

## **SPA1000 kit**

### **Power Amplifier kit - Assembly Guide**

#### **Features**

- 2 x 380W at 8  $\Omega$
- 2 x 680W at 4  $\Omega$
- 1600W (2 $\Omega$ ) burst power one channel !
- 2 ohms stable
- Soft Start circuit with mute control
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#### **Applications**

- High Power Stereo system
- Active and Passive loudspeakers
- Supreme Surround Sound Systems

#### **Description**

The SPA1000 kit is our most capable kit in terms of output power and has the same design criteria's as our other power amplifier kits. The kit is based upon two of our biggest amplifier modules PA6CC. To ensure enough power resources the kit includes our Toroidal transformer TR1000 and the high capacity power supply module PSU12DB. The AmpC module included in the kit controls the start conditions and enabling and muting of the power amplifier modules.

The kit does **not** include chassis, connectors, power switch or cables – as we leave it to you to decide design, connectors, etc. You are more than welcome to contact us for help with regards to drawings etc – [active@groundsound.com](mailto:active@groundsound.com)

#### **SPA1000 kit in Modu.it box:**



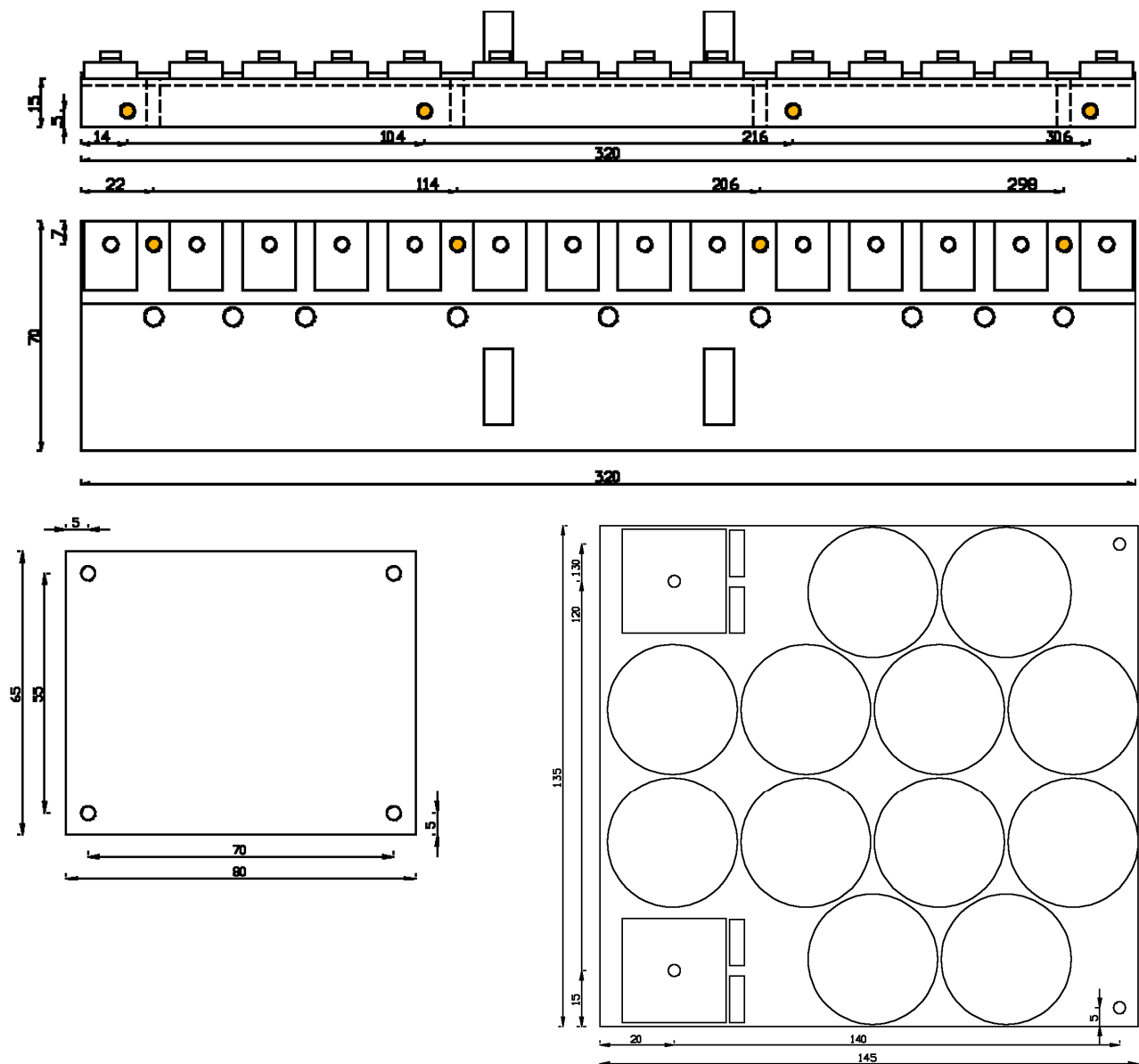
### Mechanical Layout:

When you plan the mechanical design it is recommended that you have these considerations in mind: Place the PA6CC modules so that the inputs of PA6CC are right next to the transformer and so that the input wires not pass too close to the transformer either. It is wise to avoid having mains power wires placed too near the audio connectors. It is recommended that you put the mains wires in an additional isolation hose/heat-shrinkable tube. You have to make sure that there is enough distance between the bottom of the AmpC board and the chassis – recommended minimum 4mm and taking into account the lead ends of fuse holder etc. you should use distance tubes of minimum 5mm – 12mm is used in this showcase. Regulations say basic insulation distance of 2mm and reinforced isolation distance of 4mm.

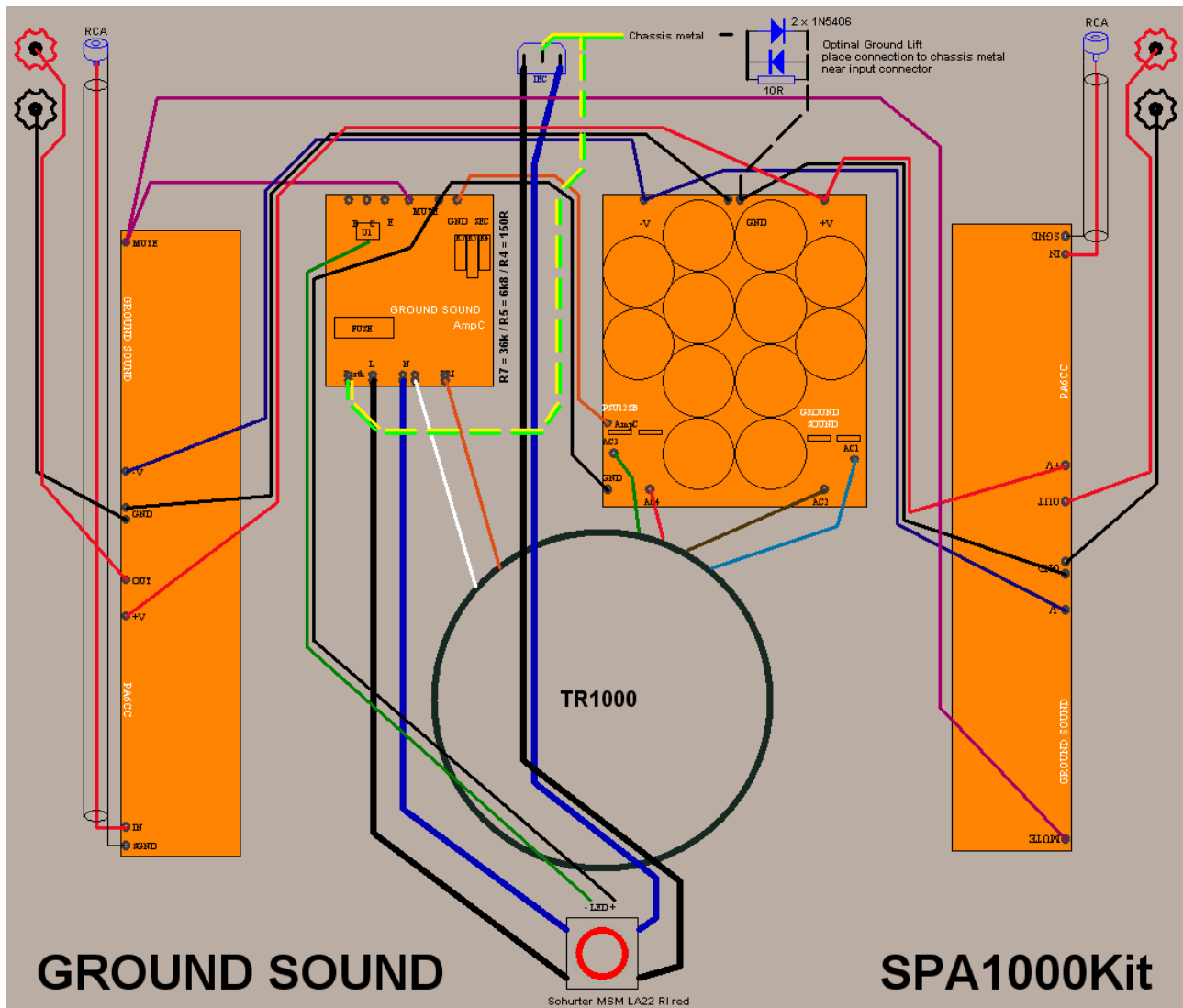
The amplifier is built in a HiFi2000 / Modu chassis with heat sinks as side panels – pretty much the standard way to do it. The chassis is model Pesante dissipante 03/400B 3U 10mm. - 40cm deep, 12cm high and with a 10mm thick front panel. The front and back panels are customized at the factory according to AutoCad drawings made by Ground Sound. You can have a copy if you like – simply contact us by mail.

When mounting the PA6CC make sure that it has excellent thermal contact to the heat sink – use thermal paste for this.

### Mechanical dimensions of PCB's:



For addition information about the individual modules please see the specific manuals of the boards.



### Recommended wire colours and used in this Assembly Guide:

#### Mains:

Live = Black or Brown wire 1,5mm<sup>2</sup> to 2,5mm<sup>2</sup>

Neutral = Blue wire 1,5mm<sup>2</sup> to 2,5mm<sup>2</sup>

Earth = Yellow/Green wire 1,5mm<sup>2</sup> to 2,5mm<sup>2</sup>

#### LED indication:

LED Cathode (-) to AmpC U1 pin 2 = Green wire 0,2mm<sup>2</sup> (U1 is **not** mounted)

LED Anode (+) to AmpC GND pad = Black wire 0,2mm<sup>2</sup>

The Schurter MSM LA 22 RI red power switch has a 24V voltage drop of the LED and R5 on AmpC is 6k8

#### AC secondary to AmpC:

AmpC pad (PSU12DB) to SEC pad (AmpC) = Orange wire 0,5mm<sup>2</sup> to 0,75mm<sup>2</sup>

GND pad near AmpC pad (PSU12DB) to GND pad (AmpC) = Black wire 0,5mm<sup>2</sup> to 0,75mm<sup>2</sup>

#### MUTE control:

Mute pad (AmpC) to Mute pads (PA6CC) = Purple wire 0,2mm<sup>2</sup>

#### PA6CC power:

+V = Red wire 1mm<sup>2</sup> to 1,5mm<sup>2</sup>

-V = Blue wire 1mm<sup>2</sup> to 1,5mm<sup>2</sup>

GND = Black wire 1mm<sup>2</sup> to 1,5mm<sup>2</sup>

#### Optional ground lift:

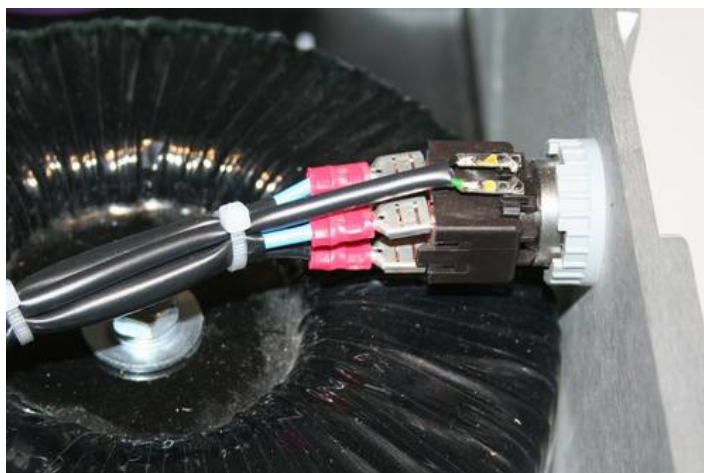
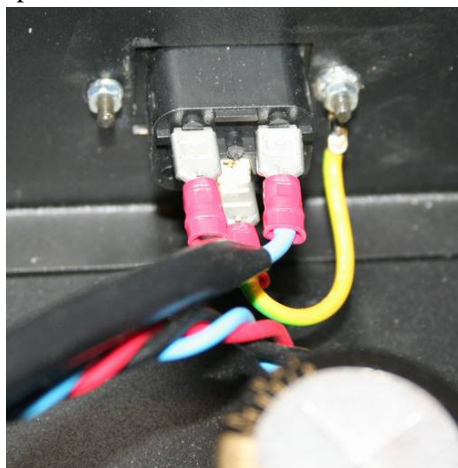
GND power output (PSU12DB) via ground lift circuitry to chassis metal = Black wire 1,5mm<sup>2</sup> to 2,5mm<sup>2</sup>

**Input and output wires are basically your own choice.**

More detailed wiring explanation can be found below.

## Wiring

The **mains** power wiring can be done in two ways, either three separate wires with an additional isolation hose/heat-shrinkable tube or simply a three lead mains cable. Notice that regulation requires basis isolation distance of 2mm if chassis is connected to Earth via mains cable and if **not** connected to Earth then reinforced isolation distance of 4mm is required. It is also recommended/required that all mains wires are double secured. E.g. two wires that are connected to mains IEC inlet is secured with additional cable tie. You can connect AmpC direct to the power mains inlet connector or insert a switch in either the live or neutral wire or if the switch has 2-pol both wires (the last is recommended). The mains wires should be between 1,5mm<sup>2</sup> and 2,5mm<sup>2</sup>. There pads for the mains supply on AmpC: L live (black or brown wire) second pad from left, N common neutral (blue wire) third pad from left and Earth (green/yellow wire) is the first from left / closest to the mounting screw. The Earth wire is not mandatory, but recommended. Make sure that the Earth pad/screw has good electrical connection to the chassis metal if this option is used. In the showcase the mains earth wire is connected direct to chassis metal on the back panel and the earth pad on the AmpC is not connected.



In addition to the ground wiring system you can connect a **lifted ground** network between PSU12DB power ground (GND between +/-V) and chassis metal close to input connectors. The circuitry is made of two diodes (E.g. 1N5406) anti-parallel and a resistor of (E.g. 10Ω) in parallel with the diodes.

When implementing the wiring - **do** look out for ground loops – it will certainly create hum in your system if you make a ground loop. If you implement the kit according to our description you will **not** be making any ground loops.



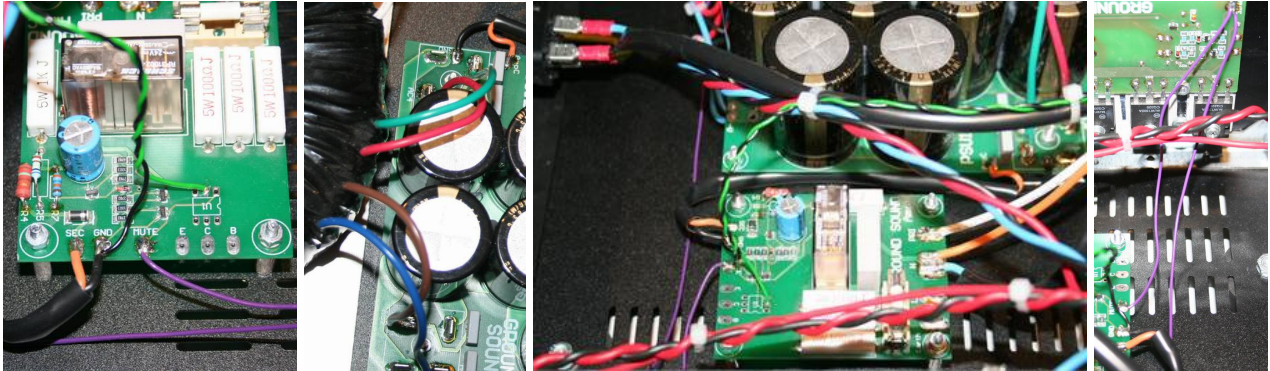
The **input** wiring should be made with shielded cable – only one inner core is required for unbalanced RCA connector.

The **output** wiring can be the cable of your choice, but it is recommended that you do not use too thick wire diameter as you can break the soldering pad and it might not be possible to twist the wire, which is highly recommended..!

The **supply power** for PA6CC is wired with 1mm<sup>2</sup> to 1,5mm<sup>2</sup> and it should be twisted. It is not wise to try to fit thicker cables as it is harder to twist and there will be a risk of breaking the pads – what would be gained - an insignificant reduction of the total impedance of the supply cable...!

The **mute circuit** ensures pop free power ON/OFF. The current is low and the 0,2mm<sup>2</sup> wire is sufficient. The mute is controlled from the AmpC module and can simply be daisy chained from module to module.

The **On LED indicator** can be supplied from the AmpC module by installing a resistor at position R5. In this kit and with the use of the Schurter MSM 22 LA RI red (LED voltage drop is 24V) you have to install a 6,8k $\Omega$  – 1/4W resistor. The voltage supply to the LED is taken between U1 pin2 and GND. U1 is **not** installed. The current is low and the 0,2mm<sup>2</sup> wire is sufficient. The LED wires are green and black and you can twist them for easier assembly. The green is attached to the cathode (-) of the LED and the black is attached to the anode (+) of the LED.



The **soft start** circuitry of AmpC gets it's power from the transformer via the AmpC pad on PSU12DB (tapped at the bridge rectifier) and power ground pad (tapped at transformer entry to power ground) wired to GND pad – recommended wire 0.5-0.75mm.

The transformer wires for primary and secondary side is easily soldered as TR1000 is supplied with multi cores wires. The primary side wires (white and yellow) have to be connected to the live soft start controlled pad PRI and the common neutral mains pad N. Because PSU12DB use two bridge rectifiers, it has 4 pieces AC pads one for each of the secondary side wires.

It is recommendable to twist nearly all wires throughout the amplifier to get as little as possible influence between the different wires and their returns. Immunity to noise and electromagnetic fields is greatly reduced by routing signal and return as close to each other as possible and it also reduces the inductance.

After some hours of “fun” in the workshop the result can be like this:



**Thank you for buying the Ground Sound kit**

### Remarks and Revision history

Ground Sound reserves the rights to make alterations without prior notice.

Please notice that Ground Sound will not be held responsible for any property damage. It's assumed that the customer is aware of the danger of high voltage and takes the necessary precautions to avoid personal injury and fully understands the consequence of dealing with high voltage.

Revision A: 2009-10-23

Revision B: 2011-06-19            Illustration corrected