

# Maintaining Your Balance, Part 2

Follow this author's instructions and you're on your way to better LP-to-CD conversions.

## LOCATING COMPONENTS ON THE BOARD

Using the program ExpressPCB, first determine the dimensions of the board based on components' sizes and shapes. Once that is set into the layout program, placement of the components can begin, the easiest way being to use the component manager to select a compo-

nent outline and place it into the layout. **Photo 1** shows an electrolytic capacitor with 0.2" lead spacing.

Note that if the component is polarized, the positive lead has a square pad, a convention that makes correctly orienting the component easier. You can also rotate the component before insertion into the layout. Once it is in the layout,

you can move the component on the grid and rotate it to different orientations. You will need to make sure that the placement allows for the maximum component dimensions so that it does not interfere with adjacent components. The grid markings make that simpler. Be especially careful of items such as heatsinks, which can extend well beyond

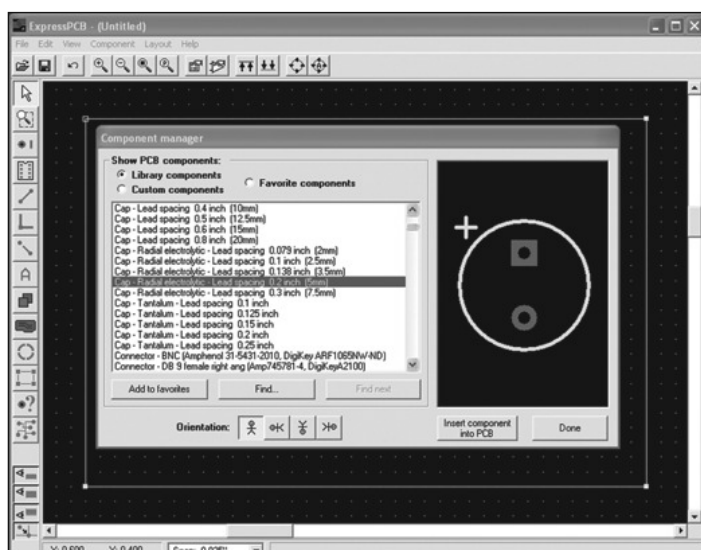


PHOTO 1: Device in Component Manager.

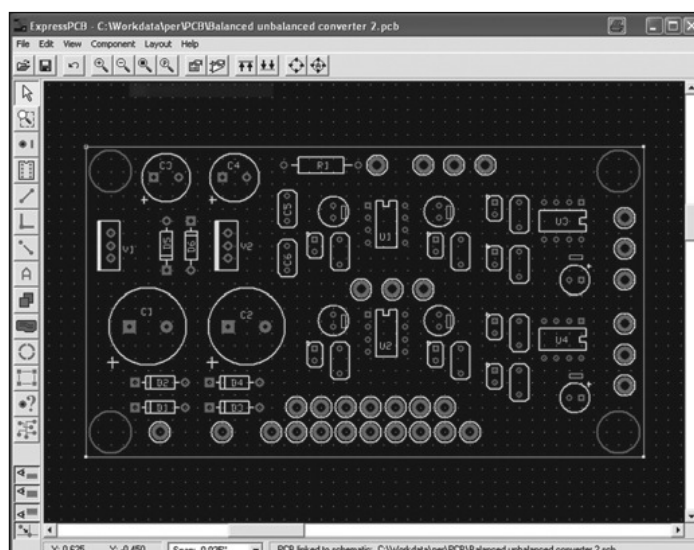


PHOTO 3: Parts layout.

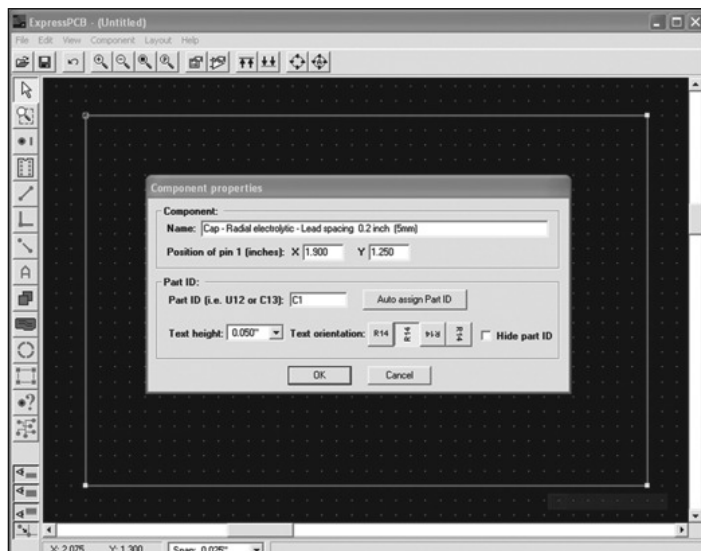


PHOTO 2: Setting component properties.

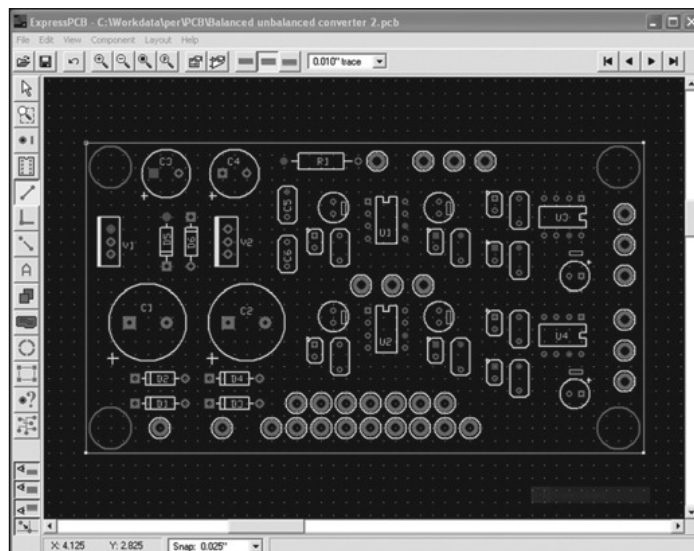


PHOTO 4: Highlighted pins.

the device outline.

If you have previously produced a schematic for this circuit using ExpressSCH, you can achieve other results at this time. By linking the board to the schematic, you can set device properties as shown in **Photo 2**.

Once linked, the board program knows all the connections. If you set the position of pin 1 in the horizontal and vertical positions, you will not need to drag it into position once in the layout. You can also choose the designation from the schematic, which will assist in the trace layout. The component will automatically assign the text used in the schematic to the component in the layout. Sizing and rotation of the text is also possible.

## LAYING DOWN TRACES

After the components are in place, you need to lay down the traces to connect the components. This is where generating a schematic in ExpressSCH can be a major time-saver, because ExpressPCB will automatically indicate the pins that you need to connect. **Photo 3** shows the parts layout of the project board before the traces were defined.

To begin the trace layout, you can click on any pad and all the pads that are connected together on the schematic will be indicated by a color change to blue. In **Photo 4** the output of V1 was highlighted and the following pins have been marked in blue:

The output of V1  
The anode of D5  
The positive side of C3  
One side of R1  
One side of C5  
Pin 6 of U1  
One side of each B+ power-supply bypass capacitor  
Pin 7 of U3  
Pin 7 of U4  
Pin 6 of U2.

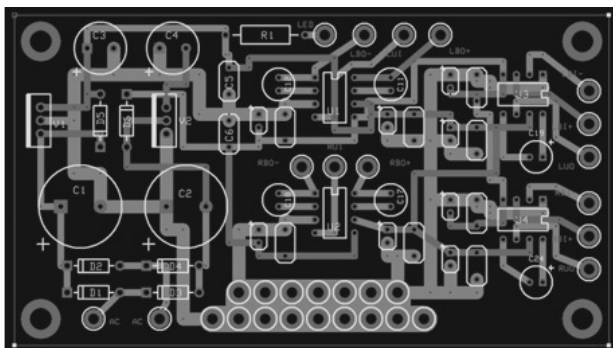
You can now use the trace layout tool to connect the highlighted pins with appropriately sized traces. You can also

pick which side of the board (top or bottom) a particular section of trace should use. For example, you may choose to have a connection on the top of the board go to one pin and have the connection from that pin go to the next component on the bottom of the board. The plated-throughhole will connect both sides of the board. This helps reduce the need for jumpers.

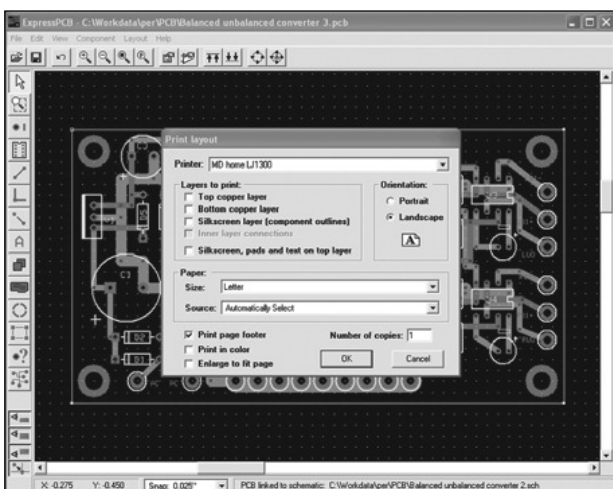
Once you have made all the connections to a particular set of interconnected pins, you can highlight another pin from a different group and repeat the process until all the traces are laid. The completed trace map is shown in **Photo 5**.

Both programs include many more tools which are not discussed here. The best way to learn about them is to download the programs and experiment.

You are now ready for final checking before sending the file out for board production. To assist in checking, the program provides several options to print various board configurations as shown in **Photo 6**.

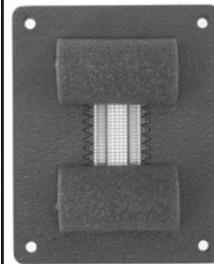


**PHOTO 5: Completed trace map.**



**PHOTO 6: Board print choices.**

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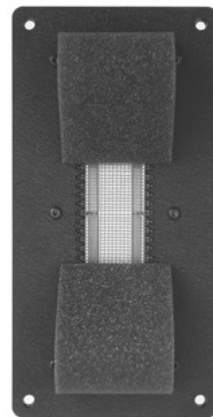
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