"LINE 2 REPAIR MANUAL"

SONIC FRONTIERS INCORPORATED

LINE 2 - REPAIR MANUAL

SONIC FRONTIERS warranty repair work shall be performed only by qualified electronics technicians. Work done by non-authorized SONIC FRONTIERS service locations and/or dealers is not covered under the SONIC FRONTIERS warranty. Damage caused by service attempted by one other than our authorized service bureaus is not covered under the warranty.

Please read these instructions before attempting any service work. They are intended to aid the electronics technician in making the proper diagnosis in repairing the Line 2 preamplifier.

Normal Operation

The following points have been found to be the most frequent areas of concern from customers, **no fault exists in the Line 2 in each case**.

1. Some hiss in speakers.
   - The Line 2 incorporates 6 vacuum tubes and will inherently make more hiss noise than a solid state product. Typical noise output is no more than 120µV per phase with the volume control fully counter-clockwise.
   - Sensitive amplifiers and sensitive speakers will reveal this hiss more readily than average sensitivity amplifiers and speakers, example: an amplifier with an input sensitivity of $0.775V_{rms}$ and speakers with a sensitivity of 90dB SPL @1W, 1m anechoic would be considered moderately sensitive.

All components listed in the text will have the same designation for both channels but with an 'L' prefix for Left channel components. For this reason, all parts will be referred to by Left channel only. Example: resistors LR43 and R43; the resistor LR43 is found in the Left channel and R43 is in the Right channel.

Filament Supply Voltages

1. Filament voltage should be measured across pins 4 and 5 of the following tubes: LV1and LV3. A reading of 6.0Vdc to 6.3Vdc is acceptable, any voltages higher or lower must be

2. If one channel has no filament voltage present, check the bridge rectifier for the filament section, LBR1 in the Power Supply chassis. Replace if needed and place a heat sink on both the filament bridge rectifier devices; this will improve heat dissipation.

3. If only tubes LV1 and LV2 are not lighting, check regulator LIC2 in the Power Supply chassis. If only tubes LV3 and LV4 are not lighting, check regulator LIC1.

High Voltage Supplies

Note: The following voltages are measured referenced to chassis ground or an audio ground (RCA jack sleeve is sufficient).

1. With the Power supply switched to ON and the STANDBY position, check the voltages

Power Supply	Mode of Operation		
Pin Number	Standby	Operate	Muted

SONIC FRONTIERS INCORPORATED

1	6.1	5.4	
2	-12.1	-12.1	
3	18.3	18	
4	5.1	1.5	5.3
5	-0.1	-123	
6	0	0	
7	10.9	0.1	
8	9.9	9.2	
9	-4.7	270	
10	-1	146	
11	0.2	1.5	5.3
12	6.15	6.15	
13	6.15	6.15	
14	6.15	6.15	
15	0	0	
16	0	0	

Front View

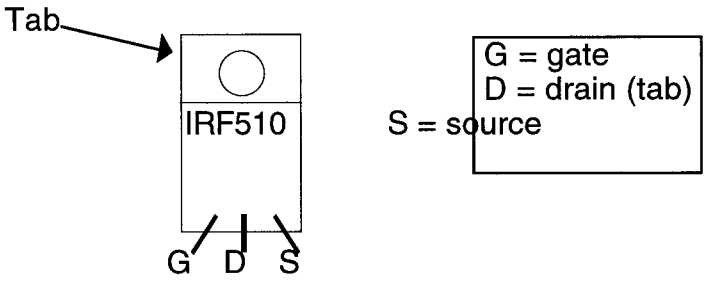


Figure 1

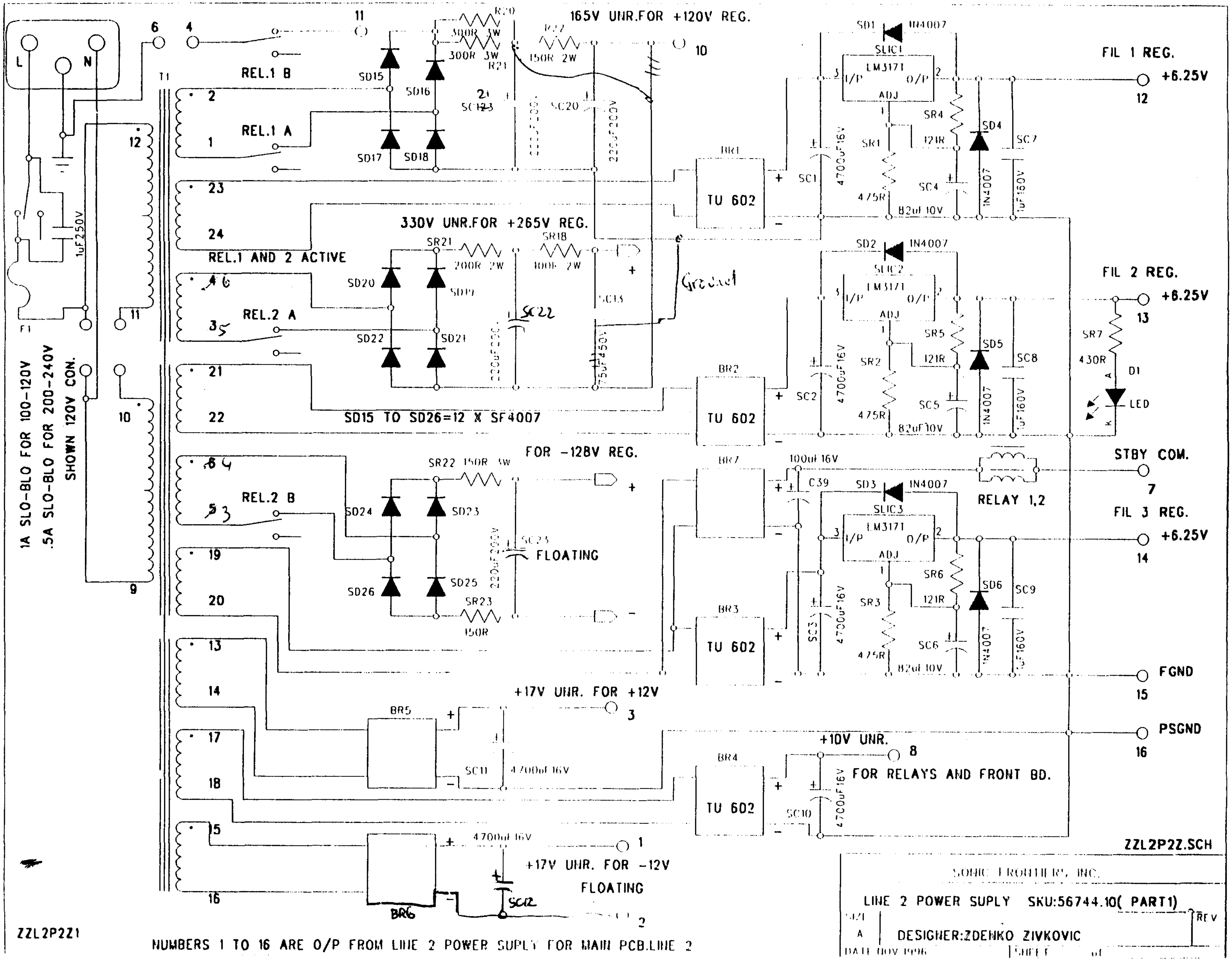
2. Place a voltmeter probe on the tab (drain) of Q3 or LQ3 and switch the Power supply to the OPERATE position. The voltage should ramp up to approximately 285Vdc ±10V within 40 seconds. If the voltage goes immediately to 300Vdc after switching to OPERATE, there is a problem in the first High Voltage regulation stages at LQ2 and LQ5. Check these components as well as each string of Zener diodes from LZD1 to LZD15. (If the circuit board is a REV.0 board, refer to Ed's Tech Notes - Power Supply Update for the SFL-2).

3. Measure the voltage on the tab of LQ6, the voltage should be approximately 155Vdc ±10V.

4. Measure the voltage at the source pin of LQ3, the voltage should be exactly 10Vdc less than the voltage measured on the tab. If this voltage is not 10V less, there is a problem in the buffer regulator. Check diodes LZD10 and D4-D6. Check LQ3 and replace LIC1 if necessary.

5. Measure the voltage on the source of LQ6, the voltage should be exactly 10Vdc less than the voltage measured on the tab. If this voltage is not 10V less, check LZD16, LD10 and LD14. Check LQ6 and replace LIC2 if necessary.

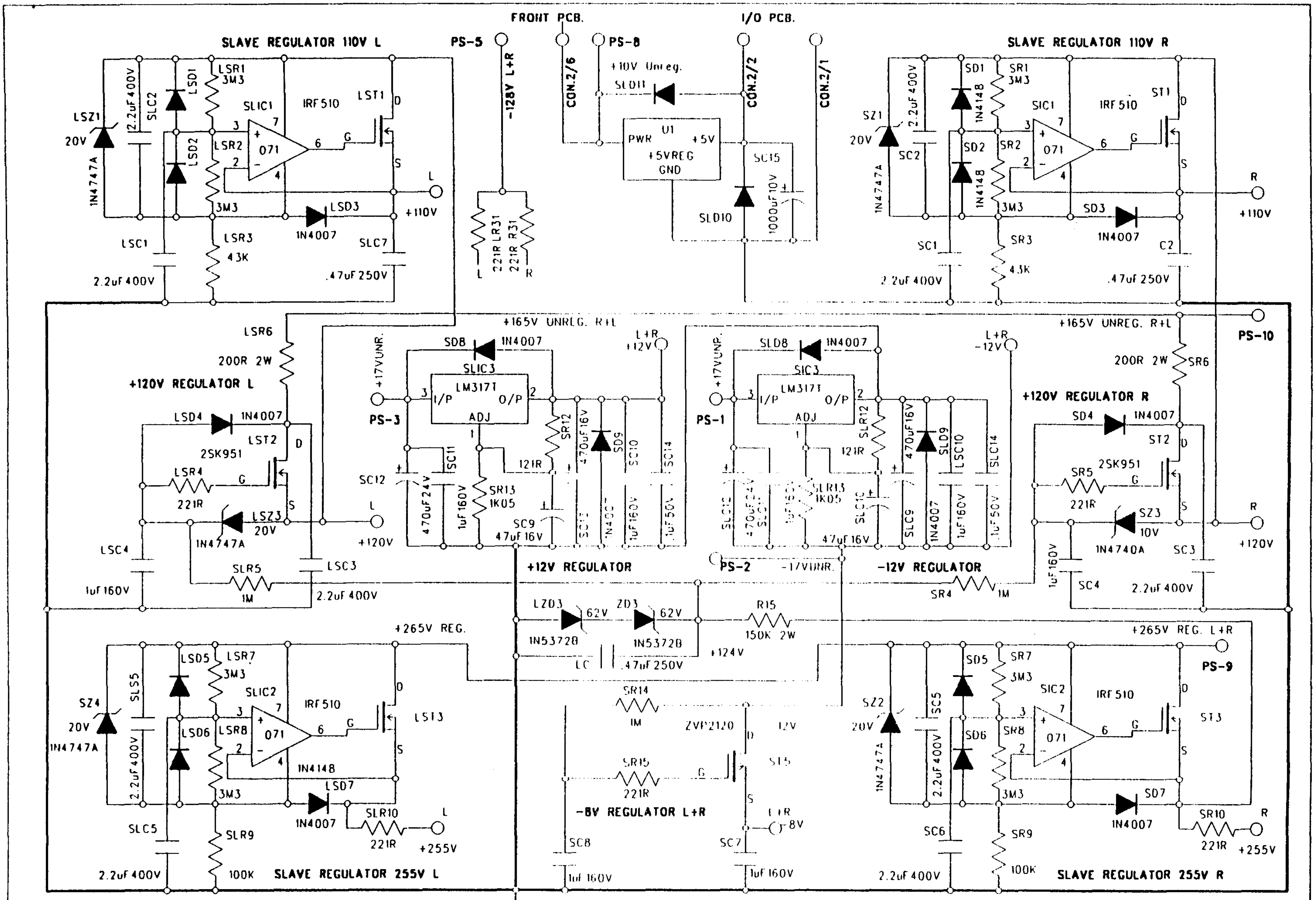
Noise (Example case for noise in Left channel)


165V UNR.FOR +120V REG.
330V UNR.FOR +265V REG.
FOR -128V REG.
FLOATING
REL.1 B
REL.1 A
REL.1 AND 2 ACTIVE
REL.2 A
REL.2 B
SD15 TO SD26=12 X SF4007
1A SLO-BLO FOR 100-120V
.5A SLO-BLO FOR 200-240V
SHOWN 120V CON.
TU 602
LM317T
FIL 1 REG.
+6.25V
FIL 2 REG.
+6.25V
FIL 3 REG.
+6.25V
STBY COM.
RELAY 1,2
FGND
PSGND
+17V UNR. FOR +12V
+10V UNR.
FOR RELAYS AND FRONT BD.
+17V UNR. FOR -12V
FLOATING
ZZL2P2Z.SCH
SONIC FRONTIERS, INC.
LINE 2 POWER SUPLY SKU:56744.10(PART1)
DESIGNER:ZDENKO ZIVKOVIC
DATE NOV 1996
ZZL2P2Z1
NUMBERS 1 TO 16 ARE O/P FROM LINE 2 POWER SUPLY FOR MAIN PCB.LINE 2

SONIC FRONTIERS
INCORPORATED

1. Reverse tubes LV1 and V1. If the noise is no longer in the Left channel but now in the Right channel, the noise problem was noisy tube LV1. If the noise remained in the Left channel, switch tubes LV2 and V2. If the noise is no longer in the Left channel but now in the Right channel, the noise problem was noisy tube LV2.

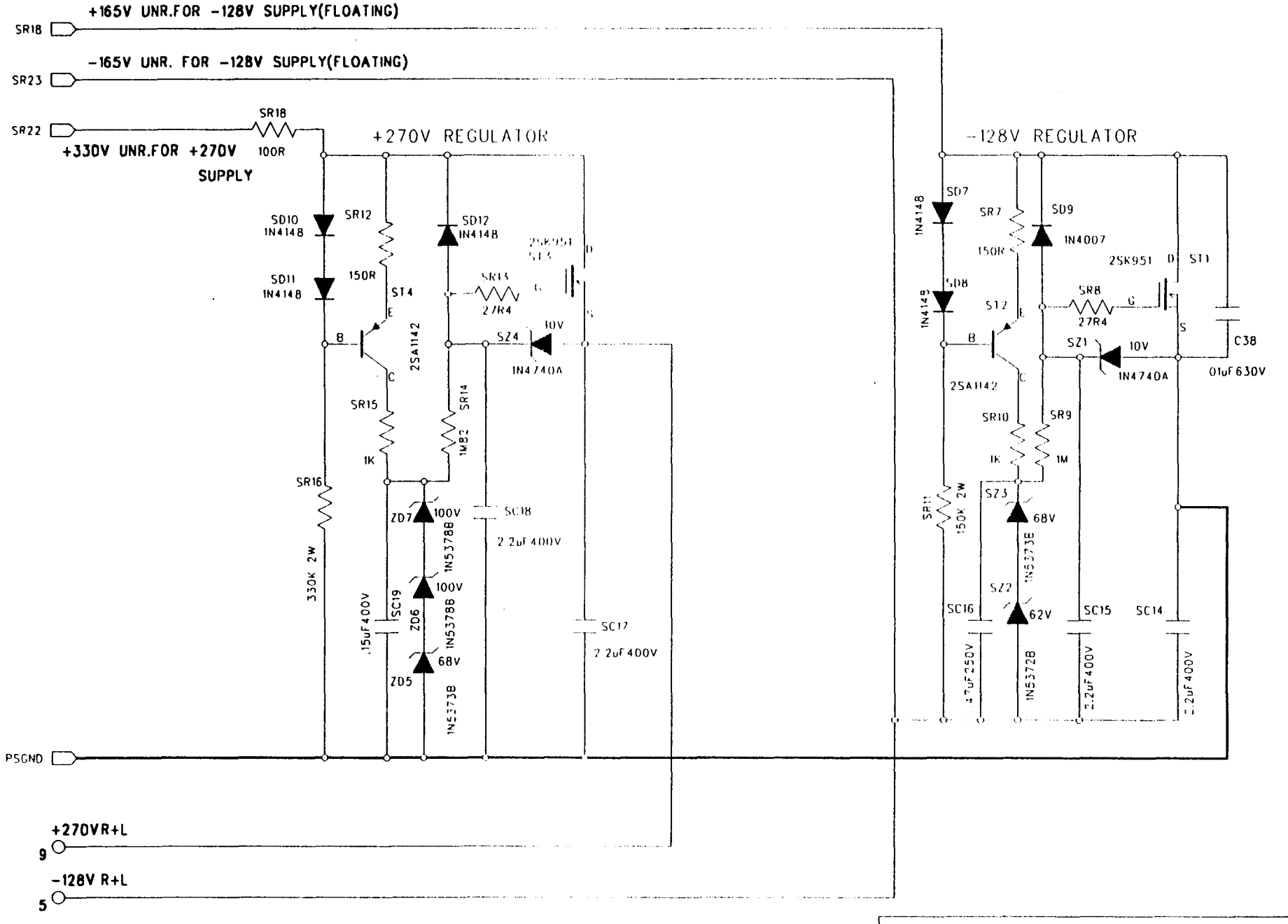
2. If after reversing tubes LV1 and V1 or LV2 and V2 did not find the noise, listen to the output of the Line 2 through the unbalanced outputs only for this next test. Switch between 0^0 Phase and 180^0 Phase, if the noise is only present in the 0^0 Phase, replace resistor LR. If the noise is only in the 180^0 Phase, replace resistor LR. If the noise is in both Phases of the output replace resistors LR and LR.

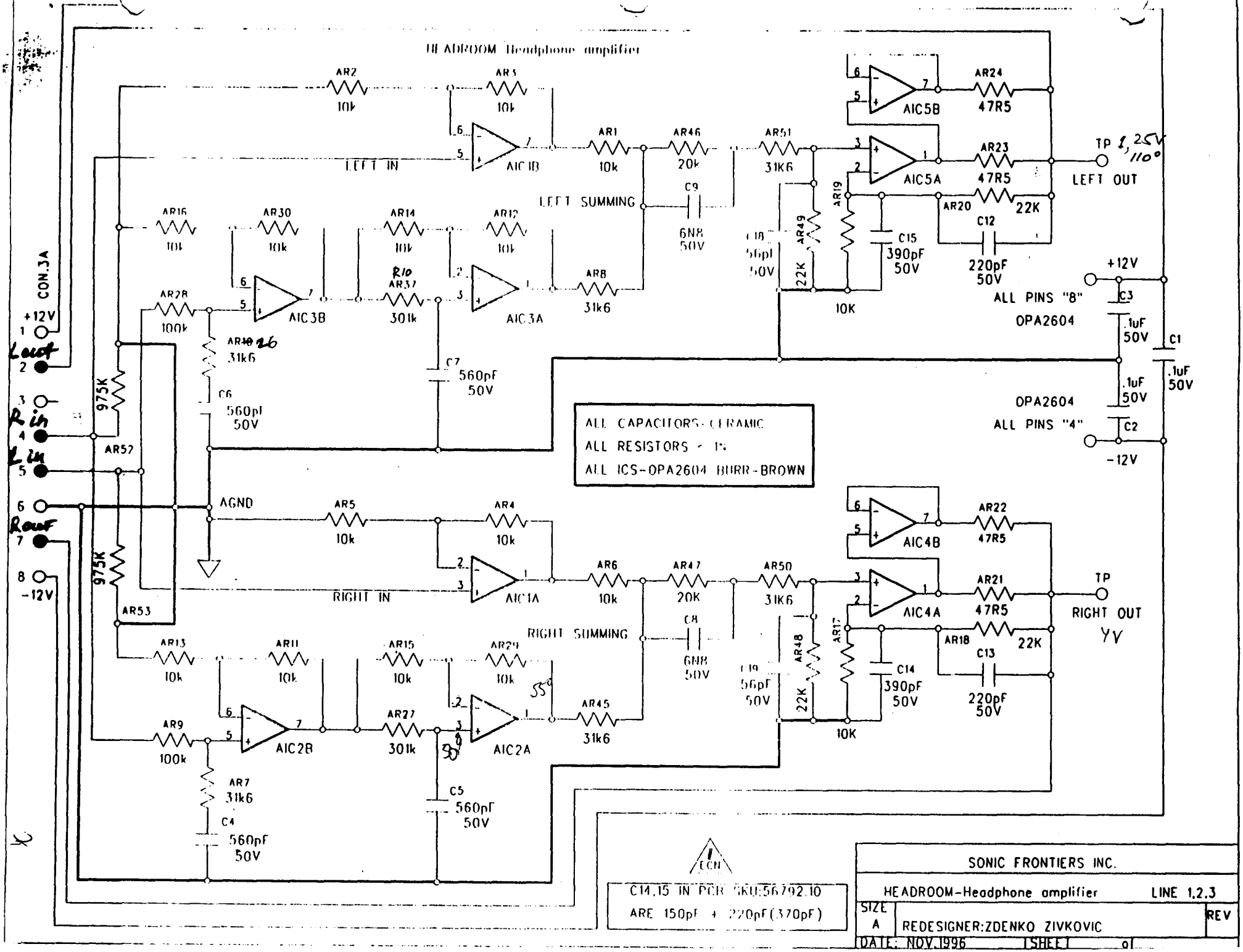

FRONT PCB.
I/O PCB.
SLAVE REGULATOR 110V L
SLAVE REGULATOR 110V R
PS-5
PS-8
-128V L+R
CON.2/6
CON.2/2
CON.2/1
+10V Unreg.
SLD11
U1
PWR
+5V
+5VREG
GND
SC15
SLD10
1000uF10V
221R LR31
221R R31
LSZ1
20V
1N4747A
2.2uF400V
SLC2
LSD1
LSD2
LSR1
3M3
LSR2
LSR3
4.3K
SLIC1
071
IRF510
LST1
LSD3
1N4007
+110V
LSC1
SLC7
.47uF 250V
SZ1
SC2
SD1
SD2
1N4148
SR1
SR2
SR3
SIC1
ST1
SD3
SC1
C2
+165V UNREG. R+L
PS-10
LSR6
200R 2W
+120V REGULATOR L
+120V REGULATOR R
LSD4
LST2
2SK951
LSR4
221R
LSZ3
1N4747A
LSC4
1uF160V
LSR5
1M
LSC3
+120V
SD8
SLIC3
LM317T
I/P
O/P
ADJ
+17VUNR.
PS-3
SC12
470uF24V
SC11
1uF160V
SR13
1K05
SR12
121R
SC9
47uF16V
SD9
470uF16V
SC10
SC14
1uF50V
L+R
+12V
+12V REGULATOR
SLD8
SIC3
PS-1
SLR12
SLD9
LSC10
SLC14
-12V
SLR13
PS-2
-17VUNR.
-12V REGULATOR
SR6
SD4
ST2
SR5
SZ3
10V
1N4740A
SC3
SC4
SR4
LZD3
62V
ZD3
1N5372B
R15
150K 2W
+124V
LC
.47uF 250V
+265V REG.
+265V REG. L+R
PS-9
SZ4
SLS5
LSD5
LSD6
LSR7
LSR8
SLIC2
LST3
1N4148
LSD7
SLR10
+255V
SLC5
SLR9
100K
SLAVE REGULATOR 255V L
SR14
ZVP2120
ST5
SR15
-8V REGULATOR L+R
-8V
SC8
SC7
SZ2
SC5
SD5
SD6
SR7
SR8
SIC2
ST3
SD7
SR10
SC6
SR9
SLAVE REGULATOR 255V R

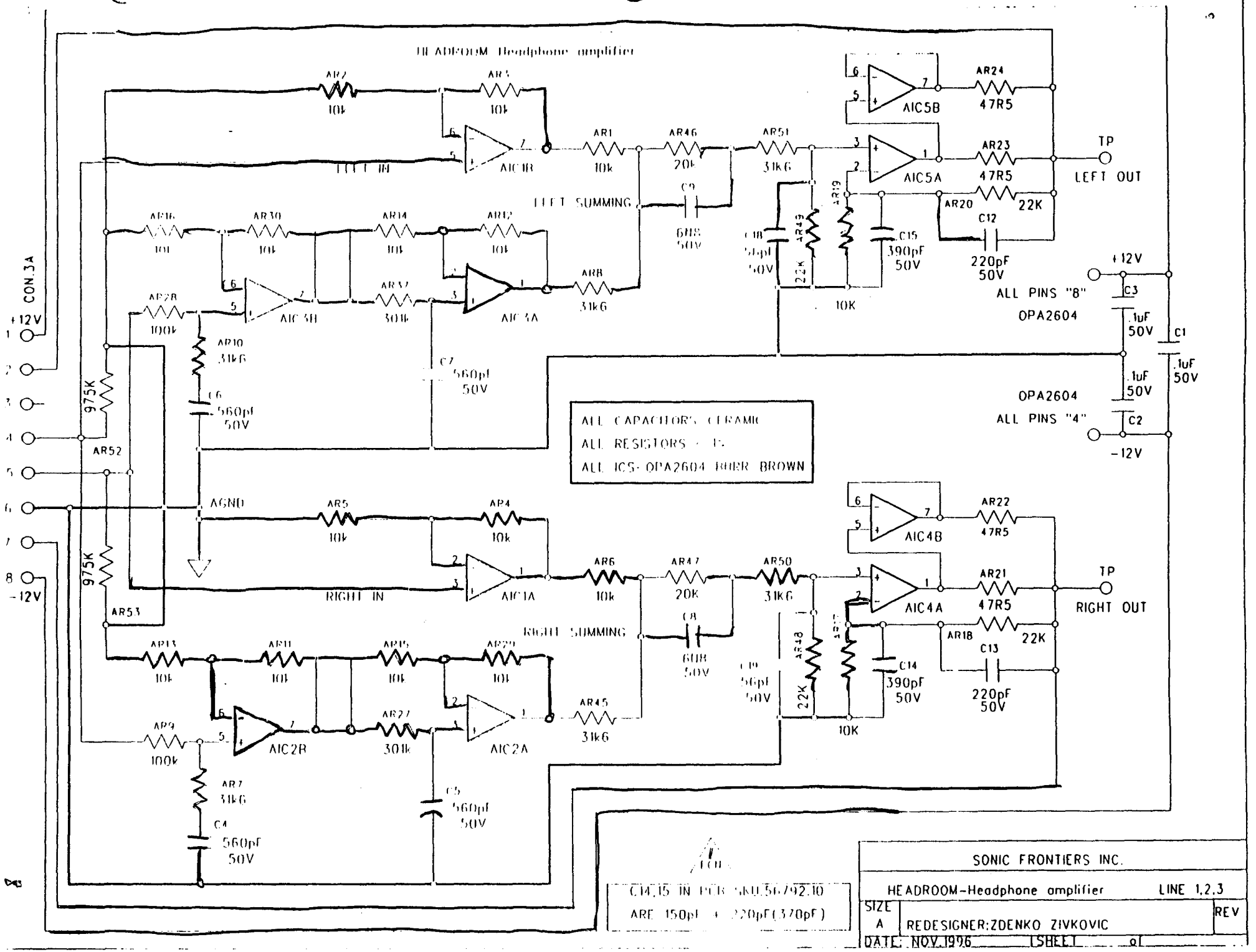
PS-• =SUPPLY FROM POWER SUPPLY LINE 2

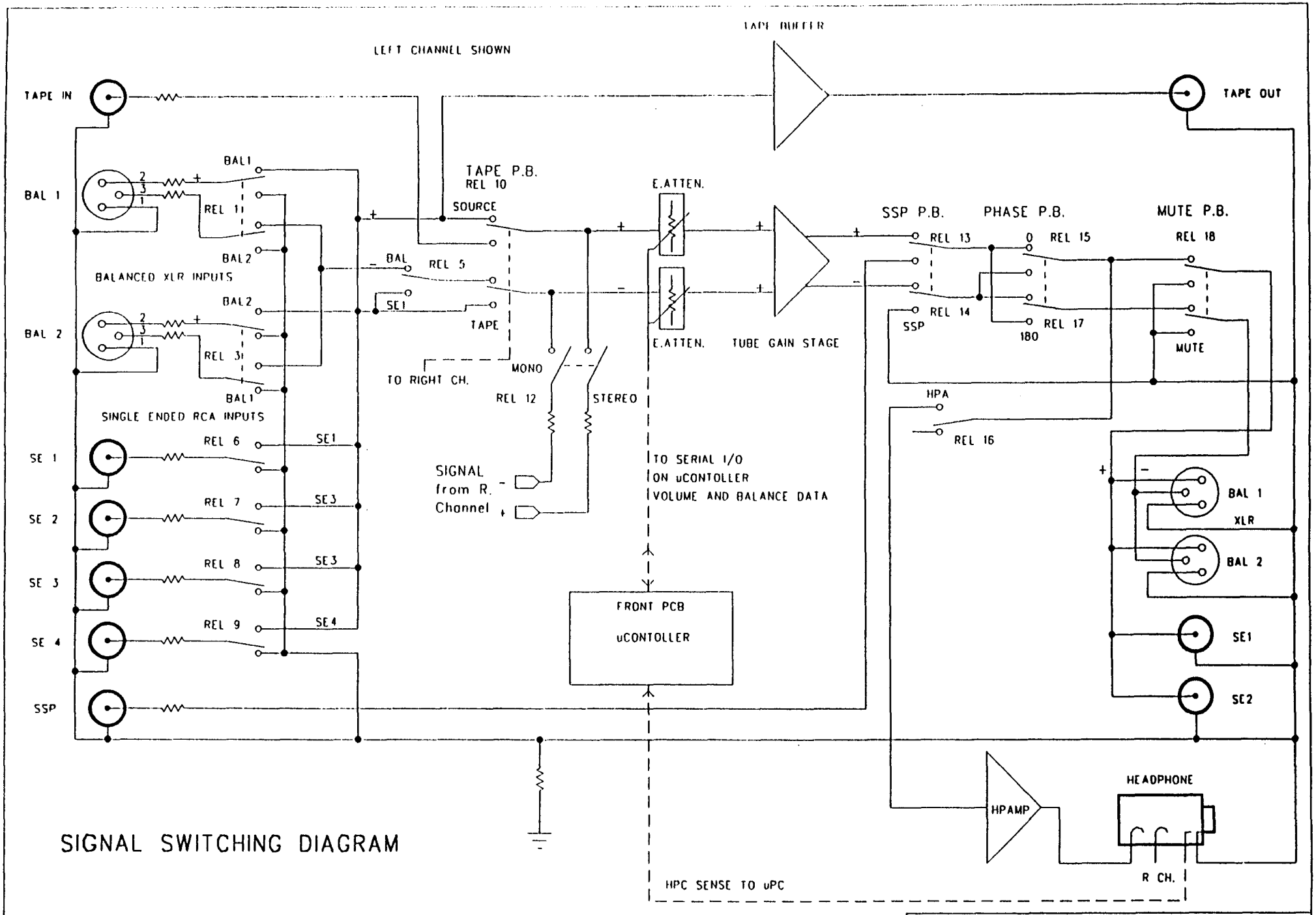
ZZL2P.

SONIC FRONTIERS INC.		
LINE 2 MAIN BOARD -POWER SUPPLY PART		
SIZE A	DOCUMENT NUMBER DESIGNER:ZDENKO ZIVKOVIC	REV
DATE: NOV.1996	SHEET of	


+165V UNR.FOR -128V SUPPLY(FLOATING)
SR18
-165V UNR. FOR -128V SUPPLY(FLOATING)
SR23
SR22
+330V UNR.FOR +270V SUPPLY
SR18
100R
+270V REGULATOR
-128V REGULATOR
SD10 1N4148
SR12
150R
SD11 1N4148
ST4
2SA1142
SD12 1N4148
SR13
27R4
2SK951
ST3
SZ4
10V
1N4740A
SR15
1K
SR14
1W82
SR16
330K 2W
ZD7
100V
1N5378B
ZD6
100V
1N5378B
ZD5
68V
1N5373B
SC19
.15uF400V
SC18
2.2uF400V
SC17
2.2uF400V
SD7 1N4148
SR7
150R
SD9 1N4007
SD8 1N4148
ST2
2SA1142
SR8
27R4
2SK951
ST1
SZ1
10V
1N4740A
C38
.01uF630V
SR10
1K
SR9
1M
SR11
150K 2W
SZ3
68V
1N5373B
SZ2
62V
1N5372B
SC16
4.7uF250V
SC15
2.2uF400V
SC14
2.2uF400V
PSGND
+270VR+L
9
-128V R+L
5
NUMBERS 1 TO 16 ARE O/P FROM LINE 2 POWER SUPLY FOR MAIN PCB.LINE 2
ZZLP2Z1
SONIC FRONTIERS INC.
LINE2 POWER SUPPLY(PART 2) SKU.56744.10
SIZE A
DESIGNER:ZDENKO ZIVKOVIC
REV 0
DATE:NOV. 1996
SHEET 9!

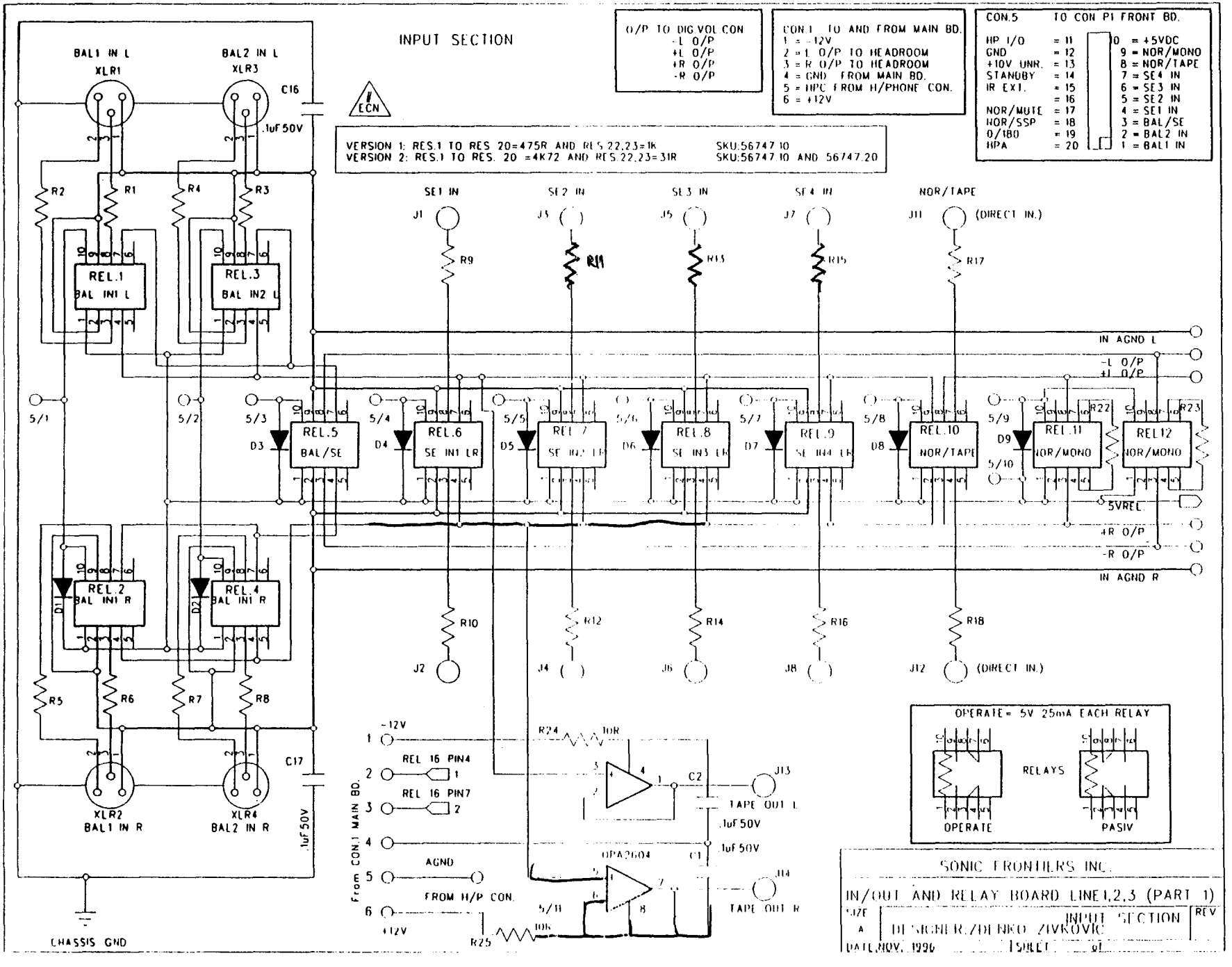






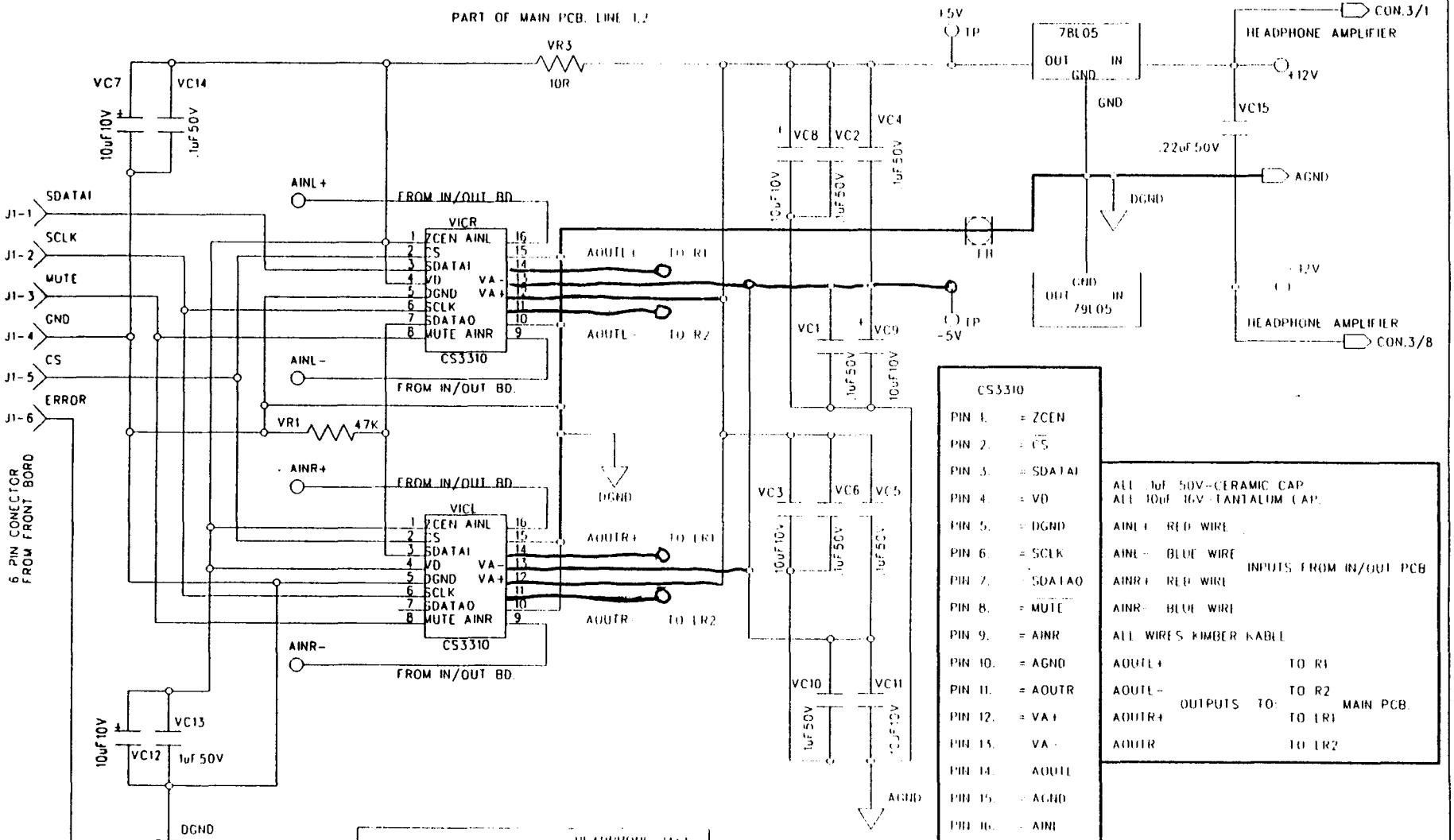
SIGNAL SWITCHING DIAGRAM

SONIC FRONTIERS INC.		
Line Stage Signal Switching		line -1,2, 3
SIZE A	DESIGNER:ZDENKO ZIVKOVIC	REV
	SHEET 01	


INPUT SECTION
O/P TO DIG.VOL CON
-L O/P
+L O/P
+R O/P
-R O/P
CON.1 TO AND FROM MAIN BD.
1 = -12V
2 = L O/P TO HEADROOM
3 = R O/P TO HEADROOM
4 = GND FROM MAIN BD.
5 = HPC FROM H/PHONE CON.
6 = +12V
CON.5 TO CON P1 FRONT BD.
HP I/O = 11
GND = 12
+10V UNR. = 13
STANDBY = 14
IR EXT. = 15
= 16
NOR/MUTE = 17
NOR/SSP = 18
0/180 = 19
HPA = 20
10 = +5VDC
9 = NOR/MONO
8 = NOR/TAPE
7 = SE4 IN
6 = SE3 IN
5 = SE2 IN
4 = SE1 IN
3 = BAL/SE
2 = BAL2 IN
1 = BAL1 IN
ECN
VERSION 1: RES.1 TO RES 20=475R AND RES.22,23=1k SKU:56747.10
VERSION 2: RES.1 TO RES. 20 =4K72 AND RES.22,23=31R SKU:56747.10 AND 56747.20
BAL1 IN L
XLR1
BAL2 IN L
XLR3
C16
.1uF 50V
SE1 IN
SE2 IN
SE3 IN
SE4 IN
NOR/TAPE
J1
J3
J5
J7
J11
(DIRECT IN.)
R9
R11
R13
R15
R17
REL.1
BAL IN1 L
REL.3
BAL IN2 L
REL.5
BAL/SE
REL.6
SE IN1 LR
REL.7
SE IN2 LR
REL.8
SE IN3 LR
REL.9
SE IN4 LR
REL.10
NOR/TAPE
REL.11
NOR/MONO
REL.12
NOR/MONO
IN AGND L
-L O/P
+L O/P
5VREL
+R O/P
-R O/P
IN AGND R
REL.2
BAL IN1 R
REL.4
BAL IN2 R
R10
R12
R14
R16
R18
J2
J4
J6
J8
J12
(DIRECT IN.)
XLR2
BAL1 IN R
XLR4
BAL2 IN R
C17
.1uF 50V
CHASSIS GND
From CON.1 MAIN BD.
-12V
REL 16 PIN4
REL 16 PIN7
AGND
FROM H/P CON.
+12V
R24
10R
R25
10R
OPA2604
C2
C1
.1uF 50V
.1uF 50V
TAPE OUT L
TAPE OUT R
J13
J14
OPERATE= 5V 25mA EACH RELAY
RELAYS
OPERATE
PASIV
SONIC FRONTIERS INC.
IN/OUT AND RELAY BOARD LINE1,2,3 (PART 1)
SIZE
A
INPUT SECTION
REV
DESIGNER:ZIVKOVIC
DATE:NOV. 1996
SHEET of

LEFT AND RIGHT CHANNEL

PART OF MAIN PCB. LINE 1,2



CS3310	
PIN 1.	= ZCEN
PIN 2.	= CS
PIN 3.	= SDATAI
PIN 4.	= VD
PIN 5.	= DGND
PIN 6.	= SCLK
PIN 7.	= SDATAO
PIN 8.	= MUTE
PIN 9.	= AINR
PIN 10.	= AGND
PIN 11.	= AOUTR
PIN 12.	= VA+
PIN 13.	= VA-
PIN 14.	= AOUTL
PIN 15.	= AGND
PIN 16.	= AINL

ALL 1uF 50V-CERAMIC CAP.
ALL 10uF 16V-TANTALUM CAP.

INPUTS FROM IN/OUT PCB:
- AINL+ RED WIRE
- AINL- BLUE WIRE
- AINR+ RED WIRE
- AINR- BLUE WIRE

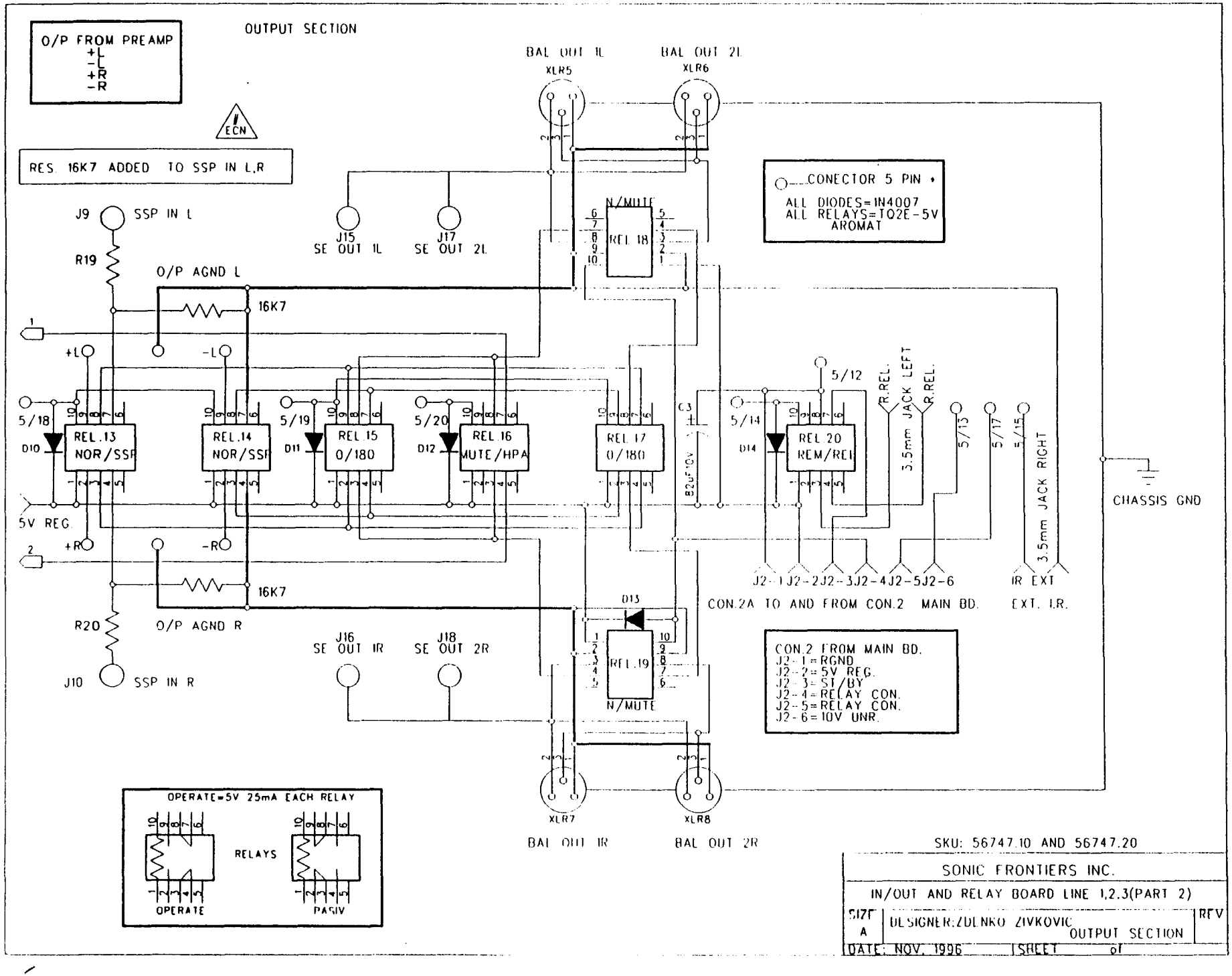
ALL WIRES RIMBER KABLE

OUTPUTS TO MAIN PCB:
- AOUTL+ TO R1
- AOUTL- TO R2
- AOUTR+ TO LR1
- AOUTR TO LR2

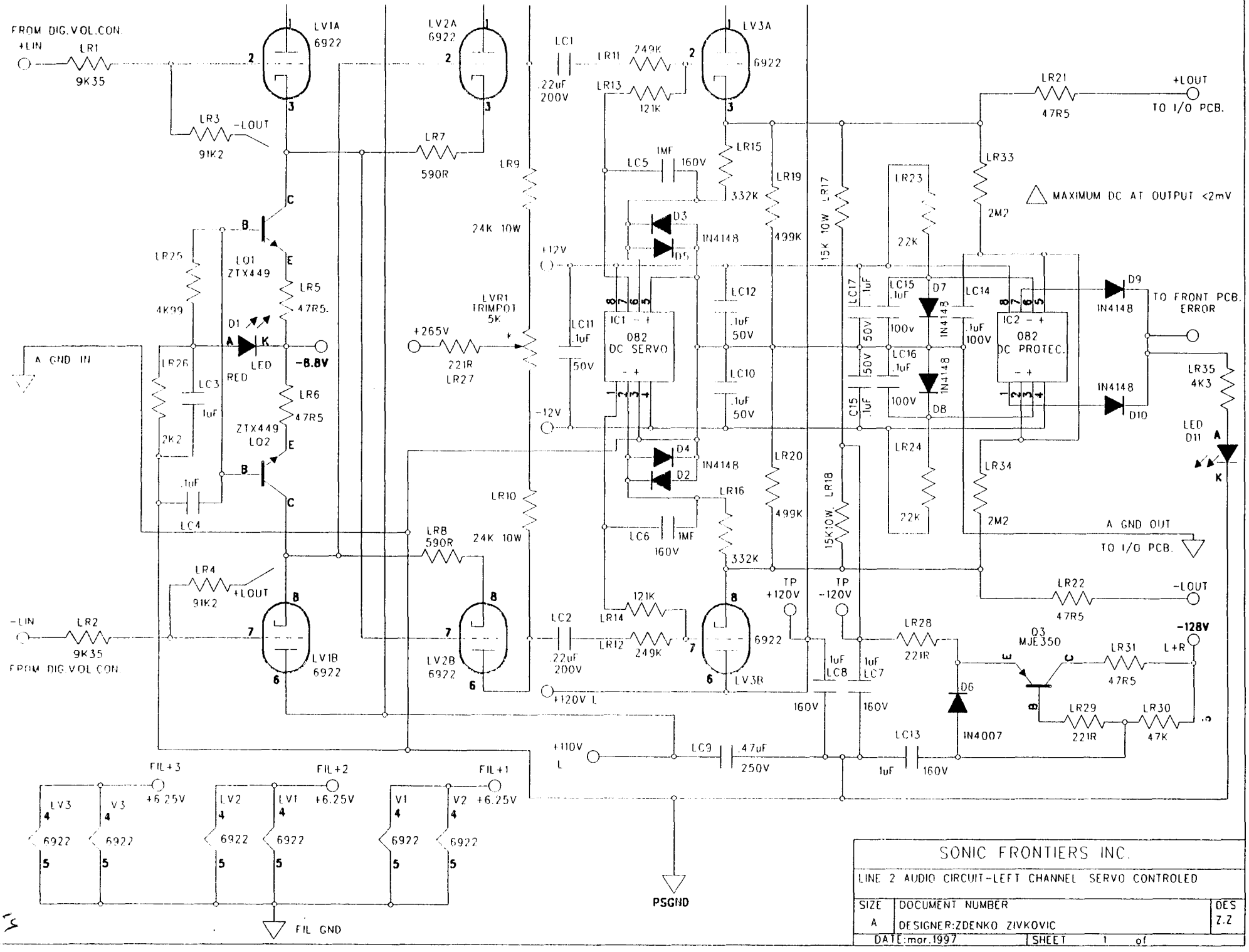
SONIC FRONTIERS INC.

DIGITAL VOLUME CONTROL FOR LINE 1,2 PREAMPLIFIER

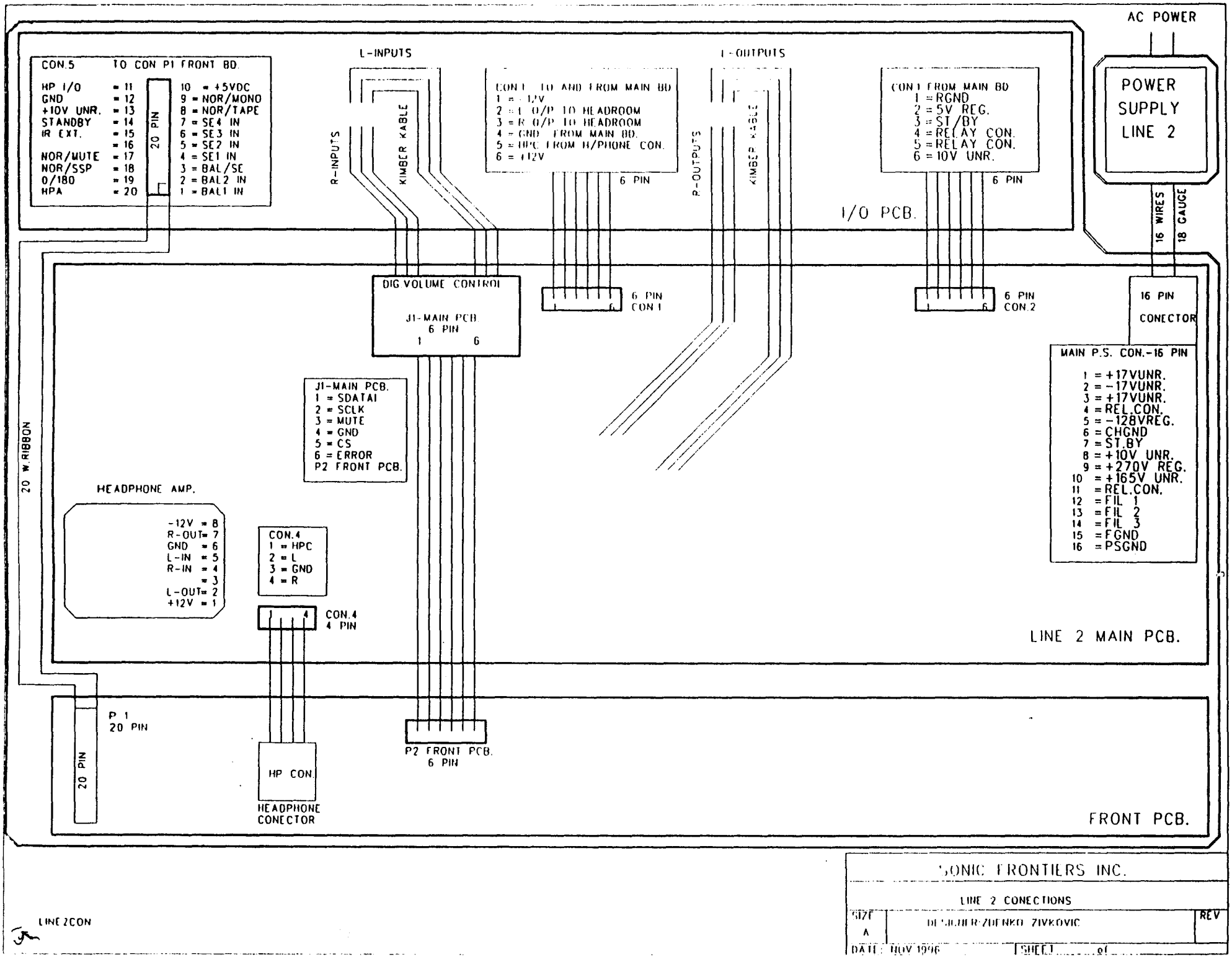
SIZE	DOCUMENT NUMBER	REV
A	DESIGNER:ZDUDEO ZIVKOVIC	
DATE	NOV 96	SHEET 6


O/P FROM PREAMP
+L
-L
+R
-R
OUTPUT SECTION
ECN
RES. 16K7 ADDED TO SSP IN L,R
BAL OUT 1L
XLR5
BAL OUT 2L
XLR6
CONECTOR 5 PIN
ALL DIODES=1N4007
ALL RELAYS=TQ2E-5V
AROMAT
J9
SSP IN L
R19
O/P AGND L
16K7
J15
SE OUT 1L
J17
SE OUT 2L
N/MUTE
REL 18
+L
-L
5/18
D10
REL.13
NOR/SSP
REL.14
NOR/SSP
5/19
D11
REL.15
0/180
5/20
D12
REL 16
MUTE/HPA
REL 17
0/180
C3
82uF/10V
5/12
5/14
D14
REL 20
REM/REL
R.REL.
3.5mm JACK LEFT
R.REL.
5/13
5/17
5/15
3.5mm JACK RIGHT
CHASSIS GND
5V REG.
+R
-R
16K7
R20
O/P AGND R
J10
SSP IN R
J16
SE OUT 1R
J18
SE OUT 2R
D13
REL.19
N/MUTE
J2-1 J2-2 J2-3 J2-4 J2-5 J2-6
CON.2A TO AND FROM CON.2 MAIN BD.
IR EXT
EXT. I.R.
CON.2 FROM MAIN BD.
J2-1=RGND
J2-2=5V REG.
J2-3=ST/BY
J2-4=RELAY CON.
J2-5=RELAY CON.
J2-6=10V UNR.
OPERATE=5V 25mA EACH RELAY
RELAYS
OPERATE
PASIV
XLR7
BAL OUT 1R
XLR8
BAL OUT 2R
SKU: 56747.10 AND 56747.20
SONIC FRONTIERS INC.
IN/OUT AND RELAY BOARD LINE 1,2,3(PART 2)
SIZE A
DESIGNER:ZDENKO ZIVKOVIC
OUTPUT SECTION
REV
DATE: NOV. 1996
SHEET of

LEFT CHANNEL SHOWN Duplicate this for Right Channel



SONIC FRONTIERS INC.		
LINE 2 AUDIO CIRCUIT-LEFT CHANNEL SERVO CONTROLED		
SIZE A	DOCUMENT NUMBER DESIGNER:ZDENKO ZIVKOVIC	DES Z.Z
DATE:mar.1997	SHEET 1 of	

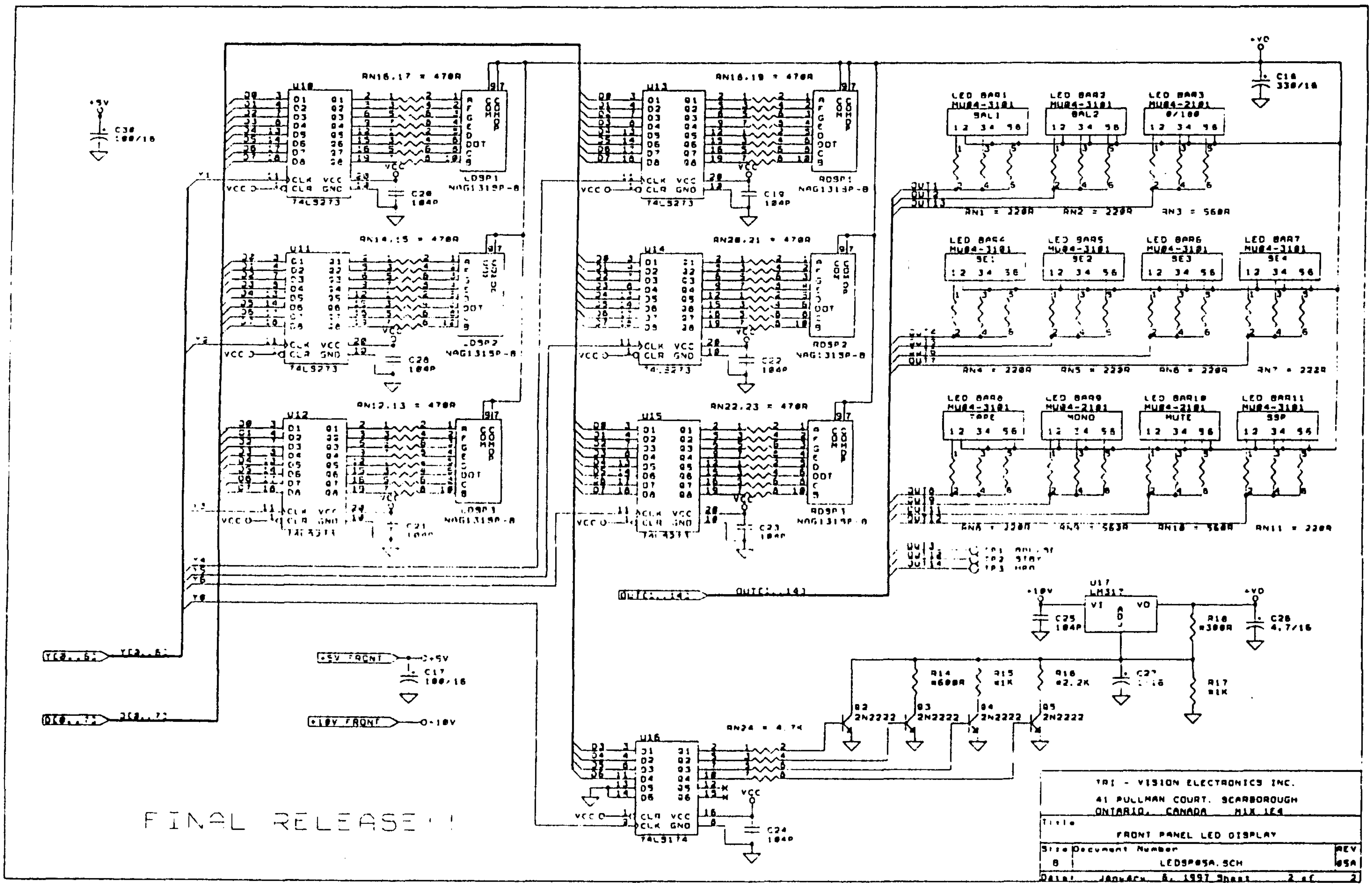


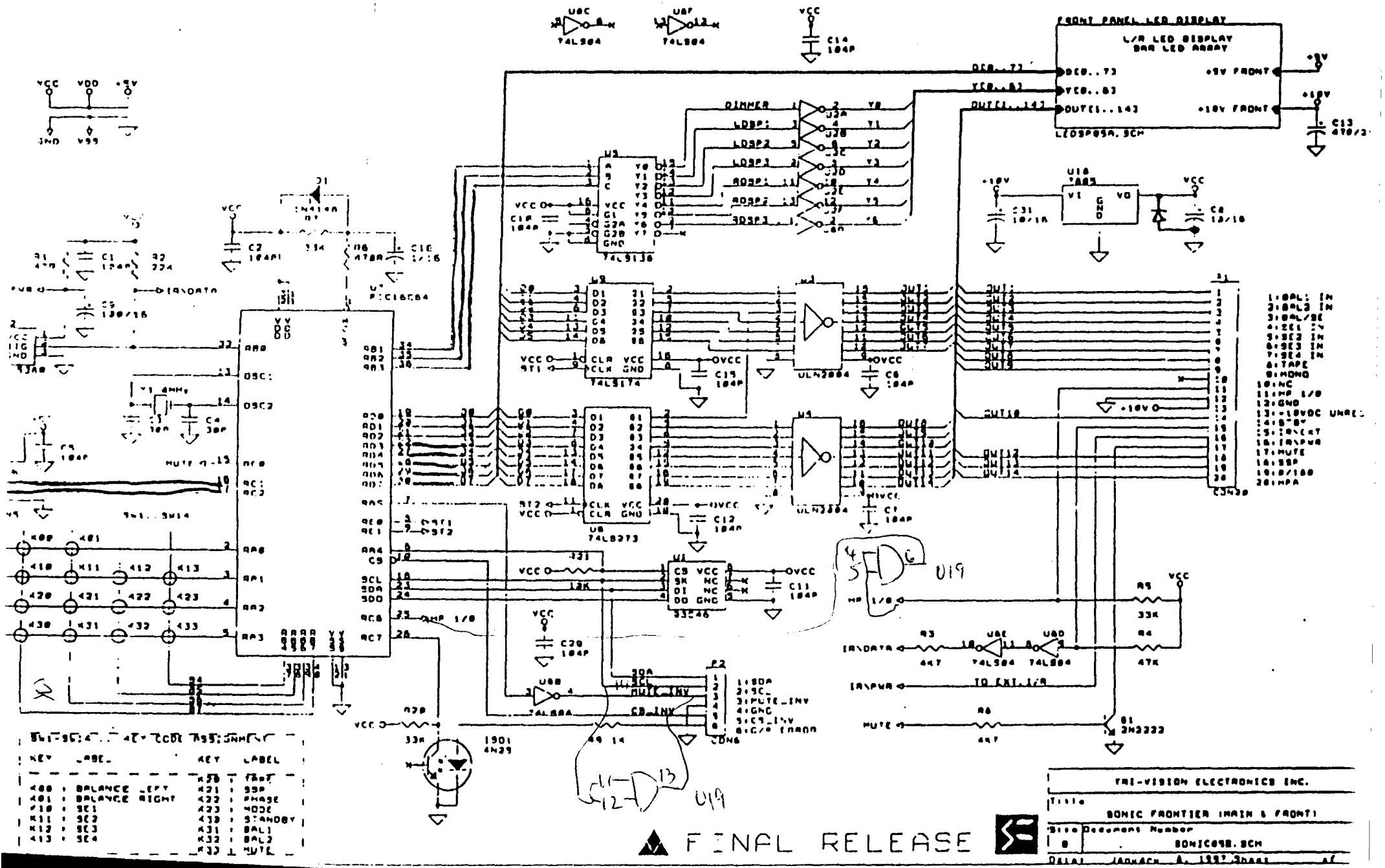
SONIC FRONTIERS INC.

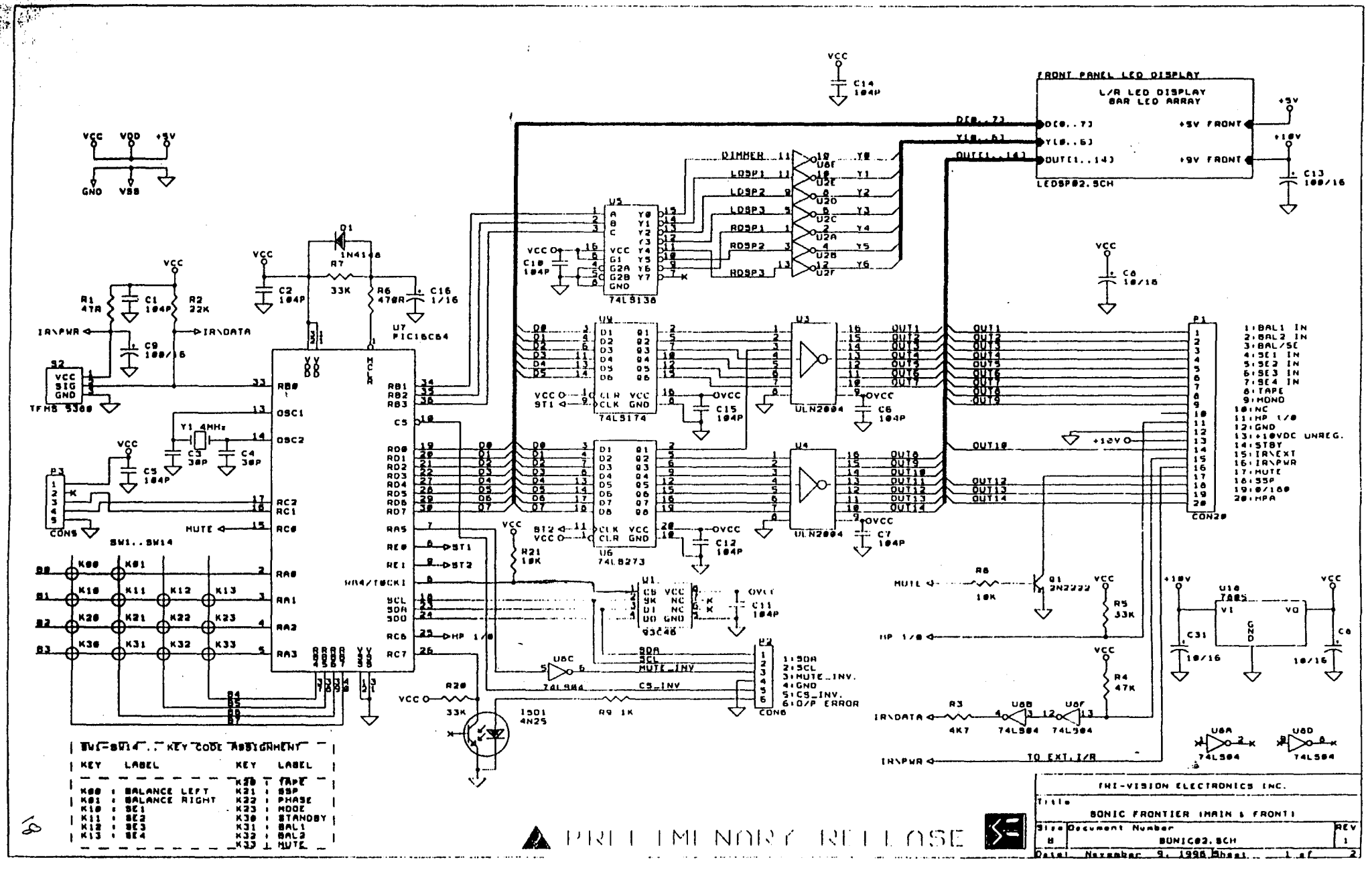
LINE 2 CONECTIONS

SIZE	DESIGNER: ZDENKO ZIVKOVIC	REV
A		
DATE: NOV 1996	SHEET ... of ...	

LINE2CON


TRI - VISION ELECTRONICS INC.
41 PULLMAN COURT, SCARBOROUGH
ONTARIO, CANADA M1X 1E4
Title
FRONT PANEL LED DISPLAY
Size B
Document Number LEDSP05A.SCH
REV 05A
Date: January 8, 1997 Sheet 2 of 2
FINAL RELEASE
LED BAR1 MU04-3101 BAL1
LED BAR2 MU04-3101 BAL2
LED BAR3 MU04-2101 0/100
LED BAR4 MU04-3101 SE1
LED BAR5 MU04-3101 SE2
LED BAR6 MU04-3101 SE3
LED BAR7 MU04-3101 SE4
LED BAR8 MU04-3101 TAPE
LED BAR9 MU04-2101 MONO
LED BAR10 MU04-2101 MUTE
LED BAR11 MU04-3101 SSP
U10 74LS273
U11 74LS273
U12 74LS311
U13 74LS273
U14 74LS273
U15 74LS311
U16 74LS174
U17 LM317
LDSP1 NAG1319P-8
LDSP2 NAG1319P-8
LDSP3 NAG1319P-8
RDSP1 NAG1319P-8
RDSP2 NAG1319P-8
RDSP3 NAG1319P-8
RN16,17 = 470R
RN14,15 = 470R
RN12,13 = 470R
RN18,19 = 470R
RN20,21 = 470R
RN22,23 = 470R
RN24 = 4.7K
Q2 2N2222
Q3 2N2222
Q4 2N2222
Q5 2N2222
+5V FRONT
+10V FRONT
C17 100/16
C30 100/16
C18 330/16
C26 4.7/16
C25 104P
R14 680R
R15 1K
R16 2.2K
R17 1K
R18 300R


FRONT PANEL LED DISPLAY
L/R LED DISPLAY
BAR LED ARRAY
LEDSP05A.SCH
FINAL RELEASE
TRI-VISION ELECTRONICS INC.
SONIC FRONTIER (MAIN & FRONT)
SONIC05B.SCH


FRONT PANEL LED DISPLAY
L/R LED DISPLAY
BAR LED ARRAY
LEDSP02.SCH
PRELIMINARY RELEASE
KEY CODE ASSIGNMENT
K00 : BALANCE LEFT
K01 : BALANCE RIGHT
K10 : SE1
K11 : SE2
K12 : SE3
K13 : SE4
K20 : TAPE
K21 : SSP
K22 : PHASE
K23 : MODE
K30 : STANDBY
K31 : BAL1
K32 : BAL2
K33 : MUTE
THI-VISION ELECTRONICS INC.
SONIC FRONTIER (MAIN & FRONT)
BONIC02.SCH
November 9, 1996

b

E.C.N.# : **PRODUCT :**

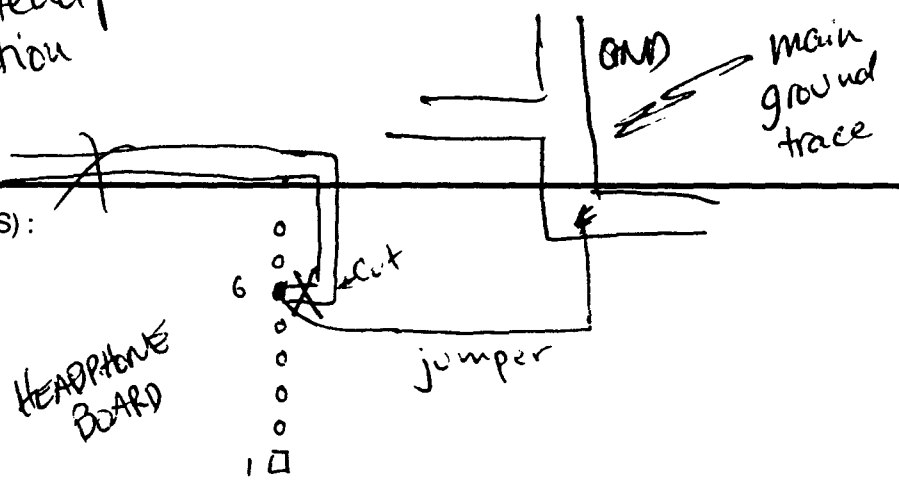
ENGINEERING CHANGE NOTICE

PRODUCT(S) AFFECTED Change or modification Temporary ( ) Permanent ( )	DATE OF ISSUE: ISSUED BY : APPROVED BY :

PURPOSE OF CHANGE(S) :

Line 2 Headphone Hum Reduction

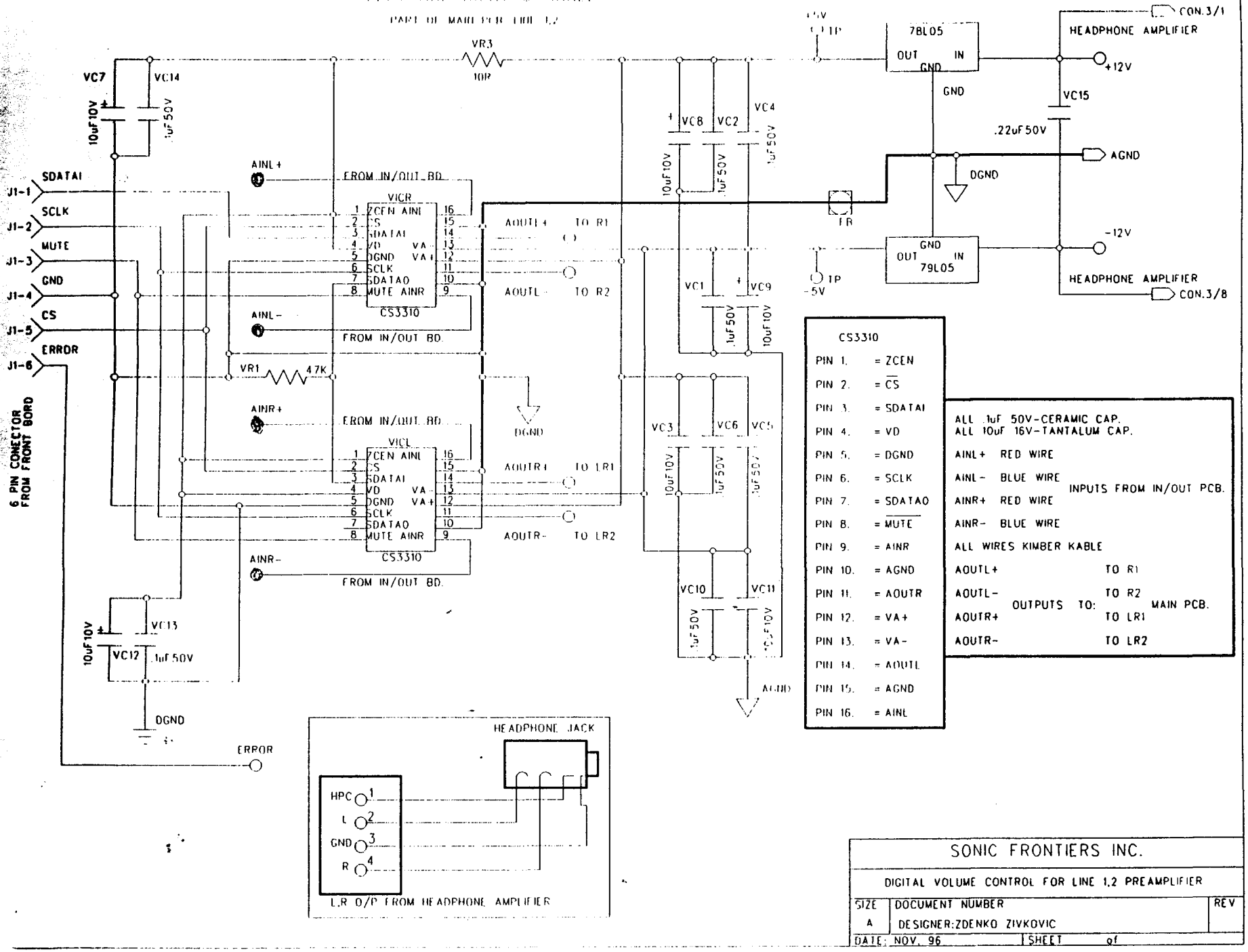
DESCRIPTION OF CHANGE(S) :



PART(S) AFFECTED :	PART #	LOCATION :	SKU# :
ADD :	PART #	LOCATION :	SKU# :
MODIFICATION DIAGRAM : See attached sheet		C.C I. Driver T. Nguyen A. Jez K. Wilk N. Platsis	CONFIRMED :

LEFT AND RIGHT CHANNEL

PART OF MAIN PCB LINE 1,2



CS3310	
PIN 1.	= $\overline{CS}$
PIN 2.	= ZCEN
PIN 3.	= SDATAI
PIN 4.	= VD
PIN 5.	= DGND
PIN 6.	= SCLK
PIN 7.	= SDATAO
PIN 8.	= $\overline{MUTE}$
PIN 9.	= AINR
PIN 10.	= AGND
PIN 11.	= AOUTR
PIN 12.	= VA+
PIN 13.	= VA-
PIN 14.	= AOUTL
PIN 15.	= AGND
PIN 16.	= AINL

ALL 1uF 50V-CERAMIC CAP.
ALL 10uF 16V-TANTALUM CAP.

INPUTS FROM IN/OUT PCB.
- AINL+ RED WIRE
- AINL- BLUE WIRE
- AINR+ RED WIRE
- AINR- BLUE WIRE

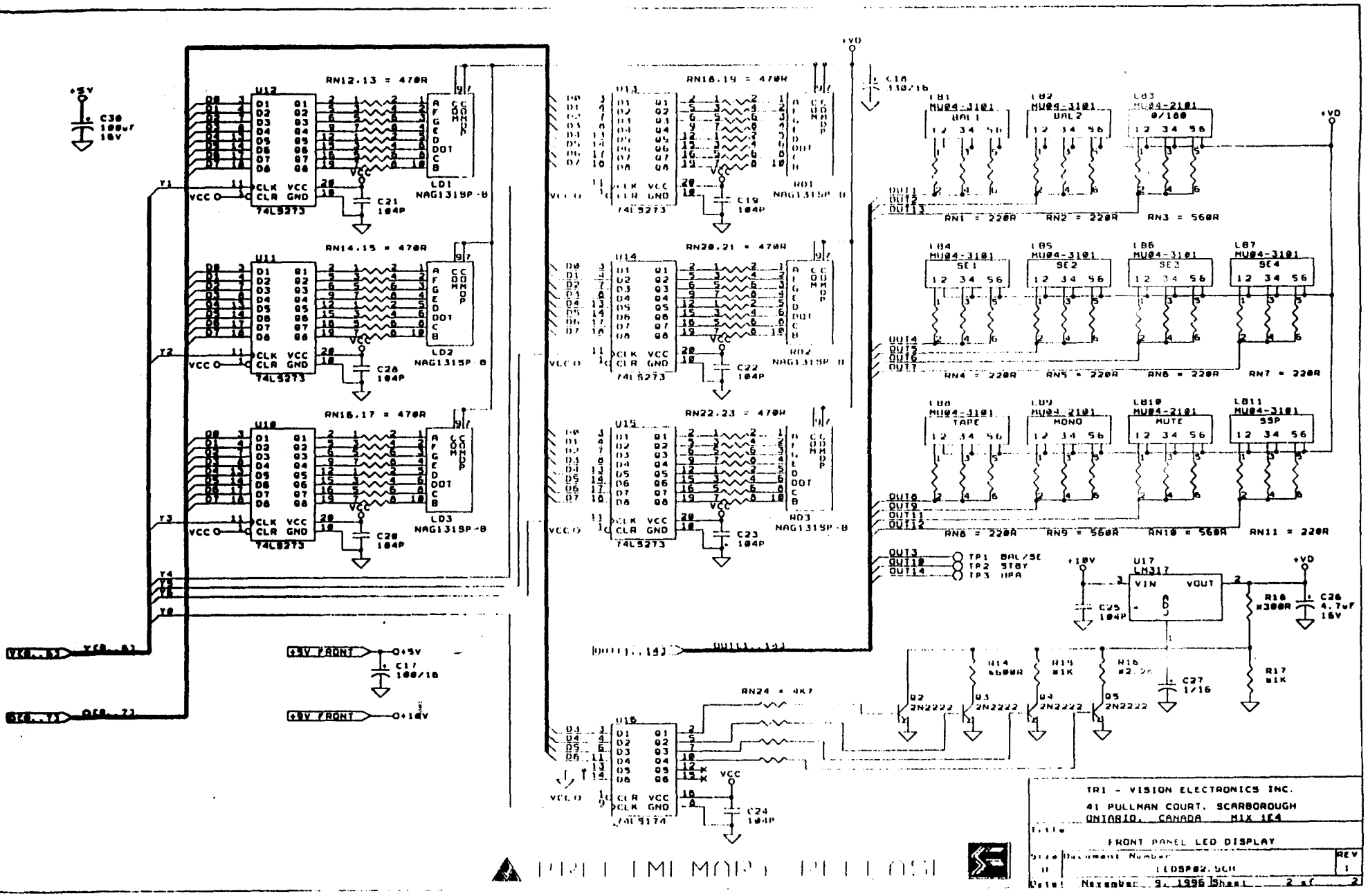
ALL WIRES KIMBER KABLE

OUTPUTS TO: MAIN PCB.
- AOUTL+ TO R1
- AOUTL- TO R2
- AOUTR+ TO LR1
- AOUTR- TO LR2

SONIC FRONTIERS INC.

DIGITAL VOLUME CONTROL FOR LINE 1,2 PREAMPLIFIER

SIZE	DOCUMENT NUMBER	REV
A	DESIGNER:ZDENKO ZIVKOVIC	
DATE: NOV. 96	SHEET of	

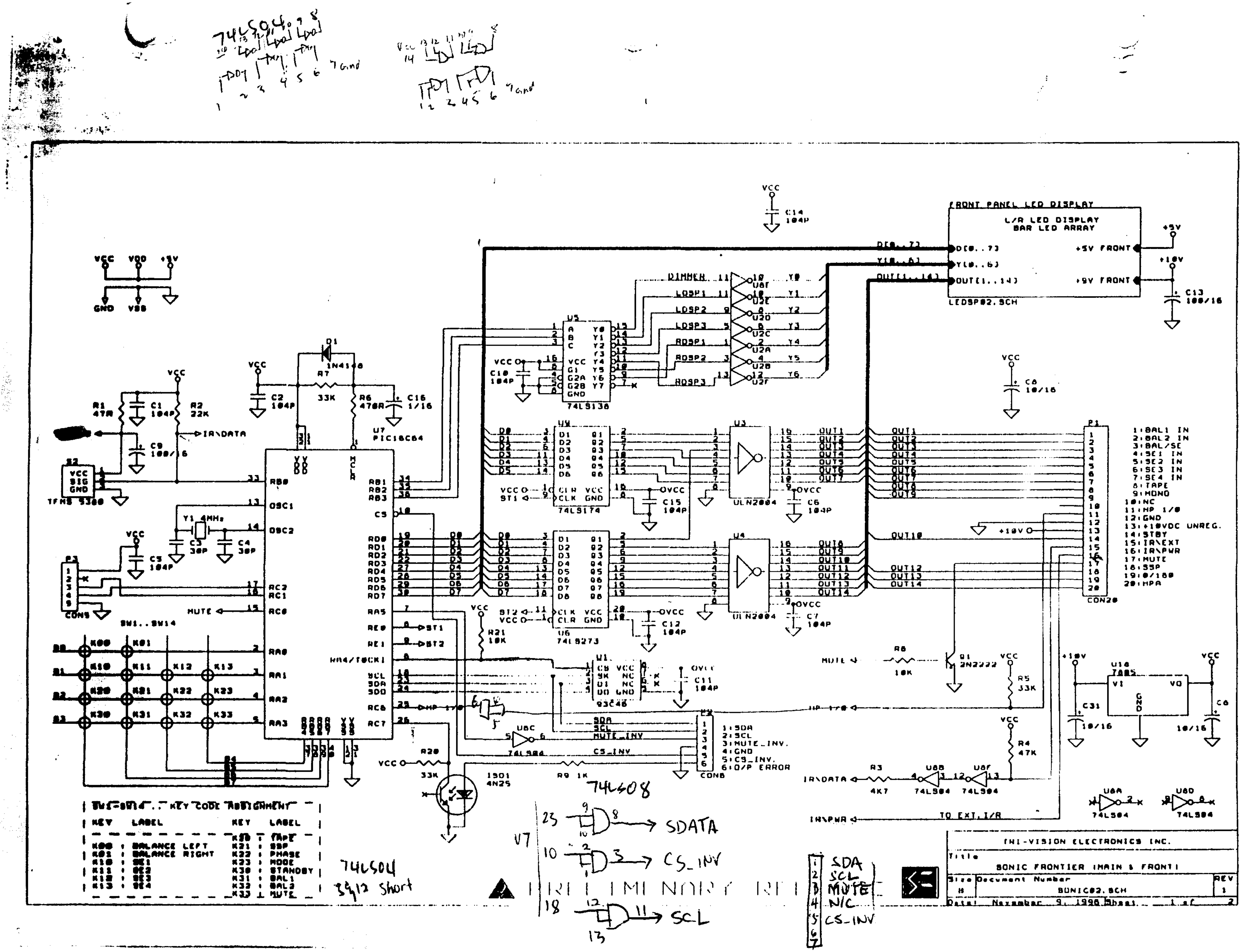


TRI - VISION ELECTRONICS INC.
41 PULLMAN COURT, SCARBOROUGH
ONTARIO, CANADA M1X 1E4

Title: FRONT PANEL LED DISPLAY

Size: D | Document Number: LEDSP02.SCH | REV: 1

Date: November 9, 1996 | Sheet 2 of 2


74LS04
74LS08
FRONT PANEL LED DISPLAY
L/R LED DISPLAY
BAR LED ARRAY
LEDSP02.SCH
D[0..7]
Y[0..6]
OUT[1..14]
+5V FRONT
+9V FRONT
DIMMER
LDSP1
LDSP2
LDSP3
RDSP1
RDSP2
RDSP3
U5 74LS138
U9 74LS174
U6 74LS273
U3 ULN2004
U4 ULN2004
U7 PIC16C84
U1 93C46
U10 7805
Q1 2N2222
D1 1N4148
Y1 4MHz
ISO1 4N25
S2 TFMS 5360
SW1..SW14
P1 CON20
1: BAL1 IN
2: BAL2 IN
3: BAL/SE
4: SE1 IN
5: SE2 IN
6: SE3 IN
7: SE4 IN
8: TAPE
9: MONO
10: NC
11: HP 1/0
12: GND
13: +10VDC UNREG.
14: STBY
15: IR\EXT
16: IR\PWR
17: MUTE
18: SSP
19: 0/180
20: HPA
CON6
1: SDA
2: SCL
3: MUTE_INV.
4: GND
5: CS_INV.
6: O/P ERROR
IR\DATA
IR\PWR
TO EXT. I/R
MUTE
HP 1/0
SW1-SW14 .. KEY CODE ASSIGNMENT
KEY LABEL KEY LABEL
K00 : BALANCE LEFT K21 : SSP
K01 : BALANCE RIGHT K22 : PHASE
K10 : SE1 K23 : MODE
K11 : SE2 K30 : STANDBY
K12 : SE3 K31 : BAL1
K13 : SE4 K32 : BAL2
K20 : TAPE K33 : MUTE
SDATA
CS_INV
SCL
SDA
SCL
MUTE
N/C
CS_INV
3&12 short
PRELIMINARY
TRI-VISION ELECTRONICS INC.
Title
SONIC FRONTIER (MAIN & FRONT)
Size Document Number REV
B SONIC02.SCH 1
Date: November 9, 1998 Sheet 1 of 2