

CONTENTS	SHEET NO.	ISSUE NO.																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
SHEET INDEX SUPPORTING INFORMATION	A1	1	2																							
FS1 DC TO DC CONVERTER CIRCUIT	B1	1	2																							
	B2	1	2																							
APP FIG.	C1	1	2																							
	C2	1	2																							
CIRCUIT NOTES EQUIPMENT NOTES INFORMATION NOTES	D1	1	2																							
	D2	1	1																							
CAD 1	G1	1	1																							
BD 1	H1	1	2																							

SHEET INDEX

CONTENTS	SHEET NO.	ISSUE NO.																								

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	J-87389F-(2) ED-82726-() ED-82733-() ED-82738-()
EQUIPMENT DESIGN REQUIREMENTS	J87389 802-213-153
MANUFACTURING TESTING REQUIREMENTS	X-78950

1M99
POWER SYSTEMS DC TO DC CONVERTER -48 VOLT AND +24 VOLT INPUTS +3.03C VOLT, 5 AMPERE OUTPUT J87389F2
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9 SHEETS

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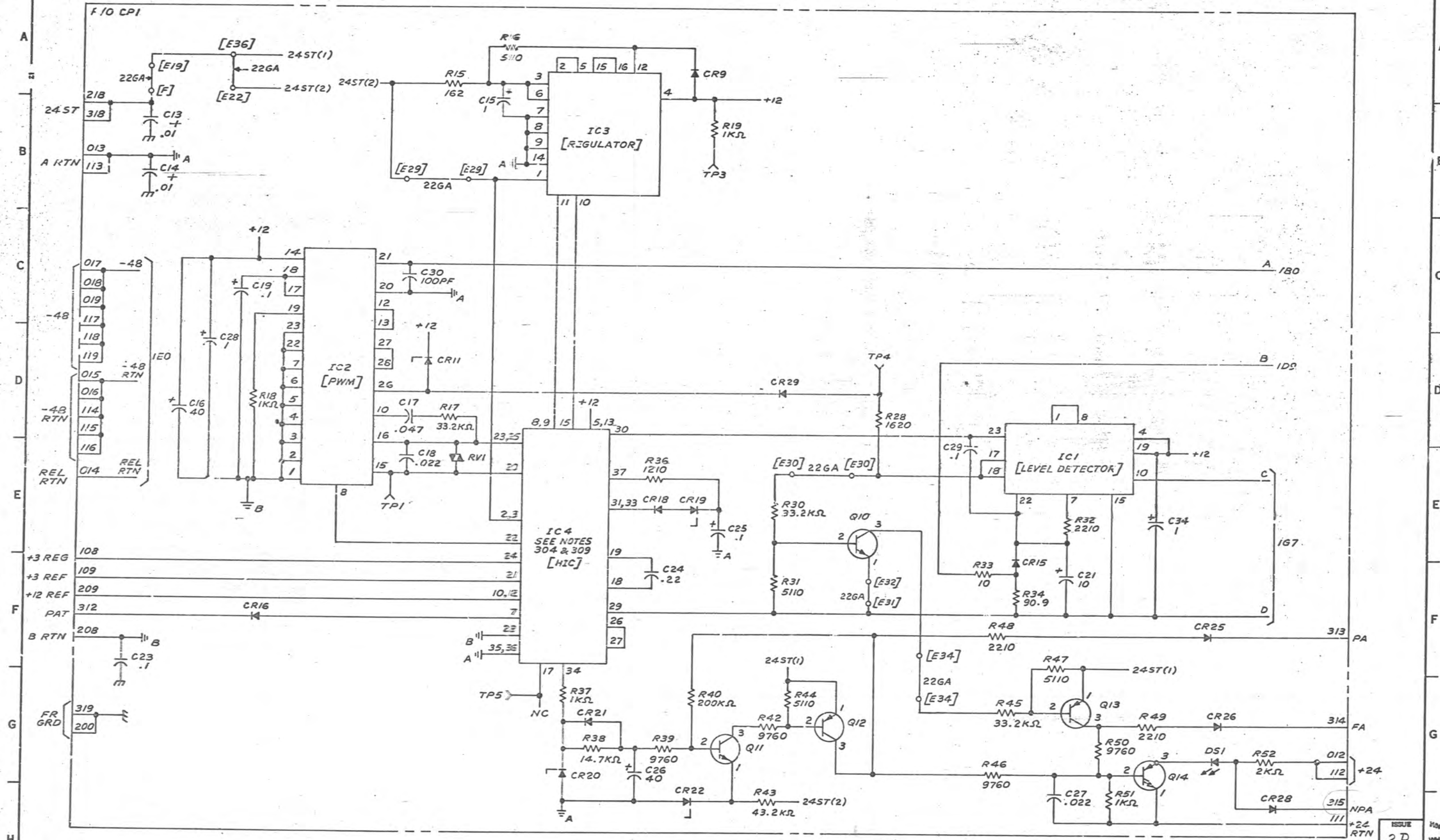
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ISSUE 2B

PART OF FSI



PART OF APP. FIG. 1

CIRCUIT PACK

DESIG LOC CODE
CPI 1A2/2A0 ED-82733

E/A

CAPACITOR

DESIG	LOC	CODE
C11	1D9	KS-20736, L8, 1
C12	1F9	KS-20736, L1, 1
C13	2B0	KS-20736, L1, 1 KS-20430, L1, .01
C14	2B0	KS-20736, L1, 1 KS-20430, L1, .01
C15	2B3	KS-20736, L1, 1, 650B, 1
C16	2D1	602A, 40
C17	2D2	KS-19774, L5, .017
C18	2E2	KS-19774, L5, .012
C19	2C1	KS-20736, L1, 0.1, 650C, 1
C21	2F7	601B, 10
C22	1D1	KS-19774, L5, 0.47, 650J, .47
C23	2F0	KS-20736, L1, .1
C24	2F4	KS-19774, L6, .22
C25	2E5	KS-20736, L1, 0.1, 650C, .1
C26	2G4	602A, 40
C27	2H7	KS-19774, L5, .022
C28	2D1	KS-20736, L1, 1, 650B, 1
C29	2E6	KS-20736, L1, .1
C30	2C2	KS-19774, L2, 100PF
C34	2E8	KS-20736, L1, 1, 650B, 1

CABLE

DESIG	LOC	CODE
W1	1A2, 1B2, 1C2, 1D2, 1F2, 1G7	EST-41.5A-9 ANSLEY ELECTRONICS, (SEE NOTE 203)
W2	1C8, 1D8	FST-21.5A-3 ANSLEY ELECTRONICS, (SEE NOTE 203)
W3	1E8, 1F8	FST-21.5A-3 ANSLEY ELECTRONICS, (SEE NOTE 203)

DIODE

DESIG	LOC	CODE
CR2	1F0	458A
CR9	2A4	458C
CR11	2D2	459AA
CR15	2F7	458D
CR16	2F1	458C
CR18	2E4	458C
CR19	2E4	459B
CR20	2G3	459J
CR21	2G3	458C
CR22	2H4	459B
CR25	2F8	458C
CR26	2G8	458C
CR28	2H9	458C
CR29	2D5	449A
DS1	2G8	541G(LED)

INTEGRATED CIRCUIT

DESIG	LOC	CODE
IC1	2E7	555A (SEE NOTE 1)
IC2	2D2	526A (SEE NOTE 2)
IC3	2B3	535A
IC4	2E3	567AK (SEE NOTE 309)

RESISTOR

DESIG	LOC	CODE
R1	1D1	250-SB, 806, ±1% NYTRONICS SEE NOTE 4
R2	1C0	KS-20616, L1A, 332
R3	1C0	KS-20616, L1A, 1210
R4	1E0	KS-20616, L1A, 20KΩ
R12	1F0	KS-20616, L1A, 137
R13	1E0	KS-20616, L1A, 10KΩ
R15	2A2	KS-20810, L1A, 162
R16	2A3	KS-20616, L1A, 5110
R17	2D2	KS-20616, L1A, 33.2KΩ
R18	2D1	KS-20616, L1A, 1KΩ
R19	2B4	KS-20616, L1A, 1KΩ
R28	2D6	KS-20616, L1A, 1620
R30	2E5	KS-20616, L1A, 33.2KΩ
R31	2F5	KS-20616, L1A, 5110
R32	2E7	KS-20616, L1A, 2210
R33	2F6	KS-20616, L1A, 10
R34	2F7	KS-20616, L1A, 90.9
R36	2E4	KS-20616, L1A, 1210
R37	2G3	KS-20616, L1A, 1KΩ
R38	2G4	KS-20616, L1A, 14.7KΩ
R39	2G4	KS-20616, L1A, 9760
R40	2G4	KS-20616, L1A, 200KΩ
R42	2G5	KS-20616, L1A, 9760
R43	2H5	KS-20616, L1A, 43.2KΩ
R44	2G5	KS-20616, L1A, 5110
R45	2G7	KS-20616, L1A, 33.2KΩ
R46	2G7	KS-20616, L1A, 9760
R47	2F7	KS-20616, L1A, 5110
R48	2F7	KS-20616, L1A, 2210
R49	2G8	KS-20616, L1A, 2210
R50	2G7	KS-20616, L1A, 9760
R51	2H7	KS-20616, L1A, 1KΩ
R52	2G8	KS-20616, L1A, 2KΩ
R53	1D0	KS-20616, L1A, 590

TRANSISTOR

DESIG	LOC	CODE
Q1	1E0	66U
Q10	2E5	66J
Q11	2G5	66U
Q12	2G5	51A
Q13	2G7	51A
Q14	2G8	27A

CONNECTOR ON FRAME
(SEE NOTE 303)

VARISTOR

DESIG	LOC	CODE
RV1	2E3	10DA

- NOTE 1: ONLY 555A INTEGRATED CIRCUITS DATE CODED 1174 OR LATER MAY BE USED WITH THIS CONVERTER.
- NOTE 2: ONLY 526A INTEGRATED CIRCUITS DATE CODED 1Q74 MAY BE USED WITH THIS CONVERTER.
- NOTE 3: EARLY PRODUCTION UNITS MAY BE EQUIPPED WITH THE FOLLOWING SPRAGUE CAPACITORS:
- | | | |
|---------|-----|----|
| 6040209 | FOR | C1 |
| 6040215 | FOR | C2 |
| 6040212 | FOR | C4 |
- NOTE 4: RESISTOR G1, 806, ±1% BY DALE MAY BE USED FOR R1.
- NOTE 5: EARLY PRODUCTION UNITS MAY BE EQUIPPED WITH S21870, MOT.
- NOTE 6: EARLY PRODUCTION UNITS MAY BE EQUIPPED WITH SPR-676-15, .008 DALE FOR R11.

DC TO DC CONVERTER

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PART OF APP FIG. 1

CP1 (CONTINUED)

E/W

CIRCUIT MODULE		
DESIG	LOC	CODE
CM1	1A2	ED-82726
E/W		

CAPACITOR

DESIG	LOC	CODE
C1	1E4	KS-21190, L9, 1000
C2	1E7	KS-21190, L15, 16000
C4	1E8	KS-21190, L12, 7200
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, L3, 1000PF

DIODE

DESIG	LOC	CODE
CR1	1E3	446F, 533F
CR3	1G6	426L
CR4	1A5	459B
CR5	1C7	KS-21021, L3
CR8	1B6	446A, 533C
CR10	1D5	446A, 533G
CR12	1B3	459F
CR13	1C4	448E, 80SCF

INDUCTOR

DESIG	LOC	CODE
L1	1D7	DELEVAN BP2929, 6.5UH
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, 75
R10	1B5	KS-16312, L4E, 60.4
R14	1D6	KS-20616, L1A, 10
R20	1B4	KS-16312, L4F, 6040
R21	1B4	KS-16312, L4F, 2210
R22	1B2	KS-20616, L1A, 12.1KQ
R23	1C2	KS-20616, L1A, 9760
R24	1B3	KS-20616, L1A, 43.2KQ
R25	1B3	KS-20616, L1A, 2KQ
R26	1B3	KS-20616, L1A, 1620
R27	1B3	KS-20616, L1A, 5110

RESISTOR SHUNT

DESIG	LOC	CODE
R11	1F7	SPR-676-15, .008 DALE KS-21592, L8 (SEE NOTE 6)

TRANSFORMER

DESIG	LOC	CODE
T1	1D6	3092J
T2	1B5	3000E
T3	1B5, 1F6	3000E, 3000F (SEE NOTE 202)

TRANSISTOR

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

VARISTOR

DESIG	LOC	CODE
RV2	1E6	100J

CIRCUIT MODULE		
DESIG	LOC	CODE
CM2	1C1, 1D9	ED-82738
E/W		

RELAY

DESIG	K1	
CODE	ALLIED CONTROL T154X1096	
OPTION	CONT 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	8131-100-651-774M, .47, ERIE KS-20480, L1, .01
C10	1F1	8131-100-651-774M, .47, ERIE KS-20480, L1, .01

DIODE

DESIG	LOC	CODE
CR6	1E9	521070, M07, KS-21178, L1 (SEE NOTE 5)

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CIRCUIT NOTES:

101.	DESIG	FUSE AMP	POTENTIAL	QUANTITY

102.

FEATURE OR OPTION	PROVIDE		QUANTITY
	APP FIG.	APP OR WRG	
DC TO DC CONVERTER	1		1 PER CIRCUIT

103.

RECORD OF APP FIGURES, WIRING AND APPARATUS CHANGES						
CHANGED ON ISS	IF JOB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT		
				STD	A&M	MD
45			204			

CIRCUIT NOTES (CONT):

104. THE LEAD BETWEEN THE ANODE OF CR5 AND TERMINAL E40 SHALL BE DRESSED ALONG THE BODY OF CR5.
105. THE CONVERTER OUTPUT IS NOT INTERNALLY GROUND. THE NEGATIVE (-) CONVERTER OUTPUT LEAD MUST BE CONNECTED AT THE LOAD TO A GROUND COMMON TO THE 24V INPUT.
106. 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:

$$I_{IN} = \frac{4.2}{E_{IN}} \times I_L$$

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

FOR THE 24V INPUT:

I_{IN} = APPROXIMATELY 0.065 AMPERES FOR NORMAL OPERATION AND APPROXIMATELY 0.080 AMPERES FOR ALARM CONDITIONS

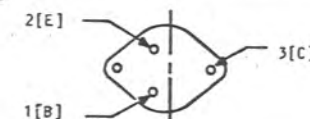
107. THE 3 VOLT OUTPUT OF THE CONVERTER IS REMOTELY REGULATED THROUGH PIN 108. FOR PROPER OPERATION THIS PIN HAS TO BE CONNECTED THROUGH A RESISTOR (APPROXIMATELY 2.25K OHMS) TO THE POSITIVE SIDE OF THE LOAD BUS. IN ADDITION, FOR PROPER OPERATION, THE CONVERTER REQUIRES +3.030 VOLT REFERENCE WITH RESPECT TO THE LOAD GROUND ON PIN 109. THE RESISTANCE OF THE REFERENCE SOURCE AND THE SENSE LEAD RESISTOR SHOULD BE APPROXIMATELY EQUAL. THE 12 VOLT REFERENCE LEADS SUPPLIED TO THE CONVERTER FROM THE FRAME SHALL BE SHIELDED WITH THE SHIELD TIED TO THE FRAME AT THE CONVERTER TERMINAL STRIP.
108. ALL WIRING BETWEEN THE CONTROL BOARD AND THE POWER BOARD SHALL BE AT LEAST 22GA.
109. ALL STRAPS ON THE CONTROL BOARD AND ON THE POWER BOARD SHALL BE 22GA.
110. WIRE BETWEEN CR6 AND THE CONTROL BOARD SHALL BE 18GA.

EQUIPMENT NOTES:

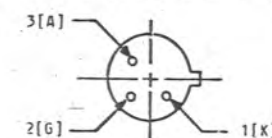
201. WIRE BETWEEN CR5 AND THE POWER BOARD SHALL BE KS-19195, L1, 16GA SOLID.
202. THE 3000T TRANSFORMER MUST BE USED WITH PKB (AM841631419 ISSUE 1). IF THE 3000L TRANSFORMER IS USED, IT CAN ONLY BE USED WITH PKB (AM841628456 ISSUE 1).
203. CONNECTIONS MADE BETWEEN CM1 AND CP1 ARE MADE BY MEANS OF FLEX JUMPERS W1, W2, AND W3. W1 (P/N FST-41.5A-9), W2 AND W3 (P/N FST-21.5A-3) ANSLEY ELECTRONICS.
204. ON ISSUE 2B, IN APP FIG. 1 CODES OF CR1, CR6, CR8, CR10, CR13, Q4, C9, C10, C13, C14, C15, C19, C22, C25, C28, C34, R11, AND T3 REVISED AS SHOWN.

INFORMATION NOTES:

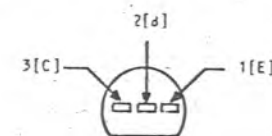
301. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN MICROFARADS. VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
302. INFORMATION SHOWN IN [] IS FOR REFERENCE ONLY.
303. CONNECTOR ON FRAME IS 947A.
304. TERMINALS 1, 4, 5, 6, 14, 16, 17, 22, 25, 26, 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-20837, L2 TRANSISTOR IS:



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



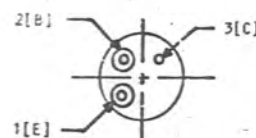
307. THE TERMINAL NUMBER ASSIGNMENT OF THE 51A, 51C, 66J AND 66U TRANSISTORS IS:



HIGHEST CAP, DIODE, RES, TRANSISTOR USED ON THIS DRAWING			
C34	CR29	R53	Q14
NOT USED			
C3, C31	CR7, CR14	R29, R35	Q5, Q6
C32, C33	CR17, CR23	R41	
	CR24		

309. SEE SD-82161-02-D2.

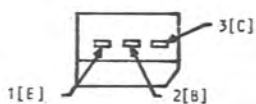
310. THE TERMINAL ASSIGNMENT OF THE 20L TRANSISTOR IS:



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



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



DC TO DC CONVERTER

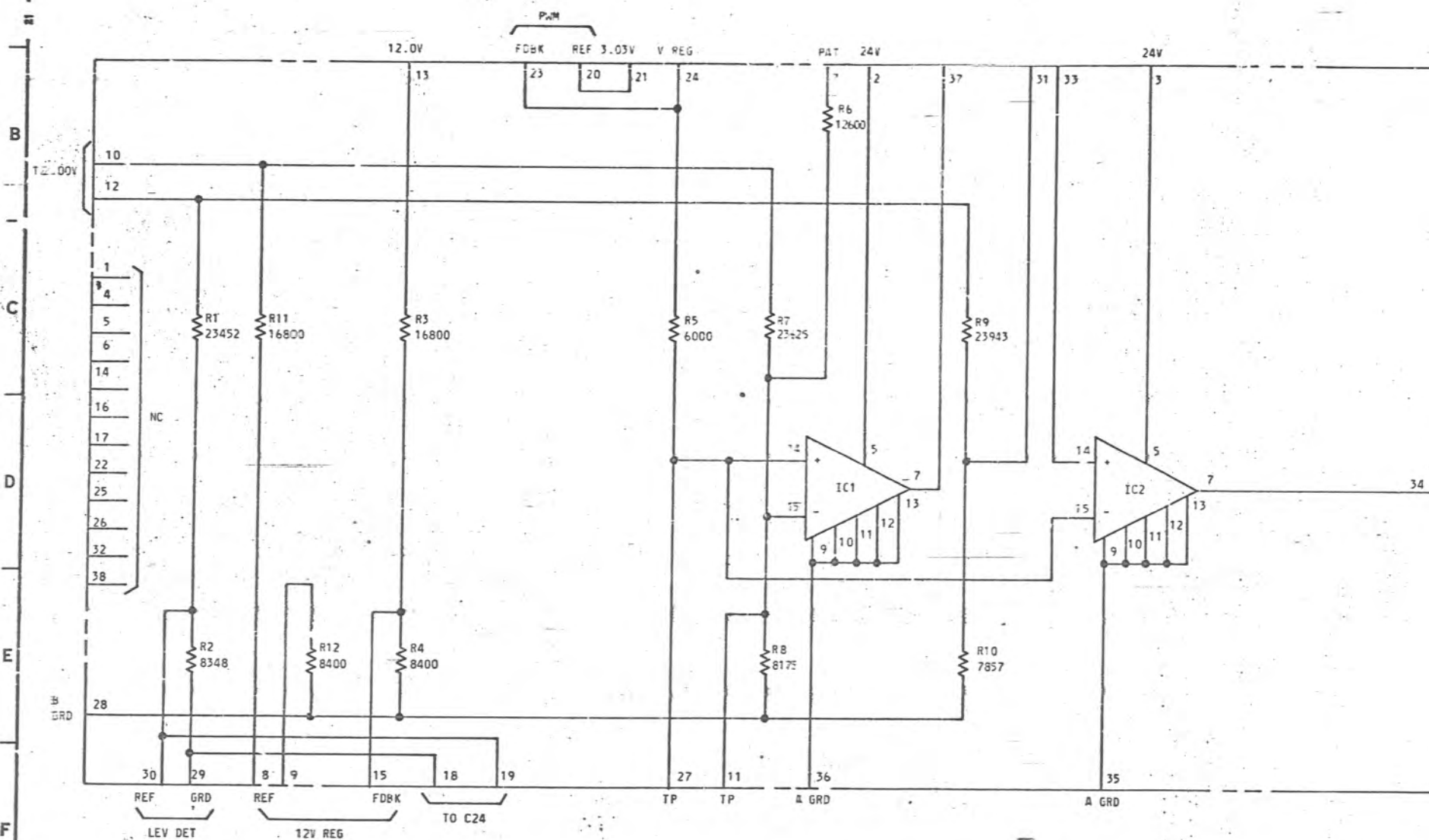
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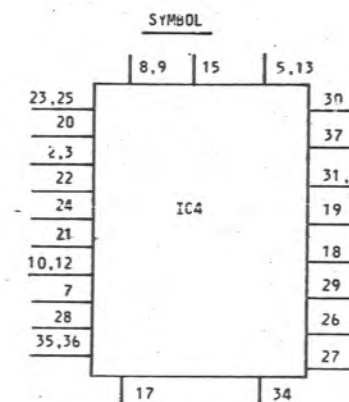
SD-82161-02-D.

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309. 567AK HYBRID INTEGRATED CIRCUIT



1. SD-82314-01 IS THE CONTROLLING DRAWING FOR THE 567AK MIC.
2. END OF LIFE (EOL) TOLERANCE INCLUDING TEMPERATURE VARIATION BETWEEN 10° C AND 80° C.

[illegible]

*SEE NOTE 2

DC TO DC CONVERTER

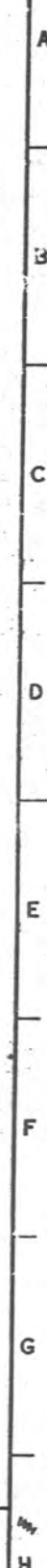
SD-82161-02-D2

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A vertical scale with labels A, B, C, D, E, F, G, and H. A horizontal line is drawn between D and E, and another between F and G.



BD 1

