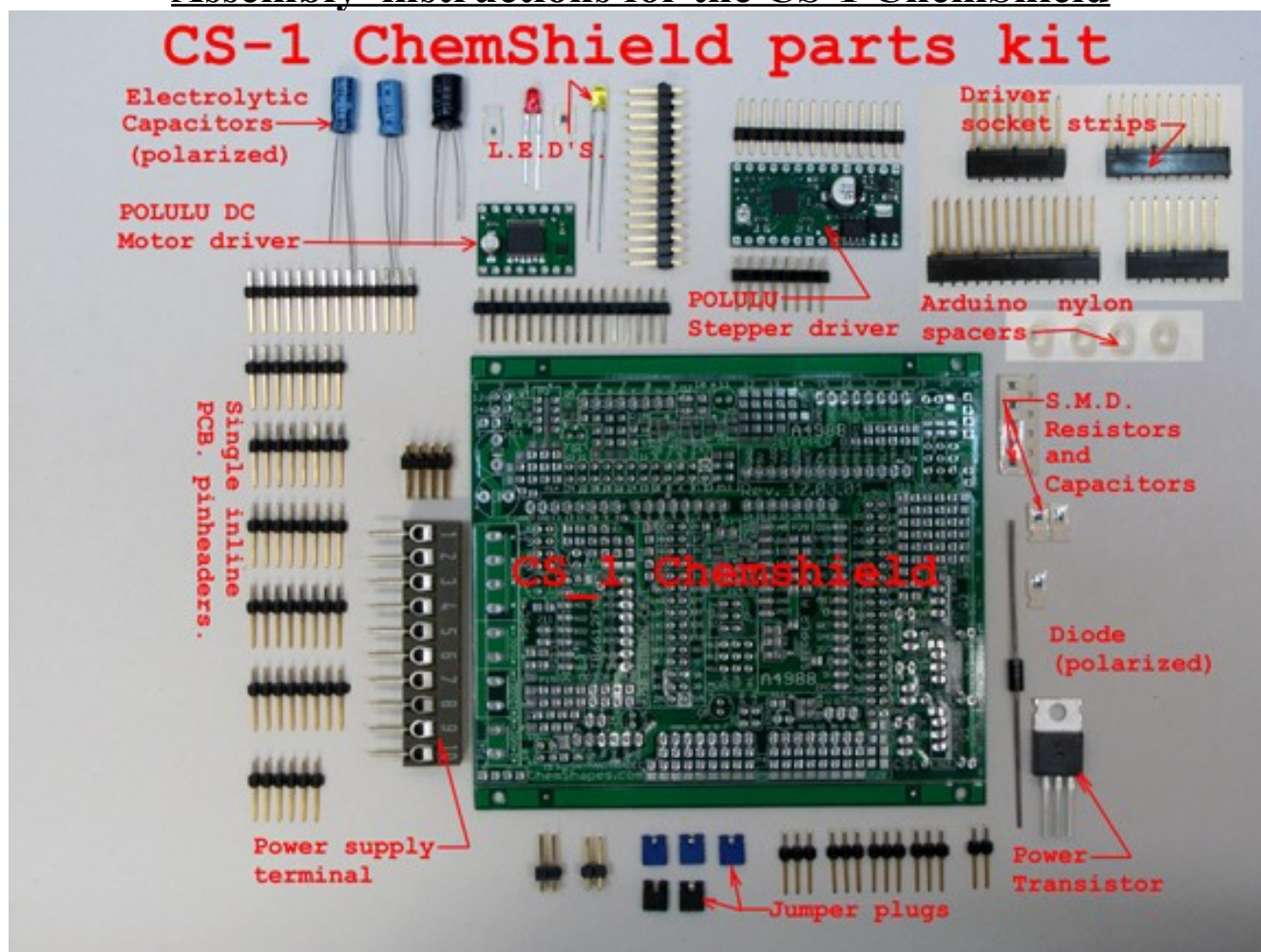# Assembly instructions for the CS-1 ChemShield

What is S.M.D
SMD=Surface mount devices, like all the components does not have leads, but gets soldered onto flat solder pads.

The CS-1 assembly is pretty simple, the only tricky part is the SMD's.
Use common sense, think ahead , and don't work yourself into corner where you can't get to any components.

 Make sure you don't have any dry/cold , loose joints or contacts and a lot of patience always helps.
Wait for the leads to get hot enough before applying the solder,That will give you a quick ,nice and smooth solder joint.
Before starting, do a quick visual inspection of the PCB board, every once in a while the PCB manufacturers leaves burs on the boards when they route and V-groove them. Look for that and any other irregularities that might short the traces and cause problems. Also check all the the traces visually for continuity from pad to pad.

What you will need:

1-Solder Iron.
I found this video on soldering irons for you guys:
http://www.youtube.com/watch?v=Sfb1Ve52ztY&feature=relmfu

Use a sharp pencil tip solder iron .

Around 40 watt and higher is good. A 20 watt solder iron is a little small but will work.
A 20 watt solder iron "tins" a 14 Guage wire in about 30 seconds or so. . A 60 watt in about 5-10
second. See this video for tinning a wire..http://www.youtube.com/watch?v=8jUaf394WIk
Also see: http://www.youtube.com/watch?v=Vh9pWu6K6tc
You can also get all kinds of fancy materials and tools like some of these on you tube:
http://www.youtube.com/watch?v=IgrEbJN8dcQ
But you do not really need them.

2-Sharp tip tweezers for the SMD's.

3-Solder wire, Flux core or Rosin Core 60/40, (60% tin and 40% Lead) solder wire, Around 0.4 mm
thick (0.015 Inches) for the SMD's and maybe thicker .025" for the bigger components.

http://www.youtube.com/watch?v=COqGkYMOA44

http://en.wikipedia.org/wiki/Solder

4-A Multimeter/voltmeter would be very handy but is not an absolute must.

SOLDER TIPS:

SOLDERING THE SMD COMPONENTS

1-This video I found use the same method I use:... "Tack and flow" ..method. Very simple and
inexpensive. http://www.youtube.com/watch?v=b9FC9fAlfQE&feature=related

2-No need for "fancy" tools. Just flow a very little solder on one pad.....(VERY LITTLE !,Just wet the
pad.)

3-Place and center the SMD component, now while pushing down lightly with a pair of tweezers .

Hold the components and heat up the pad and the component together with the solder iron tip until it "sweats" or liquify" the component should be tacked onto the pad now without moving. For now it is just "tacked on" but not soldered yet. Leave it for now, don't solder any more yet .

4-Do a quick full solder joint on the opposite side now.

4- Go back to the sweated side, this one should be easy now , you have your hands free .
Solder full contact.

5-Clean up any unwanted solder.
And don't "blob" on too much solder either,Just enough to make good contact.
As a rule of thumb,You should be able to see the full component with its top sholder edges after soldering, otherwise there is too much solder on. The solder should only go up to the sides.

6-Super glue
 Another handy tip is to use a just a very little Super glue, I really mean just a very tiny spot of super glue on the plastic pin-header housing on some of the sockets (DO NOT SOAK IT!!!) . It is only to hold it in place temporarily until soldered. Glue just a few of the high spots on the bottom of the plastic housing. Set them in the holes ,press and hold a few seconds, flip the PCB and solder the bottom. The reason you use it extremely sparse is because you don't want it to flow into the through holes and block the solder paths.
It also gives off a obnoxious smoke that irritates your eyes when heated up. So be careful with it.

7- Be cautious about adding too much solder:
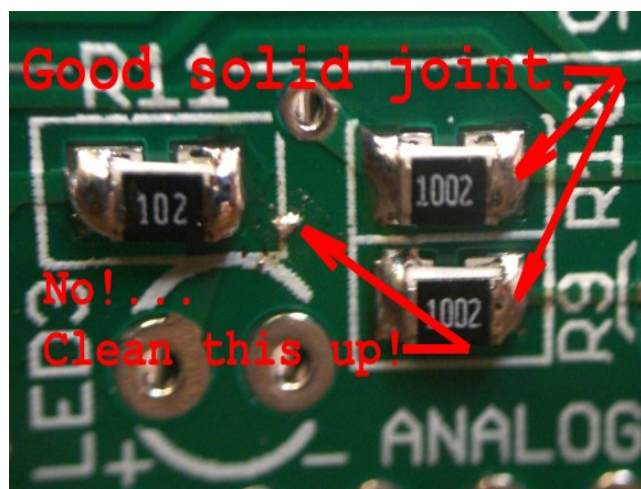
Picture 1
NOTE:
MAKE SURE YOU DON'T BRIDGE OR SHORT THE (2X) PADS WITH TOO MUCH OR SOLDER. OR A DRAWN OUT "SOLDER TAIL ". It should only take you a few seconds to do a (2x) pad SMD component.The solder should flow quick and stop. If you start dragging tails out of the solder you need more flux.

Flux makes the solder flow easy and gives you nice and clean shiny solder joint.see pic 1.Clean up any messes or unwanted and loose solder blobs on the board. They might just cause a nasty short somewhere and send your project up in smoke...lol....SMOKE IS BAD!

After finishing soldering the components with wire leads, cut the extended unwanted wire leads flush against the solder joints, that way no shorts can occur when they bend afterwords.

Here is the sequential order to populate your board :
See Picture 2
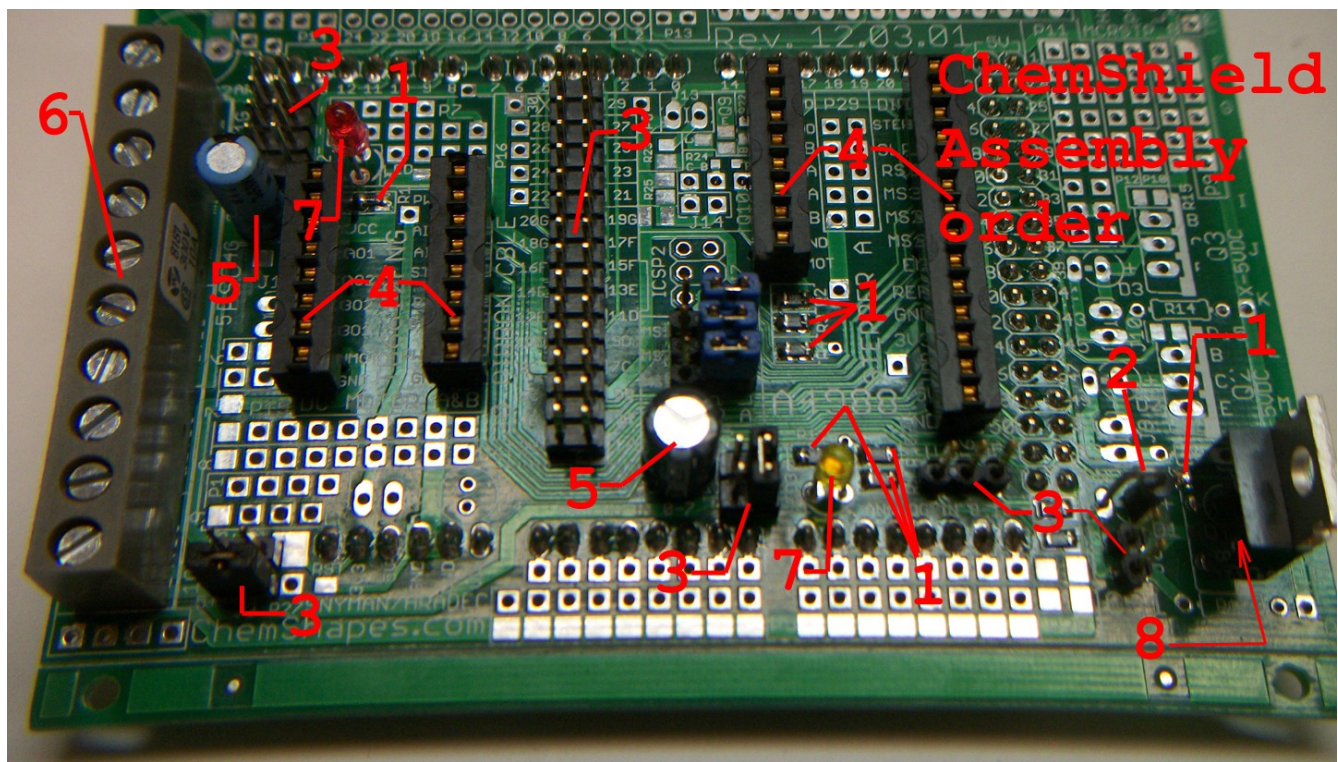
Picture 2.

1-Solder all the SMD devices first , the SMD resistors and SMD Capacitors. . The reason is that these are hard to get to if all the tall components are done first.

2-The through hole Diode
Note : The leads are polarized.
Bend the leads as per picture, insert so there is enough friction for the leads so it wouldn't fall out when the PCB. is flipped upside down. Solder on the bottom. Leave a 1mm air gap on the bottom of the Diode for air cooling.

Negative or Kathode is the painted/stripe side.
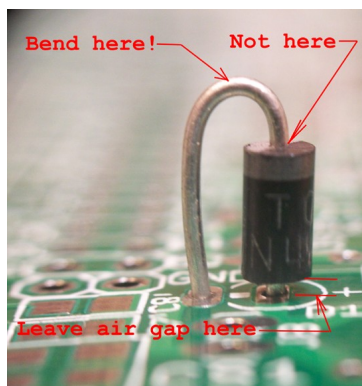
3-The pin-headers and the main 30 pin-header for the ribbon cable. Some of the pins will probably need some straitening before they will fit into all the holes. Straighten GENTLY with thin pliers or push lightly with you nail.
When soldering them,be patient ,they sink a lot heat ,especially with a small 20 or 30 watt soder iron. On the other hand, also don't overheat them either , otherwise the plastic housing will melt and the pins will be be off-center.

4-The driver Socket strips.
Info at #3 also apply here.

5- The through hole capacitors.
These are polarised,. There is a line on the negative lead side on the plastic housing with arrows, and the wire leads is also the shortest on the negative side.
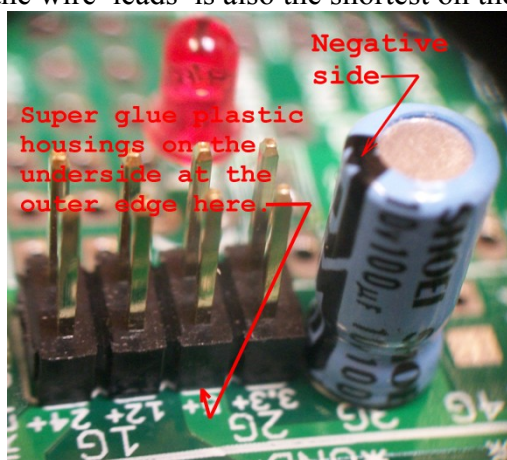

6-The main power connector, Again be very patient with it , This one sinks the most heat of all,and will take some time to heat up to solder flow temperature. ,the leads are very heavy, especially the leads that are on solid heavy copper pads .Make sure you heat the leads and pads up at the same time. You want them both to reach the solder flow temp at the same time. You don't want one to overshoot and burn them.
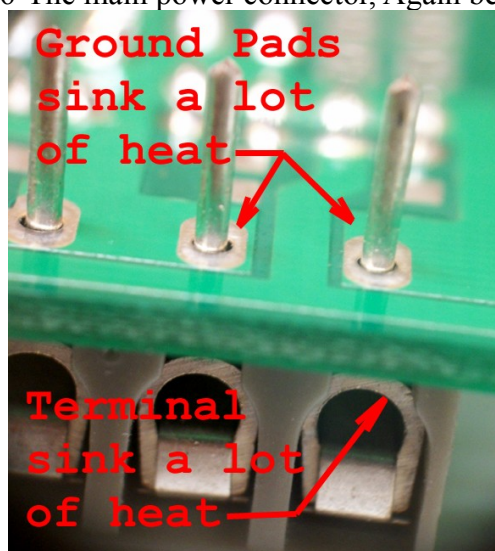
7-Solder the L.E.D.'s (Light emitting Diodes) on ,let them stand away about 5mm from the PCB for better light indication.
The short terminal leg and the flat side on the L.E.D. lens is usually the negative .

8-The power Transistor.
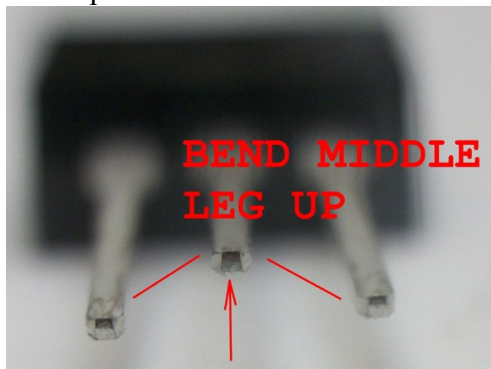
Bend the middle terminal leg up a little so that when you insert it into the 3x holes it stays/"bite" inside the holes with friction when you flip the PCB upside down to solder the bottom. Otherwise it will just slide out.

9-Install the jumper plugs for voltage selectors and micro stepping.

10- Hook ground from the power supply to terminal screw sockets 1 ,2 , 3 or 4.

11-Hook up the 5+ Volt supply to terminal screw sockets 5 or 6, If 5V+ is selected for the dc motor driver, the red L.E.D. should light up when power is turned on..

12-Hook up the 12v+ to terminal screw sockets 7 or 8. If 12V+ is selected for the Stepper motor driver, the Yellow L.E.D. should led should light up when power is turned on.

The end.