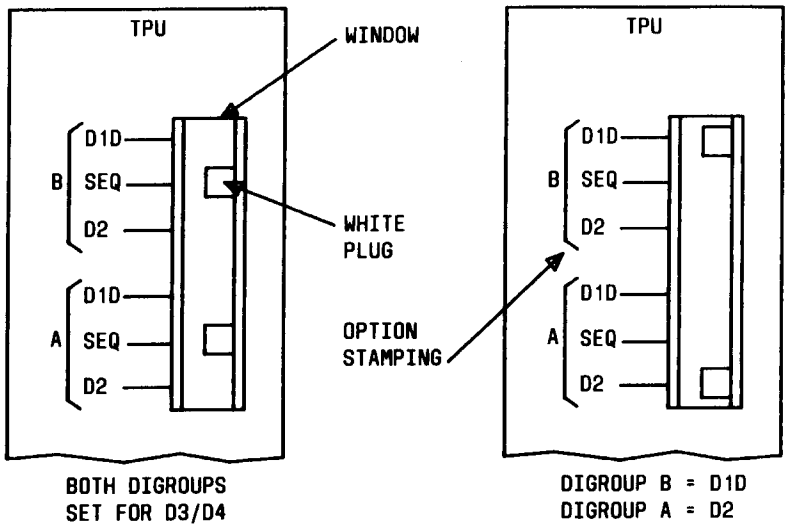
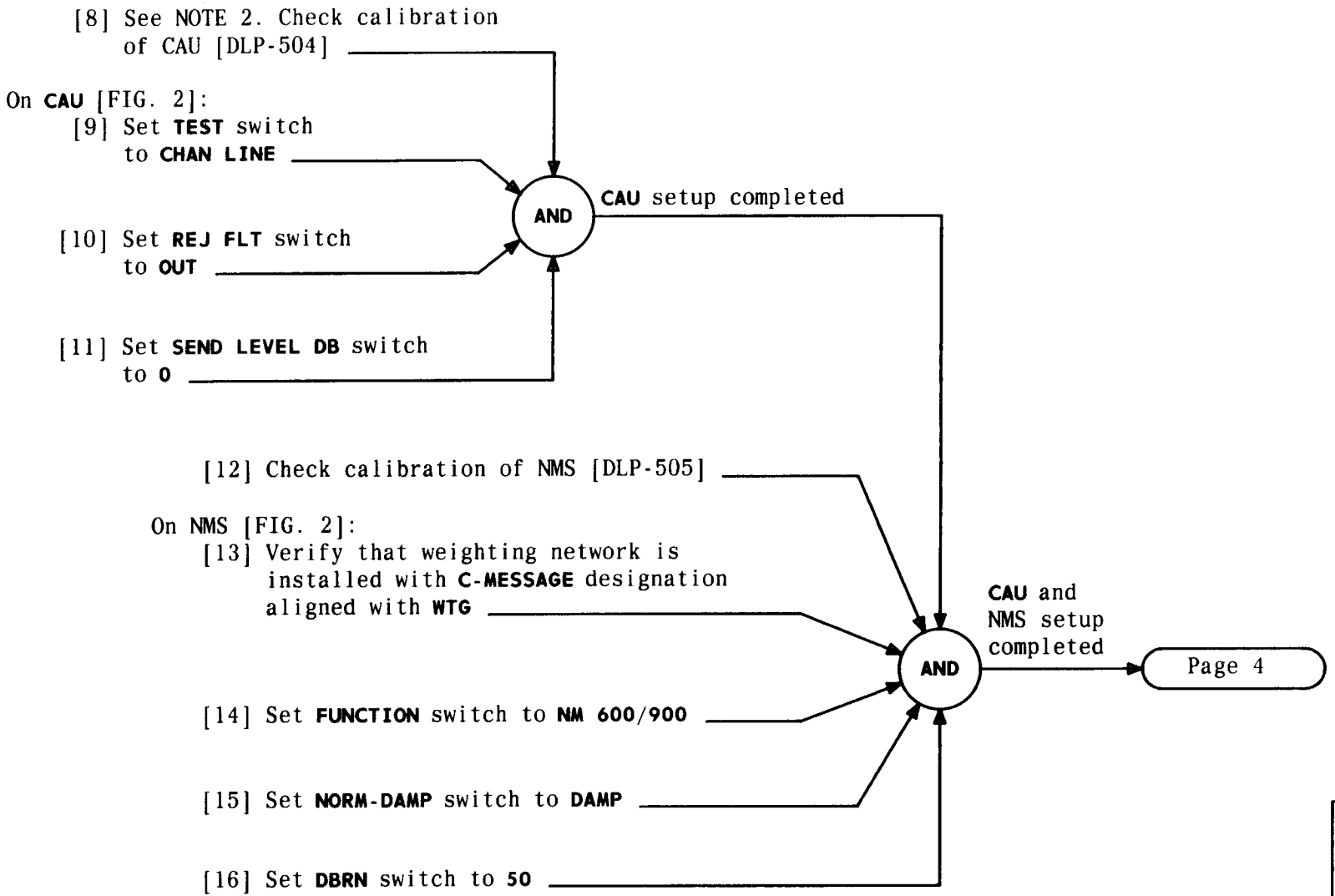


FIG. 1 – Digroup Option Settings

TABLE B						
DIGROUP OPTION SETTING	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
SEQ (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

TEST LOOPED CHANNEL BANK FOR CROSSTALK



NOTE 2
When using **CAU** for series of tests, calibration is required only once unless **CAU** is suspected of causing trouble

TEST LOOPED CHANNEL BANK FOR CROSSTALK

[17] Make test connections using patch cords [FIG. 2] (connect to channel to be measured and one interfering channel [TABLE B])

[18] On NMS, rotate **DBRN** switch counterclockwise for on-scale meter reading

AND

[19] Is NMS meter reading 27 dBrn or less

No → Page 6

Yes

[20] Has channel to be measured been tested using each of the most likely interfering channels

Yes → [21] Remove test connections

No

[22] Repeat from Step 17 using other most likely interfering channel

TABLE C

UNIT*	REPLACEMENT PROCEDURE	CONDITIONS
CU	DLP-500	Channel unit under test
TU	DLP-500	If trouble exists in **AY** channel, replace **RU** first
RU ACU	DLP-500	If more than one **RU** is alarmed, skip to **LIU**
LIU	DLP-500	Pin plug must be inserted in **LP** jack and alarm silenced by depressing **ACO** pushbutton on **ACU**
TPU	DLP-503	–
PU†	DLP-501	
OIU	DLP-500	
PDU	DLP-502	

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

† Switch must be set to **ON** after **PU** is replaced

TEST LOOPED CHANNEL BANK FOR CROSSTALK

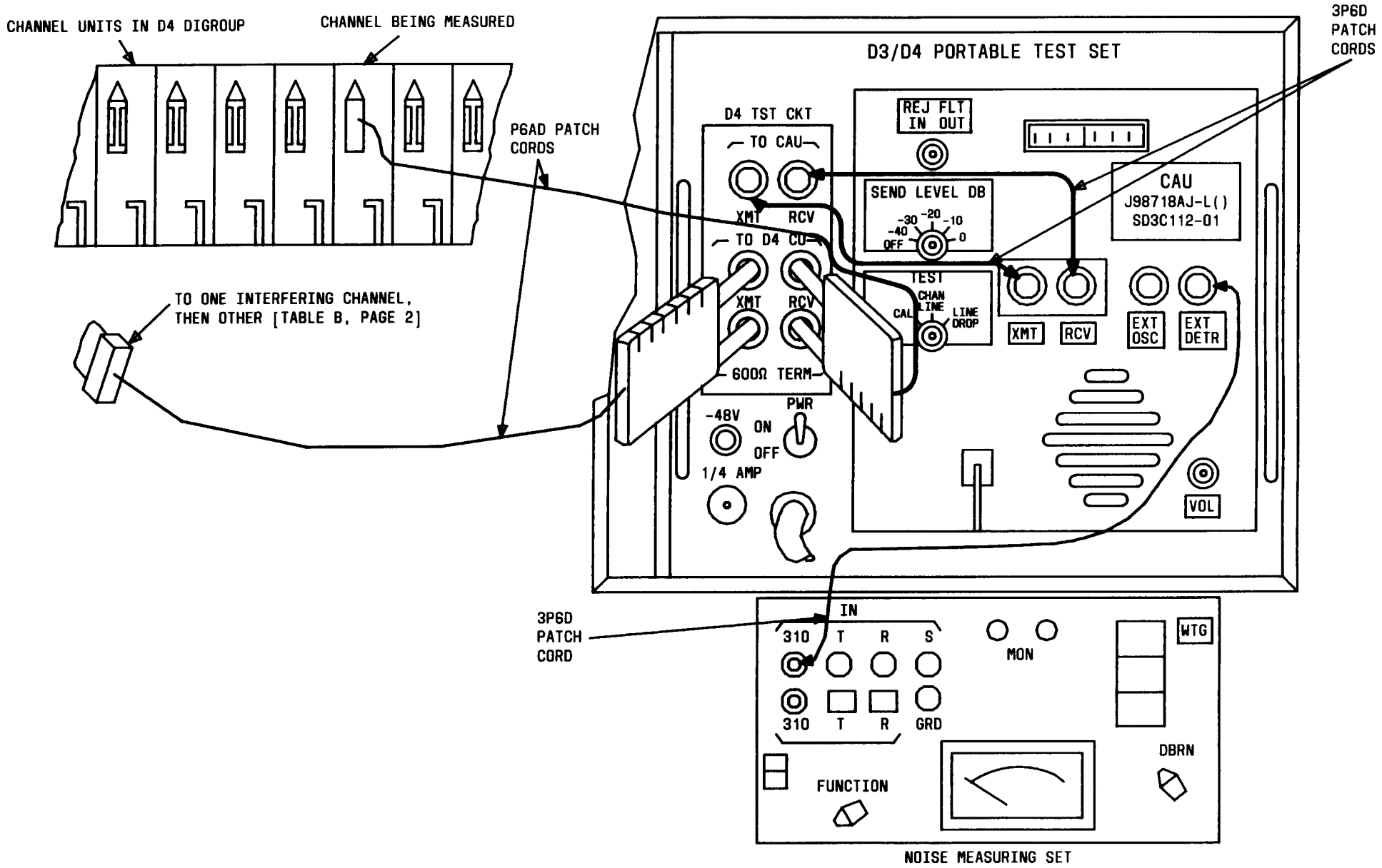


FIG. 2 – Crosstalk Test Connections

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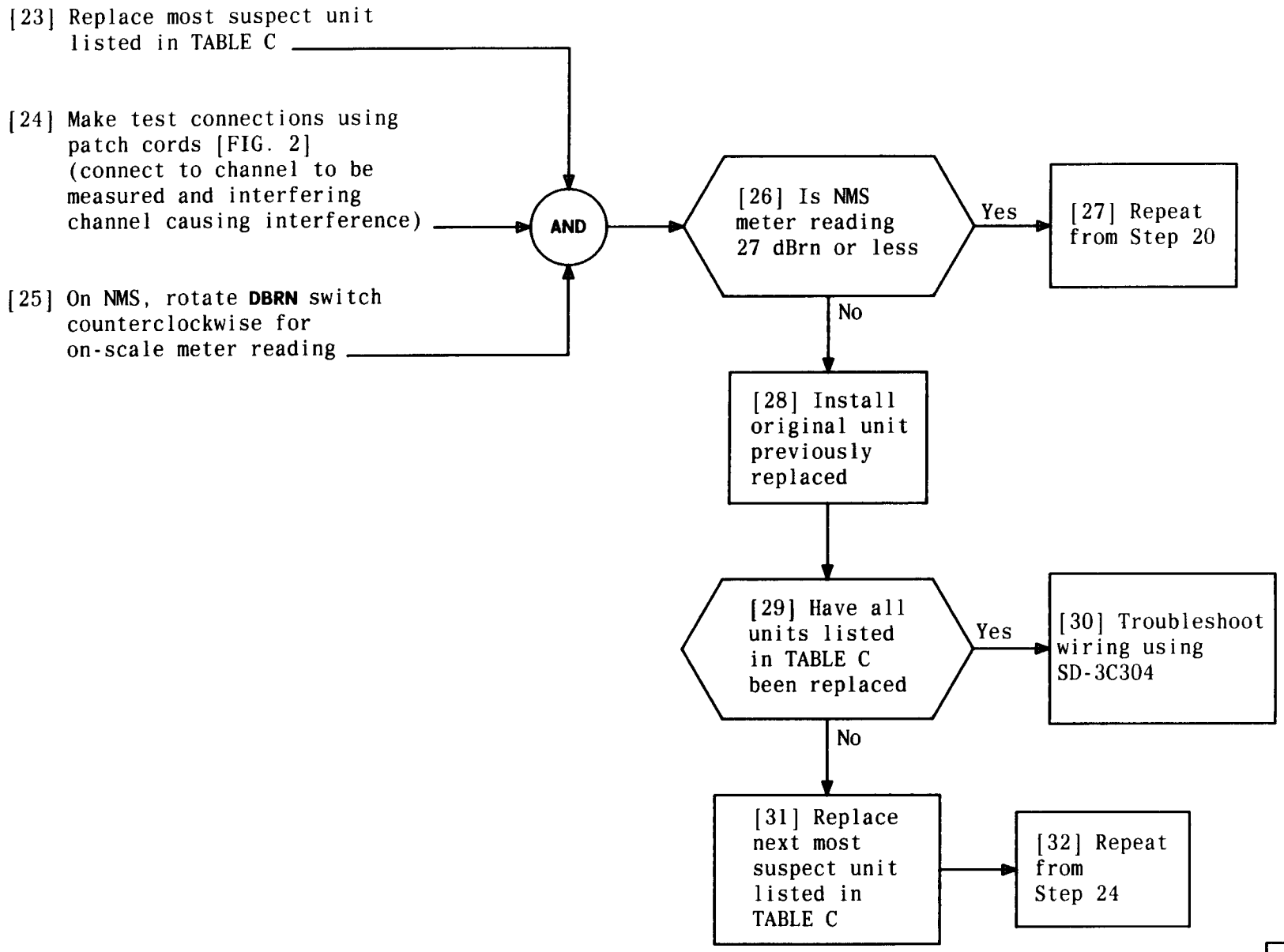
TEST LOOPED CHANNEL BANK FOR CROSSTALK



TEST LOOPED CHANNEL BANK FOR CROSSTALK

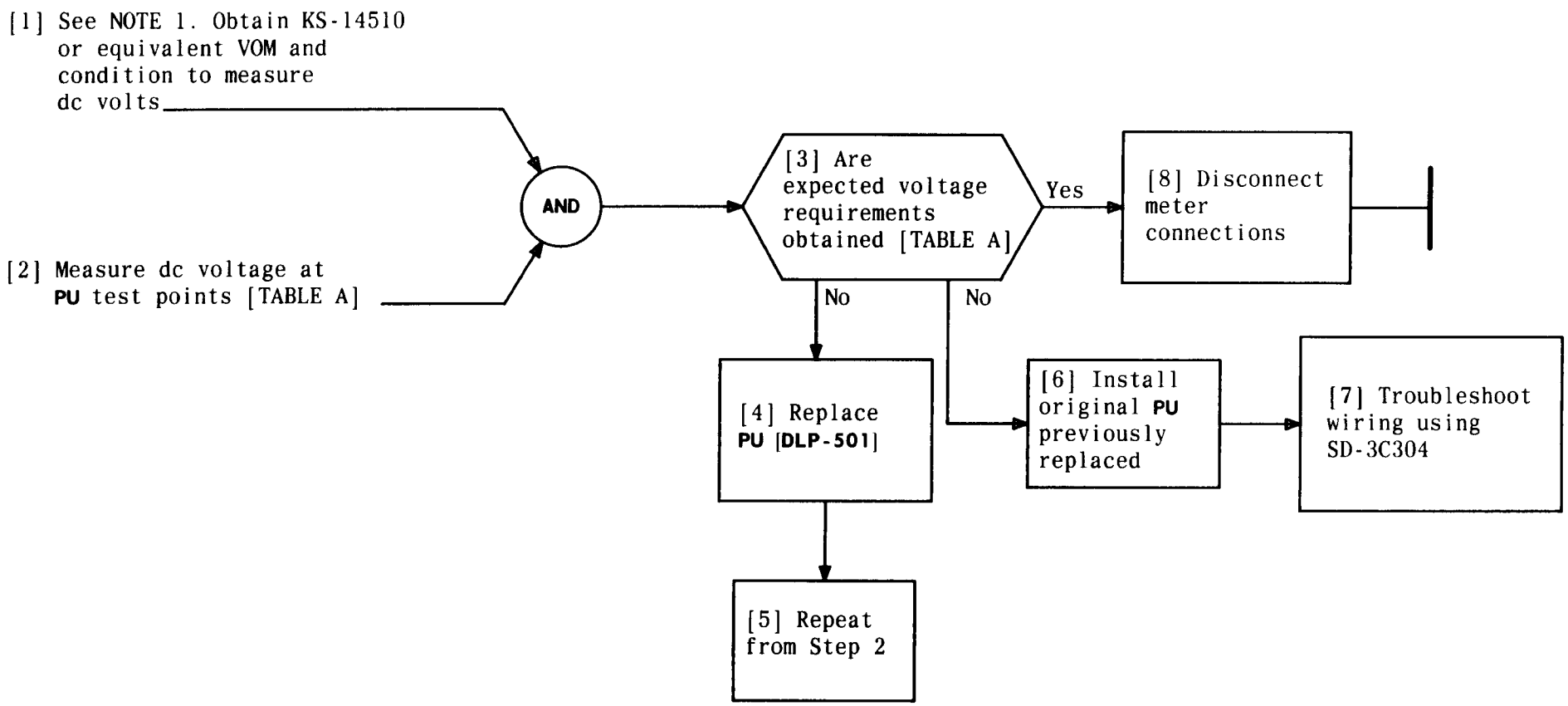


TABLE A

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

NOTE 1
KS-20599 digital voltmeter or equivalent may be used

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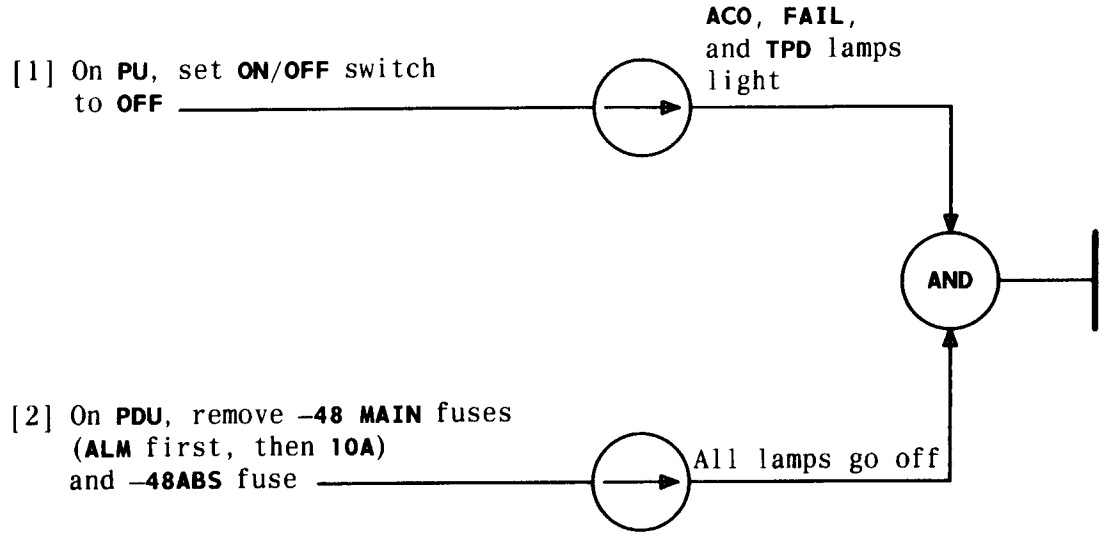
CHECK TEST POINT VOLTAGES, POWER CONTROL UNIT (PCU) UNDER LOAD



REMOVE POWER, D4 CHANNEL BANK

[1] At front of bay, remove fuses from power distribution unit (**PDU**) [FIG. 1]

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

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

[4] Insert – (black) lead into **10A** fuse holder, ensuring that it touches back contact of fuse holder

AND

[5] Does meter indicate 43 to 53 Vdc

No

[11] Refer to SD-3C304 to correct problem

Yes

[6] Install **10A** fuse and touch – (black) lead to right side contact of **ALM** fuse holder, ensuring that + (red) lead is on chassis ground

[7] Does meter indicate 43 to 53 Vdc

No

Yes

[8] Touch – (black) lead to side contact of **–48ABS** fuse holder, ensuring that + (red) lead is on chassis ground

[9] Does meter indicate 43 to 53 Vdc

No

Yes

[10] Remove test connections and install fuses into fuse holders (match color bead with dot)

Page 2

NOTE 1
KS-20599 digital voltmeter or equivalent may be used

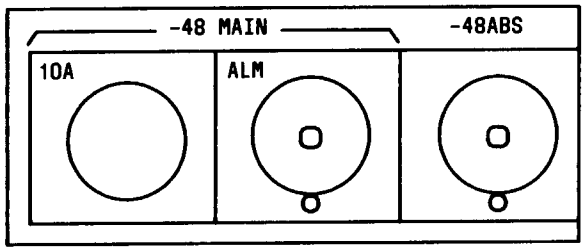


FIG. 1 – Power Distribution Unit

CHECK INCOMING –48 VOLTS, POWER DISTRIBUTION UNIT (PDU) SUBASSEMBLY

At rear of **PDU** subassembly:

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

[13] Touch + (red) lead to terminal 4

[14] Touch – (black) lead to terminal 3, then to terminal 2 and observe meter each time

AND

[15] Is 43 to 53 Vdc present at both terminals 3 and 2

Yes

[16] Remove test connections and install plastic cover

No

[17] Refer to SD-3C304 to correct problem

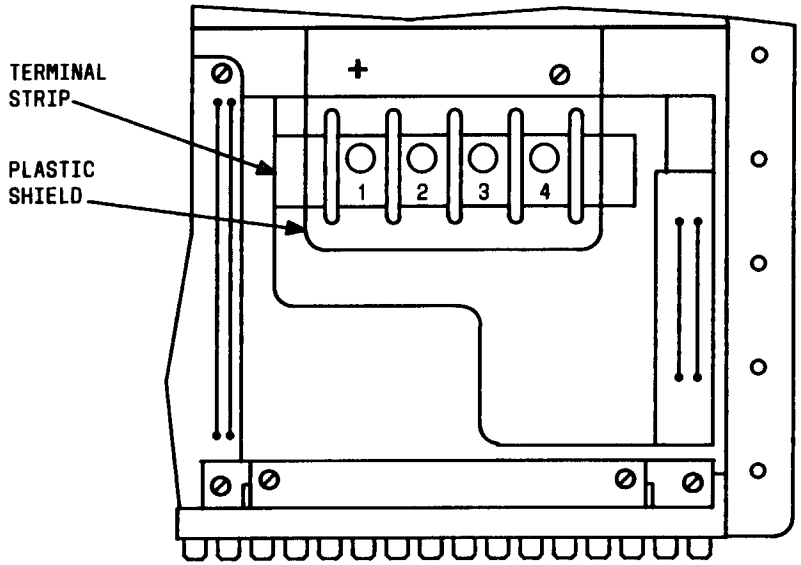


FIG. 2 – Terminal Strip Layout

CHECK INCOMING –48 VOLTS, POWER DISTRIBUTION UNIT (PDU) SUBASSEMBLY

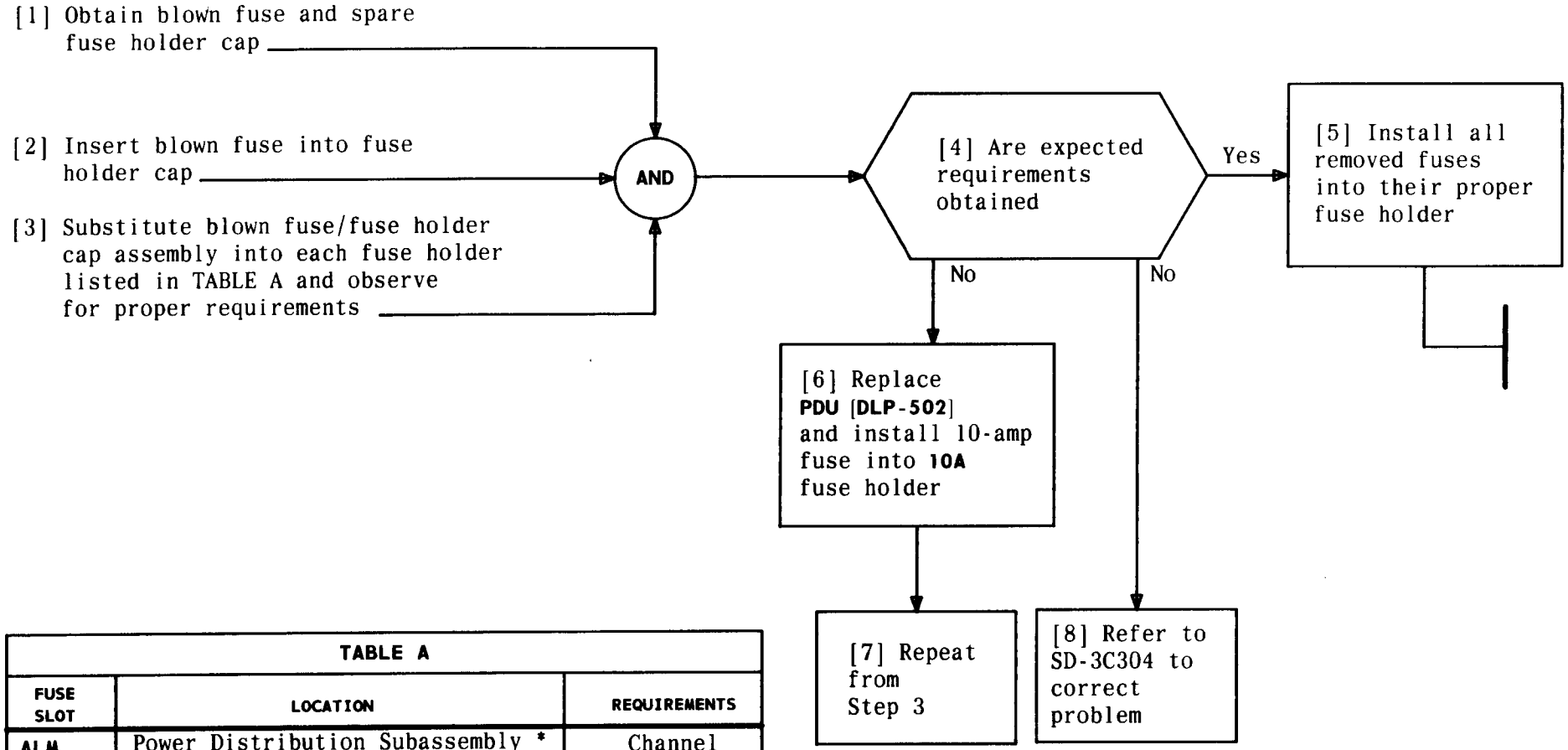
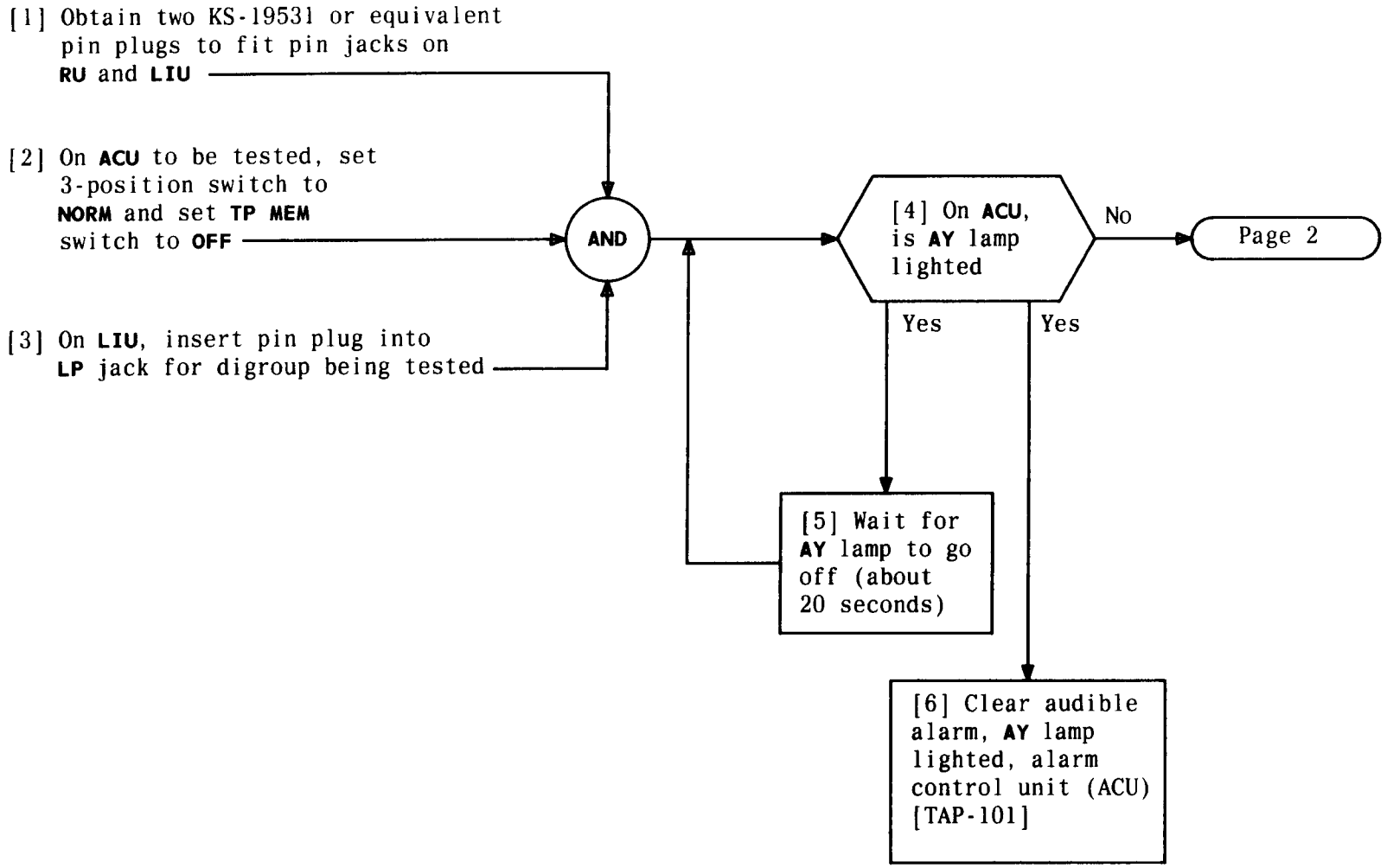


TABLE A

FUSE SLOT	LOCATION	REQUIREMENTS
ALM	Power Distribution Subassembly *	Channel Bank
–48ABS	Power Distribution Subassembly *	
–48S A	Power Distribution Unit (PDU)	Office alarm sounds and ALM lamp lights on PDU for each fuse slot
–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

CHECK FUSE ALARM CIRCUITS, D4 CHANNEL BANK



TEST D4 CHANNEL BANK ALARMS

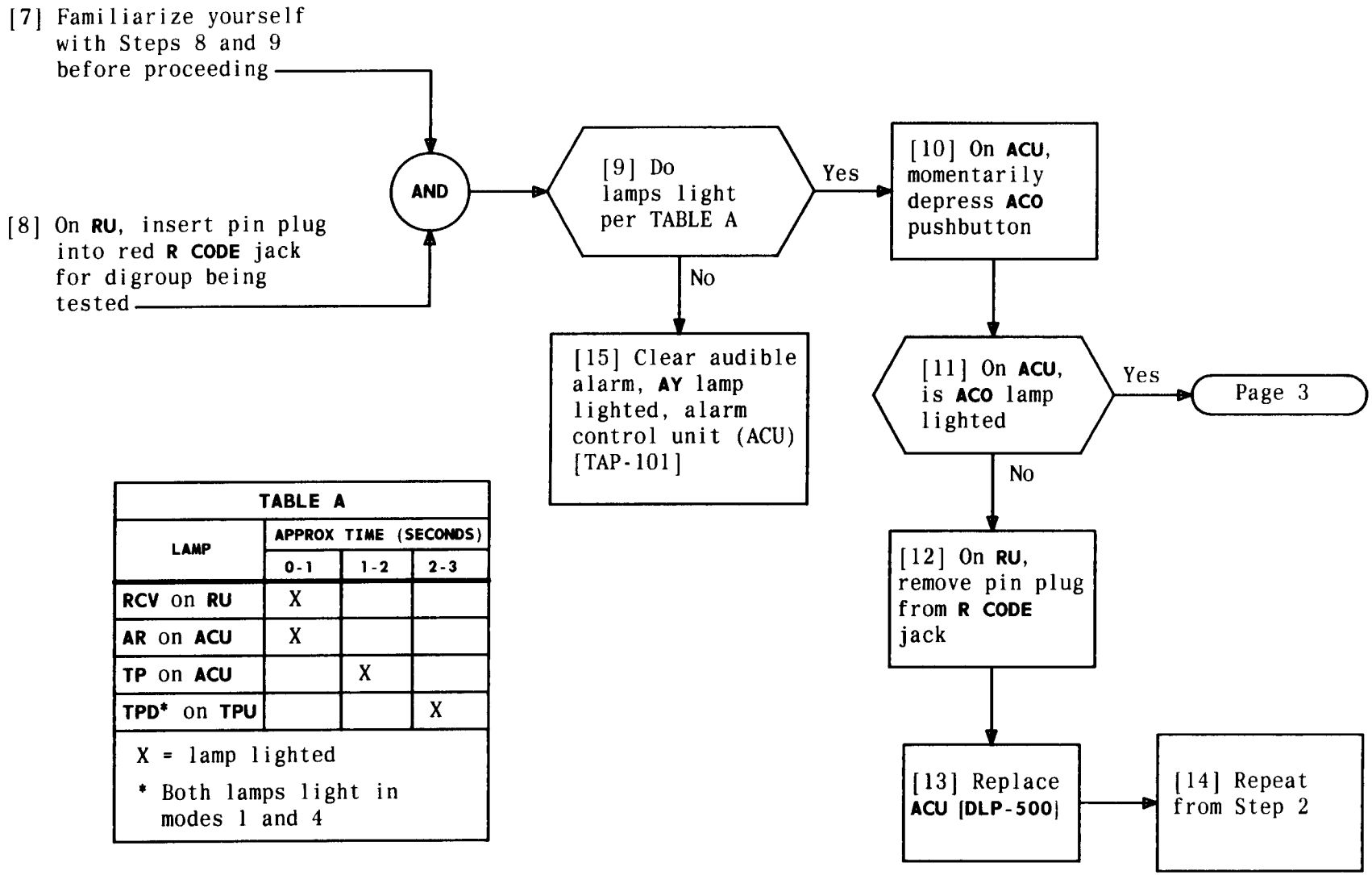


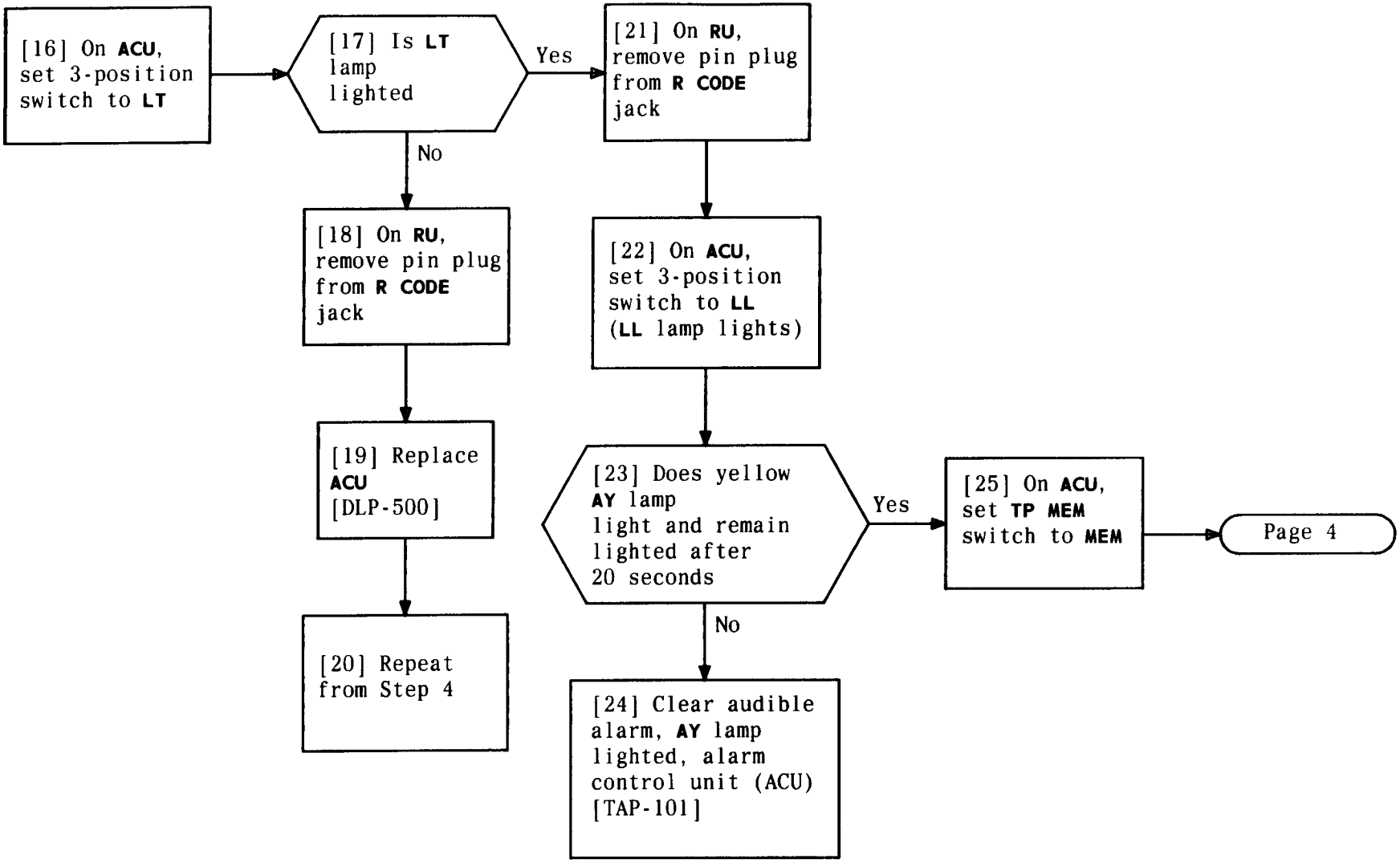
TABLE A

LAMP	APPROX TIME (SECONDS)		
	0-1	1-2	2-3
RCV on **RU**	X		
AR on **ACU**	X		
TP on **ACU**		X	
TPD* on **TPU**			X

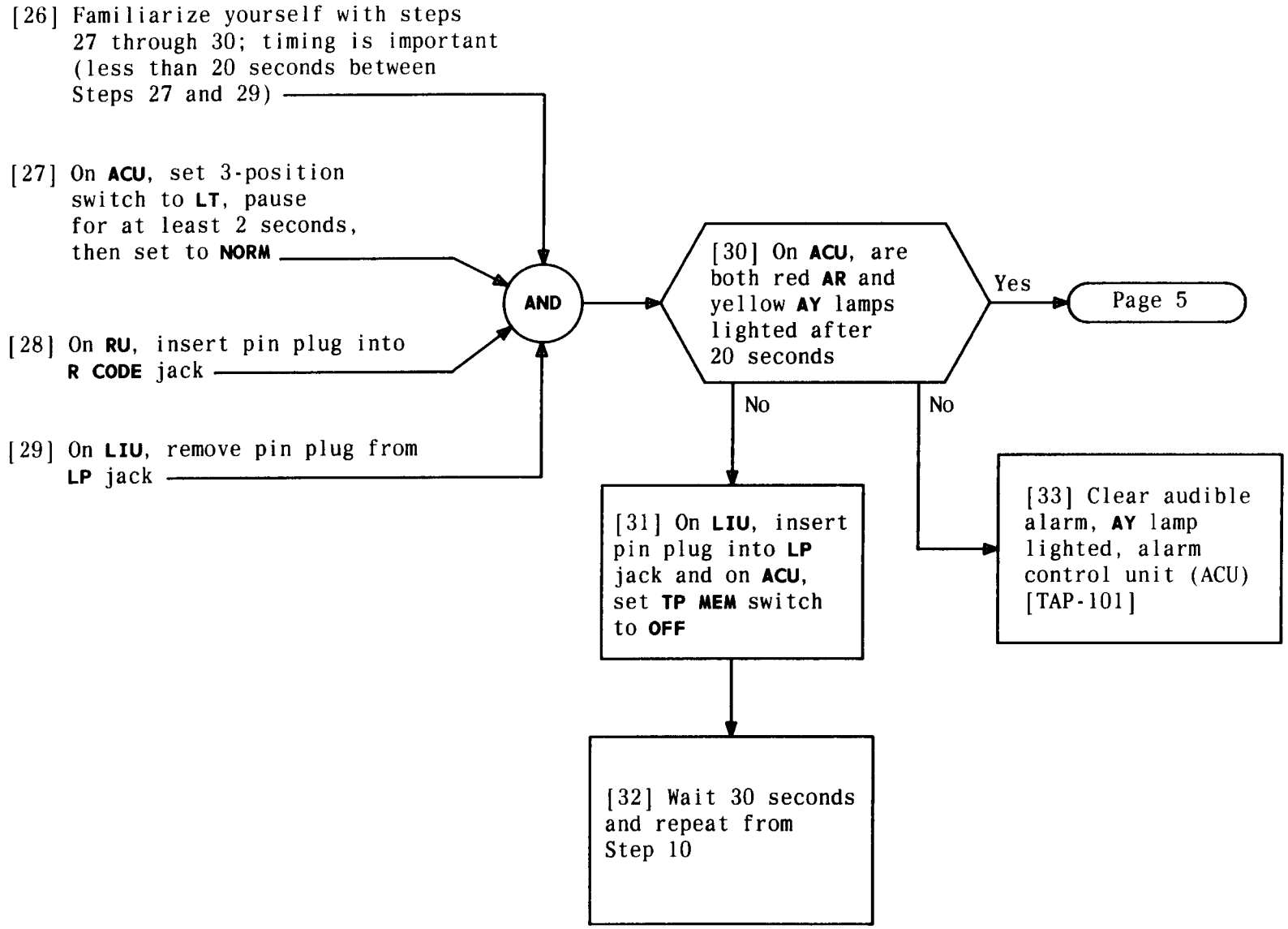
X = lamp lighted

* Both lamps light in modes 1 and 4

TEST D4 CHANNEL BANK ALARMS



TEST D4 CHANNEL BANK ALARMS



TEST D4 CHANNEL BANK ALARMS

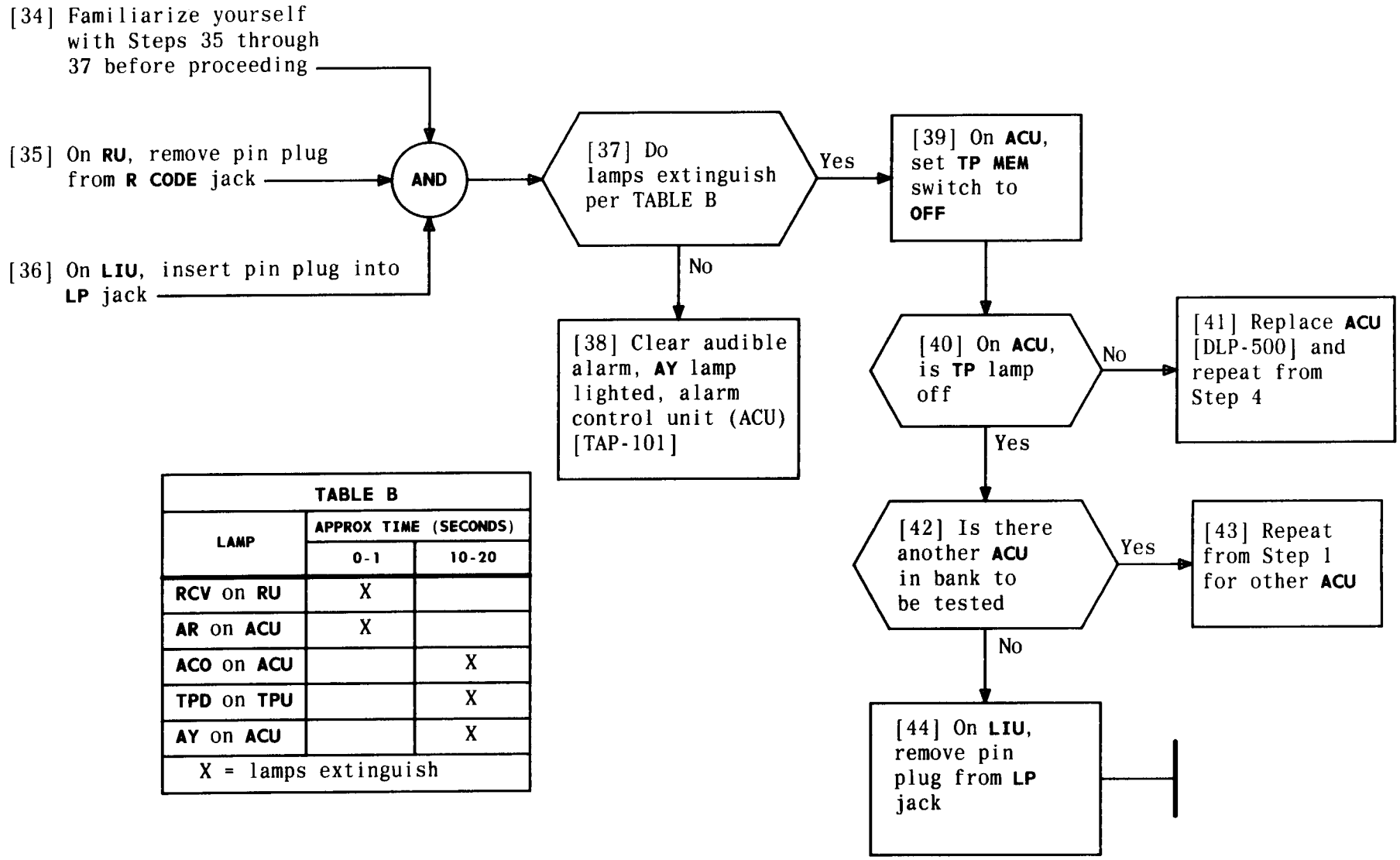


TABLE B		
LAMP	APPROX TIME (SECONDS)	
	0-1	10-20
RCV on RU	X	
AR on ACU	X	
ACO on ACU		X
TPD on TPU		X
AY on ACU		X
X = lamps extinguish		

TEST D4 CHANNEL BANK ALARMS

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 using patch cords [FIG. 1]. Adjust receive attenuators in channel unit for −3.0±0.1 dBm (−3.5±0.1 dBm International) indication on TMS. Remove pin plug from **R CODE** jack on **RU** and adjust signal generator for −3.0±0.05 dBm (3.5±0.05 dBm International) output. Adjust transmit attenuators for −3.0±0.1 dBm (−3.5±0.1 dBm International) indication on TMS.

[1] Obtain test equipment [TABLE A]

[2] Condition transmission measuring set [DLP-516]

[3] On TMS, set **LINE** switch to **REC**, **REC IMP** switch to **600Ω** and **REC LEVEL** switch to **0**

[4] Verify channels to be adjusted are out of service

[5] On **RU**, insert pin plug into **R CODE** jack and on **ACU**, depress **ACO** switch

[6] On **LIU**, insert pin plug into **LP-A** or **LP-B** jack corresponding to digroup containing test channels

[7] Unseat **TPU** from slot

AND

[8] 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 or J98726MP
2 Patch cords	3P6D
2 Pin plugs	KS-19531

ADJUST ATTENUATOR SETTINGS, 4-WIRE E&MER CHANNEL UNIT

[9] Connect 3P6D patch cord from **OSC OUT** on signal generator to **LINE T/R** on Channel Unit Extender (J98726MF or J98726MP)

[10] Connect 3P6D patch cord from **REC 310** on Transmission Measuring Set to **LINE-T1/R1** on Channel Unit Extender (J98726MF or J98726MP

[11] Set signal generator impedance to **600** ohms and output to send −3.0 ±0.05 dBm 1004 Hz tone (Domestic) or −3.5 ±0.05 dBm 1004 Hz tone (International)

[12] Adjust receiver attenuators on channel unit for −3.0±0.1 dBm (Domestic) or −3.5±0.1 dBm (International) indication on TMS

[13] On **RU**, remove pin plug from **R CODE** jack

AND

[14] Adjust transmit attenuators on channel unit for −3.0±0.1 dBm (Domestic) or −3.5±0.1 dBm (International) indication on TMS

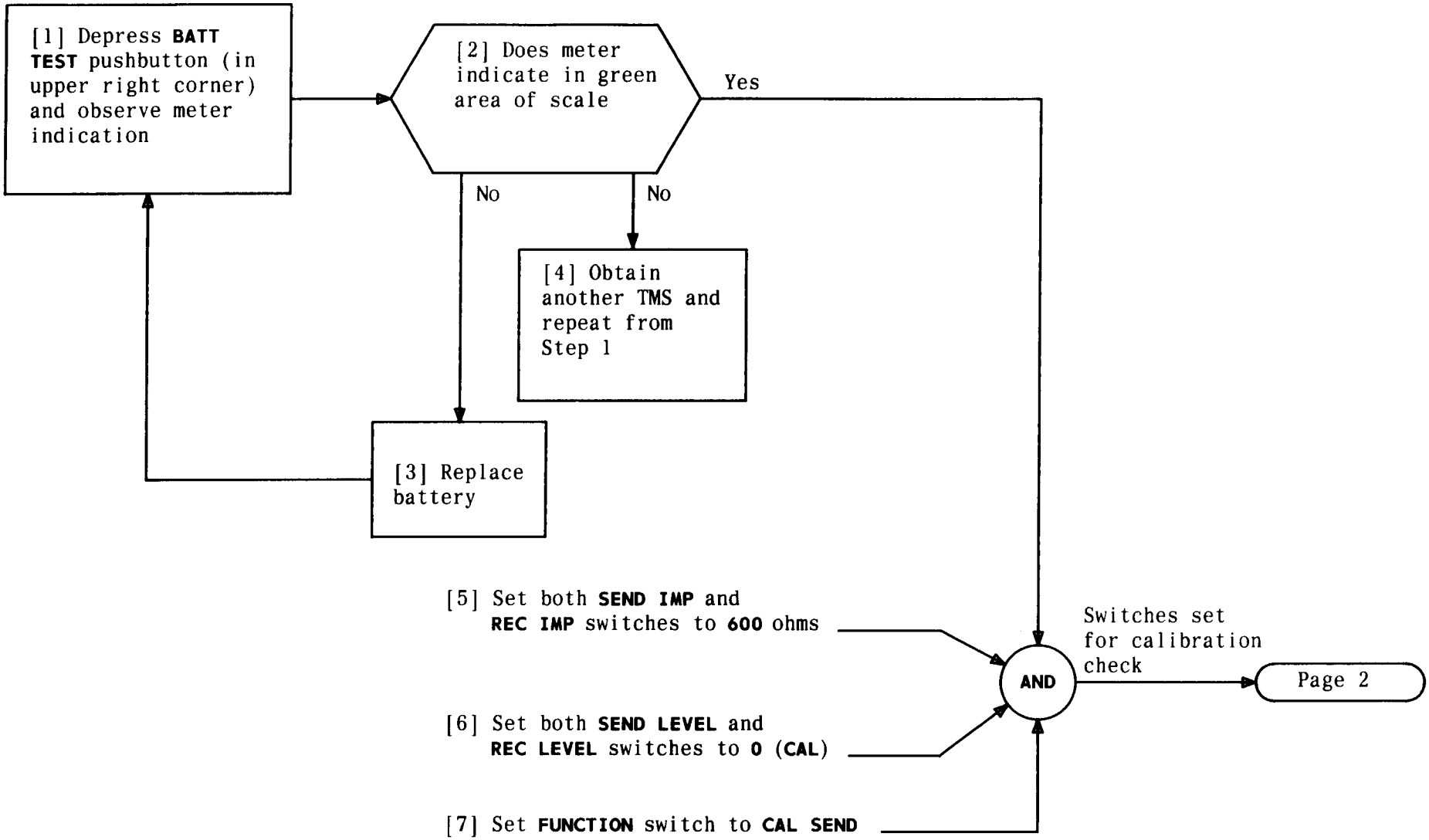
[15] Remove test connections and channel unit extender

[16] Install **TPU** and **4E&MER** channel unit into bank

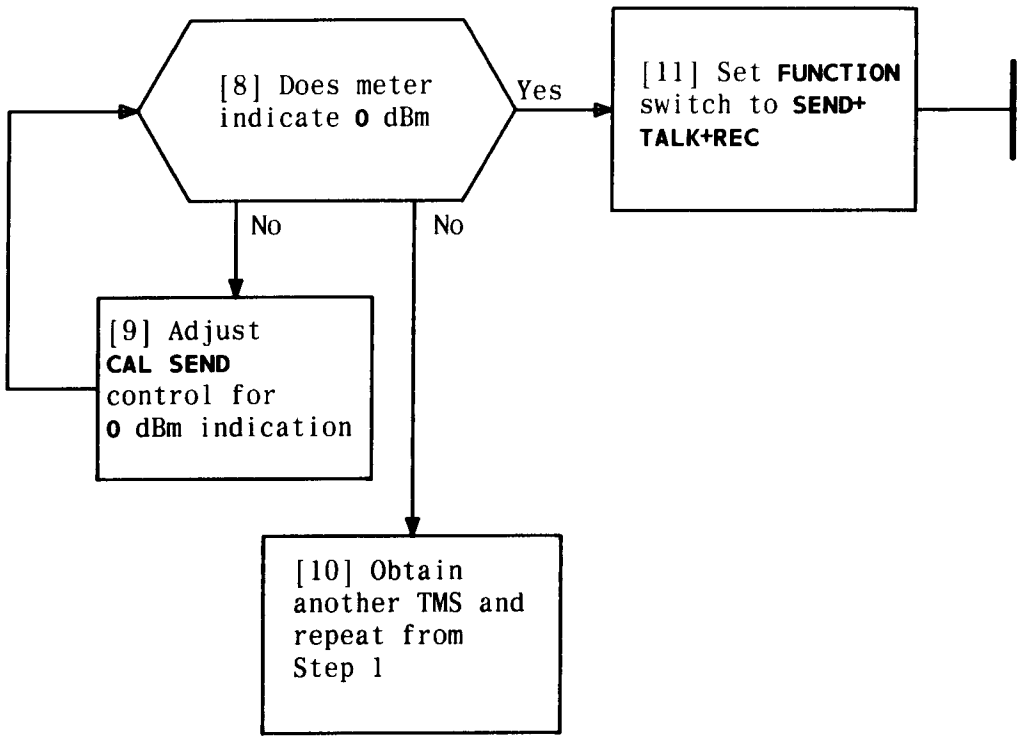
[17] On **LIU**, remove pin plug from **LP** jack

AND

ADJUST ATTENUATOR SETTINGS, 4-WIRE E&MER CHANNEL UNIT



CONDITION TTS 4BNH TRANSMISSION MEASURING SET (TMS)



CONDITION TTS 4BNH TRANSMISSION MEASURING SET (TMS)

ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE
• TPG-000 • IXL-001 • NTP-002 • TAD-100 • TAP-101											
• TAP-102 • TAP-103 • TAP-104 • TAP-105 • TAP-106											
• TAP-107 • TAP-108 • DLP-500 • DLP-501 • DLP-502											
• DLP-503 • DLP-504 • DLP-505 • DLP-506 • DLP-507											
• DLP-508 • DLP-509 • DLP-510 • DLP-511 • DLP-512											
• DLP-513 • DLP-514 • DLP-515 • DLP-516 • CKL-891											
TNG-893 DPL-895											

• REVISED OR ADDED ITEM □ CANCELED ITEM

CHECKLIST

This book is called a Task Oriented Practice or "TOP". 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 which identifies 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 (Non Trouble Procedure) 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 the procedure. Look over

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 Announcment 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; – 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 Announcment Frame – Inspect	▲NTP-010▲

FIG. 1

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 item and go on to the next item. This idea is called "bypassing" in TOP. In addition to not having to

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▲

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

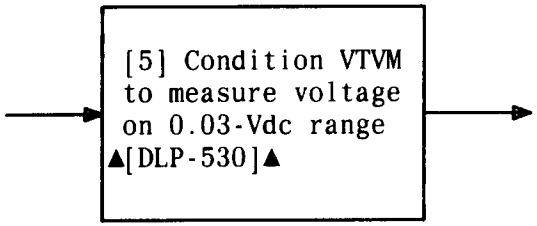
A summary statement is used with a procedure to tell you briefly how to do the procedure and what type measurement or result can be observed. If you can do the procedure after reading the summary, go ahead and do it without reading any further. Simple procedures may not have summaries.

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.

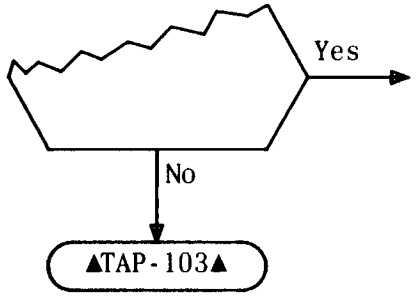
Support Procedures

When you see the following kind of reference in TOP it refers to a support procedure:
The support procedure▲[DLP-530]▲(Detailed Level Procedure) 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 (Trouble Analysis Procedure) 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).

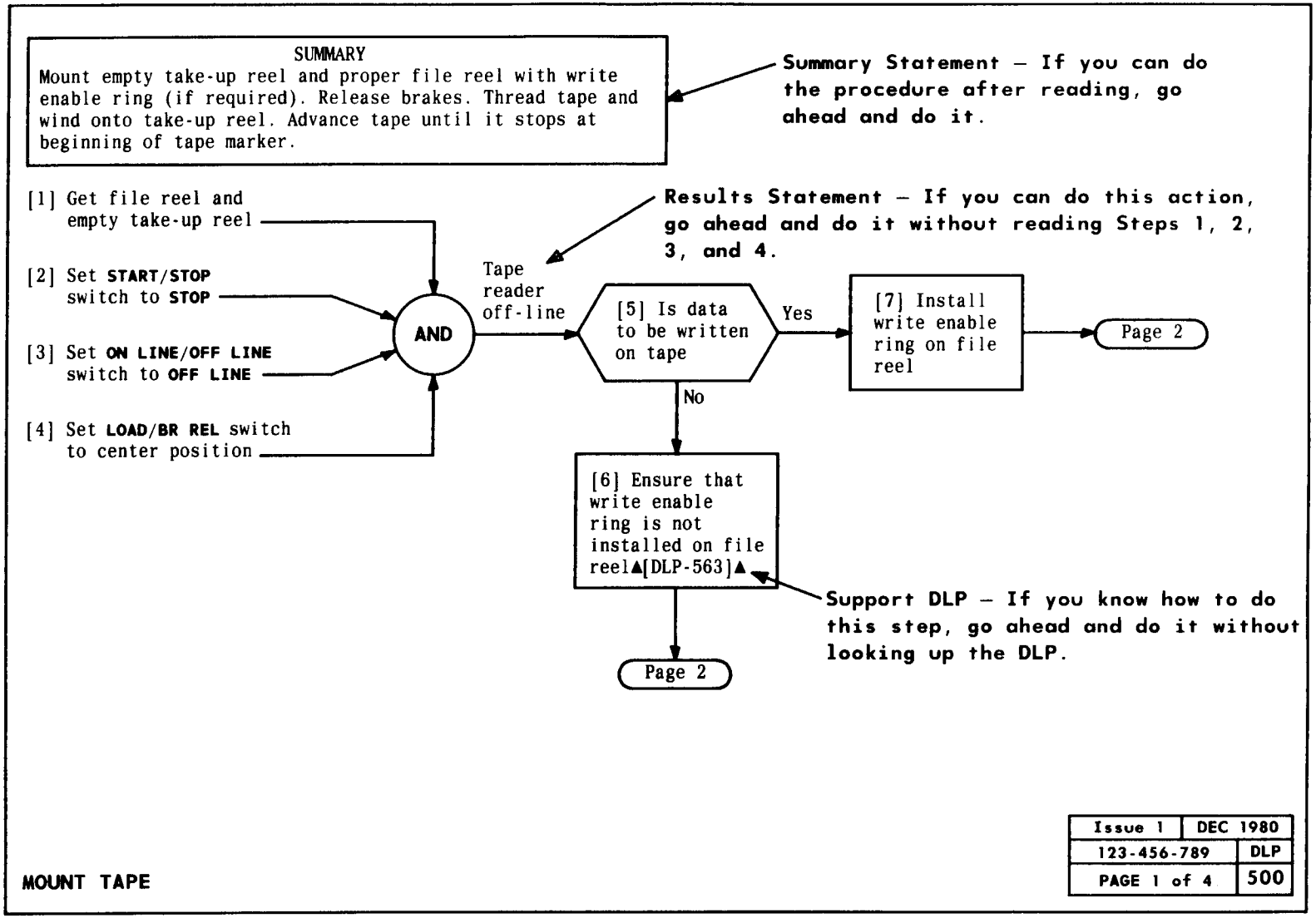
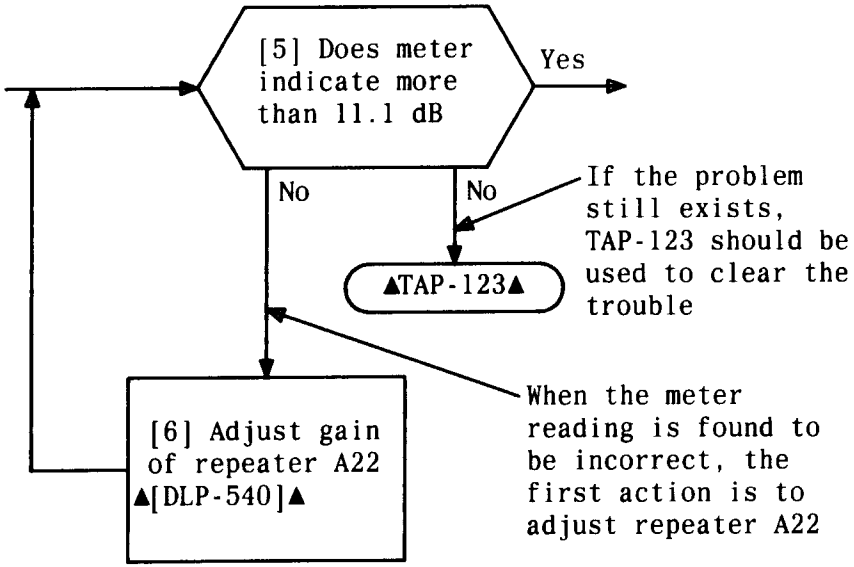

SUMMARY
Mount empty take-up reel and proper file reel with write enable ring (if required). Release brakes. Thread tape and wind onto take-up reel. Advance tape until it stops at beginning of tape marker.
Summary Statement – If you can do the procedure after reading, go ahead and do it.
[1] Get file reel and empty take-up reel
[2] Set START/STOP switch to STOP
[3] Set ON LINE/OFF LINE switch to OFF LINE
[4] Set LOAD/BR REL switch to center position
AND
Tape reader off-line
Results Statement – If you can do this action, go ahead and do it without reading Steps 1, 2, 3, and 4.
[5] Is data to be written on tape
Yes
[7] Install write enable ring on file reel
Page 2
No
[6] Ensure that write enable ring is not installed on file reel▲[DLP-563]▲
Support DLP – If you know how to do this step, go ahead and do it without looking up the DLP.
Page 2
MOUNT TAPE
Issue 1 DEC 1980
123-456-789 DLP
PAGE 1 of 4 500

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.

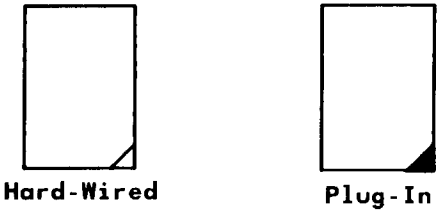


Trouble-clearing information in TOP is used basically the same way as non trouble-clearing information. When an alarm or trouble report requires you to troubleshoot a system covered by a TOP, the TASK INDEX LIST (IXL-001) is the place to start. After locating your job on IXL-001 you will be referenced 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.

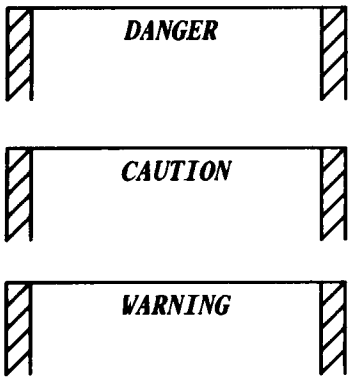
Now assume that you have to clear a major alarm on a terminal in a system covered by a TOP. Figure 3 on Page 7 shows how to access and how to use trouble-clearing information.

HOW TO USE TOP

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:



– means there is a possibility of personal injury

– means there is a possibility of service interruptions

– means there is a possibility of equipment damage

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.

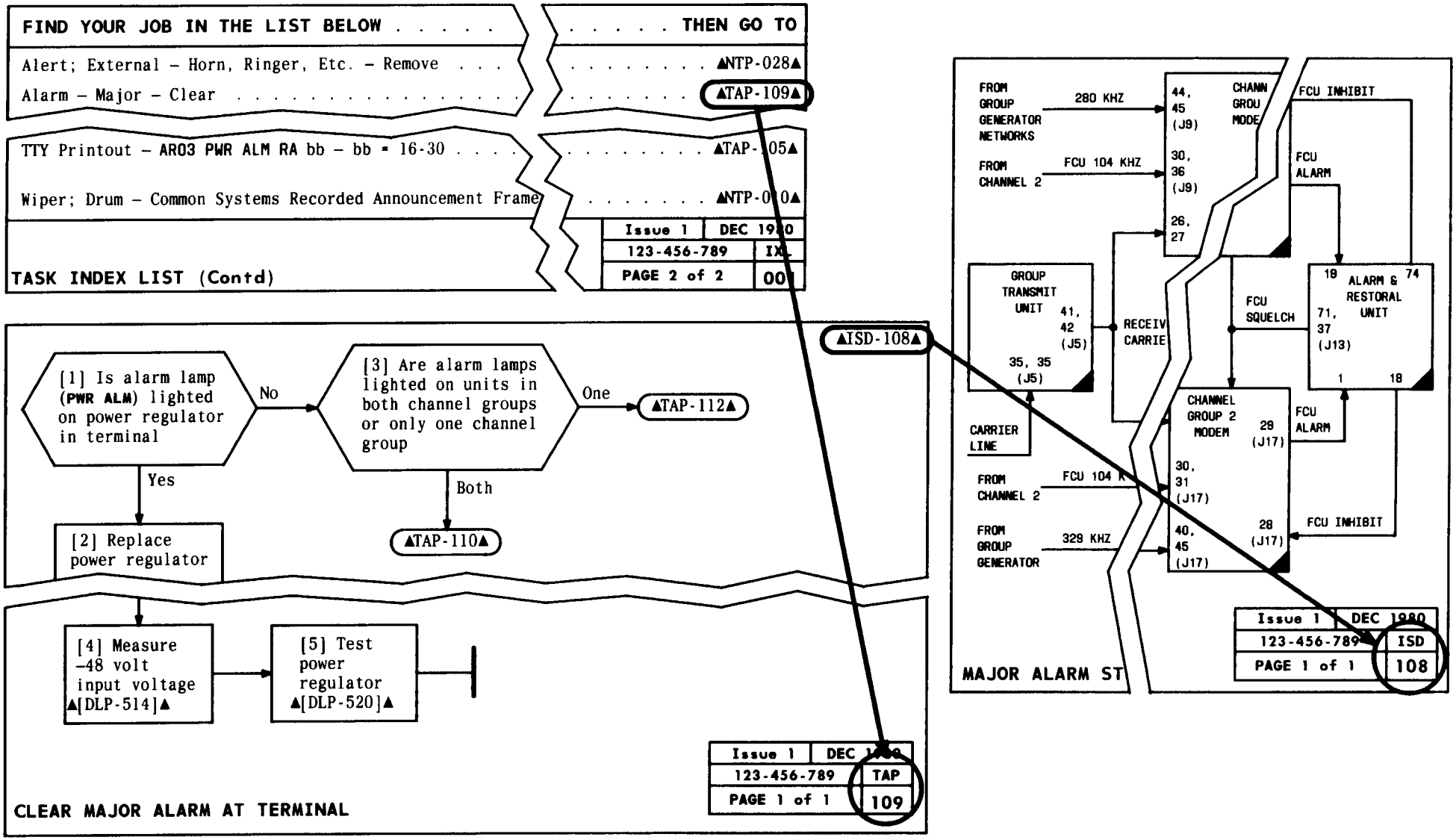
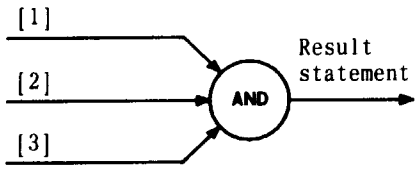
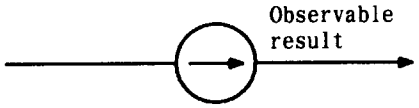

FIND YOUR JOB IN THE LIST BELOW . . . . . THEN GO TO
Alert; External – Horn, Ringer, Etc. – Remove . . . . . ▲NTP-028▲
Alarm – Major – Clear . . . . . ▲TAP-109▲
TTY Printout – AR03 PWR ALM RA bb – bb = 16-30 . . . . . ▲TAP-105▲
Wiper; Drum – Common Systems Recorded Announcement Frame . . . . . ▲NTP-010▲
Issue 1 DEC 1980
123-456-789 IXL
PAGE 2 of 2 001
TASK INDEX LIST (Contd)
[1] Is alarm lamp (PWR ALM) lighted on power regulator in terminal
No
[3] Are alarm lamps lighted on units in both channel groups or only one channel group
One
▲TAP-112▲
Yes
Both
[2] Replace power regulator
▲TAP-110▲
[4] Measure –48 volt input voltage ▲[DLP-514]▲
[5] Test power regulator ▲[DLP-520]▲
Issue 1 DEC 1980
123-456-789 TAP
PAGE 1 of 1 109
CLEAR MAJOR ALARM AT TERMINAL
▲ISD-108▲
FROM GROUP GENERATOR NETWORKS
280 KHZ
FROM CHANNEL 2
FCU 104 KHZ
44, 45 (J9)
30, 36 (J9)
26, 27
CHANN GROU MODE
FCU INHIBIT
FCU ALARM
GROUP TRANSMIT UNIT
41, 42 (J5)
35, 35 (J5)
RECEIV CARRIE
FCU SQUELCH
19 ALARM & 74
RESTORAL
71, UNIT
37
(J13)
1 18
CARRIER LINE
CHANNEL GROUP 2 MODEM
29 (J17)
FCU ALARM
30, 31 (J17)
FROM CHANNEL 2
FCU 104 K
FROM GROUP GENERATOR
329 KHZ
40, 45 (J17)
28 (J17)
FCU INHIBIT
Issue 1 DEC 1980
123-456-789 ISD
PAGE 1 of 1 108
MAJOR ALARM ST

FIG. 3

TABLE A IMPORTANT TOP SYMBOLS AND DEFINITIONS	
SYMBOL	**DEFINITION**
	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.
	The flow-through symbol relates graphically a single instruction to the expected observable result(s).
	The end-of-procedure symbol denotes that the procedure has been completed.
	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.
Acceptance (NTP-002)	Acceptance gives an overview of the acceptance techniques and facilities.
Maintenance Philosophy (TAD-100)	The maintenance philosophy, when provided, gives an overview of the considerations designed into the trouble-clearing procedures.
Checklist (CKL-891)	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.
Documentation Plan (DPL-895)	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.

TOC

TOC (DOMESTIC)	234-150-001
51A TEST POS	234-150-002
RMS-D2	234-150-003
TOC (INTERNATIONAL)	234-150-101
51A TEST POS (INTERNATIONAL)	234-150-102
SERVICE IMPROVEMENT POSITION	234-150-210
SVC CKTS & TRK TST FAC	
ROTL	234-150-005
TERMINAL EQUIPMENT	
MTF	234-150-006
A6 UTE	234-150-010
A5 UTE	234-150-025
LT-1 CONNECTOR	234-150-030
A6B/DFSG IN J68957A&B UTE	234-150-040
A6B/DFSG IN J98629K&N UTE	234-150-041
A6B/DFSG IN J98629T&U UTE	234-150-042
A6B/DFSG IN J98629W&Y UTE	234-150-043
D4 IN J68965A&B UTE	234-150-044
OBAT (INTERNATIONAL)	234-150-110

GROWTH

IO, IOP, TUC, CS & PS	234-153-010
SP1, SP2	234-153-020
APS	234-153-025
VIF, DT, EST, CCIS TGR, DIF	234-153-030
TMS, TSI, I/O, PUC, MAS	234-153-040
PUB SYSTEM	234-153-045
ABC, POWER PLANTS, NM, MF, ROTL, ALMS, CCT, MCF	234-153-050
REMOTE ACCESS IF CIRCUIT	234-153-051
3B20D MOD1 PROCESSOR COMMON SYSTEMS (GROWTH)	234-301-816
3B20D MOD 2 PROCESSOR COMMON SYSTEMS (GROWTH)	254-302-816

SYSTEM EVALUATION & ACCEPTANCE

FINAL VERIFICATION	234-155-001
OPERATIONAL READINESS	234-155-005
MAINT. FUNCT. VERIF.	234-155-010
VERIFICATION TESTS - ATTACHED PROCESSOR SYSTEM - MODEL 3	234-155-303
3B20D MODEL 2 PROCESSOR COMMON SYSTEM - ACCEPTANCE TASKS	254-302-808

MOC

MOC/MCC	234-151-002
PUC	234-151-017
MAS	234-151-070
SMCC	234-151-102
SMCC INTERFACES	234-151-106
GENERIC RETROFIT, UPDATE (4E11)	234-160-011
GENERIC RETROFIT, UPDATE (4E12)	234-160-012
GENERIC UPDATE - 4AP3-4AP4	234-160-303
GENERIC UPDATE - 4AP5-4AP6	234-160-304
GENERIC UPDATE - 4AP(5) 4K.01-.02-4AP(6)	234-160-305
1A PROCESSOR	
MCC, PPI	234-151-006
CC	254-251-001
TTY MESSAGE & ANALYSIS	254-251-003
CS/PS	254-251-005
ADS	254-251-010
FS	254-251-015
API	254-251-016
I/O (J5A006A-1)	254-251-020
I/O (J5A006C-1)	254-251-021
I/O (J5A006D-1)	254-251-022
PCDF (J4A007B)	254-251-025
PCDF (J4A007C-1)	254-251-026
PORTS	254-251-100
3B COMPUTER	
EQUIPMENT (MODEL 1)	254-301-811
TROUBLE-CLEARING (MODEL 1)	254-301-812
TROUBLE-CLEARING (MODEL 1)	254-301-813
EQUIPMENT (MODEL 2)	254-302-811
TROUBLE-CLEARING (MODEL 2)	254-302-812
NETWORK SERVICES COMPLEX	
NETWORK SERVICES COMPLEX	256-041-500
SWITCHING NETWORK	
TMS	234-151-011
TSI	234-151-012
NC	234-151-013
PUB SYSTEM	234-151-015
NET.MGMNT DSPLY EQUIP.	
DISPLAY PANELS AND FRAMES	234-151-020

MOC (CONTD)

TERM. INTERFACE EQUIP.	
VIF	234-151-025
SP1	234-151-031
SP2	234-151-032
CCIS	234-151-033
DT	234-151-045
D4	234-151-048
EST	234-151-050
DIF	234-151-055
SVC CKTS & TRK TST FAC	
820A R&T	167-728-102
MFS	234-151-041
RA	234-151-042
MISC A, B, & C	234-151-043
POWER	
415A PWR PLT	167-647-102
620A PWR PLT	167-689-102
620C & 625C PWR PLT	167-689-104
625B PWR PLT	167-690-102
630A PWR PLT	167-691-102

MAC

RECENT CHANGES - MAS (4E11/4E12)	234-152-115
CMS CIRCUIT ORDERS (G11/G12)	234-152-111
ROUTING CHANGES (4E11/4E12)	234-152-112
TRAFFIC & PLT MEAS(4E11/4E12)	234-152-114
CO - RECENT CHANGES CCIS(4E11)	234-152-117
CO - RECENT CHANGES CCIS(4E12)	234-152-127
RC UPDATE LIBRARY(4E11)	234-152-118
RC UPDATE LIBRARY(4E12)	234-152-128
CO - RECENT CHANGES - NON-CCIS (4E11)	234-152-119
CO - RECENT CHANGES - NON-CCIS (4E12)	234-152-129

CMS MC

CMS 1B	234-154-002
CMS 1C	234-154-003
CAROT 2 OPERATING PROCEDURES	190-102-301
CAROT 2 REMOTE-USER	190-102-305
CAROT 2 - CONTROLLER OPERATIONS (G3)	190-103-300

4 *ESS* SWITCH – TOP DOCUMENTATION PLAN