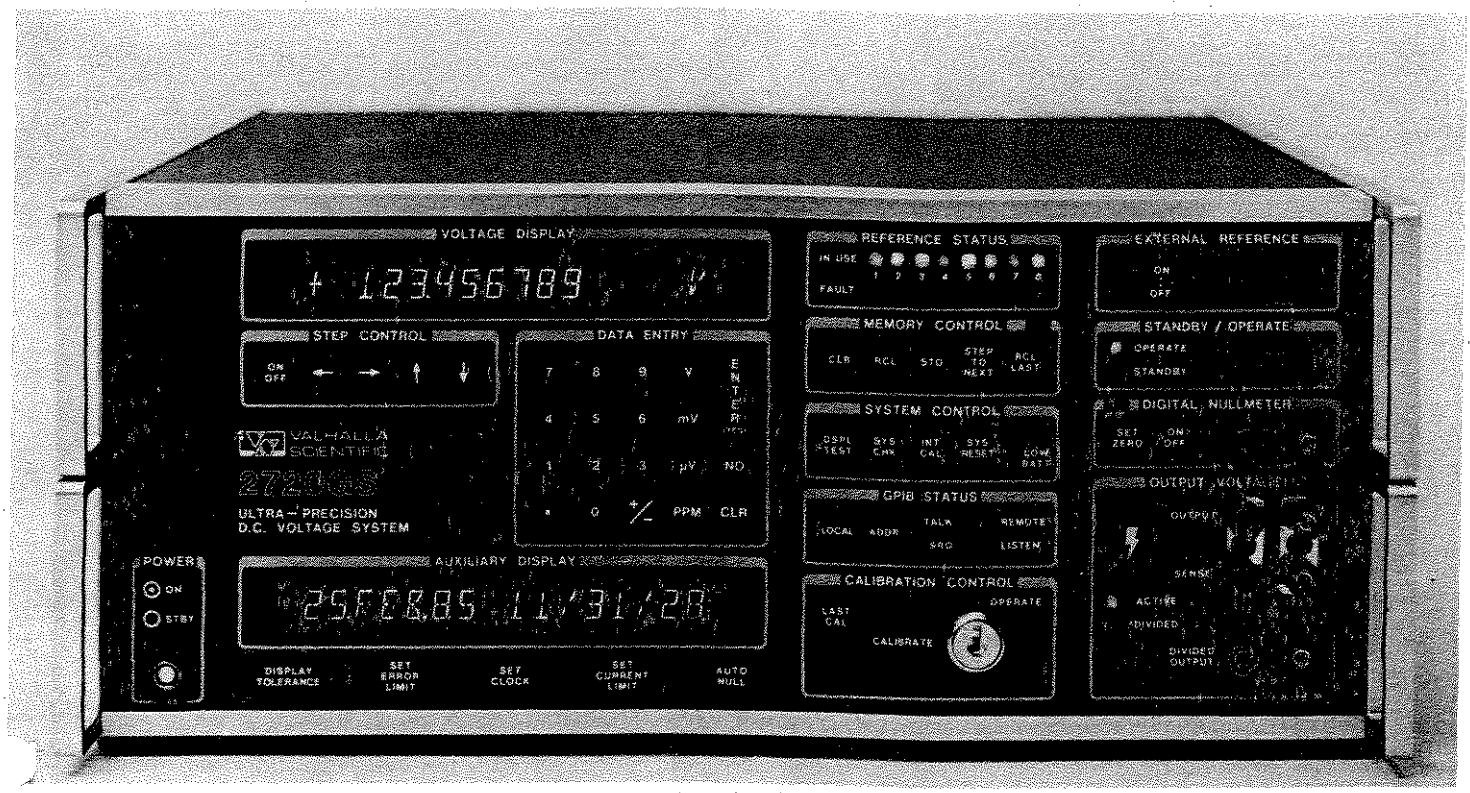
VOLUME 2

2720 GS

ULTRA-PRECISION DC VOLTAGE SYSTEM

OPERATION AND MAINTENANCE MANUAL

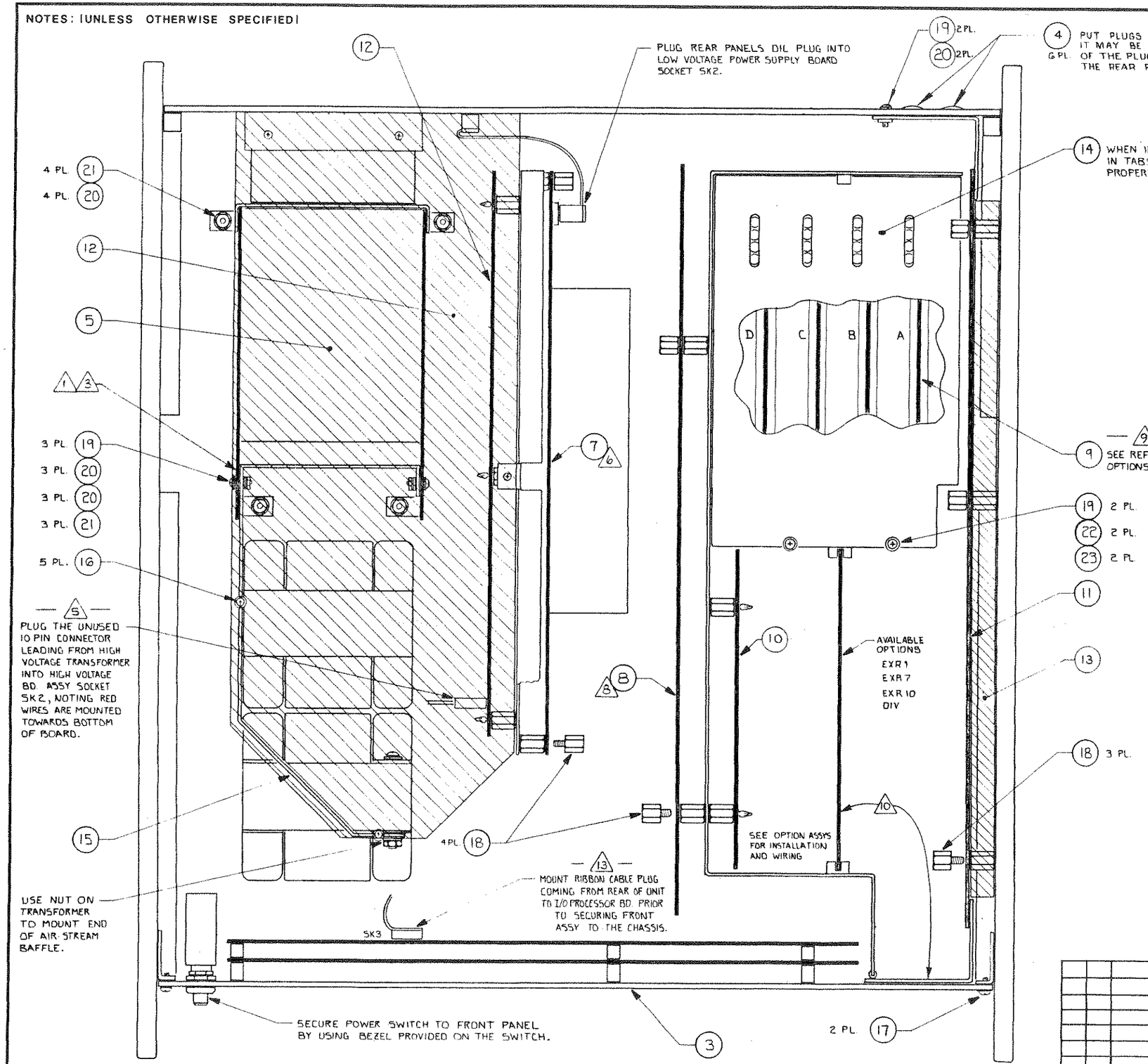


VALHALLA SCIENTIFIC
9955 Mesa Rim Rd
San Diego, Ca 92121
Telex 181750

REVISED 07/18/85

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
	A	RELEASED WPW	6-7-84	
542	B	ADD ORDER OF ASSY. INSTR.	8-14-84	
647	C	ADDED HOLE PLUGS. RDN	1-7-85	



REFERENCE MODULE OPTIONS

OPTION	* REF BDS.	LOCATIONS
HSR	4 BDS.	A,B,C,D
GS	3 BDS.	A,B,C
54-4T	2 BDS.	A,B

ALL REFERENCE BDS ARE TO BE COMPLETELY SOAKED AND TAKEN FROM 2710 REFERENCE SYSTEM. ANY GRADE BOARD MAY BE USED IN OPTION 54-4T. GS OR HSR GRADE BOARDS MAY BE USED IN OPTION GS. ONLY HSR GRADE BOARDS MAY BE USED IN OPTION HSR. BOARDS MUST BE COMPLETELY INSERTED INTO CARD GUIDES.

SUGGESTED ORDER OF ASSEMBLY

1. MOUNT AIR BAFFLE TO AMPLIFIER ASSEMBLY.
2. DISASSEMBLE SIDERAILS FROM RIGHT SIDE OF UNIT (REMOVE REAR PANEL ASSEMBLY).
3. MOUNT AMPLIFIER ASSEMBLY AND AIR BAFFLE.
4. MOUNT HIGH-VOLTAGE POWER SUPPLY ASSEMBLY. RE-INSTALL RIGHT SIDE RAILS AND REAR PANEL.
5. PLUG TRANSFORMER INTO HIGH-VOLTAGE POWER SUPPLY ASSEMBLY.
6. MOUNT LOW-VOLTAGE POWER SUPPLY ASSEMBLY.
7. CONNECT REAR PANELS DIL PLUG TO CONNECTOR ON LOW-VOLTAGE POWER SUPPLY.
8. MOUNT MAIN MICROPROCESSOR ASSEMBLY.
9. INSTALL REFERENCE MODULES.
10. WIRE NULLMETER AND OUTPUT SYSTEM ASSEMBLIES TOGETHER.
11. PUT ON REFERENCE MODULE COVER.
12. PUT ON HIGH VOLTAGE COVER.
13. MOUNT FRONT ASSEMBLY BY FIRST CONNECTING RIBON CABLE, THEN, SECURING FRONT ASSEMBLY.
14. MOUNT TOP BEZEL AND COVER.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X° = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL: SEE PARTS LIST

FINISH

DRAWN WPW	6-7-84
CHECKED	6-12-84
APPR	6-12-84
STK NO	

Valhalla Scientific Inc. SAN DIEGO CA

FINAL CHASSIS ASSY

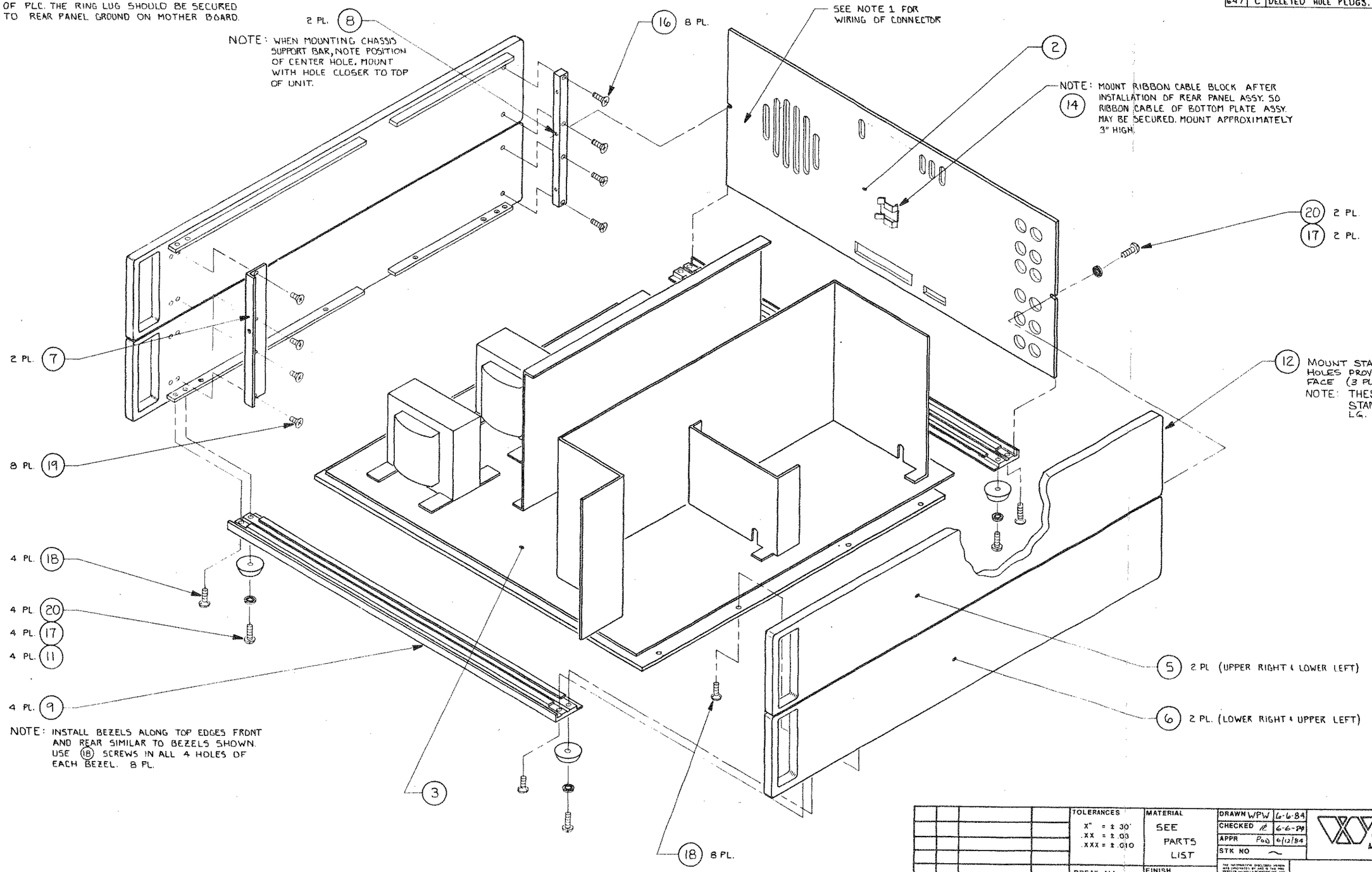
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-400	

SHEET 1 OF 2

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. WHEN INSTALLING REAR PANEL ASSY CONNECT THE PANEL'S SOCKET TO PLC OF MOTHER BOARD MATCHING PIN 1 OF SOCKET TO PIN 1 OF PLC. THE RING LUG SHOULD BE SECURED TO REAR PANEL GROUND ON MOTHER BOARD.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
470	A	RELEASED WPW	6-6-84	
545	B	MODIFIED STANDOFF(.20LG.) RDN	12-10-84	
647	C	DELETED HOLE PLUGS. RDN	1-7-84	



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES: X" = ± .30', .XX = ± .03, .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL: SEE PARTS LIST

FINISH: ~

DRAWN	WPW	6-6-84
CHECKED	[illegible]	6-6-84
APPR	RDN	6/12/84
STK NO	~	

Valhalla Scientific Inc. SAN DIEGO, CA

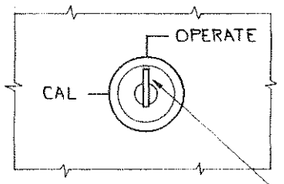
INITIAL CHASSIS ASSY.

SCALE 1:2 | SHEET 1 OF 2

CODE IDENT	SIZE	DRAWING NO	REV
53504	D	2720-404	C

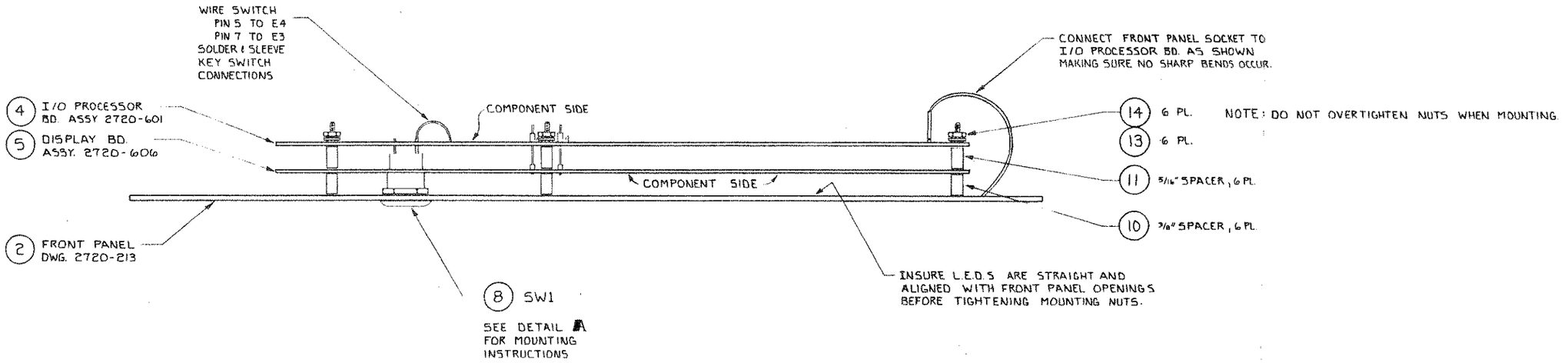
NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
424	A	RELEASED WPW	4-27-84	PBJ
633	B	DELETE REALTIME CLOCK BD. RON	12-10-84	PBJ



DETAIL A
SCALE: NONE

NOTE POSITION OF KEYHOLE RELATIVE TO FRONT PANEL MARKS. MOUNT SWITCH WITH NUT PROVIDED. DO NOT OVERTIGHTEN NUT.



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X° = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64√

MATERIAL
SEE PARTS LIST

FINISH
~

DRAWN WPW	4-25-84	
CHECKED PL	4-27-84	
APPR PBJ	4-27-84	
STK NO ~		

Valhalla Scientific Inc.
SAN DIEGO, CA

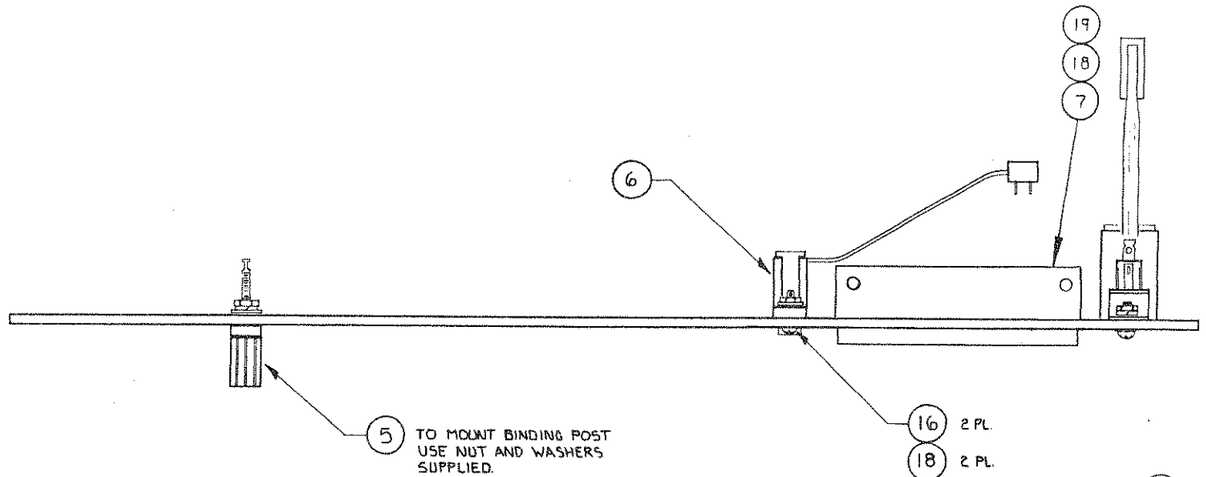
FRONT ASSY.

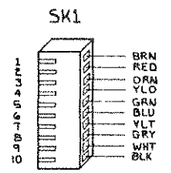
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-401	B

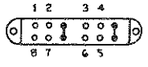
SHEET 2 OF 2

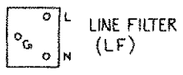
NOTES: (UNLESS OTHERWISE SPECIFIED)

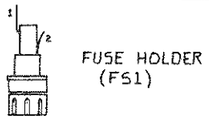
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
420	A	DWG. RELEASED WPW	4-20-84	
469	B	UPDATED PARTS LIST	6-6-84	
535	C	UPDATED PARTS LIST RDN	12-10-84	

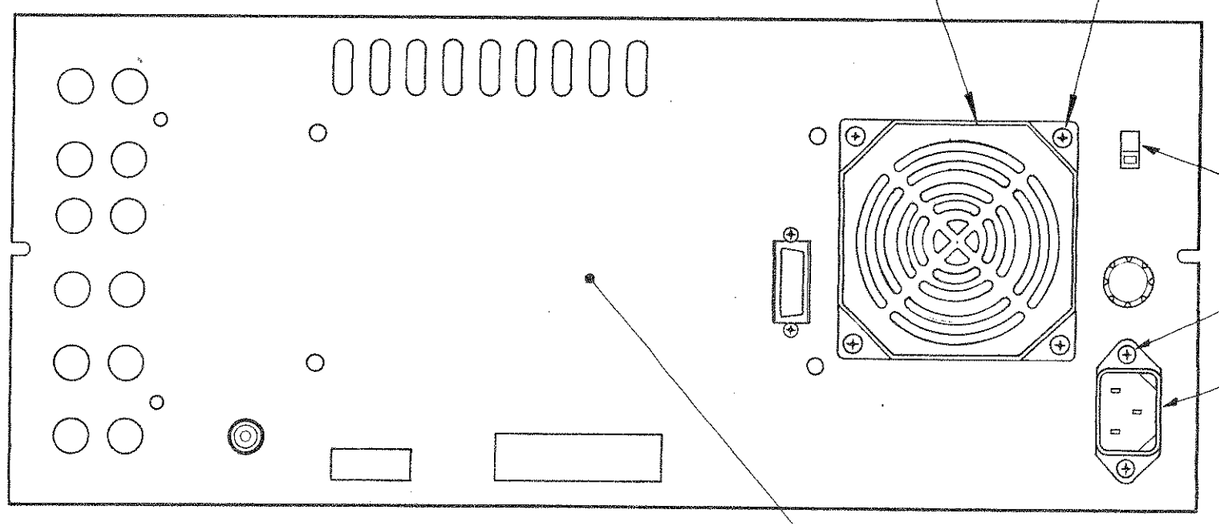


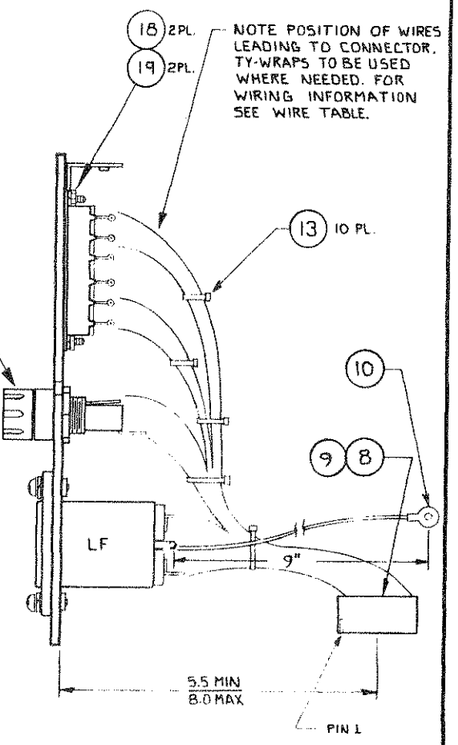












WIRE TABLE

FROM	TERMINATION	TO	TERMINATION	AWG	COLOR
SK1-1	CT	SW1-2	S-S	18	BRN
SK1-2	CT	SW1-7	S-S	18	RED
SK1-3	CT	SW1-3	S-S	18	ORN
SK1-4	CT	SW1-5	S-S	18	YLO
SK1-5	CT	SW1-4	S-S	18	GRN
SK1-6	CT	SW1-6	S-S	18	BLU
SK1-7	CT	LF-N	S-S	18	VLT
SK1-8	CT	SW1-1	S-S	18	GRY
SK1-9	CT	FS1-2	S-S	18	WHT
SK1-10	CT	SW1-8	S-S	18	BLK
FS1-1	S-S	LF-L	S-S	16	BLK
LF-G	S-S	#6 SOLDER LUG	S-S	16	GRN

NOTE: CT → CRIMP TERMINAL
S-S → SOLDER & SLEEVE


CRIMP TERMINAL TO WIRE

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X° = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES
64

MATERIAL
SEE PARTS LIST

FINISH
~

DRAWN WPW 4-20-84
CHECKED [illegible] 4-20-84
APPR [illegible] 4-30-84
STK NO ~

Valhalla Scientific Inc.
SAN DIEGO CA

REAR PANEL ASSY

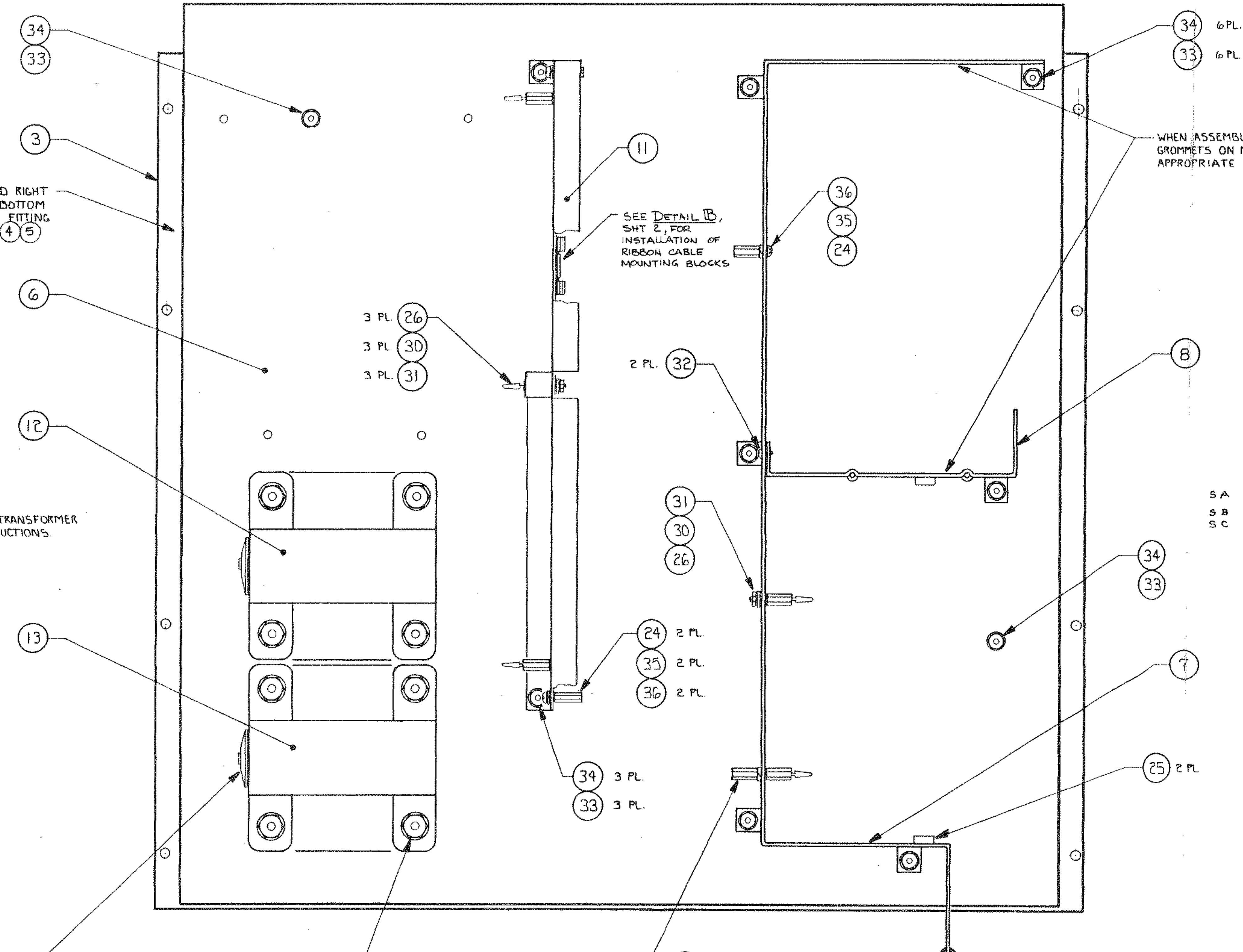
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
NONE	53504	D	2720-402	C

SHEET 3 OF 3

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. VISUALLY INSPECT MOTHER BD. ASSY FOR ANY DEFECTS BEFORE INSTALLING.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
457	A	RELEASED WPW	5-21-84	
544	C	REMOVE CLASPON SOCKET. RDN	12-10-84	



(22)(23) NOTE: MOUNT TY-WRAP BLOCKS FLUSH TO TOP OF TRANSFORMERS. TY-WRAP THE FOUR PIN CONNECTORS' WIRES TO THE BLOCKS CREATING A SERVICE LOOP IN THE WIRES, REFER TO SHT. 2.

(31) 8 PL.
(30) 6 PL. SOLDER LUGS ARE USED IN 2 PL SEE SHT. 2.

(24)
(35)
(26)

RUBBER CHANNEL (16) IS TO FIT FLUSH WITH TOP & BOTTOM OF WRAP, TO SECURE USE RTV GLUE.

TRANSFORMER WIRING

(12) HIGH VOLTAGE TRANSFORMER

PIN #	WIRE	CONNECTOR PIN
1	BLK	1
2	WHT	2
3	BRN	3
4	GRY	4

CONNECT TO PLD ON MOTHER BD

PIN #	WIRE	CONNECTOR PIN
7	GRN	1
8	VIO	2
9	YLO	3
10	VIO	4
11	GRN	5
NOT USED		6
NOT USED		7
5	RED	8
NOT USED		9
6	RED	10

NOT CONNECTED ON THIS ASSY.

S A WHT/ORN — SOLDER LUG TO TRANSFORMER MOUNT
S B WHT/YEL — SOLDER TO BEAD PIN (E9)
S C WHT/GRN — SOLDER TO BEAD PIN (E10)

(13) LOW VOLTAGE TRANSFORMER

PIN #	WIRE	CONNECTOR PIN
4	GRY	1
3	BRN	2
2	WHT	3
1	BLK	4

CONNECT TO PLE ON MOTHER BD

PIN #	WIRE	CONNECTOR PIN
NOT USED		1
20	YLO	2
18	VIO	3
17	BLU	4
16	VIO	5
NOT USED		6
15	RED	7
14	RED	8
19	GRN	9
21	GRN	10

CONNECT TO PLA ON MOTHER BD

PIN #	WIRE	CONNECTOR PIN
7	BRN	1
5	BRN	2
6	W/BRN	3
SB	W/ORN	4
SC	W/YLO	5
13	RED/YEL	6
12	RED	7
11	RED	8
9	BLU	9
8	VIO	10
10	VIO	11

CONNECT TO PLB ON MOTHER BD.

S A and D (W/GRN, W/RED) — SOLDER LUG TO TRANSFORMER MOUNT

TOLERANCES	X° = ± 30′	.XX = ± .03 / .XXX = ± .010
MATERIAL	SEE PARTS LIST	
FINISH	~	
BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64√		
DRAWN	WPW	5-21-84
CHECKED		5-25-84
APPR		6/12/84
STK NO	~	
DASH NO	QTY REQD	NEXT ASSEMBLY / USED ON

Valhalla Scientific Inc. SAN DIEGO, CA

BOTTOM PLATE ASSY.

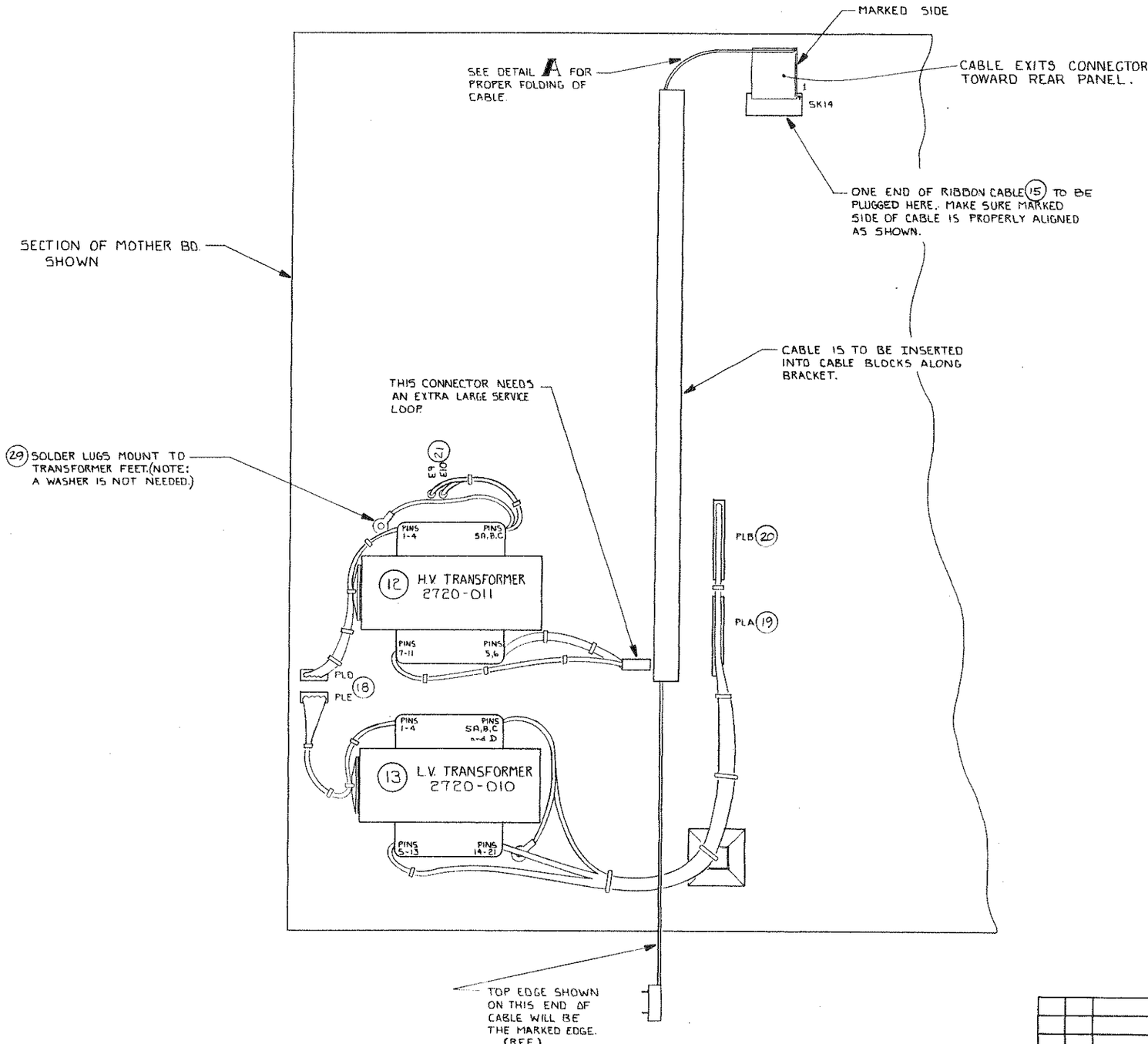
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-405	C

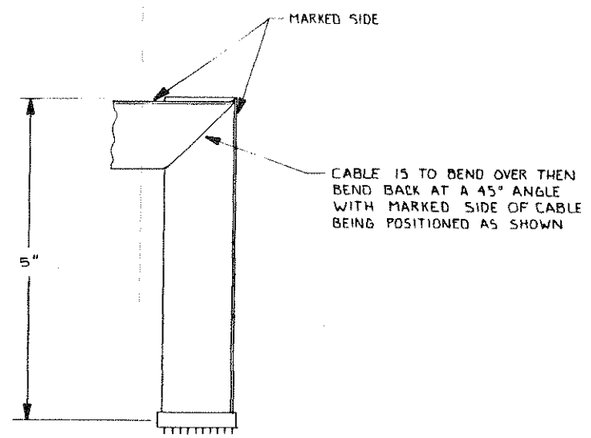
SHEET 1 OF 4

NOTES: (UNLESS OTHERWISE SPECIFIED)

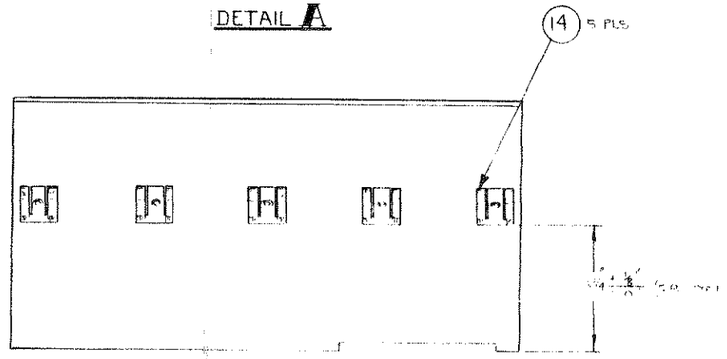
1. ALL WIRING MUST ALLOW FOR SERVICING LOOPS.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHT. 1		





DETAIL A



DETAIL B

SPACE 5 EA. ITEM (14) EVENLY ACROSS BRACKET POINTING UPWARD AS SHOWN.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES: X = ± 30', .XX = ± .03, .XXX = ± .010

MATERIAL

BREAK ALL SHARP CORNERS AND EDGES. MACH. SURFACES 64

FINISH

DRAWN	WPW	5-21-84
CHECKED	R	5-25-84
APPR	POW	6/12/84
STK NO	—	

Valhalla Scientific Inc. SAN DIEGO, CA

BOTTOM PLATE ASSY

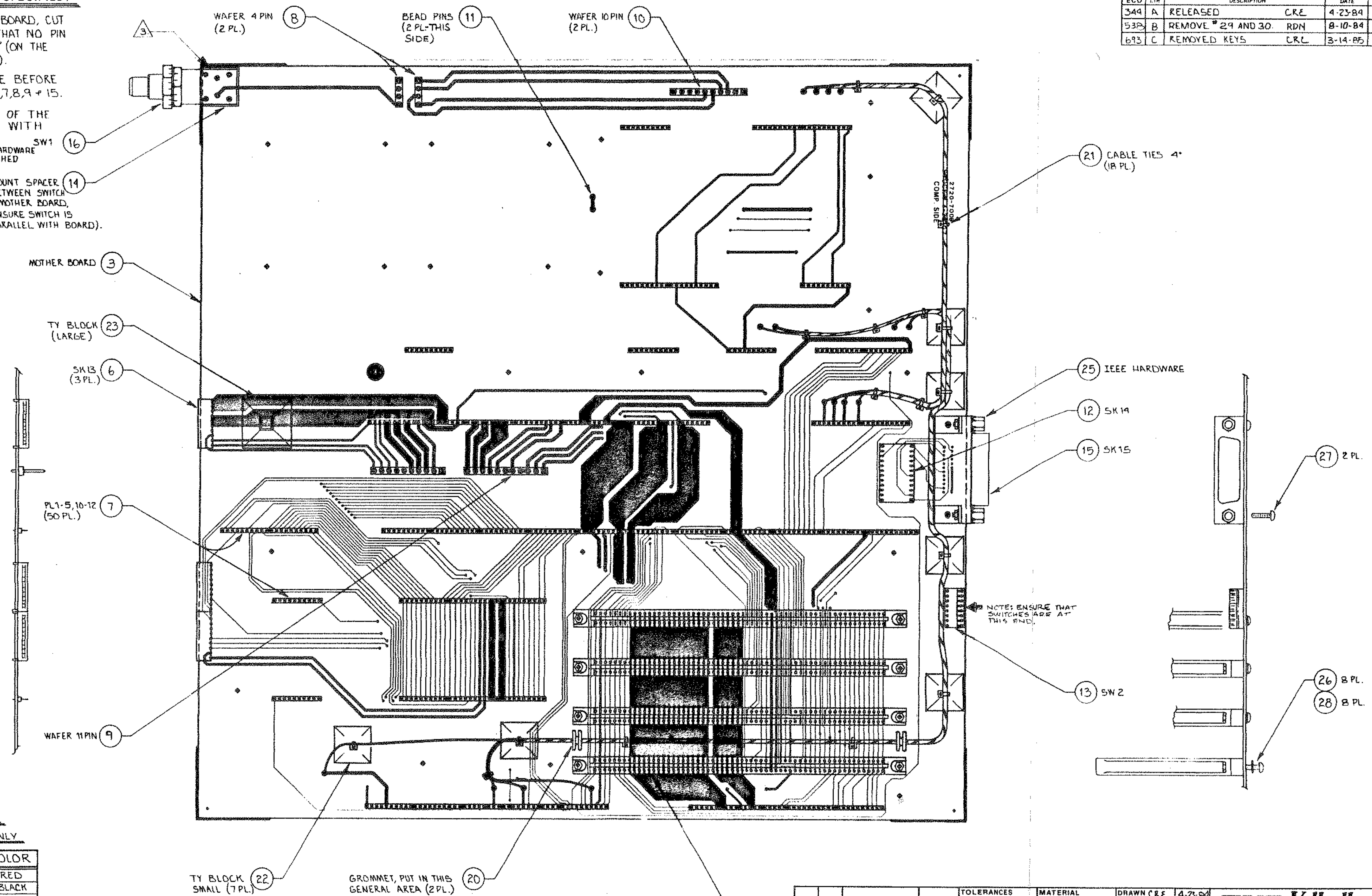
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-405	C

SHEET 2 OF 4

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. AFTER ASSEMBLING ENTIRE BOARD, CUT ALL PINS + WIRES BACK SO THAT NO PIN OR WIRE IS LONGER THAN 1/8" (ON THE SOLDER SIDE OF THE BOARD).
2. TIGHTEN DOWN ALL HARDWARE BEFORE SOLDERING THE PINS OF SK6,7,8,9 + 15.
3. (△) CUT THE TOP PINS OFF OF THE POWER SWITCH AND COVER WITH ELECTRICAL TAPE.

REVISIONS					
ECO	LTR	DESCRIPTION		DATE	APPROVED
349	A	RELEASED	CRE	4-23-84	
538	B	REMOVE #29 AND 30.	RDN	8-10-84	
693	C	REMOVED KEYS	CRL	3-14-85	



WIRE TABLE

USE TEFLON WIRE ONLY

FROM	TO	COLOR
E1	E11	RED
E2	E12	BLACK
E3	E13	WHITE
E4	E14	GREEN
E5	E15	RED
E6	E16	BLACK
E7	E17	WHITE
E8	E18	GREEN

(SLIGHTLY TWIST WIRE BUNDLES)

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON
	1		2720

TOLERANCES: X = ± 30' ; .XX = ± .03 ; .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64✓

MATERIAL: —

FINISH: —

DRAWN CRE 4-23-84 | CHECKED 4-24-84 | APPR 6-7-84 | STK NO —

Valhalla Scientific Inc. SAN DIEGO, CA

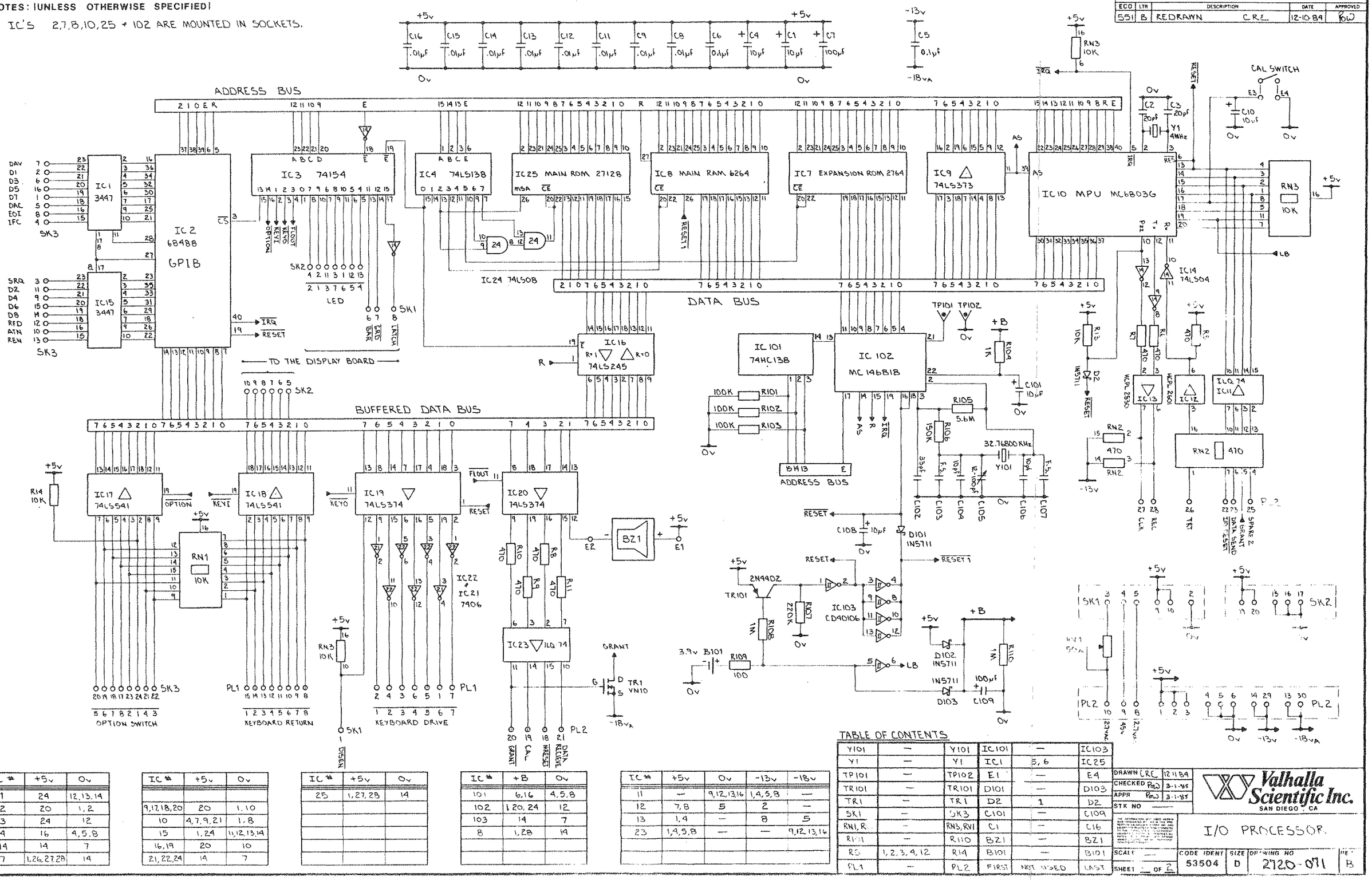
MOTHER BOARD ASSEMBLY

SCALE 1:1 | SHEET 3 OF 3 | CODE IDENT 53504 | SIZE D | DRAWING NO 2720-600 | REV C

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. IC'S 2,7,8,10,25 & 102 ARE MOUNTED IN SOCKETS.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
551	B	REDRAWN C.R.E.	12-10-84	BWD



IC #	+5v	0v
1	24	12,13,19
2	20	1,2
3	24	12
4	16	4,5,8
14	14	7
7	1,26,27,28	14

IC #	+5v	0v
9,17,18,20	20	1,10
10	4,7,9,21	1,8
15	1,24	11,12,13,14
16,19	20	10
21,22,24	14	7

IC #	+5v	0v
25	1,27,28	14

IC #	+B	0v
101	6,16	4,5,8
102	1,20,24	12
103	14	7
8	1,28	19

IC #	+5v	0v	-13v	-18v
11	—	9,12,13,16	1,4,5,8	—
12	7,8	5	2	—
13	1,4	—	8	5
23	1,4,5,8	—	—	9,12,13,16

TABLE OF CONTENTS

Y101	—	Y101	IC101	—	IC103
Y1	—	Y1	IC1	5,6	IC25
TP101	—	TP102	E1	—	E4
TR101	—	TR101	D101	—	D103
TR1	—	TR1	D2	1	D2
SK1	—	SK3	C101	—	C109
RN1,R	—	RN3,RV1	C1	—	C16
R1-1	—	R110	BZ1	—	BZ1
R5	1,2,3,4,12	R14	B101	—	B101
PL1	—	PL2	FIRST	NOT USED	LAST

DRAWN CRC	12 11 84	
CHECKED PWJ	3-1-85	
APPR PWJ	3-1-85	
STK NO		

Valhalla Scientific Inc. SAN DIEGO CA

I/O PROCESSOR

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 2	53504	D	2720-071	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		← SEE SHEET 1 —		

KEY BOARD TABLE

PINS ON PL 1	8 (D0)	9 (D1)	10 (D2)	11 (D3)	12 (D4)	13 (D5)	14 (D6)	15 (D7)
1 (D1)	ON/OFF EXT. REF.	RCL LAST	STEP TO NEXT	ENTER (TOP HALF)	STO (MEM)	RCL (MEM)	CLR (MEM)	V
2 (D6)	DN OFF	←	→	↑	↓/S	7	8	9
3 (D4)	S BELOW-EX. REF.ON	SET ZERO	RESET	ENTER YES	INT CAL	SYS CHECK	DSPL TEST	mV
4 (D5)	ON/OFF NULL MTR	ADDR	LOCAL	S LOGO	S LEFT-4	4	5	6
5 (D2)	NO	S BELOW-ADDR	S BELOW-LOCAL	μV	S LEFT-1	1	2	3
6 (D3)	CLR	S RIGHT-LAST-CAL	LAST CAL	PPM	S LEFT-■	■	0	+/−
7 (D0)	ON STBY	S-BOTTOM RIGHT IN CAL.CONTR	S BELOW-LAST-CAL.	AUTO NULL	DISPLAY TOL	SET ERROR LIMIT	SET CLOCK	SET CURRENT LIMIT

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

MATERIAL

FINISH

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64 ✓

DRAWN RDN 12-11-64
CHECKED
APPR
STK NO

Valhalla Scientific Inc.
SAN DIEGO, CA

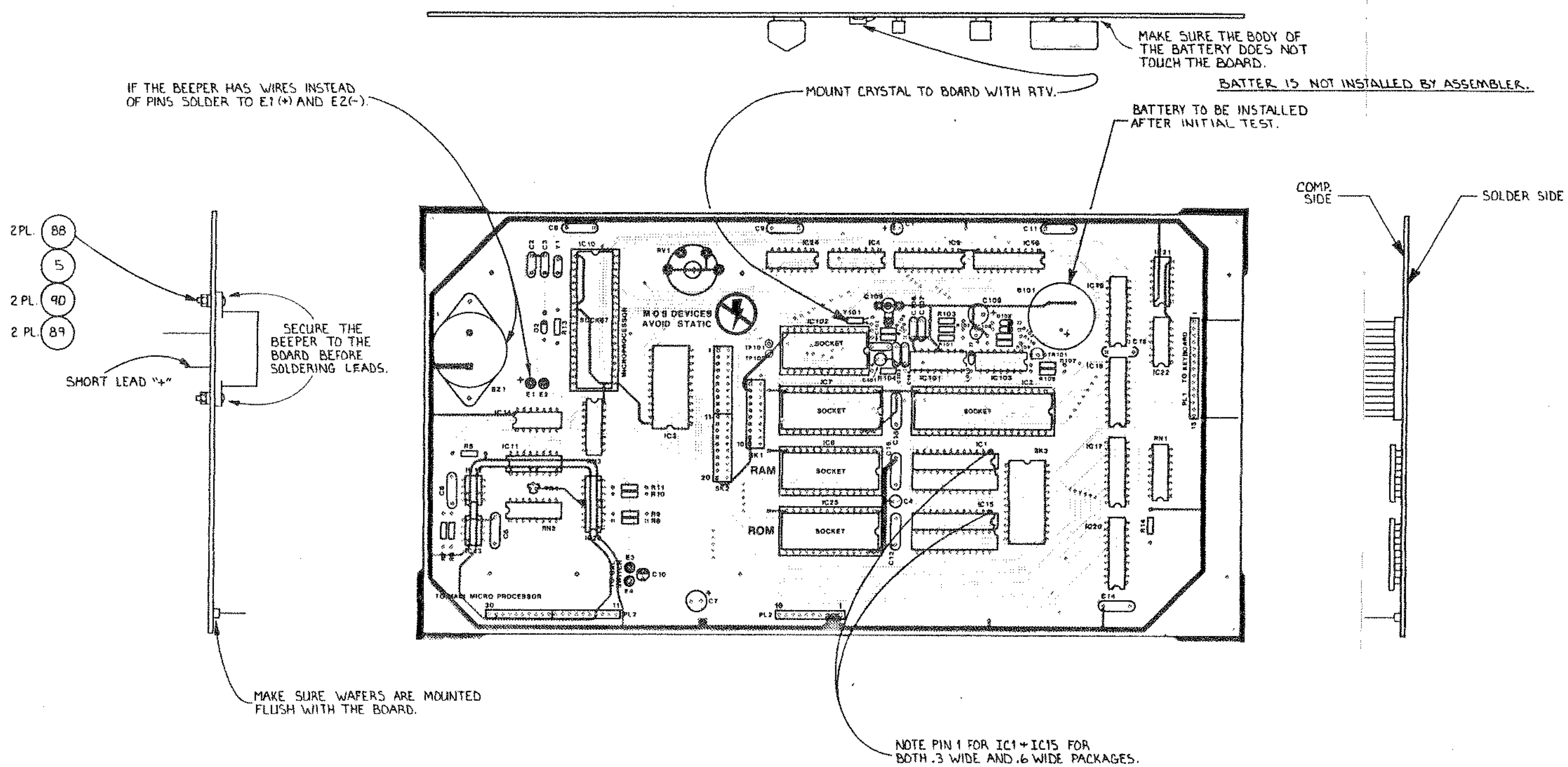
I/O PROCESSOR

SCALE
SHEET 2 OF 2

CODE IDENT	SIZE	DRAWING NO	REV
53504	D	2720-071	F

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
551	D	INC. DESIGN CHANGE DPM.	3-1-85	PGW
	E	P/L CHG. ITEMS 9,10 + 11 DPM	4-4-85	PGW



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64 ✓

MATERIAL

FINISH

DRAWN	DPM	3-1-85
CHECKED	CE	3-1-85
APPR	PGW	3-1-85
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

I/O PROCESSOR
ASSY. DWG.

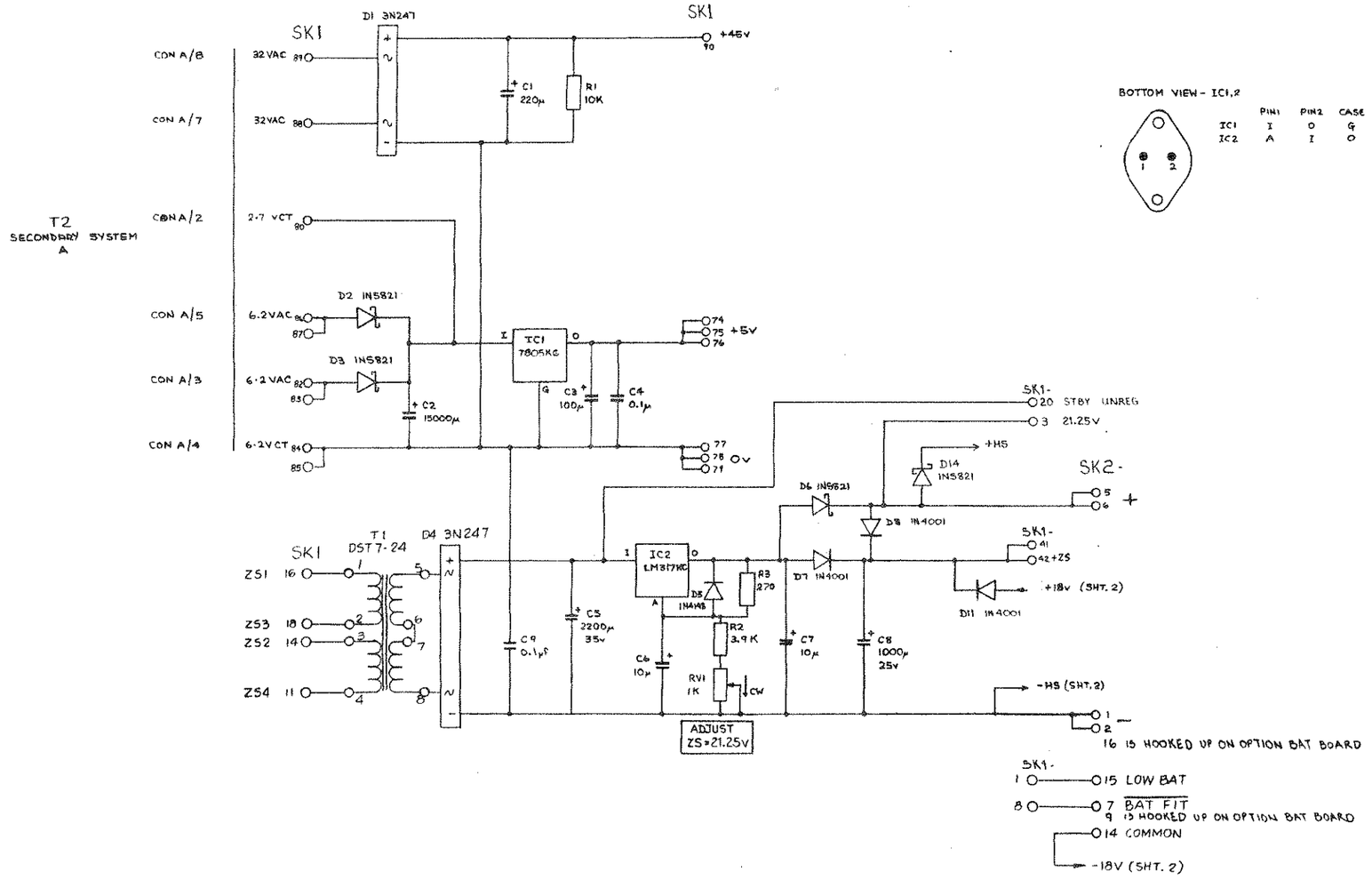
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-601	E

SHEET 1 OF 5

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. IC1,2 ARE MOUNTED ON HEATSINK.

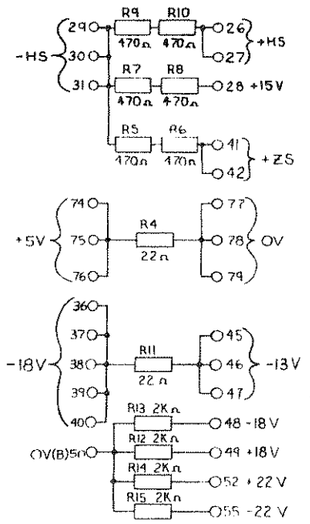
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
0332	A	RELEASE SW	3-1-84	
536	B	DPM	1-23-85	



BOTTOM VIEW - IC1,2

	PIN1	PIN2	CASE
IC1	I	O	G
IC2	A	I	O

PARTIAL EXTENDER BOARD



FIRST USED	NOT USED	LAST USED
C1	C9-C12	C8
D1	D9, D10, D12, D13	D14
IC1	IC3, IC4	IC2
R1	R4-R6, R14	R3
RV1	-	RV1
T1	-	T1

TOLERANCES: X = ± 30' .XX = ± .03 .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64

MATERIAL

FINISH

DRAWN POW	5-5-83	
CHECKED POW	5-18-83	
APPR POW	5-29-84	
STK NO —		

Valhalla Scientific Inc.
SAN DIEGO, CA

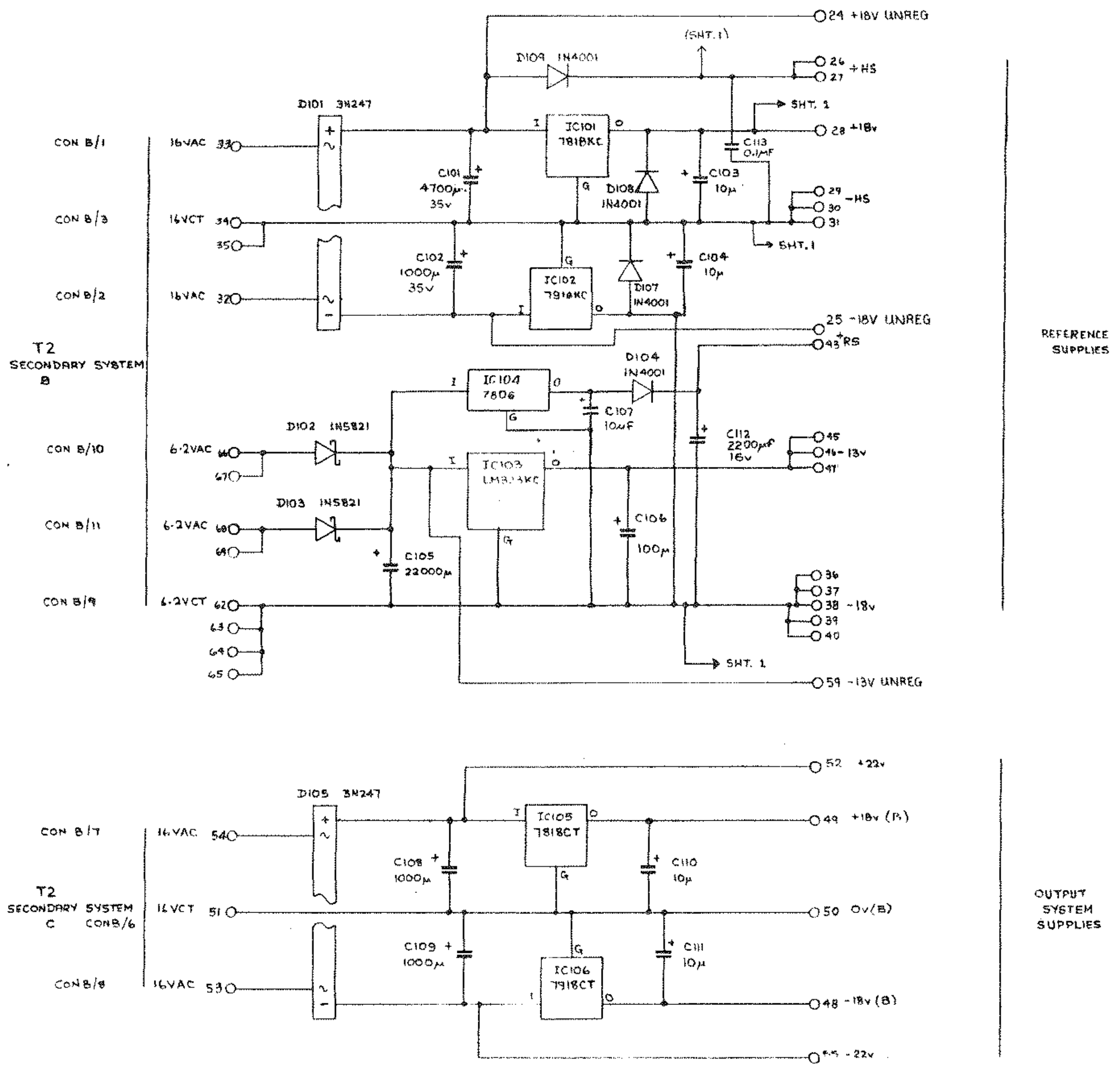
POWER SUPPLY — LOW VOLTAGE

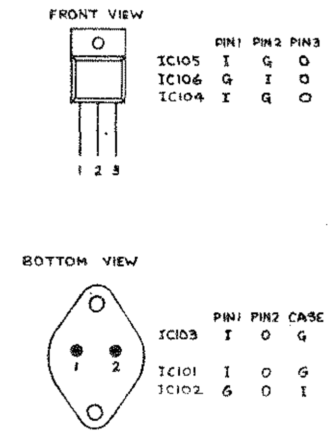
SCALE —	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 2	53504	D	2720-072	B

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. IC101 - 103 ARE MOUNTED ON HEATSINK.





FIRST USED	NOT USED	LAST USED
C101	—	C112
D101	D106	D109
IC101	—	IC106

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

MATERIAL

FINISH

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

DRAWN	POW	5-5-83
CHECKED	POW	5-13-83
APPR	POW	5-29-84
STK NO	—	

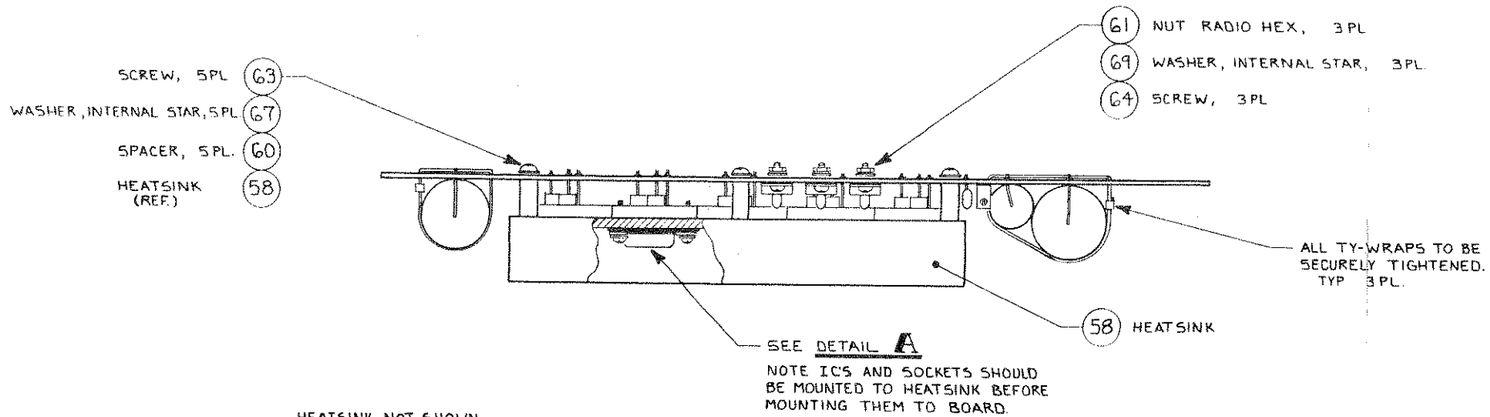
Valhalla Scientific Inc.
SAN DIEGO, CA

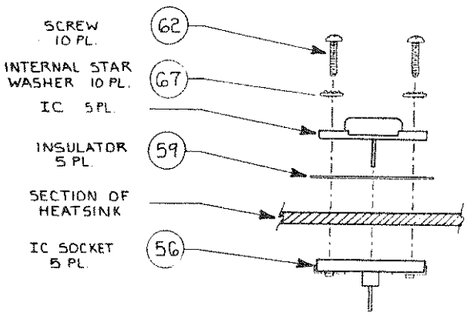
POWER SUPPLY - LOW VOLTAGE

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 2 OF 2	53504	D	2720-072	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
332	A	RELEASED FROM PROTO WPW	3-15-84	R
469	B	UPDATED PARTS LIST	6-6-84	R
536	C	INCORPORATED DESIGN CHANGES	2-22-85	RJ



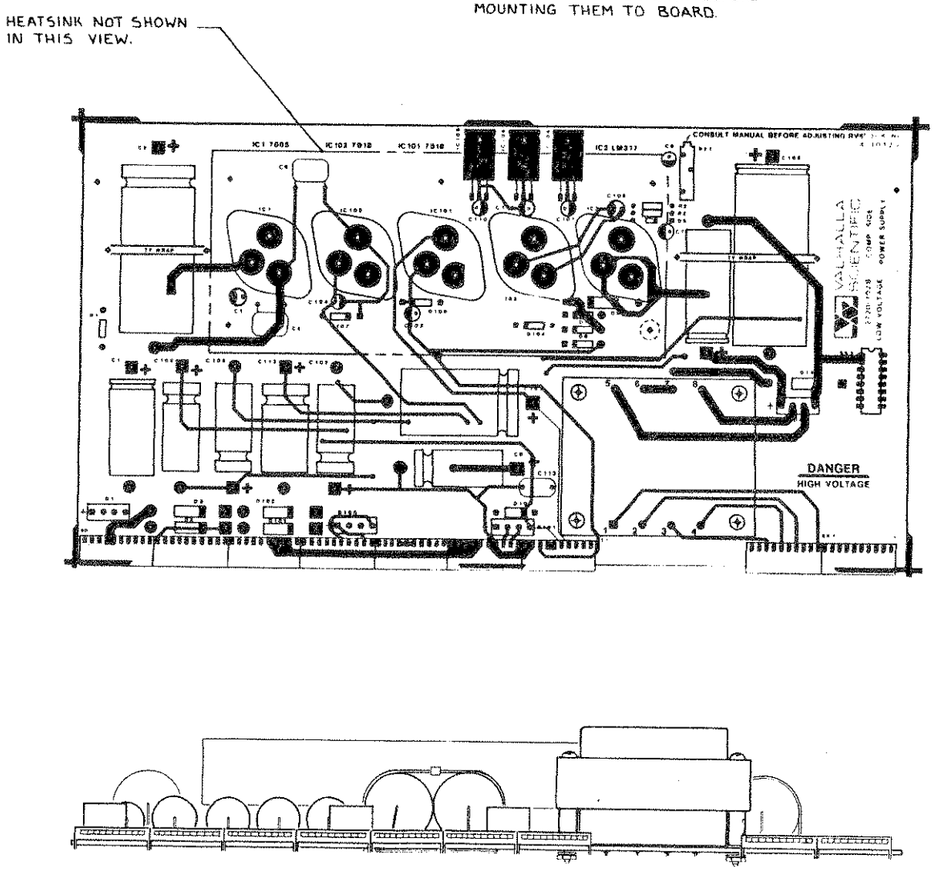


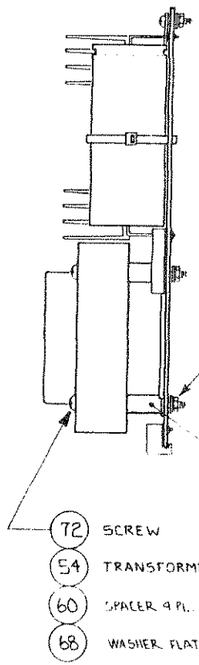
DETAIL A

SCALE: NONE

VIEW SHOWN IS PERPENDICULAR TO IC.

NOTE ALL IC'S ON HEATSINK ARE MOUNTED THE SAME WAY.





DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON
	1	2720-	2720

TOLERANCES: X° = ± 30' .XX = ± .03 .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL: SEE PARTS LISTS

FINISH: ~

DRAWN WPW	3-15-84	
CHECKED JM	3/15/84	
APPR R	3/15/84	
STK NO	~	

Valhalla Scientific Inc. SAN DIEGO, CA

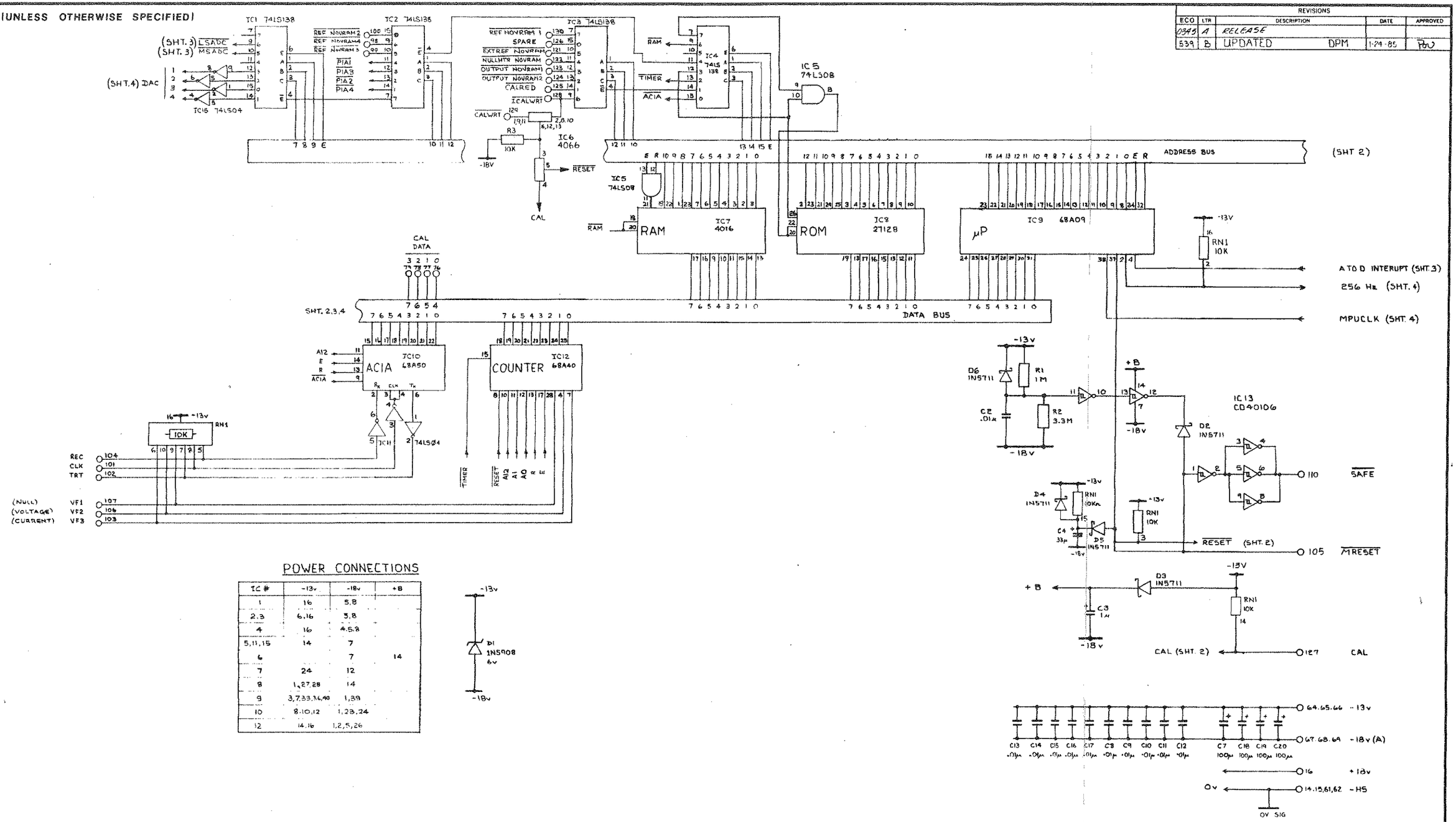
LOW VOLTAGE POWER SUPPLY ASSY.

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-602	C

SHEET 5 OF 5

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
0345	A	RELEASE		
539	B	UPDATED DPM	1-24-85	PDW



POWER CONNECTIONS

IC #	-13v	-18v	+B
1	16	5,8	
2,3	6,16	5,8	
4	16	4,5,8	
5,11,15	14	7	
6		7	14
7	24	12	
8	1,27,28	14	
9	3,7,33,34,40	1,39	
10	8,10,12	1,23,24	
12	14,16	1,2,5,26	

FIRST USED	NOT USED	LAST USED
C2	C1,C5,C6	C12
D1		D6
IC1	IC14	IC15
R1	-	R12
RN1	-	RN1

TOLERANCES: X = ± 30' .XX = ± .03 .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

DRAWN	PDW	5-6-83
CHECKED	PDW	5-13-83
APPR	PDW	5-29-84
STK NO		

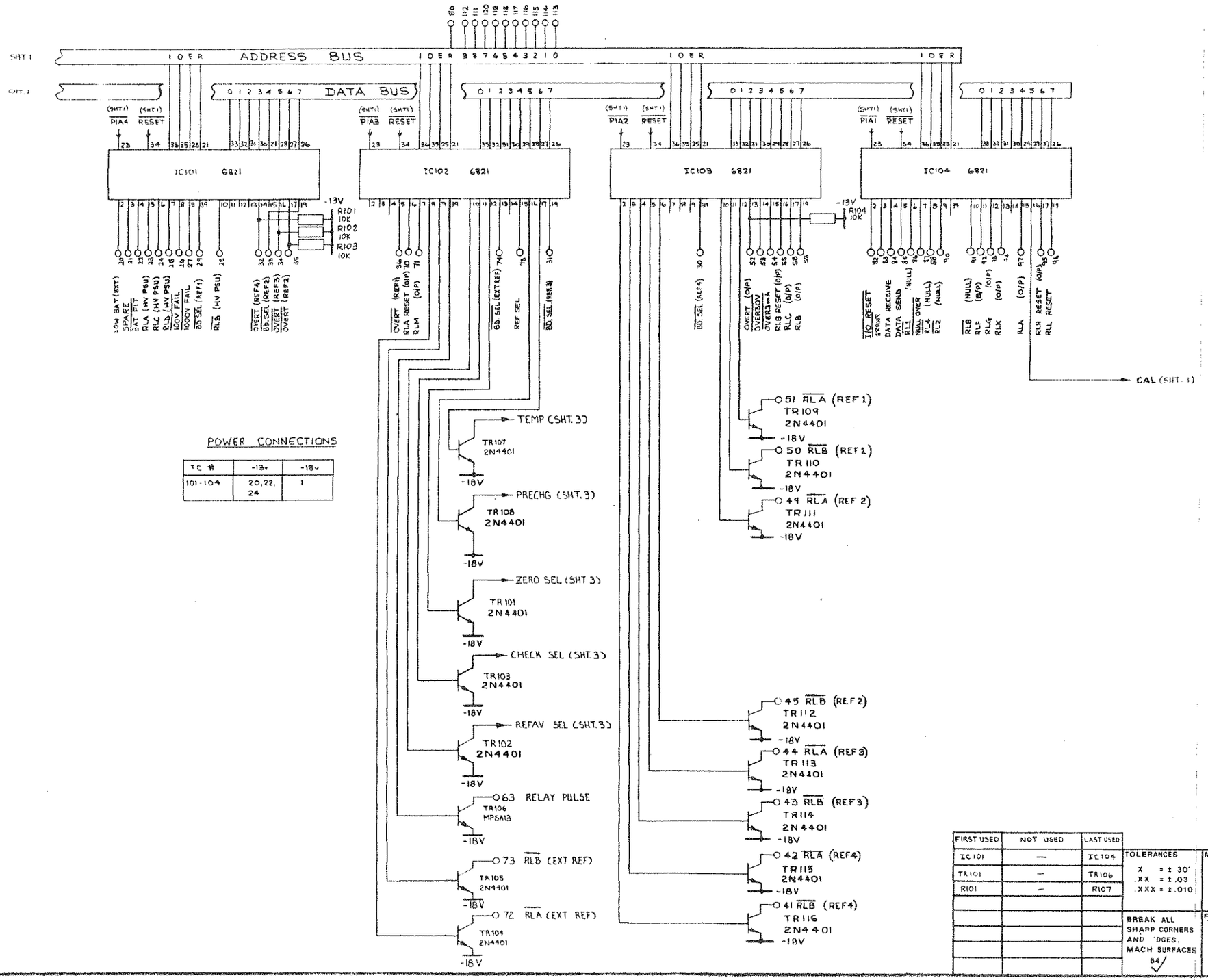
Valhalla Scientific Inc. SAN DIEGO, CA

OUTPUT MICROPROCCESSOR

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 4	53504	D	2720-073	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET #1		



POWER CONNECTIONS

I.C. #	-13v	-18v
101-104	20, 22, 24	1

FIRST USED	NOT USED	LAST USED
IC101	—	IC104
TR101	—	TR106
R101	—	R107

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64

MATERIAL

FINISH

DRAWN RDH 5-24-84
CHECKED PBW 5-30-84
APPR PBW 5-30-84
STK NO

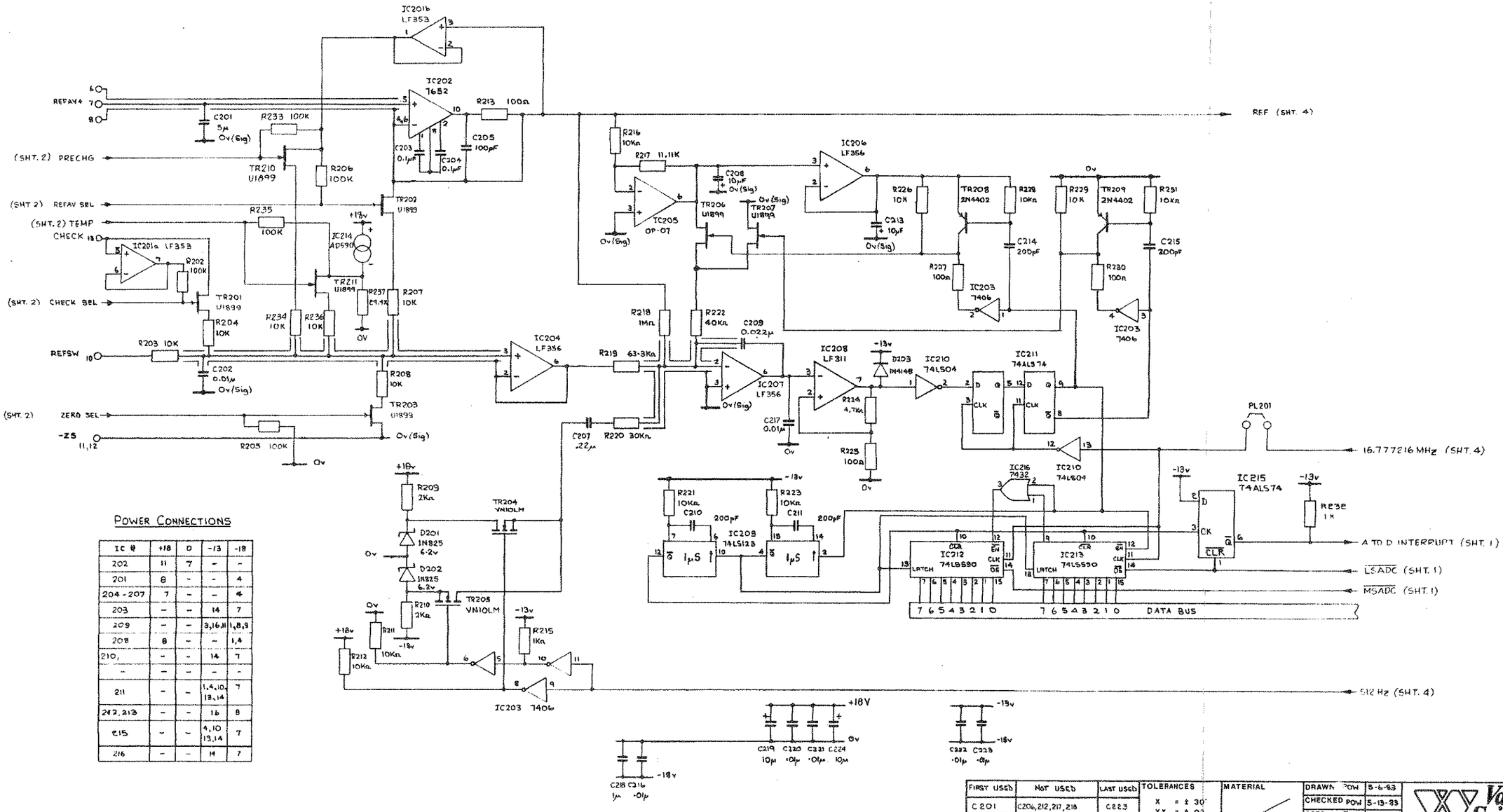
Valhalla Scientific Inc.
SAN DIEGO, CA

OUTPUT MICROPROCESSOR (INTERFACE)

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 2 OF 4	53504	D	2720-073	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET #1		



POWER CONNECTIONS

IC #	+18	0	-13	-18
202	11	7	–	–
201	8	–	–	4
204 - 207	7	–	–	4
203	–	–	14	7
209	–	–	3,16,11	1,8,9
208	8	–	–	1,4
210,	–	–	14	7
–	–	–	–	–
211	–	–	1,4,10, 13,14	7
212, 213	–	–	16	8
215	–	–	4,10 13,14	7
216	–	–	14	7

FIRST USED	NOT USED	LAST USED
C201	C206,212,217,218	C223
D201	–	D203
IC201	–	IC215
R201	–	R237
TR201	–	TR211

TOLERANCES: X = ± 30' .XX = ± .03 .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

DRAWN POW	5-6-83	
CHECKED POW	5-13-83	
APPR. POW	5-29-84	
STK NO		

Valhalla Scientific Inc. SAN DIEGO, CA

REFERENCE GENERATOR

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
	53504	D	2720-073	E

SHEET 3 OF 4

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. TR 307 AND 308 ARE MOUNTED ON BERYLLIA WASHERS.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET #1		

POWER CONNECTIONS

IC #	+18	0	-13	-18
IC 301-304			1, 24	12
IC 305-308			1, 9, 16	3-6, 8
IC 309			14	7
IC 310, 311			14 10 13 (4	7
IC 313, 314	7			4
RN 301	5			7

FIRST USED	NOT USED	LAST USED
C 301	C 317-C 321	C 328
D 301	——	D 305
IC 301	——	IC 315
R 301	——	R 323
RN 301	——	RN 301
RV 301	——	RV 301
TR 301	——	TR 314

TOLERANCES: X = ± 30' .XX = ± .03 .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

DRAWN RGN	5-23-84	
CHECKED	5-30-84	
APPR	5-30-84	
STK NO		

Valhalla Scientific Inc. SAN DIEGO, CA

DIGITAL TO ANALOG CONVERTOR

SCALE	CODE IDEN'	SIZE	DRAWING NO	REV
SHEET 4 OF 4	53504	D	2720-073	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
345	A	RELEASED RDN	3-26-84	R
469	B	UPDATE DRAWING RDN	6-11-84	R
539	C	INC. DESIGN CHANGE DPM	3-1-85	PdJ

DO NOT MOUNT TR305 + TR306 FLUSH TO THE BOARD.

TR307 + 308 ARE TO BE PUSHED DOWN TIGHTLY ONTO THE WASHERS

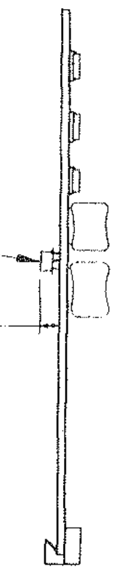
(103) BERRYLIA WASHER 2 PL.

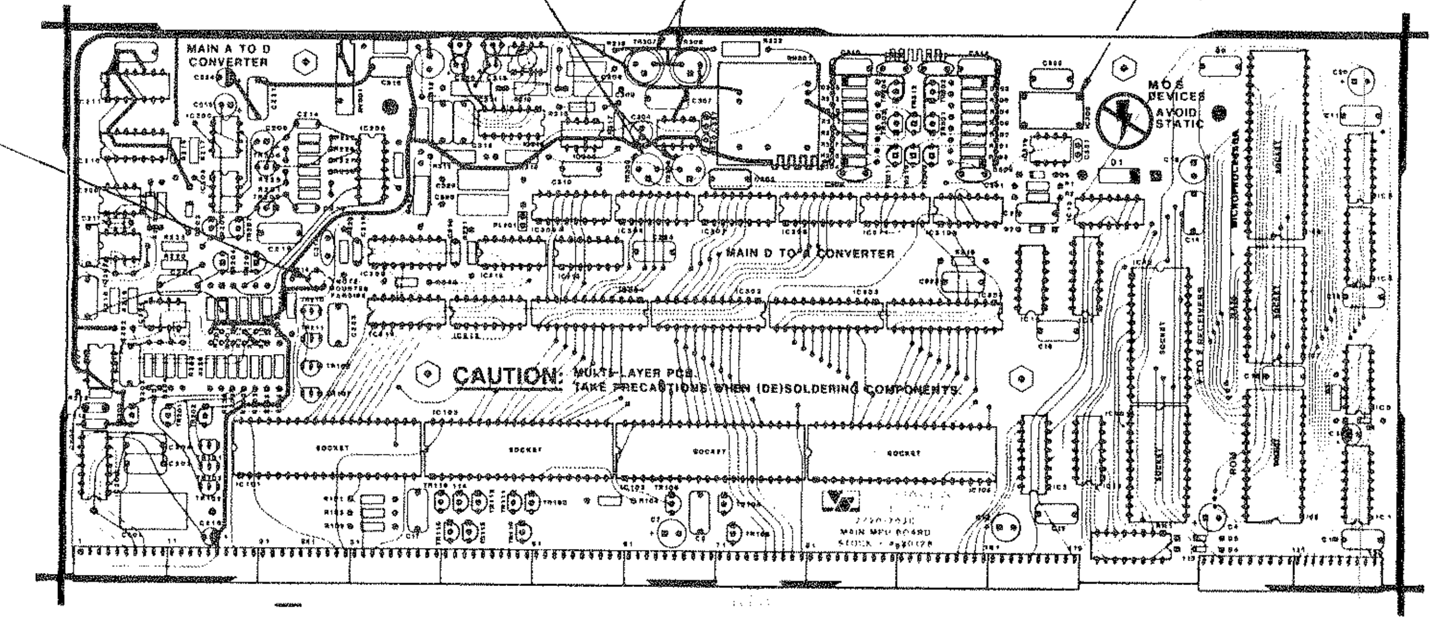
PIN 1

NOTE: IC 219 IS MOUNTED FARSIDE

IC 214

IC 219 MUST NOT BE HIGHER THAN 3/8 in. OFF THE BOARD.





MOD. FOR REV. "A" BOARDS ONLY

JUMPER PINS 1 & 2 TOGETHER ON IC12. (USE 30 AWG KYNAR ON BACK SIDE OF BOARD)

NOTE: REV "A" PCB S ONLY

JUMPER AS FOLLOWS, ON CIRCUIT SIDE (OPPOSITE SHOWN) USING 30 AWG KYNAR. GLUE WIRE TO PCB WITH RTV AS REQUIRED:

IC 101-11	IC101-39
IC 101-12	IC 103-39
IC 101-13	IC 102-19
IC 101-15	IC 101-19
IC 102-2	IC 102-16
IC 102-3	IC 102-17
IC 102-14	IC 102-13
IC 103-7	IC 102-10
IC 103-8	IC 102-11
IC 103-9	IC 102-12

REV. A PCB'S ONLY

SHORT PIN 12 TO PIN 14 ON SK1 USING 30 AWG KYNAR WIRE.

CAUTION: RN301, IC6 + IC13 ARE STATIC SENSITIVE DEVICES

RN301, TR305 - TR308, IC6 + IC13 ARE TO BE THE LAST COMPONENTS INSTALLED INTO THE BOARD.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES: .X = ± .30' ; .XX = ± .03 ; .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64/

MATERIAL

FINISH

DRAWN	RDN	3-26-84
CHECKED	R	3-27-84
APPR	PdJ	6/12/84
STK NO		

Valhalla Scientific Inc. SAN DIEGO, CA

MAIN MICROPROCESSOR ASSEMBLY DRAWING

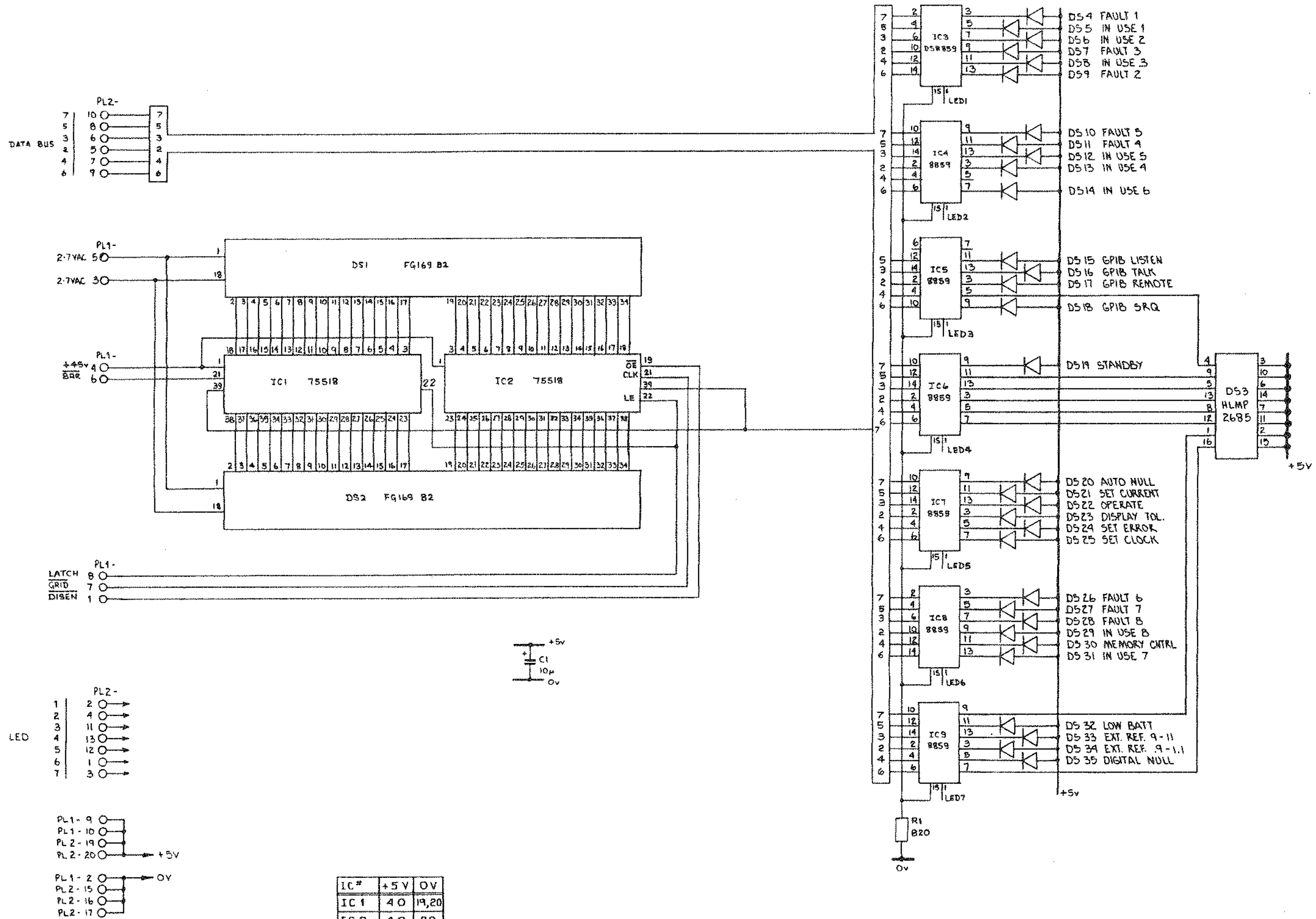
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1=1	53504	D	2720-603	C

SHEET 6 OF 6

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL DIODES ARE L.E.D.'s.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
0330	A	RELEASED SW	2-28-84	



IC#	+5V	OV
IC1	40	19,20
IC2	40	20
IC3-9	16	8

FIRST USED	NOT USED	LAST USED
DS1	-	DS35
IC1	-	IC9
R1	-	R1
C1	-	C1

TOLERANCES
.X = ± .30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64

MATERIAL

FINISH

DRAWN	POW	5-12-83
CHECKED	POW	5-13-83
APPR	POW	9-21-83
STK NO		

Valhalla Scientific Inc.
SAN DIEGO CA

DISPLAY

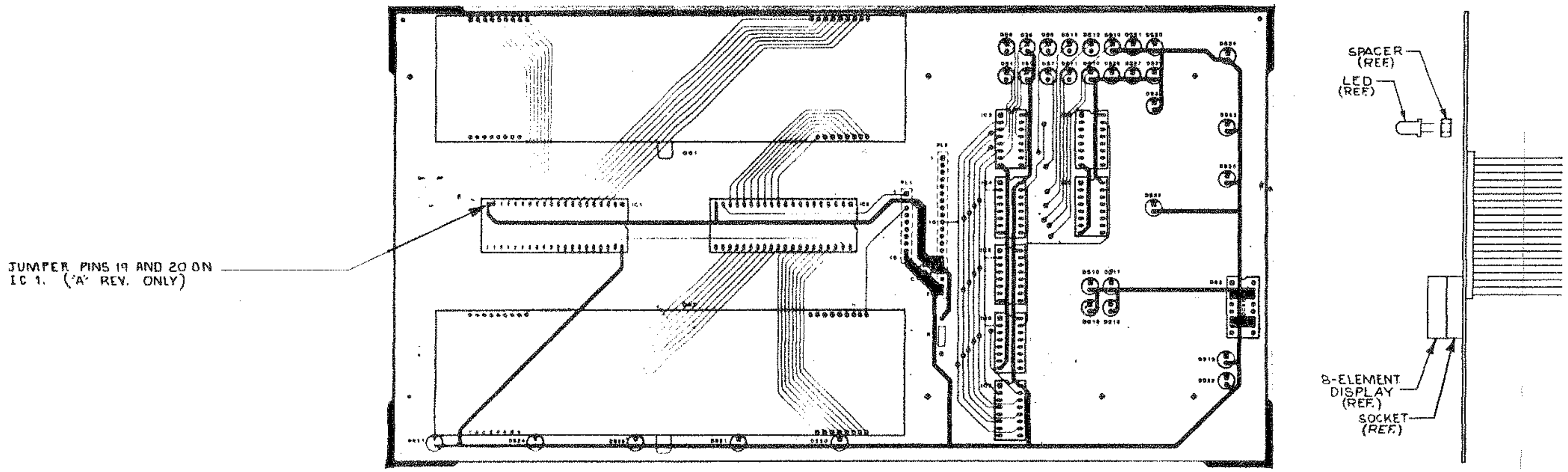
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
	53504	D	2720-076	

SHEET 1 OF 1

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
330	A	RELEASED	3-1-84	
550	B	MODIFIED P.C.B. CRE	12-7-89	

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. INSURE ALL COMPONENTS ARE FLAT TO PCB. AND FULLY INSERTED. NOT CROOKED.



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64 ✓

MATERIAL

FINISH

DRAWN RDN	3-. 84
CHECKED	3-1-84
APPR	3-1-84
STK NO	

Valhalla Scientific Inc.
SAN DIEGO, CA

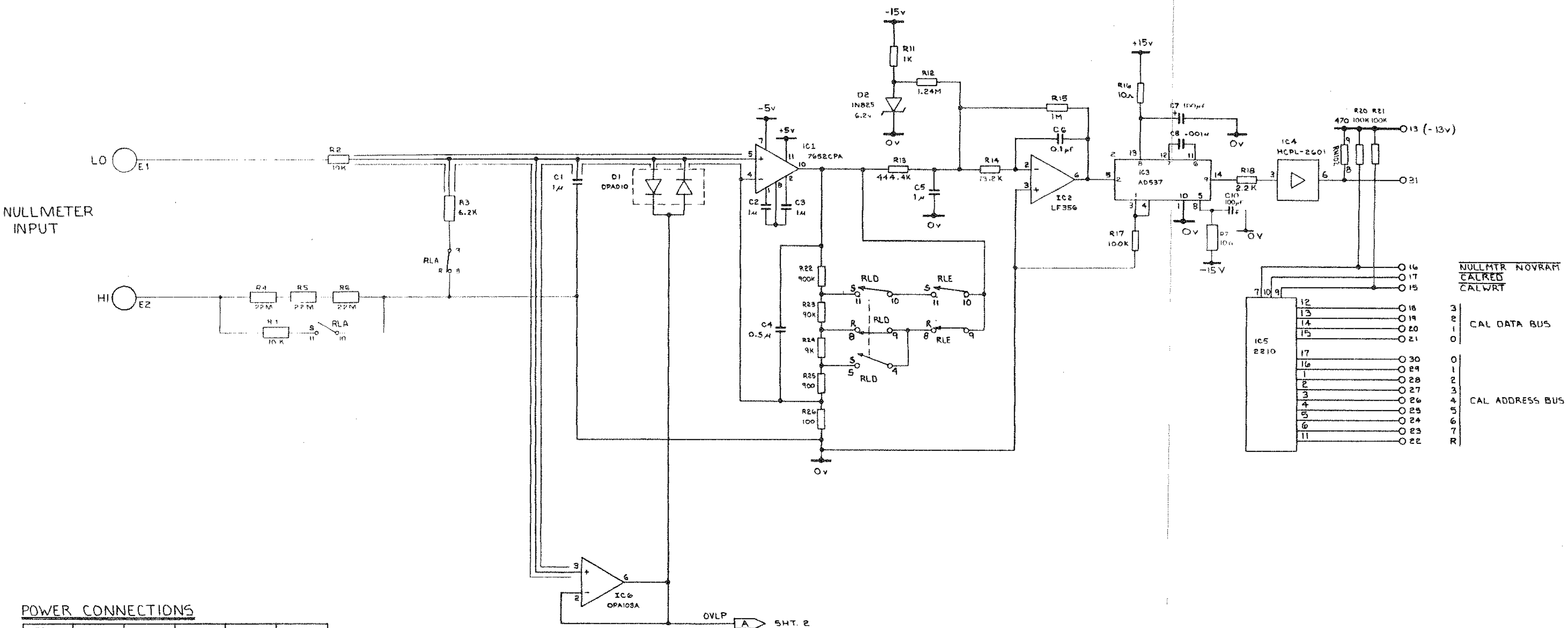
2720 DISPLAY BOARD ASSY. DWG.

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1/1	53504	D	2720-606	B

SHEET 2 OF 2

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
327	A	RELEASED WPW	2-24-84	[illegible]
527	B	UPDATED RDN	1-23-85	RW
698	C	CHANGED C9 TO .5uF • TR112 TO MPSA13	3.25.85	RW



POWER CONNECTIONS

IC #	+15v	0v	-15v	-13v	-18v
2,6	7	—	4	—	—
4	2	—	—	7,8	5
5	—	—	—	18	8

FIRST USED	NOT USED	LAST USED
C1	—	C8
D1	—	D2
IC1	—	IC6
R2	R7-10, R19	R26
RLA	—	RLE
—	—	—
—	—	—

TOLERANCES
X° = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64√

MATERIAL

FINISH

DRAWN WPW 2-24-84
CHECKED RW 3/1/85
APPR RW 3/1/85
STK NO ——

Valhalla Scientific Inc.
SAN DIEGO, CA

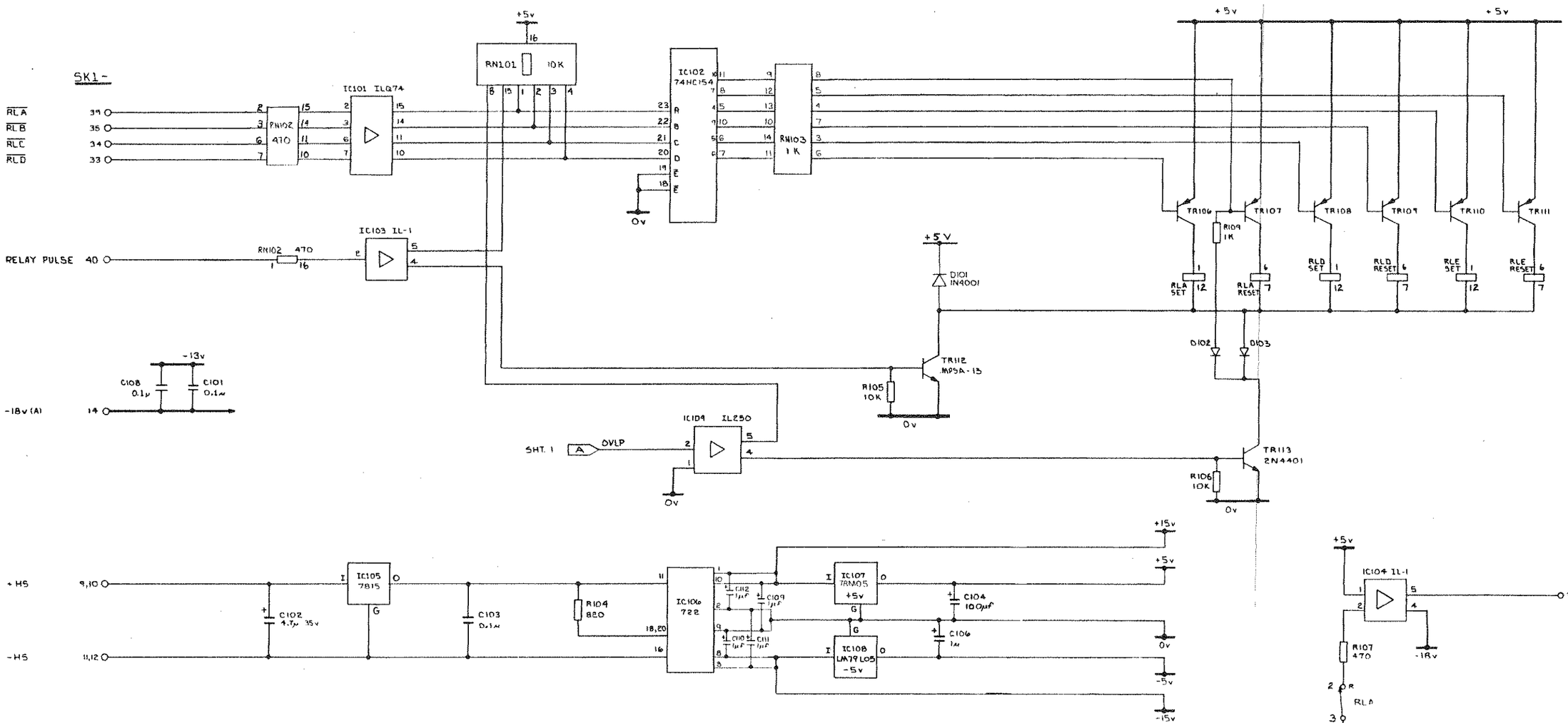
NULLMETER

SCALE ——
SHEET 1 OF 2
CODE IDENT 53504
SIZE D
DRAWING NO 2720-077
REV

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL UNMARKED TR's ARE 2N4402
2. ALL UNMARKED DIODES ARE IN4148

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		— SEE SHT. 1. —		



POWER CONNECTIONS

IC #	0v	-15v	-13v	+5
101	9,12,13,16	—	1,4,5,8	—
103	—	—	1	—
102	12	—	—	24

FIRST USED	NOT USED	LAST USED
C101	—	C108
D101	—	D103
IC101	—	IC109
R101	—	R108
RN101	—	RN103
TR101	—	TR113
RLA	—	RLE

TOLERANCES: X = ± 30' .XX = ± 03 .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

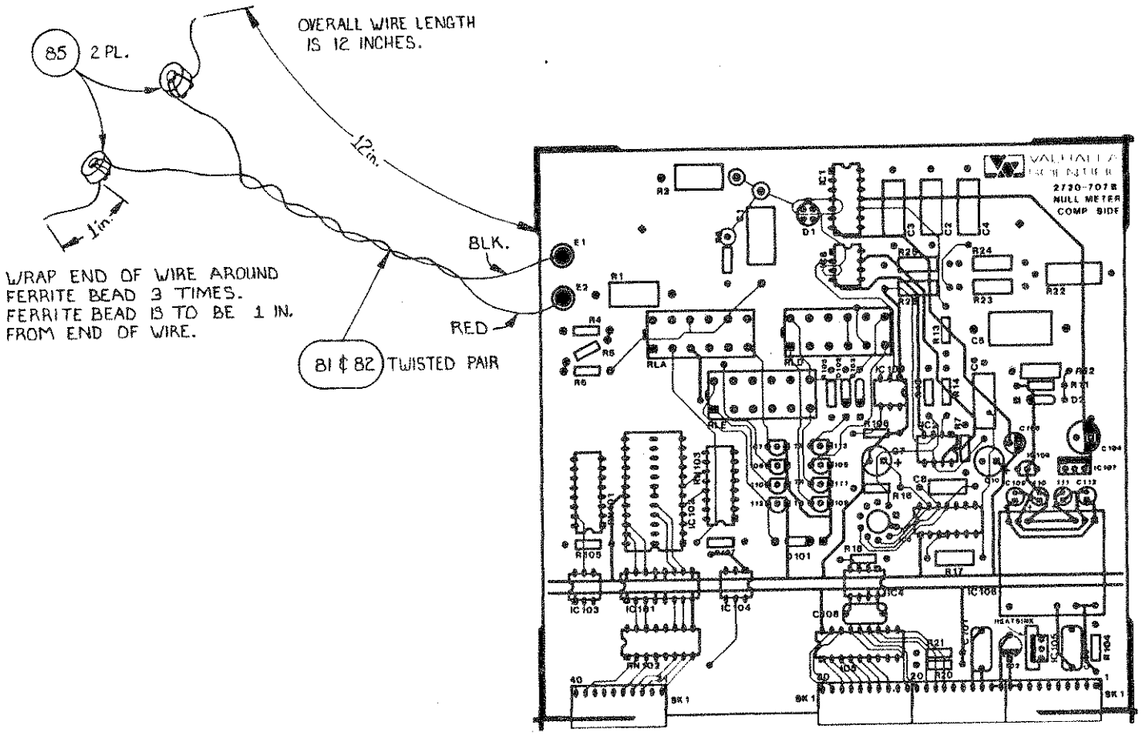
DRAWN WPW	2-24-84	
CHECKED BW	3/11/85	
APPR BW	3/11/85	
STK NO		

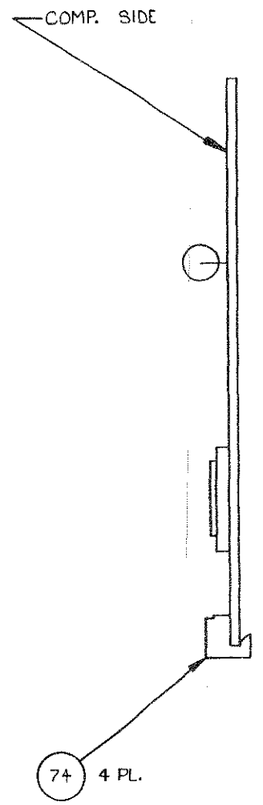
Valhalla Scientific Inc. SAN DIEGO CA

NULLMETER

SCALE	CODE IDENT	SIZE	DRAWING NO	
SHEET 2 OF 2	53504	D	2720-077	C

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
527	B	UPDATED DPM	1-25-85	
698	C	CHANGED C9 TO .5uf + TRIIZ TO MPSA-13 CRL	3-25-85	





DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

MATERIAL

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES
64

FINISH

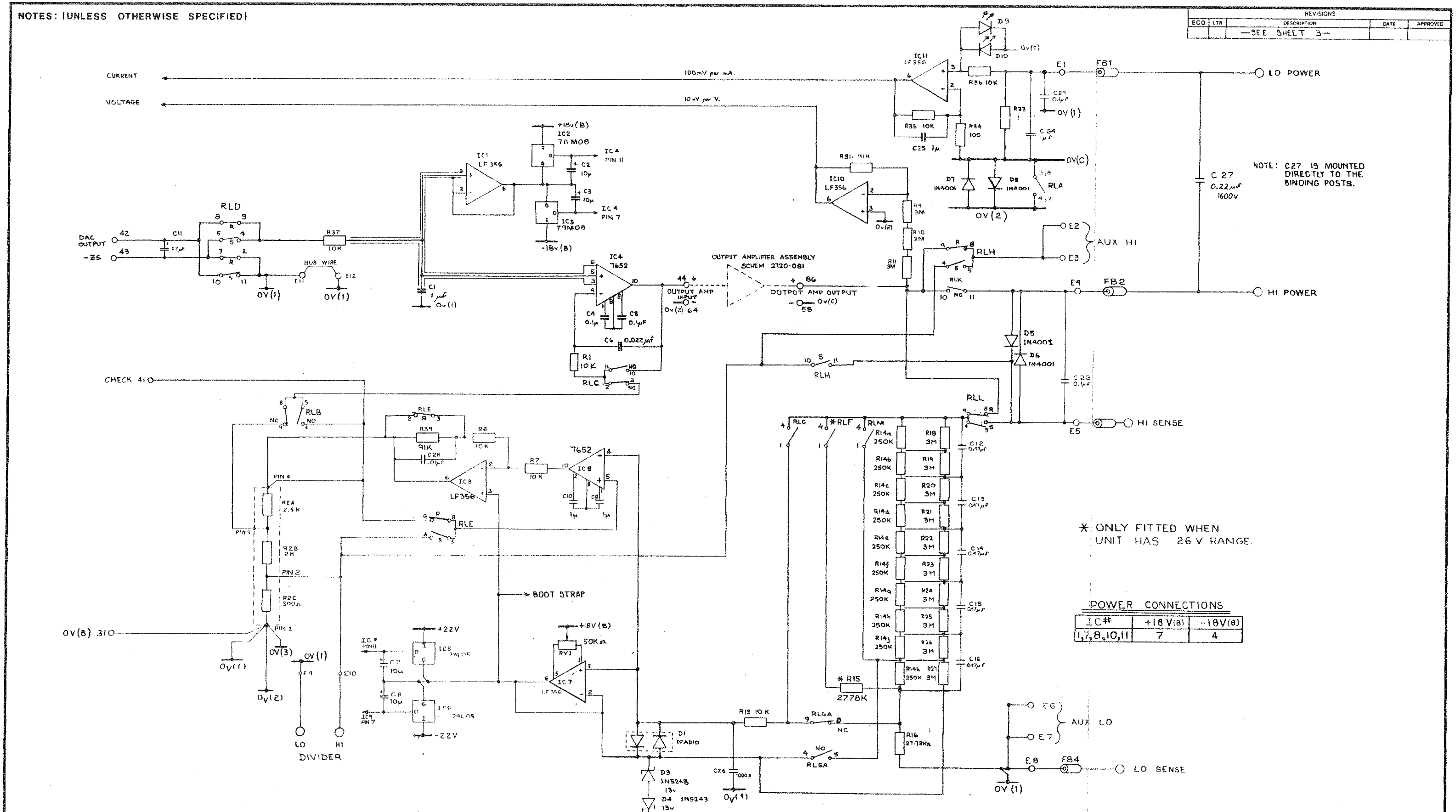
DRAWN DPM	1-29-85	
CHECKED JM	3/1/85	
APPR [illegible]	3/1/85	
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

NULL METER ASSY.

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	C	2720-607	C

SHEET 1 OF 5


NOTES: (UNLESS OTHERWISE SPECIFIED)
REVISIONS
ECO
LTR
DESCRIPTION
DATE
APPROVED
—SEE SHEET 3—
CURRENT
VOLTAGE
100mV per mA.
10mV per V.
IC11 LF356
D9
D10
Ov(c)
R36 10K
E1
FB1
LO POWER
C29 0.1μF
OV (1)
R33 1
R35 10K
R34 100
C25 1μ
C24 1μF
OV(C)
R31 91K
IC10 LF356
D7 IN4001
D8 IN4001
RLA
OV (2)
Ov(2)
C 27 0.22μF 1600V
NOTE: C27 IS MOUNTED DIRECTLY TO THE BINDING POSTS.
+18v (B)
IC2 78M08
IC 4 PIN 11
C2 10μ
C3 10μ
IC 4 PIN 7
IC3 79M08
-18v (B)
IC1 LF356
RLD
DAC OUTPUT 42
-ZS 43
C11 47μF
R37 10K
BUS WIRE
E11
E12
OV(1)
OV(1)
C1 1μF
Ov(1)
IC4 7652
C4 0.1μ
C5 0.1μF
C6 0.022μF
R1 10K
RLC
NO
NC
OUTPUT AMPLIFIER ASSEMBLY SCHEM 2720-081
44 +
OUTPUT AMP INPUT
Ov(2) 64
+ 86
OUTPUT AMP OUTPUT
Ov(c)
58
R9 3M
R10 3M
R11 3M
RLH
E2
E3
AUX HI
RLK
E4
FB2
HI POWER
D5 IN4001
D6 IN4001
C23 0.1μF
RLH
CHECK 41
RLL
E5
HI SENSE
RLB
NC
NO
RLE
R39 91K
C28 .01μF
R6 10K
IC8 LF356
R7 10K
7652 IC9
C10 1μ
C9 1μ
PIN 4
R2A 2.5K
PIN 3
R2B 2K
PIN 2
R2C 500Ω
PIN 1
RLE
BOOT STRAP
RLG
*RLF
RLM
R14a 250K
R14b 250K
R14c 250K
R14d 250K
R14e 250K
R14f 250K
R14g 250K
R14h 250K
R14j 250K
R14k 250K
R18 3M
R19 3M
R20 3M
R21 3M
R22 3M
R23 3M
R24 3M
R25 3M
R26 3M
R27 3M
C12 0.47μF
C13 0.47μF
C14 0.47μF
C15 0.47μF
C16 0.47μF
* ONLY FITTED WHEN UNIT HAS 26 V RANGE
POWER CONNECTIONS
OV(B) 31
OV(1)
OV(3)
Ov(2)
OV (1)
E9
E10
LO
HI
DIVIDER
+22V
IC 9 PIN 11
IC5 78L05
C7 10μ
C8 10μ
IC6 79L05
IC9 PIN 7
-22V
+18V (B)
50KΩ
RV1
IC 7 LF356
* R15 27.78K
R13 10K
RLGA
NC
NO
RLGA
D1 DPAD10
D3 1N5243 13v
D4 1N5243 13v
Ov(3)
C26 1000p
Ov(1)
R16 27.78KΩ
E6
E7
AUX LO
E8
FB4
LO SENSE
OV (1)

IC#	+18 V(B)	-18V(B)
1,7,8,10,11	7	4

FIRST USED	NOT USED	LAST USED
C1	C23	C25
D1	D2	D10
IC1	-	IC11
R1	R5,8,30,9-11,17,28,32	R36
RLA	RLI,J	RLM
FB1	—	FB6

TOLERANCES
.X = ± .030
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES

MATERIAL

FINISH

DRAWN	POW	5-8-83
CHECKED	POW	5-16-83
APPR	POW	5-29-84
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

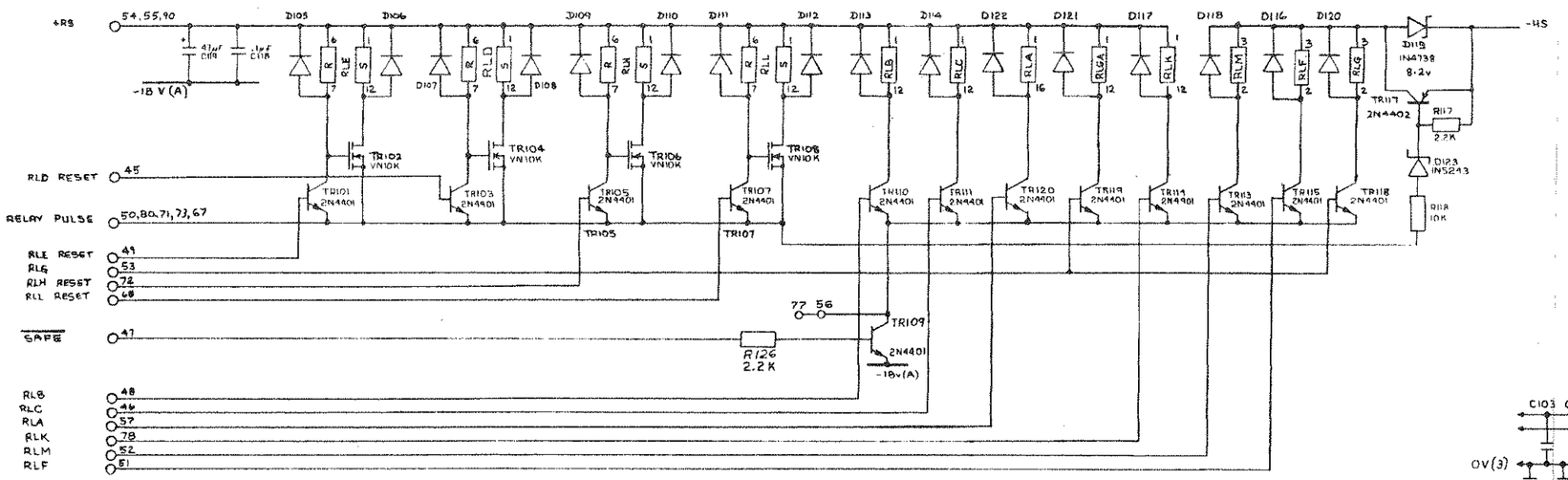
OUTPUT SYSTEM

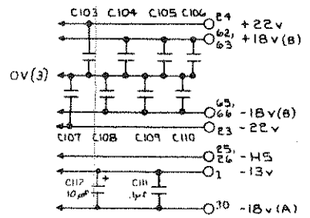
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 3	53504	D	2720-079	C

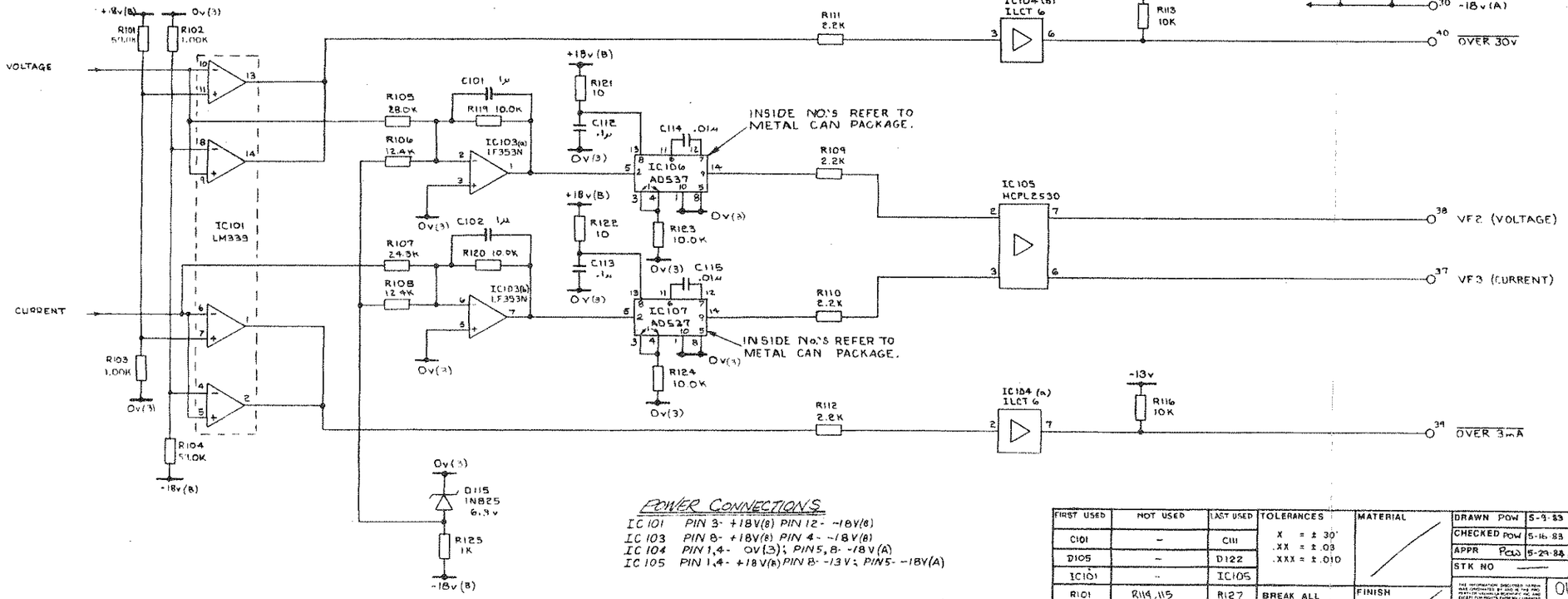
NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL DIODES ARE IN4148
2. ALL C's ARE 0.01μF.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		— SEE SHT. 3 —		







POWER CONNECTIONS

IC 101 PIN 3- +18V(8) PIN 12- -18V(8)
IC 103 PIN 8- +18V(8) PIN 4- -18V(8)
IC 104 PIN 1,4- 0V(3); PIN 5, 8- -18V(A)
IC 105 PIN 1,4- +18V(8) PIN 8- -13V; PIN 5- -18V(A)

FIRST USED	NOT USED	LAST USED
C101	–	C111
D105	–	D122
IC101	–	IC105
R101	R114, 115	R127
TR101	TR112, 116	TR120
RLA	RLE, J	RLM

TOLERANCES: X = ± .30', .XX = ± .03, .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64√

MATERIAL

FINISH

DRAWN POW	5-9-83	
CHECKED POW	5-16-83	
APPR PCW	5-29-84	
STK NO		

Valhalla Scientific Inc. SAN DIEGO, CA

OUTPUT SYSTEM LOGIC

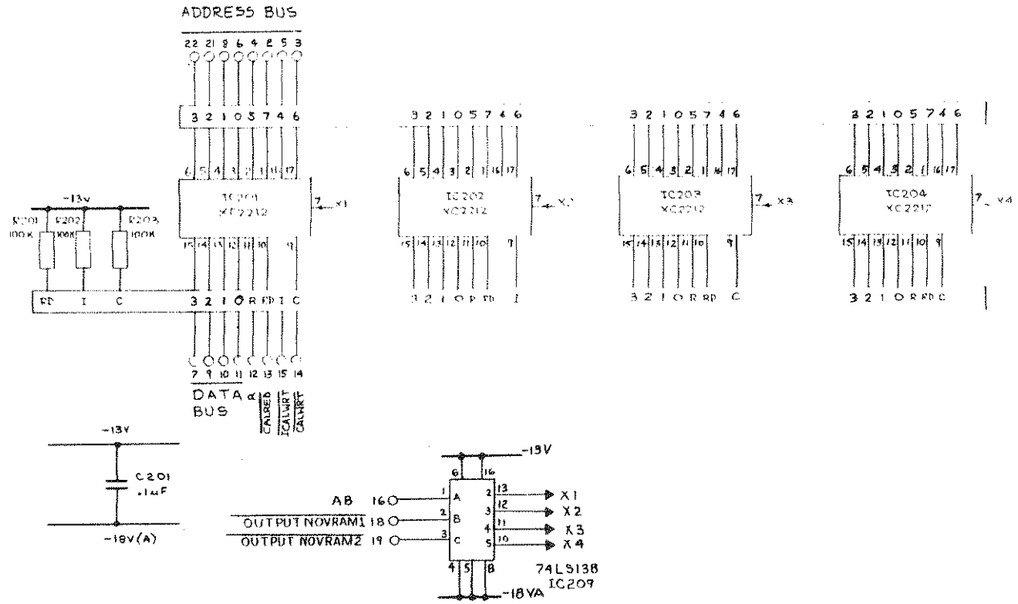
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
—	53504	D	2720 079	C

SHEET 2 OF 3

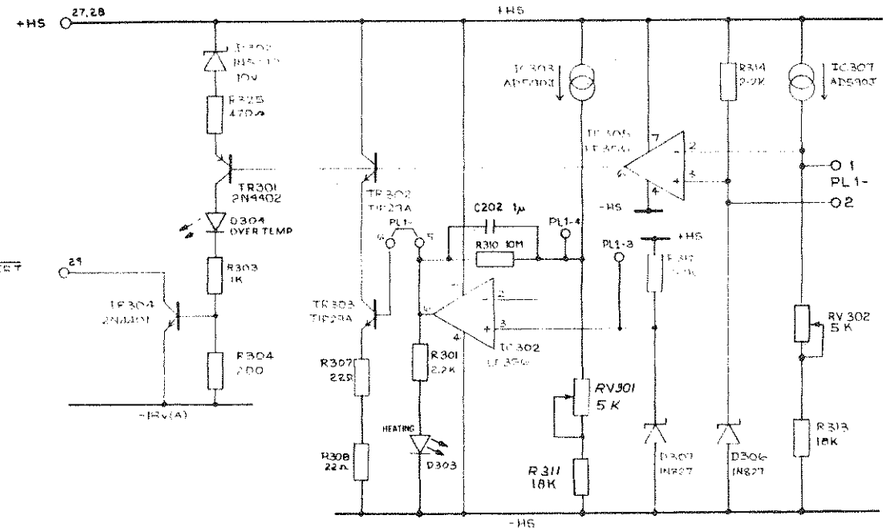
NOTES: (UNLESS OTHERWISE SPECIFIED)

1. IC201-204 ARE MOUNTED IN SOCKETS.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
	A			
547	B	UPDATED. RDN	1-4-85	JWA
675	C	DPM	2-25-85	JWA



	-13V	-18V(A)
IC201-204	18	8



NOTE:

ADJUST RV301 FOR -.5V BETWEEN PL1 PIN 4 (+) AND PL1 PIN 3 (-) WITH THE OVEN OFF.

ADJUST RV302 FOR -.8V BETWEEN PL1 PIN 1 (+) AND PL1 PIN 2 (-) WITH THE OVEN OFF.

TO TURN OFF THE OVEN REMOVE THE SHORTING PLUG FROM PL1 PINS 5 & 6.

FIRST USED	NOT USED	LAST USED
C201	—	C201
D301	D304, D308	D307
IC201	IC205-208, 211-301, 306	IC307
R201	R204-300, 302, 305	R325
	R306, 309, 315-324	
RV301	—	RV301
TR301	—	TR304

TOLERANCES: X = ±.30', .XX = ±.03, .XXX = ±.010

MATERIAL

FINISH

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

DRAWN	PdW	5-29-84
CHECKED	PdW	5-29-84
APPR	PdW	5-29-84
STK NO		

Valhalla Scientific Inc. SAN DIEGO, CA

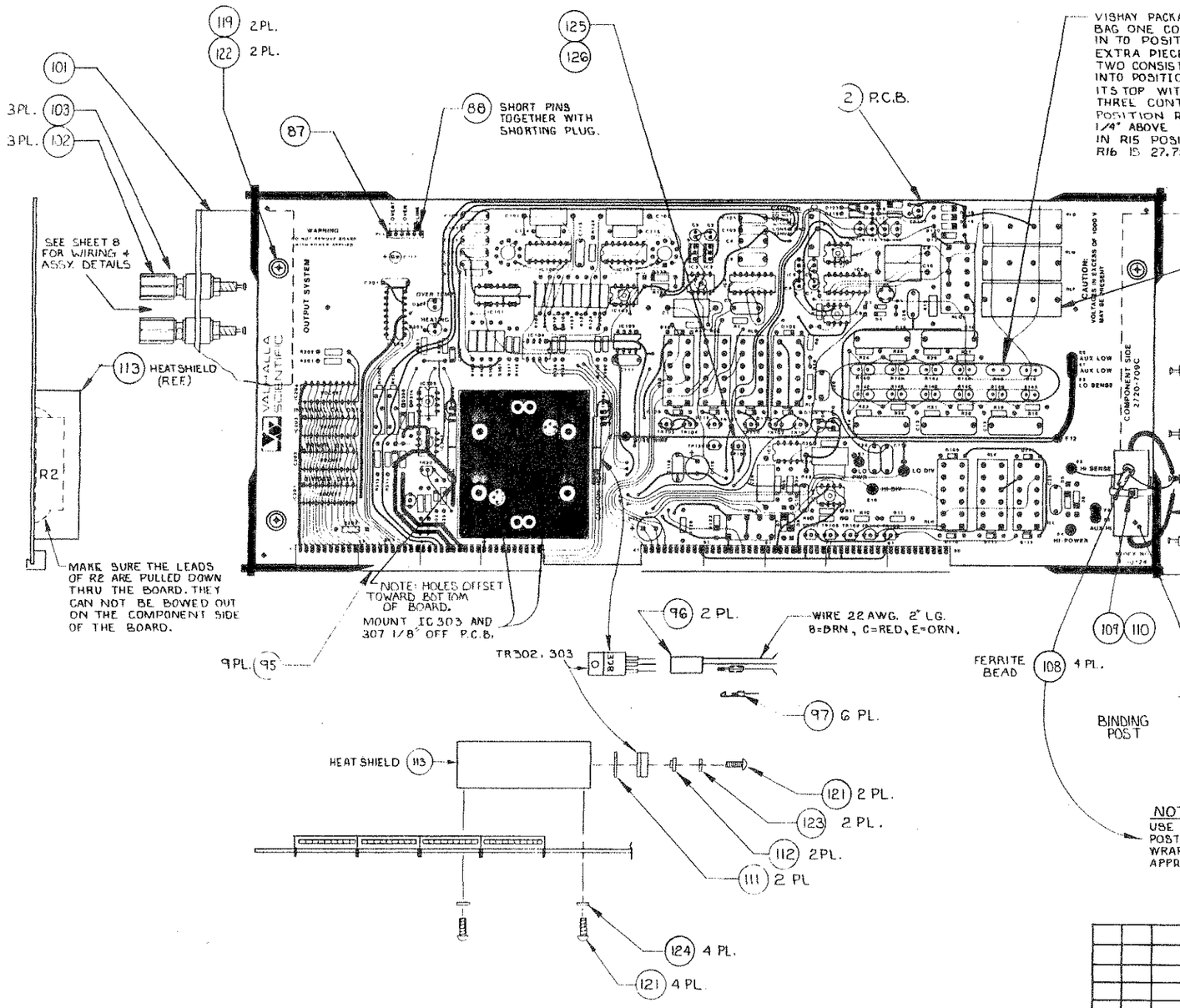
OUTPUT SYSTEM

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
—	53504	D	2720-079	C

SHEET 3 OF 3

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
547	B	UPDATED RDN	1-22-85	PDW
675	C	INCORPORATED DESIGN CHANGE RDN	1-28-85	PDW



BINDING POST WIRING

BINDING POST	FROM	WITH FERRITE BEAD	TO
	J3	YES	E4
	J4	YES	E1
	J5	YES	E5
	J6	YES	E8
	J7	NO	E10
	J8	NO	E7

OUTPUT SYSTEM BOARD

NOTE:
USE 20 AWG TEFLON WIRE, RED WIRE ON RED BINDING POST AND BLACK WIRE ON BLACK BINDING POST. WRAP EACH WIRE AROUND A FERRITE BEAD 3 TIMES APPROXIMATELY 1 INCH FROM THE BINDING POST.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X° = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 63

MATERIAL

FINISH

DRAWN	RDN 1-22-85
CHECKED	PDW 1-28-85
APPR	PDW 1-28-85
STK NO	

Valhalla Scientific Inc.
SAN DIEGO, CA

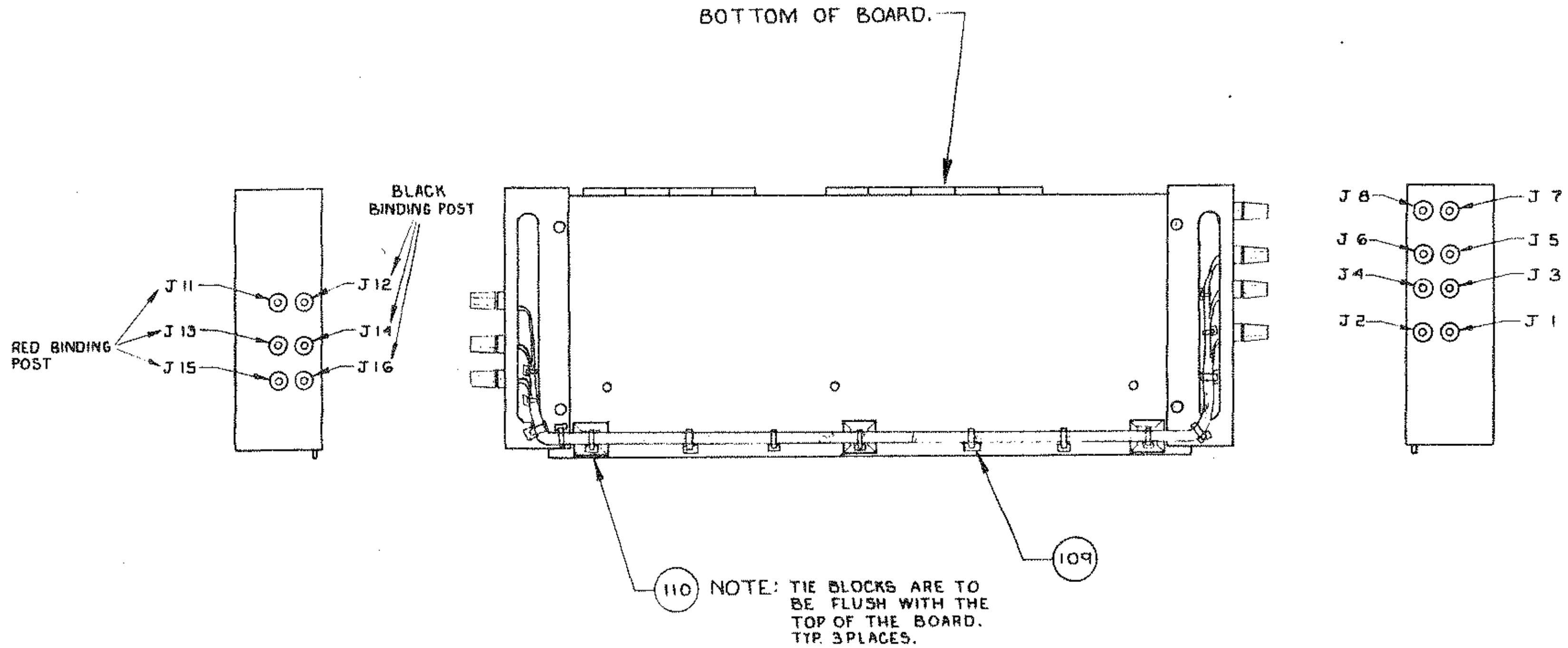
OUTPUT SYSTEM P.C.B. ASSY.

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-609	C

SHEET 7 OF 8

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		— SEE SHEET 7 OF 8 —		

NOTES: (UNLESS OTHERWISE SPECIFIED)



INSTUCTIONS FOR WIRING

FROM	COLOR	TO	NOTES
J 1	RED	J 11	TWISTED PAIR
J 2	BLACK	J 12	
J 3	RED	J 13	TWISTED PAIR
J 4	BLACK	J 14	
J 5	RED	J 15	TWISTED PAIR
J 6	BLACK	J 16	

NOTE: USE TEFLON WIRE ONLY.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
.X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64 ✓

MATERIAL

FINISH

DRAWN RDN 1-2-85
CHECKED
APPR
STK NO

Valhalla Scientific Inc.
SAN DIEGO, CA

OUTPUT SYSTEM, P.C.B. ASSY.

SCALE 1:2
SHEET 8 OF 8

CODE IDENT	SIZE	DRAWING NO	REV
33504	D	2720-609	C

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
549	B	RON	1-25-85	JM
679	C	DPM	2-21-85	DO

OUTPUT AMPLIFIER 2720-611

+150V PIN 7
+1500V PIN 11

TO HIGH VOLTAGE POWER SUPPLY PC B

+HS 28
-HS 30
E1
E2
FAN (−, +)

R213 100K
R214 100K
R215 100K
R216 100K
R217 100K

TR201 2N6499
TR202 2N6499
TR203 2N6499
TR204 2N6499
TR205 2N6499
TR206 2N6499
TR207 2N6499
TR208 2N6499
TR209 2N6499
TR210 2N6499

R229 1K
R230 1K
R231 1K
R232 1K
R233 1K
R235 237

D209 IN5239 9.1V
D211 IN5346A 9.1V

PIN 23 (MOTHER BOARD) A
PIN 12
PIN 15 B
PIN 8

R103 56K Ω 2W
TR101 2N6499
TR102 2N6499
TR103 2N6499
R106 1K
R107 1K
D107 IN5234 6.2V
R112 82.5
R113 82.5
R114 9K
R115 3K
D108 IN4735 6.2V

PIN 1 — 100V AMR OUTPUT
PIN 19 — 1000V AMP. OUTPUT

TO HIGH VOLTAGE POWER SUPPLY PCB

PIN 10 C
PIN 3
PIN 4 D
PIN 1

C102 0.004μF
R104 56K Ω 2W
TR104 2N6499
C103 50p
TR105 2N6499
TR106 2N6499
R108 1K
R109 1K
R105 100
D109 IN5234 6.2V
D113 5082-4655
D114 5082-4655
R110 82.5
D112 5082-4655
R111 82.5
D111 5082-4655

OUTPUT AMP. DRIVER 2720-612

R223 1K
C206 1000p
R224 1K
C207 1000p
R225 1K
C208 1000p
R226 1K
C209 1000p
R227 1K
C210 1000p
R228 100

R218 100K
R219 100K
R220 100K
R221 100K
R222 100K

TR211 2N6499
TR212 2N6499
TR213 2N6499
TR214 2N6499
TR215 2N6499
TR216 2N6499
TR217 2N6499
TR218 2N6499
TR219 2N6499
TR220 2N6499

R234 2K
R236 1K
R237 1K
R238 1K
R239 1K
R240 1K
R241 237

D210 IN5239 9.1V

+12V
IC101 IL201
R116 390Ω

HEATSINK GND. PIN 16

12V(C) PIN 21
12V
IC201 IL201
TO HIGH VOLTAGE POWER SUPPLY P.C.B.
1000V DRIVE 25
-1500V 20
100V DRIVE 23
-150V 5
680Ω R210

FIRST USED	NOT USED	LAST USED
R103	R118-209, 211, 212, 228, 237-240	R241
TR101	TR107-200	TR220
C101	C105-206	C211
D107	D114-208	D211
IC101	IC102-200	IC201

TOLERANCES: X = ± 30' .XX = ± .03 .XXX = ± .010
BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64
MATERIAL
FINISH

DRAWN	WPW	10-12-83
CHECKED	[illegible]	5/29/84
APPR	[illegible]	5/29/84
STK NO		

Valhalla Scientific Inc. SAN DIEGO, CA

OUTPUT AMPLIFIER

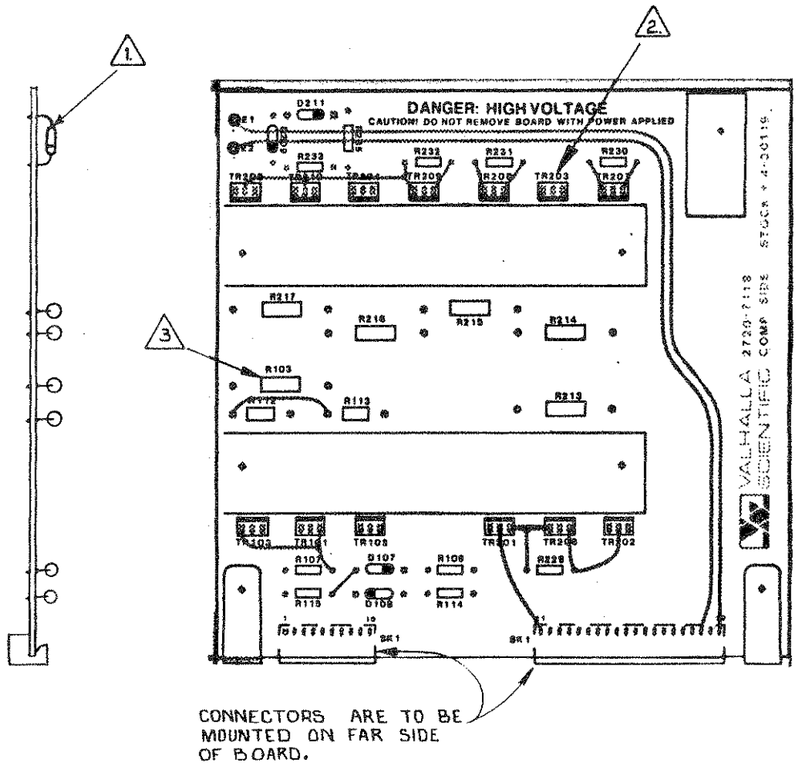
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
	53504	D	2720-081	C

SHEET 1 OF 1

REVISIONS					
ECO	LTR	DESCRIPTION		DATE	APPROVED
	A	RELEASED	RDN	5-29-84	RDN
465	B	WRONG DRAWING# ON P/L	RDN	5-31-84	RE
484	C	UPDATED PARTS LIST		6-6-84	RE
549	D	UPDATED	RDN	1-23-84	RDN
671	E	P/L CHANGE - CORRECT LINE 14	DPM	2-20-85	RDN

NOTES:

1. ALL COMPONENTS ARE MOUNTED 1/8 INCH OFF P.C. BOARD.
2. TRANSISTORS ARE NOT MOUNTED ON THIS ASSEMBLY
3. FOR "A" REVISION BOARD ONLY! USE A 47KΩ, 2W IN SERIES WITH A 10KΩ RNG0C1002F FOR R103.



CONNECTORS ARE TO BE MOUNTED ON FAR SIDE OF BOARD.

COMPONENT SIDE SHOWN

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON
-	1	2720-403	2720

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64

MATERIAL

FINISH

DRAWN RDN 5-29-84
CHECKED RE 5-29-84
APPR RDN 5/29/84
STK NO

Valhalla Scientific Inc.
SAN DIEGO, CA

OUTPUT AMPLIFIER ASSEMBLY

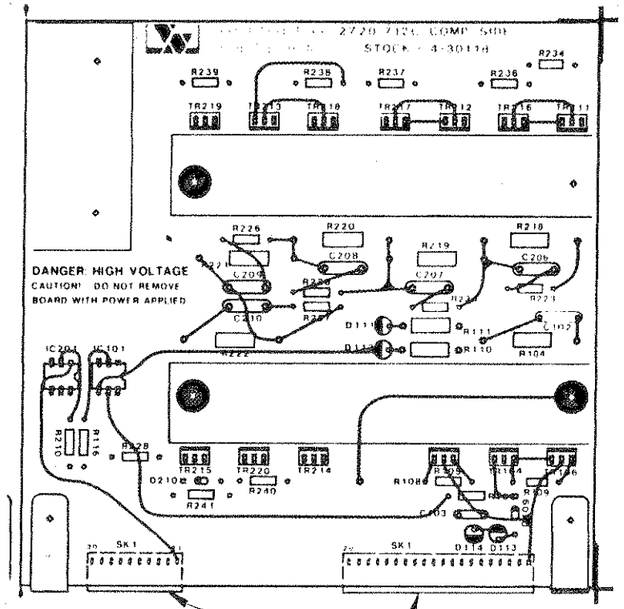
SCALE 1=1 | SHEET 1 OF 2

CODE IDENT	SIZE	DRAWING NO	REV
53504	C	2720-611	E

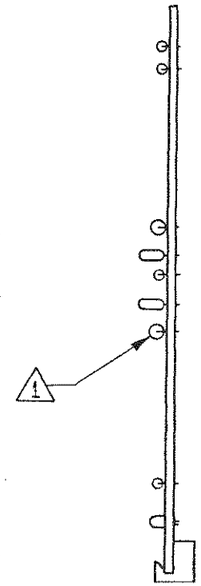
NOTES:

1. RESISTORS AND DIODES ARE TO BE MOUNTED 1/8" FROM BOARD.
2. TRANSISTORS ARE NOT MOUNTED ON THIS ASSEMBLY.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
591	D	UPDATED RDN	1-24-85	
674	E	INCORPORATED MODS. DPM	2-22-85	



CONNECTORS ARE TO BE MOUNTED ON FAR SIDE OF BOARD.



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	
—	1	2720-403	2720	

TOLERANCES: X = ± 30' ; .XX = ± .03 ; .XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

DRAWN RDN 1-24-85
CHECKED
APPR
STK NO

Valhalla Scientific Inc.
SAN DIEGO, CA

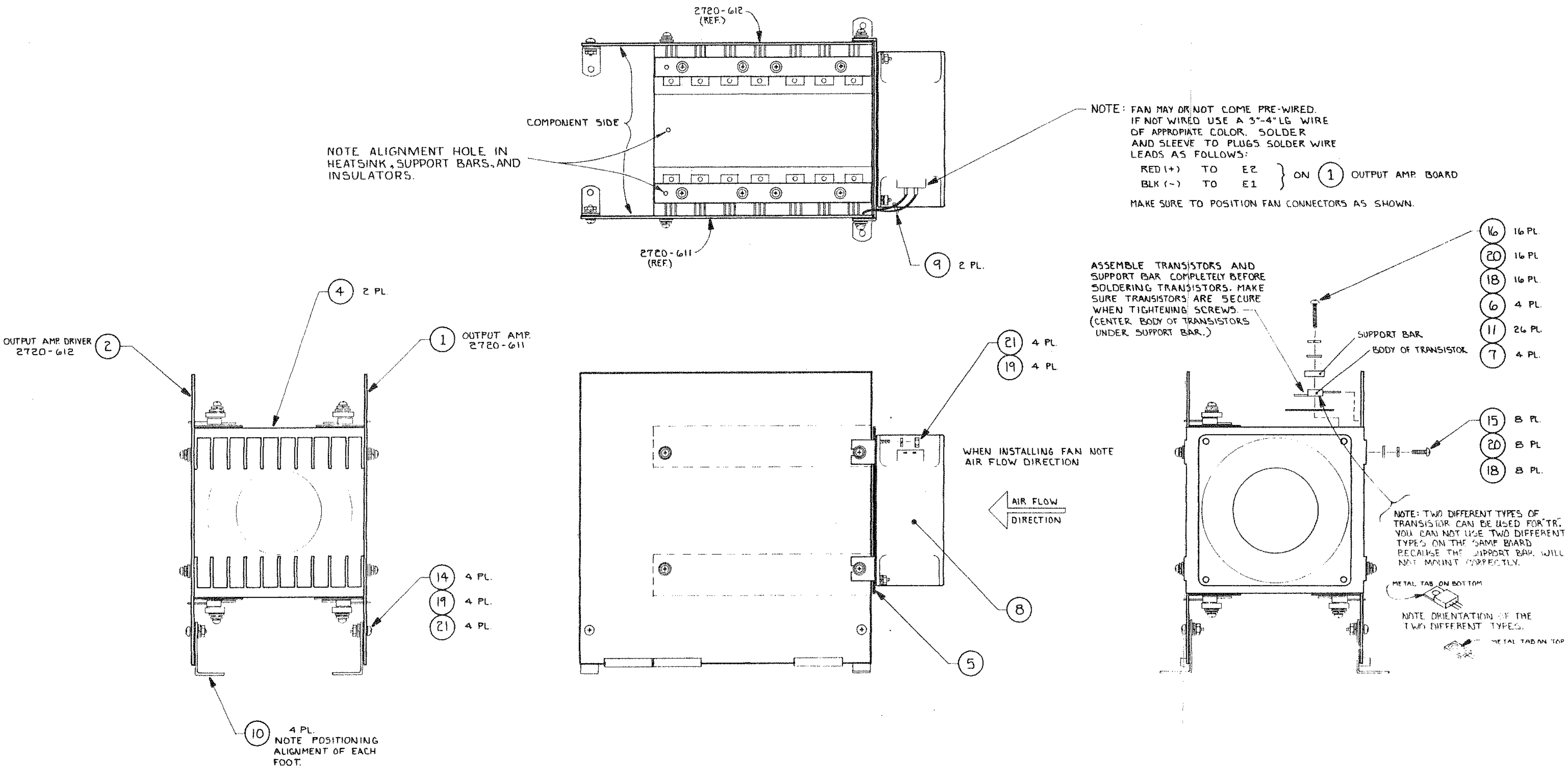
OUTPUT AMP. DRIVER ASSY.

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	C	2720-612	E

SHEET 1 OF 3

NOTES: (UNLESS OTHERWISE SPECIFIED)

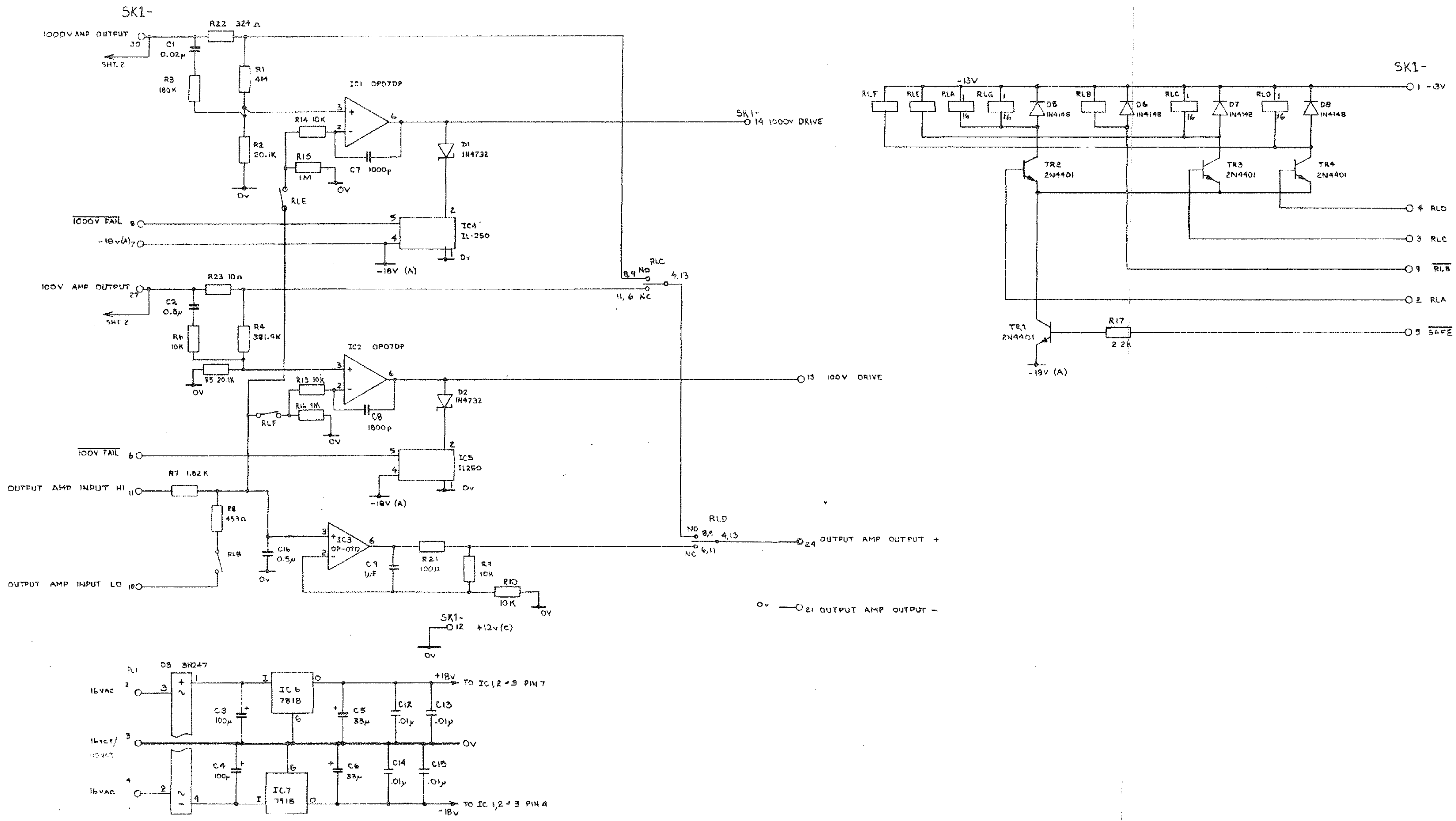
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
430	A	RELEASED WPW	5-1-84	Pow
461	B	PARTS LIST CHG. WPW	5-25-84	R
469	C	UPDATED PARTS LIST	6-6-84	R
546	D	ADDED ALIGNMENT HOLES. RDN	12-10-84	PW
711	D1	ADDED TRANSISTOR NOTE IPM	4-30-85	JM



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES X° = ± 30' .XX = ± .03 .XXX = ± .010	MATERIAL SEE PARTS LIST	DRAWN WPW 4-30-84	Valhalla Scientific Inc. SAN DIEGO, CA
				BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64 ✓	FINISH ~	CHECKED SW 5/1/84	OUTPUT AMPLIFIER ASSY
						APPR Pow 6-1-84	CODE IDENT 53504
						STK NO —	SIZE D
						SCALE 1:1	DRAWING NO 2720-403
						SHEET 1 OF 3	REV D1

NOTES: (UNLESS OTHERWISE SPECIFIED)

		REVISIONS		
ECO	LTR	DESCRIPTION	DATE	APPROVED
537	B	INC. DESIGN CHANGE DPM	2-26-85	JW



SK1-
1000V AMP OUTPUT 30
SHT. 2
C1 0.02μ
R22 324 Ω
R3 180K
R1 4M
R2 20.1K
IC1 OP07DP
R14 10K
R15 1M
C7 1000p
D1 1N4732
SK1- 14 1000V DRIVE
RLE
1000V FAIL 8
-18V(A) 7
IC4 IL-250
-18V (A)
RLC
100V AMP OUTPUT 27
SHT 2
R23 10Ω
C2 0.5μ
R6 10K
R4 381.9K
R5 20.1K
IC2 OP07DP
R13 10K
R16 1M
C8 1000p
D2 1N4732
13 100V DRIVE
RLF
100V FAIL 6
IC5 IL250
OUTPUT AMP INPUT HI 11
R7 1.82K
R8 453Ω
RLB
OUTPUT AMP INPUT LO 10
C16 0.5μ
IC3 OP-07D
C9 1μF
R21 100Ω
R9 10K
R10 10K
RLD
24 OUTPUT AMP OUTPUT +
0V 21 OUTPUT AMP OUTPUT −
SK1- 12 +12V (C)
PL1
D3 3N247
16VAC
16VCT
IC6 7818
C3 100μ
C5 33μ
C12 .01μ
C13 .01μ
+18V TO IC1,2 & 3 PIN 7
C4 100μ
IC7 7918
C6 33μ
C14 .01μ
C15 .01μ
-18V TO IC 1,2 & 3 PIN 4
SK1-
1 -13V
RLF RLE RLA RLG RLB RLC RLD
D5 1N4148
D6 1N4148
D7 1N4148
D8 1N4148
TR2 2N4401
TR3 2N4401
TR4 2N4401
4 RLD
3 RLC
9 RLB
2 RLA
TR1 2N4401
R17 2.2K
5 SAFE
-18V (A)

FIRST USED	NOT USED	LAST USED
R1	–	R20
C1	–	C15
D1	–	D7
IC1	–	IC8
RLA	–	RLF

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64

MATERIAL

FINISH

DRAWN	PDW	5-16-83
CHECKED	PDW	6-16-83
APPR	PDW	5-29-84
STK NO		

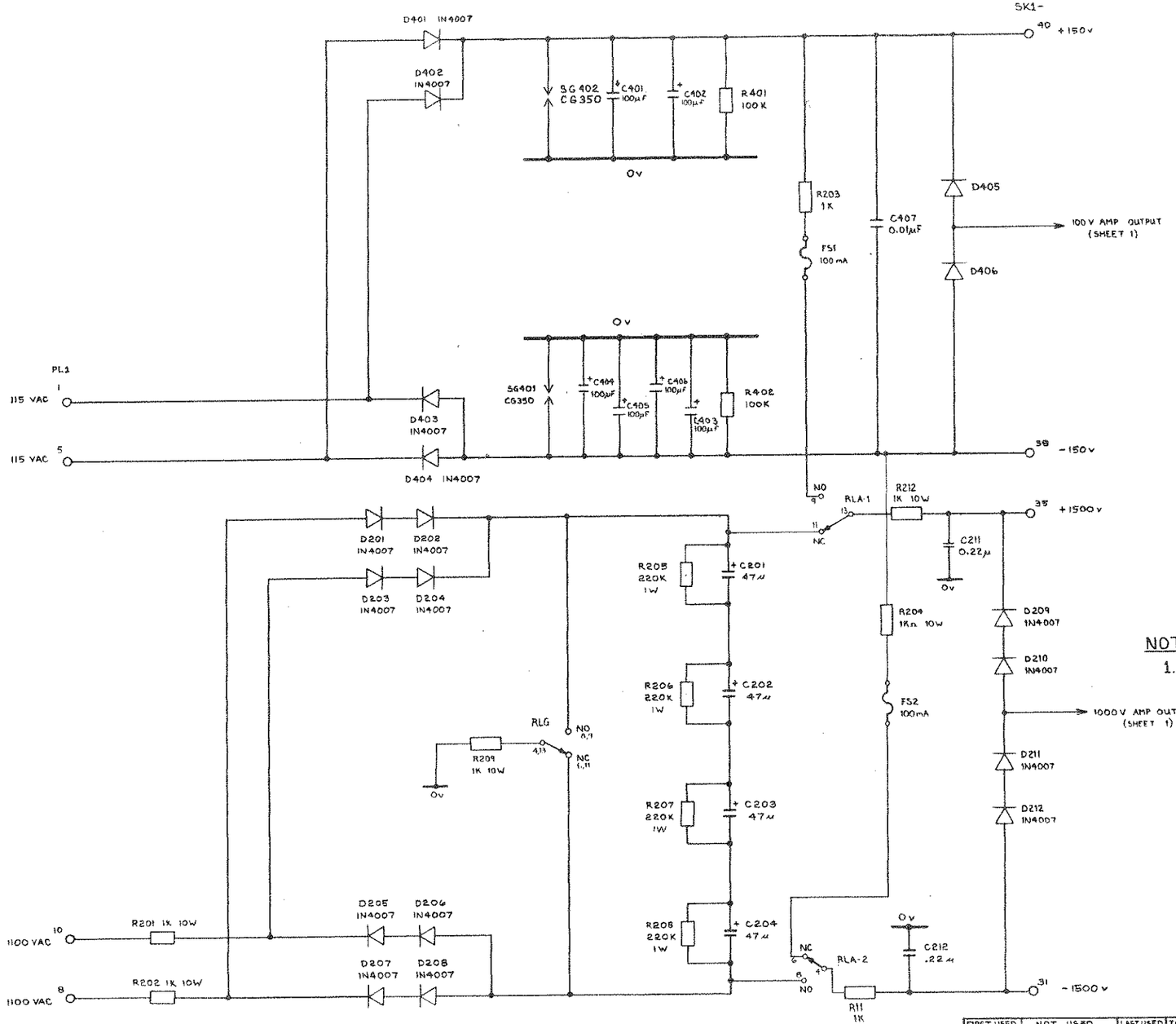
Valhalla Scientific Inc.
SAN DIEGO, CA

HIGH VOLTAGE POWER SUPPLY

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 2	53504	D	2720-083	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHT. 1		



NOTE:

1. RLA & RLG COILS ARE SHOWN ON SHT 1.

FIRST USED	NOT USED	LAST USED
C201	C205-210,213-400	C404
D201	D209-400,	D406
R201	R209,213-400	R402
RLA	—	RLA

TOLERANCES
X° = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

DRAWN W.P.W.	10-24-83	
CHECKED Pete	5-29-84	
APPR Pete	5-29-84	
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

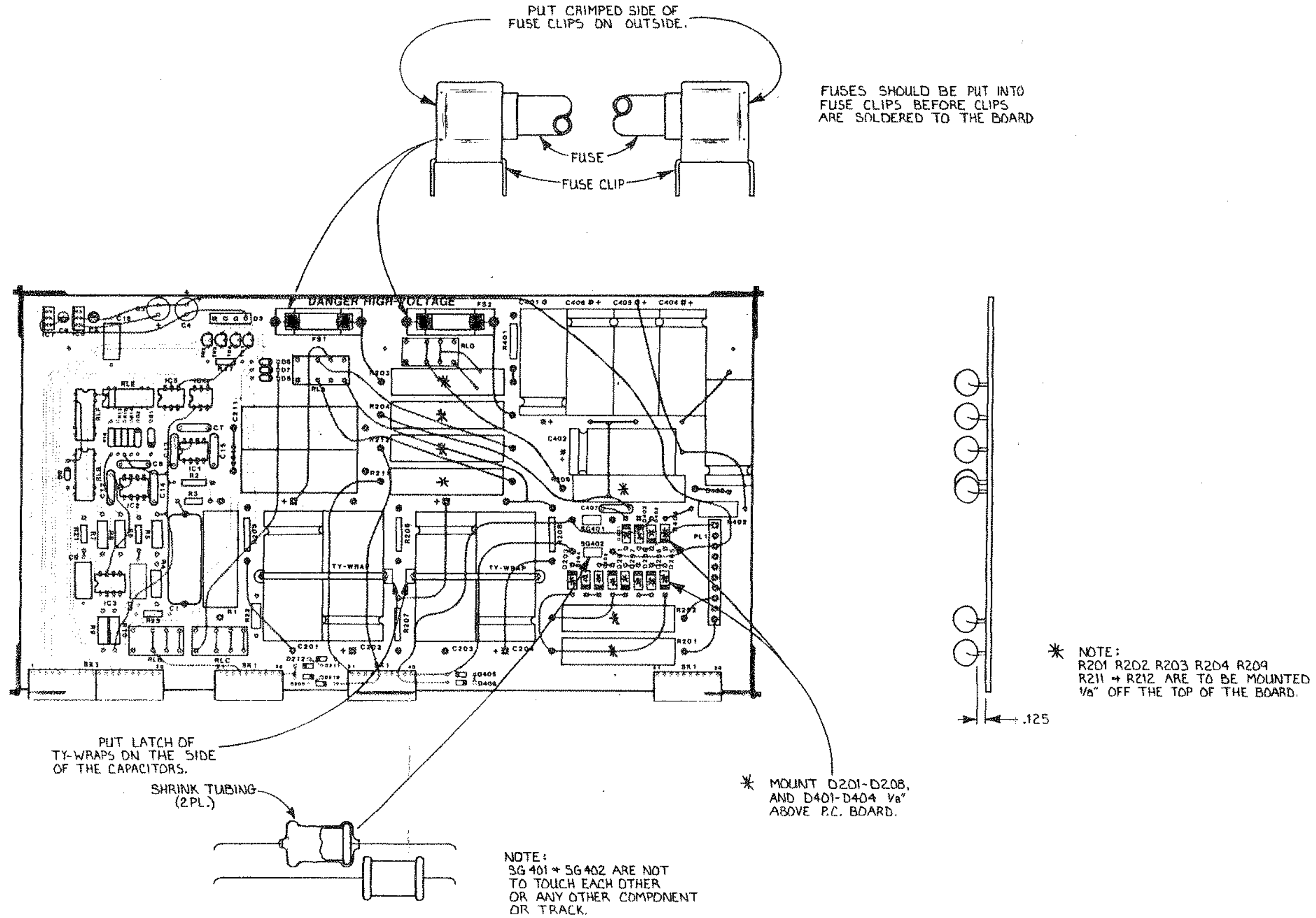
HIGH VOLTAGE POWER SUPPLY

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
	53504	D	2720-083	B

SHEET 2 OF 2

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
537	C	INCORPORATED MODS./REDRAWN DPM	3-1-85	PDG



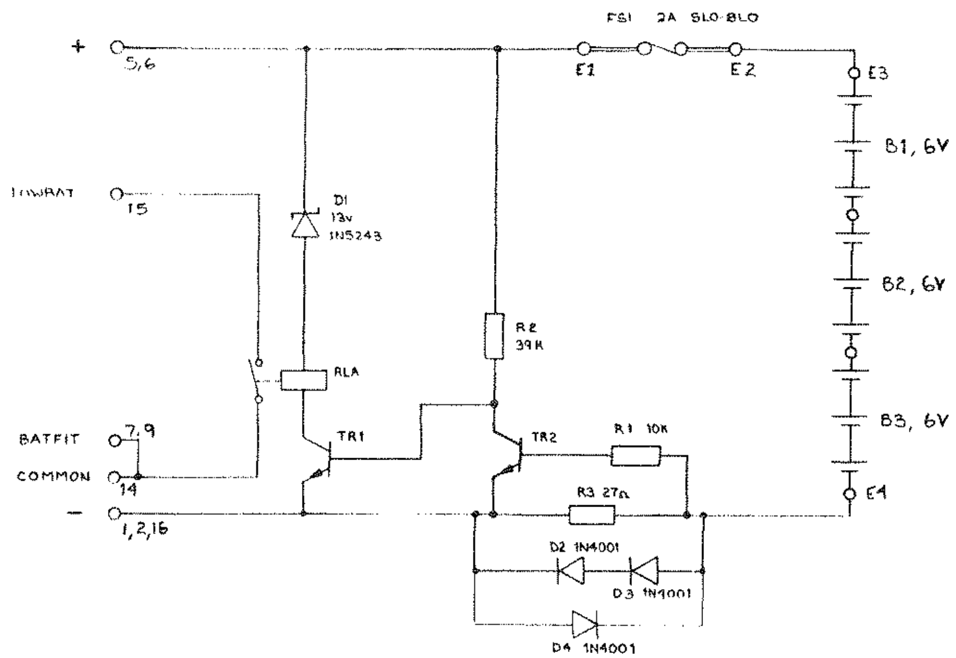
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES: X = ± 30' .XX = ± .03 .XXX = ± .010; BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64√	MATERIAL; FINISH	DRAWN DPM 3-1-85; CHECKED SM 3-1-85; APPR PDG 3-1-85; STK NO	Valhalla Scientific Inc. SAN DIEGO, CA

HIGH VOLTAGE POWER SUPPLY ASSY. DWG.

SCALE	SHEET	CODE IDENT	SIZE	DRAWING NO	REV
1:1	1 OF 4	53504	D	2720-613	C

NOTES: (UNLESS OTHERWISE SPECIFIED)

ECO	LTR	DESCRIPTION		DATE	APPROVED
676	A	RELEASED	RDN	2-28-85	PW



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64√

MATERIAL

FINISH

DRAWN	PW	8-31-83
CHECKED	PW	8-31-83
APPR	PW	8-31-83
STK NO		

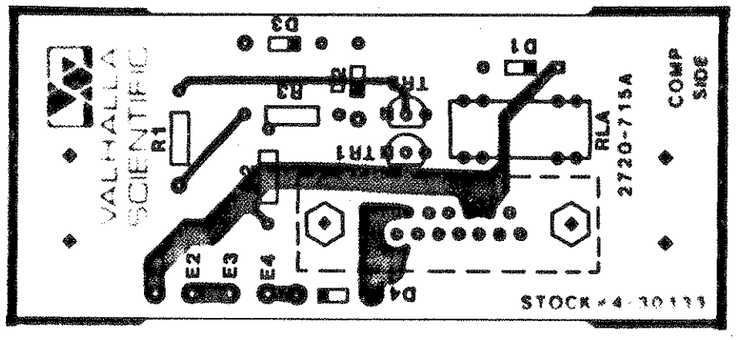
Valhalla Scientific Inc.
SAN DIEGO, CA

"2720" OPTION "BAT"

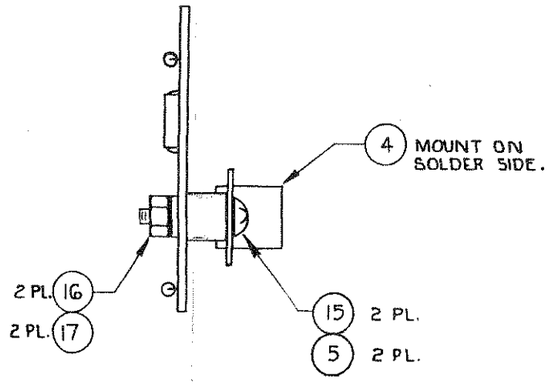
SCALE NONE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 1	53504	D	2720-085	A

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
676	C	REDESIGNED RDN	3-1-85	

COMP. SIDE SHOWN



SECURE CONNECTOR BEFORE SOLDERING



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES
64

MATERIAL

FINISH

DRAWN	RDN	3-1-85
CHECKED	BW	3-1-85
APPR	BW	3-1-85
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

OPTION "BAT"
P.C.B. ASSEMBLY

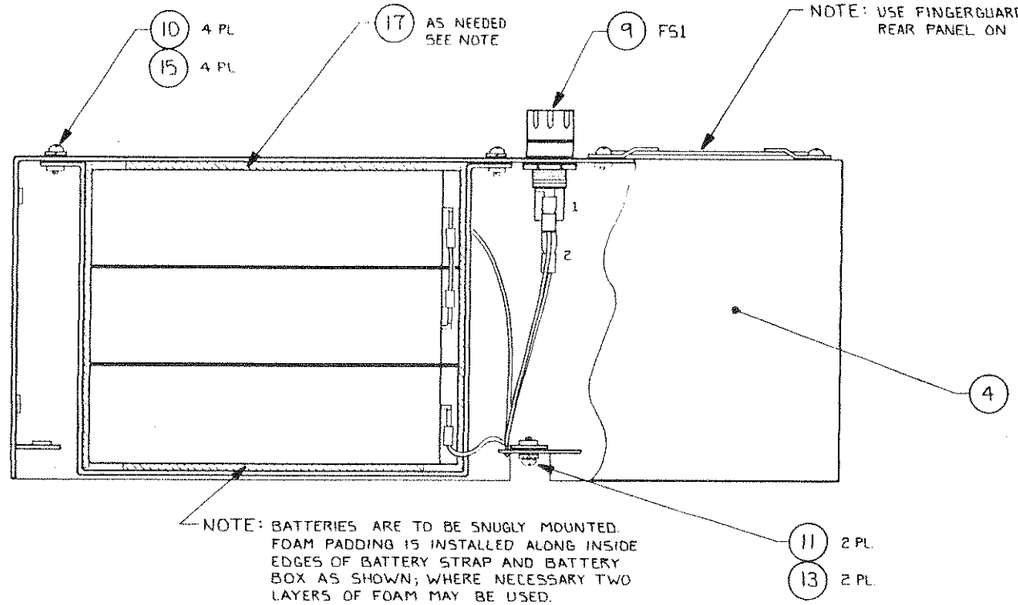
SCALE 1 : 1
SHEET 1 OF 2

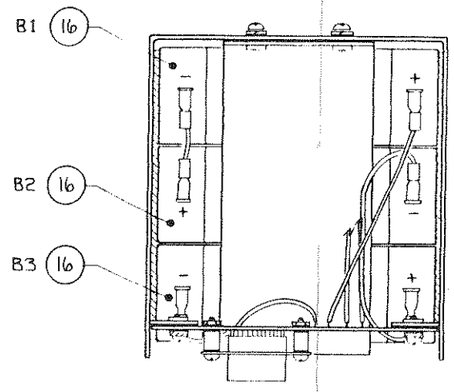
CODE IDENT	SIZE	DRAWING NO	REV
53504	C	2720-615	C

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. USE HOLE PLUGS IN UNUSED HOLES OF BATTERY BOX.

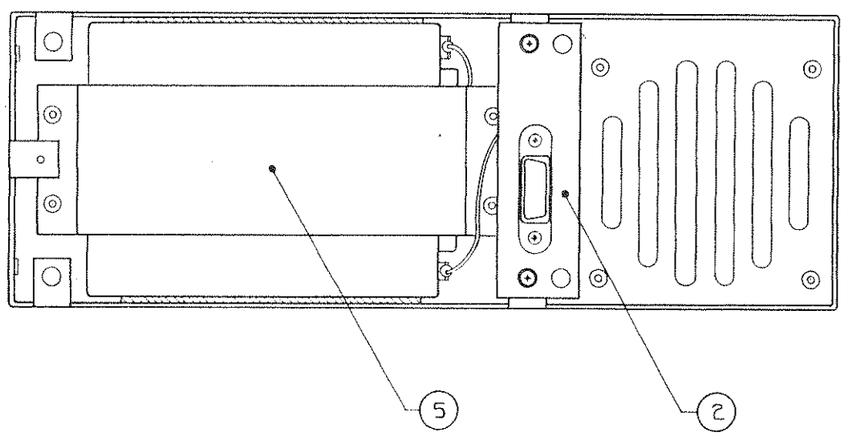
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
449	A	RELEASED WPW	5-11-84	R
467	B	UPDATED PARTS LIST R	6-6-84	R



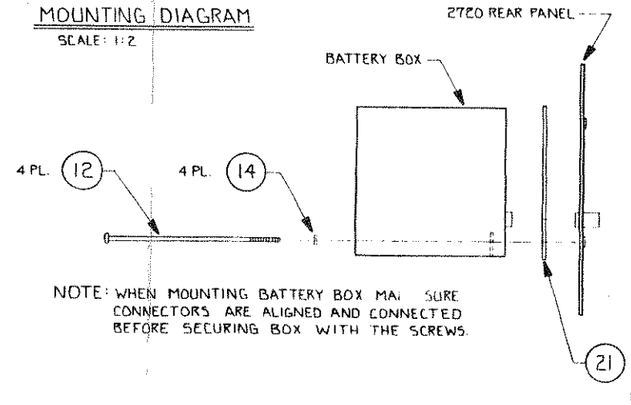


WIRE TAB

FROM	TERMINATION	TO	TERMINATION
E1	SOLDER	FS1-2	SOLDER & SLEEVE
E2	SOLDER	FS1-1	SOLDER & SLEEVE
E3	SOLDER	B1+	CRIMP TERMINAL
E4	SOLDER	B3-	CRIMP TERMINAL
B1-	CRIMP TERMINAL	B2+	CRIMP TERMINAL
B2-	CRIMP TERMINAL	B3+	CRIMP TERMINAL



MOUNTING DIAGRAM
SCALE: 1:2



NOTE: WHEN MOUNTING BATTERY BOX MAKE SURE CONNECTORS ARE ALIGNED AND CONNECTED BEFORE SECURING BOX WITH THE SCREWS.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES: X° = ± 30' .XX = ± .03 .XXX = ± .010
BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64
MATERIAL: SEE PARTS LIST
FINISH: ~

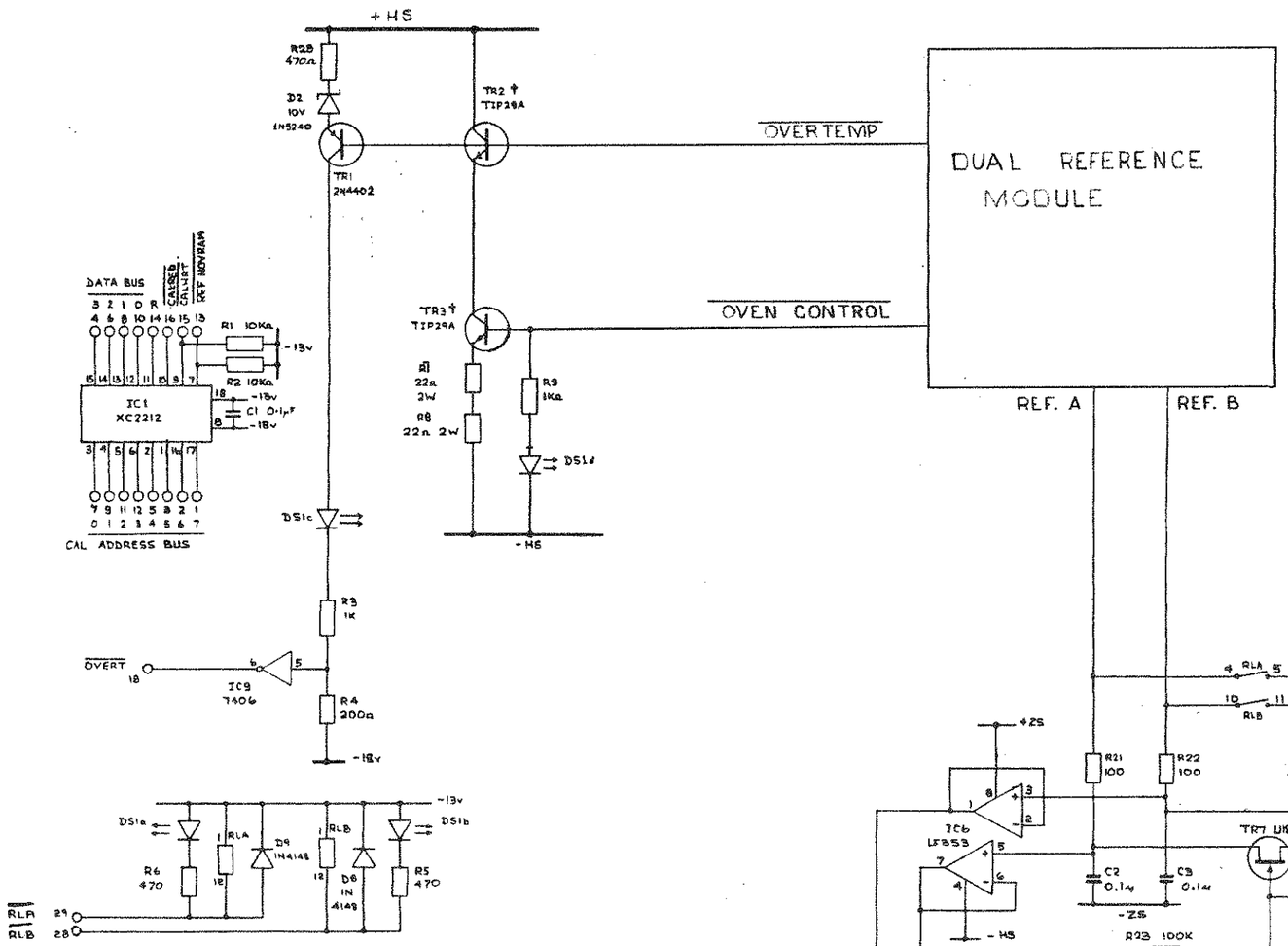
DRAWN WPW	5-11-84	Valhalla Scientific Inc. SAN DIEGO, CA
CHECKED R	5-14-84	
APPR R	5-14-84	
STK NO —		

OPTION "BAT" ASSY.

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	D	2720-407	B

SHEET 1 OF 2

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED



FIRST USED	NOT USED	LAST USED
RV1	—	RV1
C1	-	C6
D2	D3,D4,D5	D10
DS1	-	DS1
IC1	-	IC9
R1	-	R26
TR1	-	TR7
RLA	-	RLB

TOLERANCES
X = ± 30'
.XX = ± 03
.XXX = ± 010

BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64

MATERIAL

FINISH

DRAWN POW	5-6-83	
CHECKED POW	5-19-83	
APPR	5-29-84	
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

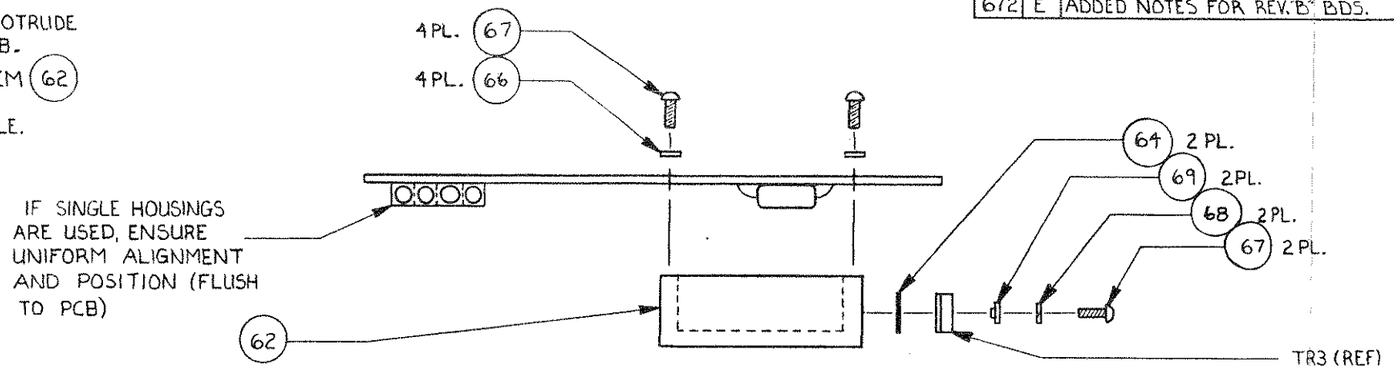
REFERENCE MODULE

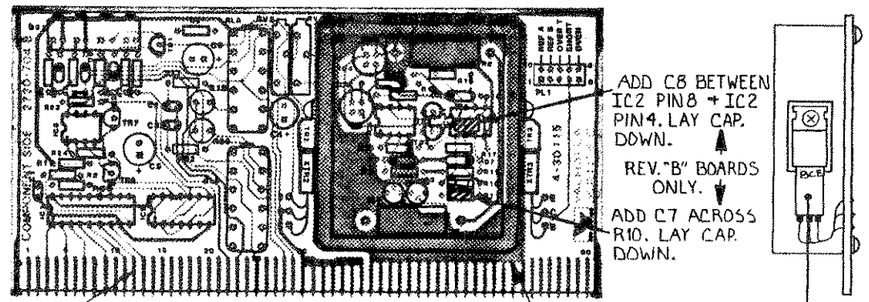
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 1	53504	D	2720-574	A

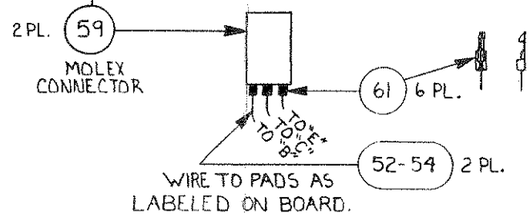
REVISIONS					
ECO	LTR	DESCRIPTION		DATE	APPROVED
341	D	UPDATED / REDRAWN	DPM	1-25-85	
672	E	ADDED NOTES FOR REV."B" BDS.	DPM	2-20-85	

NOTES:

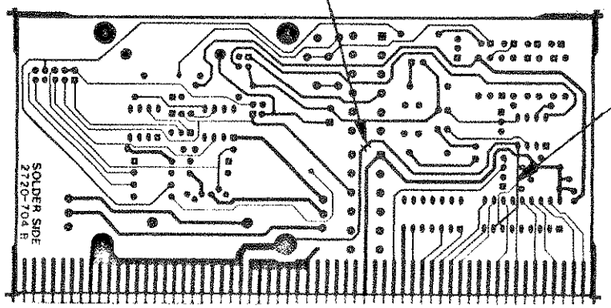
1. NO COMPONENTS CAN PROTRUDE MORE THAN .75 FROM PCB.
2. COMPONENTS INSIDE ITEM (62) (HEAT SHIELD) TO BE AS CLOSE TO PCB AS POSSIBLE.







REVISION "B" BOARDS ONLY
CUT TRACK ON THE PCB IN THIS AREA



REVISION "B" BOARDS ONLY
JUMPER PIN 4 OF IC6 TO PIN 8 OF IC1 USING KYNAR WIRE.

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64

MATERIAL

FINISH

DRAWN DPM	1-25-85	
CHECKED JW	1/28/85	
APPR PDW	1/28/85	
STK NO		

Valhalla Scientific Inc.
SAN DIEGO CA

2720 REFERENCE PCB ASSEMBLY

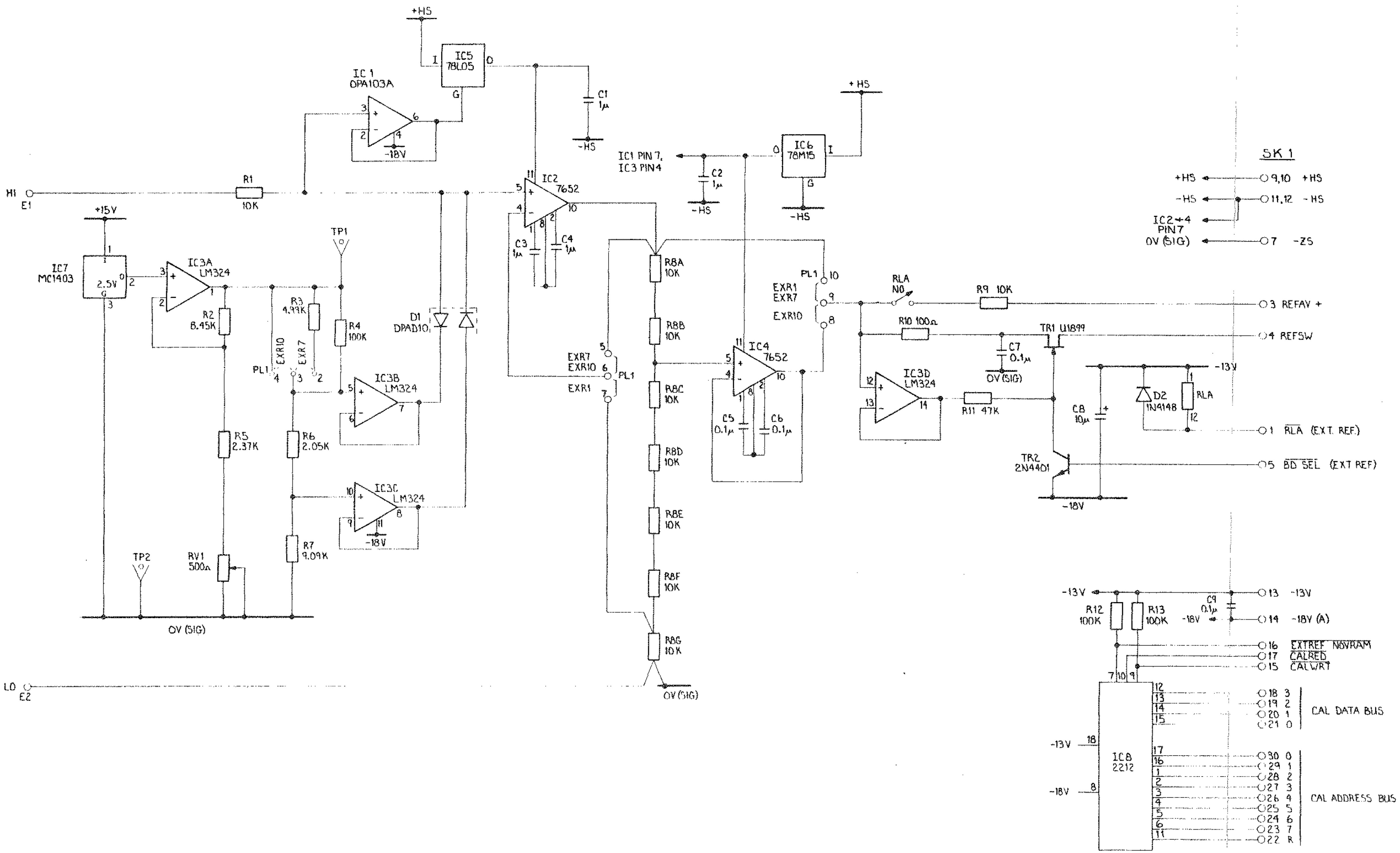
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	C	2720-604	E

SHEET 4 OF 4

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. R8 NOT FITTED ON EXR 7.
2. IC4 C5 AND C6 FITTED ON EXR 10 ONLY.
3. ADJUST RV1 FOR +11.00 VOLTS BETWEEN TP1 + TP2.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
351	A	RELEASED	5-20-85	



FIRST USED	NOT USED	LAST USED
C1	-	C9
D1	-	D2
IC1	-	IC8
R1	-	R13
RV1	-	RV1
TR1	-	TR2
RLA	-	RLA

TOLERANCES
X = ± 30′
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64 ✓

MATERIAL

FINISH

DRAWN	DPM	4-18-85
CHECKED		
APPR		
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

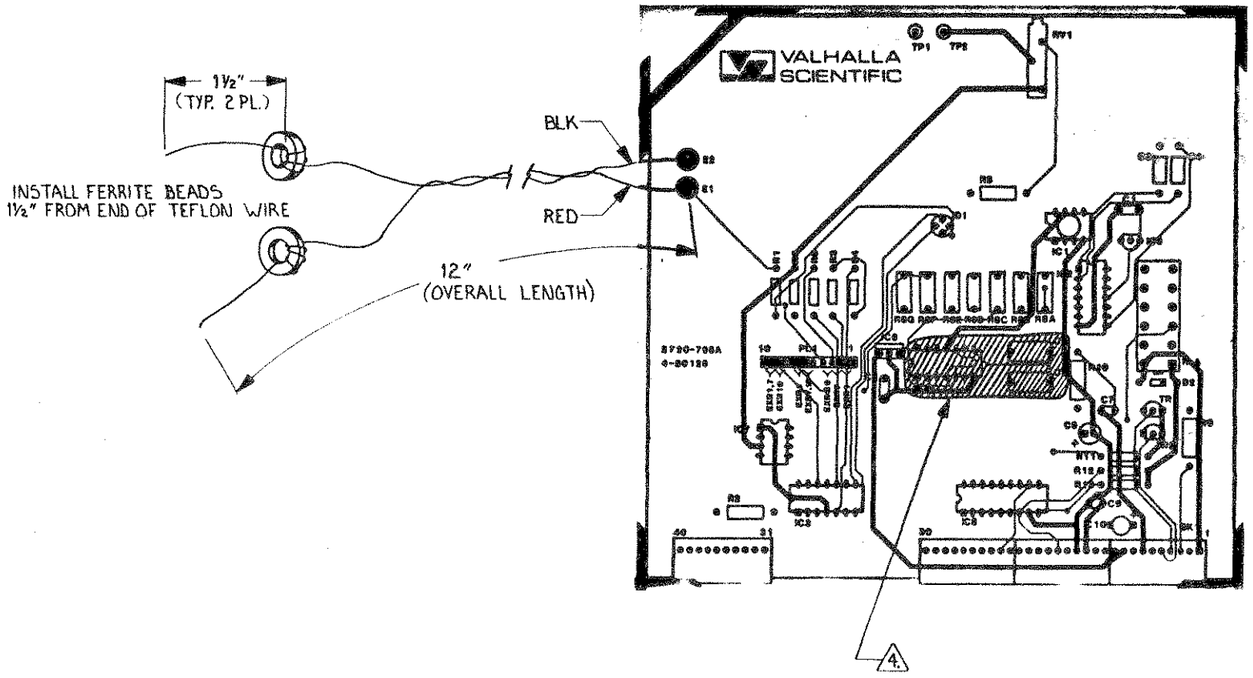
OPTION EXR

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
SHEET 1 OF 1	53504	D	2720-078	A

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
351	A	RELEASED DPM	6-7-85	Pow

NOTES:

1. RB IS A MATCHED SET OF SEVEN RESISTORS. ONE OF THESE RESISTORS IS SEPERATE FROM THE OTHER SIX. THIS SINGLE RESISTOR SHOULD BE INSTALLED IN THE R8G LOCATION, THE OTHERS IN THE R8A-F LOCATIONS.
2. R8A-G SHOULD BE MOUNTED 1/4" ABOVE PCB.
3. INSTALL SHORTING LINKS BETWEEN PL1 PINS 1+2, 6+7 AND 9+10.
4. △4. IC4, C5 AND C6 ARE NOT FITTED.



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

MATERIAL

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES
64 ✓

FINISH

DRAWN	DPM	6/6/85
CHECKED	Pow	6/11/85
APPR	Pow	6/11/85
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

OPTION EXR 1

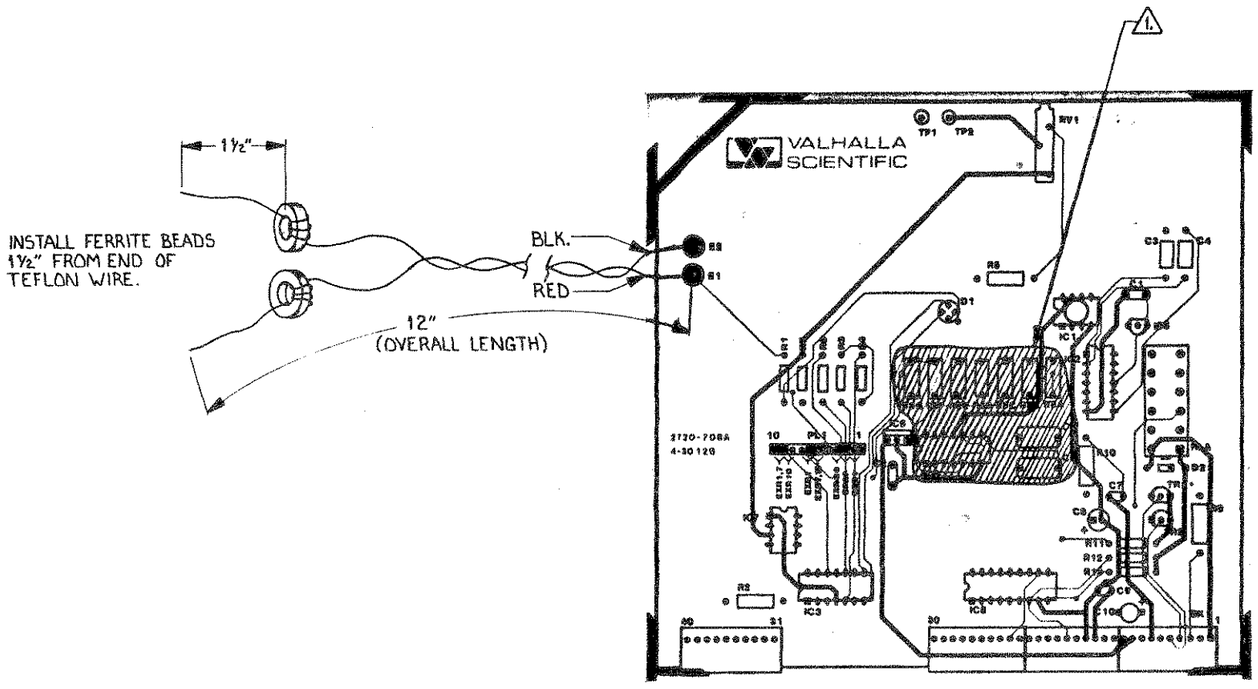
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	C	2720-605	A

SHEET 3 OF 3

NOTES:

1. R8, IC4, C5 AND C6 ARE NOT FITTED.
2. INSTALL SHORTING LINKS BETWEEN PL1 PINS 2+3, PINS 5+6 AND PINS 9+10

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
351	A	RELEASED DPM	6-7-85	PDW



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES
64

MATERIAL

FINISH

DRAWN DPM	6/5/85	
CHECKED PDW	6/11/85	
APPR PDW	6/11/85	
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

OPTION EXR 7

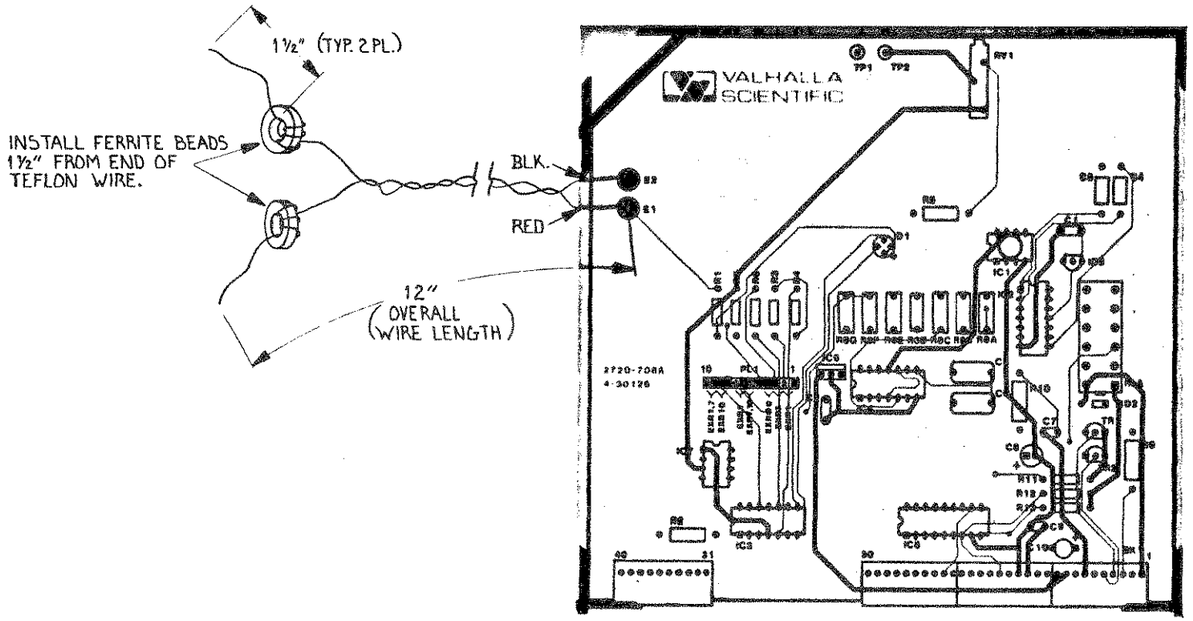
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	C	2720-610	A

SHEET 3 OF 3

NOTES:

1. R8 IS A MATCHED SET OF SEVEN RESISTORS. ONE OF THESE RESISTORS IS SEPERATE FROM THE OTHER SIX. THIS SINGLE RESISTOR SHOULD BE INSTALLED IN THE R8G LOCATION, THE OTHERS IN THE R8A-F LOCATIONS.
2. R8A-G SHOULD BE MOUNTED ¼" ABOVE PCB.
3. INSTALL SHORTING LINKS BETWEEN PL1, PINS 3+4, PINS 5+6 AND PINS 8+9.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
351	A	RELEASED DPM	6-7-85	



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON

TOLERANCES
X = ± 30'
.XX = ± .03
.XXX = ± .010

MATERIAL

BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES
64

FINISH

DRAWN DPM 6/5/85
CHECKED 6-11-85
APPR 6-11-85
STK NO

Valhalla Scientific Inc.
SAN DIEGO, CA

OPTION EXR 10

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1:1	53504	C	2720-608	A

SHEET 3 OF 3

Valhalla Scientific Inc.

PARTS LIST

FINAL CHASSIS ASSY. | MODEL 2720GS | DWG NO 2720-400 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2			Initial Chassis Assy.	Valhalla	2720-404	1					
3			Front Assy.	Valhalla	2720-401	1					
4		5-10291	Plug, Hole,.375",black	SMith	3091	6					
5			Output Amplifier Assy.	Valhalla	2720-403	1					
6			H. V. Power Supply Assy.	Valhalla	2720-613	1					
7			L. V. Power Supply Assy.	Valhalla	2720-602	1					
8			Main Microprocessor Assy.	Valhalla	2720-603	1					
9			Reference Module Assy.	Valhalla	2720-604	3					
10			Nullmeter Assy.	Valhalla	2720-607	1					
11			Output System Assy.	Valhalla	2720-609	1					
12		4-10582	High Voltage Cover	Valhalla	2720-225	1					
13		5-10489	Output Sys. Insulator	Valhalla	2720-223	1					
14		4-10440	Ref PCB Enclosure Cover	Valhalla	2720-204	1					
15		4-10466	Baffle-Airstream	Valhalla	2720-218	1					
16			Screw Phil flat 82°		4-40 x 1/4	5					
17			Screw, Phil pan blk		6-32 x 3/8	2					
18		5-10496	Standoff, Modified 8-32	Valhalla	2720-226	7					
19			Screw, Phil pan, SS		6-32 x 3/8"	7					
20			Washer, internal star		#6	12					
21			Nut, Radio Hex		6-32	7					
22			Washer, split lock		#6	2					
23			Washer, flat		#6	2					

NOTES: Sheet 1 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	FRONT ASSEMBLY	MODEL 2720	DWG NO 2720-401	REV B

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2		4-10451	Front Panel	53504	2720-213	1					
3											
4		--	I/O Processor Board	53504	2720-601	1					
5		--	Display Board	53504	2720-606	1					
6											
7											
8	SW1	5-03062	Key Operated Switch	C & K	Y201-13-0-A1-01-Q4	1					
9											
10		5-10101	Spacer, 3/8"Lg,1/4"Dia.#6	Smith	2101	6					
11		5-10465	Spacer,5/16"Lg,1/4"Dia.#6	Smith	9208	6					
12											
13		--	Washer Internal Star	--	#6	6					
14		--	Nut, Radio Hex	--	6-32	6					
15											
16		--	Shrink Tube, 1/8" dia.	--		1½"					
17		--	Wire, Brown, 22AWG	--		6"					
18											
19											
20											
21											
22											
23											

NOTES: Sheet 2 of 2 is assembly drawing

Valhalla Scientific Inc.

PARTS LIST

REAR PANEL ASSY. | MODEL 2720 | DWG NO 2720-402 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1		4-10447	Rear Panel	53504	2720-209	1					
2		5-10018	Fuse Holder, panel	75915	342004A	1					
3		5-10166	Receptacle, AC Filter	CORCOM	6EF1	1					
4		5-03034	Switch, Slide 115/230	82389	47227LFR	1					
5		5-10137	Binding Post, Gold	83330	151B	1					
6		5-10333	Cable assy. 15 pin	53504	2703-055	1					
7		4-10580	Support Bracket H.V.cover	Valhalla	2720-224	1					
8		5-10302	Housing 10 way	Molex	09-50-7101	1					
9		5-10301	Terminal	Molex	08-50-0106	10					
10		5-10086	Solder Lug #8	Smith	1412-6	1					
11		5-10491	Filter fan guard 3 1/4		FF325A/30 or 45PPI	1					
12											
13		5-10019	Ty-wraps, 4" x 1/8"	16956	WRN-4	10					
14			Screw, Phil, pan, SS		6-32 x 3/8"	2					
15											
16			Screw, Phil, pan SS		4-40 x 1/2"	2					
17			Washer split lock		#6	2					
18			Washer, split lock		#4	6					
19			Nut, radio hex		#4-40	6					
20			Screw Phil, flat 82°		6-32 x 3/8	4					
21											

NOTES: Sheet 3 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	REAR PANEL ASSY.	MODEL 2720	DWG NO 2720-402	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
22											
23	[illegible]	5-04011	Fuse, 3 amp, slo-blo	75915	313-003	1					
	or	5-04013	Fuse, 1.5 amp, slo-blo	75915	313-01.5						
25			Shrink tubing		1/4 dia.	2"					
26			Shrink Tubing		1/8 dia	12"					
27			Wire:								
28			BRN 12"		18 AWG	12"					
29			RED 12"		18 AWG	12"					
30			ORN 12"		18 AWG	12"					
31			YLO 12"		18 AWG	12"					
32			GRN 12"		18 AWG	12"					
33			BLU 12"		18 AWG	12"					
34			VLT 12"		18 AWG	12"					
35			GRY 12"		18 AWG	12"					
36			WHT 12"		18 AWG	12"					
37			BLK 12"		18 AWG	12"					
38			GRN 12"		16 AWG	12"					
39			BLK 4"		16 AWG	4"					
40											
41											
42											
43											
44											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	AMPLIFIER ASSY.	MODEL 2720	DWG NO 2720-403	REV D

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1			Output Amp. Assy.	Valhalla	2720-611	1					
2			Output Amp. Driver Assy.	Valhalla	2720-612	1					
3											
4		4-10450	Heatsink, output	Valhalla	2720-212	2					
5		4-10449	Fan Bracket	Valhalla	2720-211	1					
6		4-10501	Transistor Support Bar	Valhalla	2720-222	4					
7		4-10536	Insulator, Heatsink	Valhalla	2720-220	4					
8		5-10469	Fan, 3 1/8", 24VDC	Rotron	5D24B2	1					
9		5-10019	Cable Tie, 4" x 1/8"	Panduit	WRN-4	2					
10		5-10328	Bracket, Angle	Zierick	251	4					
11	TR101-106,201-220	3-10030	NPN Transistor	--	2N6499	26					
12											
13											
14			Screw, Phil, Pan SS		6-32 x 3/8"	4					
15			Screw, Phil, Pan SS		4-40 x 3/8"	8					
16			Screw, Phil, Pan SS		4-40 x 1/2	16					
17											
18			Washer, flat		#4	16					
19			Washer, split lock		#6	8					
20			Washer, split lock		#4	16					
21			Nut, Radio Hex		6-32	8					
22											

NOTES: Sht. 1 of 3 is assembly drawing

Valhalla Scientific Inc. | **PARTS LIST** | AMPLIFIER ASSY. | MODEL 2720 | DWG NO 2720-403 | REV D

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
23			Wire, RED, 20 AWG, 4"			4"					
24			Wire, BLUE, 20AWG, 4"			4"					
25			Heat Shrink, 1/8" dia., 2"			2"					

NOTES:

Valhalla Scientific Inc.

PARTS LIST

INITIAL CHASSIS ASSY.

MODEL 2720

DWG NO 2720-404

REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2			Rear Panel Assy.	Valhalla	2720-402	1					
3			Bottom plate assy.	Valahlla	2720-405	1					
4											
5		4-10456	Side Rail	Valhalla	2300-223	2					
6		4-10457	Side Rail	Valhalla	2300-224	2					
7		4-10437	Support Angle	Valhalla	2720-201	2					
8		4-10370	Chassis Support Bar	Valhalla	2703-212	2					
9		4-10333	Bezel (4-hole)	Valhalla	2724-205	4					
10											
11		5-10361	Foot, hard, rubber, gray	Acc.Rub.	2095W-017-Grey	4					
12		5-10496	Standoff Modified 8-32	Valhalla	2720-226	3					Made from 5-10438
13											
14		5-10437	Block, Adhesive, Ribbon, cable	Icorally	FRC-1	1					
15											
16			Screw Flat, 82°, Stain		6-32 x 9/16"	8					
17			Washer, Internal Star		#6	6					
18			Screw, Flat, 82°, Stain		6-32 x 3/8"	20					
19			Screw, Flat, 82°, Stain		6-32 x 1/4"	8					
20			Screw, Phil, Pan, Stain		6-32 x 1/2"	6					
21											
22											
23											

NOTES: Sheet 1 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	BOTTOM PLATE ASSY.	MODEL 2720	DWG NO 2720-405	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3		4-10448	Bottom Plate	53504	2720-210	1					
4		4-10462	P. C. B. Spacer L.	53504	2720-214	1					
5		4-10461	P. C. B. Spacer R.	53504	2720-215	1					
6			Mother Bd. Assy.	53504	2720-600	1					
7		4-10443	Analog Wrap	53504	2720-205	1					
8		4-10444	Enclosure Ref. Bd.	53504	2720-206	1					
9											
10											
11		4-10439	LV-HV PCB Bracket	53504	2720-203	1					
12		4-20047	HV Transformer	53504	2720-011	1					
13		4-20046	LV Transformer	53504	2720-010	1					
14		5-10437	Ribbon Cable TY-Block	Icorally	FRC-1	5					
15		5-10423	Ribbon Cable Assy.	53504	2720-050	1					
16		5-10468	U-Channel, Rubber,.15x.12	Accu-Rub.	924	12"					
17											
18	PLD, PLE	5-10439	Molex Housing, 4 Pin	Molex	09-50-7041	2					
19	PLA	5-10302	Molex Housing, 10 pin	Molex	09-50-7101	2					
20	PLB	5-10440	Molex Housing, 11 Pin	Molex	09-50-7111	1					
21											
22		5-10261	Ty-Wrap Block, Large	06383	ABM25-A	2					
23		5-10019	Ty-Wrap 4" x 1/8"		WRN-4	36					

NOTES: Shts 1 & 2 are assembly drawings

Valhalla Scientific Inc.

PARTS LIST

BOTTOM PLATE ASSY. | MODEL 2720 | DWG NO 2720-405 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24		5-10485	Standoff, 1/4Hex,1/2Lg.,8-32	Smith	8443 or 2327	4					
25		5-10409	Card Guide 2.5"	Amerlok	PCG-5250	2					
26		5-10318	Stand off, snap-in	83330	3922	5					
27		5-10301	Molex Terminal	Molex	08-50-0106	34					
28			Shrink Tubing		1/8" diameter	2"					
29		5-10354	Solder Lub #8	Smith	1412-8	2					
30			Washer, Int. Star		#8	12					
31			Nut, Raido Hex		8-32	12					
32			Screw, self tapping		#4 x 1/4"	2					
33			Washer, Int. Star		#6	11					
34			Nut, Radio, Hex		#6	11					
35			Washer, split		#8	4					
36			Screw, Phil, Pan SS		#8 x 1/4"	3					
37											
38											
39											
40											
41											
42											
43											
44											
45											
46											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	OPTION "BAT"	MODEL 2720	DWG NO 2720-407	REV B

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2			Bat Board Assy.	Valhalla	2720-615	1					
3											
4		4-10452	Battery Pack Box	Valhalla	2720-207	1					
5		4-10500	Battery Strap	Valhalla	2720-221	1					
6											
7											
8		5-10250	Hole Plug	Smith	3090 BLK	2					
9		5-10018	Fuse Holder, Panel Mt.	Little Fuse	342004A	1					
10			Screw, Phil pan, SS		8-32 x 1/2"	4					
11			Screw, Phil pan, SS		6-32 x 3/8"	2					
12			Screw, Phil pan, SS		10-24 x 4 1/2"	4					
13			Washer, Internal Star		#6	2					
14			Washer split lock		#10	4					
15			Washer, split lock		#8	4					
16	B1, 2, 3	5-10457	Battery, 6V, lead acid 4.8 AHR	Panasonic	LCR-456P	3					
17		5-10266	Rubber Strip, 1/2W	Acc. Rub.	1/2 x 3/16 Neoprene	36"					
18		5-04001	Fuse 2 amp	Little Fuse	312-002	1					
19			Shrink tubing 1/4" dia.		Black, 1/4" dia.	3"					
20		5-10395	Disconnect Insulated	Waldom	KST-2188	6					
21		5-10468	Rubber "U" Channel	Acc.Rub.	924	36"					
22			Wire, Red, 16 AWG, 48"			1					
23											

NOTES: Sheet 1 is the assembly drawing

SHT 2 OF 2

Valhalla Scientific Inc.

PARTS LIST

MOTHER BOARD | MODEL 2720 | DWG NO 2720-600 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N				REMARKS
1											
2											
3		4-30127	PCB Mother Board	53504	2720-700	1					
4											
5											
6	SK 13	5-10310	10 Way Socket	Molex	22-16-2101	3					
7	PL1-5, 10-12	5-10313	10-way pins, .56 lg.	Molex	22-10-2101	50					
8	PLD, E	5-10427	4 pin wafer assy.	Molex	09-67-1043	2					
9	PLB	5-10428	11 pin wafer assy.	Molex	09-6701113	1					
10	PLA, C	5-10300	10 Pin Wafer Assy.	Molex	09-6701113	2					
11		5-10330	Bead Pin	Molex	R62-3	2					
12	SK14	5-10042	24 Pin IC Socket	T. I.	8524-01	1					
13	SW2	5-03080	8 Pos. Rgt. angle switch	Grayhi	l 76PSB08	1					
14		4-10463	Spacer, Power Switch	Valhal	a 2720-216	1					
15	SK15	5-10243	Connector, GPIB	AMP	552791-1	1					
16	SW1	5-03061	Switch, power, 4A	Schadow	ZFNE152U	1					
17					EE11010106B						
18	SK6, 7, 8, 9	5-10453	Connector 120 pin	EDAC	345-120-524-2-78	4					
19											
20		5-10464	Grommet Rubber	Smith	91118	2					
21		5-10019	Cable Tie 4"	Panduit	WRN-4	18					
22		5-10441	Tie Wrap Block Small	Panduit	ABMM-AT	7					
23		5-10261	Tie Wrap Block, Lg.	Panuit	ABM25-A	1					

NOTES: Sht. 3 of 3 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	MOTHER BOARD	MODEL 2720	DWG NO 2720-600	REV C

##	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24											
25		5-10244	IEEE Hardware	Amphenol	552633-3	1					
26			Screw, Phil, Pan SS		4-40 x 1/2	8					
27			Screw, Phil, pan SS		4-40 x 3/8	2					
28			Washer, Internal Star		#4	8					
29											
30											
31											
32			Wire Teflon Red		20 AWG Teflon	60"					
33			Wire Teflon White		20 AWG Teflon	60"					
34			Wire Teflon Black		30 AWG Teflon	60"					
35			Wire Teflon Green		20 AWG Teflon	60"					
36											
37			Electrical tape		Black	3"					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	I/O PROCESSOR	MODEL 2720	DWG NO 2720-601	REV E

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2		4-30121	I/O Processor PCB	Valhalla	2720-701	1					
3											
4	B101	5-10458	Batter 3.9V 1Ahr.	Elect. Indust.	BCX72-3B50		1				
5	B21	5-10442	Beeper Piezo PCB Mount	TDK	PB3120UP002A	1					
6											
7											
8	C1, 4	2-30001	10uf 25V TANT	--	--	2					
9	C2, 3	2-20014	20pf 500V MICA	--	CM05FD200J03	2					
10	C8, 9, 11-16	2-60004	0.01uf 630V Mylar	--	--	8					
11	C5, 6	2-60002	0.1uf 100V Mylar	--	--	2					
12											
13	C10,101, 108	2-40026	10uf 50V Alum Radial	--	--	3					
14	C102	2-20018	33pf Mica 500V	--	CM05FD330J03	1					
15	C103, 107	2-2	Factory Select	--	CM05		2				
16	C104, 106	2-20012	10pf MICA 500V	--	CM05FD100J03	2					
17	C105	2-70004	12-100pf VAriable	Mouser	24AA067	1					
18	C7, 109	2-40029	100uf 25V Alum Radial	--	--	2					
19											
20											
21											
22	D2, 101,102,103	3-20028	Diode Signal Schottky	--	1N5711	4					
23											

NOTES: Sht. 1 is the assy. drawing

Valhalla Scientific Inc.	PARTS LIST	I/O PROCESSOR	MODEL 2720	DWG NO 2720-601	REV E

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N			REMARKS
24										
25	IC1, 15	3-30157	Octal GPIB Transceiver	Moto	MC3447P3	2				
26	May use either one	3-30332	Octal GPIB Transceiver	Moto	MC3447P					
27	IC2	3-30158	GPIB/MPU Interface	Moto	MC68488P	1				
28	IC3	3-30182	Binary 1 of 16 Decoder	T. I.	SN74154N	1				
29	IC4	3-30155	1 of 8 Decoder	T. I.	SN47LS138N	1				
30										
31	IC8	3-30373	CMOS 8K x 8 static RAM	Hitachi	HM6264LP-15	1				
32	IC9	3-30344	Octal Latch, Trans, 3-state	T.I.	74LS373N	1				
33	IC10	3-30342	Micro-P+RAM/PTM/ACIA/PIA	Moto	MC6803G	1				
34	IC11, 23	3-30185	Quad Opto-Isolator	Litronix	ILQ-74	2				
35	IC12	3-30093	Fast Opto Isolator	H. P.	HCPL-2601	1				
36	IC13	3-30375	Dual Med Opto Isolator	H. P.	HCPL-2530	1				
37	IC14	3-30184	HEX Inverter	T. I.	74LS04N	1				
38	IC16	3-30162	Octal Transceiver 3 state	T. I.	74LS245N	1				
39	IC17, 18	3-30156	Octal 3 state Buffer	T. I.	74LS541N	2				
40	IC19, 20	3-30177	Octal Latch 3 state	T. I.	74LS374N	2				
41	IC21, 22	3-30173	Hex Inverter 15V O/C	T. I.	7406 or 7416	2				
42	IC24	3-30061	Quad 2 I/P AND	T. I.	74LS08N	1				
43	IC25	3-50028	2720/IC25 (Main ROM)	Valhalla	3-30367		1			Programmed in test
44	IC101	3-30362	CMOS 1 of 8 Decoder	T. I.	74HC138	1				
45	IC102	3-30363	Real time clock & RAM	Moto	MC146818	1				
46	IC103	3-30149	CMOS HEX inverter		CD40106	1				

NOTES:

Valhalla Scientific Inc. | **PARTS LIST** | I/O PROCESSOR | MODEL 2720 | DWG NO 2720-601 | REV E

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
47											
48	PL1	5-10443	Wafer 15 way .1sp.,.56Lg.	Molex	22-03-2151	1					
49	PL2	5-10360	Wafer 10 way .1sp.,.70Lg.	Molex	22-03-2102	3					
50											
51											
52											
53	R5-11	1-01033	470 ohm 5% 1/4W	--	RC07GF471J	7					
54	R13, 14	1-01061	10K ohm 5% 1/4W	--	RC07GF103J	2					
55	R101,102,103	1-01081	100K ohm 5% 1/4W	--	RC07GF104J	3					
56	R104	1-01041	1 K ohm 5% 1/4W	--	RC07GF102J	1					
57	R105	1-01113	5.6M ohm 5% 1/4W	--	RC07GF565J	1					
58	R106	1-01083	150 K ohm 5% 1/4W	--	RC07GF154J	1					
59	R107	1-01086	220 K ohm 5% 1/4W	--	RC07GF224J	1					
60	R108, 110	1-01100	1 M ohm 5% 1/4W	--	RC07GF105J	2					
61	R109	1-01021	100 ohm 5% 1/4W	--	RC07GF101J	1					
62											
63											
64	RN1, 3	1-40003	15 x 10K ohm	--	316A-103	2					
65	RN2	1-40001	8 x 470 ohm	--	316B-471	1					
66											
67											
68	RV1	1-50010	50 ohm single turn	CTS	110-50 ohm	1					
69											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	I/O PROCESSOR	MODEL 2720	DWG NO 2720-601	REV E

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
70											
71	SK1, 2	5-10321	Socket 10 way bottom entry	Molex	22-17-2102	3					
72	SK3, XIC102	5-10042	Socket il 24 Pin	T. I.	8524-01	2					
73	XIC2, 10	5-10246	Socket DIL 40 pin	Burndy	DILB40P-11	2					
74	XIC7, 8, 25	5-10295	Socket DIL 28 Pin	Burndy	DILB28P-108	3					
75											
76											
77	TR1	3-10026	N-Channel VMOS	--	VN10KM	1					
78	TR101	3-10010	Transistor PNP	--	2N4402	1					
79											
80											
81	TP101, 102	5-10290	Test Point Hook	Vector	K32-2	2					
82											
83											
84	Y1	5-02004	Crystal MPU 4 MHz.	--	HC18-4MHz.	1					
85	Y101	5-02009	Crystal 32.76800KHz.	--	--	1					
86											
87											
88		--	Screw Phil pan SS	--	4-40 x 3/8	2					
89		--	Nut Radio Hex	--	4-40	2					
90		--	Washer Internal Star	--	#4	2					
91											
92		--	R. T. V.	--	--	A/R					

NOTES:

Valhalla Scientific Inc.

PARTS LIST

LOW VOLTAGE POWER SUPPLY | MODEL 2720 | DWG NO 2720-602 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3		4-30123	PCB, Low Voltage P. S.		2720-702	1					
4											
5											
6											
7	C2	2-40012	15000uf, 10V, Alum.		159TTA010	1					
8	C1	2-40036	220uf, 63V, Alum.		227TTA063	1					
9	C105	2-40016	22000uf,10V, Alum.		229TTA010	1					
10	C106, C3	2-40029	100uf, 25V, Alum. Radial		--	1					
11	C4, 9, 113	2-60002	0.1uf,100V, Mylar			3					
12	C5	2-40017	2200uf,35V, Alum.		228TTA035	1					
13	C6, 7, 103	2-40026	10uf, 50V, Alum. Radial		--	7					
	104, 107, 110, 111										
15	C101	2-40018	4700uf, 35V, Alum.		478TTA035	1					
16	C112	2-40004	2200uf, 16V, Alum.		228TTA016	1					
17	C102,108,109	2-40035	1000uf, 35V, Alum.		108TTA035	3					
18											
19	C8	2-40010	1000uf, 25V, Alum.		108TTA025	1					
20											
21											
22											
23											

NOTES: Sheet 5 is the assembly drawing

Valhalla Scientific Inc.	PARTS LIST	LOW VOLTAGE POWER SUPPLY	MODEL 2720	DWG NO 2720-602	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24											
25	D1,4,101,105	3-20027	Bridge, 1A, 100V		3N247	4					
26	D2,3,6,14	3-20021	Rectifier, 3A, 30V		1N5821	6					
27	102, 103										
28	D5	3-20000	Diode, Signal		1N4148	1					
29	D7,8,11,104	3-20002	Diode Rectifier		1N4001-1N4007	7					
30	107-109										
31											
32	IC103	3-30355	Regulator,+5V,3A(to 3 STL)		LM323KC	1					
33	IC2	3-30356	Regulator,+Adj,1.5A,To 3		LM317KC	1					
34	IC104	3-30369	Regulator,+6V,1A		7806CT	1					
35	IC1	3-30042	Regulator,+5V, 1.5A		LM7805CK	1					
36	IC101	3-30370	Regulator,+18V,1.5A		7818CK	1					
37	IC102	3-30358	Regulator,-18V,1.5A		7918CK	1					
38	IC105	3-30171	Regulator,+18V,1.0A		7818CT	1					
39	IC106	3-30172	Regulator,-18V, 1A		7918CT	1					
40	R1	1-01061	10K ohm, 5%, 1/4W		RC07GF103J	1					
41	R2	1-01051	3.9K, 5%, 1/4W		RC07GF392J	1					
42	R3	1-01028	270 ohm, 5%, 1/4W		RC07GF271J	1					
43											
44											
45											
46											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	LOW VOLTAGE POWER SUPPLY	MODEL 2720	DWG NO 2720-602	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
47											
48	RV1	1-50022	1K ohm End Adjust	Beckman	89PK1K	1					
49											
50											
51											
52	SK1	5-10310	Socket,Rt. Angle,10way,gold	Molex	22-16-2101	9					
53	SK2	5-10008	Socket,DIL, 16 pin	T. I.	C8516-01	1					
54	T1	4-20048	Pwr XFMR, 24VCT,1.5A	Signal	DST7-24	1					
55		5-10449	Cable tie, 14"x.15	Panduit	PLT41-M	2					
56		5-10315	Socket, To -3	Smith	6243	5					
57											
58		4-10446	Heatsink, Power Supply		2720-208	1					
59		5-10232	Washer, Insulator, to 3	Bergquist	7403-09FR-06	5					
60		5-10288	Spacer,1/4"dia x 1/2" lg. x #6 Alum	Smith	8503	9					
61			Nut, Radio Hex		#4	3					
62			Screw, Phil pan, SS		6-32 x9/16"	10					
63			Screw, Phil pan, SS		6-32 x 3/4"	5					
64			Screw, Phil pan, SS		4-40 x 1/4"	3					
65											
66											
67			Washer, Internal Star		#6	19					
68			Washer, Flat		#6	4					
69			Washer, Int. Star		#4	3					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	LOW VOLTAGE POWER SUPPLY	MODEL 2720	DWG NO 2720-602	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
70			Nut, Radio Hex		#6	4					
71											
72			Screw, Phil pan, SS		6-32 x 1 3/8"	4					

NOTES:

Valhalla Scientific Inc.

PARTS LIST

MAIN MICROPROCESSOR | MODEL 2720 | DWG NO 2720-603 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1		4-30128	Main MPU PC Board	Valhalla	2720-703	1					
2	C208,213,219,224 304,318,319	2-40026	10uf, 50V, Alum. Radial		--	7					
3	C207	2-60001	.22 uf, 100V, Mylar		--	1					
4	C218, 317	2-10013	1uf, 50V, Ceramic		8131/050/651/105M	2					
5	C209	2-60009	0.022uf,400V, Mylar	Wima	MKC-4 .022	1					
6	C217	2-10006	0.01uf, 100V, Ceramic		--	1					
7	C325	2-40037	220uf, 10V, Alum. Radial		--	1					
8	C3	2-30004	1 uf, 10V, Tantalum Bead			1					
9											
10	C4	2-40028	47 uf, Alum. Radial		--	1					
11	C18-20, 7	2-40029	100uf, 25V, Alum. Radial		--	4					
12	C2,8-17, 216	2-60004	0.01uf, 630V, Mylar			22					
	C220-223, 202,314										
	C315,316,322-324										
15											
16	C203-204, 303	2-60002	0.1 uf, 100V, Mylar			7					
	307,310,312,313										
18	C305, 306	2-20002	50pf, 500V, MICA			2					
19	C205	2-20013	100pf, 500V, MICA			1					
20	C210,211,214,215	2-20019	200pf, 500V, MICA			6					
21	301,302										
22	C328, 326	2-90002	0.5uf, 50V, Polycarbonate		--	2					
23	C308, 309, 311	2-90005	0.1uf, 50V, Polycarbonate		--	3					

NOTES: Sheet 6 of 6 is the assembly drawing

Valhalla Scientific Inc.	PARTS LIST	MAIN MICROPROCESSOR	MODEL 2720	DWG NO 2720-603	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24	C201	2-90003	5uf, 50V, Polycarbonate		--	1					
25	D1	3-20036	Transient, Supply, 6V		1N5908	1					
26	D2-6,302-305	3-20028	Diode, Signal, Schottky		1N5711	9					
27	D201, 202'	3-20041	Diode, Reference, 6.3V		1N825	2					
28	D203	3-20000	Diode, Signal		1N4148	1					
29											
30											
31	IC1-4	3-30155	1 of 8 Decoder		74LS138N	4					
32	IC5	3-30061	Quad 2 I/P AND		74LS08N	1					
33	IC6	3-30023	CMOS, Quad, Analog Switch		4066BF(Ceramic)	1					
34	IC7	3-30213	RAM,2048X8, 300ns		TMS4016-30NL	1					
35	IC8	3-50031	2720 Main ROM		3-30367 (27128)	1					
36	IC9	3-30187	Microprocessor, 1.5MHz.		MC68A09P	1					
37	IC10	3-30350	A. C. I. A., 1.5MHz.		MC68A50P	1					
38	IC12	3-30351	PTM, 1.5MHz.		MC68A40P	1					
39	IC101-104	3-30159	Peripheral Interface Adapt.		MC6821P	4					
40	IC13	3-30149	CMOS Hex Invertor (Schmidt)		40106BE	1					
41	IC15, 11, 210	3-30184	Hex Invertor		74LS04N	3					
42	IC201	3-30322	Dual Op-Amp, JFET		LF353N	1					
43	IC202, 315	3-30336	Chopper Amp Lo Noise		ICL7652CPD	2					
44	IC203	3-30173	Hex Inverter, 15V, O/C		7406-7416	1					
45	IC205	3-30170	OP-Amp, Low Noise		OP-07DP	1					
46	IC206, 207, 313	3-30090	Op-Amp, Bi-Fet		LF356N	5					

NOTES: 204,314

Valhalla Scientific Inc. | **PARTS LIST** | MAIN MICROPROCESSOR | MODEL 2720 | DWG NO 2720-603 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
47	IC208	3-30073	Comparator, JFET		LF311H or TL311	1					
48	IC209	3-30175	Dual Monostable Retrigerable		74LS123N	1					
49	IC216	3-30174	Quad, 2 I/P OR		7432	1					
50	IC211,215',310,311		Dual D-Type		74ALS74	4					
51	IC212, 213	3-30339	8 Bit Counter + Latch		74LS590N	2					
52	IC301-304	3-30340	8 Bit Comp. + Latch		74AS885N	4					
53	IC305-308	3-30194	4 Bit Sync. Counter		74LS163AN	4					
54	IC309	5-02008	Oscillator, 16.77216MHz,0.01%			1					
55	IC214	3-30333	Temperature Sensor		AD590JH	1					
56	R101-104,R3,203	1-01061	10K ohm, 5%, 1/4W	81349	RC07GF103J	25					
	204,234,236,207,226										
	208,211,212,307										
	221,223,228,231,310										
	303,306,309,312,229										
61	R202,205,206	1-01081	100K ohm, 5%, 1/4W	81349	RC07GF104J	7					
	233,235,301,304										
63	C320,321,327	2-10014	0.1uf, 50V, Ceramic			3					
64	R209, 210	1-01045	2K ohm, 5%, 1/4W	81349	RC07GF202J	2					
65	R213,230,227 225,319	1-01021	100 ohm, 5%, 1/4W	81349	RC07GF101J	5					
66	R215, 232	1-01041	1K ohm, 5%, 1/4W	81349	RC07GF102J	2					
67	R216	1-10198	10K ohm, 1%, 10PPM	PRP	1/8W-10K-1%-10PPM	1					
68											
69	R219	1-10205	63.3K ohm, 0.05%, 5PPM	PRP	1/8W-63.3K-.05%-5PPM	1					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	MAIN MICROPROCESSOR	MODEL 2720	DWG NO 2720-603	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
70	R220	1-01069	30K ohm, 5%, 1/4W		RC07GF303J	1					
71											
72	R224	1-01053	4.7K ohm, 5%, 1/4W	81349	RC07GF472J	1					
73											
74											
75	R313, 314	1-10117	19.6K ohm, 1%		RN60C1962F	2					
76	R321, 222	1-10206	40K, .05%, 5PPM	PRP	18W-40K.05%-5PPM	2					
77	R315	1-10225	46.5K 1%		RN60C4652F	1					
78	R322	1-10226	15.4K 1%		RN60C1542F	1					
79	R316,317	1-01073	47K ohm, 5%, 1/4W	81349	RC07GF473J	2					
80	R323	1-20124	700K ohm,0.05%, 2PPM		GS802-700K-2PPM	1					
81	R320	1-20013	100 ohm, .05%, 5PPM 1°C	Goldstar	R127 100 ohm .05%	1					
82	RN1	1-40003	15x10K ohm		316A-103	1					
83	RV301	1-50043	200 ohm End adjust		89PR200 ohm	1					
84	SK1	5-10310	10-way socket	Molex	22-16-2101	13					
85	R1, 218	1-01100	1M ohm, 5%, 1/4W	81349	RC07GF0105J	2					
86	XIC7, 10	5-10042	Socket,DIL, 24 pin	T. I.	8524-01	2					
87	XIC8, 12	5-10295	Socket, DIL, 28 pin	Burndy	DILB28P-108	2					
88	XIC9,101-104	5-10246	Socket, DIL, 40 Pin	Burndy	DILB40P-11	5					
89	R318	1-10004	15K, 1%		RN60C1502F	1					
90	R2	1-01109	3.3M ohm, 5%, 1/4W	81349	RC07GF335J	1					
91	R237	1-10107	29.4K ohm, 1%	81349	RN60C2942F	1					
92	R302,305,308,311	1-01007	10 ohm, 5%, 1/4W	81349	RC07GF100J	4					

NOTES:

Valhalla Scientific Inc.

PARTS LIST

MAIN MICRORPOCESSOR

MODEL 2720

DWG NO 2720-603

REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
93	TR101-105,107-116	3-10013	NPN Transistor (TO92)		2N4401	15					
94	TR204,205	3-10033	N-Channel, UPIGFET		VN10LM	2					
95	TR309-312	3-10026	N-Channel, VMOS (TO92)		VN10KM	4					
96	TR106	3-10032	NPN Darlington		MPSA-13	1					
97	TR201-203,211	3-10000	N-Channel JFET		U1899(E)	7					
	206,207,210										
98	TR208,209	3-10010	PNP Transistor (TO92)		2N4402	6					
	301-304										
101											
102	TR305-308	3-10016	N-Channel VMOS (TO5)		VN66AK	4					
103	XTR307,308	5-10229	Washer, Eeryllia, TO5	Permag	CG-3835-1	2					
104											
105											
106	RN301	1-40011	Personality Res Net.	G. S.	2720-026	1					
107	IC316	3-30328	Op-Amp JFET		OPA103AM	1					
108	IC317	3-30169	Regulator, 5V, .1A		LM79L05CLP	1					
109	IC318	3-30168	Regulator, +5V, .1A		LM78L05ACLP	1					
110	R217	1-10185	11.11K ohm, 0.1%, 5PPM	PRP	1/8W-11.11K-0.1%-5PPM	1					
111	IC319	3-30376	Dual High Speed Driver	Teledyne	TSC427CPA	1					
112	PL201	5-10398	Wafer, 2 Pin .56	Molex	22-03-2021	1					
113	XPL201	5-10488	Shorting Plug .1 sp.	Molex	15-29-1024	1					
114											
115											

NOTES:

Valhalla Scientific Inc.

PARTS LIST

OPTION EXR 1 | MODEL 2720 | DWG NO 2720-605 | REV A

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3	C1,C2	2-10013	1 uf, 50V, Ceramic Disc		8131-050-651-105M	2					
4	C3, C4	2-90006	1 uf, 50V, Polycarb.			2					
5											
6	C7, C9	2-10014	0.1 uf, 50V, Ceramic Disc		8212-050-651-104M	2					
7	C8	2-40026	10 uf, 50V, Alum. Rad.			1					
8	C10	2-30011	4.7 uf, 35V, Tant.			1					
9											
10	D1	3-20024	Pair, Low leakage Diodes		DPAD10	1					
11	D2	3-20000	Diode, Signla		1N4148	1					
12											
13	IC1	3-30328	Op-Amp, JFET	Burr-Brown	OPA103AM	1					
14	IC2	3-30336	Chopper Amp, Low noise	Intersil	ICL7652CPD	1					
15	IC3	3-30031	Quad-Op Amp		LM324N	1					
16	IC5	3-30168	Reg.,+5V,0.1A,T092		LM78L05ACLP	1					
17	IC6	3-30036	Reg.,+15V,0.5A,T0202		78M15CP	1					
18	IC7	3-30064	Reference, 2.5V, 1%	Motorola	MC1403	1					
19	IC8	3-30189	Novram, 256x4	Xicor	XC2212	1					
20											
21											
22											
23											

NOTES: Sheet 3 is the assembly drawing

Valhalla Scientific Inc.

PARTS LIST

OPTION EXR 1

MODEL 2720

DWG NO 2720-605

REV A

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24		5-10488	Shorting Plug,.1sp,gold	Molex	15-29-1024	3					
25											
26	R1	1-10008	10K ohm, 1%	81349	RN60C1002F	1					
27	R2	1-10016	8.45K ohm, 1%	81349	RN60C8451F	1					
28	R3	1-10061	4.99K ohm, 1%	81349	RN60C4991F	1					
29	R4	1-10006	100K ohm, 1%	81349	RN60C1003F	1					
30	R5	1-10277	2.37K ohm, 1%	81349	RN60C2371F	1					
31	R6	1-10278	2.05 K Ohm, 1%	81349	RN60C2051F	1					
32	R7	1-10017	9.09K ohm, 1%	81349	RN60C9091F	1					
33	R8	1-30023	7x10K ohm, Set	Vishay	2720-024	1					
34	R9	1-01061	10K ohm, 5%, 1/4W	81349	RC07GF103J	1					
35	R10	1-01021	100 ohm, 5%, 1/4W	81349	RC07GF101J	1					
36	R11	1-01073	47K ohm, 5%, 1/4W	81349	RC07GF473J	1					
37	R12, 13	1-01081	100K ohm, 5%, 1/4W	81349	RC07GF104J	2					
38											
39	RLA	5-03083	Relay, 2A+2B, 5V	Aromat	S2EB-5V	1					
40											
41	RV1	1-50034	500 ohm, end adjust	Beckman	89PR500 OHM	1					
42	TR1	3-10000	N-Channel, JFET		U1899E	1					
43	TR2	3-10013	NPN Transistor (TO92)		2N4401	1					
44	TP1, TP2	5-10290	Test Hook, PCB	Vector	K32-2	2					
45	PL1	5-10313	Wafer,10 way,Gold.56 long	Molex	22-10-2101	1					
46	SK1	5-10310	Socket Rt. Angle 10 way	Molex	22-16-2101	4					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	DISPLAY P. C. B. ASSY.	MODEL 2720	DWG NO 2720-606	REV B

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3											
4		4-30120	P. C. B. Display		2720-706	1					
5											
6	C1	2-30001	10 uf, 25V TANT			1					
7											
8											
9	DS4-35	5-01011	Led, Red	H. P.	5082-4655	32					
10	DS1, 2	5-01022	Display,V-F, 14Seg.,16 digit	Itron	FG169B2	2					
11	DS3	5-01023	Light Bar (16 pin DIL)	H. P.	HLMP2685	1					
12	XDS3	5-10008	Socket, 16 pin DIL		C8516-01	1					
13	IC1, 2	3-30353	32-bit VFD Driver	T. I.	SN75518N	2					
14	IC3-9	3-30354	6-bit LED driver & latch	National	DS8859 AN	7					
15											
16	R1	1-01039	8202, 5% 1/4W		RC07GF821J	1					
17											
18	PL1, 2	5-10332	Wafer, 10 pin, 1.23L, gold	C. A.	CAS-10SP-230T-1.23	3					
19											
20	XDS4-35	5-10454	Spacer, Nylon, LED,0.1"Lg	Bivar	908-100	32					
21											
22											

NOTES: Sheet 2 of 2 is assembly drawing

Valhalla Scientific Inc.

PARTS LIST

NULLMETER | MODEL 2720 | DWG NO 2720-607 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1		4-30125	Null Meter P. C. B.	53504	2720-707	1					
2											
3	C7, 10, 104	2-40029	100uf 25V, Alum Radial			3					
4	C2, 3, 1, 5	2-90006	1uf, 50V, Polycarb			4					
5	C102	2-30011	4.7uf 35V, Tant Bead			1					
6	C101, 103, 108	2-60002	.1uf, 100V Mylar			3					
7	C8	2-90009	.001uf, 50V, Polycarb			1					
8	C106, 109-112	2-30004	1uf, 25V, Tant Bead			6					
9	C6	2-90005	0.1uf, 50V, Polycarb			1					
10	C4	2-90002	0.5uf, 50V, Polycarb			1					
11											
12	D1	3-20024	Pair, Low leakage, Diode		DPAD10	1					
13	D2	3-20041	Zener Reference 6.3V		1N825	1					
14	D101-103	3-2000	Diode, Signal		1N4148	3					
15											
16											
17											
18											
19											
20											
21											

NOTES: Sheet 1 of 5 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	NULLMETER	MODEL 2720	DWG NO 2720-607	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
22											
23											
24											
25	IC1	3-30336	Chopper,Amp, lo-noise	Intersil	ICL7652CPD	1					
26	IC2	3-30090	Op-Amp, BIFET		LF356N	1					
27	IC3	3-30371	V-F Converter	A. D.	AD537KD	1					
28	IC4	3-30093	Fast Opto-Isolator	H. P.	HCPL-2601	1					
29	IC5	3-30374	Novram, 64 x 4	XICOR	XC2210	1					
30	IC6	3-30328	Op-Amp, JFET	Burr Brn	OPA 103AM	1					
31	IC109	3-30348	AC Opto-Isolator	Litronix	IL250	1					
32	IC101	3-30185	Quad Opto-Isolator	Litronix	ILQ-74A	1					
33	IC102	3-30372	CMOS, 1 of 16 decoder	T. I.	74HC154	1					
34	IC103, 104	3-30084	Opto-Isolator		IL1 or TIL 111	2					
35	IC105	3-30036	Regulator +15V 0.5A		78M15CP	1					
36	IC106	3-30349	Dual Power Supply	Burr Brn	722	1					
37	IC107	3-30034	Regulator, +5V, 0.5A		78M05CP	1					
38	IC108	3-30169	Regulator, -5V, 0.1A		LM79L05CLP	1					
39											
40											
41											
42											
43											
44											

NOTES:

Valhalla Scientific Inc. | **PARTS LIST** | NULLMETER | MODEL 2720 | DWG NO 2720-607 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
45	R1, 2	1-20127	10K 20% Low Thermal	G. S.	GS805-10K-20%	2					
46	R3	1-01056	6.2K ohm 5%, 1/4W	81349	RC07GF622J	1					
47	R4-6	1-01124	22M ohm, 5%, 1/4W	81349	RC07GF226J	3					
48	R105, 106	1-01061	10K ohm, 5%, 1/4W	81349	RC07GF103J	2					
50	R11, 109	1-01041	1 K Ohm, 5%, 1/4W	81349	RC07GF102J	2					
51	R12	1-10111	1.24M ohm, 1%	81349	RN60C1244F	1					
52	R13	1-10181	444.4K ohm, 1%, 10PPM	PRP	1/8W 444.4K 1% 10PPM	1					
53	R14	1-10154	73.2K ohm, 1%	81349	RN60C7322F	1					
54	R15	1-10007	1M ohm, 1%	81349	RN65C1004F	1					
55	R16, 7	1-01007	10 ohm, 5%, 1/4W	81349	RC07GF100J	2					
56	R17	1-10008	10K ohm, 1%	81349	RN60C1002F	1					
57	R107	1-01033	470 ohm, 5%, 1/4W	81349	RC07GF471J	1					
58	R20, 21	1-01081	100K 5%, 1/4W	81349	RC07GF104J	2					
59	R22	1-20007	900K ohm, 0.05%	Elliot	EI48-900K-.05%	1					
60	R23	1-20006	90K ohm, 0.05%	Elliot	EI27-90K-.05%	1					
61	R24	1-20005	9K ohm, 0.05%	Elliot	EI27-9K-.05%	1					
62	R25	1-20004	900 ohm, 0.05%	Elliot	EI27-900R-.05%	1					
63	R26	1-20013	100 ohm, 0.05%, 5PPM	G. S.	R127100R.05%5PPM	1					
64	R104	1-01039	820 ohm, 5%, 1/4W	81349	RC07GF821J	1					
65											
66											
67	R18	1-01046	2.2K, 5%, 1/4W	81349	RC07GF222J	1					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	NULLMETER	MODEL 2720	DWG NO 2720-607	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
68	RN103	1-40008	8 x 1 K ohm	A. B.	316B-102	1					
69	RN102	1-40001	8 x 470 ohm	A. B.	316B-471	1					
70	RN101	1-40003	15 x 10K ohm	A. B.	316A-108	1					
71											
72	RLA, D, E,	5-03082	Relay, Latching,2A+2B	Aromat	S2EBT-L2-5V	3					
73											
74	SK1	5-10310	Socket Rt. Angle	Molex	22-16-2101	4					
			10 way, gold								
76											
77	TR106-111	3-10010	PNP Transistor		2N4402	6					
78	TR113	3-10013	NPN Transistor		2N4401	1					
79	TR112	3-10032	NPN Darlington		MPSA-13	1					
80											
81			Wire Teflon, 20AWG		Red, Teflon	18'					
82			Wire, Teflon, 20 AWG		Black, Teflon	18'					
83											
84											
85		4-20043	Ferrite BEad	Amidon	FB-43-2401	2					
86											
87	XIC105	5-10404	Heatsink, TO202	Therm	6047B	1					
88											
89											
90											

NOTES:

Valhalla Scientific Inc.

PARTS LIST

OPTION EXR. 10

MODEL 2720

DWG NO 2720-608

REV A

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3	C1, C2	2-10013	1uf, 50V, Ceramic Disc		8131-050-651-105M	2					
4	C3, C4	2-90006	1uf, 50V, Polycarb			2					
5	C5, C6	2-60002	0.1uf, 100V, Mylar			2					
6	C7, C9	2-10014	0.1uf, 50V, Ceramic Disc		8121-050-651-104M	2					
7	C8	2-40026	10uf, 50V, Alum. Rad.			1					
8	C10	2-30011	4.7uf, 35V, Tant.			1					
9											
10	D1	3-20024	Pair, Low Leadage Diodes		DPAD10	1					
11	D2	3-20000	Diode, Signal		1N4148	1					
12											
13	IC1	3-30328	Op-Amp JFET	Burr-Brown	OPA103AM	1					
14	IC2 and 4	3-30336	Chopper Amp, Low Noise	Intersil	ICL7652CPD	2					
15	IC3	3-30031	Quad-Op Amp		LM324N	1					
16	IC5	3-30168	Reg., +5V,0.1A, TO92		LM78L05ACLP	1					
17	IC6	3-30036	Reg.+15V, 0.5A, TO202		78M15CP	1					
18	IC7	3-30064	Reference, 2.5V, 1%	Motorola	MC1403	1					
19	IC8	3-30189	Novram, 256x4	Xicor	XC2212	1					
20											
21											
22											
23											

NOTES: Sheet 3 is the asembly drawing

Valhalla Scientific Inc.	PARTS LIST	OPTION EXR 10	MODEL 2720	DWG NO 2720-608	REV A

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24		5-10488	Shorting plug, .1sp.Gold	Molex	15-29-1024	3					
25											
26	R1	1-10008	10K ohm, 1%	81349	RN60C1002F	1					
27	R2	1-10016	8.45K ohm, 1%	81349	RN60C8451F	1					
28	R3	1-10061	4.99K ohm, 1%	81349	RN60C4991F	1					
29	R4	1-10006	100K ohm, 1%	81349	RN60C1003F	1					
30	R5	1-10277	2.37K ohm, 1%	81349	RN60C2371F	1					
31	R6	1-10278	2.05K ohm, 1%	81349	RN60C2051F	1					
32	R7	1-10017	9.09K ohm, 1%	81349	RN60C9091F	1					
33	R8	1-30023	7 x 10K ohm set	Vishay	2720-024	1					
34	R9	1-01061	10K ohm, 5%, 1/4W	81349	RC07GF103J	1					
35	R10	1-01021	100 ohm, 5%, 1/4W	81349	RC07GF101J	1					
36	R11	1-01073	47K ohm, 5%, 1/4W	81349	RC07GF473J	1					
37	R12, R13	1-01081	100K ohm, 5%, 1/4W	81349	RC07GF104J	2					
38											
39	RLA	5-03083	Relay, 2A +2B, 5V	Aromat	S2EB-5V	1					
40											
41	RV1	1-50034	500 ohm, End Adjust	BEckman	89PR500ohm	1					
42	TR1	3-10000	N-Channel, JFET		U1899E	1					
43	TR2	3-10013	NPN Transistor (TO92)		2N4401	1					
44	TP1, TP2	5-10290	Test Hook, PCB	Vector	K32-2	2					
45	PL1	5-10313	Wafer, 10Way, Gold,.561ong	Molex	22-10-2101	1					
46	SK1	5-10310	Socket Rt. Angle 10 Way	Molex	22-16-2101	4					

NOTES:

Valhalla Scientific Inc.

PARTS LIST

OUTPUT SYSTEM | MODEL 2720 | DWG NO 2720-609 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N				REMARKS
1											
2		4-30124	Output System P. C. B.		2720-709	1					
3	C6	2-60009	0.022uf, 400V, Mylar		--	1					
4	C202	2-10013	1 uf, 50V, Ceramic Disc								
5	C24,25,101,102	2-90006	1 uf, 50V, Polycarbonate			7					
	1, 9, 10										
6	C2, 3, 7, 8,117	2-40026	10 uf, 50V, Alum. Radial		--	5					
7	C4, 5, 23	2-60002	0.1 uf, 100V, Mylar			9					
	112, 113, 201										
	29, 111, 118										
8	C11, 119	2-40028	47 uf, 35V, Alum. Radial		--	2					
9	C103-110, 28	2-60004	0.01 uf, 630V, Mylar			9					
10	C114, 115	2-90004	0.01 uf, 50V, Polycarbonate			2					
11	C27	2-80003	0.22 uf, 20%, 1500V		EP37478	1					
12	C12-16	2-60010	0.47 uf, 250V, Mylar	Illinois	474MSR250K	5					
13	D1	3-20024	Pair Low-leakage diodes		DPAD10	1					
14	D3, 4, 123	3-20034	Diode, Zener,13V, 10%		1N5243	3					
15	D5-8	3-20002	Diode, Rectifier, 1A		1N4001-4007	4					
16	D9, 10,303,304	5-01011	LED, red	H. P.	5082-4655	4					
17	D105-114 116-118,120-122	3-20000	Diode, Signal		1N4148	16					
18	D119	3-20035	Diode, Zener,8.2V,10%,1W		1N4738	1					
19	D302	3-20003	Diode,Zener, 10V, 10%		1N5240	1					
20	D306,307	3-20007	Zener, reference, 6.3V		1N827	2					

NOTES: Sheets 7 and 8 are assembly drawings

Valhalla Scientific Inc.	PARTS LIST	OUTPUT SYSTEM	MODEL 2720	DWG NO 2720-609	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
21	D115	3-20041	Zener Reference, 6.3V		1N825	1					
22	C26	2-20011	1000pf,500V, Mica		CM06FD102J03	1					
23	IC103	3-30322	Dual Op-Amp , JFET		LF353N	1					
24											
25	IC5	3-30168	Regulator, +5V, 100mA		LM78L05ACLP	1					
26	IC6	3-30169	Regulator, -5V, 100mA		LM79L05CLP	1					
27	IC4, 9	3-30336	Chopper Amp, Low Noise		ICL7652CPD or IJD	2					
28											
29	IC1, [illegible] 10,11	3-30090	Op-Amp, BIFET		LF356N	7					
	302, 305										
31	IC101	3-30133	Quad Comparator		LM339N	1					
32	IC106, 107	3-30364	V-F Converter		AD537JH or D	2					
33	IC104	3-30201	Dual Opto-Isolator		ILCT-6 or MCT6	1					
34	IC105	3-30375	Dual med-speed Opto-isolator		HCPL2530	1					
35	IC201-204	3-30189	Novram 256x4		XC2212	4					
36	IC209	3-30155	1 of 8 decoder		74LS138N	1					
37	IC303, 307	3-30333	Temperature Sensor		AD590JH	2					
38	IC2	3-30085	Regulator +8V .5A		LM78M08CP	1					
39	IC3	3-30086	Regulator -8V .5A		LM79M08CP	1					
40	XIC 201-204	5-10293	Socket, DIL, 18 pin	Burndy	DILB18P-108	4					
41											
42											
43											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	OUTPUT SYSTEM	MODEL 2720	DWG NO 2720-609	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
44											
45	R201,202,203	1-01081	100K, 5%, 1/4W		RC07GF104J	3					
46	R6,7,35,36	1-01061	10K ohm, 5%, 1/4 W		RC07GF103J	7					
	113, 116, 118										
47	R2	1-30026	10:1 Divider Network	Vishay	2720-021	11					
48	R125, 303	1-01041	1K ohm, 5%, 1/4W		RC07GF102J	2					
49	R101, 104	1-10003	59.0K ohm, 1%		RN60C5902F	2					
50	R34	1-01021	100 ohm, 5%, 1/4W		RC07GF101J	1					
51	R14, 16	1-30028	100/10:1 Divider set	Vishay	2720-020	1					
52	R18-27,9,10,11	1-01108	3M ohm, 5%, 1/4W		RC07GF305J	13					
53											
54											
55	R33	1-30000	1 ohm, 3 watt, 5%	Mills	MRP-2A-A IR 5%	1					
56	R102, 103	1-10001	1.00K, 1%		RN60C1001F	2					
57	R105	1-10222	28K ohm, 1%	81349	RN60C2802F	1					
58	R106, 108	1-10223	12.4K ohm, 1%	81349	RN60C1242F	2					
59	R107	1-10224	24.3K ohm, 1%		RN60C2432F	1					
60	R109-112, 117, 3	2 1-01046	2.2K ohm, 5%, 1/4W		RC07GF222J	9					
	301, 126, 314										
61	R325	1-01033	470 ohm, 5%, 1/4W		RC07GF471F	1					
62	R39,31	1-01080	91K, 5%, 1/4W		RC07GF913J	2					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	OUTPUT SYSTEM	MODEL 2720	DWG NO 2720-609	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
63											
64	R121, 122	1-01007	10 ohm, 5%, 1/4W	81349	RC07GF100J	2					
65	R304	1-01025	200 ohm, 5% 1/4W		RC07GF201J	1					
66	R119, 120, 123	1-10008	10K ohm, 1%	81349	RN60C1002F	7					
	124, 1, 13, 37										
67	R307, 308	1-30021	22 ohm, 5%, 2W		RC42GF220J	2					
68	R310	1-01119	10M ohm, 5%, 1/4W	81349	RC07GF106J	1					
69											
70	R311, 313	1-01064	18K ohm, 5%, 1/4W	81349	RC07GF183J	2					
71											
72											
73	RLA	5-03072	Relay, 2PDT, 5V, 1500V	Omron	G2V-2PUSDC5	1					
74	RLB,C,K,RLGA	5-03083	Relay, 2A+2B, 5V	Aromat	S2EB-5V	4					
75	RLD, E, H, L	5-03082	Relay, Latching 2A+2B,5V	Aromat	S2EBT-L2-5V	4					
76	RLG, M	5-03043	Relay,Reed,1KV,Lo-Thermal	12V COTO	Cr3221-12-810 or 812	2					
77											
78											
79											
80	RV1	1-50035	50K ohm, end-adjust	Beckman	89PR-50K	1					
81	RV301,302	1-50042	5K ohm, end-adjust	Beckman	89PR-5K	2					
82											
83											
84											

NOTES:

Valhalla Scientific Inc. | **PARTS LIST** | OUTPUT SYSTEM | MODEL 2720 | DWG NO 2720-609 | REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
85											
86											
87	TP1-6	5-10335	Wafer 6 pin, rt. angle	Molex	22-05-2061	1					
88		5-10488	Shorting Plug, .1 spacing	Molex	15-29-1024	1					
89	TR102,104,106 108	3-10026	N-Channel VMOS	--	VN10KM	4					
90	TR117, 301	3-10010	PNP Transistor		2N4402	2					
91	TR101,103,105 107,109,304	3-10013	NPN Transistor		2N4401	14					
	110,111,113,114 115,118,119,120										
93	TR302, 303	3-10024	NPN Transistor		TIP29A	2					
94											
95	SK1	5-10310	10 way rt. angle socket	Molex	22-16-2101	9					
96		5-10435	Connector,Housing,3 Way,0.1"Molex		22-01-2031	2					
97		5-10340	Terminal, Crimp, Female	Molex	08-05-0114	6					
98											
99											
100											
101		4-10438	Binding Post-Bracket	53504	2720-202	2					
102		5-10191	Binding Post, Lt. Red	Pomona	3750-2	7					
103		5-10190	Binding post,Lt. Blk.	Pomona	3750-0	7					
104											
105											
106											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	OUTPUT SYSTEM	MODEL 2720	DWG NO 2720-609	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
107											
108	FB1-4	4-20043	Ferrite Beads	Amidon	FB-43-2401	4					
109		5-10019	Cable tie 4" x 1/8"	Panduit	WRN-4	16					
110		5-10441	Tie Wrap,block,small	Panduit	ABMM-AT	4					
111		5-10433	Insulator, to-220	Berquist	7403-09FR-51	2					
112		5-10434	Washer,shoulder, to-220	Therm Alloy	7721-7PPS	2					
113		4-10464	Heatshield		2720-217	1					
114			20AWG Teflon wire		20AWG,Red,Tef	11	ft				
115			20AWG Teflon Wire		20AWG, Blk.,Tef.	11	ft				
116			Wire, Red, 22AWG		22AWG, red	6"					
117			Wire, Brn, 22AWG		22AWG, Brn.	6"					
118			Wire, ORN, 22AWG		22AWG, Orn	6"					
119			Screw, Phil, Pan, SS		6-32 x 1/4"	4					
120											
121			Screw, Phil pan, SS		4-40 x 1/4"	6					
122			Washer, Internal Star		#6	4					
123			Washer, split		#4	2					
124			Washer, Internal Star		#4	4					
125			Wire Buss 14 AWG		14AWG Buss	10"					
126			Sleeving Clear		14AWG	10"					
127			Sleeving Clear		22AWG	4'					
128											
129											

NOTE

Valhalla Scientific Inc.	PARTS LIST	OPTION EXR 7	MODEL 2720	DWG NO 2720-610	REV A

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3	C1, C2	2-10013	1uf, 50V, Ceramic disc		8131-050-651-105M	2					
4	C3, C4	2-90006	1uf, 50V, Polycarb.			2					
5											
6	C7, C9	2-10014	0.1uf, 50V, Ceramic disc		8121-050-651-104M	2					
7	C8	2-40026	10uf, 50V, Alum Rad.			1					
8	C10	2-30011	4.7uf, 35V, Tant.			1					
9											
10	D1	3-20024	Pair, Low Leakage Diodes		DPAD10	1					
11	D2	3-20000	Diode, Signal		1N4148	1					
12											
13	IC1	3-30328	Op-Amp, JFET	Burr-Brown	OPA103AM	1					
14	IC2	3-30336	Chopper Amp, Low Noise	Intersil	ICL7652CPD	1					
15	IC3	3-30031	Quad-Op Amp		LM324N	1					
16	IC5	3-30168	Reg., +5V,0.1A,TO92		LM78L05ACLP	1					
17	IC6	3-30036	REG, +15V, 0.5A,TO202		78M15CP	1					
18	IC7	3-30064	Reference, 2.5V, 1%	Motorola	MC1403	1					
19	IC8	3-30189	Novram, 256x4	Xicor	XC2212	1					
20											
21											
22											
23											

NOTES: Sheet 3 is the assembly drawing

Valhalla Scientific Inc.	PARTS LIST	OPTION EXR 7	MODEL 2720	DWG NO 2720-610	REV A

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24		5-10488	Shorting plug, .1 sp gold	Molex	15-29-1024	3					
25											
26	R1	1-10008	10K ohm, 1%	81349	RN60C1002F	1					
27	R2	1-10016	8.45 K ohm, 1%	81349	RN60C8451F	1					
28	R3	1-10061	4.99K ohm, 1%	81349	RN60C4991F	1					
29	R4	1-10006	100K ohm, 1%	81349	RN60C1003F	1					
30	R5	1-10277	2.37K ohm, 1%	81349	RN60C2371F	1					
31	R6	1-10278	2.05K ohm, 1%	81349	RN60C2051F	1					
82	R7	1-10017	9.09K ohm, 1%	81349	RN60C9091F	1					
83											
34	R9	1-01061	10K ohm, 5%, 1/4W	81349	RC07GF103J	1					
35	R10	1-01021	100 ohm, 5%, 1/4W	81349	RC07GF101J	1					
36	R11	1-01073	47K ohm, 5%, 1/4W	81349	RC07GF473J	1					
37	R12, R13	1-01081	100 K ohm, 5%, 1/4W	81349	RC07GF104J	1					
38											
39	RLA	5-03083	Relay, 2A+2B,5V	Aromat	S2EB-5V	1					
40											
41	RV1	1-50034	500 ohm, end adjust	Beckman	89PR5000HM	1					
42	TR1	3-10000	N-Channel,JFET		U1899E	1					
43	TR2	3-10013	NPN Transistor (TO92)		2N4401	1					
44	TP1, TP2	5-10290	Test Hook, PCB	Vector	K32-2	2					
45	PL1	5-10313	Wafer, 10way,gold.56 long	Molex	22-10-2101	1					
46	SK1	5-10310	Socket Rt.Angle,10 way	Molex	22-16-2101	4					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	OUTPUT AMPLIFIER	MODEL 2720	DWG NO 2720-611	REV E

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2											
3		4-30119	Output Amplifier, PCB		2720-711	1					
4											
5											
6											
7	D107	3-20005	Diode, Zener, 6.2V, 10%		1N5234	1					
8	D108	3-20038	Diode, Zener, 6.2V, 10%, 1W		1N4735	1					
9	D209	3-20017	Diode Zener, 9.1V,10%		1N5239	1					
10	D211	3-20030	Diode, Zener, 9.1V,10%5W		1N5346A	1					
11											
12	R103	1-30036	56K ohm, 5%, 2W		RC42GF563J	1					
13	R106,107,229-233	1-01041	1K ohm,5%, 1/4W		RC07GF102J	7					
14	R112, 113	1-10010	82.5 ohm, 1%		RN60C82R5F	2					
15	R114, 115	1-01049	3K ohm, 5%, 1/4W		RC07GF302J	2					
16	R213-217	1-30033	100K ohm, 2W, 5%		RC42GF104J	5					
17	R235	1-10119	237 ohm, 1%		RN60C2370F	1					
18											
19	SK1	5-10310	Socket, Rt. Angle,10way,gold	Molex	22-16-2101	3					
20											
21											
22											
23											

NOTES: Sheet 1 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	OUTPUT AMP DRIVER	MODEL 2720	DWG NO 2720-612	REV E

##	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2		4-30118	Output Amp Driver PCB		2720-712	1					
3	C102	2-60000	.0047uf 100V Mylar		--	1					
4	C206-210	2-20011	1000pf, 500V, MICA		CM06FD102J03	5					
5	C103	2-20002	50pf, 500V, MICA		CM05ED500J03	1					
6	C109	3-20005	Diode, Zener, 6.2V, 10%		1N5234	1					
7	D111-114	5-01011	LED, Red, Panel Mount	H. P.	5082-4655	4					
8	D210	3-20017	Diode, Zener, 9.1V, 10%		1N5239	1					
9											
10	IC101, 201	3-30359	Opto-Isolator, 75-150%CTR	Litronix	IL201	2					
11											
12	R104	1-30036	56 K Ohm, 5%, 2W		RC2GF563J	1					
13	R110;111	1-10010	82.5, 1%	81349	RN60C82R5F	2					
14	R105, 228	1-01021	100 ohm, 5%, 1/4 W	81349	RC07GF101J	2					
15	R116	1-01031	390 ohm 5% 1/4W	81349	RC07GF391J	1					
16	R210	1-01037	680 ohm, 5%, 1/4W	81349	RC07GF681J	1					
17	R218-222	1-30033	100K ohm, 2W, 5%	81349	RC42GF104J	5					
18	R223-227	1-01041	1K ohm, 5%, 1/4W	81349	RC07GF102J	12					
	236-240, 108,109										
19	R234	1-01045	2K ohm, 5%, 1/4W	81349	RC07GF202J	1					
20	R241	1-10119	237 ohm, 1%	81349	RN60C2370F	1					
21											
22											

NOTES: Sheet 1 is the assembly drawing

Valhalla Scientific Inc.

PARTS LIST

OUTPUT AMP DRIVER | MODEL 2720 | DWG NO 2720-612 | REV E

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
23											
24	SK1	5-10310	Socket, Rt. Angle, Gold 10 way	Molex	22-16-2101	3					

NOTES:

Valhalla Scientific Inc.	PARTS LIST	HIGH VOLTAGE POWER SUPPLY	MODEL 2720	DWG NO 2720-613	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2		4-30122	High Voltage Power Sup. PCB		2720-713	1					
3	C9	2-90006	1 uf, 50V, Polycarb.			1					
4	C1	2-80004	0.02uf, 1600V, 10%	Sprague	16PS-S20	1					
5											
6	C3, 4	2-40029	100uf, 25V, Alum Radial			2					
7	C5, 6	2-40026	10uf., 50V, Alum Radial			2					
8	C7	2-20011	1000pf, 500V, MICA		CM06F0102J03	1					
9	C201-204	2-40009	47uf, 450V, Aluminum	Illinois	476TTA450	4					
10	C211, 212	2-80003	.22uf, 1500V, 20% MYLAR	Electron	EP37478	2					
11	D1, D2	3-20025	Diode, Zener, 4.7V, 10%, 1W		1N4732	2					
12	D3	3-20027	Bridge 1A, 100V		3N247	1					
13	D8, 5,	3-20000	Diode, Signal		1N4148	4					
14	D201-212,401-406	3-20015	Diode, Rectifier, 1A		1N40007	18					
15	C8	2-20001	1800pf, 500V, MICA		CM06FD182J03	1					
16	IC1, 2, 3	3-30170	Low noise op amp		Op-07DP	3					
17	IC4, 5	3-30348	AC Opto-Isolator		IL-250	2					
18	IC6	3-30171	+18V Regulator,1.5A,to 220		MC7818CT	1					
19	IC7	3-30172	-18V Regulator 1.5A to 220		MC7918CT	1					
20	C401-406	2-40020	100uf, 250V, Alum	Illinois	107TTA250	6					
21	SG401, 402	3-20022	spark Gap, 350V	C.P.Clang	CG2-350L	2					
22	FS1, FS2	5-04000	Fuse .1A Slo-Blo	Little Fuse	313-.100	2					
23	FX1, FX2	5-10269	Fuse Clip, PCB Mtg.	Zierrick	926, 927 or 798	4					

NOTES: Sheet 1 is assembly drawing

Valhalla Scientific Inc.	PARTS LIST	HIGH VOLTAGE POWER SUPPLY	MODEL 2720	DWG NO 2720-613	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
24	R23	1-01007	Res., 10 ohm, 5% 1/4W		RC07GF100J	1					
25	R1	1-30020	4M ohm, 0.1%, 5PPM	Caddock	TF050N-4M-5PPM-.1%	1					
26	R2, 5	1-10212	20.1K ohm, 1%, 10PPM	PRP	18W 20.1K-1%-10PPM	2					
27											
28	R4	1-10213	381.9K ohm, 1%, 10PPM	PRP	18W-38.9K-1%-10PPM	1					
29	R6, 13, 14	1-01061	10K ohm, 5%, 1/4W		RC07GF103J	3					
30	R7	1-10137	1.82K ohm 1%	81349	RN60C1821F	1					
31	R8	1-10143	453ohm 1%	81349	RN60C4530F	1					
32											
33	R15, 16	1-01100	1M ohm, 5%, 1/4W	81349	RC07GF105J	2					
34	R201-204,209,212,211	1-30011	1K ohm, 10W (Axial)	Mills	MRP-10A	7					
35	R205-208	2-30030	220K ohm, 1W, 5%		RC32GF224J	4					
36	R9, 10	1-10008	10.0K ohm, 1%	81349	RN60C1002F	2					
37	R401, R402	1-30019	100K ohm, 1W, 5%	81349	RC32GF104J	2					
38	RLA, C, D. G	5-03072	Relay, 2PDT, 5V, 1500V	Omron	G2V-2PUSDC5	4					
39	RLB, E. F	5-03012	Relay, Reep, 5V, Coil, DIL	Sigma	191TE1A1-5S	3					
40	R3	1-01084	180K ohm, 5%, 1/4W		RC07G184J	1					
41	PL1	5-10300	Wafer, 10 pin, .156	Molex	09-67-1103	1					
42	SK1	5-10310	Socket, Rt. Angle,10way,gold	Molex	22-16-2101	5					
43											
44											
45		5-10449	Cable tie, 14" x .15	Panduit	PLT 41-M	2					
46											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	HIGH VOLTAGE POWER SUPPLY	MODEL 2720	DWG NO 2720-613	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
47											
48											
49	R17	1-01046	2.2K ohm, 5%, 1/4W	Burk	RC07GF222J	1					
50	R21	1-01021	100 ohm, 5%, 1/4W	81349	RC07GF101J	1					
51	R22	1-10175	324 ohm 1%		RN60C3240F	1					
52											
53	C12-15, 407	2-60004	.01 uf, Mylar, 630V			5					
54	C2, C16	2-90002	0.5uf, 50V, Polycarb.			2					
55											
56	TR1, 2-4	3-10013	NPN Transistor (T092)		2N4401	4					
57											
58											
59											
60											

NOTES:

Valhalla Scientific Inc.	PARTS LIST	OPTION "BAT" P. C. B. ASSEMBLY	MODEL 2720	DWG NO 2720-615	REV C

#	REF DES	VALHALLA PART NO	DESCRIPTION	CODE IDENT	MFG PART NO	QTY. I	QTY. N	I	N		REMARKS
1											
2		4-30133	Option "BAT" PCB	Valhalla	2720-715	1					
3											
4	PL1	5-10466	Connector, 15 pin, D, PC MNT, Male	Cannon	DA15PU	1					
5		5-10467	Spacer, 1/4 dia,3/16Lg#4	Smith	9200	2					
6	RLA	5-03012	Relay, Reed, 5V	Sigma	191TE1A1 -5S	1					
7	D1	3-20034	Diode, Zener, 23V, 10%		1N5243	1					
8	D2, 3, 4	3-20002	Diode, Rectifier, 1A		1N4001	3					
9	TR1, 2	3-10013	NPN Transistor		2N4401	2					
10	R1	1-01061	10K ohm, 5%, 1/4W		RC07GF103J	1					
11	R2	1-01071	39K ohm, 5%, 1/4W		RC07GF393J	1					
12	R3	1-01012	27 ohm, 5%, 1/4W		RC07GF270J	1					
13											
14											
15			Screw, Phil, pan SS		4-40 x 5/16	2					
16			Washer Internal, S.		#4	2					
17			Nut Radio Hex		4-40	2					
18											
19											
20											
21											
22											
23											

NOTES:

Federal Supply Codes for Manufacturers

00656
Aerovox Corp.
New Bedford, Massachusetts

00686
Film Capacitors, Inc.
Passaic, New Jersey

00779
AMP Inc.
Harrisburg, Pennsylvania

00853
Sangamo Electric Company
Pickens, South Carolina

01121
Allen-Bradley Co.
Milwaukee, Wisconsin

01255
Litton Industries, Inc.
Beverly Hills, California

01281
TRW Electronic Comp.
Semiconductor Operations
Lawndale, California

01295
Texas Instruments, Inc.
Dallas, Texas

01686
RCL Electronics Inc.
Manchester, New Hampshire

02114
Ferroxcube Corp.
Saugerties, New York

02131
General Instrument Corp.
Westwood, Maine

02799
Areo Capacitors, Inc.
Chatsworth, California

03508
General Electric Co.
Syracuse, New York

03797
Genisco Technology Corp.
Compton, California

03877
Transistron Electronic Corp.
Wakefield, Massachusetts

03911
Clairex Corp.
Mt. Vernon, New York

04009
Arrow Hart Inc.
Hartford, Connecticut

04217
Essex International Inc.
Anaheim, California

04222
AVX Corp.
Myrtle Beach, Florida

04423
Telonic Industries
Laguna Beach, California

04713
Motorola Inc.
Phoenix, Arizona

04946
Standard Wire & Cable
Los Angeles, California

05276
Pomona Electronics Co., Inc.
Pomona, California

05277
Westinghouse Electric Corp.
Youngwood, Pennsylvania

05397
Kemet, Union Carbide Corp.
New York, New York

05574
Viking Industries
Chatsworth, California

05820
Wakefield Engineering Inc.
Wakefield, Massachusetts

06001
General Electric Co.
Columbia, South Carolina

06383
Panduit Corp.
Tinley Park, Illinois

06473
Bunker Ramo Corp.
Chatsworth, California

06555
Beede Electrical Instrument Co.
Penacook, New Hampshire

06743
Clevite Corp.
Cleveland, Ohio

07088
Kelvin Electric Company
Van Nuys, California

07256
Silicon Transistor Corp.
Chelmsford, Massachusetts

07263
Fairchild Semiconductor
Mountain View, California

07344
Bircher Co., Inc.
Rochester, New York

07597
Burndy Corp.
Rochester, New York

07716
I R C Incorporated
Burlington, Iowa

07910
Teledyne Semiconductor
Hawthorne, California

08065
Accurate Rubber and Plastics Co.
San Diego, California

08261
Spectra Strip Corp.
Garden Grove, California

08530
Reliance Mica Corp.
Brooklyn, New York

08806
General Electric Co.
Cleveland, Ohio

09026
Babcock Electronics Corp.
Costa Mesa, California

09214
G. E. Co. Semi-Conductor
Auburn, New York

09353
C and K Components
Watertown, Massachusetts

09922
Burndy Corp.
Norwalk, Connecticut

09969
Dale Electronics Inc.
Yankton, S. Dakota

11236
CTS of Berne
Berne, Indiana

11403
Best Products Co.
Chicago, Illinois

11503
Keystone Columbia Inc.
Warren, Michigan

11532
Teledyne Relays
Hawthorne, California

11711
General Instrument Corp.
Hicksville, New York

12014
Chicago Rivet & Machine Co.
Bellwood, Illinois

12060
Diodes, Inc.
Chatsworth, California

12136
Philadelphia Handle Co.
Camden, New Jersey

12405
Hysol Corporation
El Monte, California

12406
Elpac, Incorporated
Fullerton, California

12615
U.S. Terminals Inc.
Cincinnati, Ohio

12617
Hamlin Inc.
Lake Mills, Wisconsin

12697
Clarostat Mfg. Co.
Dover, New Hampshire

12969
Unitrode Corp.
Watertown, Massachusetts

13103
Thermalloy Co., Inc.
Dallas, Texas

13327
Solitron Devices Inc.
Tappan, New York

13454
Texas Crystals
River Grove, Illinois

13511
Amphenol Cadre Div.
Los Gatos, California

13606
Use 56289
Sprague Electric Co.
Concord, New Hampshire

14099
Semtech Corp.
Newbury Park, California

14655
Cornell-Dublier Electronics
Newark, New Jersey

14752
Electro Cube Inc.
San Gabriel, California

14936
General Instrument Corp.
Hicksville, New York

15801
Fenwal Electronics Inc.
Framingham, Massachusetts

15818
Teledyne Semiconductors
Mountain View, California

15849
Useco Inc.
Van Nuys, California

15898
International Business
Machines Corp.
Essex Junction, Vermont

16332
Replaced by 28478

16473
Cambridge Scientific Ind.
Cambridge, Maryland

16758
Delco Electronics
Kokomo, Indiana

17856
Siliconix, Inc.
Santa Clara, California

18324
Signetics Corp.
Sunnyvale, California

Federal Supply Codes for Manufacturers (cont.)

18612
Vishay Intertechnology Inc.
Malvern, Pennsylvania

18722
R C A
Mountaintop, Pennsylvania

18927
GTE Sylvania Inc.
Titusville, Pennsylvania

21604
Bucheye Stamping Co.
Columbus, Ohio

21845
Solitron Devices Inc.
Riveria Beach, Florida

22767
ITT Semiconductors
Palo Alto, California

23936
Pamotor Div.
Burlingham, California

24355
Analog Devices Inc.
Norwood, Massachusetts

24655
General Radio
Concord, Massachusetts

25088
Siemen Corp.
Isilen, New Jersey

25403
Amperex Electronic Corp.
Slatersville, Rhode Island

25684
Victoreen Instrument Co., Inc.
Oak Lawn, Illinois

27014
National Semiconductor Corp.
Santa Clara, California

27556
IMB Electronic Products
Santa Fe Springs, California

27264
Molex Products
Downers Grove, Illinois

28213
Minnesota Mining & Mfg. Co.
St. Paul, Minnesota

28480
Hewlett Packard Co.
Palo Alto, California

29083
Monsanto Co., Inc.
Santa Clara, California

29604
Stackpole Components Co.
Raleigh, North Carolina

30323
Illinois Tool Works, Inc.
Chicago, Illinois

30983
Electra/Midland
San Diego, California

32539
Mura Corp.
Great Neck, New York

32897
Erie Technological Products, Inc.
Carlisle, Pennsylvania

32997
Bourns Inc.
Riverside, California

33173
General Electric Co.
Owensboro, Kentucky

34333
Silicon General
Westminister, California

34335
Advanced Micro Devices
Sunnyvale, California

34802
Electromotive Inc.
Kenilworth, New Jersey

37942
P.R. Mallory & Co., Inc.
Indianapolis, Indiana

43543
Nytronics Inc.
Geneva, New York

44655
Ohmite Mfg. Co.
Skokie, Illinois

49671
RCA Corp.
New York, New York

49956
Raytheon Company
Lexington, Massachusetts

50088
Mostek Corp.
Carrollton, Texas

50579
Litronix Inc.
Cupertino, California

51605
Scientific Components Inc.
Linden, New Jersey

53021
Sangamo Electric Co.
Springfield, Illinois

53504
Valhalla Scientific, Inc.
San Diego, California

54294
Cutler-Hammer Inc.
Selma, North Carolina

55026
Simpson Electric Co.
Elgin, Illinois

56289
Sprague Electric Co.
North Adams, Massachusetts

58474
Superior Electric Co.
Bristol, Connecticut

63743
Ward Leonard Electric Co., Inc.
Mount Vernon, New York

65092
Weston Instruments Inc.
Newark, New Jersey

70563
Amperite Company
Union City, New Jersey

70903
Belden Corp.
Geneva, Illinois

71279
Cambridge Thermionic Corp.
Cambridge, Massachusetts

71400
Bussmann Mfg.
Saint Louis, Missouri

71450
CTS Corp.
Elkhart, Indiana

71468
ITT Cannon Electric Inc.
Santa Ana, California

71482
Clare, C.P. & Co.
Chicago, Illinois

71590
Centrelab Electronics
Milwaukee, Wisconsin

71707
Coto Coil Co., Inc.
Providence, Rhode Island

71744
Chicago Miniature Lamp Works
Chicago, Illinois

71785
TRW Electronics Components
Chicago, Illinois

72005
Wilber B. Driver Co.
Newark, New Jersey

72259
Nytronics Inc.
Pelham Manor, New Jersey

72619
Dialight Div.
Brooklyn, New York

729[illegible]
Erie Tech. Products Inc.
Erie, Pennsylvania

73138
Bechman Instrument Inc.
Helipot Division
Fullerton, California

73445
Amperex Electronic Corp.
Hicksville, New York

73734
Federal Screw Products, Inc.
Chicago, Illinois

73899
JFD Electronics Co.
Brooklyn, New York

73949
Guardian Electric Mfg. Co.
Chicago, Illinois

74276
General Instrument Corp.
Neptune, New Jersey

74306
Piezo Crystal Co.
Carlisle, Pennsylvania

74970
Johnson E.F., Co.
Waseca, Minnesota

75042
TRW Electronics Components
IRC Fixed Resistors
Philadelphia, Pennsylvania

75378
CTS Knights Inc.
Sandwich, Illinois

75382
Kulka Electric Corp.
Mount Vernon, New York

75915
Littlefuse Inc.
Des Plaines, Illinois

76055
Mallory Controls
Frankfort, Indiana

76493
J.W. Miller Company
Los Angeles, California

76854
Oak Industries Inc.
Crystal Lake, Illinois

77342
Potter & Brumfield Div.
Princeton, Indiana

77638
General Instrument Corp.
Rectifier Division
Brooklyn, New York

78488
Stackpole Carbon Co.
Saint Marys, Pennsylvania

78553
Eaton Corp.
Cleveland, Ohio

80031
Electro-Midland Corp.
Mepco Div.
Morristown, New Jersey

56289
Sprague Products
North Adams, Massachusetts

80294
Bourns Inc., Instrument Div.
Riverside, California

81073
Grayhill, Inc.
La Grange, Illinois

Federal Supply Codes for Manufacturers (cont.)

81095
Triad Transformer Corp.
Venice, California

81312
Winchester Electronics
Div. of Litton Industries Inc.
Oakville, Connecticut

81483
International Rectifier Corp.
Los Angeles, California

81741
Chicago Lock Co.
Chicago, Illinois

82389
Switchcraft Inc.
Chicago, Illinois

82877
Rotron Inc.
Woodstock, New York

82879
ITT Royal Electric Div.
Pawtucket, Rhode Island

83003
Varo Inc.
Garland, Texas

83298
Bendix Corp.
Eatontown, New Jersey

83330
Herman H. Smith, Inc.
Brooklyn, New York

83594
Burroughs Corp.
Plainfield, New Jersey

83740
Union Carbide Corp.
New York, New York

84171
Arco Electronics
Great Neck, New York

84411
TRW Electronic Components
Ogallala, Nebraska

84613
Fuse Indicator Corp.
Rockville, Maryland

84682
Essex International Inc.
Peabody, Massachusetts

86684
Radio Corp. of America
Harrison, New Jersey

88219
Gould Inc.
Trenton, New Jersey

88245
Litton Systems Inc.
Useco Div.
Van Nuys, California

88419
Cornell-Dubilier Electronic Div.
Fuquay-Varian, North Carolina

89730
G.E. Co.
Newark, New Jersey

90201
Mallory Capacitor Co.
Indianapolis, Indiana

56365
Square D Co.
Chicago, Illinois

90303
Mallory Battery Co.
Tarrytown, New York

91094
Essex International Inc.
Newmarket, New Hampshire

91293
Johanson Mfg. Co.
Boonton, New Jersey

91506
Augat Inc.
Attleboro, Massachusetts

91637
Dale Electronics Inc.
Columbus, Nebraska

91662
Elco Corp.
Willow Grove, Pennsylvania

71468
Gremar Mfg. Co., Inc.
ITT Cannon/Gremar
Santa Ana, California

91802
Industrial Devices, Inc.
Edgewater, New Jersey

91833
Keystone Electronics Corp.
New York, New York

91929
Honeywell Inc.
Micro Switch Div.
Freeport, Illinois

92194
Alpha Wire Corp.
Elizabeth, New Jersey

93332
Sylvania Electric Products
Woburn, Massachusetts

94988
Wagner Electric Corp.
Tung-Sol Div.
Newark, New Jersey

95146
Alco Electronic Products Inc.
Lawrence, Massachusetts

95275
Vitramon Inc.
Bridgeport, Connecticut

95303
RCA Corp.
Receiving Tube Div.
Cincinnati, Ohio

95348
Gordo's Corp.
Bloomfield, New Jersey

95712
Bendix Corp.
Franklin, Indiana

97913
Industrial Electronic
Hardware Corp.
New York, New York

97945
Penwalt Corp.
SS White Industrial Products Div.
Piscataway, New Jersey

98278
Malco A. Microdot Co., Inc.
Connector & Cable Div.
Pasadena, California

98291
Sealectro Corp.
Mamaroneck, New York

98388
Royal Industries
Products Div.
San Diego, California

98978
IERC
Burbank, California

99120
Plastic Capacitors, Inc.
Chicago, Illinois

99217
Bell Industries Elect.
Burbank, California

99392
STM
Oakland, California

99515
ITT Jennings Monrovia Plant
Monrovia, California

99779
Use 29587
Bunker-Ramo Corp.
Landsdowne, Pennsylvania

99942
Centrelab Semiconductor
El Monte, California