

# IRLabs, Inc.

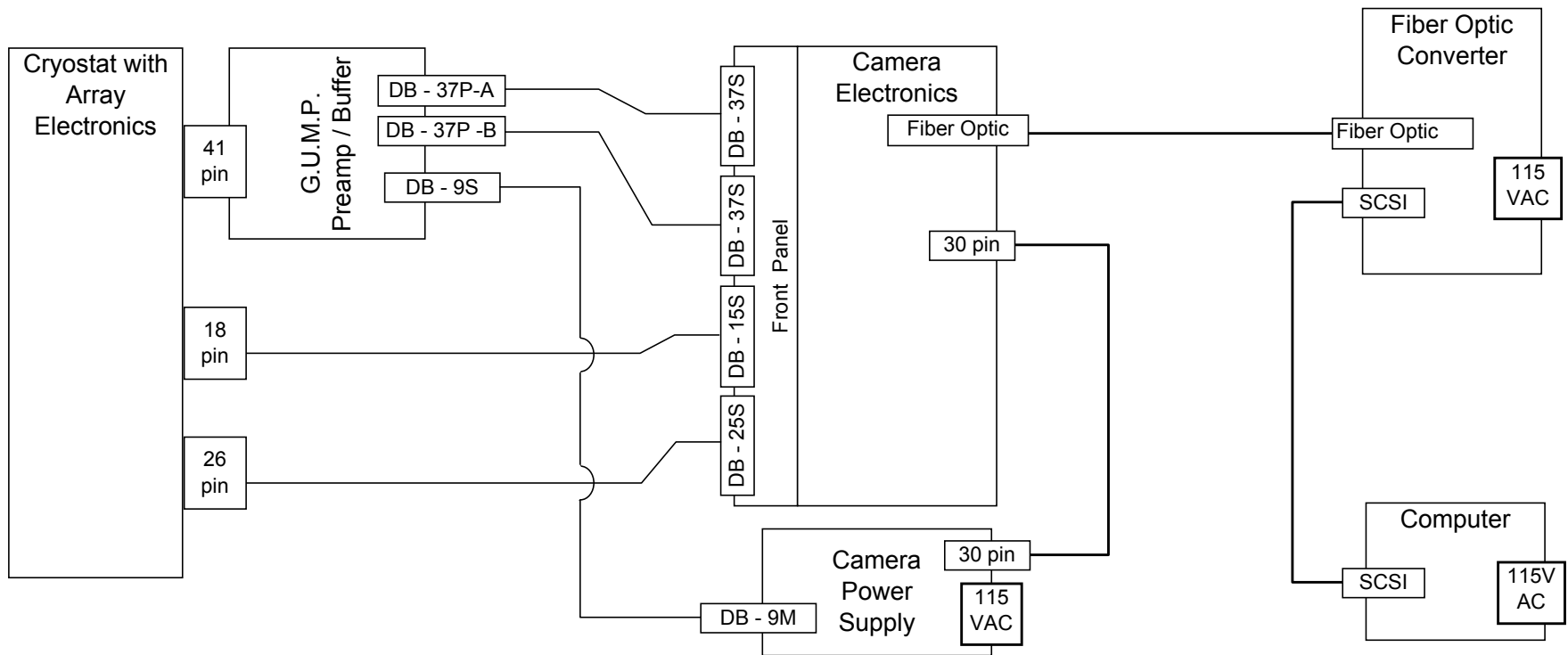
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Tucson, AZ 85719 - 6505 / USA  
Phone # : 520 - 622 - 7074  
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Email : irlabs.com

Customer : \_\_\_\_\_  
P.O. number : \_\_\_\_\_  
Dewar number : \_\_\_\_\_  
Job Order number : \_\_\_\_\_  
Quote number : \_\_\_\_\_  
Components : GUMP Preamp, configured for 32 channels, includes external Analog,  
Digital and Power Supply cables

Most recent REV DATE : Apr - 12, 05

page #

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7	Channels 9 to 16, schematic bus lines
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# G.U.M.P. Main Board

View and Parts list

Parts Layout

Channels 1 to 8, schematic bus lines

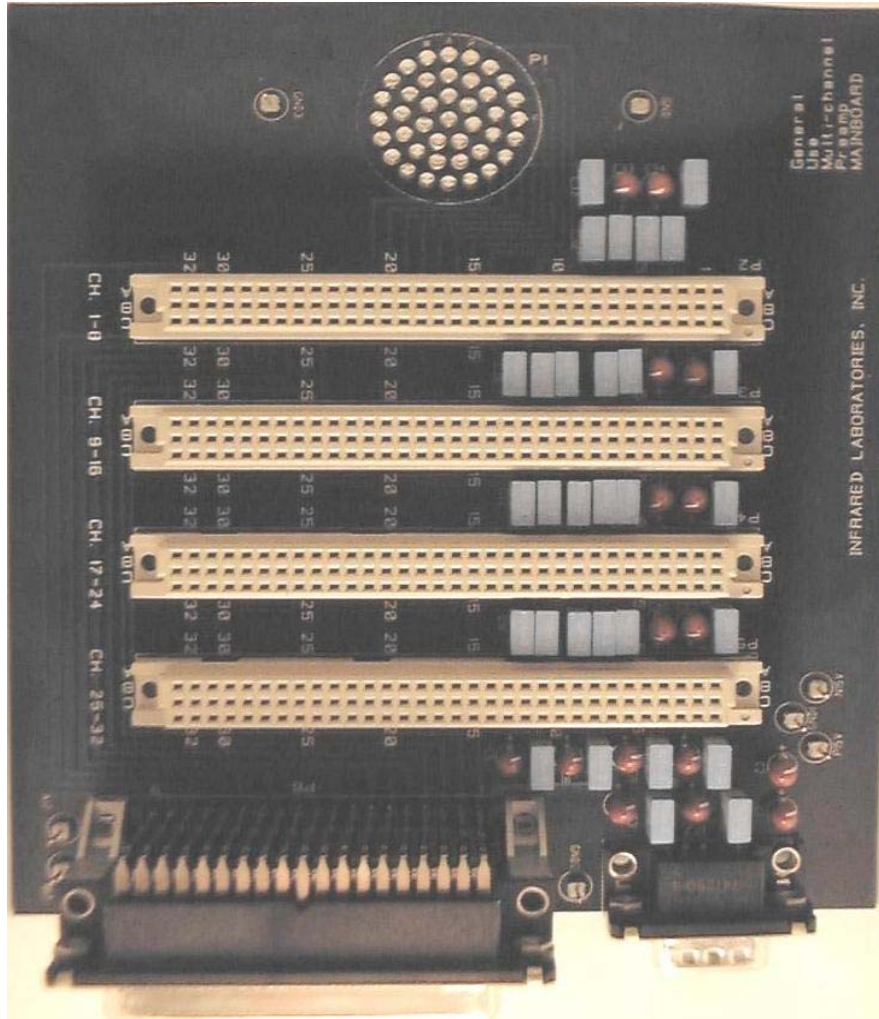
Channels 9 to 16, schematic bus lines

Channels 17 to 24, schematic bus lines

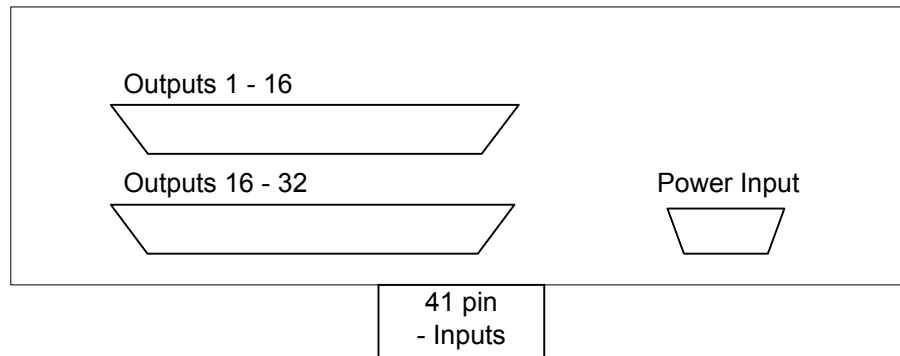
Channels 25 to 32, schematic bus lines

Channels 1 to 32, schematic Outputs and power supply

## GUMP Mainboard Layout



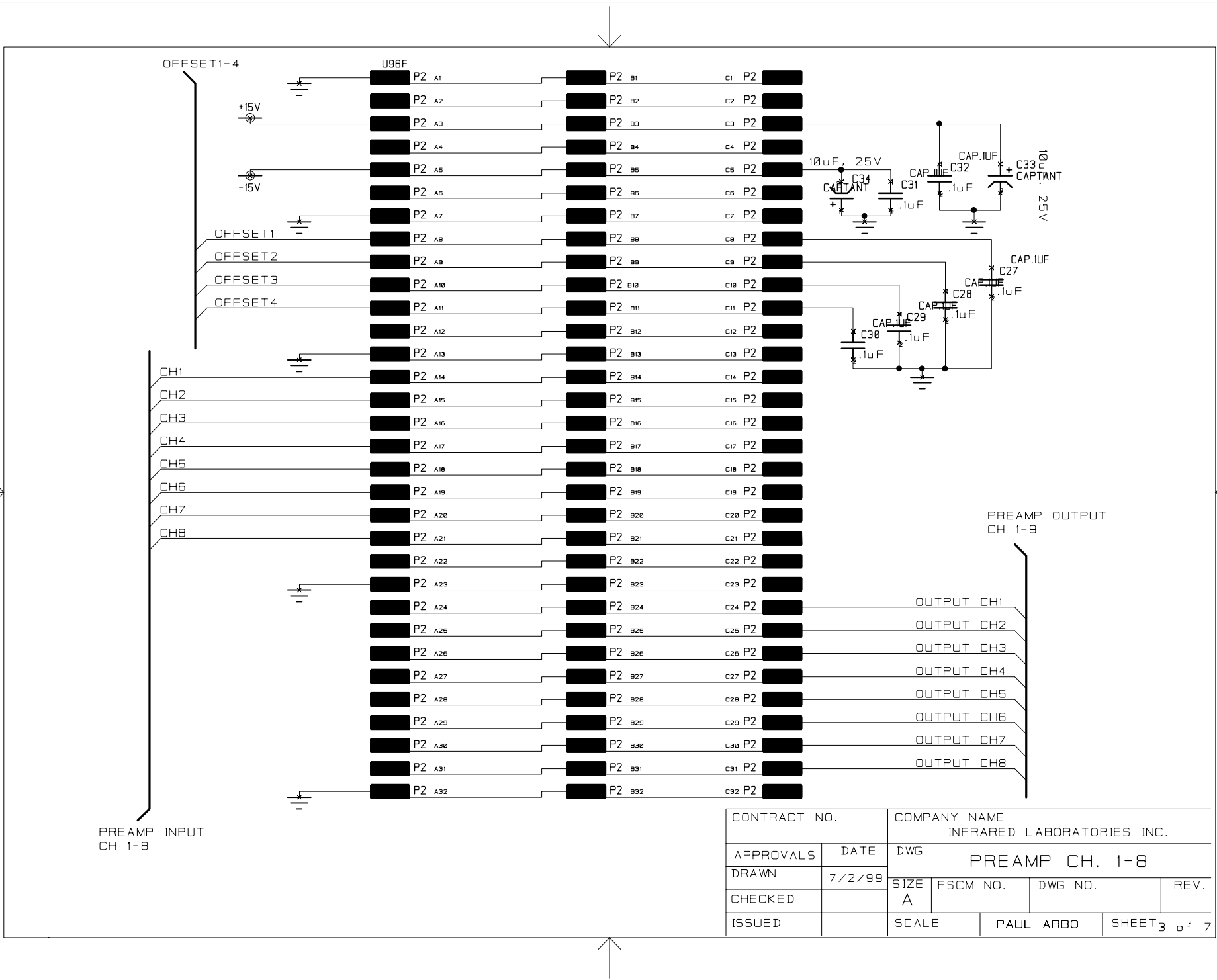
## GUMP end panel



## Parts List (populated for 4 Daughter Boards)

QTY	Description
1	connector, 41 PIN Bulkhead Receptacle
1	connector, D-SUB 9 pin male right angle, PCB mount
1	connector, DUAL DSUB 37 pin male right angle, PCB mount
1	enclosure, Lansing box
3	connector, D-SUB mounting Hardware kit
16	capacitors, 10 UF / 25 VOLT
30	capacitors, 0.1 UF caps
8	connector, Header pins, Breakaway type

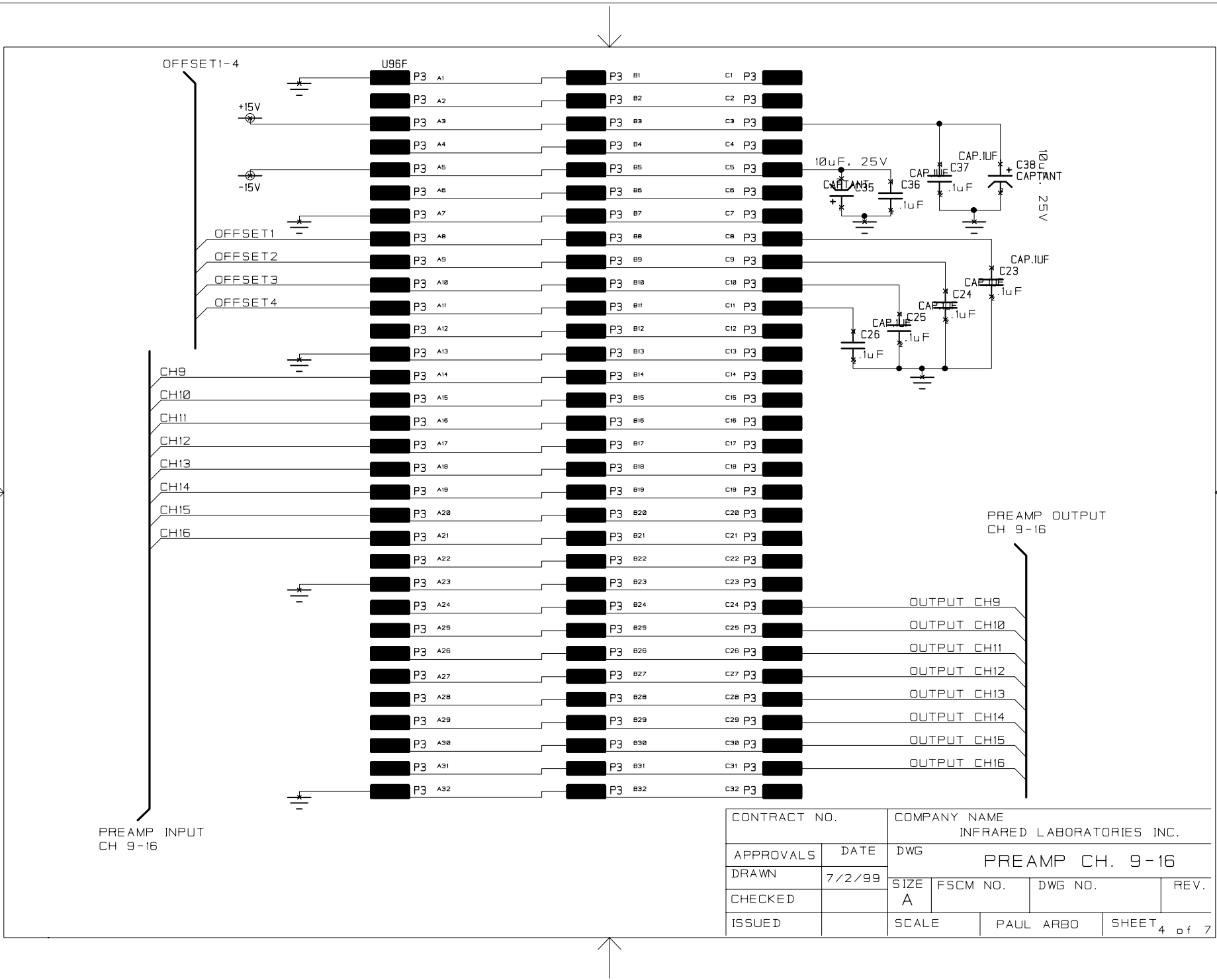




PREAMP INPUT  
CH 1-8

PREAMP OUTPUT  
CH 1-8

CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES INC.			
APPROVALS	DATE	DWG PREAMP CH. 1-8			
DRAWN	7/2/99	SIZE A	FSCM NO.	DWG NO.	REV.
CHECKED		SCALE	PAUL ARBO	SHEET 3 of 7	
ISSUED					



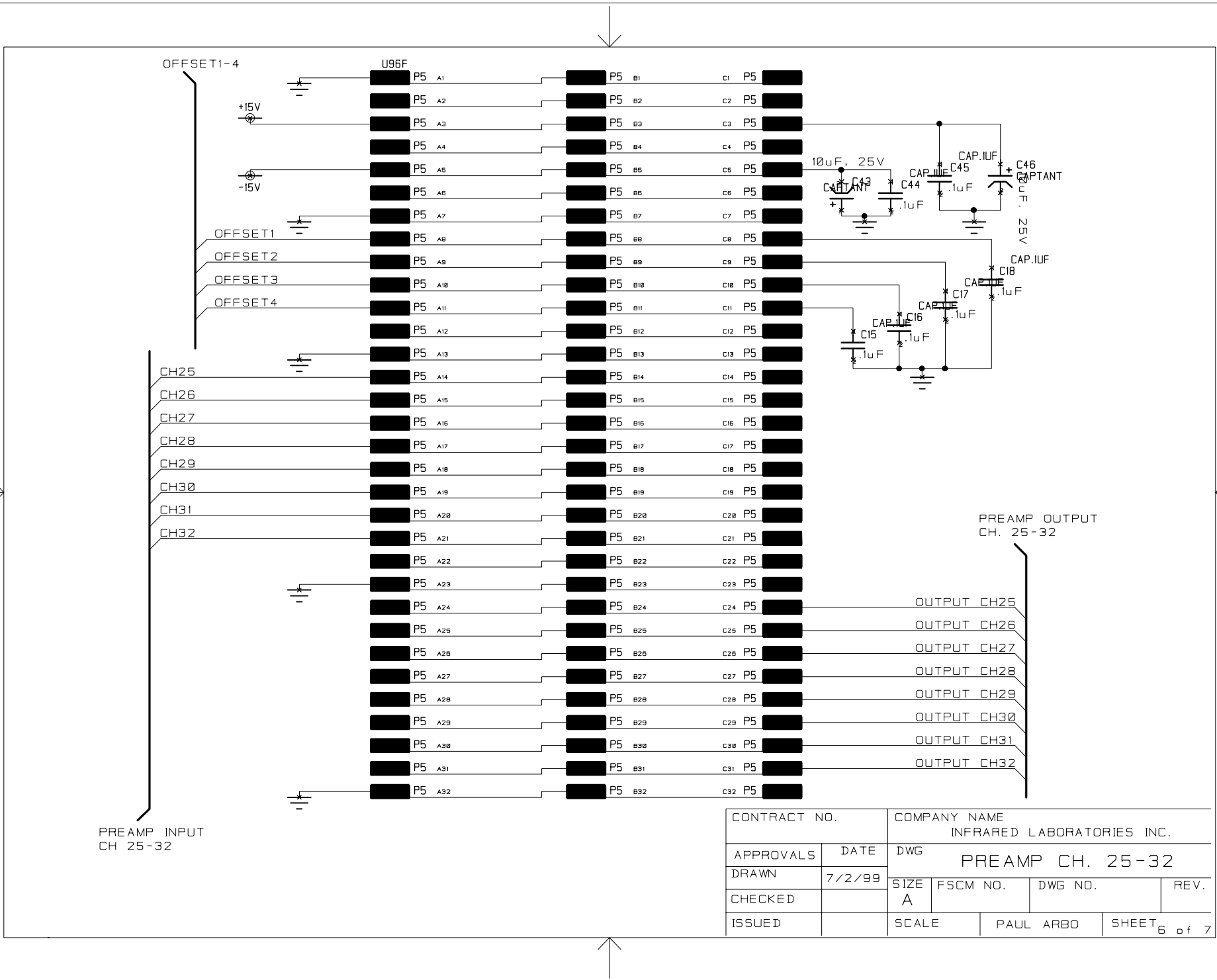
PREAMP INPUT  
CH 9-16

PREAMP OUTPUT  
CH 9-16

CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES INC.			
APPROVALS	DATE	DWG PREAMP CH. 9-16			
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CHECKED		SCALE	PAUL ARBO	SHEET 4 of 7	



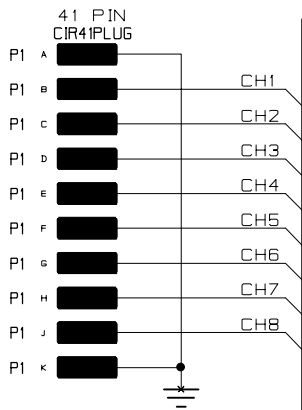




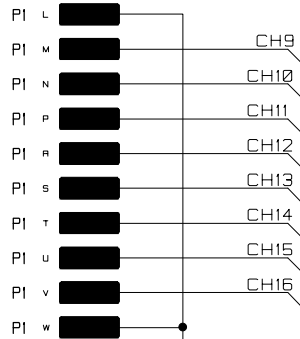
PREAMP INPUT  
CH 25-32

PREAMP OUTPUT  
CH. 25-32

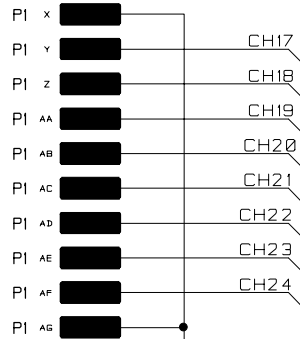
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CHECKED		SCALE	PAUL ARBO	SHEET 6 of 7	



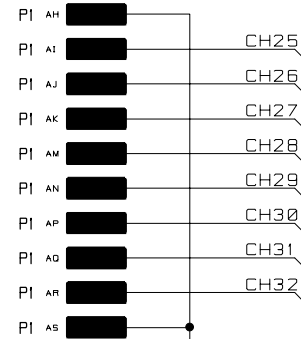
PREAMP INPUT  
CH 1-8



PREAMP INPUT  
CH 9-16



PREAMP INPUT  
CH 17-24



PREAMP INPUT  
CH 25-32

PI AT  
OPEN

CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES INC.			
APPROVALS	DATE	DWG PREAMP INPUT			
DRAWN	7/2/99	SIZE A	FSCM NO.	DWG NO.	REV.
CHECKED		SCALE		PAUL ARBO	SHEET 2 OF 7
ISSUED					



## G.U.M.P. Daughter board

View and Parts list

Parts Layout

Daughter board - missing trace

Channels 1 and 2, schematic

Channels 3 and 4, schematic

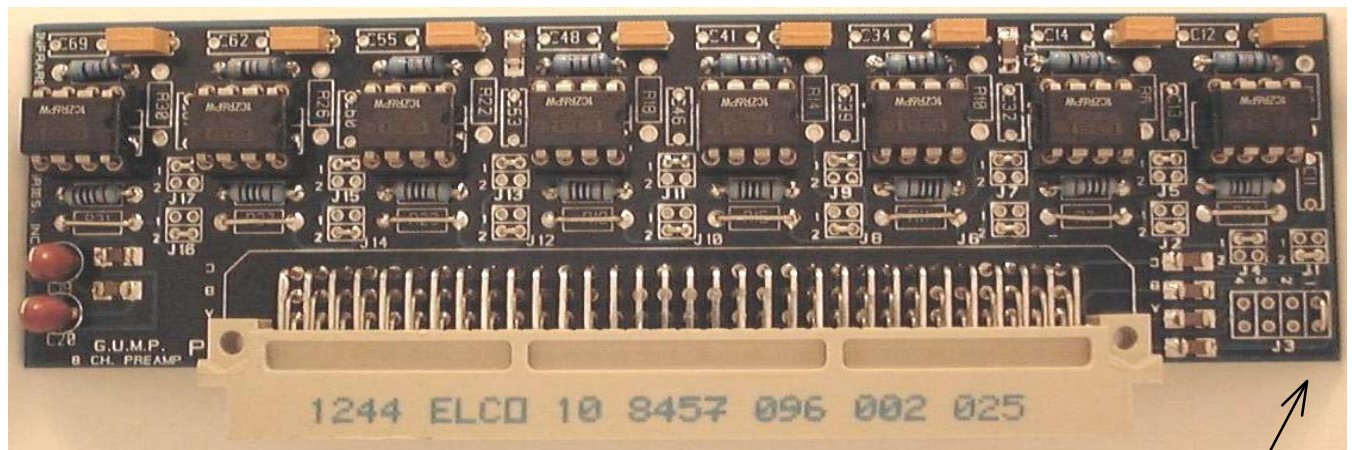
Channels 5 and 6, schematic

Channels 7 and 8, schematic

Note : All Daughter Board Schematics  
are the same.

> See the "View and Parts List" page to  
configure each Daughter Board for specific  
groups of channels.

## G.U.M.P. daughter boards



### NOTE :

Voltage Offset is applied to the group of channels depending on the jumper position on J3.  
 Channels 1 through 8 - J3 jumper is installed between pins 1 and 5 (as picture above shows)  
 Channels 9 through 16 - J3 jumper is installed between pins 2 and 6  
 Channels 17 through 24 - J3 jumper is installed between pins 3 and 7  
 Channels 25 through 32 - J3 jumper is installed between pins 4 and 8

α **GAIN IS ~ 5.05**

## Parts List

channel Components	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
.1 UF - SM 25V	C3, C4	C5, C6	C36, C35	C43, C42	C50, C49	C57, C56	C64, C63	C71, C70
68 PF	C1	C2	C31	C38	C45	C52	C59	C66
4 KΩ	R1	R8	R9	R13	R17	R21	R25	R29
8 pin OP Amp socket	U1	U2	U3	U4	U5	U6	U7	U8
1 KΩ	R2	R5	R12	R16	R20	R24	R28	R32
jumper	R4	R7	R11	R15	R19	R23	R27	R31
jumper	J1, 2 - 4	J2, 2 - 4	J6, 2 - 4	J8, 2 - 4	J10, 2 - 4	J12, 2 - 4	J14, 2 - 4	J16, 2 - 4
jumper	J4, 1 - 3	J4, 1 - 3	J4, 1 - 3	J4, 1 - 3	J4, 1 - 3	J4, 1 - 3	J4, 1 - 3	J4, 1 - 3
open	R3	R6	R10	R14	R18	R22	R26	R30
open	C11	C13	C32	C39	C46	C53	C60	C67
open	C12	C14	C34	C41	C48	C55	C62	C69
OPA 627 AP	U1	U2	U3	U4	U5	U6	U7	U8

## POWER SUPPLY COMPONENTS

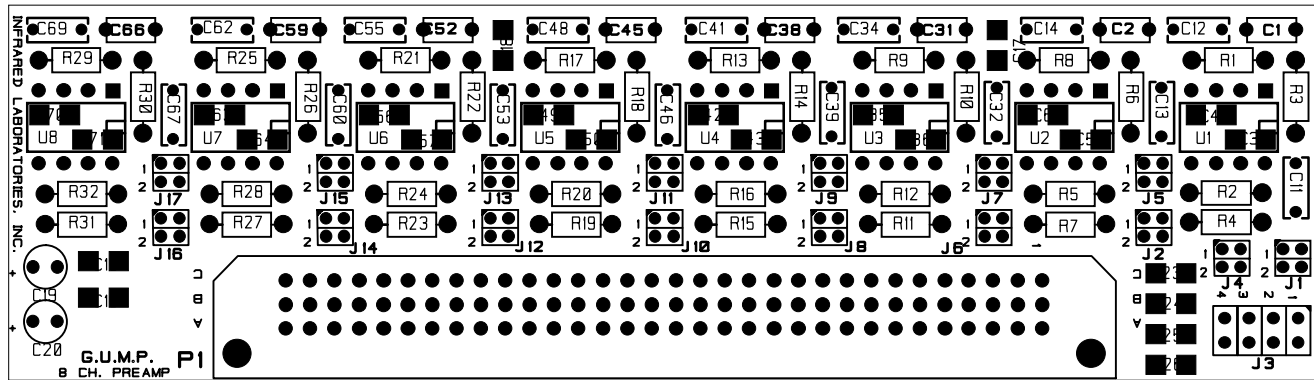
.1 UF - SM 25V	C15, C16, C7, C18
10 UF, 25 Volt	C19, C20

## VOLTAGE OFFSET COMPONENTS

.1 UF - SM 25V	C23, C24, C25, C26
jumper	SEE ABOVE NOTE

## BOARD CONNECTOR

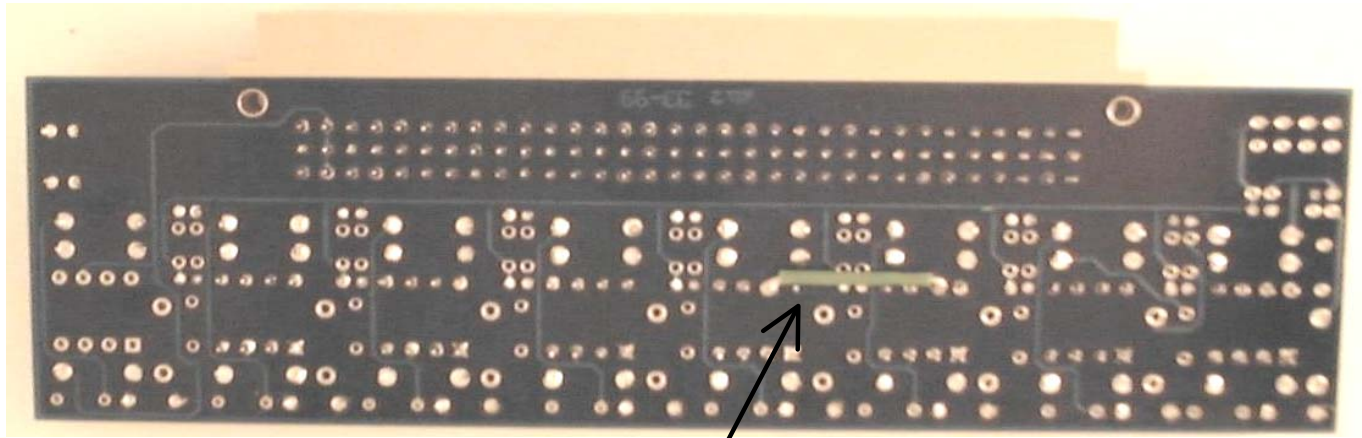
96 pin IDC, right angle



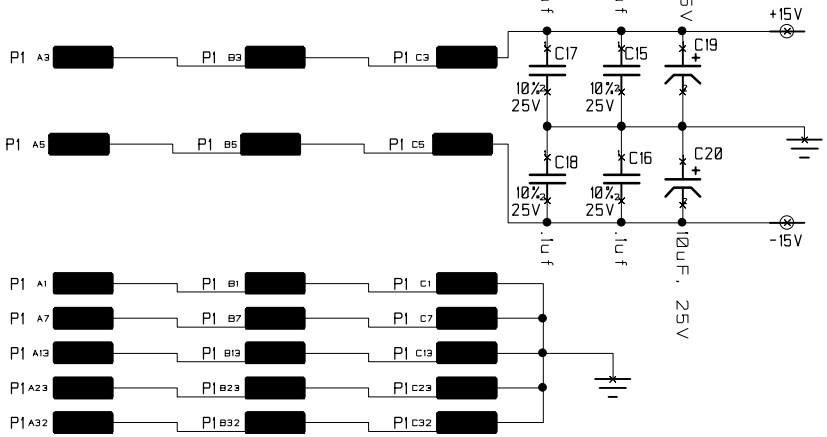
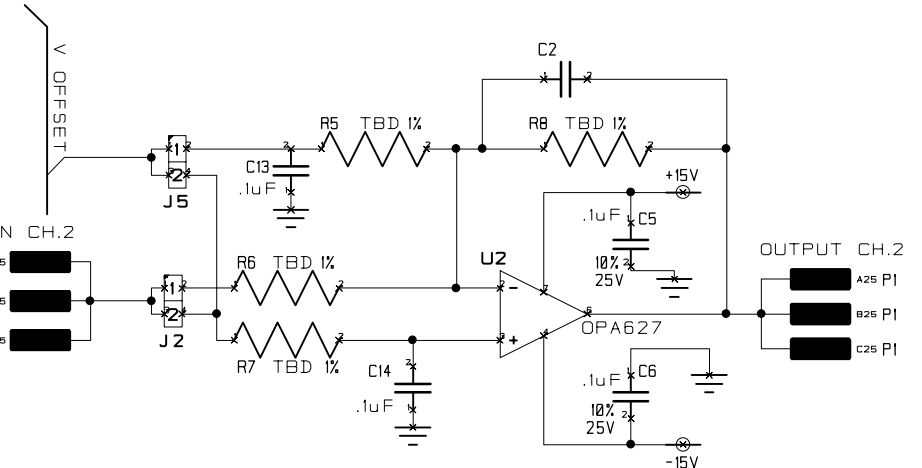
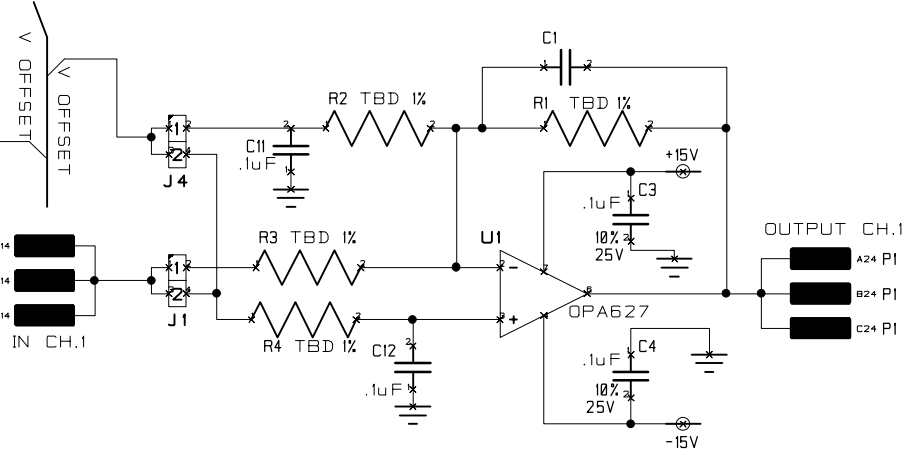
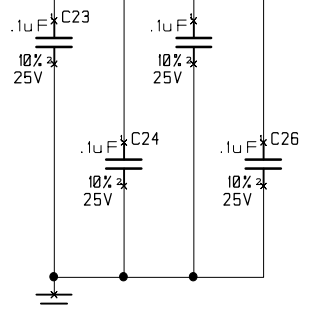
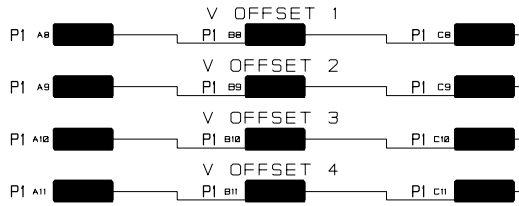
L1 SILKSCREEN

G.U.M.P. Daughter board - missing trace

back view of circuit board

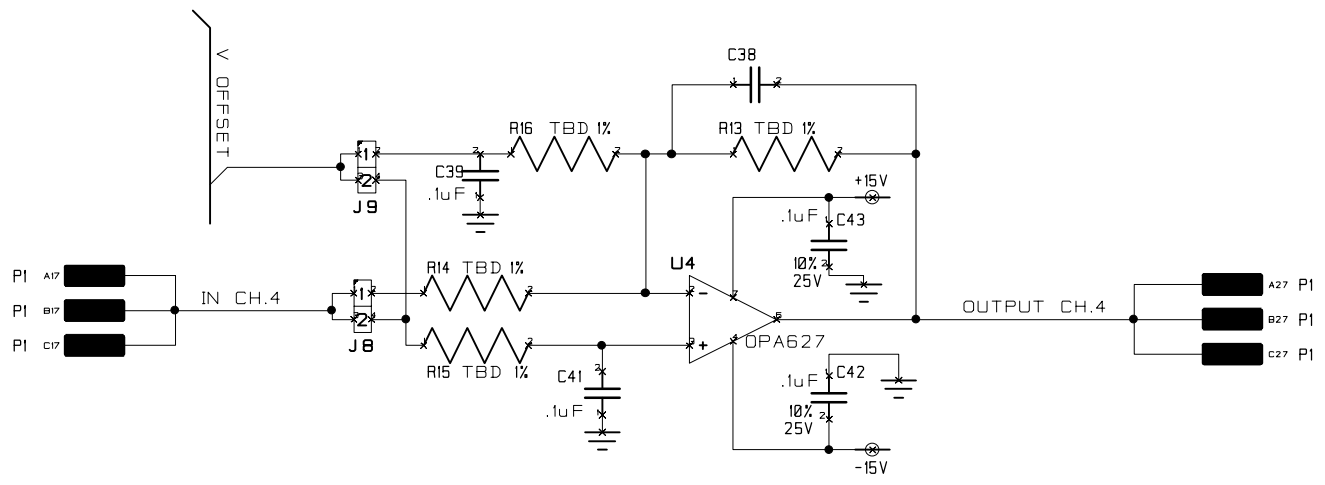
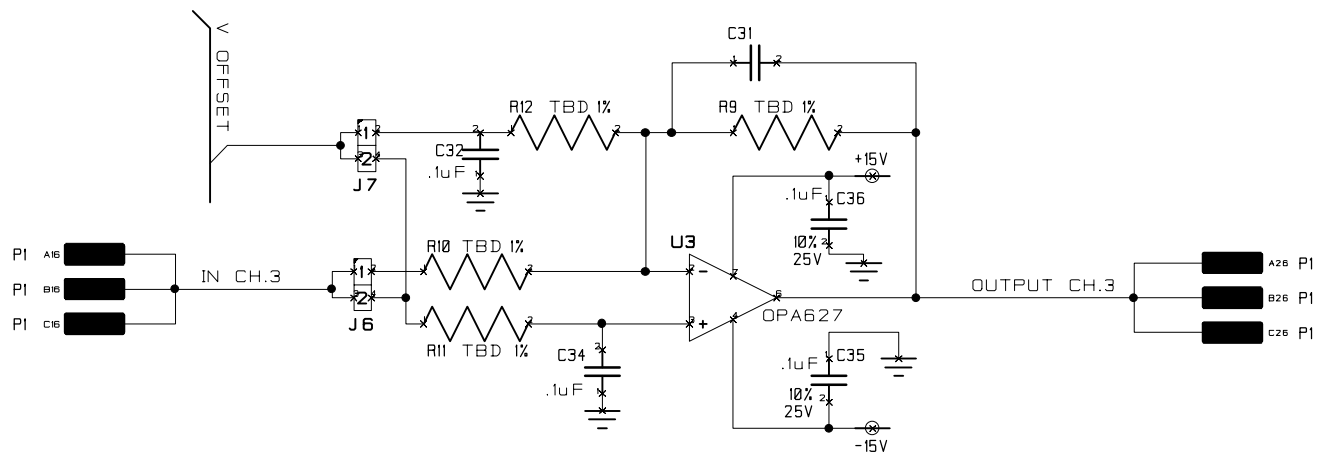


U4 pin 7 is missing the (+ V ) trace in the board.  
This is repaired with a JUMPER from U3 pin 7 to U4 pin 7

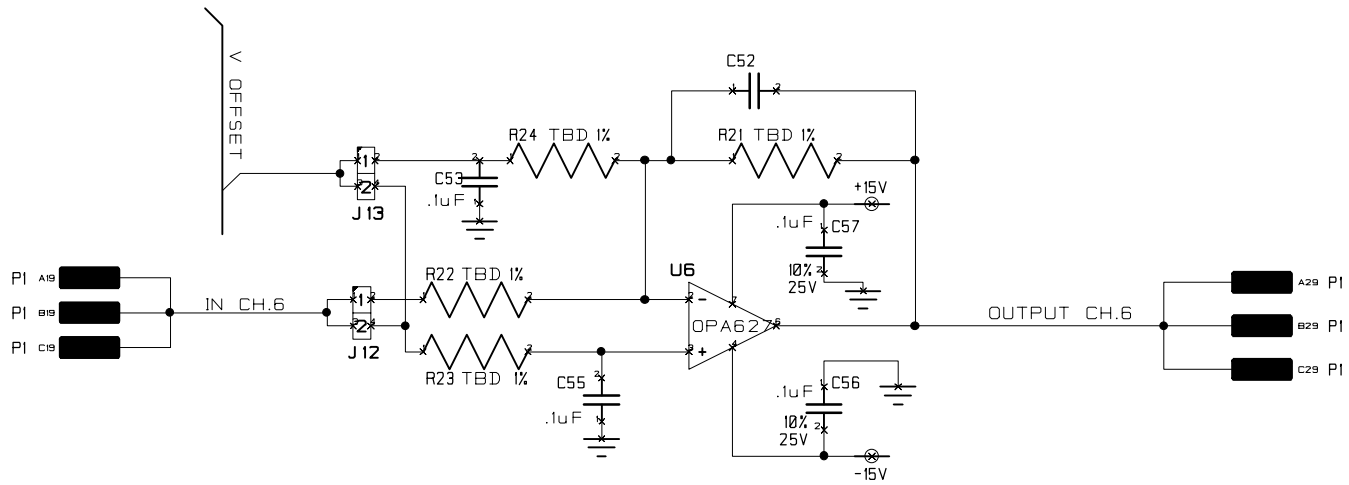
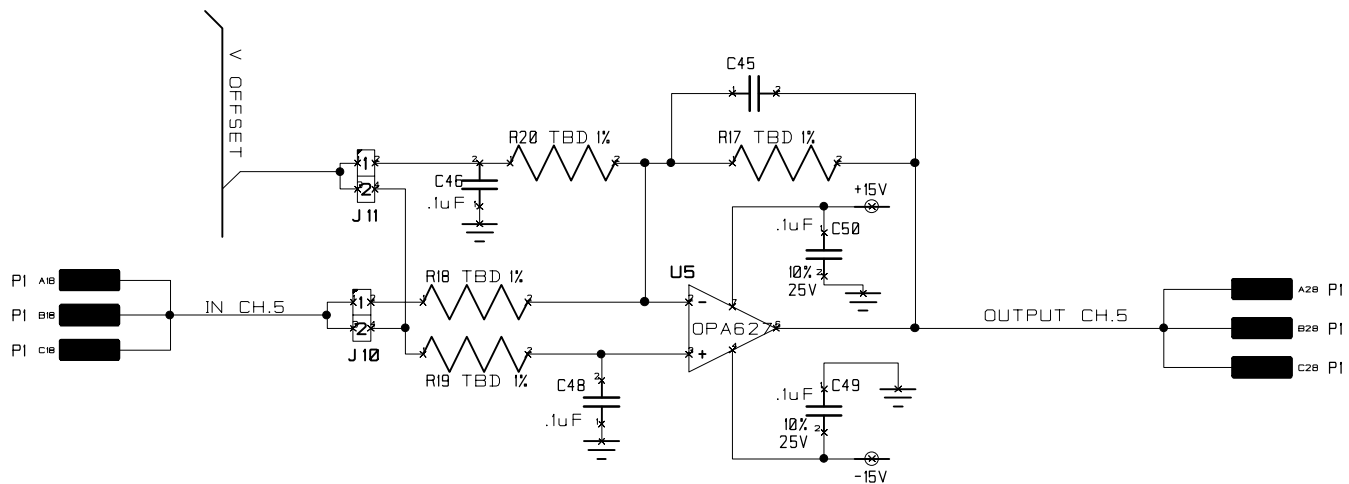


CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES, INC.			
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CHECKED		SCALE	PAUL ARBO	SHEET 2 of 5	
ISSUED					

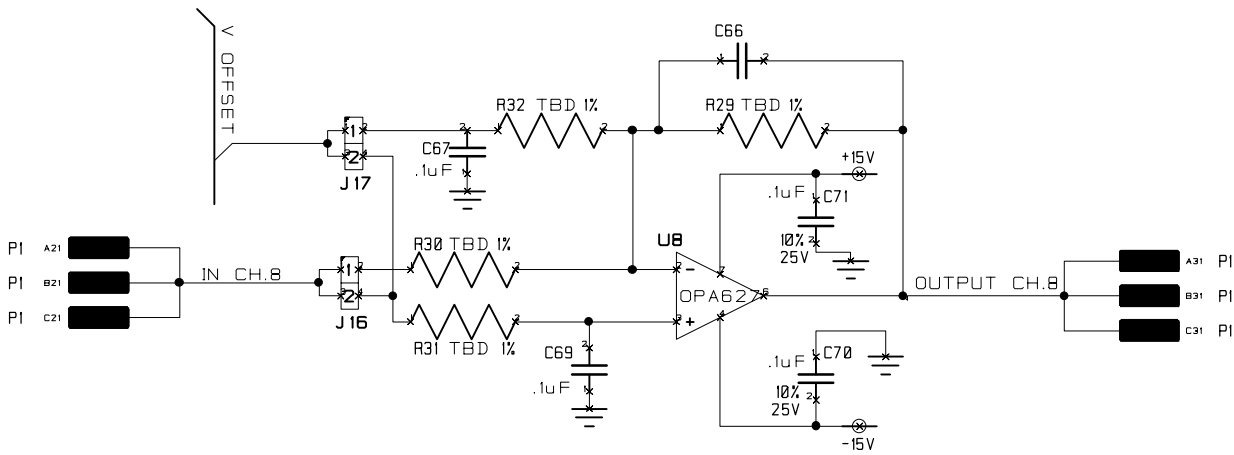
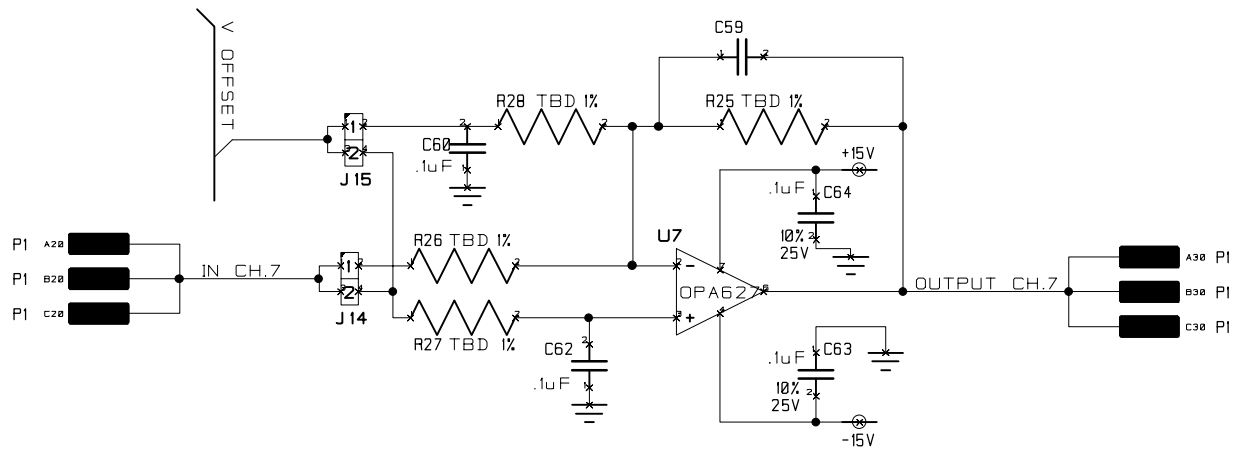




CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES, INC.			
APPROVALS	DATE	DWG PREAMP CH. 3-4			
DRAWN	7-27-99	SIZE	FSCM NO.	DWG NO.	REV.
CHECKED		A			
ISSUED		SCALE	PAUL ARBO	SHEET 3 of 5	



CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES, INC.			
APPROVALS	DATE	DWG PREAMP CH. 5-6			
DRAWN	7-27-99	SIZE A	FSCM NO.	DWG NO.	REV.
CHECKED		SCALE	PAUL ARBO	SHEET 4 of 5	
ISSUED					



CONTRACT NO.		COMPANY NAME INFRARED LABORATORIES, INC			
APPROVALS	DATE	DWG PREAMP CH. 7-8			
DRAWN	7-27-99	SIZE A	FSCM NO.	DWG NO.	REV.
CHECKED		SCALE	PAUL ARBO	SHEET 5 of 5	
ISSUED					

# G.U.M.P. Connecting Cables

Overall Cables Wiring Diagram

Analog Cable - A

Analog Cable - B

Clocks Cable

Bias Cable

Power Supply Cable

FPA # Function  
CLOCKS  
26 pin connector

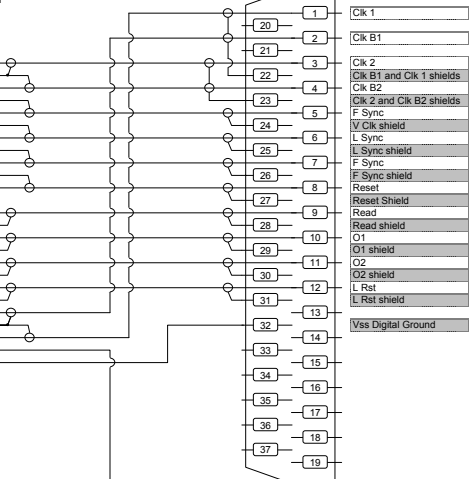
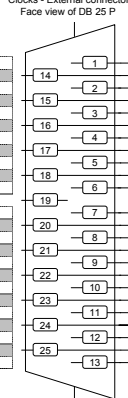
Clk 2	
Clk 2 and Clk B2 shields	
Clk B2	
V Clk shield	
V Clk	
L Sync shield	
L Sync	
F Sync shield	
F Sync	
Reset Shield	
Reset	
Read	
Read shield	
O1	
O1 shield	
O2	
O2 shield	
L Rst	
L Rst shield	
Clk B1	
Clk B1 and Clk 1 shields	
Clk 1	
Vdd (Digital Power)	
Vss Digital Ground	
(24 connections)	

Face view of DB 25 S



Clk 2	
Clk 2 and Clk B2 shields	
Clk B2	
V Clk shield	
V Clk	
L Sync shield	
L Sync	
F Sync shield	
F Sync	
Reset Shield	
Reset	
Read	
Read shield	
O1	
O1 shield	
O2	
O2 shield	
L Rst	
L Rst shield	
Clk B1	
Clk B1 and Clk 1 shields	
Clk 1	
Vdd (Digital Power)	
Vss Digital Ground	
(24 connections)	

Clocks - External connector  
Face view of DB 25 P



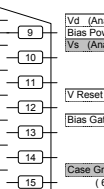
Clock Driver Board

Clk 1
Clk B1
Clk 2
Clk B1 and Clk 1 shields
Clk B2
Clk 2 and Clk B2 shields
F Sync
V Clk shield
L Sync shield
L Sync
F Sync shield
F Sync
F Sync shield
Reset
Reset Shield
Read
Read shield
O1
O1 shield
O2
O2 shield
L Rst
L Rst shield
Vss Digital Ground

FPA # Function  
BIAS  
18 pin connector

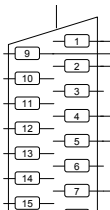
Vd (Analog Power)	
Bias Power	
Vs (Analog Ground)	
V Reset	
Bias Gate	
Case Ground	
(6 connections)	

Face view of DB 15 S

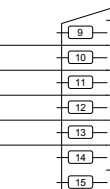


Vd (Analog Power)	
Bias Power	
Vs (Analog Ground)	
V Reset	
Bias Gate	
Case Ground	
(6 connections)	

Face view of DB15 P



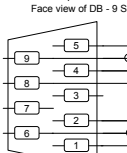
Face view of DB15 P



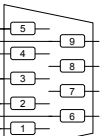
Video Board 0

V offset
+15 V preamp power
V reset
-15 V preamp power
Vd Analog
[CTL Bias
Vdd (Digital Power)
Bias Power
Vs Analog Ground

GUMP Preamp Connectors  
Face view of DB - 9 S



Face view of DB - 9 M

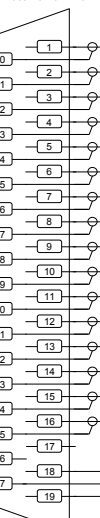


Customer Supplied  
Power Supply  
±15 VDC / > 3A

Outputs 1 to 16  
41 pin connector

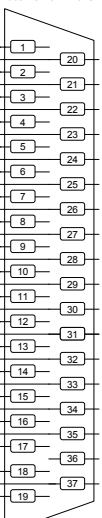
Output # 1	
shield / gnd	
Output # 2	
shield / gnd	
Output # 3	
shield / gnd	
Output # 4	
shield / gnd	
Output # 5	
shield / gnd	
Output # 6	
shield / gnd	
Output # 7	
shield / gnd	
Output # 8	
shield / gnd	
Output # 9	
shield / gnd	
Output # 10	
shield / gnd	
Output # 11	
shield / gnd	
Output # 12	
shield / gnd	
Output # 13	
shield / gnd	
Output # 14	
shield / gnd	
Output # 15	
shield / gnd	
Output # 16	
shield / gnd	
(32 connections)	

Face view of DB 37P



Analog Cable - A

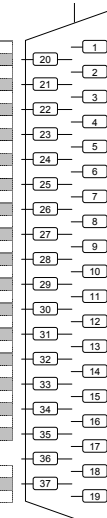
Face view of DB 37S



Functions

Output # 1	
shield / gnd	
Output # 2	
shield / gnd	
Output # 3	
shield / gnd	
Output # 4	
shield / gnd	
Output # 5	
shield / gnd	
Output # 6	
shield / gnd	
Output # 7	
shield / gnd	
Output # 8	
shield / gnd	
Output # 9	
shield / gnd	
Output # 10	
shield / gnd	
Output # 11	
shield / gnd	
Output # 12	
shield / gnd	
Output # 13	
shield / gnd	
Output # 14	
shield / gnd	
Output # 15	
shield / gnd	
Output # 16	
shield / gnd	
offset channels 1 - 8	
Ground	
offset channels 9 - 16	
(35 connections)	

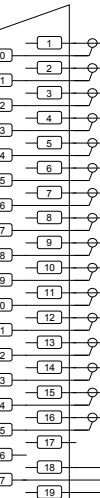
Face view of DB37 P



Outputs 1 to 16  
41 pin connector  
continued

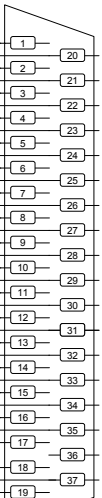
Output # 17	
shield / gnd	
Output # 18	
shield / gnd	
Output # 19	
shield / gnd	
Output # 20	
shield / gnd	
Output # 21	
shield / gnd	
Output # 22	
shield / gnd	
Output # 23	
shield / gnd	
Output # 24	
shield / gnd	
Output # 25	
shield / gnd	
Output # 26	
shield / gnd	
Output # 27	
shield / gnd	
Output # 28	
shield / gnd	
Output # 29	
shield / gnd	
Output # 30	
shield / gnd	
Output # 31	
shield / gnd	
Output # 32	
shield / gnd	
(32 connections)	

Face view of DB 37P



Analog Cable - B

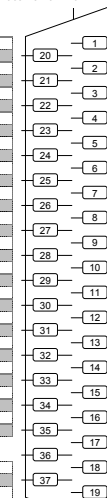
Face view of BD 37S



Functions

Output # 17	
shield / gnd	
Output # 18	
shield / gnd	
Output # 19	
shield / gnd	
Output # 20	
shield / gnd	
Output # 21	
shield / gnd	
Output # 22	
shield / gnd	
Output # 23	
shield / gnd	
Output # 24	
shield / gnd	
Output # 25	
shield / gnd	
Output # 26	
shield / gnd	
Output # 27	
shield / gnd	
Output # 28	
shield / gnd	
Output # 29	
shield / gnd	
Output # 30	
shield / gnd	
Output # 31	
shield / gnd	
Output # 32	
shield / gnd	
not used	
not used	
offset channels 1 - 8	
Ground	
offset channels 9 - 16	
(35 connections)	

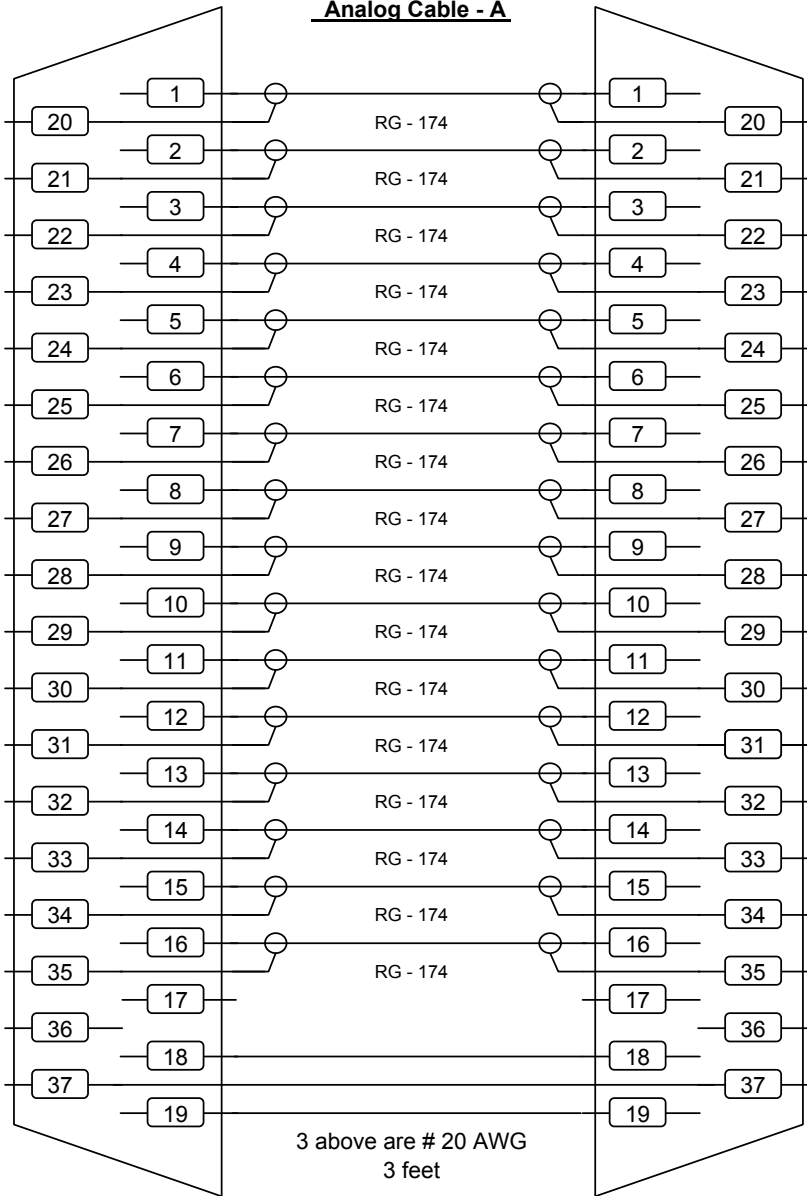
Face view of DB37 P



Face view of DB 37P

Face view of DB 37S

**Analog Cable - A**



Functions

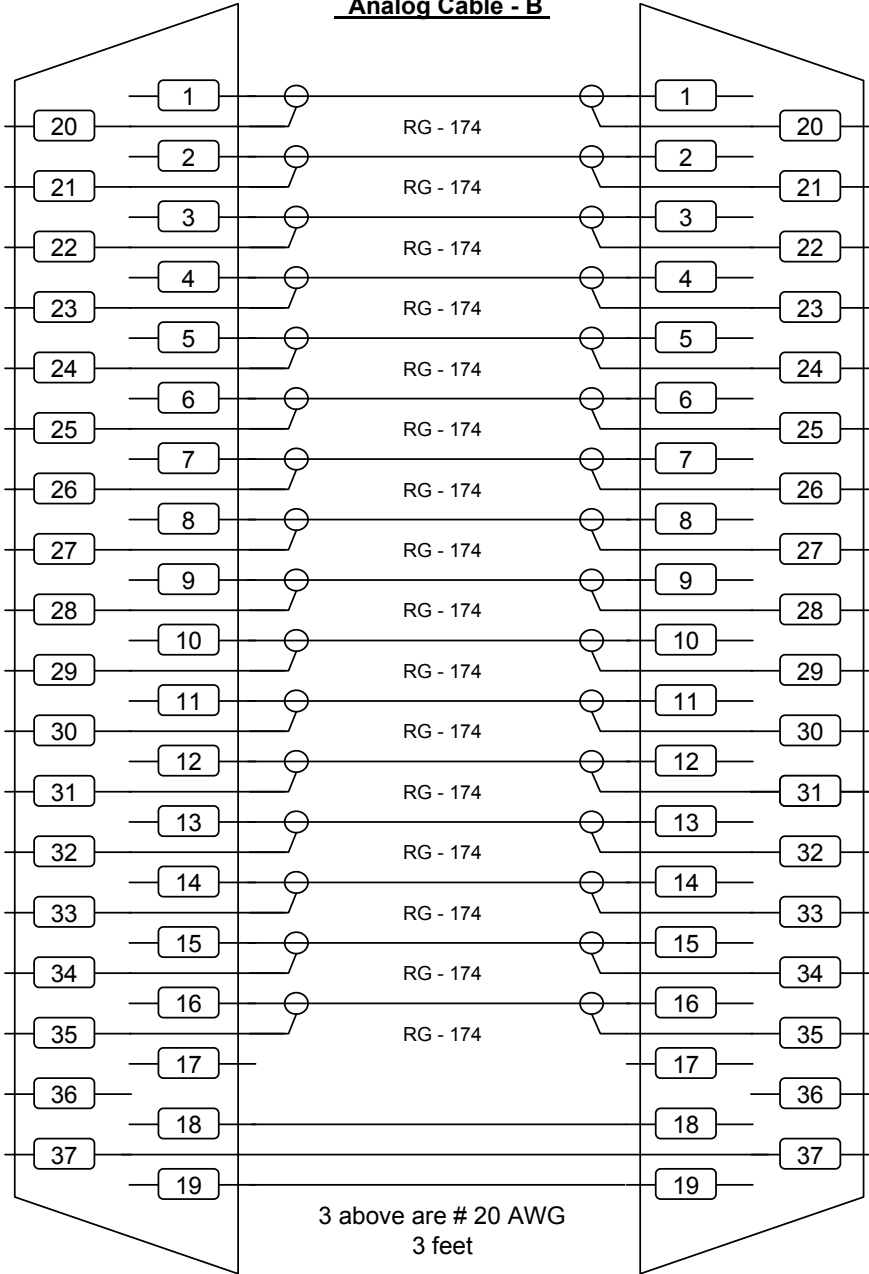
Output # 1
shield / gnd
Output # 2
shield / gnd
Output # 3
shield / gnd
Output # 4
shield / gnd
Output # 5
shield / gnd
Output # 6
shield / gnd
Output # 7
shield / gnd
Output # 8
shield / gnd
Output # 9
shield / gnd
Output # 10
shield / gnd
Output # 11
shield / gnd
Output # 12
shield / gnd
Output # 13
shield / gnd
Output # 14
shield / gnd
Output # 15
shield / gnd
Output # 16
shield / gnd

offset channels 1 - 8
Ground
offset channels 9 - 16
( 35 connections )

Face view of DB 37P

Face view of BD 37S

**Analog Cable - B**



Functions

Output # 17
shield / gnd
Output # 18
shield / gnd
Output # 19
shield / gnd
Output # 20
shield / gnd
Output # 21
shield / gnd
Output # 22
shield / gnd
Output # 23
shield / gnd
Output # 24
shield / gnd
Output # 25
shield / gnd
Output # 26
shield / gnd
Output # 27
shield / gnd
Output # 28
shield / gnd
Output # 29
shield / gnd
Output # 30
shield / gnd
Output # 31
shield / gnd
Output # 32
shield / gnd
not used
not used
offset channels 1 - 8
Ground
offset channels 9 - 16
( 35 connections )





Function

**BIAS**  
18 pin connector

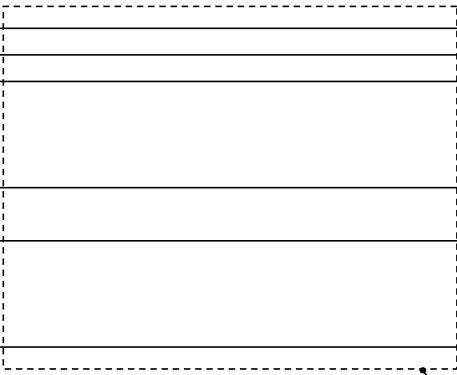
Face view of DB15 S

Vd (Analog Power)	A
Bias Power	B
Vs (Analog Ground)	C

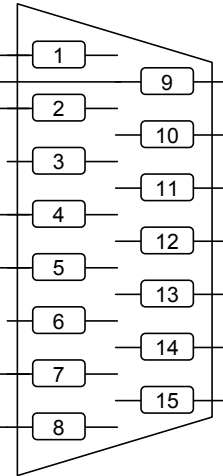
V Reset	D
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Bias Gate	E
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Case Ground ( 6 connections)	F
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Beldon # 8777  
3 feet

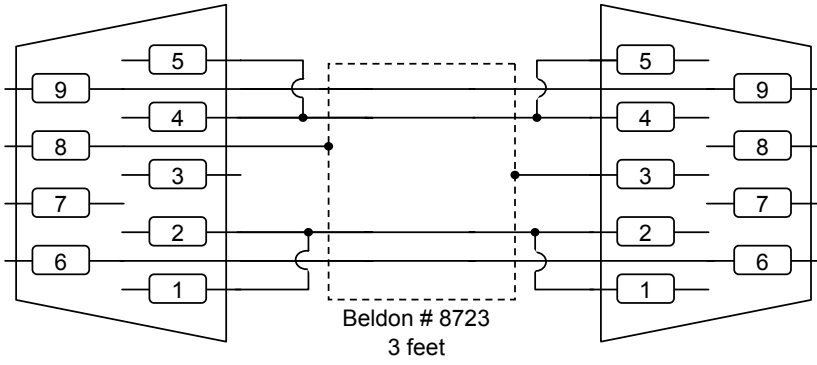


Function

-15 V preamp power
Vs Analog Ground
-15 V preamp power
Vs Analog Ground
Vs Analog Ground
Vs Analog Ground
+15 V preamp power
Vs Analog Ground
+15 V preamp power

GUMP Preamp Connectors  
Face view of DB - 9 S

Face view of DB - 9 M



Signal trace list  
from input to output  
on preamp

Daughter Card  
to Main board  
mount position  
# 1

Daughter Card  
to Main board  
mount position  
# 2

Daughter Card  
to Main board  
mount position  
# 3

Daughter Card  
to Main board  
mount position  
# 4

41 pin	Daughter Card Edge connector # on Main board	Daughter Cards channel #	Daughter cards output to mainboard connector #	GUMP output signal on DB37 #
B	P2 - 14	1	P2 - 24	P6 - A1
C	P2 - 15	2	P2 - 25	P6 - A2
D	P2 - 16	3	P2 - 26	P6 - A3
E	P2 - 17	4	P2 - 27	P6 - A4
F	P2 - 18	5	P2 - 28	P6 - A5
G	P2 - 19	6	P2 - 29	P6 - A6
H	P2 - 20	7	P2 - 30	P6 - A7
J	P2 - 21	8	P2 - 31	P6 - A8
M	P3 - 14	1	P3 - 24	P6 - A9
N	P3 - 15	2	P3 - 25	P6 - A10
P	P3 - 16	3	P3 - 26	P6 - A11
R	P3 - 17	4	P3 - 27	P6 - A12
S	P3 - 18	5	P3 - 28	P6 - A13
T	P3 - 19	6	P3 - 29	P6 - A14
U	P3 - 20	7	P3 - 30	P6 - A15
V	P3 - 21	8	P3 - 31	P6 - A16
Y	P4 - 14	1	P4 - 24	P6 - B1
Z	P4 - 15	2	P4 - 25	P6 - B2
a	P4 - 16	3	P4 - 26	P6 - B3
b	P4 - 17	4	P4 - 27	P6 - B4
c	P4 - 18	5	P4 - 28	P6 - B5
d	P4 - 19	6	P4 - 29	P6 - B6
e	P4 - 20	7	P4 - 30	P6 - B7
f	P4 - 21	8	P4 - 31	P6 - B8
I	P5 - 14	1	P5 - 24	P6 - B9
j	P5 - 15	2	P5 - 25	P6 - B10
k	P5 - 16	3	P5 - 26	P6 - B11
m	P5 - 17	4	P5 - 27	P6 - B12
n	P5 - 18	5	P5 - 28	P6 - B13
p	P5 - 19	6	P5 - 29	P6 - B14
q	P5 - 20	7	P5 - 30	P6 - B15
r	P5 - 21	8	P5 - 31	P6 - B16
A	GND			
K	GND			
L	GND			
W	GND			
X	GND			
g	GND			
h	GND			
s	GND			
t	not used			

Preamp Model : G.U.M.P. x32 channels

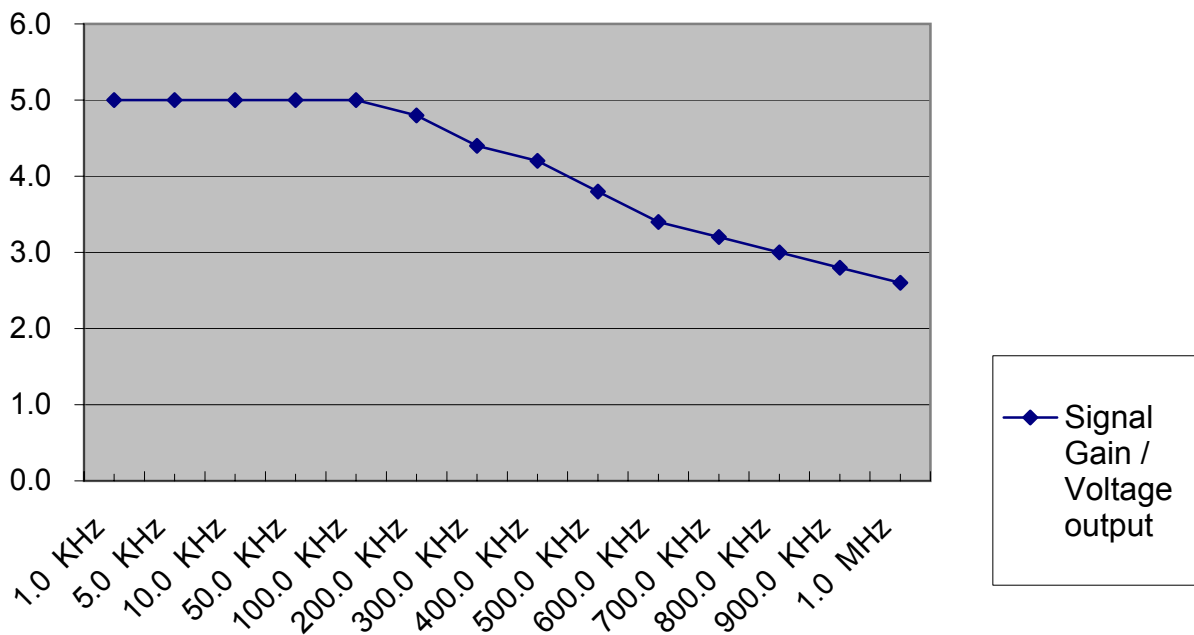
Test Date : 2/18/05

Power Supply Voltage =  $\pm 15.00$  VDC (tested at circuit board)

Circuit Offset Voltage = 0.0 VDC (Grounded)

Test OP AMP # OPA627AP

## Voltage output Compared to Frequency Input



All channels were tested and gave the same results.

< 15 minutes Current draw = 290mA

~ 30 minutes Current draw = 300mA

~ 60 minutes Current draw = 230mA (circuit stabilized, enclosure warm)

~ 120 minutes Current draw = 230mA (no other changes)

Voltage measurement tolerance is  $\pm 2\%$

Frequency input at 1 volt P-P	Signal Gain / Voltage output
1.0 KHz	5.0
5.0 KHz	5.0
10.0 KHz	5.0
50.0 KHz	5.0
100.0 KHz	5.0
200.0 KHz	4.8
300.0 KHz	4.4
400.0 KHz	4.2
500.0 KHz	3.8
600.0 KHz	3.4
700.0 KHz	3.2
800.0 KHz	3.0
900.0 KHz	2.8
1.0 MHz	2.6