

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																								
FS 1	B1	1																								
	B2	1																								
	B3	1																								
	B4	1																								
	B5	1																								
APP FIG. 1	C1	1																								
	C2	1																								
CIRCUIT NOTES EQUIPMENT NOTES INFORMATION NOTES	D1	1																								
CAD 1	G1	1																								
BD 1	H1	1																								

SHEET INDEX

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

DWG ISSUE	CD ISSUE	DATE ISSUED	Drawn	APPD
/	/	7-24-75	WFF	MMN
			DCB	LLC

SHEET INDEX NOTES

- WHEN CHANGES ARE MADE IN THIS DRAWING, ONLY THOSE SHEETS AFFECTED WILL BE REISSUED.
- 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.
- THE ISSUE NUMBER ASSIGNED TO A CHANGED OR NEW SHEET WILL BE THE SAME ISSUE NUMBER AS THAT OF THE SHEET INDEX.
- SHEETS THAT ARE NOT CHANGED WILL RETAIN THEIR EXISTING ISSUE NUMBER.
- 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	
MANUFACTURING TESTING REQUIREMENTS	X-18227

1M99
POWER SYSTEMS DC TO DC CONVERTER 184A POWER UNIT -48V INPUT +48V, 1.8 AMP OUTPUT
BELL TELEPHONE LABORATORIES INCORPORATED

2
6S

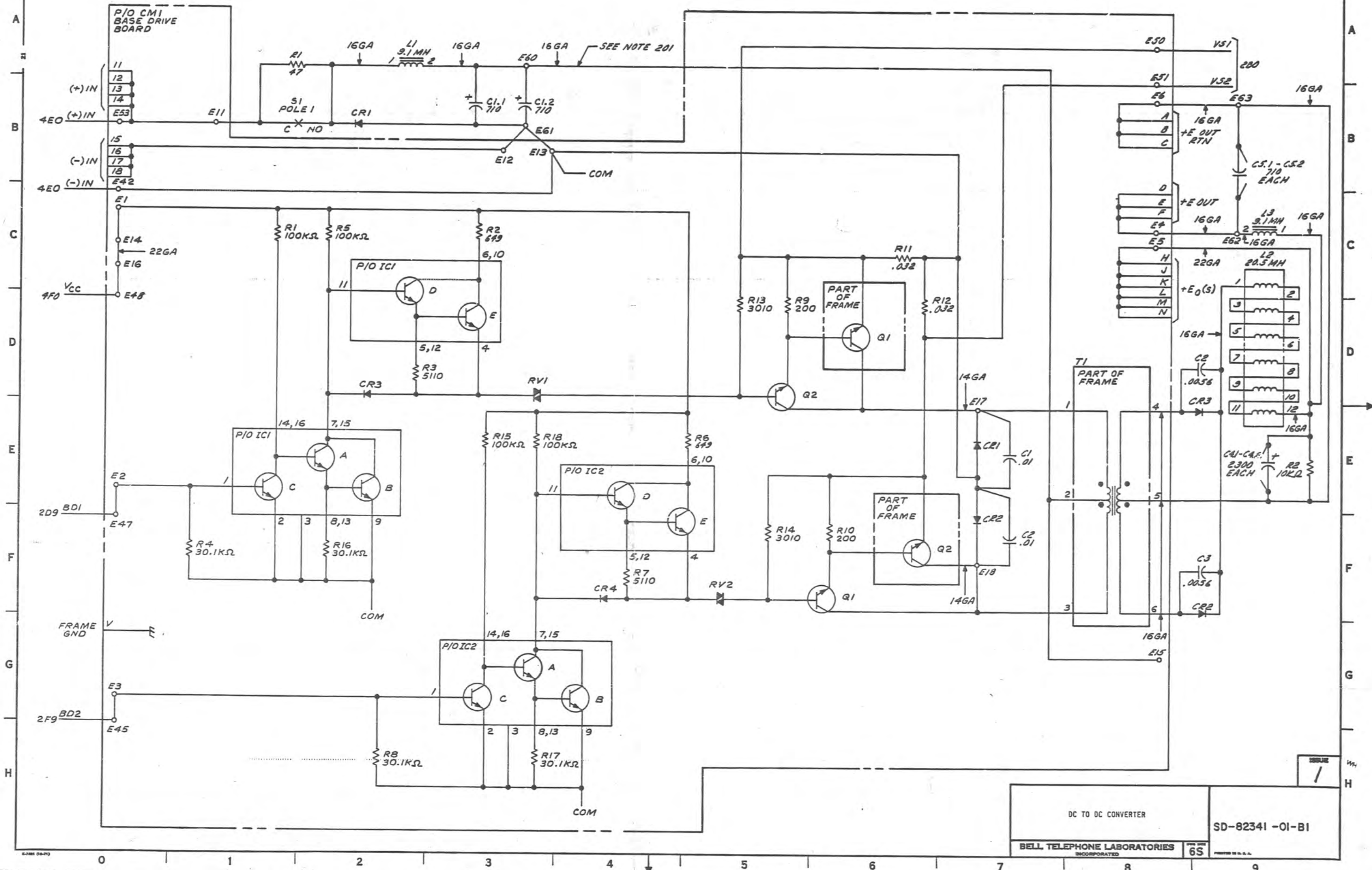
AT&TCO
STANDARD

SD-82341-01-A1

11 SHEETS

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PART OF FS1



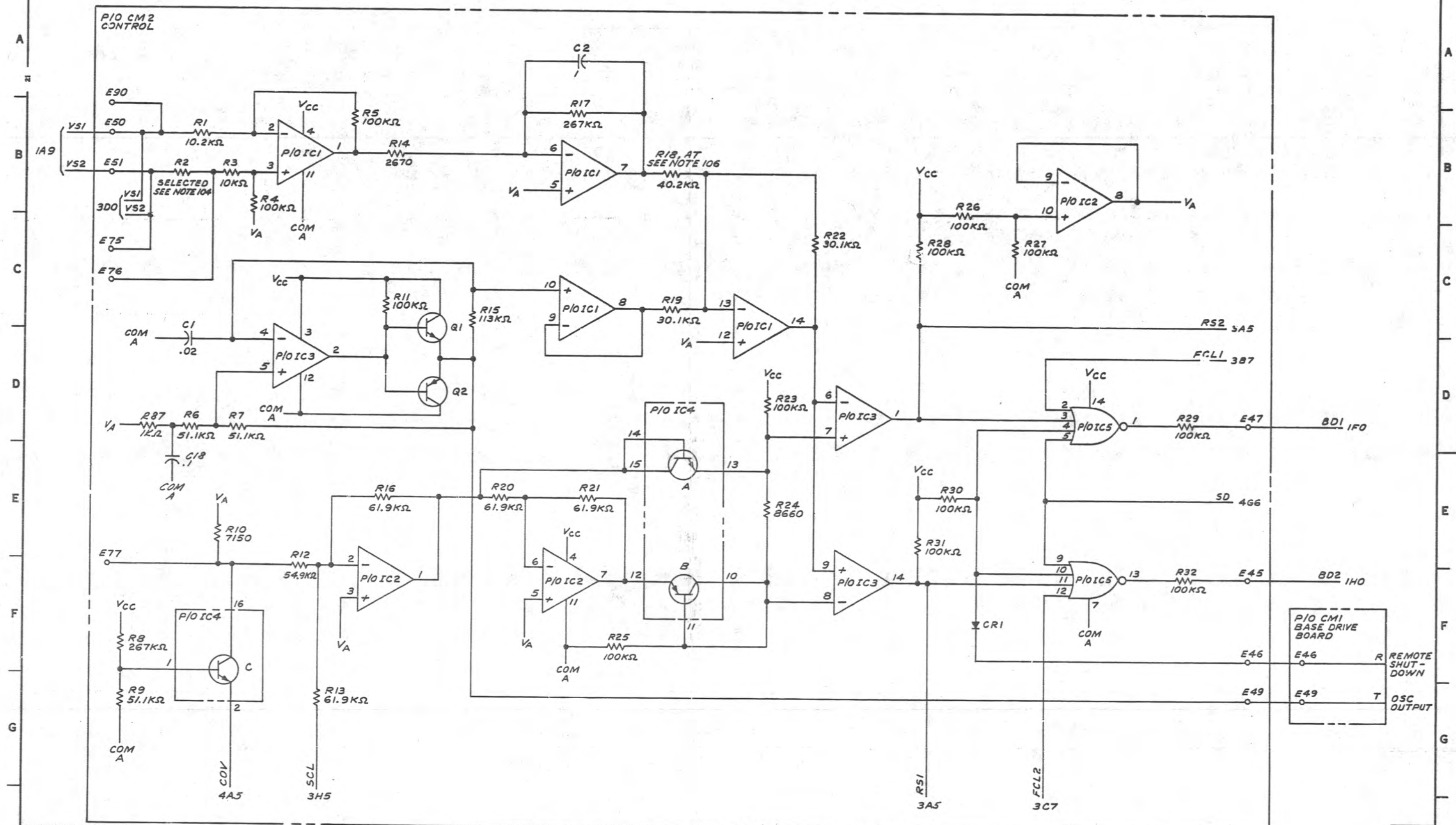
DC TO DC CONVERTER

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PART OF FSI



DC TO DC CONVERTER

BELL TELEPHONE LABORATORIES
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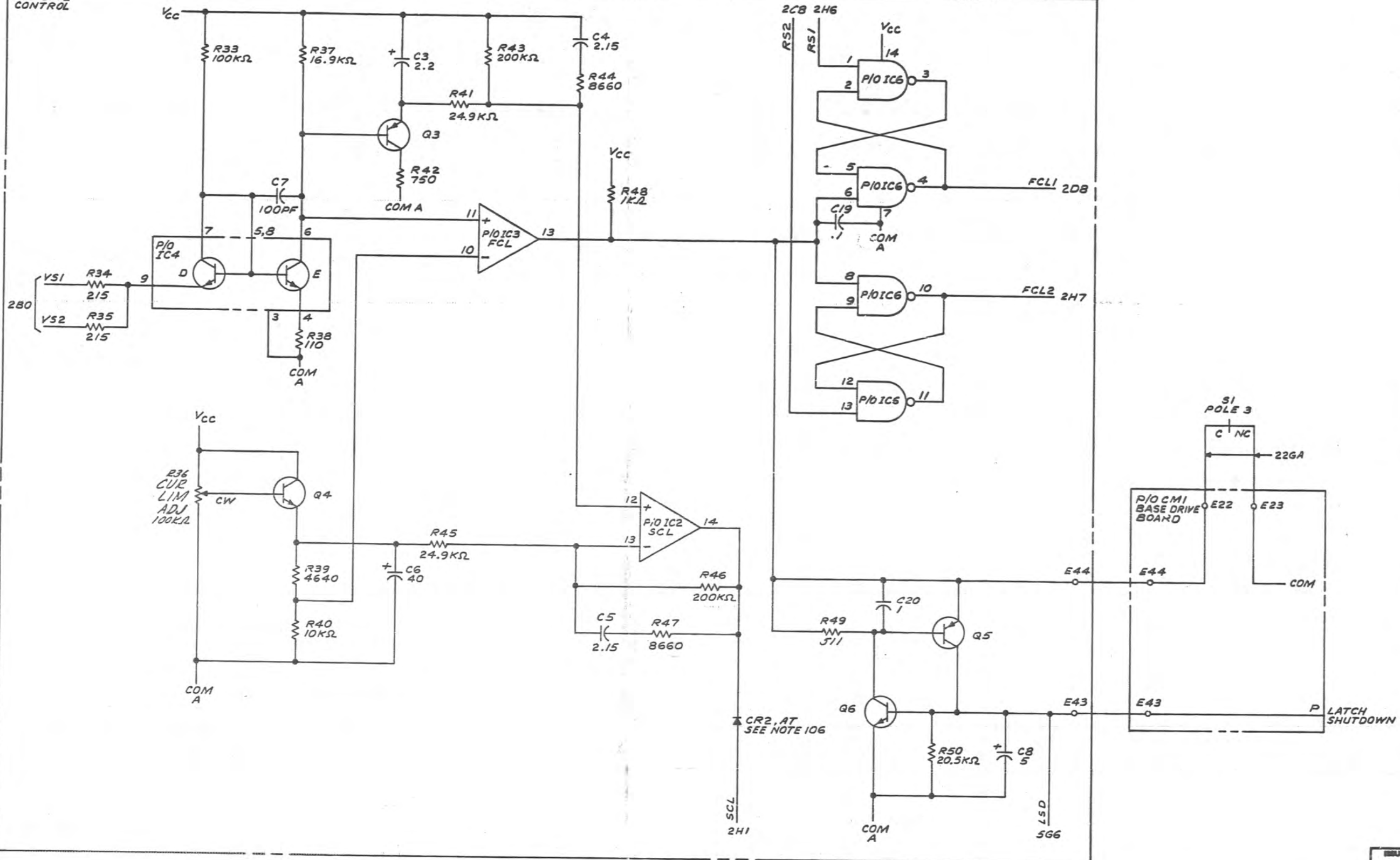
SD-82341 -OI-B2

69

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PART OF FSI

P/O CM2 CONTROL



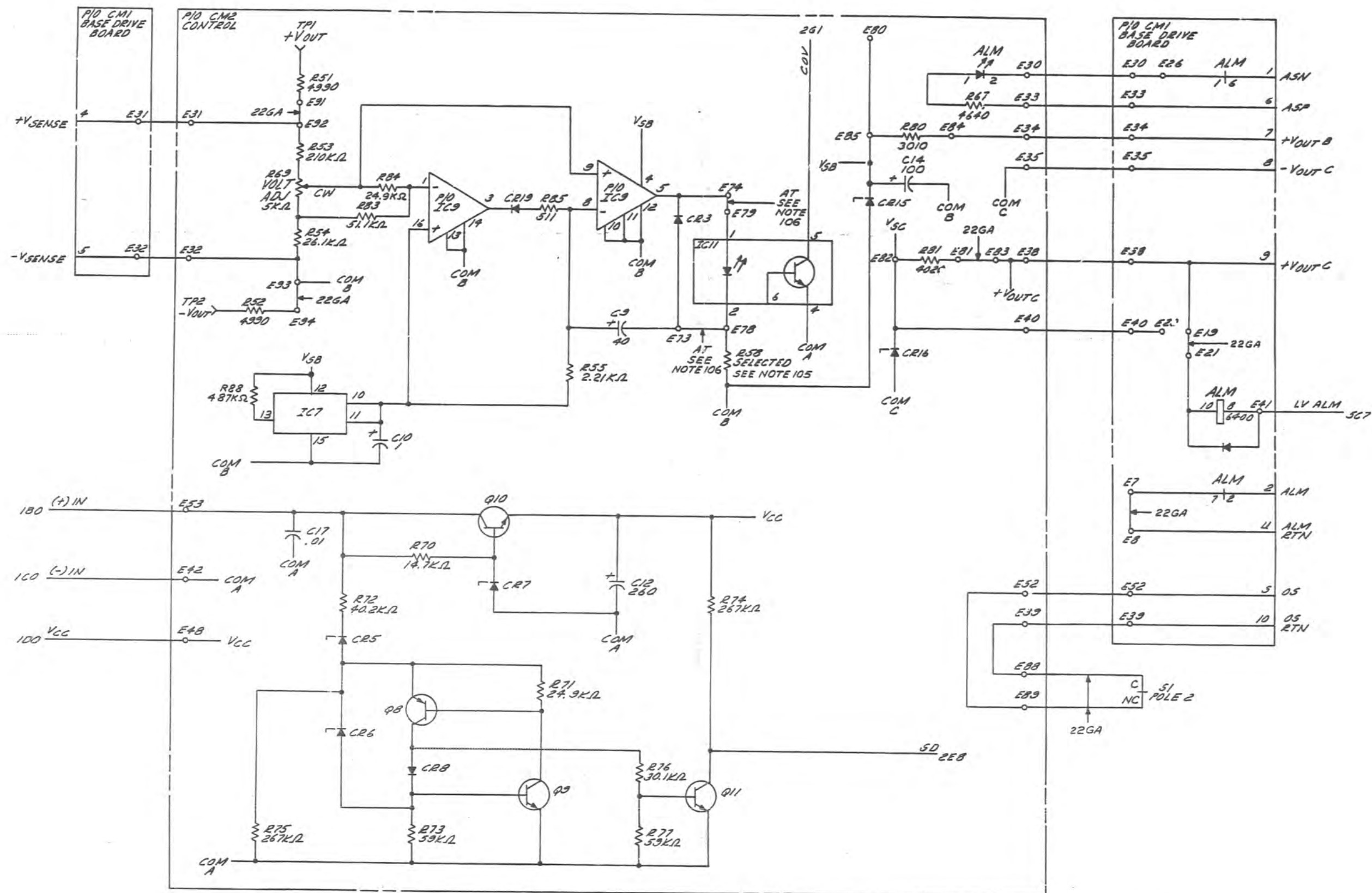
DC TO DC CONVERTER

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PART OF FSI



DC TO DC CONVERTER

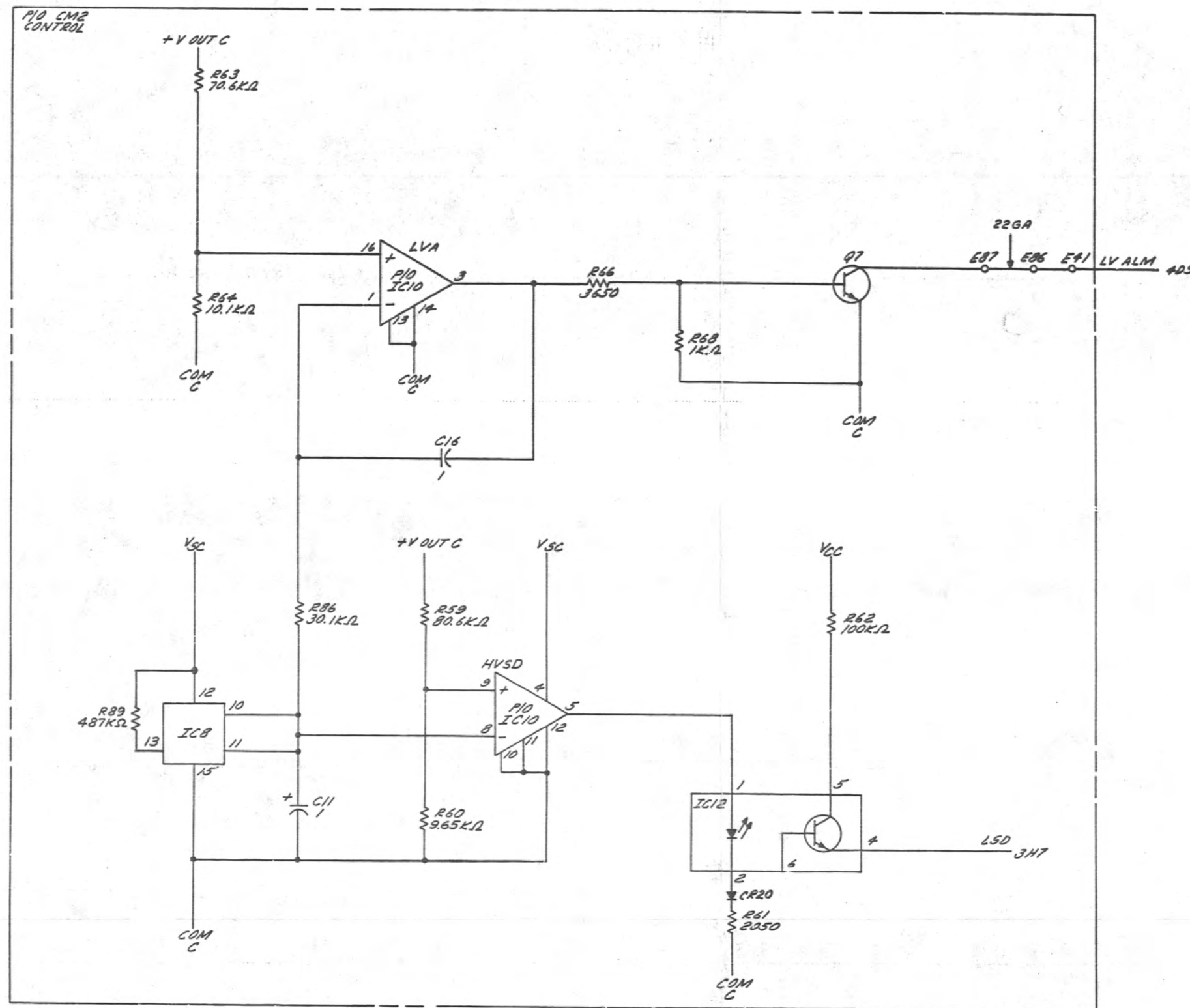
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SD-82341-01-B4

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PART OF FS 1



PART OF APP FIG. 1

CAPACITOR

DESIG	LOC	CODE
C1.1	1B3	6010717G060GP4, 710, SPRAGUE
C1.2	1B3	6010717G060GP4, 710, SPRAGUE
C2	1D9	KS-20977 L4, .0056
C3	1F9	KS-20977 L4, .0056
C4.1	1E9	602032G060A82A, 2300
C4.2	1E9	602032G060A82A, 2300
C5.1	1B9	6010717G060GP4, 710
C5.2	1B9	6010717G060GP4, 710

SPRAGUE

CONNECTOR

SEE NOTE 303

DIODE

DESIG	LOC	CODE
CR1	1B2	426A
CR2	1F9	485AB
CR3	1D9	485AB

INDUCTOR

DESIG	LOC	CODE
L1	1A2	1120J, 9.1MH
L2	1C9	1180A, 20.5MH
L3	1C9	1120J, 9.1MH

RESISTOR

DESIG	LOC	CODE
R1	1A1	383E47R00J, 47, SPRAGUE
R2	1E9	KS-20810 L1A, 10K Ω

SWITCH

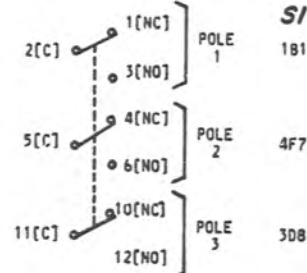
DESIG	LOC	CODE
S1	1A1	0140-3014, MC GILL MFG. CO.

TRANSFORMER

DESIG	LOC	CODE
T1	108	3184A

TRANSISTOR

DESIG	LOC	CODE
Q1	106	2N3773
Q2	1F6	2N3773



CIRCUIT MODULE

DESIG	LOC	CODE
CM1	1A0, 2F9, 3E8, 4A0, 4A7	841058985

E/W

RELAY

STRUTHERS-DUNN

ALM

(2)	(7)	4E8
(1)	(6)	4A8
(8)	(10)	408

CAPACITOR

DESIG	LOC	CODE
C1	1E7	KS-16048 L4, .01
C2	1F7	KS-16048 L4, .01

DIODE

DESIG	LOC	CODE
ALM	408	458A
CR1	1E7	426A
CR2	1F7	426A
CR3	1D2	458A
CR4	1F4	458A

INTEGRATED CIRCUIT

DESIG	LOC	CODE
IC1	1C2, 1E1	502G
IC2	1E4, 1G3	502G

RESISTOR

DESIG	LOC	CODE
R1	1C1	KS-20616 L1A, 100K Ω
R2	1C3	KS-20289 L6C, 649
R3	1D2	KS-20616 L1A, 5110
R4	1F1	KS-20616 L1A, 30.1K Ω
R5	1C2	KS-20616 L1A, 100K Ω
R6	1E5	KS-20289 L6C, 649
R7	1F4	KS-20616 L1A, 5110
R8	1H2	KS-20616 L1A, 30.1K Ω
R9	1D5	KS-20616 L1A, 200
R10	1F6	KS-20616 L1A, 200
R11	1C6	SPR-676-19, .032
R12	1D6	SPR-676-19, .032
R13	1D5	KS-20616 L1A, 3010
R14	1F5	KS-20616 L1A, 3010
R15	1E3	KS-20616 L1A, 100K Ω
R16	1F2	KS-20616 L1A, 30.1K Ω
R17	1H3	KS-20616 L1A, 30.1K Ω
R18	1E3	KS-20616 L1A, 100K Ω

TRANSISTOR

DESIG	LOC	CODE
Q1	1F6	KS-20838, L1
Q2	1D5	S-20838, L1

VARISTOR

DESIG	LOC	CODE
RV1	1D3	100A
RV2	1F5	100A

CIRCUIT MODULE

DESIG	LOC	CODE
P/O CM2	2A0, 3A0, 4A1, 5A1	841718596

E/W

CAPACITOR

DESIG	LOC	CODE
C1	2D1	577A, .02
C2	2A3	KS-20736 L1, 1
C3	3A3	605G, 2.2
C4	3A4	701C, 2.15
C5	3F4	701C, 2.15
C6	3F3	602A, 40
C7	3B2	KS-20676 L1, 100PF
C8	3G7	601A, 5
C9	4C4	602A, 40
C10	4D2	600A, 1
C11	5F2	600A, 1
C12	4E4	KS-16390 L25, 260
C14	4C6	KS-20362, L2, 100
C16	5D3	KS-20736, L1, 1
C17	4E2	KS-19774, L1, .01
C18	2E0	KS-20736, L1, .1
C19	3C6	KS-20736, L1, .1
C20	3F6	KS-20736, L1, 1

DIODE

DESIG	LOC	CODE
ALM	4A6	531G(LED)
CR1	2F6	458A
CR2	3G5	458A
CR3	4C4	458A
CR5	4F2	459AJ
CR6	4G2	459B
CR7	4E3	459AA
CR8	4G2	458A
CR15	4B5	426P
CR16	4D6	426P
CR19	4B3	458A
CR20	5G4	458A

INTEGRATED CIRCUIT

DESIG	LOC	CODE
IC1	2B1, 2B3, 2C3, 2C5	LM324N
IC2	2B7, 2F2, 2F3, 3E4	LM324N
IC3	2D1, 2D5, 2F5, 3C3	LM339N
IC4	2D4, 2F1, 3C1	502E
IC5	2D7, 2F7	CD4002AE
IC6	3B6, 3C6, 3D6	CD4011AE
IC7	4D2	502BP
IC8	5F1	502BP
IC9	4B3, 4B4	502F
IC10	5C3, 5F3	502F
IC11	4C4	TIL-111
IC12	5F4	TIL-111

NATIONAL SEMICONDUCTOR

RCA

TEXAS INSTRUMENT

POTENTIOMETER

DESIG	LOC	CODE
R36	3E1	KS-19646 L3A, 100K Ω
R6%	4B1	KS-19055 L10, 5K Ω

JACK (TEST POINT)

DESIG	LOC
TP1	4A1
TP2	4C1

SEALECTRO

DC TO DC CONVERTER

BELL TELEPHONE LABORATORIES
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CIRCUIT MODULE (CONT)

DESIG LOC CODE
P/O CM2 2A0, 3A0, 4A1 841718596

E/W

RESISTOR

DESIG	LOC	CODE
R1	2B1	KS-20616 L1A, 10.2KΩ
R2	2B0	KS-20616 L1A, SEE NOTE 104
R3	2B1	KS-20616 L1A, 10KΩ
R4	2B1	KS-20616 L1A, 100KΩ
R5	2B2	KS-20616 L1A, 100KΩ
R6	2D1	KS-20616 L1A, 51.1KΩ
R7	2D1	KS-20616 L1A, 51.1KΩ
R8	2F0	KS-20616 L1A, 267KΩ
R9	2G0	KS-20616 L1A, 51.1KΩ
R10	2E1	KS-20616 L1A, 7150
R11	2C2	KS-20616 L1A, 100KΩ
R12	2E1	KS-20616 L1A, 54.9KΩ
R13	2G2	KS-20616 L1A, 61.9KΩ
R14	2B2	KS-20616 L1A, 2670
R15	2C3	KS-20616 L1A, 113KΩ
R16	2E2	KS-20616 L1A, 61.9KΩ
R17	2B3	KS-20616 L1A, 267KΩ
R18	2B4	KS-20616 L1A, 40.2KΩ
R19	2C4	KS-20616 L1A, 30.1KΩ
R20	2E3	KS-20616 L1A, 61.9KΩ
R21	2E3	KS-20616 L1A, 61.9KΩ
R22	2C5	KS-20616 L1A, 30.1KΩ
R23	2D5	KS-20616 L1A, 100KΩ
R24	2E5	KS-20616 L1A, 8660
R25	2F4	KS-20616 L1A, 100KΩ
R26	2B6	KS-20616 L1A, 100KΩ
R27	2C7	KS-20616 L1A, 100KΩ
R28	2C6	KS-20616 L1A, 100KΩ
R29	2D8	KS-20616 L1A, 100KΩ
R30	2E6	KS-20616 L1A, 100KΩ
R31	2E6	KS-20616 L1A, 100KΩ
R32	2F8	KS-20616 L1A, 100KΩ
R33	3A1	KS-20616 L1A, 100KΩ
R34	3C1	KS-20616 L1A, 215
R35	3D1	KS-20616 L1A, 215
R37	3A2	KS-20616 L1A, 16.9KΩ
R38	3D2	KS-20616 L1A, 110
R39	3F2	KS-20616 L1A, 4640
R40	3F2	KS-20616 L1A, 10KΩ
R41	3B3	KS-20616 L1A, 24.9KΩ
R42	3B3	KS-20616 L1A, 750
R43	3A3	KS-20616 L1A, 200KΩ
R44	3B4	KS-20616 L1A, 8660
R45	3E3	KS-20616 L1A, 24.9KΩ
R46	3F5	KS-20616 L1A, 200KΩ
R47	3F4	KS-20616 L1A, 8660
R48	3C4	KS-20616 L1A, 1KΩ
R49	3F6	KS-20616 L1A, 511
R50	3G6	KS-20616 L1A, 20.5KΩ
R51	4A2	KS-20616 L1A, 4990
R52	4C1	KS-20616 L1A, 4990
R53	4B2	KS-20616 L1A, 210KΩ
R54	4C2	KS-20616 L1A, 26.1KΩ
R55	4D3	KS-20616 L1A, 2.21KΩ
R58	4D4	KS-20616 L1A, SEE NOTE 105
R59	5E3	KS-16764 L1F, 80.6KΩ
R60	5F3	KS-16764 L1F, 9.65KΩ
R61	5G4	KS-20616 L1A, 2050
R62	5E5	KS-20616 L1A, 100KΩ
R63	5A1	KS-16764 L1F, 70.6KΩ
R64	5C1	KS-16764 L1F, 10.1KΩ
R66	5C4	KS-20616 L1A, 3650
R67	4B6	KS-20289 L6C, 4640
R68	5C4	KS-20616 L1A, 1KΩ
R70	4E2	KS-20616 L1A, 14.7KΩ
R71	4F3	KS-20616 L1A, 24.9KΩ
R72	4F2	KS-20616 L1A, 40.2KΩ
R73	4G2	KS-20616 L1A, 59KΩ

RESISTOR (CONT)

DESIG	LOC	CODE
R74	4F4	KS-20616 L1A, 267KΩ
R75	4G1	KS-20616 L1A, 267KΩ
R76	4G4	KS-20616 L1A, 30.1KΩ
R77	4G4	KS-20616 L1A, 59KΩ
R80	4A5	KS-20289 L6C, 3010
R81	4C6	KS-20289 L6C, 4020
R83	4B2	KS-20616 L1A, 51.1KΩ
R84	4B2	KS-20616 L1A, 24.9KΩ
R85	4B3	KS-20616 L1A, 511
R86	5E2	KS-20616 L1A, 30.1KΩ
R87	2D0	KS-20616 L1A, 1000
R88	4D1	KS-20616 L1A, 487KΩ
R89	5F1	KS-20616 L1A, 487KΩ

TRANSISTOR

DESIG	LOC	CODE
Q1	2C2	66J
Q2	2D2	51A
Q3	3B3	51A
Q4	3E2	66J
Q5	3F7	51A
Q6	3G6	66J
Q7	5C5	66J
Q8	4F2	51A
Q9	4G3	66R
Q10	4E3	KS-20838 L1
Q11	4G4	66R

ISSUE

/

DC TO DC CONVERTER

SD-82341-01-C2

BELL TELEPHONE LABORATORIES
INCORPORATEDCIRCUIT SIZE
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CIRCUIT NOTES:

DESIG	FUSE AMP	POTENTIAL	QUANTITY
	5	-48	
BATTERY SYMBOL		VOLTAGE RANGE	
-48V		-42.75 TO -52.5	

FEATURE OR OPTION	PROVIDE		
	APP FIG.	APP OR FIG.	QUANTITY

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

CIRCUIT NOTES: (CONT)

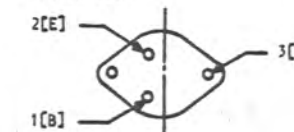
104. RESISTOR (R2) SELECTED AT TEST. OBTAIN THE FOLLOWING VALUES:
10.0, 19.6, 30.1, 40.2, 51.1, 60.4, 69.8, 80.6, 90.9, 100, 110, 121, 130, 140, 150, 162, 164, 182, 191, 200, 210, 221, 232, 243, 249, 261, 267, 280, 287, 301, 309, 324, 332, 340, 349, 357, 374, 383, 392, 402.
105. RESISTOR (R58) SELECTED AT TEST. OBTAIN THE FOLLOWING VALUES:
294, 432, 549, 768, 1270, 1780, 2490.
106. COMPONENTS AND STRAPS DESIGNATED "AT" ARE TO BE INSERTED AT TEST.
107. THE CURRENT DRAINS ARE:
LIST 1 = $0.07 + 60 \left(\frac{I_{OUT}}{48} \right)$
LIST 2 = $0.08 + 60 \left(\frac{I_{OUT}}{42.75} \right)$
(I_{OUT} AND LISTS 1 AND 2 ARE IN AMPERES)
108. RELAY (ALM) CONTACTS ARE RATED AT:
500 MILLIAMPERES MAXIMUM,
200 VOLTS MAXIMUM, BUT, THE PRODUCT (VOLTS X AMPS) OF THE TWO MUST NOT EXCEED 10 V_A .

EQUIPMENT NOTES:

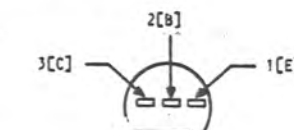
201. THE WIRE CONNECTING (+) C1.2 AND TERMINAL 2 OF T1 IS HARD WIRED TO THE CONNECTOR BLOCK ON T1.
202. UNLESS OTHERWISE SPECIFIED ALL WIRE SHALL BE KS-19195 L1, 12GA STRANDED.
203. C1 AND C2 ON CM1 ARE TO BE HARD WIRED TO THE PIGTAILS OF CR1 AND CR2.
204. CONNECTIONS MADE BETWEEN CM1 AND CM2 BY MEANS OF A FST-22A-24 PRINTED CIRCUIT BOARD JUMPER, MANUFACTURED BY ANSLEY MANUFACTURING CORP.
205. ALL THE CONNECTOR STRAPPING, SHOWN IN CAD 1 MUST BE EQUIVALENT TO NO.18 AWG.

INFORMATION NOTES:

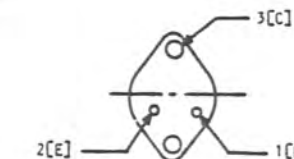
301. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
302. INFORMATION SHOWN IN [] IS FOR REFERENCE ONLY.
303. CONNECTOR ON FRAME IS KS-21244, L1.
304. THE TERMINAL NUMBER ASSIGNMENT OF THE KS-20838, L1 TRANSISTOR IS:



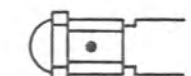
305. THE TERMINAL NUMBER ASSIGNMENT OF THE 51A, 66J AND 66R TRANSISTOR IS:



306. THE TERMINAL NUMBER ASSIGNMENT OF THE 2N3773 TRANSISTOR IS:



307. THE TERMINAL ARRANGEMENT OF THE 531G (LED) DIODE IS:



HIGHEST CAP., DIODE, RES, TRANSISTOR USED ON THIS DRAWING				
FRAME MOUNTED	C5.2	CR3	R2	Q2
	NOT USED			
CM1	C2	CR4	R18	Q2
	NOT USED			
CM2	C20	CR20	R87	Q11
	NOT USED			
	C13, C15	CR4, CR9-CR14	R56, R57, R63	
	CR17, CR18 R78, R79, R82			

DC TO DC CONVERTER

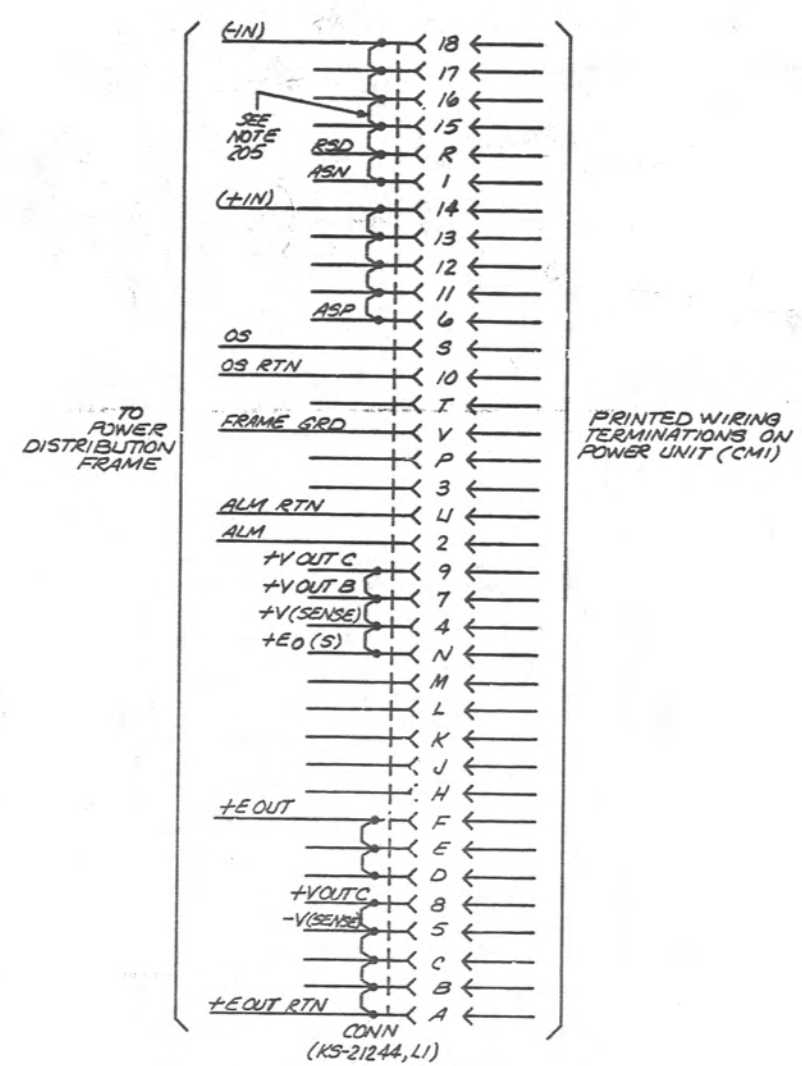
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CAD 1 (FOR APP FIG. 1)



BD 1

