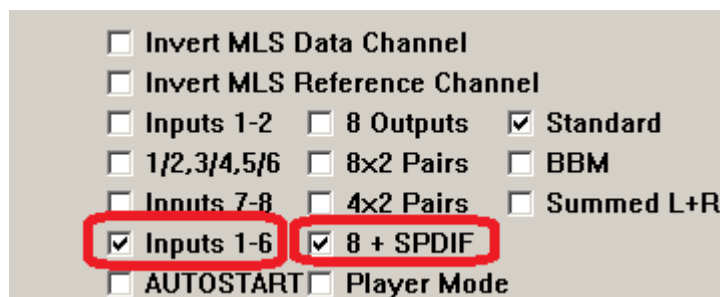


## Delta1010LT and SPDIF Amplifier

### Using SPDIF output of Delta1010LT

In order to maximize processing power of Delta1010LT, Ultimate Equalizer V5 supports all 10 outputs of Delta1010LT, including the digital SPDIF output. You can easily built a 10-channel system, by inserting a separate DAC into the SPDIF output of the Delta1010LT and using this device, create two additional channels of analogue audio.

In this configuration, the Delta1010LT is used as “multi-channel” output device, set in the Preferences screen. Inputs and Outputs need to be preset to the following options in the Preferences screen:



Then – just plug-in the DAC and the audio will come out of the L/R outputs of the DAC.

The following two, low-cost DACs have been tested for correct operation with Delta1010LT and 48kHz sampling frequency:

1. <http://www.altronics.com.au/index.asp?area=item&id=A3199#>



2.

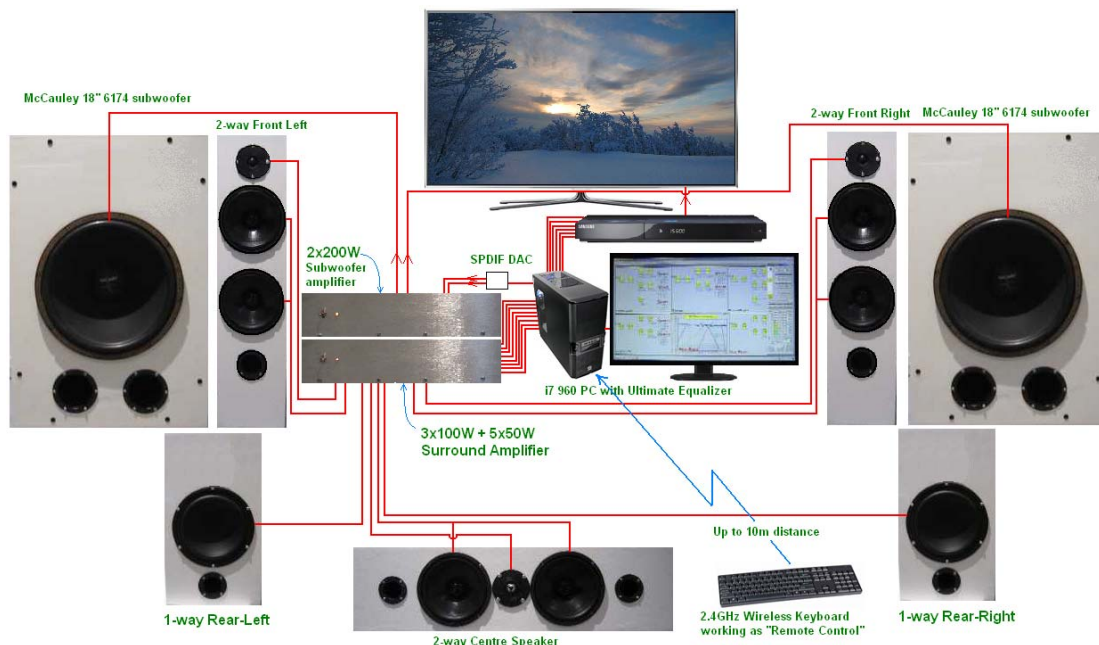
<http://www.jaycar.com.au/productView.asp?ID=AC1633&form=CAT2&SUBCATID=1014#4>



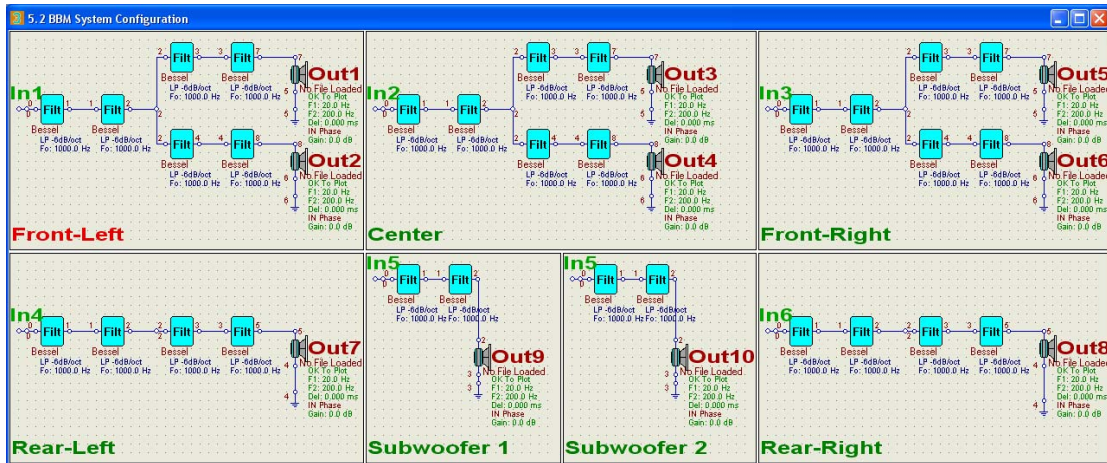
Shown below, is an example of an advanced 5.2HT system, utilizing 10-channel configuration of single Delta1010LT+SPDIF DAC.

The rear loudspeakers could employ Dayton Audio PS220-8 8" Point Source Full-Range Neo Driver - <http://www.parts-express.com/pe/showdetl.cfm?partnumber=295-346> to achieve excellent wide-band performance.

With a 50W amplifier, the PS220-8 will deliver 112dB maximum SPL, leaving plenty of room (7dB) for HBT equalization to meet THX specs.



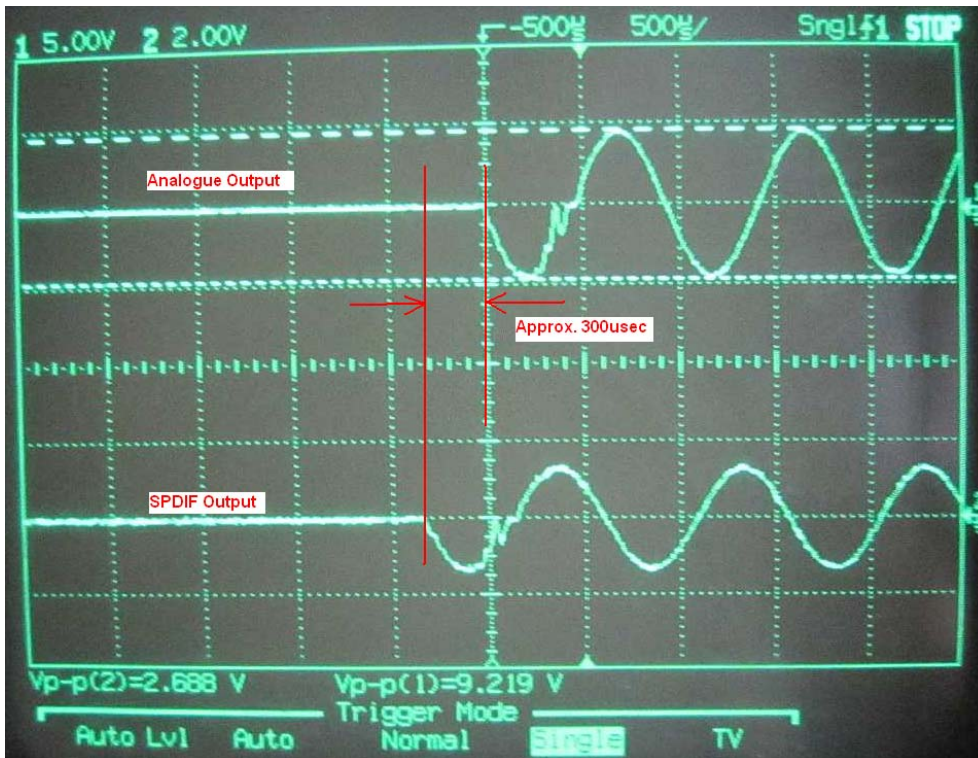
The SPDIF DAC is shown as separate component, but it would be typically built into the amplifier – in this case – subwoofer amplifier.



Picture above, shows corresponding BBM System Configuration screen, with two subwoofers serviced via SPDIF DAC on outputs 9 and 10.

Latency measurements indicate, that the analogue outputs coming from SPDIF DAC are advanced by about 300usec, which is equivalent to 10.3cm acoustical distance – see figure below.

It would be necessary to account for this difference in latency in your system. Fortunately, this is not really a problem, as the SPDIF outputs can be assigned to two subwoofers (.2) as a way of aligning their acoustical centres with other drivers, or perhaps to two rear channels, without any major consequences to the surround sound field.



## SPDIF Amplifiers

Two examples of a cost-effective, 2-way SPDIF amplifiers for a WTW or subwoofer loudspeaker system are conceptualized below.

There are some DACs available as kits. One example are products available from this website: <http://www.beis.de/Elektronik/ADDA24QS/Preview/ADDA24QS.html>, or top quality <http://www.esi-audio.com/products/drdacprime/>

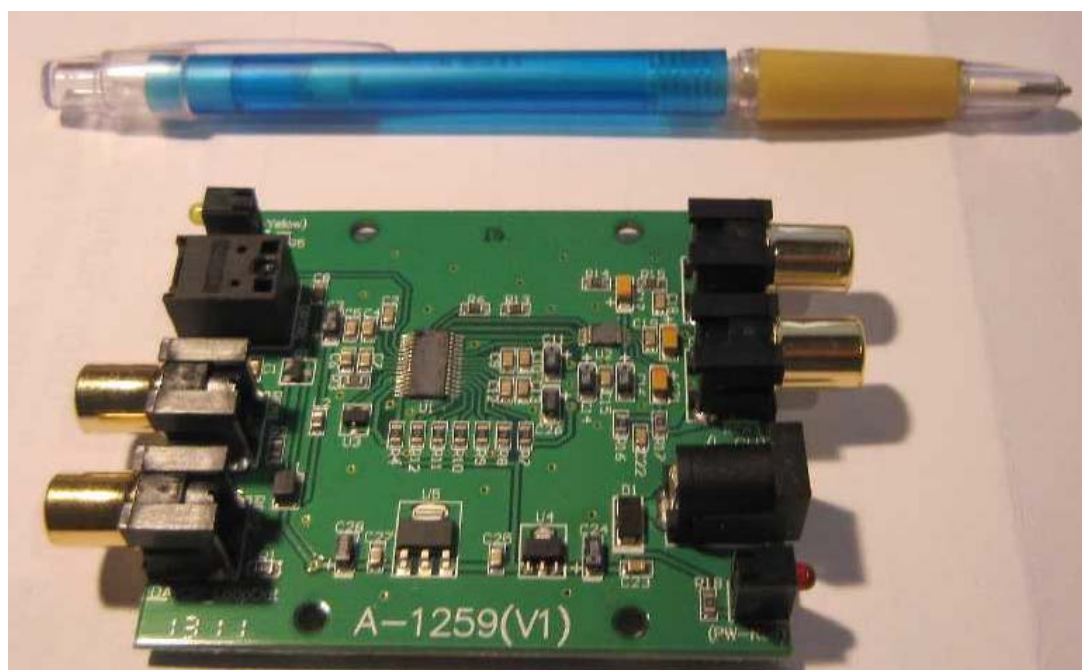
The SPDIF DAC employed in this project is a low-cost converter available from Altronics in Melbourne, Australia for \$AUD59  
<http://www.altronics.com.au/index.asp?area=item&id=A3199#>

A quick eBay search is also very advisable, as perhaps cheaper alternatives can be found readily.

The module has the following characteristics:

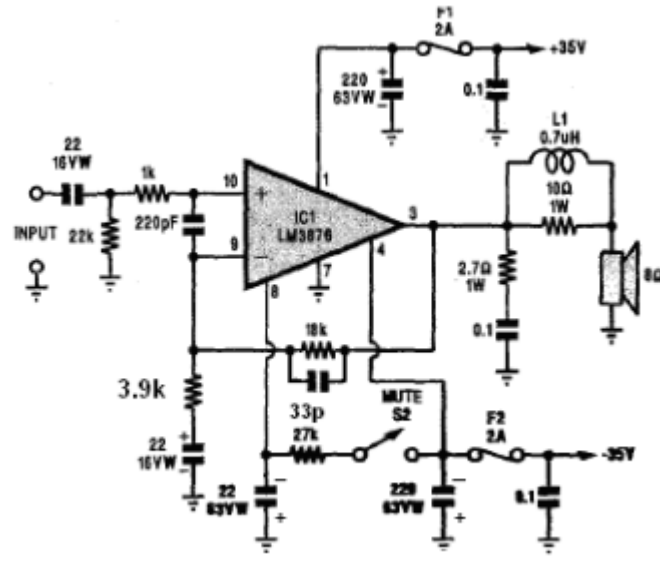
- input: SPDIF coaxial or Toslink
- Audio format: LPCM
- Input impedance: 75ohms
- Minimum load impedance: 10kohms
- Loopout function: yes
- Sampling rates: 44.1-192kHz/24bit
- Supply: +12VDC (power supply included)
- Dimensions: 7cm x 6cm (without cover)

The module will deliver 3.2 Vpp of analogue signal for full DAC swing.  
The SPDIF DAC is actually very small (see below without a cover), and can be conveniently built-in the amplifier enclosure.

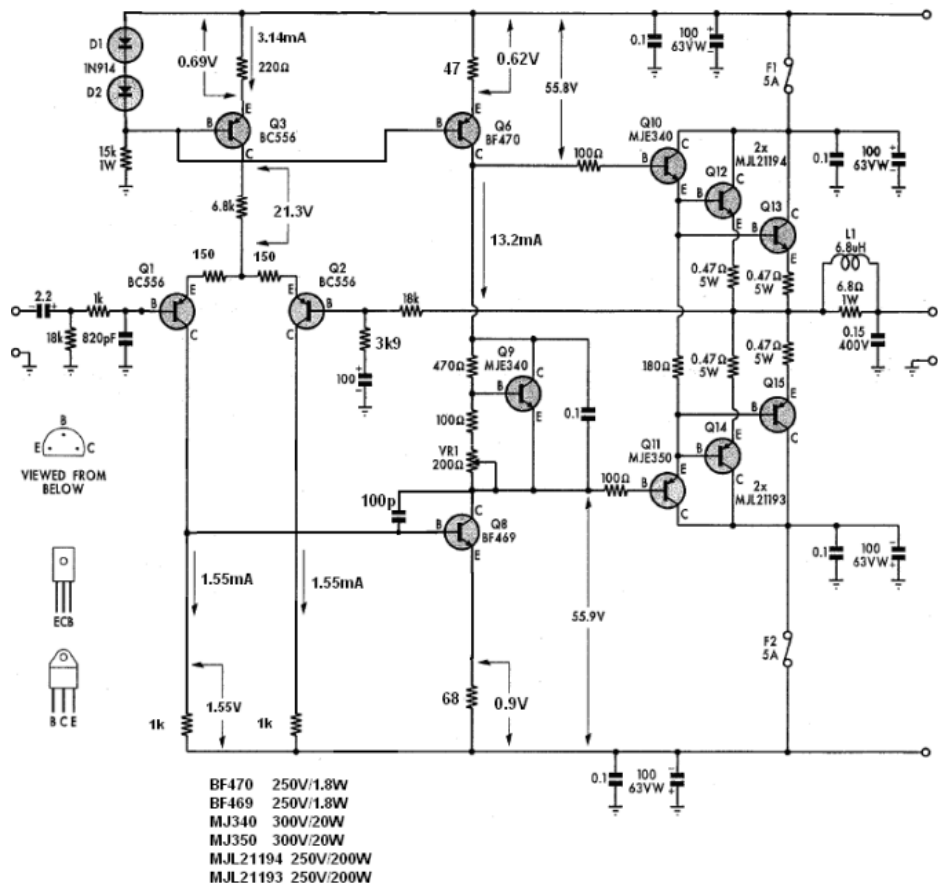




In our 2-way, WTW loudspeakers, the 8 ohm tweeter is powered by a 50W amplifier Kit KC5150 from Jaycar Electronics, Melbourne Australia.

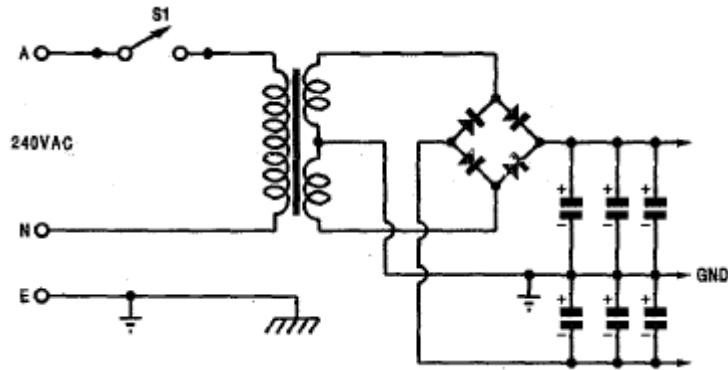


Two 8ohm woofers are powered by a modified Kit KC5201 from Jaycar Electronics, Melbourne, Australia.



## Power Supply – used for 1x 50W/8ohm modules and 1 x 100W/4ohm modules

- Transformer is 160VA toroidal transformer. Secondary 2 x 30V
- Bridge rectifier is 400V/35A.
- Electrolytic capacitors are 2,200uF/100V x 6
- DC output is +/- 41.6V

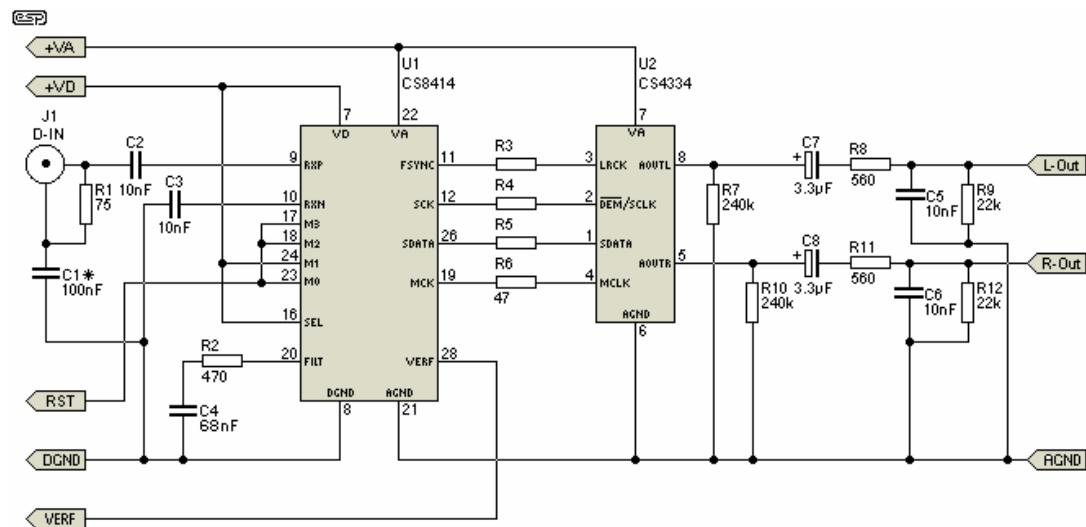


Power supply for the DAC needs to be arranged via 12V voltage regulator connected to the +41VDC power supply branch.

The SPDIF DAC (shown above) has only two active ICs. However, the markings on the top side of the ICs are removed, so I can not confirm their type with 100% confidence.

If these are happened to be Cirrus Logic chips: CS8414 and CS 4334, then the likely schematic is acknowledged with the source website.

<http://sound.westhost.com/project85.htm>



This could possibly be the simplest SPDIF DAC. Other, more sophisticated designs would provide higher quality audio, but at higher cost.

I would also recommend a protection circuit to delay loudspeaker ON state when powering the amplifier.

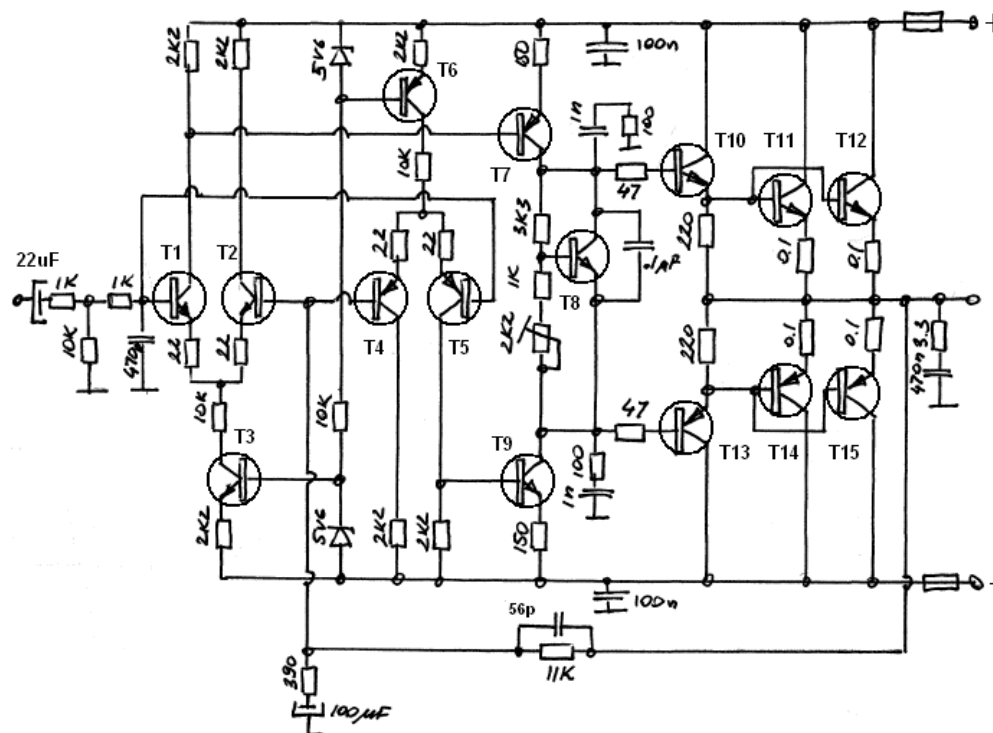
Volume control is provided by UE5.

## 2-channel Subwoofer Amplifier with SPDIF Input

This is a “symmetrical” design from input to output type of amplifier. It is my own amplifier design I built it about 20 years ago and it has been working very well ever since. It has been refurbished and I also have beefed-up electrolytic capacitors and use 2 x 300VA toroidal transformers in the power supply. DC supply voltage is +/-56V. Quite reasonable amplifier for each 18” McCauley subwoofer. I would suggest using complimentary pair of Motorola MJ15003/MJ15004 transistors in the outputs stage. The same SPDIF DAC is used at the input of the amplifier.

This amplifier was designed as a classical 3-stage device, with differential input stage (providing (+) Input and (-) Feedback terminals), followed by a common-emitter voltage gain stage and finishing with emitter followers output stage. With one exception, the differential input and voltage gain stages are fully symmetrical.

T1,T2,T3 = BC546  
T4,T5,T6 = BC556  
T7,T13 = BD140  
T8,T9,T10 = BD139  
T11,T12 = MJ15003  
T14,T15 = MJ15004



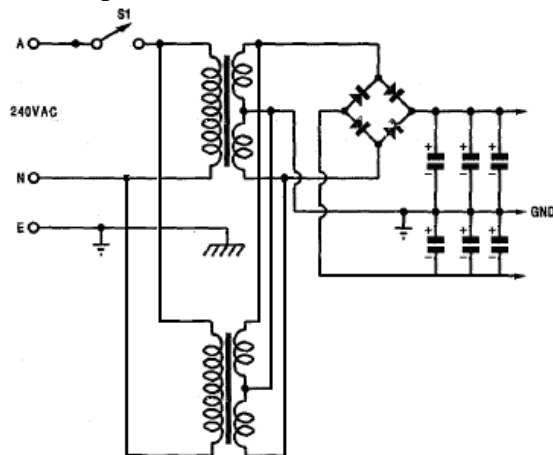
There are 2 modules of 200W amplifiers in the system. The output power is easily controlled by supply rail voltage. The 2.2kohm variable resistor is used to adjust idle current of the output transistors to 25mA combined.

Power supply for the DAC needs to be arranged via 12V voltage regulator connected to the +56VDC power supply branch, with perhaps an extra high-power resistor in-series, to provide additional voltage drop.

The modules are housed in a separate enclosure, that is of the same size and look as the 8-channel amplifier, so they now constitute a “matching pair”.

### Power Supply 2 – used for 2 x 200w/8ohm Subwoofer Amplifiers

- Transformers are two 300VA (600VA total) toroidal transformers. Primary and secondary windings are paralleled. Output is 2 x 40V/7.5A Transformers are mounted one on the top of the other, with 10mm insulating gap between them.
- Bridge rectifier is 400V/35A.
- Electrolytic capacitors are 10,000uF/100V x 6
- DC output is +/- 55.7V



The front panel is also a simple 45cm x 14cm aluminium plate, bolted to 42cm x 30cm chassis plate using right-angle bracket. Brushed-aluminium finish was accomplished by taking a belt-sander with coarse sandpaper to it, and finishing it with a few strokes of smoother sandpaper by hand. The front panel is very simple in appearance, and has only power switch and a red LED indicator on it (shown below). Main chassis plate has four rubber feet bolted to it.





## Conclusions

Full utilization of the Delta1010LT sound card outputs leads to a high quality, low-cost 5.2 HT system, or a very high-quality, 3-way stereo system with subwoofer augmentation.

Rear loudspeakers designed as wide-band PS220-8 units will achieve 110dB (will exceed THX specs) SPL over 45Hz-22kHz, and are therefore more than sufficient for excellent reproduction of musical/background material destined for rear speakers in music and movie DVDs.

Two examples of SPDIF amplifiers show how versatile the SPDIF outputs of the Delta1010LT can be. The examples are very basic, and are intended to highlight the bottom-line in SPDIF utilization. Assigning the SPDIF DAC for the two subwoofers seems like a good choice.

Please note, that the 10-channel UE5 system implements advanced acoustical features such as:

- Binaural Bass Management - AES Preprint 6628.
- Summed Sub (L+R) – for correcting “one-channel bass” on older recording.
- 5.2 HT system – as seen above.
- HBT equalization.
- Acoustical Linear-Phase

With BBM or Summed Sub functions, you do not have to worry about the low-frequency response of your surround loudspeakers – all channels below 100Hz are diverted to the subwoofers.

Thank you for reading

Bohdan