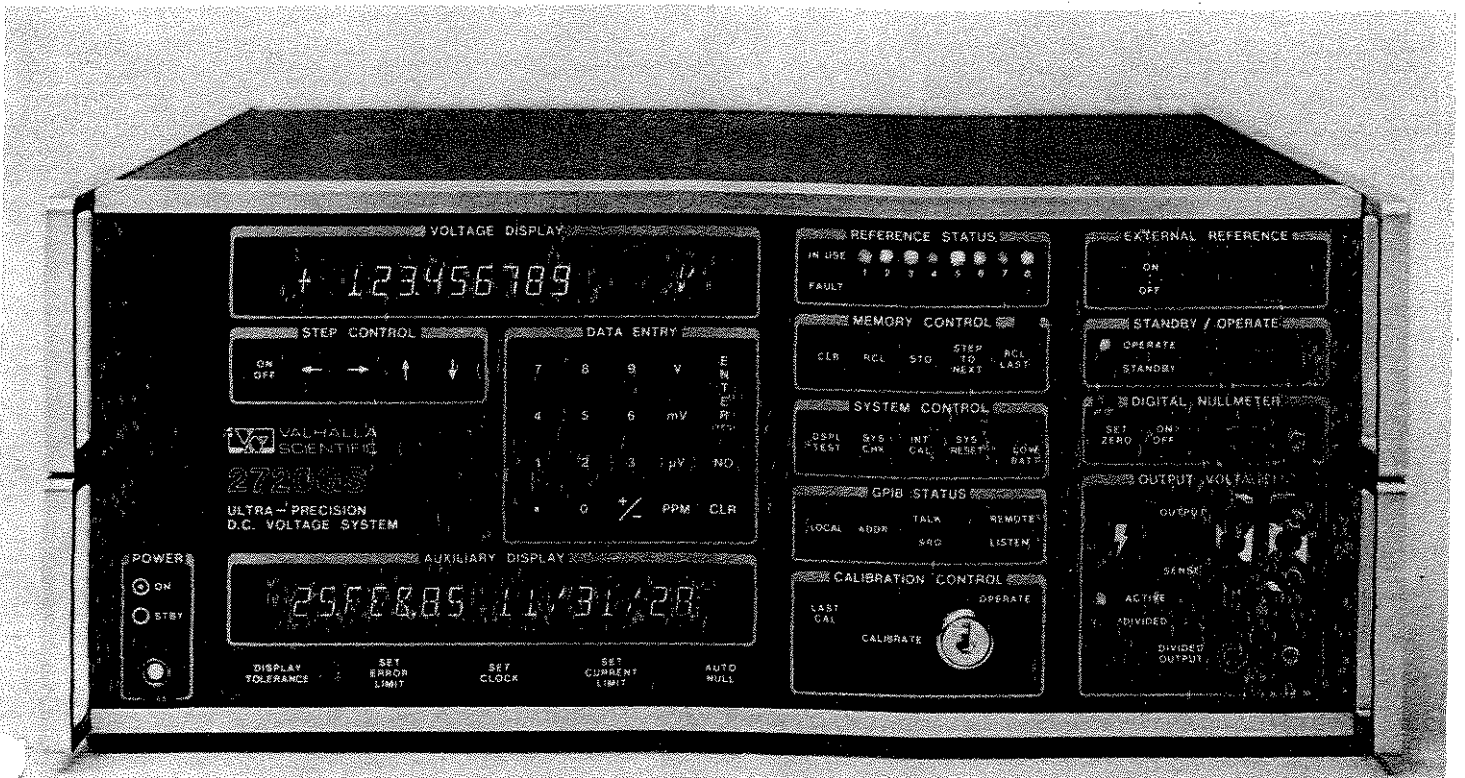


VOLUME 2

2720 GS

ULTRA-PRECISION DC VOLTAGE SYSTEM

OPERATION AND MAINTENANCE MANUAL



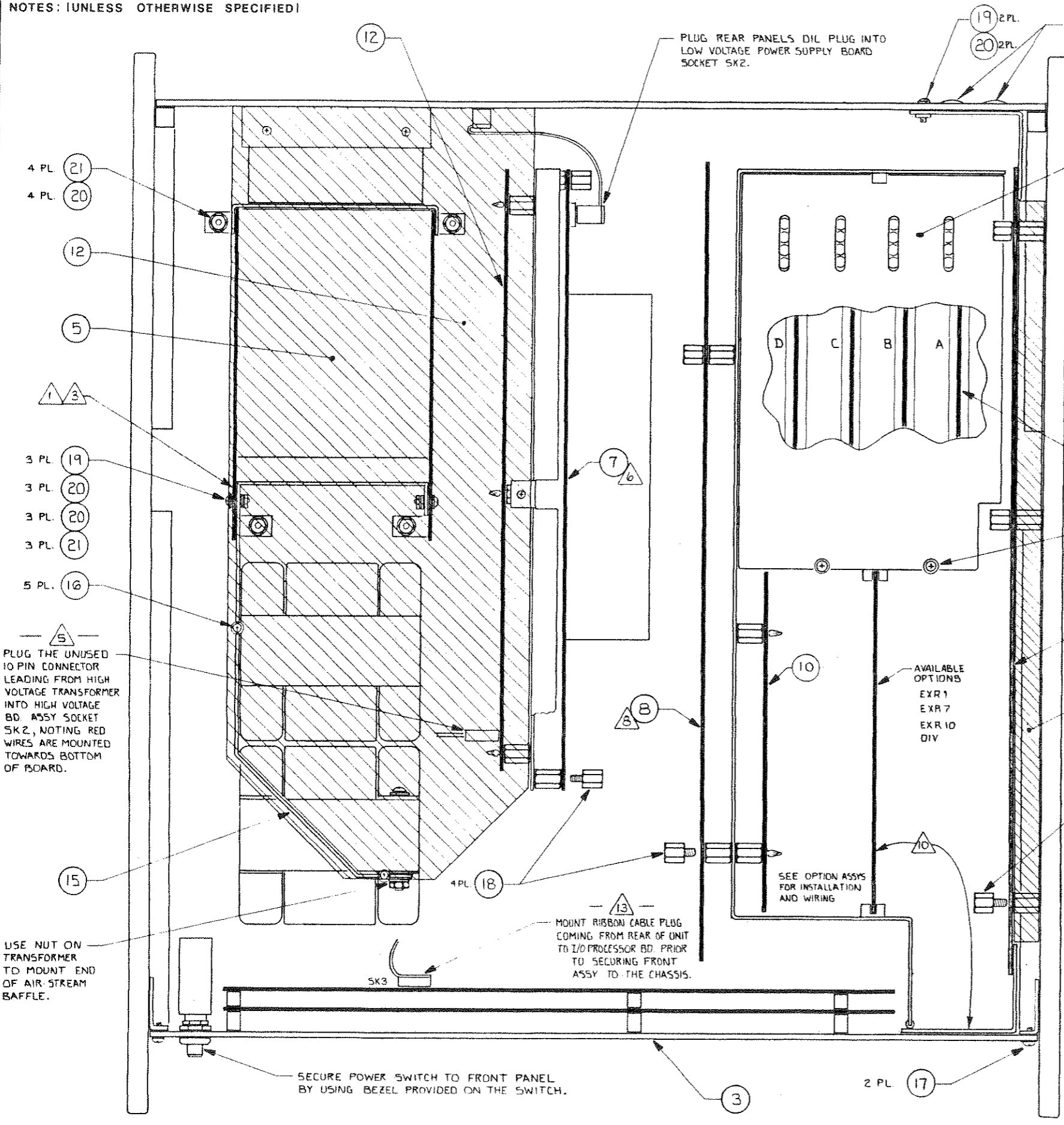
VALHALLA
SCIENTIFIC

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	it
542	B	ADD ORDER OF ASSY INSTR.	8-14-84	FWD
647	C	ADDED HOLE PLUGS.	RDN 1-7-85	JMA



PLUG REAR PANELS DIL PLUG INTO LOW VOLTAGE POWER SUPPLY BOARD SOCKET SK2.

4 PUT PLUGS IN HOLES WITHOUT BINDING POST. IT MAY BE NECESSARY TO SHAVE ONE SIDE OF THE PLUG, SO IT WILL FIT FLUSH WITH THE REAR PANEL.

14 WHEN INSTALLING COVER INSURE IT MOUNTS IN TABS AS SHOWN, ALSO ENSURE L.E.D.S ARE PROPERLY ALIGNED IN SLDT.S.

REFERENCE MODULE OPTIONS

OPTION	* REF. BQS.	LOCATIONS
HSR	4 BQS.	A,B,C,D
GS	3 BQS.	A,B,C
S4-4T	2 BQS.	A,B

ALL REFERENCE BQS ARE TO BE COMPLETELY SOAKED AND TAKEN FROM 2710 REFERENCE SYSTEM. ANY GRADE BOARD MAY BE USED IN OPTION S4-4T. 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.

9 SEE REFERENCE MODULE OPTIONS

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.

5 PLUG THE UNUSED 10 PIN CONNECTOR LEADING FROM HIGH VOLTAGE TRANSFORMER INTO HIGH VOLTAGE BD ASSY SOCKET SK2, NOTING RED WIRES ARE MOUNTED TOWARDS BOTTOM OF BOARD.

USE NUT ON TRANSFORMER TO MOUNT END OF AIR-STREAM BAFFLE.

13 MOUNT RIBBON CABLE PLUG COMING FROM REAR OF UNIT TO I/O PROCESSOR BD. PRIOR TO SECURING FRONT ASSY TO THE CHASSIS.

10 SEE OPTION ASSYS FOR INSTALLATION AND WIRING

AVAILABLE OPTIONS
EXR1
EXR7
EXR10
DIV

3 SECURE POWER SWITCH TO FRONT PANEL BY USING BEZEL PROVIDED ON THE SWITCH.

DASH NO		QTY RECD	NEXT ASSEMBLY	USED ON	TOLERANCES X' = ± .30' .XX = ± .03 XXX = ± .010	MATERIAL SEE PARTS LIST	FINISH	DRAWN WPW 6-7-84	CHECKED it 6-12-84	APPR FWD 6-12-84	STK NO	<p>Valhalla Scientific Inc. SAN DIEGO CA</p>	FINAL CHASSIS ASSY
SCALE 1:1		CODE IDENT SIZE DRAWING NO		BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES		84	SHEET 1 OF 2		53504	D	2720-400		

NOTES: (UNLESS OTHERWISE SPECIFIED)

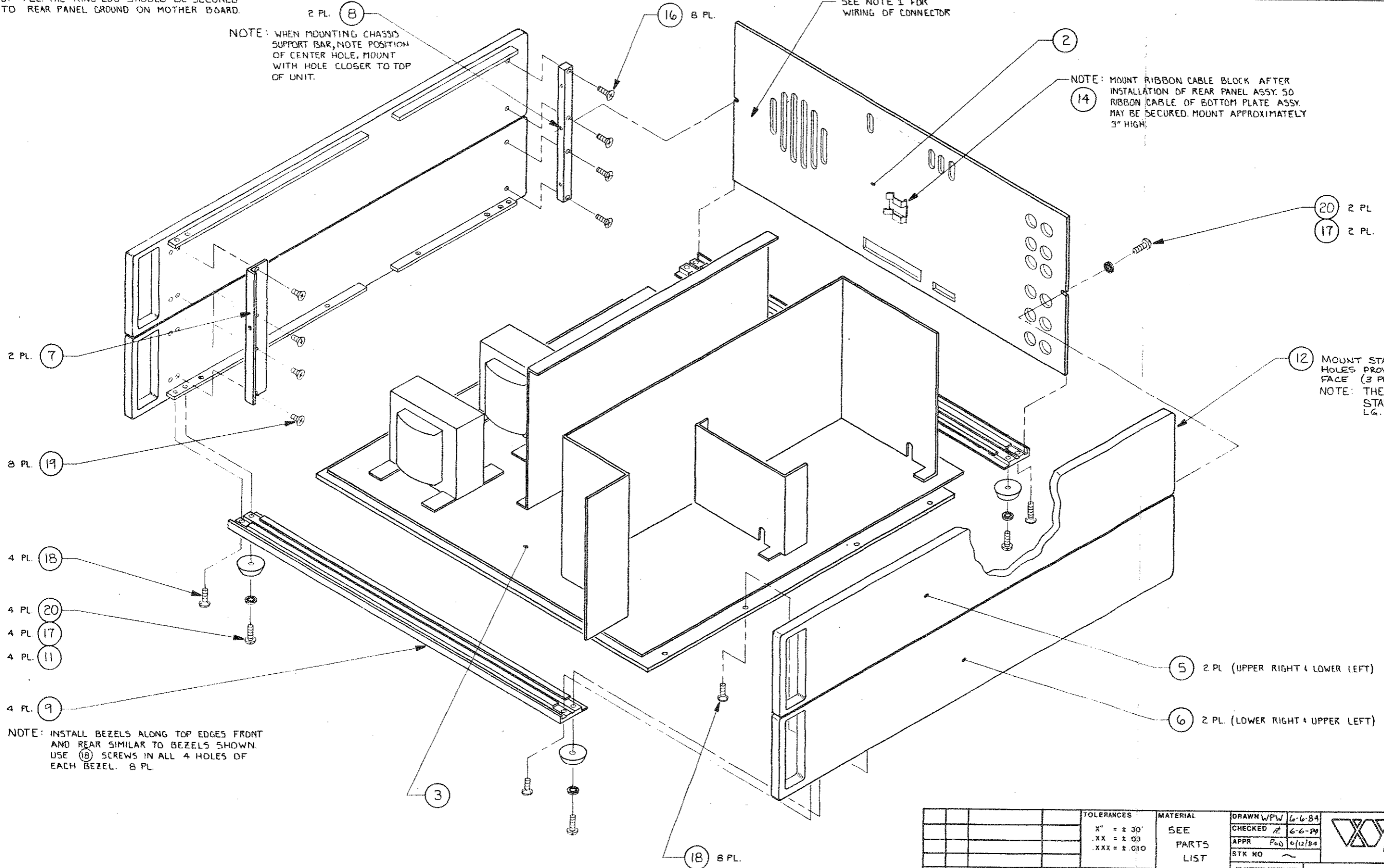
1. WHEN INSTALLING REAR PANEL ASSY CONNECT THE PANEL'S SOCKET TO PLC OF MOTHER BOARD MATCHING PIN 1 OF SOCKET TO PIN 1 OF PLC. THE RING LUG SHOULD BE SECURED TO REAR PANEL GROUND ON MOTHER BOARD.

NOTE: WHEN MOUNTING CHASSIS SUPPORT BAR, NOTE POSITION OF CENTER HOLE. MOUNT WITH HOLE CLOSER TO TOP OF UNIT.

SEE NOTE 1 FOR WIRING OF CONNECTOR

NOTE: MOUNT RIBBON CABLE BLOCK AFTER INSTALLATION OF REAR PANEL ASSY. SO RIBBON CABLE OF BOTTOM PLATE ASSY. MAY BE SECURED. MOUNT APPROXIMATELY 3" HIGH.

NOTE: MOUNT STANDOFFS INTO #8-32 HOLES PROVIDED ON THE INSIDE FACE (3 PLACES). NOTE: THESE ARE MODIFIED STANDOFFS WITH .20 LG. THREADS.



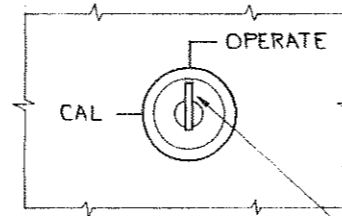
NOTE: INSTALL BEZELS ALONG TOP EDGES FRONT AND REAR SIMILAR TO BEZELS SHOWN. USE (8) SCREWS IN ALL 4 HOLES OF EACH BEZEL. 8 PL.

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

TOLERANCES		MATERIAL		DRAWN WPW 6-6-84		 Valhalla Scientific Inc. SAN DIEGO, CA
X" = ± .30		SEE PARTS LIST		CHECKED PL 6-6-84		
.XX = ± .03				APPR Poo 6/12/84		
XXX = ± .010		FINISH		STK NO		INITIAL CHASSIS ASSY.
BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES						
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	SCALE 1:2	CODE IDENT 53504	SIZE D
					DRAWING NO 2720-404	REV C
				SHEET 1 OF 2		

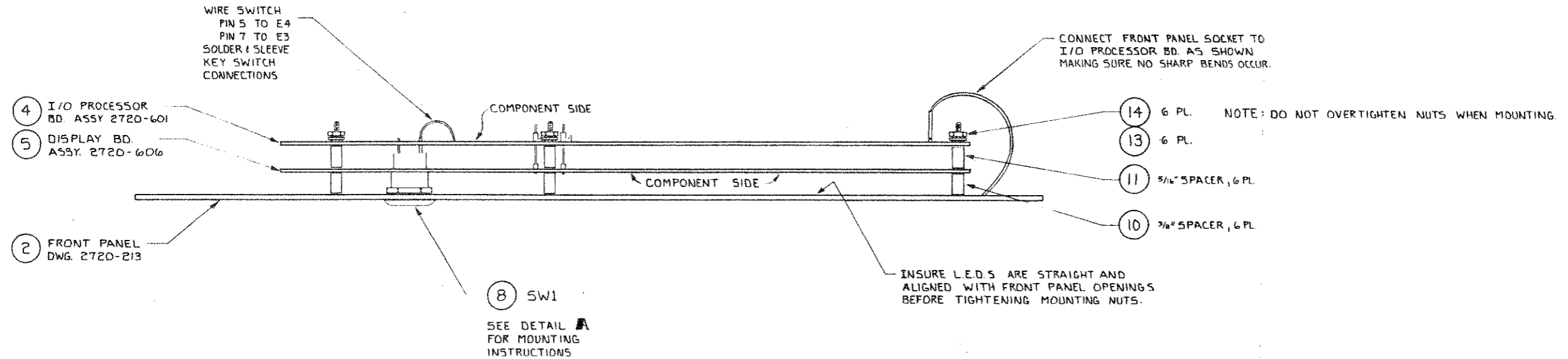
NOTES: (UNLESS OTHERWISE SPECIFIED)


REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
424	A	RELEASED	4-27-84	W.P.W.
633	B	DELETE REALTIME CLOCK BD. RDN	12-10-84	W.P.W.



DETAIL A
SCALE: NONE

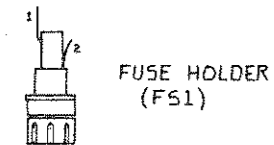
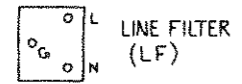
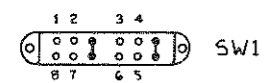
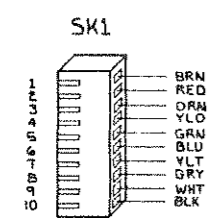
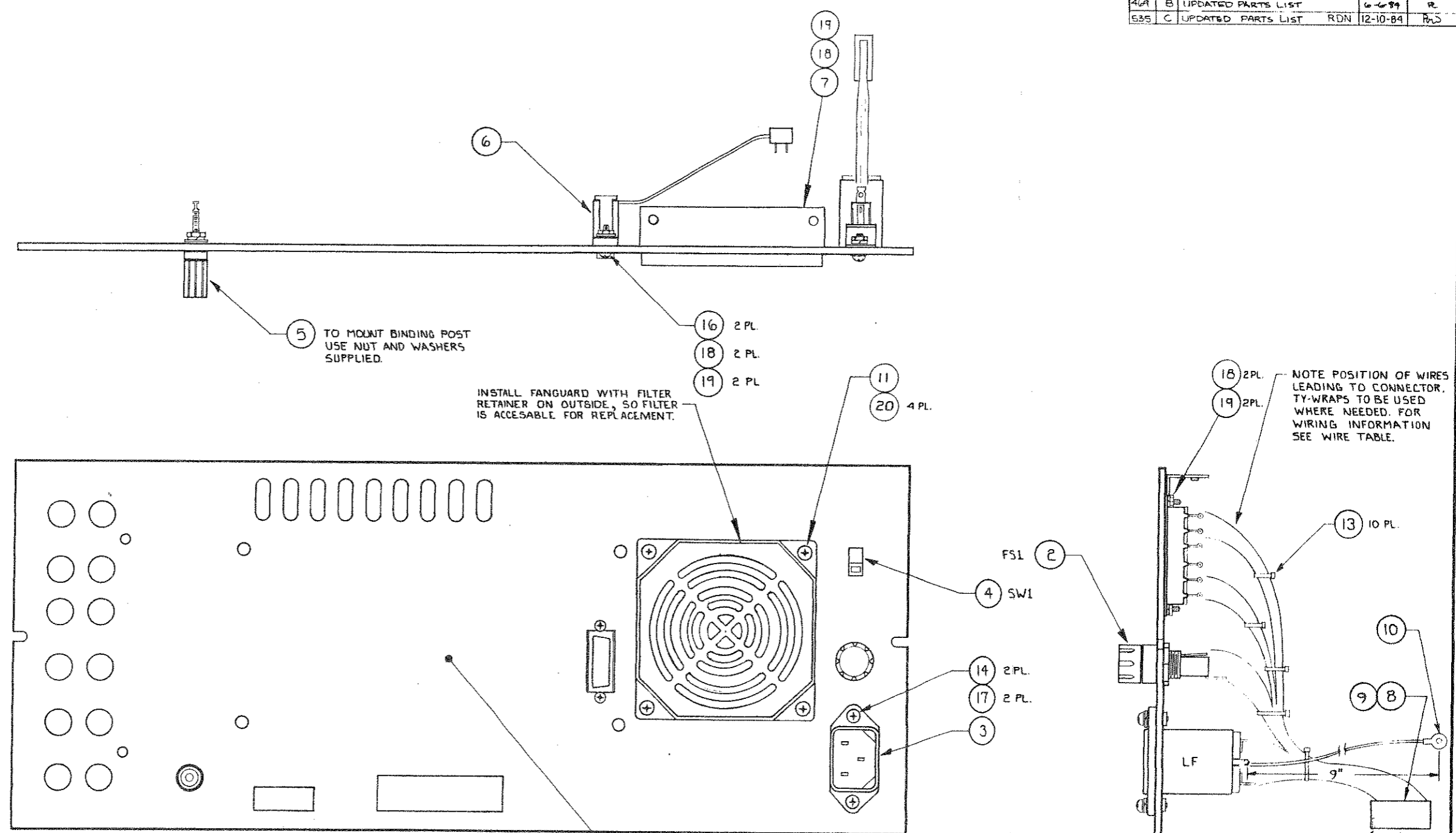
NOTE POSITION OF KEYHOLE
RELATIVE TO FRONT PANEL MARKS.
MOUNT SWITCH WITH NUT PROVIDED.
DO NOT OVERTIGHTEN NUT.



DASH NO		QTY RECD	NEXT ASSEMBLY	USED ON	TOLERANCES X" = ± .30" .XX = ± .03 .XXX = ± .010	MATERIAL SEE PARTS LIST	FINISH ~	DRAWN W.P.W. 4-25-84 CHECKED R 4-27-84 APPR W.P.W. 4-27-84 STK NO	 Valhalla Scientific Inc. SAN DIEGO, CA	FRONT ASSY.		
SCALE 1:1		CODE IDENT 53504	SIZE D	DRAWING NO 2720-401	REV B	SHEET 2 OF 2						

NOTES: (UNLESS OTHERWISE SPECIFIED)

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



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	FSL-2	S-S	18	WHT
SK1-10	CT	SW1-8	S-S	18	BLK
FSL-1	S-S	LF-L	S-S	16	BLK
LF-G	S-S	6 SOLDER LOG	S-S	16	GRN

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



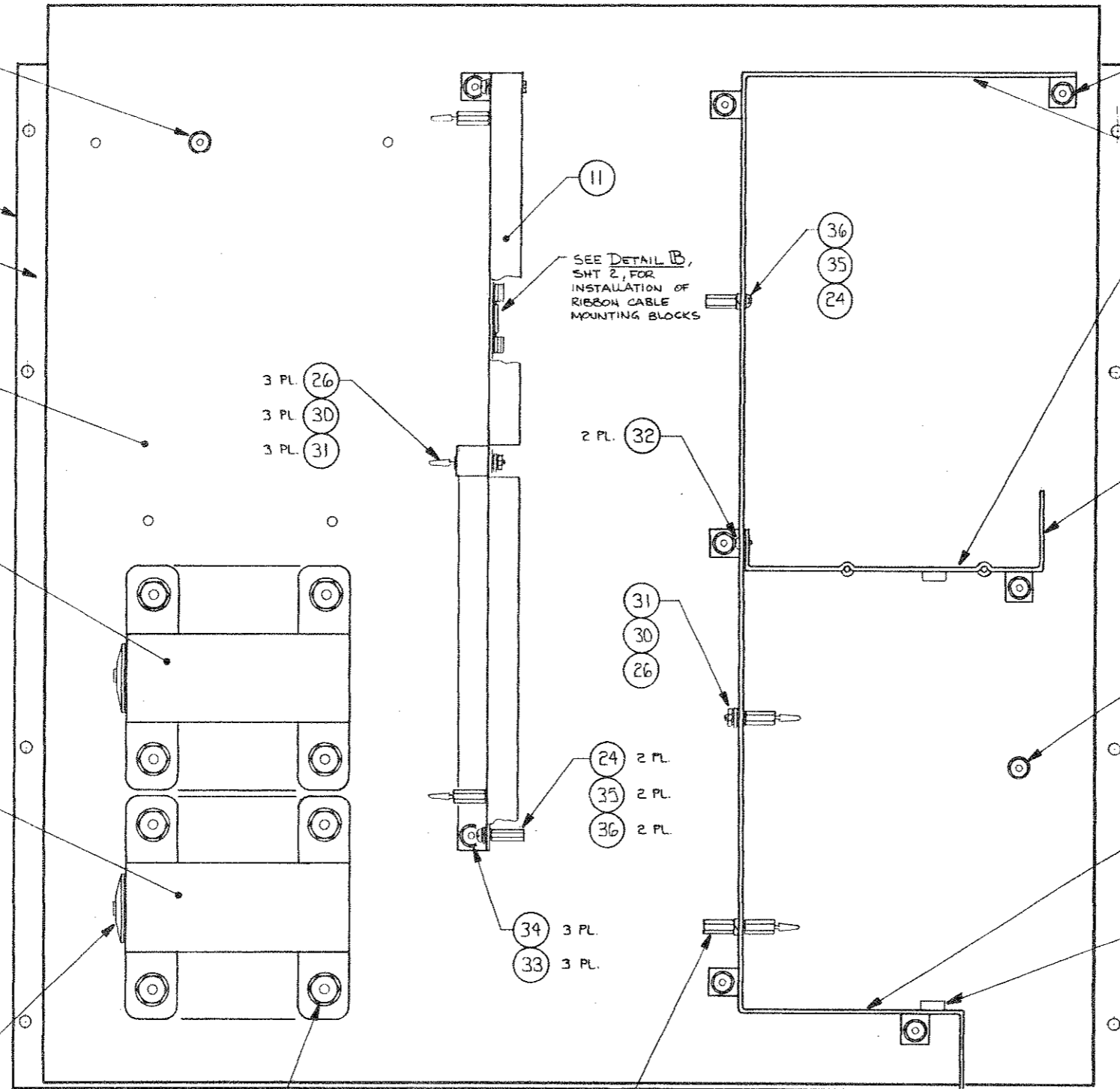
TOLERANCES		MATERIAL		DRAWN WPW 4-20-84	
X° = ± .30°	XX = ± .03	SEE PARTS LIST	SEE PARTS LIST	CHECKED R 4-20-84	APPR R 4-20-84
XXX = ± .010				STK NO	
BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES		FINISH		REAR PANEL ASSY	
64 ✓		~		SCALE NONE	
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	CODE IDENT	SIZE
				53504	D
			DRAWING NO	REV	
			2720-402	C	



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	PL
544	C	REMOVE CLASPON SOCKET. RDN	12-10-84	PLS



NOTE: FIT LEFT AND RIGHT SPACERS TO BOTTOM PLATE BEFORE FITTING MOTHER BD. (4) (5)

NOTE: SEE SHT. 2 FOR TRANSFORMER MOUNTING INSTRUCTIONS.

NOTE: MOUNT TY-WRAP BLOCKS FLUSH TO TOP OF TRANSFORMERS. TY-WRAP THE FOUR PIN CONNECTOR WIRES TO THE BLOCKS CREATING A SERVICE LOOP IN THE WIRES, REFER TO SHT. 2.

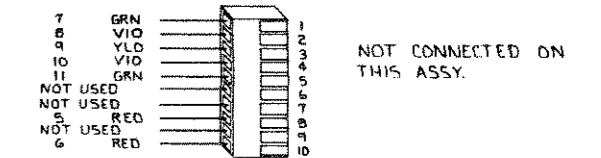
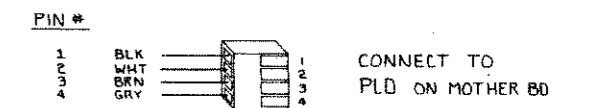
31 8 PL.
30 6 PL. SOLDER LUGS ARE USED IN 2 PL SEE SHT. 2.

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

WHEN ASSEMBLING WRAP INSERT GROMMETS ON MOTHER ASSY INTO APPROPRIATE SLOTS.

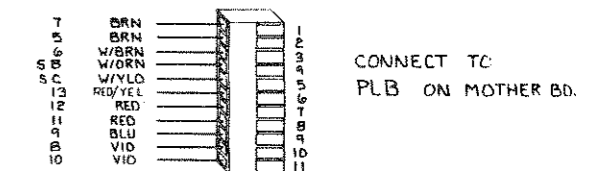
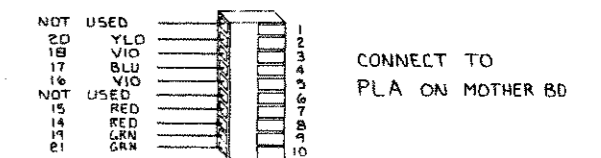
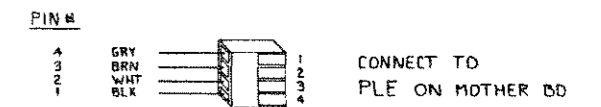
TRANSFORMER WIRING

(12) HIGH VOLTAGE TRANSFORMER



5A WHT/ORN — SOLDER LUG TO TRANSFORMER MOUNT
5B WHT/YEL — SOLDER TO BEAD PIN (E9)
5C WHT/GRN — SOLDER TO BEAD PIN (E10)

(13) LOW VOLTAGE TRANSFORMER



5A and D (W/GRN) — SOLDER LUG TO TRANSFORMER MOUNT (W/REY)

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES	MATERIAL	FINISH	SCALE	CODE IDENT	SIZE	DRAWING NO	REV
				X' = ± .30' .XX = ± .03 .XXX = ± .010	SEE PARTS LIST		1:1	53504	D	2720-405	C



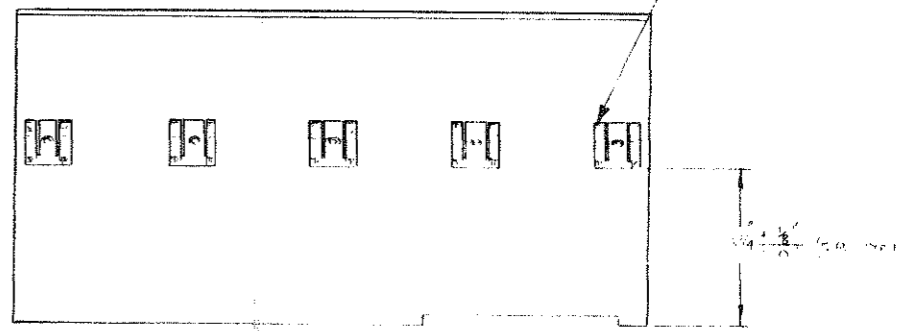
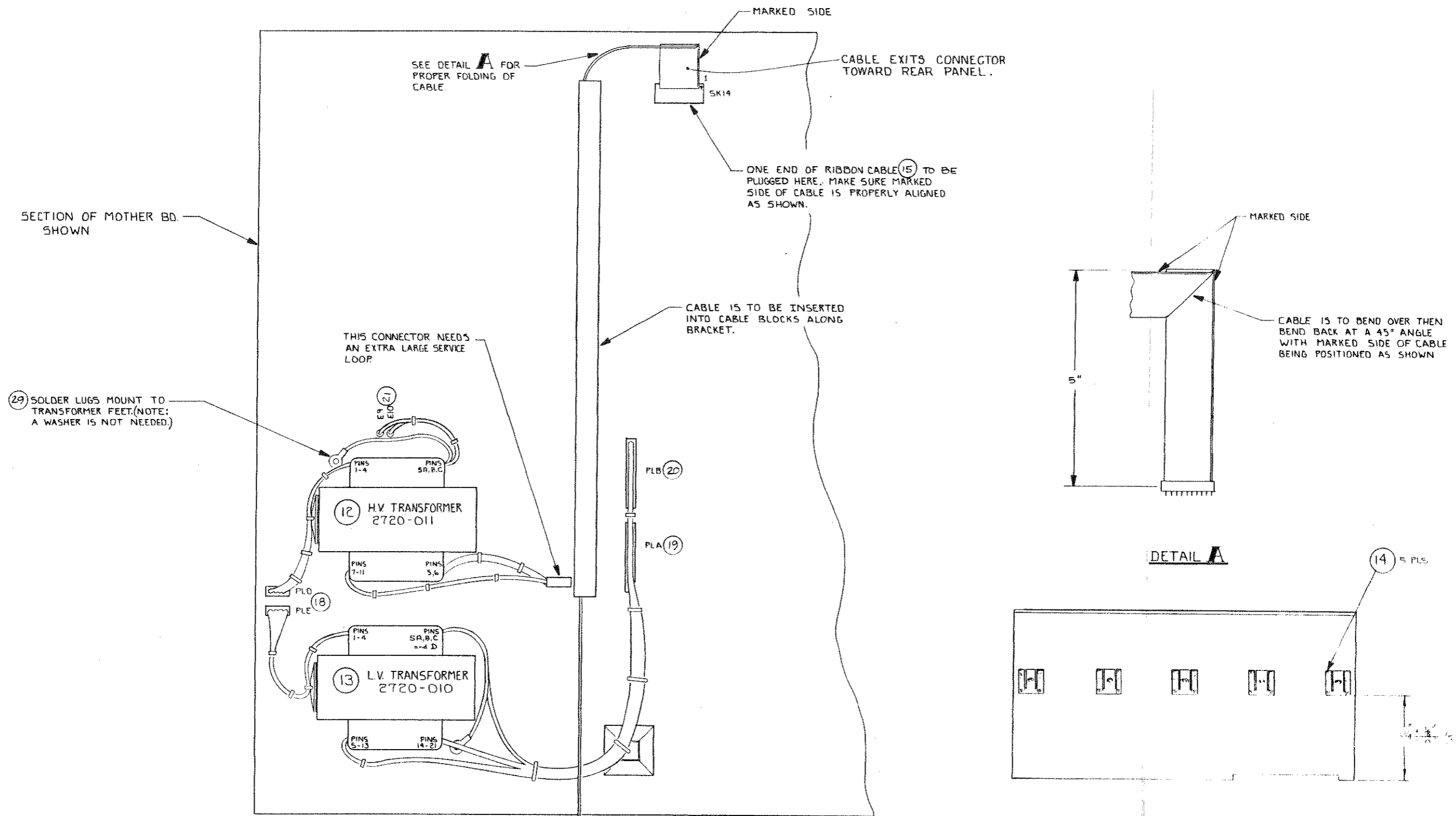
BOTTOM PLATE ASSY.

SCALE	1:1	CODE IDENT	53504	SIZE	D	DRAWING NO	2720-405	REV	C
SHEET	1	OF	4						

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL WIRING MUST ALLOW FOR SERVICING LOOPS.

ECO		LTR		REVISIONS		DATE	APPROVED
				DESCRIPTION			
				SEE SHT. 1			



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

DASH NO		QTY RECD	NEXT ASSEMBLY	USED ON	TOLERANCES X = ± .30 .XX = ± .03 .XXX = ± .010	MATERIAL	FINISH	DRAWN WPW 5-21-84	Valhalla Scientific Inc. SAN DIEGO, CA	
					BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES			CHECKED R 5-25-84	BOTTOM PLATE ASSY.	
					84/			APPR POW 6/6/84	SCALE 1:1	CODE IDENT 53504
								STK NO	SIZE D	DRAWING NO 2720-405
									SHEET 2 OF 4	REV C

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.

SW1
LEAVE HARDWARE ATTACHED

MOUNT SPACER BETWEEN SWITCH & MOTHER BOARD. (ENSURE SWITCH IS PARALLEL WITH BOARD).

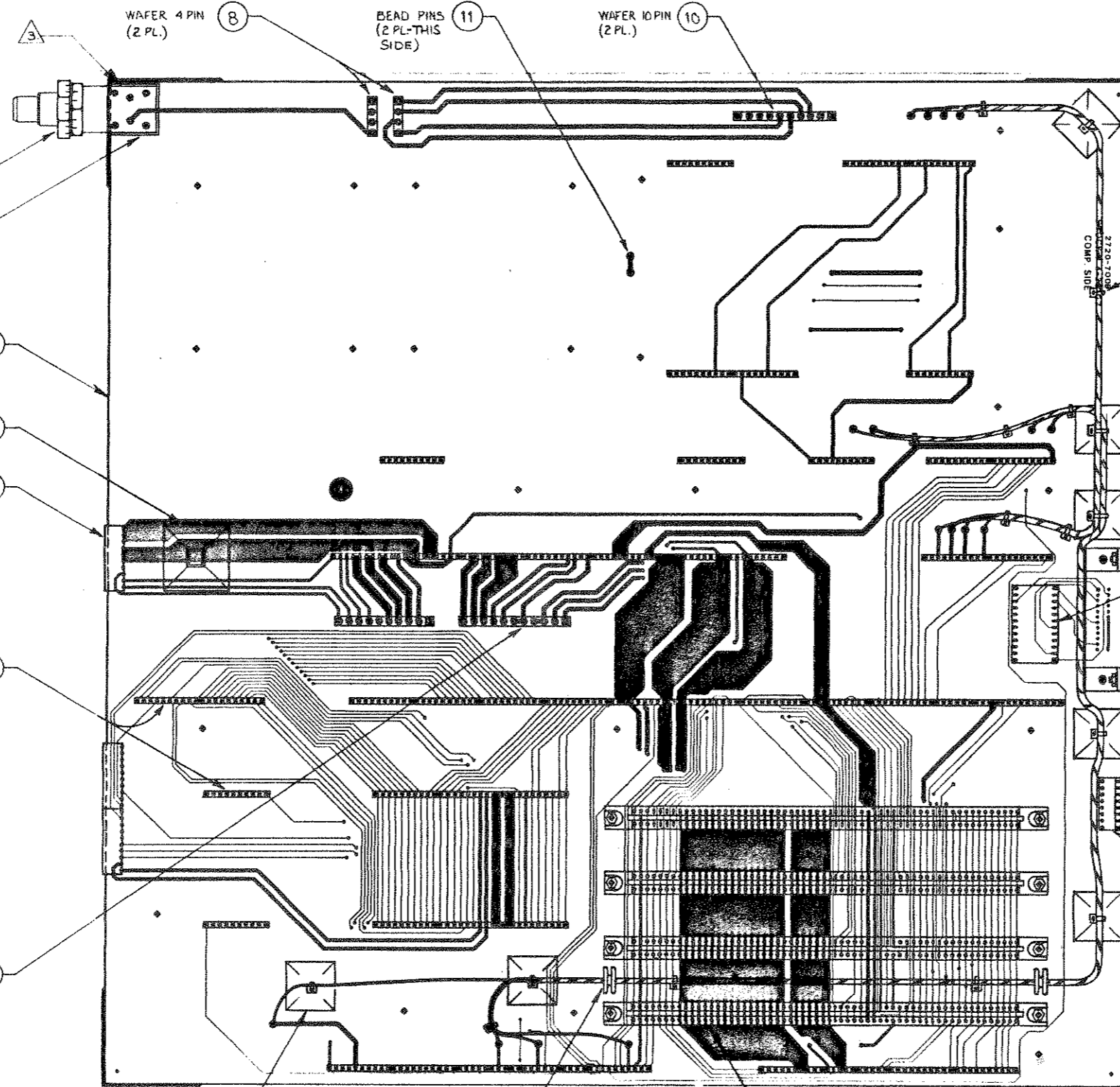
MOTHER BOARD

TY BLOCK (LARGE)

SK13 (3 PL.)

PL1-5,10-12 (50 PL.)

WAFER 11PIN



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

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	TOLERANCES	MATERIAL	FINISH	DRAWN CRE	4-23-84	<p>Valhalla Scientific Inc. SAN DIEGO, CA</p>
1			2720		X = ± .30' .XX = ± .03 .XXX = ± .010			CHECKED	4-24-84	
					BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES			APPR	6-1-84	
								STK NO		<p>MOTHER BOARD ASSEMBLY</p> <p>SCALE 1:1</p> <p>SHEET 3 OF 3</p>
										<p>CODE IDENT 53504</p> <p>SIZE D</p> <p>DRAWING NO 2720-600</p> <p>REV C</p>

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	1010

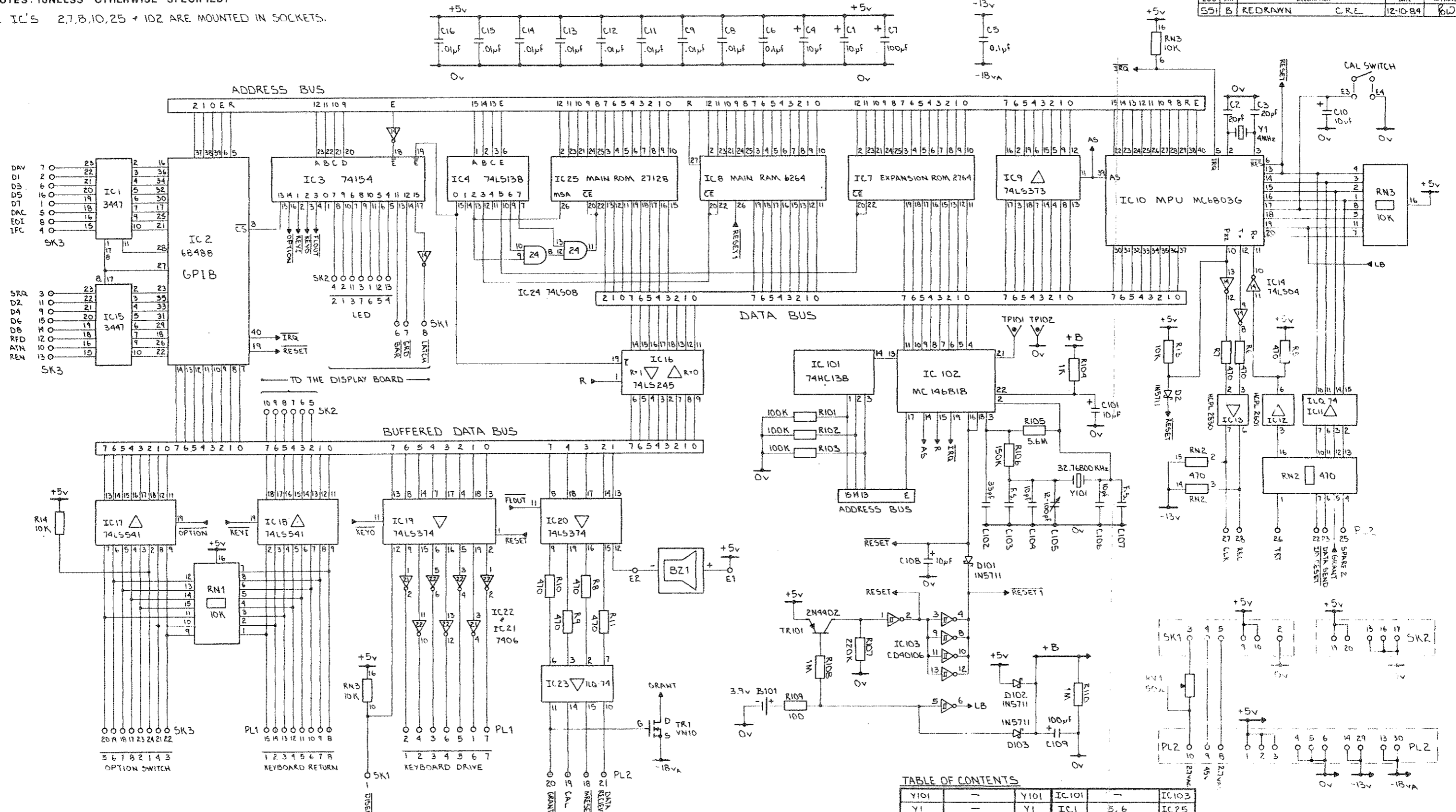


TABLE OF CONTENTS

Y101	-	Y101	IC101	-	IC103
Y1	-	Y1	IC1	-	IC25
TP101	-	TP102	E1	-	E4
TR101	-	TR101	D101	-	D103
TR1	-	TR1	D2	1	D2
SK1	-	SK3	C101	-	C109
RN1,R	-	RN3,RV1	C1	-	C16
R101	-	R110	BZ1	-	BZ1
RS	1,2,3,4,12	R14	B101	-	B101
PL1	-	PL2	FIRST	NOT USED	LAST

IC #	+5v	0v
1	24	12,13,14
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	14

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

Valhalla Scientific Inc. SAN DIEGO, CA

I/O PROCESSOR

CODE IDENT 53504 SIZE D DR'WING NO 2720-071


SHEET 1 OF 2

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

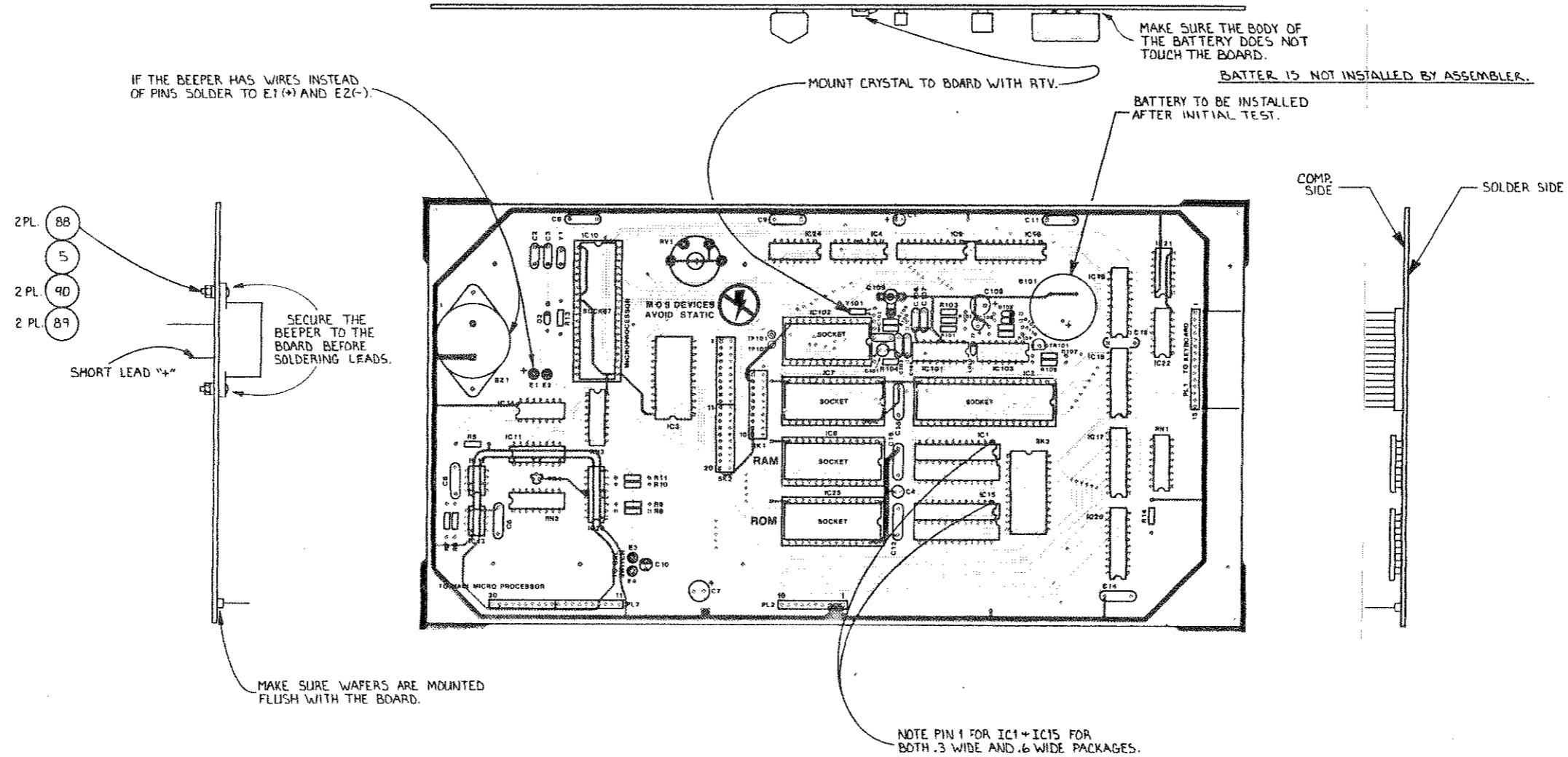
KEY BOARD TABLE

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	DRAWN RDN 12-11-64	CHECKED	APPR	STK NO	 Valhalla Scientific Inc. SAN DIEGO, CA	
					BREAK ALL SHARP CORNERS AND EDGES MACH SURFACES			I/O PROCESSOR					
SCALE		CODE IDENT	SIZE	DRAWING NO	REV			SHEET 2 OF 2		53504	D	2720-071	1

NOTES: (UNLESS OTHERWISE SPECIFIED)

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



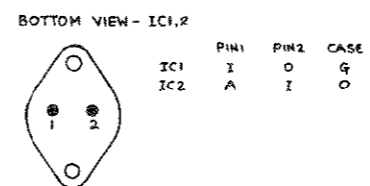
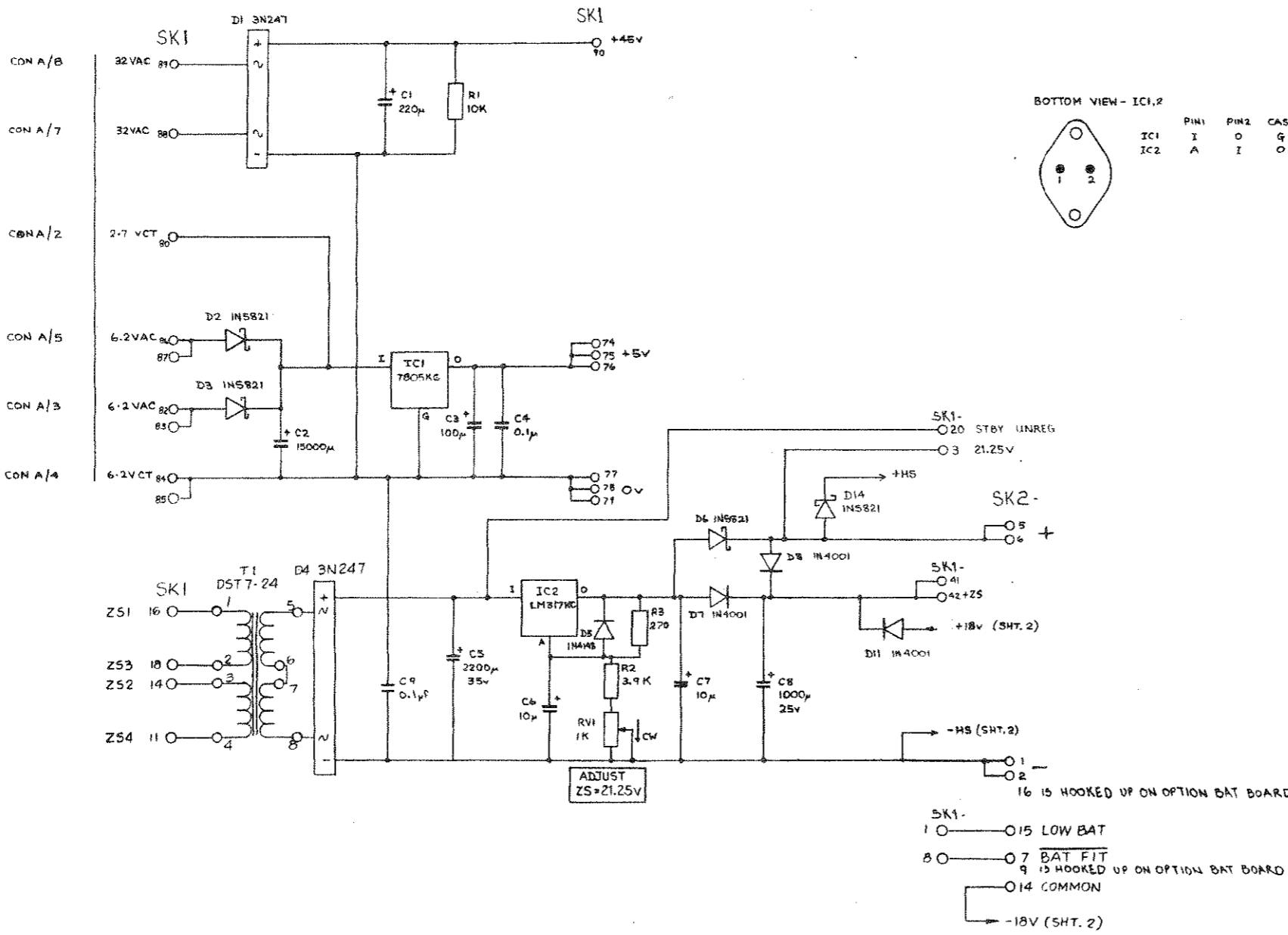
DASH NO		QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES	MATERIAL	DRAWN DPM 3-1-85	 Valhalla Scientific Inc. SAN DIEGO, CA	I/O PROCESSOR ASSY. DWG.	
					X = ± .30 .XX = ± .03 .XXX = ± .010		CHECKED E 3-1-85		SCALE 1:1	
					BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES	FINISH	APPR Paw 3-1-85		CODE IDENT 53504	SIZE D
					64 ✓		STK NO	SHEET 1 OF 5		REV E

NOTES: (UNLESS OTHERWISE SPECIFIED)

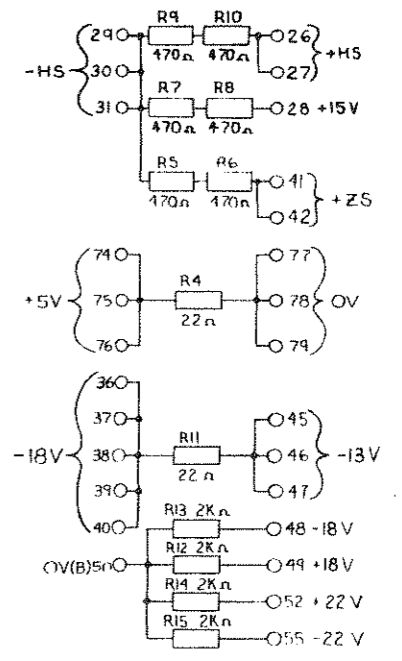
1. IC1,2 ARE MOUNTED ON HEATSINK.

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

T2
SECONDARY SYSTEM
A



PARTIAL EXTENDER BOARD



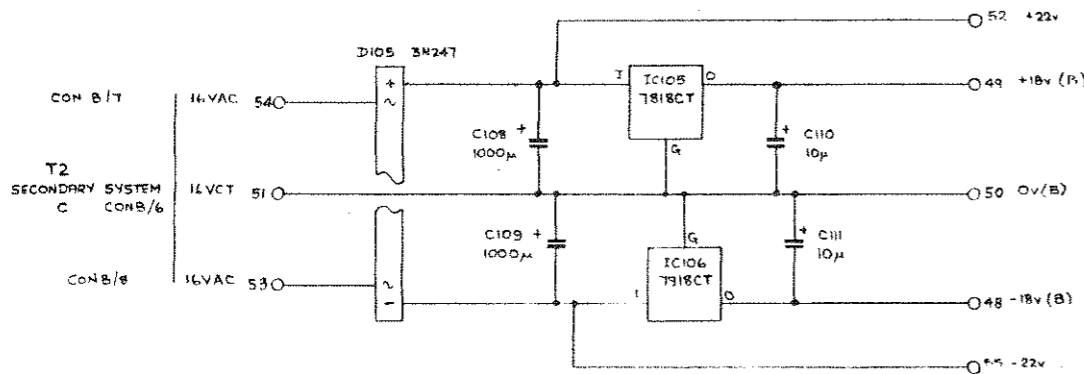
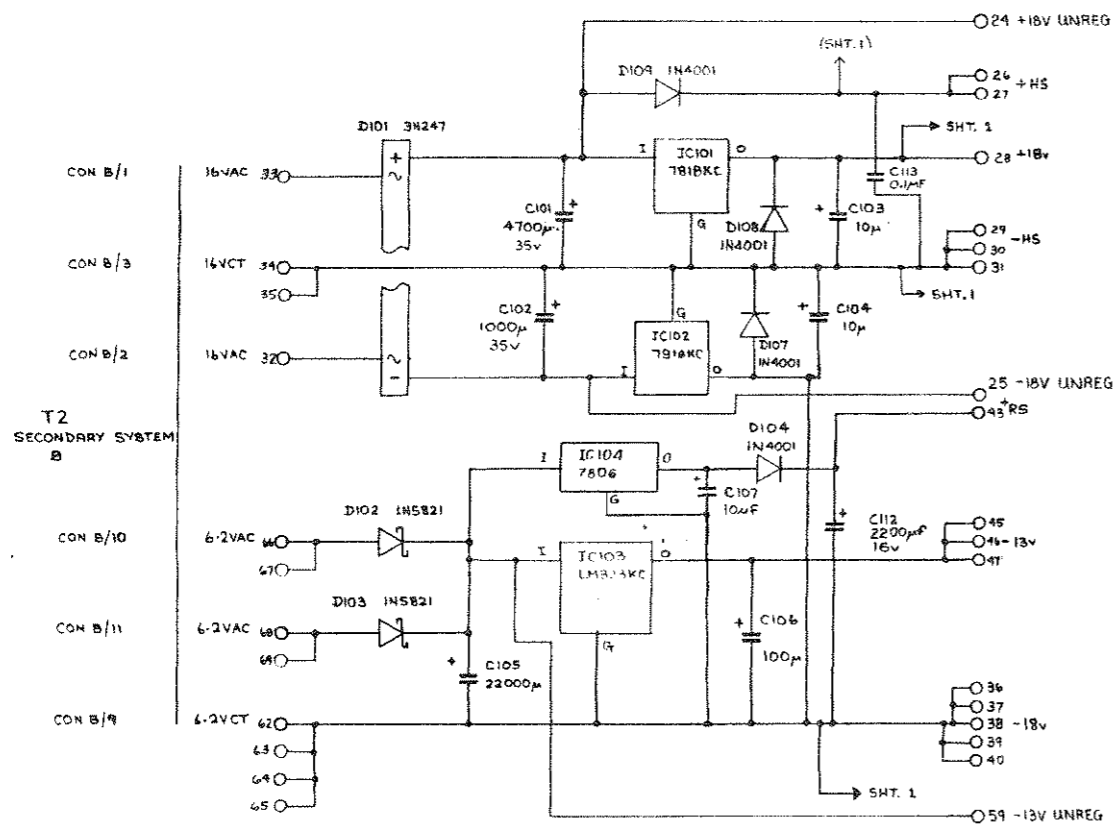
FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN POW	5-5-83
C1	C9-C12	C8	X = ± 30'		CHECKED POW	5-13-83
D1	D9, D10, D12, D13	D14	.XX = ± .03		APPR	5-29-84
IC1	IC3, IC4	IC2	.XXX = ± .010		STK NO	
R1	R4-R6, R1A	R3	BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES	FINISH	POWER SUPPLY - LOW VOLTAGE	
RV1	-	RV1			SCALE	CODE IDENT
T1	-	T1			53504	SIZE D
					DRAWING NO	REV
					2720-072	B
					SHEET 1 OF 2	



NOTES: UNLESS OTHERWISE SPECIFIED!

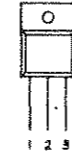
1. IC101-103 ARE MOUNTED ON HEATSINK.

REVISIONS			
ECO	LTR	DESCRIPTION	DATE
		SEE SHEET #1	



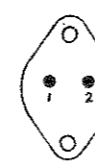
REFERENCE SUPPLIES

FRONT VIEW



	PIN1	PIN2	PIN3
IC105	I	G	O
IC106	G	I	O
IC104	I	G	O

BOTTOM VIEW



	PIN1	PIN2	CASE
IC103	I	O	G
IC101	I	O	G
IC102	G	O	I

OUTPUT SYSTEM SUPPLIES

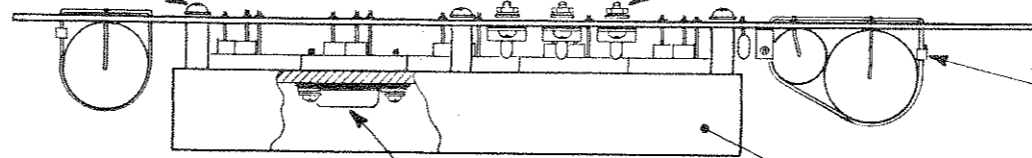
FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN POW	5-5-83			
IC101	-	C112	X = ± .30'	/	CHECKED POW	5-13-83			
D101	D106	D109	.XX = ± .03		APPR	RLW	5-29-84		
IC101	-	IC106	.XXX = ± .010		STX NO	-			
			BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH	POWER SUPPLY - LOW VOLTAGE				
			64 ✓	/	SCALE	CODE IDENT	SIZE	DRAWING NO	REV
					1/2"	53504	D	2120-072	B



NOTES: (UNLESS OTHERWISE SPECIFIED)

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

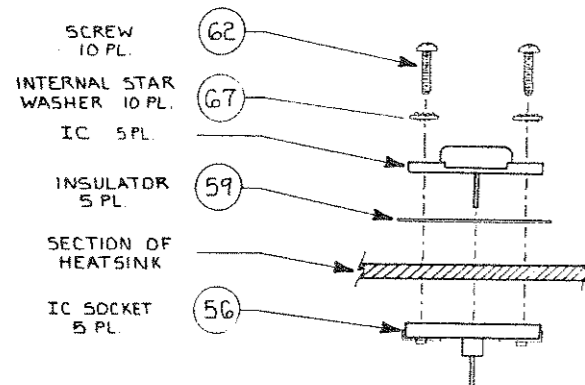
- SCREW, 5 PL. (63)
- WASHER, INTERNAL STAR, 5 PL. (67)
- SPACER, 5 PL. (60)
- HEATSINK (REF.) (58)
- (61) NUT RADIO HEX, 3 PL
- (69) WASHER, INTERNAL STAR, 3 PL
- (64) SCREW, 3 PL



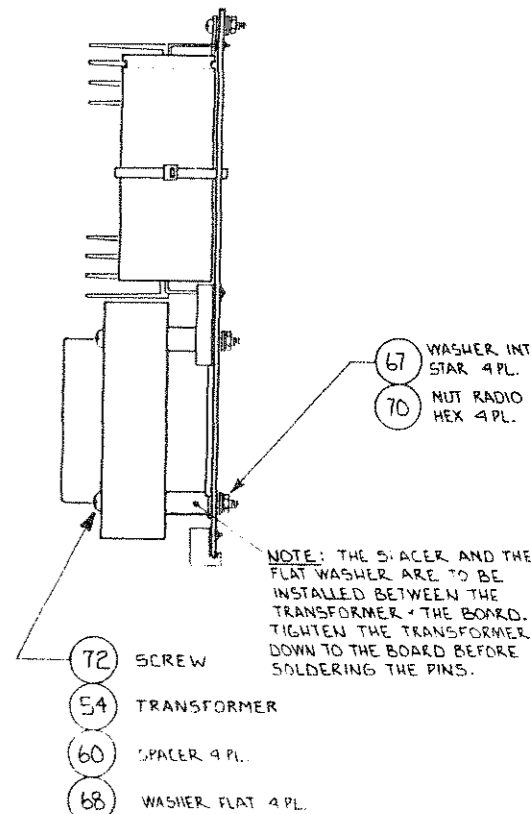
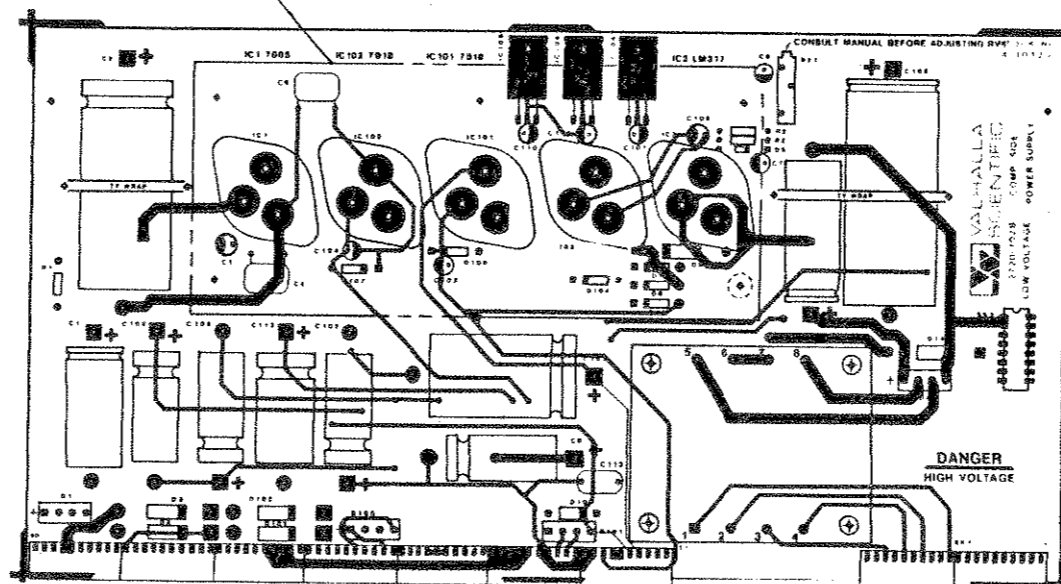
ALL TY-WRAPS TO BE SECURELY TIGHTENED. TYP 3 PL.

SEE DETAIL A
NOTE IC'S AND SOCKETS SHOULD BE MOUNTED TO HEATSINK BEFORE MOUNTING THEM TO BOARD.

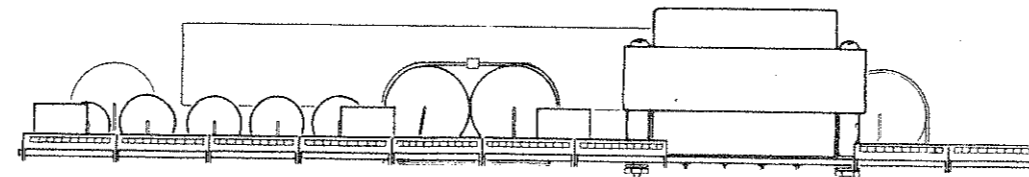
HEATSINK NOT SHOWN IN THIS VIEW.



DETAIL A
SCALE: NONE
VIEW SHOWN IS PERPENDICULAR TO IC.
NOTE ALL IC'S ON HEATSINK ARE MOUNTED THE SAME WAY.



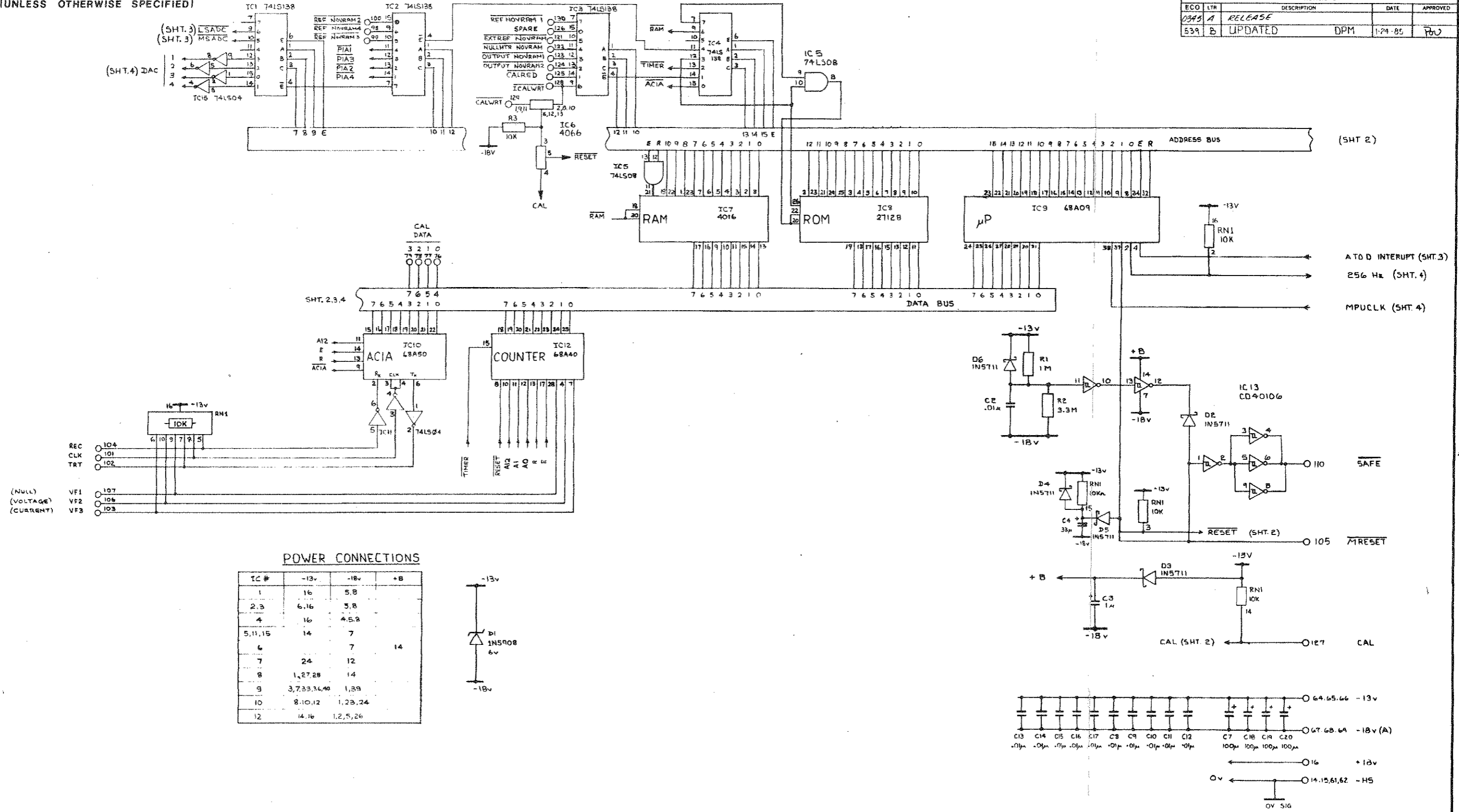
NOTE: THE SPACER AND THE FLAT WASHER ARE TO BE INSTALLED BETWEEN THE TRANSFORMER & THE BOARD. TIGHTEN THE TRANSFORMER DOWN TO THE BOARD BEFORE SOLDERING THE PINS.



TOLERANCES		MATERIAL		DRAWN WPW 3-15-84	
X° = ± .30°		SEE PARTS LISTS		CHECKED JMW 3/15/84	
.XX = ± .03				APPR R 3/15/84	
.XXX = ± .010				STK NO	
BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES		FINISH		Valhalla Scientific Inc. SAN DIEGO, CA	
1 2720- 2720				LOW VOLTAGE POWER SUPPLY ASSY.	
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	SCALE 1:1	CODE IDENT 53504
					SIZE D
					DRAWING NO 2720-602
					REV C
				SHEET 5 OF 5	

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
0343	A	RELEASE		
539	B	UPDATED	DPM 1-24-85	FW



POWER CONNECTIONS

IC #	-13v	-18v	+B
1	16	5,8	
2,3	6,16	3,8	
4	16	4,5,8	
5,11,15	14	7	14
6		7	
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	TOLERANCES	MATERIAL	DRAWN POW	5-4-83
C2	C1, C5, C6	C12	X = ± 30		CHECKED POW	5-15-83
D1		D6	.XX = ± .03		APPR	5-29-84
IC1	IC14	IC15	.XXX = ± .010		STK NO	
R1		R2				
RN1		RN1	BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH		

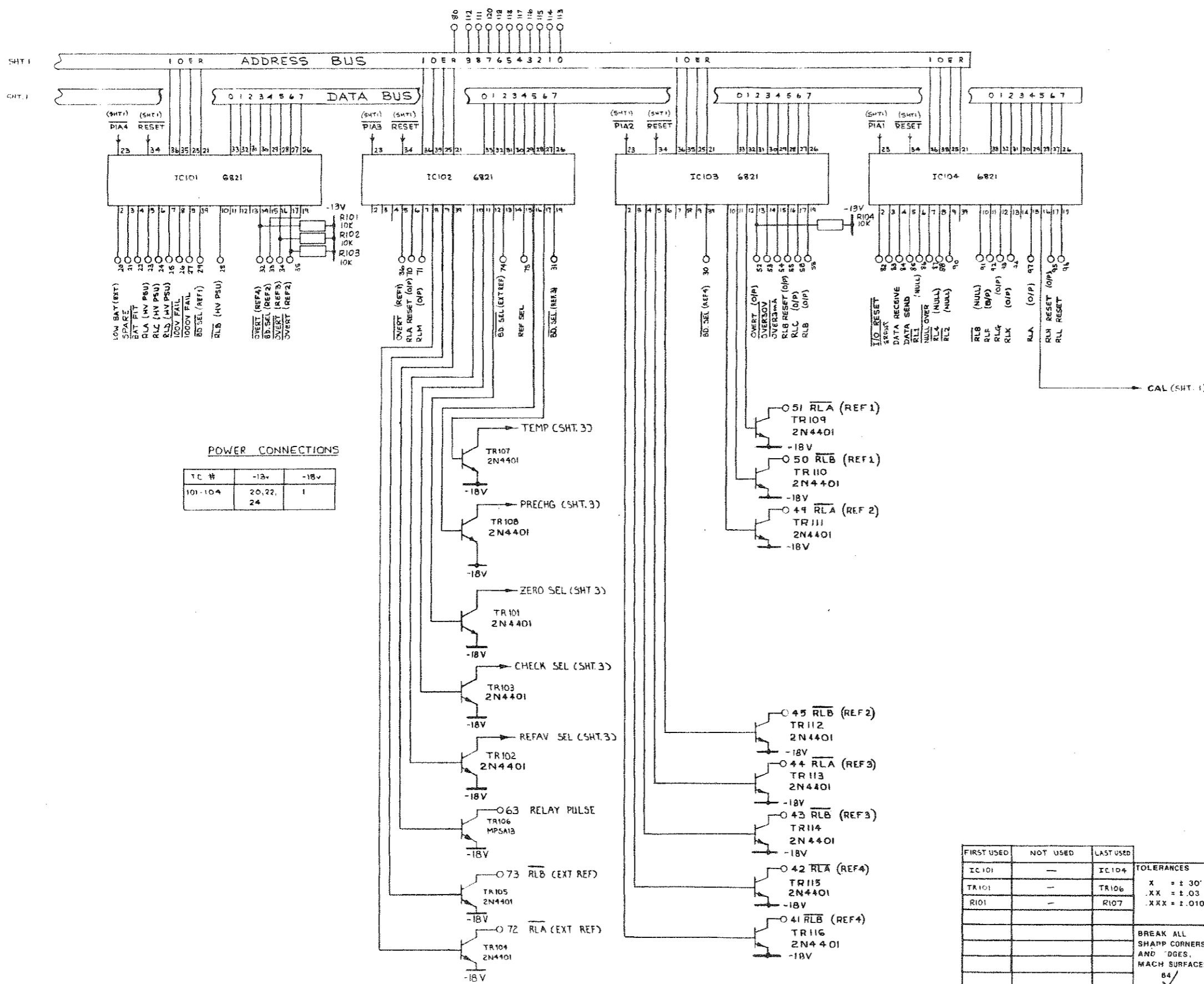
SCALE	CODE IDENT	SIZE	DRAWING NO	REV
1 OF 4	53504	D	2720-073	B



OUTPUT MICROPROCESSOR

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS			
ECO	LTR	DESCRIPTION	DATE
		SET SHEET # 1	



POWER CONNECTIONS

TC #	-18v	-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

MATERIAL
BREAK ALL SHARP CORNERS AND DGS. MACH SURFACES

FINISH
SCALE
SHEET 2 OF 4

Valhalla Scientific Inc.
SAN DIEGO, CA

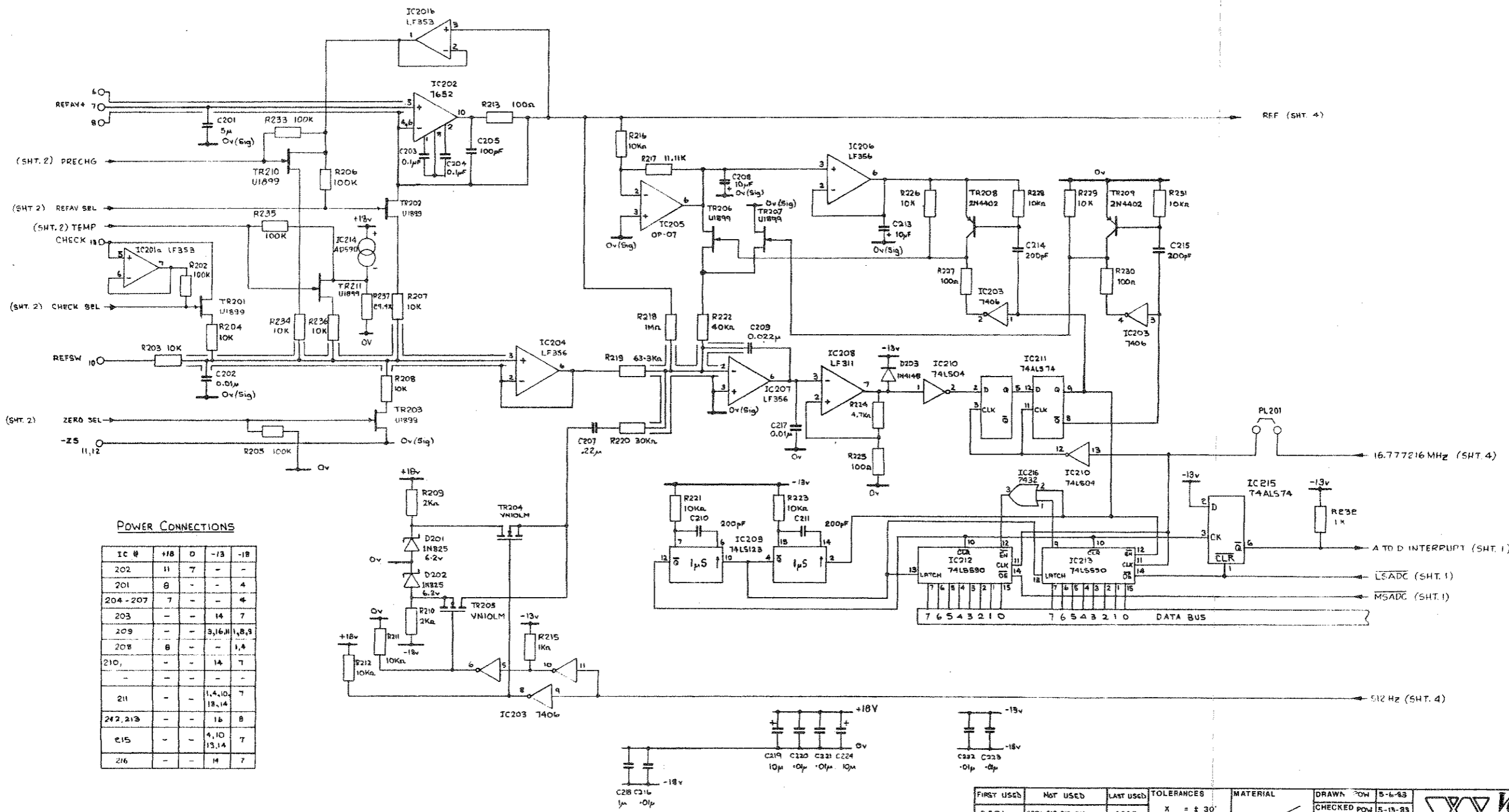
OUTPUT MICROPROCESSOR (INTERFACE)

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

CODE IDENT	53504
SIZE	D
DRAWING NO	2720-073
REV	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

ECO		LTR		REVISIONS		DATE	APPROVED
				REF SHEET #1			



POWER CONNECTIONS

IC #	+18	0	-13	-18
202	11	7	-	-
201	8	-	-	4
204 - 207	7	-	-	4
203	-	-	14	7
209	-	-	3,16,11,18,19	-
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

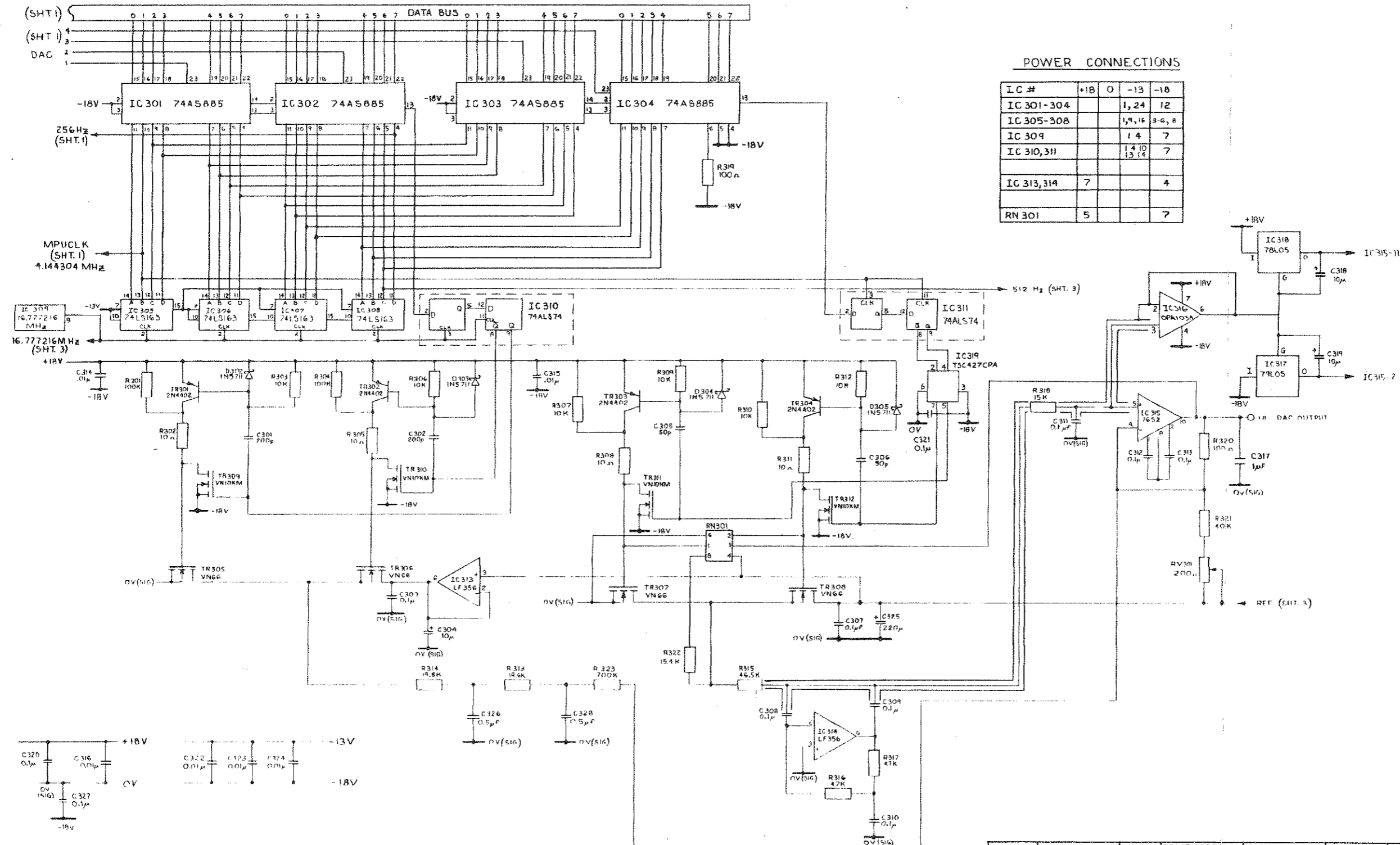
FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL
C 201	C206, 212, 217, 218	C223	X = ± 30' .XX = ± 0.03 .XXX = ± 0.010	
D 201	-	D 203		
IC 201	-	IC 215		
R 201	-	R 237	BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH
TR 201	-	TR 211		

DRAWN POW	5-6-83	<p>Valhalla Scientific Inc. SAN DIEGO, CA</p>
CHECKED POW	5-13-83	
APPR ROL	5-29-84	
STK NO		REFERENCE GENERATOR
SCALE		CODE IDENT
SHEET 3 OF 4	53504	SIZE D
		DRAWING NO 2720-073
		REV E

NOTES: (UNLESS OTHERWISE SPECIFIED)

I, TR 307 AND 308 ARE MOUNTED ON BERYLLIA WASHERS.

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		REF 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			1, 4	7
IC 310, 311			1, 4, 10, 13, 14	7
IC 313, 314	7			4
RN 301	5			7

FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL
C 301	C 317-C 321	C 328	X = ± 30'	
D 301		D 305	.XX = ± .03	
IC 301		IC 315	.XXX = ± .010	
R 301		R 323		BREAK ALL SHARP CORNERS AND EDGES.
RN 301		RN 301		MACH SURFACES
RV 301		RV 301		
TR 301		TR 314		

DRAWN	ADH	5-23-84
CHECKED	RWS	5-30-84
APPR	RWS	5-30-84
STK NO		

Valhalla Scientific Inc.
SAN DIEGO, CA

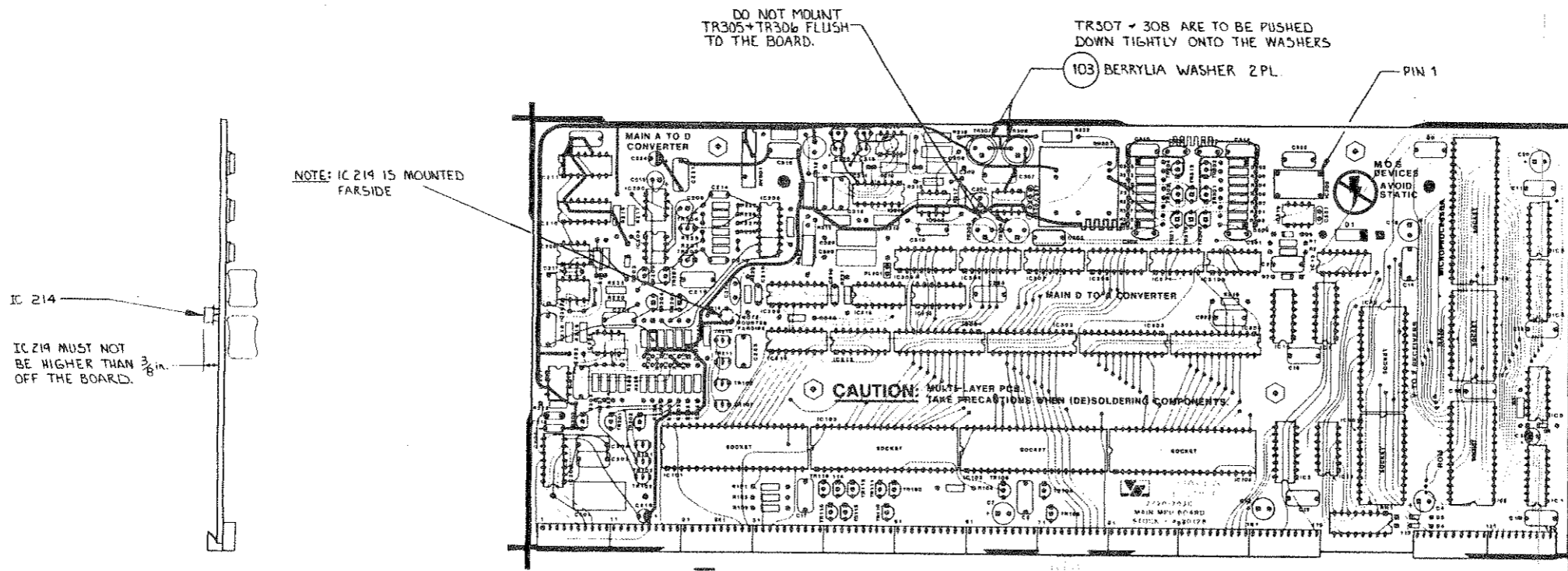
DIGITAL TO ANALOG CONVERTOR

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

SHEET 4 OF 4

NOTES: (UNLESS OTHERWISE SPECIFIED)

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



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 | IC 101-39 |
| 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 SKI 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.

TOLERANCES		MATERIAL		DRAWN RDN 3-26-84	
X = ± .30'		B		CHECKED RDN 3-27-84	
.XX = ± .03		FINISH		APPR PW 6/12/84	
.XXX = ± .010		BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES		STK NO	
DASH NO		QTY REQD		NEXT ASSEMBLY	
USED ON		64		SCALE 1=1	
CODE IDENT		SIZE		DRAWING NO	
53504		D		2720-603	
SHEET 6 OF 6		REV		C	

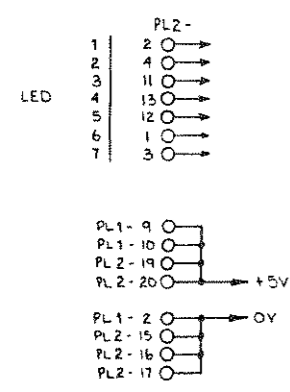
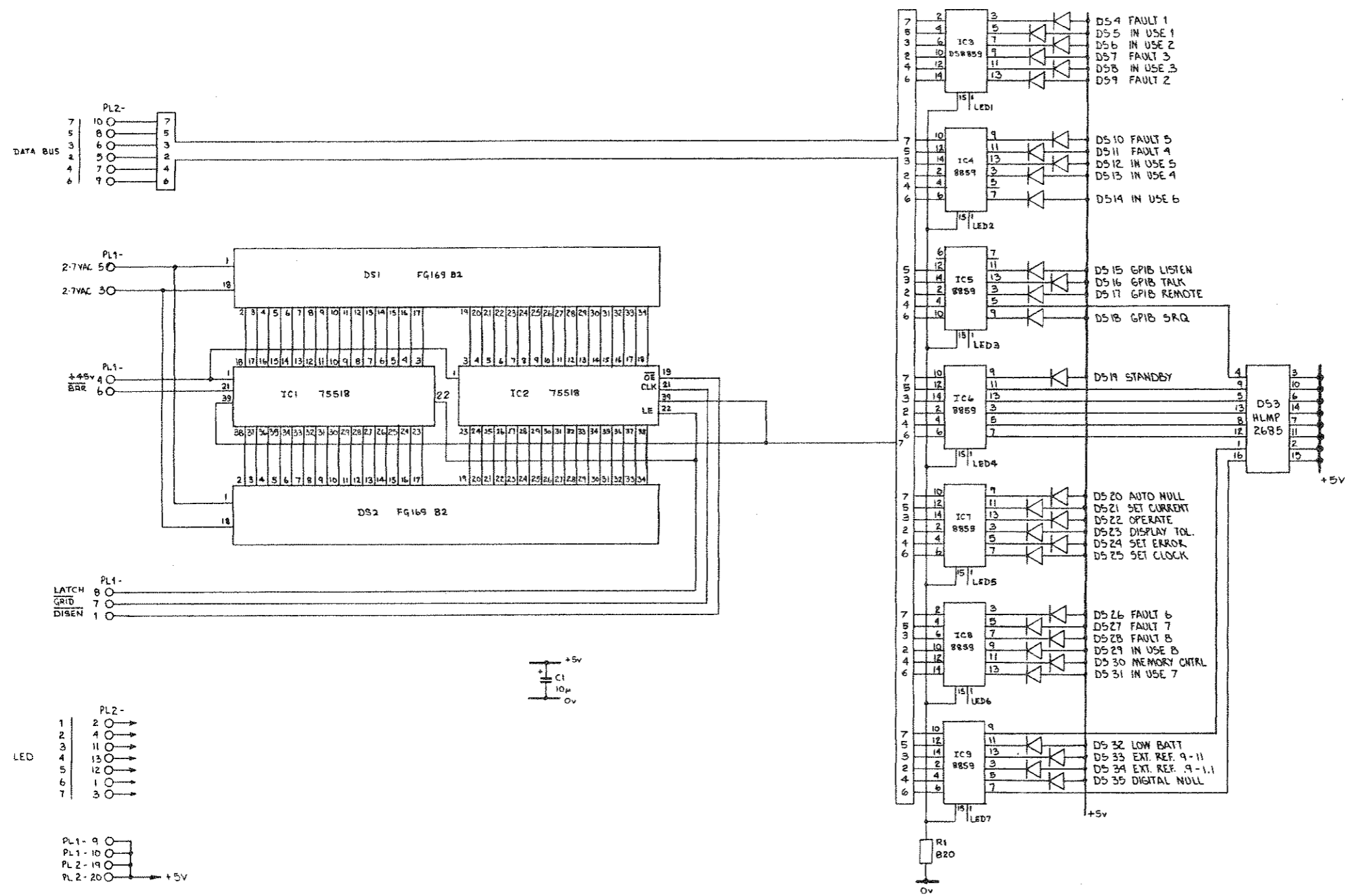


MAIN MICROPROCESSOR ASSEMBLY DRAWING

NOTES: (UNLESS OTHERWISE SPECIFIED)

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

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
0330	A	RELEASED	SW 9-28-89	JCN



IC#	+5V	0V
IC1	40	19, 20
IC2	40	20
IC3-9	16	8

FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN POW	5-12-83			
DS1	-	DS35	X = ± .30'	/	CHECKED POW	5-13-83			
IC1	-	IC9	.XX = ± .03		APPR	FSW	9-21-83		
R1	-	R1	.XXX = ± .010		STK NO				
C1	-	C1		BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH	/			
					SCALE	CODE IDENT	SIZE	DRAWING NO	REV
					SHEET 1 OF 1	53504	D	2720-076	



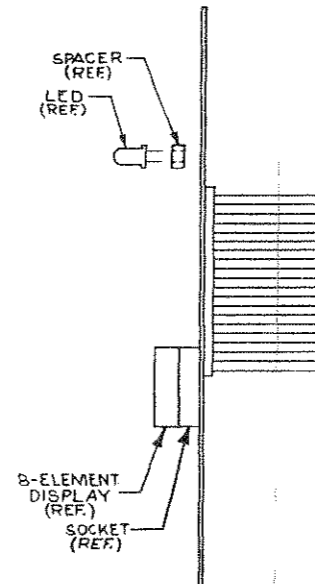
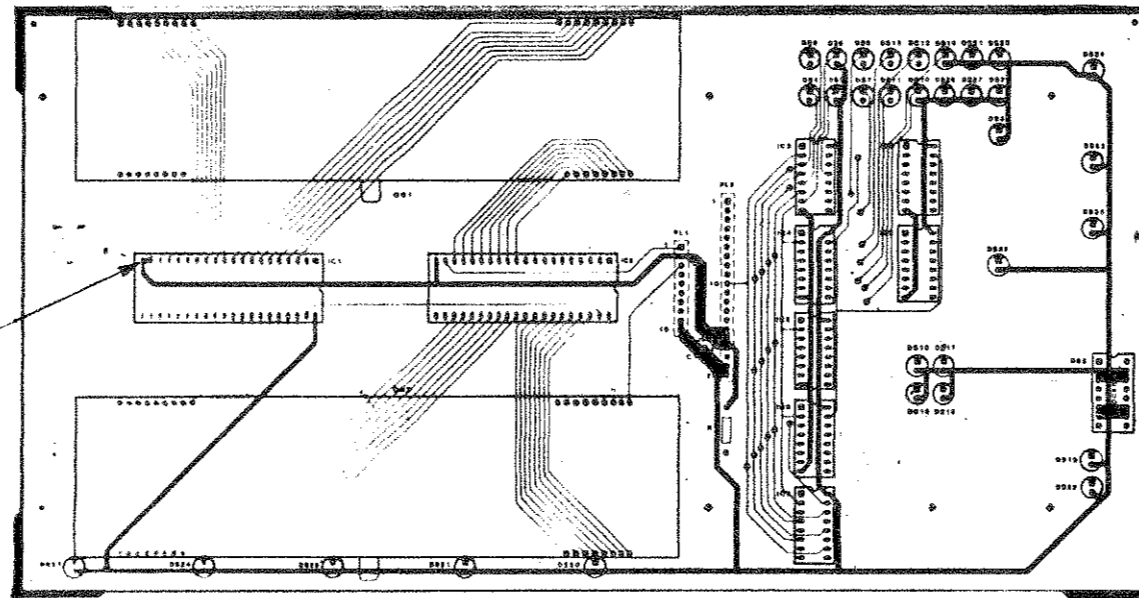
DISPLAY

NOTES: (UNLESS OTHERWISE SPECIFIED)

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

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

JUMPER PINS 19 AND 20 ON IC 1. ('A' REV. ONLY)



DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES	MATERIAL	FINISH	DRAWN RDN	CHECKED	APPR	STK NO	CODE IDENT	SIZE	DRAWING NO	REV
				X = ± .30 .XX = ± .03 .XXX = ± .010			3-1-84	RE	RE		53504	D	2720-606	B

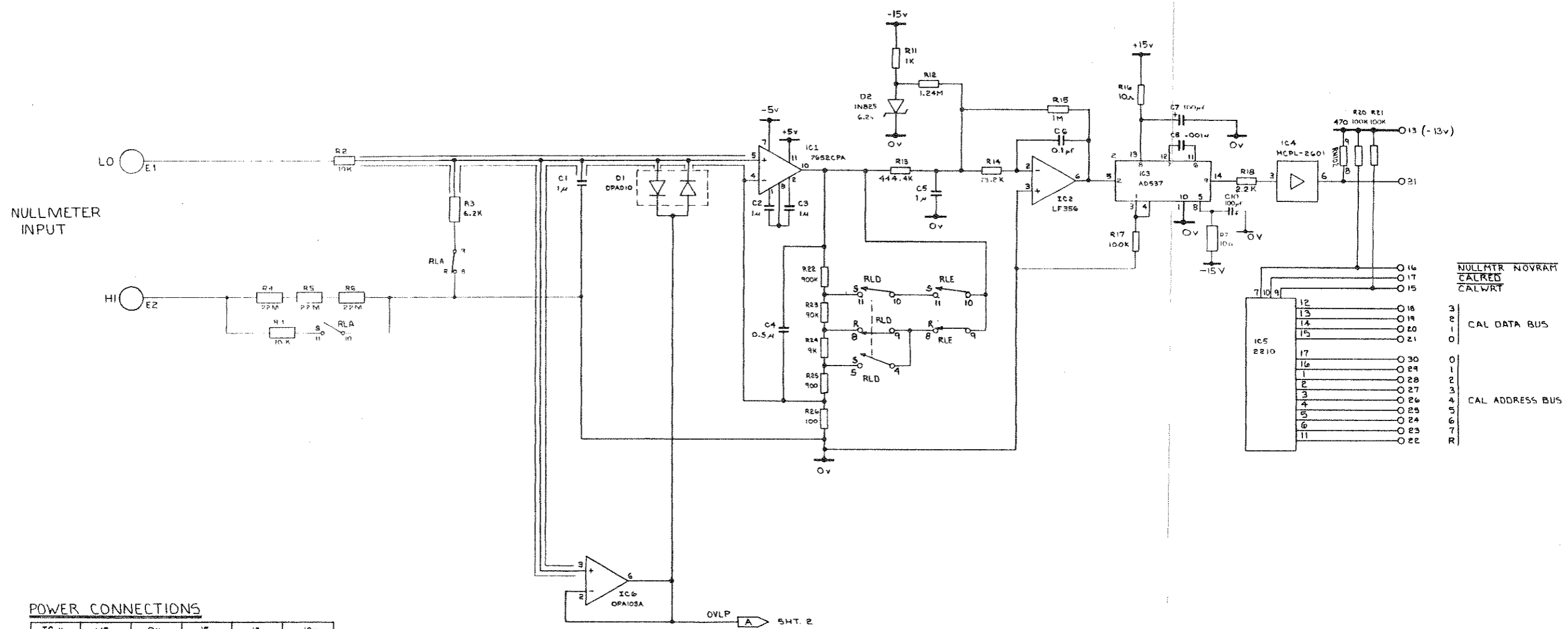


2720 DISPLAY BOARD ASSY. DWG.

SCALE 1/1 SHEET 2 OF 2

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
327	A	RELEASED	WPW 2-24-84	FW
527	B	UPDATED	RDN 1-23-85	RW
695	C	CHANGED C4 TO 5uF • TRIZ TO MP5A13	3.25.85	POW



POWER CONNECTIONS

IC #	+15v	0v	-15v	-13v	-10v
2,6	7	--	4	--	--
4	2	--	--	7,8	5
5	--	--	--	18	8

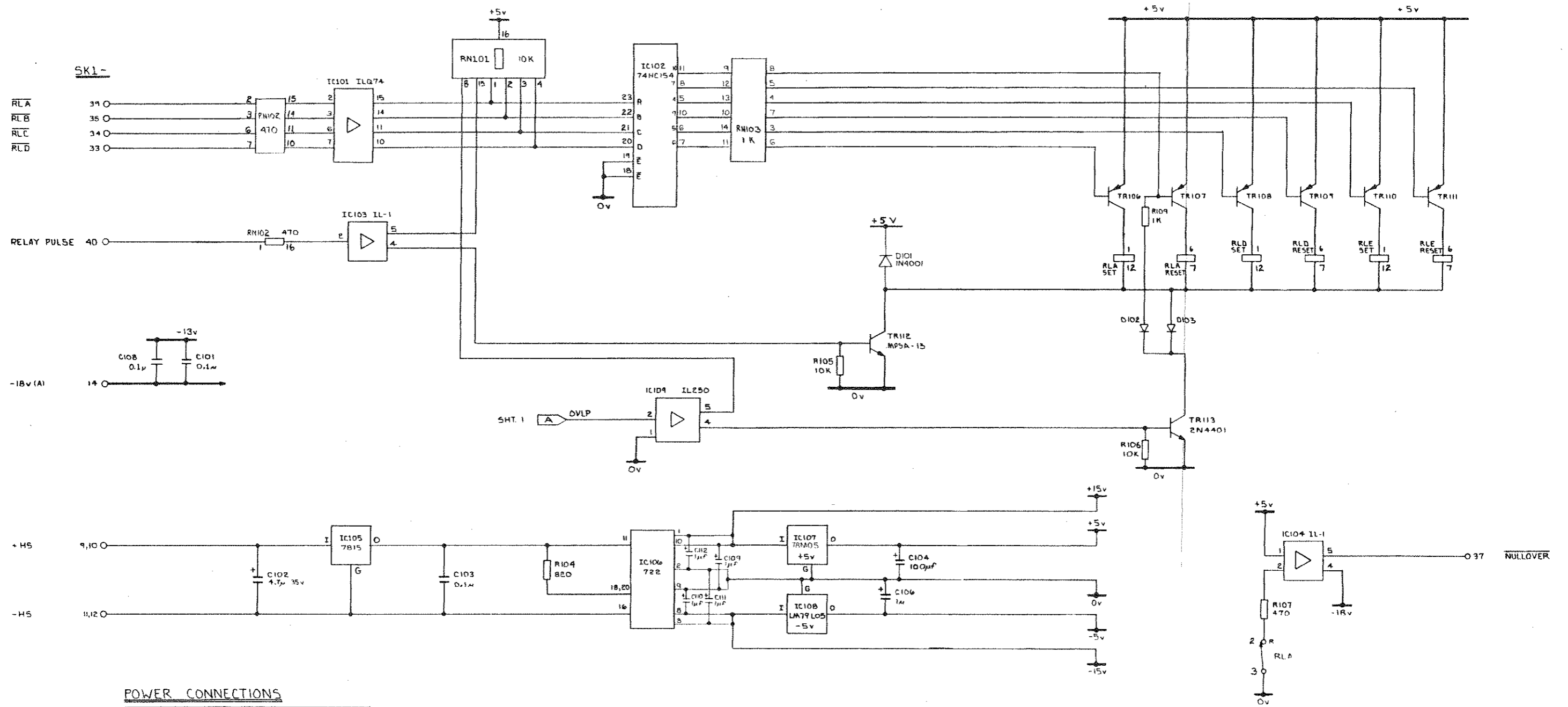
FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	FINISH
C1	--	C8	X" = ± .30" .XX = ± .03 .XXX = ± .010		
D1	--	D2			
IC1	--	IC6			
R2	R7-10, R19	R26	BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES		
RLA	--	RLE			

DRAWN WPW 2-24-84	<p>Valhalla Scientific Inc. SAN DIEGO, CA</p>
CHECKED RW 3/1/85	
APPR RW 3/1/85	
STK #	NULLMETER
SCALE	CODE IDENT 53504
SHEET 1 OF 2	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
		- 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	TOLERANCES	MATERIAL	DRAWN	DATE
C101	-	C108	X = ± 30'		LPW	2-24-84
D101	-	D103	.XX = ± 03		BW	3/1/85
IC101	-	IC109	XXX = ± 010		BW	3/1/85
R101	-	R106	BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH		
RN101	-	RN103	64			
TR101	-	TR113				
RLA	-	RLE				

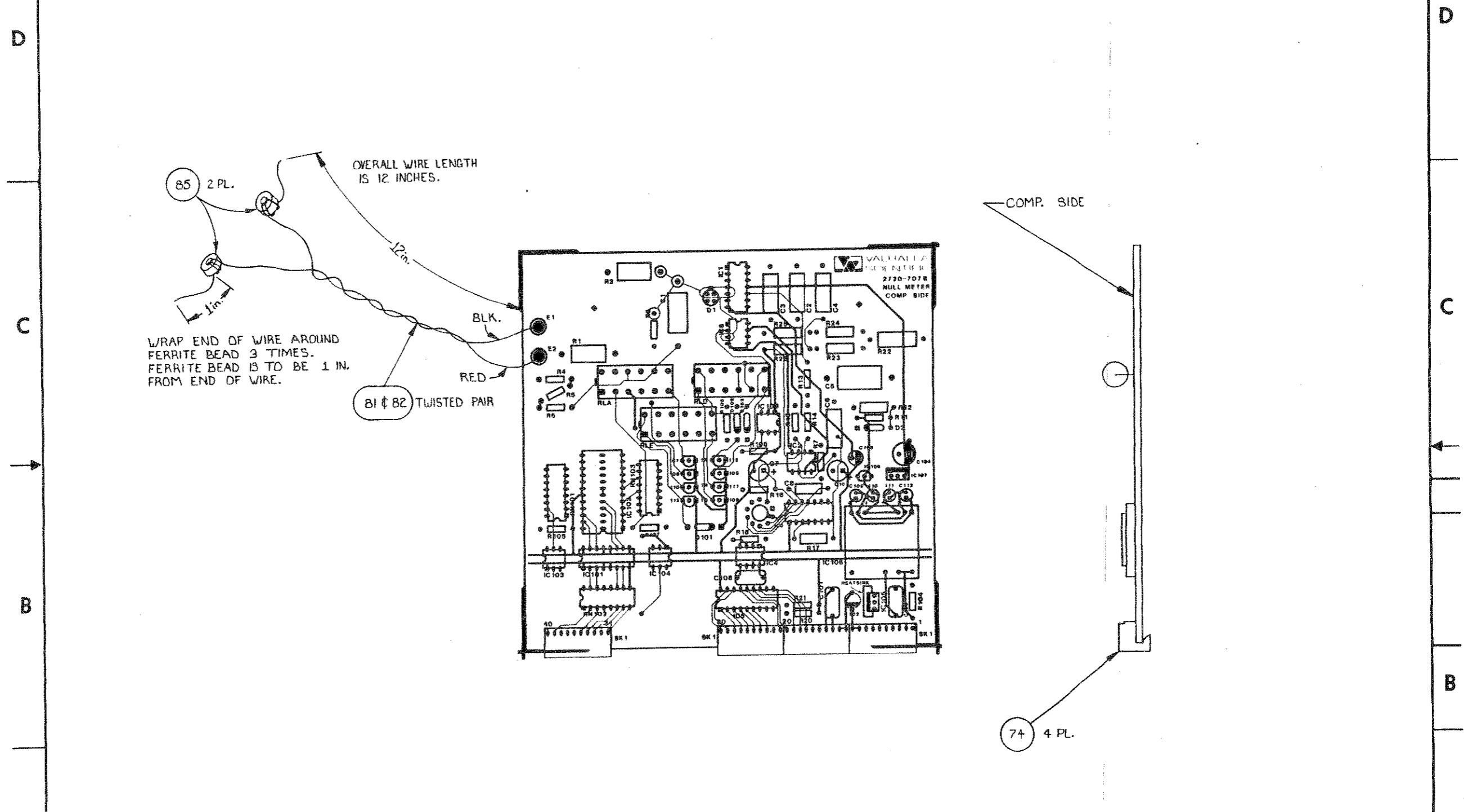
CHECKED	DATE	APPR	DATE
BW	3/1/85	BW	3/1/85

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
	53504	D	2720-077	C



NULLMETER

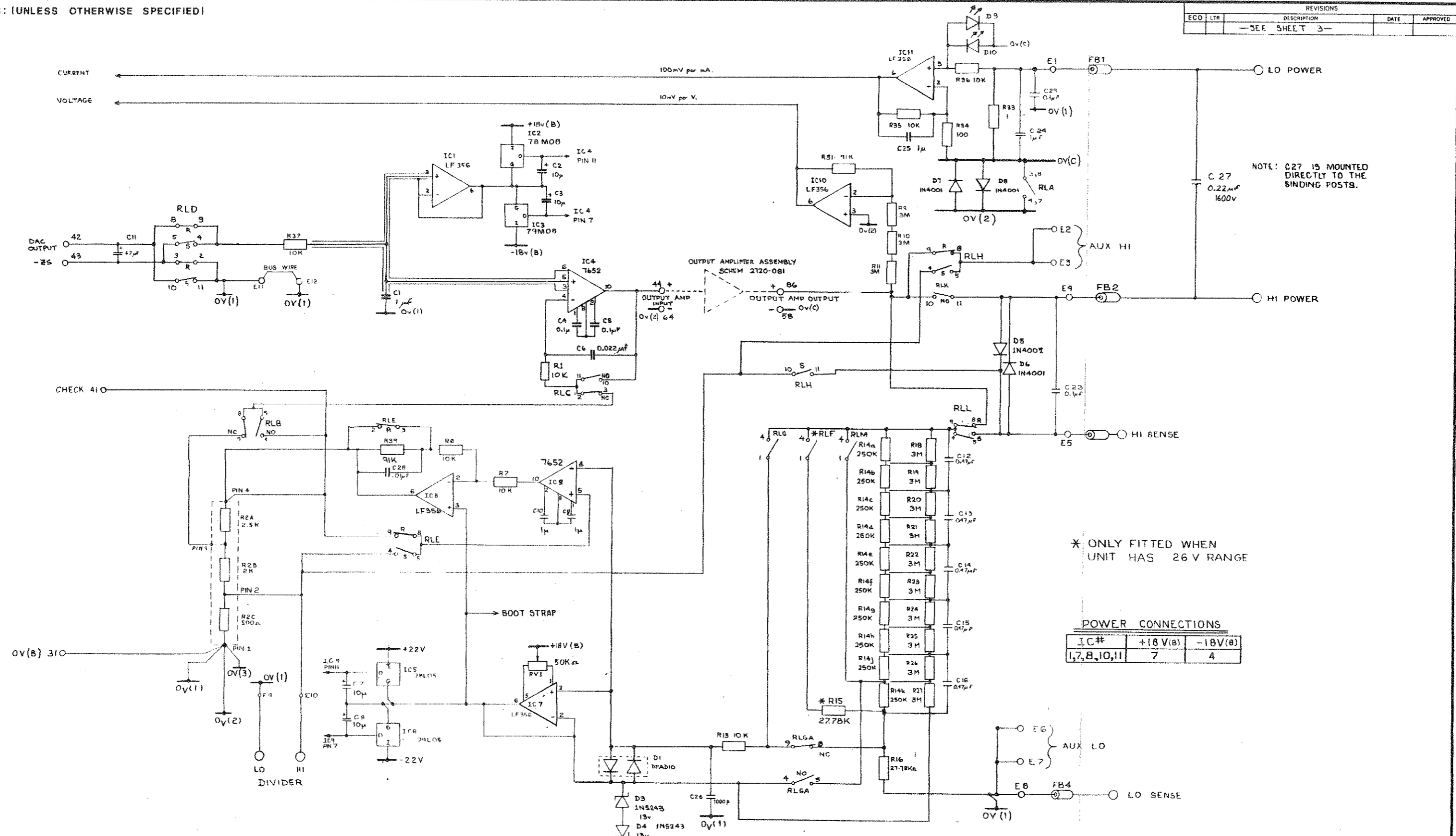
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
527	B	UPDATED	DPM 1-25-85	[Signature]
69B	C	CHANGED C9 TO .5UF + TR12 TO MP5A-13 CLK	3-25-85	[Signature]



				TOLERANCES X = ± .30" XX = ± .03 XXX = ± .010		MATERIAL 		DRAWN DPM 1-29-85 CHECKED JWA 3/1/85 APPR [Signature] 3/1/85 STK NO _____		 Valhalla Scientific Inc. SAN DIEGO, CA	
				BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64 ✓		FINISH 		THE INFORMATION DISCLOSED HEREIN WAS OBTAINED BY AND IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF VALHALLA SCIENTIFIC INC.		NULL METER ASSY.	
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	SCALE 1:1	CODE IDENT 53504	SIZE C	DRAWING NO 2720-607	REV C	SHEET 1 OF 5		

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
		-SEE SHEET 3-		



NOTE: C27 IS MOUNTED DIRECTLY TO THE BINDING POSTS.

* ONLY FITTED WHEN UNIT HAS 26 V RANGE.

POWER CONNECTIONS

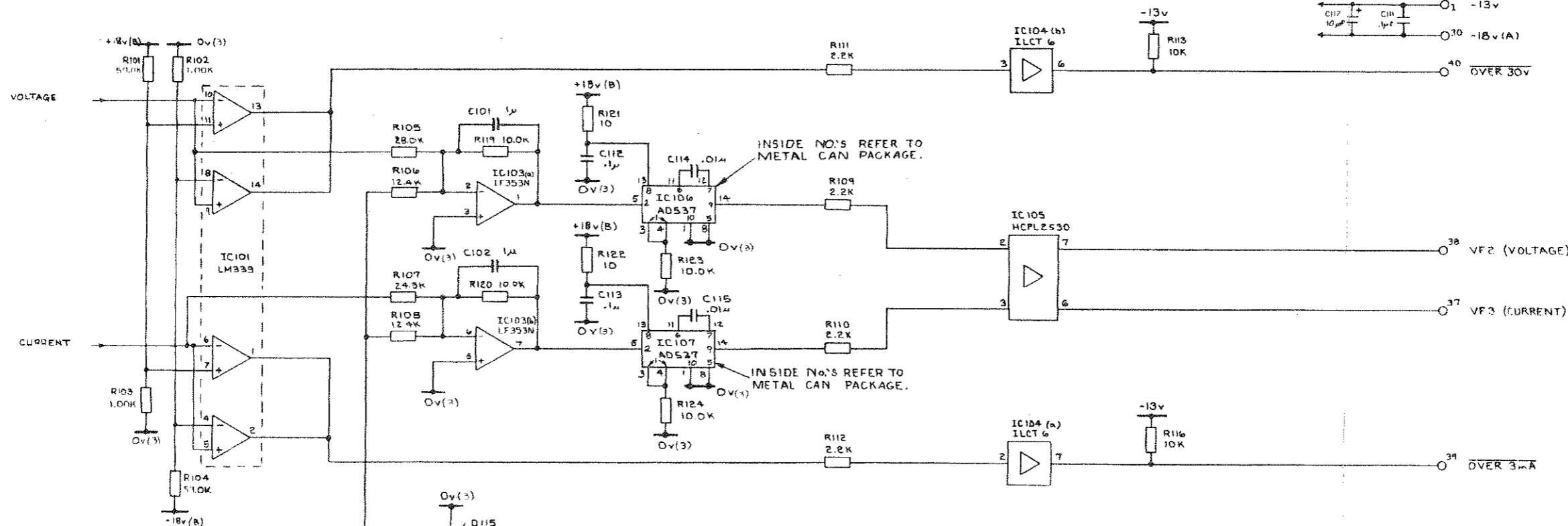
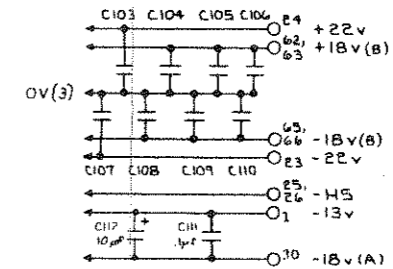
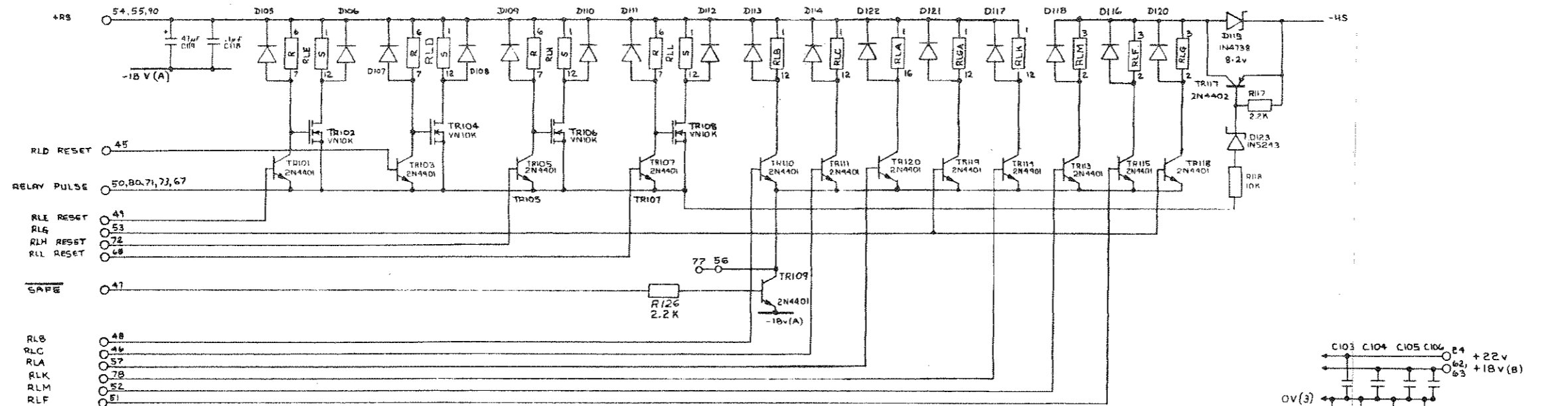
IC#	+18V(B)	-18V(B)
1,7,8,10,11	7	4

FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN POW	5-8 83
C1	C23	C25	X = ±.00"		CHECKED POW	5-16 83
D1	D2	D10	XX = ±.03		APPR	5-29 84
IC1	-	IC11	XXX = ±.010		STK NO	
R1	R5,8,30,9-11,228,32	R36	BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES	FINISH		
RLA	RL1,J	RLM			OUTPUT SYSTEM	
FB1	-	FB6			SCALE	
					CODE IDENT	SIZE
					53504	D
					DRAWING NO	REV
					2720-079	C
					SHEET	1 OF 3

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ALL DIODES ARE 1N4148
2. ALL C's ARE 0.01 μ F.

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



POWER CONNECTIONS
 IC101 PIN 3- +18V(B) PIN 12- -18V(B)
 IC103 PIN 8- +18V(B) PIN 4- -18V(B)
 IC104 PIN 1,4- 0V(3); PINS 8- -18V(A)
 IC105 PIN 1,4- +18V(B) PIN 8- -13V; PINS 5- -18V(A)

FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	FINISH
C101	-	C111	X = $\pm 30\%$.XX = ± 0.3 .XXX = ± 0.10		
D105	-	D122			
IC101	-	IC105			
R101	RL1, R5	R127			
TR101	TR12, TR16	TR120			
RLA	RLI, J	RLM			

Valhalla Scientific Inc.
 SAN DIEGO, CA

OUTPUT SYSTEM LOGIC

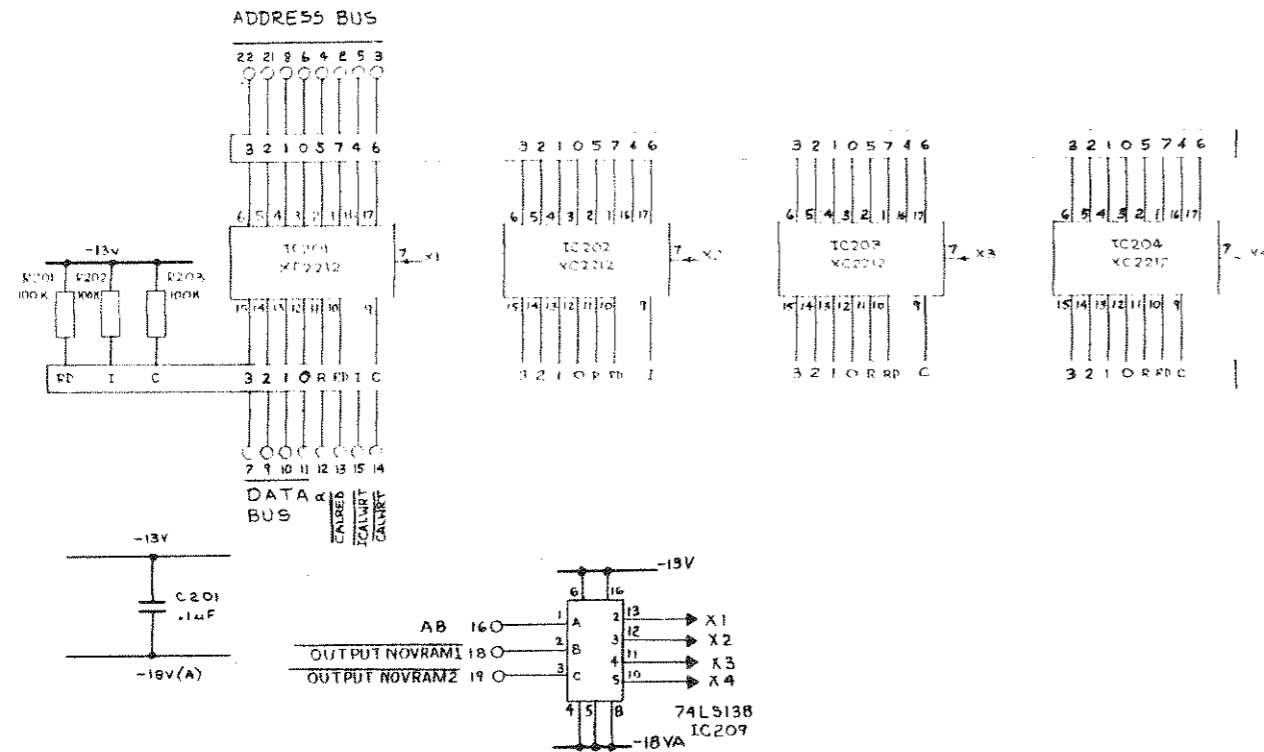
DRAWN POW 5-9-83
 CHECKED POW 5-16-83
 APPR PCW 5-24-84
 STK NO

SCALE CODE IDENT SIZE DRAWING NO REV
 SHEET 2 OF 3 53504 D 2720 079 C

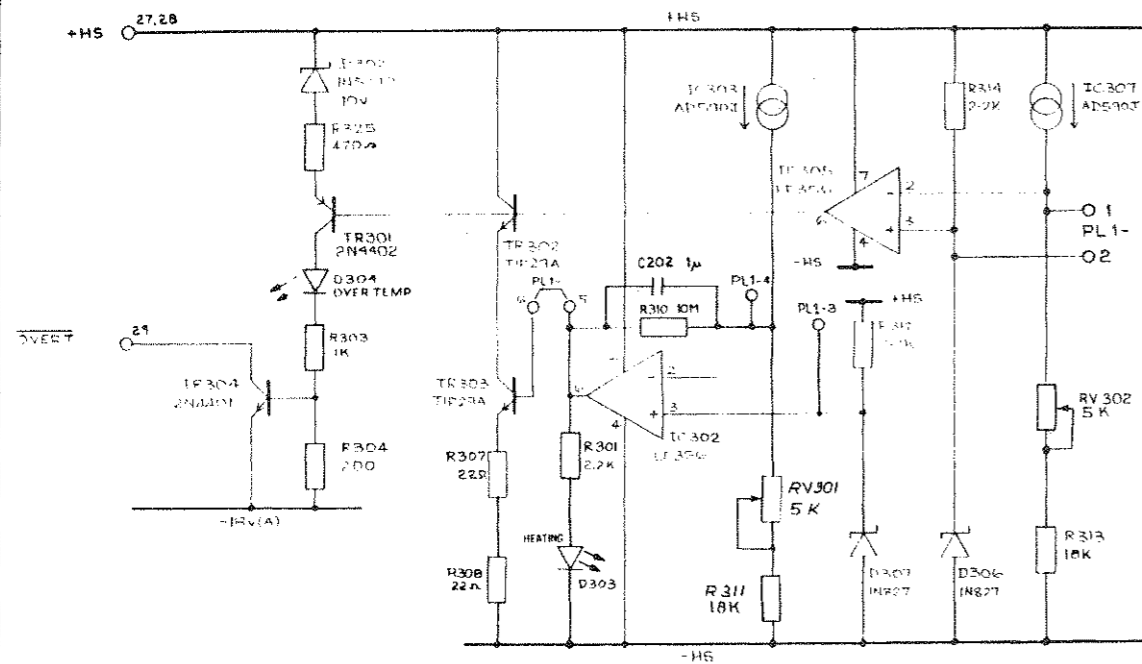
NOTES: UNLESS OTHERWISE SPECIFIED

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	JW



	-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	TOLERANCES	MATERIAL	DRAWN	DATE
C201	-	C201	X = ±.30'		Pet	5-29-84
D301	D304, D305	D307	.XI = ±.03		Pet	5-29-84
IC201	IC205, 206, 304, 310, 301, 306	IC307	.XXX = ±.010		Pet	5-29-84
R201	R204, 300, 302, 305	R325*				
RV301	-	RV301	BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH		
TR301	-	TR304				

Valhalla Scientific Inc.
 SAN DIEGO, CA

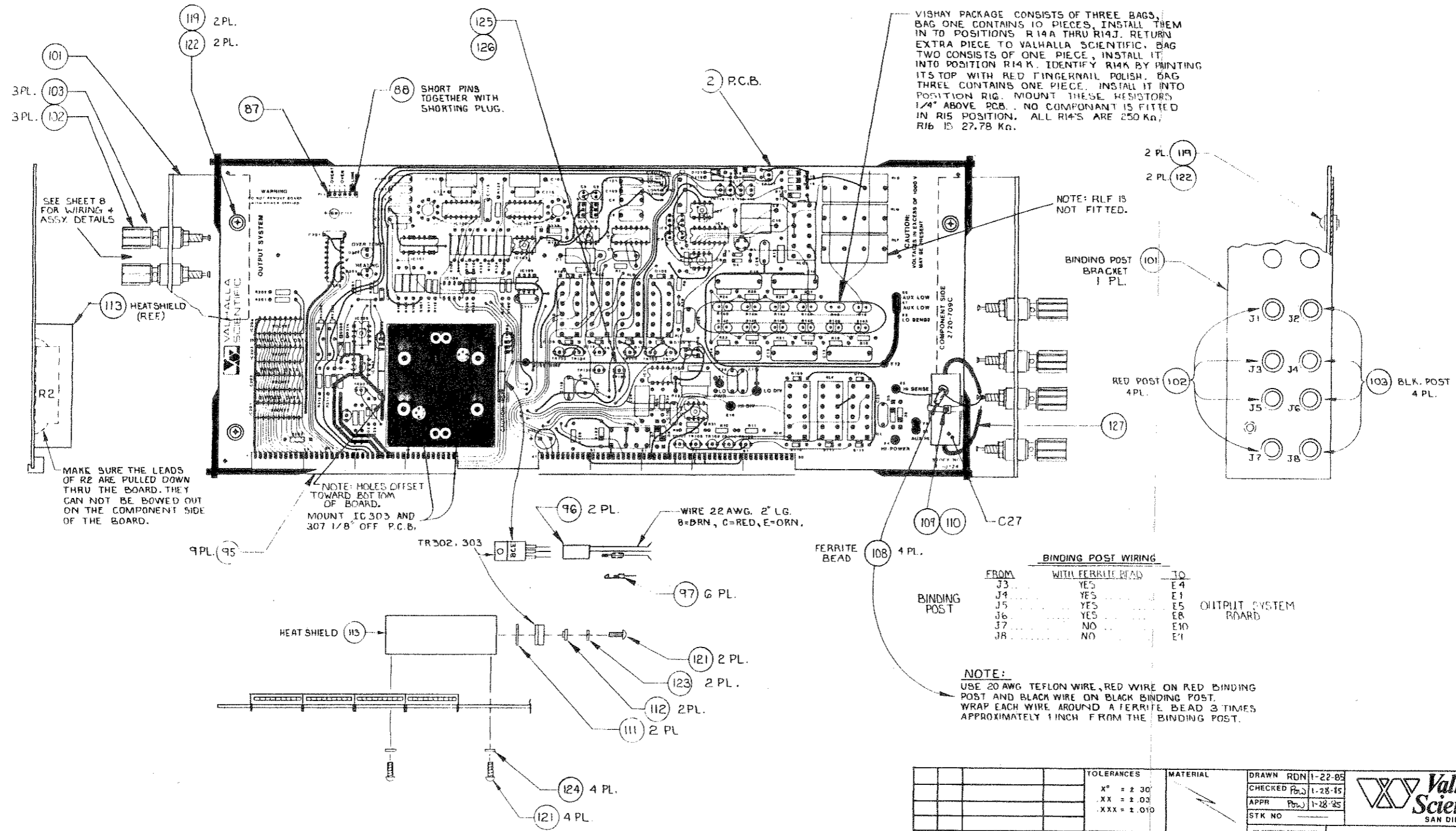
OUTPUT SYSTEM

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

SHEET 3 OF 3

NOTES: (UNLESS OTHERWISE SPECIFIED)

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



BINDING POST WIRING

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

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.

DRAWN RDN 1-22-85		CHECKED FLC 1-28-85		APPR FLC 1-28-85		STK NO			
TOLERANCES		MATERIAL		FINISH		BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES			
X" = ± .30	XX = ± .03	XXX = ± .010							
DASH NO	QTY RECD	NEXT ASSEMBLY	USED ON	63	SCALE 1:1	CODE IDENT 53504	SIZE D	DRAWING NO 2720-609	REV C

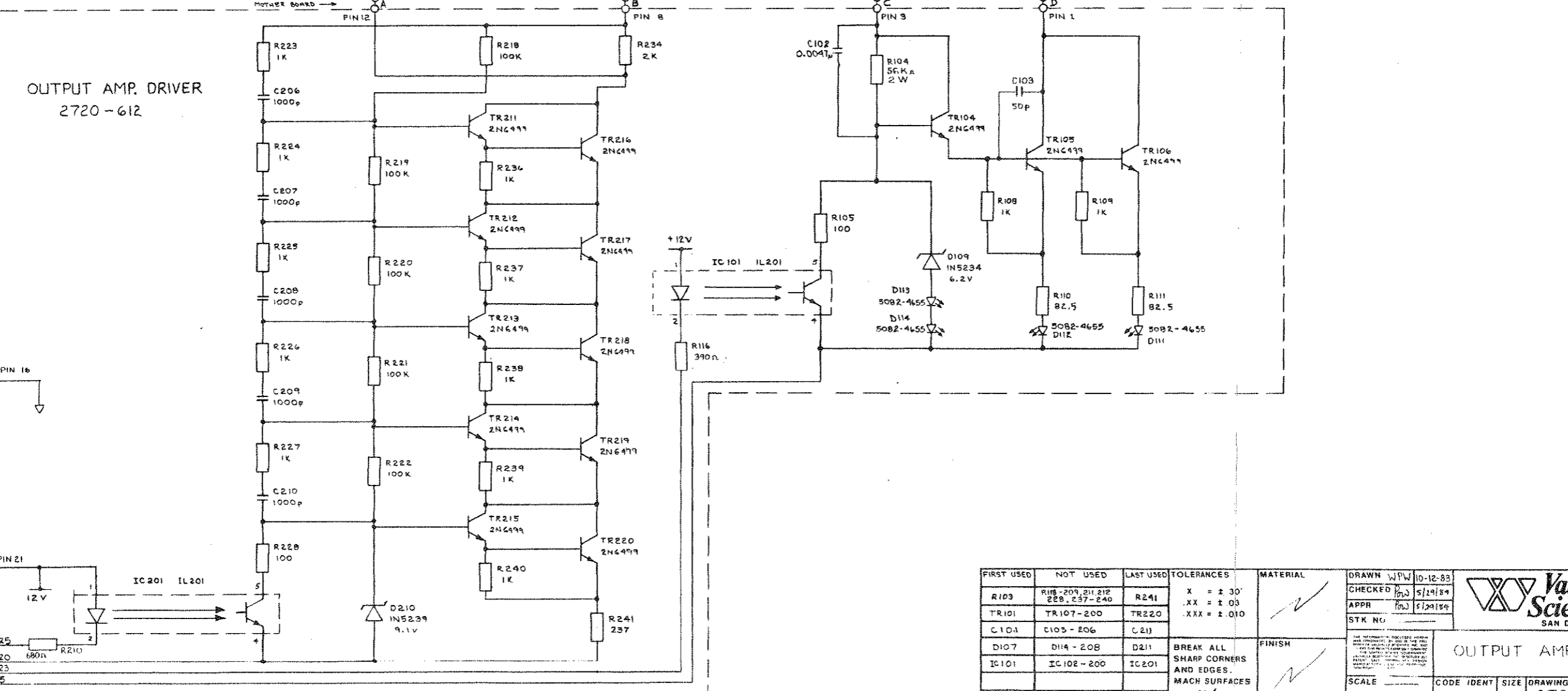
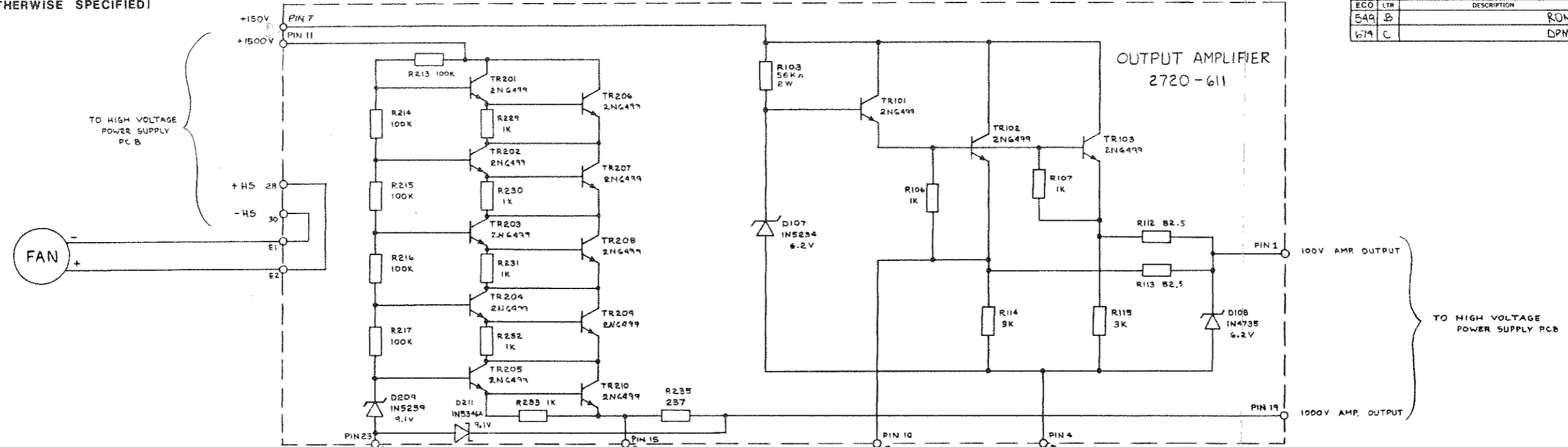


OUTPUT SYSTEM P.C.B. ASSY.

SCALE 1:1	CODE IDENT 53504	SIZE D	DRAWING NO 2720-609	REV C
SHEET 7 OF 8				

NOTES: (UNLESS OTHERWISE SPECIFIED)

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



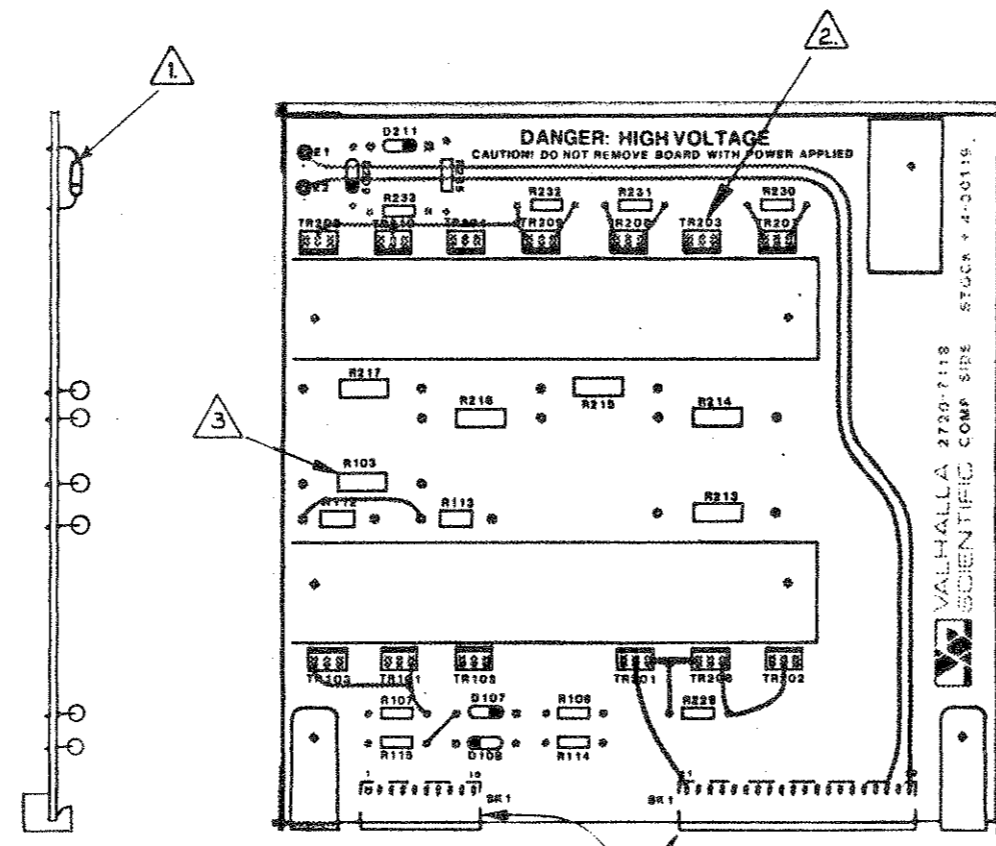
FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL
R103	R103-209, 211, 212, 228, 237-240	R241	X = ± 30'	
TR101	TR107-200	TR220	.XX = ± 0.03	
C104	C103-206	C211	.XXX = ± 0.10	
D107	D114-208	D211	BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	
IC101	IC102-200	IC201		

DRAWN W/PW	10-12-83	 Valhalla Scientific Inc. SAN DIEGO, CA
CHECKED P/W	5/29/84	
APPR P/W	5/29/84	
STK NO		
SCALE		FINISH
SHEET 1 OF 1		CODE IDENT 53504
		SIZE D
		DRAWING NO 2720-081
		REV C

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 47K Ω , 2W IN SERIES WITH A 10K Ω RINGC1002F FOR R103.

REVISIONS					
ECO	LTR	DESCRIPTION	DATE	APPROVED	
	A	RELEASED	RDN	5-29-84	RW
465	B	WRONG DRAWING# ON P/L	RDN	5-31-84	R
46A	C	UPDATED PARTS LIST		6-6-84	R
599	D	UPDATED	RDN	1-23-84	JM
671	E	P/L CHANGE - CORRECT LINE 14	DPM	2-20-85	RD



CONNECTORS ARE TO BE MOUNTED ON FAR SIDE OF BOARD.

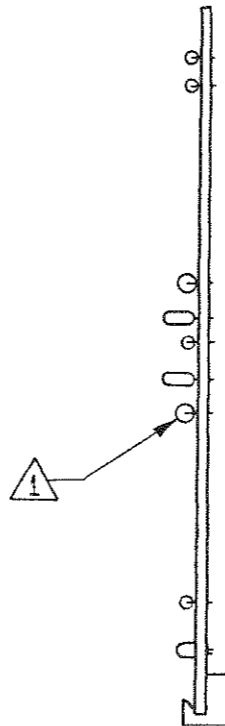
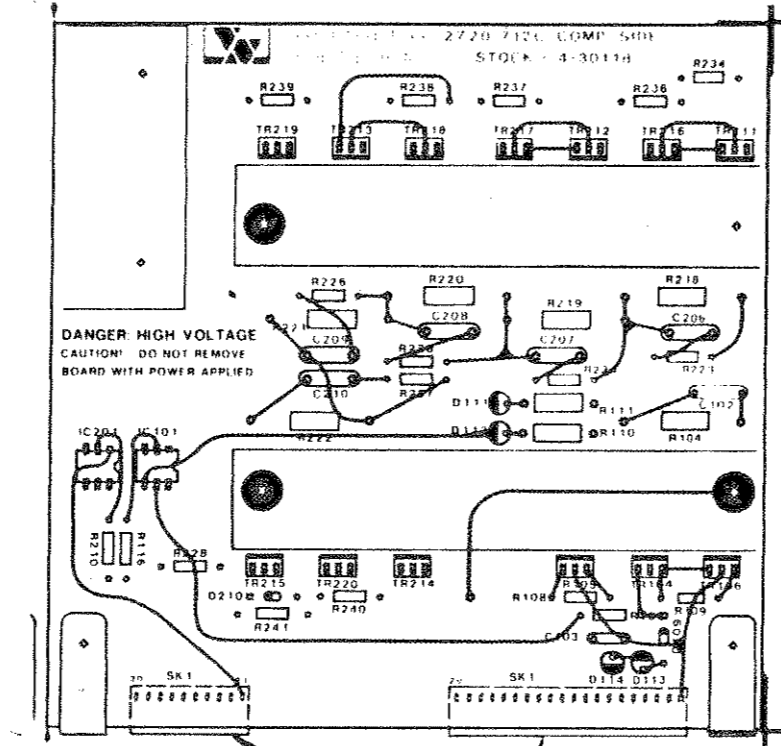
COMPONENT SIDE SHOWN

		TOLERANCES		MATERIAL		DRAWN RDN 5-29-84		 Valhalla Scientific Inc. SAN DIEGO, CA			
		X = ± .30'		BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES 64 ✓		CHECKED R 5-29-84				THE INFORMATION DISCLOSED HEREIN IS UNCLASSIFIED AND IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.	
		XX = ± .03				APPR RW 5/29/84					
		XXX = ± .010		FINISH		SCALE 1=1		OUTPUT AMPLIFIER ASSEMBLY			
- 1		2720-403 2720				CODE IDENT 53504		SIZE C			
DASH NO		QTY REQD		NEXT ASSEMBLY USED ON		DRAWING NO 2720-611		REV E			
						SHEET 1 OF 2					

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
541	D	UPDATED	RDN 1-24-85	JW
674	E	INCORPORATED MODS	DPM 2-22-85	RD



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

MATERIAL

DRAWN RDN 1-24-85
CHECKED
APPR
STK NO

Valhalla Scientific Inc.
SAN DIEGO, CA

OUTPUT AMP DRIVER ASSY.

SCALE 1:1	CODE IDENT 53504	SIZE C	DRAWING NO 2720-612	REV E
SHEET 1 OF 3				

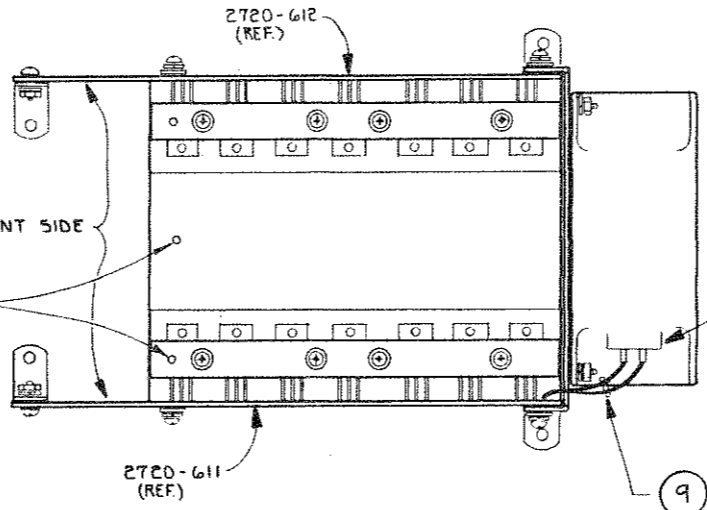
BREAK ALL SHARP CORNERS AND EDGES.
MACH SURFACES

FINISH

THE INFORMATION DISCLOSED HEREIN WAS OBTAINED BY AND IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND EXCEPT FOR RIGHTS EXPRESSLY GRANTED TO THE UNITED STATES GOVERNMENT VALHALLA SCIENTIFIC INC. RESERVES ALL PATENT, TRADE SECRET, PROPRIETARY DESIGN, MANUFACTURING USE AND METHODIC RIGHTS THEREIN.

NOTES: (UNLESS OTHERWISE SPECIFIED)

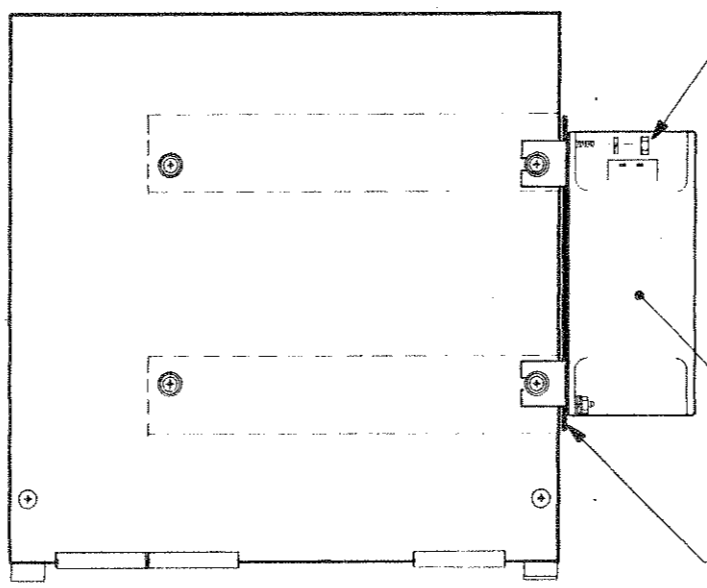
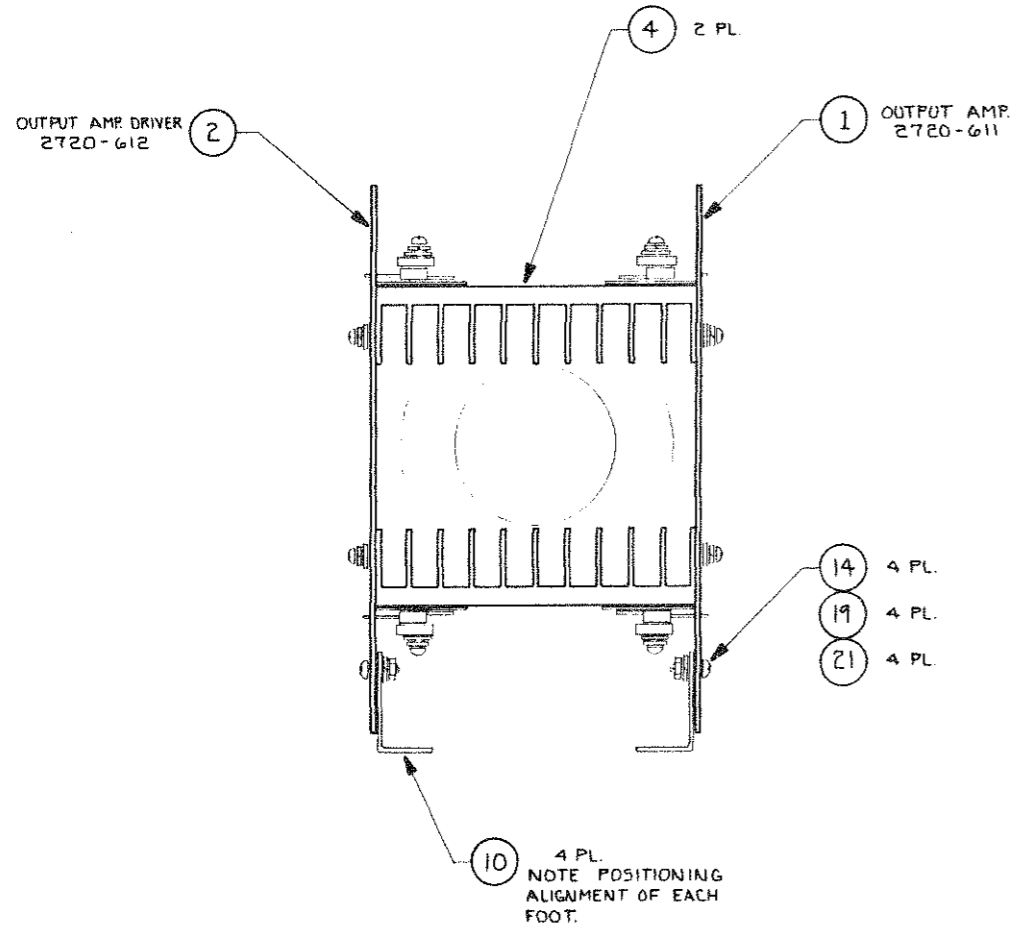
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
430	A	RELEASED	WPW 5-1-84	FOR
461	B	PARTS LIST CHG.	WPW 5-25-84	R
469	C	UPDATED PARTS LIST	6-6-84	R
546	D	ADDED ALIGNMENT HOLES.	RDN 12-10-84	FOR
711	D1	ADDED TRANSISTOR NOTE	1 30-85	JM



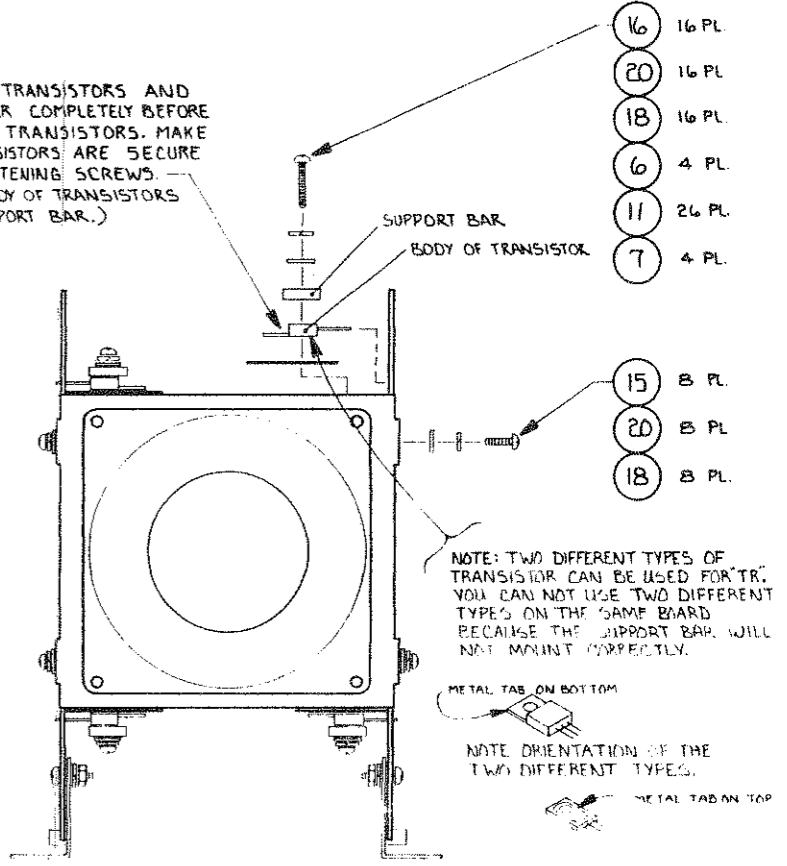
NOTE: FAN MAY OR NOT COME PRE-WIRED. IF NOT WIRED USE A 3"-4" LG WIRE OF APPROPRIATE COLOR. SOLDER AND SLEEVE TO PLUGS SOLDER WIRE LEADS AS FOLLOWS:

RED (+) TO E2 } ON 1 OUTPUT AMP BOARD
 BLK (-) TO E1 }

MAKE SURE TO POSITION FAN CONNECTORS AS SHOWN.



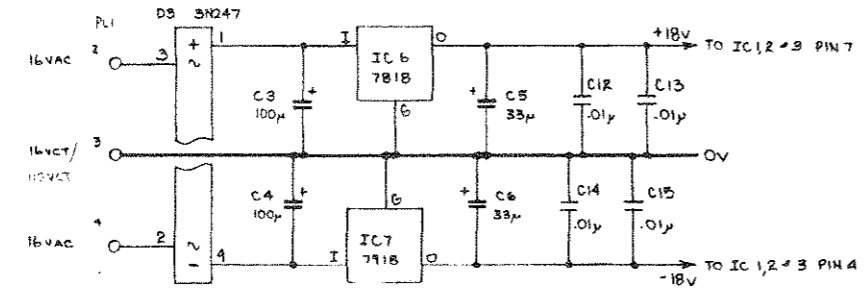
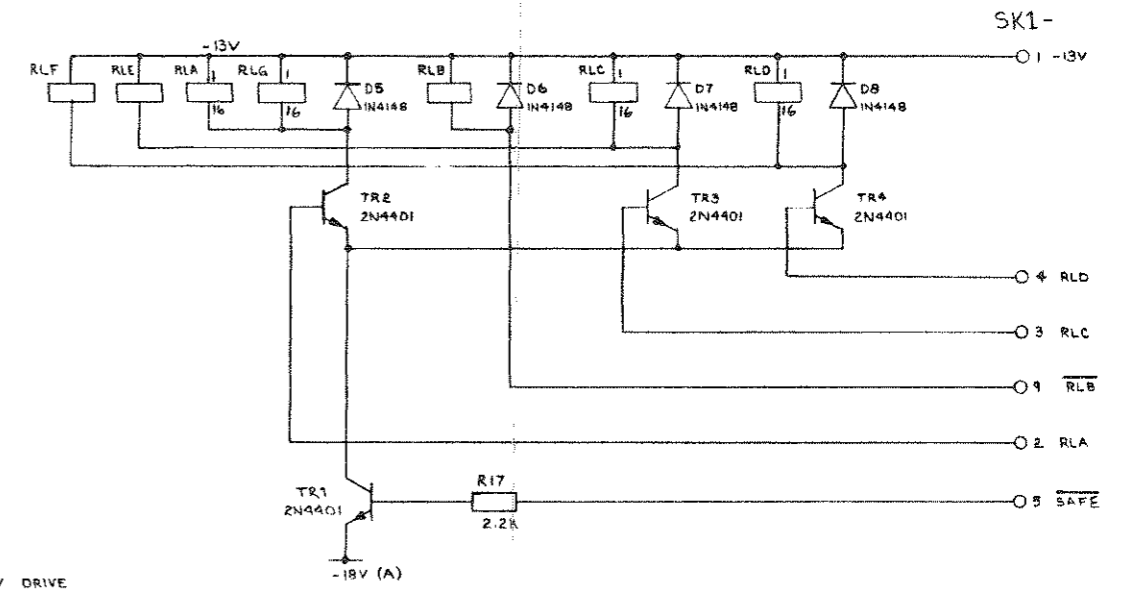
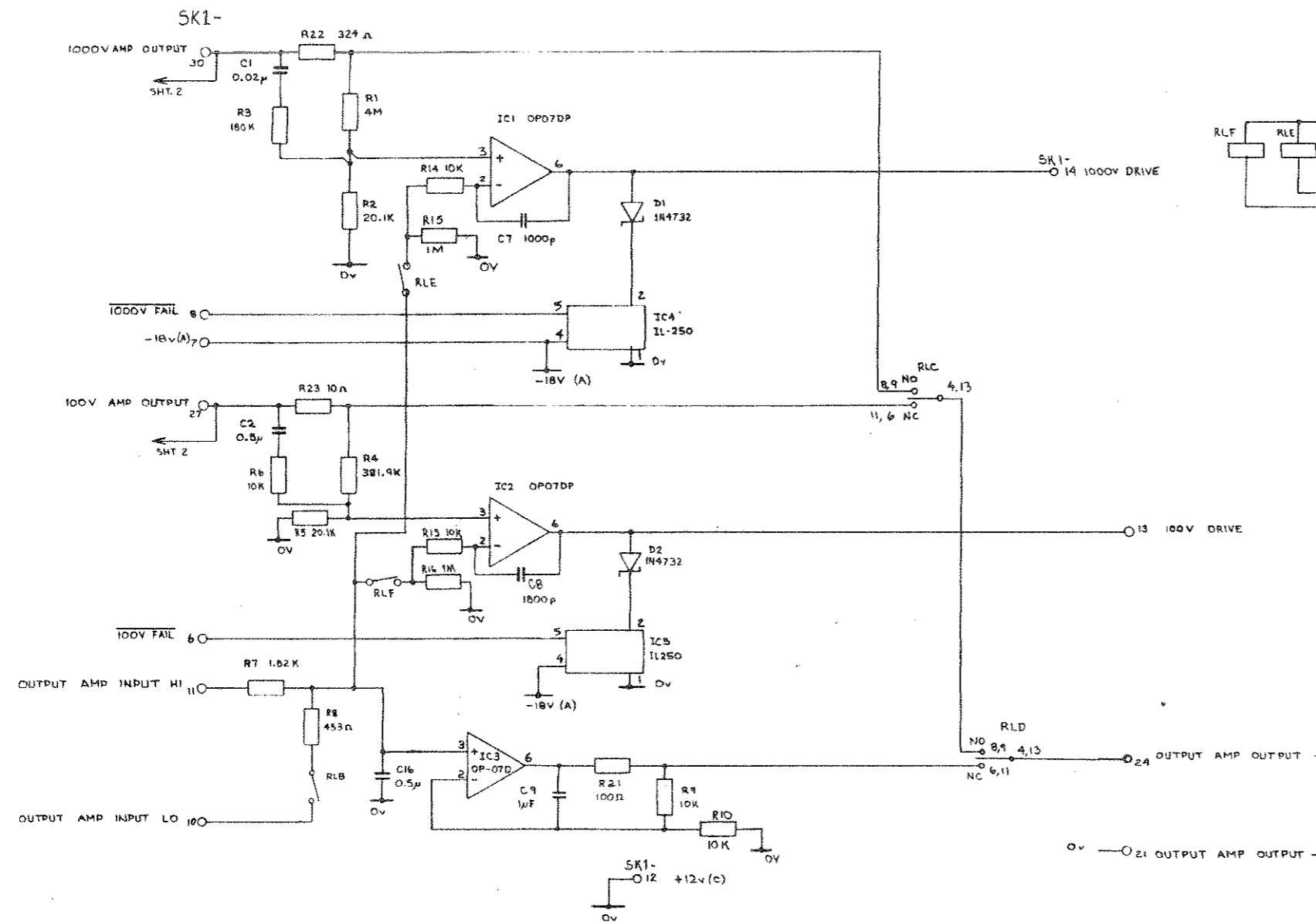
ASSEMBLE TRANSISTORS AND SUPPORT BAR COMPLETELY BEFORE SOLDERING TRANSISTORS. MAKE SURE TRANSISTORS ARE SECURE WHEN TIGHTENING SCREWS (CENTER BODY OF TRANSISTORS UNDER SUPPORT BAR.)



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

NOTES: (UNLESS OTHERWISE SPECIFIED)

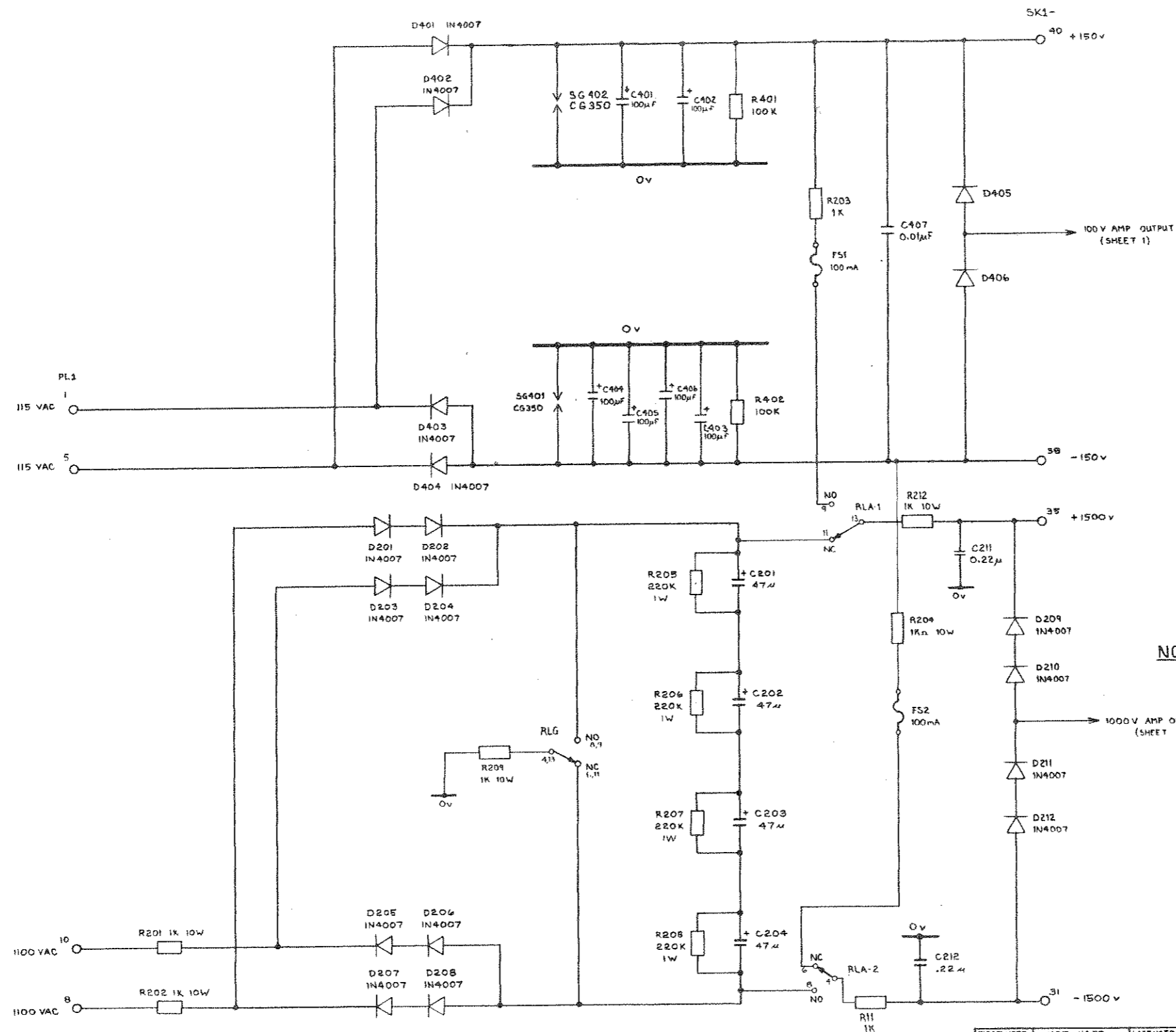
REVISIONS					
ECO	LTR	DESCRIPTION	DATE	APPROVED	
537	B	INC. DESIGN CHANGE	DPM	2-26-85	δW



FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN POW	5-16-83
R1	-	R20	X = ± 30'		CHECKED POW	6-16-83
C1	-	C15	.XX = ± 03		APPR POW	5-29-84
D1	-	D7	.XXX = ± 010		STK NO	
IC1	-	ICB		FINISH	 Valhalla Scientific Inc. SAN DIEGO, CA	
RLA	-	RLF	BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES		HIGH VOLTAGE POWER SUPPLY	
			94		SCALE	CODE IDENT
					SHEET 1 OF 2	53504
					SIZE	D
					DRAWING NO	2720-083
					REV	B

NOTES: (UNLESS OTHERWISE SPECIFIED)

REVISIONS			
ECO	LTR	DESCRIPTION	DATE
		SEE SHT. 1	



NOTE:
1. RLA-1 & RLA-2 COILS ARE SHOWN ON SHT. 1.

FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL
C201	C205-210, 213-400	C404	X* = ± 30' XX = ± 03 XXX = ± 010	
D201	D209-400	D406		
R201	R209, 213-400	R40E		
RLA		RLA	BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES	FINISH

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SAN DIEGO, CA

HIGH VOLTAGE POWER SUPPLY

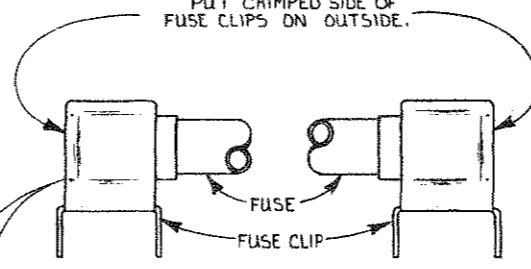
DRAWN W.P.L.	10-24-83
CHECKED P.L.S.	5-29-84
APPR P.M.	5-29-84
STK NO	
SCALE	
CODE IDENT	53504
SIZE	D
DRAWING NO	2720-083
REV	B

SHEET 2 OF 2

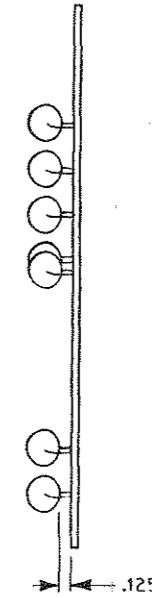
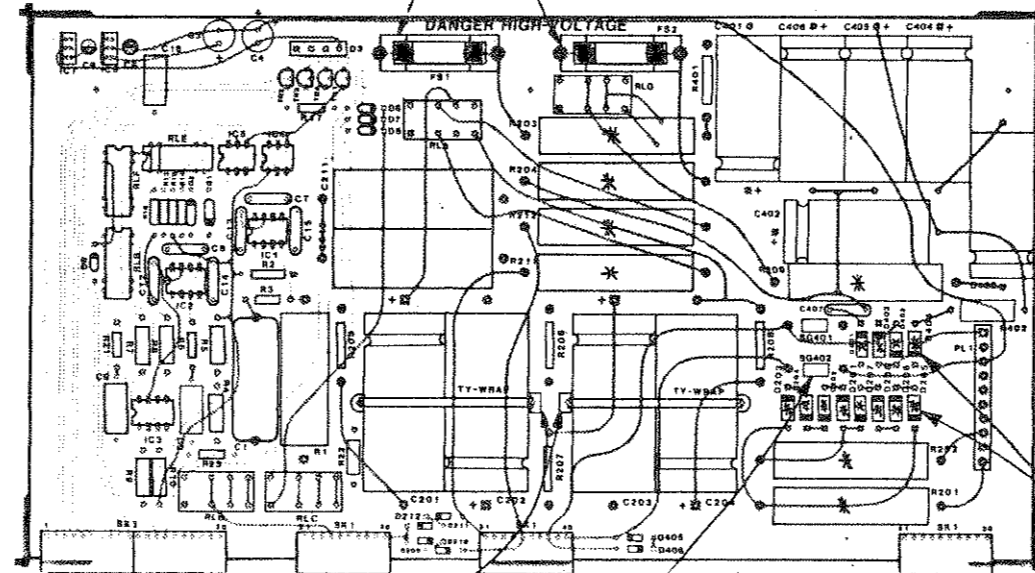
NOTES: (UNLESS OTHERWISE SPECIFIED)

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

PUT CRIMPED SIDE OF FUSE CLIPS ON OUTSIDE.



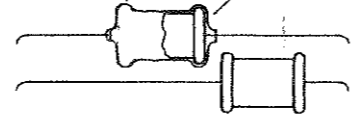
FUSES SHOULD BE PUT INTO FUSE CLIPS BEFORE CLIPS ARE SOLDERED TO THE BOARD



* NOTE:
R201 R202 R203 R204 R209
R211 + R212 ARE TO BE MOUNTED
1/8" OFF THE TOP OF THE BOARD.

PUT LATCH OF TY-WRAPS ON THE SIDE OF THE CAPACITORS.

SHRINK TUBING (2 PL.)



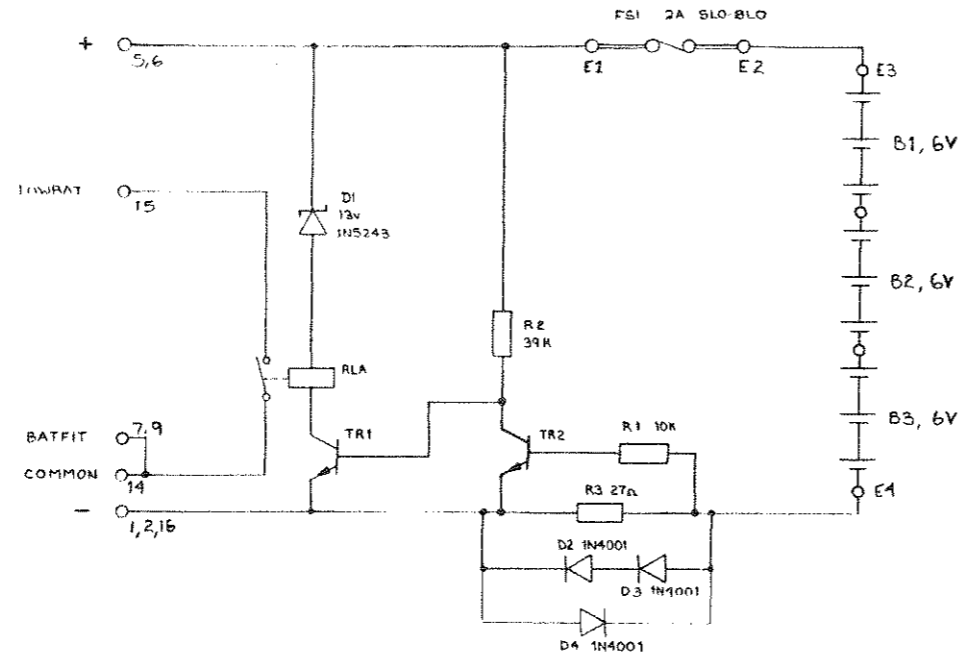
* MOUNT D201-D208, AND D401-D404 1/8" ABOVE P.C. BOARD.

NOTE:
SG 401 + SG 402 ARE NOT TO TOUCH EACH OTHER OR ANY OTHER COMPONENT OR TRACK.

DASH NO		QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES X = ± .30" .XX = ± .03" .XXX = ± .010	MATERIAL	FINISH	DRAWN DPM 3-1-85	CHECKED SW 3-1-85	APPR DGM 3-1-85	STK NO	<p>Valhalla Scientific Inc. SAN DIEGO, CA</p>	<p>HIGH VOLTAGE POWER SUPPLY ASSY. DWG.</p>
SCALE 1:1		CODE IDENT 53504	SIZE D	DRAWING NO 2720-613	REV C	<p>BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES</p>		<p>FOR INFORMATION ENCLOSED SHEET HAS BEEN REVIEWED BY THE DESIGN ENGINEER AND APPROVED FOR MANUFACTURE. THIS DRAWING IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.</p>					

NOTES: (UNLESS OTHERWISE SPECIFIED)

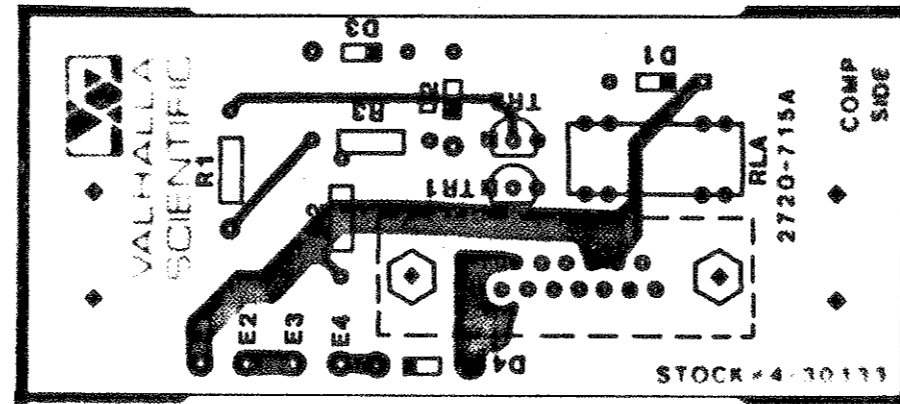
REVISIONS				
ECO	LTR	DESCRIPTION	DATE	APPROVED
676	A	RELEASED	RDN 2-28-85	PWD



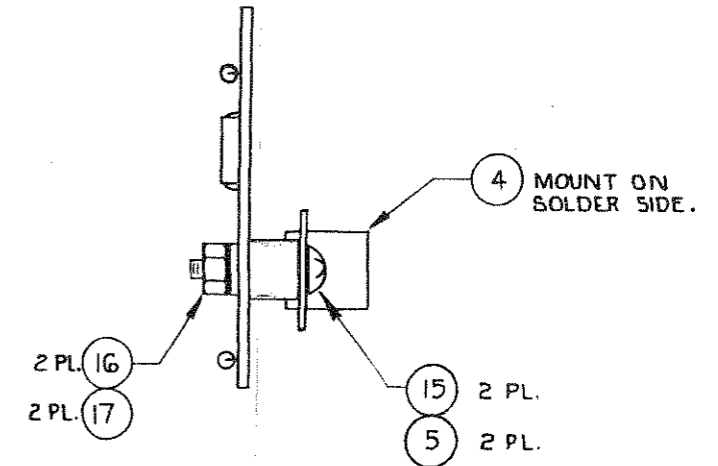
DASH NO	QTY RECD	NEXT ASSEMBLY	USED ON	TOLERANCES	MATERIAL	FINISH	DRAWN P/W	CHECKED P/W	APPR P/W	STK NO	SCALE	CODE IDENT	SIZE	DRAWING NO	RFV
				X = ± .30' .XX = ± .03 .XXX = ± .010			8-31-83	8-31-83	8-31-83		NONE	53504	D	2720-085	A
				BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES			Valhalla Scientific Inc. SAN DIEGO, CA				"2720" OPTION "BAT"				
				04 ✓											
				SHEET 1 OF 1											

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

COMP. SIDE SHOWN



SECURE CONNECTOR BEFORE SOLDERING

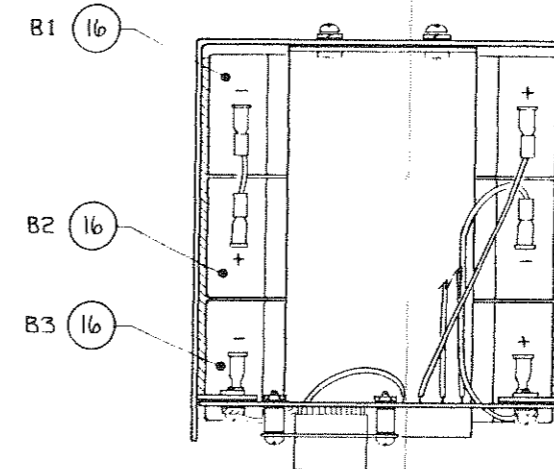
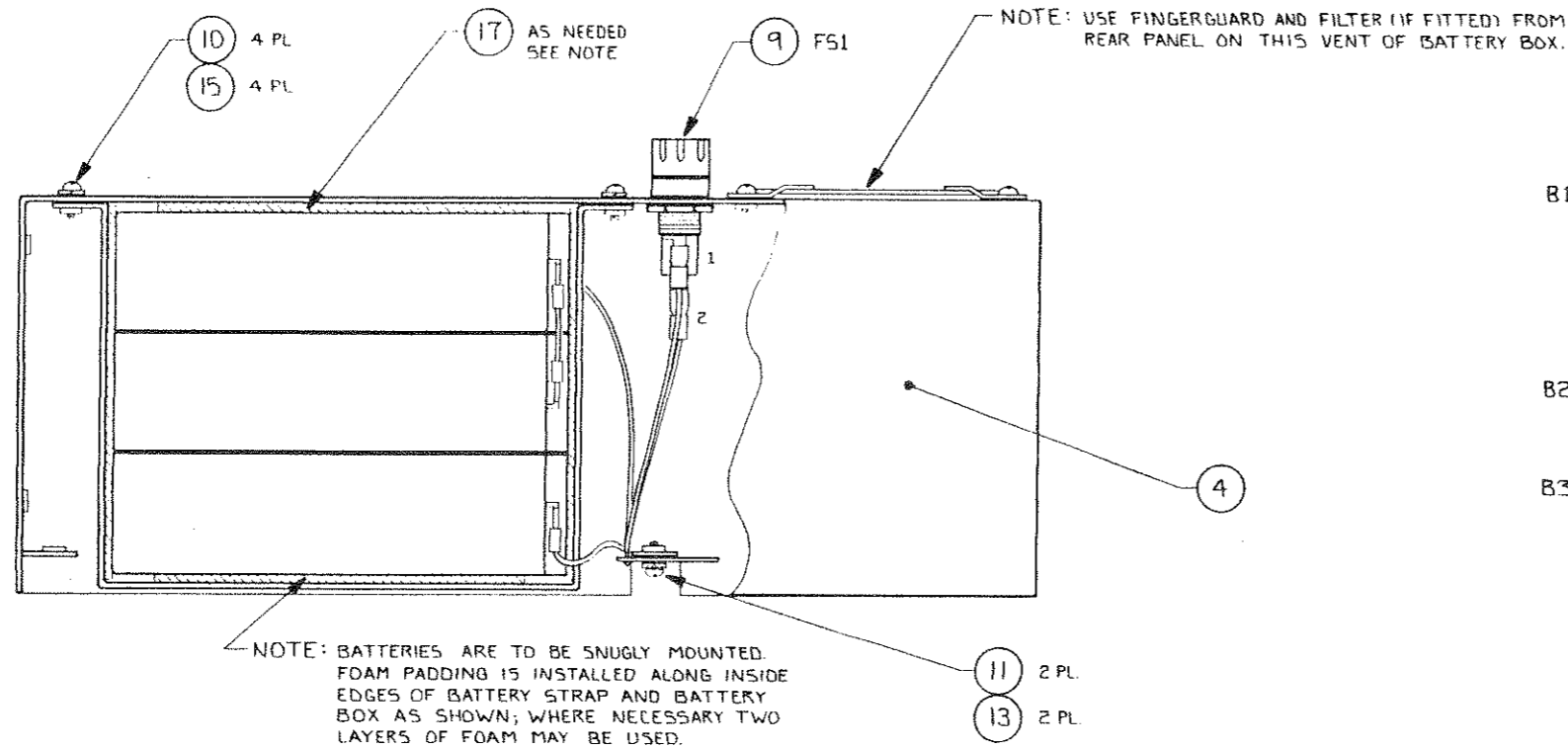


				TOLERANCES X = ± .30' .XX = ± .03 .XXX = ± .010		MATERIAL 		DRAWN RDN 3-1-85 CHECKED BW 3-1-85 APPR BW 3-1-85 STK NO		 Valhalla Scientific Inc. SAN DIEGO, CA	
				BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES 64 ✓		FINISH 		THE INFORMATION DISCLOSED HEREIN WAS OBTAINED BY AND IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE EXPRESS WRITTEN PERMISSION OF VALHALLA SCIENTIFIC INC. VALHALLA SCIENTIFIC INC. RESERVES ALL PATENT, TRADE SECRET, AND PROPRIETARY DESIGN RIGHTS THEREIN.		OPTION "BAT" P.C.B. ASSEMBLY	
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	SCALE 1:1	CODE IDENT 53504	SIZE C	DRAWING NO 2720-615	REV C			
				SHEET 1 OF 2							

NOTES: (UNLESS OTHERWISE SPECIFIED)

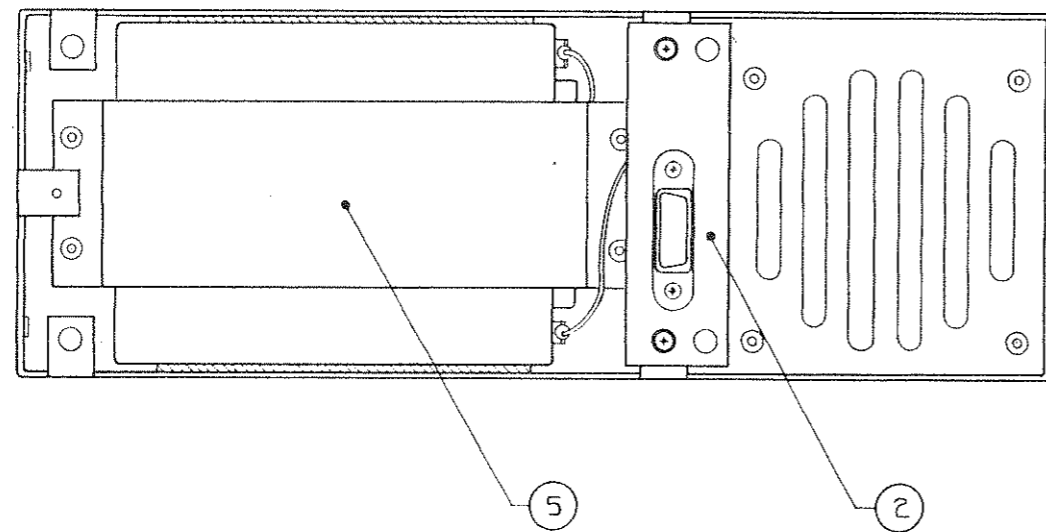
1 USE HOLE PLUGS IN UNUSED HOLES OF BATTERY BOX.

		REVISIONS		
ECO	LTR	DESCRIPTION	DATE	APPROVED
44P	A	RELEASED	WPW 5-11-84	P
44P	B	UPDATED PARTS LIST	R 6-16-84	R

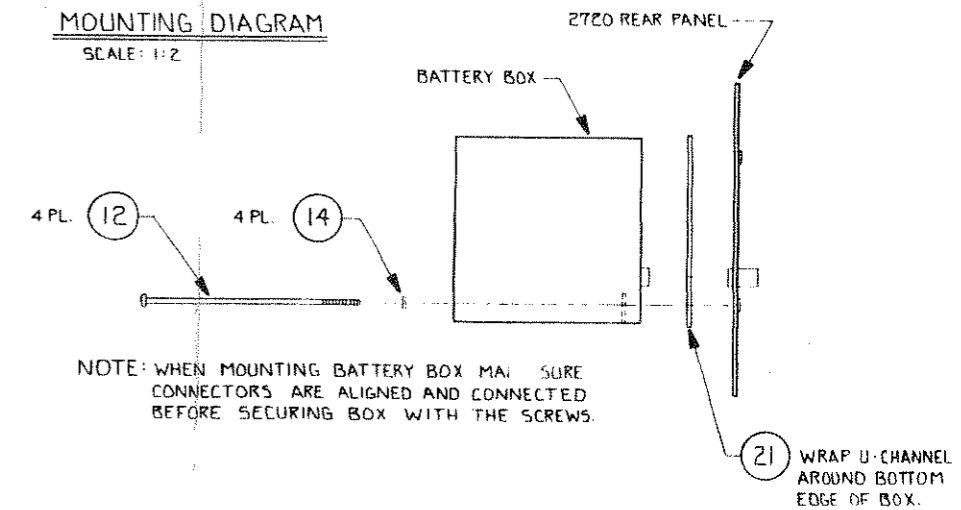


WIRE TAB

FROM	TERMINATION	TO	TERMINATION
E1	SOLDER	F51-2	SOLDER SLEEVE
E2	SOLDER	F51-1	SOLDER SLEEVE
E3	SOLDER	B1+	CRIMP TERMINAL
E4	SOLDER	B3-	CRIMP TERMINAL
B1-	CRIMP TERMINAL	B2+	CRIMP TERMINAL
B2-	CRIMP TERMINAL	B3+	CRIMP TERMINAL

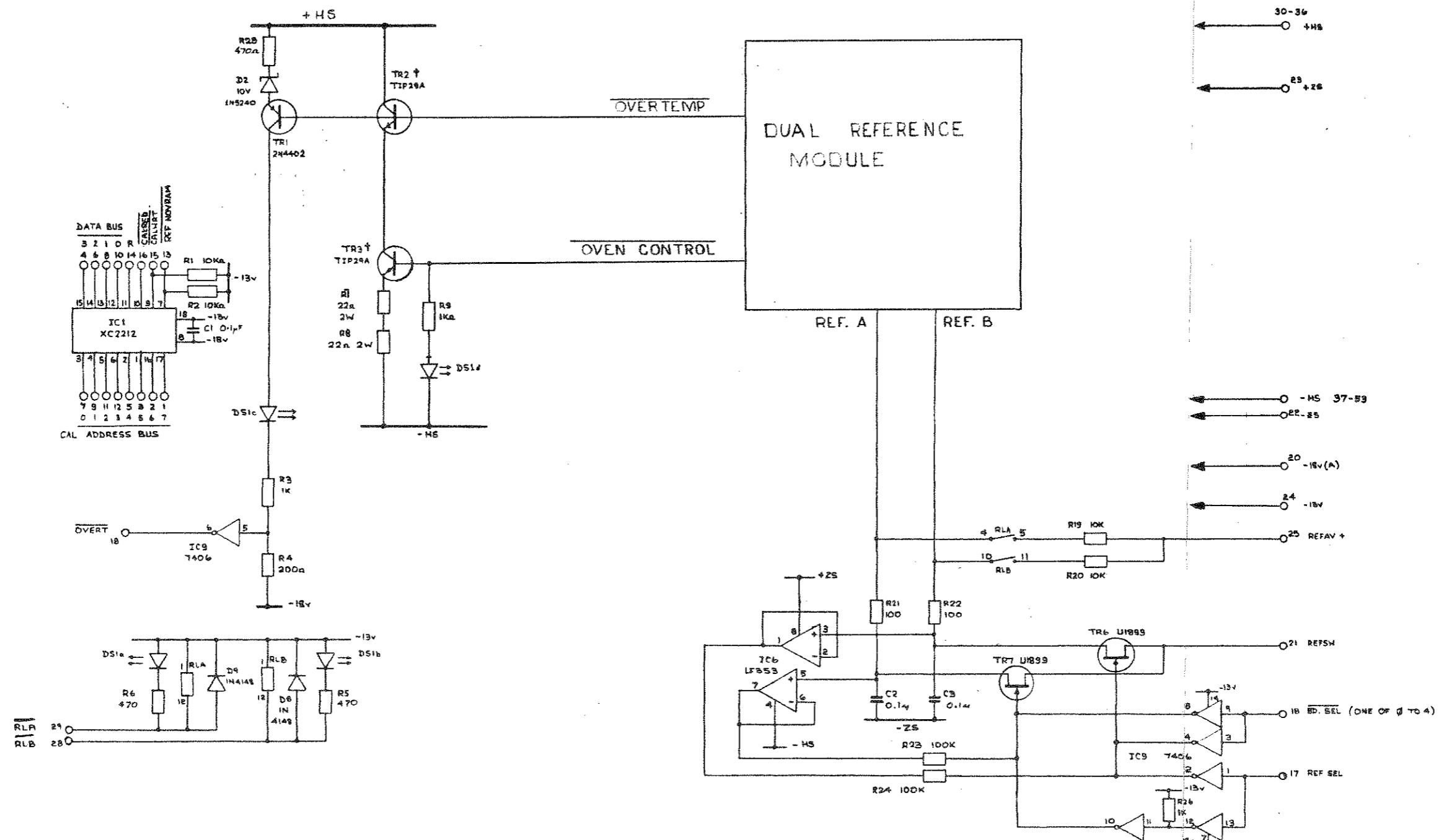


MOUNTING DIAGRAM
SCALE: 1:2



			TOLERANCES	MATERIAL	DRAWN WPW 5-11-84	 Valhalla Scientific Inc. SAN DIEGO, CA
			X' = ± .30'	SEE PARTS LIST	CHECKED PL 5-14-84	
			.XX = ± .03		APPR R 5-14-84	
			.XXX = ± .010		STK NO	
			BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES	FINISH	<small>ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE TO BE TAKEN TO THE CENTER UNLESS OTHERWISE SPECIFIED. DIMENSIONS TO BE TAKEN TO THE CENTER UNLESS OTHERWISE SPECIFIED. DIMENSIONS TO BE TAKEN TO THE CENTER UNLESS OTHERWISE SPECIFIED.</small>	OPTION "BAT" ASSY.
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	64 ✓	SCALE 1:1	CODE IDENT 53504
					SHEET 1 OF 2	SIZE D
						DRAWING NO 2720-407
						REV B

REVISIONS			
ECO	LTR	DESCRIPTION	DATE



FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN POW	5-5-83
RV1	-	RV1	X = ± 30'		CHECKED POW	5-15-83
CI	-	CE	.XX = ± 03		APPR	5-29-84
DE	D3, D4, D5	D10	.XXX = ± 010		STK NO	
DS1	-	DS1				
IC1	-	IC3	BREAK ALL SHARP CORNERS AND EDGES.	FINISH		
RI	-	R26	MACH SURFACES			
TR1	-	TR7				
RLA	-	RLB				

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



REFERENCE MODULE

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.

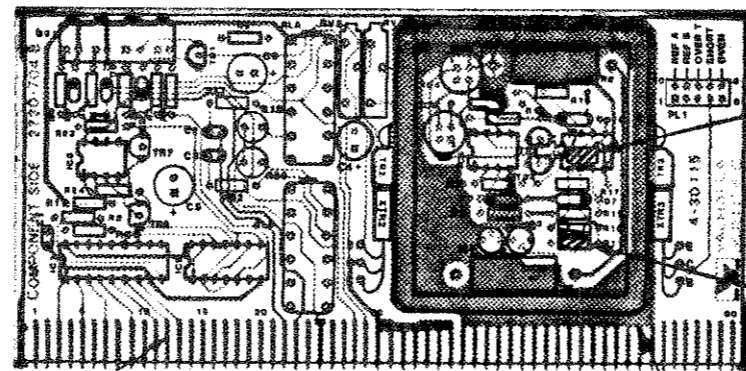
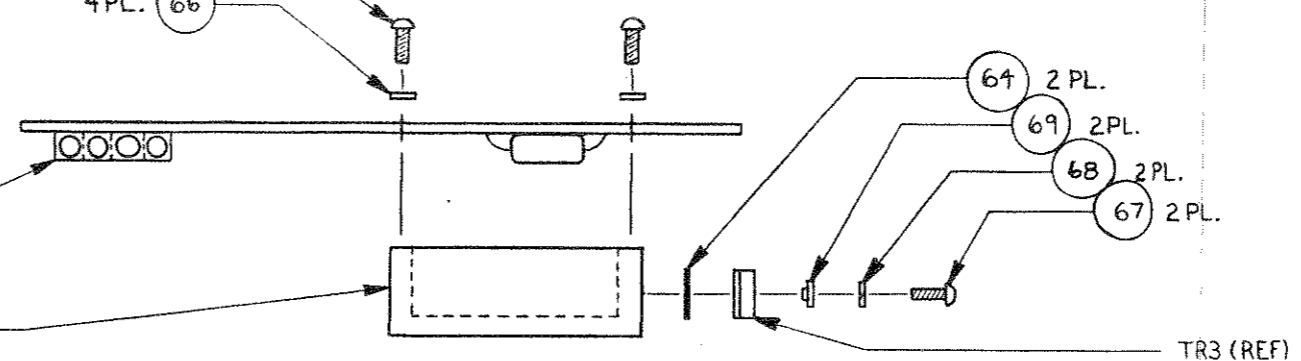
IF SINGLE HOUSINGS ARE USED, ENSURE UNIFORM ALIGNMENT AND POSITION (FLUSH TO PCB)

(62)

4 PL. (67)

4 PL. (66)

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

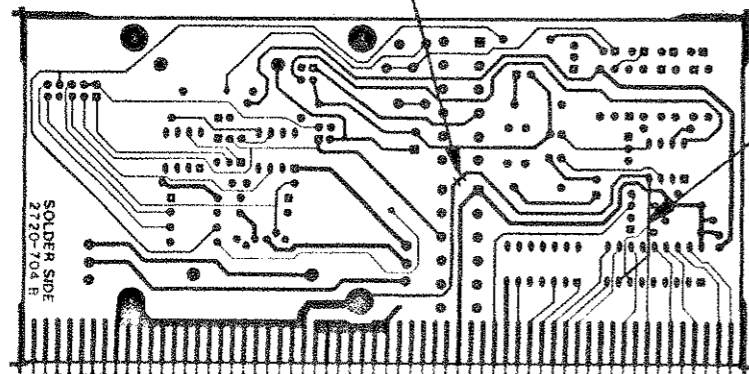


ADD C8 BETWEEN IC2 PIN 8 + IC2 PIN 4. LAY CAP. DOWN.
REV. "B" BOARDS ONLY.
ADD C7 ACROSS R10. LAY CAP. DOWN.

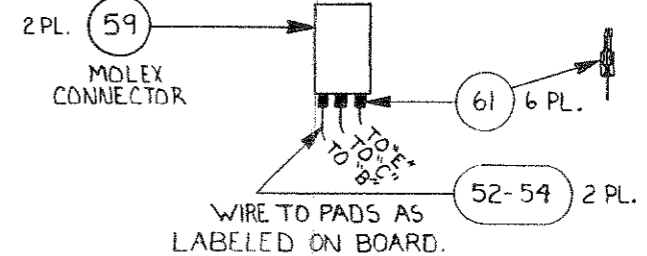
MAKE SURE THAT GOLD FINGERS ARE FREE OF SOLDER AFTER BOARD IS COMPLETELY ASSEMBLED.

SEE NOTE 2

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.

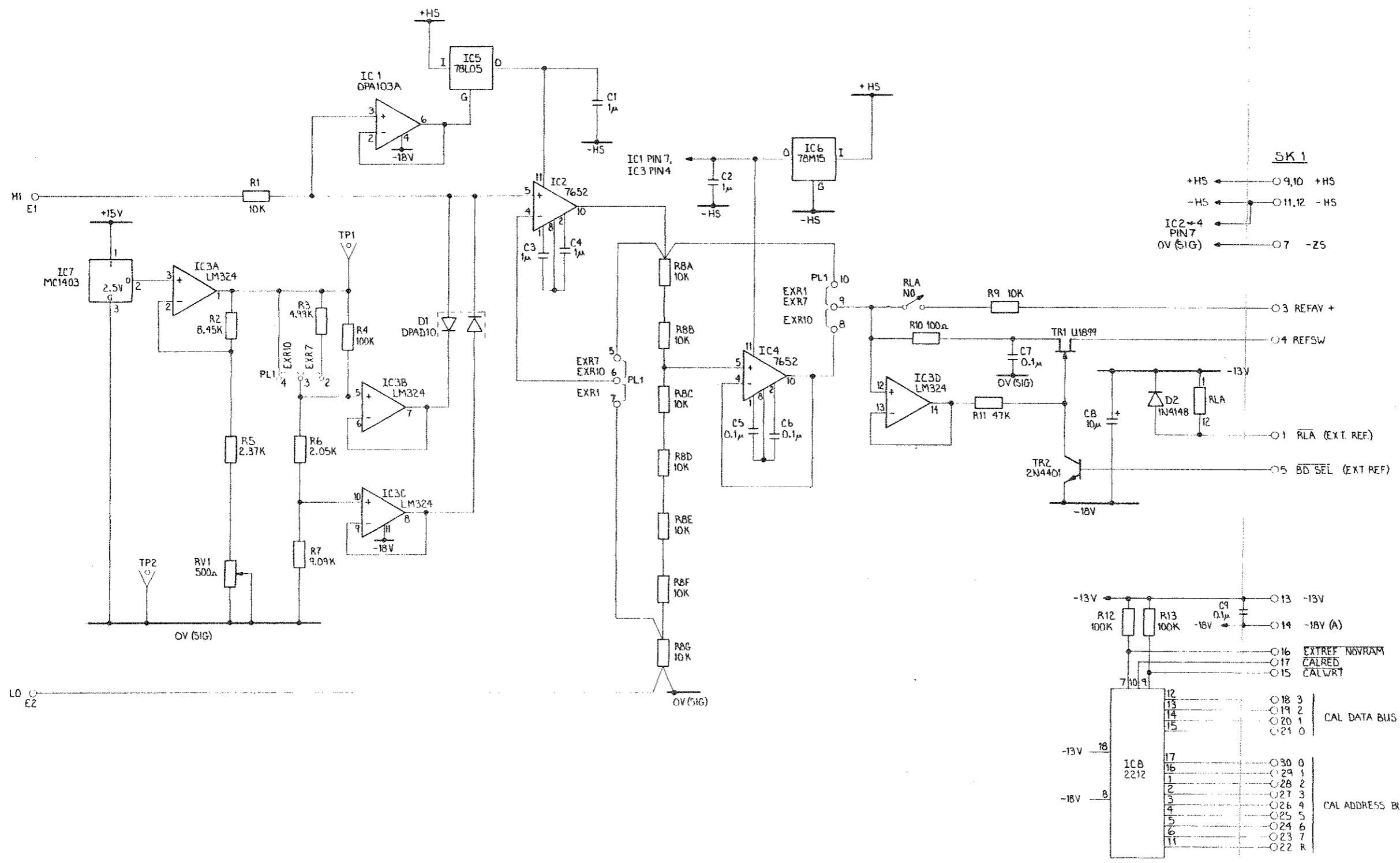


				TOLERANCES	MATERIAL	DRAWN DPM 1-25-85		 Valhalla Scientific Inc. SAN DIEGO, CA	
				X = ± .30'		CHECKED JWM 1/28/85			
				.XX = ± .03		APPR FDW 1/28/85			THE INFORMATION DISCLOSED HEREIN WAS ORIGINATED BY AND IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF VALHALLA SCIENTIFIC INC.
				.XXX = ± .010		STK NO			
				BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES	FINISH	2720 REFERENCE PCB ASSEMBLY			
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	64		SCALE 1:1	CODE IDENT 53504	SIZE C	DRAWING NO 7720-604
						SHEET 4 OF 4			REV E

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. R8 NOT FITTED ON EXR7.
2. IC4 C5 AND C6 FITTED ON EXR10 ONLY.
3. ADJUST RV1 FOR +11.00 VOLTS BETWEEN TP1 & TP2.

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



FIRST USED	NOT USED	LAST USED	TOLERANCES	MATERIAL	DRAWN DPM	4-18-85
C1	-	C9	X = ± 30'		CHECKED	
D1	-	D2	.XX = ± .03		APPR	
IC1	-	IC6	.XXX = ± .010		STK NO	
R1	-	R13				
RV1	-	RV1	BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES	FINISH		
TR1	-	TR2	64 ✓			
RLA	-	RLA				

SCALE	CODE IDENT	SIZE	DRAWING NO	REV
	53504	D	2720-075	A



OPTION EXR

4

3

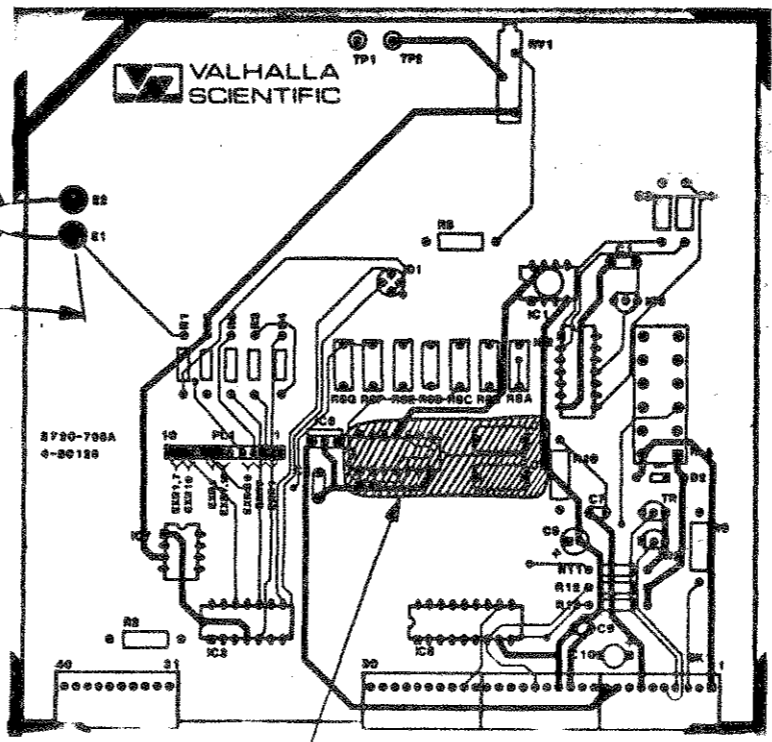
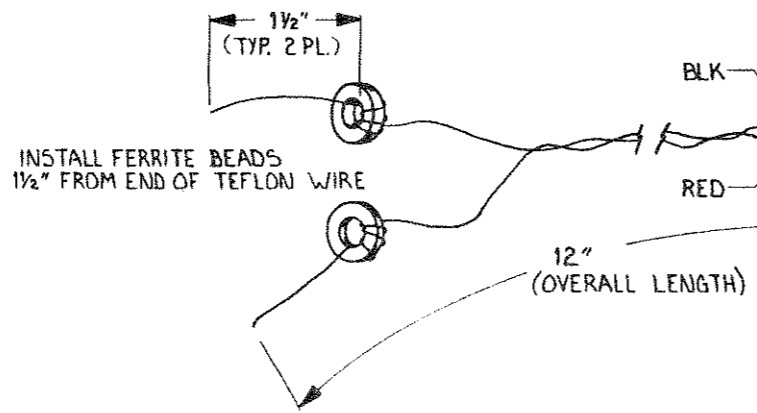
2

1

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 RBG LOCATION, THE OTHERS IN THE RBA-F LOCATIONS.
- 2. RBA-G SHOULD BE MOUNTED 1/4" ABOVE PCB.
- 3. INSTALL SHORTING LINKS BETWEEN PL1 PINS 1+2, 6+7 AND 9+10.
- 4. IC4, C5 AND C6 ARE NOT FITTED.

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



D

C

B

A

D

C

B

A

				TOLERANCES		MATERIAL		DRAWN <i>(DPM)</i> 6/6/85		 Valhalla Scientific Inc. SAN DIEGO, CA			
				X = ± .30'		 FINISH		CHECKED <i>(DPM)</i> 6/11/85				THE INFORMATION DISCLOSED HEREIN WAS OBTAINED BY AND IS THE PROPERTY OF VALHALLA SCIENTIFIC INC. AND IS NOT TO BE DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF VALHALLA SCIENTIFIC INC.	
				.XX = ± .03				APPR <i>(DPM)</i> 6/11/85					
				.XXX = ± .010				STK NO					
				BREAK ALL SHARP CORNERS AND EDGES. MACH SURFACES		64		SCALE 1:1		OPTION EXR 1			
DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON					CODE IDENT		SIZE	DRAWING NO	REV	
								53504		C	2720-605	A	
								SHEET 3 OF 3					

4

3

2

1

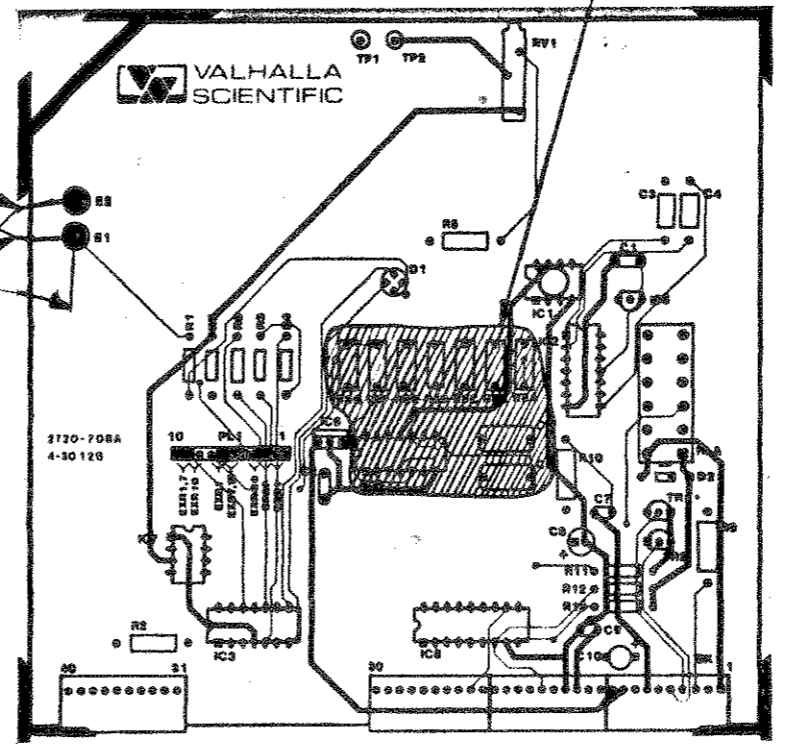
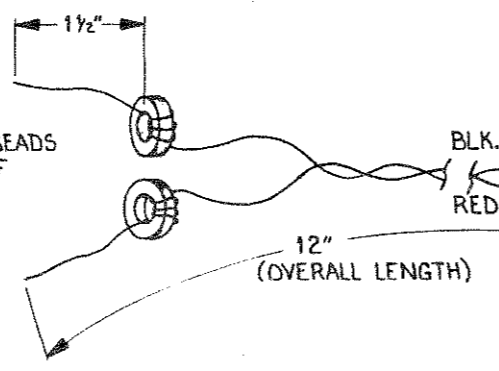
4 3 2 1

NOTES:

⚠ RB, 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	PW

INSTALL FERRITE BEADS
1 1/2" FROM END OF
TEFLON WIRE.



D
C
B
A

D
C
B
A

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 PW 6/11/85
APPR PW 6/11/85
STK NO

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RIGHTS THEREOF.



OPTION EXR 7

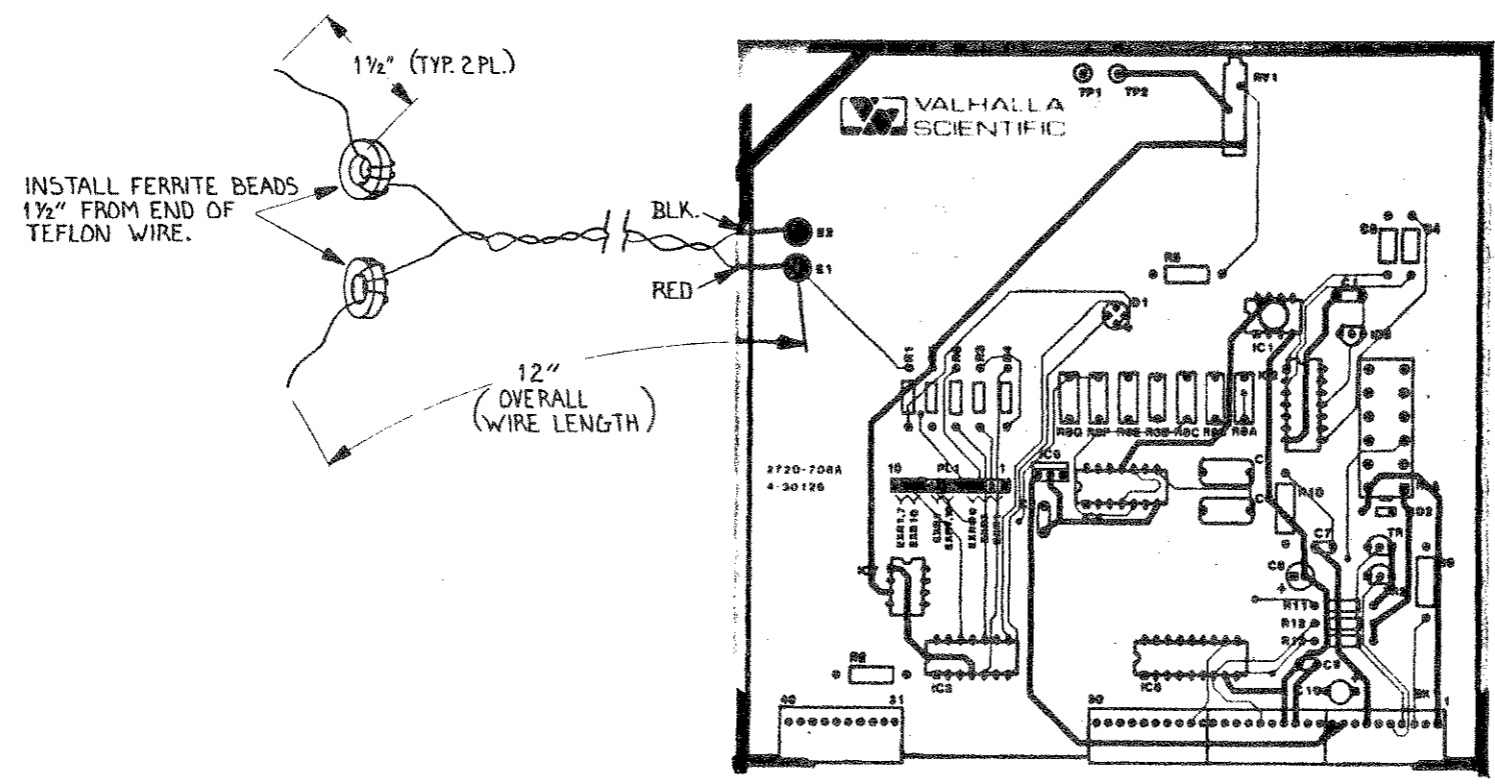
SCALE 1:1	CODE IDENT 53504	SIZE C	DRAWING NO 2720-610	REV A
SHEET 3 OF 3				

4 3 2 1

4 3 2 1

- 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 1/4" 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	[Signature]



D
C
B
A

D
C
B
A

DASH NO	QTY REQD	NEXT ASSEMBLY	USED ON	TOLERANCES	MATERIAL	FINISH	DRAWN	CHECKED	APPR	STK NO	Valhalla Scientific Inc. SAN DIEGO, CA			
				X = ± .30' .XX = ± .03 .XXX = ± .010	⚡	⚡	6/5/85	6-11-85	6-11-85		OPTION EXR 10			
				BREAK ALL SHARP CORNERS AND EDGES, MACH SURFACES			SCALE 1:1	CODE IDENT 53504	SIZE C	DRAWING NO 2720-608	REV A			
				84 ✓			SHEET 3 OF 3							

4 3 2 1