Task Oriented Practice
(TOP)

MULTIFREQUENCY SIGNALING FRAME

SERVICE CIRCUITS & TRUNK TEST FACILITIES

NO. 4 "ESS*" SWITCH

Printed in U.S.A.

Issue 4	NOV 1983
234-151-041	TPG
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Common Tone Transfer Circuits; Lamps And – Test	NTP-006
Common Tone Transfer Circuit Fault – Clear	TAP-102
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Test Circuit Trouble; Receiver – Clear	TAP-121
Test Circuit Trouble; Transmitter – Clear	TAP-121
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Transmitter Test Circuit Trouble – Clear	TAP-121
TTY Printout – REPT: CIN a SVC*MFb****(office code); SVC; STAT MTC	TAP-120

FIND YOUR JOB IN THE LIST BELOW	THEN GO TO
TTY Printout – REPT: CIN a SVC*MFbT***(office code); ERA; STAT MTC	TAP-121
TTY Printout – RMV: MFS a CTS b COMPL MATE ACT	TAP-104
TTY Printout – RMV: MFS a CTS b COMPL MATE OSS (duplex failure)	TAP-104
TTY Printout – TEST: TRK, CIN a SVC*MFb****(office code); SVC STF	TAP-120

No acceptance test procedures are required for this frame. Readiness of this frame to become part of working system was established by successful completion of Installation Handbook test procedures.

DO THE ITEMS BELOW IN THE ORDER LISTED	FOR DETAILS, GO TO
NOTE: Converter 1 supplies RCVRs and XMTRs 00 through 15 Converter 2 supplies RCVRs and XMTRs 16 through 31	–
1 At TTY, Type **SET:TRKSTAT MTC.DSA,CIN a SVC*MFR****(office code):NUM b!** a = TFN of First RCVR Circuit in Group Associated With Converter to be Replaced b = Number of Equipped RCVRs Associated With Converter to be Replaced	–
2 Type **SET:TRKSTAT MTC.DSA,CIN a SVC*MFX****(office code):NUM b!** a = TFN of First XMTR Circuit in Group Associated With Converter to be Replaced b = Number of Equipped XMTRs Associated With Converter to be Replaced	–
3 Replace DC-to-DC Converter 73E and 74E Power Units	DLP-500
4 Type **SET:TRKSTAT ACT,CIN a SVC*MFX****(office code):NUM b!** a = TFN of First XMTR Circuit in Group Associated With Converter Replaced b = Number of Equipped XMTRs Associated With Converter Replaced	–
5 Type **SET:TRKSTAT ACT,CIN a SVC*MFR****(office code):NUM b!** a = TFN of First RCVR Circuit in Group Associated With Converter Replaced b = Number of Equipped RCVRs Associated With Converter Replaced	–
6 At Common Tone Supply, Depress **RST(A/B)** Pushbutton Associated With Lighted **TRF(00/01)** Lamp	–

REPLACE DC-TO-DC CONVERTER ASSOCIATED WITH RECEIVER OR TRANSMITTER POWER

DO THE ITEMS BELOW IN THE ORDER LISTED	FOR DETAILS, GO TO
NOTE: MFS Frame 0 Contains Test Unit Associated With MFRT and MFXT Circuits 0 MFS Frame 1 Contains Test Unit Associated With MFRT and MFXT Circuits 1	–
1 At TTY, Type **SET:TRKSTAT MTC.DSA,CIN a SVC*MFRT***(office code)!** a = TFN of Receiver Test Circuit (0 or 1)	–
2 Type **SET:TRKSTAT MTC.DSA,CIN a SVC*MFXT***(office code)!** a = TFN of Transmitter Test Circuit (0 or 1)	–
3 Replace DC-to-DC Converter 73E and 74E Power Units	DLP-500
4 Type **SET:TRKSTAT ACT,CIN a SVC*MFXT***(office code)!** a = TFN of Transmitter Test Circuit (0 or 1)	–
5 Type **SET:TRKSTAT ACT,CIN a SVC*MFRT***(office code)!** a = TFN of Receiver Test Circuit (0 or 1)	–

DO THE ITEMS BELOW IN THE ORDER LISTED		FOR DETAILS, GO TO
	NOTE: MFS Frame 0 Contains Test Unit Associated With MFRT And MFXT Circuits 0 MFS Frame 1 Contains Test Unit Associated With MFRT And MFXT Circuits 1	–
1	At TTY, Type **SET:TRKSTAT MTC.DSA,CIN a SVC*MFRT***(office code)!** a = TFN of Receiver Test Circuit (0 or 1)	–
2	Type **SET:TRKSTAT MTC.DSA,CIN a SVC*MFXT***(office code)!** a = TFN of Transmitter Test Circuit (0 or 1)	–
3	Replace Circuit Pack – MFS Test Unit	DLP-506
4	Type **SET:TRKSTAT ACT,CIN a SVC*MFXT***(office code)!** a = TFN of Transmitter Test Circuit (0 or 1)	–
5	Type **SET:TRKSTAT ACT,CIN a SVC*MFRT***(office code)!** a = TFN of Receiver Test Circuit (0 or 1)	–

DO THE ITEMS BELOW IN THE ORDER LISTED		FOR DETAILS, GO TO
1	Determine MDN Octal Address for TFRA, INTA, TFRB, INTB, PASS and FAIL	DLP-502
2	Test Circuit A Signal Distributor Points	DLP-501
3	Test Circuit B Signal Distributor Points	DLP-507
4	Test Pass and Fail Lamp Signal Distributor Points	DLP-508

GENERAL

The maintenance philosophy contained in this volume is based upon the design of equipment hardware, service circuit software and test equipment employed. Procedures provided are intended to aid personnel in performing trouble-clearing tasks. When procedures are affected by differences in hardware and/or software, the procedure will address the differences where possible. When extensive differences warrant, separate procedures will be provided and referenced according to SD, J-spec or option. Where a procedure does not address differences, it will apply to all versions and options of the equipment. Reference documents such as SDs, PRs, I/O manuals, etc, are referred to where applicable rather than duplicating that information. Some portions of documents may be utilized in procedures but only as examples for the purpose of explanation. Some procedures will require the use of test equipment; however, no attempt is made to provide the detail required to set up the equipment in order to obtain the expected results.

When documenting a procedural approach to trouble clearing, certain assumptions are made. It is assumed that one fault is being cleared at a time. When directing the user to perform an action, it is assumed that he performs that action correctly. Similarly, when directed to make replacements, the replacement part is always assumed to be good and equipment used for testing, both built-in (hardware and software) and commercial, are assumed to be good.

IXL PHILOSOPHY

The IXL is an alphabetized permuted index structured to provide fast access to trouble analysis procedures (TAPs), non-trouble procedures (NTPs), and detailed level procedures (DLPs) pertinent to identified symptoms.

Power faults are sensed by scan points which generate a major or minor alarm. The IXL is based upon the assumption that the user following the aisle pilot lights or reading the REPT:PA printout can locate the frame with this power fault. The symptoms described in the IXL reflect the above assumptions, and indicate other conditions that are observable at this frame to enable the user to access the proper trouble-clearing procedures. These conditions are blown fuses and/or lighted indicator lamps.

TTY printouts are generated for MFS circuits when they fail to perform properly or when they are affected by other circuits that have failed to perform properly. The IXL and procedures related to TTY printouts were generated with the assumption that some analysis by the user has been performed to select the most suspect unit reported; ie, multiple receiver or transmitter failures would tend to imply test or other common use circuits and inconsistent test results of multiple unit failures would tend to eliminate the test circuits.

TAP PHILOSOPHY

The power alarm related TAPs address spurious faults and circuit failures. Spurious faults will require only the replacement of blown fuses and restoring affected circuits. When the replacement fuse blows or no fuse is found blown, the TAPs will take the user through an isolation process to clear the trouble.

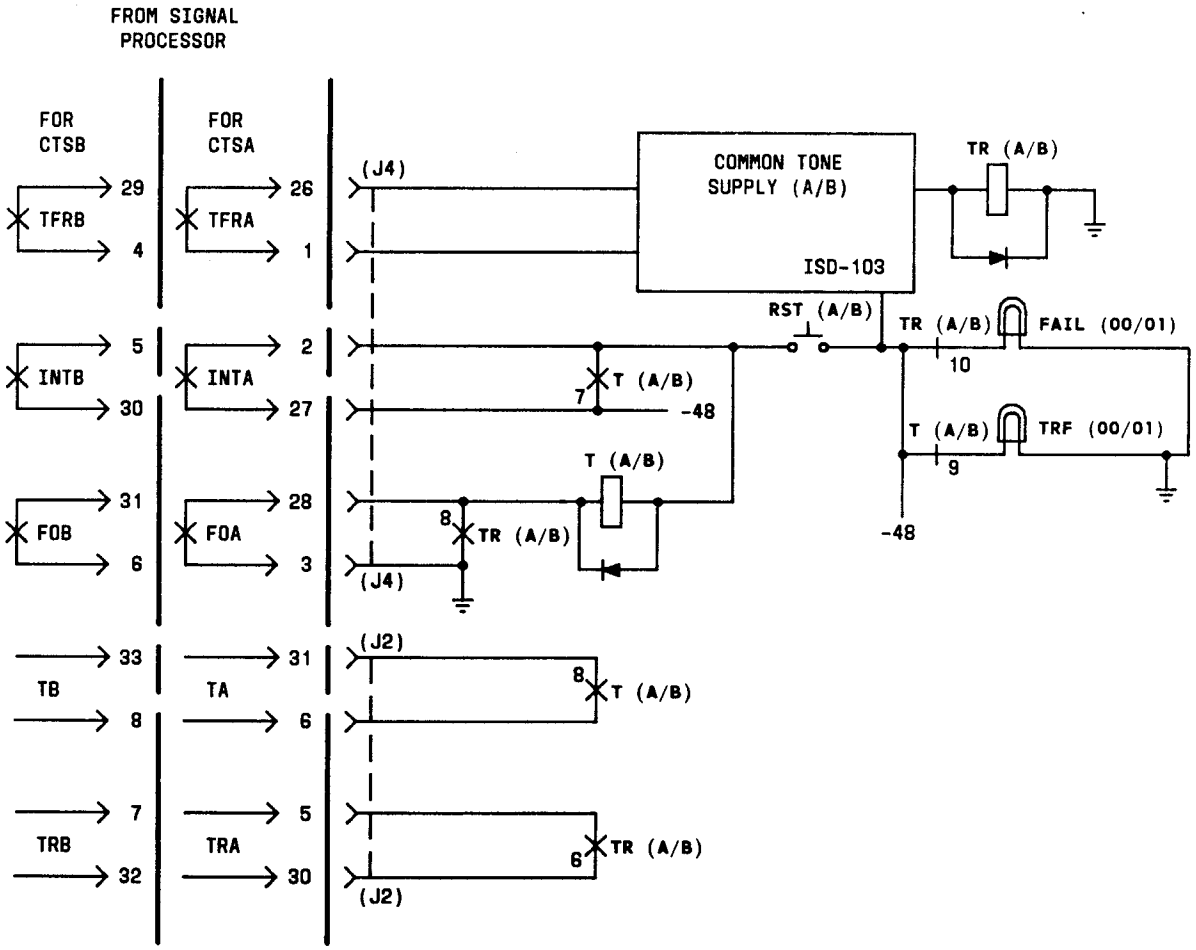
The TAPs provided for MF signaling circuit troubles reported by TTY printouts are intended to aid the user in identifying and isolating faulty circuits, then by replacing circuit packs, clear the cause of the faulty condition.

When circuit pack replacement does not clear the faulty condition (power alarm or circuit failure), a higher level of maintenance will be required to isolate the trouble cause. The TAPs will reference the appropriate SD and/or ISD to be used for trouble shooting and/or signal tracing; however, no attempt is made to provide complete step-by-step procedures required for this level of maintenance.

MAINTENANCE PHILOSOPHY

ALTERNATE METHODS

The more knowledgeable and experienced personnel may access the TOP documents at a point in trouble-clearing when analyzation is completed (the faulty component determined) and only repair or replacement is required. Most DLPs are constructed to support TAPs and NTPs with preconditioning and system restoration steps covered in that level of procedures (TAPs and NTPs). Therefore, access to detailed data (DLPs) on a hunt-and-find basis is a threat to equipment operation and may compound trouble-clearing problems.



COMMON TONE TRANSFER MONITOR AND CONTROL CIRCUIT

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[1] Determine miscellaneous distributor number (MDN) and miscellaneous scanner number (MSN) octal addresses listed in TABLE A for failing common tone supply (CTS) [DLP-502]

At TTY:

[2] See NOTE 1. Type
ORD:SD;RLS:MDN 0' a!
a = octal address for FO(A/B)

[3] Type
ORD:SD;READ:MDN 0' a!
a = octal address for FO(A/B)

AND

[4] Did reply message indicate 0

No

[5] Record octal address for FO(A/B) and refer to TOP 234-151-031 for trouble clearing procedure

Yes

[6] Type
ORD:SD;RLS:MDN 0' b!
b = octal address for INT(A/B)

[7] Type
ORD:SD;READ:MDN 0' b!
b = octal address for INT(A/B)

AND

[8] Did reply message indicate 0

Yes

Page 2

No

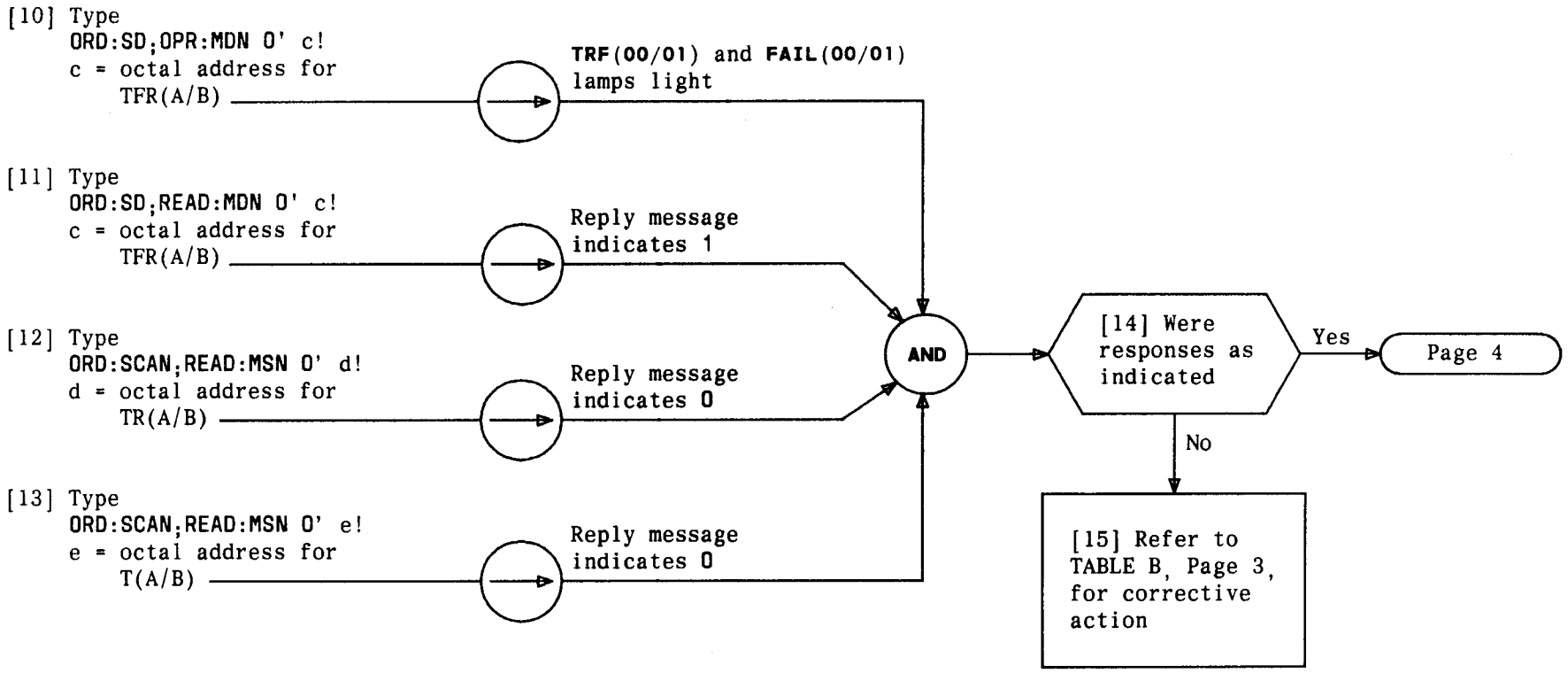
[9] Record octal address for INT(A/B) and refer to TOP 234-151-031 for trouble clearing procedure

NOTE 1
Signal processor (SP) addresses require binary bits 16 through 0. Therefore, only use six least significant octal digits when inputting octal addresses

TABLE A

FAILING CTS	a MDN	b MDN	c MDN	d MSN	e MSN
CTS A	FOA	INTA	TFRA	TRA	TA
CTS B	FOB	INTB	TFRB	TRB	TB

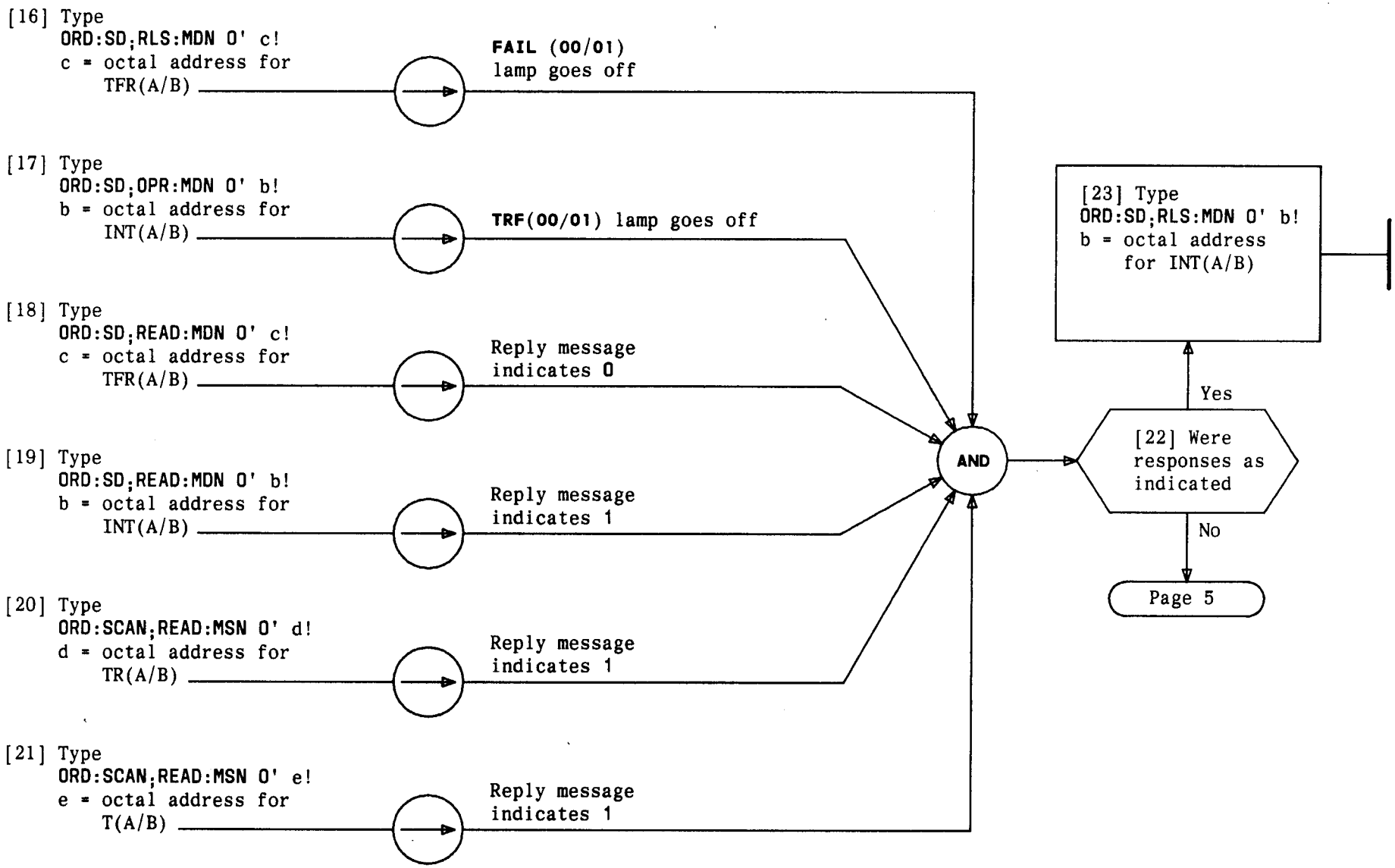
CLEAR COMMON TONE TRANSFER CIRCUIT FAULT



CLEAR COMMON TONE TRANSFER CIRCUIT FAULT

TABLE B					
TRF (00/01) LAMP STATUS	FAIL (00/01) LAMP STATUS	TFR(A/B) MDN c STATE	TR(A/B) MSN d STATE	T(A/B) MSN e STATE	CORRECTIVE ACTION
ON	ON	1	0	0	Expected results – no action required
ON	OFF	1	0	0	Transfer occurred – replace **FAIL (00/01)** lamp bulb
OFF	ON	1	0	0	Transfer occurred – replace **TRF (00/01)** lamp bulb
OFF	OFF	1	0	0	Transfer occurred – replace **FAIL (00/01)** and **TRF (00/01)** lamp bulbs
OFF	OFF	0	1	1	No transfer. MDN is problem. Record octal address for TFR(A/B) and refer to TOP 234-151-031 for trouble clearing procedure
ON	ON	1	0	1	Transfer occurred. MSN is problem. Record octal address for T(A/B) and refer to TOP 234-151-031 for trouble clearing procedure
OFF	OFF	1	1	1	No transfer. TR(A/B) relay did not deenergize. Refer to SD-1C489 and SD-1C498 for trouble clearing
ON	ON	1	1	0	Transfer occurred. MSN is problem. Record octal address for TR(A/B) and refer to TOP 234-151-031 for trouble clearing procedure
OFF	ON	1	0	1	No transfer. T(A/B) relay did not deenergize. Refer to SD-1C498 for trouble clearing

CLEAR COMMON TONE TRANSFER CIRCUIT FAULT



CLEAR COMMON TONE TRANSFER CIRCUIT FAULT

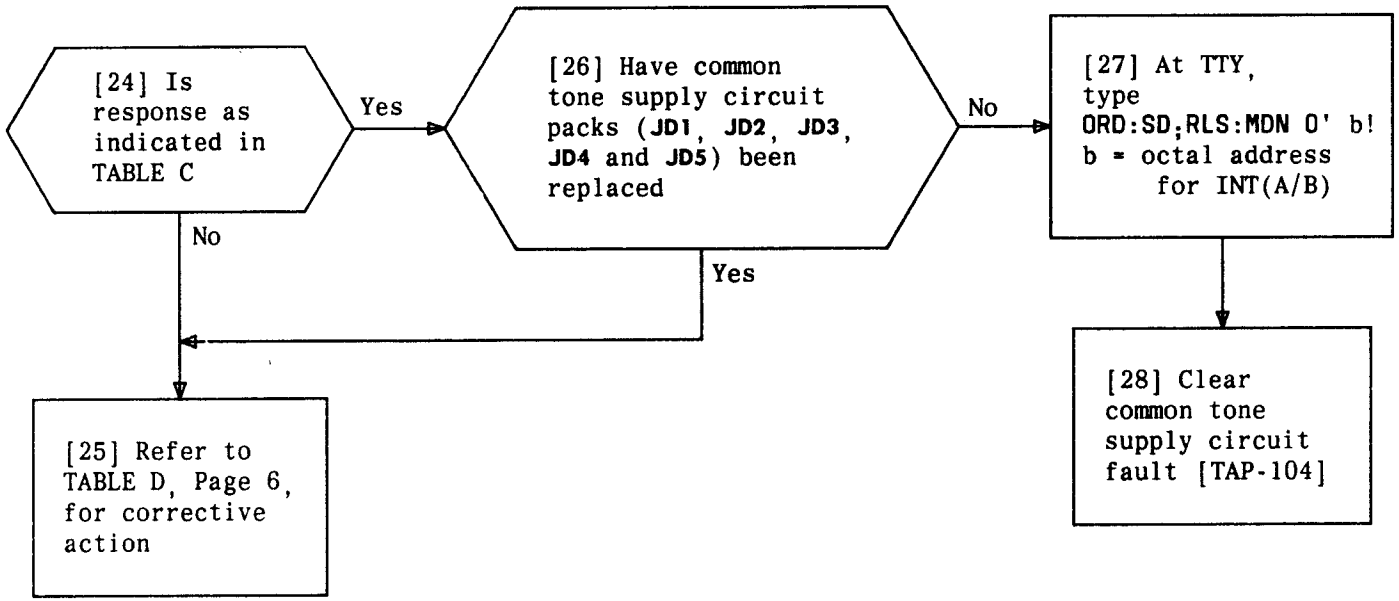
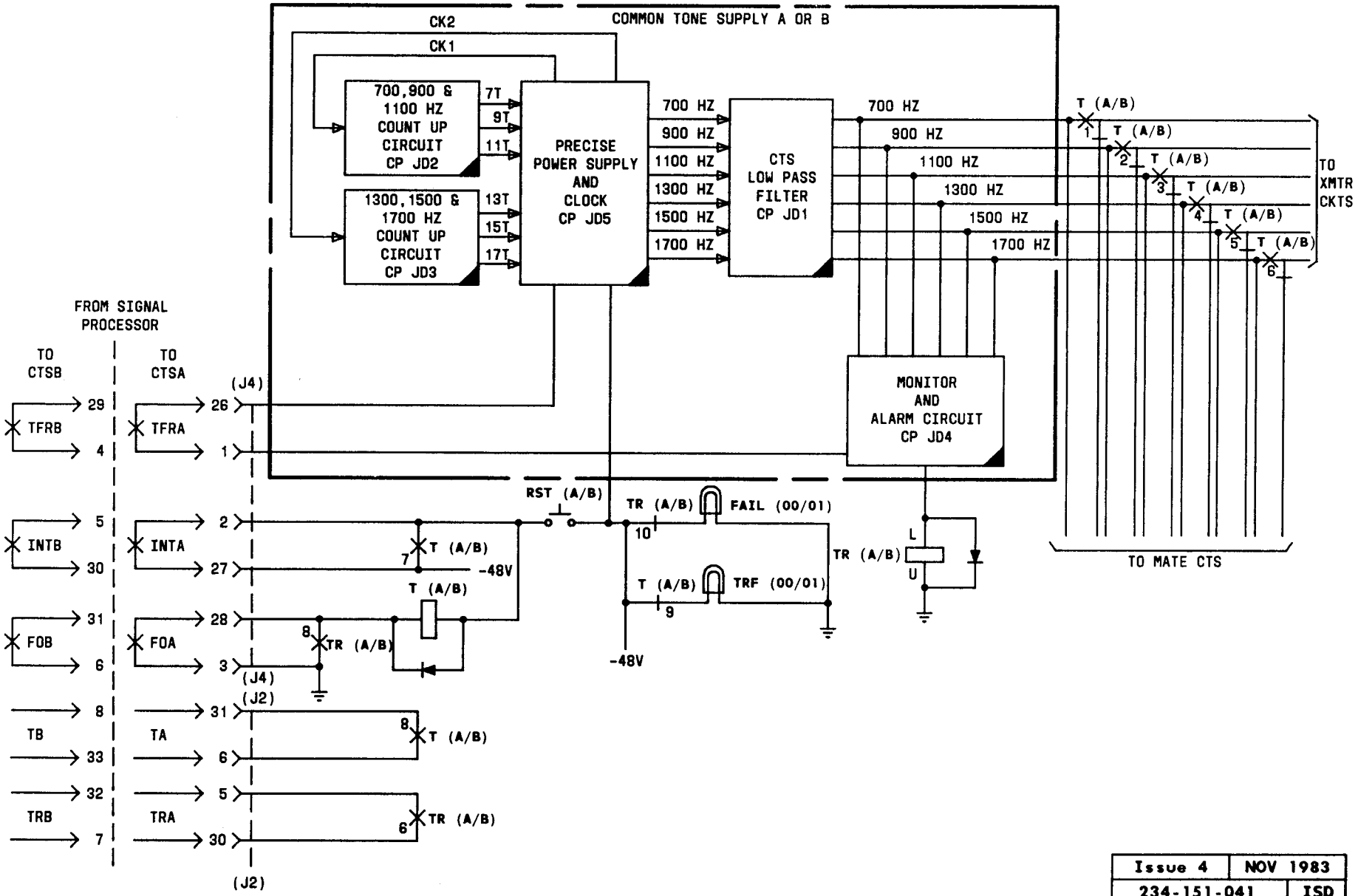


TABLE C

TRF (00/01) LAMP STATUS	FAIL (00/01) LAMP STATUS	TFR(A/B) MDN c STATE	INT(A/B) MDN b STATE	TR(A/B) MSN d STATE	T(A/B) MSN e STATE
ON	ON	0	1	0	0

CLEAR COMMON TONE TRANSFER CIRCUIT FAULT

TABLE D						
TRF (00/01) LAMP STATUS	FAIL (00/01) LAMP STATUS	TFR(A/B) MDN c STATE	INT(A/B) MDN b STATE	TR(A/B) MSN d STATE	T(A/B) MSN e STATE	CORRECTIVE ACTION
OFF	OFF	0	1	1	1	Expected results – release INT(A/B) MDN point
OFF	OFF	0	1	0	1	TR(A/B) scan point is problem. Record octal address for TR(A/B) and refer to TOP 234-151-031 for trouble clearing procedure
OFF	OFF	0	1	1	0	T(A/B) scan point is problem. Record octal address for T(A/B) and refer to TOP 234-151-031 for trouble clearing procedure
ON	OFF	0	0	1	0	INT(A/B) scan point is problem. Record octal address for INT(A/B) and refer to TOP 234-151-031 for trouble clearing procedure
ON	ON	0	1	0	0	Signal distributor (SD) point is problem. Record octal address for TFR(A/B) and refer to TOP 234-151-031 for trouble clearing procedure



MFS COMMON TONE SUPPLY AND TRANSFER CIRCUITS

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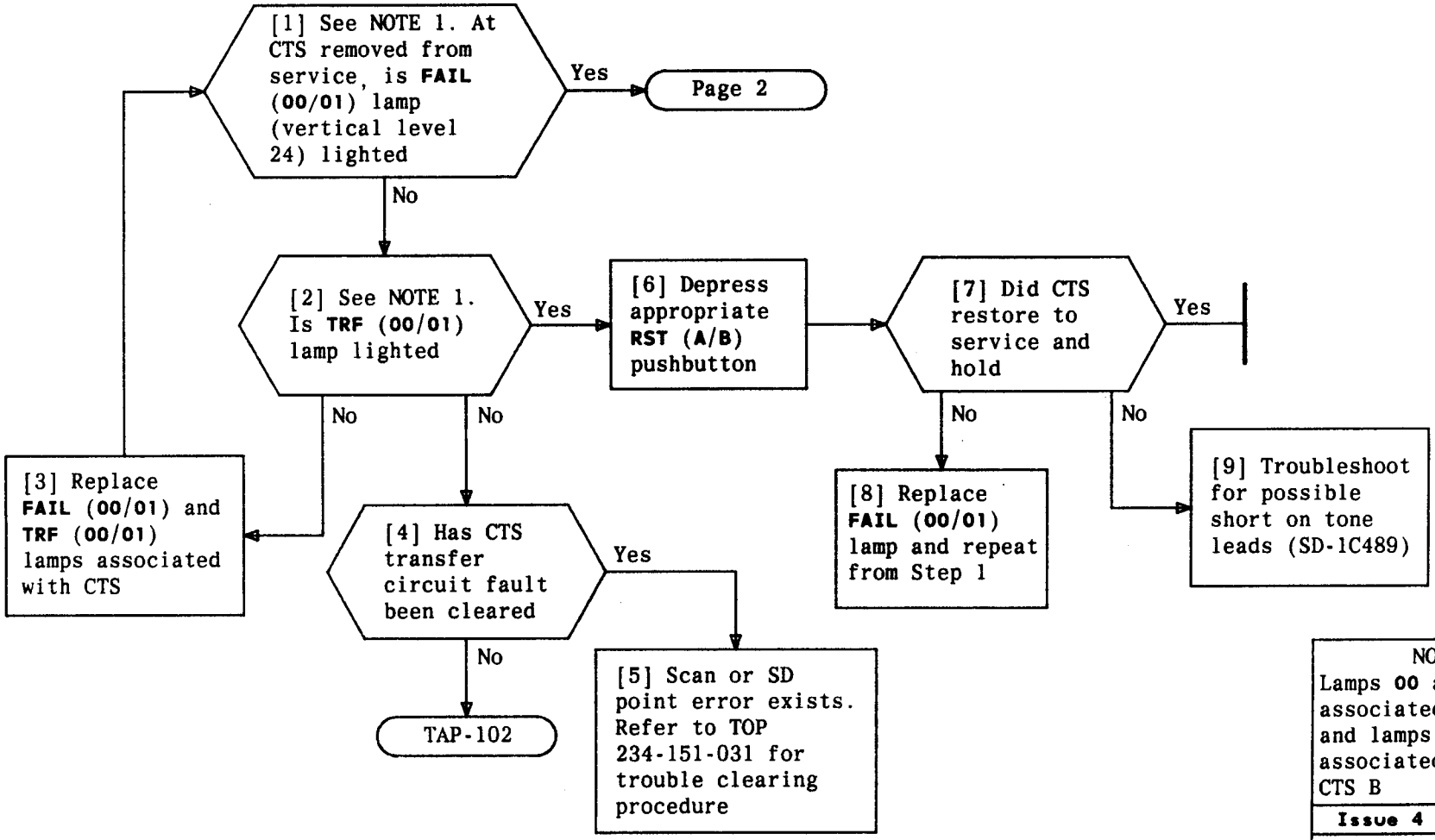
SUMMARY

If **FAIL (00/01)** lamp (associated with CTS removed from service) is lighted, replace appropriate CTS circuit packs one at a time until **FAIL (00/01)** lamp goes off. If replacing circuit packs does not clear **FAIL** lamp trouble, check scan and distributor points TAP-102. If **TRF (00/01)** lamp is lighted, depress **RST (A/B)** pushbutton associated with CTS removed from service. If **RST** pushbutton will not clear **TRF** lamp, troubleshoot for possible short on tone leads



NOTE 1

Lamps **00** are associated with CTS A and lamps **01** are associated with CTS B

CLEAR COMMON TONE SUPPLY CIRCUIT FAULT

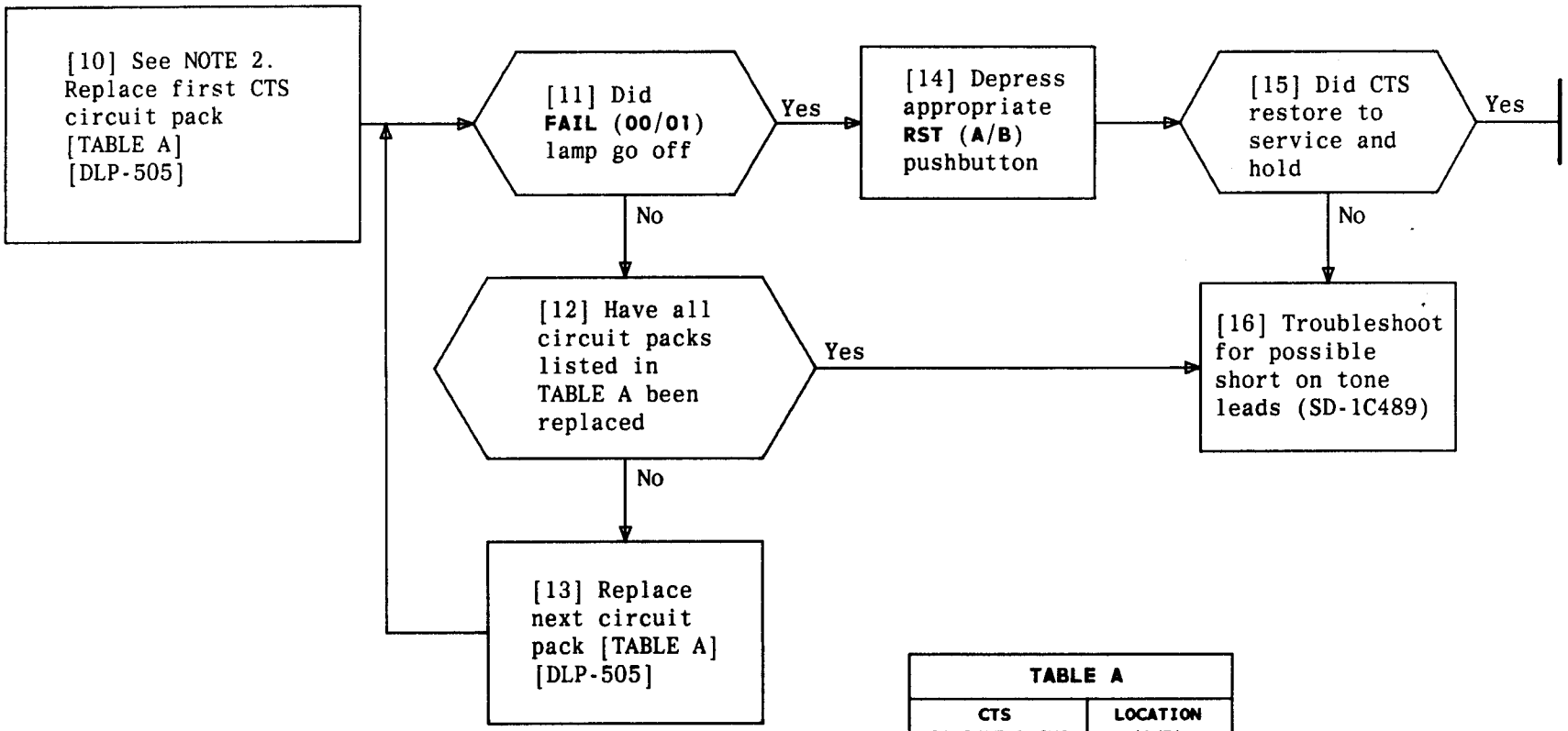
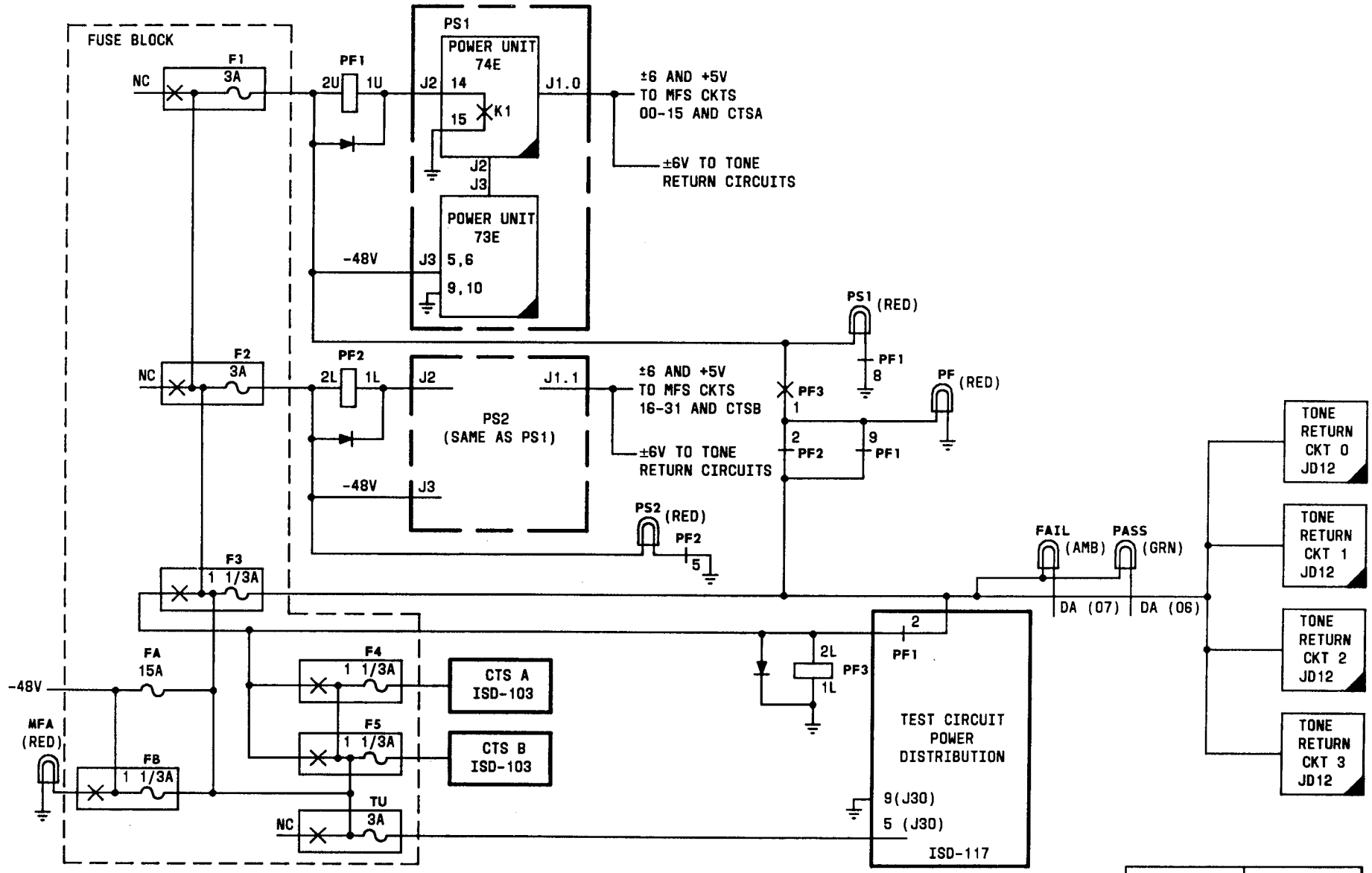


TABLE A	
CTS CIRCUIT PACKS	LOCATION (A/B)
JD5	24-03/38
JD2	24-01/36
JD3	24-02/37
JD1	24-05/40
JD4	24-08/43

NOTE 2
Circuit packs associated with **FAIL (00)** lamp are located left of lamps. Packs associated with **FAIL (01)** lamp are located right of lamps

CLEAR COMMON TONE SUPPLY CIRCUIT FAULT



MF SIGNAL FRAME –48 VOLT POWER DISTRIBUTION

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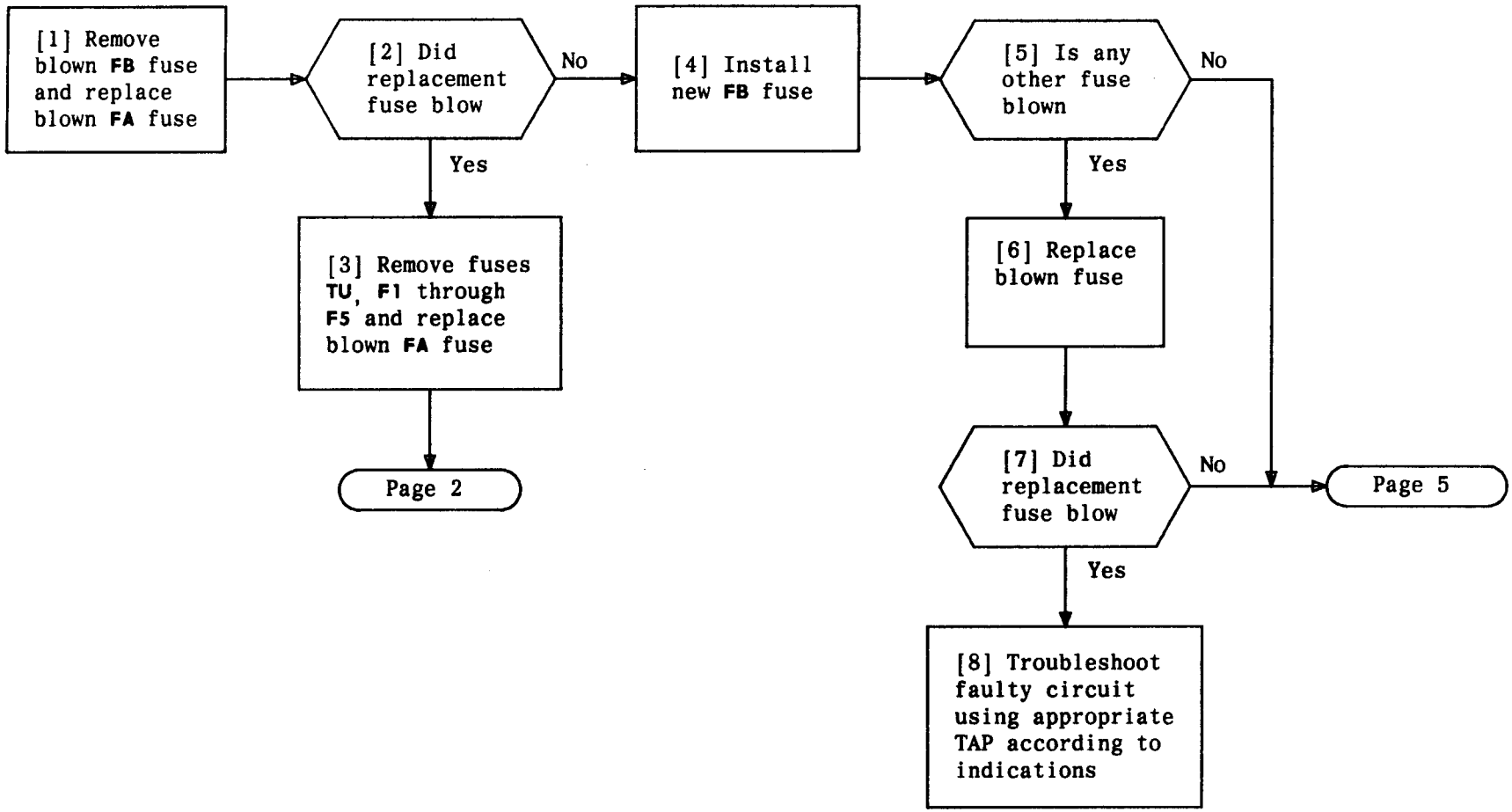


CLEAR MAJOR POWER ALARM WITH MFA LAMP LIGHTED

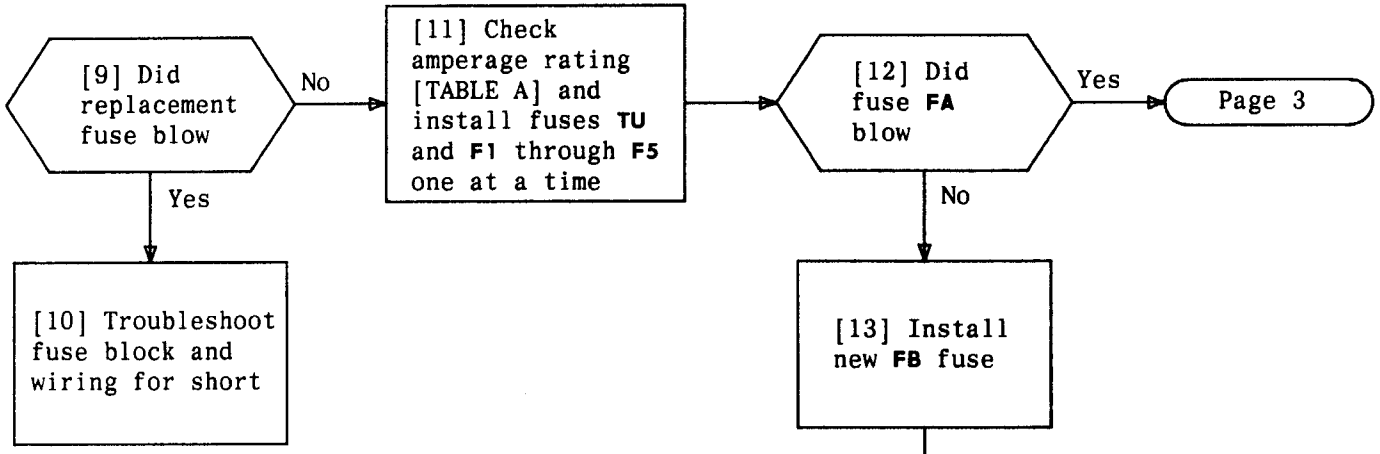


TABLE A	
FUSE DESIGNATION	AMPERAGE RATING
FA	15 AMPS
FB	1 1/3 AMPS
F1	3 AMPS
F2	3 AMPS
F3	1 1/3 AMPS
F4	1 1/3 AMPS
F5	1 1/3 AMPS
TU	3 AMPS

CLEAR MAJOR POWER ALARM WITH MFA LAMP LIGHTED

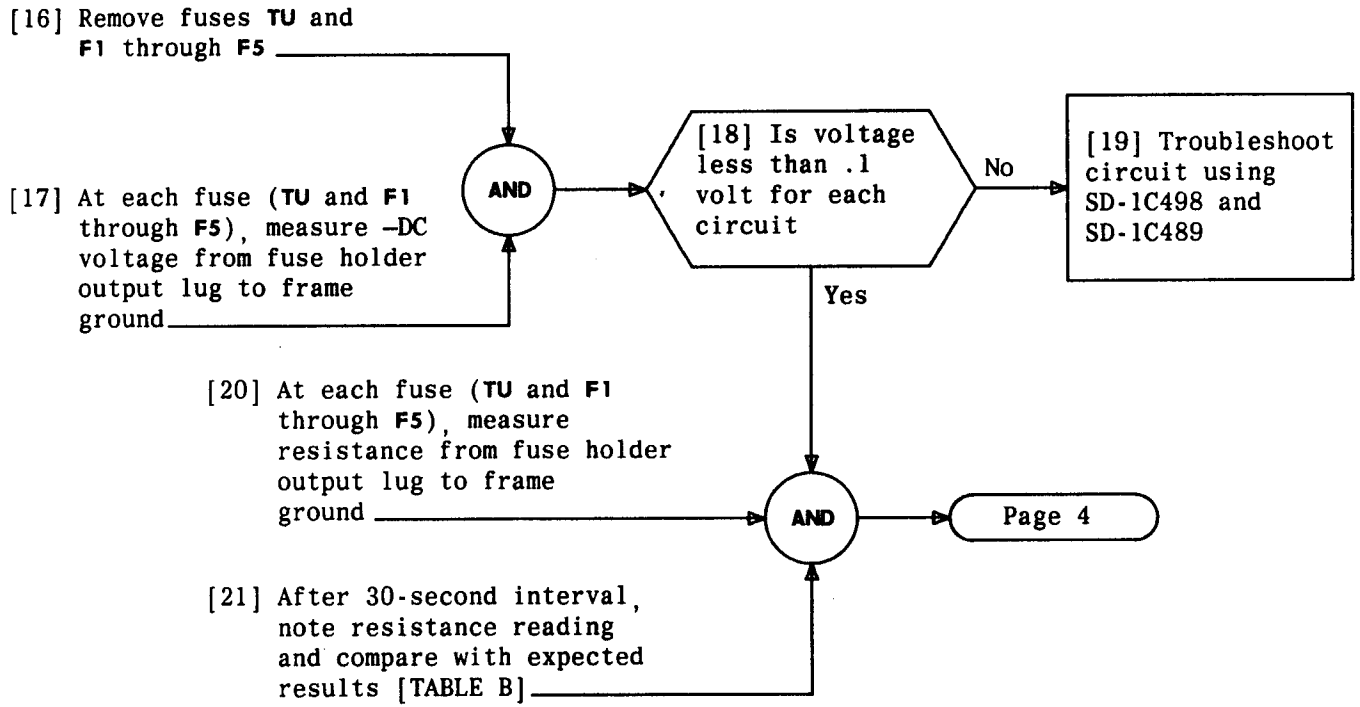
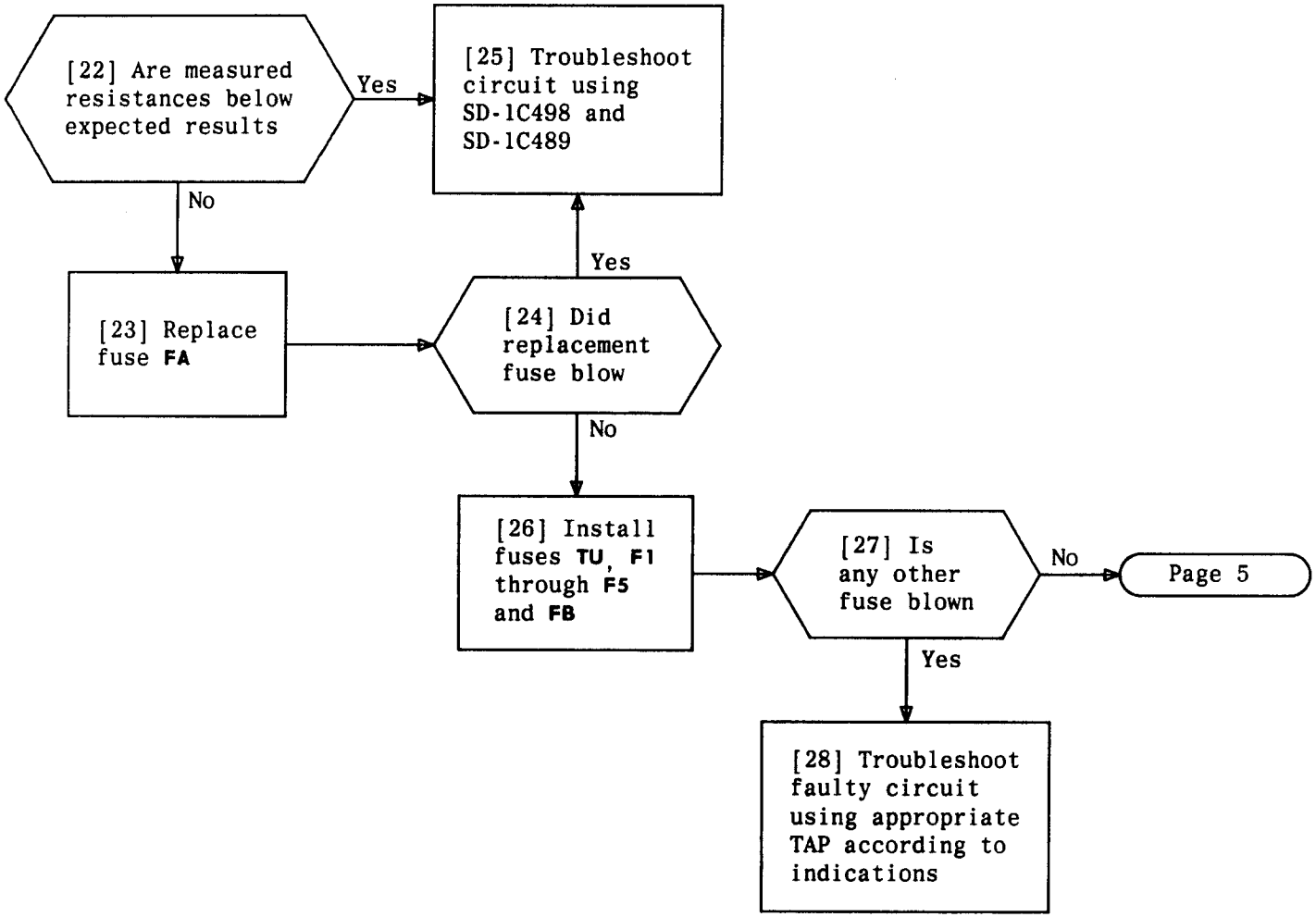


TABLE B – POWER FEEDER RESISTANCES FOR MFS FRAME CIRCUITS

FUSE	EXPECTED RESISTANCE
F1	Approximate 2K ohms
F2	Approximate 2K ohms
F3	Greater than 2K ohms
F4	Approximate 1K ohms
F5	Approximate 1K ohms
TU	Approximate 2K ohms

CLEAR MAJOR POWER ALARM WITH MFA LAMP LIGHTED



CLEAR MAJOR POWER ALARM WITH MFA LAMP LIGHTED

[29] At CTS unit, depress **RST A** and **RST B** pushbuttons

At TTY:

[30] Type
OP:TRKSTAT, CIN a SVC*MFb** (office code); SUM:TSG:STAT CAD!**
to determine trunks that are out-of-service
(a = TFN of TRK, b = R or X)

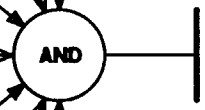
[31] Type
SET:TRKSTAT ACT, CIN a SVC*MFR**(office code)!**
for all receivers removed from service when
power alarm occurred
(a = TFN of TRK)

[32] Type
SET:TRKSTAT ACT, CIN a SVC*MFX**(office code)!**
for all transmitters removed from service when
power alarm occurred
(a = TFN of TRK)

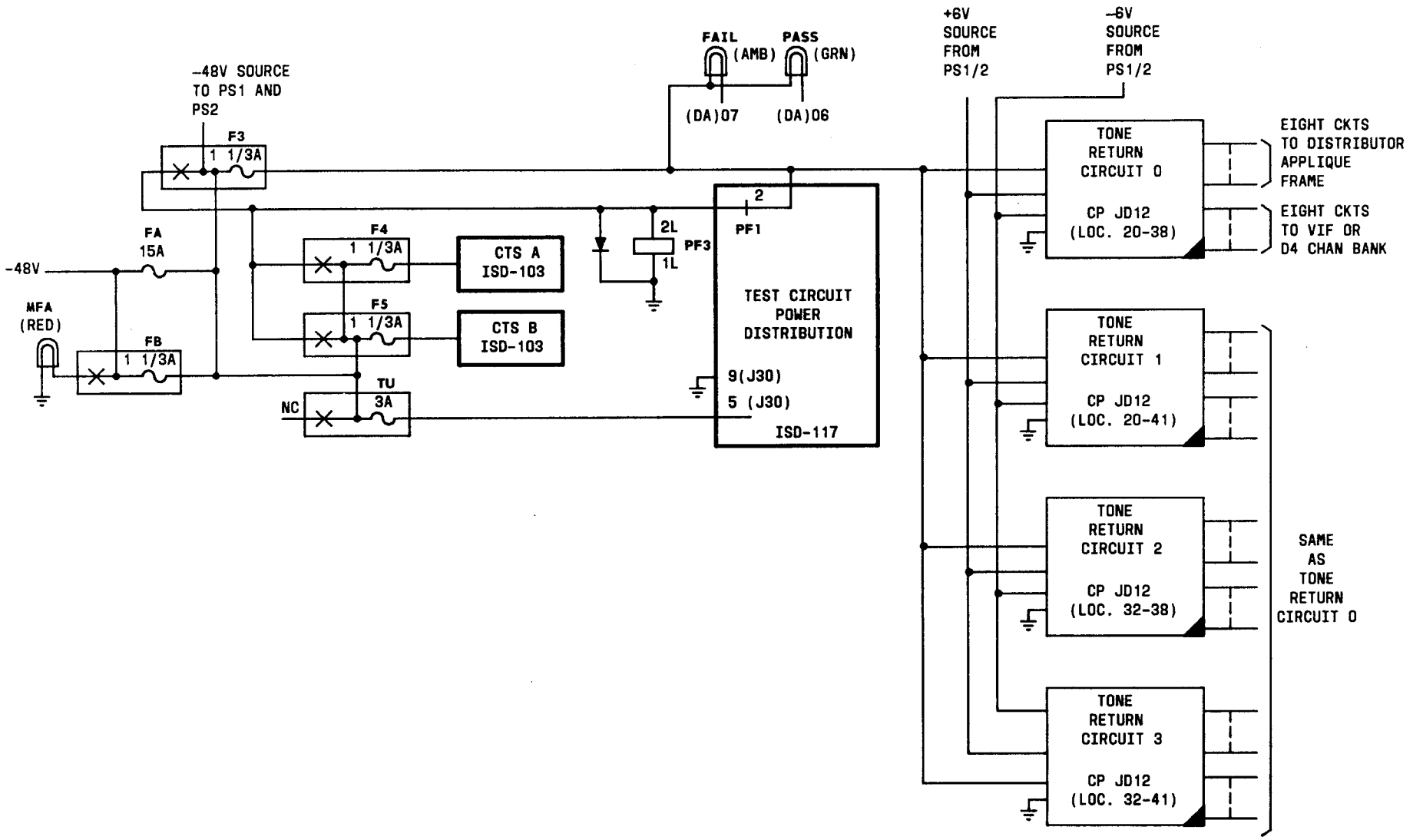
[33] Type
OP:TRKSTAT, CIN a SVC*MFbT* (office code); SUM:TSG:STAT CAD!**
to determine test circuits that are out-of-service
(a = TFN of test circuit, b = R or X)

[34] Type
SET:TRKSTAT ACT, CIN a SVC*MFRT*(office code)!**
for receiver test circuits removed from service
when power alarm occurred
(a = TFN of receiver test circuit)

[35] Type
SET:TRKSTAT ACT, CIN a SVC*MFXT*(office code)!**
for transmitter test circuits removed from service
when power alarm occurred
(a = TFN of transmitter test circuit)



CLEAR MAJOR POWER ALARM WITH MFA LAMP LIGHTED



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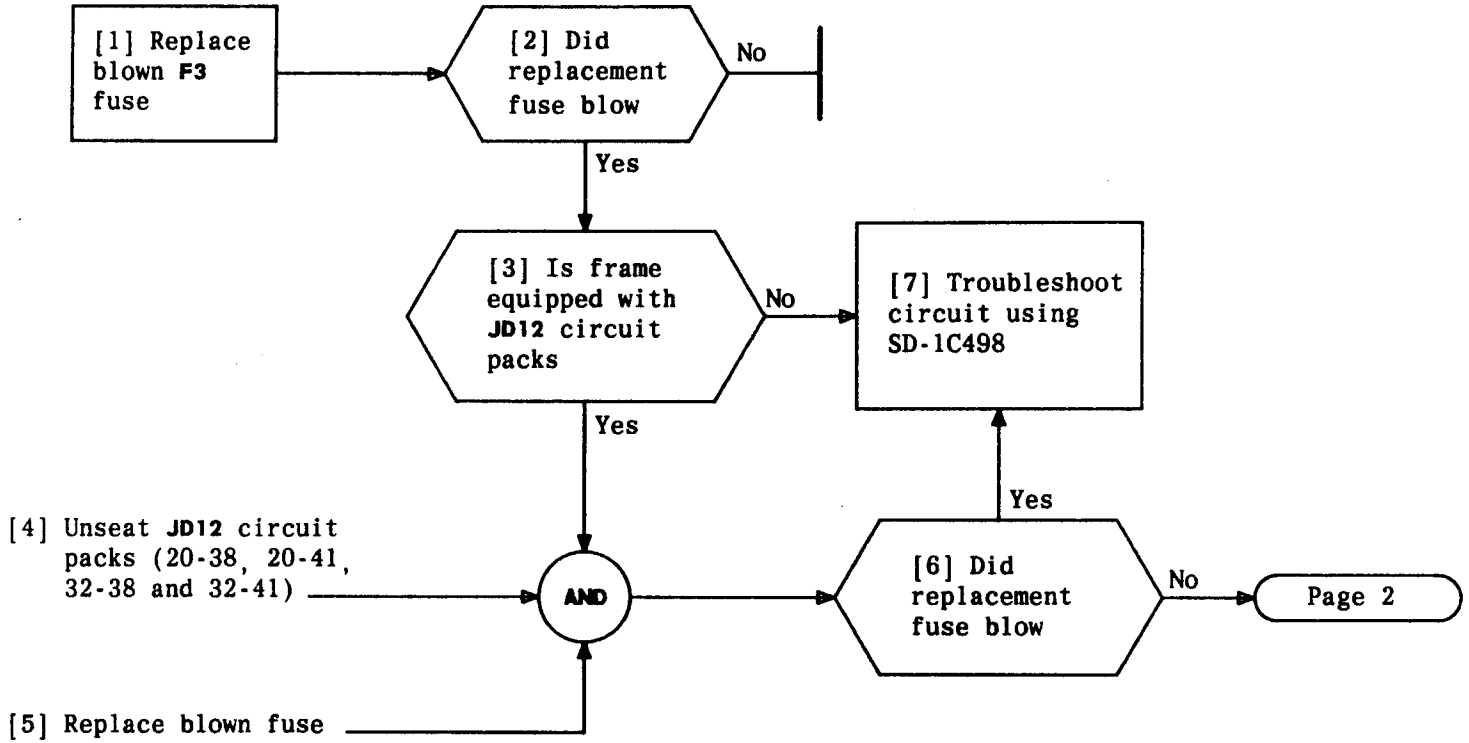
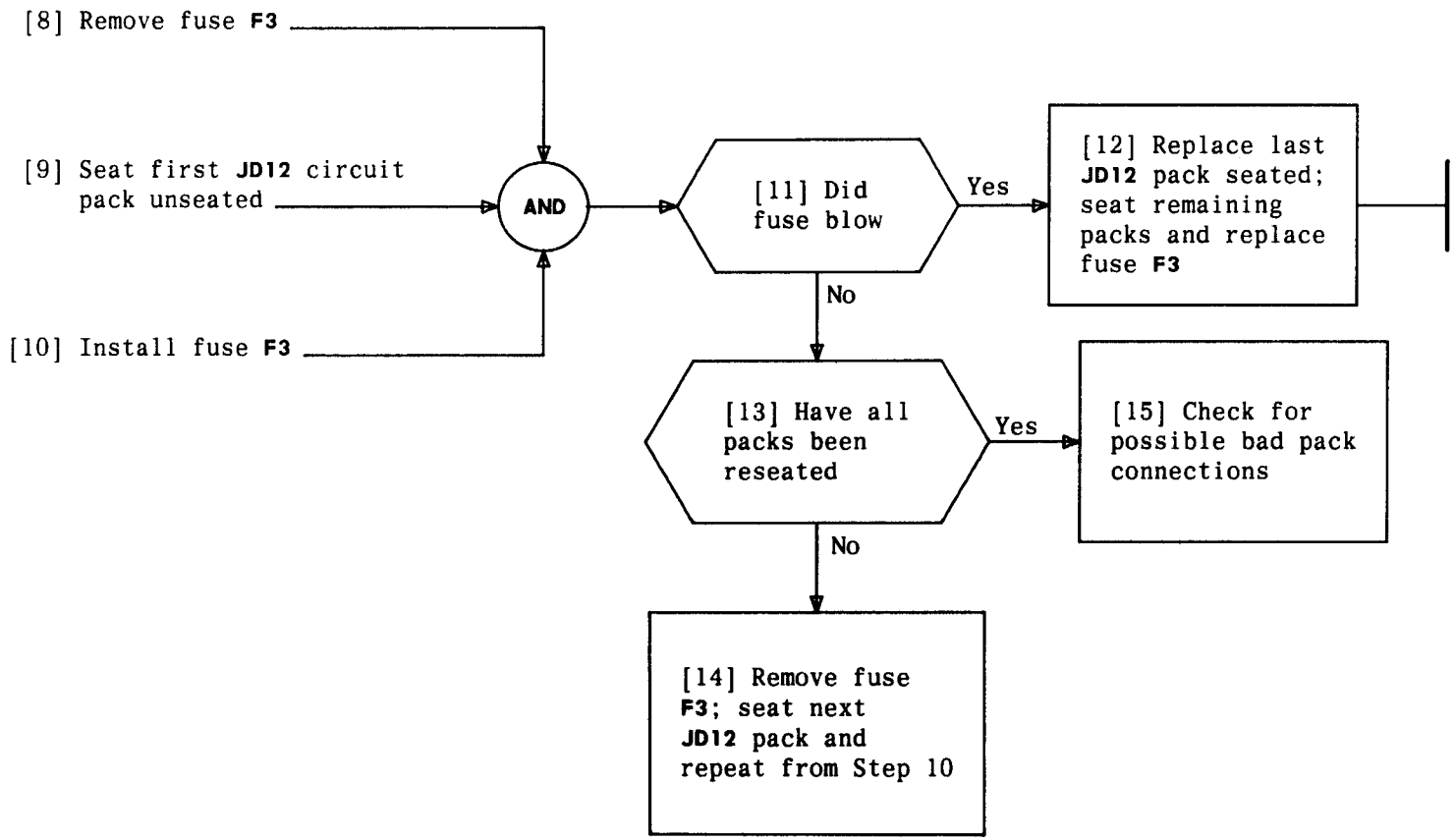
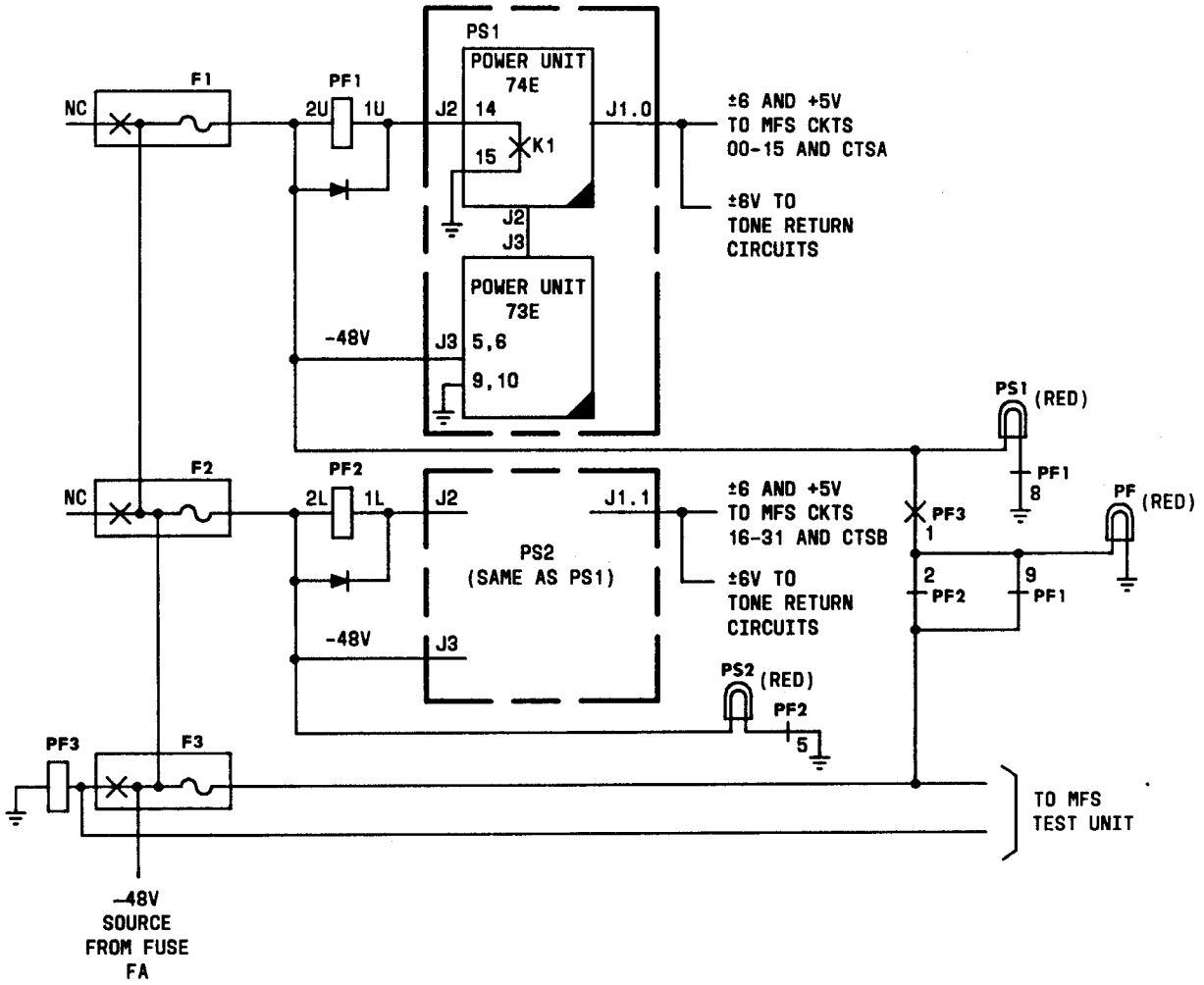
TONE RETURN CIRCUIT –48, –6V, AND +6V POWER DISTRIBUTION



CLEAR MINOR POWER ALARM WITH FUSE F3 BLOWN



CLEAR MINOR POWER ALARM WITH FUSE F3 BLOWN



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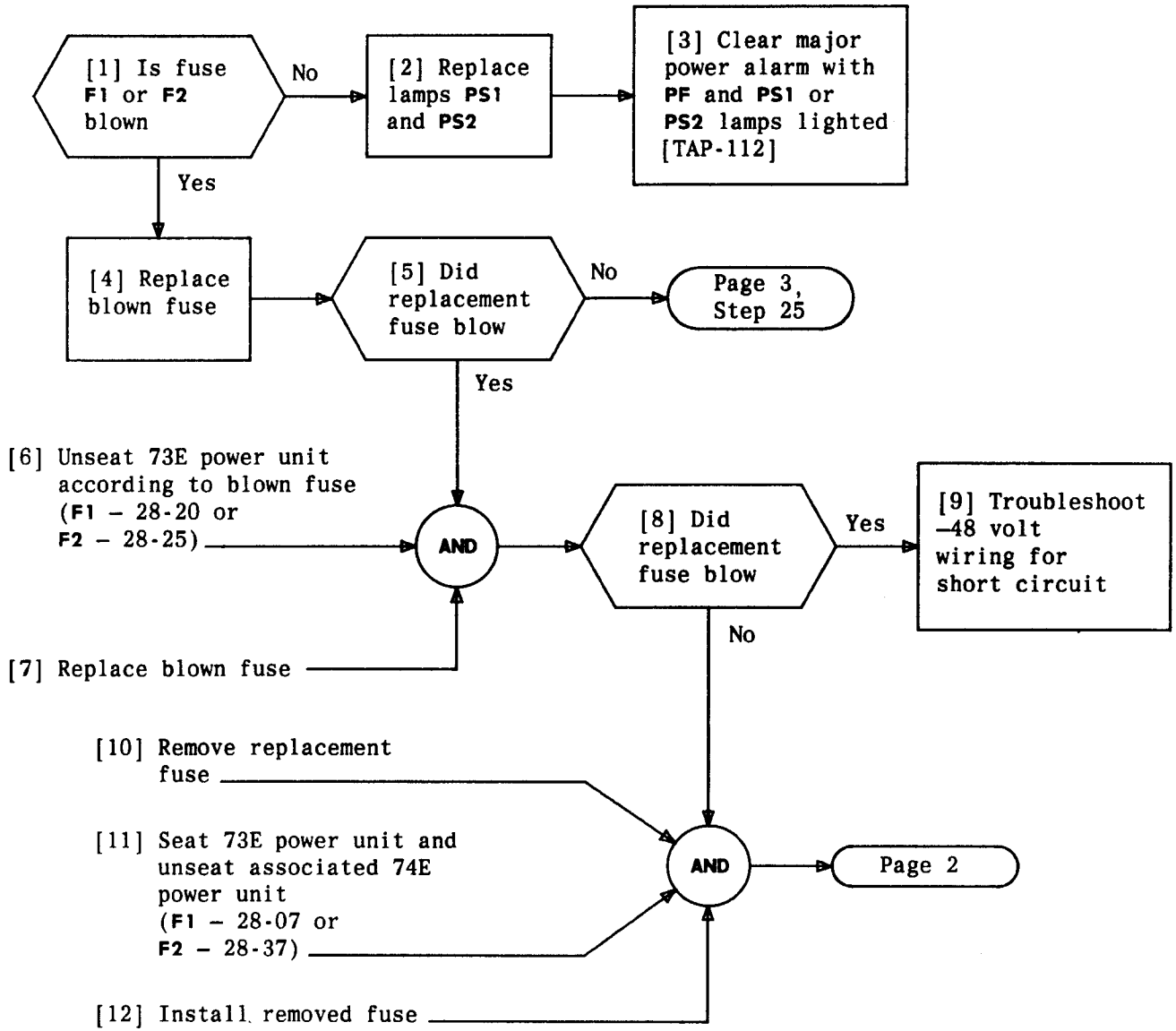
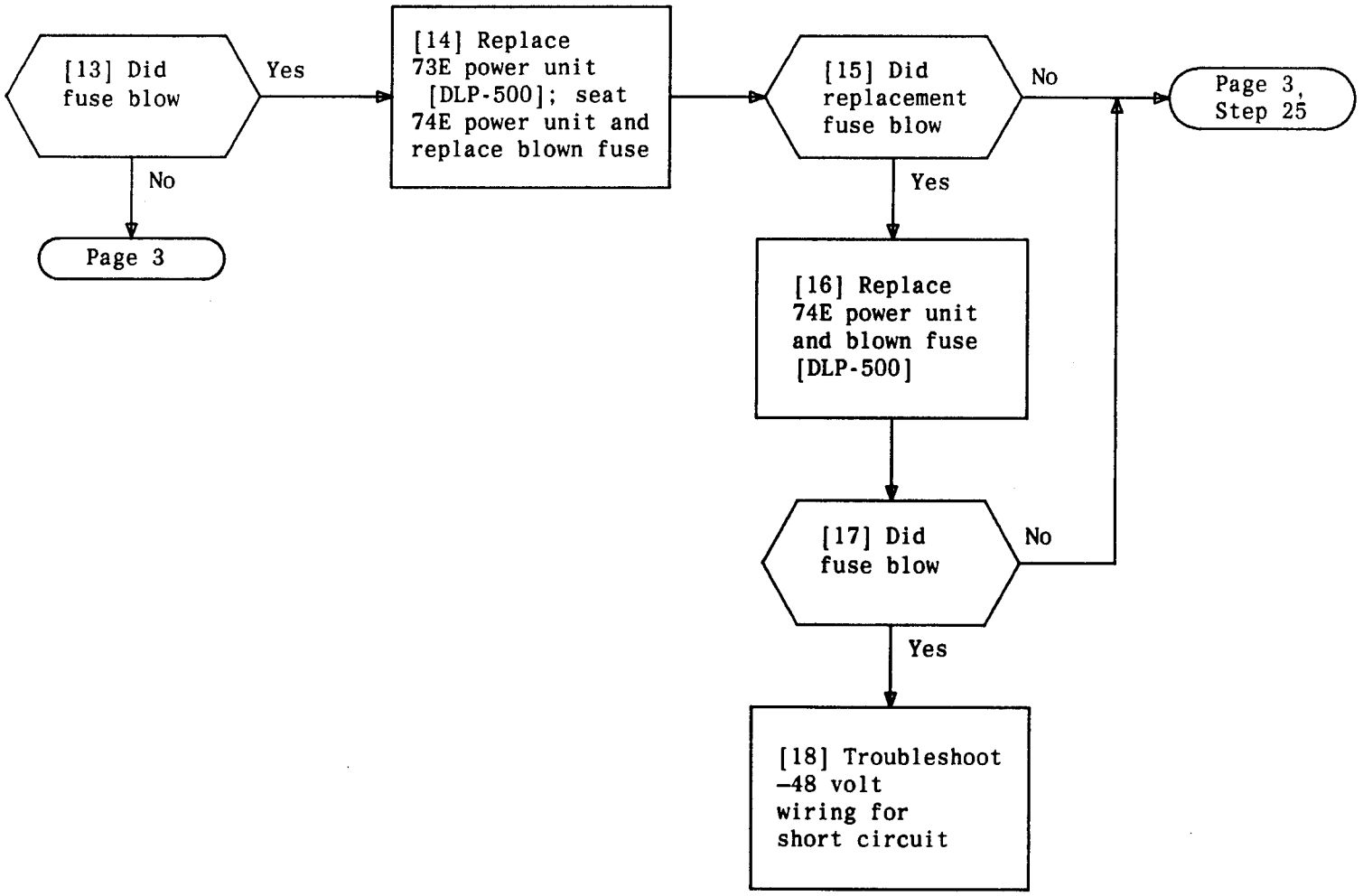
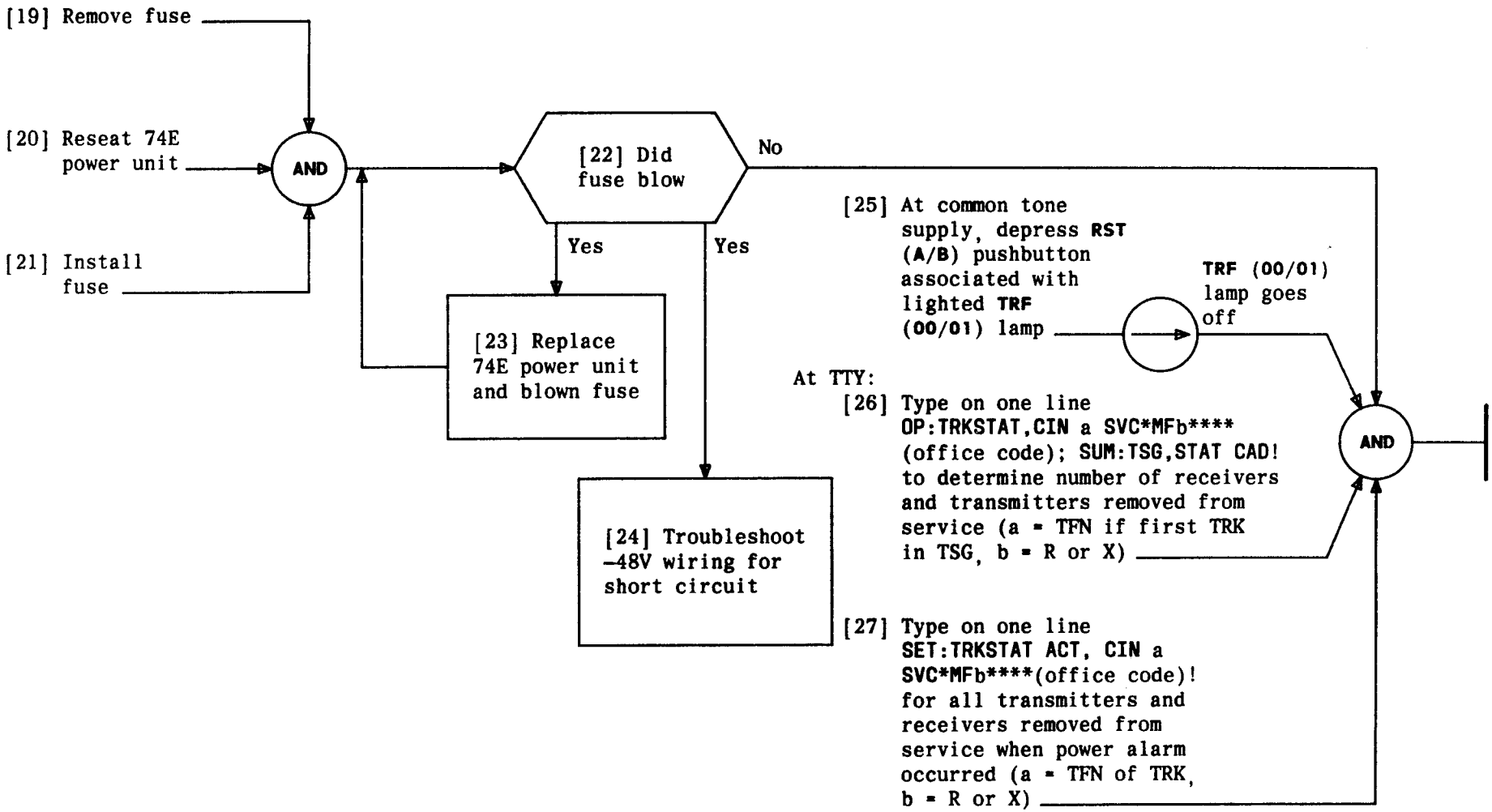
POWER DISTRIBUTION FOR TRANSMITTERS AND RECEIVERS



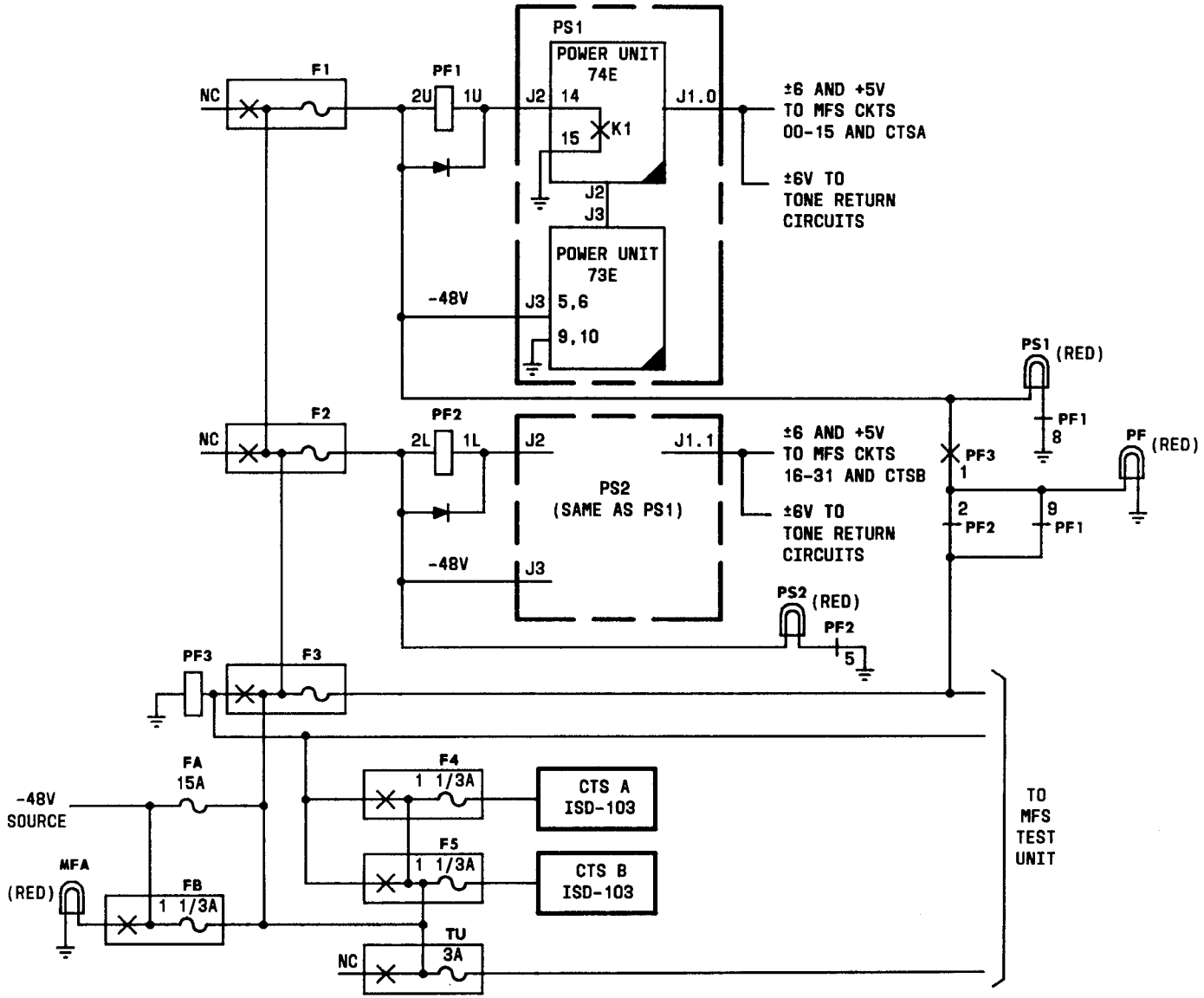
CLEAR MAJOR POWER ALARM WITH PF LAMP ONLY LIGHTED



CLEAR MAJOR POWER ALARM WITH PF LAMP ONLY LIGHTED



CLEAR MAJOR POWER ALARM WITH PF LAMP ONLY LIGHTED



POWER DISTRIBUTION FOR TRANSMITTERS, RECEIVERS AND COMMON TONE SUPPLIES

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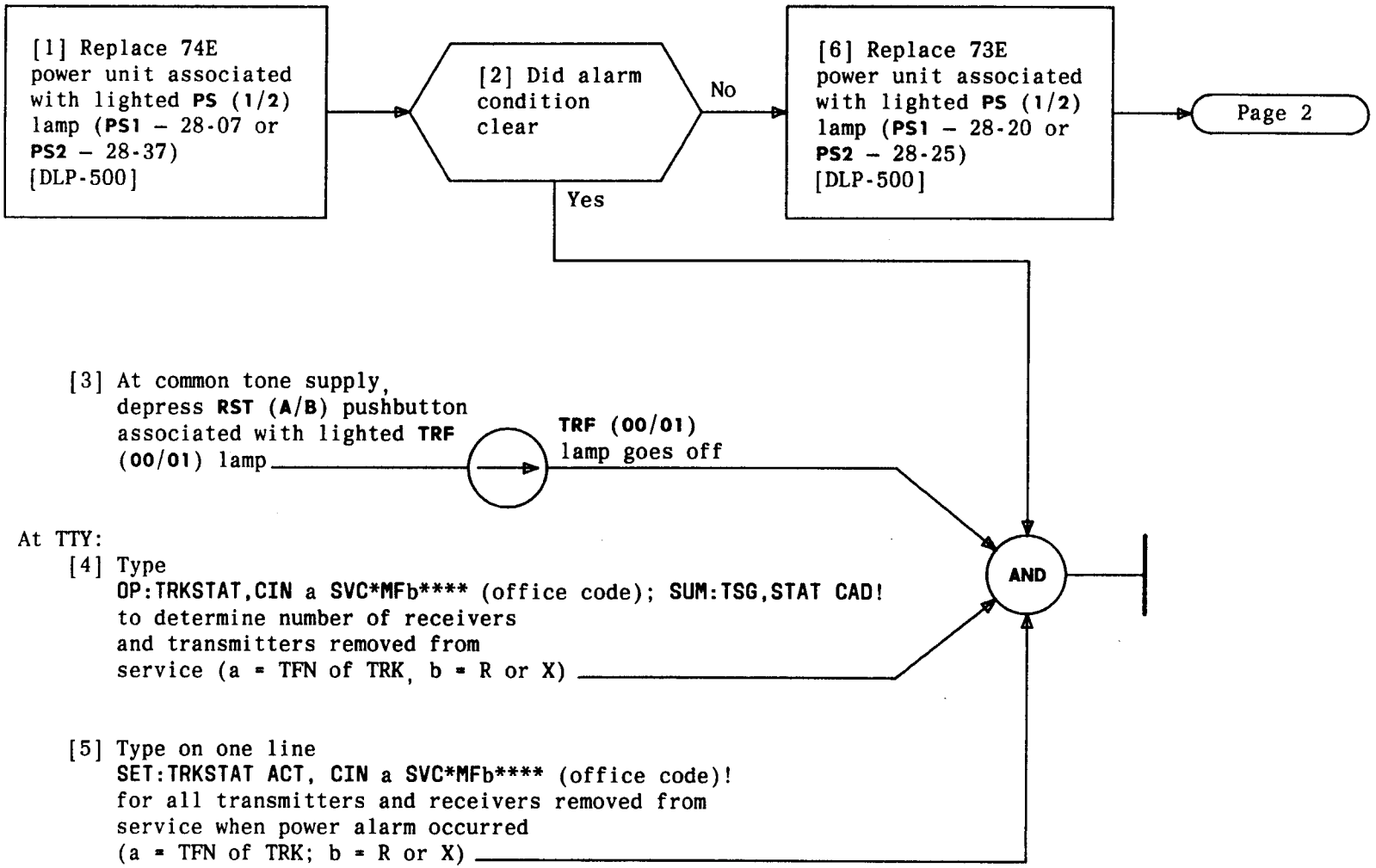
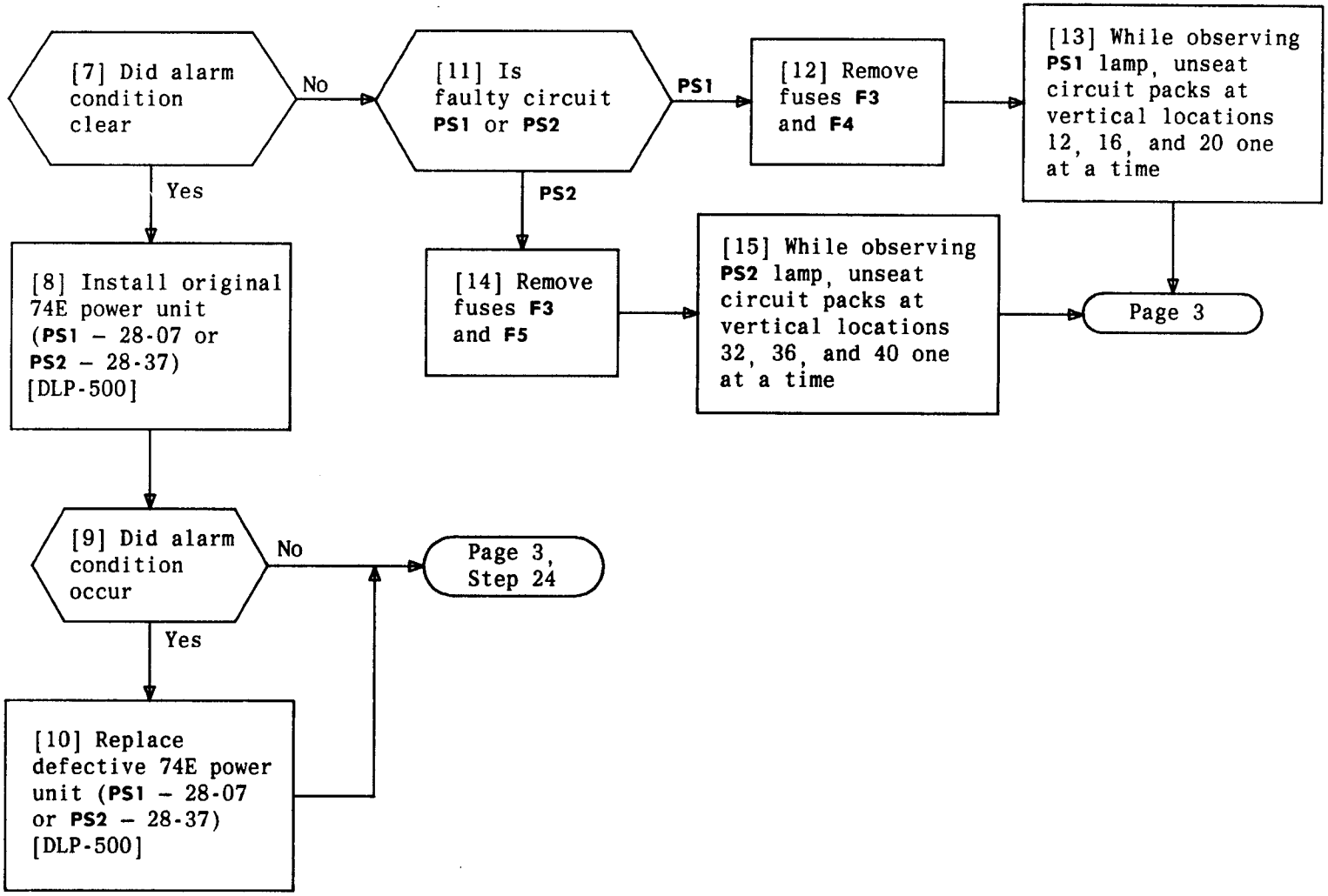
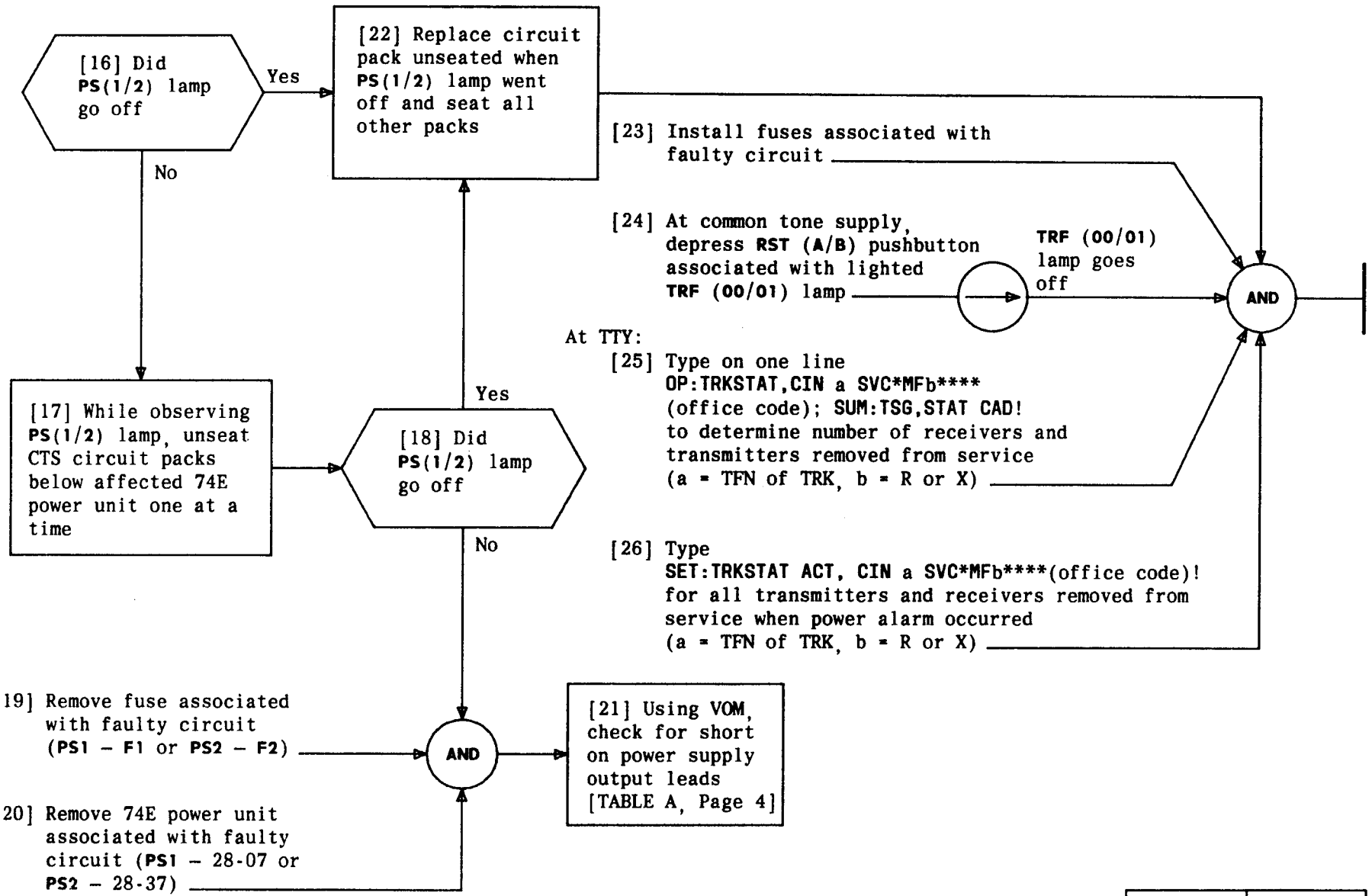


CLEAR MAJOR POWER ALARM WITH PF AND PS1 OR PS2 LAMPS LIGHTED



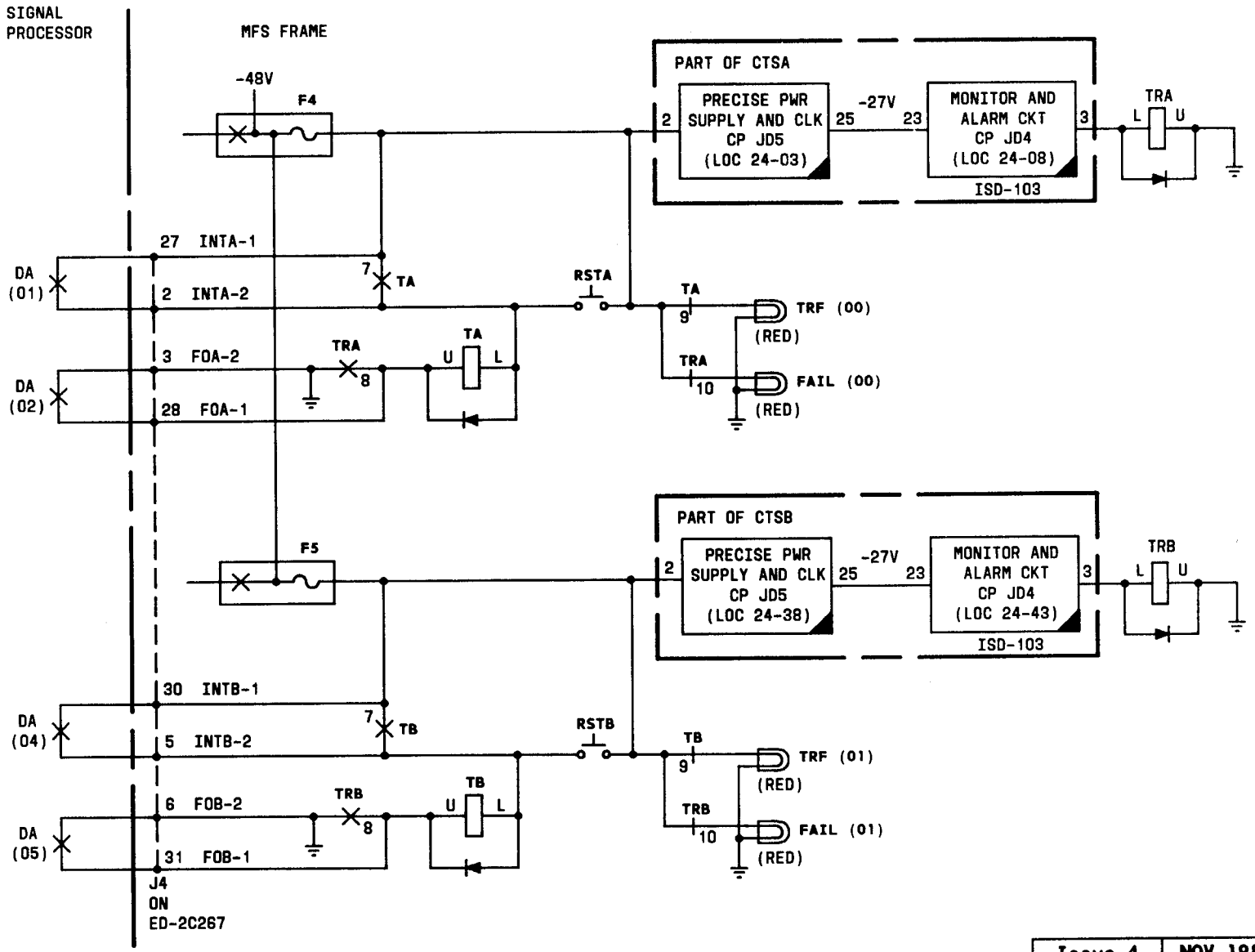
CLEAR MAJOR POWER ALARM WITH PF AND PS1 OR PS2 LAMPS LIGHTED



CLEAR MAJOR POWER ALARM WITH PF AND PS1 OR PS2 LAMPS LIGHTED

TABLE A									
POWER SUPPLY 1					POWER SUPPLY 2				
CONN	PIN NO.	GRD	VOLTAGE	CIRCUIT	CONN	PIN NO.	GRD	VOLTAGE	CIRCUIT
J1.0	3	15	+6	Common tone supply 00 MFT-00 thru MFT-03 MFR-00 thru MFR-03	J1.1	3	15	+6	Common tone supply 01 MFT-16 thru MFT-19 MFR-16 thru MFR-19
	7		−6			7		−6	
	11		+5			11		+5	
	4	16	+6	MFT-04 thru MFT-07 MFR-04 thru MFR-07		4	16	+6	MFT-20 thru MFT-23 MFR-20 thru MFR-23
	8		−6			8		−6	
	12		+5			12		+5	
	5	17	+6	MFT-08 thru MFT-11 MFR-08 thru MFR-11		5	17	+6	MFT-24 thru MFT-27 MFR-24 thru MFR-27
	9		−6			9		−6	
	13		+5			13		+5	
	6	18	+6	MFT-12 thru MFT-15 MFR-12 thru MFR-15		6	18	+6	MFT-28 thru MFT-31 MFR-28 thru MFR-31
	10		−6			10		−6	
	14		+5			14		+5	
	6	−	+6	Tone return CKTS 0,1		6	−	+6	Tone return CKTS 2,3
	10		−6			10		−6	

CLEAR MAJOR POWER ALARM WITH PF AND PS1 OR PS2 LAMPS LIGHTED



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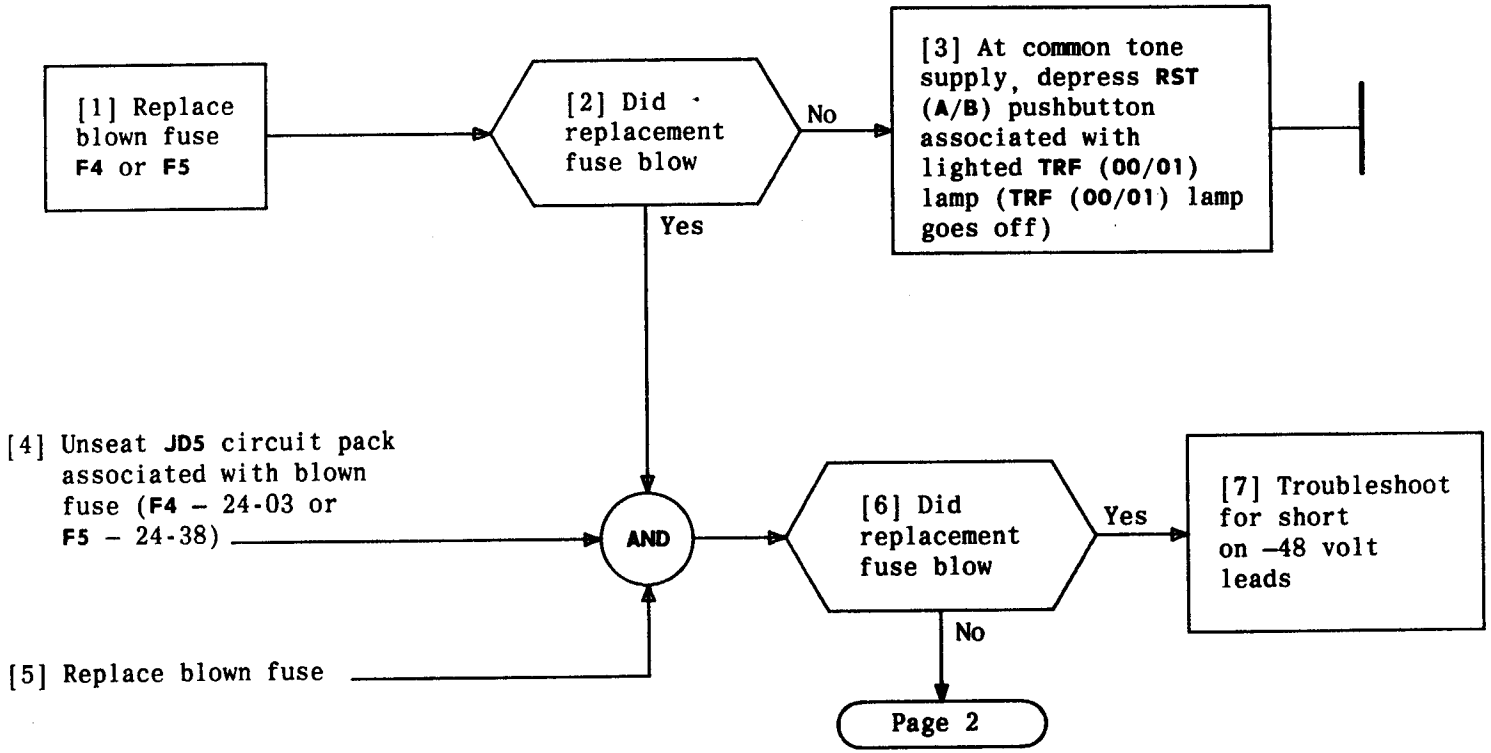
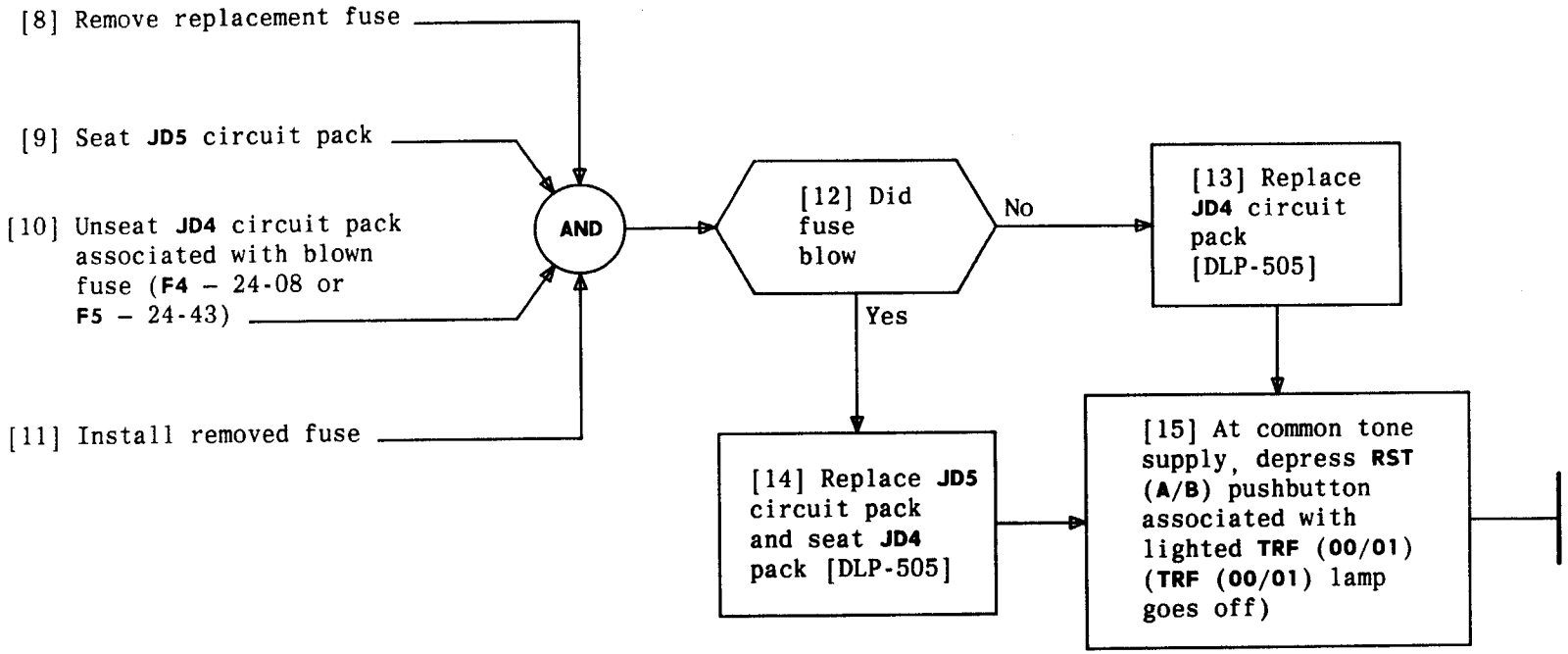
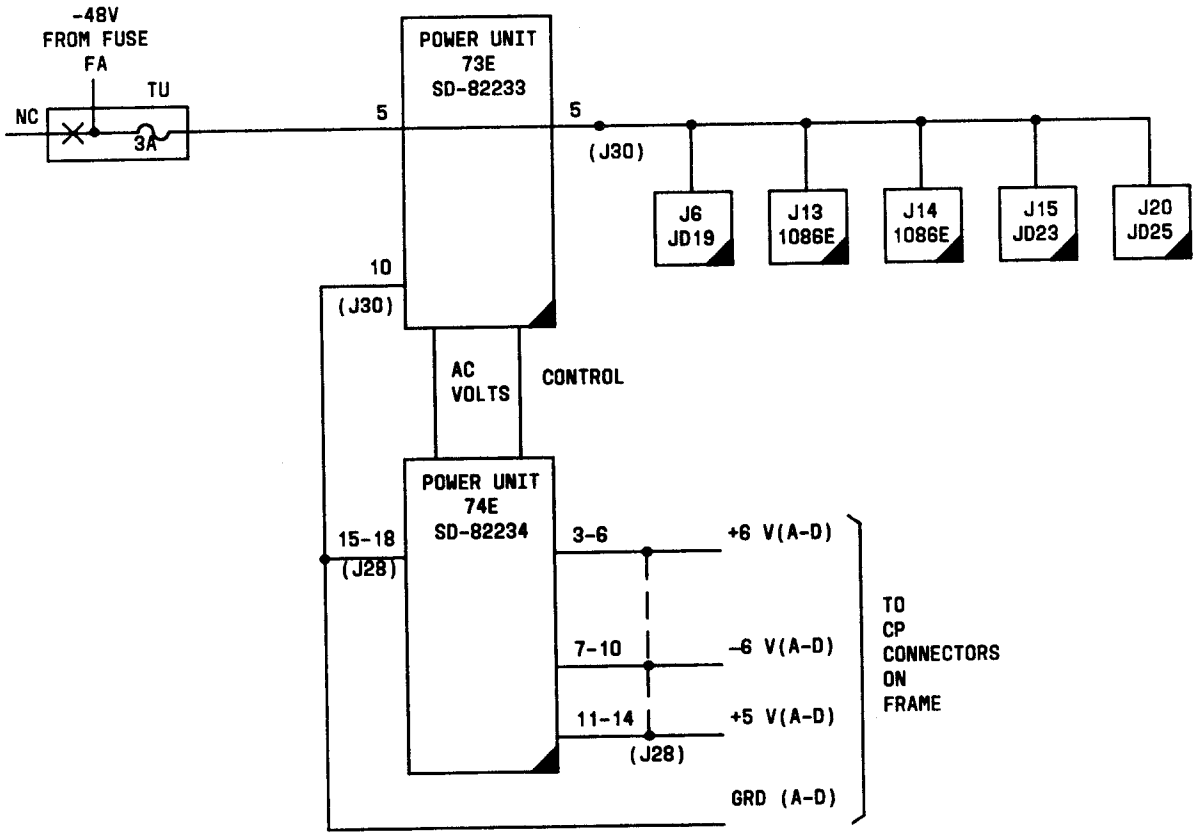
CTS –48 VOLT POWER DISTRIBUTION



CLEAR MINOR POWER ALARM WITH FUSE F4 OR F5 BLOWN



CLEAR MINOR POWER ALARM WITH FUSE F4 OR F5 BLOWN



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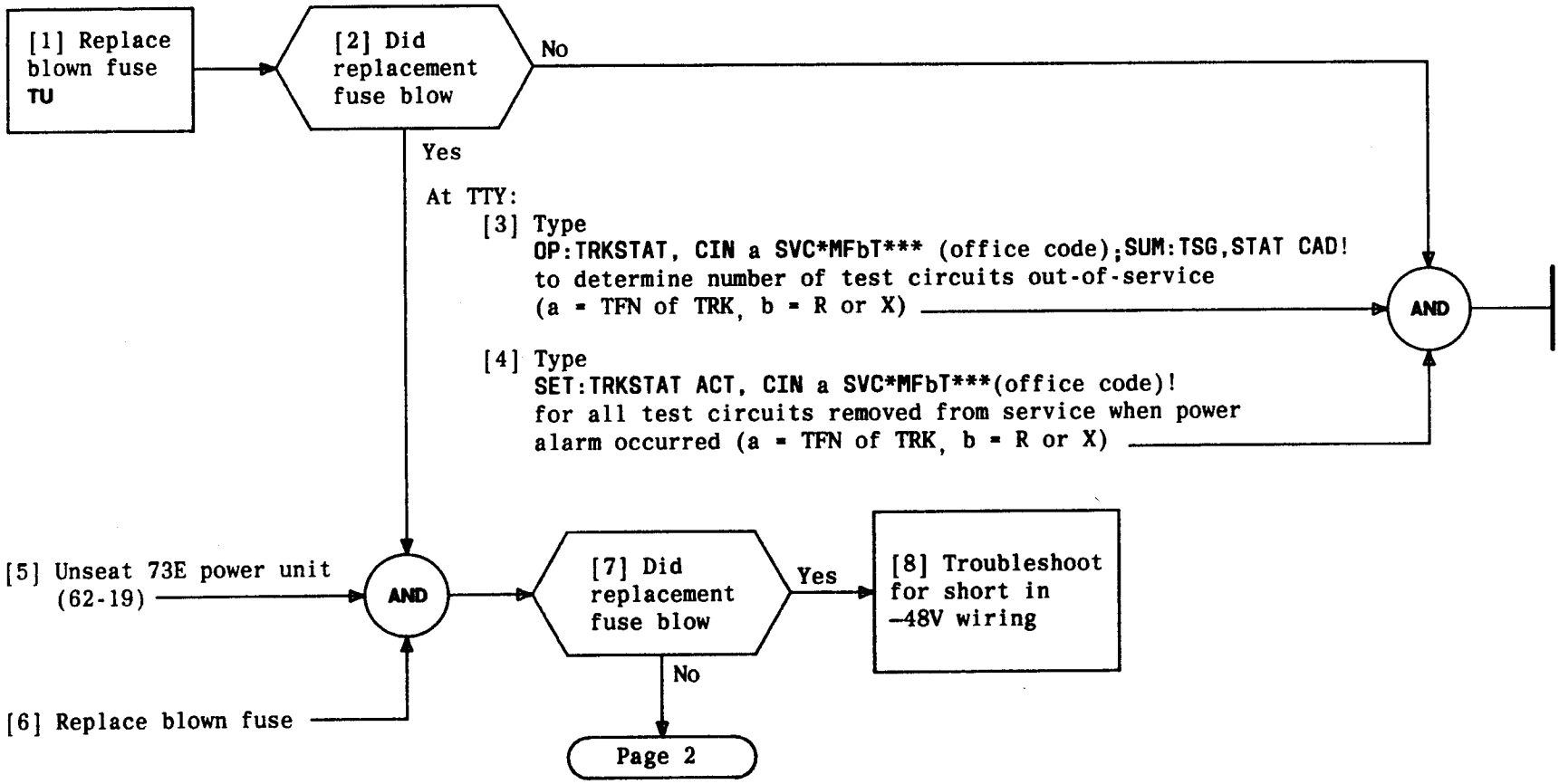
TEST CIRCUIT –48V POWER DISTRIBUTION



CLEAR MINOR POWER ALARM WITH FUSE TU BLOWN

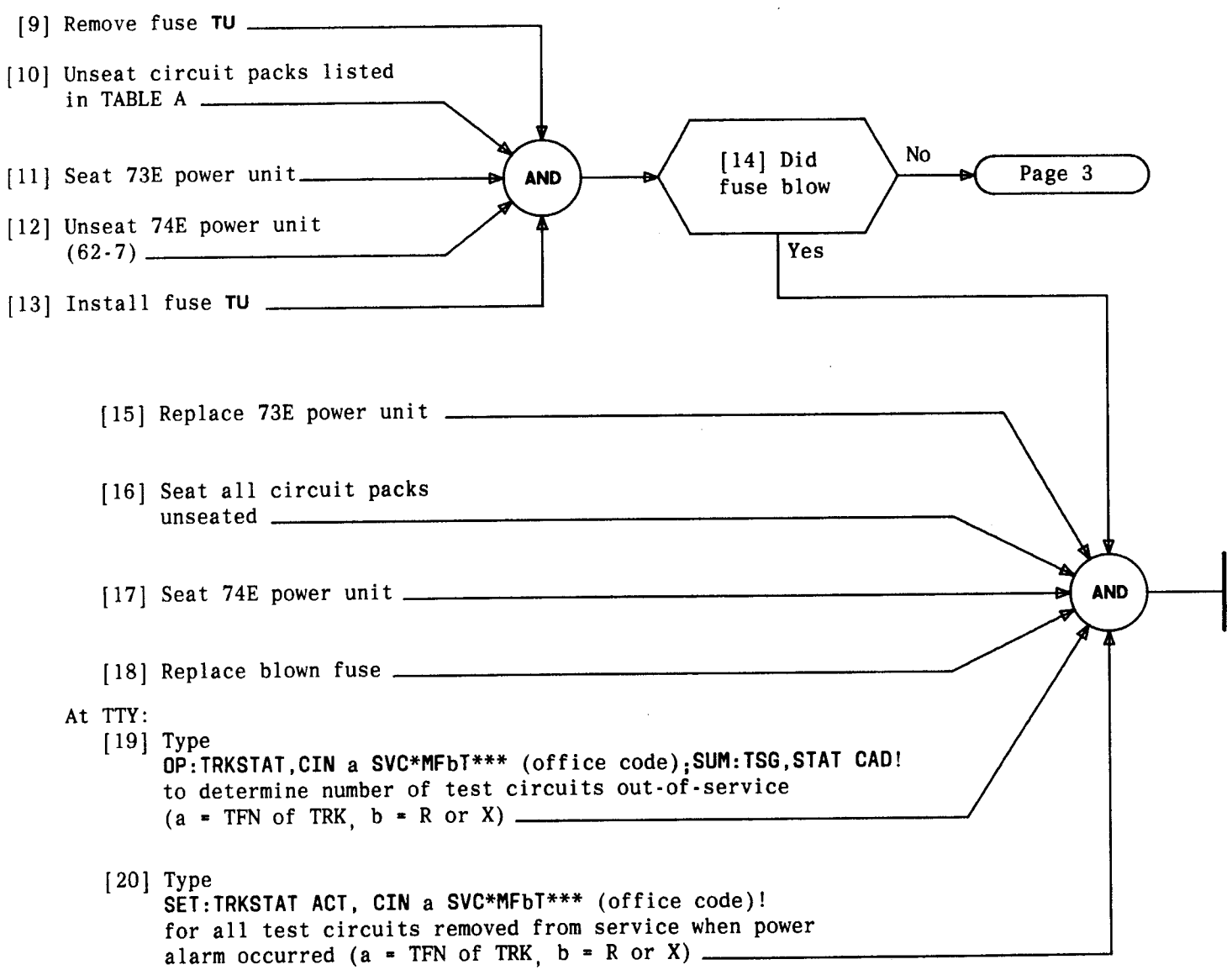
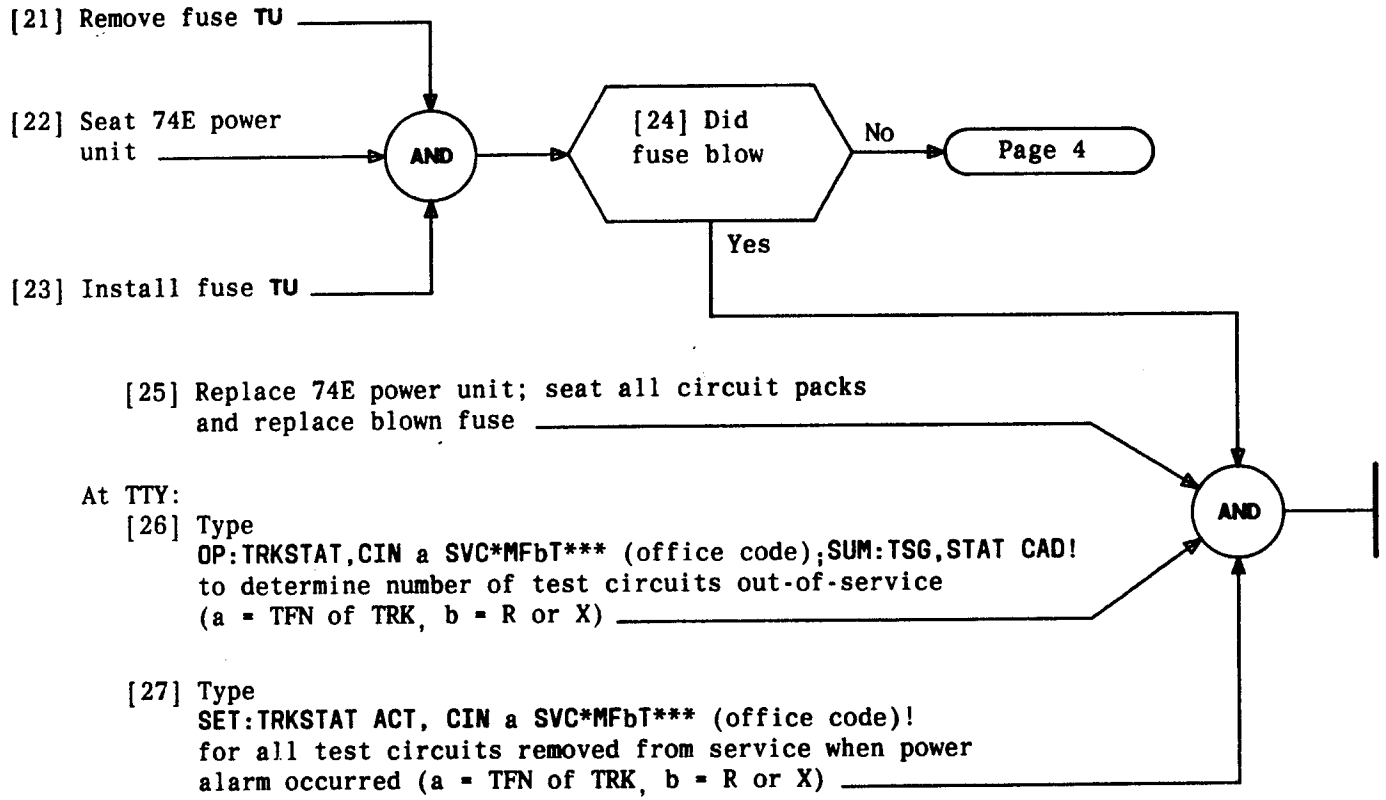
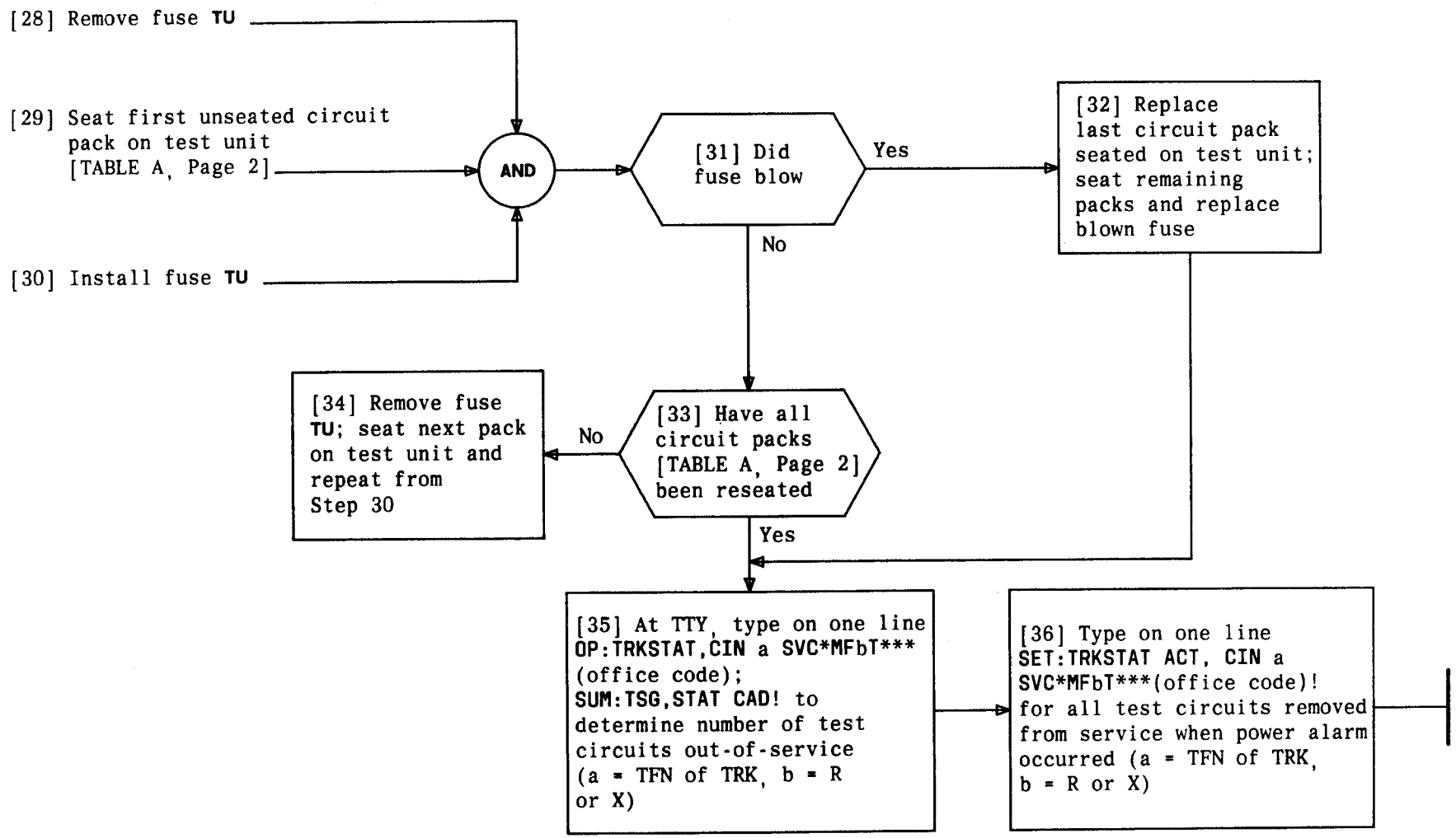


TABLE A	
CIRCUIT PACK	LOCATION
JD19	58-06
1086E	58-16
1086E	58-18
JD23	58-20
JD25	58-27

CLEAR MINOR POWER ALARM WITH FUSE TU BLOWN



CLEAR MINOR POWER ALARM WITH FUSE TU BLOWN



CLEAR MINOR POWER ALARM WITH FUSE TU BLOWN

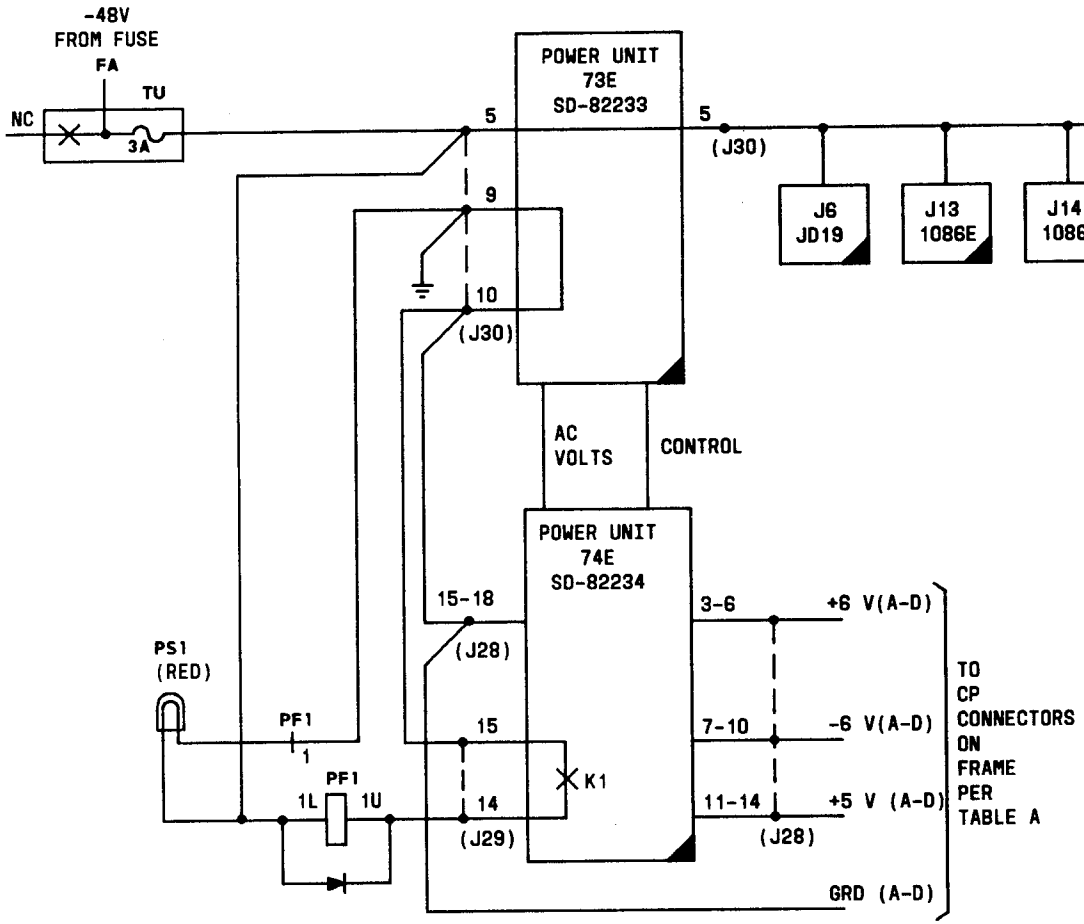
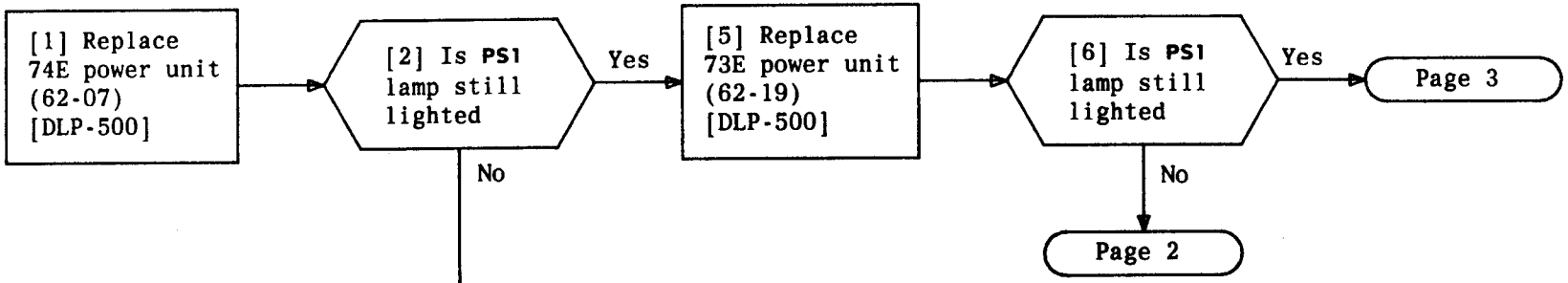


TABLE A		
J28 PIN	VOLTAGE	CIRCUIT PACK CONNECTOR
3	+6V A	J6
4	+6V B	J10
5	+6V C	NONE
6	+6V D	J13-J16, J18, J20, J22-J24
7	-6V A	J6
8	-6V B	J10
9	-6V C	NONE
10	-6V D	J13-J16, J18, J20, J22-J24
11	+5V A	J1-J6
12	+5V B	J7-J9, J12
13	+5V C	J17, J21, J25, J27
14	+5V D	J11, J18, J19, J26
15	GRD A	J1-J6
16	GRD B	J7-J10, J12
17	GRD C	J17, J21, J25, J27
18	GRD D	J11, J13-J16, J18-J20, J22-J24, J26

TEST CIRCUIT –48V, –6V, +6V, AND +5V POWER DISTRIBUTION



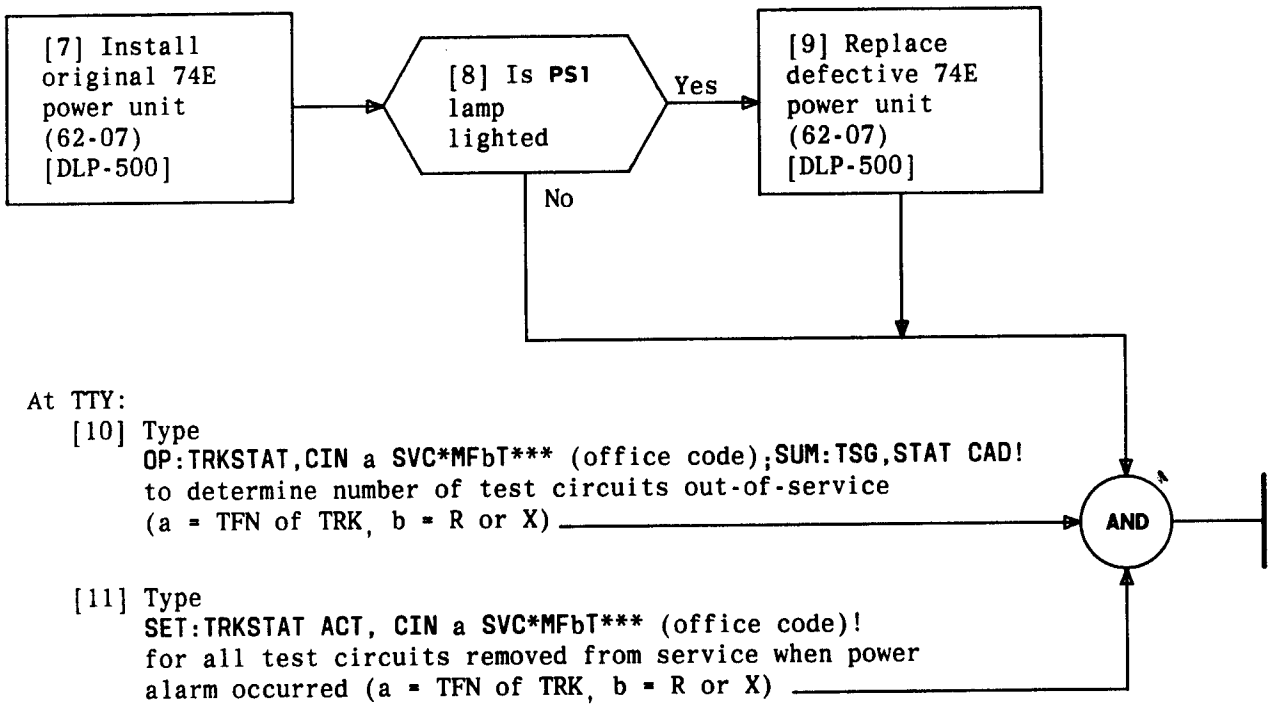
At TTY:

[3] Type
OP:TRKSTAT,CIN a SVC*MFbT*** (office code);SUM:TSG,STAT CAD!
to determine number of test circuits out-of-service
(a = TFN of TRK, b = R or X)

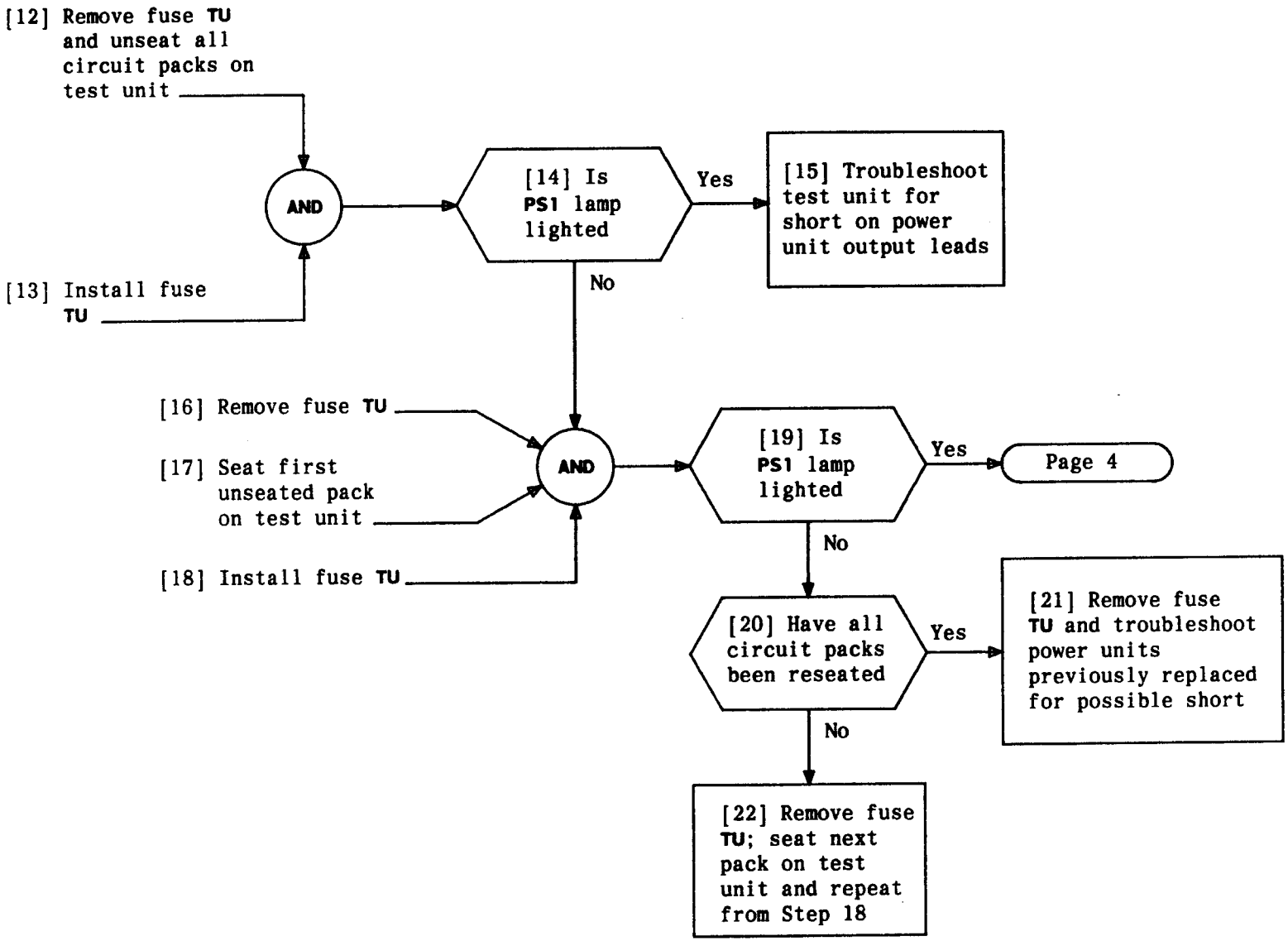
[4] Type
SET:TRKSTAT ACT, CIN a SVC*MFbT*** (office code)!
for all test circuits removed from service when power
alarm occurred (a = TFN of TRK, b = R or X)

AND

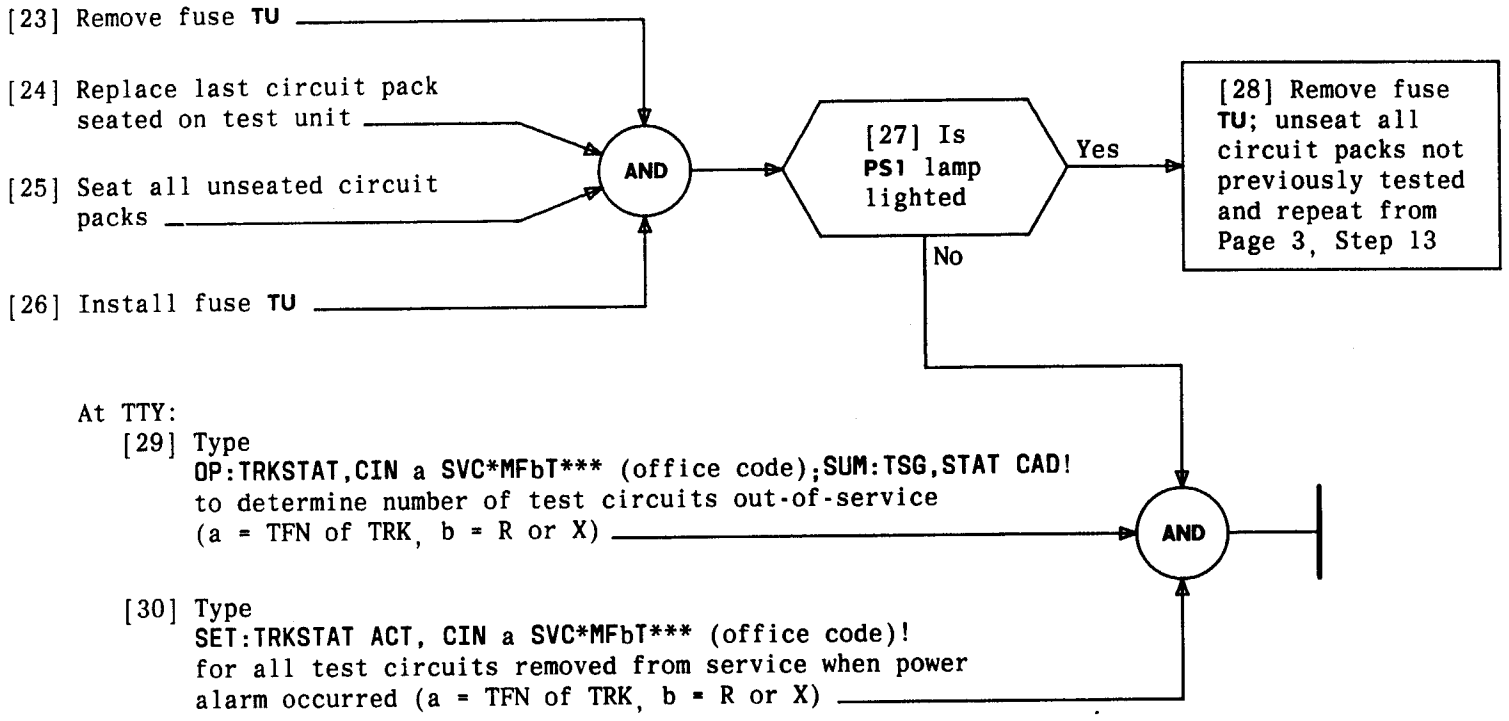
CLEAR MINOR POWER ALARM WITH PS1 LAMP ON TEST UNIT LIGHTED



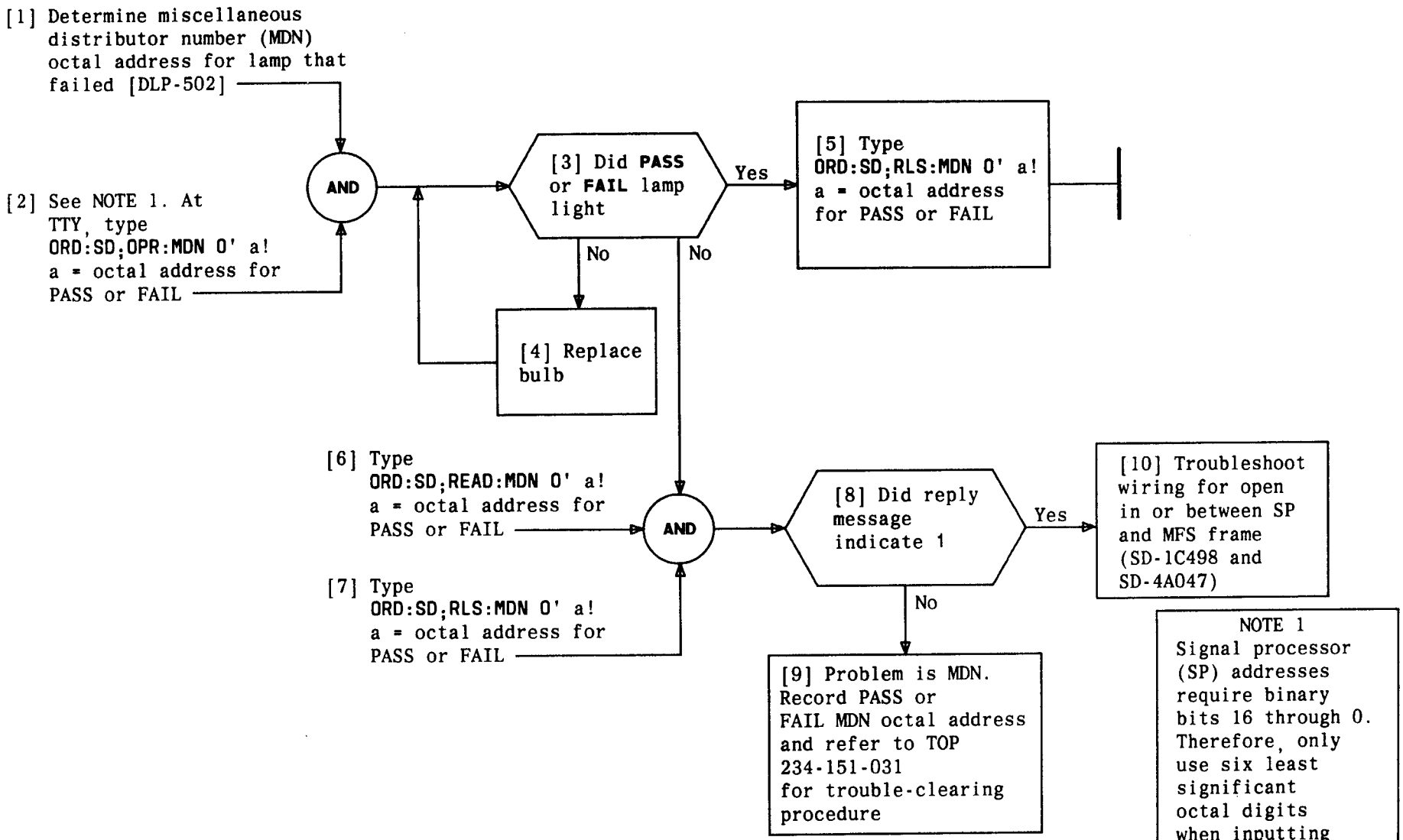
CLEAR MINOR POWER ALARM WITH PS1 LAMP ON TEST UNIT LIGHTED



CLEAR MINOR POWER ALARM WITH PS1 LAMP ON TEST UNIT LIGHTED



CLEAR MINOR POWER ALARM WITH PS1 LAMP ON TEST UNIT LIGHTED



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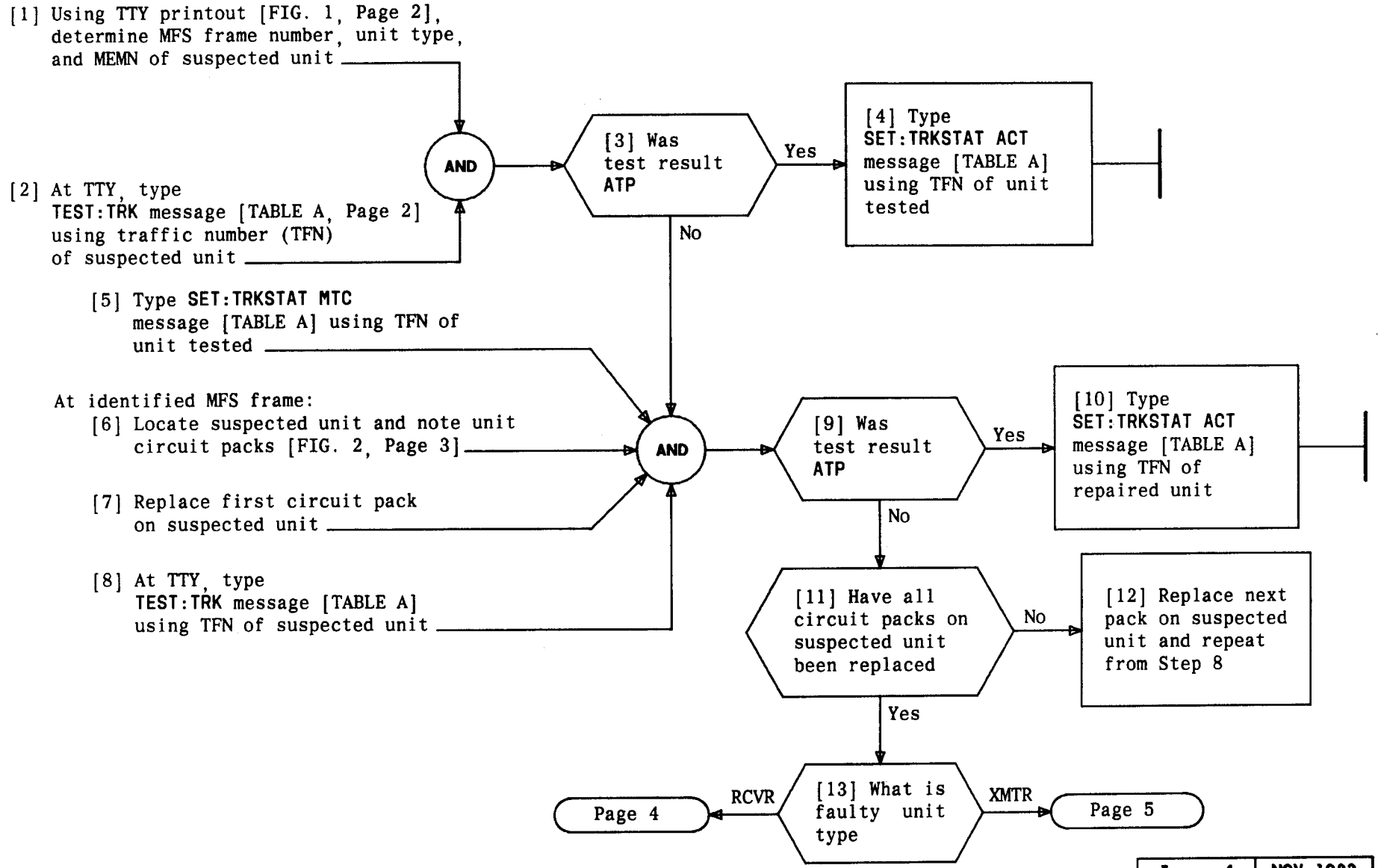
CLEAR PASS OR FAIL LAMP PROBLEM



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CLEAR RECEIVER OR TRANSMITTER TROUBLE

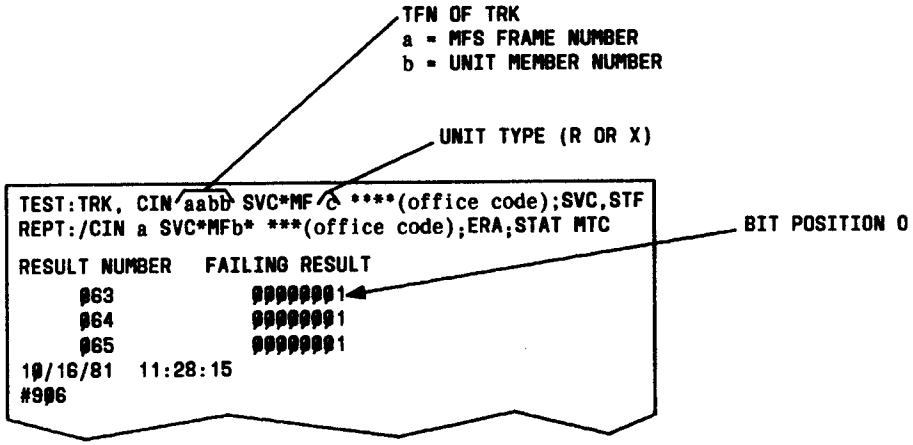


FIG. 1 – Sample Printout of Failing Test Results (MFS Frame Number, Unit Type And Member Identification)

TABLE A	
INPUT MESSAGES	**VARIABLES**
TEST:TRK, CIN a SVC*MFb****;SVC:PALL!	a = TFN of TRK b = Unit type (R or X)
SET:TRKSTAT MTC.DSA, CIN a SVC*MFb****!	a = TFN of TRK b = Unit type (R or X)
SET:TRKSTAT ACT, CIN a SVC*MFb****!	a = TFN of TRK b = Unit type (R or X)

CLEAR RECEIVER OR TRANSMITTER TROUBLE

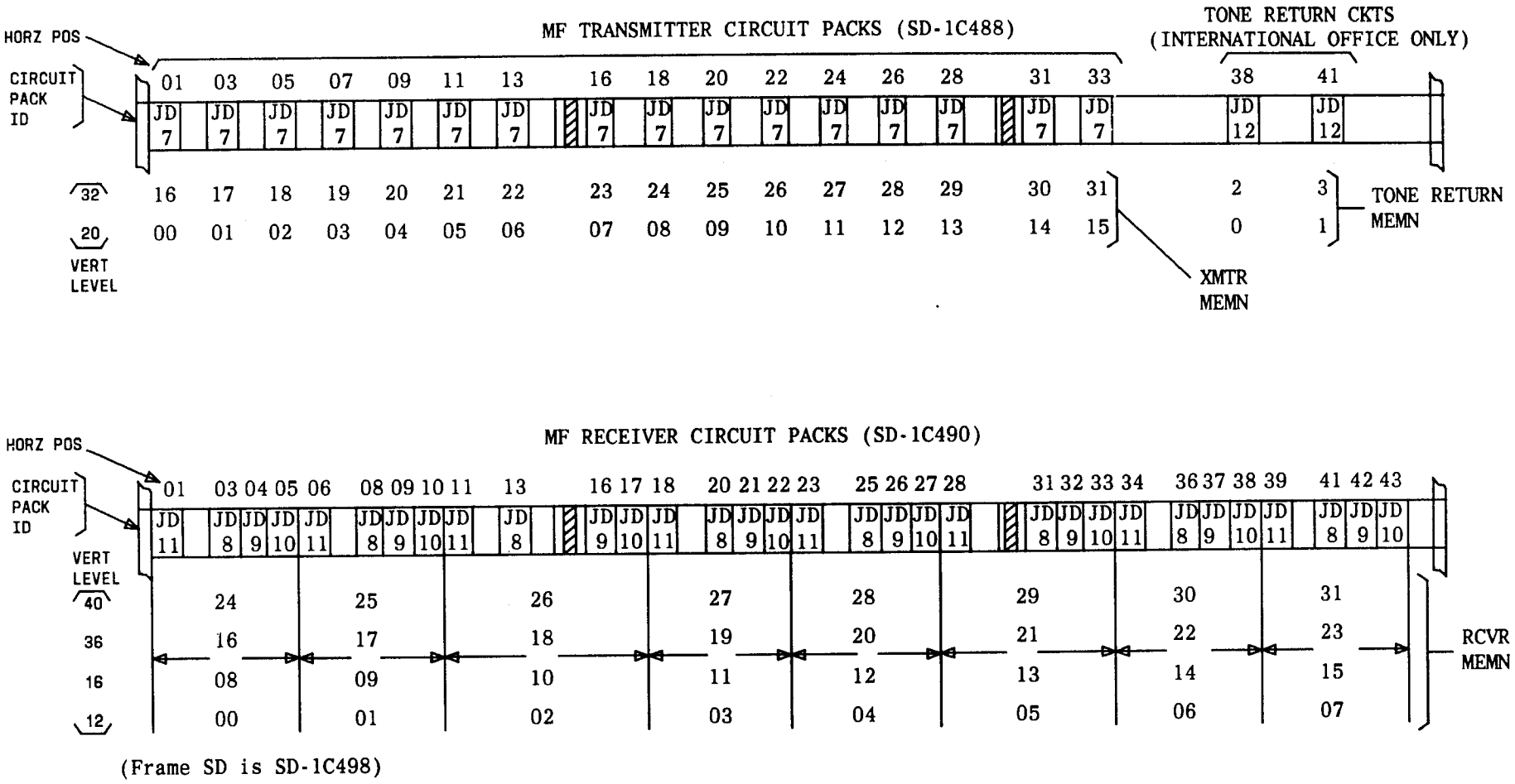


FIG. 2 – MFS Receiver and Transmitter Pack Location

CLEAR RECEIVER OR TRANSMITTER TROUBLE

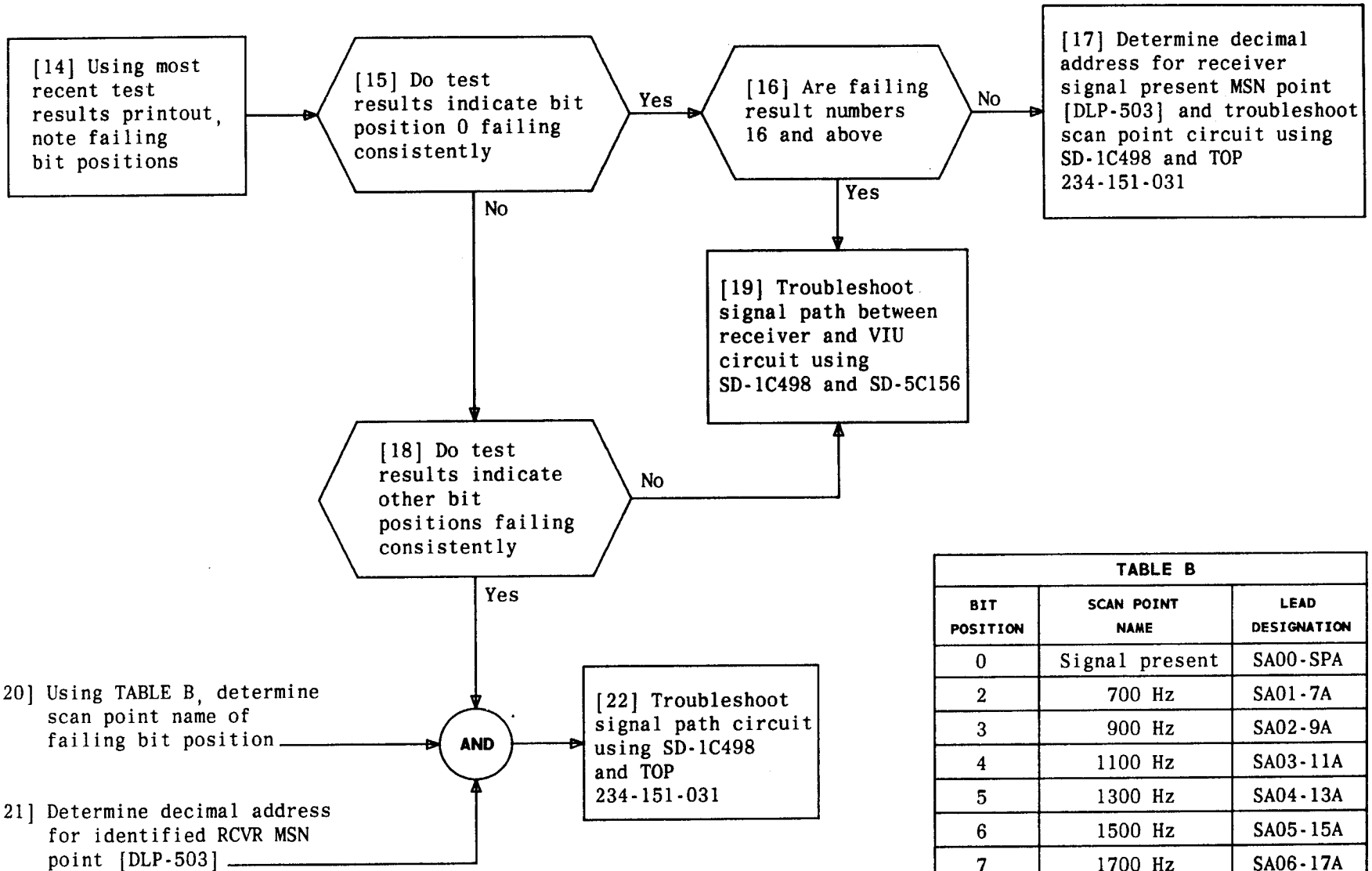


TABLE B		
BIT POSITION	SCAN POINT NAME	LEAD DESIGNATION
0	Signal present	SA00-SPA
2	700 Hz	SA01-7A
3	900 Hz	SA02-9A
4	1100 Hz	SA03-11A
5	1300 Hz	SA04-13A
6	1500 Hz	SA05-15A
7	1700 Hz	SA06-17A

CLEAR RECEIVER OR TRANSMITTER TROUBLE

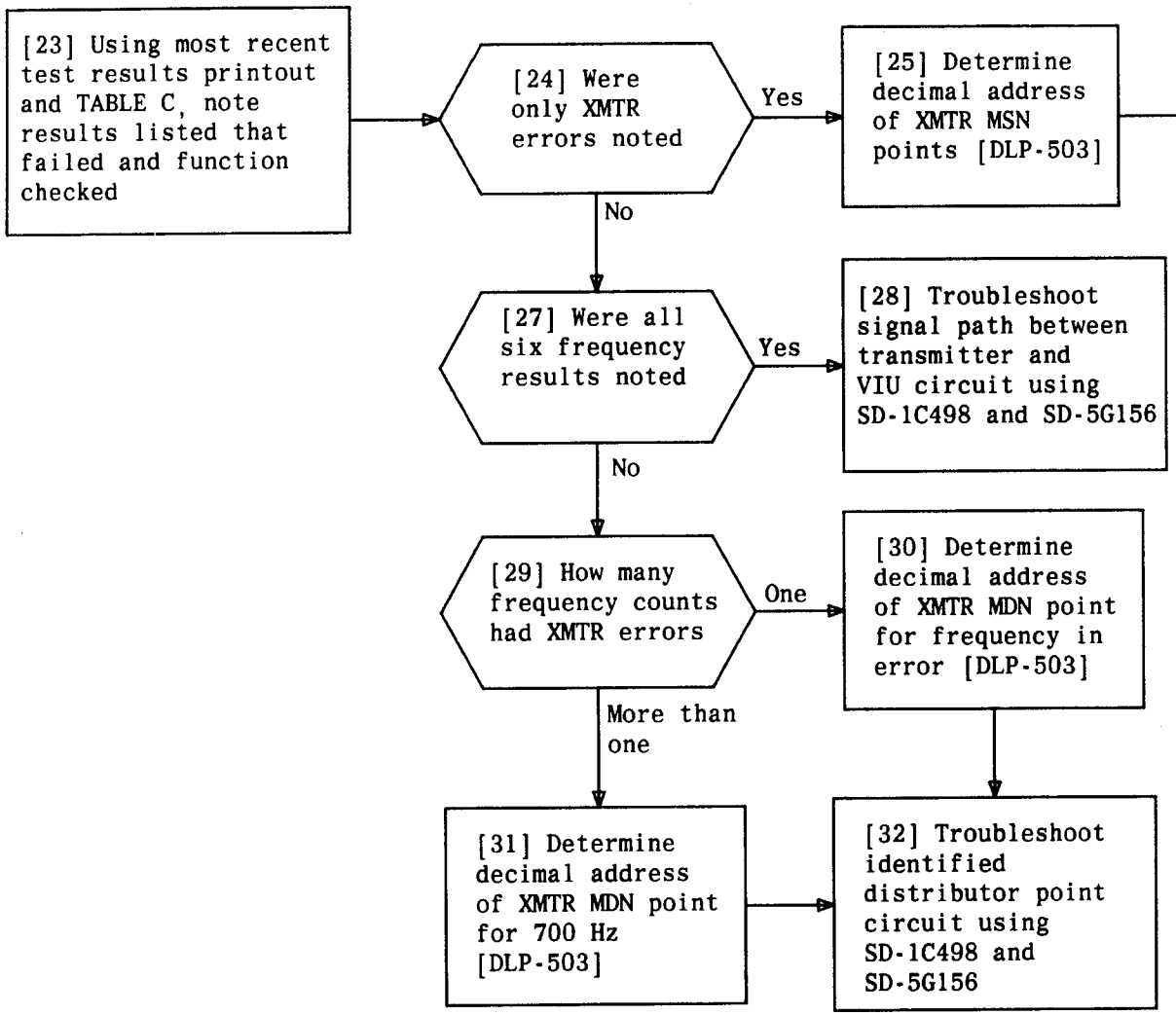
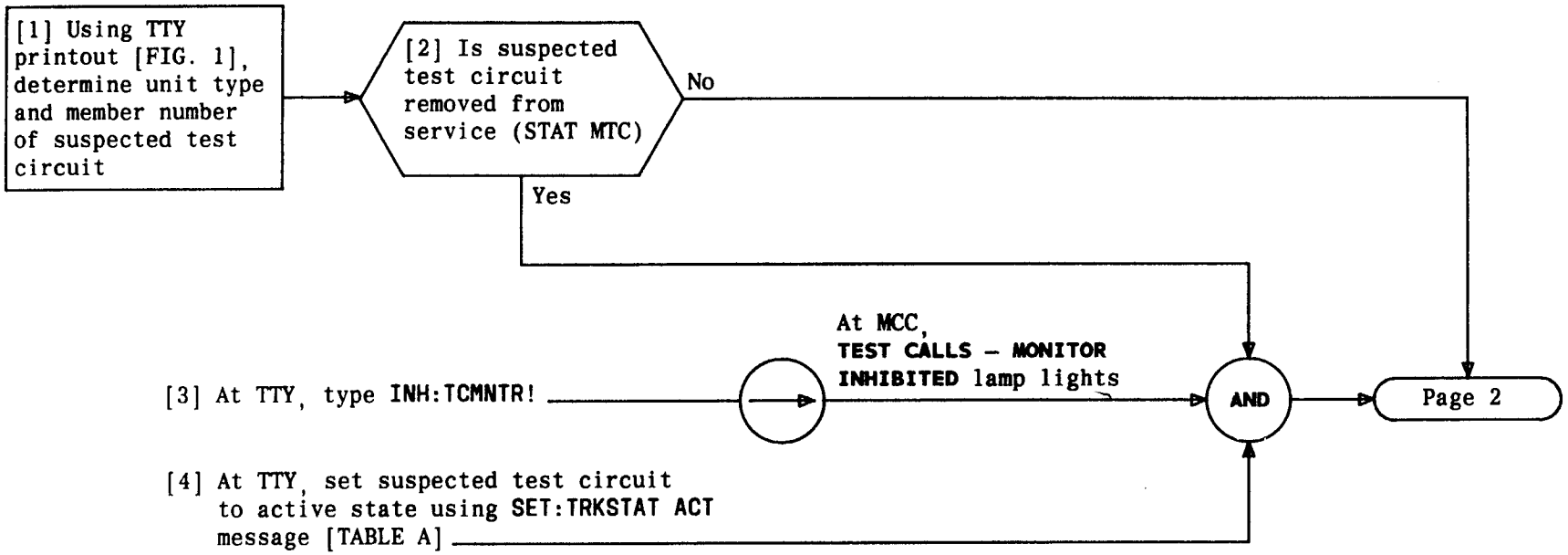


TABLE C

TEST RESULTS NUMBER	FREQUENCY COUNT CHECKED	XMTR ERROR	SD-1C498 SCAN/DIST POINT
000	700 Hz		DA00
001		700 Hz	SA00
007	1100 Hz		DA01
008		1100 Hz	SA00
011	1300 Hz		DA02
012		1300 Hz	SA00
015	1500 Hz		DA03
016		1500 Hz	SA00
019	1700 Hz		DA04
020		1700 Hz	SA00
023	900 Hz		DA05
024		900 Hz	SA00

CLEAR RECEIVER OR TRANSMITTER TROUBLE



REPT:CIN a SVC*MFbT***(office);ERA;STAT MTC:
a = TFN OF TRK
TFN = 0 OR 1 (TEST CIRCUIT MEMN)
b = UNIT TYPE (R OR X)

TABLE A

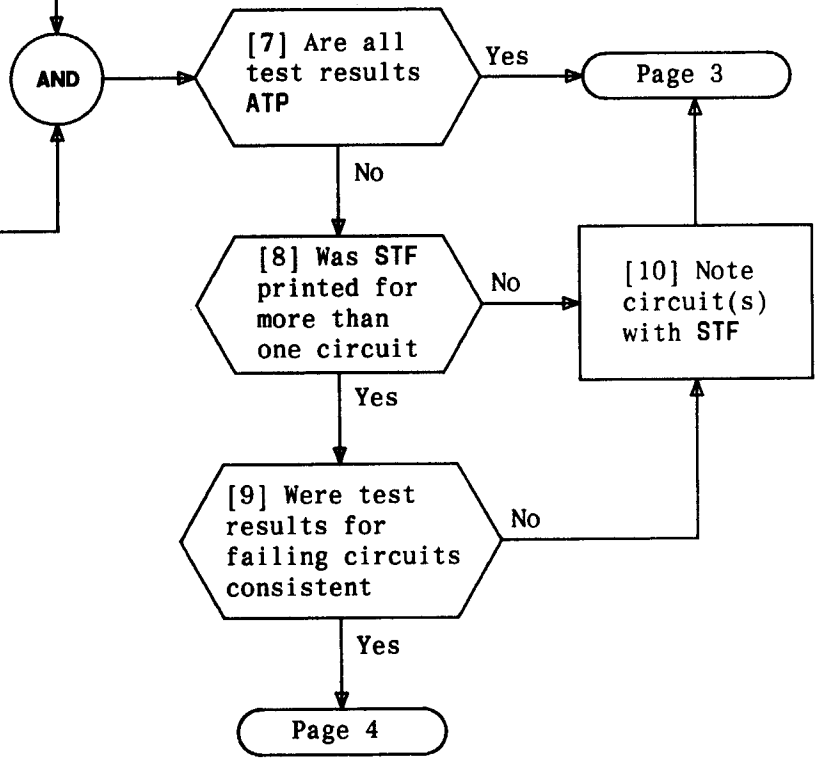
INPUT MESSAGES	VARIABLES
SET:TRKSTAT ACT, CIN a SVC*MFbT***(office code)!	a = TFN of TRK (0 or 1) b = Unit type (R or X)
SET:TRKSTAT MTC.DSA,CIN a SVC*MFbT***(office code)!	a = TFN of TRK (0 or 1) b = Unit type (R or X)
TEST:TRK, CIN 0 SVC*MFb*; SVC:NUM 16,PALL!	a = TFN of TRK (0 or 1) b = Unit type (R or X)

FIG. 1 – Test Unit Member Number and Unit Type Identification

CLEAR RECEIVER OR TRANSMITTER TEST CIRCUIT TROUBLE

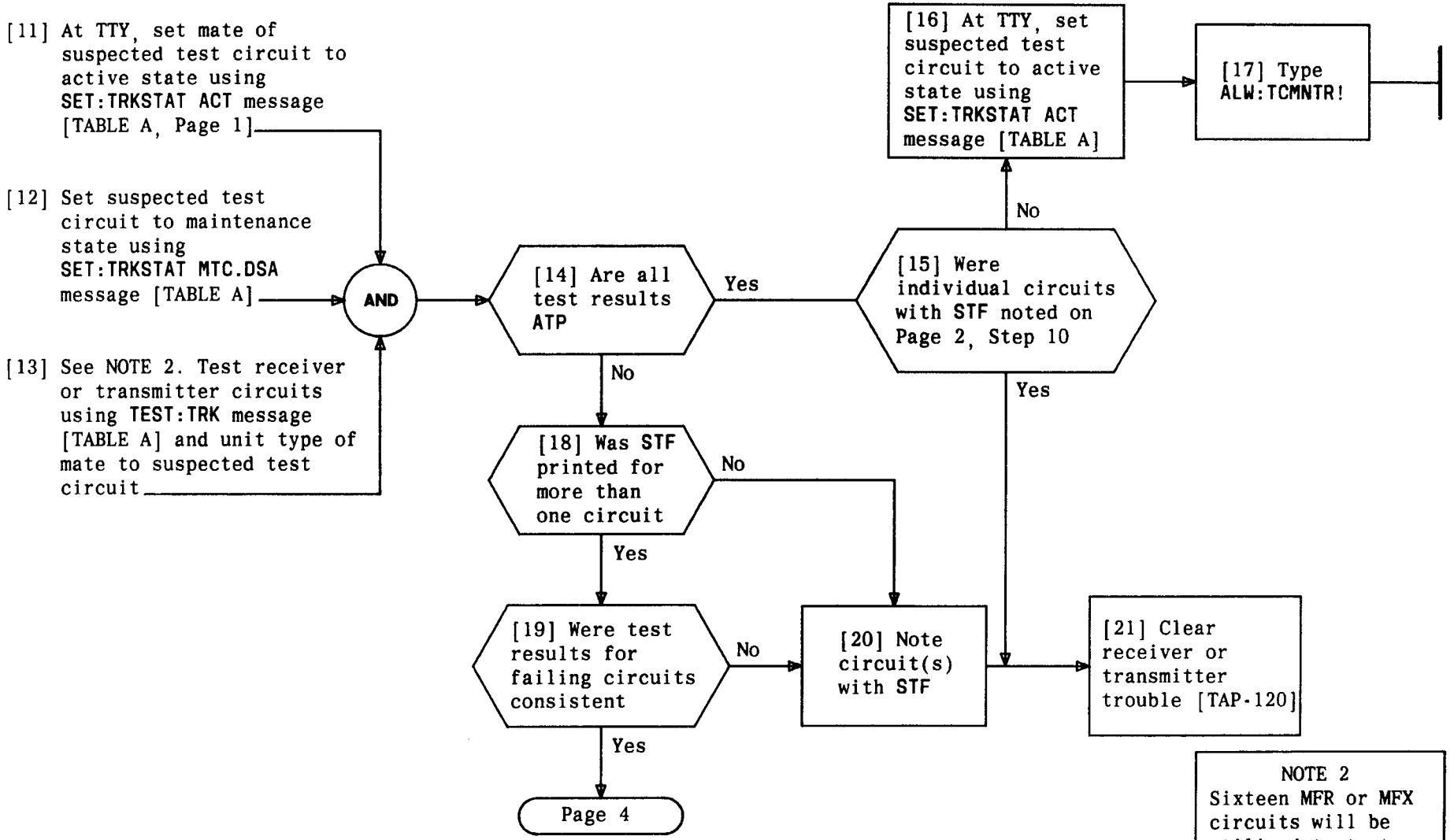
[5] Set mate of suspected test circuit to maintenance state using SET:TRKSTAT MTC.DSA message [TABLE A, Page 1]

[6] See NOTE 1. Test receiver or transmitter circuits using TEST:TRK message [TABLE A] and unit type of suspected test circuit

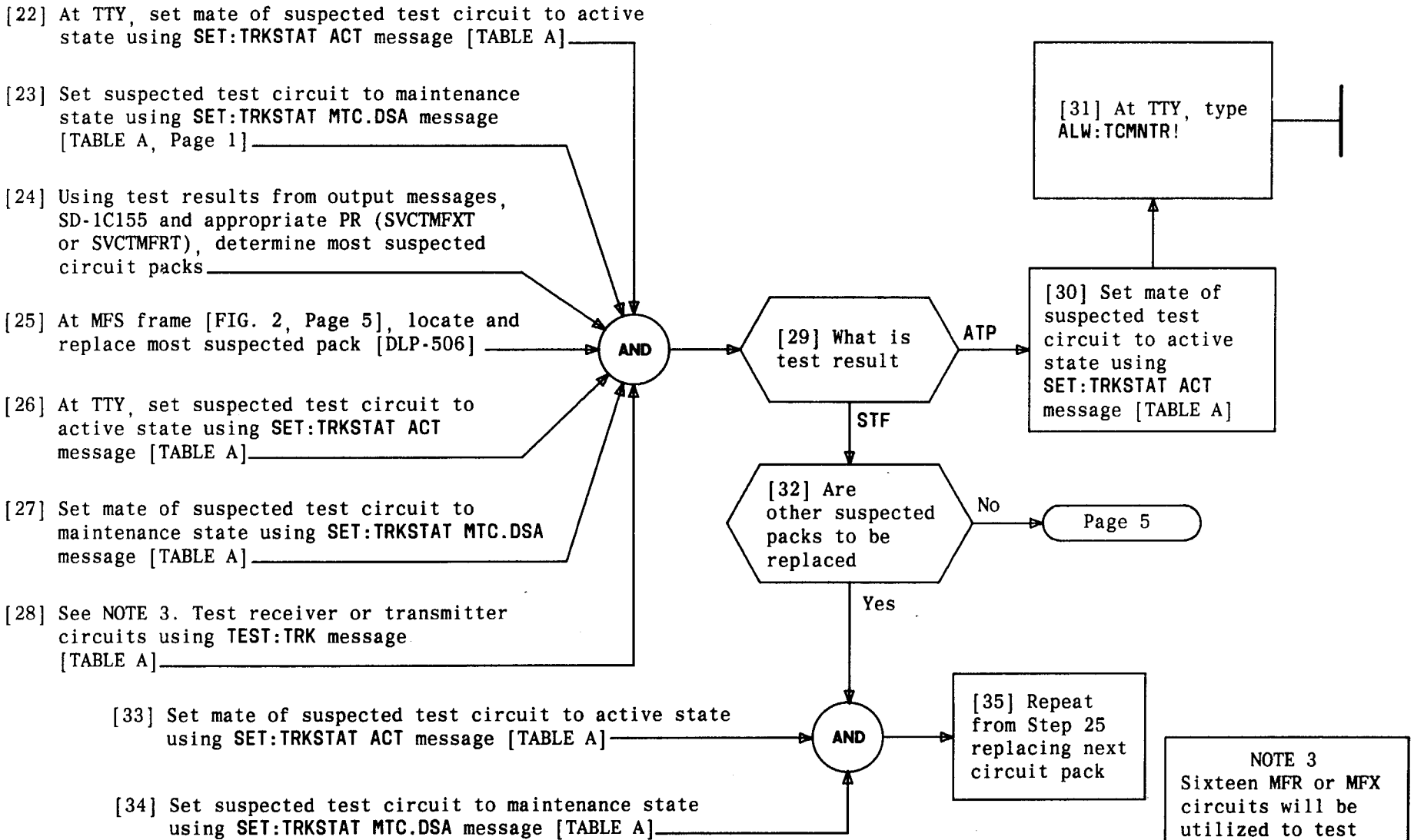


NOTE 1
Sixteen MFR or MFX circuits will be utilized to test suspected MFRT or MFXT circuit

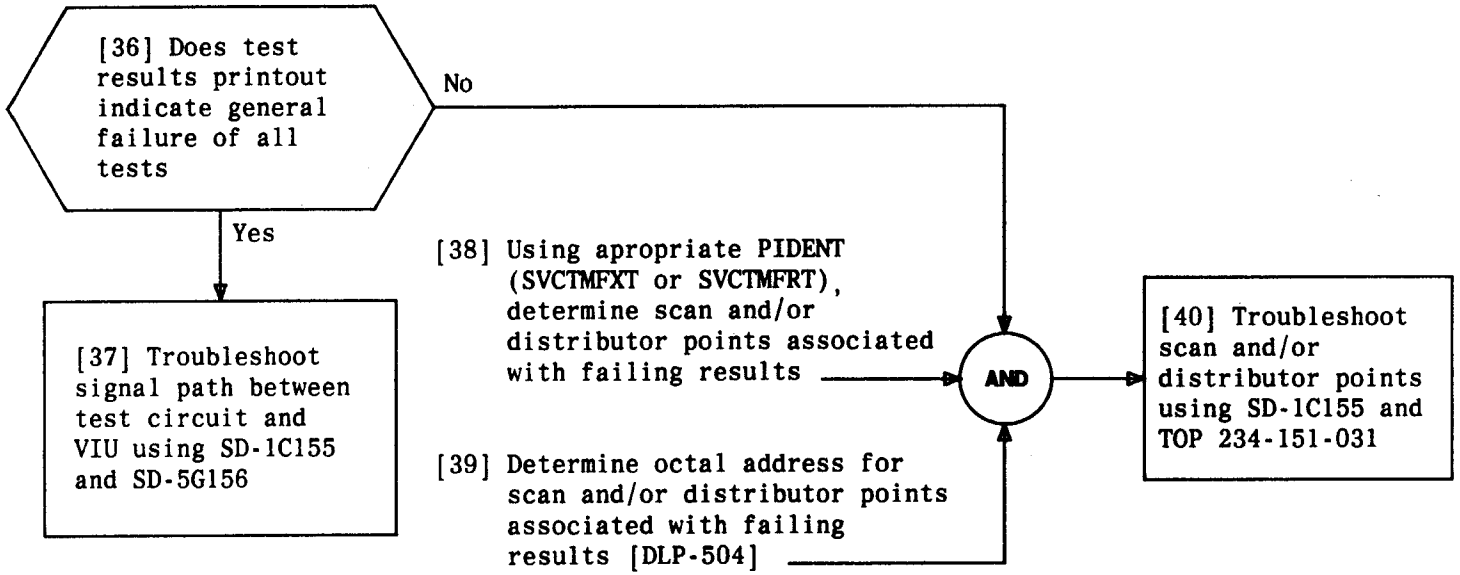
CLEAR RECEIVER OR TRANSMITTER TEST CIRCUIT TROUBLE



CLEAR RECEIVER OR TRANSMITTER TEST CIRCUIT TROUBLE



CLEAR RECEIVER OR TRANSMITTER TEST CIRCUIT TROUBLE



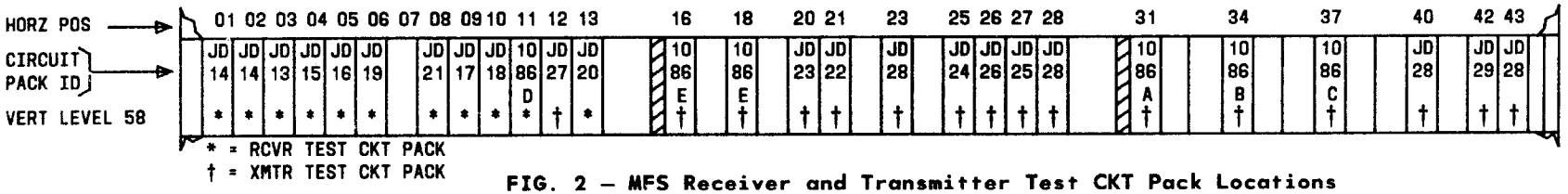


FIG. 2 – MFS Receiver and Transmitter Test CKT Pack Locations

CLEAR RECEIVER OR TRANSMITTER TEST CIRCUIT TROUBLE

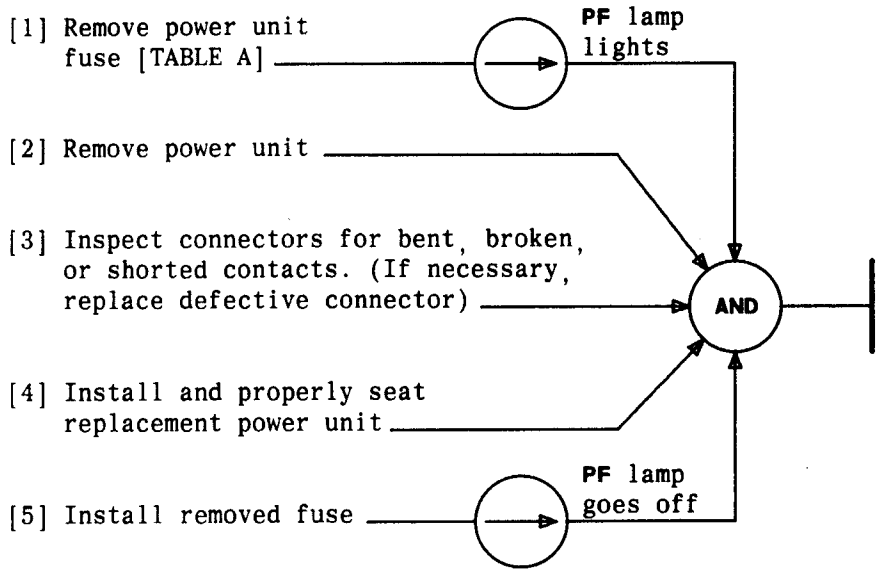
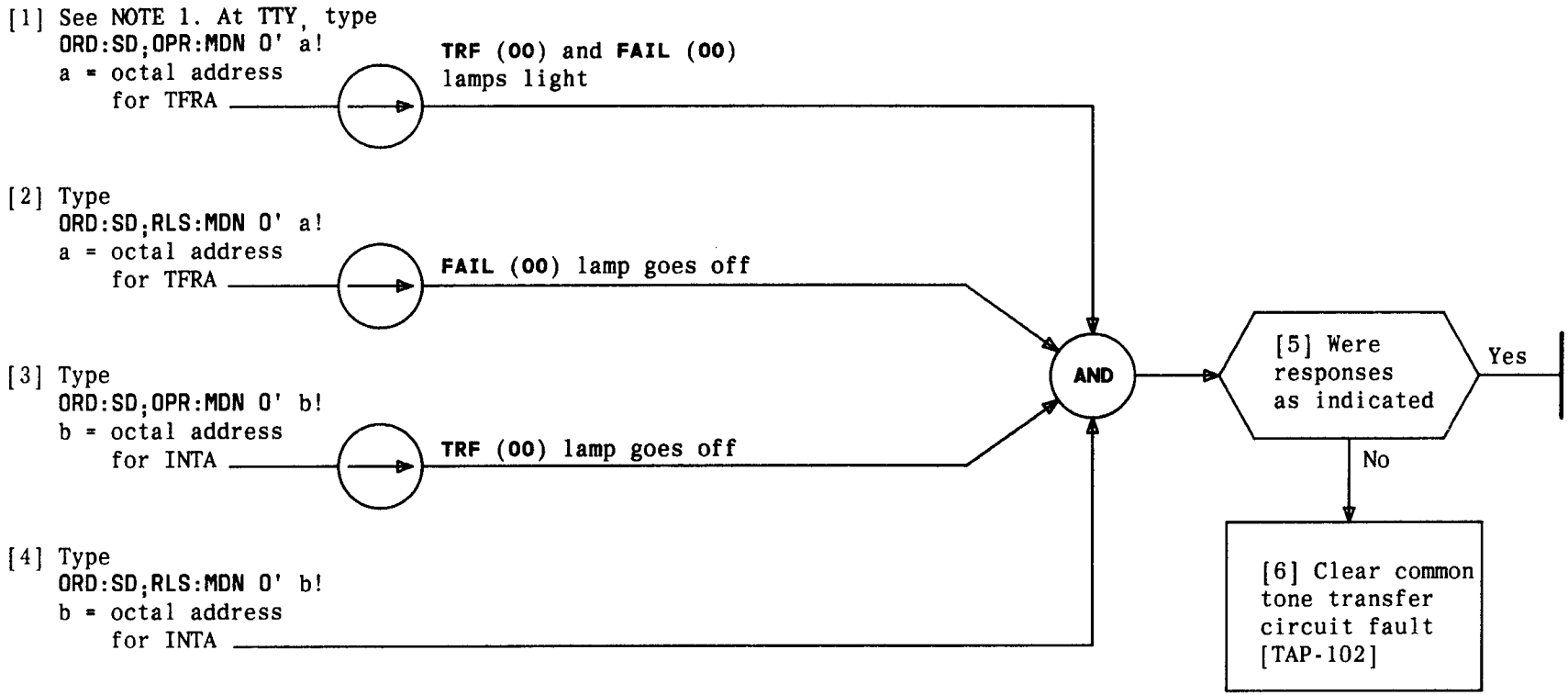


TABLE A

POWER UNIT			POWER CONTROL		
POSITION (VERT-HORZ)	TYPE	FUNCTION	POSITION (VERT-HOR)	TYPE	NAME
62-07	74E	AC-to-DC converter	52-07	Fuse	TU
62-19	73E	DC-to-AC converter	52-07	Fuse	
28-07	74E	AC-to-DC converter	52-07	Fuse	F1
28-20	73E	DC-to-AC converter	52-07	Fuse	
28-25	73E	DC-to-AC converter	52-07	Fuse	F2
28-37	74E	AC-to-DC converter	52-07	Fuse	

REPLACE 73E AND/OR 74E POWER UNIT



NOTE 1
Signal processor (SP) addresses require binary bits 16 through 0. Therefore, only use six least significant octal digits when inputting octal addresses

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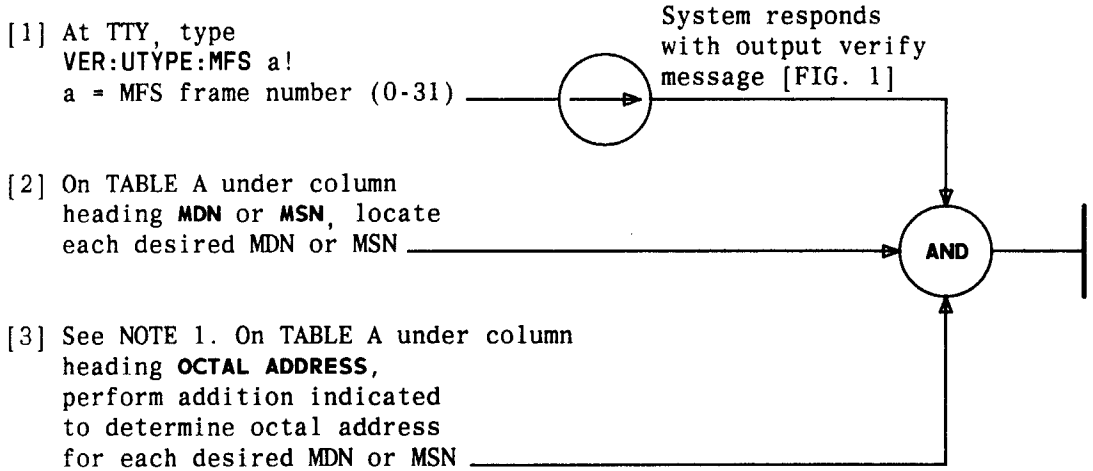
TEST CIRCUIT A SIGNAL DISTRIBUTOR POINTS



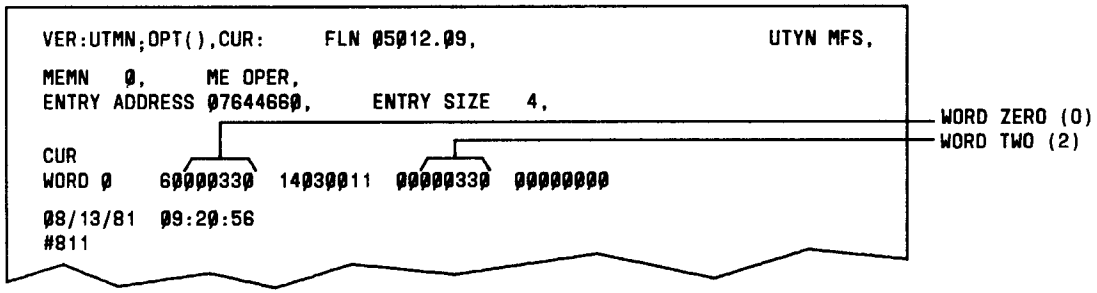


FIG. 1 – Sample Unit Type Output Verify Message

NOTE 1

Signal processor (SP) addresses require binary bits 16 through 0. Therefore, only use six least significant octal digits when determining octal addresses

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DETERMINE OCTAL ADDRESS FOR MDN AND/OR MSN POINTS

TABLE A			
MDN	MSN	OCTAL ADDRESS	FUNCTION
TFRA		(WORD 2) + 0	Controls CTS A testing
INTA		(WORD 2) + 1	Controls resetting CTS A transfer relay TA
FOA		(WORD 2) + 2	Controls forced reconfiguration of CTS A for testing when failed
TFRB		(WORD 2) + 3	Controls CTS B testing
INTB		(WORD 2) + 4	Controls resetting CTS B transfer relay TB
FOB		(WORD 2) + 5	Controls forced reconfiguration of CTS B for testing when failed
PASS		(WORD 2) + 6	Controls MFS **PASS** lamp
FAIL		(WORD 2) + 7	Controls MFS **FAIL** lamp
	PF1	(WORD 0) + 0	Power failure CONV 0
	PF2	(WORD 0) + 1	Power failure CONV 1
	PF3	(WORD 0) + 2	Power failure CTS A or B
	TST	(WORD 0) + 3	Test button
	TRA	(WORD 0) + 4	CTS A monitor alarm
	TA	(WORD 0) + 5	CTS A transfer relay (TA)
	TRB	(WORD 0) + 6	CTS B monitor alarm
	TB	(WORD 0) + 7	CTS B transfer relay (TB)

DETERMINE OCTAL ADDRESS FOR MDN AND/OR MSN POINTS

1. See NOTE 1. Note MFS frame number containing transmitter or receiver

2. See NOTE 2. Note transmitter or receiver member number

3. Using TABLE A, determine and note column number of scan or distributor point

4. Write numbers noted in Steps above in decimal address format [FIG. 1]

End of procedure

MSN/MDN aaØbbcc

aa = 2 DIGIT MFS FRAME NUMBER
Ø bb = 3 DIGIT UNIT MEMBER NUMBER
cc = 2 DIGIT COLUMN NUMBER OF POINT

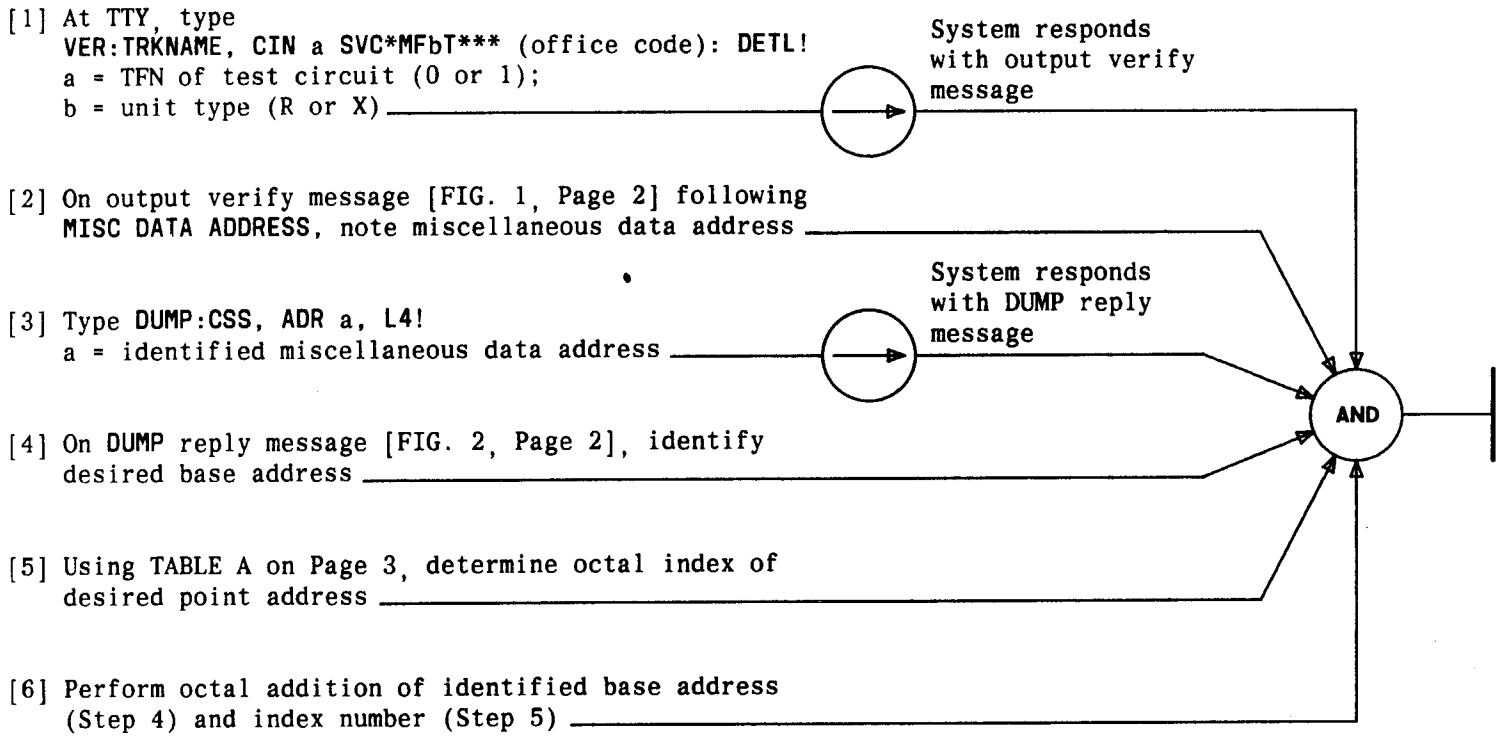
FIG. 1 – Decimal MSN/MDN Format

TABLE A

TRANSMITTER POINTS			RECEIVER POINTS		
SD-1C488 DESIG*	NAME	COLUMN	SD-1C490 DESIG*	NAME	COLUMN
SA00	Error scan	01	SA00	Signal present	00
DA00	700 Hz	02	SA01	700 Hz	02
DA01	900 Hz	03	SA02	900 Hz	03
DA02	1100 Hz	04	SA03	1100 Hz	04
DA03	1300 Hz	05	SA04	1300 Hz	05
DA04	1500 Hz	06	SA05	1500 Hz	06
DA05	1700 Hz	07	SA06	1700 Hz	07
* SA = Scan Point			DA00	CAMA MODE	00
DA = SD Point			DA01	INTL MODE	01

NOTES
1. MFS frame number equates to SP number
2. Transmitter or receiver member number equates to SP row number

DETERMINE DECIMAL ADDRESS FOR MF TRANSMITTER OR RECEIVER MDN AND MSN POINTS



DETERMINE OCTAL ADDRESS OF MF TRANSMITTER AND RECEIVER TEST CKT MDN, MSN OR PP POINTS

```
  33 VER:TRKNAME,CIN 1 SVC* MFXT *** Ø3T : DETL ,   ISC 1WAYOUT OSC MFXMTRT

0 TAN  Ø63241  -  TAN 12 1 5 Ø33
       CIN 1 SVC* MFXT *** Ø3T  - BTFN Ø
       TSN Ø71Ø6Ø1  -  TSN O'73241
       DIF 7,DIU 13,DG 2
       TSGN   O'Ø765   D' 5Ø1
       TBTEA  Ø74ØØ14Ø  DISK TSN ADDR ØØØØØØØØ
       TBN    D'771    MEMN D' 1  TB STATUS ADDR Ø157Ø544
       TSGHCA Ø1625763  DISK TSG ADDR 2363565Ø
       CINC   D'  47   CINEA Ø7546746  CORE TSG ADDR Ø7537752
       MISC DATA ADDRESS Ø7336193
       Ø8/13/81  Ø9:33:Ø9
       #16Ø
```

MISCELLANEOUS DATA ADDRESS

FIG. 1 – Sample Output Verify Message

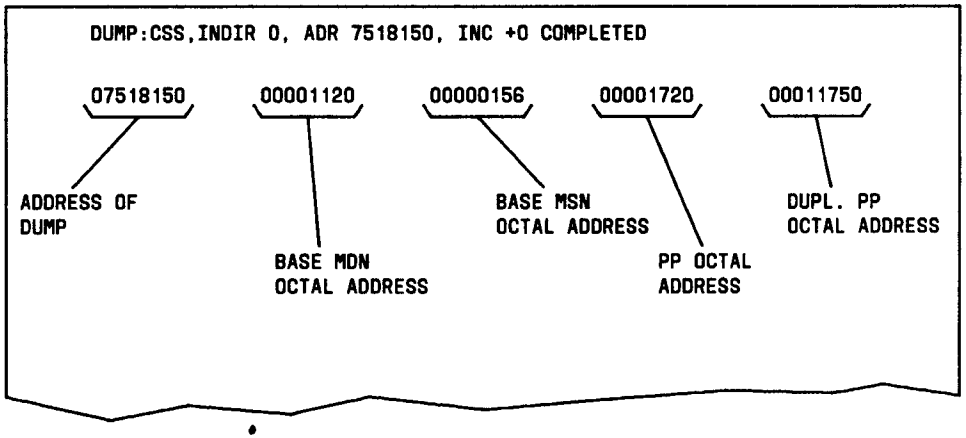


FIG. 2 – Sample DUMP Reply Message (MF Test Circuit Subtranslator Layout)

DETERMINE OCTAL ADDRESS OF MF TRANSMITTER AND RECEIVER TEST CKT MDN, MSN OR PP POINTS

TABLE A

TRANSMITTER TEST CIRCUIT POINTS				RECEIVER TEST CIRCUIT POINTS			
SD-1C155 DESIG *	PR-SVCTMFXT DESIG	NAME	OCTAL INDEX FROM BASE	SD-1C155 DESIG *	PR-SVCTMFRT DESIG	NAME	OCTAL INDEX FROM BASE
SA02	TTSA00	Frequency Counters	0	SA00	RTSCA00	RVR TST	0
SA03	TTSA01		1	SA01	NA	PF1 (POWER)	1
SA04	TTSA02		2	DA00	RTDA00	First tone to send	0
SA05	TTSA03		3	DA01	RTDA01		1
SA06	TTSA04		4	DA02	RTDA02		2
SA07	TTSA05		5	DA03	RTDA03	Second tone to send	3
SA08	TTSA06		6	DA04	RTDA04		4
SA09	TTSA07		7	DA05	RTDA05		5
SA10	TTSA08		10	DA06	RTDA06	Control of tone duration	6
SA11	TTSA09		11	DA07	RTDA07		7
SA12	TTSA10		12	DA08	RTDA08		10
SA13	TTSA11		13	DA09	RTDA09	Control of relative AMP	11
SA14	TTSA12		14	DA10	RTDA10		12
SA15	TTSA13		15	DA11	RTDA11	Control of ABSOLUTE AMP of tone 1	13
SA16	TTSA14		16	DA12	RTDA12		14
SA17	TTSA15		17	DA13	RTDA13		15
SA18	TTSA16	700 Hz	20	DA14	RTDA14	Control of PRECISION	16
SA19	TTSA17	900 Hz	21	DA15	RTDA15		17
SA20	TTSA18	1100 Hz	22	DA16	RTDA16	TONE ON	20
SA21	TTSA19	1300 Hz	23	DA17	RTDA17	Third tone to send	21
SA22	TTSA20	1500 Hz	24	DA18	RTDA18		22
SA23	TTSA21	1700 Hz	25	DA19	RTDA19		23
SA24	TTSA22	Twist test	26	DA20	RTDA20	RCT test	24
SA25	TTSA23	Level test	27				
SA26	TTSA24	MED PROD test	30				
DA21	TTDA00	FREQ MEAS	0				
DA22	TTDA01	Bypass	1				
DA23	TTDA02	TTC test	2				
DA24	TTDA03	FREQ COUNT	3				

* SA = Scan point
DA = SD point

DETERMINE OCTAL ADDRESS OF MF TRANSMITTER AND RECEIVER TEST CKT MDN, MSN OR PP POINTS

1. If circuit pack to be replaced is a **JD5** pack, remove appropriate CTS fuse (**F4** for CTS A or **F5** for CTS B)

NOTE: Removal of fuse **F4** or **F5** removes –48V source from common tone supply. However, +6, –6 and/or +5 volts are still present on circuit pack connectors

2. Remove circuit pack to be replaced

3. Inspect connector for bent, broken or shorted contacts (If necessary, replace defective connector)

4. Install and properly seat replacement pack

5. If fuse **F4** or **F5** was removed, install appropriate CTS fuse

End of procedure

REPLACE CIRCUIT PACK – COMMON TONE SUPPLY

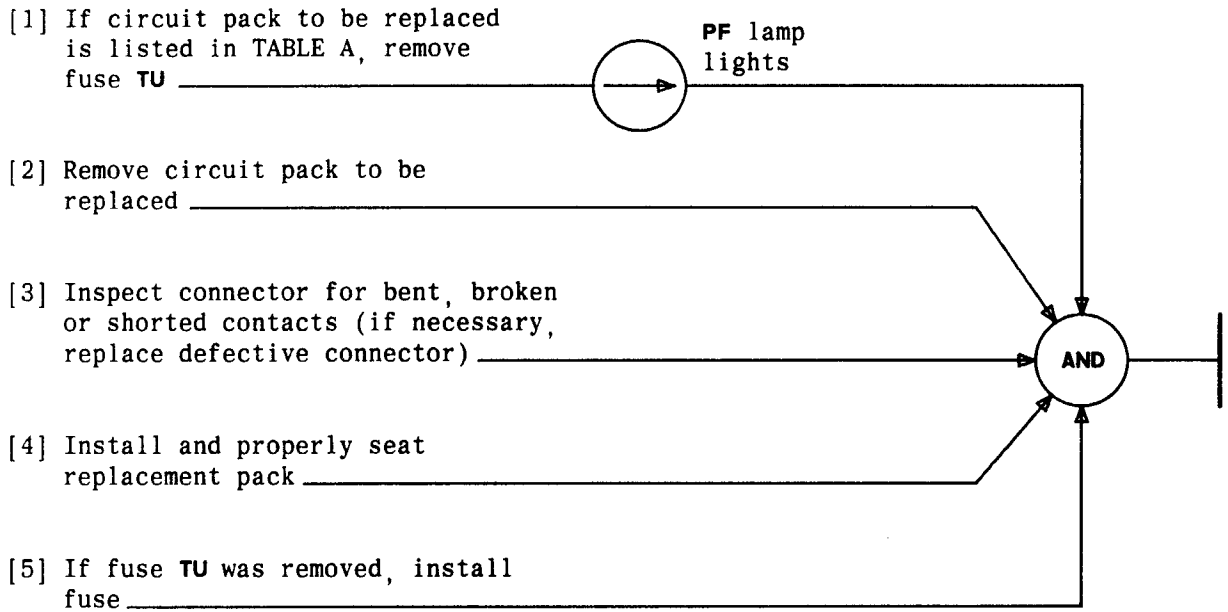
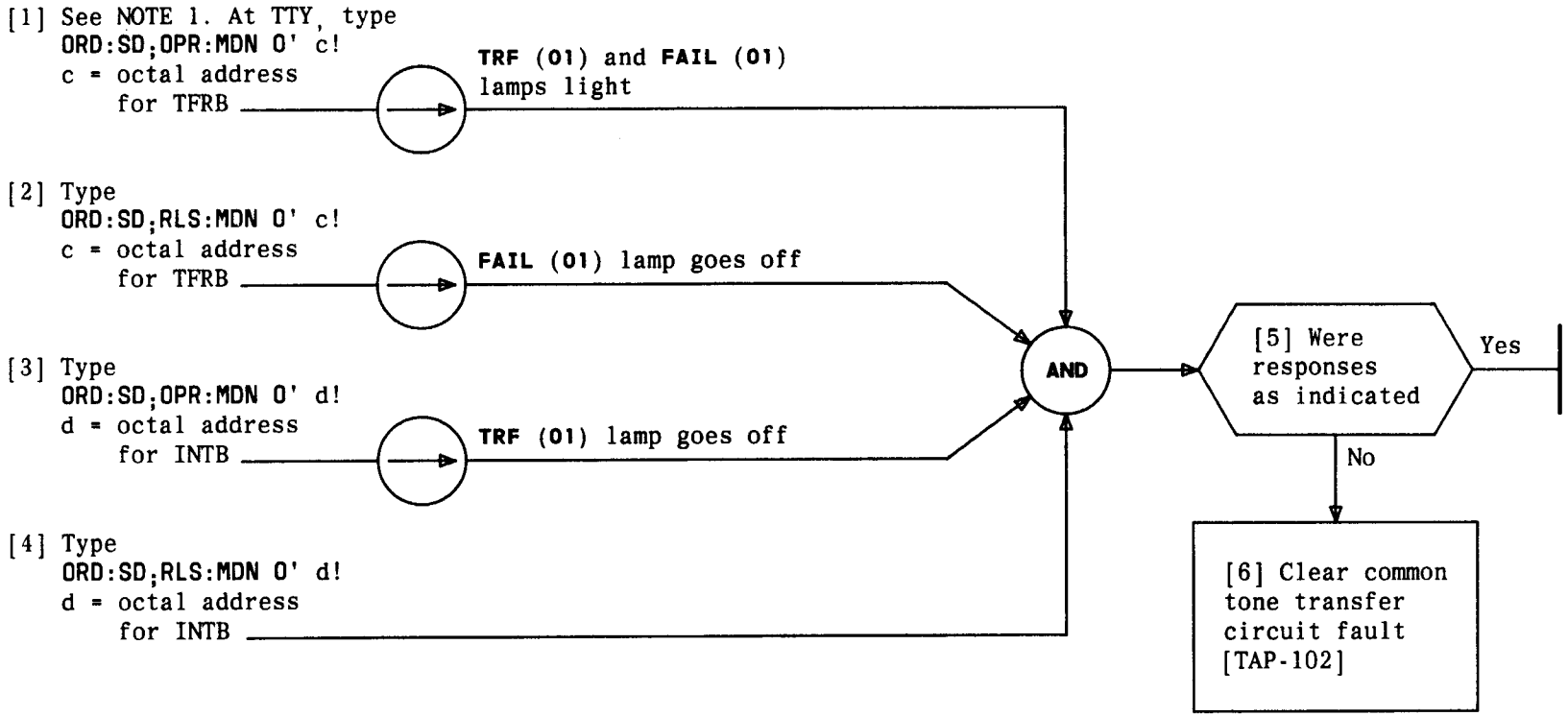


TABLE A	
CIRCUIT PACK	LOCATION
JD19	58-06
1086E	58-16
1086E	58-18
JD23	58-20
JD25	58-27

REPLACE CIRCUIT PACK – MFS TEST UNIT



NOTE 1
Signal processor (SP) addresses require binary bits 16 through 0. Therefore, only use six least significant octal digits when inputting octal addresses

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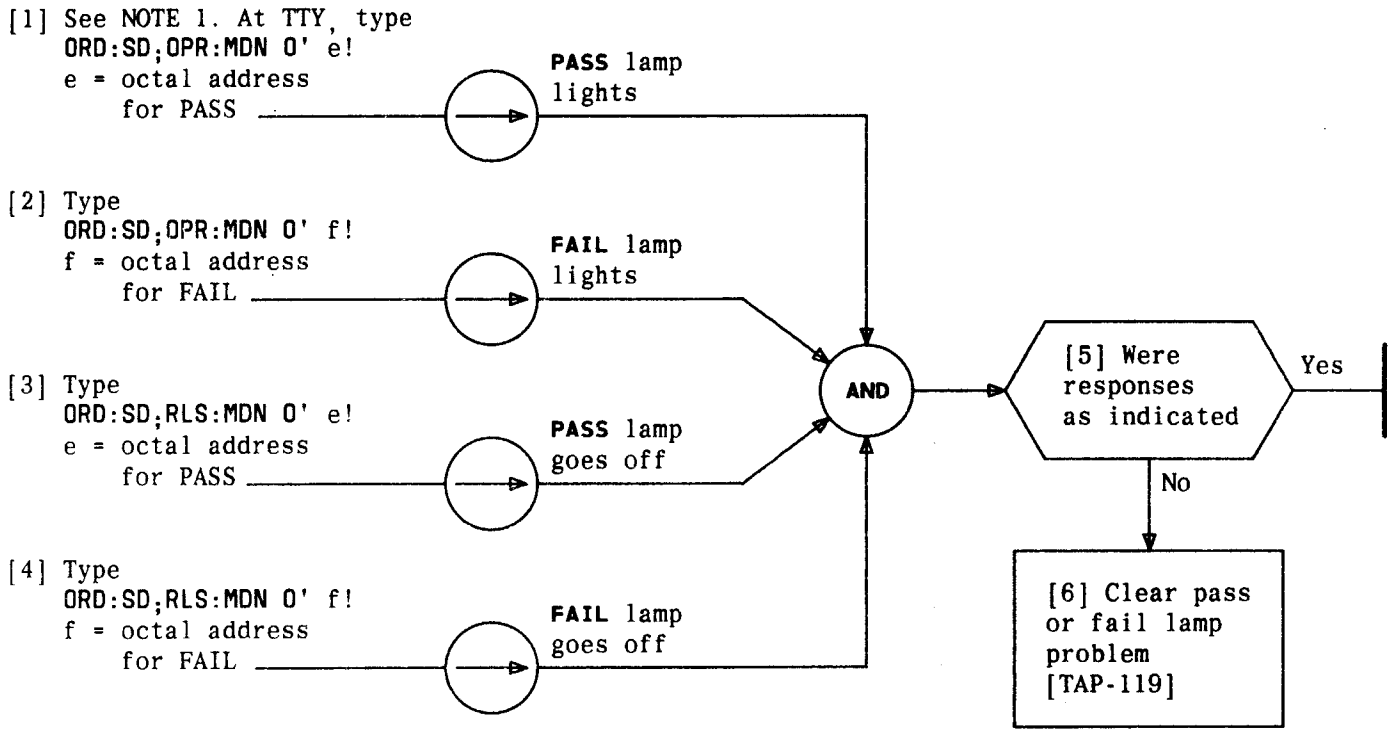
TEST CIRCUIT B SIGNAL DISTRIBUTOR POINTS



NOTE 1
Signal processor (SP) addresses require binary bits 16 through 0. Therefore, only use six least significant octal digits when inputting octal addresses

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TEST PASS AND FAIL LAMP SIGNAL DISTRIBUTOR POINTS

ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE	ITEM	ISSUE
IXL-001		DLP-507									
NTP-002		DLP-508									
NTP-003		• CKL-891									
NTP-004		TNG-893									
NTP-005		DPL-895									
NTP-006											
TAD-100											
ISD-101											
• TAP-102											
ISD-103											
• TAP-104											
ISD-105											
• TAP-106											
ISD-107											
TAP-108											
ISD-109											
• TAP-110											
ISD-111											
• TAP-112											
ISD-113											
TAP-114											
ISD-115											
• TAP-116											
ISD-117											
• TAP-118											
TAP-119											
TAP-120											
• TAP-121											
DLP-500											
DLP-501											
• DLP-502											
DLP-503											
• DLP-504											
DLP-505											
DLP-506											

• REVISED OR ADDED ITEM □ CANCELED ITEM

CHECKLIST

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 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; 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 Announcment Frame – Inspect	NTP-010

FIG. 1

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

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PERFORM SYSTEM TEST

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

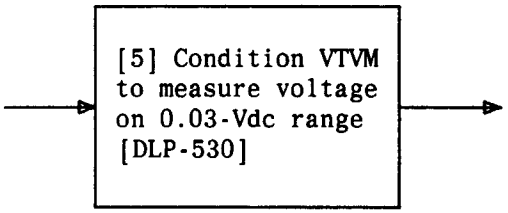
A summary statement is used with a procedure to tell you briefly how to do the procedure and what type measurement or result can be observed. If you can do the procedure after reading the summary, go ahead and do it without reading any further. Simple procedures may not have summaries.

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

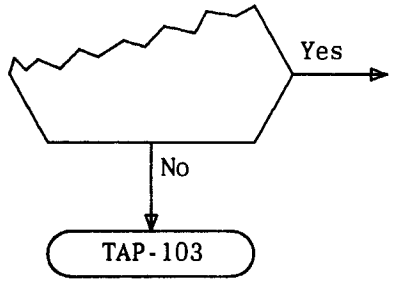
When you see the following kind of reference in TOP it refers to a support procedure:



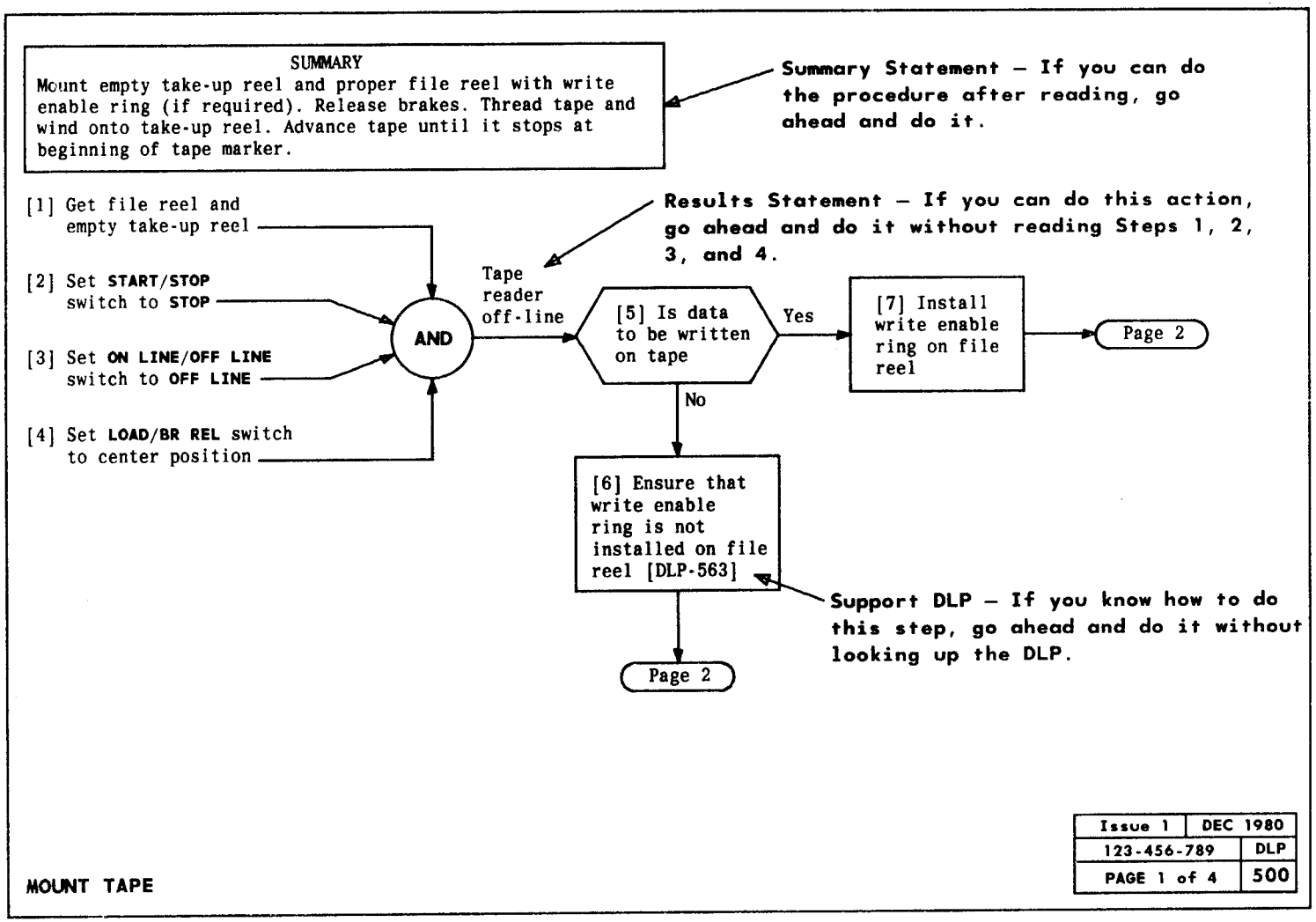
The support procedure [DLP-530] provides the information on how to operate the VTVM. Here again, if you already know how to operate the VTVM, go ahead and do it without looking up any further information.

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).


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.
Results Statement – If you can do this action, go ahead and do it without reading Steps 1, 2, 3, and 4.
[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
[5] Is data to be written on tape
Yes
No
[7] Install write enable ring on file reel
Page 2
[6] Ensure that write enable ring is not installed on file reel [DLP-563]
Page 2
Support DLP – If you know how to do this step, go ahead and do it without looking up the DLP.
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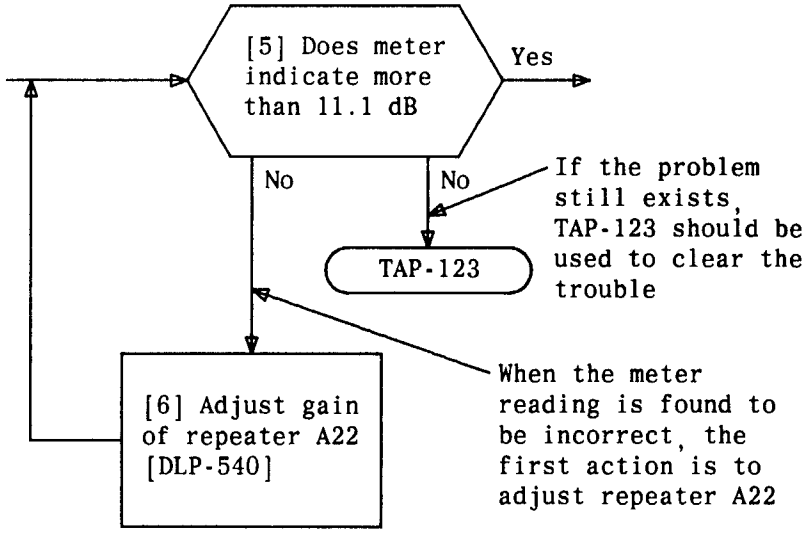
123-456-789 DLP
PAGE 1 of 4 500
MOUNT TAPE

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.

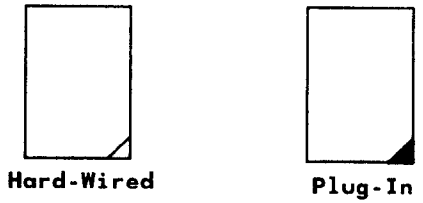


Trouble-clearing information in TOP is used basically the same way as non trouble-clearing information. When an alarm or trouble report requires you to troubleshoot a system covered by a TOP, the TASK INDEX LIST (IXL-001) is the place to start. After locating your job on IXL-001 you will be referenced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

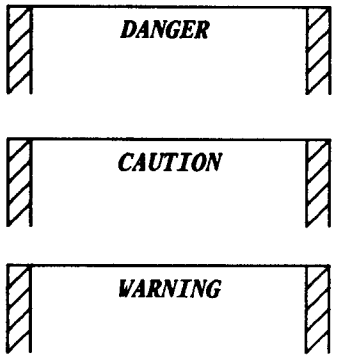
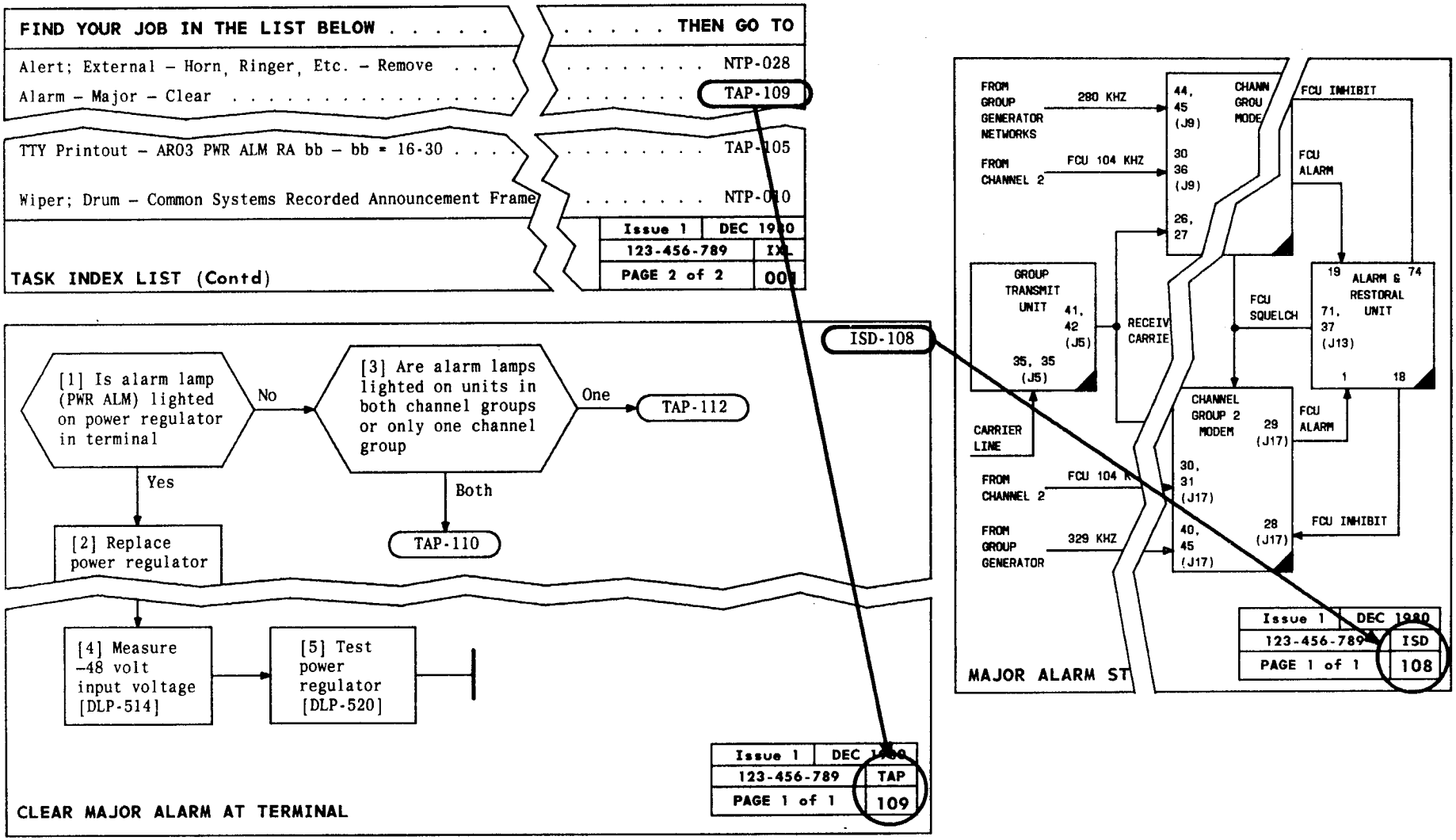


TABLE A on Page 8 shows some of the more important symbols and definitions.

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
TASK INDEX LIST (Contd)
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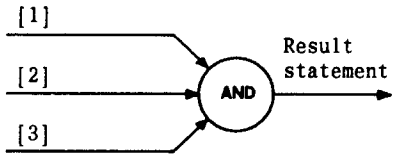
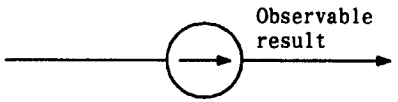
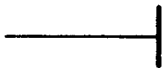
PAGE 2 of 2 001
ISD-108
[1] Is alarm lamp (PWR ALM) lighted on power regulator in terminal
No
[3] Are alarm lamps lighted on units in both channel groups or only one channel group
One
TAP-112
Yes
Both
[2] Replace power regulator
TAP-110
[4] Measure -48 volt input voltage [DLP-514]
[5] Test power regulator [DLP-520]
CLEAR MAJOR ALARM AT TERMINAL
Issue 1 DEC 1980
123-456-789 TAP
PAGE 1 of 1 109
FROM GROUP GENERATOR NETWORKS
280 KHZ
44, 45 (J9)
CHANN GROU MODE
FCU INHIBIT
FROM CHANNEL 2
FCU 104 KHZ
30 36 (J9)
FCU ALARM
26, 27
GROUP TRANSMIT UNIT
41, 42 (J5)
35, 35 (J5)
RECEIV CARRIE
FCU SQUELCH
19
ALARM & RESTORAL UNIT
74
71, 37 (J13)
1
18
CHANNEL GROUP 2 MODEM
29 (J17)
FCU ALARM
CARRIER LINE
30, 31 (J17)
FROM CHANNEL 2
FCU 104 K
FROM GROUP GENERATOR
329 KHZ
28 (J17)
FCU INHIBIT
40, 45 (J17)
MAJOR ALARM ST
Issue 1 DEC 1980
123-456-789 ISD
PAGE 1 of 1 108

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
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

API	234-153-005
IO, IOP, TUC, CS & PS	234-153-010
SP1, SP2	234-153-020
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

SYSTEM EVALUATION & ACCEPTANCE

FINAL VERIFICATION	234-155-001
OPERATIONAL READINESS	234-155-005
MAINT. FUNCT. VERIF.	234-155-010

MOC

MOC/MCC	234-151-002
TTY MESSAGE ANALYSIS	234-151-003
PUC	234-151-017
MAS	234-151-070
SMCC	234-151-102
SMCC INTERFACES	234-151-106
GENERIC RETROFIT, UPDATE (4E5)	234-160-005
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