

## Rod assembly Certification

- The following individuals can train others in the proper procedures for rod assembly.

Susanne Kyre

- The following individuals have been trained in the rod assembly procedures by someone authorized to do so in the list above.

Trainee	Trainer Authorization	Date
Dan Callahan	Susanne Kyre	04-01-05

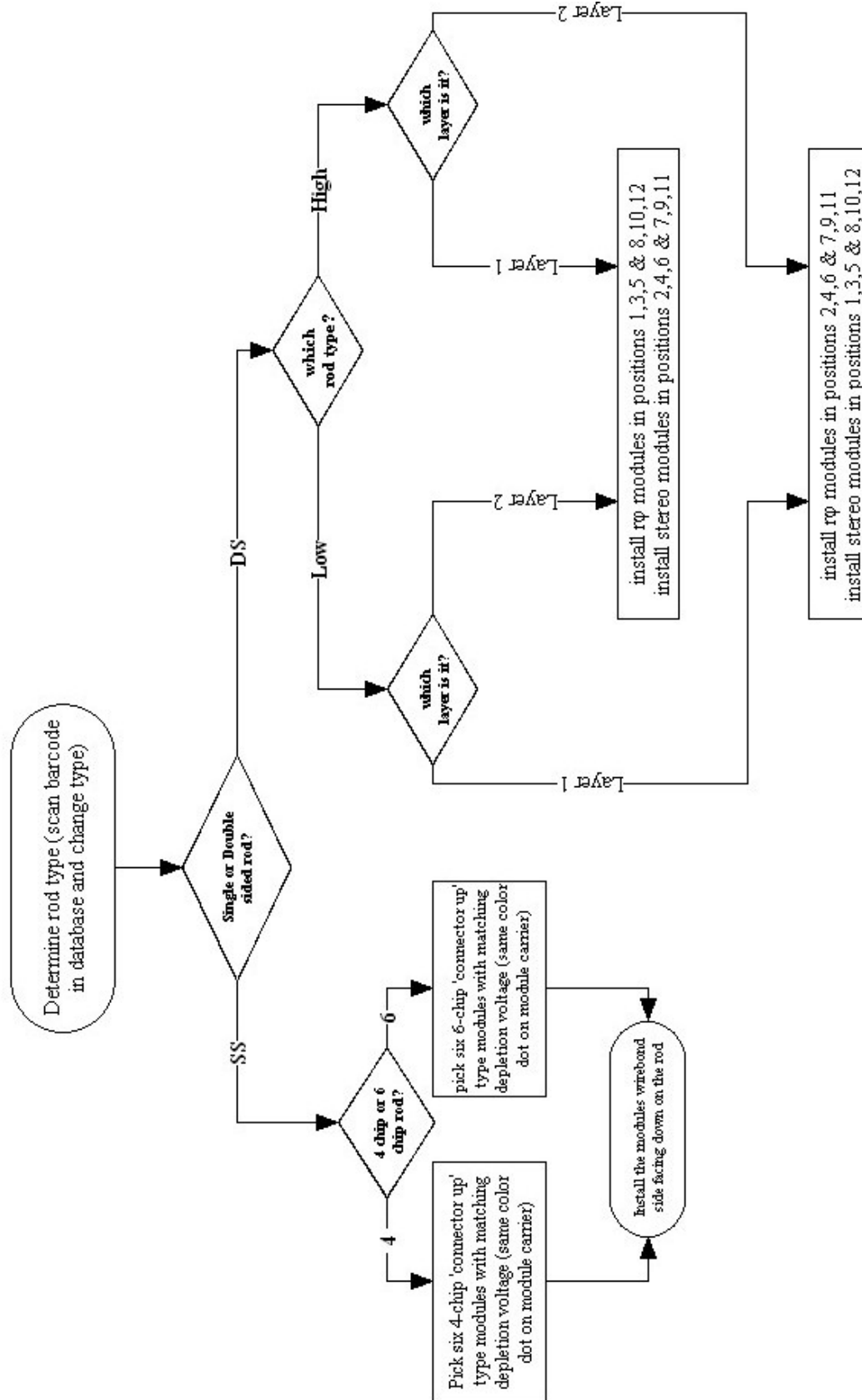
## **Installation of Modules on Rods**

- Database entry
- Rod/module type flowchart
- Preparation of the rod
- Preparation of the modules and bending of the hybrid tail
- Installation of modules on a Single Sided rod
- Installation of modules on a Double Sided rod
- Making the electrical connections
- Gluing of the HV tails
- Removing modules from the rod

### ***Datebase entry***

1. Open Big Browser
2. Enter the logon password
3. If the Rod assembly tab is not open already, click on Plug-Ins and select Rod Assembly
4. Pick a rod from the cabinet, keeping in mind that the multi-rod test stand can only test rods with different CCUM numbers (6 rods per load)
5. In the Rod assembly window enter the rod barcode by clicking on the “scan” button and scanning the barcode at the readout end of the rod
6. In the Big Browser rod assembly window click on “Change Type”
7. Select the rod type given (there is only one choice)
8. Use this rod type and the flowchart in the following section to determine which modules get installed in which position
9. Make sure the modules picked for installation all have the same depletion voltage (same color dot sticker)
10. Mark the barcode sticker on the rod with a blue or green dot according to the depletion voltage of the modules
11. Once the rod type is successfully changed, the rod barcode needs to be entered again
12. Click on “Add/Remove components”
13. Enter the module barcodes in the positions they are going to get installed in and write the position number on the barcode label on the module carrier
14. Once all positions are filled, click on “Update Assembly”

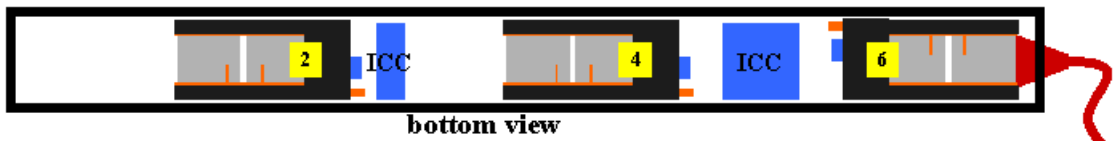
# Installation of modules on rods



**Positions 1-6 are always mounted wirebond side down and need 'connector up' style modules**  
**Positions 7-12 are always mounted wirebond side up and need 'connector down' style modules**

Sketch of TOB Single Sided rod

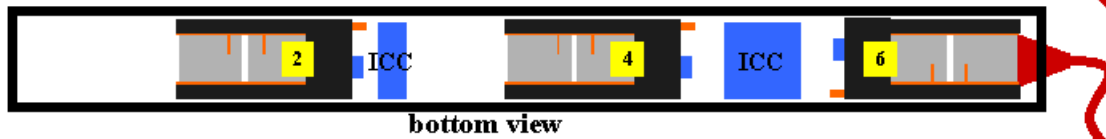
D. Abbaneo - September 2003



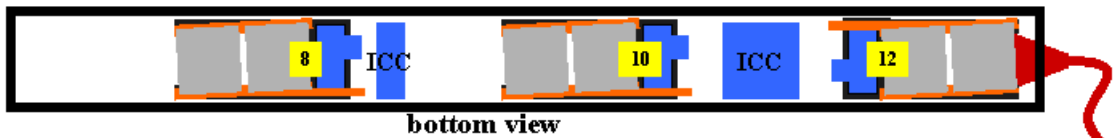
Sketch of TOB Double Sided rod, type L layer 1 OR type H layer 2

D. Abbaneo - September 2003

Populated with modules 1-6



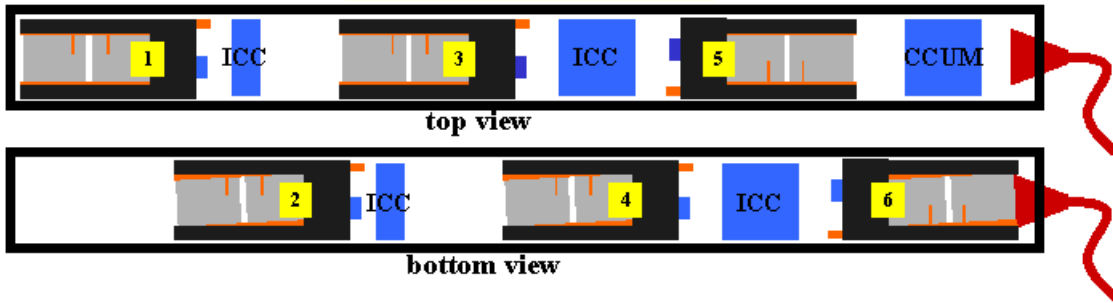
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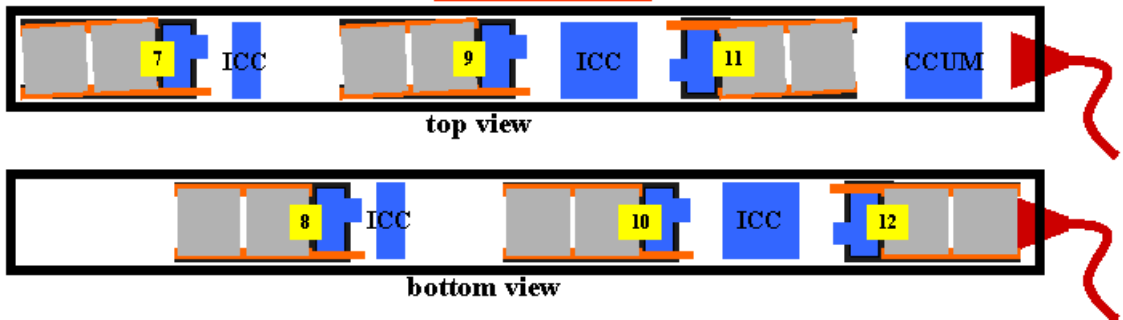
Sketch of TOB Double Sided rod, type H layer 1 OR type L layer 2

D. Abbaneo - September 2003

Populated with modules 1-6

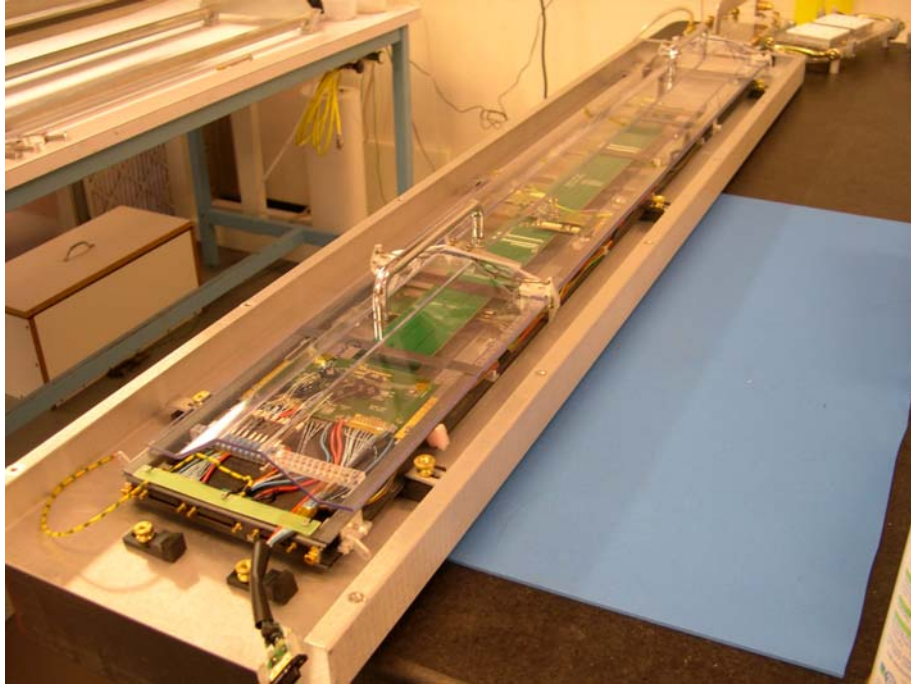


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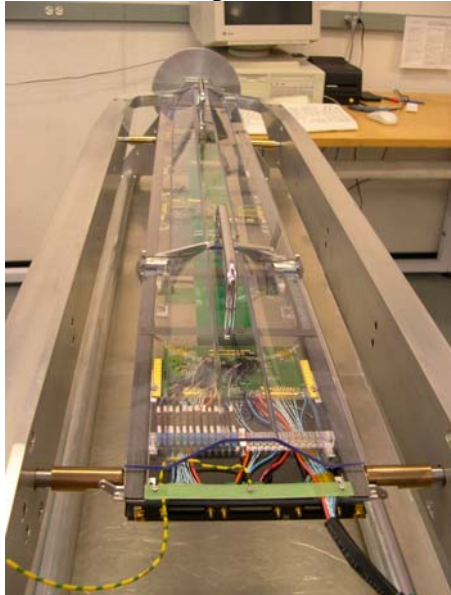


### ***Preparation of the rod***

1. Loosen the clamps that hold the rod in the rod box and pull them back
2. Set the rod pick up fixture onto the rod (make sure its orientation is correct)



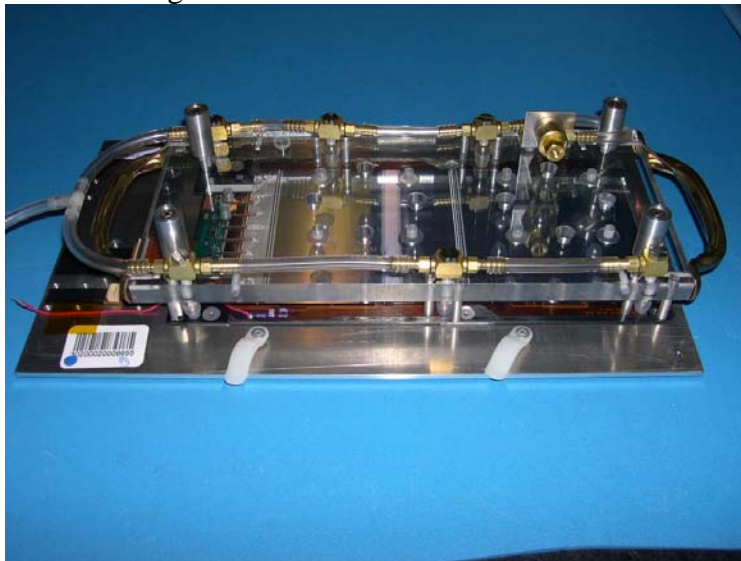
3. Flip the levers to engage the clamps
4. Make sure the rotisserie is turned horizontal and locked into position with the rod mounts facing up and the clamps pulled back
5. Pick up the rod and set it on the rotisserie, making sure all 4 mounts are placed correctly
6. Close all 4 clamps on the rotisserie



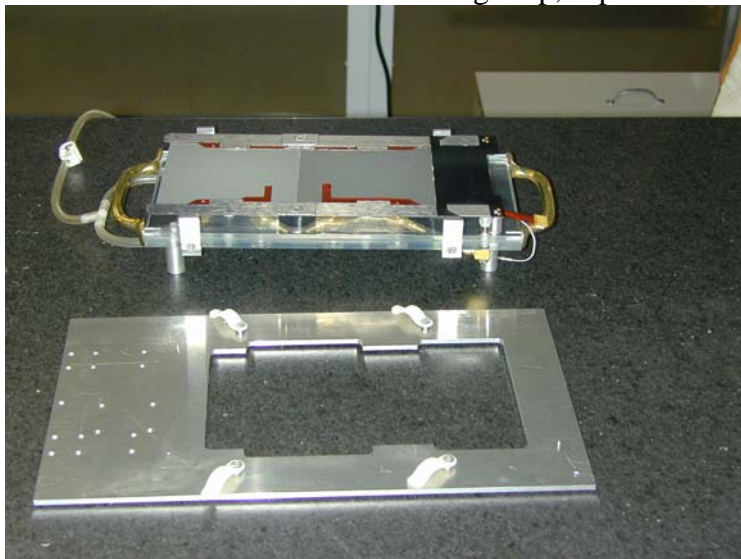
7. Flip the levers on the rod pick up fixture to release the fixture and remove it
8. The rod will now sit in the rotisserie with the odd numbered module positions facing up
9. Make sure all the loose wires are taped out of the way of the modules

### ***Preparation of the modules and bending of the hybrid tail***

1. With module in module carrier, remove the test tails
2. Remove all barcode labels and stickers from the module and clean off the residue with isopropanol
3. Use fixture labeled “R-Phi Module flip fixture, back side”
4. Clean the fixture by first blowing loose particles off with canned air, then wiping the surface of the vacuum cups and downstops with isopropanol,
5. Plug in the vacuum line and close the hose clamp on the vacuum line
6. With the module in the module carrier, remove the white clamps from the C-fiber frame
7. Lower the fixture onto the module, making sure that the semicircular downstops make contact with the rivets on the clips and the locating pin engages the hole in the c-fiber frame
8. With the fixture resting on its downstops, open the hose clamp on the vacuum line, the module will get lifted onto the fixture

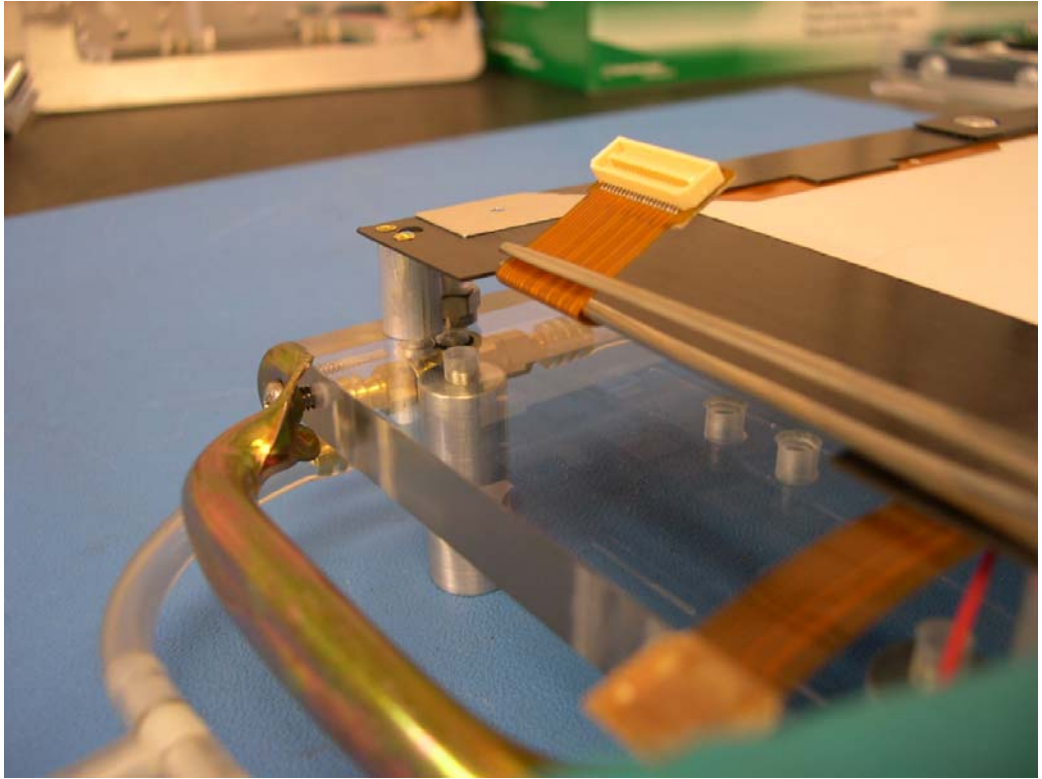


9. Lift the fixture with the module straight up, flip it over and set it down on the feet

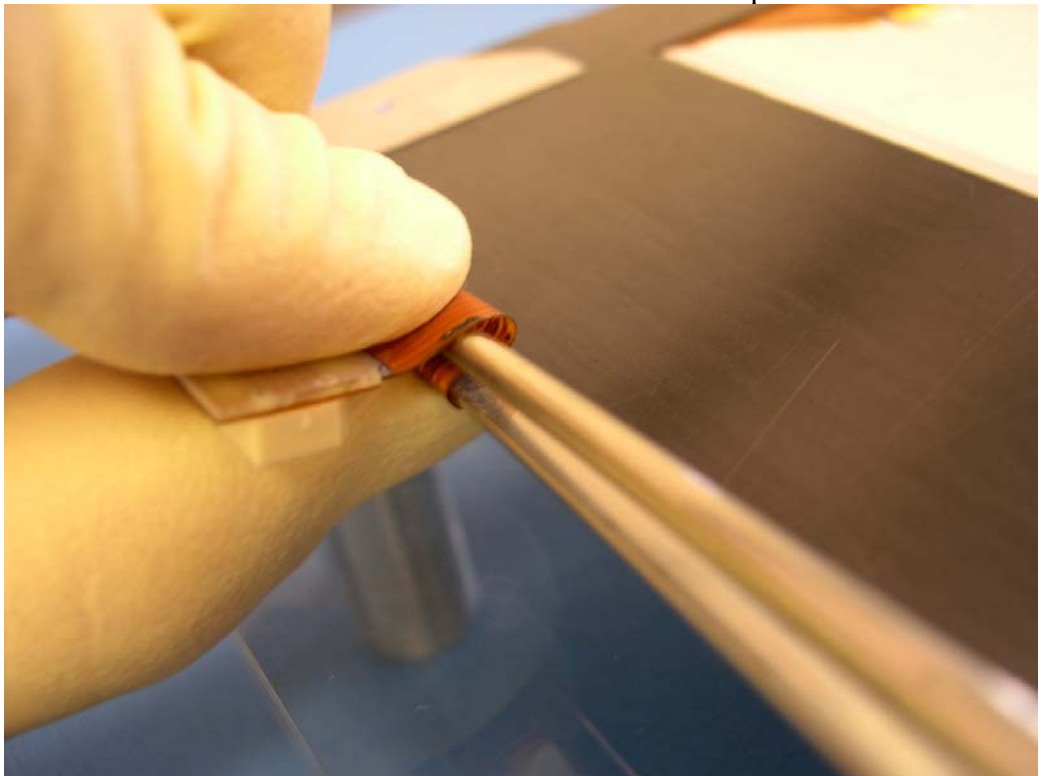




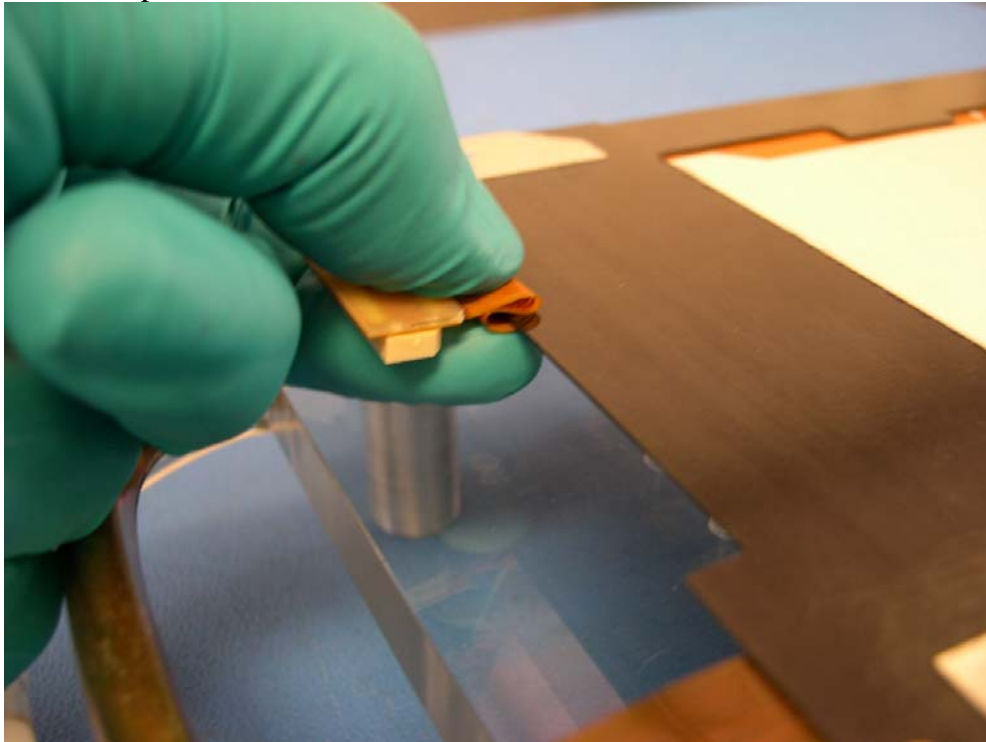
10. For modules that are installed with the wirebonds facing down:
  - a. Clamp the hybrid tail with the long tweezers about 5mm from the module frame and bend it back over the module frame



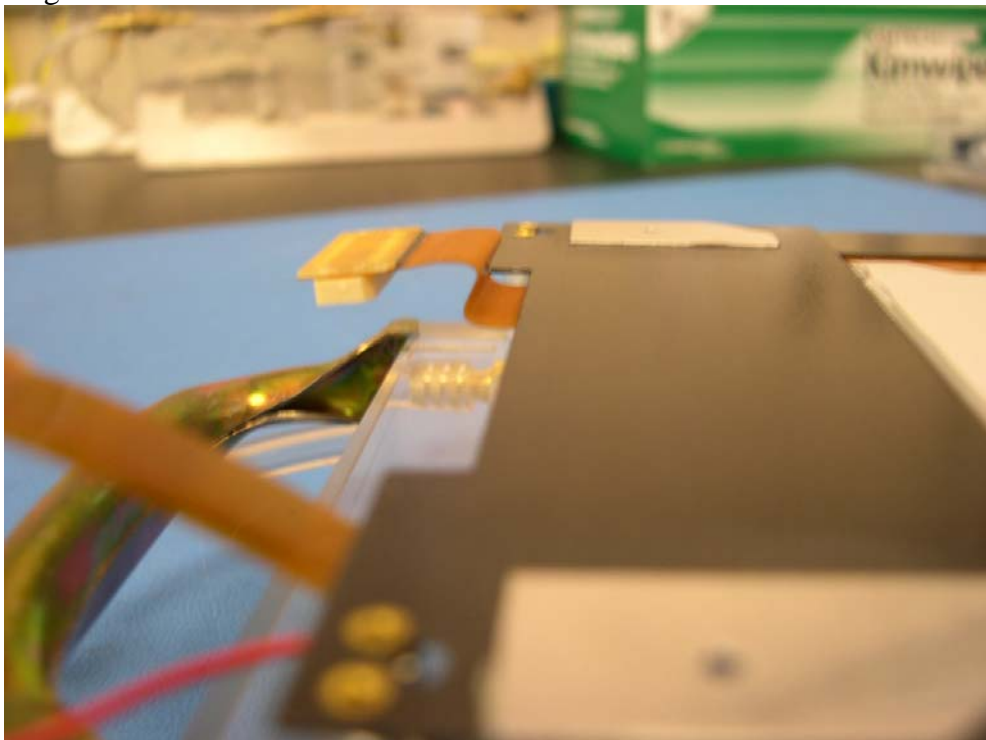
- b. Then bend the tail back over the tweezers to make a Z-shaped bend



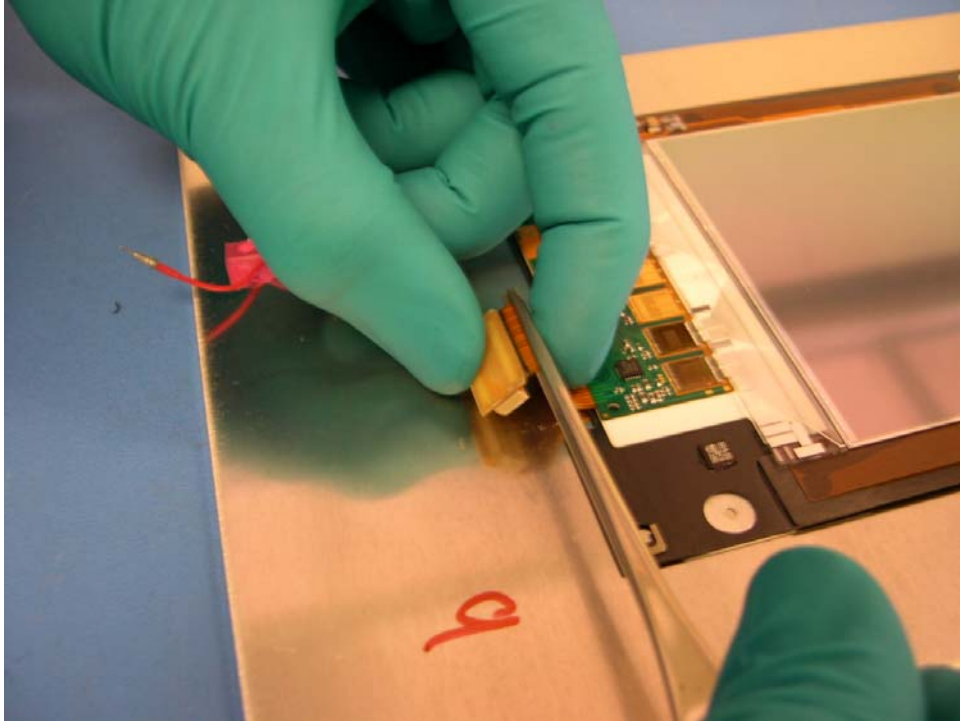
- c. Pull out the tweezers and pinch the tail gently between your fingers to make the bends sharper



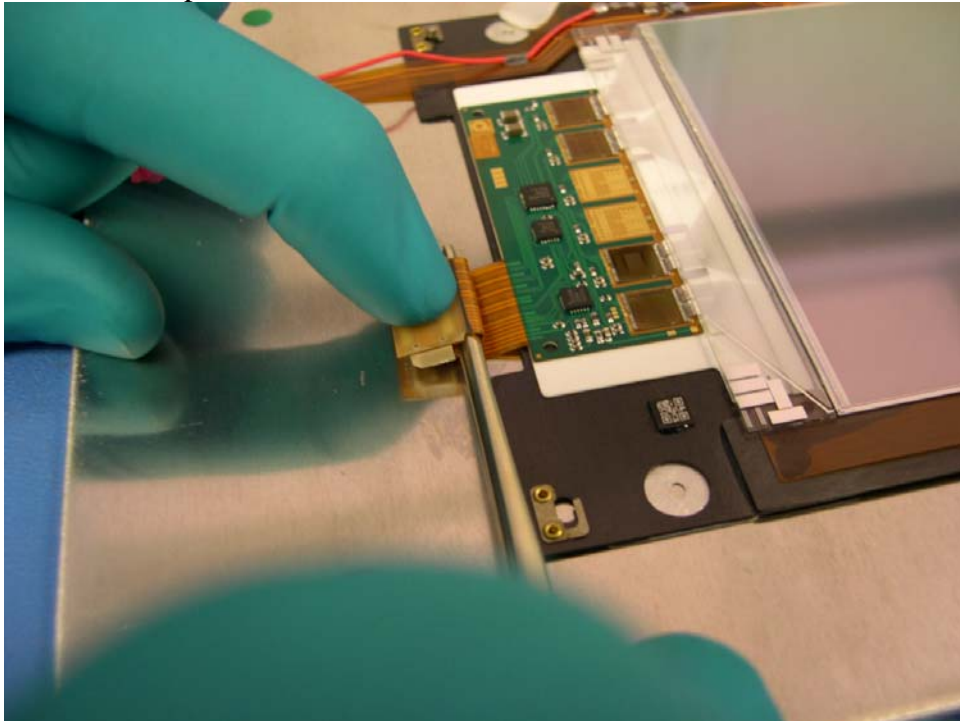
- d. This is what the tail should look like, a straight section of about 1cm length right after the connector, then a Z-shaped bend and a straight section of about 4 mm length to the module frame



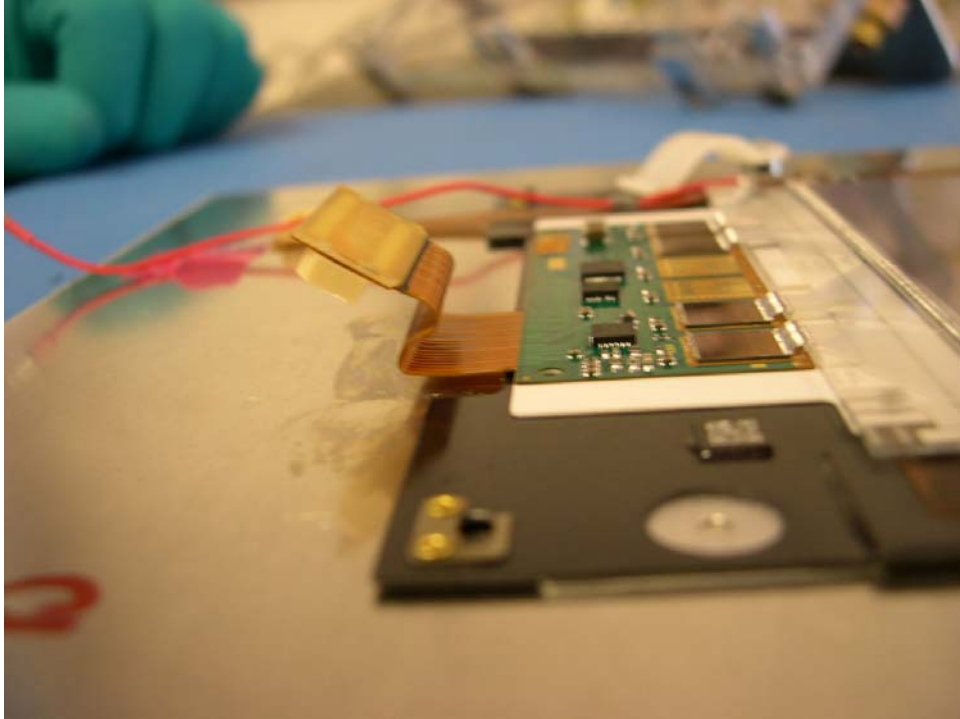
11. For modules that a being installed with the wirebonds facing up:
  - a. Tail bending will be done on the module carrier, so make sure the 4 plastic clamps hold the module securely on the carrier
  - b. Clamp the hybrid tail between the long tweezers about 4mm from the connector and bend the connector end of the tail back on itself



- c. With the tail still held by the tweezers, rotate the tweezers toward the module to create a Z-shaped bend in the tail

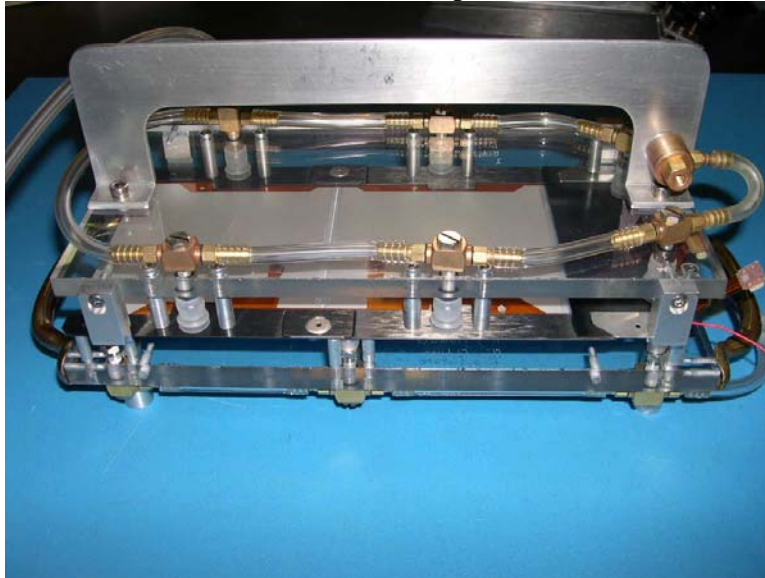


- d. Pull out the tweezers and gently pinch the tail between your fingers to make the bends sharper
- e. This is what the tail should look like, a straight section of about 5mm length right after the connector, then a Z-shaped bend and a straight section of about 1cm length to the module frame

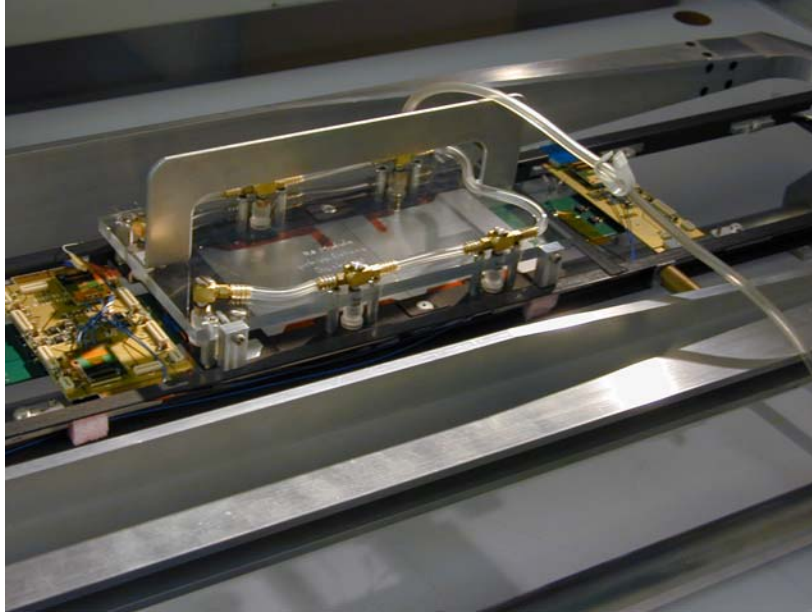


### ***Installation of modules on a Single Sided rod***

1. All modules for a single sided rod are 'down' type modules, that get installed with the wirebond side facing down
2. After bending the tail leave the module in the flip fixture
3. To pick up the module from the back side, use the fixture labeled "R-Phi Module pick-up fixture, back side"
4. Plug in the vacuum line and close the hose clamp on the vacuum line
5. Lower the fixture onto the module which is back side up in the flip fixture, making sure the pin engages the clearance hole in the heat spreader
6. Note that the semicircular downstops make contact with the rivets on the clips



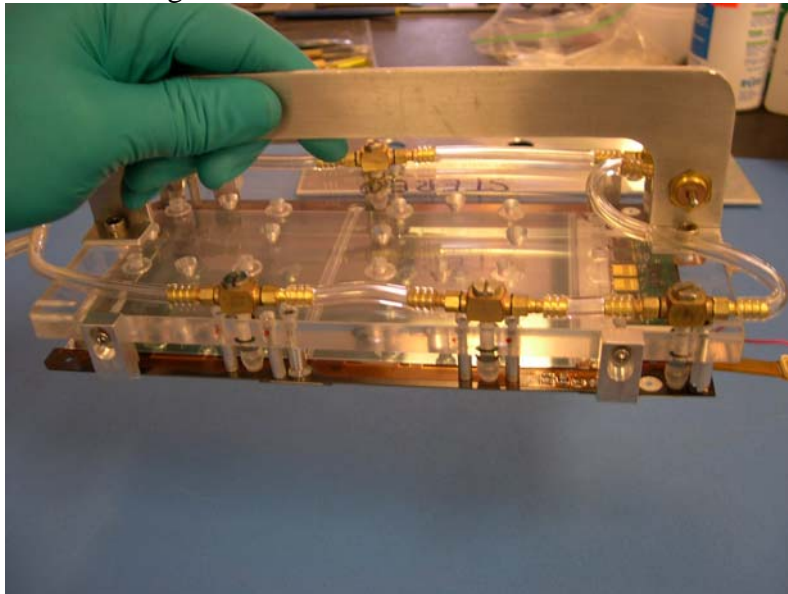
7. With the pick-up fixture resting on the flip fixture, open the hose clamp on the vacuum line of the pick-up fixture, the module is now held by both fixtures
8. Close the hose clamp on the vacuum hose of the flip-fixture and push the release valve, the module is now held by the pick-up fixture
9. Lift the fixture with the module straight up and move it over to the correct module position on the rod.
10. Hold on to the red bias wire or tape it to the pick-up fixture, it has a tendency to bend down and could touch the surface of a sensor that is already on the rod causing scratches
11. Holding the fixture horizontal, lower it into position on the rod, making sure that the 2mm hollow pins on the rod engage the clips on the module frame
12. When the downstops on the side of the fixture have engaged the rod frame, let go of the fixture, if necessary remove the tape from the bias wire making sure the bias wire is not getting close to any silicon surface



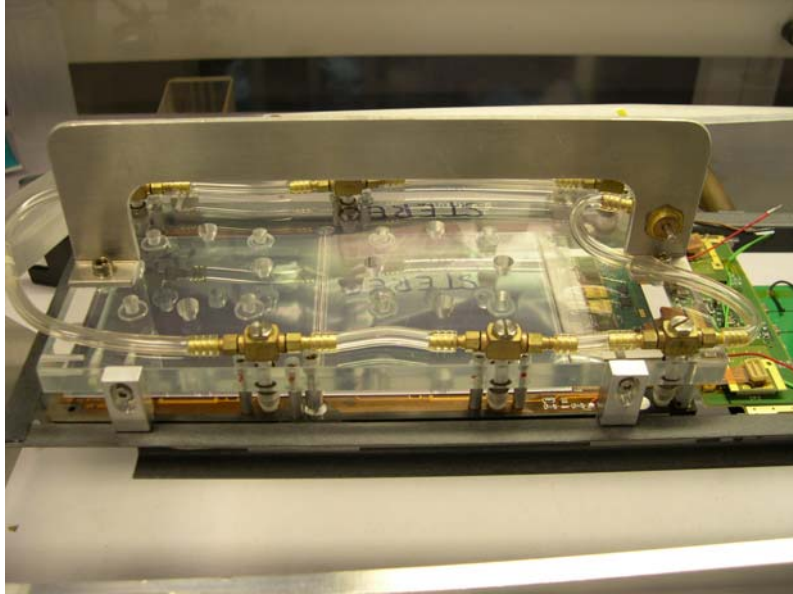
13. Close the hose clamp on the vacuum hose and push the release valve
14. Lift the fixture straight up making sure that the module stays on the rod
15. Insert a screw and washer into the screwdriver tool
16. Insert a screw into each of the clearance holes on the heat spreader on the frame (4 screws) and hand tighten screw
17. Using a torque-screwdriver tighten screws to 7.1 in oz (500 g cm)

### ***Installation of modules on a Double Sided rod***

1. Install modules 1,3 and 5 wirebond side down like on a single sided rod, but do not screw the modules down
2. Install modules 7,9 and 11 wirebond side up according to the following procedure
3. Bend the hybrid tail on the module carrier
4. Use the fixture labeled “R-Phi Module pick-up fixture, front side”
5. Plug in the vacuum line and close the hose clamp on the vacuum line
6. Lower the fixture onto the module, making sure the pin engages the clearance hole in the heat spreader
7. Note that the semicircular downstops make contact with the rivets on the clips
8. With the fixture resting on its downstops, open the hose clamp on the vacuum line, the module will get lifted onto the fixture



9. Lift the fixture with the module straight up and move it over to the correct module position on the rod
10. Hold on to the red bias wire or tape it to the pick-up fixture, it has a tendency to bend down and could touch the surface of a sensor, that is already on the rod, causing scratches
11. Holding the fixture horizontal, lower it into position on the rod, on top of a wirebond down facing module, making sure that the 2mm hollow pins on the rod engage the clips on the module frame
12. When the downstops on the side of the fixture have engaged the rod frame, let go of the fixture, if necessary remove the tape from the bias wire making sure the bias wire is not getting close to any silicon surface

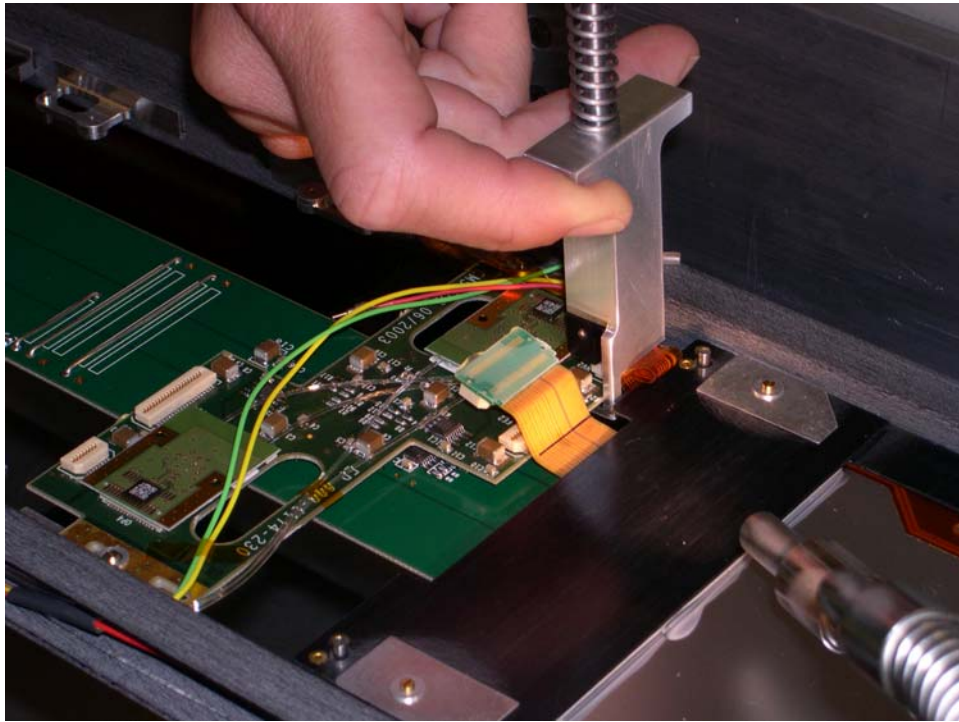


13. Close the hose clamp on the vacuum hose and push the release valve
14. Lift the fixture straight up making sure that the module stays on the rod
15. Insert a screw and washer into the screwdriver tool
16. Insert a screw into each of the clearance holes on the heat spreader on the frame (4 screws) and hand tighten screw
17. Using a torque-screwdriver tighten screws to 7.1 in oz (500 g cm)
18. After all 6 modules are screwed down, turn the rod over and repeat the steps to install the 6 modules on the other side

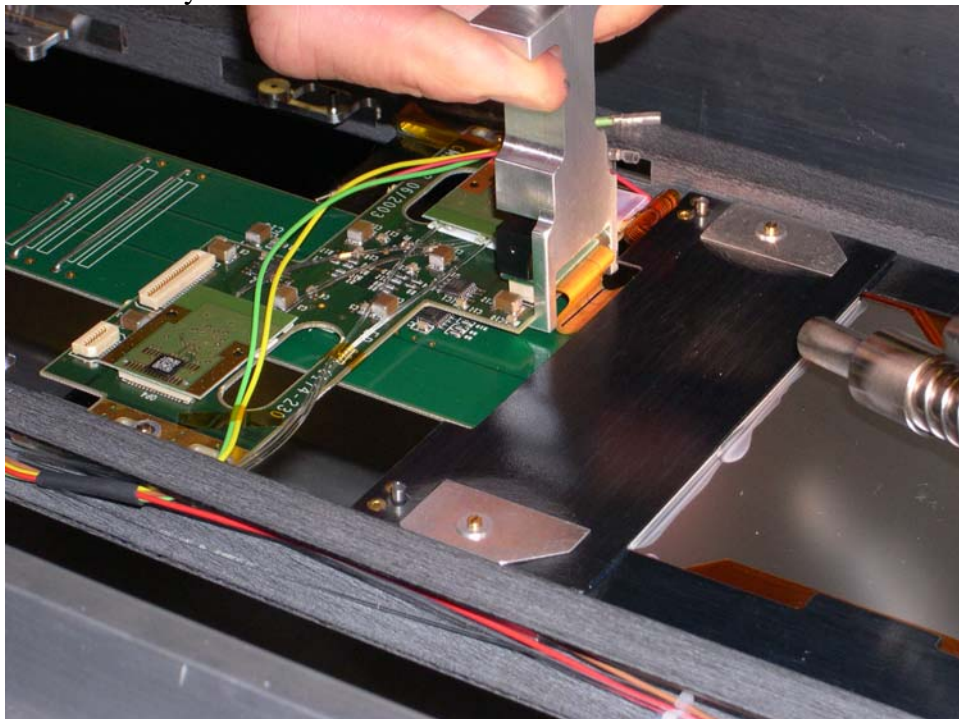


## ***Making the electrical connections***

1. Connect the high voltage tail first using using either the “left” or “right” HV tail closing tool



2. Connect the hybrid tail



3. Connect the bias wire according to the following tables
- Single sided rod:

Wire color	Module #
Brown	1
Yellow	3
Green	5
Red	2
Blue	4
Violet	6

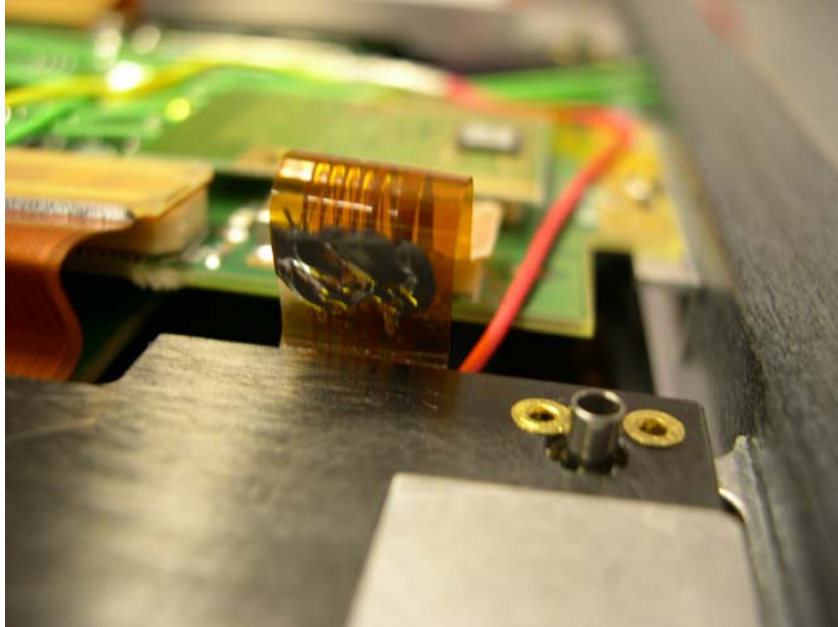
- Double sided rod:

Wire color	Module #
Brown	1
Black	7
Yellow	3, 11
Green	5, 9
Red	2
Orange	8
Blue	4, 12
Violet	6, 10

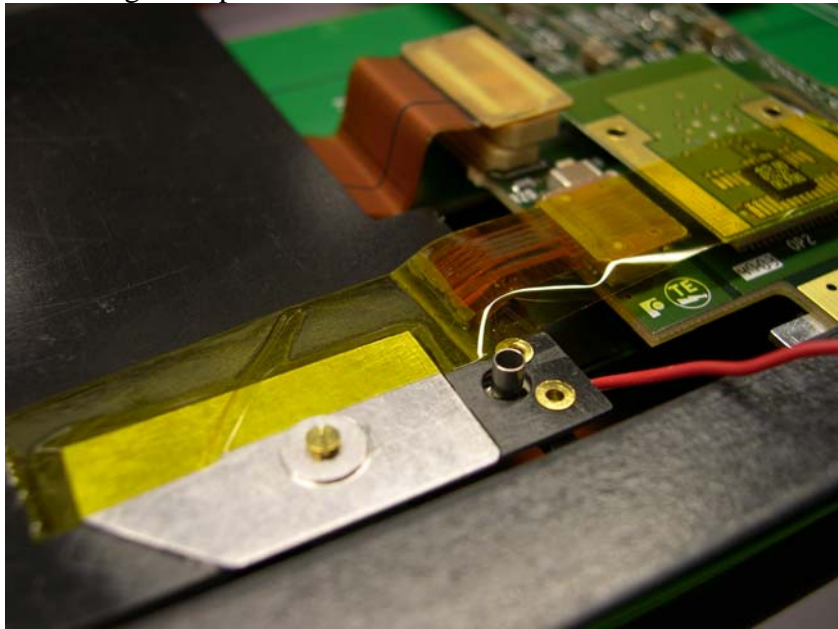
4. Tape the bias wire to the interconnect card using kapton tape

### ***Gluing of the HV tails for Single Sided Rods***

1. Wipe the HV tail and the surface of the c-fiber frame in the area where they are to be glued together with isopropanol
2. Mix a small amount of Araldite 2013 epoxy using the static mixer and dispense it into a small cup
3. Using a small applicator tip (needle tool) add a line of epoxy across the width of the tail to the underside of the HV tail in the area where the tail will contact the c-fiber frame



4. Place a piece of 0.5" wide kapton tape lengthwise over the HV tail, taping it first to the tail and pushing down on the tail to make contact with the C-fiber frame, and then smoothing the tape over the C-fiber frame and the connector



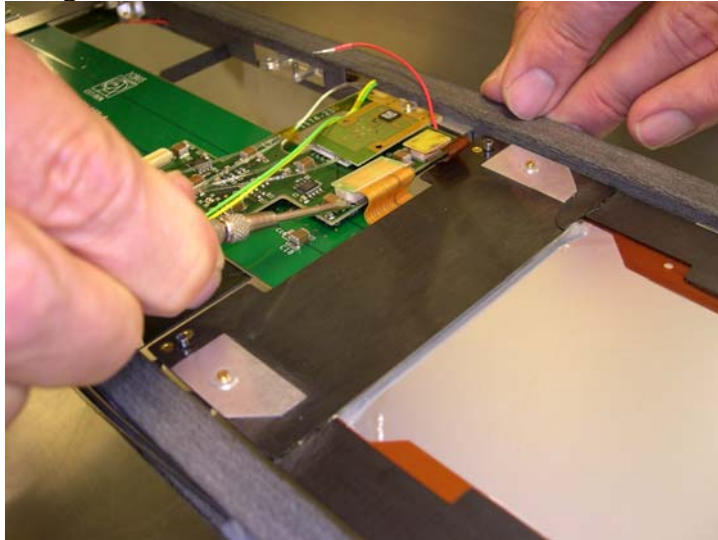
5. Make sure that the profile of the HV tail is as low as possible
6. Repeat steps 3 and 4 for all HV tails
7. Remove the rod from the rotisserie and place it back into the rod box
8. Cure for at least 24 hours

***Gluing of the HV tails for Double Sided Rods (still needs to be worked out)***

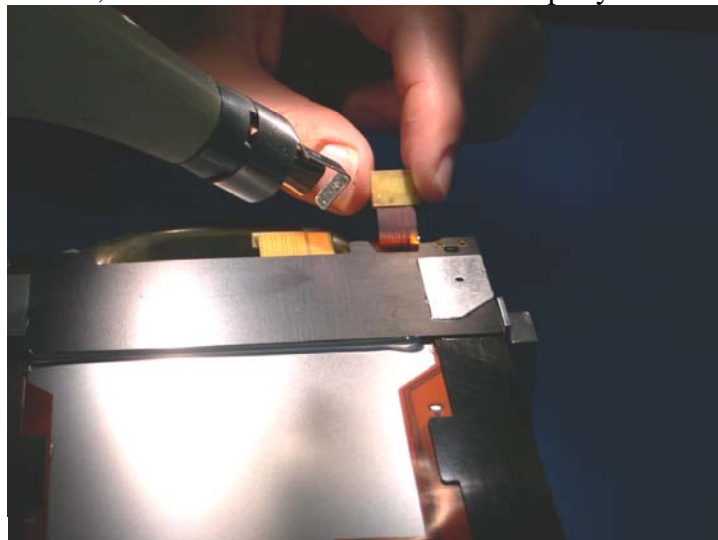
1. Wipe the HV tail and the surface of the c-fiber frame in the area where they are to be glued together with isopropanol
2. Mix a small amount of Araldite 2013 epoxy using the static mixer and dispense it into a small cup
3. Using a small applicator tip (needle tool) add a line of epoxy across the width of the tail to the underside of the HV tail in the area where the tail will contact the c-fiber frame

## ***Removing modules from the rod***

1. Mount the rod in the rotisserie
2. Disconnect all HV and hybrid tails from the interconnect cards by using a small screwdriver to pry apart the connectors, do not pull on the tail or the tail stiffener while doing this

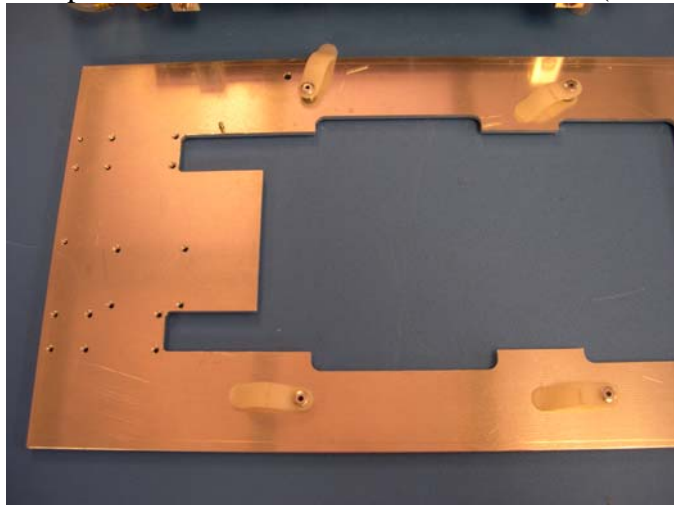


3. Disconnect the bias wires and remove the kapton tape holding the wires to the interconnect cards
4. If the module is to be installed back in the same position in the rod, the HV tail does not have to be released from the c-fiber frame, if it is to be installed in a different location on a rod, the glue holding the HV tail to the c-fiber frame might have to be removed
  - o To release the glue on the HV tails, heat the glue with a small heat gun until the epoxy softens and the HV tail can be pulled off the c-fiber frame (note: this doesn't take much heat, at a distance of about 1" between the heat gun and the tail, it takes about 10 seconds for the epoxy to soften)



- o Clean off any epoxy residue with isopropanol

5. Remove the 4 screws and washers from a modules using the special screwdriver, after loosening the screw by one turn push down on the washer holder to pick up the washer together with the screw
6. For a wirebond down facing modules:
  - Set up the flip fixture labeled “R-Phi Module flip fixture, back side” on the table, plug in the vacuum line and close the vacuum clamp
  - Use the fixture labeled “R-Phi Module pick-up fixture, back side” to pick up the module from the rod
  - Plug in the vacuum line and close the hose clamp on the vacuum line
  - Lower the fixture onto the module in the rod, making sure the pin engages the clearance hole in the heat spreader and that the semicircular downstops make contact with the rivets on the clips
  - With the down stops on the side of the fixture resting on the rod frame, let go of the fixture and open the vacuum clamp
  - The module will get pulled up onto the fixture
  - Lift the fixture with the module straight up and move it over to the flip fixture
  - Lower the module onto the flip fixture, making sure the semicircular down stops line up on both fixtures
  - Open the vacuum clamp on the flip fixture, the module is now being held by vacuum on both fixtures
  - Close the vacuum clamp on the module pick up fixture and push the release valve
  - Remove the module pick up fixture
  - Get a module carrier ready; if the HV tail is still glued to the c-fiber frame, a special modified module carrier is needed (it has a cutout where the HV tail is)



- Turn over the flip fixture, align the holes in the c-fiber frame with the pins on the module carrier and lower the module onto the module carrier
  - With the fixture resting on the down stops, close the vacuum clamp and push the release valve button
  - Remove the flip fixture and swing the white clamps onto the module to secure it to the module carrier
7. For a wirebond up facing module:
    - Get a module carrier ready; if the HV tail is still glued to the c-fiber frame, a special modified module carrier is needed (it has a cutout where the HV tail is)

- Use the fixture labeled “R-Phi Module pick-up fixture, front side”
- Plug in the vacuum line and close the hose clamp on the vacuum line
- Lower the fixture onto the module, making sure the pin engages the clearance hole in the heat spreader and that the semicircular downstops make contact with the rivets on the clips
- With the down stops on the side of the fixture resting on the rod frame, let go of the fixture and open the vacuum clamp
- The module will get pulled up onto the fixture
- Lift the fixture with the module straight up and move it over the module carrier
- Align the holes in the c-fiber frame with the pins on the module carrier and lower the module onto the module carrier
- With the fixture resting on the down stops, close the vacuum clamp and push the release valve button
- Remove the fixture and swing the white clamps onto the module to secure it to the module carrier