

DWG ISSUE	CD ISSUE	DATE ISSUED	Drawn	APPRO
1	1	1-14-76	WF	RWM JJS <u>LC</u>
2B	1 APP 1B	6-23-78	FCR	PFF GCD <u>LC</u>

[illegible][illegible]

SHEET INDEX NOTES

1. WHEN CHANGES ARE MADE IN THIS DRAWING, ONLY THOSE SHEETS AFFECTED WILL BE REISSUED.
2. THIS SHEET INDEX WILL BE REISSUED AND BROUGHT UP TO DATE EACH TIME ANY SHEET OF THE DRAWING IS REISSUED, OR A NEW SHEET IS ADDED.
3. THE ISSUE NUMBER ASSIGNED TO A CHANGED OR NEW SHEET WILL BE THE SAME ISSUE NUMBER AS THAT OF THE SHEET INDEX.
4. SHEETS THAT ARE NOT CHANGED WILL RETAIN THEIR EXISTING ISSUE NUMBER.
5. THE LAST ISSUE NUMBER OF THE SHEET INDEX IS RECOGNIZED AS THE LATEST ISSUE NUMBER OF THE DRAWING AS A WHOLE.

SUPPORTING INFORMATION

CATEGORY	NO.
EQUIPMENT DRAWING	J87389R-(1) ED-82687-() ED-82689-() ED-82760-()
EQUIPMENT DESIGN REQUIREMENTS	J87389 802-213-153
MANUFACTURING TESTING REQUIREMENTS	X-79012

NOTICE

NOT FOR USE OR DISCLOSURE
OUTSIDE THE BELL SYSTEM
EXCEPT UNDER WRITTEN AGREEMENT

1499

POWER SYSTEMS

DC TO DC CONVERTER

-48 VOLT AND +24 VOLT INPUTS

-1 TO -13 VOLT, 2 AMPERE OUTPUT
J87389R-1

BELL TELEPHONE LABORATORIES
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6S

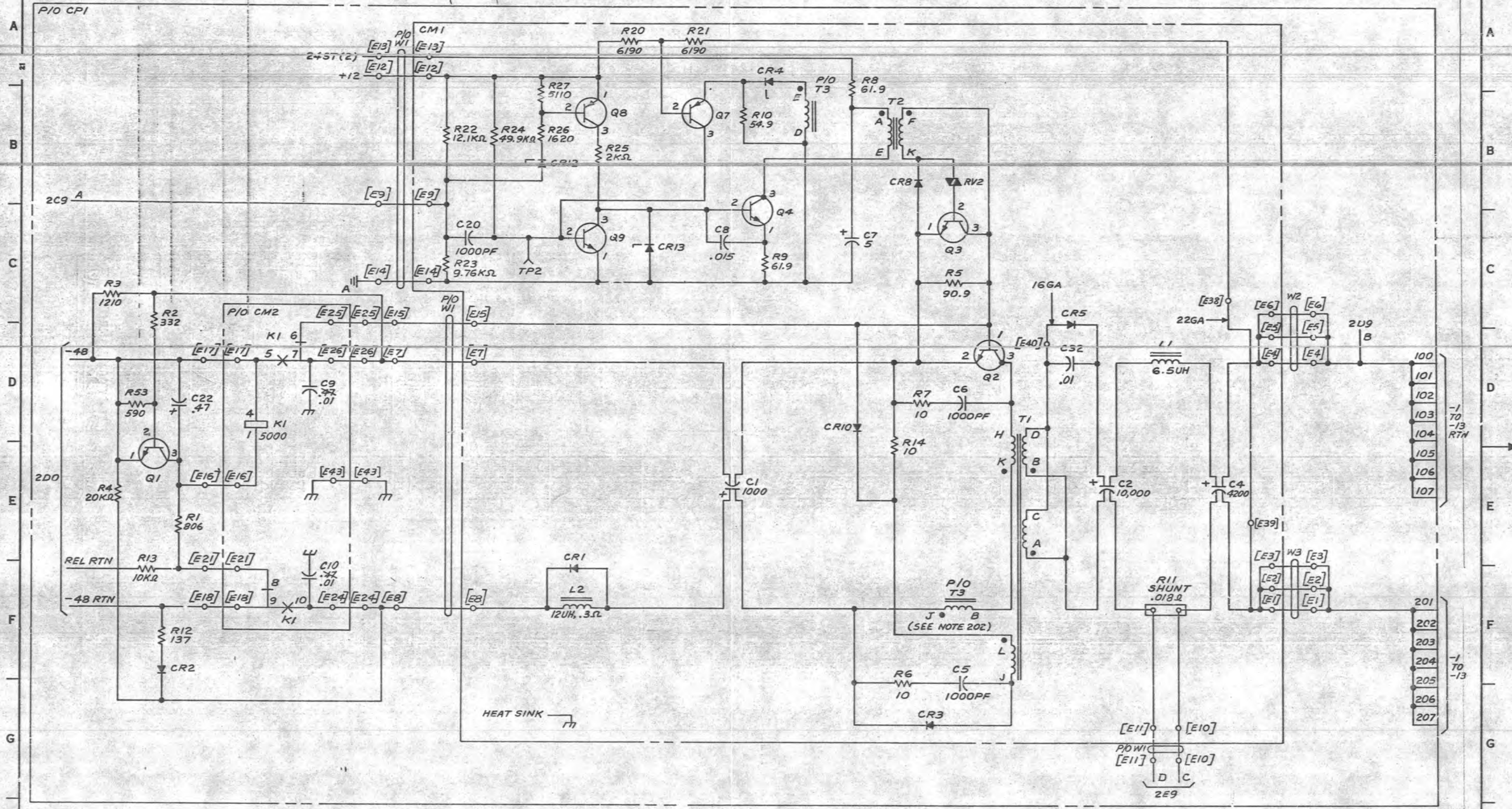
AT&TC
STANDARD

SD-82250-01-A1

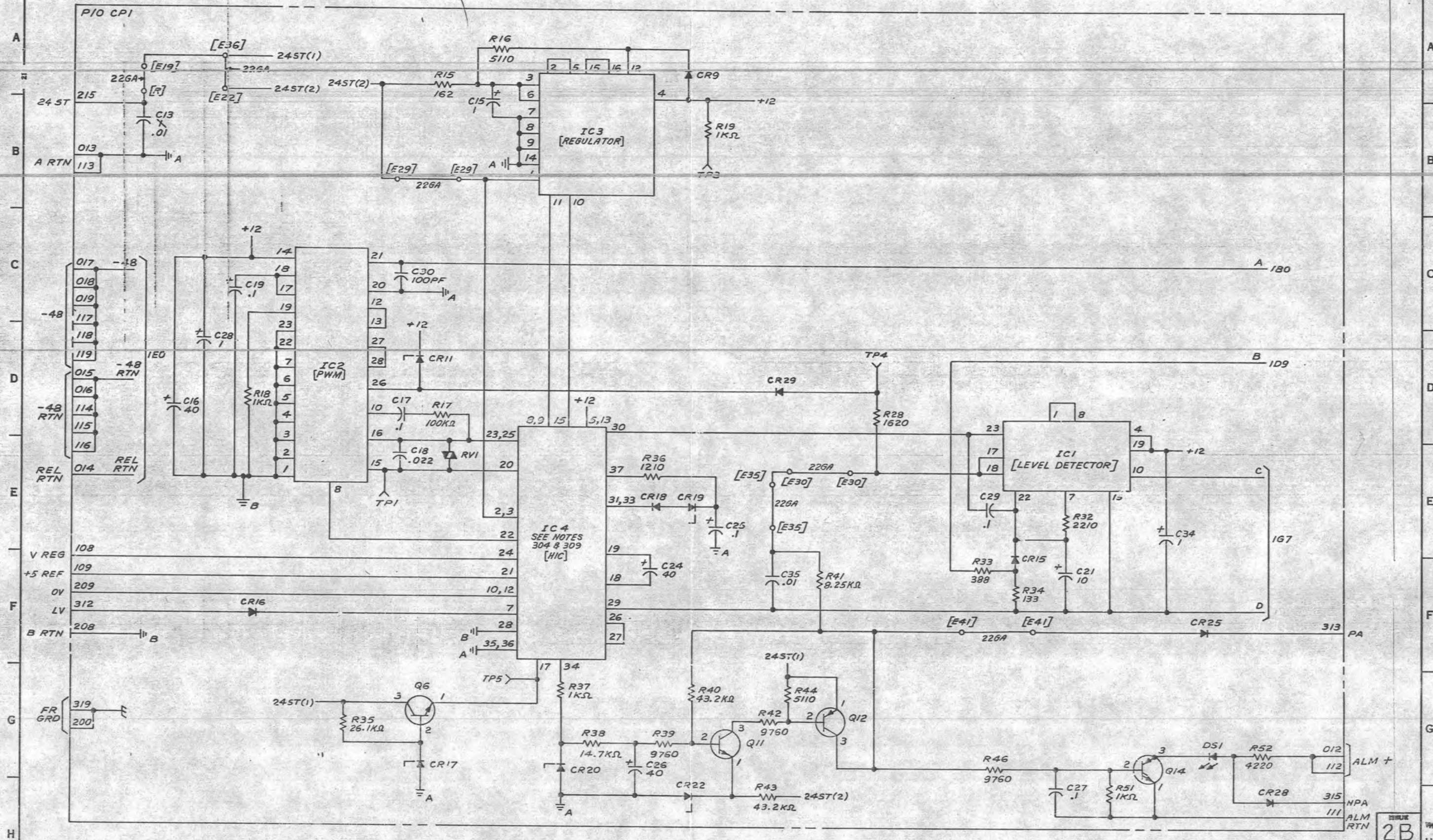
9 SHEETS

ISSUE
2B

PART OF FS1



PART OF FSI



PART OF APP. FIG. 1

CIRCUIT PACK

DESIG LOC CODE
CP1 1A0 ED-82689

E/W

CAPACITOR			FUSE			DIODE			INTEGRATED CIRCUIT			RESISTOR			TRANSISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE
C13	2B0	KS-20736, L1, 1 KS-20460, L1, 1.01	W1	1A2, 1C2, 1G7	FST-42A-9 ANSLEY ELECTRONICS (SEE NOTE 203)	CR2	1F0	458A	IC1	2E7	555A (SEE NOTE 1)	R1	101	01, 806, ±1%, DALE (SEE NOTE 4)	Q1	1E0	66U
C15	2B3	KS-20736, L1, 1, 650B, 1	W2	10B	FST-22A-3 ANSLEY ELECTRONICS (SEE NOTE 203)	CR9	2A4	458C	IC2	2D2	526A (SEE NOTE 2)	R2	1C0	KS-20616, L1A, 332	Q6	2G2	66J
C16	2D1	602A, 40	W3	1F8	FST-22A-3 ANSLEY ELECTRONICS (SEE NOTE 203)	CR11	2D2	459AA	IC3	2B3	535A	R3	1C0	KS-20616, L1A, 1210	Q11	2G5	66U
C17	2D2	KS-19774, L5, 1				CR15	2F7	458D	IC4	2E3	567AJ (SEE NOTE 309)	R4	1E0	KS-20616, L1A, 20KΩ	Q12	2G5	51A
C18	2E2	KS-19774, L5, 1.022				CR16	2F1	458C				R5	2A2	KS-20810, L1A, 162	Q14	2G8	27A
C19	2C1	KS-20736, L1, 1, 650C, 1				CR17	2G2	459AA				R6	2A3	KS-20616, L1A, 5110			
C21	2F7	601B, 10				CR18	2E4	458C				R7	2D2	KS-20616, L1A, 100KΩ			
C22	1D1	KS-19774, L5, 550J, .47	CONNECTOR ON FRAME			CR20	2G3	459J				R8	2D1	KS-20616, L1A, 1KΩ			
C24	2F4	602A, 40	SEE NOTE 303			CR22	2H4	459B				R9	2B4	KS-20616, L1A, 1KΩ			
C25	2E5	KS-20736, L1, 1, 650C, 1										R28	2D6	KS-20616, L1A, 1620			
C26	2G4	602A, 40				CR25	2F8	458C				R32	2E7	KS-20616, L1A, 2210			
C27	2H7	KS-19774, L5, 1										R33	2F6	KS-16312, L4F, 388			
C28	2D1	KS-20736, L1, 1, 650B, 1				CR28	2H9	458C				R34	2F7	KS-16312, L4F, 133			
C29	2E6	KS-20736, L1, 1				CR29	2D5	449A				R35	2G2	KS-20616, L1A, 26, 1KΩ			
C30	2C2	KS-19774, L2, 100PF				DS1	2G8	541G(LED)				R36	2F4	KS-20616, L1A, 1210			
C34	2E8	KS-20736, L1, 1, 650B, 1										R37	2G3	KS-20616, L1A, 1KΩ			
C35	2F5	KS-20736, L4, .01										R38	2G4	KS-20616, L1A, 14, 7KΩ			
												R39	2G4	KS-20616, L1A, 9760			
												R40	2G4	KS-20616, L1A, 43, 2KΩ			
												R41	2F5	KS-20616, L1A, 8250			
												R42	2G5	KS-20616, L1A, 9760			
												R43	2H5	KS-20616, L1A, 43, 2KΩ			
												R44	2G5	KS-20616, L1A, 5110			
												R46	2G7	KS-20616, L1A, 9760			
												R51	2H7	KS-20616, L1A, 1KΩ			
												R52	2G8	KS-20616, L1A, 4220			
												R53	1D0	KS-20616, L1A, 590			

VARISTOR		
DESIG	LOC	CODE
RV1	2E3	100A

NOTES:

- ONLY 555A INTEGRATED CIRCUITS DATE CODED 1174 OR LATER MAY BE USED WITH THIS CONVERTER.
- ONLY 526A INTEGRATED CIRCUITS DATE CODED 1Q74 OR LATER MAY BE USED WITH THIS CONVERTER.
- EARLY PRODUCTION UNITS MAY BE EQUIPPED WITH THE FOLLOWING SPRAGUE CAPACITORS:
604D209 FOR C1
604D213 FOR C2
604D210 FOR C4
- RESISTOR 250-58, 806, ±1% BY NITRONICS MAY BE USED FOR (R1).
- EARLY PRODUCTION UNITS MAY BE EQUIPPED WITH SPR-676-B, 0.018 DALE FOR R11.

DC TO DC CONVERTER

SD-82250-01-C1

PULL TELEPHONE LABORATORIES
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2B

PART OF APP FIG. 1

CP1 (CONTINUED)

E/M

CIRCUIT MODULE

DESIG	LOC	CODE
CM1	1A2	ED-82687
E/M		

CAPACITOR

DESIG	LOC	CODE
C1	1E4	KS-21190, L9, 1000
C2	1E7	KS-21190, L13, 10,000
C4	1E8	KS-21190, L10, 4200
C5	1F6	KS-19708, L3M, 1000PF
C6	1D6	KS-19708, L3M, 1000PF
C7	1C5	601A, 5
C8	1C4	KS-19774, L5, .015
C20	1C2	KS-20676, L7, 1000PF
C32	1D7	KS-20736, L1, .01

SEE
NOTE
3

DIODE

DESIG	LOC	CODE
CR1	1E3	446C, 533F
CR3	1G6	426L
CR4	1A5	459B
CR5	1C7	485AU
CR8	1B6	446A, 533G
CR10	1D5	446A, 533G
CR12	1B3	459F
CR13	1C4	446C, 808CF

INDUCTOR

DESIG	LOC	CODE
L1	1D7	DELEVAN BP2929, 6.5 UH
L2	1F3	NYTRONICS RFC-M-12, 12UH

RESISTOR

DESIG	LOC	CODE
R5	1C6	KS-20616, L1A, 90.9
R6	1F6	KS-20616, L1A, 10
R7	1D6	KS-20616, L1A, 10
R8	1A5	KS-20289, L6C, 61.9
R9	1C5	KS-20289, L6C, 61.9
R10	1B5	KS-16312, L4E, 54.9
R14	1D6	KS-20616, L1A, 10
R20	1B4	KS-16312, L4F, 6190
R21	1B4	KS-16312, L4F, 6190
R22	1B2	KS-20616, L1A, 12.1KΩ
R23	1C2	KS-20616, L1A, 976Ω
R24	1B3	KS-20616, L1A, 49.9KΩ
R25	1B3	KS-20616, L1A, 2KΩ
R26	1B3	KS-20616, L1A, 1620
R27	1B3	KS-20616, L1A, 5110

RESISTOR SHUNT

DESIG	LOC	CODE
R11	1F7	39A-675-8, .018 DATE KS-21592, L6 (SEE NOTE 5)

TRANSFORMER

DESIG	LOC	CODE
T1	1D6	3002AA
T2	1B5	3000E
T3	1B5, 1F6	3000T (SEE NOTE 202)

TRANSISTOR

DESIG	LOC	CODE
Q2	1D6	KS-20837, L2
Q3	1C6	46C
Q4	1C5	20A, 108A
Q7	1B4	51C
Q8	1B3	51A
Q9	1C3	66J

VARIATOR

DESIG	LOC	CODE
RV2	1B6	100J

CIRCUIT MODULE

DESIG	LOC	CODE
CM2	1C1, 109	ED-82760
E/M		

RELAY

DESIG	KT
CODE	ALLIED CONTROL T154X1096
OPTION	
CONF ARR	LOC
8, 9, 10	EMB 1F1
5, 6, 7	EMB 1D1
3	-
2	-
1, 4	COIL 1D1

RELAY NOT ADJUSTABLE,
REPLACE IN EVENT OF MALFUNCTION

CAPACITOR

DESIG	LOC	CODE
C9	1D1	8131-100-651-474H, 0.47, 6815
C10	1F1	KS-20480, L1, .01

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104. THE LEAD BETWEEN THE ANODE OF (CR5) AND TERMINAL E40 SHALL BE DRESSED ALONG THE BODY OF (CR5).

105. CONVERTER INPUT CURRENT IS A FUNCTION OF OUTPUT CURRENT AND INPUT VOLTAGE. LIST 1 DRAIN (FOR SIZING BATTERY PLANT, STANDBY AC PLANTS AND AIR CONDITIONING EQUIPMENT) AND LIST 2 DRAIN (FOR SIZING FEEDERS AND PROTECTION DEVICES) MAY BE CALCULATED FROM THE FORMULA BELOW. APPROPRIATE VALUES OF LOAD CURRENT AND INPUT VOLTAGE SHALL BE OBTAINED FROM THE ASSOCIATED SYSTEM APPLICATION SCHEMATIC AND INPUT DISTRIBUTION CIRCUIT, RESPECTIVELY. FOR THE 48V BATTERY-

$$I_{IN} = .1 + \frac{I_L (54 - E_{IN})}{.67(E_{IN})}$$

WHERE: I_{IN} = CONVERTER INPUT CURRENT IN AMPERES
 I_L = CONVERTER OUTPUT (LOAD) CURRENT IN AMPERES
 E_{IN} = CONVERTER INPUT VOLTAGE A. THE CONVERTER INPUT TERMINALS

FOR THE 24V INPUT:

I_{IN} = APPROXIMATELY .065 AMPERES FOR NORMAL
OPERATION AND APPROXIMATELY .080 AMPERES
FOR ALARM CONDITIONS

106. THE OUTPUT OF THE CONVERTER IS REGULATED AT THE FRAME SIDE OF CONVERTER TERMINAL STRIP (CONNECTOR). FOR PROPER OPERATION OF THE CONVERTER, THE TERMINAL STRIP IN THE FRAME HAS TO BE WIRED AS SHOWN ON SHEET G1. THE TWO CAPACITORS SHOWN ON SHEET G1 ARE 542C, .25UF

107. ALL WIRING BETWEEN THE CONTROL BOARD AND THE POWER BOARD SHALL BE AT LEAST 22GA.

108. ALL STRAPS ON THE CONTROL BOARD AND ON THE POWER BOARD SHALL BE 22GA.

201. WIRE BETWEEN (CR5) AND THE POWER BOARD SHALL BE KS-19195, L1, 16GA SOLID.
202. THE 3000T TRANSFORMER MUST BE USED WITH PWB(AM-841631419 ISSUE 1). IF THE 3000L TRANSFORMER IS USED. IT CAN ONLY BE USED WITH PWB(AM-841628456 ISSUE 1).
203. CONNECTIONS MADE BETWEEN CM1 AND CP1 ARE MADE BY MEANS OF FLEX JUMPERS W1, W2, AND W3. W1(P/N FST-424-9), W2 AND W3 (P/N FST-224-3) ANSLEY ELECTRONICS.
204. ON ISSUE 28, IN APP FIG. 1 CODES OF CR1, CR8, CR10, CR13, Q4, C9, C10, C13, C15, C19, C22, C25, C28 AND C34 REVISED AS SHOWN.

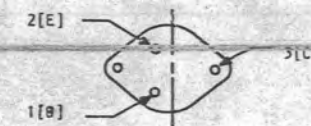
301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES
ARE IN MICROFARADS. VALUES PRECEDED BY THE SYMBOL
+(PLUS) OR -(MINUS) ARE IN VOLTS.

302. INFORMATION SHOWN IN [] IS FOR REFERENCE ONLY.

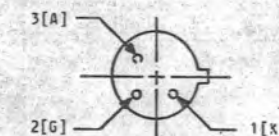
303. CONNECTOR ON FRAME IS 947A.

304. TERMINALS 1,5,9,11,12,14,16,22,32,38 OF (IC4)
HIC HAVE NO INTERNAL CONNECTIONS. TERMINALS 1 AND 38
HAVE BEEN USED TO FACILITATE CIRCUIT CONNECTIONS
EXTERNAL TO THE HIC.

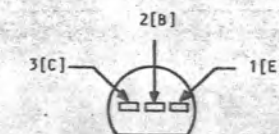
305. THE TERMINAL NUMBER ASSIGNMENT OF THE KS-20B37,L2 TRANSISTOR
IS:



306. THE TERMINAL NUMBER ASSIGNMENT OF THE 27A THYRISTOR IS:



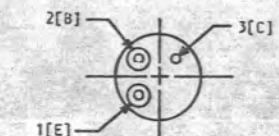
307. THE TERMINAL NUMBER ASSIGNMENT OF THE 51A, 51C, 66J AND 66U TRANSISTORS IS:



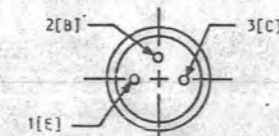
HIGHEST CAP, DIODE, RES, TRANSISTOR USED ON THIS DRAWING			
C35	CR29	R53	Q14
NOT USED			
C3, C23	CR6, CR7	R29, R30	Q5, Q10
C31, C33	CR14, CR23	R31, R45	Q13
C11, C12	CR24, CR26	R47, R48	
C14	CR27, CR21	R49, R50	

309. SEE SD-82250-01-D2.

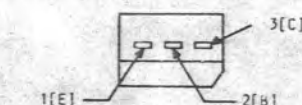
310. THE TERMINAL ASSIGNMENT OF THE 20L TRANSISTOR IS:



311. THE TERMINAL ASSIGNMENT OF THE 46C TRANSISTOR IS:



312. THE TERMINAL ASSIGNMENT OF THE 108A TRANSISTOR IS:



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DC TO DC CONVERTER

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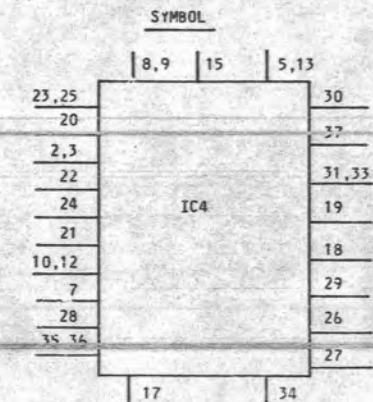
69

S

309. 567AJ HYBRID INTEGRATED CIRCUIT



1. SD-82313-01 IS THE CONTROLLING DRAWING FOR THE 567AJ HIC.
2. END OF LIFE (EOL) TOLERANCE INCLUDING TEMPERATURE VARIATION BETWEEN 10° C AND 80° C.



REF DESIG	VALUE (OHMS)	TOLERANCE		RATIO TOLERANCE		MAX POWER (mW)	
		INITIAL	EOL*	INITIAL	EOL*		
R1	10,185	±5%	±6%	$\frac{R1}{R2} = 1.5397 \pm .2\%$	± .3%	3	
R2	6615					2	
R3	8400			$\frac{R3}{R4} = 0.5000 \pm .8\%$	± 1%	2	
R4	16,800					4	
R5	48,800			$\frac{R5}{R6} = 1.1000 \pm .2\%$	± .3%	48	
R6	8000					8	
R9	6200			$\frac{R9}{R10} = 0.6327 \pm .2\%$	± .3%	2	
R10	9800					3	
R12	44,640			$\frac{R12}{R13} = 9.9200 \pm .2\%$	± .3%	50	
R13	4500					5	
R7	6870				1		
R8	3800				1		
R11	4088				1		
R14	5600				1		
	CODE						
IC1	500F						
IC2	500F						
IC3	500L						

*SEE NOTE 2

DC TO DC CONVERTER

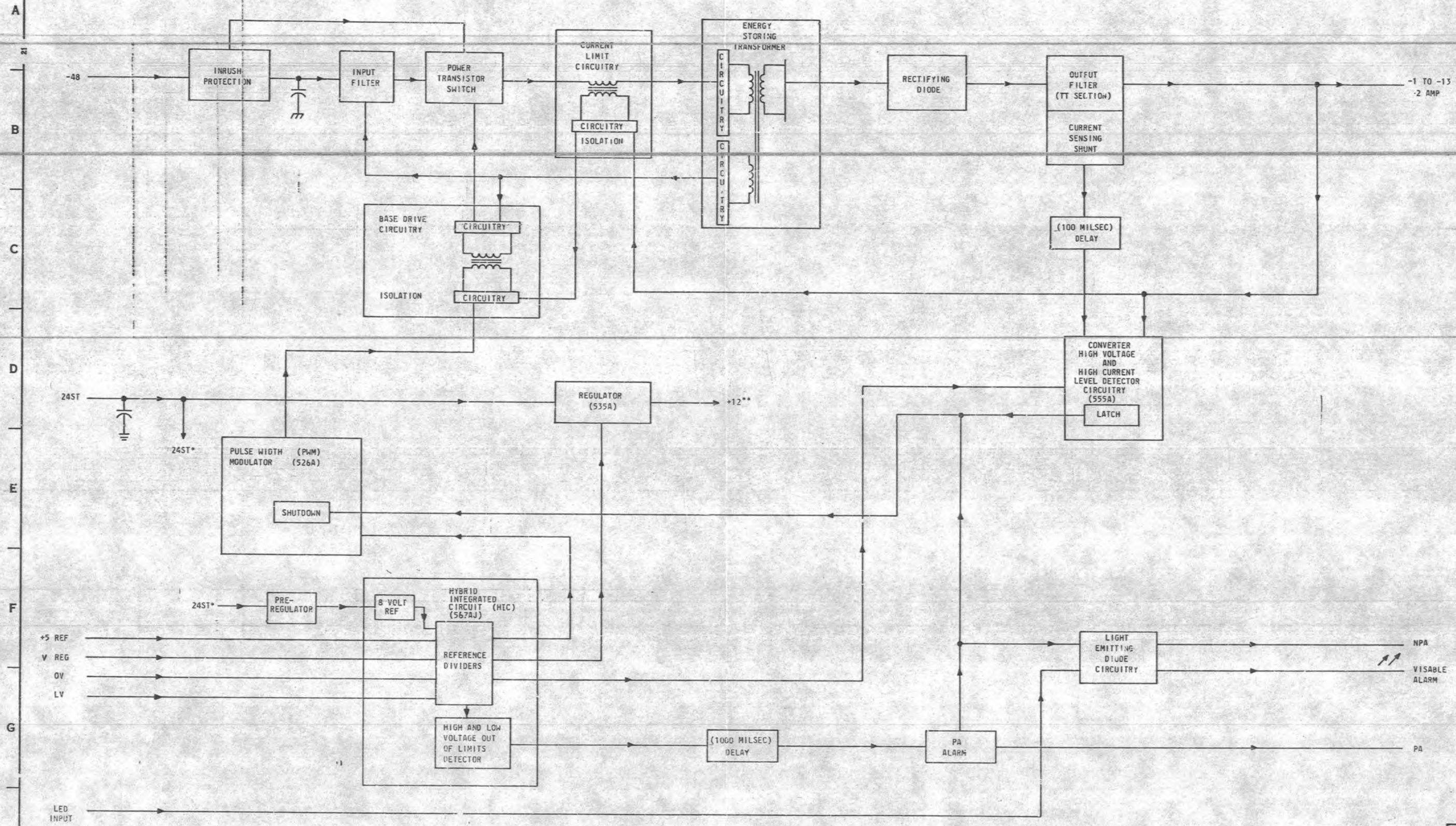
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ENTER 15 ON CARD

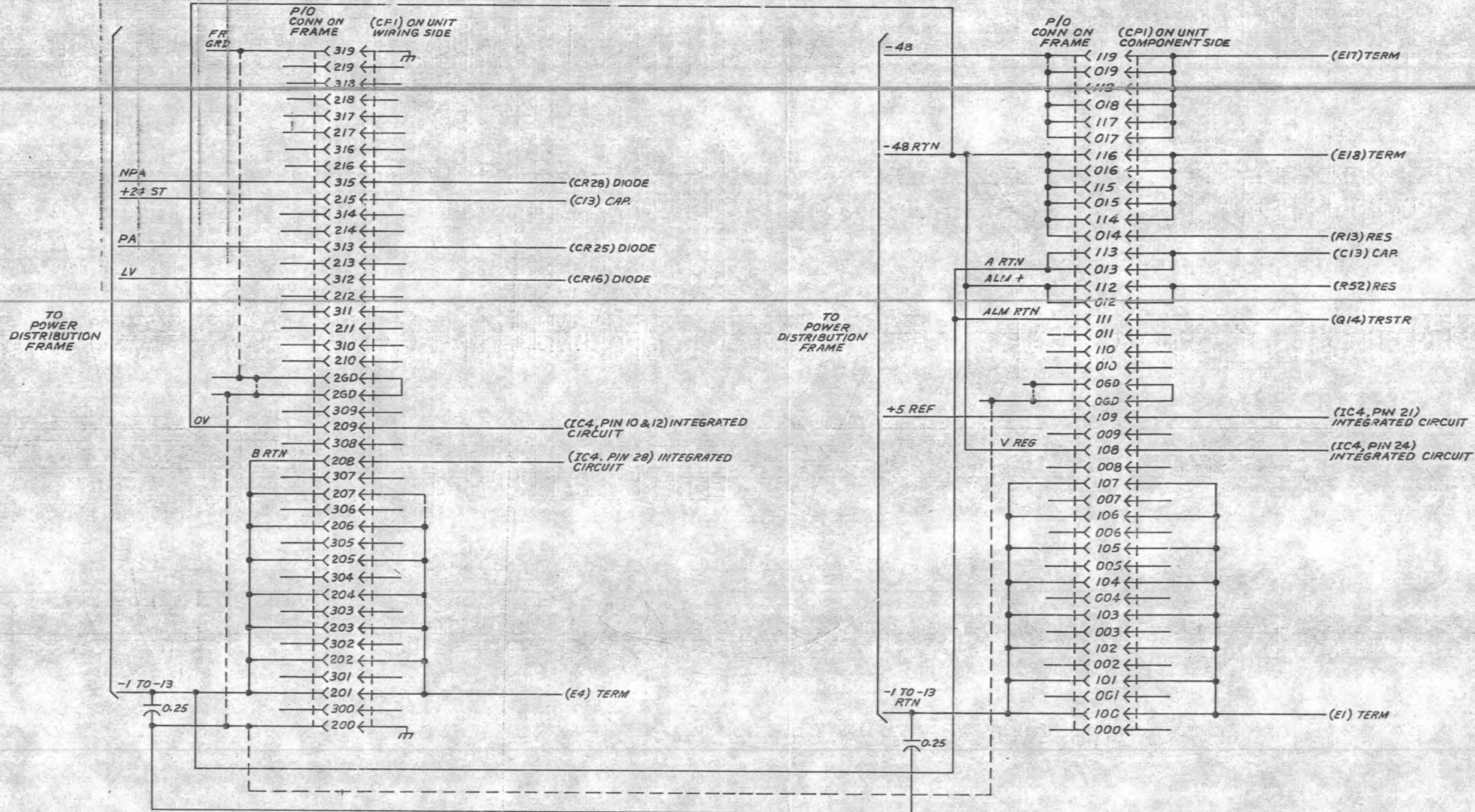
BD 1



* BIAS FOR HIC, ALARMS, (24ST (1)), (24ST (2))
 ** BIAS FOR PWM, LEVEL DETECTOR, BASE DRIVE

2B

CAD 1



2B

DC TO DC CONVERTER

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