

WATERS MANUFACTURING ASSEMBLY PROCEDURE

PAGE 1 OF 28
279003847 REV B
DATE
26-Sep-2017

ITEM NUMBER
279003847

DESCRIPTION
ASSY, OPTICS BENCH, ACQUITY PDA

WRITTEN BY
MATT FRANKLIN

REVISION RECORD

<u>REV</u>	<u>AUTHORITY</u>
A	M. FRANKLIN
B	M. FRANKLIN

NOTES
ECO 9218403
ECO 9219909

OPER OPERATION DESCRIPTION

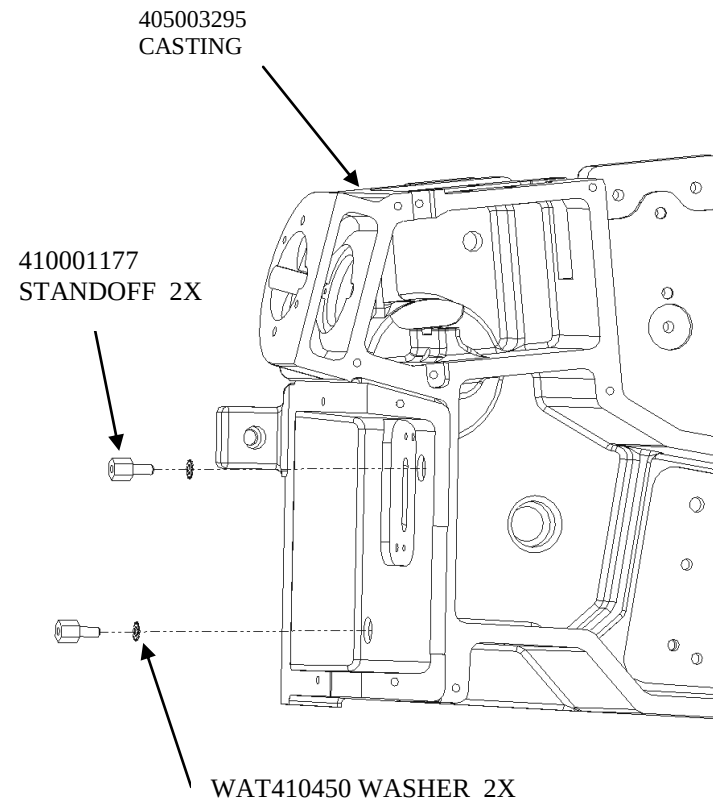
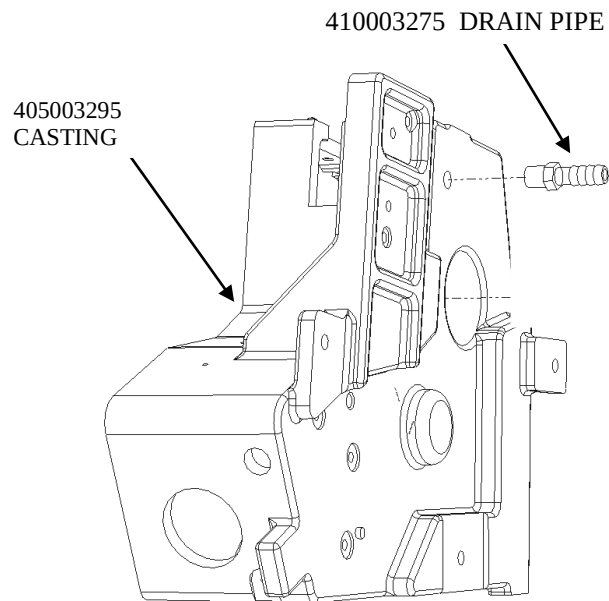
TOOL NUMBER/DESCRIPTION

NOTE: THIS ASSEMBLY TO BE BUILT IN CLEAN ROOM ENVIRONMENT EXCEPT WHERE NOTED

WRENCH 7/16
NUT DRIVER 5/16

1.0 Screw drain Pipe into casting flush with inside.

1.1 Screw Standoffs into casting with Washers

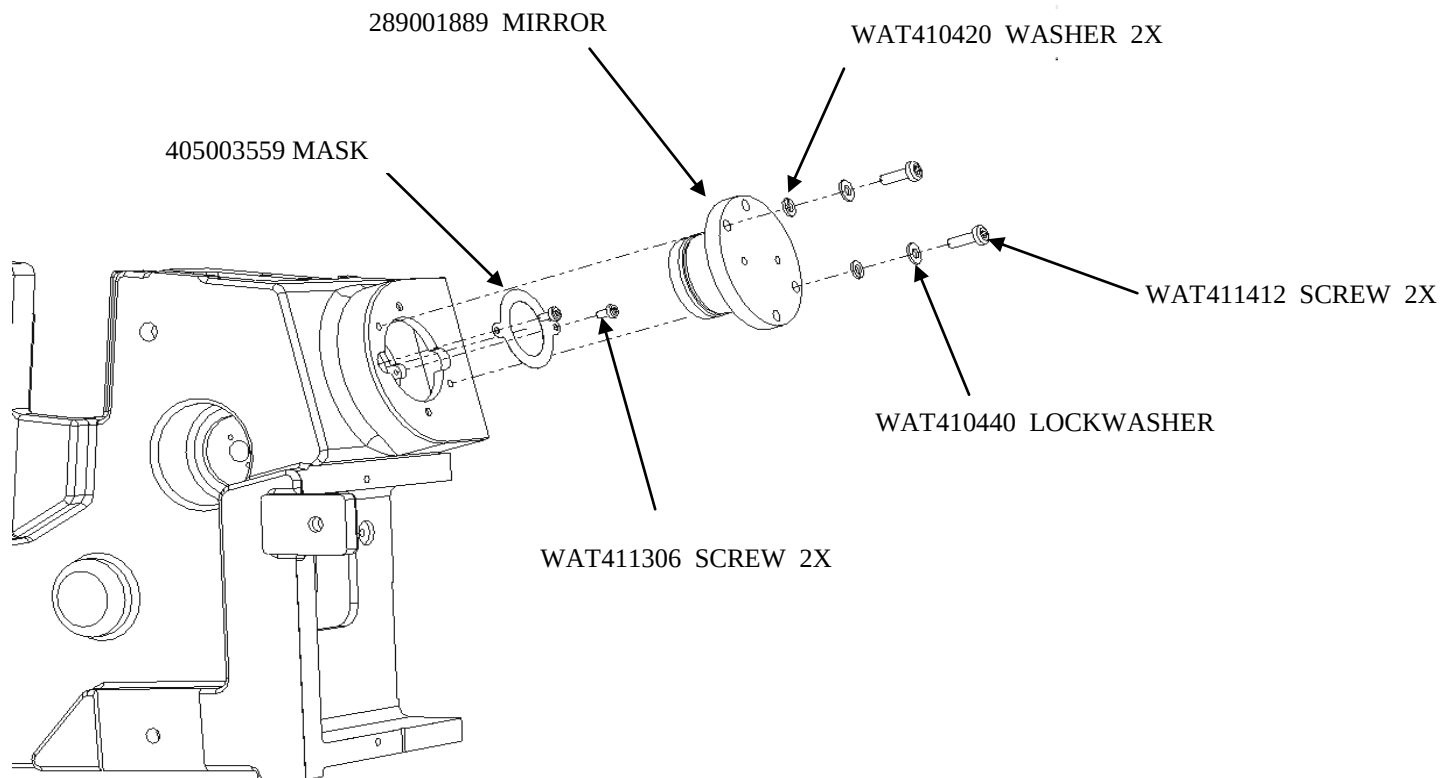


OPERATION DESCRIPTION

- 2.0 Place Mask into slots and secure with hardware.
- 2.1 Place Mirror Assembly into casting align with pins and secure with hardware.

TOOL NUMBER/DESCRIPTION

T10 TORX DRIVER T20 TORX DRIVER



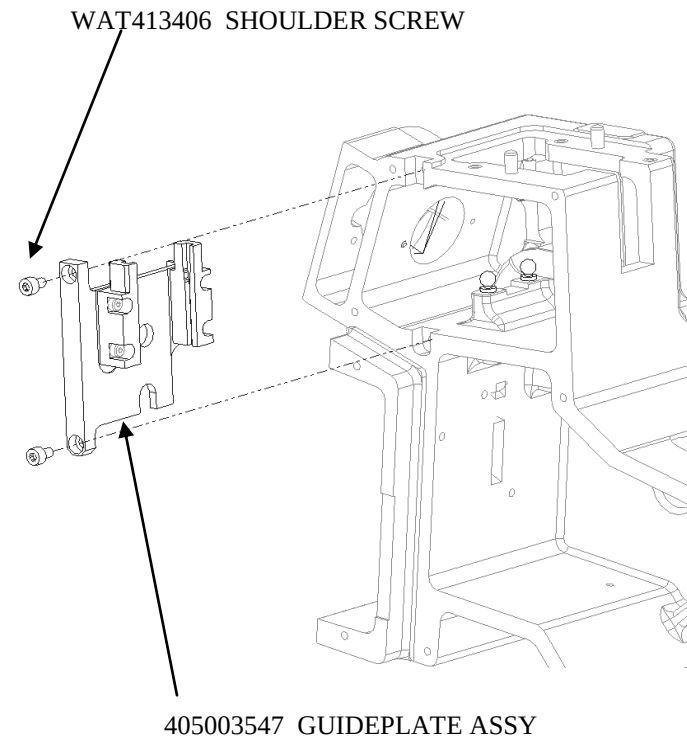
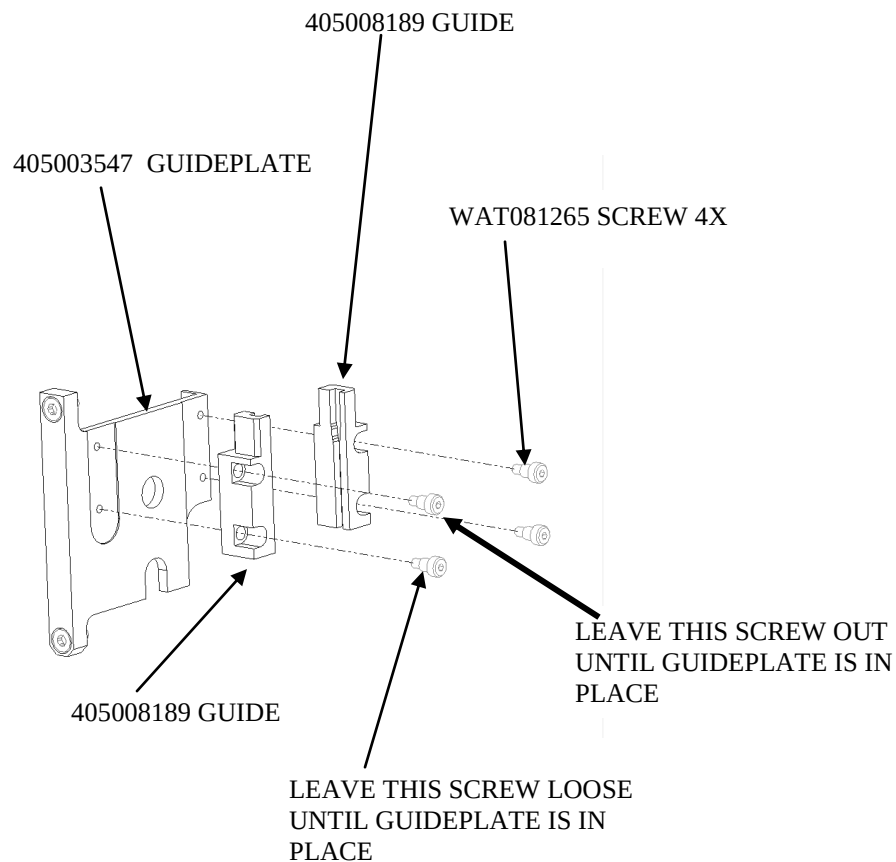
**T10 TORX DRIVER
T20 TORX DRIVER**

OPERATION DESCRIPTION

- 3.0 Assemble flowcell guides to the Guideplate with hardware, leave out top left screw and leave bottom left screw loose.

Slide assy into slot and screw in top left screw, tighten top right screw. Secure common Guideplate with hardware

NOTE: MAKE SURE ALL GUIDE PLATE SCREWS ARE TIGHT AFTER ASSEMBLY



OPER **OPERATION DESCRIPTION**

TOOL NUMBER/DESCRIPTION

4.0 In SigmaSure, use "Build 279003847 ASSY, OPTICS BENCH, ACQUITY PDA " and scan in the Optics Bench serial number as the parent assembly.

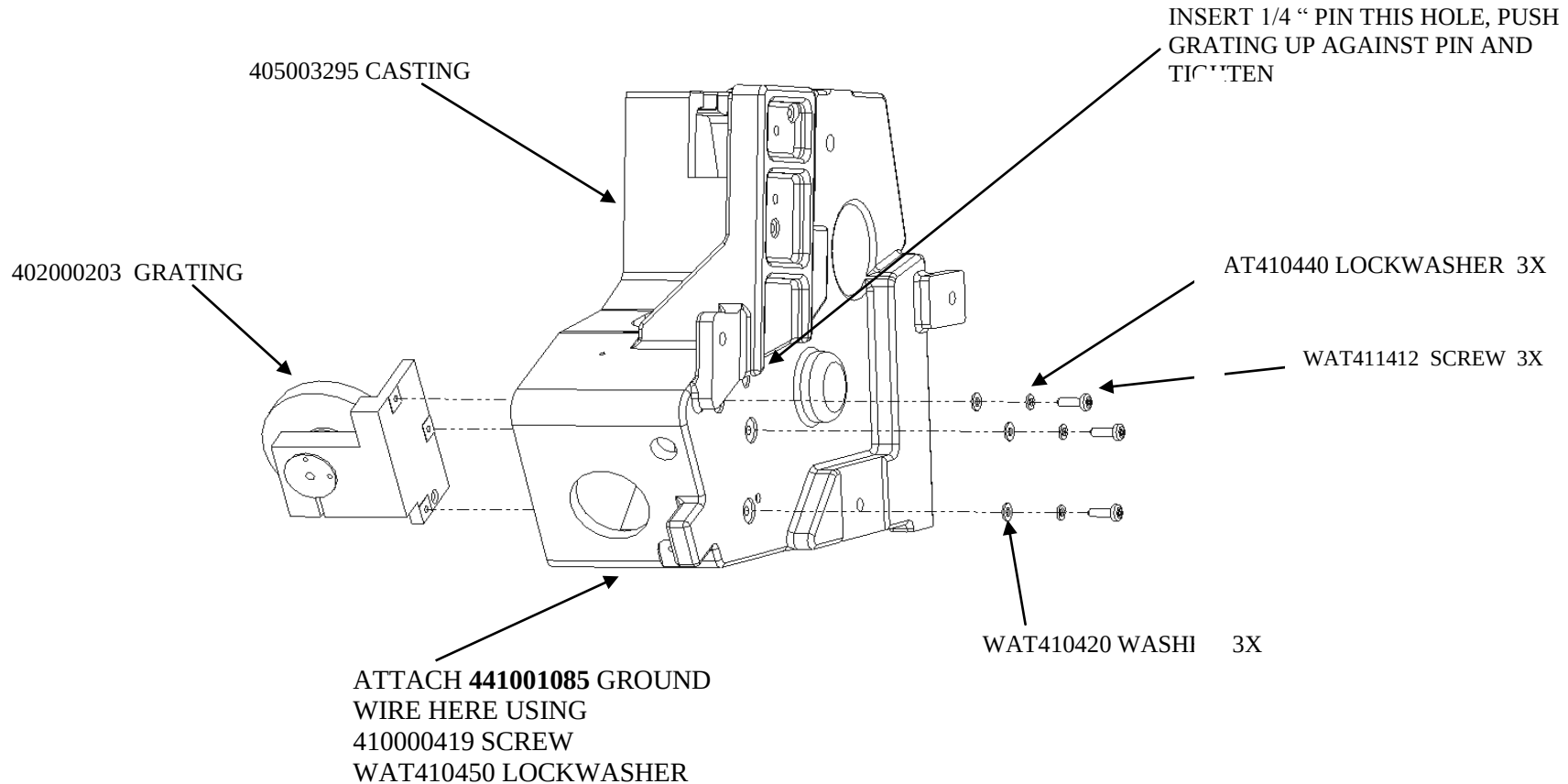


Scan or Type in the Grating 402000203 Serial Number

T20 TORX DRIVER
1/4 "PIN

4.1 Assemble Grating into casting with hardware, use 1/4" Pin thru bottom of casting for rough alignment.

4.2 Attach Ground Wire where shown to bench with hardware.



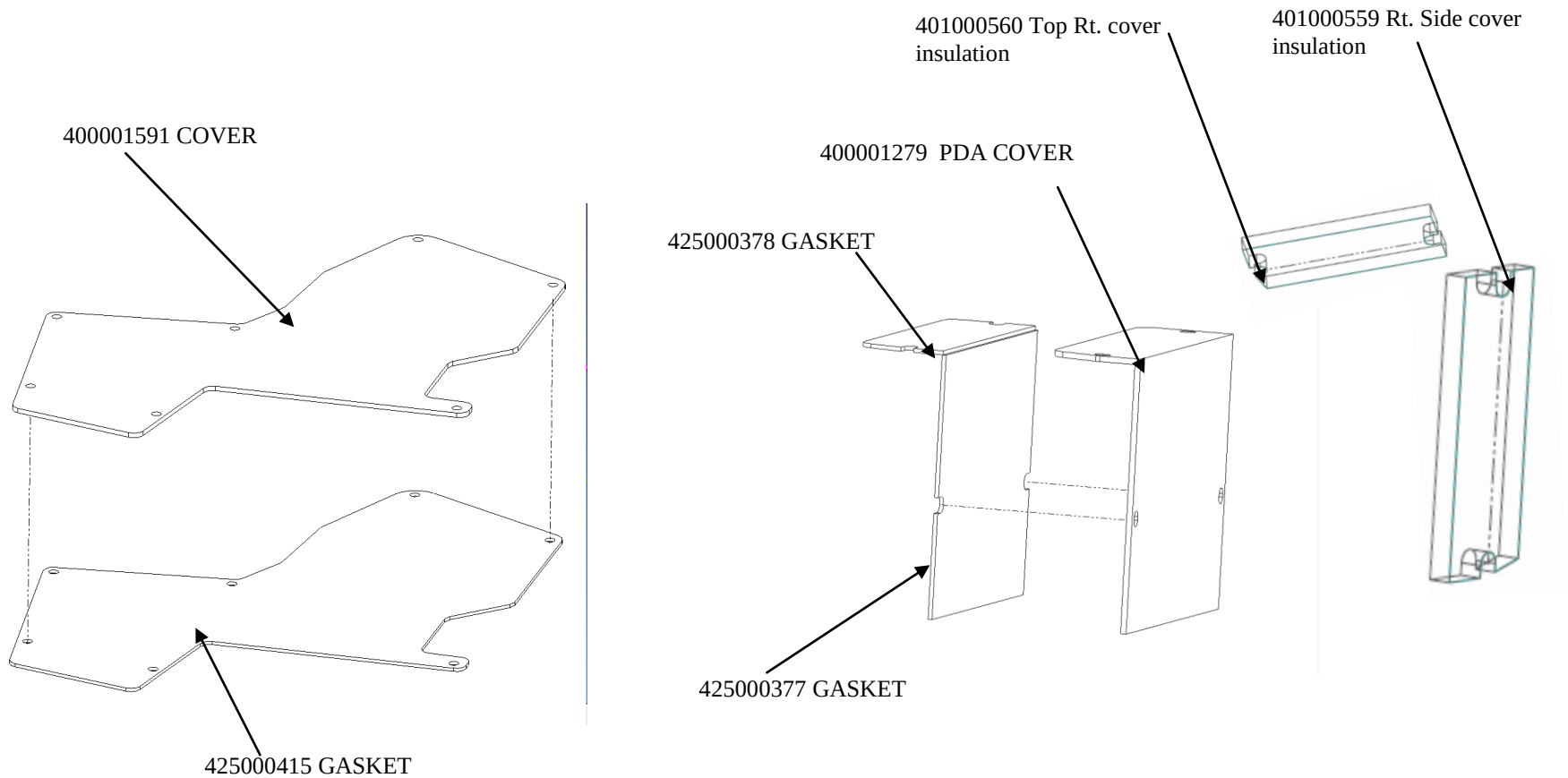
OPER **OPERATION DESCRIPTION**

TOOL NUMBER/DESCRIPTION

4.3 Attach Gasket to top Cover using Gasket Alignment Fixture 999028958

999028958 Gasket Alignment Fixture

4.4 Attach Gaskets to PDA Cover; Attach insulation 401000560 and 401000559. (Note: Insulation may optionally be installed outside the clean room after bench assembly and alignment are complete)



OPER OPERATION DESCRIPTION

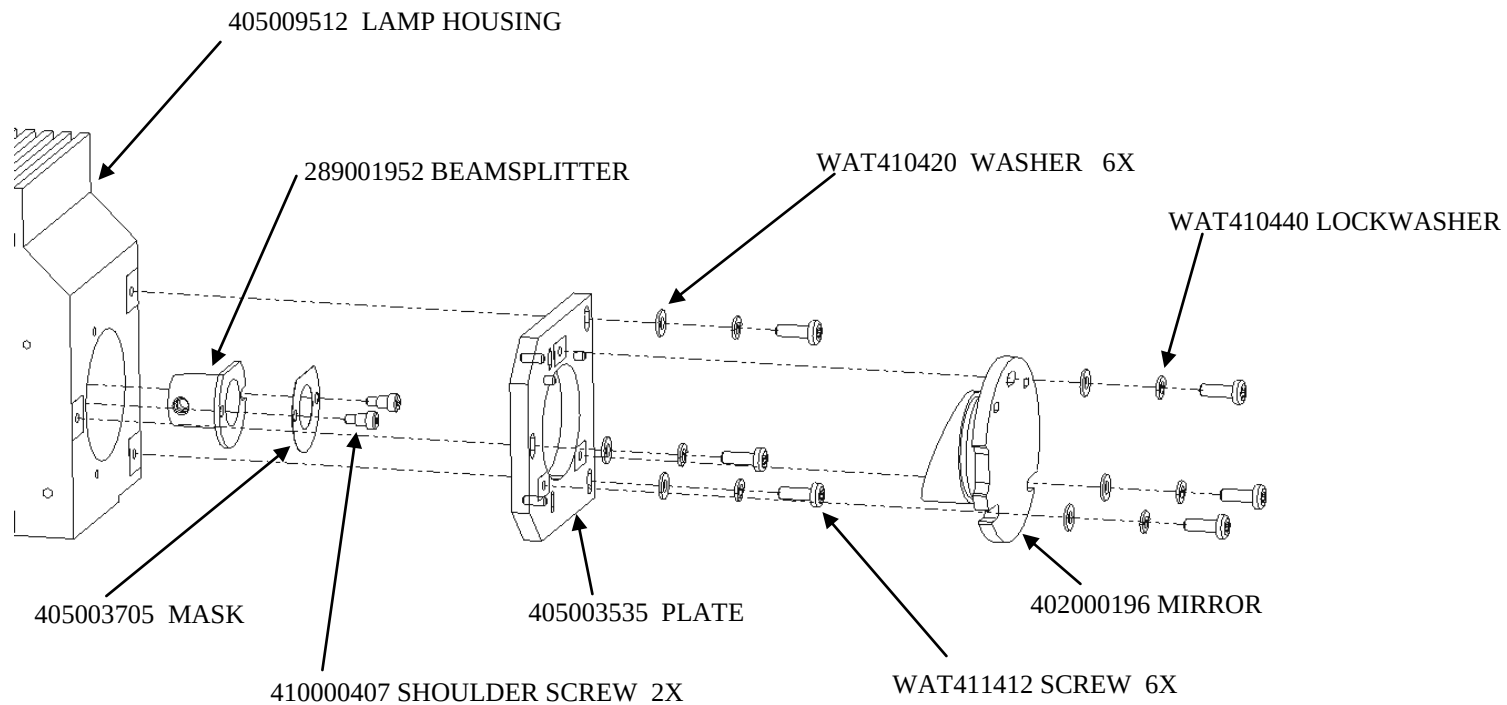
TOOL NUMBER/DESCRIPTION

ASSEMBLE LAMP HOUSING

T20 TORX DRIVER
5/64 ALLEN WRENCH
TWEEZER

5.0 Insert Beamsplitter into Lamp Housing with Mask on top and secure with Shoulder Screws.
NOTE: Orientation of Beamsplitter

5.1 Assemble Plate and Mirror to Lamp Housing, lightly snug hardware.

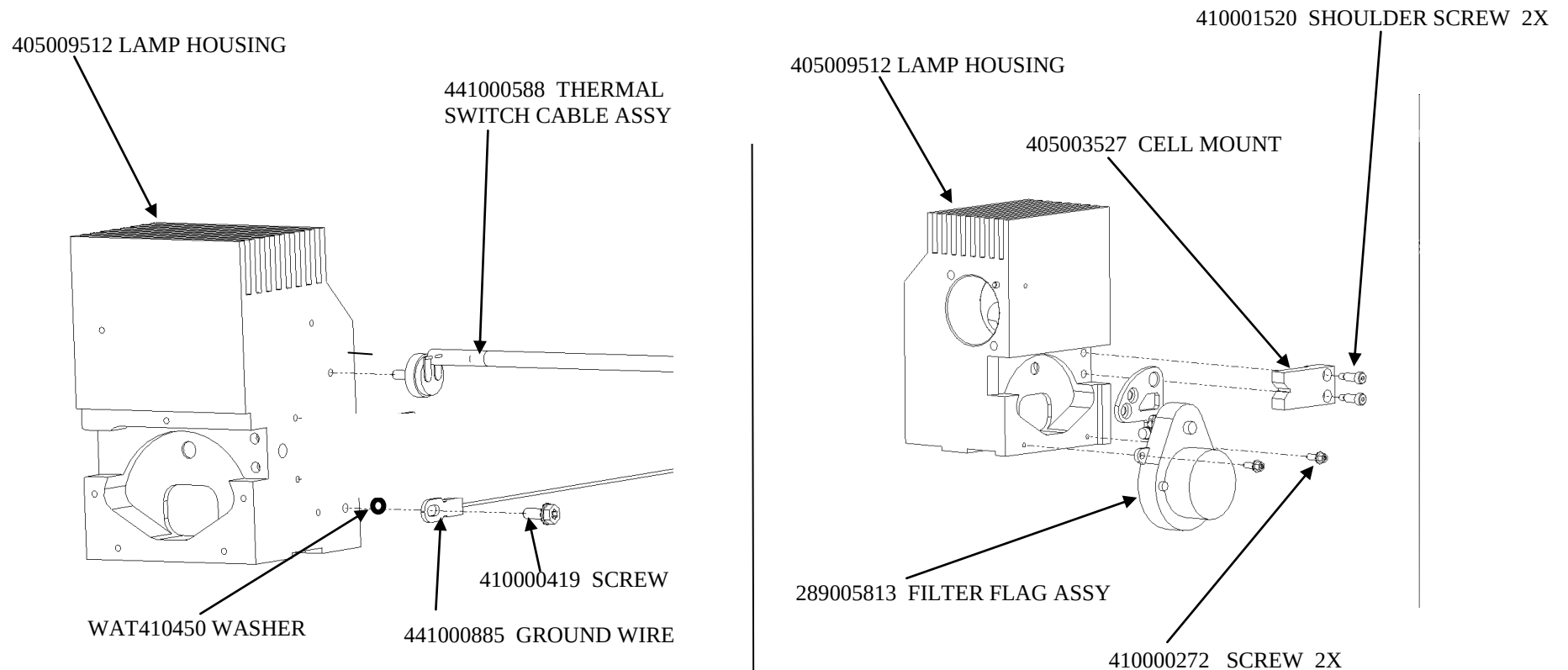


OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

- 5.2 Screw in Thermal Switch and Ground Wire to Lamp Housing with hardware
- 5.3 Attach Filter Flag Assy to Lamp Housing with hardware.
- 5.4 Attach Cell Mount to Lamp Housing with Shoulder Screws.

T10 TORX DRIVER
T20 TORX DRIVER
5/64 ALLEN WRENCH

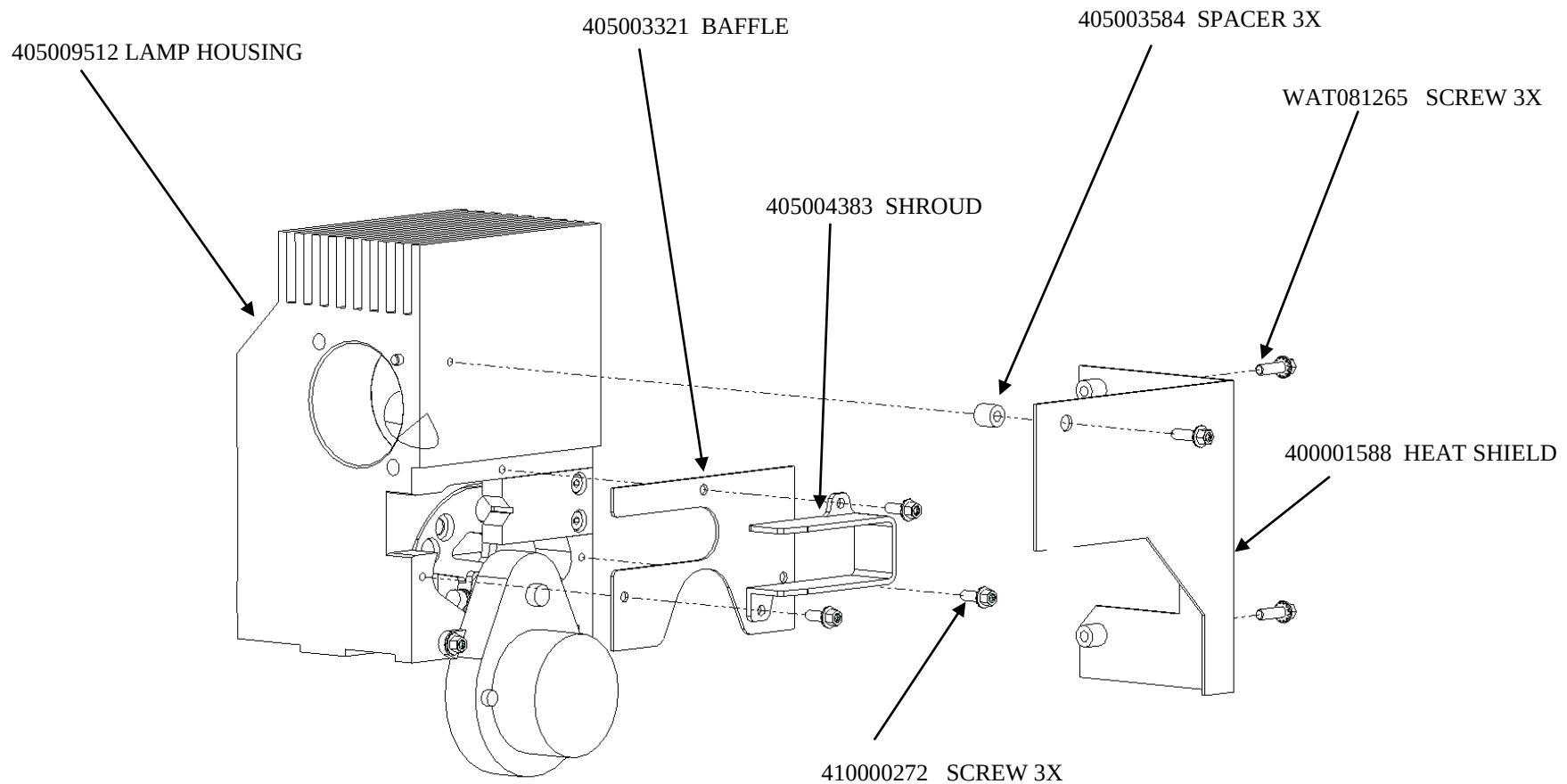


OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

- 5.5 Attach Baffle and Shroud to Lamp Housing with hardware.
- 5.6 Assemble Heat Shield to Lamp Housing using Spacers and screws;
- 5.7 Install lamp (402000353) to lamp housing

T10 TORX DRIVER
SLOTTED DRIVER



OPER **OPERATION DESCRIPTION**

TOOL NUMBER/DESCRIPTION

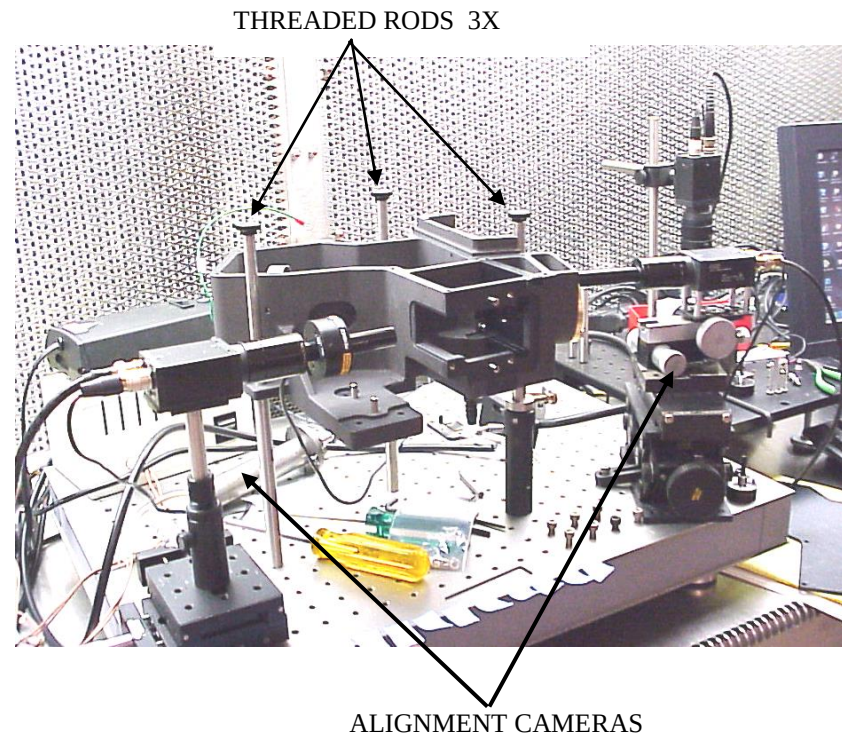
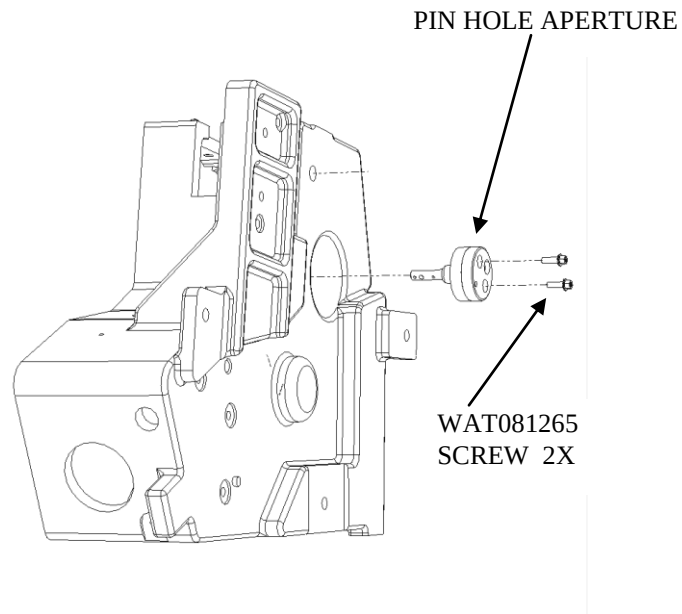
- 6.0 M2 MIRROR ALIGNMENT.
Note: For M2 Spares, install M2 into Bench per OPER. 2.0 – 2.1

PIN HOLE APERTURE
T10 TORX DRIVER
TE83096 UNIVERSAL ALIGN FIXTURE

Note: If using the universal alignment setup, use the following positions for the Bench Holders and Cameras, where A, B and F are Camera mount locations and C, D and E are bench mounting pole locations:
- PDA: A2, B2, C2, D2, E2, F2

- 6.1 Assemble Pin Hole Aperture to Bench with hardware and secure
Optics Bench to Rough Alignment Fixture with Threaded Rods as shown.

Note: Be careful not to bump cameras when placing Bench on Fixture.

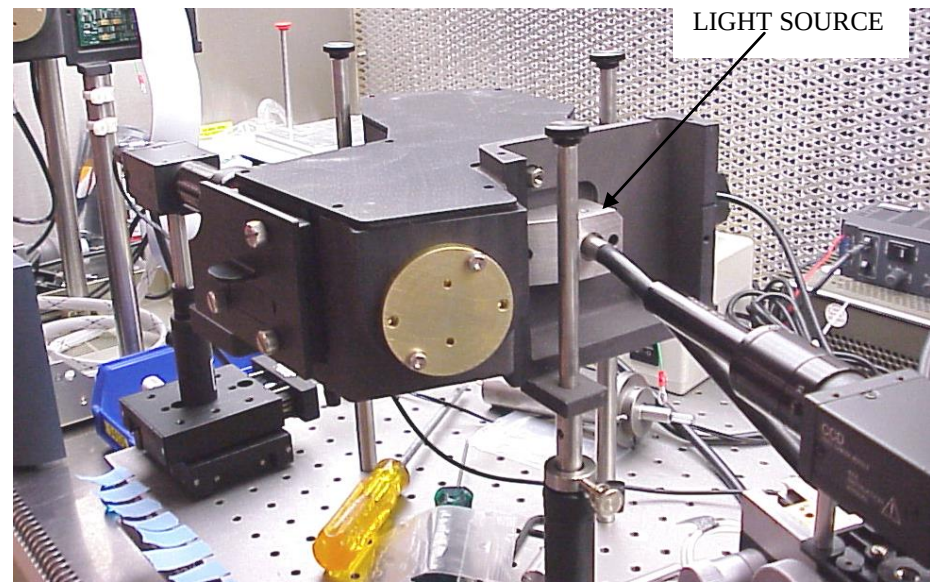
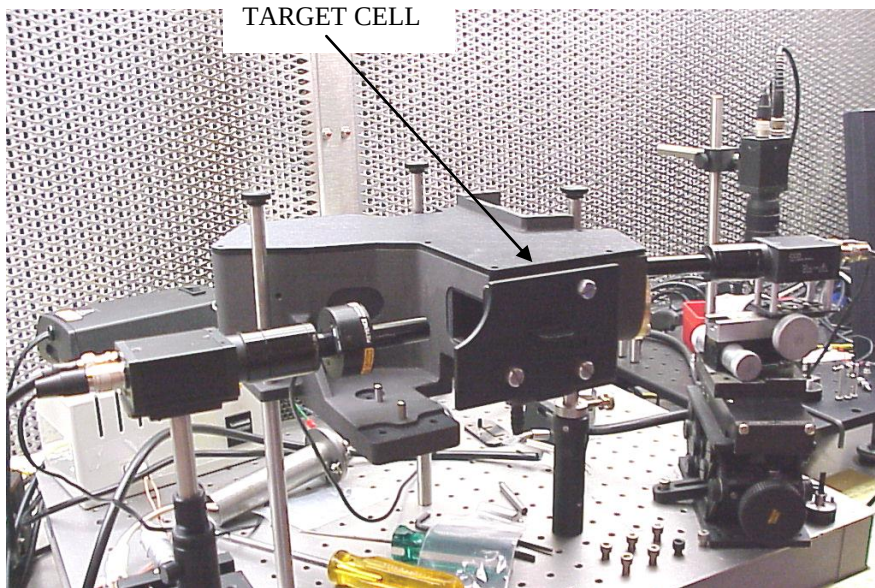


OPER **OPERATION DESCRIPTION**

TOOL NUMBER/DESCRIPTION

6.2 Install Target Cell into Bench and Attach Light Source to PDA Mount

999028612 Rough Alignment Fixture
SLOTTED DRIVER
TARGET CELL

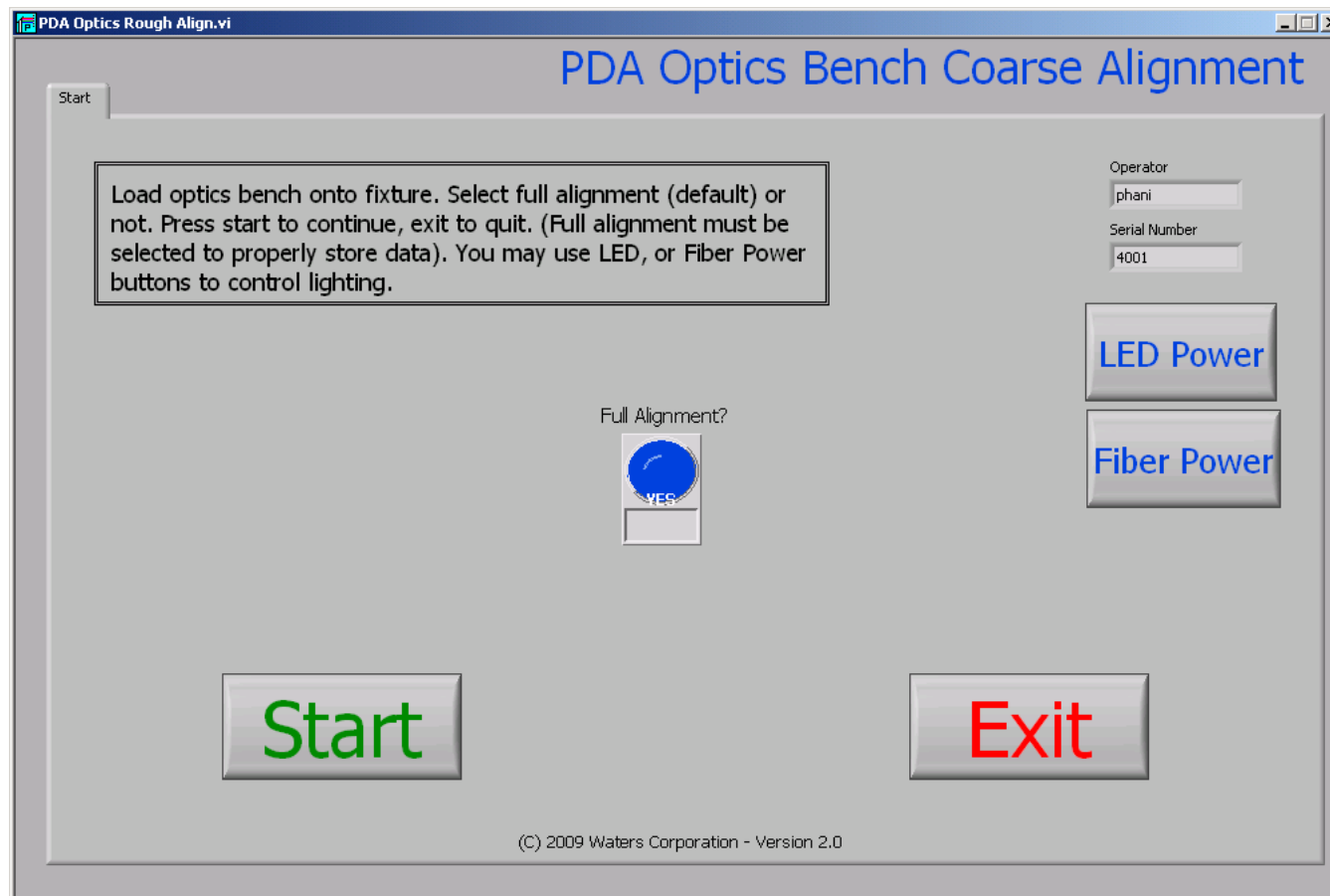


OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

- 6.3 Start 2998coarse.exe program on Computer, if program is already running hit "Start" button on top.
- 6.4 Verify program is set to FULL Alignment and click Start
- 6.5 Input Operator Name and hit enter, input Bench Number and hit "Enter" then hit "Continue".

NA

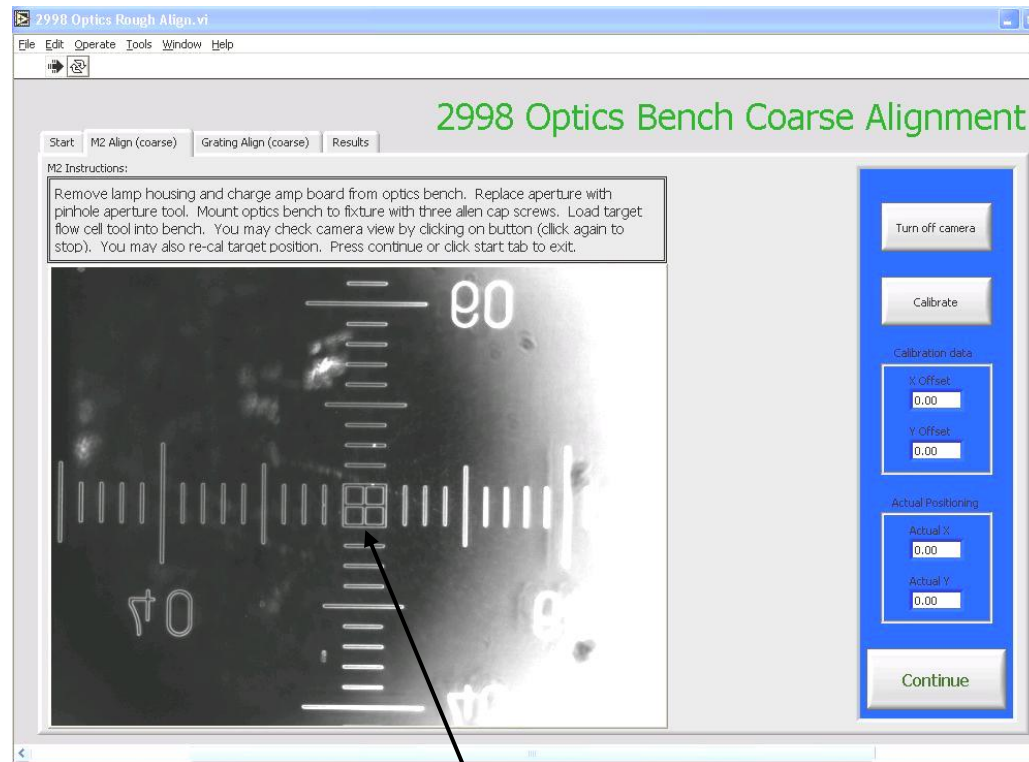


OPER **OPERATION DESCRIPTION**

TOOL NUMBER/DESCRIPTION

- 6.6 Program will take picture of Reticle and a Red Box will appear on screen.
If the red box is not close to the center of the screen go back to the Diagnostics
button and turn lamp on to center Reticule as shown.

NA



IF RED BOX DOES NOT APPEAR NEAR CENTER OF SCREEN,
PRESS DIAGNOSTICS BUTTON TO TURN ON LAMP
MANUALLY AND ROUGHLY CENTER BOX IN MIDDLE OF
SCREEN BY MOVING CAMERA

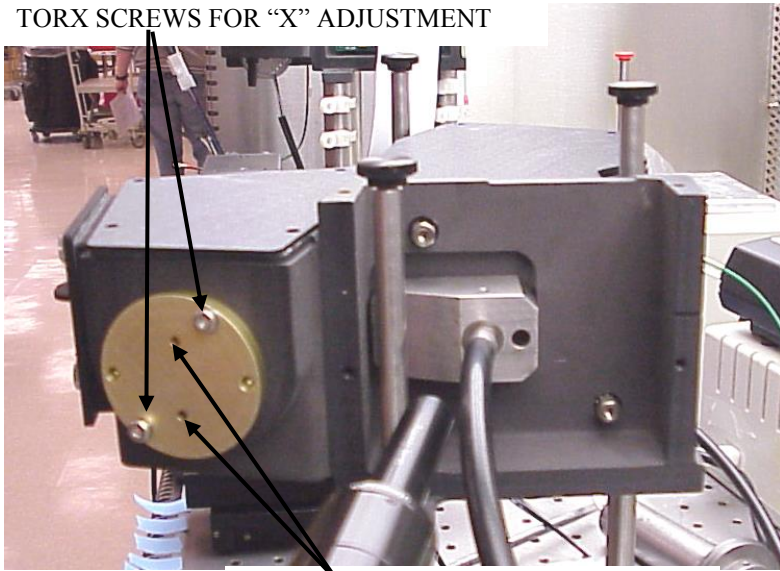
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

- 6.7 Adjust M2 Mirror to place white dot into Red Box using the (2) set screws for the “Y” adjustment and the (2) Torx screws for the “X” adjustment.
Make sure set screws are snug and tighten Torx screws when dot is centered.
Click “Pinhole Centered”
- 6.8 Remove Light Source from Optics Bench. Remove Flow Cell Target and Pin Hole Aperture.

T20 TORX DRIVER
1.5MM ALLEN WRENCH

TORX SCREWS FOR “X” ADJUSTMENT



SET SCREWS FOR “Y” ADJUSTMENT



WHITE DOT CENTERED

OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

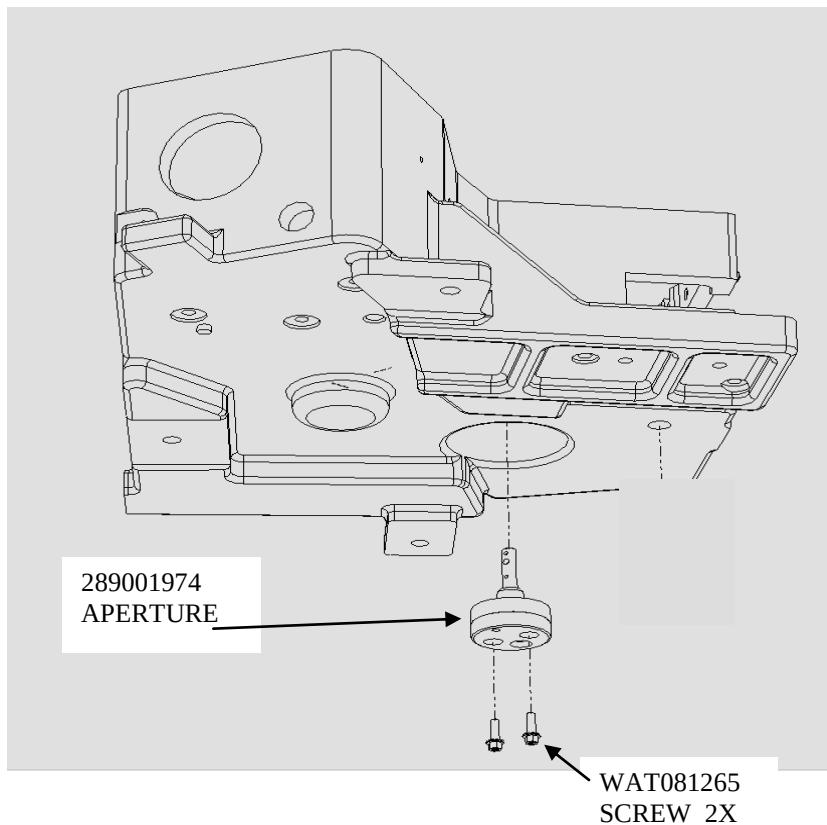
ROUGH ALIGNMENT - GRATING

T10 TORX DRIVER
999028612 Alignment Tool

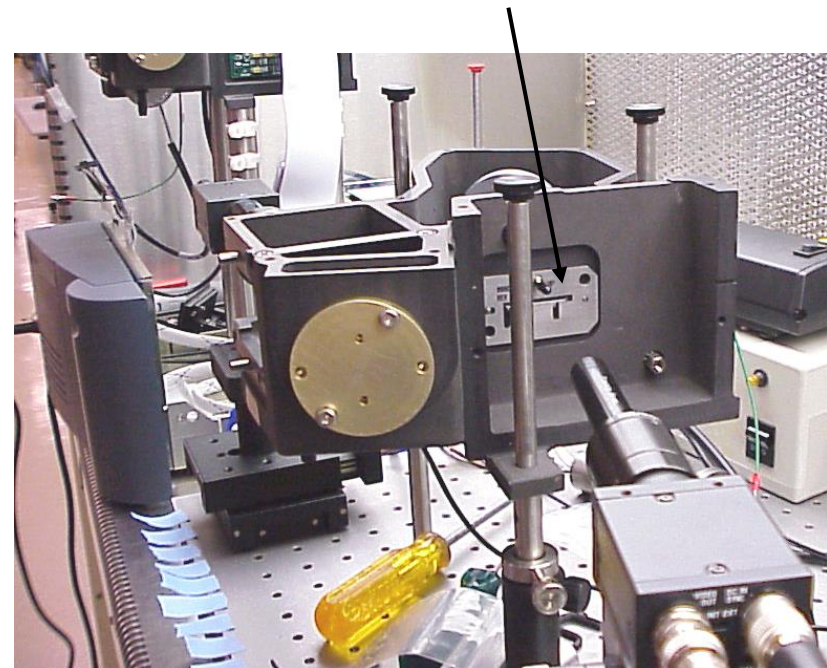
7.0 Install Slit Aperture into Optics Bench and secure with hardware.

7.1 Mount Alignment Tool onto pins at PDA location. Install Mercury Lamp assembly.

Note: The eLambda and standard A-PDA tools are different.



ALIGNMENT TOOL



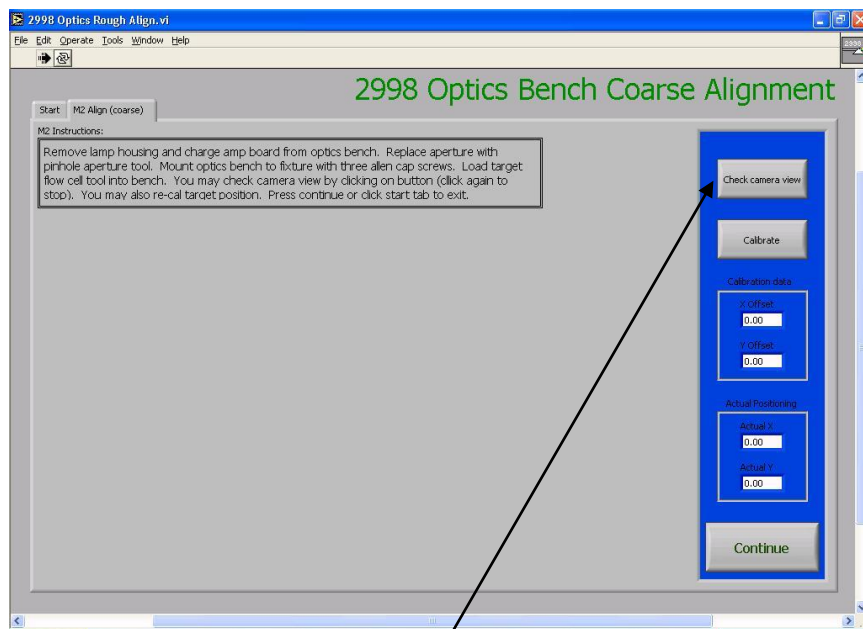
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

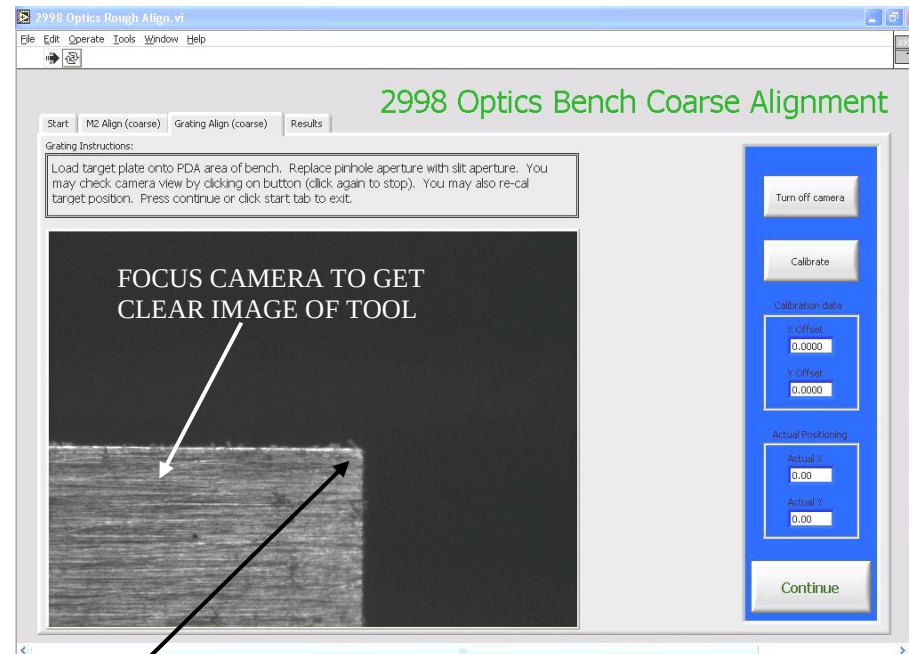
ROUGH ALIGNMENT – GRATING

NA

- 7.2 Click on “Check Camera View”
- 7.3 Verify Alignment Tool edge is roughly in center of screen, move camera if required.
Focus camera as needed to get clear image of Tool. Click “Continue”. Lamp will come on.



CLICK ON “CHECK CAMERA VIEW”



ROUGHLY CENTER THIS EDGE
IN SCREEN BY MOVING
CAMERA IF REQUIRED

OPER OPERATION DESCRIPTION

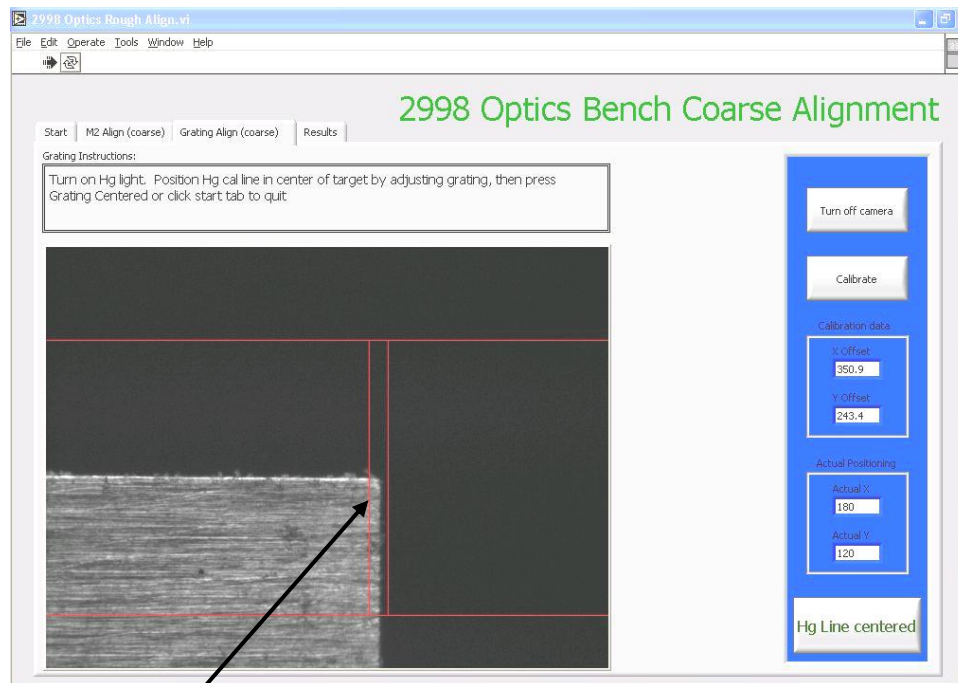
TOOL NUMBER/DESCRIPTION

ROUGH ALIGNMENT – GRATING

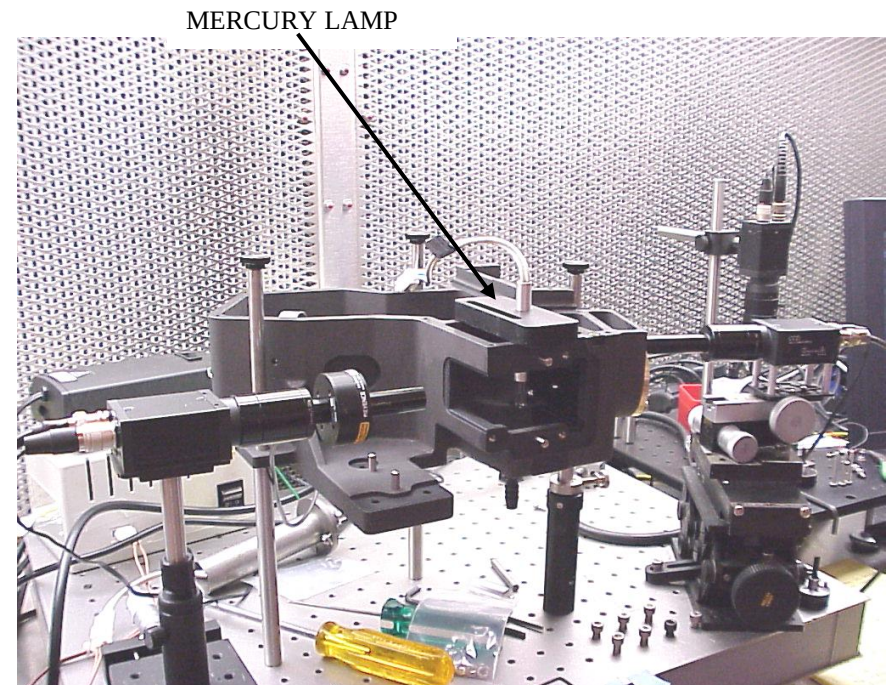
NA

7.4 Verify that the red target box is superimposed on the screen in the proper location.

7.5 Remove the Alignment Tool



**RED TARGET BOX IN
PROPER LOCATION**



MERCURY LAMP

OPER OPERATION DESCRIPTION

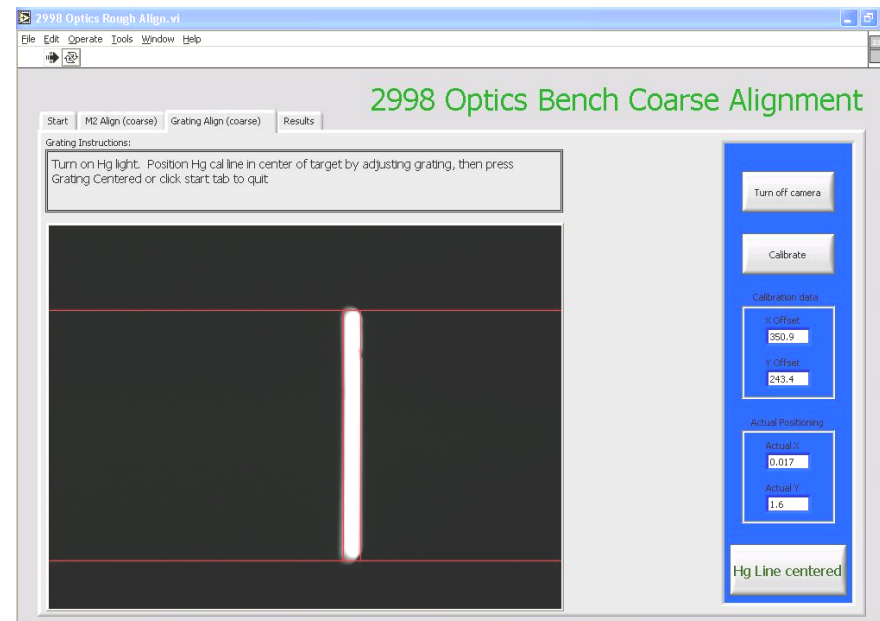
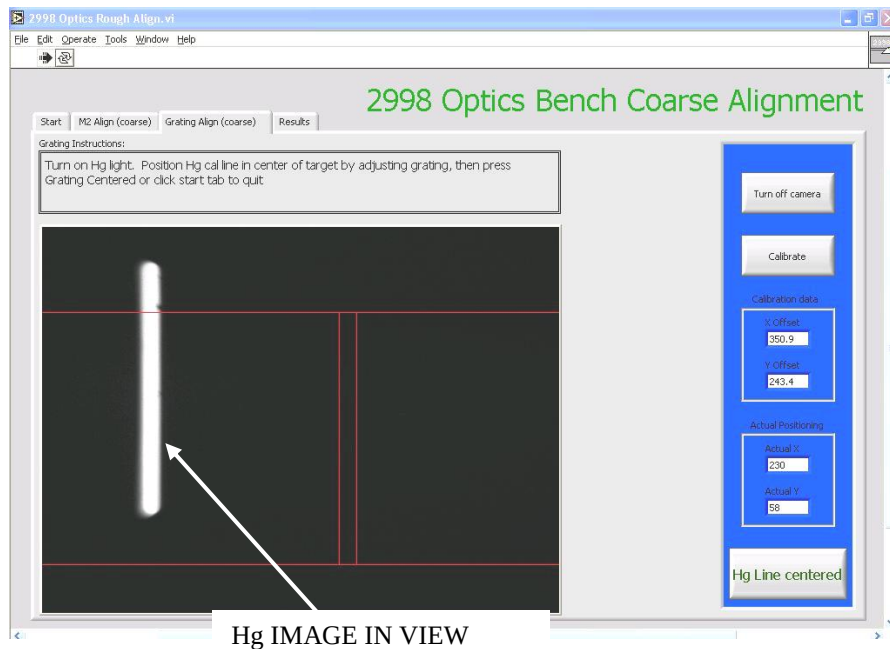
TOOL NUMBER/DESCRIPTION

ROUGH ALIGNMENT – GRATING

1.5MM ALLEN WRENCH

- 7.6 Once the Hg Image appears on the screen adjust the Grating using the set screws to get the image inside the Target Box.. Click “Hg Line Centered” when complete. Remove bench from station.

HIT “START” BUTTON TO ROUGH ALIGN ANOTHER BENCH.



Hg IMAGE IN VIEW POSITIONED
IN TARGET BOX AND FOCUSED

OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

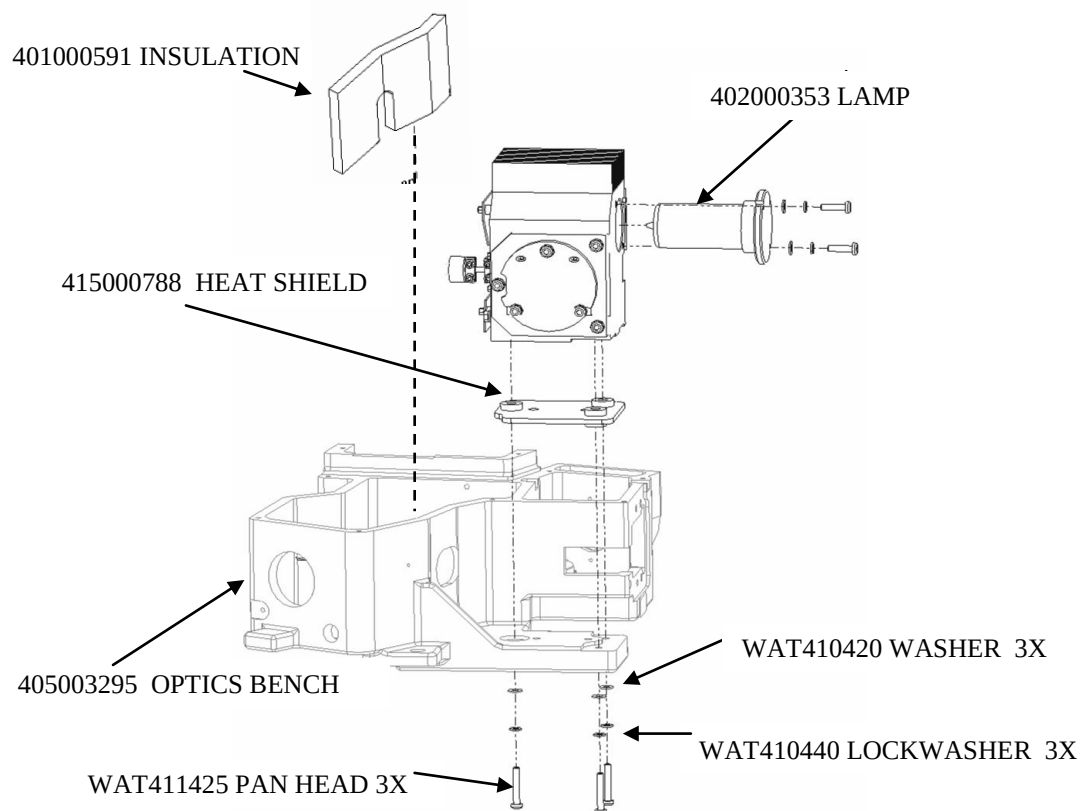
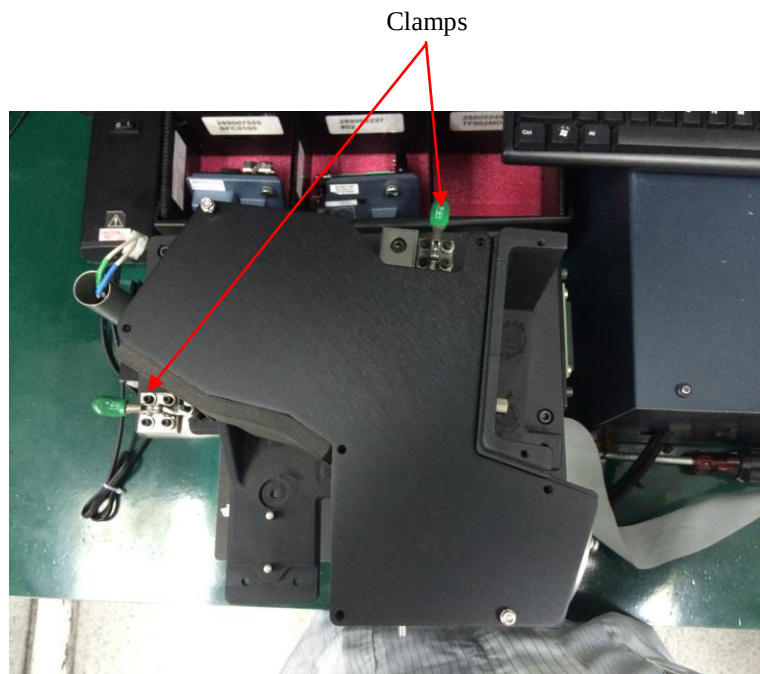
999029221 Fine Alignment Station
T20 TORX DRIVER
SLOTTED DRIVER

8.0 Load Bench on Fine Alignment Station and secure with 2 clamps as shown.

8.1  Scan or type the Lamp (402000353) Serial Number into SigmaSure

8.2 Assemble Lamp Housing, Heat Shield and Lamp to Bench with hardware. Assemble insulation 401000591. (Note: Insulation may optionally be installed outside the clean room after bench assembly and alignment are complete)

8.3 Connect Cables from Lamp Housing to Alignment Station.

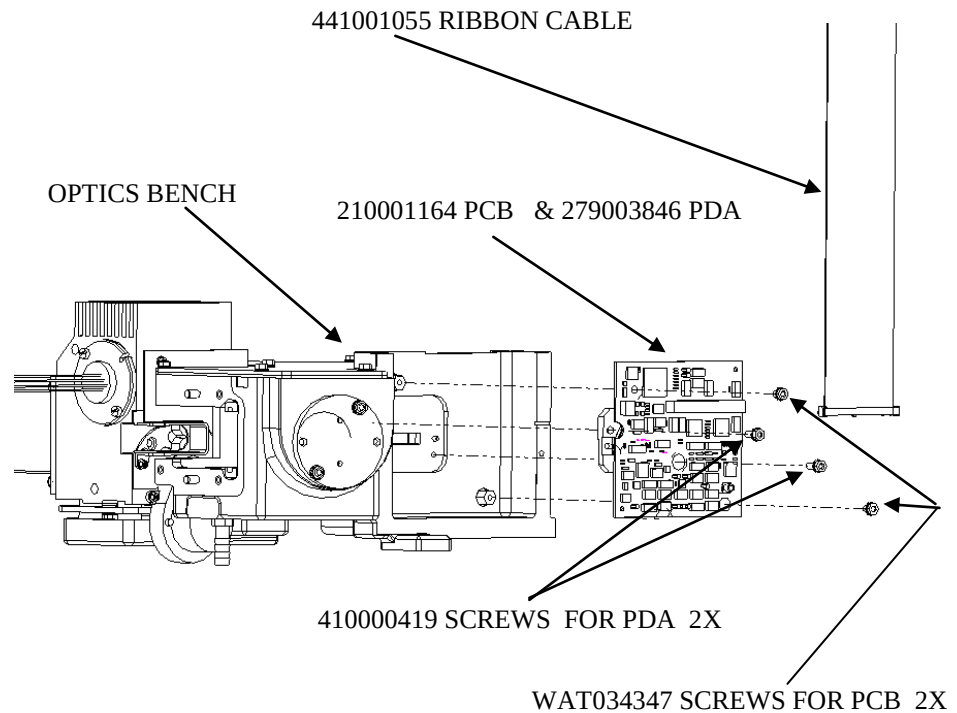
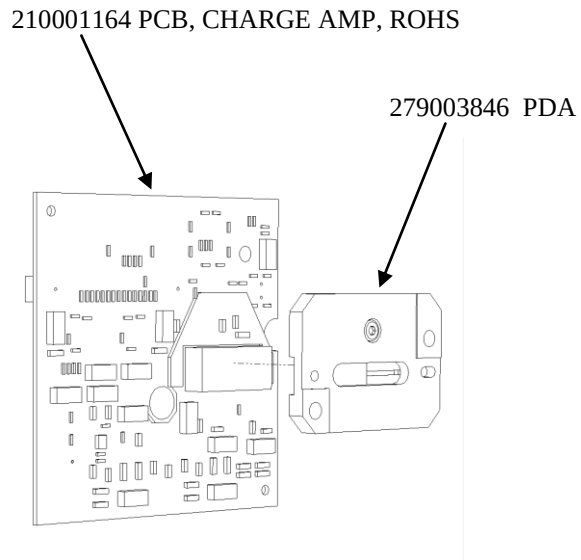


<u>OPER</u>	<u>OPERATION DESCRIPTION</u>	<u>TOOL NUMBER/DESCRIPTION</u>
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FINISH ALIGNMENT

T20 TORX DRIVER

- 8.4  Scan or type the PDA (402000539) Serial Number into SigmaSure under assembly part number 279003846. Scan or type the Charge Amp PCB (210001164) Serial Number into SigmaSure.
- 8.5 Attach PDA assembly to Charge Amp Board. Note Pin #1
- 8.6 Attach PDA/PCB assembly and Ribbon Cable to Bench with hardware. Attach other end of Ribbon Cable to Alignment Station connection.



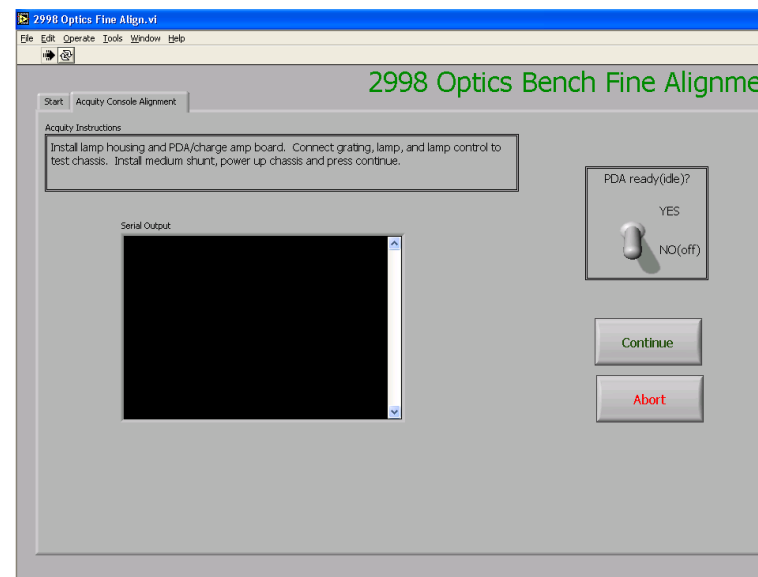
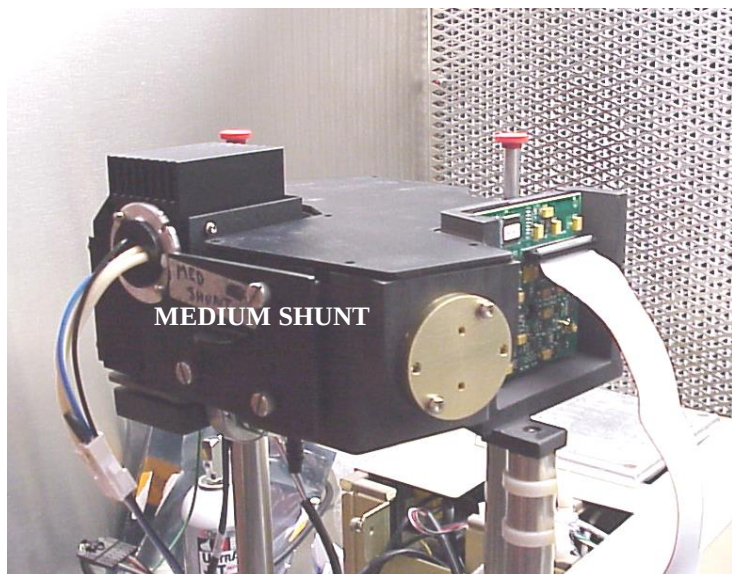
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

SLOTTED DRIVER

- 8.7 Install Medium Shunt and Top Cover, Power up Bench Unit
- 8.8 Start up 2998fine Program, if program is already running just Click “Start” button and input Operator name and Bench number.
- If a Wavelength Verification Failure occurs proceed to the troubleshoot tab, Click on erbium calibration, Click on Optimize exposure, and Click on Start/Stop button. After getting the optimization value Click Save and then Click ok 2 times. Close the tab and proceed to control tab and Click reset PDA. This will turn the lamp to steady green.
- 8.9 When Detector is ready (both lights green) move switch on screen to “Yes” and click “Continue”.
If Detector is not ready select “No” and click “Continue”.



OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

SLOTTED DRIVER

8.10 After Console program is loaded, from top menu click Troubleshoot – Service Mode – and enter Password---1147

NOTE: If system status indicates communications failure(red in color) then click control and reset PDA to make it green.

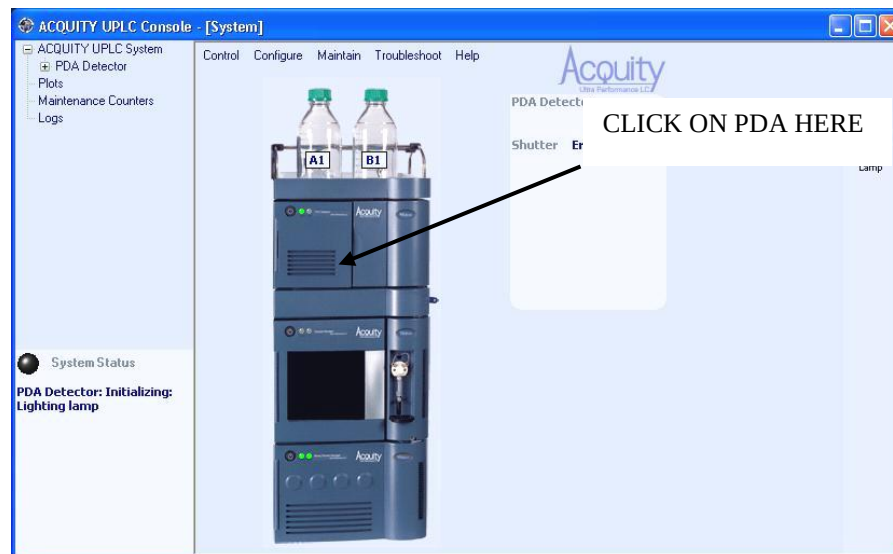
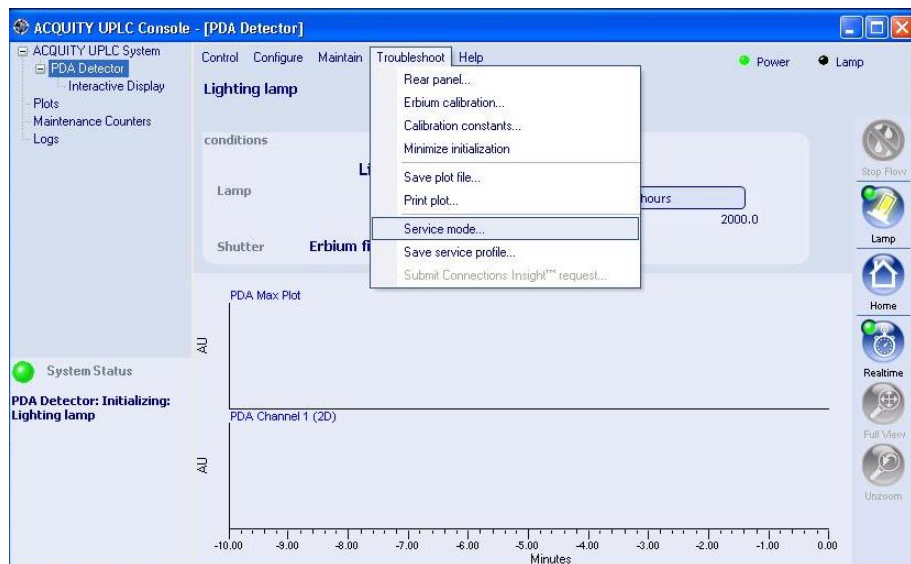
NOTE: If system status indicates wavelength verification failure (status led blinking red), do the following:

- 1) Click on **Troubleshoot | Erbium calibration**
- 2) Click on the **Optimize Exposures** button
- 3) Click **Start**
- 4) When the wavelength appears, click **Stop**
- 5) In the Wavelength Calibration box, click **Save...**
- 6) In the Apply Wavelength Calibration dialog box, Click **OK**
- 7) In the next Applying calibration dialog box, click **OK**
- 8) Click **Close**
- 9) Click **Control | Reset PDA**

8.11 After Lamp turns steady green, Remove Medium Shunt from Bench and install Large Shunt

8.12 Click on picture of the PDA Detector, from top menu click Maintain – Read Energy. Click troubleshoot...calibration values:
Wavelength (WL) at Pixel 1: enter 187; WL at pixel 512:: enter 510.

NOTE: If system status indicates communication failure(red writing), then click control and reset PDA to make letters green.



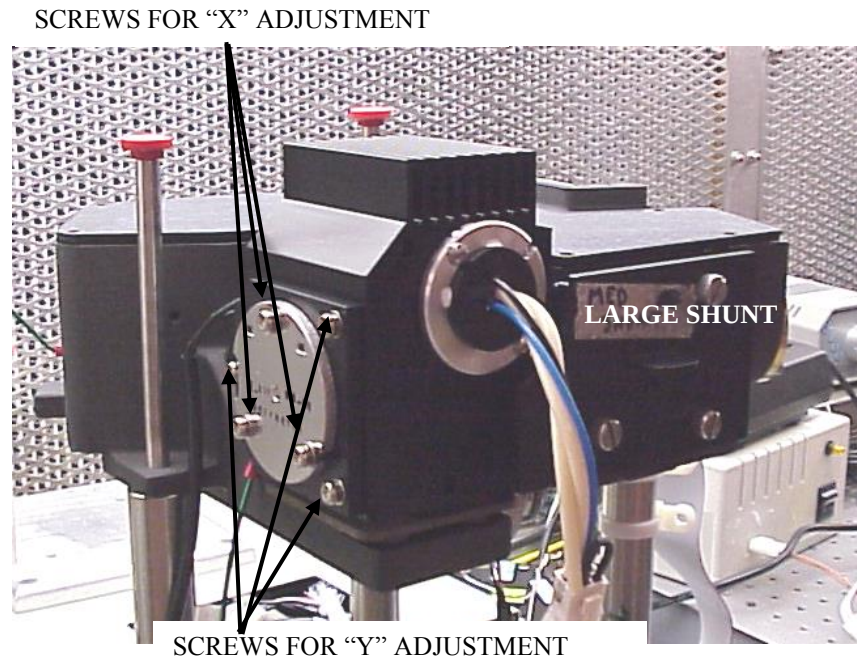
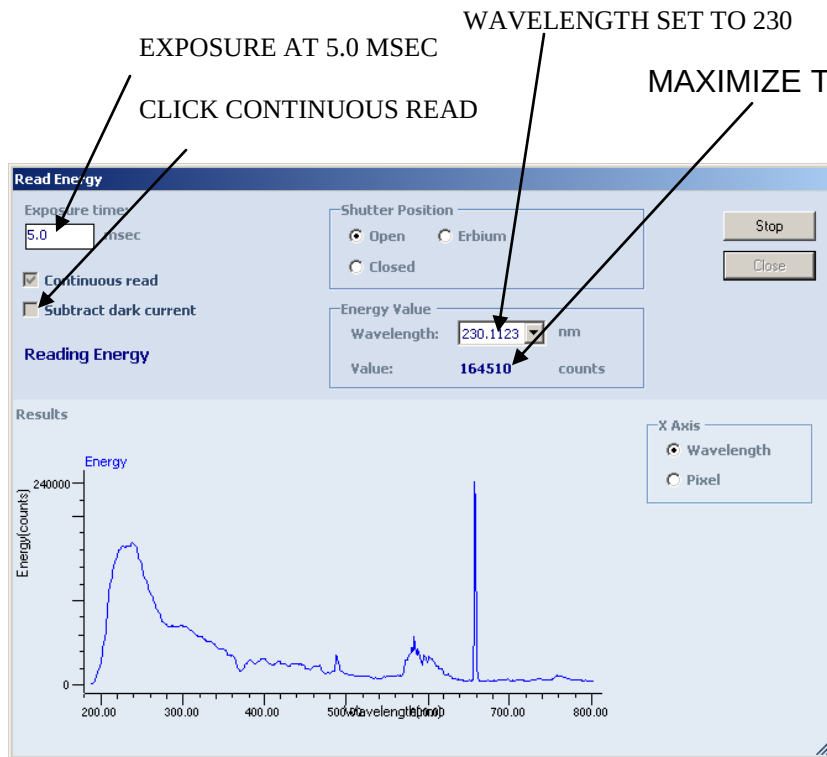
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

T20 TORX DRIVER

- 8.13 From top menu Click Maintain--then--Read Energy. In the Read Energy Screen, Set Wavelength to 230 nm, Exposure time should be 5.0 msec, Check box for Continuous read and Click Read.
- 8.14 Maximize energy (at 230nm wavelength) by adjusting M1 Mirror in “Y” direction first, then “X” direction then “Y” direction again.
The minimum energy guideline is 150,000. Otherwise, notify engineering
Note: Minimum energy guideline applies only after adjustments are made to maximize energy.
Note: If energy curve saturates, maximize energy at the 250 nm wavelength.
- 8.15 Once Maximum energy is achieved by adjusting M1, tighten screws. Click “Stop” to stop reading energy.



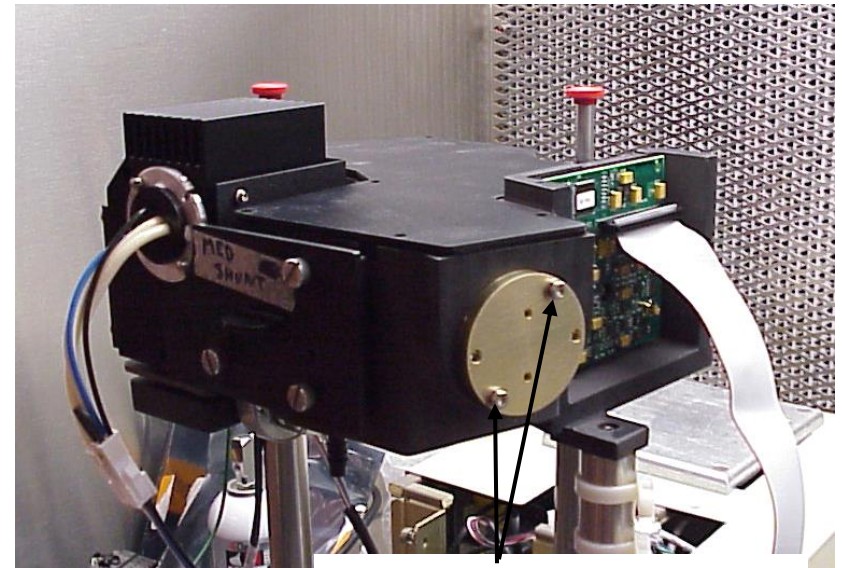
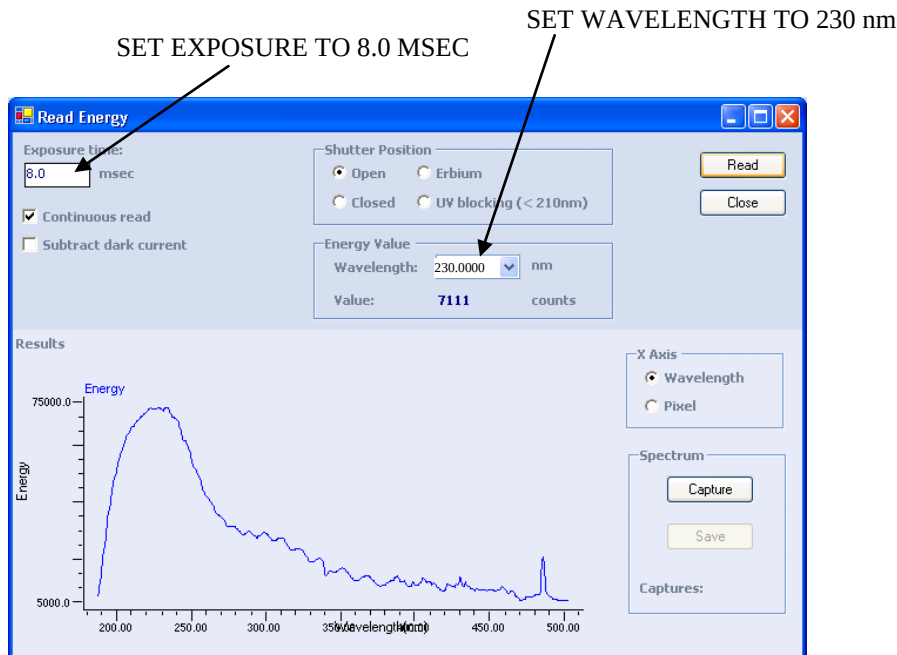
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

T20 TORX DRIVER
SLOTTED DRIVER

- 8.16 Remove Large Shunt from Bench and install Small Shunt.
- 8.17 Set Exposure Time to 8.0 msec and Set Wavelength to 230 nm, check box for Continuous read and Click Read.
- 8.18 Loosen torx screws on M2 and maximize energy by adjusting M2 Mirror in "X" direction only.
The minimum energy guideline is 40,000. Otherwise, notify engineering
Tighten screws when maximum energy is achieved. Click "Stop" and then "Close" to stop reading energy.
Note: Minimum energy guideline applies only after adjustments are made to Maximize energy.



SCREWS FOR "X" ADJUSTMENT

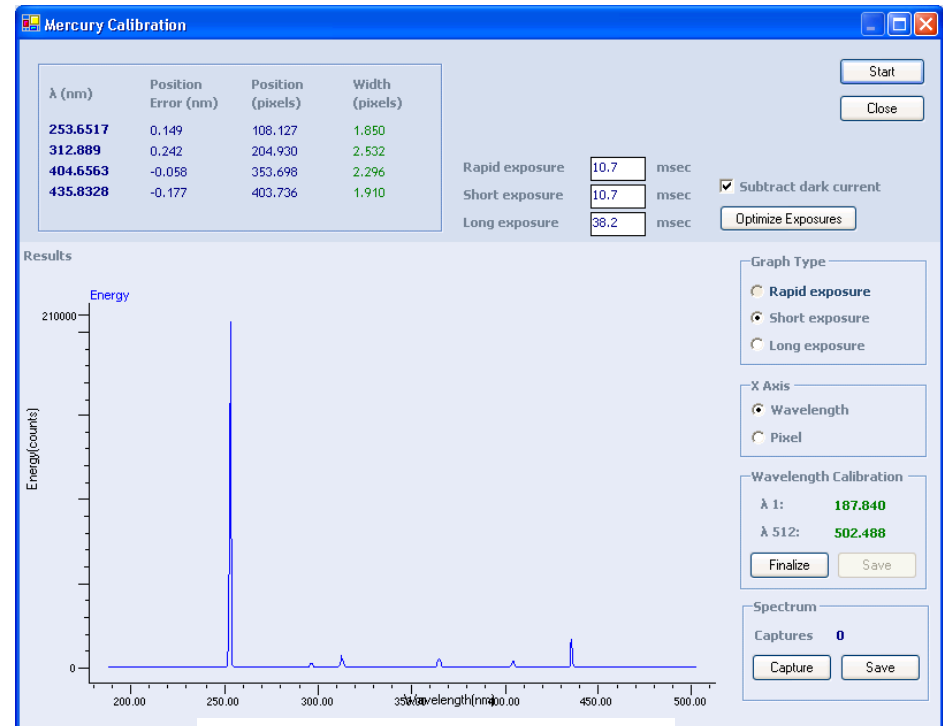
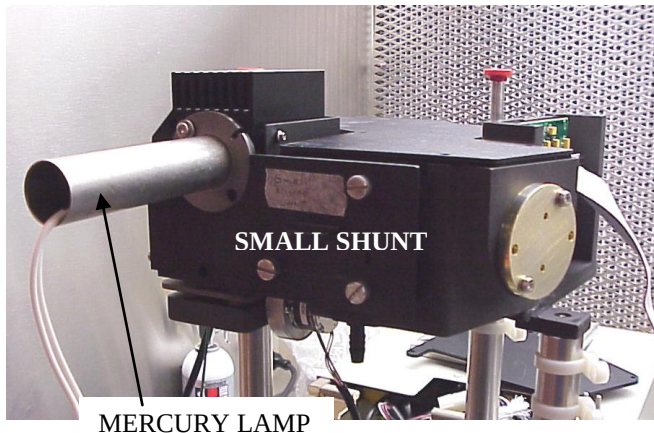
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

- 8.19 Click on the Lamp Button on the right side of the screen, click yes to turn off Lamp.
- 8.20 Remove the D2 Lamp and replace with the Mercury Lamp. Turn on Mercury Lamp
- 8.21 Click Troubleshoot on the top menu, select Mercury Calibration. Wait 15 sec. Click the Optimize Exposure Button, once exposure times appear, click Start.
- 8.22 If all values, including the Lambda 1 and 512 values in the lower right are not green, adjust the Grating in the "X" direction only, using the flecture set screw. DO NOT adjust bottom set screw ("Y" axis) If adjusting the flecture will not bring all values into spec. The Micrometer adjusting tool must be used to sweep the Grating. Make sure Grating screws are loose underneath. Move Grating back and bring forward by adjusting Micrometer in clockwise direction. Bring all values into spec. (Green) by making sweep and flecture adjustments. Once all values are in spec. tighten Grating from bottom and remove Micrometer, make sure all values stay green.

999029396/grating adjustment tool
1.5MM ALLEN WRENCH
SLOTTED DRIVER
T20 TORX DRIVER



MERCURY CALIBRATION SCREEN

OPER OPERATION DESCRIPTION

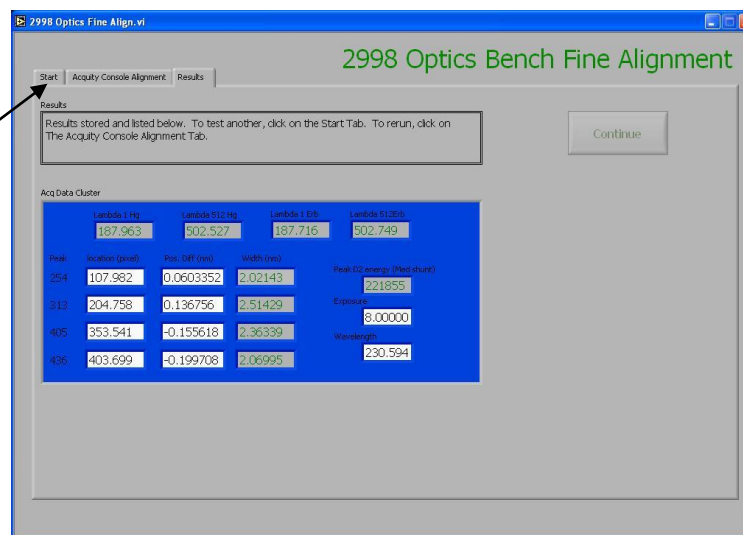
TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

SLOTTED DRIVER

- 8.23 Once all values are green click “Stop” then click “Capture” then “Save” save as serial # Hg.txt. When finished close the Mercury Calibration Window.
- 8.24 Turn off the Mercury Lamp and install the D2 Lamp. Turn on D2 Lamp.
- 8.25 Remove the Small Shunt and install the Medium Shunt.
- 8.26 Click on “Maintain” from upper menu, click “Read Energy”. Set exposure to 6.0 msec and click “Continuous Read” then “Read”. After a few seconds click “Stop” then “Capture” then “Save”. Save as serial # d2.txt. Click “Close” to close energy screen.
- 8.27 Click “Troubleshoot “, “Erbium Calibration”, then “Optimize exposure” and “Start” and wait for energy wave to appear, Lambda values should be green, if values are not green the finish alignment will have to be repeated. If values are green click “Stop” then “Capture” and “Save” as # erb.txt.
- 8.28 Close all Console windows, wait for software to record data. After data is recorded, turn power off on Bench and remove from Fixture. Bench is now complete.
- 8.29 Click on “Start” button to start new Bench.

CLICK ON START TO BEGIN NEW BENCH



RECORDED DATA

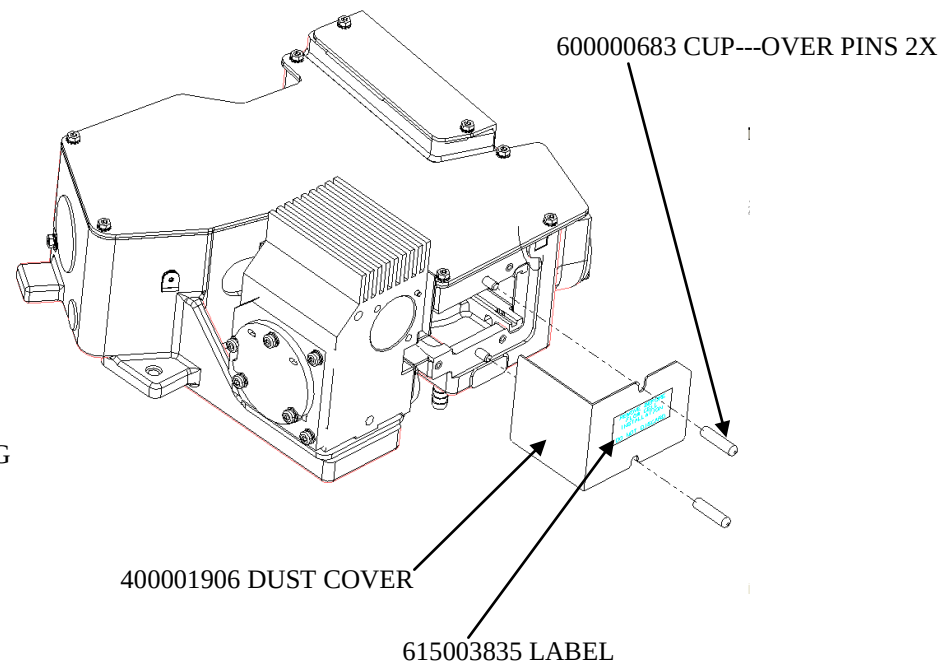
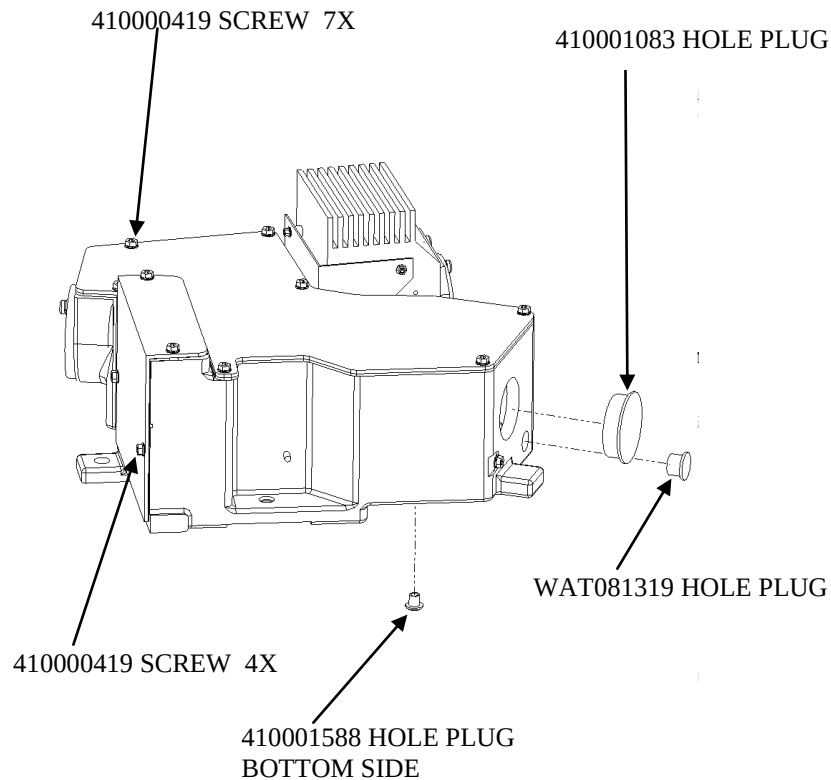
OPER OPERATION DESCRIPTION

TOOL NUMBER/DESCRIPTION

FINISH ALIGNMENT

T20 TORX DRIVER

- 8.30 Remove Medium Shunt and secure top Cover and PDA Cover with screws.
- 8.31 Insert Plugs into Bench as shown.
- 8.32 Attach Label to Dust Cover and secure to Bench using Plastic Cups over Pins.



OPER **OPERATION DESCRIPTION**

TOOL NUMBER/DESCRIPTION

9.0 Attach remaining pieces of insulation. (Note: Insulation may optionally be installed outside the clean room after bench assembly and alignment are complete)

NA

