

## PCB Hints

### Loading a design

- For a new design imported from gschem, either run "pcb yourfile.pcb", or run pcb without parameters and then choose "Load layout" from the File menu. Either way, just the footprints are loaded, bunched together in the top left hand corner.
- The select menu has an item for spreading out all the footprints.
- Now load the netlist, using "Load netlist file" from the file menu. The rats nest will appear when you press the o key (or menu Connects/Optimise rats nest).

### Auto Place (don't use it)

- Although there is an auto place option which is supposed to optimally position the footprints on the board, **this is not recommended**. It's more likely to mess up your board than do anything useful.

### Zoom

- Zoom in about cursor by pressing z key, zoom out by Z (shift z).
- Zoom to whole board by pressing v key.

### Undo

- Use the u key (note: NOT ctr-z).

### Delete

- With cursor over object to be deleted, press delete key.
- If you delete a rats nets connection it will be redrawn when you press the o key again (connections are not deleted from the netlist).

### Move Footprints

- With the "SEL" tool, click with cursor over the footprint (not text) and drag. Text is dragged with the footprint.
- Rotate by selecting "ROT" tool and clicking over the footprint or text.
- Text associated with footprint can be moved and rotated independently of the rest of the footprint in the same way.

**Move a number of footprints and tracks together**

- With the select tool active, draw a box around the items you want to move. This should select them.
- Drag the block to where you want it.

**Layers**

- Turn off a layer by clicking on the coloured box containing the layer's name.
- Line, text or polygon drawing will draw on the currently active layer (the one whose check box is selected). Auto routing will use any visible routing layer.
- Layers can be grouped so that more than one layer will be on the same physical layer of the finished board.
- See the groupings under File/Preferences/Layers, Groups tab. Info tab gives some help on how the groups work. You can also change layer colours and names here.

**Tracks**

- Draw tracks using the "LINE" (straight lines) or "ARC" tool (arcs).
- Select the layer for the track by clicking on the check box to the left of the layer's name. (Remember: surface mount components are usually only on the "component" layer.)
- Select the track thickness by clicking one of the radio buttons underneath "Route Style".
- The route style name, thickness etc can be changed by clicking on the "Route Style" box.
- Change layers whilst drawing tracks by typing the required new layer number (numbers start from 1 at the top of the layers list in the panel on the left).
- Delete a segment of track by pressing the delete key when the cursor is over it.
- Continue tracking somewhere else by moving the cursor where you want and clicking the middle mouse button.
- Finish tracking by pressing the escape key.
- Press the o key to redraw the rats nets.
- A congratulatory box pops up when you have routed the last rat net.

## Selecting Things

- With the select (SEL) tool, left click on the object you want to select. It becomes highlighted.
- Objects are deselected by left clicking somewhere else.
- Select additional objects by holding the shift key down whilst you left click.
- Or draw a box around a collection of objects with the select tool active.

## Measuring Things

- Position the cursor at the start point for the measurement and press control m. This position is marked with an X.
- Move the cursor - the position relative to the marked position is shown in the left hand of the 2 coordinate boxes (in polar and rectangular coordinates) in the top right hand corner.
- Press control m again to clear the marked position.
- Click on the "mil" or "mm" box in the top right hand corner to change units between imperial (1 mil = 1/1000 inch) and metric (this changes the displayed units for everything in the pcb program).

## Nets

- Nets can conveniently be found and selected using the "Netlist" window (menu Window/Netlist).
- Choose the net under "Net Name". Click on Select, Unselect etc. as required. Find highlights the net without selecting it. Clicking on a node highlights that node.
- You can select multiple nets by selecting them individually and leaving them selected.

## Auto Routing

- Under the Connects menu you can auto route selected rats or all rats.
- To route selected nets, it's often easiest to select them using the Netlist window (see above).
- The auto router will potentially use all layers that are visible. Turn off (make invisible) unused layers before running the auto router.
- The router uses the currently selected Route Style for track thicknesses etc.

- You can unroute all auto routed tracks (Connects menu) or selected auto routed tracks (from the Select menu). Deleting a section of track has the same effect.
- Make sure you have the “new lines clear polygons” checked under the Settings menu before auto routing, unless you want the new tracks to connect to polygons.

### **Power Planes (Copper Fill)**

- To do polygon fills use the RECT or POLY tools.
- For rectangular fill, use RECT, select the required layer and click on opposite corners of the desired fill area.
- For arbitrary shapes use POLY fill. Click where you want corners. To close the polygon, press shift p.
- If, under the Settings menu you don't have "All direction lines" ticked (the normal state), then lines are only permitted at 45 or 90 degree angles. The polygon will not close unless the closing line can meet this requirement.
- Tracks will be connected to (covered by) polygon fills unless their "clear polygons" flag is set. The flag is individually set/clear for each segment of track (not the whole net). You can set the flag for new tracks (Settings menu, "New lines, arcs clear polygons") before manually drawing or auto routing tracks. You may then end up with a mixture of tracks, some of which have the clear polygons flag set and some don't.
- You can toggle the "clear lines flag" for a segment of track by pressing the j key whilst the cursor is over the track, or by selecting multiple segments and pressing shift j.
- You can view the state of the flags associated with a segment of track by selecting "Generate object report" from the Info menu and clicking on the segment of track.