

Aligning Procedure for IRIS

1.0 ***Check Prealigner function.***

- 1.1 Place a 6" round substrate onto the Prealigner, slightly offset from center by hand.
- 1.2 Align the substrate (P0S6, P0SN, P0GW).
- 1.3 Turn the vacuum off (P0VF).
- 1.4 Get the substrate using the Robot.
- 1.5 Reference the Prealigner Vacuum Chuck (P0RC).
- 1.6 Put the substrate back to the Prealigner using the Robot.
- 1.7 Align the substrate (P0GW). Watch the substrate as it rotates, it should be perfectly centered. If it wobbles as it rotates, the Prealigner needs repair (most likely the CPU board to be calibrated or NVRAM mismatch).

2.0 ***Check Prealigner accuracy.***

- 2.1 Place a 4.5" square substrate onto the Prealigner (by hand or Robot).
- 2.2 Align the substrate (P0SS45, P0GW).
- 2.3 Using a square, check that the substrate is square to the edge of the Prealigner.
- 2.4 If it is not square, adjust the Prealigner "Y" axis.
 - 2.4.1 From the terminal in "runrobot" utility enter "P0SY2xxx", where the 2xxx portion is a number derived from the "Y" value listed on the side of the Prealigner with 25 added or subtracted as required.
 - 2.4.2 Reset the Prealigner, enter P0RS.
 - 2.4.3 Repeat steps 2.4.1 and 2.4.2 until the substrate is square as defined in step 2.3.

3.0 ***Align the End-Effector to the Prealigner.***

- 3.1 Set the Prealigner to 8" substrate (P0S8).
- 3.2 Remove the Urethane Vacuum Pad from the Vacuum Chuck.
- 3.3 Using the Teach Pendant, step the End_Effector to the Prealigner. The End-Effector and Prealigner should be adjusted so the End-Effector is 11/16" (.687") from the Vacuum Chuck and the End_Effector is square from the edge of the Prealigner simultaneously.
 - 3.3.4 Loosen the screws securing the Prealigner to base plate.
 - 3.3.5 Re-teach new "R" value and "Theta" value for :Stage 1".
 - 3.3.6 Tighten Prealigner mounting screws, save new "R" and "Theta" values.
- 3.4 Replace the Urethane Vacuum Pad to the Vacuum Chuck.

4.0 ***Check the End-Effectors are on the same plane (< .010" difference).***

- 4.1 Turn the Robot Servo's off using the Teach Pendant.
- 4.2 Extend, by hand, "R1" End-Effector to the top surface of the Cassette.
- 4.3 Adjust, by hand, "Z" axis until the End-Effector is just above or flush (as close as you can adjust) to the top of the Cassette.
- 4.4 Rotate "Theta", by hand, being careful not to disturb the "Z" axis height, and extent "R2" to the top surface of the Cassette.
- 4.5 Check if "R2" matches the height of "R1" to within .010".
- 4.6 If "R2" doesn't match the height of "R1", adjust the End-Effectors and repeat steps 4.2 – 4.4 until step 4.5 is achieved correctly.

5.0 *Align the End-Effectors to the Cassettes.*

5.1 "Get" and "Put" a 6" round substrate to the Prealigner.

5.2 Align the Substrate (P0S6, P0SN, P0GW).

5.3 Turn the vacuum off (P0VF).

5.4 "Get" the substrate using End-Effector "R1" from the Prealigner on the End-Effector.

5.5 Turn the Robot Servo's off using the Teach Pendant.

5.6 Adjust Cassette 3 "R" value.

5.6.1 By hand, slowly move the 6" substrate, while secured to the End-Effector by vacuum, taking care not to disturb its alignment (location) on the End-Effector, into the 6" Cassette 3, and fully nest it to full "R" reach until it touch's both rear stops.

5.6.2 On the Teach Pendant, go to "Cassette", "3", "R".

5.6.2.1 Use "PAR+" or "PAR-" buttons to get to "Cassette".

5.6.2.2 Use "FWD" or "REV" buttons to get "3".

5.6.2.3 Use "PRV" or "NXT" buttons to get "R".

5.6.3 Press "Read Position", look at the "R1" value. Subtract 10 from this value and enter this new value for "R".

"R1" value	6950
subtract 10	-10
new "R" value	6940

5.6.3.1 Press the numbers "6" "9" "4" "0" (as shown in this example, replace these numbers with the value you have determined).

Note: The Pendant should display "6940" in the lower left corner.

5.6.3.2 Press "Enter".

5.6.3.3 Press "Temp"

Note: Your new value should now be "R=6940", but only temporary. If the Robot is reset or powered down all data will be lost. This is good for only trying different settings without losing the old settings.

5.6.3.4 Press "Shift" and "Temp" buttons simultaneously to store new value permanent.

5.7 Adjust "Cassette", "3", "Theta" value.

5.7.1 On the Teach Pendant, go to "Cassette", "3", "Theta".

5.7.1.1 Use "PAR+" or "PAR-" buttons to get to "Cassette".

5.7.1.2 Use "FWD" or "REV" buttons to get "3".

5.7.1.3 Use "PRV" or "NXT" buttons to get "Theta".

5.7.2 Press "Read Position", look at the "Theta" value. Enter this new value for "Theta".

5.7.3 Repeat steps 5.8.1 – 5.8.4 substituting the "Theta" value for "R" values.

5.8 Adjust Cassette 4 "R" value.

5.8.2 By hand, slowly move the 6" substrate, while secured to the End-Effector by vacuum, taking care not to disturb its alignment (location) on the End-Effector, into the 6" Cassette 4, and fully nest it to full "R" reach until it touch's both rear stops.

5.8.3 On the Teach Pendant, go to "Cassette", "4", "R".

- 5.8.3.1 Use "PAR+" or "PAR-" buttons to get to "Cassette".
- 5.8.3.2 Use "FWD" or "REV" buttons to get "4".
- 5.8.3.3 Use "PRV" or "NXT" buttons to get "R".

5.8.4 Press "Read Position", look at the "R1" value. Subtract 10 from this value and enter this new value for "R".

"R1" value	6950
subtract 10	-10
new "R" value	6940

5.9 Adjust "Cassette", "4", "Theta" value.

5.9.1 On the Teach Pendant, go to "Cassette", "4", "Theta".

- 5.9.1.1 Use "PAR+" or "PAR-" buttons to get to "Cassette".
- 5.9.1.2 Use "FWD" or "REV" buttons to get "4".
- 5.9.1.3 Use "PRV" or "NXT" buttons to get "Theta".

5.9.2 Press "Read Position", look at the "Theta" value. Enter this new value for "Theta".

5.9.3 Repeat steps 5.8.1 – 5.8.4 substituting the "Theta" value for "R" values.

5.10 Adjust Cassette 1 and Cassette 2 "Theta" value.

5.10.1 The "Theta" values for Cassette 3 and Cassette 1 should be identical. The "Theta" values for Cassette 4 and Cassette 2 should be identical. Repeat steps 5.9 – 5.10 using same value as in Cassette 3 for Cassette 1, and same value as in Cassette 4 for Cassette 2.

5.11 Adjust "R" value for Cassette 1.

- 5.11.1 "Get" and "Put" a 4.5" square substrate to the Prealigner.
- 5.11.2 Align the Substrate (P0SS45, P0GW).
- 5.11.3 Turn the vacuum off (P0VF).
- 5.11.4 "Get" the substrate using End-Effector "R1" from the Prealigner on the End-Effector.
- 5.11.5 Turn the Robot Servo's off using the Teach Pendant.
- 5.11.6 By hand, slowly move the 4.5" substrate, while secured to the End-Effector by vacuum, taking care not to disturb its alignment (location) on the End-Effector, into the 4.5" Cassette 1, and fully nest it to full "R" reach until it touch's its rear stops.
- 5.11.7 On the Teach Pendant, go to "Cassette", "1", "R".

- 5.11.7.1 Use "PAR+" or "PAR-" buttons to get to "Cassette".
- 5.11.7.2 Use "FWD" or "REV" buttons to get "1".
- 5.11.7.3 Use "PRV" or "NXT" buttons to get "R".

5.11.8 Press "Read Position", look at the "R1" value. Subtract 10 from this value and enter this new value for "R".

"R1" value	6950
subtract 10	-10
new "R" value	6940

5.12 Adjust "R" value for Cassette 2.

5.12.1 By hand, slowly move the 4.5" substrate, while secured to the End-Effector by vacuum,

taking care not to disturb its alignment (location) on the End-Effector, into the 4.5" Cassette 2, and fully nest it to full "R" reach until it touch's its rear stops.

5.12.2 On the Teach Pendant, go to "Cassette", "2", "R".

5.12.2.1 Use "PAR+" or "PAR-" buttons to get to "Cassette".

5.12.2.2 Use "FWD" or "REV" buttons to get "2".

5.12.2.3 Use "PRV" or "NXT" buttons to get "R".

5.12.3 Press "Read Position", look at the "R1" value. Subtract 10 from this value and enter this new value for "R".

"R1" value	6950
subtract 10	-10
new "R" value	6940

6.0 Level the Stage Vacuum Chuck (Shuttle) to the Microscope Focus.

6.1 Remove Shuttle Cover.

6.2 Place 4.5 " substrate onto Shuttle Vacuum Chuck.

6.3 Turn the stage vacuum "on" (R0OP04).

6.4 Change to 20X Objective and focus on the upper right corner of the 4.5" substrate.

6.5 Level "Y" axis.

6.5.1 Transverse the Stage up and down along the "Y" axis, stop in 2 right corners (upper-right and lower-right). Adjust the 2 right levelling screws until focus is within 5um of each other.

6.6 Level "X" axis.

6.6.1 Transverse the Stage left and right along the "X" axis centered along the "Y" axis (center-left and center-right). Adjust the center-left levelling screw until focus is within 5um of each other.

7.0 Level Microscope to End-Effector.

7.1 Login into "Maintenance mode in Dart NT.

7.1.1 Click on "Nikon Stage Communications" at bottom of screen.

7.1.2 Click on menu "Options".

7.1.3 Click on "Login to Maintenance Mode".

7.1.4 Type in the password if required, click "OK".

7.2 Toggle Shuttle.

7.2.1 Click on menu "Options".

7.2.2 Click on "Toggle Shuttle".

7.3 Move Stage to "Load/Unload Position".

7.3.1 Click on menu "Options".

7.3.2 Click on "Go To Load/Unload Position".

7.4 Move "R1" End-Effector to Stage 2 position.

7.4.1 Using the Teach Pendant, go into Teach Robot mode.

7.4.1.1 Press the lower left button on the Teach Pendant until "TCHRBT" is displayed.

7.4.2 Go to "Step Stage 2" on the Teach Pendant.

7.4.2.1 Press the "PAR+" or "PAR-" buttons until "Step Stage" is displayed.

7.4.2.2 Press the "FWD" or "REV" buttons until Step Stage "2" is displayed.

7.4.3 Moving the Robot End-Effector "R1" to Stage 2 "Put" position.

7.4.3.1 Press the "PRV" button once to go to the first position of a "Put" operation.

7.5 Place a Bubble Level onto the End-Effector nested around the Stage Vacuum Chuck directly behind the large O-Ring. Note its "Bubble Location".

7.6 Place the Bubble Level onto the center of the Stage Vacuum Chuck. Note its "Bubble Location".

7.7 Adjust the front-right Levelling Pad to the floor, and Rubber Isolation Pads (under Microscope Table Top) as necessary until the Bubble Level matches both End-Effector (step 7.5) and Stage Vacuum Chuck (step 7.6) level ness.

8.0 Adjust Stage Load/Unload "Z" axis height.

8.1 Place a 4.5" square substrate onto the Stage Vacuum Chuck.

8.2 Focus on the 4.5" square substrate with the 20X Objective.

8.3 Move "R1" End-Effector to Stage 2 through entire "Put" positions.

8.3.1 Repeat steps 7.1 – 7.4.

8.3.2 Press "PRV" button repeatedly to go through all steps of a "Put" operation.

8.3.3 Note the End-Effectors positions if it is above the Stage Vacuum Chuck and does not touch the Shuttles Transport supporting the Vacuum Chuck.

8.3.4 Adjust the "Z" axis height for "Stage 2" as required until all conditions in step 8.3.3 are met.

8.4 Place a 6" round substrate onto the Stage Vacuum Chuck.

8.5 Focus on the 6" round substrate with the 20X Objective.

8.6 Move "R1" End-Effector to Stage 2 through entire "Put" positions.

8.6.1 Repeat steps 7.1 – 7.4.

8.6.2 Press "PRV" button repeatedly to go through all steps of a "Put" operation.

8.6.3 Note the End-Effectors positions if it is above the Stage Vacuum Chuck and does not touch the Shuttles Transport supporting the Vacuum Chuck.

8.6.4 Adjust the "Z" axis height for "Stage 2" as required until all conditions in step 8.6.3 are met.

8.7 Repeat steps 8.1 – 8.6 as required until all conditions in steps 8.3.3 and 8.6.3 are met simultaneously between 4.5" square substrates and 6 " round substrates.

9.0 Par focal Microscope Objectives.

9.1 Place a substrate onto the Stage Vacuum Chuck.

9.2 Focus onto the substrate using the 100X (or highest power) Objective. Note its location on the Focus Knob for the Microscope.

9.3 Focus onto the substrate using the next lower power Objective. Note its location on the Focus Knob for the Microscope.

9.3.1 If the difference is greater then 20um for the next lower power Objective.

9.3.1.1 You need to remove this Objective and install a shim around the threads of the Objective so it gets between the Objective and Nose Piece.

9.3.1.2 Replace the Objective.

9.3.1.3 Repeat steps 9.3.1.1 – 9.3.1.2 as necessary until difference is less than 20um.

9.3.2 If/when the difference is less than 20um for the next lower power Objective, continue to step 9.4.

9.4 Repeat step 9.3 for each lower power Objective, until all Objectives are within 20um of each other.

10.0 Cycle Test.

10.1 Cycle test each different type of substrate focused with 5X and 20X objectives. This means, if two different substrates are being used, 4 different cycle tests are required.

- Cycle Test
- 1) Substrate 1 and 5X Objective.
 - 2) Substrate 1 and 20X Objective.
 - 3) Substrate 2 and 5X Objective.
 - 4) Substrate 2 and 20X Objective.

10.1.1 Open "Dart Options" from Dart Application Folder