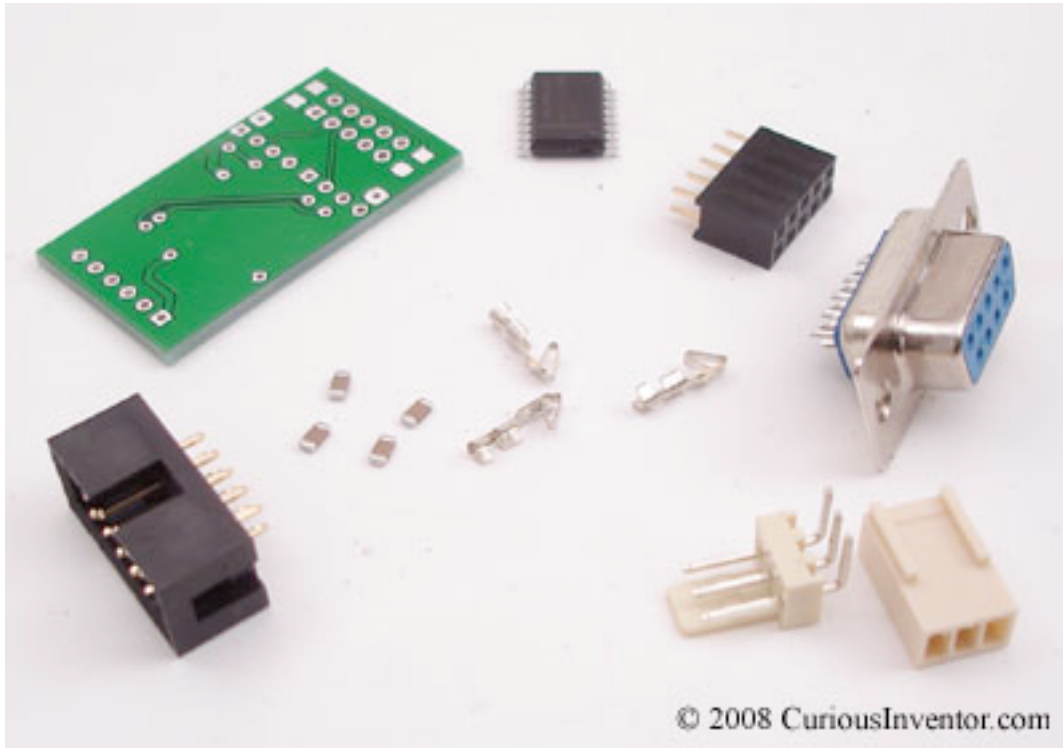


Serial Port Kit for WRT54G(L)

Assembly Instructions

The parts:



- U1: MAX3222CWN+ ([spec](#)), dual RS-232 transceiver
- C1-4: 1206 .1 uF ceramic capacitor
- 10 pos. (2x5) female IDC socket
- 10 pos. (2x5) shrouded header
- rt. angle friction-lock header
- 3 pos. crimp terminal housing
- (3) crimp terminal contact (accepts 22-28 AWG wire)
- pcb
- female DB9 connector with solder cups and mounting hardware (mounting hardware not shown in pic)

1. Recommend Tools and Supplies:

This list shows lots of tools that are nice to have... you can definitely get by with tweezers, wick and a cheap iron, however.

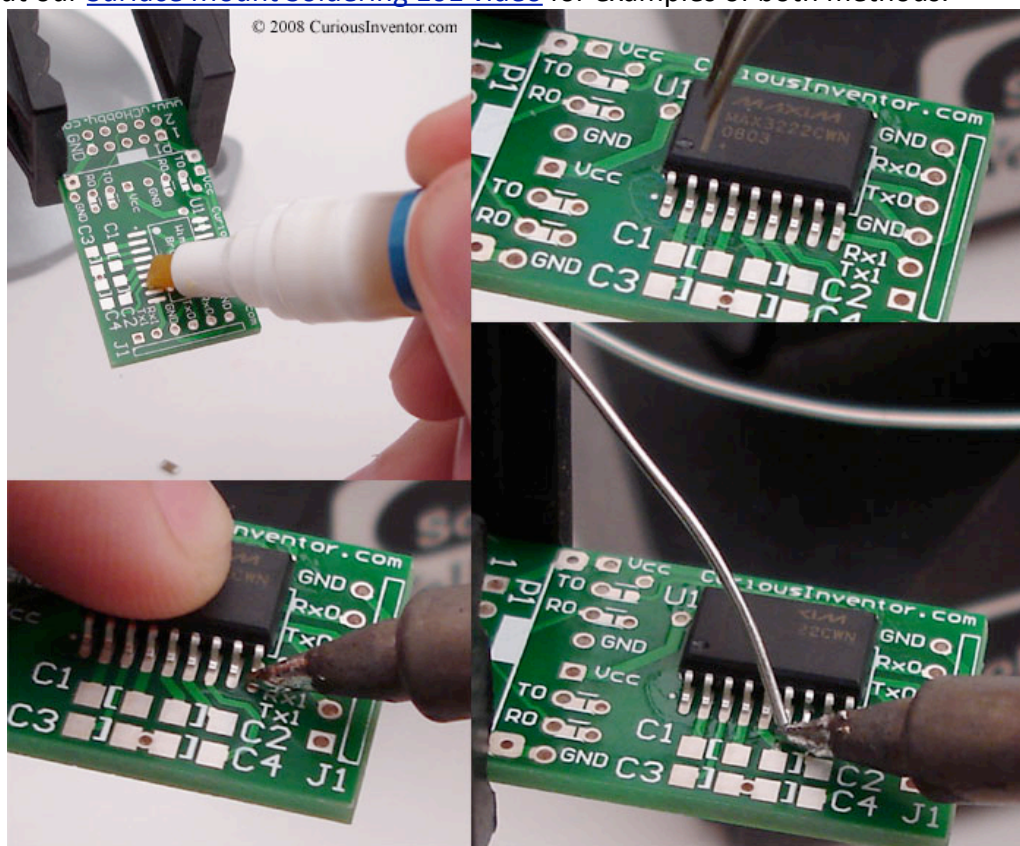


- **Soldering Iron and Solder:** Even though this requires surface mount soldering, the parts are on the easiest SMDs to solder. You don't actually need a super small tip (we actually don't like the micro-sized tips), but it'll help if it's fairly small. We like small chisel or screw driver shaped tips (say 1/16th of an inch wide), but personal preference plays a big role. For solder, we recommend .015, .02 or .031" diameter (smaller is easier, but you can get away with .03" for these parts), rosin cored flux, tin-lead solder, either 63/37 or 60/40, whatever's cheaper. See our [soldering guide](#) for explanations. Lead-free solder is a little bit harder to use since it "wets" metal somewhat slower and has a slightly higher melting point. If your kit has sat on the shelf for a while (a year), some steel wool or a pink eraser is useful to remove oxidation from the components and board before starting.
- **Flux:** the marker-shaped object next to the solder is a flux pen. Flux helps solder wick to connections and is especially helpful in surface mount soldering where solder is sometimes applied directly from the iron and not from a wire that has flux built inside. If you don't have flux you may need to use the "flood-and-wick" method on the SOIC (small outline IC) MAX chip.
- **Tweezers:** You *may* be able to solder the caps with some needle nose pliers, but nice tweezers will make things a lot easier.
- **Needle Nose Pliers:** Used to clinch or bend component leads and helpful for pulling out components when fixing mistakes.

- **Helping Hands:** Two alligator clips on a heavy base that are useful for holding wires while you solder them.
- **Flush Cutters:** Used to trim leads close ("flush") to the board.
- **Solder Wick:** Used to remove bridges between pins on surface mount chips. A popular technique is to flood the leads with solder until everything is bridged together, and then go back with wick to remove bridges. Surface tension will retain enough solder to keep a connection.
- **Clamp:** A table top will be fine for most of the job, but a clamp can be handy, especially when removing components.
- **Multimeter:** To check your work.
- **Wire Strippers:**

2. Soldering the MAX RS-232 SOIC Transceiver:

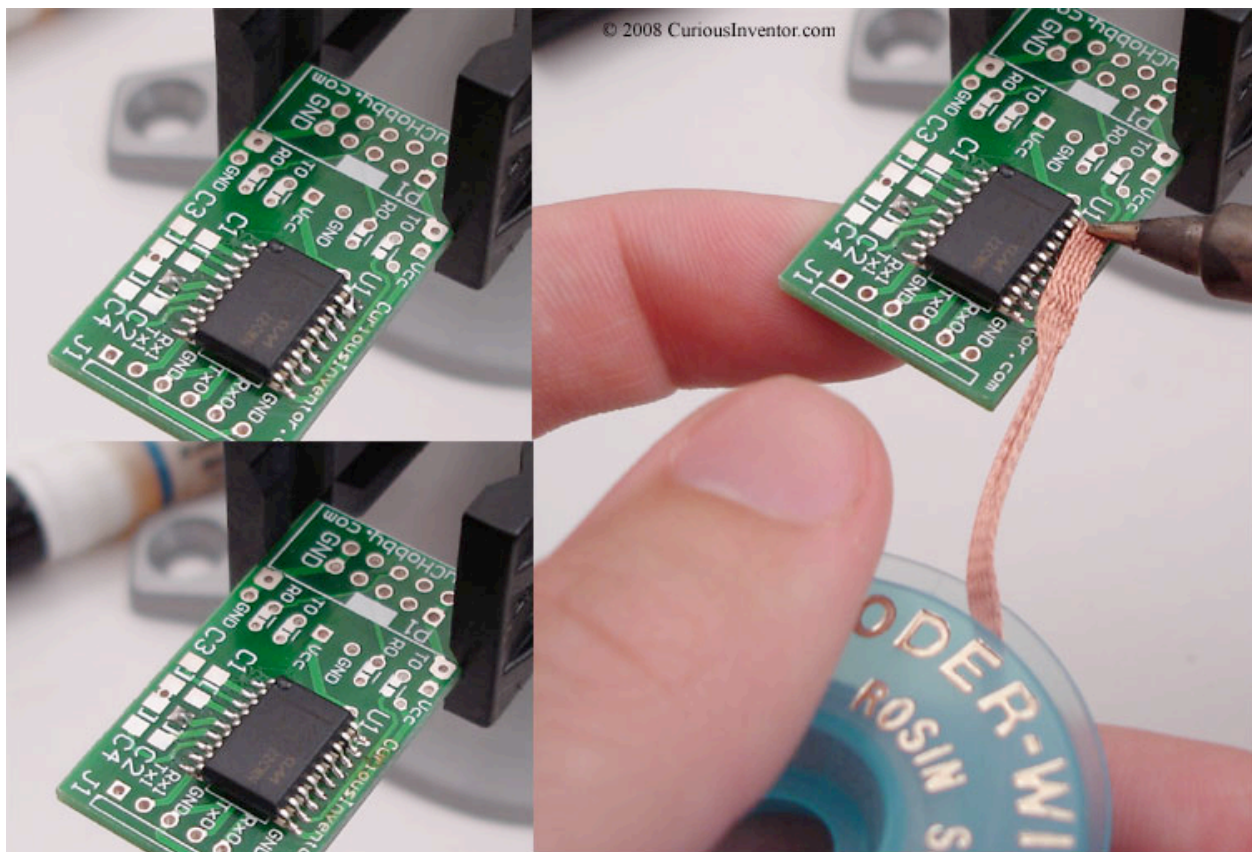
We're going to describe how to solder each pin individually by adding flux first to the pads, and then touching the toe of each pin with a tinned tip. The small bit of solder on the tip should wick onto the pin. If you don't have flux, first attempt to "tack" two opposing corners in place, and then flood all the pins with solder. Use the wick to remove all the bridges; surface tension should retain enough solder under each pin. There are some risks with the flood-and-wick method, mostly that the extra heat could damage the pcb or component, and sometimes the wick will freeze on a pad and pull it off. Most of the time you shouldn't inflict any damage. Check out our [Surface Mount Soldering 101 video](#) for examples of both methods.



First flux the pads (if you have flux), then align the chip so that the dot next to pin 1 lines up with the dot shown on the pcb.

Then add some solder to the tip of your iron and slide it up against the toe of one of the corner pins. A small bit of solder should be wicked away from the tip and onto the corner connection. Do this to the opposite corner also before soldering other pins. Note: make sure it's aligned before soldering a 2nd pin. You will likely have to remove the entire chip once 2 or more pins are soldered if it's misaligned.

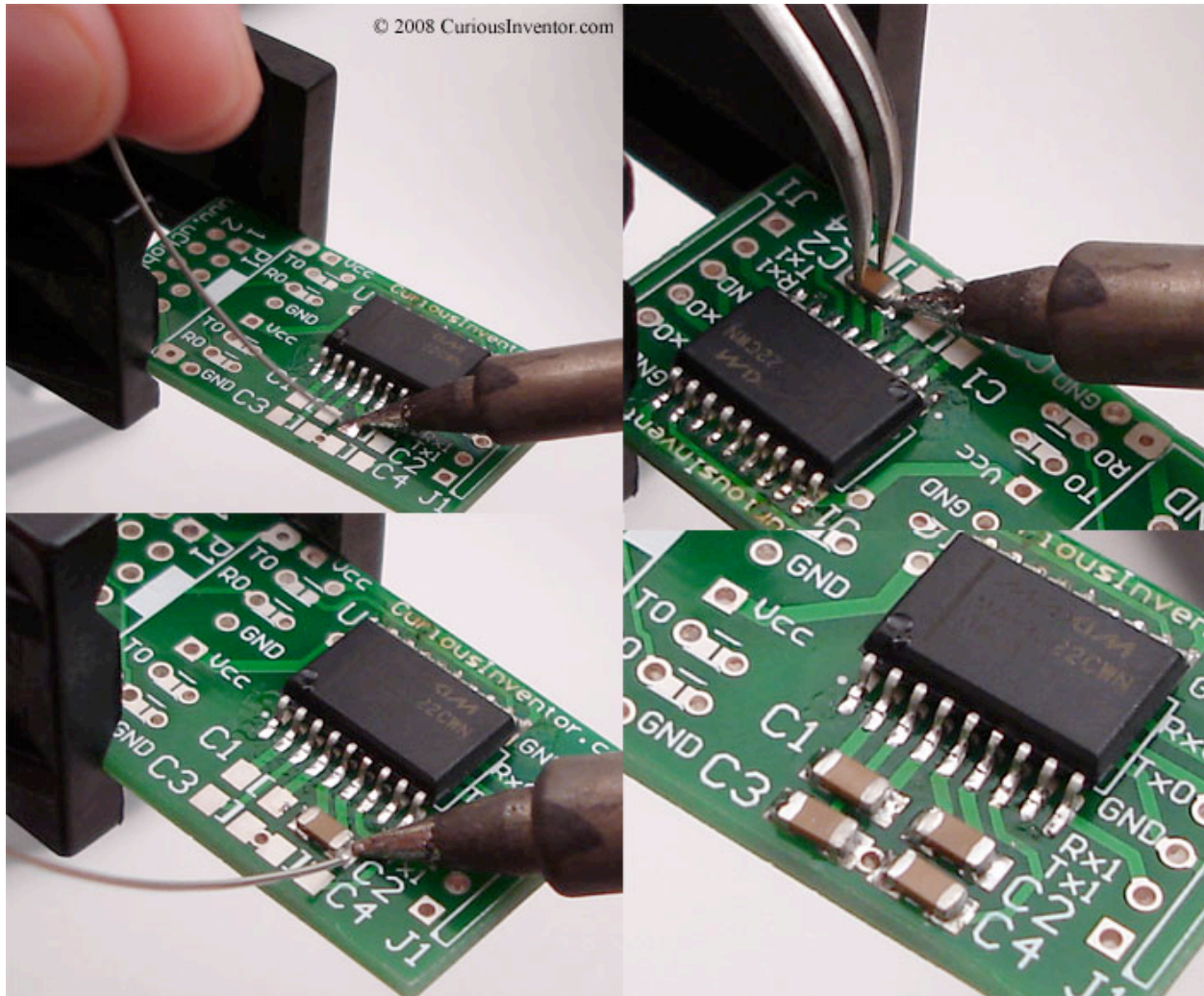
Now repeat the same process of touching the toe of each pin with a tinned tip. If you're having trouble getting solder on your tip, you might try pushing the solder wire into the toe as shown. The smaller the solder the easier, but here I'm getting away with .031 sized solder.



If you bridge some pins, just lightly press some wick on top of the bridge. Use a tinned iron to speed the heat transfer.

As mentioned before, without flux, an alternative method is to flood solder over all the pins and then de-bridge everything with the wick.

3. Adding the 1206 Capacitors:

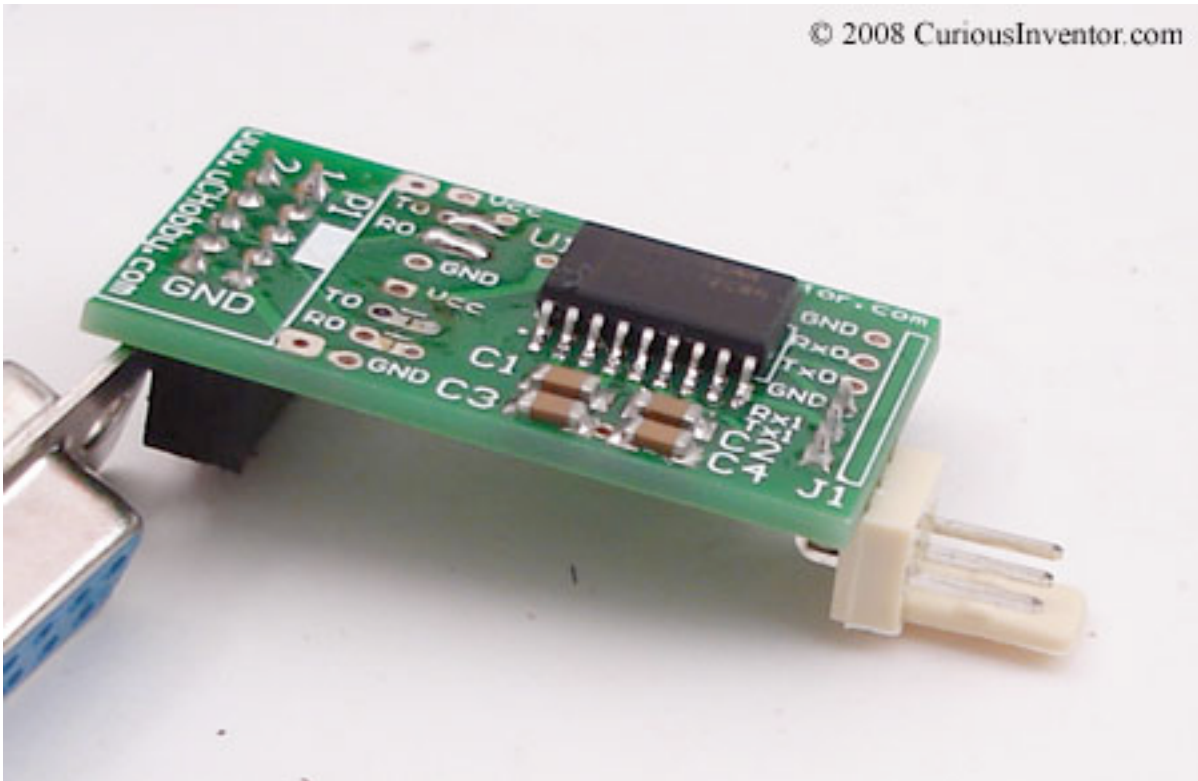


First add a small pillow of solder to one side of each cap pad. On 1206 sized caps, you can do this by quickly touching some solder wire. On smaller pads, I usually flux the pad and then touch it with a tinned tip to avoid adding too much solder

Next, hold the cap on top of the pad and touch the junction between cap and pad. You should feel the cap drop into place.

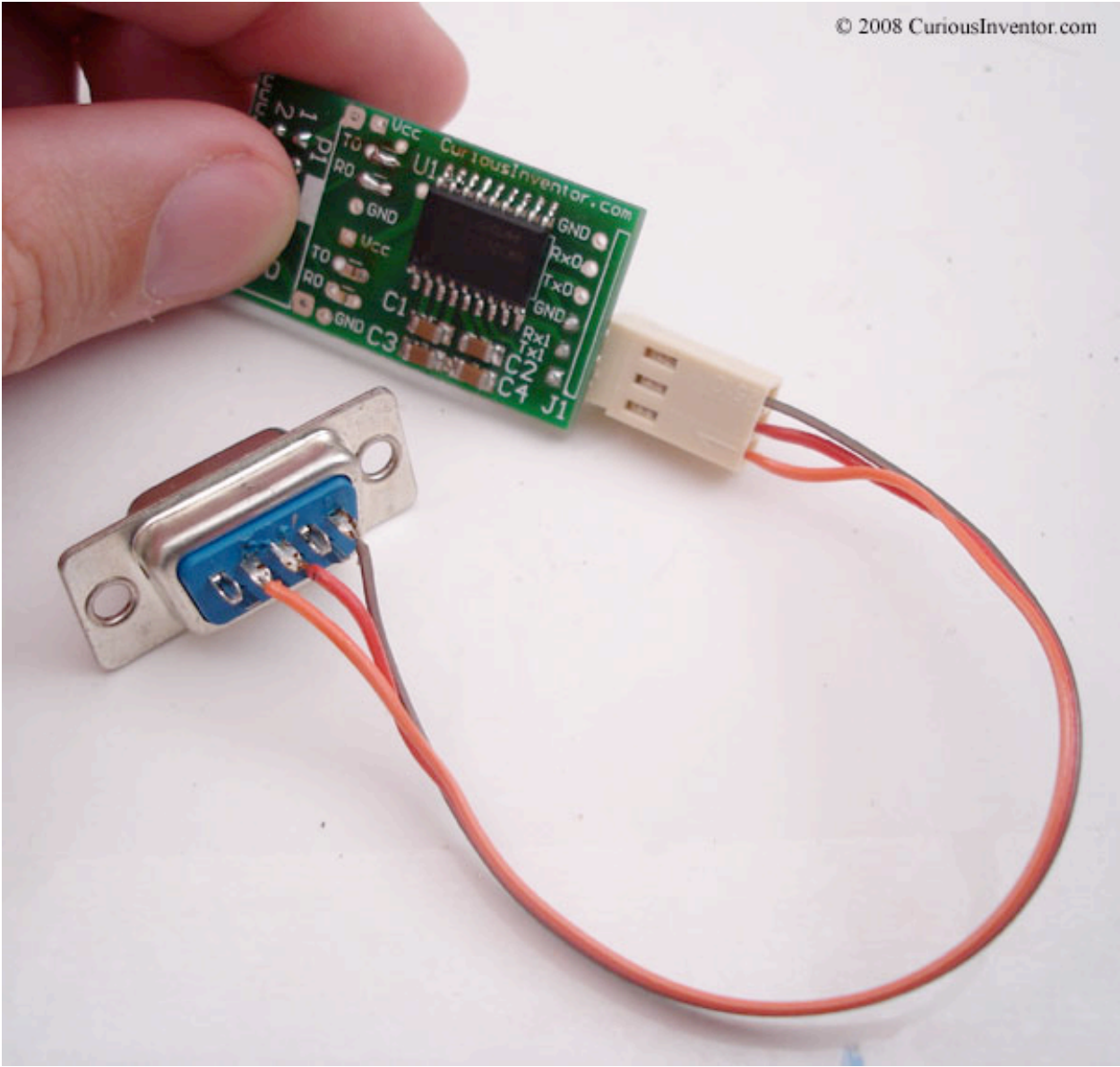
Solder the other side by adding a very small amount of solder. Ideally there should be enough solder to form a ramp between the pad and cap, and not much more.

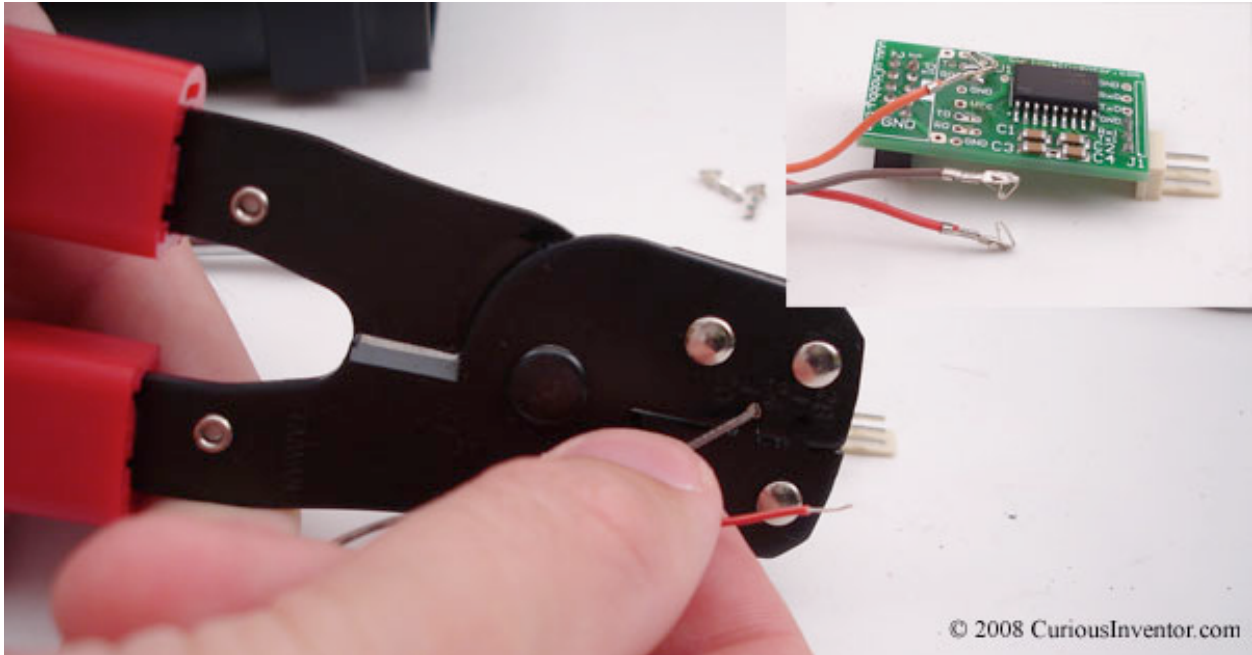
4. Add the Right Angle Header and 10 pos. IDC connector to the PCB:



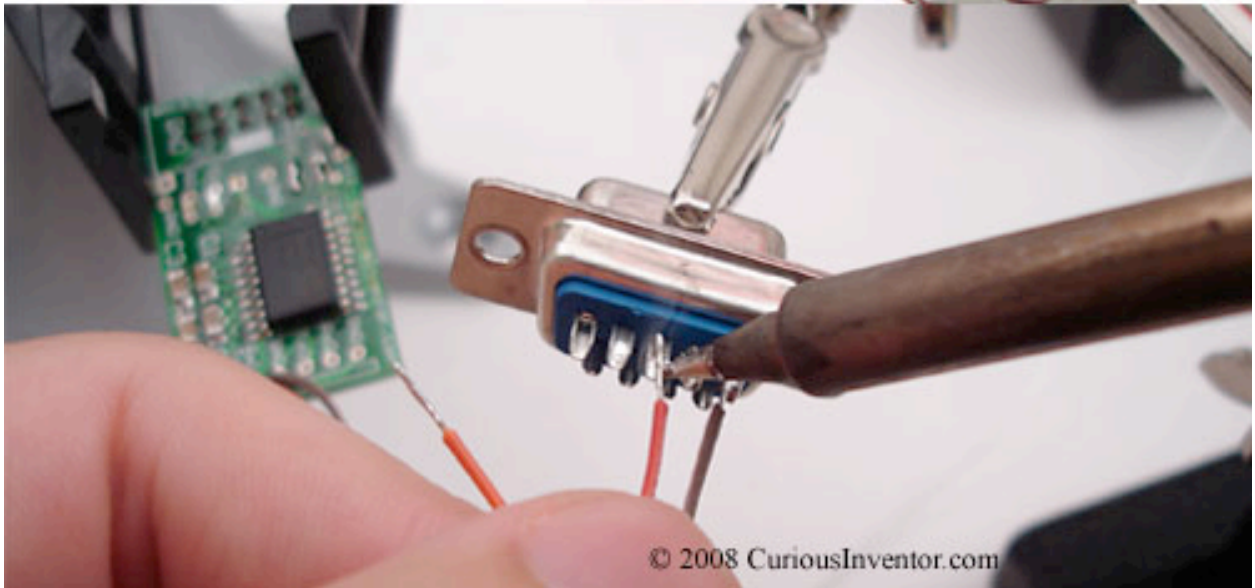
Add the female IDC connector and right angle header to the bottom side.

5. Make DB9 Extension Cable:





Crimp on the crimp terminals with a crimper or pliers. If you have a crimper, be aware that there are typically two halves where one has a slightly larger area to accommodate the wire's insulation. Be sure to crimp the pin so that the larger side goes over the insulation. First put the crimp terminal in the crimper, then insert the wire so about a 1/16" of insulation goes in. Then crimp. These crimp pins will accept 22-28 AWG wire.



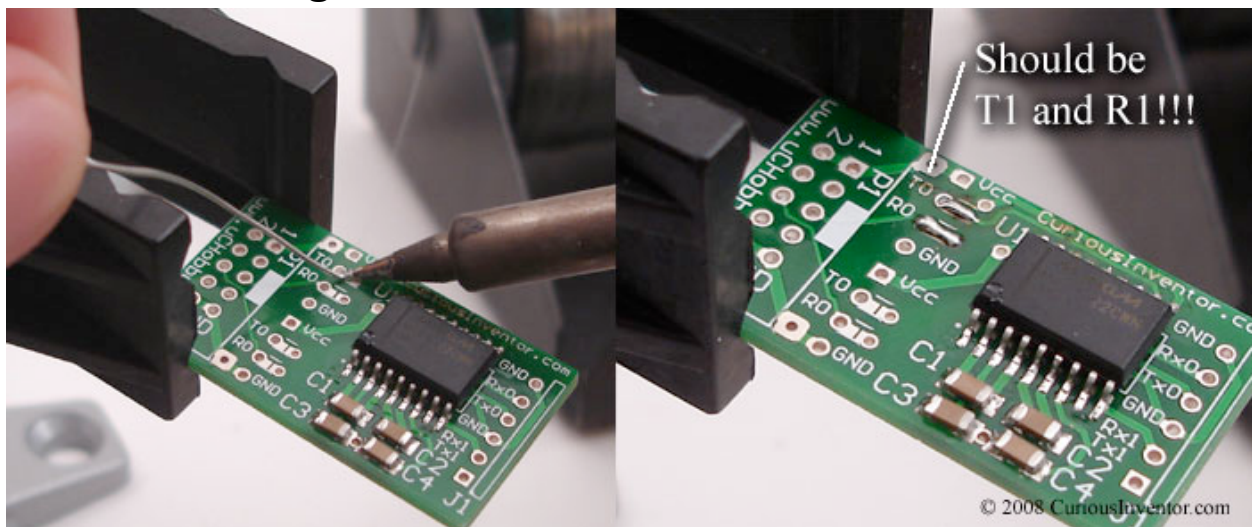
To solder wires to the db9, first melt a little solder in the cup by cutting off a chunk of solder wire, and then touching the back of the cup. Then hold a wire while heating the back of the cup again. Ideally the wire will rest against the back of the cup and the solder will appear to adhere or cling to the wire.

It can be a little confusing what pins to solder to on db9 connectors since many of the diagrams on the internet don't make it clear whether you're looking at the front or back of the connector, whether it's the PC port or not, or whether a "null modem" cable is being used.. The connections shown above are:

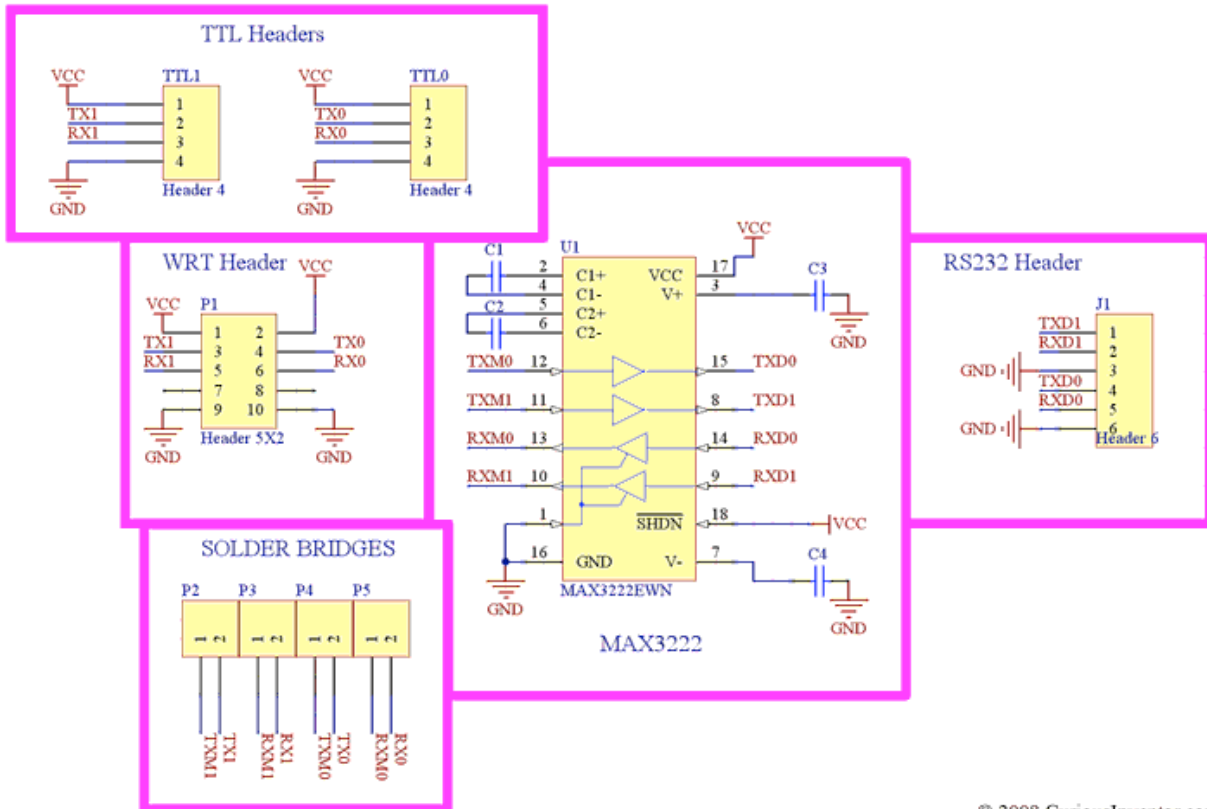
ground (brown) pin 5
Rx1 (red) pin 3
Tx1 (orange) pin 2

Pin 2 (Tx1) should go to the PC port's Rx pin. If the cable you're using is a "null modem cable," its Rx and Tx pins will be swapped in the wire, so it's a good idea to check for continuity to see if pin 2 on one end is connected to pin 2 on the other or pin 3. These instructions assume you're *not* using such a cable and no swapping happens inside.

6. Solder a Bridge to Select RS-232 or TTL Levels.



Add a solder bridge to connect the Tx1/Rx1 ports on the router to the MAX Chip. The linux kernel will use port 0 (not 1) by default. There were two small labeling mistakes in the first run of the pcbs. The T0 and R0 labels next to P1 should be T1 and R1. Also, port 1 on the breakout is actually port 0 on the router and 1 is 0.



© 2008 CuriousInventor.com

7. Take Apart the Router!



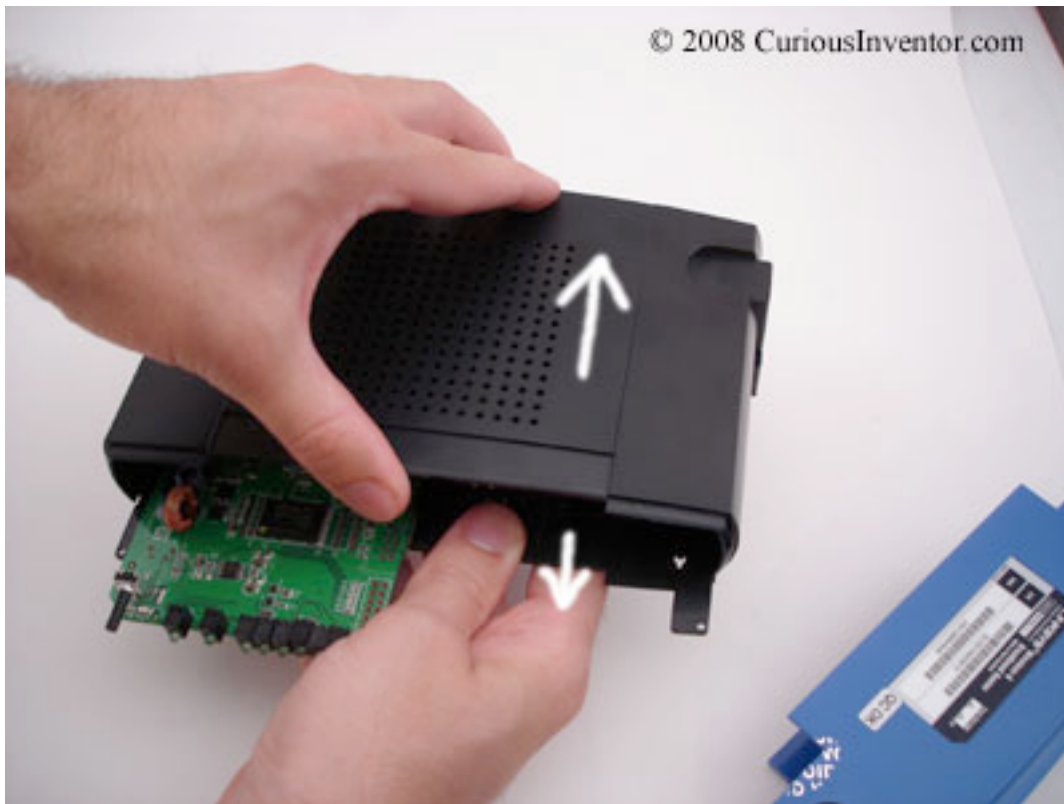
We're using the WRT54GL, but the procedure is largely the same for other WRT54G routers. The serial pinout is the same, also (wouldn't hurt to double check this, though).



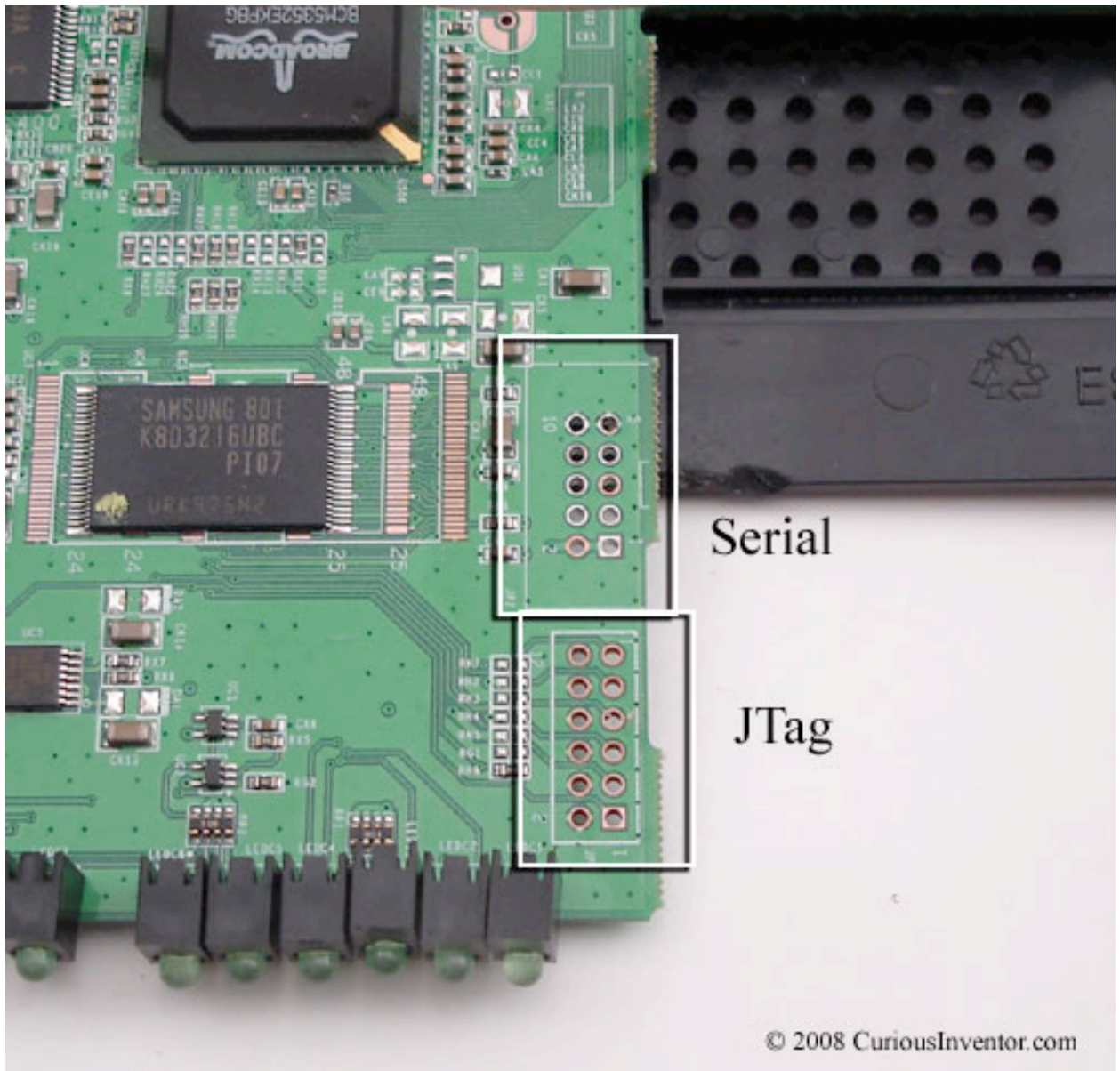
First, unscrew the antennas.



Now pop open the blue, front of the case. There aren't actually any screws, the front just snaps in place on the sides.

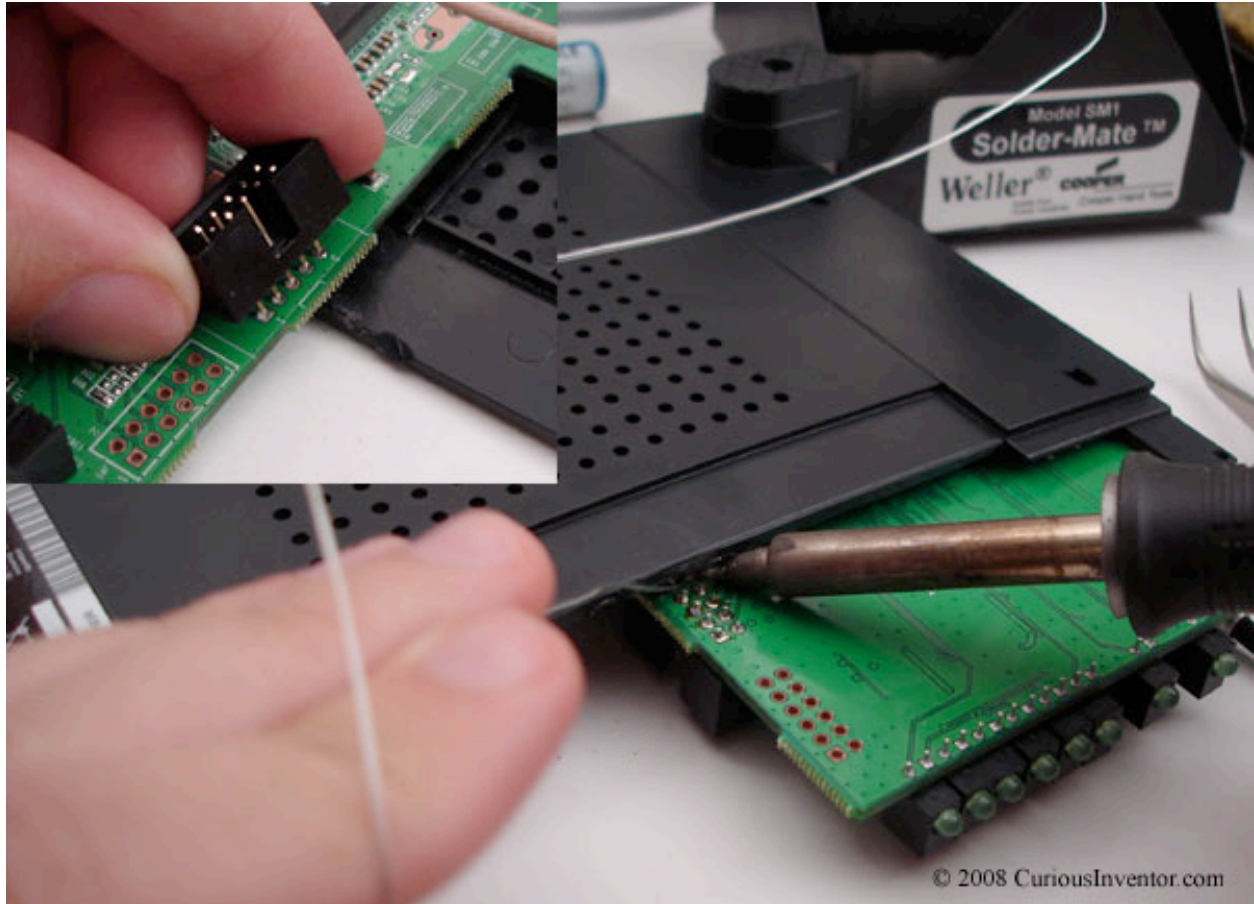


Now slide off the black top but sliding it back and off the antenna jacks.

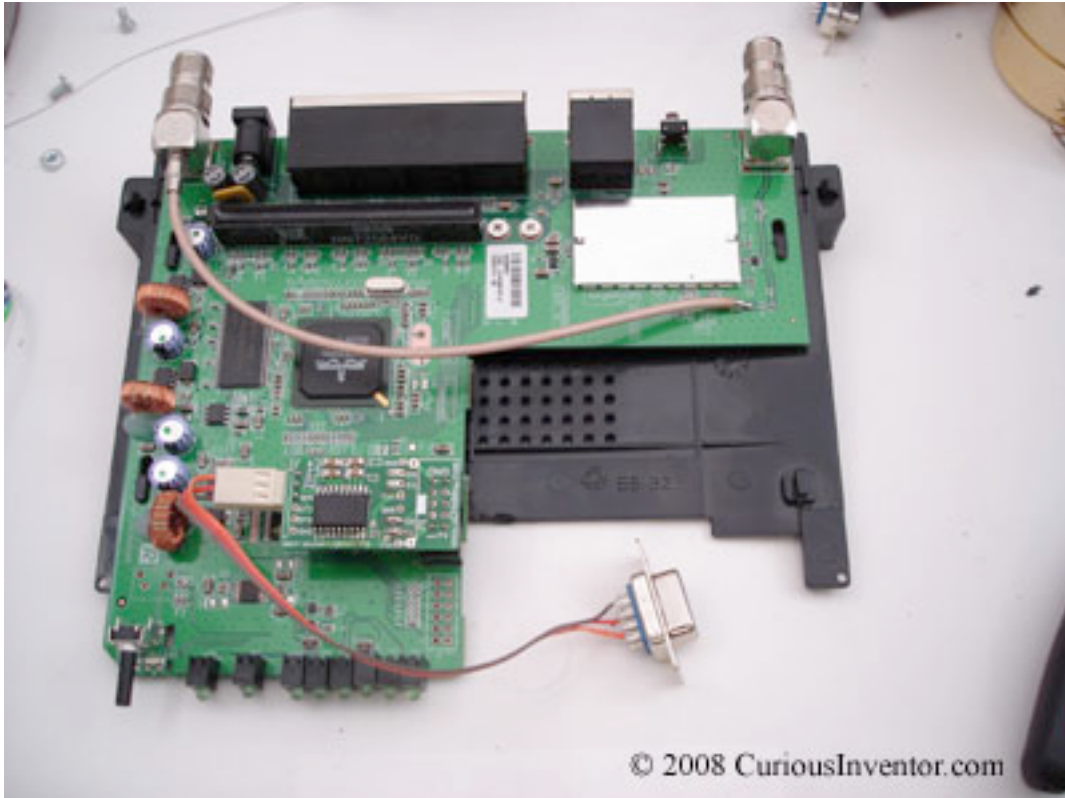


Serial

JTag



Solder on the shrouded male headers. Unscrew the two philips screws in the middle of the pcb and then slide off the pcb. Or, you may be able to just barely solder on the headers without taking the pcb off.



Plug in the SPK_WRT as shown and attach DB9 extension cable.



As Rod Whitby demonstrated, the holes make a pretty good guide for the db9 connector. Drill out two outer holes with a 7/64" drill bit or 1/8" to make room for the 4-40 holes. It was a bit of a pain, and a dremel would probably be easier, but we were able to cut out a suitable hole just using flush cutters.

To test, plug into a PC and open up hyperterminal or some other terminal program and set the connection settings to 115200 kb/s, 8 bits, no hardware control, 1 stop bit. When you type characters should be echo'd back to you. If you flashed DD-WRT you should be able to log in as root with a password of admin. Note that you may have to enable console serial access through the web configuration.

