PRIMARE

A32 Power Amplifier
Service Manual

1. Technical Description.

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3. Bias Adjustment.

4. Schematics.

5. Technical Specifications.

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A32 Functional Description

Features

The Primare A32 power amplifier is a fully balanced design, this means that the negative speaker terminals are active, not ground as on an unbalanced design. When performing measurements, test equipment (such as Audio Precision) that can handle balanced amplifiers must be used.
The input impedance is 15K and the gain is 26dB. It is possible to obtain just above 250 undistorted watts at an 8R load (both channels driven). The frequency response are flat, the A32 will drop down only -2dB at 100Khz.

Standby

The A32 is equipped with two standby modes, where standby mode 2 is the power save mode. In power save mode only the standby circuit will be powered by the small standby transformer placed on the digital PCB.

Digital control and monitoring

When power is first applied and the standby button on the front panel are pressed down the A32 are going to initiate the startup sequence. Relay K1 will be turned on where after a small delay will follow before relay K2 goes active to disable the inrush limiters. At the same time bias are turned on by shutting down the voltage supplied to the optocouplers on the amplifier channels. After a 20 second startup delay for the amplifier to settle down the speaker relays are turned ON. During the startup sequence all safety parameters such as DC-offset and fuses will be monitored, if an error is spotted the amplifier will refuse to start and the standby LED will flash rapidly to indicate that an error has occurred. The error code can be read out by pressing the error check switch (SW1). Description of the error codes can be found on the next page.

If the standby switch is pressed when the amplifier is in operate mode it will go to standby mode 1, which means that bias and speaker relay will be switched off. The standby LED is going to half light intensity to indicate that the amplifier is in this standby mode.

If the standby button are pressed down for more than one second the amplifier are shutting down into standby mode 2 which means that bias, speaker relay and the two power relays K1, K2 are switched off. Only the standby circuit is still powered consuming just a few watt of energy.

Temperature protection

When temperature has reached 70 centigrade at the temperature sensors the speaker relay and bias are going to be switched off, when the temperature have decreased 10 centigrade the A32 are going to be restarted. In practice this will mean that the warmest part of the heatsink will be around 75-80 centigrade when over- temperature protection cuts in.

General Protection

During operation mode DC-offset, fuse, temperature and AC-loss are constantly monitored, any abnormal function from these will immediately disengage the speaker relay and the standby LED will start to flash rapidly indicating that an error has been spotted. The error code can be checked by pressing the error check button (SW1), if more than one error at the same time a repeated press of the button will display the next error.
DC-offset and over temperature will automatically resume to normal operation after a delay if the error recovers. Fuse error will not (latch), here the amplifier must be turned off and the fuses replaced before normal operation is possible.

Trigger.

If a 3.5mm teleplug are connected to the left trigger input (the right connector is the output) the function of the standby button are being changed to only be able to turn the amplifier into standby mode 2 directly. The standby button cannot turn the amplifier on while the trigger is connected (trigger mode enable). The circuit will trigger at 2.5V and are highly immune against disturbances. The trigger are only able to control the amplifier between operate and standby mode 1.

RS232

The RS232 port can be used for firmware upgrading as well as controlling by Crestron compatible RS232 codes.

Fuses

Due to the large capacitance of the electrolytics bank, turn off the mainspower and wait minimum 15minutes before replacing a blown fuse. Make sure to replace a blown fuse with exactly the same type and value.

Error codes

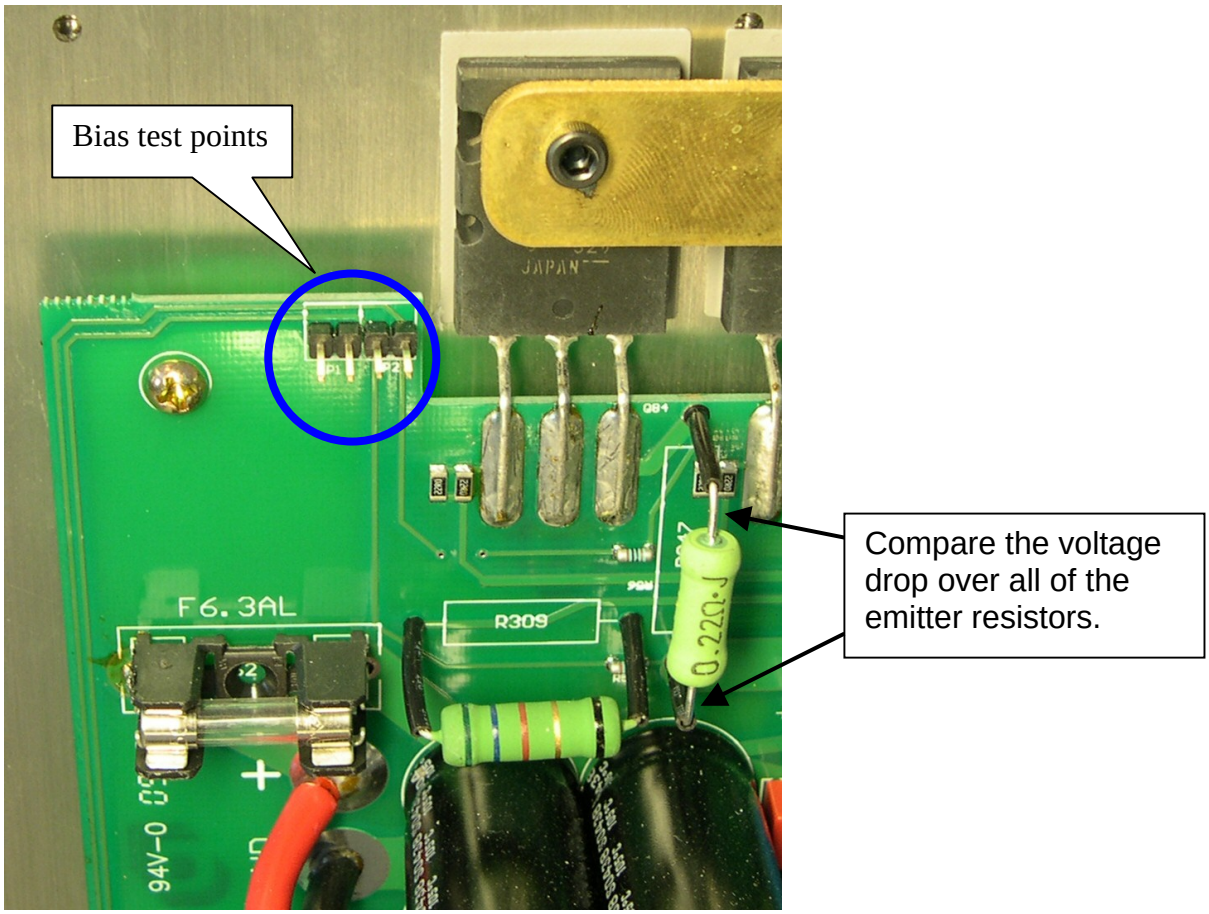
LED Nr

3	**2**	**1**	**Error**
0	0	0	All OK
0	0	1	DC L+
0	1	0	DC L-
0	1	1	DC R+
1	0	0	DC R-
1	0	1	Fuse Rch
1	1	0	Fuse Lch
1	1	1	Overheated

Bias Adjustment

Critical for the adjustment are that the mainsvoltage is 230V or 120V exactly.
The temperature in the facility must be constant during the adjustment procedure.

Use the Bias test points and potentiometers (R1, R2) to adjust bias on each channel.
The lower potentiometer is accessible thru a hole in the bottom of the amplifier.



These steps describe the Bias adjustment procedure, which is the same for both L& R channels.

1. Switch the amplifier on or if it has been on burn-in (test), disconnect input signal and loads. The A32 amplifier must be in operate mode, bias will be switched off in standby.

2. Let the amplifier run for 1h, without input signal.

3. Adjust the bias to 17mV measured on JP3, JP4 or JP2, JP1.

4. Check the maximum difference (voltage drop) over emitter resistors (R241, R243, R245, R247, R239, R237, R235, R233, R240, R238, R236, R234, R242, R244, R246, R248). The difference between them should not exceed 7mV. Higher difference might be due to a faulty transistor or Emitter resistor, also check and that the screw are tightened.

5. Wait 1h.

6. Measure the bias and if needed readjust to 17mV measured on JP3, JP4 or JP2, JP1.

7. Wait 1h.

8. Measure the bias and if needed readjust to 17mV measured on JP3, JP4 or JP2, JP1.

9. Wait 1h.

10. Measure the bias and if needed readjust to 17mV measured on JP3, JP4 or JP2, JP1.

Repeat step 5-9 until the bias are stabile.

P6 PLUG
P7 PLUG
S1 T500mA
SW3 240V SW120-240
T1 TRANSF53X44
D12 BRIDGE1
C4 2200U/25V
U4 LD1085V33 Vin ADJ Vout
C32 100n
C31 100n
+3.3VD
C33 100U/6.3V
D8 LL4148
R42 470K
C24 330N
C1 47nF/275V X2
K1 RELAY_DPDT3
K2 RELAY_DPDT3
Q2 BCV46
Q4 BCV46
Q6 BC846
Q7 BC846
R45 10K
R11 470R
R22 4K7
R23 10K
R12 470R
R4 4K7
D2 BDY17D
D3 BDY17D
R39 NTC 7R
R37 NTC 7R
R38 NTC 7R
P1 PLUG
P9 PLUG
P3 PLUG
P10 PLUG
P4 PLUG
P8 PLUG
120V
240V
C2 47nF/275V X2
To mains Transformer
C28 47u/16V
C19 100N
C20 100N
C25 10N
R43 10R
R46 10K
R47 10K
R25 2K2
Q1 BCV46
Q3 BCV46
R10 2K2
LL4148 D16 D17 D18 D19 D20
R15 10K
R16 10K
R14 10K
R13 10K
R27 10K
R26 10K
D13 LL4148
D14 LL4148
D15
J2 CON10
Bias R
SPK Relay R
XLR/RCA R
+15V R
GND R
Temp1 R
Temp2 R
Fuse R
DC-Check+ R
DC-Check- R
J1 CON10
Bias L
SPK Relay L
XLR/RCA L
+15V L
GND L
Temp1 L
Temp2 L
Fuse L
DC-Check+ L
DC-Check- L
C30 100U/6.3V
LL4148 D21
C13
C14
D22 LL4148
100U/6.3V
100U/6.3V
X2 4MHZ
C18 22p
C17 10p
U3 P89LPC935
P2.0/ICB/DAC0/ADC03
P2.1/OCD/AD02
P0.0/CMP2/KBI0/AD01
P1.7/OCC/AD00
P1.6/OCB
P1.5/RST
VSS
P3.1/XTAL1
P3.0/XTAL2/CLKOUT
P1.4/INT1
P1.3/INT0/SDA
P1.2/T0/SCL
P2.2/MOSI
P2.3/MISO
P2.7/ICA
P2.6/OCA
P0.1/CIN2B/KBI1/AD10
P0.2/CIN2A/KBI2/AD11
P0.3/CIN1B/KBI3/AD12
P0.4/CIN1A/KBI4/AD13
P0.5/CMPREF/KBI5
VDD
P0.6/CMP1/KBI6
P0.7/T1/KBI7
P1.0/TXD
P1.1/RXD
P2.5/SPICLK
P2.4/SS
R33 2R2
R34 2R2
R5 0R
R6 0R
R7 536R
R8 560R
D23 LL4148
C15 100U/6.3V
C16 100U/6.3V
D24 LL4148
C29 100U/6.3V
+3.3VD
+3.3V
PCB 2
R32 4K7
Q5 BC846
D4 LL4148
D6 LL4148
R1 2K2
R9 2K2
R44 10R
C27 100N
C22 100N
R21 510R
D5 LL4148
D7 LL4148
C23 100N
R24 10R
PHONEJACK STEREO SW J6
PHONEJACK STEREO SW J5
R19 4K7
Standby mode
S3 SW-SPDT
S2 NC
SW BAL/UNBAL
R3 NC
R2 NC
C11 100N
C26 100U/25V
U2 MAX3232ECAE
VCC GND T1OUT R1IN R1OUT T1IN T2IN R2OUT
C1+ V+ C1- C2+ C2- V- T2OUT R2IN
C8 100N
C9 100N
C12 100N
C10 100N
F1 NMF40
F2 NMF40
P2 HEADER 4
RS232
J3 CON10
J4 CON10
PCB3
SW2
PIN4 ON P5
PIN3 ON P5
PCB4
D1 KB2855
PIN1 ON P5
PIN2 ON P5
P5 HEADER 4
U5 74LVC595
SER SRCLK SRCLR RCLK E VCC GND
O0 O1 O2 O3 O4 O5 O6 O7 Q7
R41 110R
R40 412R
R20 1K
R31 3K3
R30 3K3
R29 3K3
D11 LED
D10 LED
D9 LED
SW1 SW-B3
Check error
R18 10K

Title		
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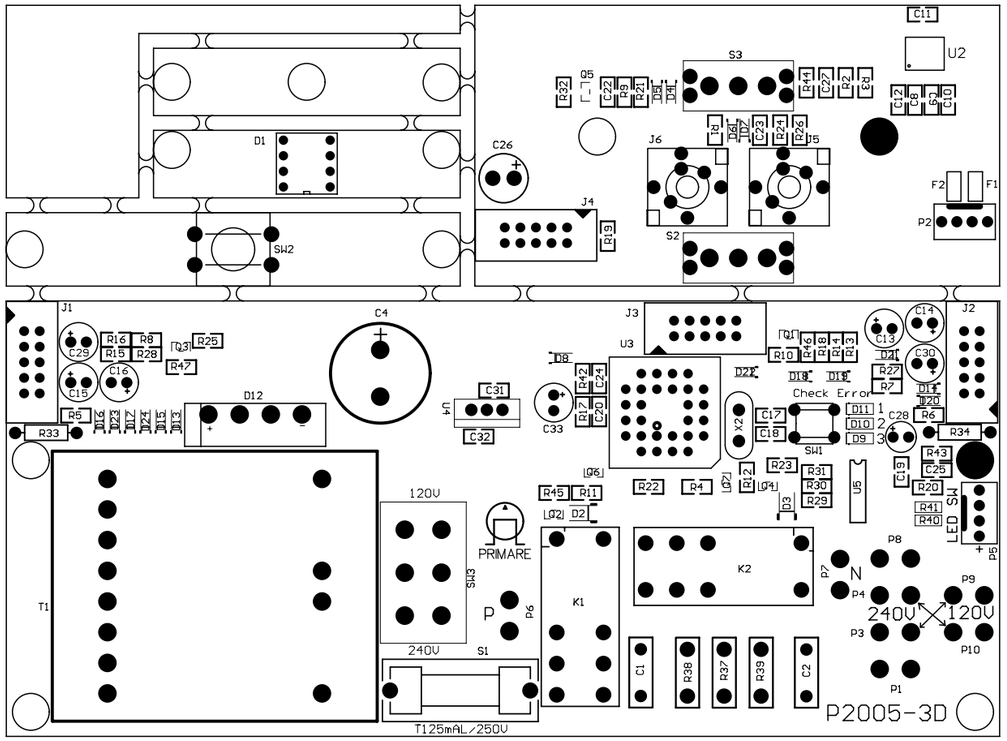
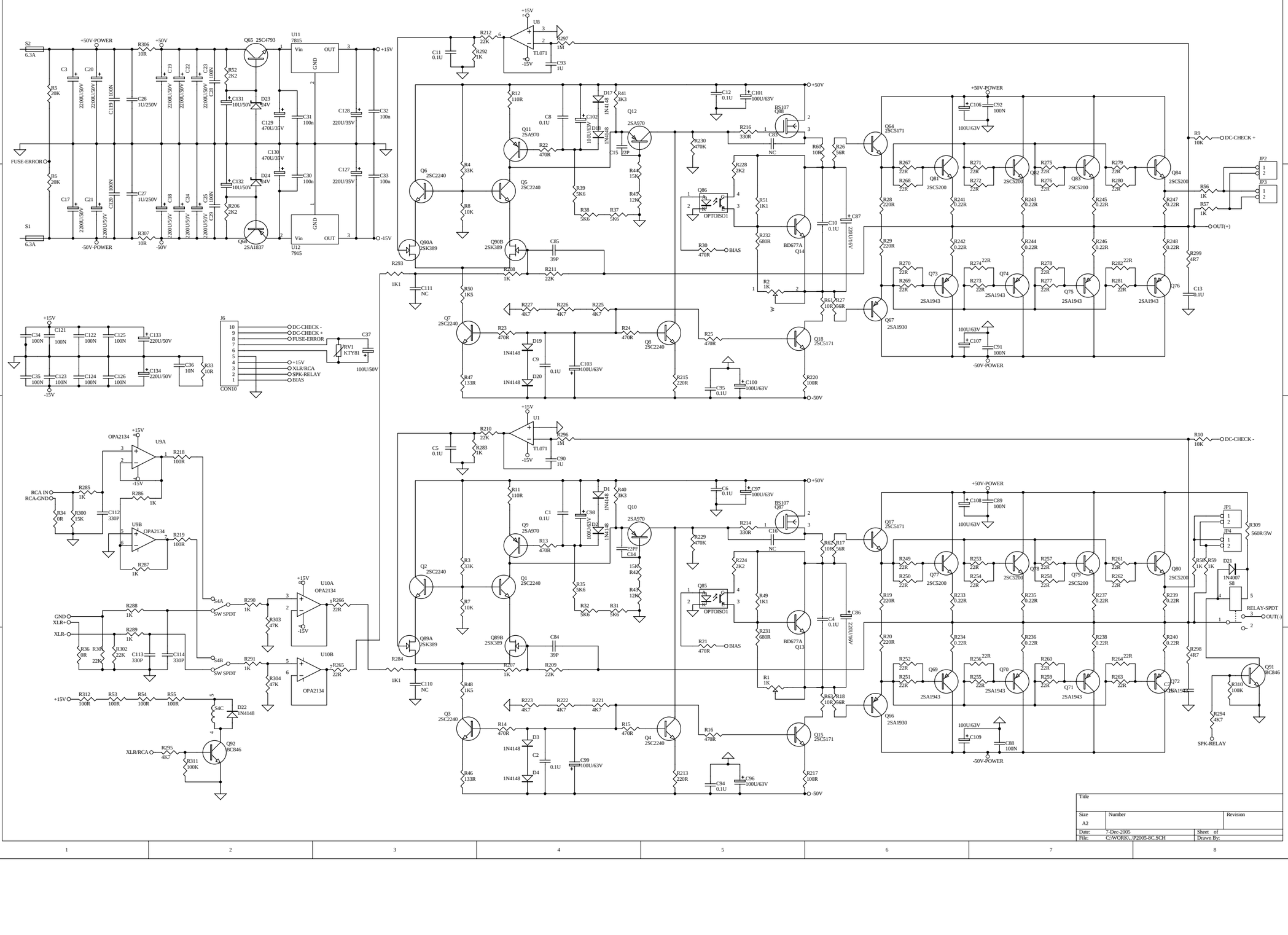

C11
U2
S3
Q5
R32
C22
R9
R21
D5
D4
R44
C7
R2
R3
C12
C8
C9
C10
D1
C26
J6
J5
D6
D7
C23
R24
R26
F2
F1
P2
J4
R19
S2
SW2
J1
C4
J3
U3
C14
C13
C30
J2
R16
R8
R25
C29
R15
R28
R47
C15
C16
D8
D22
D18
D19
Check Error
D12
R5
R33
C31
C33
U4
R42
C24
R17
C20
X2
C17
C18
SW1
D11
D10
D9
C28
R6
R34
R43
C19
C25
R23
R31
R30
R29
R20
R41
R40
LED SW
P5
U5
R45
R11
D2
R22
R4
R12
D3
P8
P7
N
P4
P9
240V
120V
P3
P10
P1
120V
PRIMARE
SW3
P6
K1
K2
T1
240V
S1
C1
R38
R37
R39
C2
T125mAL/250V
P2005-3D


S2
6.3A
S1
6.3A
+50V-POWER
-50V-POWER
FUSE-ERROR
R306
10R
R307
10R
+50V
-50V
Q65 2SC4793
Q69 2SA1837
U11
7815
U12
7915
Vin
GND
OUT
+15V
-15V
C3
C20
C26
1U/250V
C27
1U/250V
C119
100N
C120
100N
C17
C21
C18
C24
C25
C29
C19
C22
C23
C28
2200U/50V
R5
20K
R6
20K
R52
2K2
R206
2K2
C131
10U/50V
C132
10U/50V
D23
24V
D24
24V
C129
470U/35V
C130
470U/35V
C31
100n
C30
100n
C128
220U/35V
C127
220U/35V
C32
100n
C33
100n
U11 7815
U12 7915
+15V
U8
TL071
R212
22K
R292
1K
R297
1M
C11
0.1U
C93
1U
R12
110R
R22
470R
R4
33K
R8
10K
R39
5K6
R38
5K6
R37
5K6
R44
15K
R45
12K
C8
0.1U
C102
100U/63V
D17
1N4148
D18
1N4148
R41
8K3
C15
22P
Q12
2SA970
Q11
2SA970
Q6
2SC2240
Q5
2SC2240
Q90A
2SK389
Q90B
2SK389
C85
39P
R293
1K1
C111
NC
R208
1K
R211
22K
C12
0.1U
C101
100U/63V
BS107
Q88
R216
330R
C83
NC
R230
470K
R228
2K2
Q86
OPTOISO1
R30
470R
BIAS
R51
1K1
R232
680R
BD677A
Q14
R2
1K
W
R60
10R
R26
56R
C10
0.1U
C87
200U/16V
R61
10R
R27
56R
R50
1K5
Q7
2SC2240
R227
4K7
R226
4K7
R225
4K7
R23
470R
R24
470R
R25
470R
D19
1N4148
D20
1N4148
C9
0.1U
C103
100U/63V
Q8
2SC2240
Q18
2SC5171
R47
133R
R215
220R
C95
0.1U
C100
100U/63V
R220
100R
-50V
Q64
2SC5171
Q67
2SA1930
+50V-POWER
C106
100U/63V
C92
100N
-50V-POWER
C107
100U/63V
C91
100N
R267
22R
R268
22R
Q81
2SC5200
R271
22R
R272
22R
Q82
2SC5200
R275
22R
R276
22R
Q83
2SC5200
R279
22R
R280
22R
Q84
2SC5200
R28
220R
R241
0.22R
R243
0.22R
R245
0.22R
R247
0.22R
R29
220R
R242
0.22R
R244
0.22R
R246
0.22R
R248
0.22R
R270
22R
R269
22R
Q73
2SA1943
R274
22R
R273
22R
Q74
2SA1943
R278
22R
R277
22R
Q75
2SA1943
R282
22R
R281
22R
Q76
2SA1943
R9
10K
DC-CHECK +
JP2
JP3
R56
1K
R57
1K
OUT(+)
R299
4R7
C13
0.1U
C34
100N
C121
100N
C122
100N
C125
100N
C133
220U/50V
C35
100N
C123
100N
C124
100N
C126
100N
C134
220U/50V
C36
10N
R33
10R
-15V
J6
CON10
DC-CHECK -
DC-CHECK +
FUSE-ERROR
+15V
XLR/RCA
SPK-RELAY
BIAS
VRV1
KTY81
C37
100U/50V
OPA2134
U9A
U9B
U10A
U10B
R218
100R
R219
100R
R285
1K
R286
1K
R287
1K
RCA IN
RCA-GND
R34
0R
R300
15K
C112
330P
R288
1K
R289
1K
R36
0R
R301
22K
R302
22K
C113
330P
C114
330P
GND
XLR+
XLR-
S4A
S4B
SW SPDT
R290
1K
R291
1K
R303
47K
R304
47K
R266
22R
R265
22R
R312
100R
R53
100R
R54
100R
R55
100R
S4C
D22
1N4148
XLR/RCA
R295
4K7
Q92
BC846
R311
100K
R284
1K1
C110
NC
R210
22K
R283
1K
R296
1M
C5
0.1U
C90
1U
R11
110R
R13
470R
R3
33K
R7
10K
R35
5K6
R32
5K6
R31
5K6
R40
8K3
C38
100U/63V
D2
1N4148
Q10
2SA970
C14
22PF
15K
R42
R43
12K
Q1
2SC2240
Q2
2SC2240
Q89A
2SK389
Q89B
2SK389
C84
39P
R207
1K
R209
22K
C6
0.1U
C97
100U/63V
BS107
Q87
R214
330R
C16
NC
R229
470K
R224
2K2
Q85
OPTOISO1
R21
470R
BIAS
R49
1K1
R231
680R
BD677A
Q13
R1
1K
R62
10R
R17
56R
C4
0.1U
C86
200U/16V
R63
10R
R18
56R
R48
1K5
Q3
2SC2240
R223
4K7
R222
4K7
R221
4K7
R14
470R
R15
470R
R16
470R
D3
1N4148
D4
1N4148
C2
0.1U
C99
100U/63V
Q4
2SC2240
Q15
2SC5171
R46
133R
R213
220R
C94
0.1U
C96
100U/63V
R217
100R
-50V
Q17
2SC5171
Q66
2SA1930
+50V-POWER
C108
100U/63V
C89
100N
-50V-POWER
C109
100U/63V
C88
100N
R249
22R
R250
22R
Q77
2SC5200
R253
22R
R254
22R
Q78
2SC5200
R257
22R
R258
22R
Q79
2SC5200
R261
22R
R262
22R
Q80
2SC5200
R19
220R
R233
0.22R
R235
0.22R
R237
0.22R
R239
0.22R
R20
220R
R234
0.22R
R236
0.22R
R238
0.22R
R240
0.22R
R252
22R
R251
22R
Q69
2SA1943
R256
22R
R255
22R
Q70
2SA1943
R260
22R
R259
22R
Q71
2SA1943
R264
22R
R263
22R
Q72
2SA1943
R10
10K
DC-CHECK -
JP1
JP4
R309
560R/3W
R58
1K
R59
1K
D21
1N4007
SB
RELAY-SPDT
OUT(-)
R298
4R7
Q91
BC846
R310
100K
R294
4K7
SPK-RELAY
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P2005-2C

PRIMARE

RCA

+XLR -

1:BIAS
2:SPK-RELAY
3:+15V
4:+50V
5:GND
6:NTC
7:FUSE-ERROR
8:DC-CHECK (+)
9:DC-CHECK (-)
10:DC-CHECK (-)

+15V

-15V

+50V

-50V

GND

F6.3AL

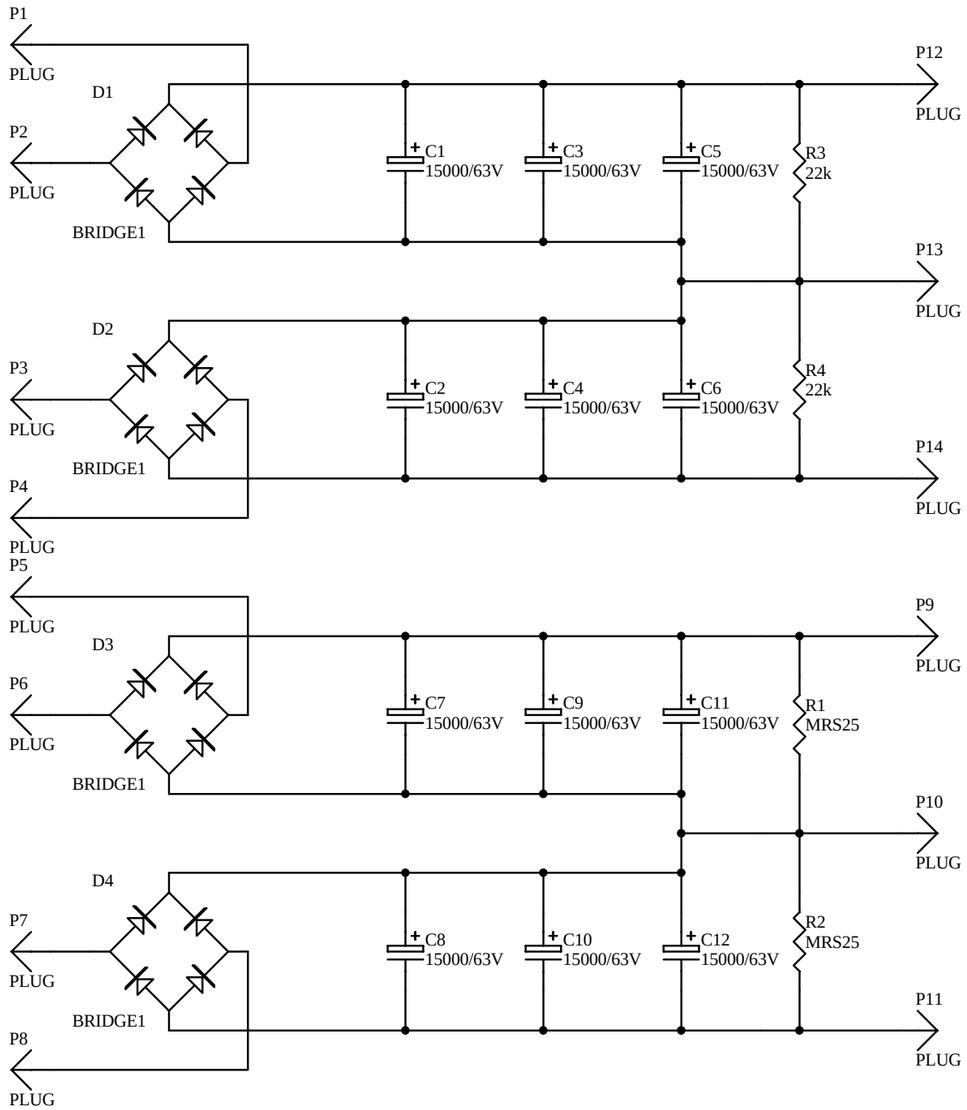
F6.3AL

F6.3AL

F6.3AL

BIAS

BIAS



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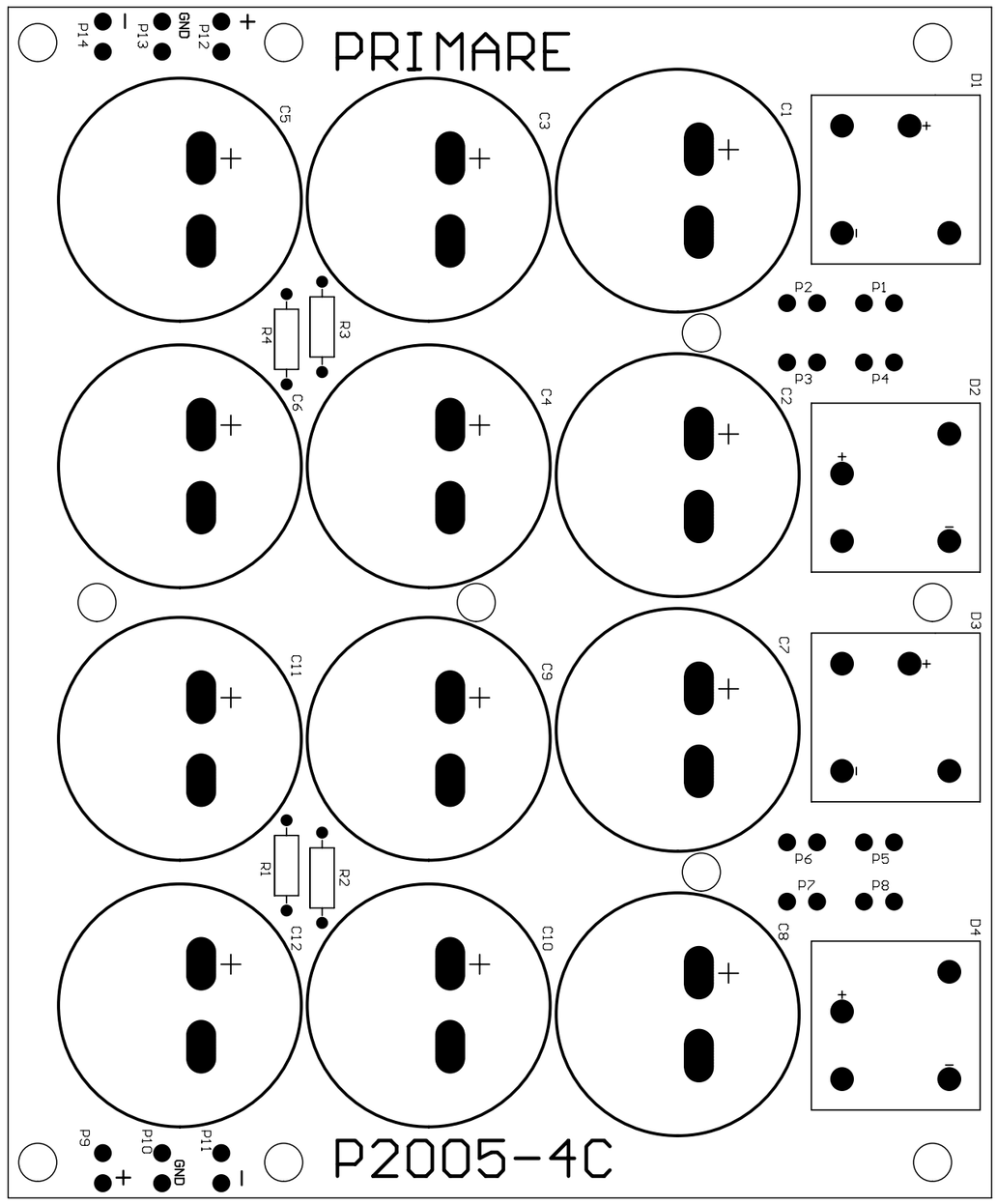
PRIMARE
P14
P13
GND
P12
+
−
D1
C1
C3
C5
P2
P1
P3
P4
R4
R3
C6
C2
C4
D2
D3
C7
C9
C11
P6
P5
P7
P8
R1
R2
C12
C8
C10
D4
P9
P10
GND
P11
+
−
P2005-4C

Performance Data

2000VA Torodial Transformer.

A total of 180 000 uF electrolytes in the powersupply.

Dual set of Speakerterminals for each channel.

Balanced (RCA) and Unbalanced (XLR) inputs.

Input impedance 15K, RCA and XLR

Output Power (both channel driven): 2x250W 8Ohms load 20Hz-20Khz
2x400W 4Ohms load 20Hz-20Khz
THD+N below 0.05% in both cases.

Frequency response: 20Hz-100Khz –0.5dB

Noise, below –100dBV

THD+N: 1K 250W 8R load below 0.01%.

Gain: 26dB unbalanced, 20dB balanced.

Trigger input range: 4-15V.