SDR Cube Transceiver

Online Assembly Guide

Detailed construction notes for building and testing the SDR Cube Kit

Home Bill of Materials I/O Board Controls Board DSP Board Softrock SR-Base Softrock TX/PA
RXAMP X-LPF Internal Cable Set External Cable Set Main Enclosure Accessory Enclosure
Digital Subassembly Test Final Assembly RF Functional Test

Final Assembly of SDR Cube Boards into the Enclosure *... (Section version 1.0a)*

The Goal

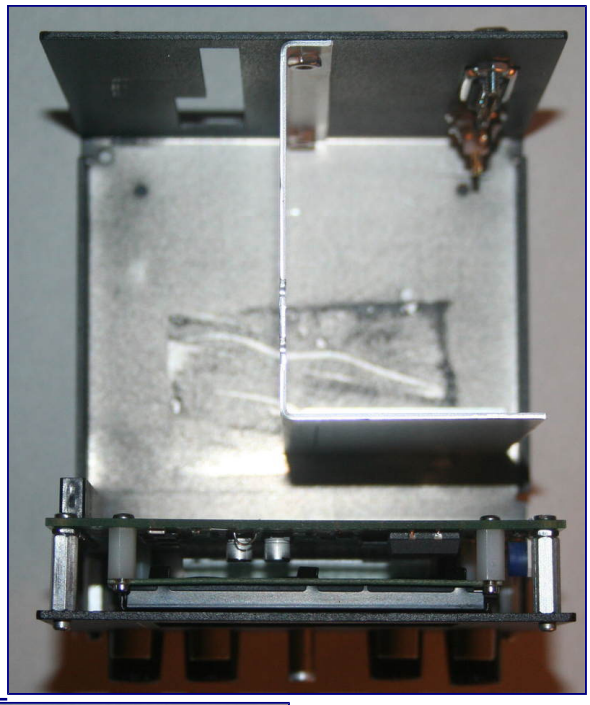
The goal of this section is to assemble all completed SDR Cube boards and optional boards into the main Enclosure. The available space starts getting a little tight, so please be sure to follow the steps recommended on this page ... it works pretty well this way.

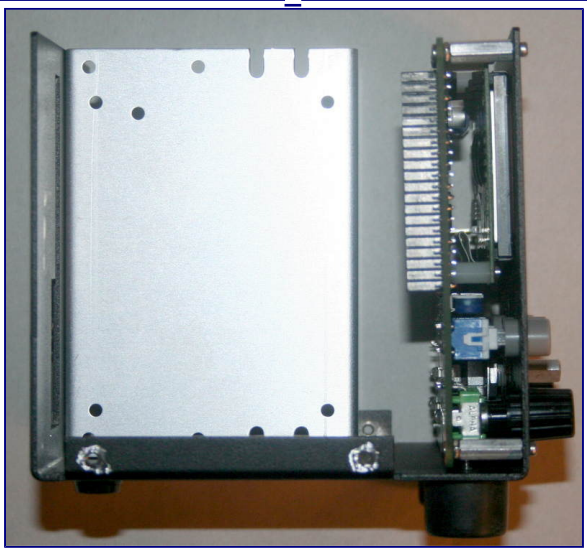
STEP 1: Straighten the front & rear panels of the chassis.

Take the main Enclosure chassis and press outward on the front and rear panels to make sure they are at 90 degrees to the floor of the chassis. This will help the DSP board fit properly later on this page.

STEP 2: Install the Controls board behind the front panel

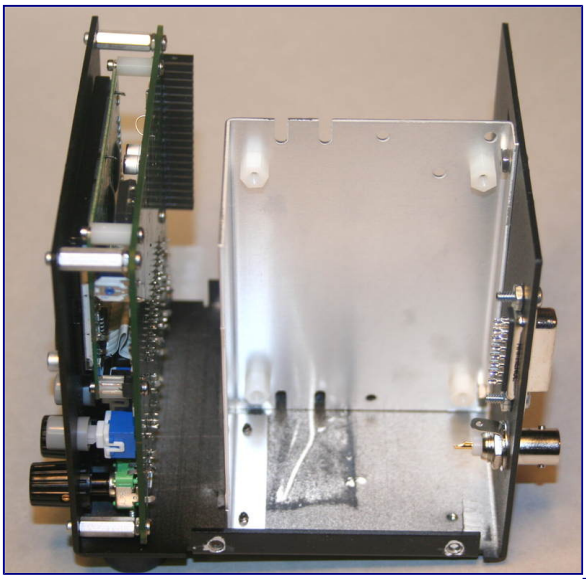
Use the four remaining #2-56 filister screws to attach the Controls board as shown below.

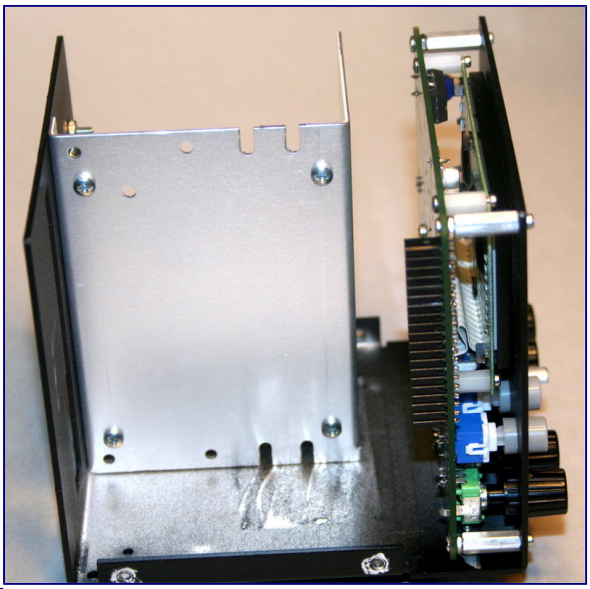




STEP 3: Attach the SR-Base standoffs to the sub-chassis

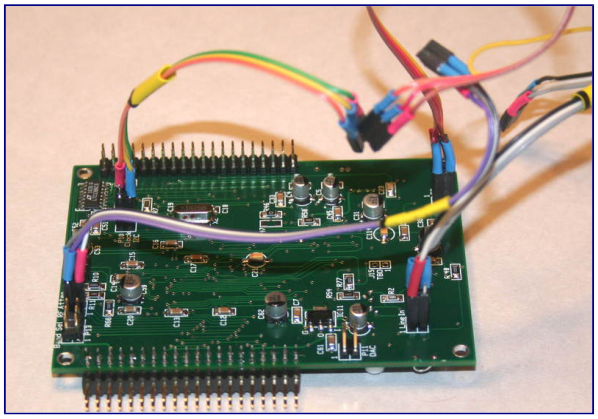
Remove the four standoffs from the SR-Base assembly and attach them into the sub-chassis as shown below using the four remaining 4-40 screws from the SR-Base kit assembly process. This will enable you to easily attach the SR-Base later on this page.





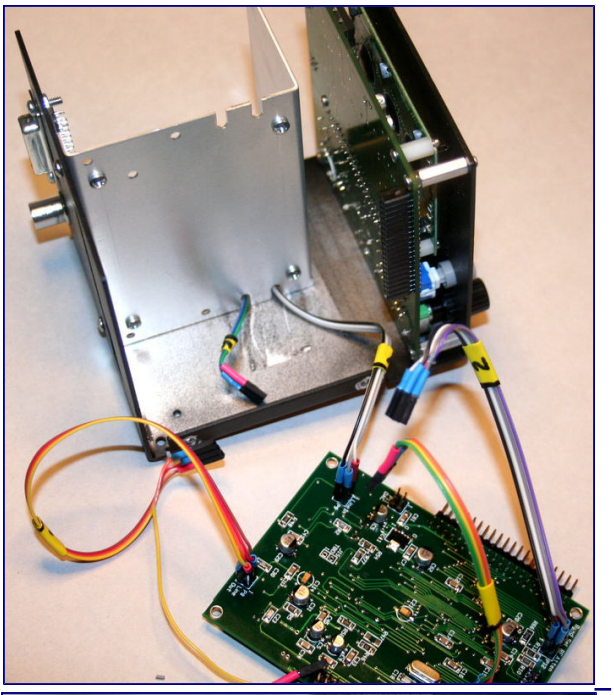
STEP 4: Attach the Internal cables to the DSP board

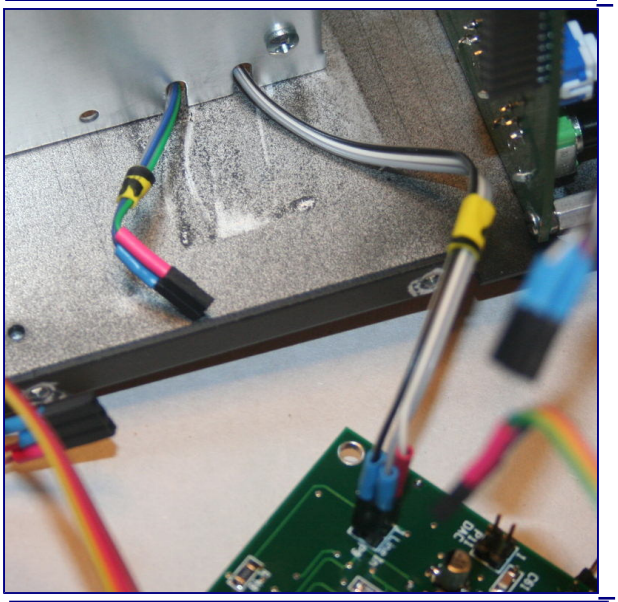
Using the **Cable Interconnect Diagram** as a guide (having it printed out and with you on the bench would be most helpful), attach the four Internal Cables to the DSP board. Be sure to ensure that pin 1 of the cable (red heat shrink) is oriented on pin 1 of the DSP board connector.

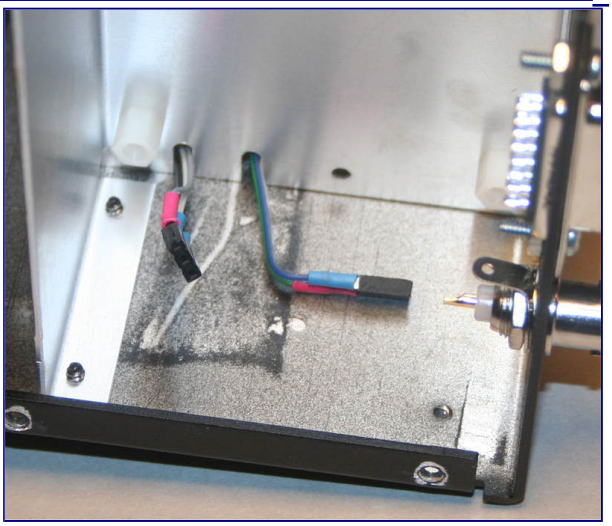


STEP 5: Feed Cables through bottom access holes in sub-chassis

Feed cable #3 though the right access hole in the sub-chassis, as shown below. Then take the SR-Base power cable (#6) and feed it through the other access hole, as also shown.





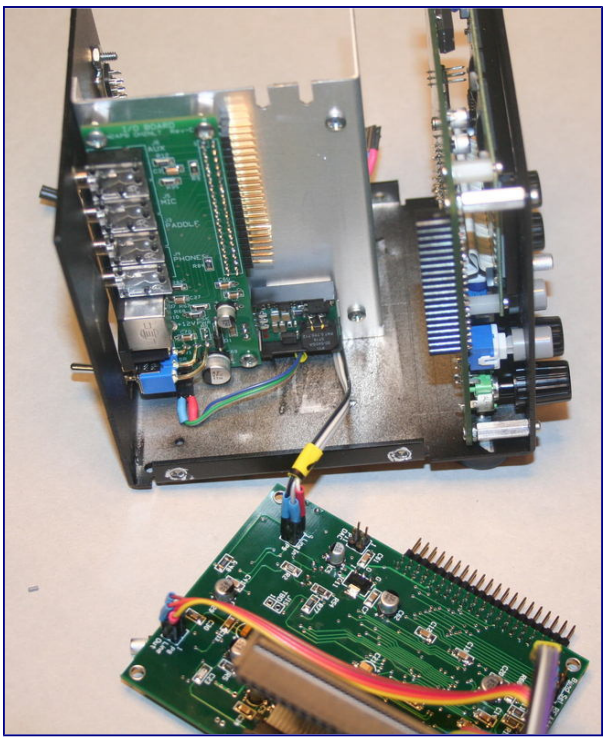


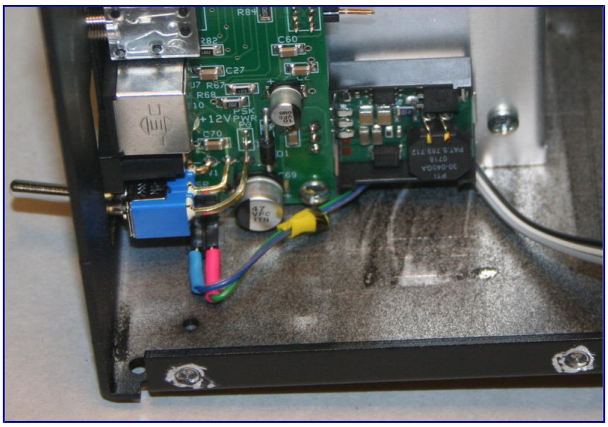
STEP 6: Attach the I/O board to the sub-chassis & connect the SR-Base power cable #6

Using the four remaining #4-40 screws from the I/O board kit, attach the I/O board to the sub-chassis as shown in the photo below. With all eight screws still loose in the standoffs, bias the I/O board toward the rear of the enclosure in order to have the I/O board edge connectors protruding as far as possible through the hole in the rear panel. Then while still applying the boas pressure with one hand, tighten down the eight screws to hold the I/O board firmly in this optimal position. This action will ensure that 1/8" stereo plugs connecting to the audio jacks on the board will sit flush with the jack and be fully inserted.

Next take the tie-wrap supplied in the kit (or in the Service Pack provided for early kit owners) and attach it in a way that gently holds down the offboard-protruding voltage regulator onto the sub-chassis. Insert one end of the tie-wrap through the hole in the sub-chassis and wrap it around the backside such that it comes back to the topside through the slot at the lower end of the sub-chassis. Finish attaching the two ends of the tie-wrap over the regulator and pull "loosely snug" thus holding the regulator to the chassis. The white pad on the bottom of the regulator will help cushion the part while being held in place. If the regulator was mounted as described in the I/O Assembly section, the regulator will already sit flush with the surface of the sub-chassis when the I/O board is mounted. The purpose of the tie-wrap is to ensure that there is no "wiggling" of the regular (from vibration) when the Cube is being transported.

Lastly for this step, take the loose Cable #6 and connect it to P10 on the I/O board, ensuring that the red side of the plug is oriented to the right, as shown. (This is = +12V.) Gently push that connector downward and angle the wires coming from it at a sharp 90-degree bend, so as to keep the protruding cable as close to the I/O board as possible. (We'll need that space when mounting the DSP board.

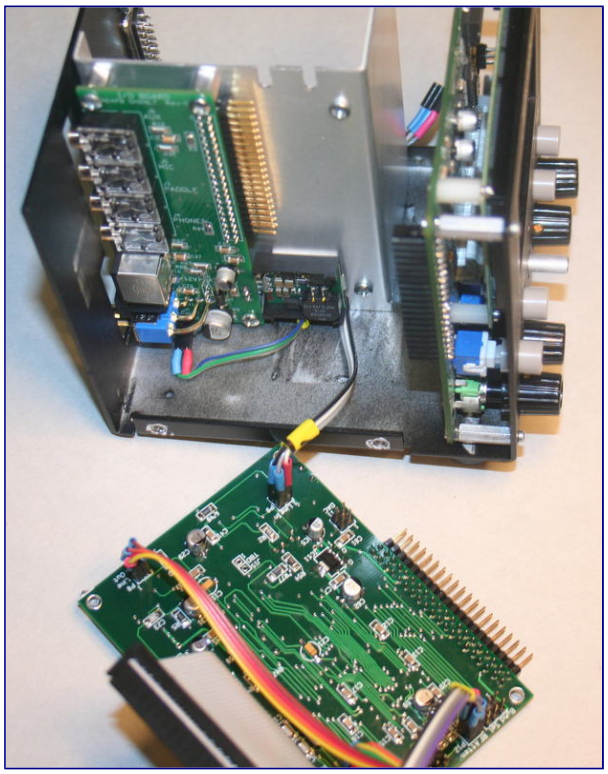




NOTE: The tie-wrap hold-down technique is not yet shown in these photos. (They will be updated shortly.)

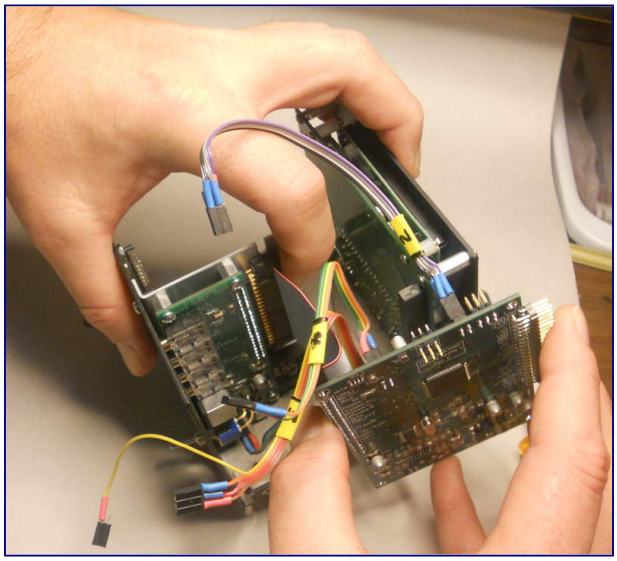
STEP 7: Attach cable #1 (40-wire flat cable) to P2 on the DSP card.

It is much easier to do it at this point, rather than later.



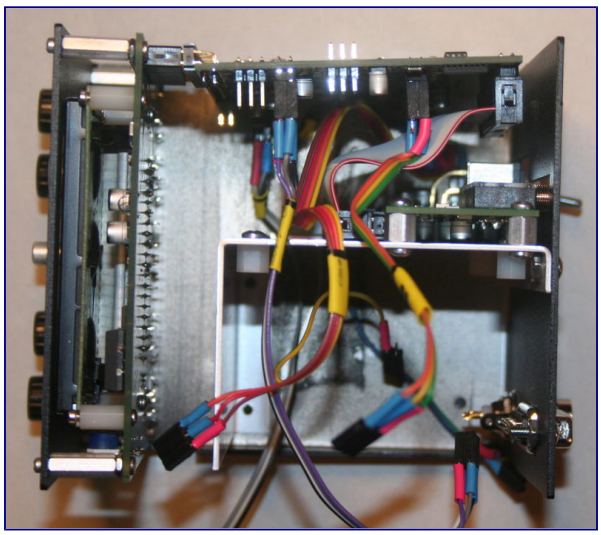
STEP 8: Attach other end of Cable #1 to the I/O board

Gently holding the octopus assembly of DSP and cables in one hand, orient the other end of Cable 1 over the 40-position pinheader P2 on the I/O board and press it into place with your other hand. Make sure that the DSP board is oriented on the inside of the lower mounting lip of the chassis, as you will not be able to get it inside after the flat cable is in position. Then carefully orient the DSP board's P1 connector in front of the Controls board J1 connector and gently push from the rear of the DSP board such that the 40-pos'n pinheader inserts fully into J1. (I say "gently" and"carefully" because you don't not want to manhandle the DSP board with its many components sticking up from the surface.)



STEP 9: Orient the cables as shown

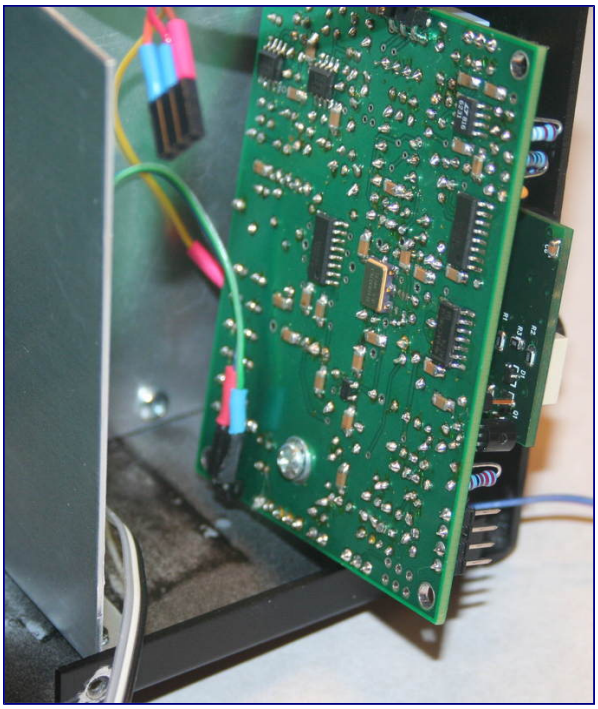
Make sure the flat cable has a curve in it to allow room for the Cable #4 connector on the DSP board. Route the remaining cables roughly over the top of the sub-chassis for now. Note how the DSP board is angled slightly outward - we'll take care of that in a minute. (This is caused by two things: the slightly non-parallel soldering of the DSP board connector P1 that plugs into the DSP board, as well as a gentle outward pushing due to the cables between the DSP and I/O boards.)



STEP 10: Connect Cable 6 to the SR-Base power connector P2 and screw down the SR-Base board

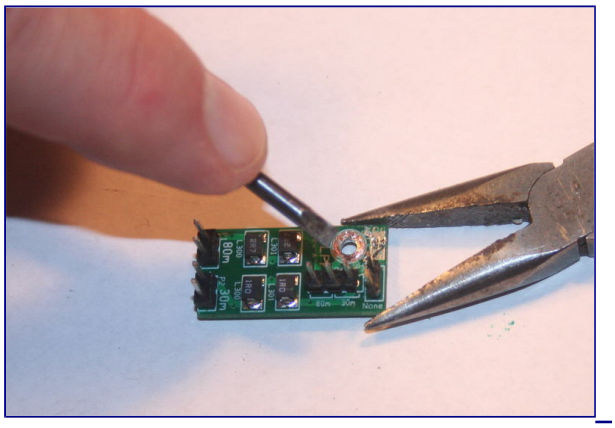
Take the loose end of Cable 6 and insert it into the SR-Base power connector P2, being careful to orient the connector such that the red shrink side is on the left, as shown below. (Again, a reminder that you will probably want to be using a longer Cable #6 than what is provided in the initial kits. A 6" cable provides adequate room for the inward-pointing P2 connector.)

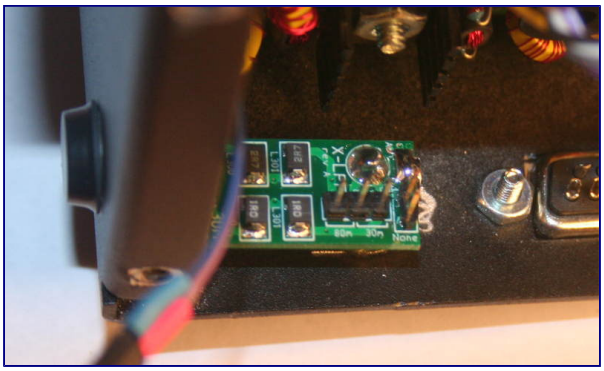
Attach the SR-Base board to the four standoffs on the sub-chassis using the four #4-40 phillips head screws.



STEP 11: Attach the X-LPF board

First ensure that the BNC connector is tight, with its grounding tab oriented pointing to the top of the enclosure. Take the X-LPF board assembly created in a previous section, and if not already done, scrape the soldermask away from the main mounting hole so as to expose the underlying copper for soldering, as shown below. Then mount the X-LPF board assembly on the BNC center conductor post and solder. Bend the BNC grounding tab tightly upward until it is just meeting the top edge of the X-LPF board and solder it to the large rectangular ground pad. (The ground tab will be perpendicular to the top edge of the X-LPF board and even with the board. Use a good amount of solder to make a solid connection.) Make sure the X-LPF board and BNC assembly together are oriented parallel to the side of the enclosure.





STEP 12: Connect the remaining cables to the SR-Base assembly.

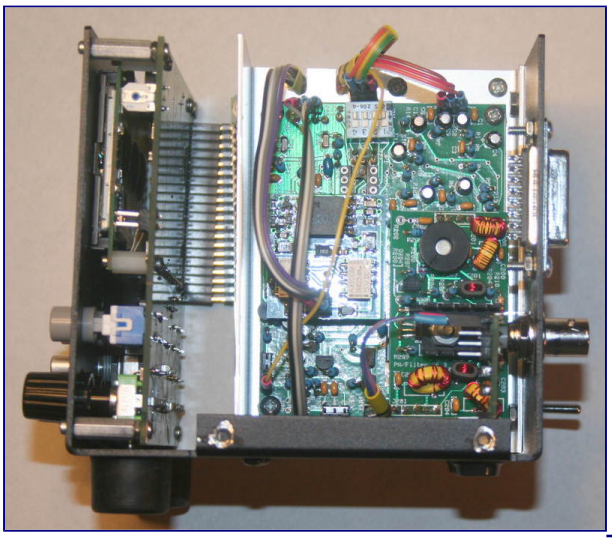
Insert the RXAMP into position on the SR-Base board and connect its control **Cable #2** to the RXAMP connector P1, carefully noting the proper location of pin 1 on the connector. (This connector carries both 5V and ground, so if improperly inserted, some damage can occur.)

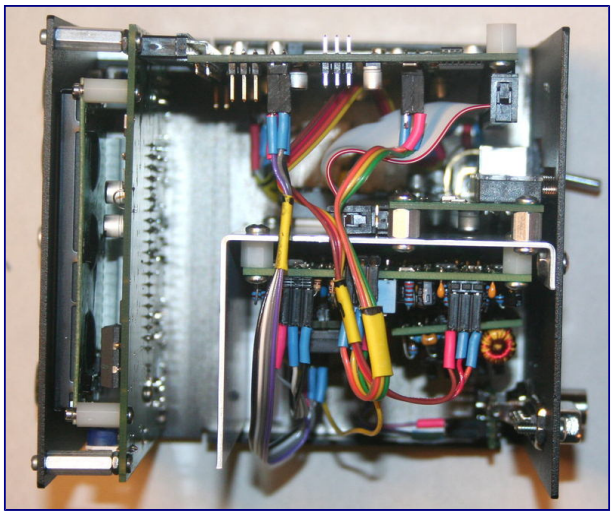
Connect **Cable #4** (I2C) to P6 on the SR-Base board at the top-middle location. Pin 1 is oriented to the right.

Connect **Cable #5** to P5 on the SR-Base board at the top-right location. Pin 1 is oriented to the left. Connect the longer single-wired PTT connector down to P4 on the SR-Base board at the lower left location.

Connect **Cable #3** to P7 on the SR-base board at the top-left location. Pin 1 is oriented to the left.

Tuck the cables going over the top edge of the sub-chassis into a convenient access slot, such that when the top cover is placed on the chassis, the wires will not be pinched.

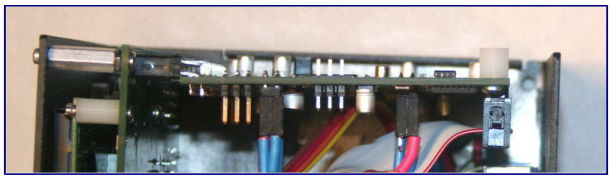




STEP 13: Attach 1/4" nylon standoffs to the top and bottom corners of the DSP board (If not already done earlier during DSP board assembly.)

NOTE: If you reached this step and have not yet attached the nylon standoffs during the DSP board assembly phase, you may need to remove the DSP board connector from its mating jack in the Controls board in order to do this step.

To handle the natural outward bending of the DSP board mentioned before, two #4 threaded nylon standoffs (from the DSP board kit) need to be attached to the bottom side of the DSP board at the upper-rear and lower-rear corners, using the remaining #4-40 screw. These will gently hold the DSP board away from the chassis mounting lip and the inside of the top cover when in place. (There is enough force in the DSP board mounting such that there will be no vibrating or undue stress applied to the board.)



STEP 14: Attach the top cover, using the #4-40 black flat head screws remaining from the Man Enclosure assembly step

STEP 15: Attach the main tuning knob

Using the nice black anodized aluminum knob remaining from the Controls board kitting, position the knob over the shaft of the rotary encoder on the front panel and tighten down the set screw to hold it in place. Ensure that the knob is positioned at least 3/16" above the front panel such that the encoder's pushbutton has sufficient travel to reliably engage. Some minimal "knob wobble" may be experienced while turning the encoder, and this is normal even with the better quality encoder and aluminum knob that we chose for the Cube. This wobble may be reduced, if desired, by carefully placing shims between the knob and shaft. Some experimentation may be necessary to achieved desired results.

Congratulations, the SDR Cube is completely assembled!
Next ... move on to the RF Functional Test section!

Back to Construction Home

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