BILLING DATA TRANSMITTER
TROUBLE SECTIONALIZING

CONTENTS PAGE

1. GENERAL

1.01 This section provides procedures for isolating trouble conditions associated with the billing data transmitter (BDT) portion of a No. 5 crossbar office with a master test frame, step-by-step centralized automatic message accounting (CAMA), No. 1 crossbar, No. 4A toll, crossbar tandem, or a step-by-step automatic message accounting (SAMA) office.

1.02 This section is reissued to include No. 1 crossbar, No. 4A toll, crossbar tandem, and step-by-step offices. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Trouble indications will be provided from trouble recorder cards, alarms, and associated light emitting diodes (LEDs) at the BDT, and telephone calls from No. 1 Automatic Message Accounting Recording Center (No. 1 AMARC) personnel.

1.04 ***Before any of the plug-in components of the BDT may be removed from their respective connectors, the power supply to the particular component must be removed.*** Some components of the BDT (ENCODER control [ECDR] boards, recorder control [RCDR] boards, power converters, and display boards) are equipped with power switches to permit removal of power before disengaging or engaging the unit. Power switches are not provided on other BDT components (scan boards, distribute boards, ENCODER components, program controllers, and data sets). ***When it is necessary to remove a component of a BDT not provided with a power switch, the other ENCODER must be made primary to all recorder ports*** (see paragraph 4.01). Once the ENCODER associated with the plug-in unit to be replaced has been made secondary to all recorders in the BDT, set POWER switch on the secondary ECDR board to OFF. With the ENCODER powered down, associated plug-in components may then be removed. The physical locations of the ENCODER components and the control and display boards are shown in Fig. 1, 2, and 3.

1.05 The trouble record presently produced in CAMA and local automatic message accounting (LAMA) offices will have additional information in

offices equipped with BDT. This additional information will indicate:

(a) A through F digits scanned by the ENCODER (EA 0-2, EB 0-7, EC 0-7, ED 0-7, EE 0-7, and EF 0-7 on trouble recorder cards and trouble indicator panels; EA 0-3, EB 0-9, EC 0-9, ED 0-9, EE 0-9, and EF 0-9 on trouble ticketer tickets).

(b) Whether a control lead failure (CLF) was detected.

(c) Which ENCODER (ENC 0 or ENC 1) was primary.

1.06 Spare plug-in units should be stocked locally. It is recommended that each BDT location stock a minimum of:

(a) Two 202T data sets at a central location for up to ten BDTs

(b) Two 202S data sets at a central location for up to ten BDTs

(c) One programmable controller (procon) and one set of procon circuit packs (Table A) at a central location for up to ten BDTs

(d) One fully equipped ENCODER (including a procon) and one 132T power converter per telephone company or operating area

(e) Circuit packs in accordance with Table B at a central location for up to ten BDTs.

2. APPARATUS

2.01 Maintenance spare plug-in units (see paragraph 1.06).

2.02 723A Tool (for removing A1068 circuit packs).

2.03 748A Tool (for removing JW364, JW365, and JW366 circuit packs).

2.04 Card Puller Assembly 841571284 (for removing data sets not equipped with a handle).

2.05 KS-14510 L11 volt-ohm-milliammeter or equivalent.

3. TROUBLE-LOCATING FLOWCHART

3.01 Fig. 4 through Fig. 40 comprise a trouble-locating guide that may be used when BDT experiences a trouble. Trouble in the BDT may be indicated by major or minor alarms or trouble records.

3.02 Precautions in paragraphs 1.04 and 4.01 should be observed when troubleshooting the BDT.

3.03 When an ENCODER is out of service, high priority should be given to the restoral of the ENCODER to service, since the handling of all billing traffic associated with the BDT is now handled by one ENCODER.

3.04 When a dedicated data link failure occurs, the No. 1 AMARC will attempt to substitute a dialed backup link. Since the No. 1 AMARC has only two backup links for use with all the offices it serves, it is necessary to expedite the restoral of data links.

3.05 Fig. 41, 42, and 43 contain information used for interpreting LED designations on the display panel. These LEDs will supply data and control lead status and trouble numbers. This information is used when performing recorder tests and also when trouble sectionalizing. The LED display is activated by setting the POWER switches on the display boards to ON and setting a DISPLAY switch on a RCDR board to A or B, or an ECDR board DISPLAY switch to ON. The DISPLAY switches should be set to OFF when observations are not being made.

4. TAKING EQUIPMENT OUT OF SERVICE

A. Procedure for Transferring the Primary/Secondary Status of Recorder Ports

4.01 At RCDR board for recorder port(s) to be transferred, set RUN switch to other ENCODER position (0/1).

Caution: Do not operate a RUN switch while an XFR LED is lighted on an ENCODER control board.

4.02 A successful transfer of a recorder is indicated when the XFR LED on the ECDR board of the originally assigned primary ENCODER is

extinguished, and the RUN LED is lighted on the RCDR board for the new primary ENCODER.

B. Procedure for Removing an ENCODER or an ENCODER Control Board From Service

4.03 Notify No. 1 AMARC, then set the primary status (at recorder control boards) of all recorder ports to the other ENCODER (see paragraphs 4.01 and 4.02).

4.04 At the ECDR board for the ENCODER to be removed from service, set the POWER switch to OFF.

> ***Note:*** Before restoring an ENCODER to service, allow it to run as secondary to all associated recorder ports for two to three minutes. When restoring an ENCODER to service, set the RUN switch on the RCDR boards so that each ENCODER will be primary to 50 percent of the billing traffic of the recorders.

C. Procedure for Removing a Data Link From Service

4.05 Notify No. 1 AMARC; then remove the associated ENCODER from service (see paragraphs 4.03 and 4.04).

> ***Note:*** Test procedures for 202T and 202S data sets are covered in Sections 592-031-500 and 592-028-500.

> ***Note:*** If No. 1 AMARC detects a data link failure, it will attempt to transfer the associated ENCODER to the backup data link.

4.06 If data link trouble proves to be a faulty data set, options and straps must be set on the replacement data set according to Table C before placing in service.

D. Procedure for Removing a Recorder Control Board From Service

4.07 At the master test frame or office test frame, check that emergency recorder is not in service by observing that there are no plugs in any recorder transfer jacks.

4.08 Insert a make-busy plug into the recorder transfer jack of recorder under test. Transfer of the recorder will be indicated by the lighted EW lamp at the emergency recorder frame.

4.09 At the RCDR board for the recorder under test, set the POWER switch to OFF.

> ***Note:*** Before restoring a recorder to service, an operation test should be performed to verify continuity between the recorder and BDT (see Section 201-901-501 for recorder tests).

E. Procedure for Removing a Power Converter From Service

4.10 Remove associated ENCODER from service (see paragraphs 4.03 and 4.04).

> ***Note:*** Prior to removing a defective power converter from service, the following action should be taken. Set the POWER switch on the ECDR board to ON. Set the power switch on the power converter to OFF for approximately 1 minute; then set the power switch to ON. If the ALM LED lights, or if voltages at the test points on the power converter are not at an acceptable level, proceed to paragraph 4.11. If the power converter functions are normal after the preceding action, restore the ENCODER to service.

4.11 At power converter to be removed, raise designation strip and set power switch to OFF. Using handle provided, remove power converter and replace with the maintenance spare.

> ***Note:*** Power switch on a power converter must be in the OFF position before removing or installing the converter.

F. Procedure for Replacing ENCODER Components

4.12 Before replacing procon, procon boards, scan boards, distribute boards, interface, memory, or I/O circuit boards, remove the ENCODER from service (see paragraphs 4.03 and 4.04).

Note: Before removing a procon, remove connectorized cabling on rear of procon and four mounting screws on face of procon.

G. Procedure for Replacing Display Boards

4.13 Before removing or inserting a display board, set POWER switch on the display board to OFF.

TABLE A

PROCON CIRCUIT PACKS

DMU	ED-4C055-30 G2
CUB	ED-4C056-30 G4
PSU1	ED-4C058-30 G3, G4 w/program PKAA-22
PSU2	ED-4C058-30 G3, G4 w/program PKAA-22
PSU3	ED-4C058-30 G3, G4 w/program PKAA-22

TABLE B

SPARE CIRCUIT PACKS

CIRCUIT PACK	5 BDTs*	10 BDTs*	15 BDTs*
A1068	3	4	4
A1074	3	4	4
A1148	2	2	2
FB594	4	5	6
FB598	3	3	4
FB602	2	2	2
FB603	2	2	3
FC319	2	2	2
FC320	3	3	4
FC321	2	2	2
FC335	2	2	2
JW364	3	3	4
JW365	2	2	2
JW366	2	2	2

* Assumes an average of 8 recorders per BDT.

TABLE C

DATA SET OPTIONS

202S		
FUNCTION		SWITCH CONTACT SETTINGS
Transmit Line Signal at −6 dBm		S3 Switch Closed—2,5,8,9 Open—4,6,7
Reverse Channel-Out		S3 Switch Closed—1,3
Soft Turn Off Interval		S2 Switch Open—3,4,9,0
Fast Carrier Detection-In		S2 Switch Open—5
Clear to Send Interval (30 ms)		S2 Switch Closed—7 Open—6
Automatic Answer-In		S2 Switch Closed—8
Local Copy-Out	202S LI	S2 Switch Open—1
	202S LIA	S2 Switch Closed—1
Clamp-In	202S LI	S2 Switch Open—2
Condition of CC (DSR) During Analog Loop Back-Off	202S LIA	

TABLE C (Contd)

DATA SET OPTIONS

202T		
FUNCTION		**SWITCH CONTACT SETTINGS**
2-Wire Channel	Without Reverse Channel	S3 Switch Closed—1,3,6,7 Open—2,4,5,8,9,0
	Local Copy-Out	S2 Switch Open—1
	Soft Turn Off Interval	S2 Switch Open—3,4,9,0
	Clear To Send Interval (30 ms)	S2 Switch Closed—7 Open—6
4-Wire Channel		S3 Switch Closed—3,4,8,9,0 Open—1,2,5,6,7
		S2 Switch Closed—1
	Soft Turn Off Interval	S2 Switch Closed—4 Open—3,9,0
	Clear To Send Interval (8 ms)	S2 Switch Open—6,7
Control by Data Aux Set 828 Type-Out		S2 Switch Closed—8
Clamp-In		S2 Switch Open—2
Carrier Detection Reset-Out		Install E22-E23 Strap
Continuous Carrier May Be In or Out Depending on Local Considerations	Out	Install E25-E26 Strap
	In	Install E24-E25 Strap
Fast Carrier Detection-In		S2 Switch Open—5

SCAN AND DISTRIBUTE POINT CIRCUIT BOARD LOCATION

LEVEL 10

ENCODER / EMER RCDR					RECORDER PORT 0, 1					RECORDER PORT 2, 3				
TN 4 / SP	TN 3 / A0	TN 2 / A1	TN 1 / A2	TN 0 / ON	SP	A0	A1	A2	ON	SP	A0	A1	A2	ON
TN 9 / P1	TN 8 / CK	TN 7 / RST	TN 6 / DPL	TN 5 / P0	P1	CK	RST	DPL	P0	P1	CK	RST	DPL	P0
EIU 0 / MTP	EIU 1		ALM / PTY	TBL EM / TPIP	MTP			PTY	TPIP	MTP			PTY	TPIP
TBL 4 / B1	TBL 3 / B2	TBL 2 / B4	TBL 1 / B7	TBL 0 / B0	B1	B2	B4	B7	B0	B1	B2	B4	B7	B0
TBL 9 / C1	TBL 8 / C2	TBL 7 / C4	TBL 6 / C7	TBL 5 / C0	C1	C2	C4	C7	C0	C1	C2	C4	C7	C0
OK 0 / D1	OK 1 / D2	OK 2 / D4	OK 3 / D7	DPL B / D0	D1	D2	D4	D7	D0	D1	D2	D4	D7	D0
OK 4 / E1	OK 5 / E2	OK 6 / E4	OK 7 / E7	DPL E / E0	E1	E2	E4	E7	E0	E1	E2	E4	E7	E0
OK 8 / F1	OK 9 / F2	OK EM / F4	F7	F0	F1	F2	F4	F7	F0	F1	F2	F4	F7	F0
2	3	4	5	6	7	8	9	SLOT	12	13	14	15	16	

LEVEL 6

DISTRIBUTE POINTS								RECORDER PORT 4, 5					RECORDER PORT 6, 7					RECORDER PORT 8, 9				
OK 0	OK 2	CK 0	CK 2	C0	C2	C7		SP	A0	A1	A2	ON	SP	A0	A1	A2	ON	SP	A0	A1	A2	ON
OK 1	OK 3	CK 1	CK 3	C1	C4	XFR		P1	CK	RST	DPL	P0	P1	CK	RST	DPL	P0	P1	CK	RST	DPL	P0
CK 4	CK 6	OK 4	OK 6	D0	D2	D7		MTP			PTY	TPIP	MTP			PTY	TPIP	MTP			PTY	TPIP
CK 5	CK 7	OK 5	OK 7	D1	D4	INIT 2		B1	B2	B4	B7	B0	B1	B2	B4	B7	B0	B1	B2	B4	B7	B0
OK 8	OK EM	CK 8	CK EM	E0	E2	E7		C1	C2	C4	C7	C0	C1	C2	C4	C7	C0	C1	C2	C4	C7	C0
OK 9	MN	CK 9	CLF	E1	E4	INIT 1		D1	D2	D4	D7	D0	D1	D2	D4	D7	D0	D1	D2	D4	D7	D0
B0	B2	B7	A1	F0	F2	F7		E1	E2	E4	E7	E0	E1	E2	E4	E7	E0	E1	E2	E4	E7	E0
B1	B4	A0	A2	F1	F4	T		F1	F2	F4	F7	F0	F1	F2	F4	F7	F0	F1	F2	F4	F7	F0
2	4	6	8	SLOT	10	12	14	16	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Fig. 1—Scan and Distribute Point Circuit Board Location

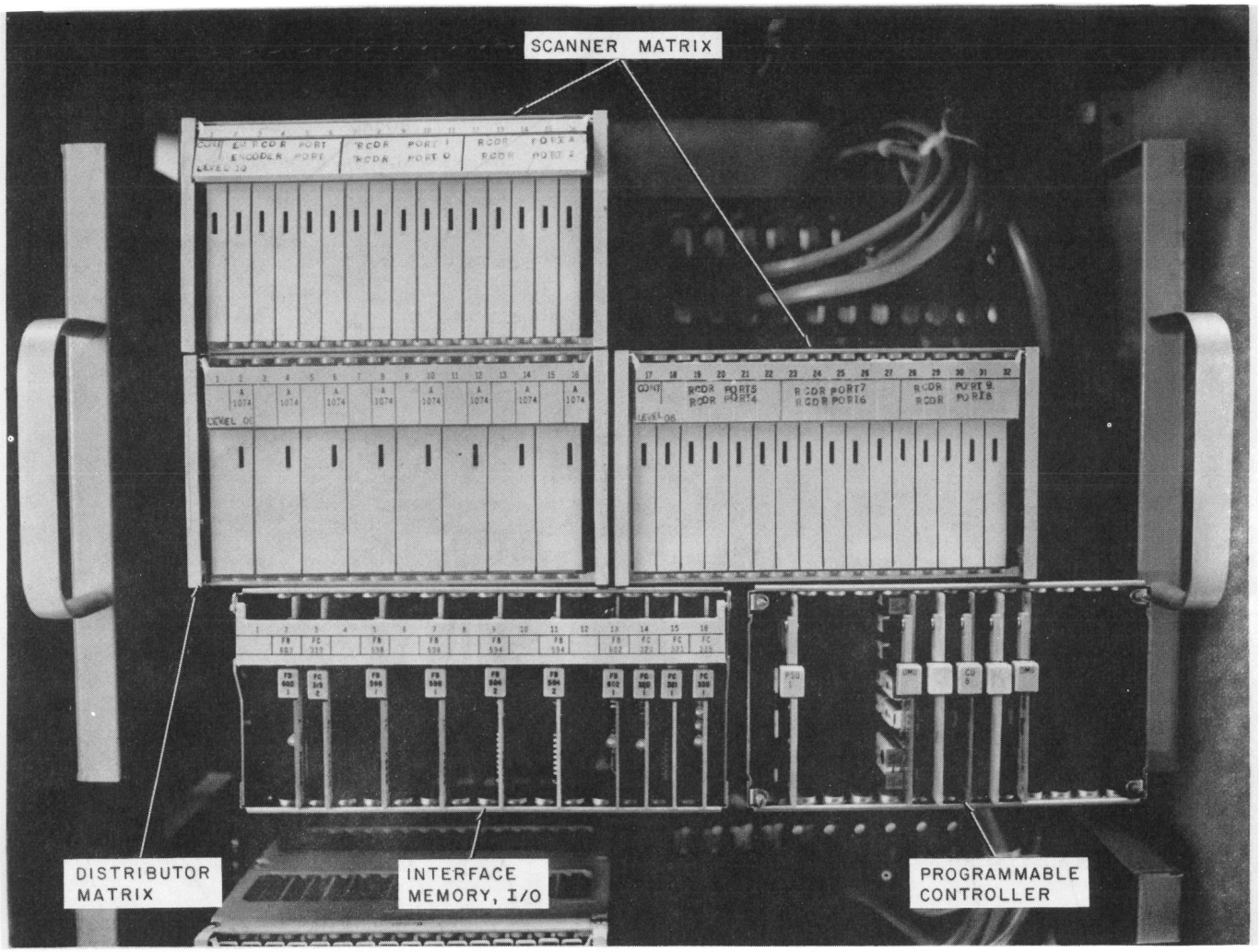


Fig. 2—ENCODER

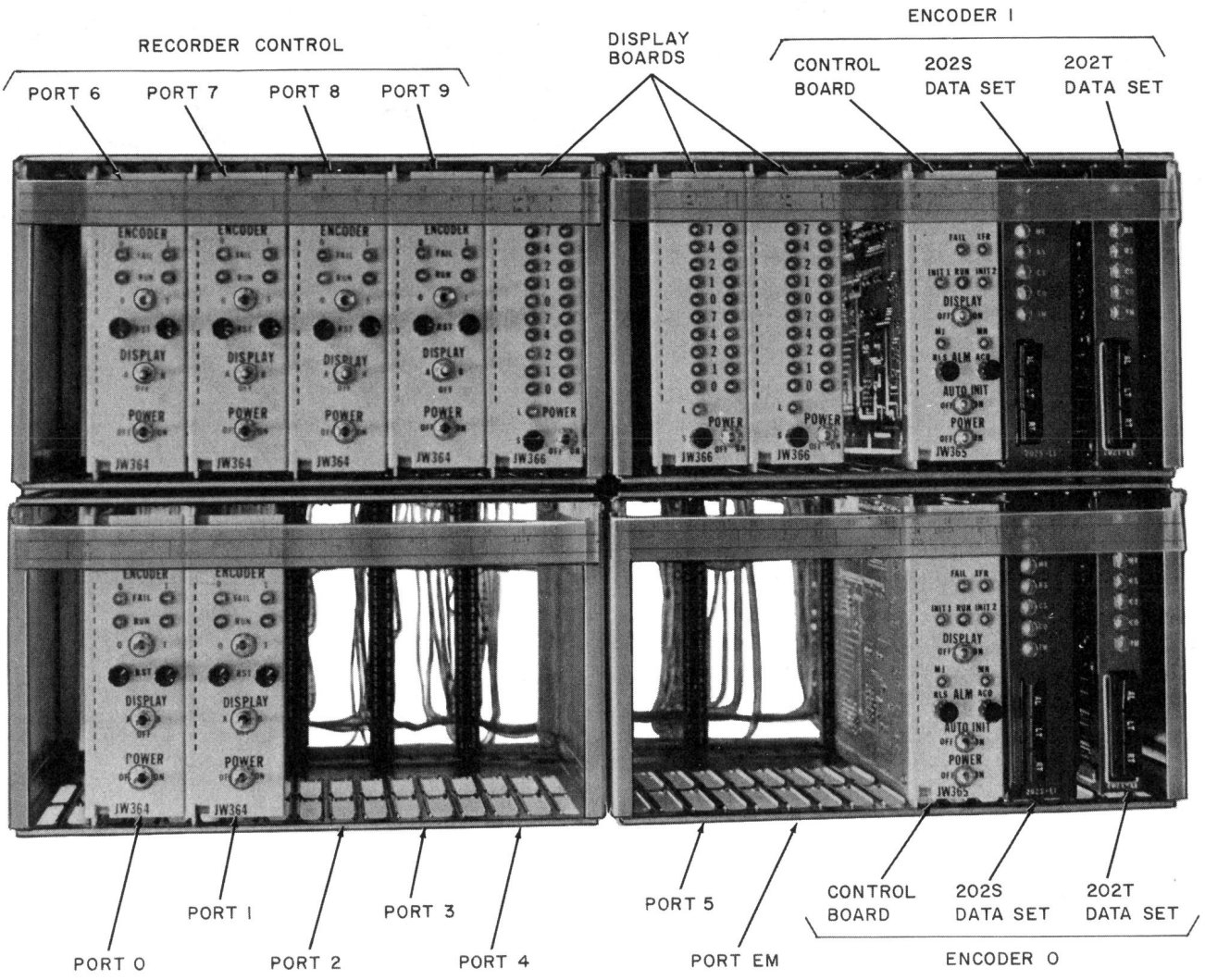


Fig. 3—Display and Control Panel

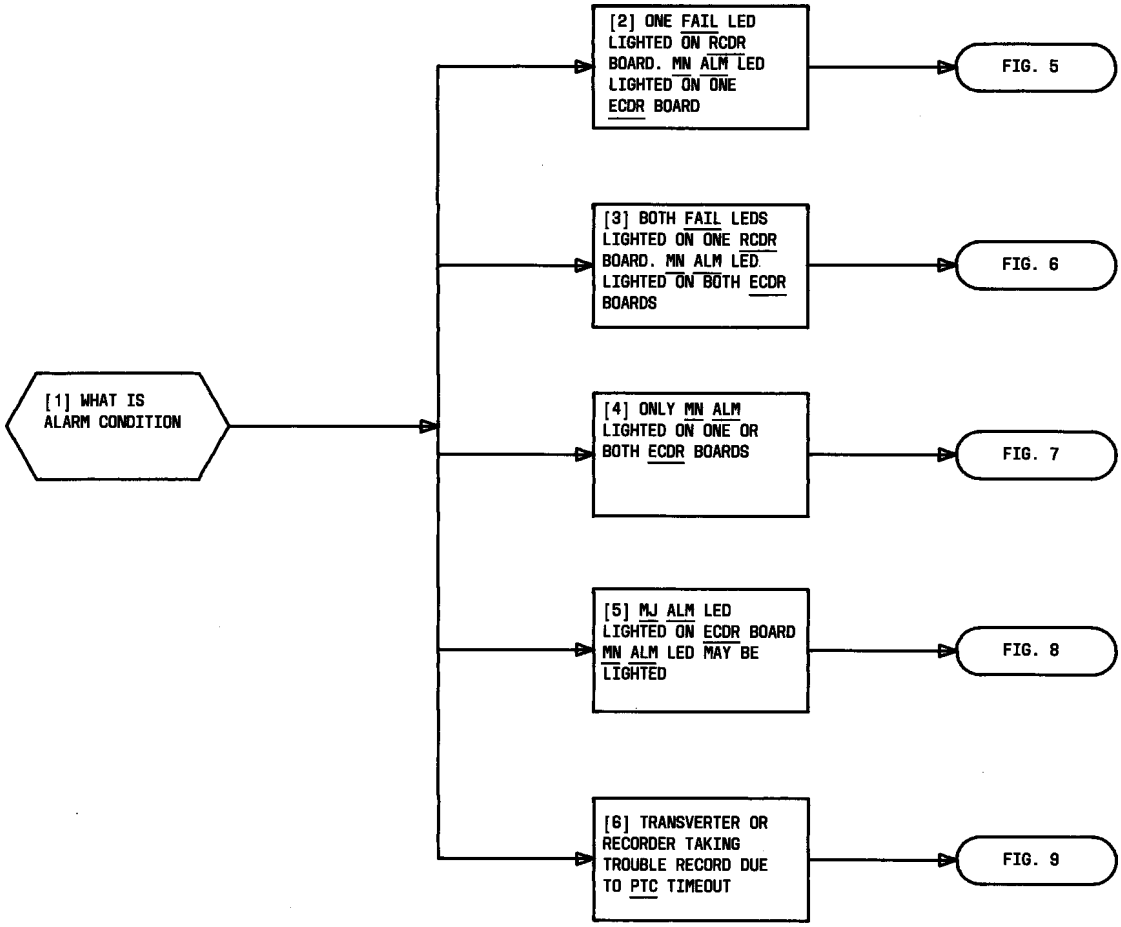


Fig. 4—BDT Alarms

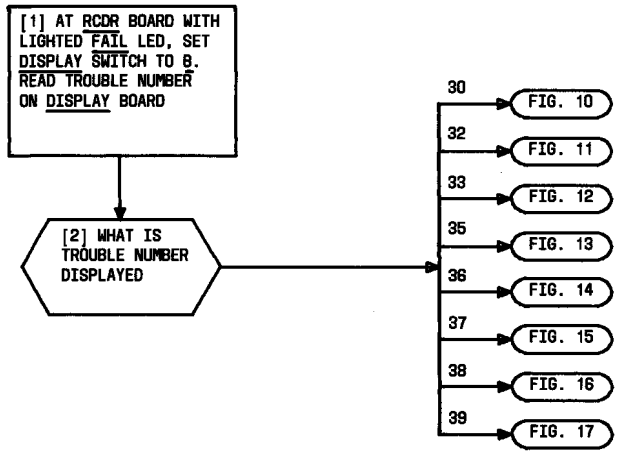


Fig. 5—Minor Alarm, One FAIL LED Lighted on RCDR Board

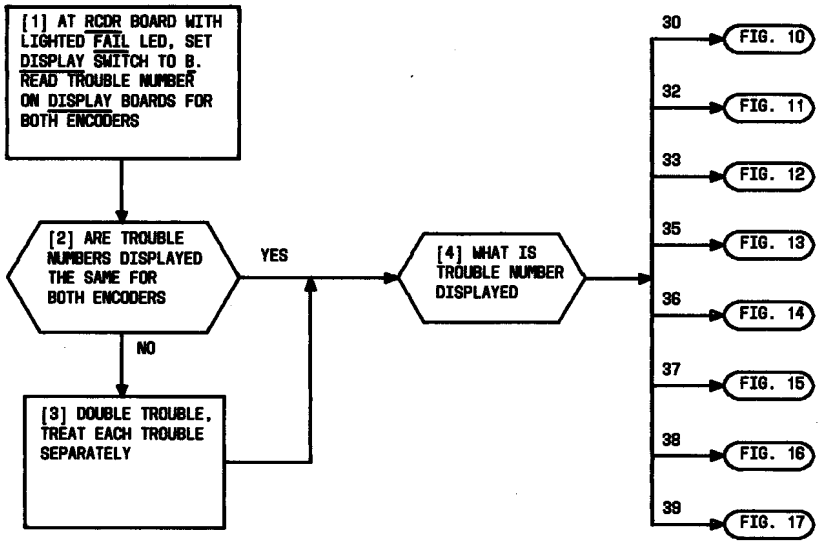


Fig. 6—Minor Alarm, Both FAIL LEDS Lighted on One RCDR Board

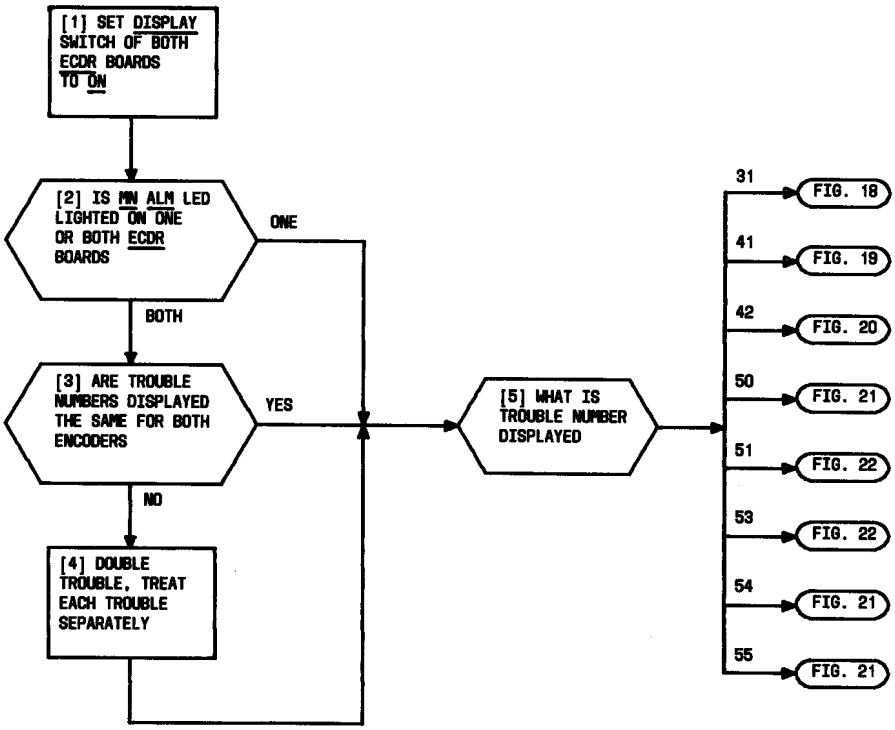
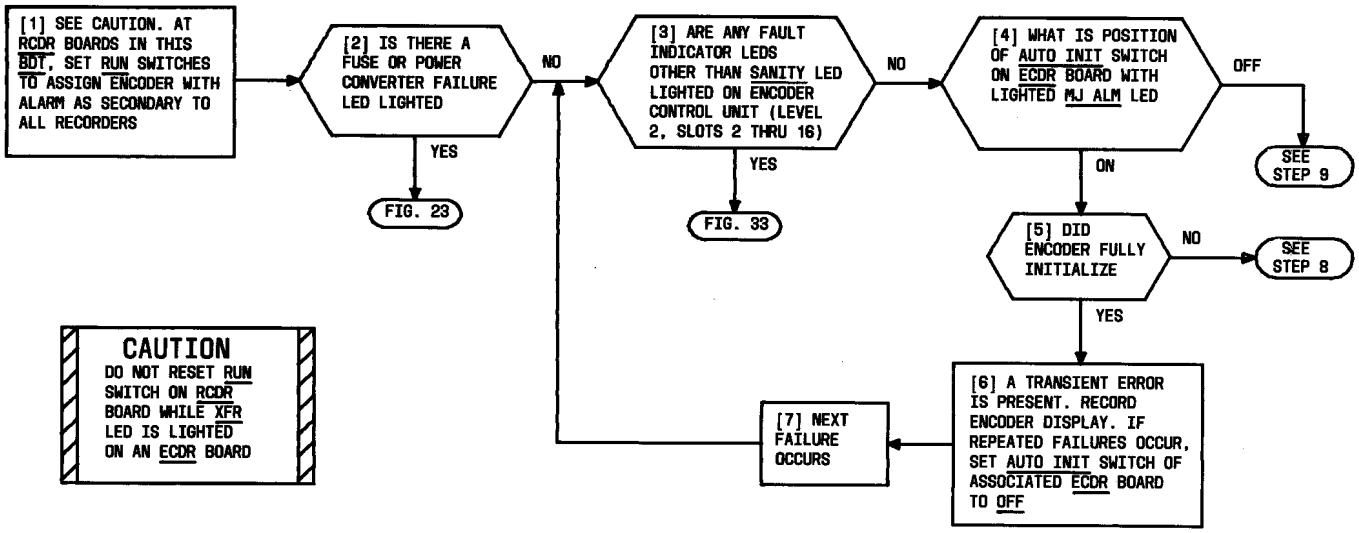


Fig. 7—Minor Alarm, Only on One or Both ECDR Boards



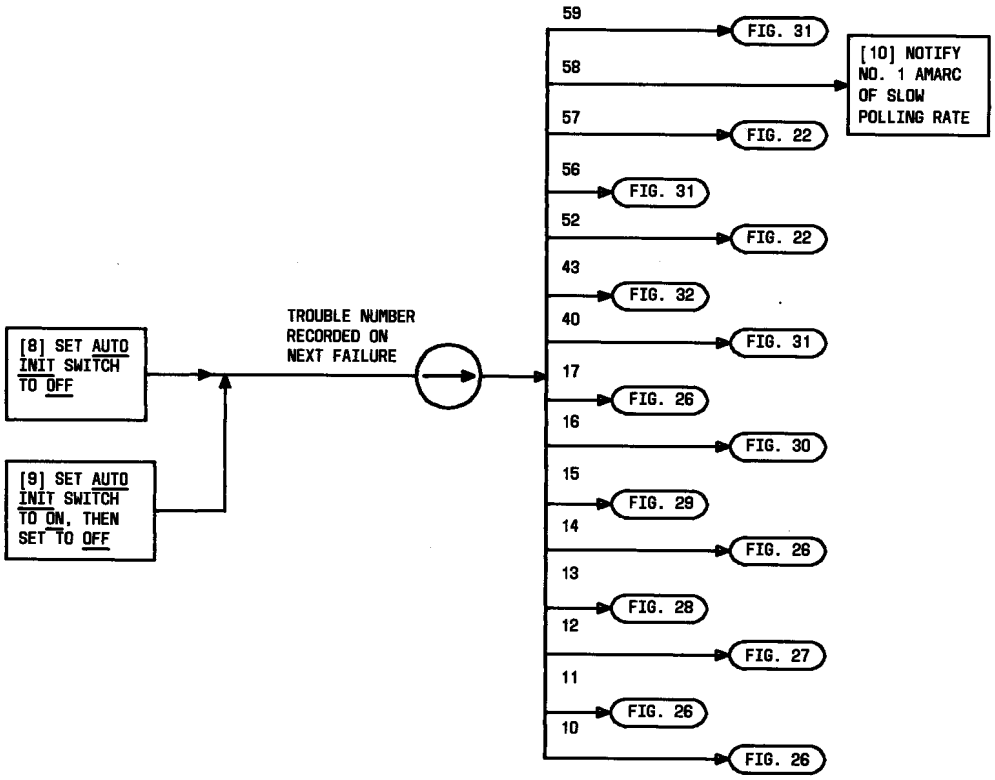
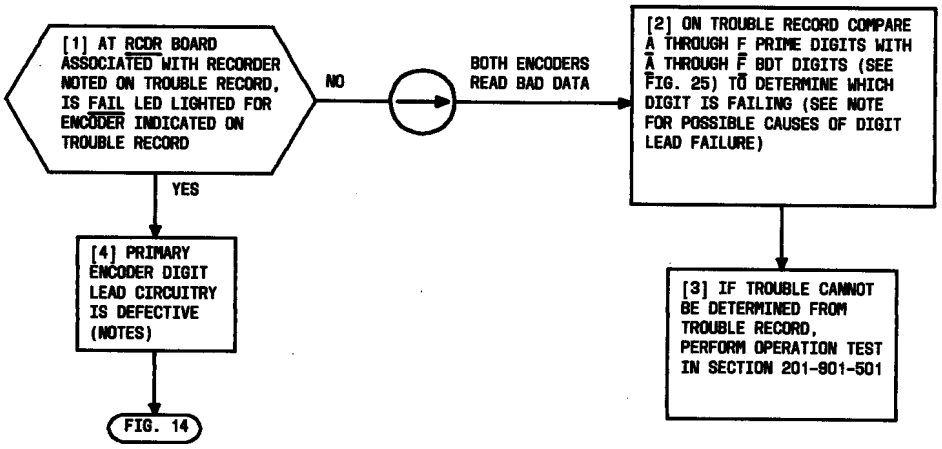


Fig. 8—Major Alarm



NOTES
1. SHORTED DIGIT LEAD WIRING WITHIN DAC, OR BETWEEN BDT AND WIRING
2. OPEN DIGIT LEAD WIRING BETWEEN BDT AND RECORDER
3. RECORDER, TRANSVERTER, OR CII WHICH IS MUTILATING THE DIGIT LEADS

Fig. 9—Recorder or Transverter Taking Trouble Record Showing PT Time-out

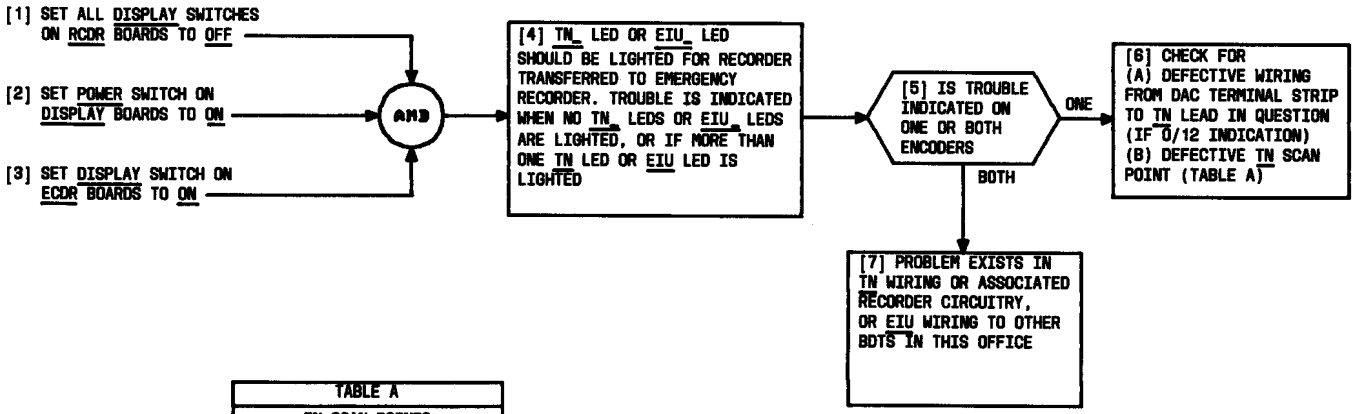


TABLE A				
TN SCAN POINTS				
LEVEL 10				
SLOT				
2	3	4	5	6
TN9	TN8	TN7	TN6	TN5
TN4	TN3	TN2	TN1	TN0

Fig. 10—Trouble Number 30, TN/EIU Check Failed 1/12 (Should Occur Only on EM RCDR Port) (Sheet 1 of 2)

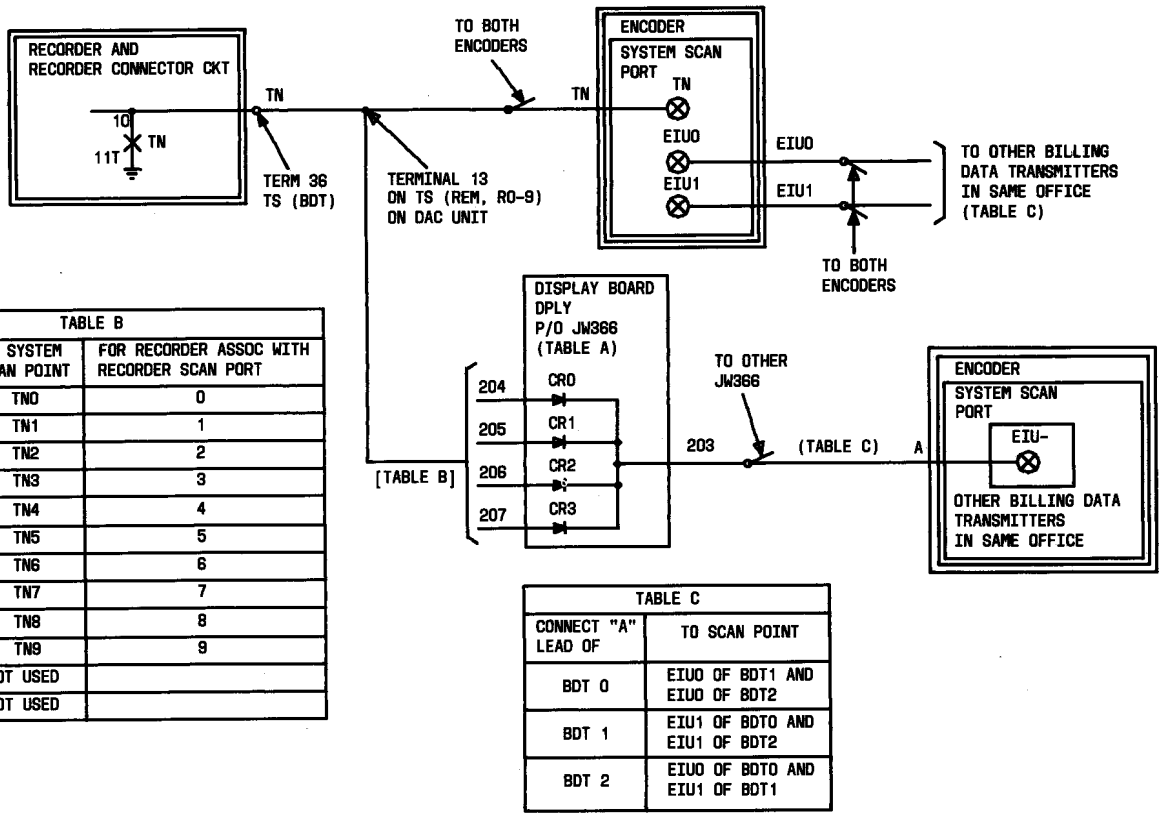


TABLE B			
CONNECT JW366 TERM		TO SYSTEM SCAN POINT	FOR RECORDER ASSOC WITH RECORDER SCAN PORT
1ST JW366	204	TN0	0
	205	TN1	1
	206	TN2	2
	207	TN3	3
2ND JW366	204	TN4	4
	205	TN5	5
	206	TN6	6
	207	TN7	7
3RD JW366	204	TN8	8
	205	TN9	9
	206	NOT USED	
	207	NOT USED	

TABLE C	
CONNECT "A" LEAD OF	TO SCAN POINT
BDT 0	EIU0 OF BDT1 AND EIU0 OF BDT2
BDT 1	EIU1 OF BDT0 AND EIU1 OF BDT2
BDT 2	EIU0 OF BDT0 AND EIU1 OF BDT1

Fig. 10—Trouble Number 30, TN/EIU Check Failed 1/12 (Should Occur Only on EM RCDR Port) (Sheet 2 of 2)

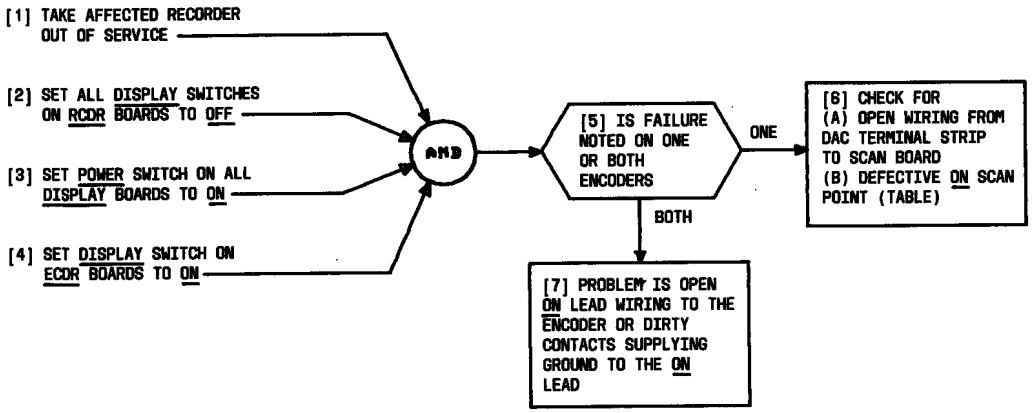


TABLE		
ON SCAN POINT CIRCUIT BOARD LOCATION		
RCDR PORT	LEVEL	SLOT
0, 1	10	11
2, 3	10	16
4, 5	6	22
6, 7	6	27
8, 9	6	32
EM	10	6

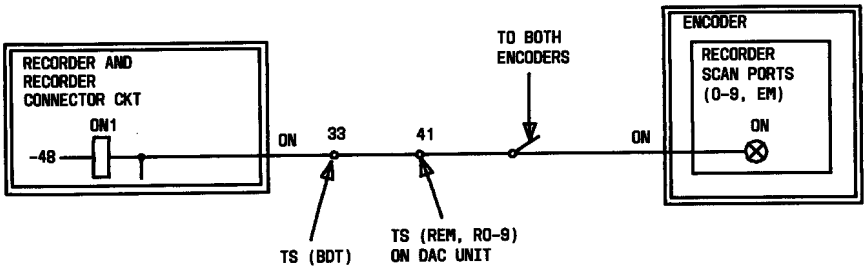


Fig. 11—Trouble Number 32, ON Stuck at 0 Audit

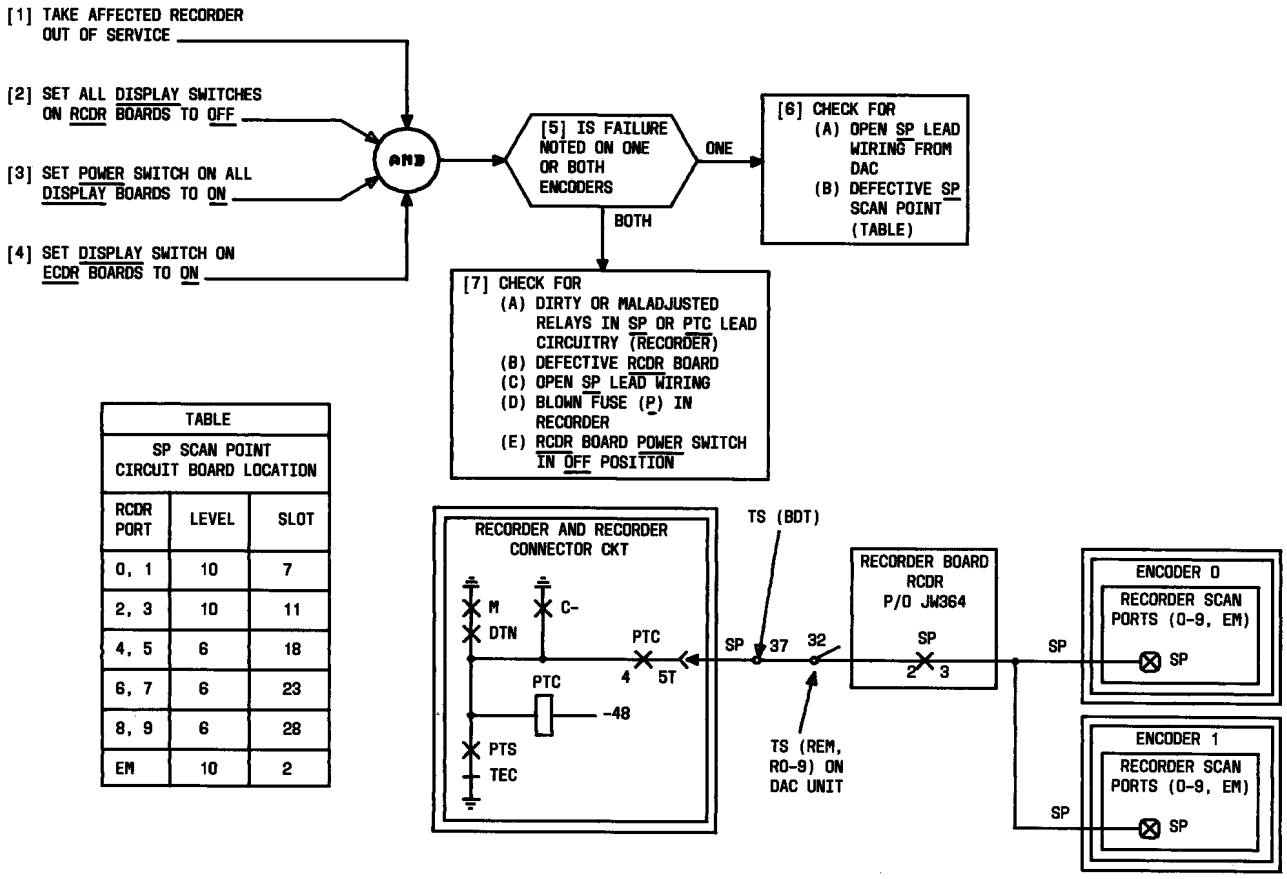


TABLE		
SP SCAN POINT CIRCUIT BOARD LOCATION		
RCDR PORT	LEVEL	SLOT
0, 1	10	7
2, 3	10	11
4, 5	6	18
6, 7	6	23
8, 9	6	28
EM	10	2

Fig. 12—Trouble Number 33, SP Stuck at 0

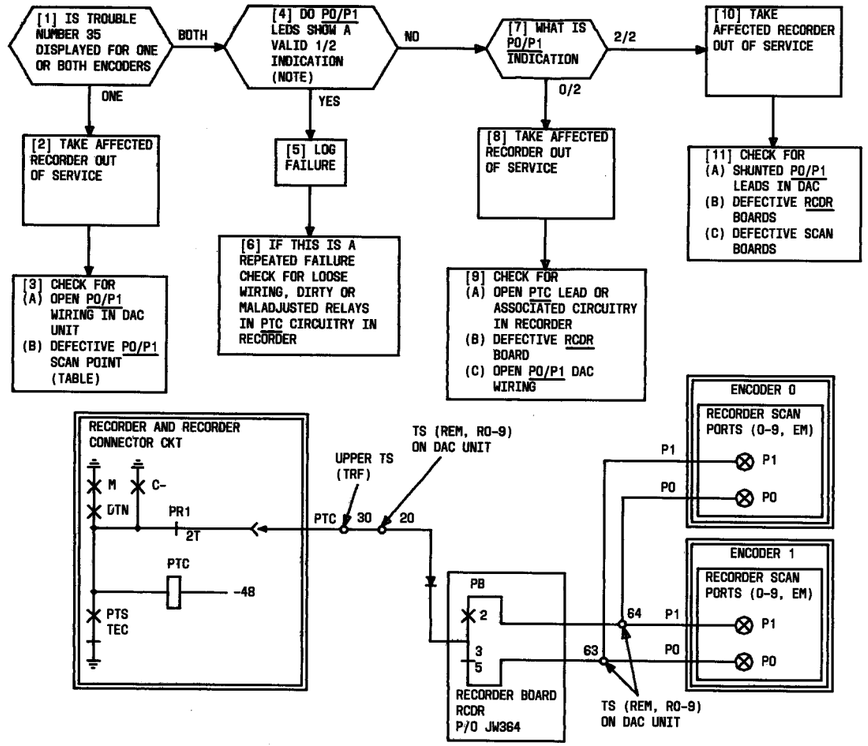
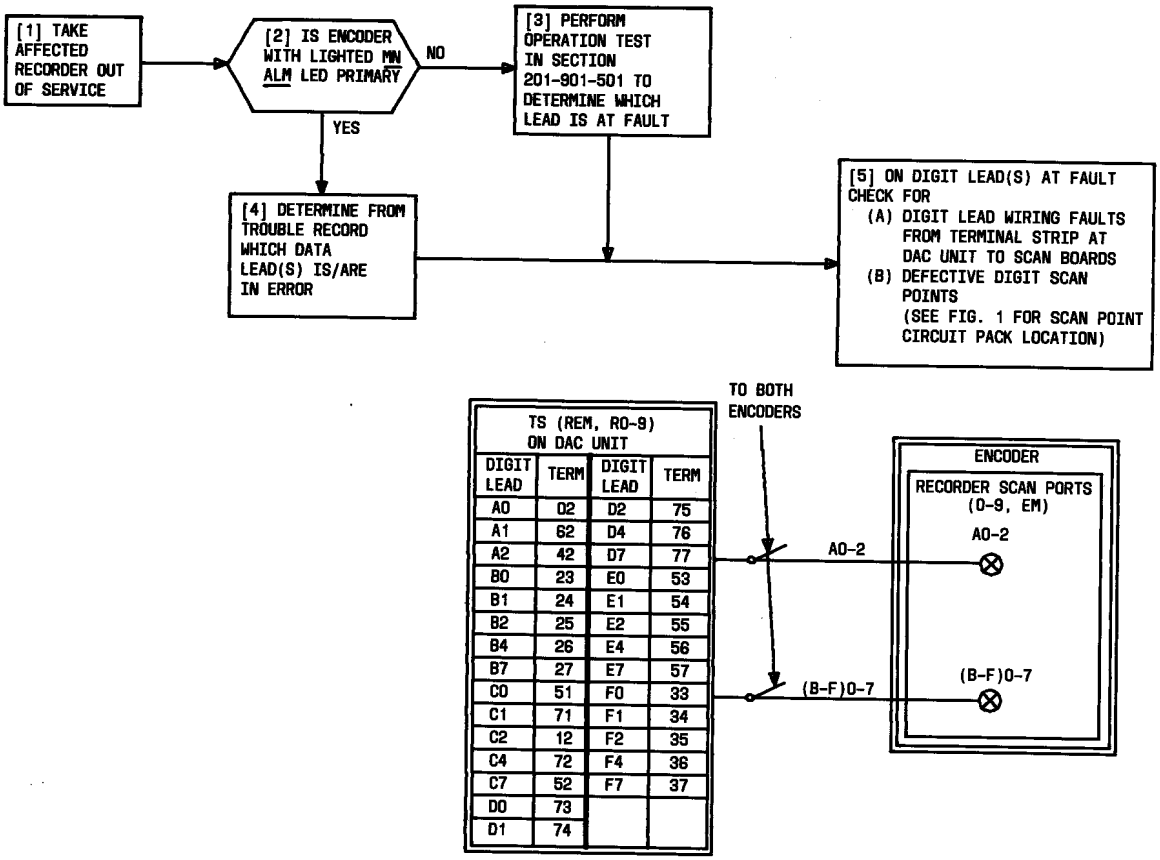


TABLE			
PO/P1 SCAN POINT CIRCUIT BOARD LOCATION			
RCDR PORT	LEVEL	SLOT	
		PO	P1
EM	10	6	2
0, 1	10	11	7
2, 3	10	16	12
4, 5	6	22	18
6, 7	6	27	23
8, 9	6	32	28

NOTE
A YES INDICATION IN STEP 4 INDICATES A TRANSIENT FAULT. A NO INDICATION IN STEP 4 INDICATES A HARD FAULT

Fig. 13—Trouble Number 35, PO/P1 Failed 1/2 Check



DIGIT LEAD	TERM	DIGIT LEAD	TERM
A0	02	D2	75
A1	62	D4	76
A2	42	D7	77
B0	23	E0	53
B1	24	E1	54
B2	25	E2	55
B4	26	E4	56
B7	27	E7	57
C0	51	F0	33
C1	71	F1	34
C2	12	F2	35
C4	72	F4	36
C7	52	F7	37
D0	73		
D1	74		

Fig. 14—Trouble Number 36, 2/5 Digit Lead Check Failed (1/3 or 3/3 on a Digit)

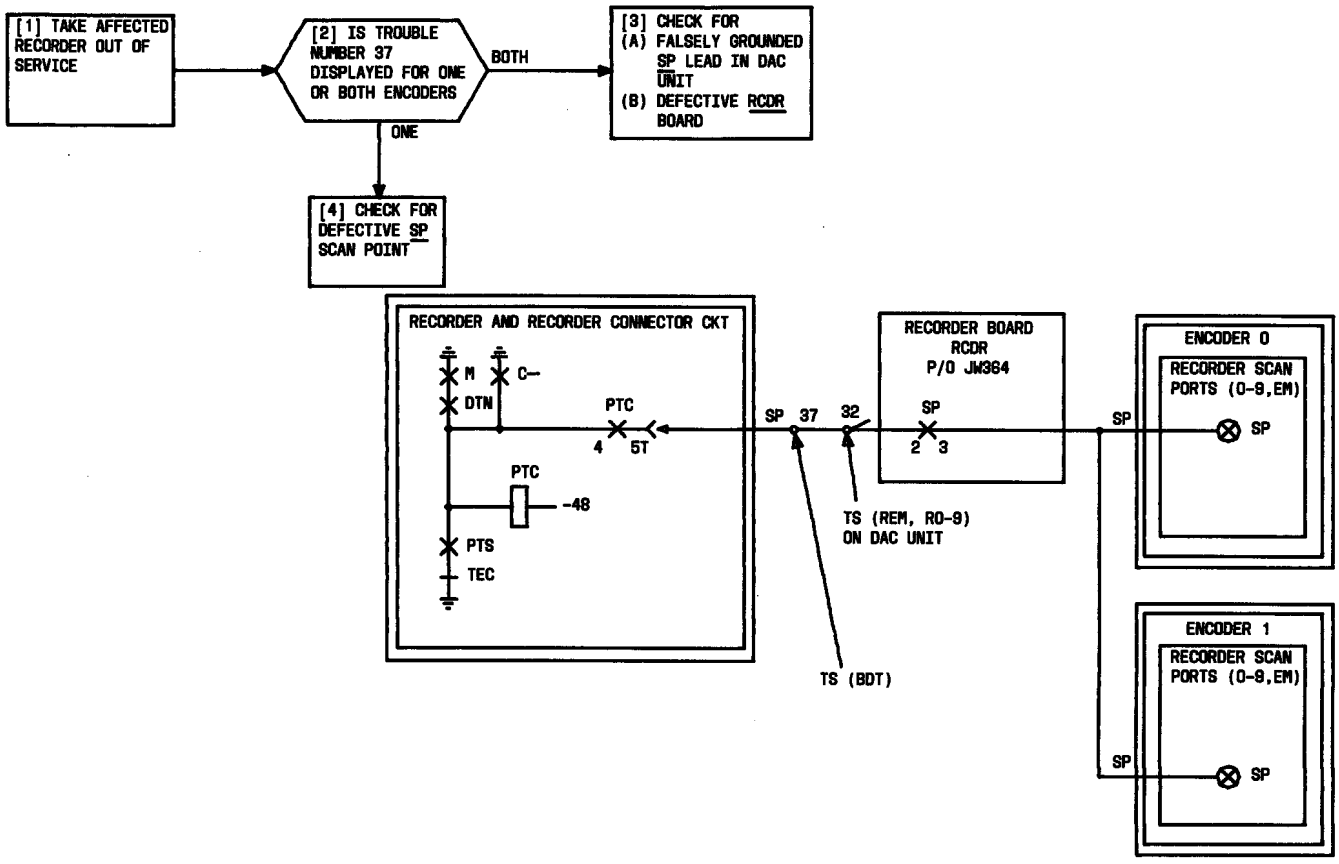
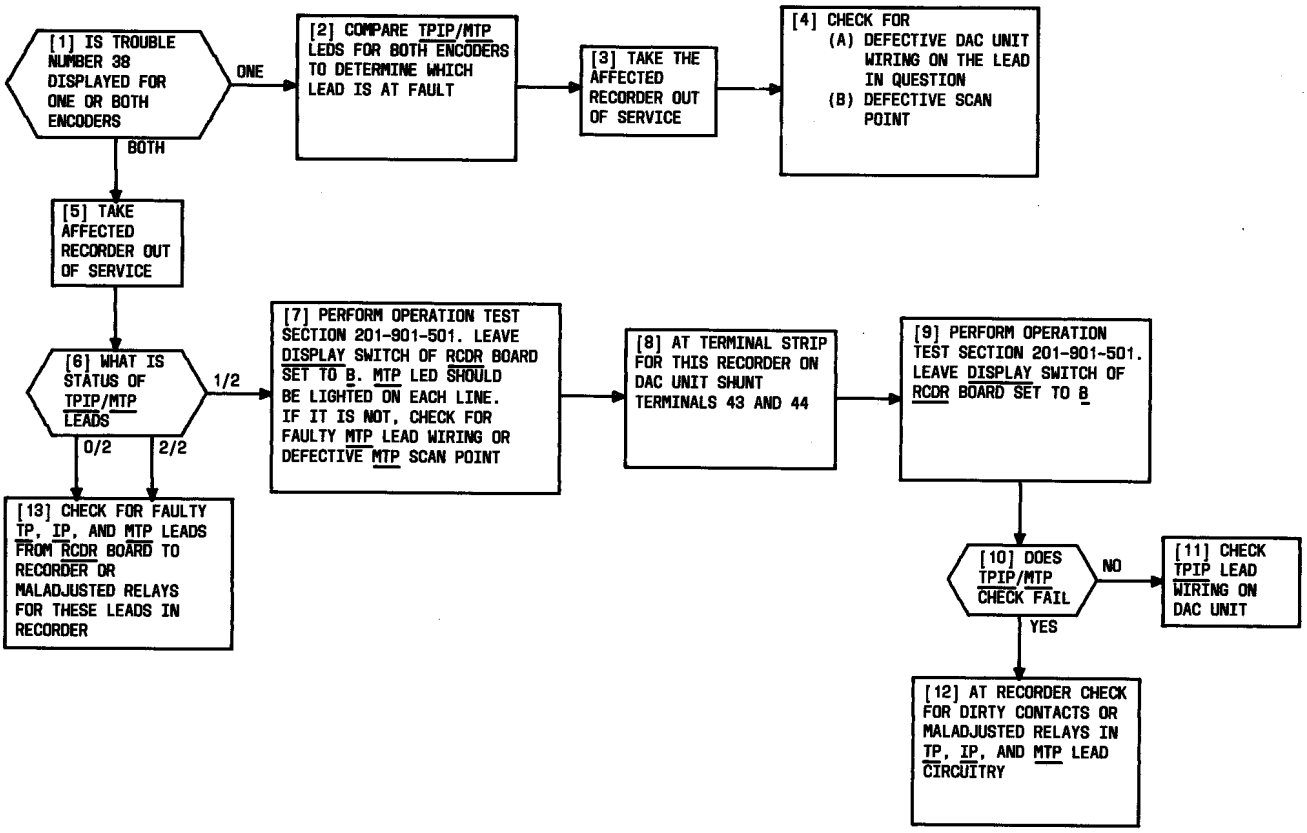


Fig. 15—Trouble Number 37, SP Stuck at 1



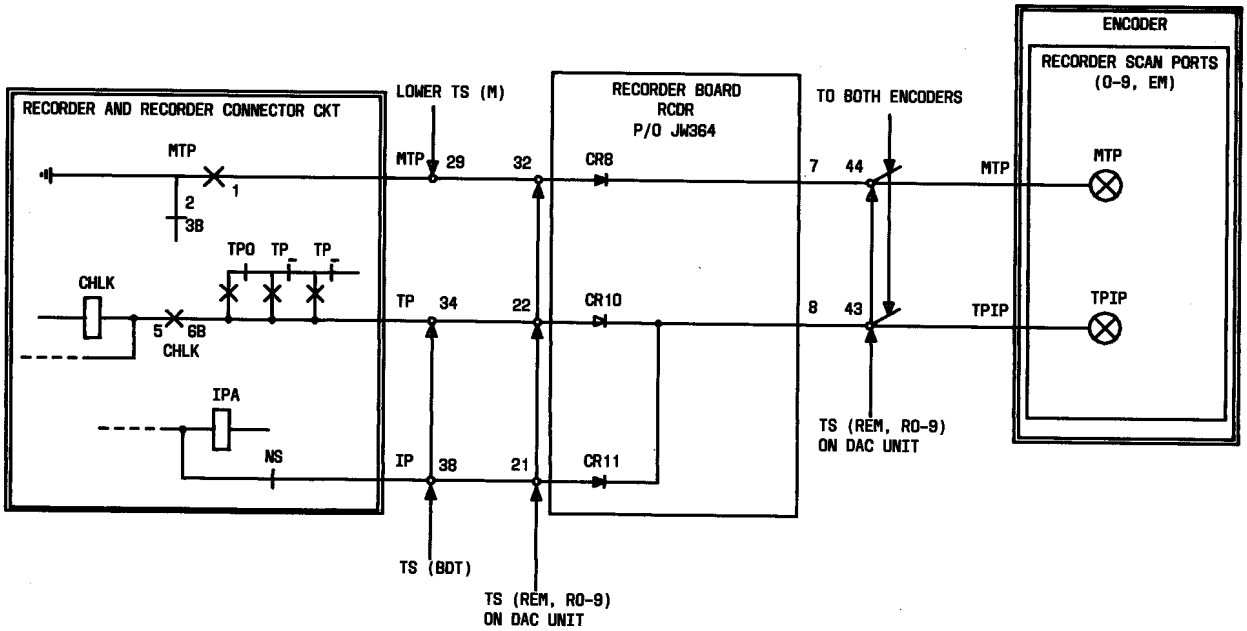


Fig. 16—Trouble Number 38, TPIP/MTP 1/2 Check Failed

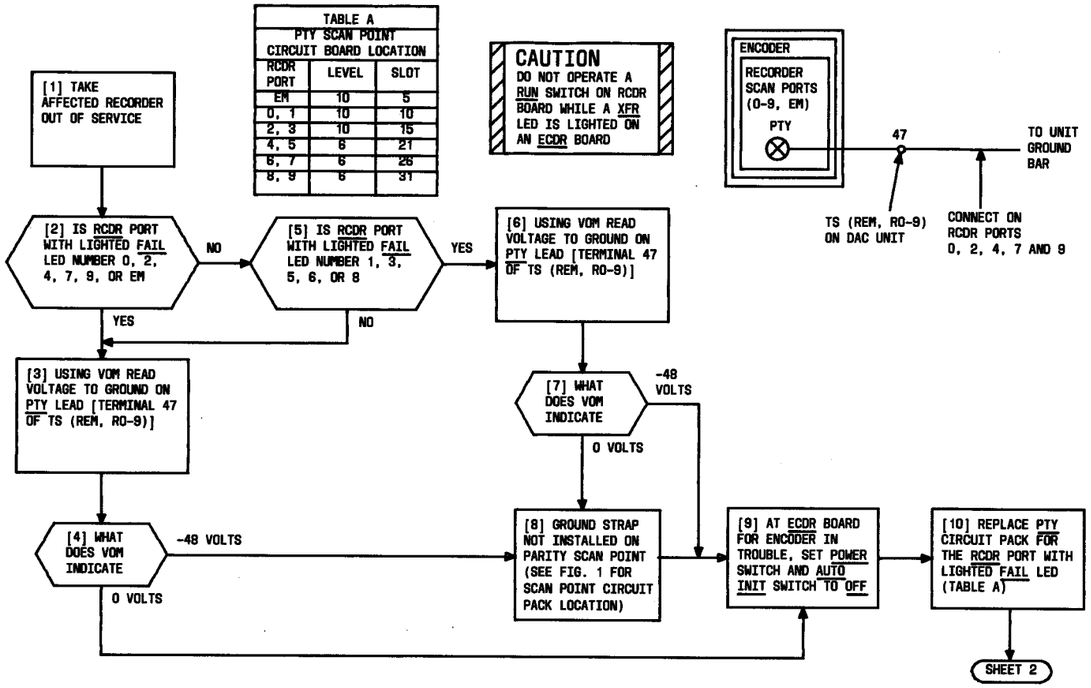


Fig. 17—Trouble Number 39, PARITY Lead Failure (Sheet 1 of 2)

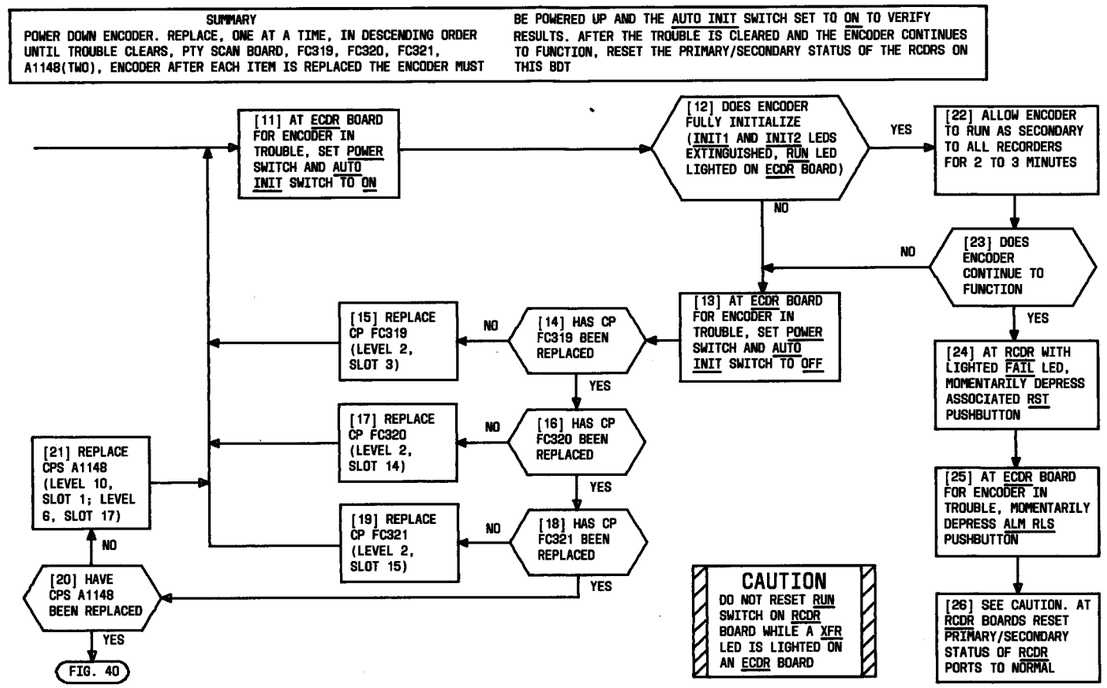


Fig. 17—Trouble Number 39, PARITY Lead Failure (Sheet 2 of 2)

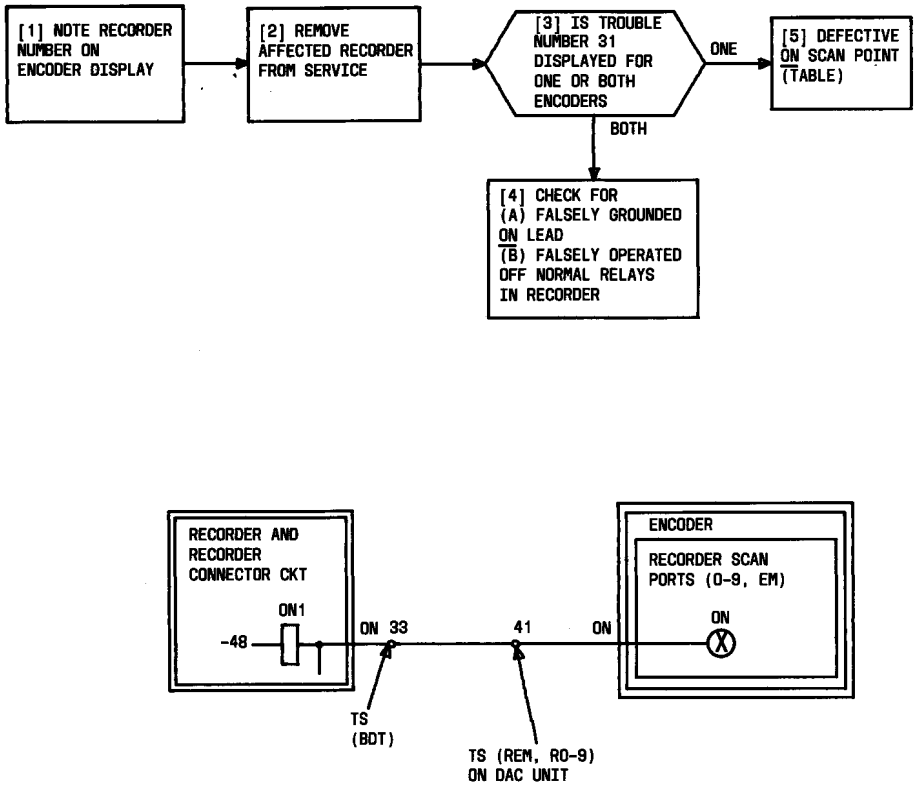


TABLE		
ON SCAN POINT CIRCUIT BOARD LOCATION		
RCDR PORT	LEVEL	SLOT
EM	10	6
0, 1	10	11
2, 3	10	16
4, 5	6	22
6, 7	6	27
8, 9	6	32
ENCODER MUST BE POWERED DOWN BEFORE REPLACING CIRCUIT BOARD		

Fig. 18—Trouble Number 31, ON Stuck at 1

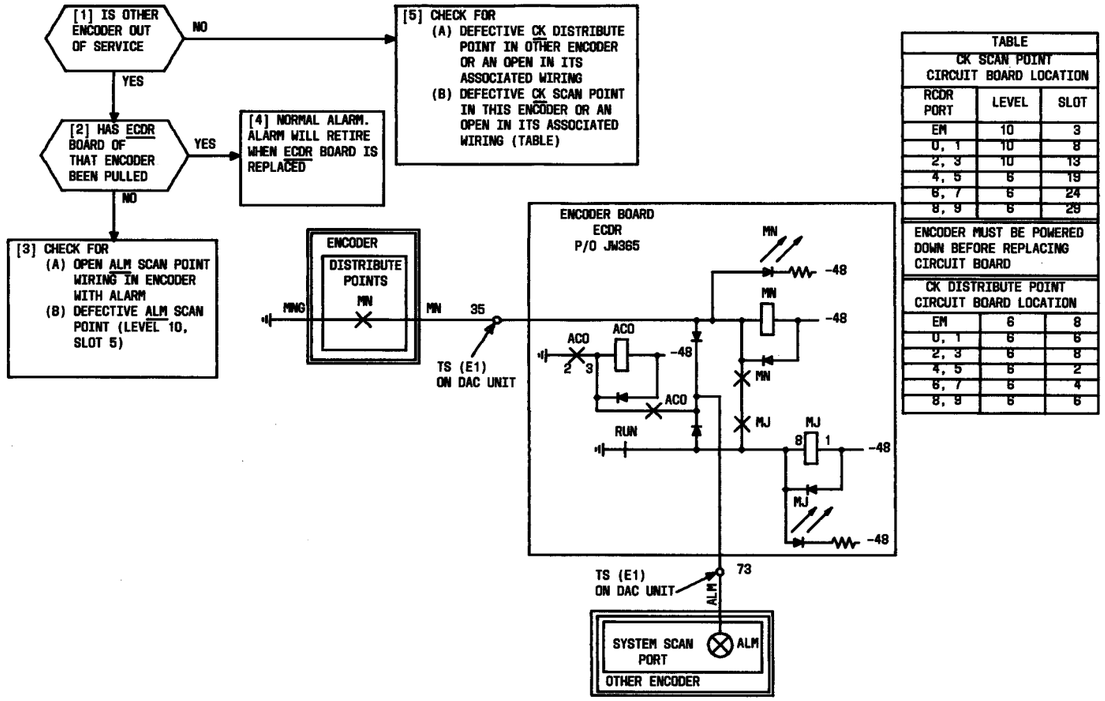


TABLE		
CK SCAN POINT CIRCUIT BOARD LOCATION		
RCDR PORT	LEVEL	SLOT
EM	10	3
0, 1	10	8
2, 3	10	13
4, 5	6	19
6, 7	6	24
8, 9	6	29
ENCODER MUST BE POWERED DOWN BEFORE REPLACING CIRCUIT BOARD		
CK DISTRIBUTE POINT CIRCUIT BOARD LOCATION		
EM	6	8
0, 1	6	6
2, 3	6	8
4, 5	6	2
6, 7	6	4
8, 9	6	6

Fig. 19—Trouble Number 41, CK Stuck at 0 in Other ENCODER (Sheet 1 of 2)

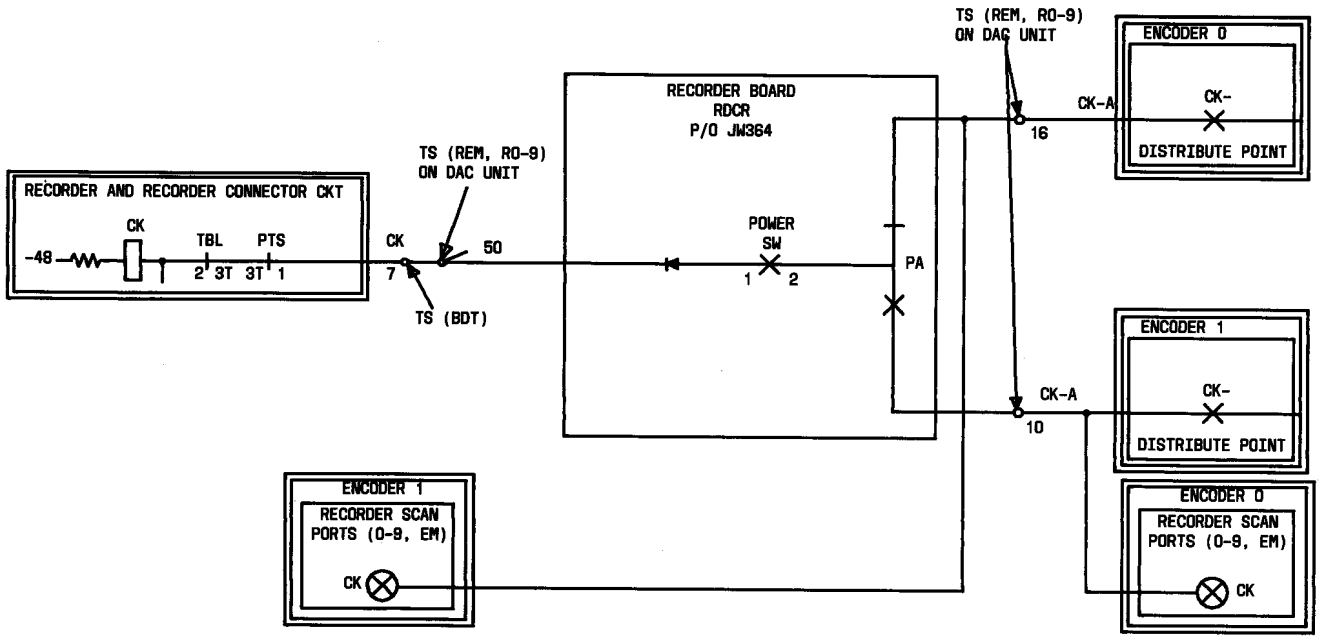
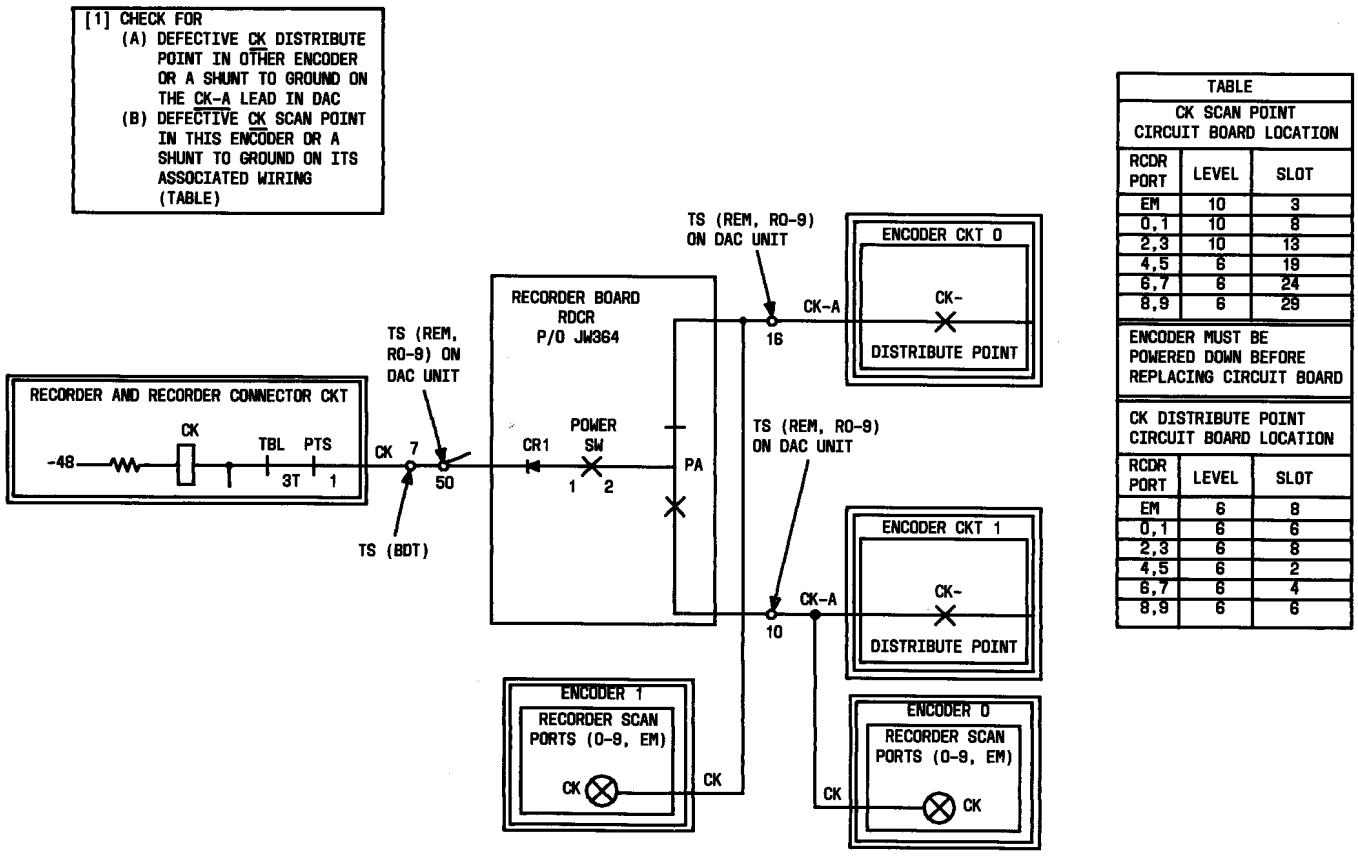


Fig. 19—Trouble Number 41, CK Stuck at 0 in Other ENCODER (Sheet 2 of 2)



TABLE

CK SCAN POINT CIRCUIT BOARD LOCATION

RCDR PORT	LEVEL	SLOT
EM	10	3
0,1	10	8
2,3	10	13
4,5	6	19
6,7	6	24
8,9	6	29

ENCODER MUST BE POWERED DOWN BEFORE REPLACING CIRCUIT BOARD

CK DISTRIBUTE POINT CIRCUIT BOARD LOCATION

RCDR PORT	LEVEL	SLOT
EM	6	8
0,1	6	6
2,3	6	8
4,5	6	2
6,7	6	4
8,9	6	6

Fig. 20—Trouble Number 42, CK Stuck at 1 in Other ENCODER

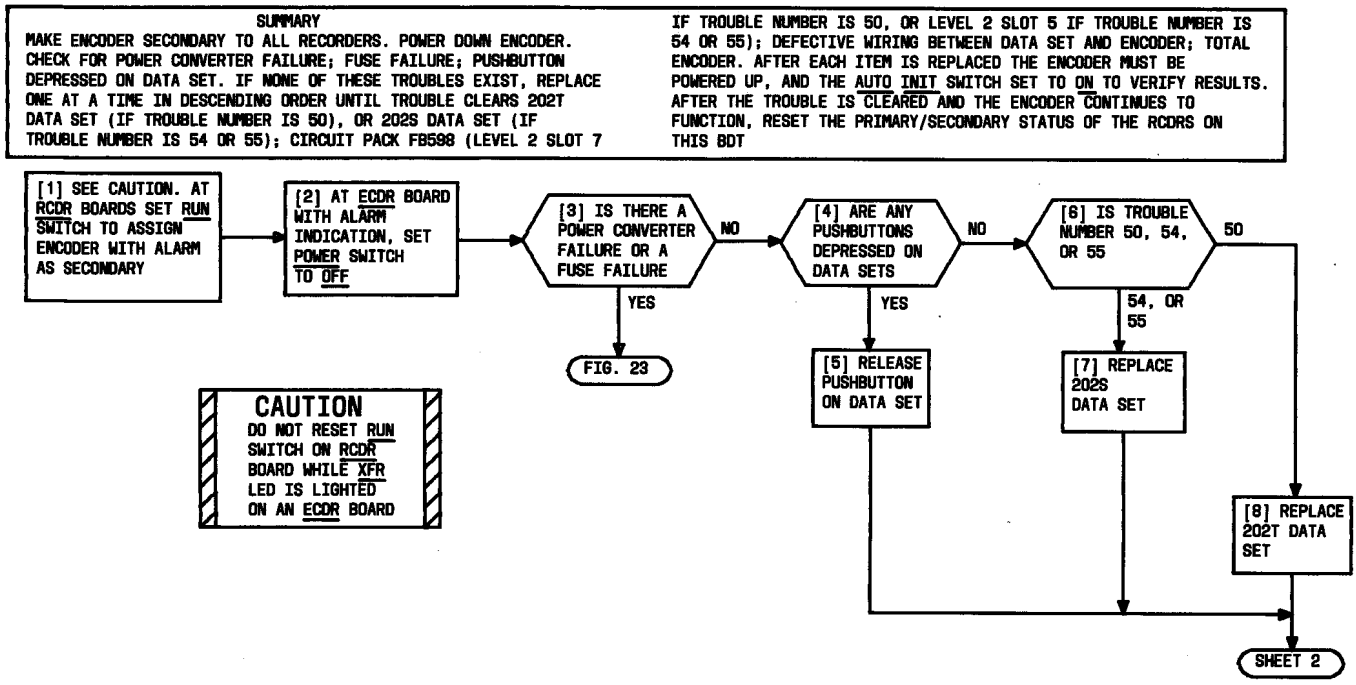


Fig. 21—Trouble Number 50, 54, or 55, Data Set Failure (50 = Primary, 54 and 55 = Dial Up) Sheet 1 of 2)

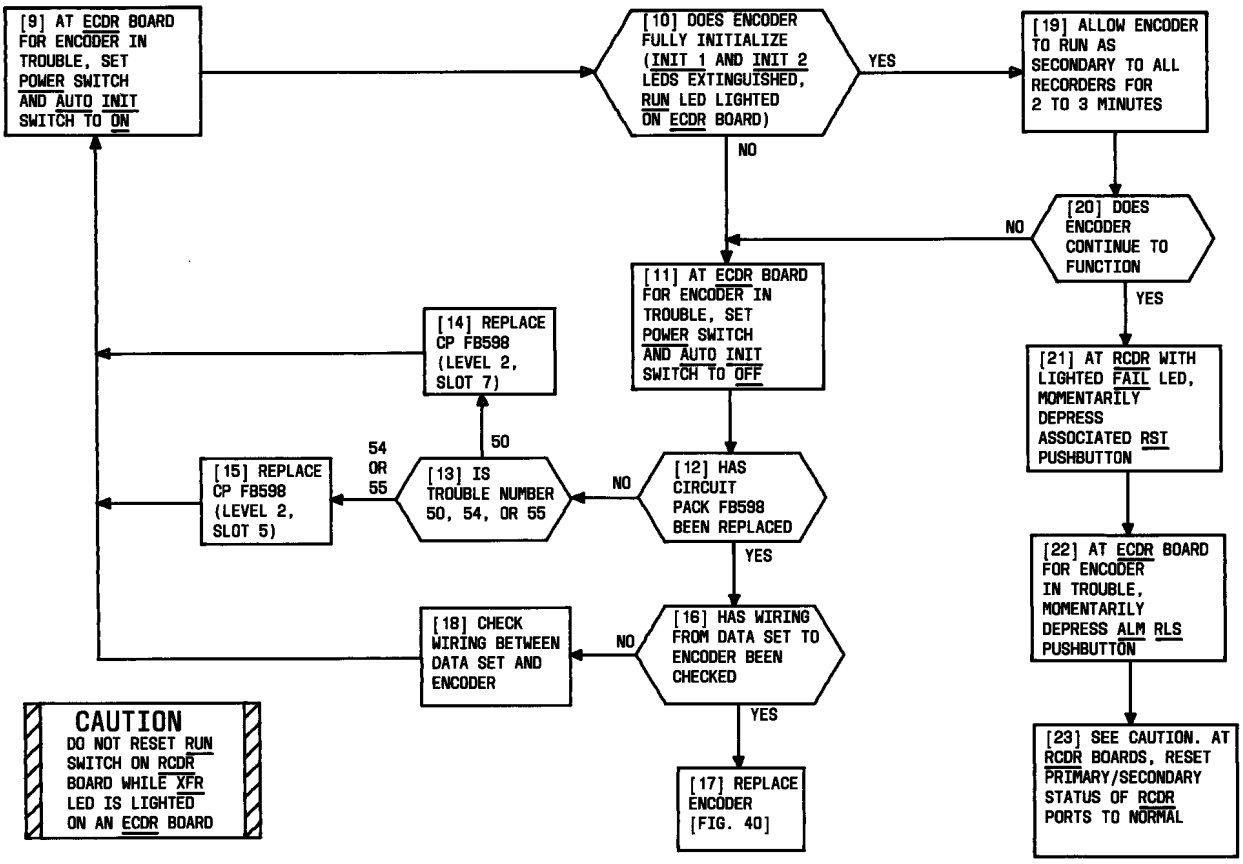


Fig. 21—Trouble Number 50, 54, or 55, Data Set Failure (50 = Primary, 54 and 55 = Dial Up) (Sheet 2 of 2)

IF TROUBLE NUMBER IS 51 OR 52 AND AMARC IS NOT OPERATIONAL TAKE NO ACTION. IF AMARC IS OPERATIONAL OR TROUBLE NUMBER IS 53 OR 57 MAKE ENCODER SECONDARY TO ALL RECORDERS, PERFORM THE FOLLOWING IN DESCENDING ORDER UNTIL TROUBLE CLEARS – PERFORM LOCAL SELF TEST ON 202T DATA SET; TEST DATA LINK WITH AMARC; POWER DOWN ENCODER THEN REPLACE CP F8598 (LEVEL 2 SLOT 7); TOTAL ENCODER. AFTER TROUBLE CLEARS AND THE ENCODER CONTINUES TO FUNCTION, RESET THE PRIMARY/SECONDARY STATUS OF THE RCDRS. AMARC CONTROLS RESTORAL OF DATA LINKS

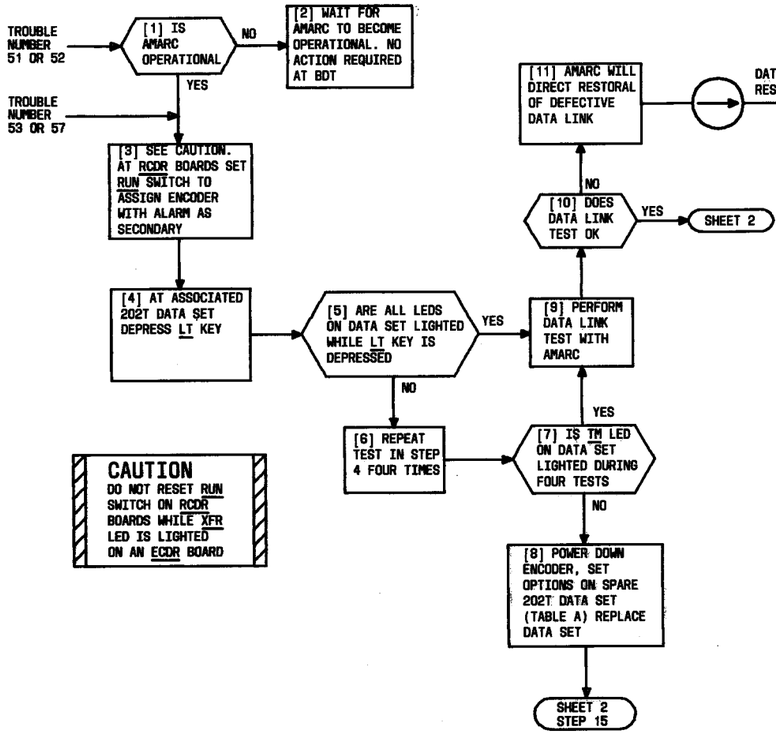


TABLE A

202T

FUNCTION		SWITCH CONTACT SETTINGS
2-WIRE CHANNEL	WITHOUT REVERSE CHANNEL	S3 SWITCH CLOSED–1,3,6,7 OPEN–2,4,5,8,9,0
	LOCAL COPY–OUT	S2 SWITCH OPEN–1
	SOFT TURN OFF INTERVAL	S2 SWITCH OPEN–3,4,9,0
	CLEAR TO SEND INTERVAL (30 MS)	S2 SWITCH CLOSED–7 OPEN–6
4-WIRE CHANNEL		S3 SWITCH CLOSED–3,4,8,9,0 OPEN–1,2,5,6,7
		S2 SWITCH CLOSED–1
	SOFT TURN OFF INTERVAL	S2 SWITCH CLOSED–4 OPEN–3,9,0
	CLEAR TO SEND INTERVAL (30 MS)	S2 SWITCH OPEN–6,7
CONTROL BY DATA AUX SET 828 TYPE–OUT		S2 SWITCH CLOSED–8
CLAMP–IN		S2 SWITCH OPEN–2
CARRIER DETECTION RESET–OUT		INSTALL E22–E23 STRAP
CONTINUOUS CARRIER MAY BE IN OR OUT DEPENDING ON LOCAL CONSIDERATIONS	OUT	INSTALL E25–E26 STRAP
	IN	INSTALL E24–E25 STRAP
FAST CARRIER DETECTION–IN		S2 SWITCH OPEN–5

Fig. 22—Trouble Number 51, 52, 53, or 57, Lack of Polling Messages From No. 1 AMARC (Sheet 1 of 2)

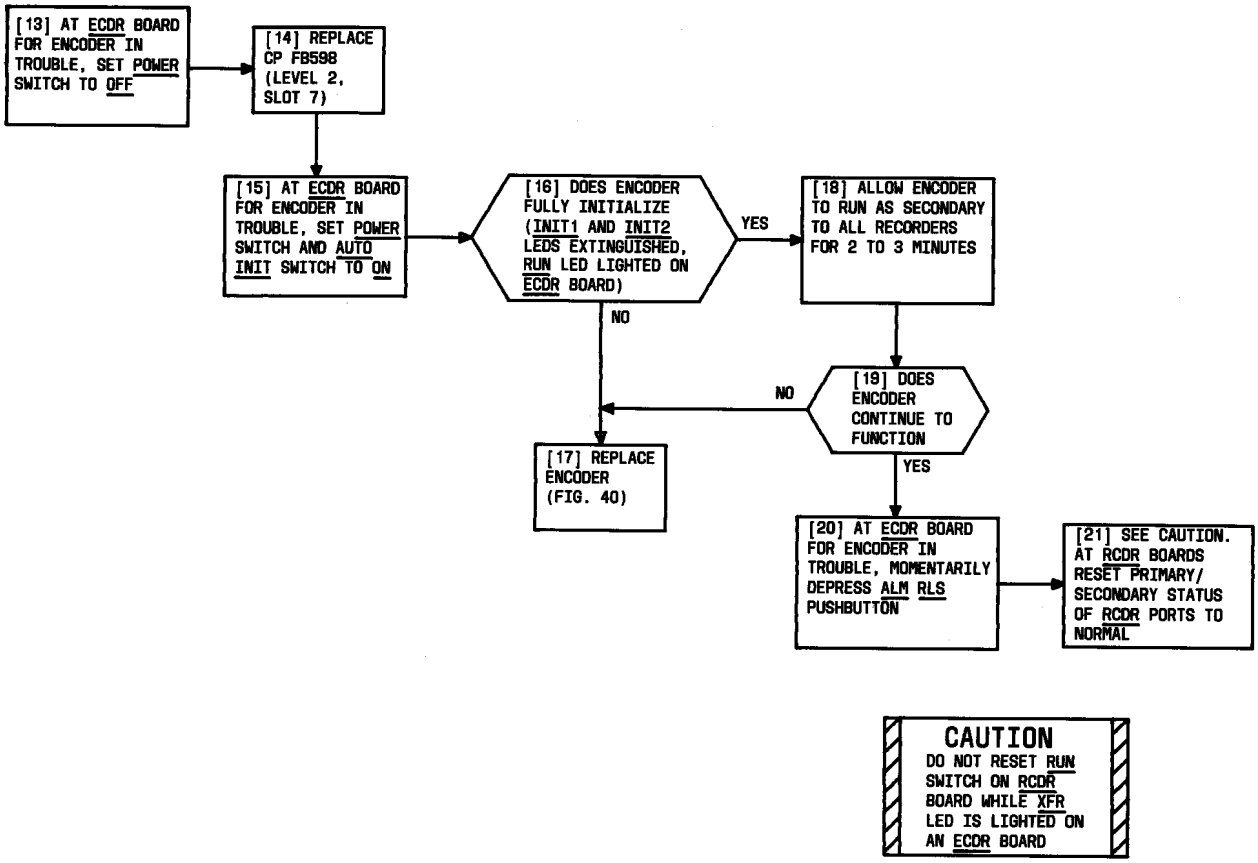


Fig. 22—Trouble Number 51, 52, 53, or 57, Lack of Polling Messages From No. 1 AMARC (Sheet 2 of 2)

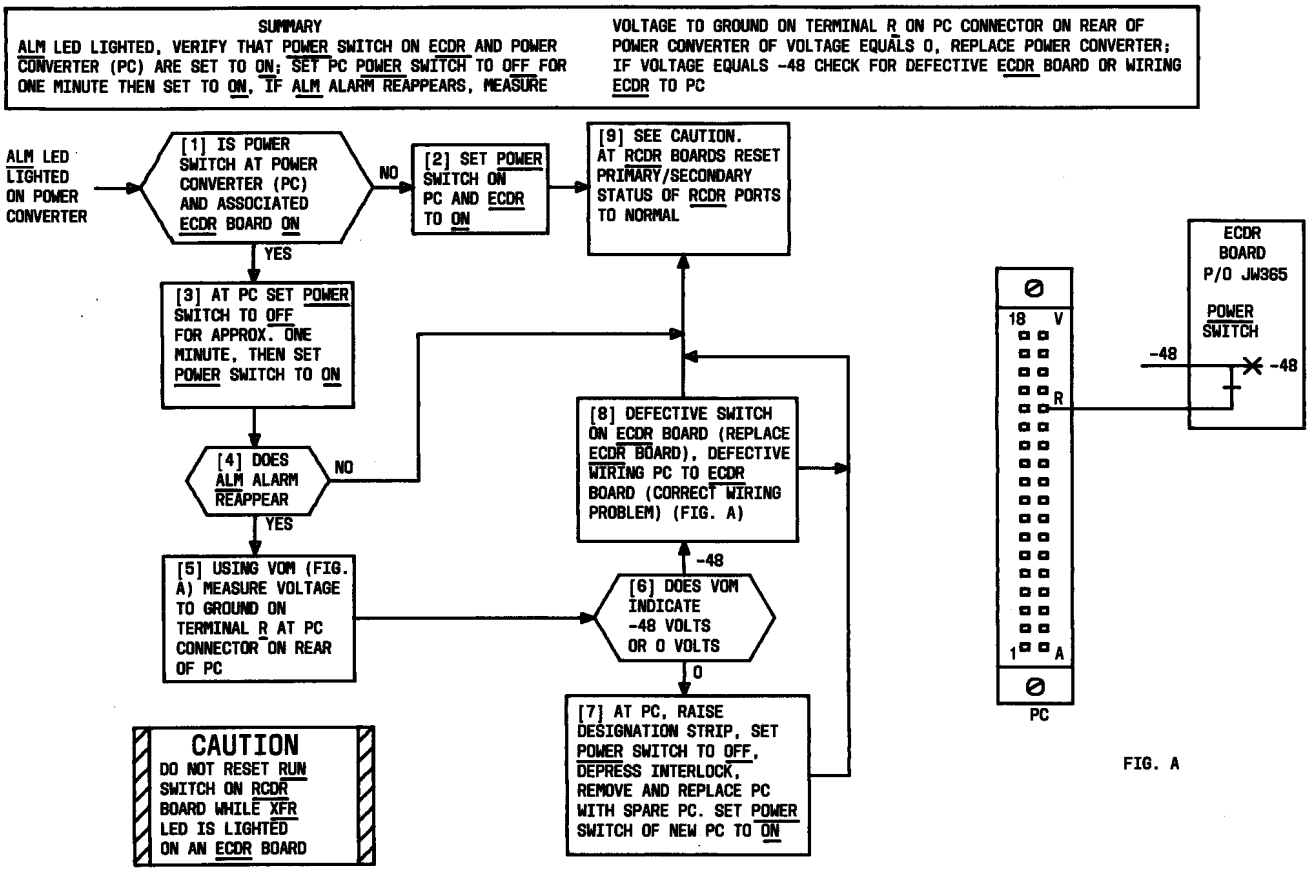


Fig. 23—Power Converter Failure or Fuse Failure (Sheet 1 of 2)

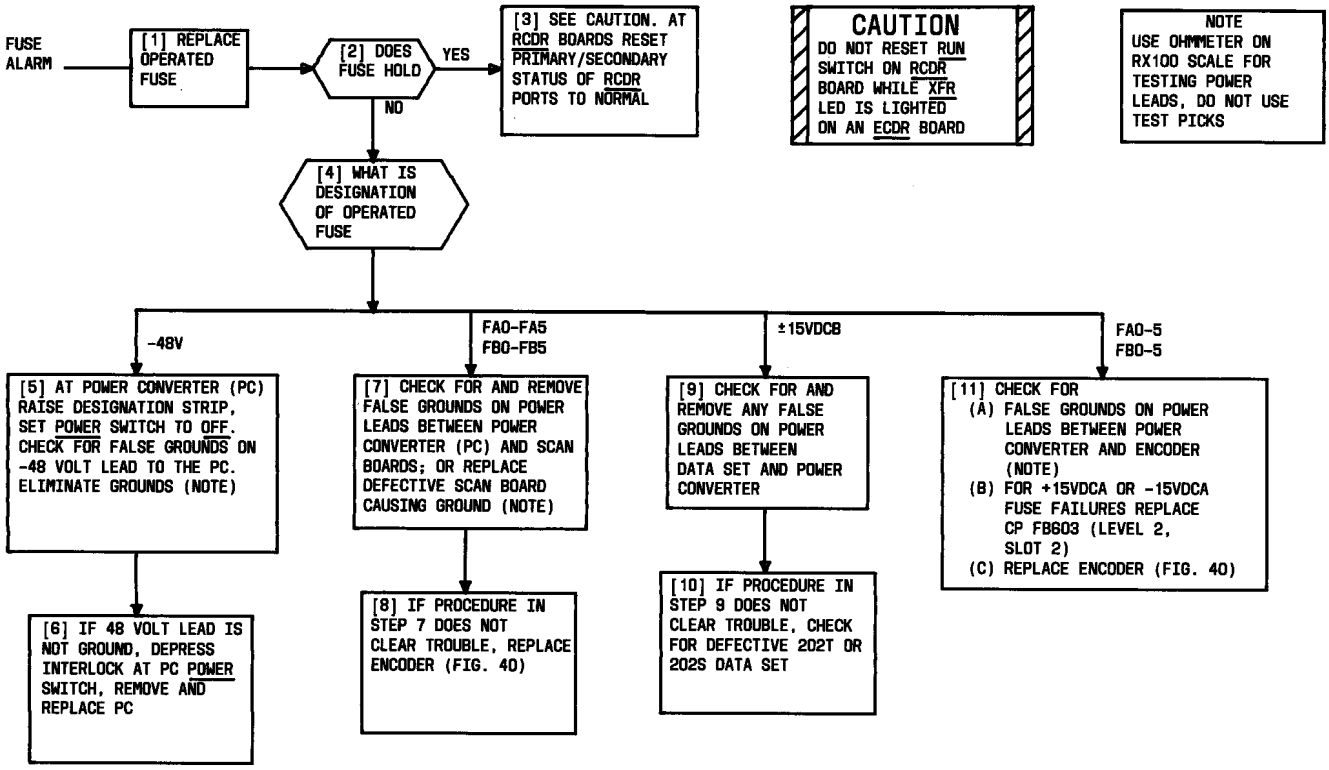


Fig. 23—Power Converter Failure or Fuse Failure (Sheet 2 of 2)

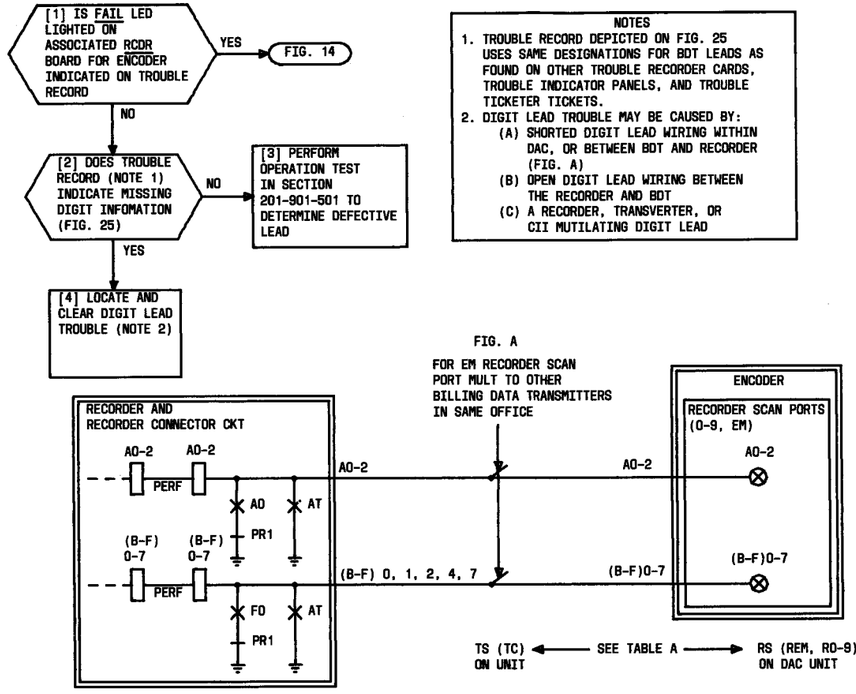


TABLE A		
DIGIT	TS (TC)	TS (REM, R0-9)
A0	15	02
A1	25	62
A2	35	42
B0	50	23
B1	51	24
B2	52	25
B4	53	26
B7	54	27
C0	40	51
C1	41	71
C2	42	12
C4	43	72
C7	44	52
D0	30	73
D1	31	74
D2	32	75
D4	33	76
D7	34	77
E0	20	53
E1	21	54
E2	22	55
E4	23	56
E7	24	57
F0	10	33
F1	11	34
F2	12	35
F4	13	36
F7	14	37

Fig. 24—Trouble Record Indicates Perforator Timing Control (PTC) Time-out

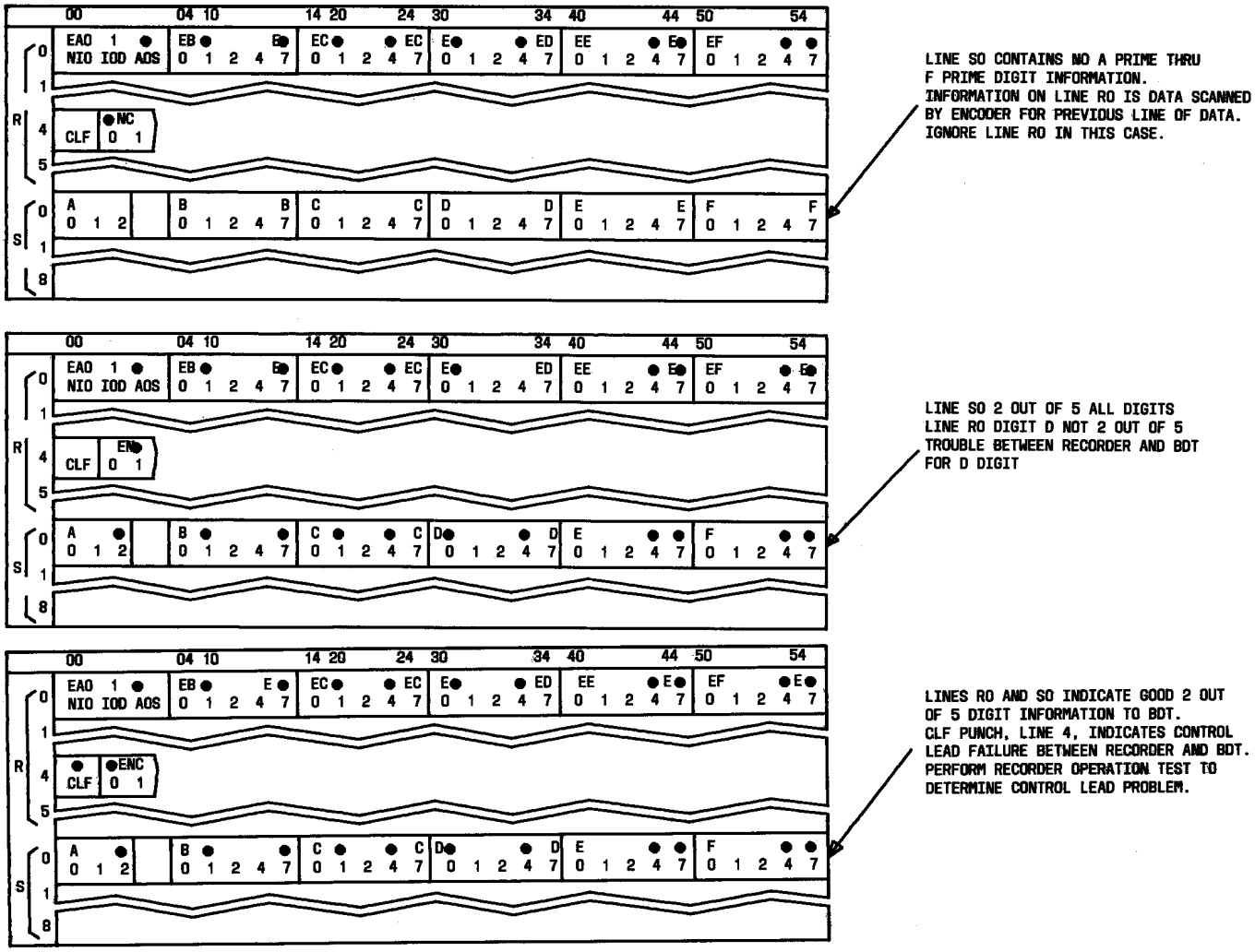


Fig. 25—Examples of Trouble Record—No. 5 Crossbar Office

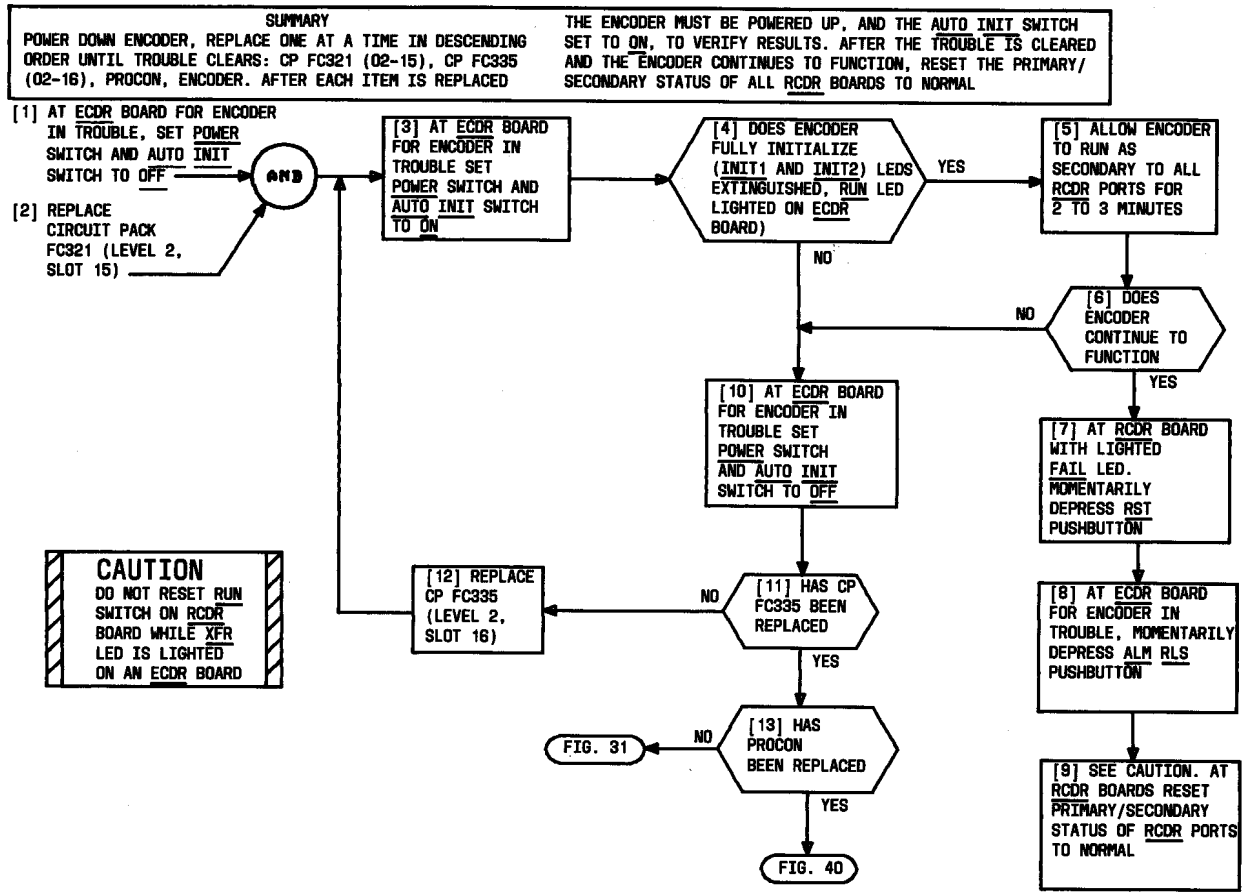


Fig. 26—Trouble Number 10, 11, 14, or 17, ENCODER Failure

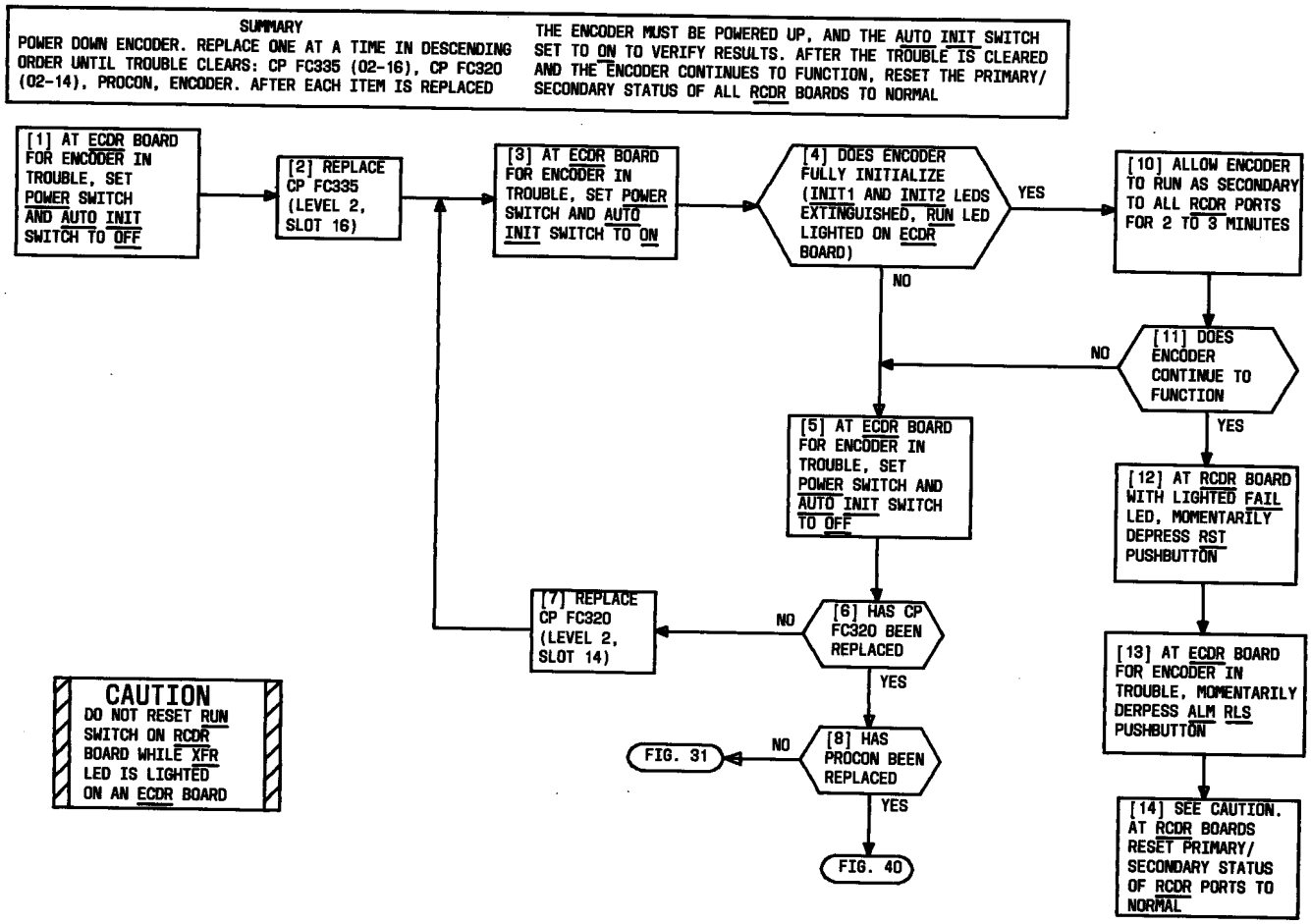


Fig. 27—Trouble Number 12, ENCODER Failure

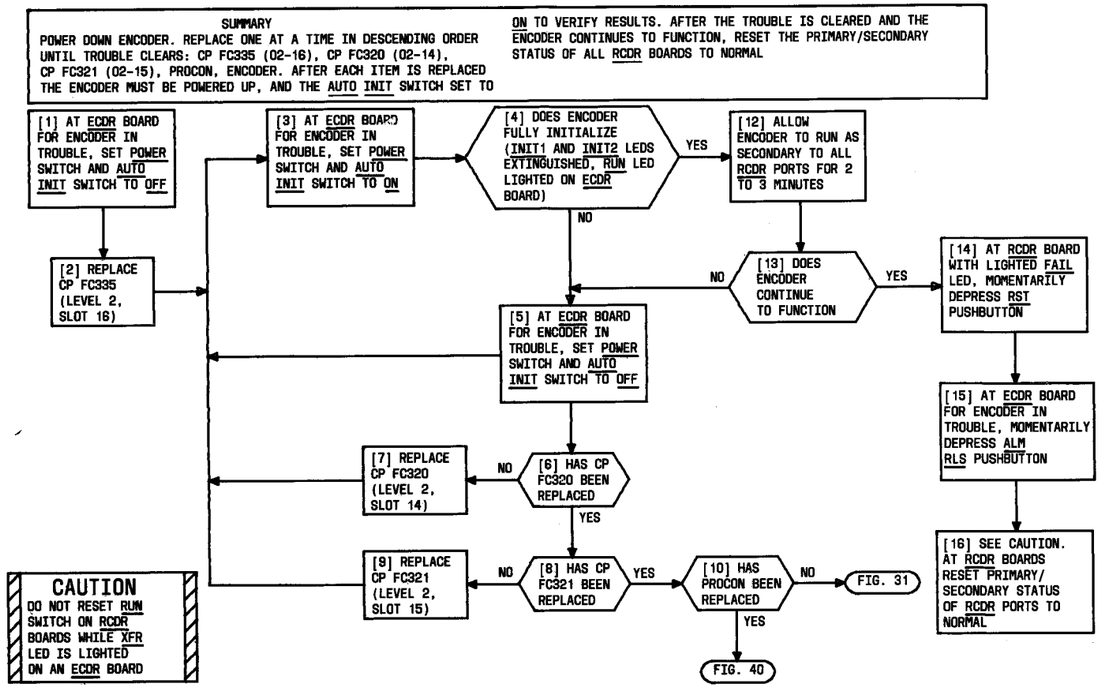


Fig. 28—Trouble Number 13, ENCODER Failure

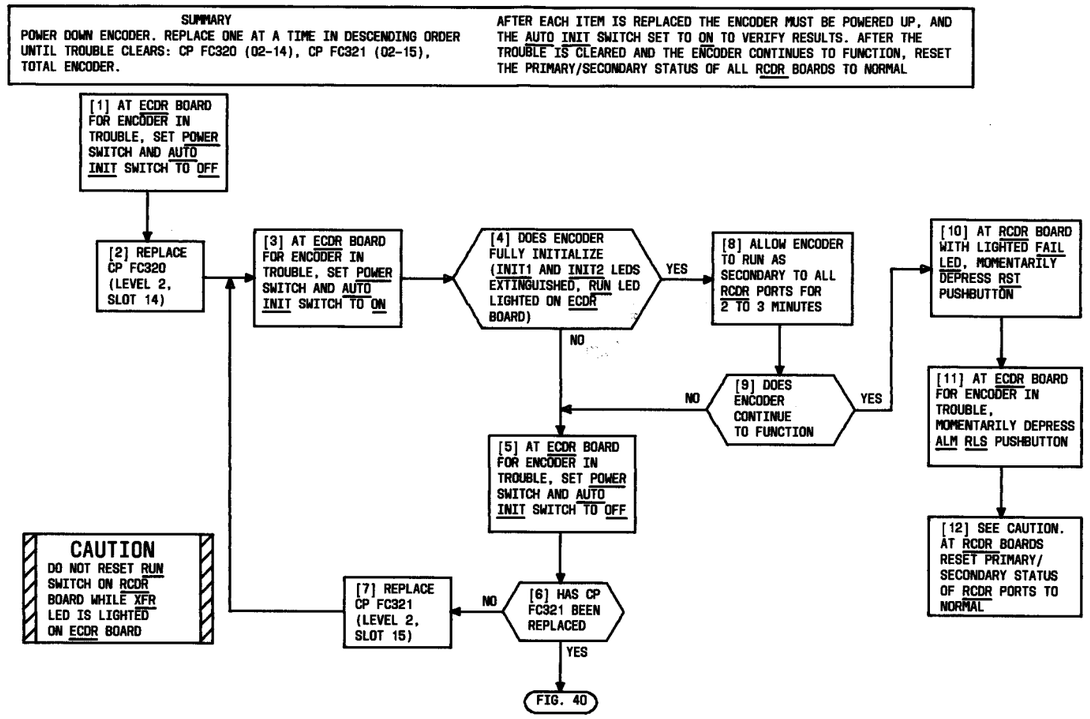


Fig. 29—Trouble Number 15, ENCODER Failure

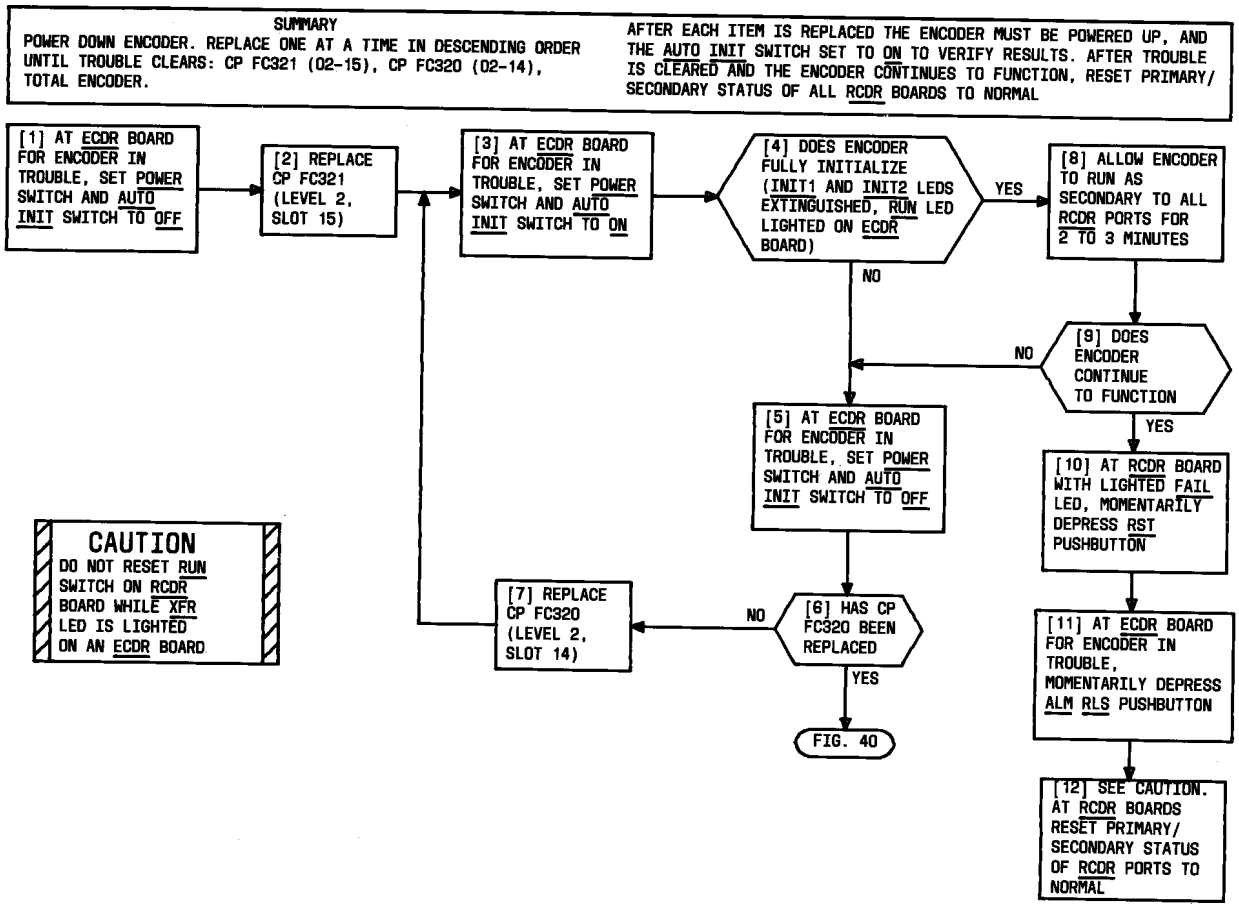


Fig. 30—Trouble Number 16, ENCODER Failure

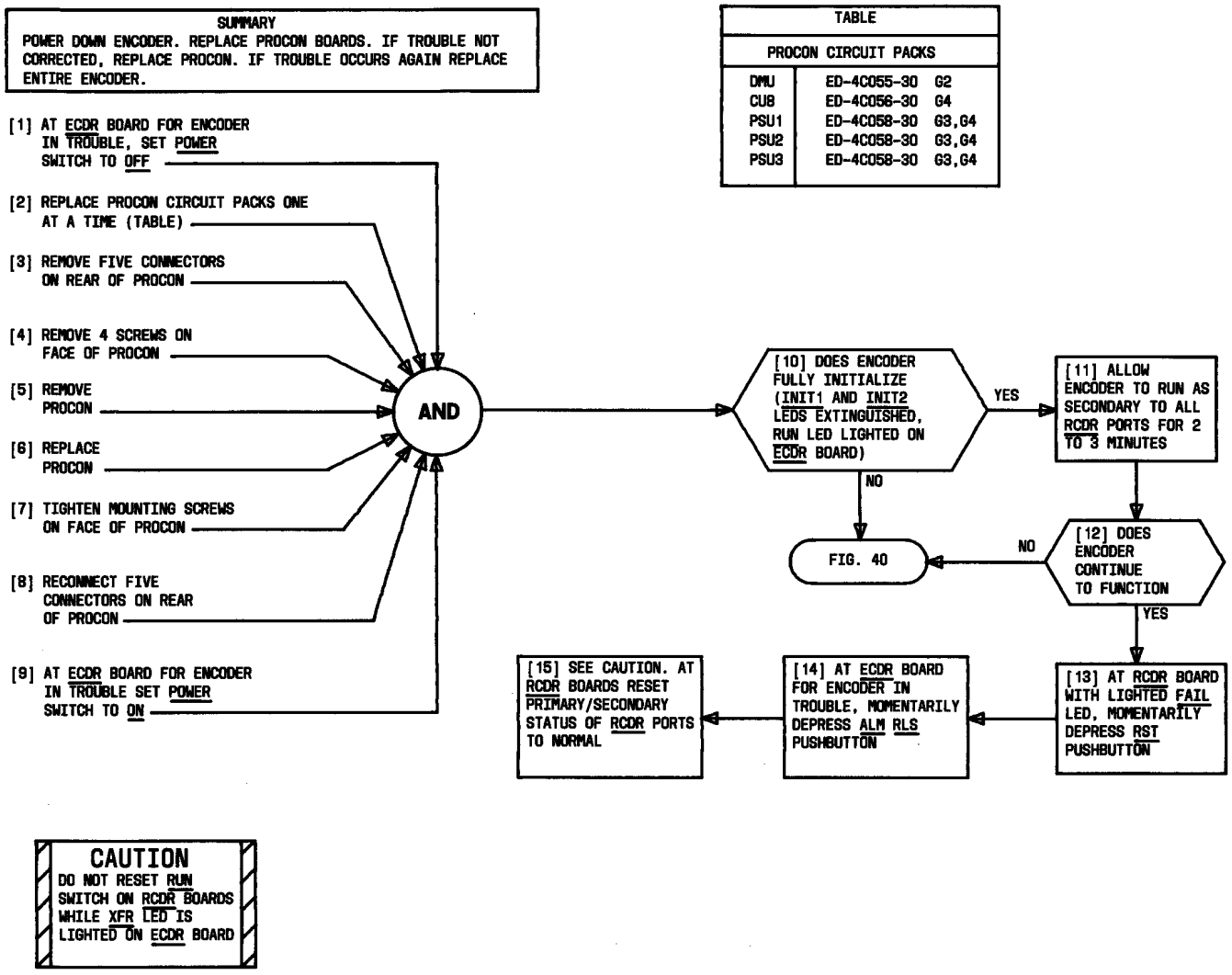


Fig. 31—Trouble Number 40, 56, or 59, Improper Progress Marks or Program Flags Detected In Program

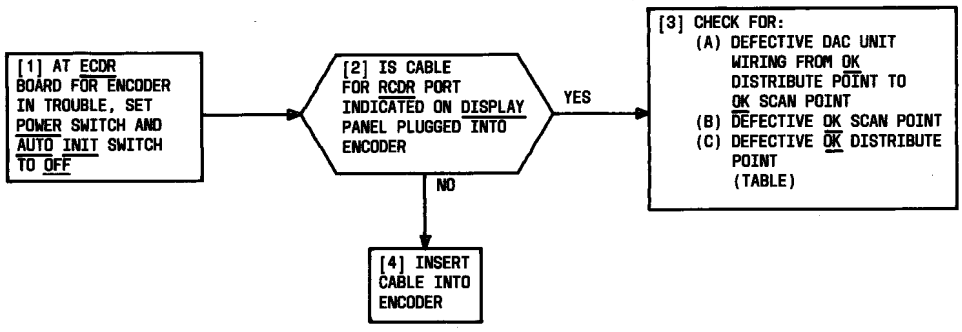


TABLE		
OK SCAN POINT CIRCUIT BOARD LOCATION		
RCDR PORT	LEVEL	SLOT
0, 4, 8	10	2
1, 5, 9	10	3
2, 6, EM	10	4
3, 7	10	5
OK DISTRIBUTE POINT CIRCUIT BOARD LOCATION		
RCDR PORT	LEVEL	SLOT
0, 1	6	2
2, 3	6	4
4, 5	6	6
6, 7	6	8
8, 9	6	2
EM	6	4

Fig. 32—Trouble Number 43, OK Scan Mismatch, OK Distributes Two Scans

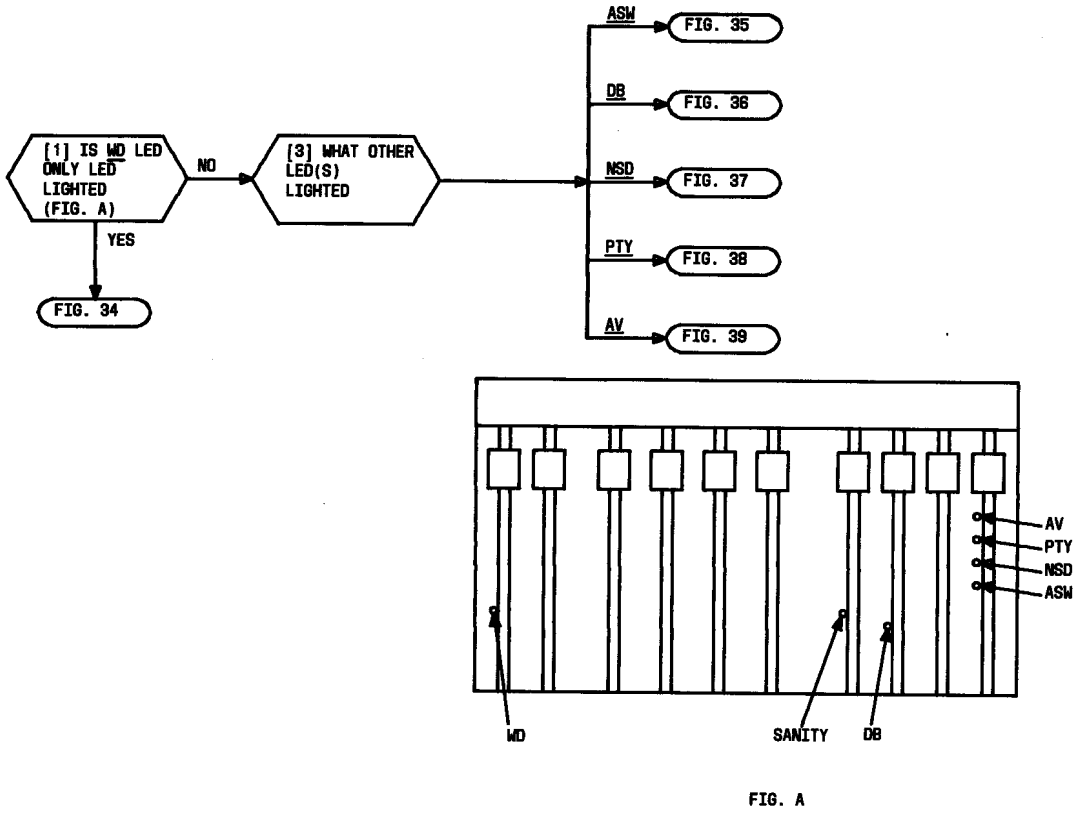


Fig. 33—ENCODER Hardware Faults

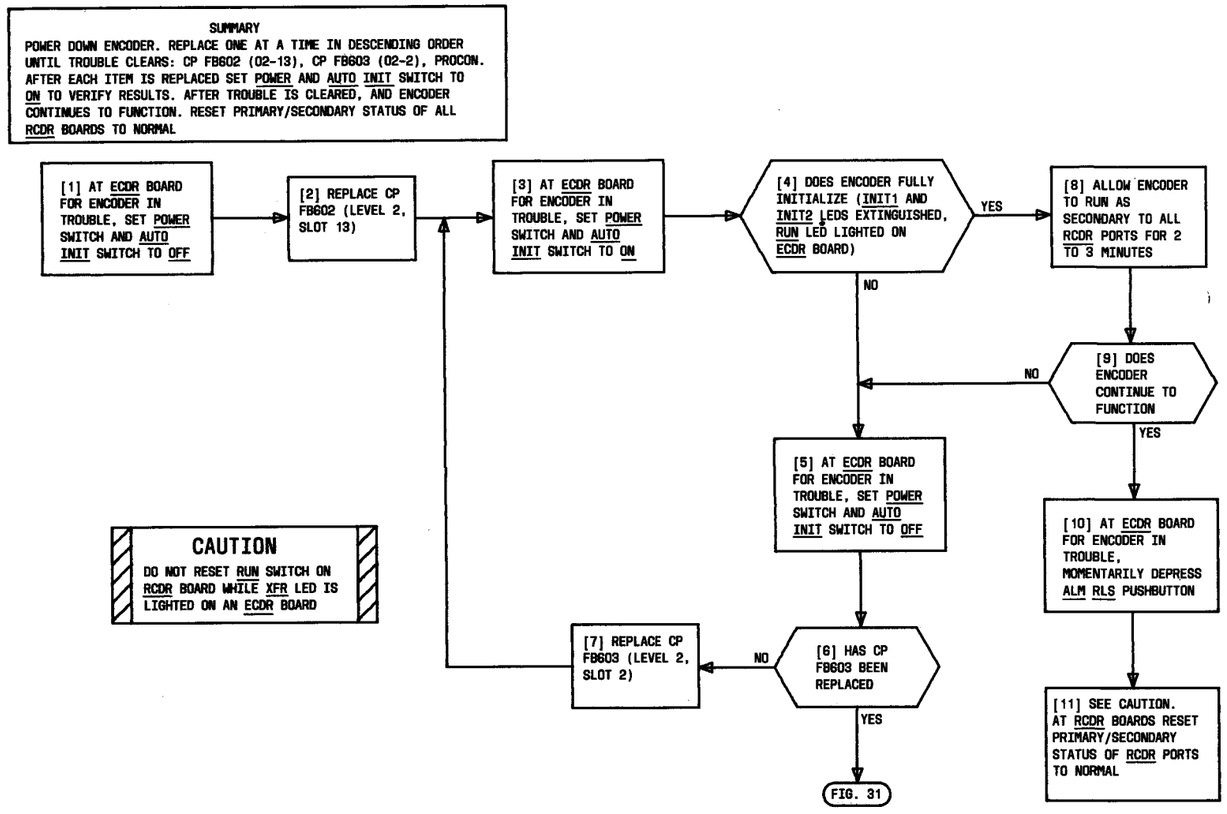


Fig. 34—WD LED Lighted

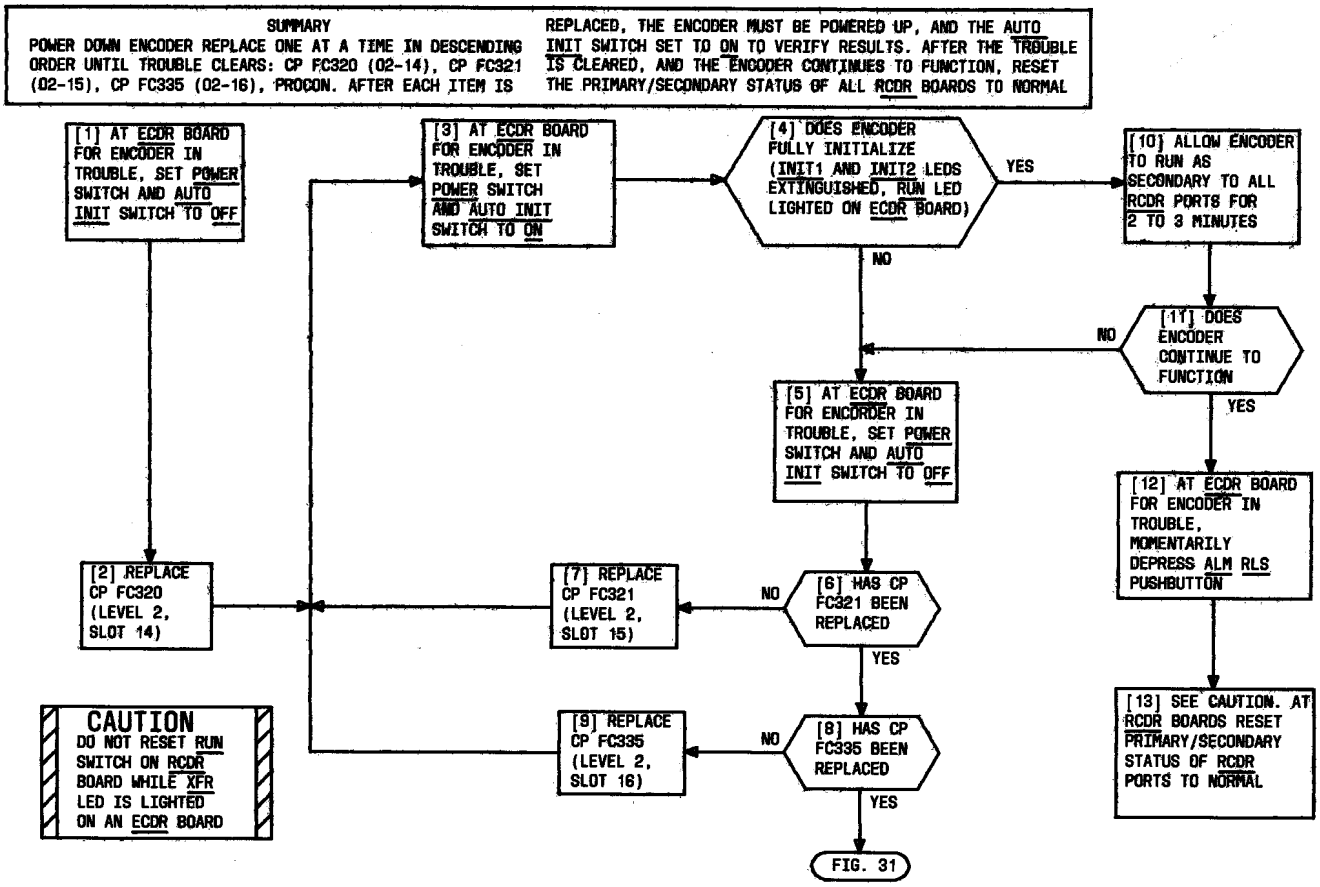


Fig. 35—ASW LED Lighted

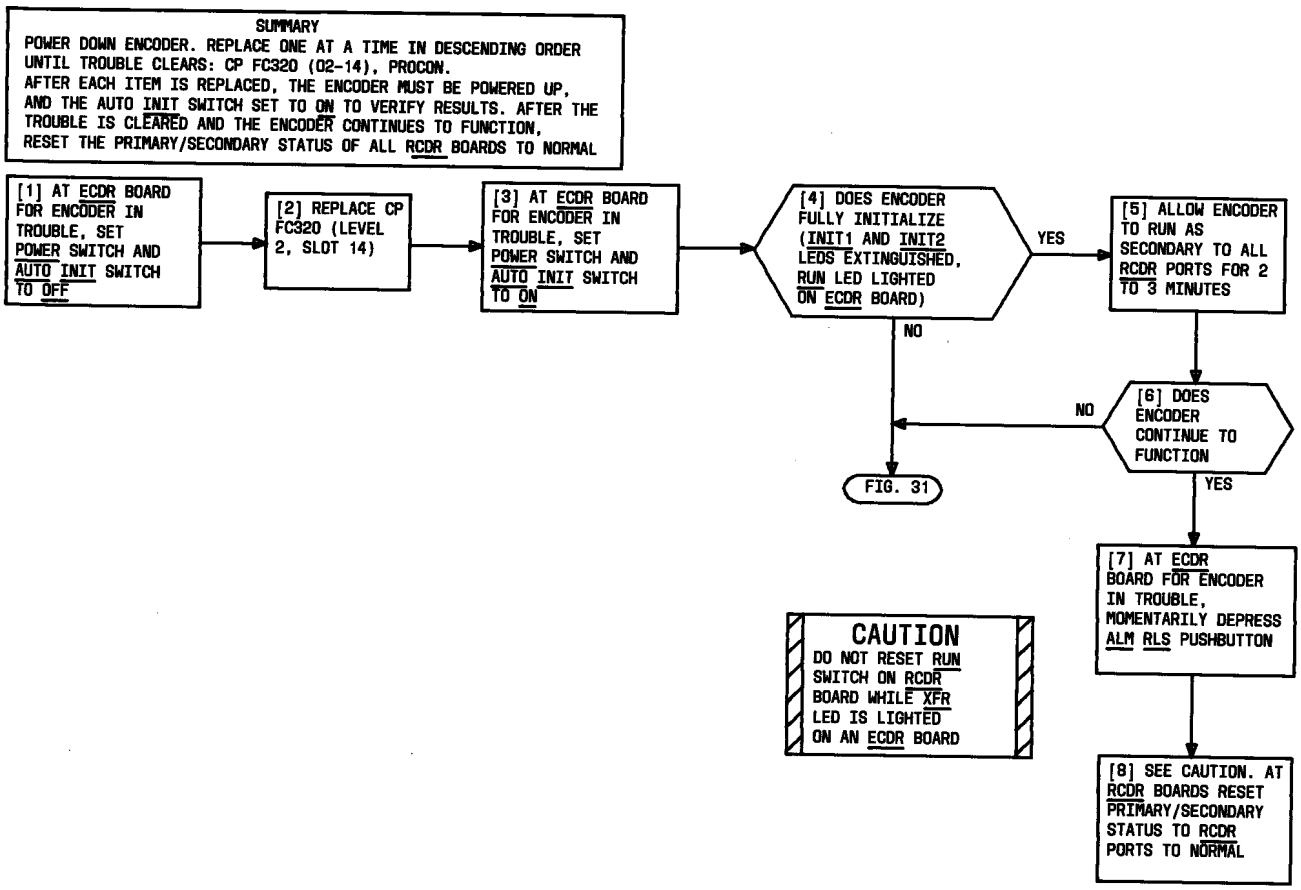


Fig. 36—DB LED Lighted

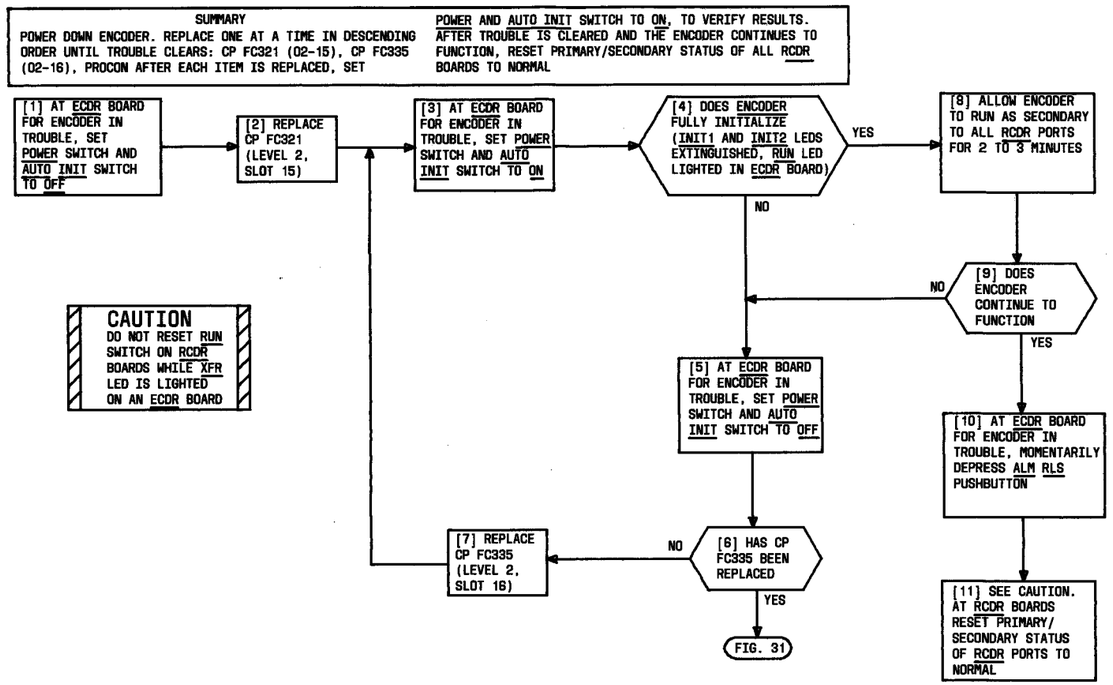


Fig. 37—NSD LED Lighted

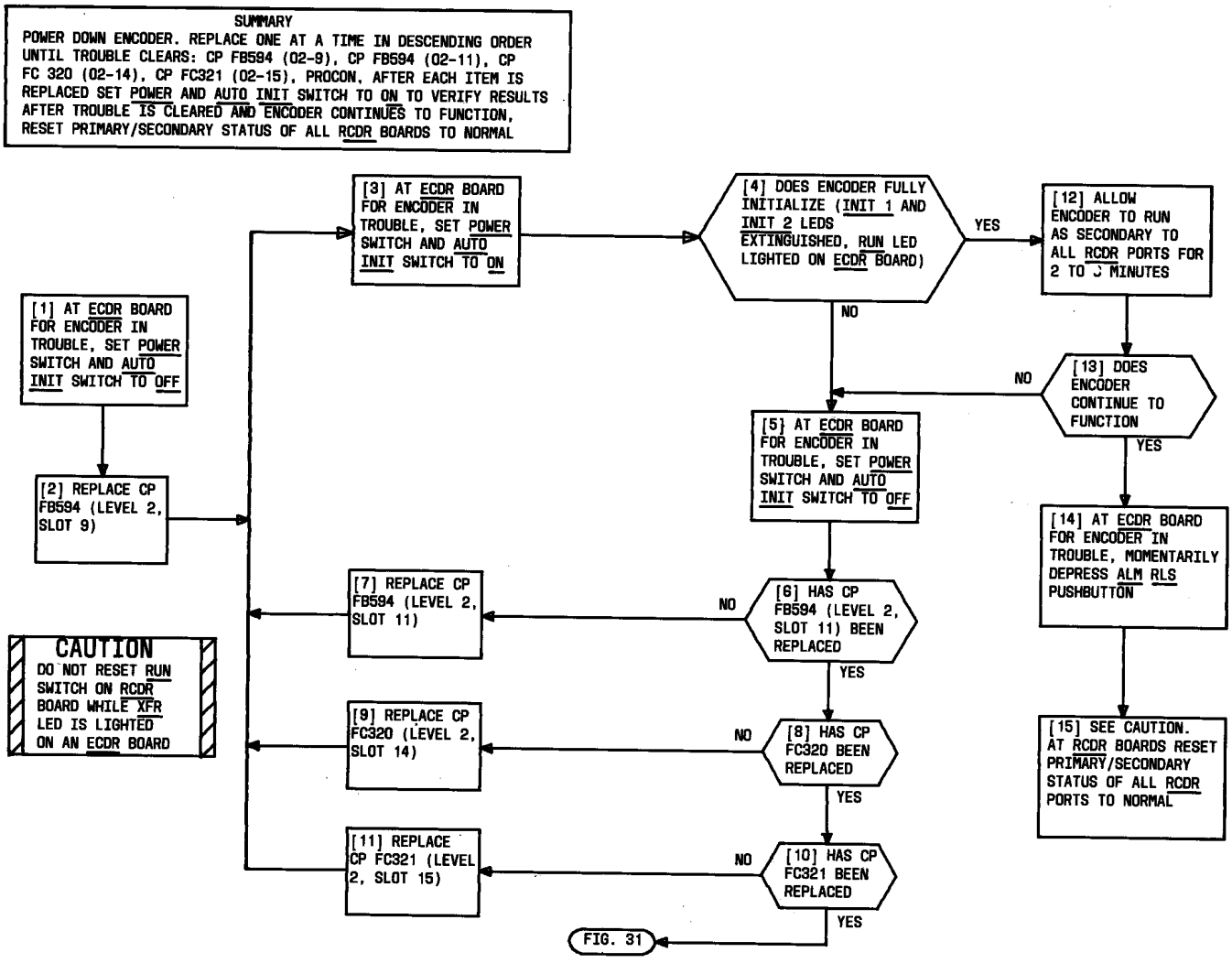


Fig. 38—PTY LED Lighted

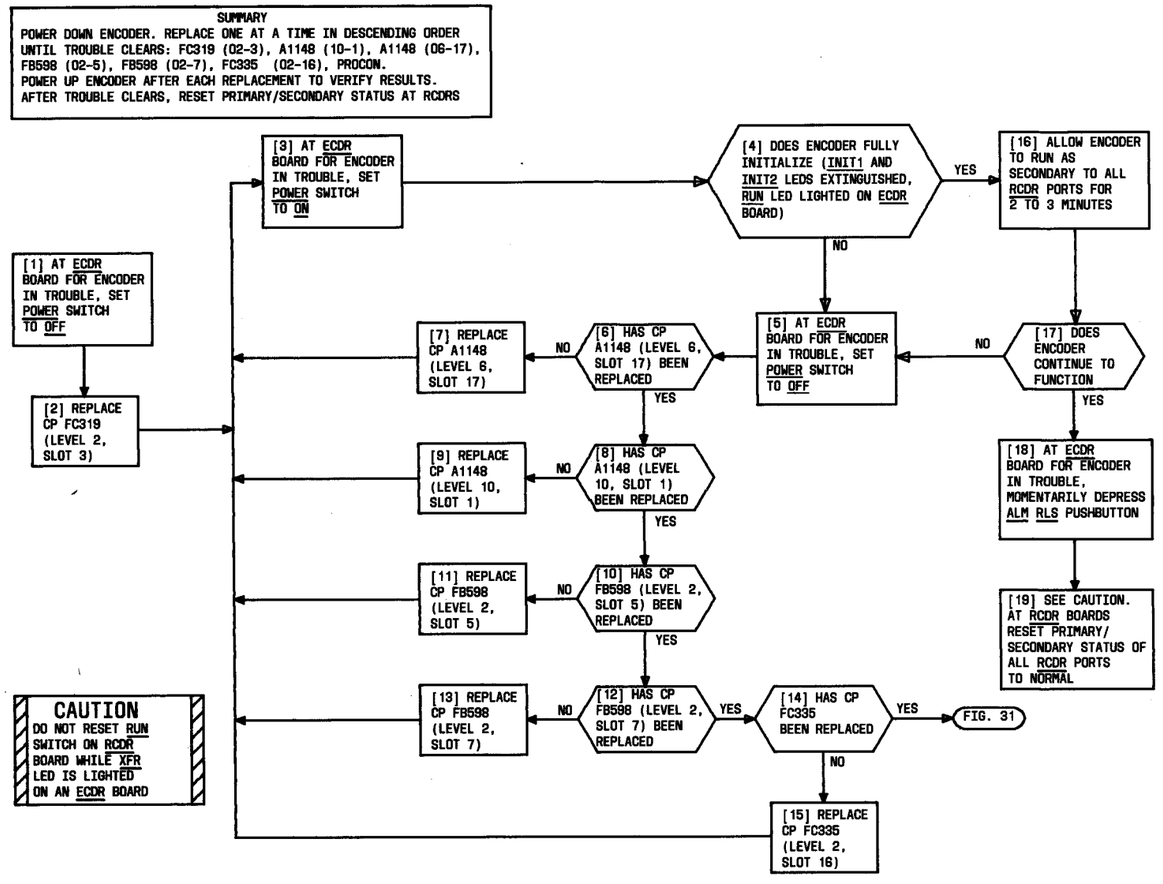


Fig. 39—AV LED Lighted

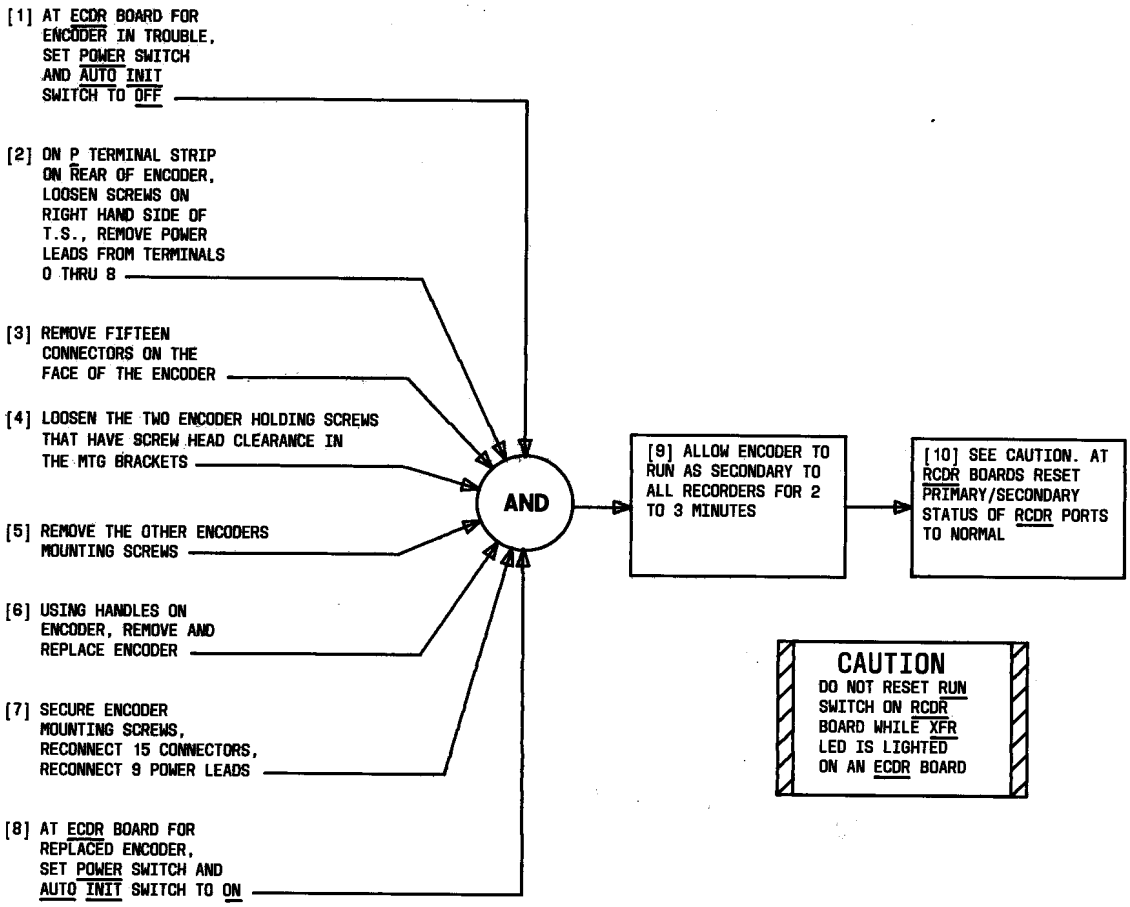


Fig. 40—ENCODER Replacement

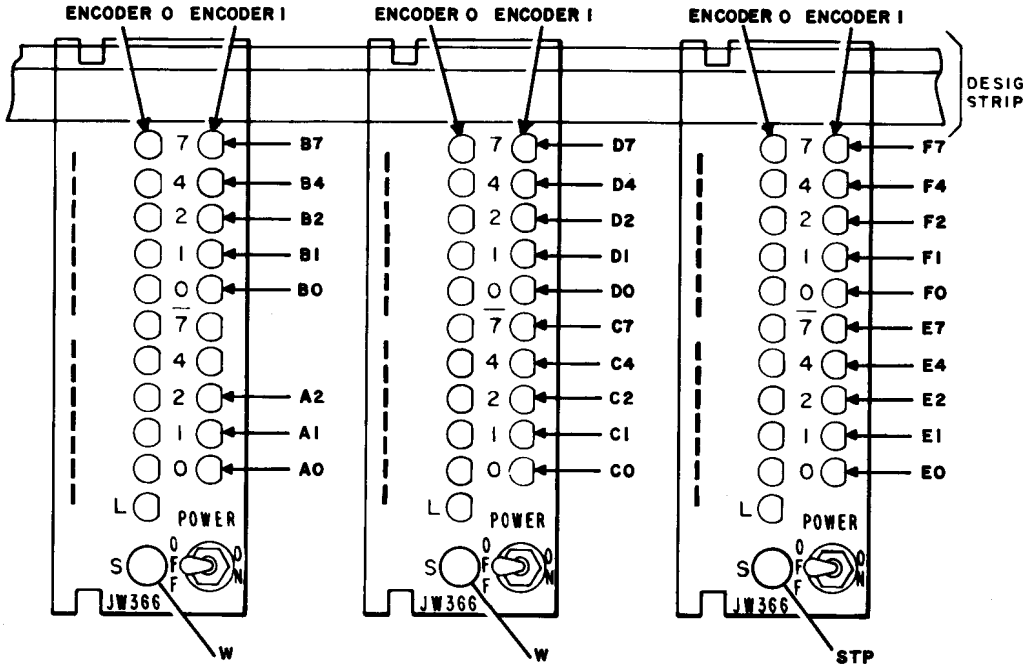


Fig. 41—Display Panel LED Designation for Recorder Mode A

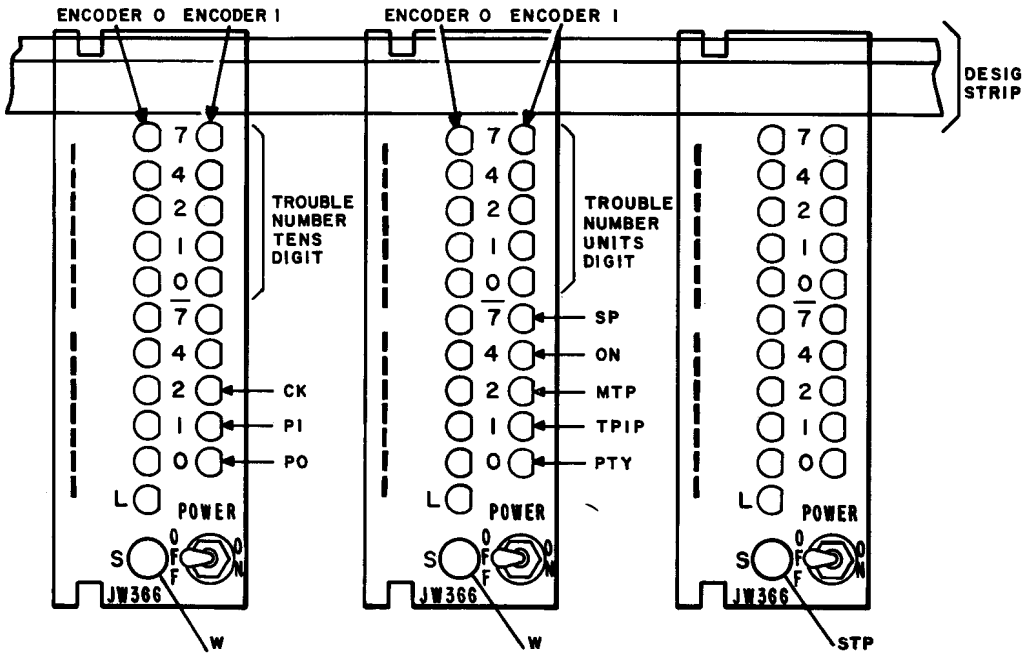


Fig. 42—Display Panel LED Designation for Recorder Mode B

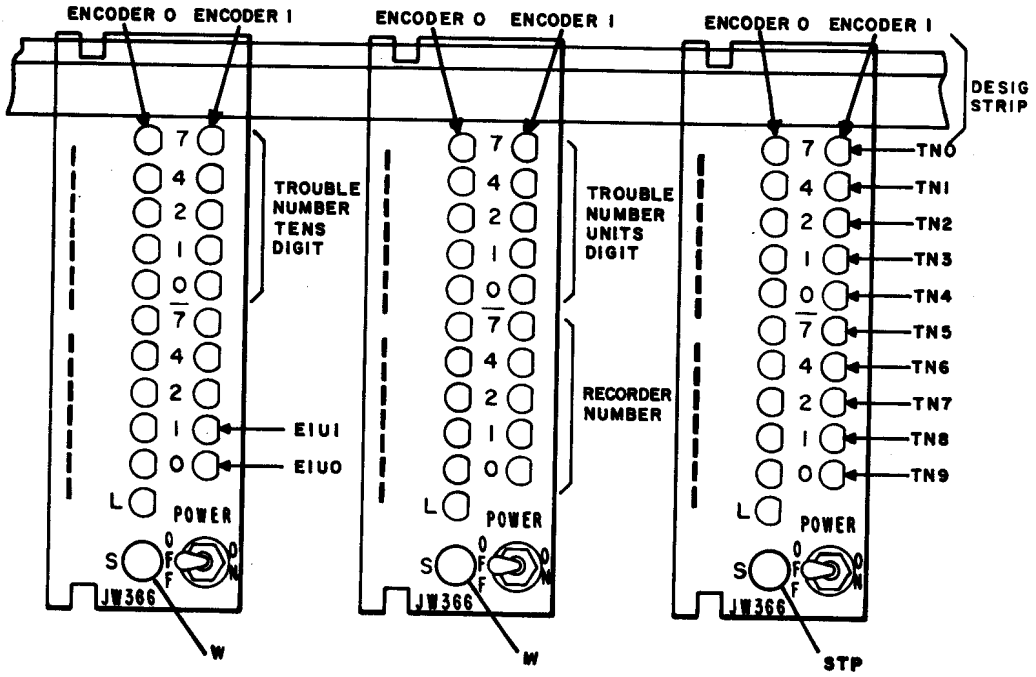


Fig. 43—Display Panel LED Designation for ENCODER Display