Warp Drive mods for ALL V1 or V2 SSCs

Please read all steps and plan your work ahead!!

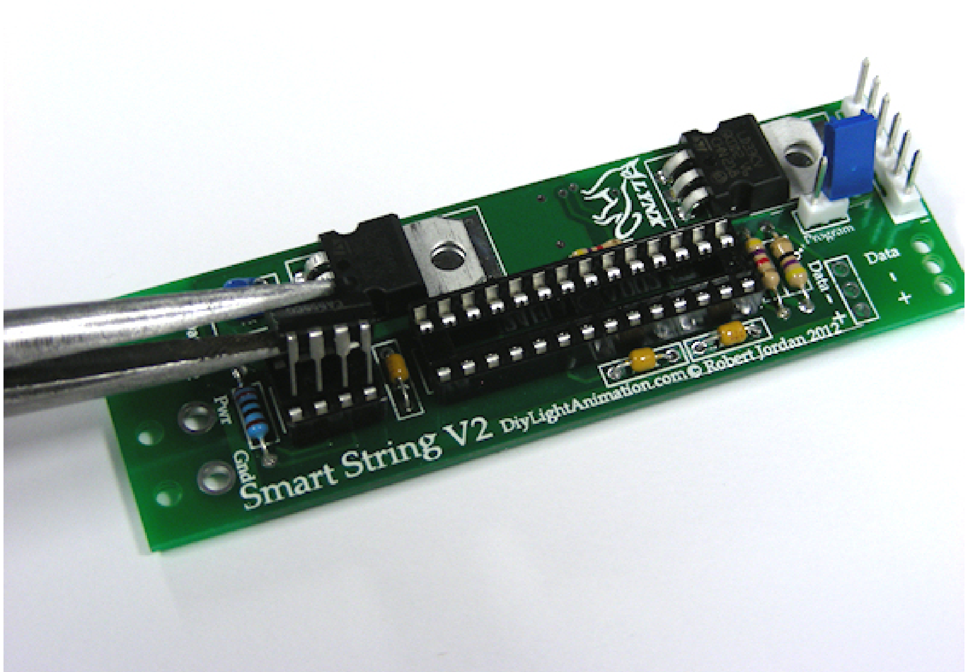
NOTE–This modification is fully compatible with Falcon Firmware.

Materials needed:

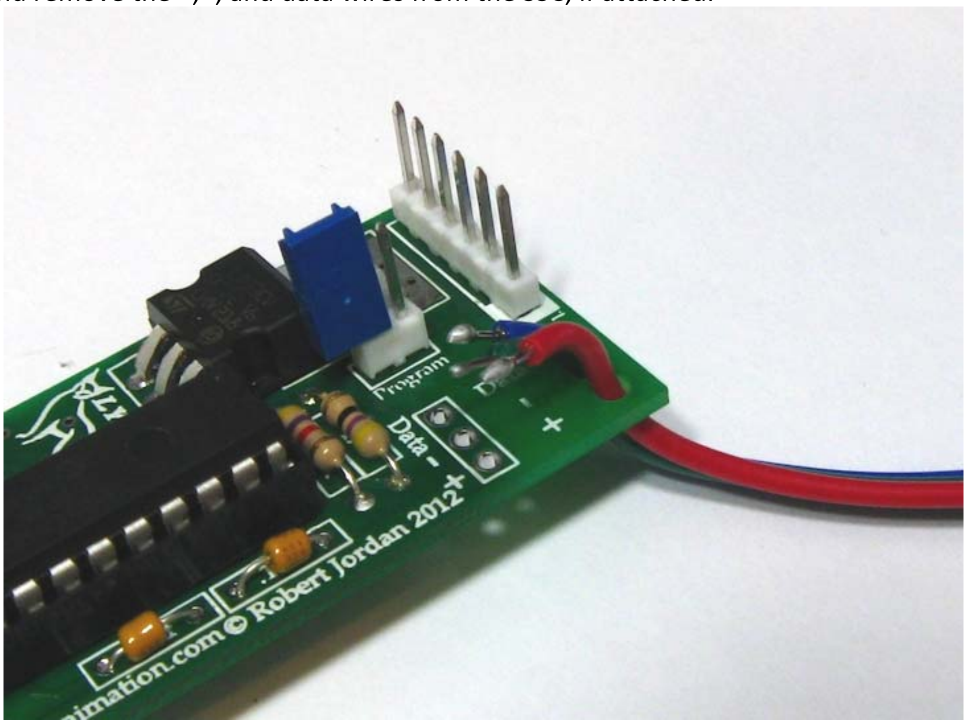
One 1/4 watt, 180 ohm resistor (latest discussion showing this to be the best value)
Small flat blade screwdriver or other prying device
Wire stripper / Wire cutter
Solder, Soldering iron
Masking tape – optional
Hot glue or epoxy - optional

PREPARATION

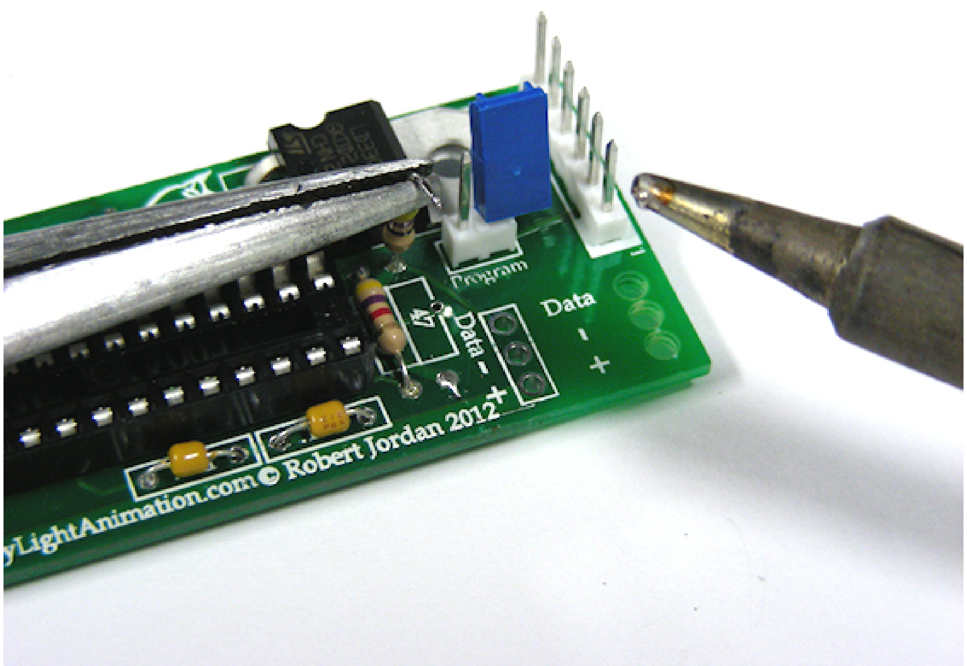
Recommended: Use a small flat blade screwdriver to remove the 28 pin PIC chip and the 8 pin 485BN chip. This is not necessary, but will reduce the possibility of any static build-up harming the chips during the re-work process. Of course, it introduces the chance of damaging them during removal. So be careful either way.



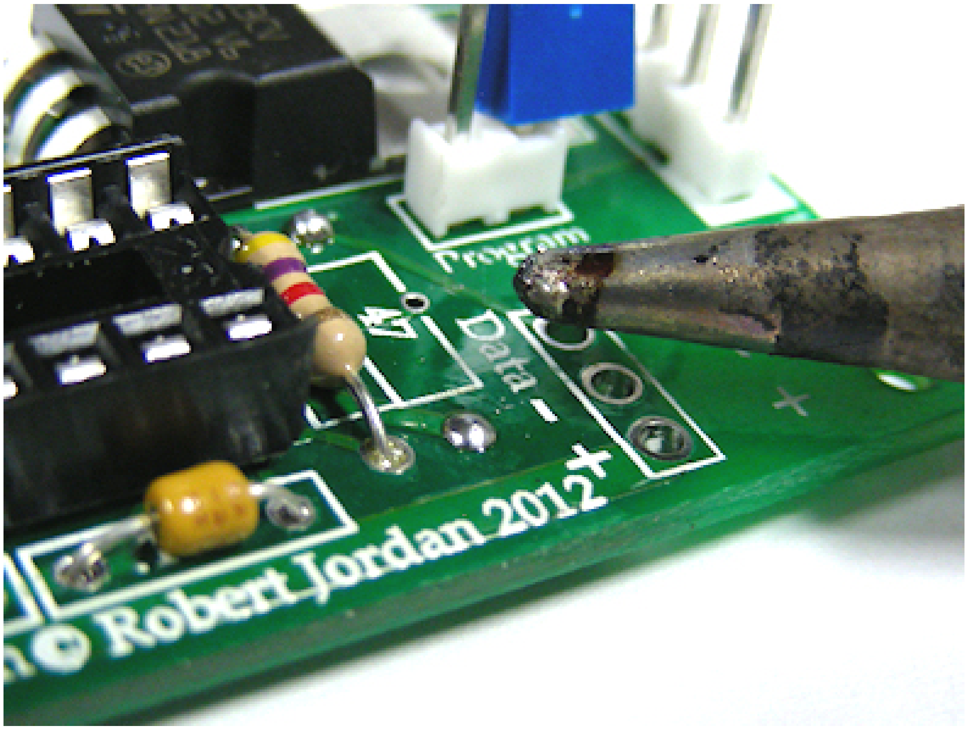
De-solder and remove the +, -, and data wires from the SSC, if attached.



De-solder and remove the original pull-up resistor. This may be 330ohm or 150ohm from the original SSC V1, or 47 ohm or 150ohm from the SSC V2. Whichever resistor value you have, remove it – nothing will be going back in this space, it will remain blank.

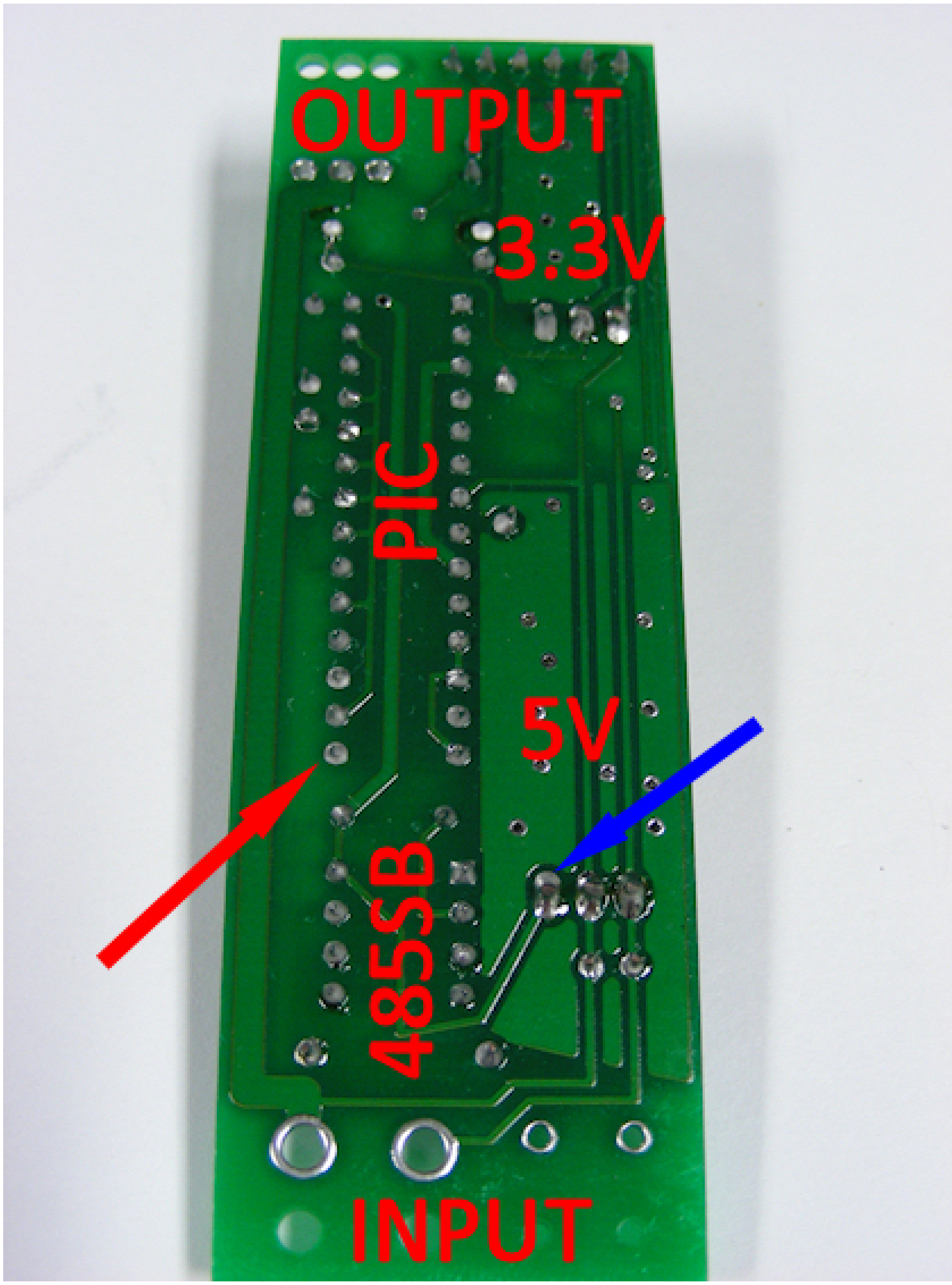


Use a small amount of solder to ‘retouch’ the holes left in the circuit board. They should be left with a small, clean rounded dome of solder.

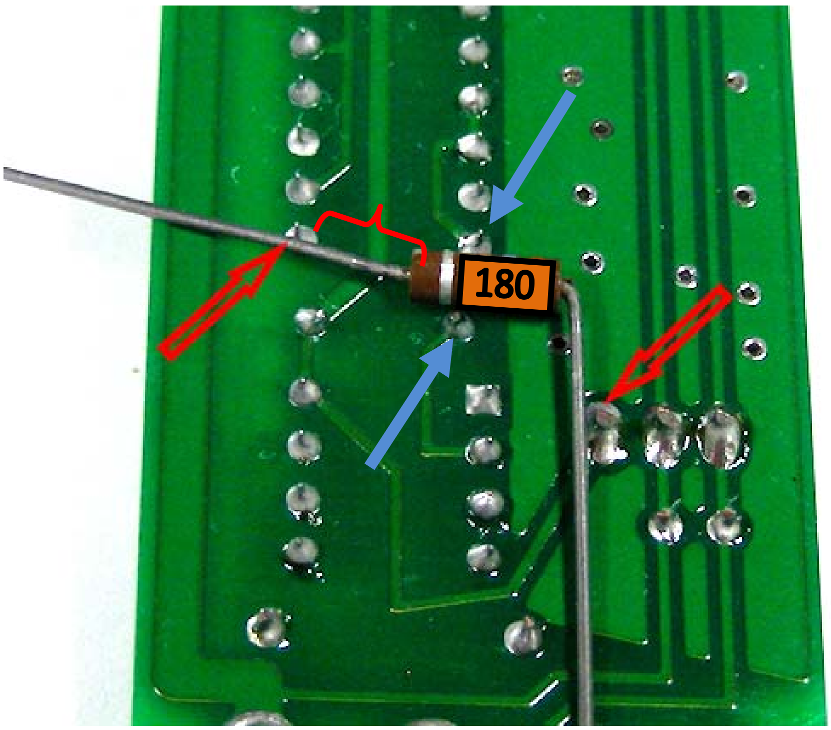


INSTALLING THE NEW PULL-UP RESISTOR

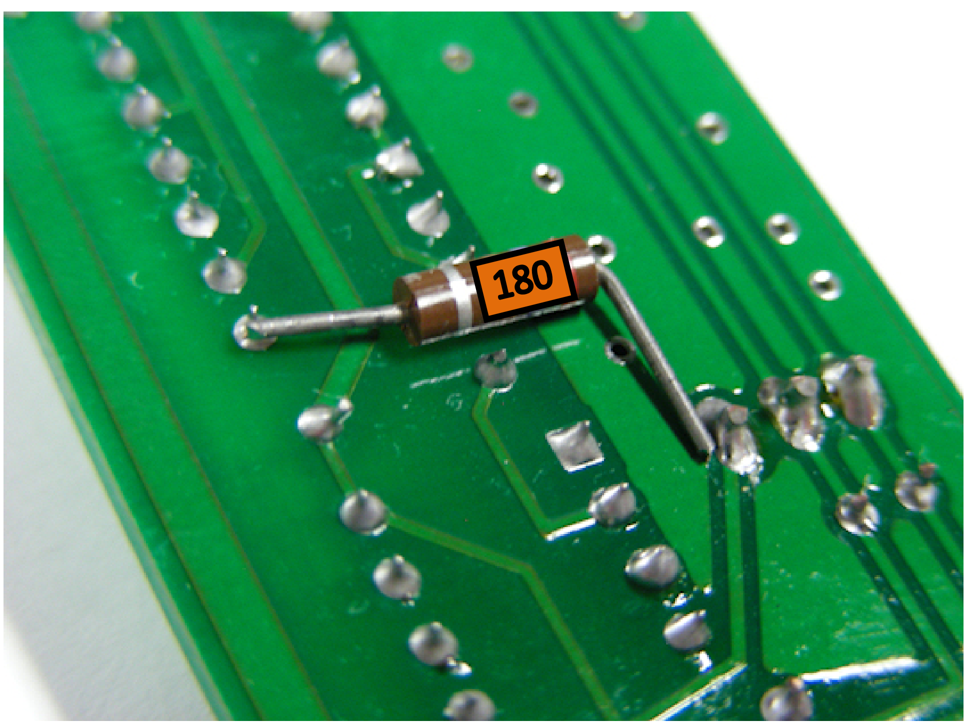
Take a moment to familiarize yourself with the bottom of the circuit board. Note 'landmarks' like the input (Cat-5 network cable from the hub), the output (3 conductor wire to the nodes), the socket of the 28 pin PIC chip and the 8 pin 485SB chip. We need to connect a new resistor between pin #15 of the PIC chip (red arrow) and the +5V output of the 5V regulator (blue arrow).



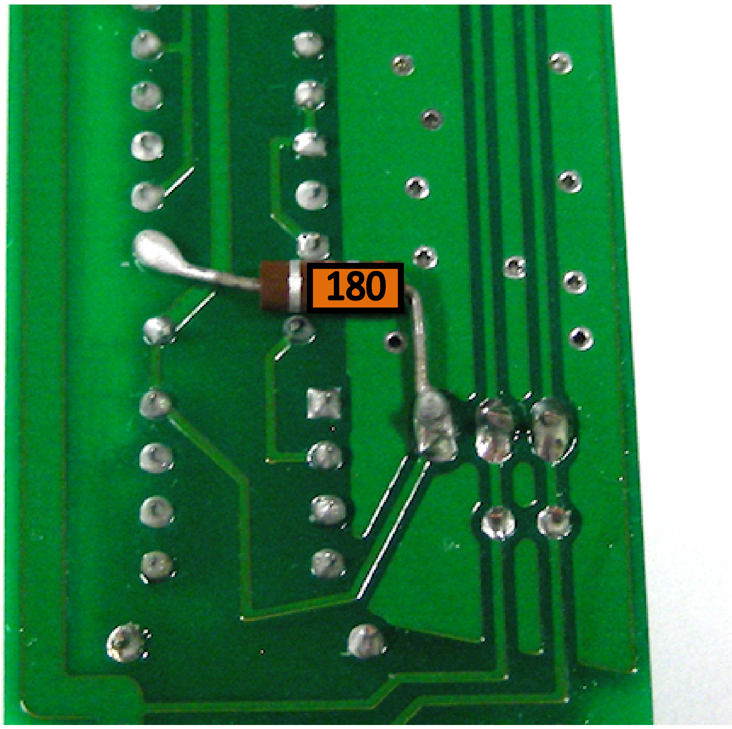
Using a new 1/4 watt – 180 ohm resistor, bend one lead to a 90 degree angle immediately at the end of the resistor body. This lead will contact the +5V output pin of the voltage regulator. Bend the opposite lead of the resistor to a slight angle, allowing it to contact pin #15 of the PIC chip socket. The resistor has no polarity, so either lead can go to either pin. Leave space between the PIC pin and the resistor body. (red bracket) Also be careful to adjust the resistor position so the insulating body of the resistor is between the #14 PIC pin and the capacitor pin (blue arrows)



Trim the leads of the resistor to fit the spacing of the pins on the board. Trial fit this resistor several times to make sure it fits well and does not contact other near-by pins.

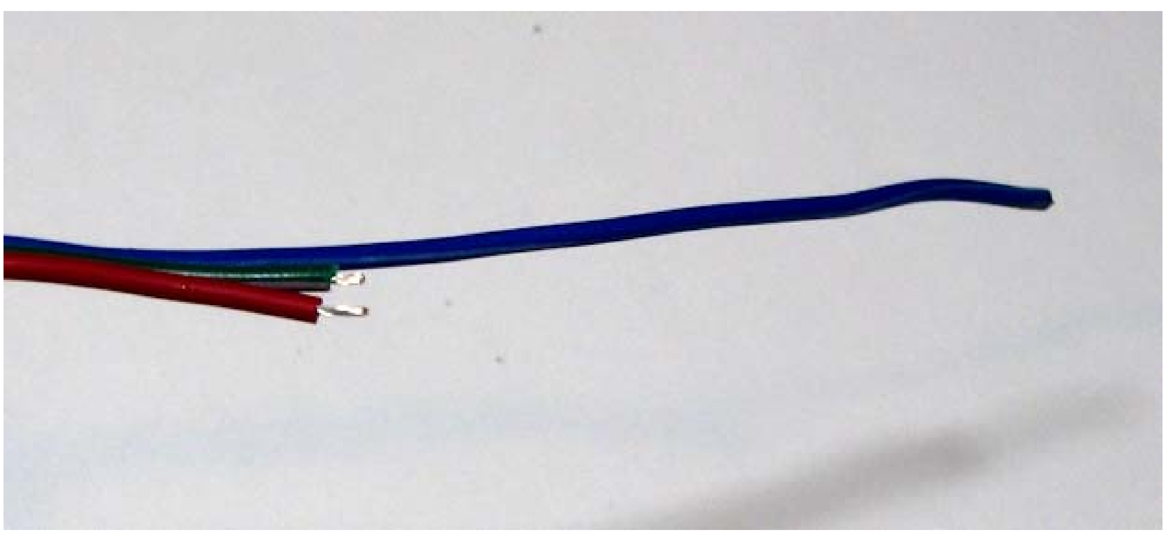


When you are satisfied with the fit, solder the resistor leads to the voltage regulator and #15 PIC pin. As an option, I recommend a piece of tape to hold the resistor in place while soldering the first lead. Remove the tape, adjust for a perfect fit one last time then solder the remaining lead.

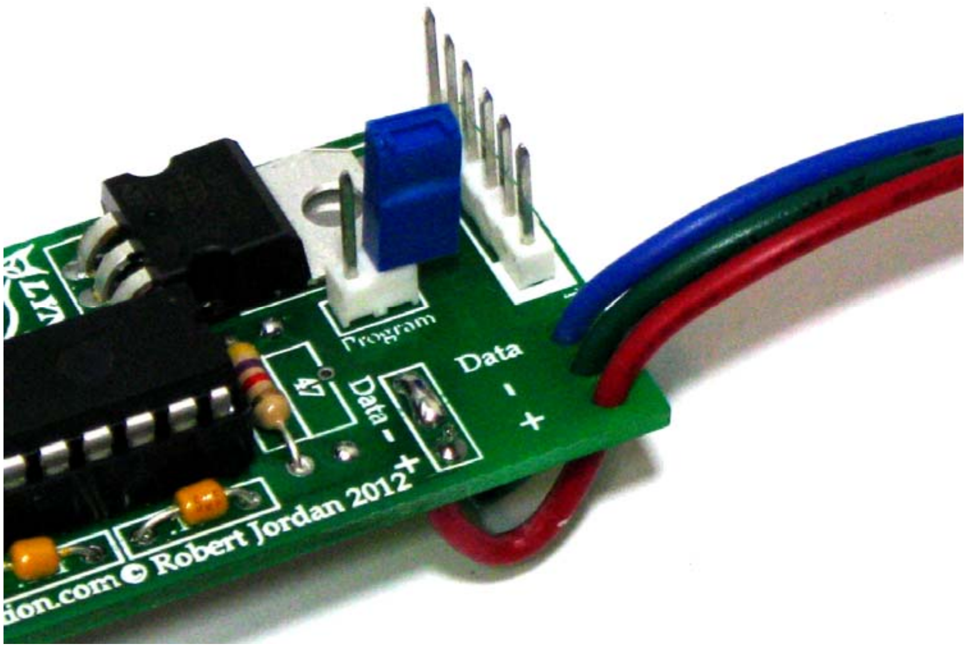


RE-ATTACH THE +, - AND DATA WIRES

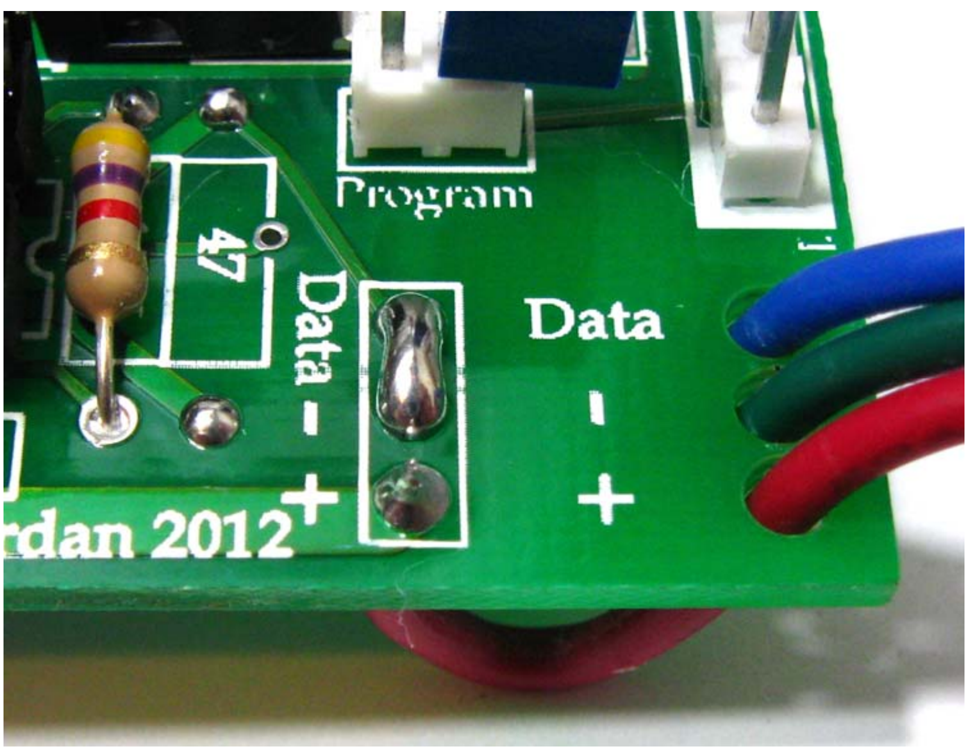
Prepare the node leads for attachment. Cut the + and – leads approximately 3 inches shorter than the data line lead. Strip and lightly 'tin' the + and – leads with solder.



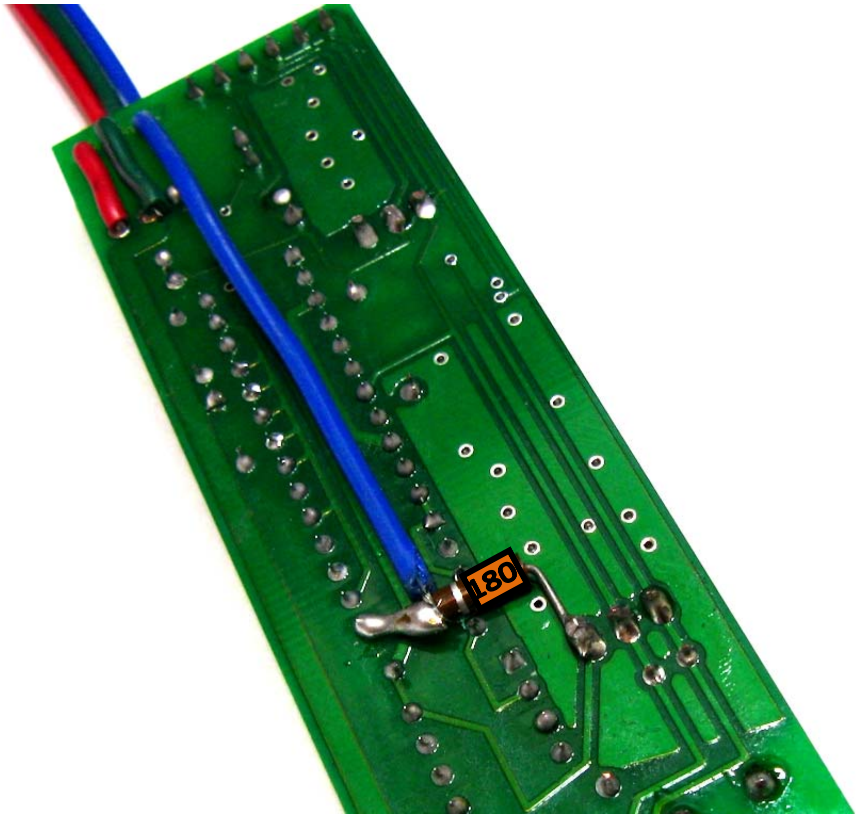
All 3 leads should now be brought through the stress-relief holes, this time from the top of the SSC. Insert the power leads into the corresponding + and – circuit board holes from the bottom. Solder the + and - leads from the top of the circuit board to secure the connection. Trim excess soldered wire length if needed. Leave the data line loose for now.



At this point, build a solder bridge from the – lead to the now empty 'data' lead hole. This will properly ground the poor old, burnt up, over driven data pins on the PIC and put them to rest once and for all. Thank you for your valiant service, rest in peace!!



Strip the insulation from the data line to a length appropriate to contact the newly added pull-up resistor.   Ideally you should have about 1 inch of bare wire exposed.   Slide the bare data wire around and under **the PIC pin side** of the resistor lead, wrap the wire back over the top of the lead and solder in place. Be careful not to disturb the solder on the PIC pin/resistor joint. Trim the excess data wire tip as needed. An additional drop of hot glue or epoxy can secure the length of data line, but is not needed.

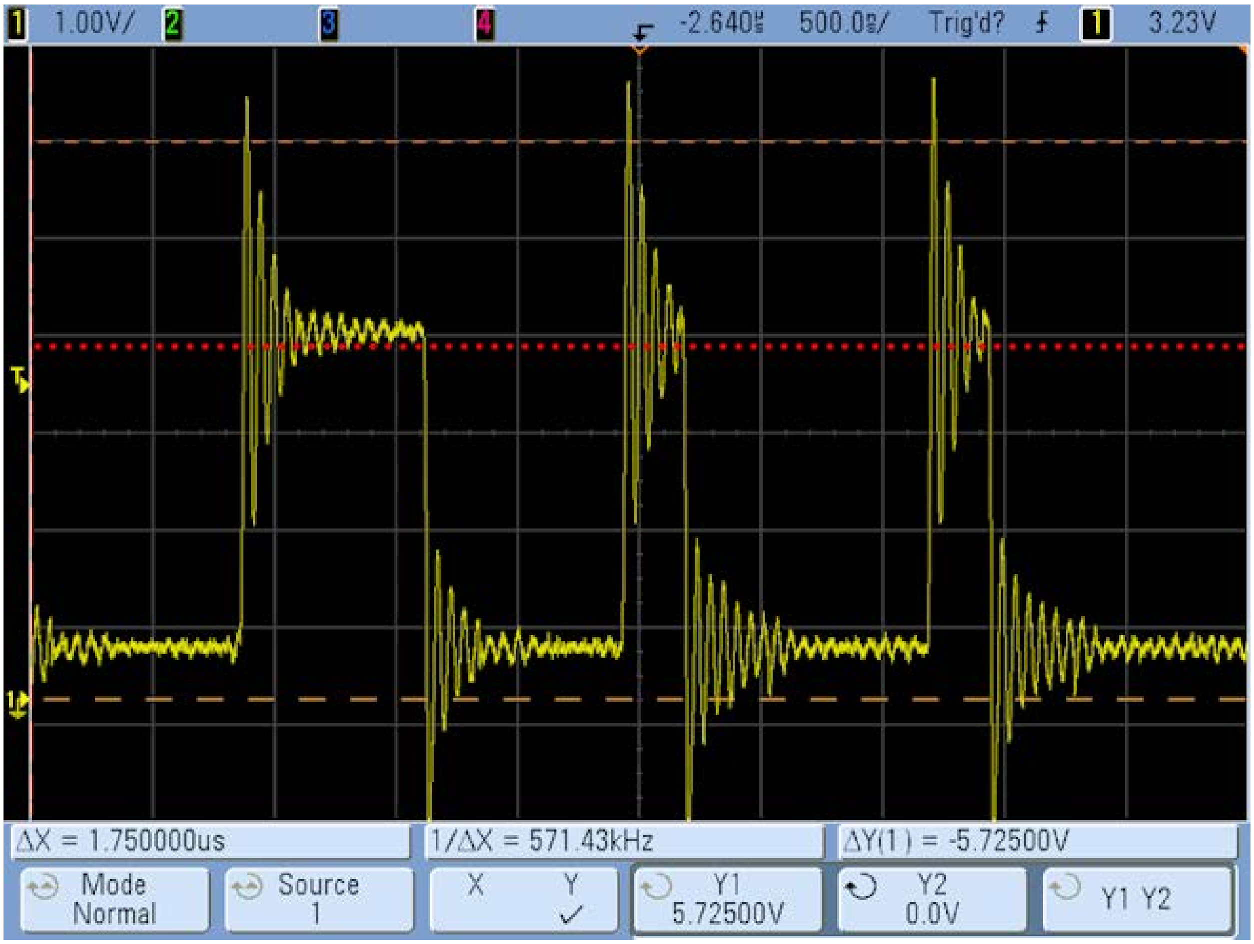


If you removed the DIP chips to start work, carefully re-install them being sure to watch the correct orientation. Notches in the chips correspond to notches in the sockets. Both notches should face the 'output' end of the SSC.

Load Falcon firmware using the PICkit 2 or PICkit 3. Then configure as normal with the standard utilty software.

This mod will bring ANY SSCV1 or SSCV2 to an equivalent level of 5V performance, and you should now have HAPPY BLINKING!!!

SSCV1 / V2 data output drives the PIC chip pins far in excess of the rated voltage specifications, but still barely meets the absolute minimum 3.5 volt requirement of the node data input (red dashed line), and makes a jagged ‘ringing’ data pulse. The nodes have a VERY hard time ‘understanding’ this signal.



The new WARP DRIVE modification uses a different pin on the PIC chip which can fully support 5 volt output to the nodes. This returns the PIC chip to well within the published operating specs. The data signal is boosted to a solid 5 volts – which is exactly what the node expects to see and far in excess of the 3.5V minimum requirement (red dashed line).

All components are now operating within spec and ringing is reduced to virtually nil. Just remember – while this mod fully fixes all data output issues, it does not / can not fix a node which still has issues. A bad node is still a bad node – all we can do is give them the best possible data stream!

Also, SSC to first node distances should always be kept as short as practical, though with WARP DRIVE, 4, 5, or 6 feet seem perfectly acceptable. Though not recommended, 8-9 feet may be achieved with good nodes.