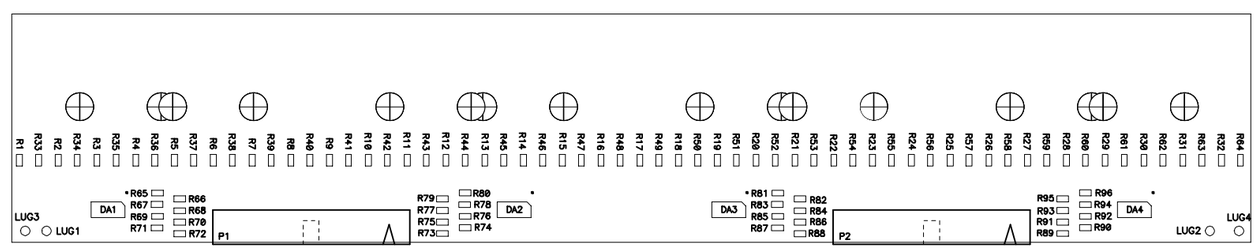
ITEM	REF #	QTY	MANUFACTURER	DESCRIPTION	PART #	Pick and Place Ready
1	R1–R64	64	PANASONIC	1 MEG, 5%, 1/8 W, 1206 CHIP RESISTOR	ERJ–8GEYJ105	Yes
2	R65–96	32	PANASONIC	220 ohm, 5%, 1/8 W, 1206 CHIP RESISTOR	ERJ–8GEYJ220	Yes
3	DA1–4	4	MOTOROLA	Diode Array,10 back–to–back pairs, SO–14 case	MMAD130	Yes
4	LUG1–4	4	USECO	TERMINAL, SWAG MOUNT, TURRENT, SUBMINIATURE, SOLID.	2030B–45	N/A
5	P1,2	2	SAMTEC	34 pin right–angle header, 30u gold	ASP–17463–01–S	No
6		64		Jumper wire, made from Belden 8021, 22AWG Bus Bar (32*)		No

General: Assembly Process.

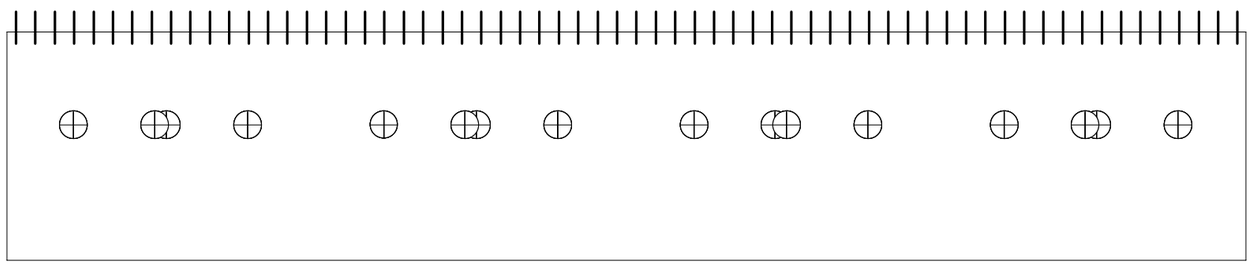
1.1. Interpret drawing in accordance with standards prescribed in IPC–D–325.

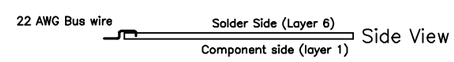
1.2. Workmanship to be equal to and complient with requirements of IPC–A–610.

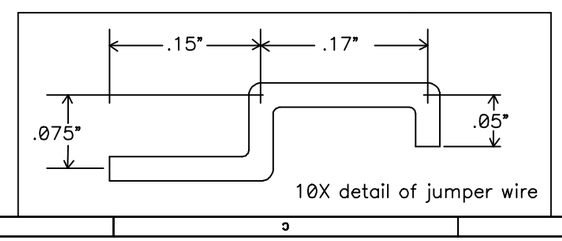
2. Pick & Place file is 002–0212–507.pnp
3. Clean cards after all parts installed
4. Apply clear conformal coating, masking off components and surfaces per sheets 10 and 11
5. Schematic is 002–0212–507.sch
6. Electrical test per sheet 3.
7. Apply serial number per sheet 3



Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
	Assembly Drawing, Layer 1 (Top)	
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002–0212–507		Drawn by: G. Hart
Filename 002–0212–507.pcb		Sheet 7 of 12







Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
Layer 4 (bottom side) assembly		
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart
Filename 002-0212-507.pcb		Sheet 8 of 12

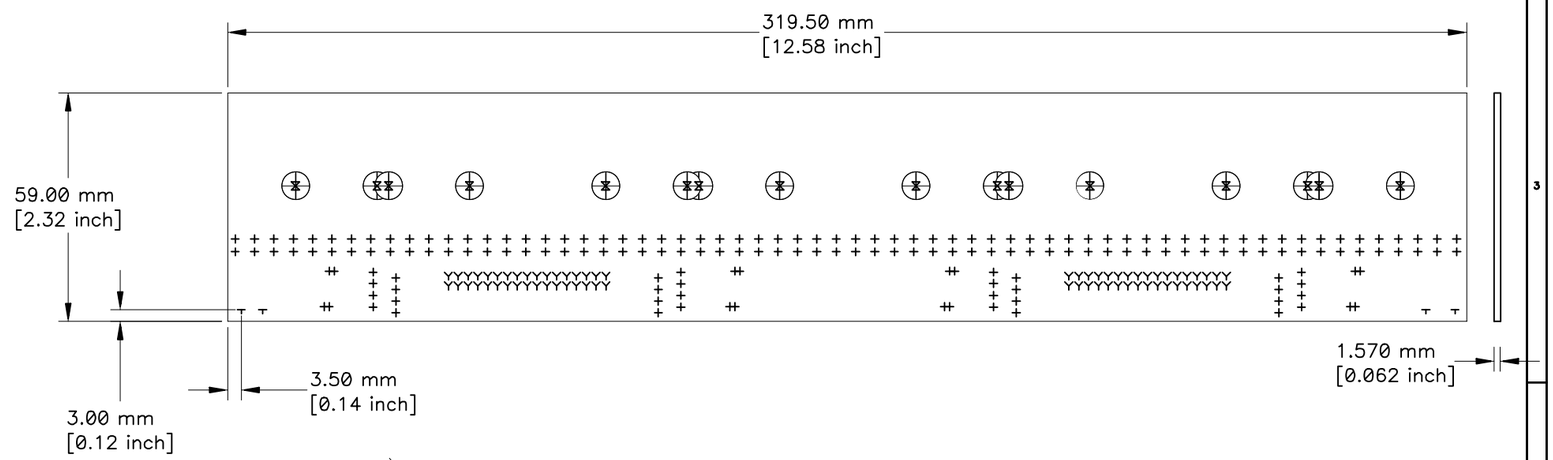
Mask off areas indicated (Term lugs, connectors, square solder pads, and upper half surface) Positive Image

Los Alamos National Laboratory			
Title	Station 3 N & S, 32 Channel Cathode Card		
Conformal Coating Drawing, Layer 1 (Component side)			
Size C	Date Originated: 25 Feb 1998		
	Date Last Revised: 27 Sept 2000		
LANL DWG #		Approved By: W. Sondheim	
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart	
Filename 002-0212-507.pcb		Sheet 10 of 12	

Mask off areas indicated (Upper half of surface) Positive Image

Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
Conformal Coating Drawing, Layer 4		
Size	Date Originated: 25 Feb 1998	
C	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 092-0212-507		Drawn by: G. Hart
Filename 092-0212-507.pcb		Sheet 11 of 12

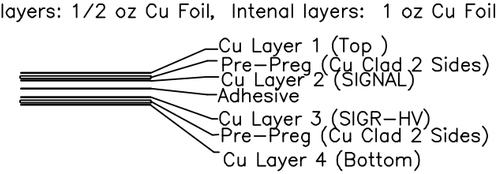
1. INTERPRET DRAWING PER IPC–D–275, MANUFACTURE PRINTED WIRING BOARD (PWB) TO BEST COMMERCIAL PRACTICE PER IPC–600, CLASS 2.
2. MATERIAL: FABRICATE FROM REINFORCED FR–4 GLASS LAMINATE, PER MIL–P–13949/4 TYPE GFN AND PRE PREG PER MIL–P–13949/10.
3. REGISTRATION: FRONT TO BACK SHALL BE WITHIN .127mm.
4. DIMENSIONS SHOWN ARE FINISHED SIZE AND APPLY AFTER PLATING.
5. ANNULAR RING: A MINIMUM OF .05mm IS ALLOWED ON EXTERNAL LAYERS. A MINIMUM OF .05mm ON INTERNAL LAYERS.
6. SOLDER REFLOW: .005mm MAXIMUM (USE HOT AIR SOLDERING LEVELING ON BOTH SIDES.
7. ALL TOLERANCE TO BE +/–.127mm UNLESS OTHERWISE STATED.
8. NC DRILL & GERBER Formats listed in 002–0212–507readme.txt
9. ELECTRICAL NETLIST FOR BARE BOARD TESTING: 002–0212–507 PCB.NET
10. SOLDER FILL ALL .46mm HOLES.
11. ETCH BACK IS NOT REQUIRED. BUT IS PERMITTED.
12. MARKINGS: UNLESS APPROVED IN WRITING, NO ADDITIONAL MARKINGS OF ANY KIND SHALL BE PERMITTED ON THE PWB.
13. BOW AND TWIST: THE MAXIMUM ALLOWED SHALL BE 1 PERCENT.
14. BRAKE ALL BURRS AND SHARP EDGES..



See sheet 6 for blind via drill drawing

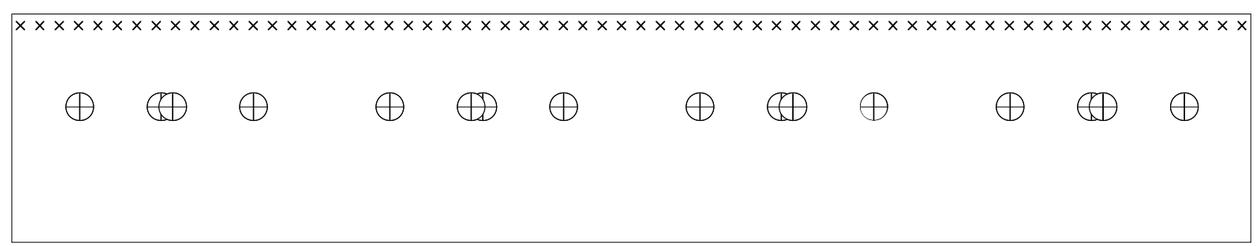
Drill Table			
Hole Dia (mm)	Symbol	Quantity	Plated
0.457	+	176	Yes
0.810	X	64	Yes
0.965	Y	68	Yes
1.850	⊤	4	Yes
7.140	⧖	16	Yes

External layers: 1/2 oz Cu Foil, Intenal layers: 1 oz Cu Foil



Dimensions in mm [in]

Los Alamos National Laboratory			
Title	Station 3 N & S, 32 Channel Cathode Card		
	Fabrication Drawing		
Size C	Date Originated: 25 Feb 1998		
	Date Last Revised: 27 Sept 2000		
LANL DWG #		Approved By: W. Sondheim	
PHENIX DWG #: 002–0212–507		Drawn by: G. Hart	
Filename 002–0212–507.pcb		Sheet 5 of 12	



See sheet 1 for drill table

Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
Blind Via (layers 2 thru 4) Drill Drawing		
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart
Filename 002-0212-507.pcb		Sheet 6 of 12

PCB pads & terminals				
Test Point A	Net Name	Test Point B	Net Name	Value (Ohms) +/−10%
1	Field 1	65	SIGR−HV	1 M
1	Field 1	66	FG	>20 M
2	Cathode 1	P1 Pin 31	Cathode 1	< .2
2	Cathode 1	65	SIGR−HV	1013
2	Cathode 1	66	FG	>20 M
3	Field 2	65	SIGR−HV	1 M
3	Field 2	66	FG	>20 M
4	Cathode 2	P1 Pin 29	Cathode 2	< .2
4	Cathode 2	65	SIGR−HV	1013
4	Cathode 2	66	FG	>20 M
5	Field 3	65	SIGR−HV	1 M
5	Field 3	66	FG	>20 M
6	Cathode 3	P1 Pin 27	Cathode 3	< .2
6	Cathode 3	65	SIGR−HV	1013
6	Cathode 3	66	FG	>20 M
7	Field 4	65	SIGR−HV	1 M
7	Field 4	66	FG	>20 M
8	Cathode 4	P1 Pin 25	Cathode 4	< .2
8	Cathode 4	65	SIGR−HV	1013
8	Cathode 4	66	FG	>20 M
9	Field 5	65	SIGR−HV	1 M
9	Field 5	66	FG	>20 M
10	Cathode 5	P1 Pin 23	Cathode 5	< .2
10	Cathode 5	65	SIGR−HV	1013
10	Cathode 5	66	FG	>20 M
11	Field 6	65	SIGR−HV	1 M
11	Field 6	66	FG	>20 M
12	Cathode 6	P1 Pin 21	Cathode 6	< .2
12	Cathode 6	65	SIGR−HV	1013
12	Cathode 6	66	FG	>20 M
13	Field 7	65	SIGR−HV	1 M
13	Field 7	66	FG	>20 M
14	Cathode 7	P1 Pin 19	Cathode 7	< .2
14	Cathode 7	65	SIGR−HV	1013
14	Cathode 7	66	FG	>20 M
15	Field 8	65	SIGR−HV	1 M
15	Field 8	66	FG	>20 M
16	Cathode 8	P1 Pin 17	Cathode 8	< .2
16	Cathode 8	65	SIGR−HV	1013
16	Cathode 8	66	FG	>20 M
17	Field 9	65	SIGR−HV	1 M
17	Field 9	66	FG	>20 M
18	Cathode 9	P1 Pin 15	Cathode 9	< .2
18	Cathode 9	65	SIGR−HV	1013
18	Cathode 9	66	FG	>20 M
19	Field 10	65	SIGR−HV	1 M
19	Field 10	66	FG	>20 M
20	Cathode 10	P1 Pin 13	Cathode 10	< .2
20	Cathode 10	65	SIGR−HV	1013
20	Cathode 10	66	FG	>20 M
21	Field 11	65	SIGR−HV	1 M
21	Field 11	66	FG	>20 M
22	Cathode 11	P1 Pin 11	Cathode 11	< .2
22	Cathode 11	65	SIGR−HV	1013
22	Cathode 11	66	FG	>20 M
23	Field 12	65	SIGR−HV	1 M
23	Field 12	66	FG	>20 M
24	Cathode 12	P1 Pin 9	Cathode 12	< .2
24	Cathode 12	65	SIGR−HV	1013
24	Cathode 12	66	FG	>20 M
25	Field 13	65	SIGR−HV	1 M
25	Field 13	66	FG	>20 M
26	Cathode 13	P1 Pin 7	Cathode 13	< .2
26	Cathode 13	65	SIGR−HV	1013
26	Cathode 13	66	FG	>20 M
27	Field 14	65	SIGR−HV	1 M
27	Field 14	66	FG	>20 M
28	Cathode 14	P1 Pin 5	Cathode 14	< .2
28	Cathode 14	65	SIGR−HV	1013
28	Cathode 14	66	FG	>20 M
29	Field 15	65	SIGR−HV	1 M
29	Field 15	66	FG	>20 M
30	Cathode 15	P1 Pin 3	Cathode 15	< .2
30	Cathode 15	65	SIGR−HV	1013
30	Cathode 15	66	FG	>20 M

PCB pads & terminals				
Test Point A	Net Name	Test Point B	Net Name	Value (Ohms) +/−10%
31	Field 16	65	SIGR−HV	1 M
31	Field 16	66	FG	>20 M
32	Cathode 16	P1 Pin 1	Cathode 16	< .2
32	Cathode 16	65	SIGR−HV	1013
32	Cathode 16	66	FG	>20 M
33	Field 17	P2 Pin 31	SIGR−HV	1 M
33	Field 17	65	FG	>20 M
34	Cathode 17	66	Cathode 17	< .2
34	Cathode 17	65	SIGR−HV	1013
34	Cathode 17	66	FG	>20 M
35	Field 18	P2 Pin 29	SIGR−HV	1 M
35	Field 18	65	FG	>20 M
36	Cathode 18	66	Cathode 18	< .2
36	Cathode 18	65	SIGR−HV	1013
36	Cathode 18	66	FG	>20 M
37	Field 19	P2 Pin 27	SIGR−HV	1 M
37	Field 19	65	FG	>20 M
38	Cathode 19	66	Cathode 19	< .2
38	Cathode 19	65	SIGR−HV	1013
38	Cathode 19	66	FG	>20 M
39	Field 20	P2 Pin 25	SIGR−HV	1 M
39	Field 20	65	FG	>20 M
40	Cathode 20	66	Cathode 20	< .2
40	Cathode 20	65	SIGR−HV	1013
40	Cathode 20	66	FG	>20 M
41	Field 21	P2 Pin 23	SIGR−HV	1 M
41	Field 21	65	FG	>20 M
42	Cathode 21	66	Cathode 21	< .2
42	Cathode 21	65	SIGR−HV	1013
42	Cathode 21	66	FG	>20 M
43	Field 22	P2 Pin 21	SIGR−HV	1 M
43	Field 22	65	FG	>20 M
44	Cathode 22	66	Cathode 22	< .2
44	Cathode 22	65	SIGR−HV	1013
44	Cathode 22	66	FG	>20 M
45	Field 23	P2 Pin 19	SIGR−HV	1 M
45	Field 23	65	FG	>20 M
46	Cathode 23	66	Cathode 23	< .2
46	Cathode 23	65	SIGR−HV	1013
46	Cathode 23	66	FG	>20 M
47	Field 24	P2 Pin 17	SIGR−HV	1 M
47	Field 24	65	FG	>20 M
48	Cathode 24	66	Cathode 24	< .2
48	Cathode 24	65	SIGR−HV	1013
48	Cathode 24	66	FG	>20 M
49	Field 25	P2 Pin 15	SIGR−HV	1 M
49	Field 25	65	FG	>20 M
50	Cathode 25	66	Cathode 25	< .2
50	Cathode 25	65	SIGR−HV	1013
50	Cathode 25	66	FG	>20 M
51	Field 26	P2 Pin 13	SIGR−HV	1 M
51	Field 26	65	FG	>20 M
52	Cathode 26	66	Cathode 26	< .2
52	Cathode 26	65	SIGR−HV	1013
52	Cathode 26	66	FG	>20 M
53	Field 27	P2 Pin 11	SIGR−HV	1 M
53	Field 27	65	FG	>20 M
54	Cathode 27	66	Cathode 27	< .2
54	Cathode 27	65	SIGR−HV	1013
54	Cathode 27	66	FG	>20 M
55	Field 28	P2 Pin 9	SIGR−HV	1 M
55	Field 28	65	FG	>20 M
56	Cathode 28	66	Cathode 28	< .2
56	Cathode 28	65	SIGR−HV	1013
56	Cathode 28	66	FG	>20 M
57	Field 29	P2 Pin 7	SIGR−HV	1 M
57	Field 29	65	FG	>20 M
58	Cathode 29	66	Cathode 29	< .2
58	Cathode 29	65	SIGR−HV	1013
58	Cathode 29	66	FG	>20 M
59	Field 30	P2 Pin 5	SIGR−HV	1 M
59	Field 30	65	FG	>20 M
60	Cathode 30	66	Cathode 30	< .2
60	Cathode 30	65	SIGR−HV	1013
60	Cathode 30	66	FG	>20 M

PCB pads & terminals				
Test Point A	Net Name	Test Point B	Net Name	Value (Ohms) +/−10%
61	Field 31	65	SIGR−HV	1 M
61	Field 31	66	FG	>20 M
62	Cathode 31	P2 Pin 3	Cathode 31	< .2
62	Cathode 31	65	SIGR−HV	1013
62	Cathode 31	66	FG	>20 M
63	Field 32	65	SIGR−HV	1 M
63	Field 32	66	FG	>20 M
64	Cathode 32	P2 Pin 1	Cathode 32	< .2
64	Cathode 32	65	SIGR−HV	1013
64	Cathode 32	66	FG	>20 M
65	SIGR−HV	66	FG	>20 M
65	SIGR−HV	68	SIGR−HV	< .2
66	FG	66	FG	< .2

P1 & P2 pins				
Test Point A Pin #	Net Name	Test Point B	Net Name	Value (Ohms)
2	SIGR−HV	65	SIGR−HV	< .2
4	SIGR−HV	65	SIGR−HV	< .2
6	SIGR−HV	65	SIGR−HV	< .2
8	SIGR−HV	65	SIGR−HV	< .2
10	SIGR−HV	65	SIGR−HV	< .2
12	SIGR−HV	65	SIGR−HV	< .2
14	SIGR−HV	65	SIGR−HV	< .2
16	SIGR−HV	65	SIGR−HV	< .2
18	SIGR−HV	65	SIGR−HV	< .2
20	SIGR−HV	65	SIGR−HV	< .2
22	SIGR−HV	65	SIGR−HV	< .2
24	SIGR−HV	65	SIGR−HV	< .2
26	SIGR−HV	65	SIGR−HV	< .2
28	SIGR−HV	65	SIGR−HV	< .2
30	SIGR−HV	65	SIGR−HV	< .2
32	SIGR−HV	65	SIGR−HV	< .2
34	FG	66	FG	< .2

Resistance Measurements Notes:

.

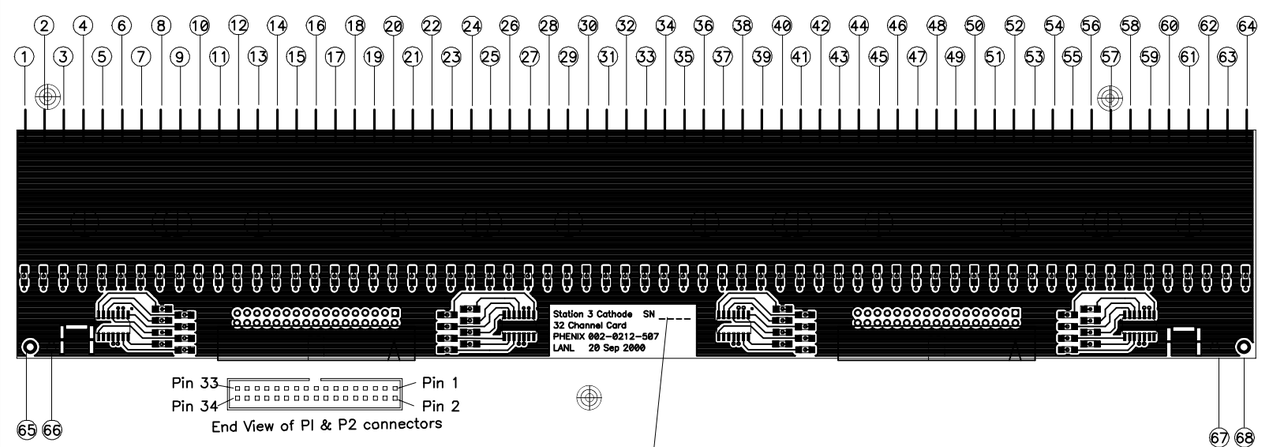
1. Resistance measurements of 1013 ohms (between Cathode wires and SIGR−HV) were taken with a Fluke 8020B digital multimeter on the 2K range. This value is the series resistance of a 220 ohm resistor and a diode. The actual value measured will depend on the meter used. This is due to the different voltage and current supplied by the meter to the circuit.

.

2. Polarity of leads does not matter.

.

3. The Fluke 8020B meter will be supplied to the assembler/tester if needed.

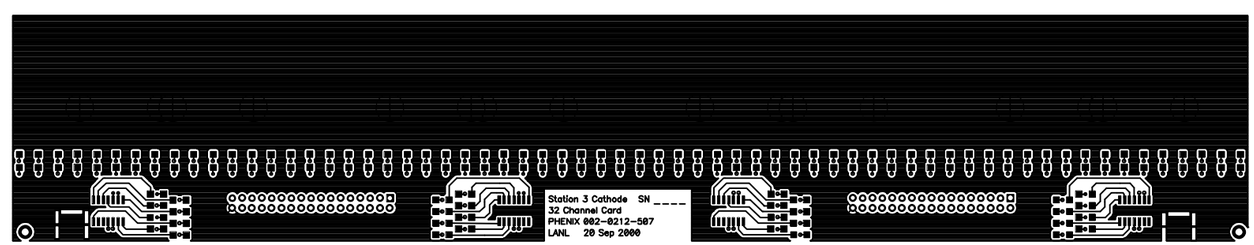


End View of Pl & P2 connectors

Apply Serial number to card after passing all tests
Start with 01

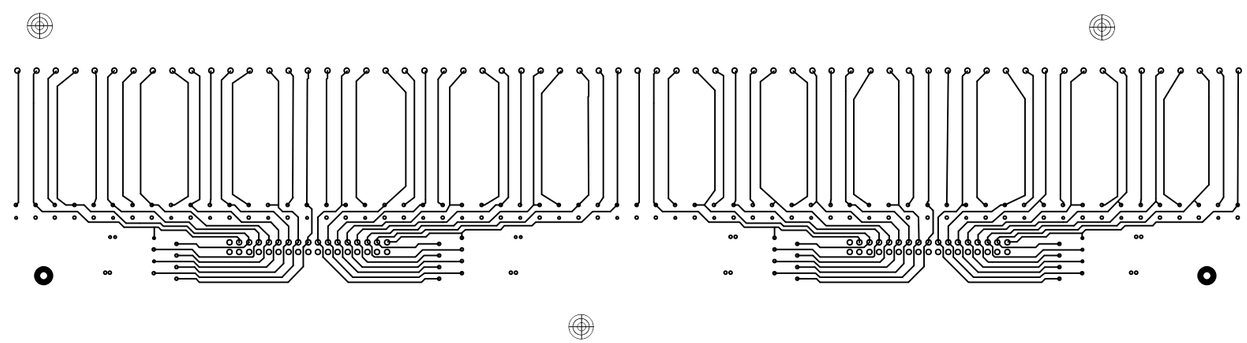
Top View

Los Alamos National Laboratory			
Title	Station 3 N & S, 32 Channel Cathode Card		
	Electrical Testing Drawing		
Size C	Date Originated: 25 Feb 1998		
	Date Last Revised: 27 Sept 2000		
LANL DWG #		Approved By: W. Sondheim	
PHENIX DWG #: 002−0212−507		Drawn by: G. Hart	
Filename 002−0212−507.pcb		Sheet 9 of 12	



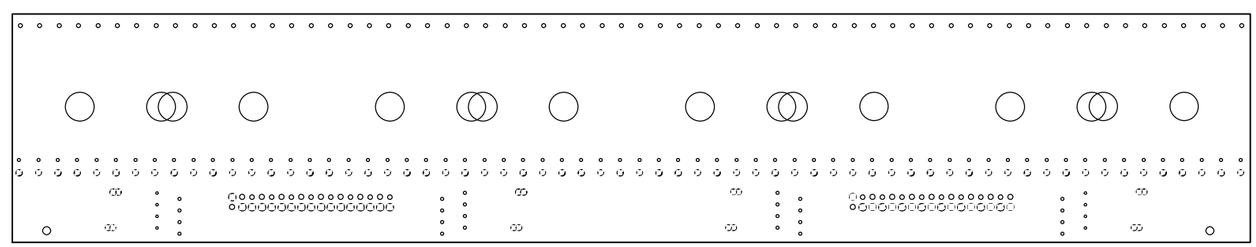
Station 3 Cathode 32 Channel Card
Los Alamos National Laboratory
20 Sept 2000
PHENIX 002-0212-507
Layer 1 (Component side)

Los Alamos National Laboratory			
Title	Station 3 N & S, 32 Channel Cathode Card		
	Layer 1 (Component side)		
Size C	Date Originated: 25 Feb 1998		
	Date Last Revised: 27 Sept 2000		
LANL DWG #		Approved By: W. Sondheim	
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart	
Filename 002-0212-507.pcb		Sheet 1 of 12	



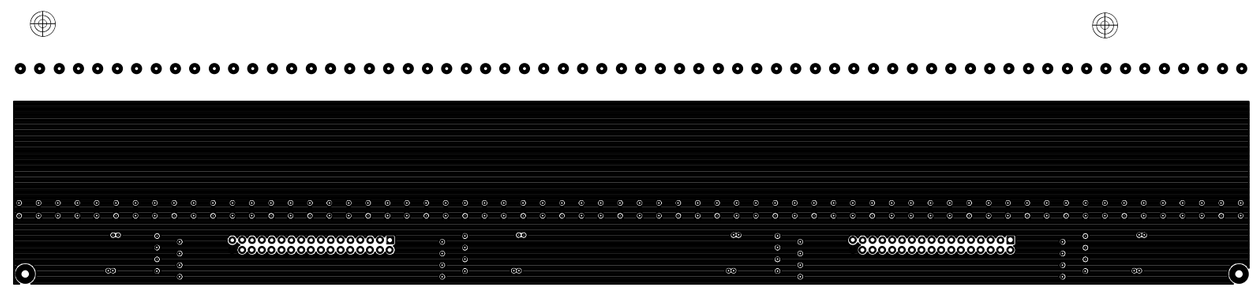
Station 3 Cathode 32 Channel Card
Los Alamos National Laboratory
20 Sept 2000
PHENIX 002-0212-507
Layer 2 (traces)

Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
	Layer 2 (traces)	
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart
Filename 002-0212-507.pcb		Sheet 2 of 12



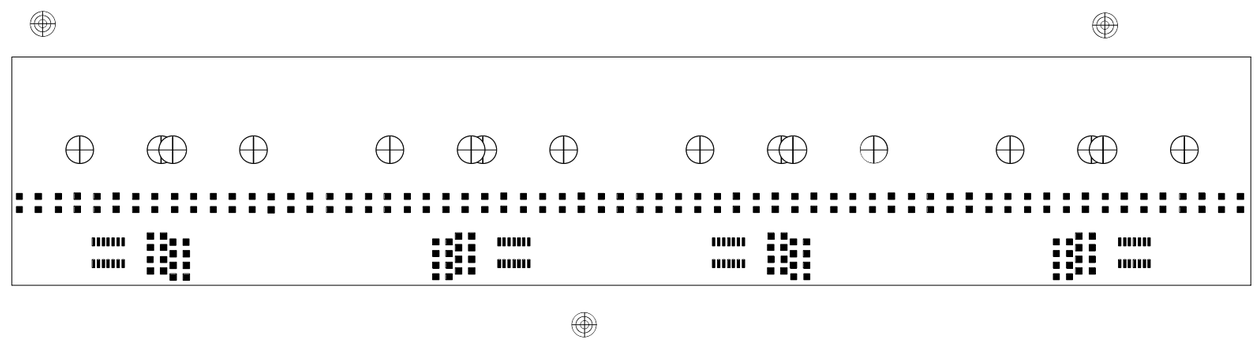
Station 3 Cathode 32 Channel Card
Los Alamos National Laboratory
20 Sept 2000
PHENIX 002-0212-507
Layer 3 (Ground Plane) NEGATIVE IMAGE

Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
	Layer 3 (Ground Plane) Negative Image	
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart
Filename 002-0212-507.pcb		Sheet 3 of 12



Station 3 Cathode 32 Channel Card
Los Alamos National Laboratory
20 Sept 2000
PHENIX 002-0212-507
Layer 4 (Bottom)

Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
	Layer 4 (bottom side)	
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart
Filename 002-0212-507.pcb		Sheet 4 of 12



Los Alamos National Laboratory		
Title	Station 3 N & S, 32 Channel Cathode Card	
Solder Paste, layer 1 (Component Side)		
Size C	Date Originated: 25 Feb 1998	
	Date Last Revised: 27 Sept 2000	
LANL DWG #		Approved By: W. Sondheim
PHENIX DWG #: 002-0212-507		Drawn by: G. Hart
Filename 002-0212-507.pcb		Sheet 12 of 12