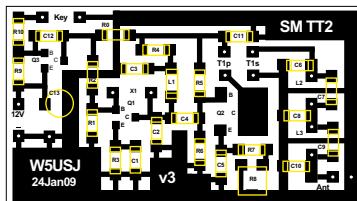


Surface Mount Assembly Notes

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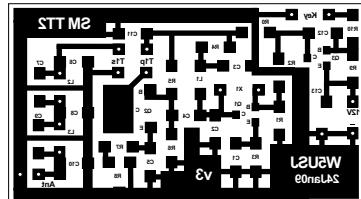
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Artwork



Shown here 1x size, the drawing is prepared 4x using graphics software (Canvas), then reduced. The yellow parts outlines are used to produce an assembly drawing.

Exposure Contact Print



Assembly information is stripped from the drawing. The art is then reduced to 1x, flipped and printed on transparency film. The art is again reversed when the printed side is placed over the resist on the photosensitive PCB.

Solder and Tweezers



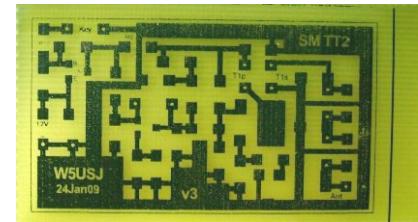
Surface mount soldering is best done with .015 dia silver-bearing solder. The tweezers used to hold the tiny parts for soldering is made from a bamboo chop stick. A web search will find lots of ideas for manual PCB assy.

Soldering SMT Parts



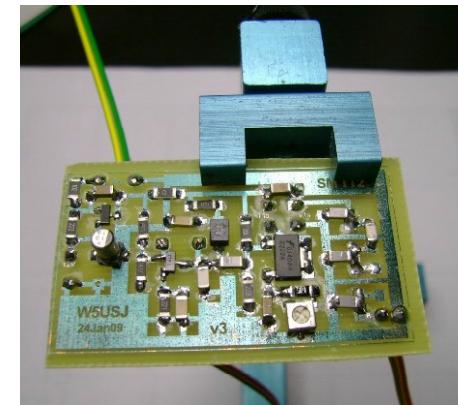
A soldering Iron tip shaped to a fine point. The tip shown here fits between the leads of an SOIC chip. Also allows soldering in close to the edge of parts that don't have extended leads, e.g., electrolytics, pots and some inductors, etc. Also makes it easier to solder chip capacitors and resistors. The soldering station is a Solomon SR-976 adjustable temperature.

Etched Circuit Board



The PCB is exposed, developed and etched using the process and procedures provided with a MG Chemicals photofabrication kit. The kit includes all the basic materials needed. The finished etch looks like the original 1x art.

PCB Assembly Vice



QRPkits.com supplies this really neat PCB holding vice. The board is positioned up about 5 in. and makes it easier to work on the assembly for positioning and soldering the parts. Doesn't help with shaky hands and keeping the parts lined up nicely. The clamp screws are on the bottom to keep them out of the way.

Surface Mount Assembly Notes

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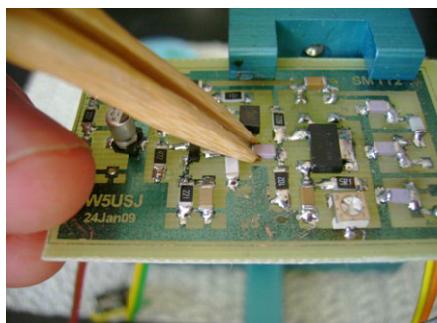
Preparations

Work surfaces that are soft will help keep the small parts from bouncing if one is dropped. An old pillow case works good. A towel might be a problem with tiny parts getting lost in the coarse fabric. Glass, metal and even plastic containers can be a problem and the hard surface of a desk or table will let dropped parts bounce nicely into never never land.

Holding Parts

The home made bamboo tweezers work OK and being non-metallic they don't slip off the parts like metal ones do. Possibly a soft plastic tweezer would also work better than metal. Tiddly winking of parts doesn't seem to be as bad with the non metal tweezers.

With the QRPkits PCB vice the PCB assembly is positioned up off the work surface about 5 inches. This allows you to rest fingers against the edge of the board while holding the part in place with the tweezers; helps steady the hand and the positioning of the part. In the picture below, the tweezers are held with thumb and forefinger with the middle finger resting on the edge of the board.



Assembly sequence

Attach the larger and harder to solder parts on first. Otherwise try to determine which parts are likely to interfere with others. Solder the easier parts first that won't interfere.

Also, many surface mount parts like Cs look alike. Select and make ready one part at a time. Fasten it in place and check it before going on the next part.

Soldering Parts

Use a soldering tip that will fit between the leads of parts like the SOIC chips. See page 1 notes. A variable temperature soldering iron will let you control the heat as needed. Seems best to have high enough heat to melt solder quickly and keep soldering time to a minimum.

It seems to work best for most folks to first tin one PCB pad for Rs and Cs and tack one end in place. After checking that the part is correct, solder remaining the remaining end (or lead). With the tiny transistors, solder the single lead side first, check position, then solder the other two. Same idea with other parts with close lead spacing like the SOIC chips.

On parts where the solder pads are mostly underneath, lightly tin the pads on the part first. Then lightly tin the PCB pads where the part attaches. If you get too much solder on the pads it will be hard position them**. Next carefully position and flow the solder from the PCB pad to the part pad.

**Remove excess solder with solder wick. Chemtronics makes several sizes and the narrower one work best with the tiny SM parts. Keep a couple of sizes on hand as needed.