

DAC-End2

Digital to Analog Converters

audiodesignguide.com

Design DAC by Andrea Ciuffoli starting in the 2010

Design supply shunt for DAC by Salas

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INTRODUCTION

After the good result obtain with the DAC End I have design with Nguyen Quang Hao a set of boards to create a cheaper project with a sonic performances very near.

The No Oversampling DAC give a more natural sound but if you ear the TDA1541 and TDA1543 seem to lose details.

The AD1865N-K with passive I/V give a perfect combination, natural sound and all the details.

The AD1865N-K give the better performances with a 200ohm MK132 Caddock as passive I/V.

In this configuration the output signal is too low to drive any amplifier so I have design for the AD1865N-K the better output stage.

This DAC use a single ended vacuum tube amplifier without the expensive output transformers used in my original DAC End.

The DAC board follows the original design but has been inserted a jump to switch the phase of output signal.

In any vacuum tube stage the signal on the anode is in out phase with the grid signal so the jump is necessary to get a correct in phase output.

After some test has been decided to use shunt regulator to increase the sonic performances so a Salas regulator has been used for the DAC section.

Quang Hao have created a group buy on diyAudio to reduce the production cost of these pcb.

Any board have the same size 12.5 x 9.5 and all 19 x 25 cm.
All these pcb boards has been created only for DIY so no commercial use is allowed.

COMPONENTS

* **Crystal CS8414** used like receivers to obtain LSB signals from spdif input

* **Analog Device AD1865**

* **74HC04** Hex Inverter used to create the latch signal for the right channel

* **E182CC** Mullard or 5687 Jan Philips

* **LM311**

Information DAC-END2

* **BC337**

<http://www.audiodesignguide.com/DACend2/index.html>.

* **IRFP240**

* **IRPF9240**

The Salas shunt: <http://www.diyaudio.com/forums/power-supplies/143693-simplistic-salas-low-voltage-shunt-regulator.html>

* **TL431**

Thank Salas verry much!

* **2SK170**

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* **BC550**

* **BC560**

About wire forget the teflon ! use only stranded tinned copper wire with pvc isulator.

A very good quality stranded tinned copper wire could be buy directly from E-Z-HOOK that carries an extensive line of fine stranded and extra flexible wire.

DAC BOARD

On the pcb layout is visible the jump for the digital phase inverter as described in the introduction and no other regulation are necessary.

A little post shunt regulators using the TL431 has been inserted to separate all the power supply like suggested in the datasheet of AD1865 and Cs8414.

I suggest only a MK132 Caddock resistors like current to voltage converter (I/V) so the internal active I/V of AD1865 is not used.

In parallel to the 200-220ohm I/V resistors will be inserted a little capacitor necessary to create a high frequency cut-off upper.

The original DAC end have no capacitor on output because in this case this filter is created by the output transformers band.

POWER SUPPLY OF DAC BOARD

This schematic follows the Salas schematic.

OUTPUT STAGE

This output stage has been design to get an output impedance near to 1Kohm with only one vacuum tube on the signal path and without use output transformers.

The relay will short the output to ground during the switch on and switch off phase to prevent dc peak on the outputs.

The design and pcb is compatible with E182CC and 5687, in the first case the choice should be a NOS E182CC Mullard (not the new production) and for the 5687 the best is a NOS Jan Philips.

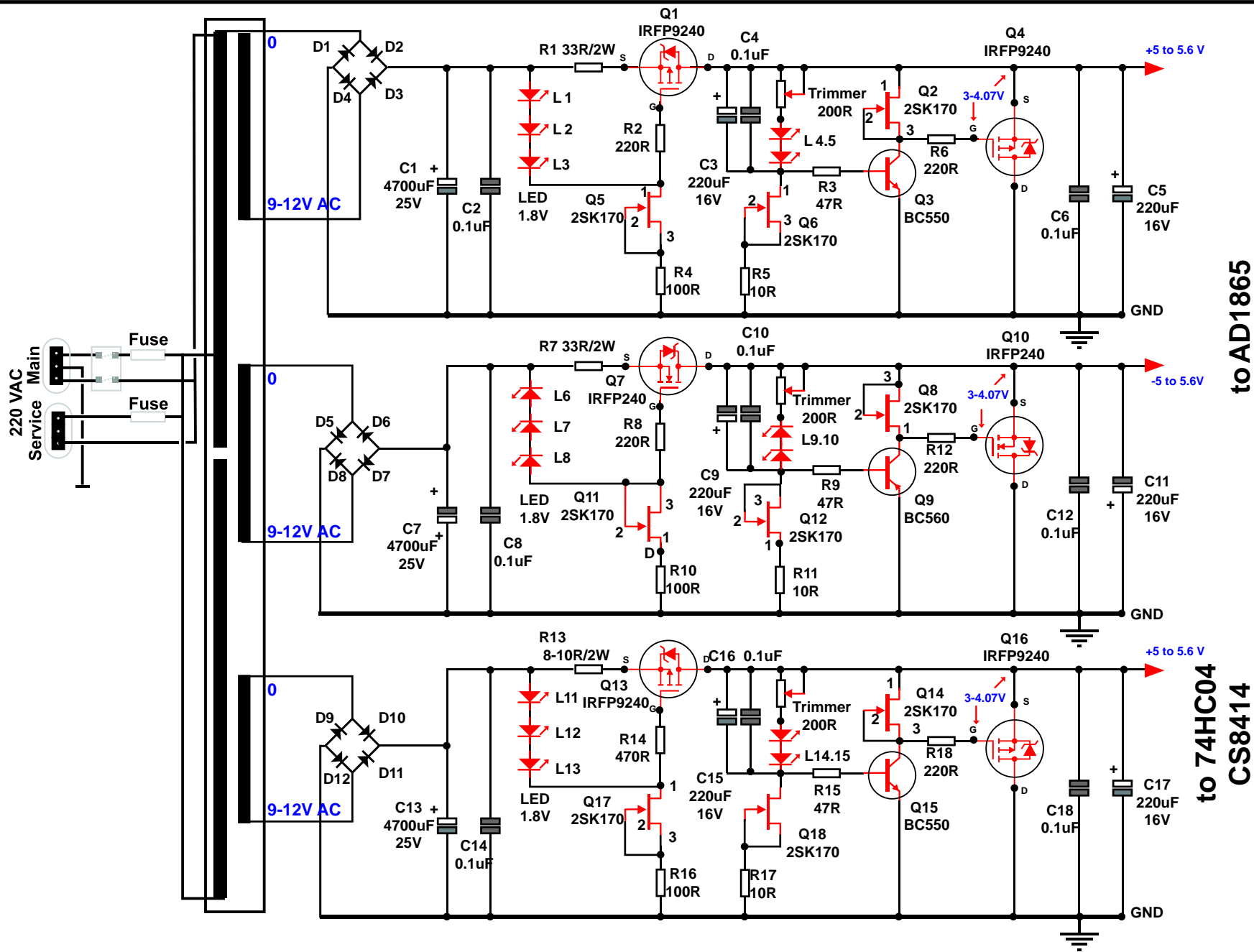
The E182CC will give an higher output level because the amplification factor is 24 instead of 17 and the internal resistance is quite the same.

Using the 5687 the voltage gain of this stage is 12.7x so the output at 0db is 127mV * 12.7 = 1.6Vrms and with the E182CC will be 127mV * 17.9 = 2.3Vrms.

THE SOUND:

adamus in diyaudio wrote: ***well... its been playing music all morning. the dac-end clearly has potential. its very natural sounding, superb top end (maybe slightly rolled off? not sure but its definately sweet with no hint of sibilance. This is using jan phillips - actually looking at audiodesigns tests it does begin to roll off before 20khz). Generally i would say that it has a warmer presentation, slightly more bodied sound.

The old transformer dac was very good though, it sounded much much better p than my cambridge audio dacmagic. not doubt about that. bear in mind i used



Part list

1. Resistor

220K 1/4W x 4
220R 1/4W x 6
47R 1/4W x 3
10R 1/4W x 3
100R 1/4W x 3
33R 2W x 2
27R/2W x 1

2. Caps

2200uf/25V to
4700uF/25V x 3
220uF /16V x 6
0.1uf x 12

3. Jfet

2SK170-BL x 9

4. Transistors

BC-560 NPN x 1
BC-550 PNP x 2

5. MOSFET

IRFP240 x 2
IRFP9240 x 4

6. Led Green x 15

Diode 1N5819 x 12

7. Trim 200R x 3

8. Tranformer

3 x12 V

9. Board

Board Salas shunt

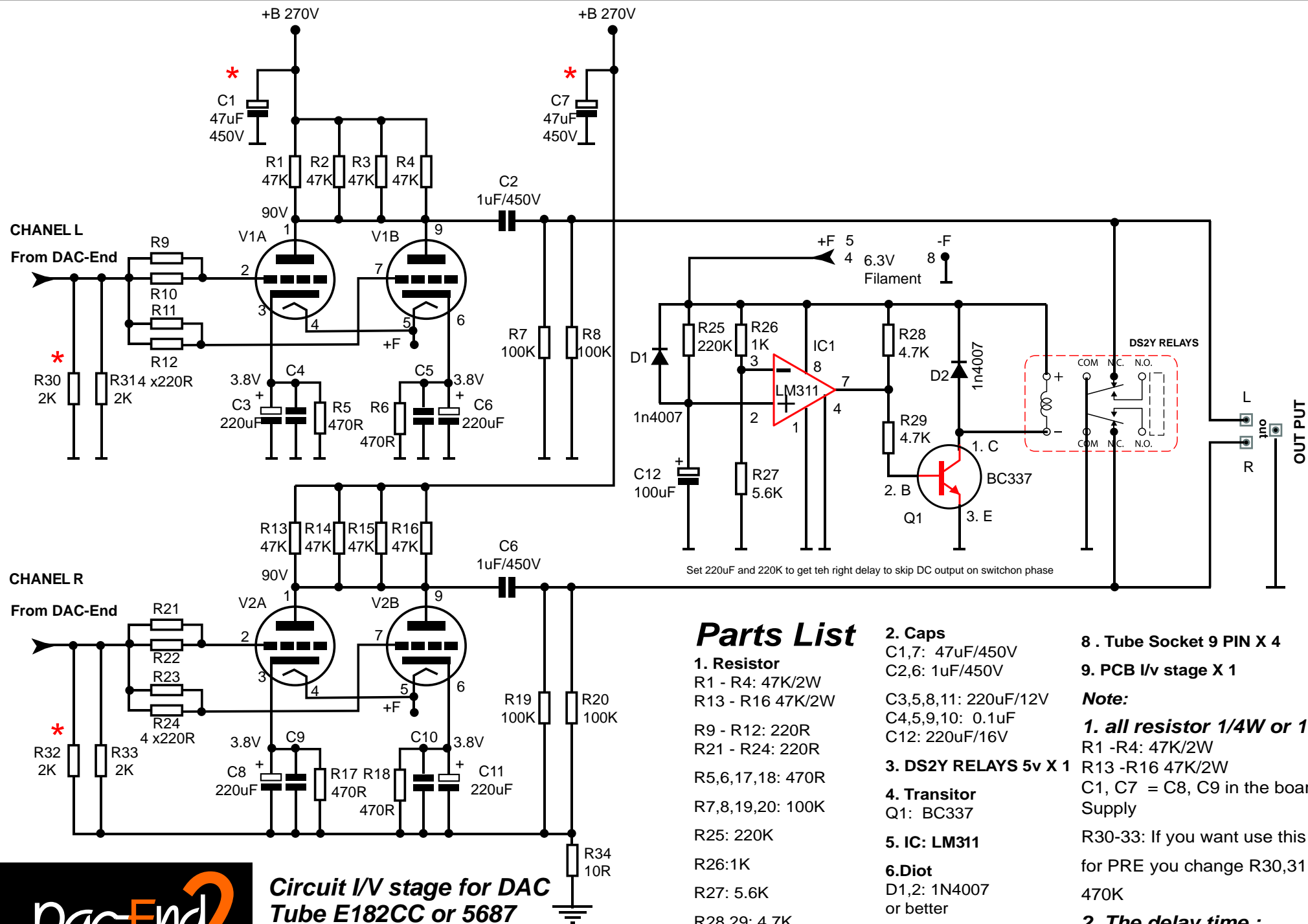
10. Tranformer

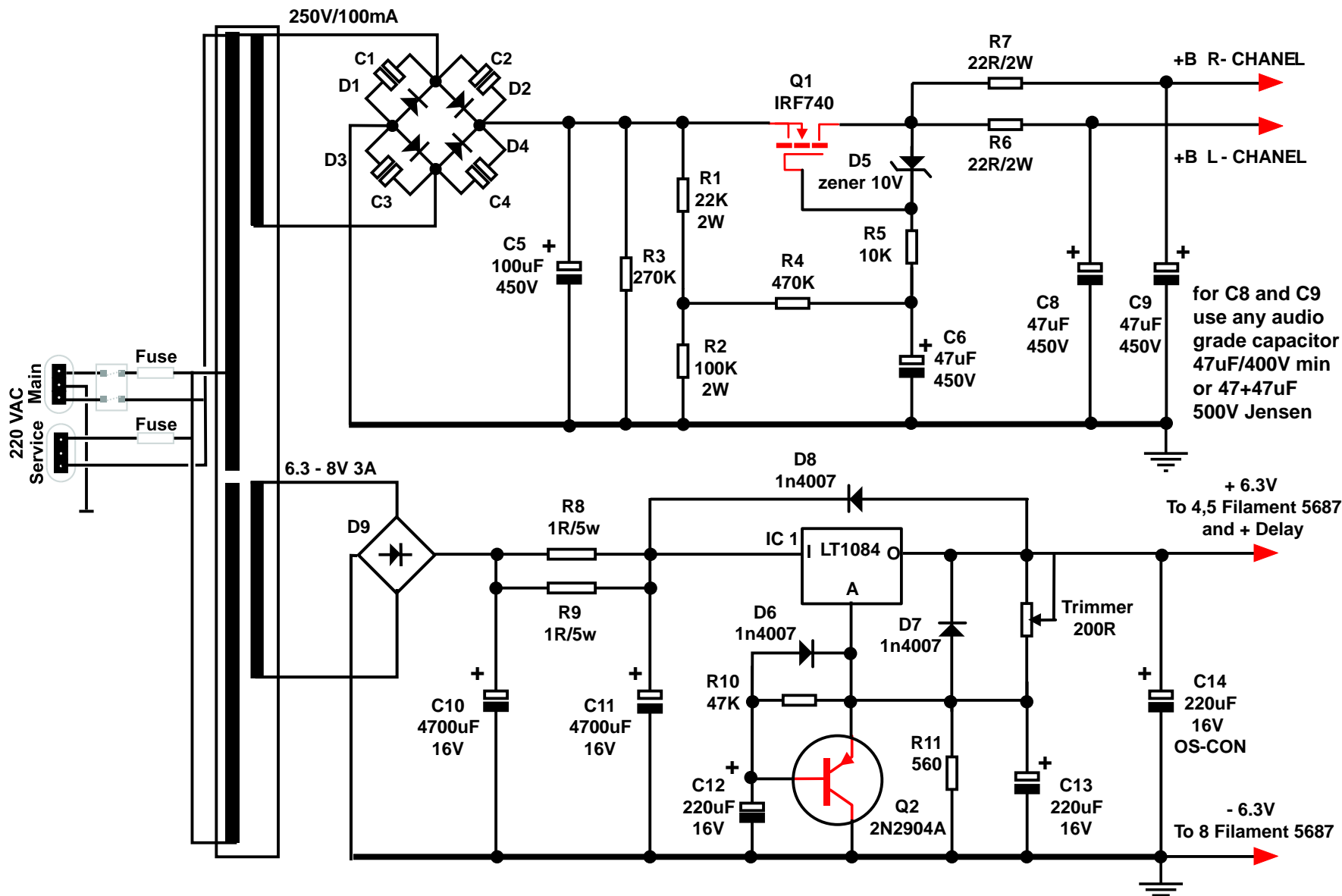
Input: 220V
Out: 9-12V/300mA x 3

Note:

All Resistor 1/4W x 4
R1, R7, R13 = 2W







Circuit power supply for I/V stage

Andrea Ciuffoli starting in the 2008
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Resistor R1,R2,R7,R6: 2W
 R8,R9: 3W-5W. all Resistor 1/4 to 1W
 Change R1 change V-Out for HV

Note: C8, C9 can change by 2 Cap 47uF/450V
 Or Better use Jensen Cap 47uF +47uF/500V

Part list

1. Resistor

R1: 22K /2W x 1
 R2: 100K x 1
 R3: 270K x 1
 R4: 470K x 1
 R5: 10K x 1
 R6,7: 22R x 2
 R8,9: 1R/5W x 2
 R10: 47K x 1
 R11: 560 x 1

2. Caps

C1,2,3,4: 0.1uF/470V
 C5: 100uF/450V
 C6: 47uF/450V
 C8,9: 47uF/450V
 Or 47uF+47uf Jensen
 C10,11: 4700uF/16V
 C12,13,14: 220uF/16V

3. Transistors

2N2904 x 1

4. MOSFET

IRF740 x 1 or 840

5. IC LT1084 x 1

6. Diode

D1,2,3,4: 1n4007 x 4
 D5: zener diot 10v
 D6,7,8: 1n4007 x 4
 D9: Bridge diot 5-1A

7. Trim 200R x 1

8. Transformer

Input: 220V
 Out: 250V/100mA x 1
 6.3 to 9 V/3-5A x 1

9. Heatsink for IRF740
 And LT1084 x 2

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Power Supply for I/V Stage

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R1 22K 2W Try quickly any 1W carbon and find right value for right B+ 270V then buy a good one like R3
 R2 100K 2W Try quickly any 1W carbon and find right value for right B+ 270V then buy a good one like R3
 R3 270K 2W 500V Vishay FARNELL 896299
 R4 470K 1W Dale RN60 WELBORNE
 R5 10K 0.5W Dale ebay 400026898796
 R6,R7 22R 2W Dale FARNELL 1277989
 R8,R9 2.2R 4W Welwyn FARNELL 1219256
 R10 47K 0.5W Generic Metal film
 R11 1K 0.5W Dale WELBORNE
 TR1 200R TRIMMER Vishay FARNELL 9608702
 C1,C2,C3,C4 0.1uF 630VDC Vishay BC FARNELL 1166464
 C5 150uF 450V Vishay BC FARNELL 1165371
 C6 47uF 450V Panasonic FARNELL1673507
 C8,C9 47+47uF 500V Jensen ebay Item 180413478642
 C10,C11 4700uF 16V Vishay BC FARNELL 1165605
 C12,C13,C14 270uF 16V Oscon SP ebay Item 310201286598
 D1,2,3,4,6,7,8 1N5062-TR Vishay FARNELL 1612313
 D5 10V ZENER
 D9 Bridge rectifier
 Q1 IRF840 Vishay FARNELL 8648573
 Q2 2N2904 NTE FARNELL 1530749
 IC1 LM338 National FARNELL 1469094
 Transformer R80-36 DYICLUB.BIZ

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Salas Shunt for DAC

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R1,7,13 28R 2W (56R Parallel) Vishay FARNELL 1155017
 R2,6,8,12,14,18 220R Dale RN55 ebay 400023718622
 R4,10,16 100R 0.5W Dale RN55 ebay 400060639786
 R5,11,17 10R 0.5W Dale RN55 ebay 390023280590
 R3,9,15 47R 0.5W Dale RN55 ebay 390023316111
 C1,7,13 4700uF 25V Elna ebay item 110477272327
 C3,5,9,11,15,17 220uF 16V Elna Silmic
 C2,4,6,8,10,12,14,16,18 0.1uF Vishay BC FARNELL 1215508
 L1-L15 Generic Green LED
 Q1,7,13 IRFP240 IR FARNELL 1463256
 Q4,10,16 IRFP9240 IR FARNELL 1653670
 Q3,15 BC550 Fairchild FARNELL 1467880
 Q9 BC560 Fairchild FARNELL 1467886
 Q5,6,11,12,17,18 2SK170 Toshiba ebay item 130351188411
 D1-12 1N5062-TR Vishay FARNELL 1612313
 Transformer1,2 9+9Vp

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DAC END

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R1-7 10R 1W Dale RN60 Welborne
 R8-21 1K 0.5W Dale RN55 ebay 390024745931
 R22 560R 0.5W Dale RN55 ebay 400025212430
 R23,24 200R MK132V Caddock
 R25 470R 0.5W Dale RN55 ebay 390023518699
 R26(28) 75R 0.5W DaleRN55 ebay 390023320694
 C1-7 270uF 16V Oscon SP ebay 310201286598
 C8-12 C20,30,31 0.1uF Vishay BC FARNELL 1215508
 C14,16,18,22,24 0.1uF Vishay RS 1666487
 C13,15,17,19,21,23 47uF Oscon SA ebay 150414134548
 C25 0.068uF Epcos FARNELL 9750860
 C26,27 0.01uF Vishay RS 1666421
 C28,29 0.01uF GAD-Viva ebay 260390883803
 U1-7 TL431 Fairchild FARNELL 1467370
 L1,L2 120uH Bourns FARNELL 1601334
 SPDIF Transf. DA101C Murata FARNELL 1362398
 CS8414 ebay 330360180451
 AD1865NK ebay 180465366327
 74HC04 FARNELL 1013912

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I / V STAGE DAC END

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R1,2,3,413,14,15,16 47K 2W Vishay FARNELL 9475338
 R5,6,17,18 470R 1W Dale RN60 Welborne
 R7,8,19,20 100K 1W Dale RN60 Welborne
 R9-12, 21-24 220R 1W Dale RN60 Welborne
 R30-33 2k 1W Dale RN60 Welborne
 R25 220K 0.5W Generic
 R26 1k 0.5W Dale RN55 ebay 390024745931
 R27 5.6K 0.5W Dale RN55 ebay 400091516904
 R28 4.7K 0.5W Dale RN55 ebay 390130730501
 C2,6 1uF Obbligato Premium DIY HIFI
 C3,6,8,11 220uF 16V Elna Silmic or Oscon 270uF 16V SP as above
 C4,5,9,10 0.1uF Vishay RS 1666487
 C12 100uF 50V Lelon, whatever
 D1,2 1N5062-TR Vishay FARNELL 1612313
 IC1 LM311 anything
 Q1 BC337 anything
 Relay Axcom FARNELL 9913670
 V1,V2 5687 Philips Jan ebay 280219691072