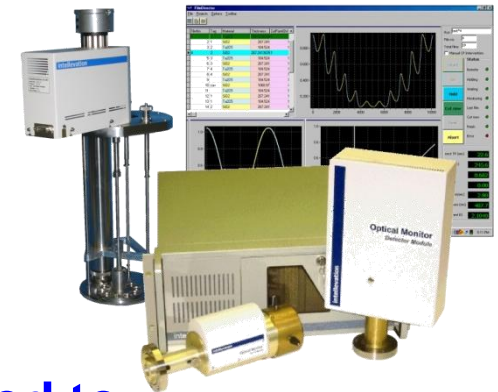
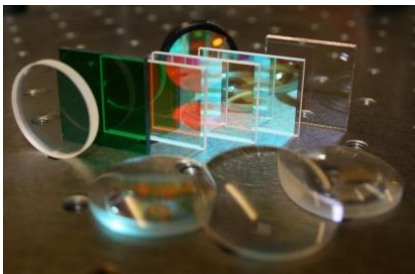


# Intellemetrics Free Space Optical Monitors

## Tutorial 5 Stage Optical Alignment



Use this tutorial whenever you need to  
optically align your system, including;

Installation  
Qualification  
Maintenance  
Bulb Replacement  
Testing Against Factory Results

# Equipment

For the purposes of this tutorial, we will assume you have the following equipment...

# Equipment



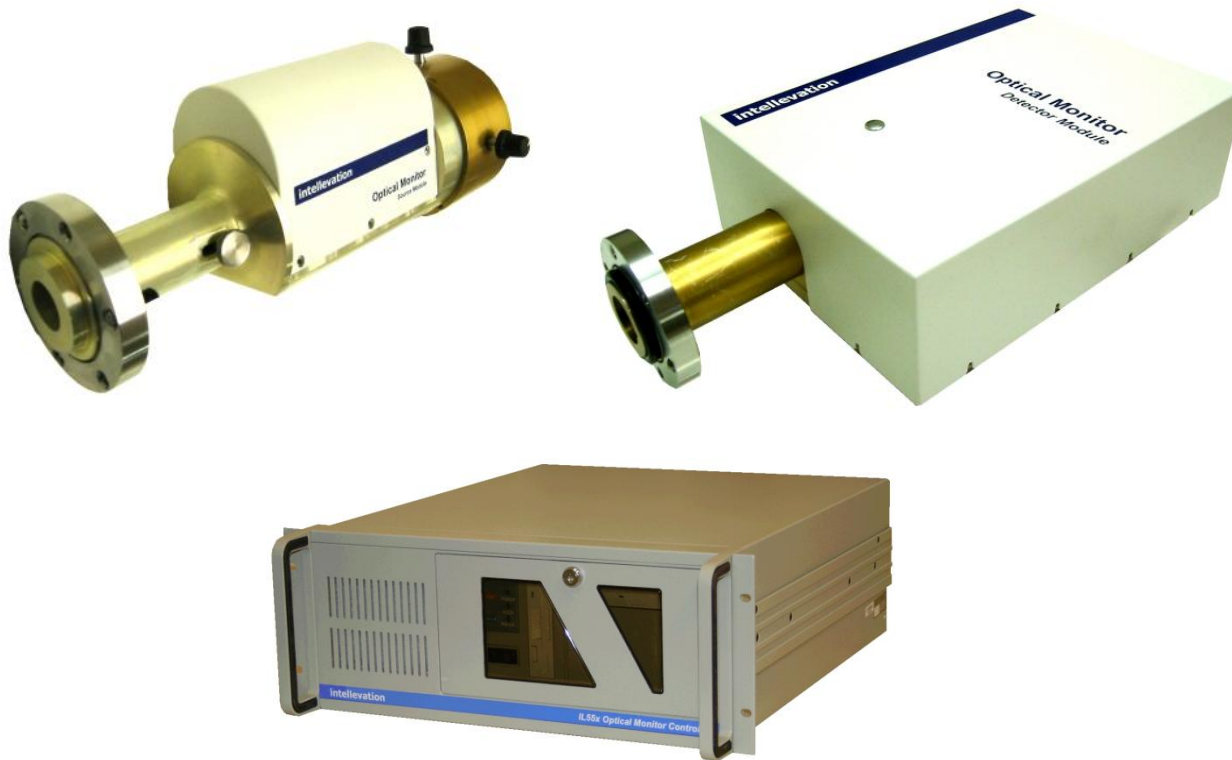
...a Source Module...

# Equipment



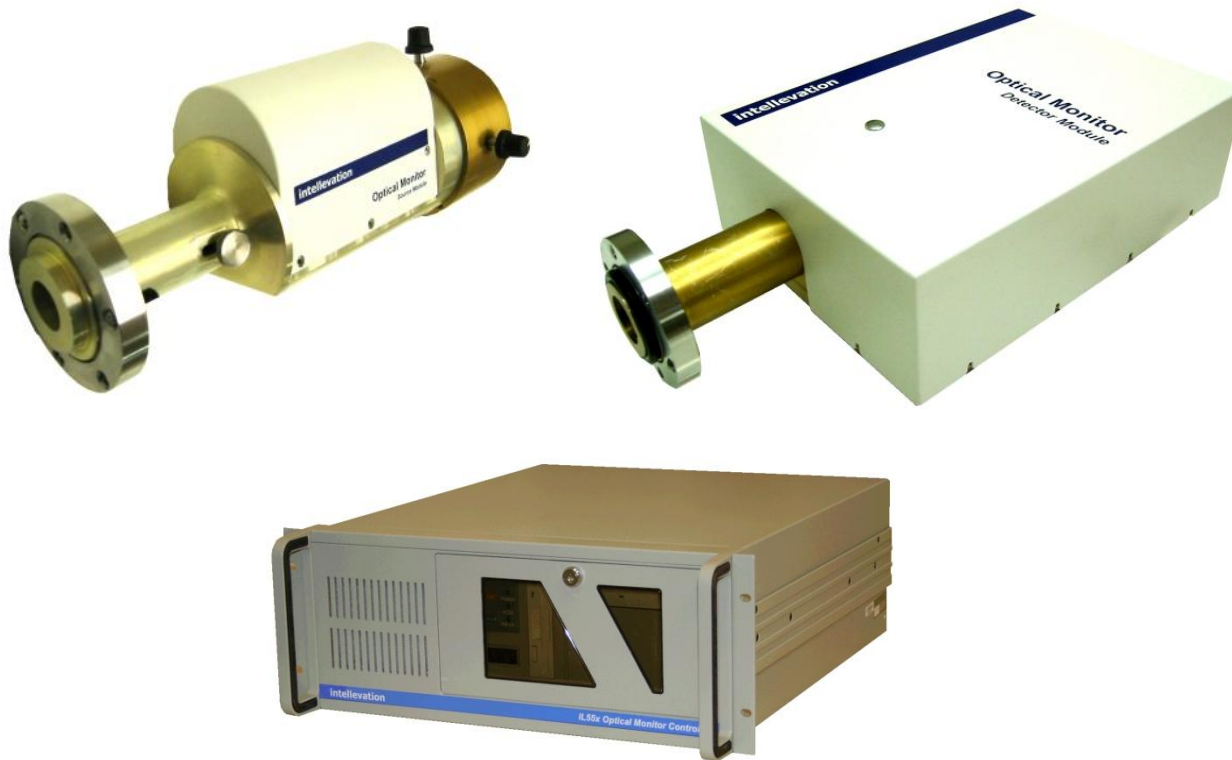
...a Source Module, a Detector Module...

# Equipment



...a Source Module, a Detector Module, a Controller Module...

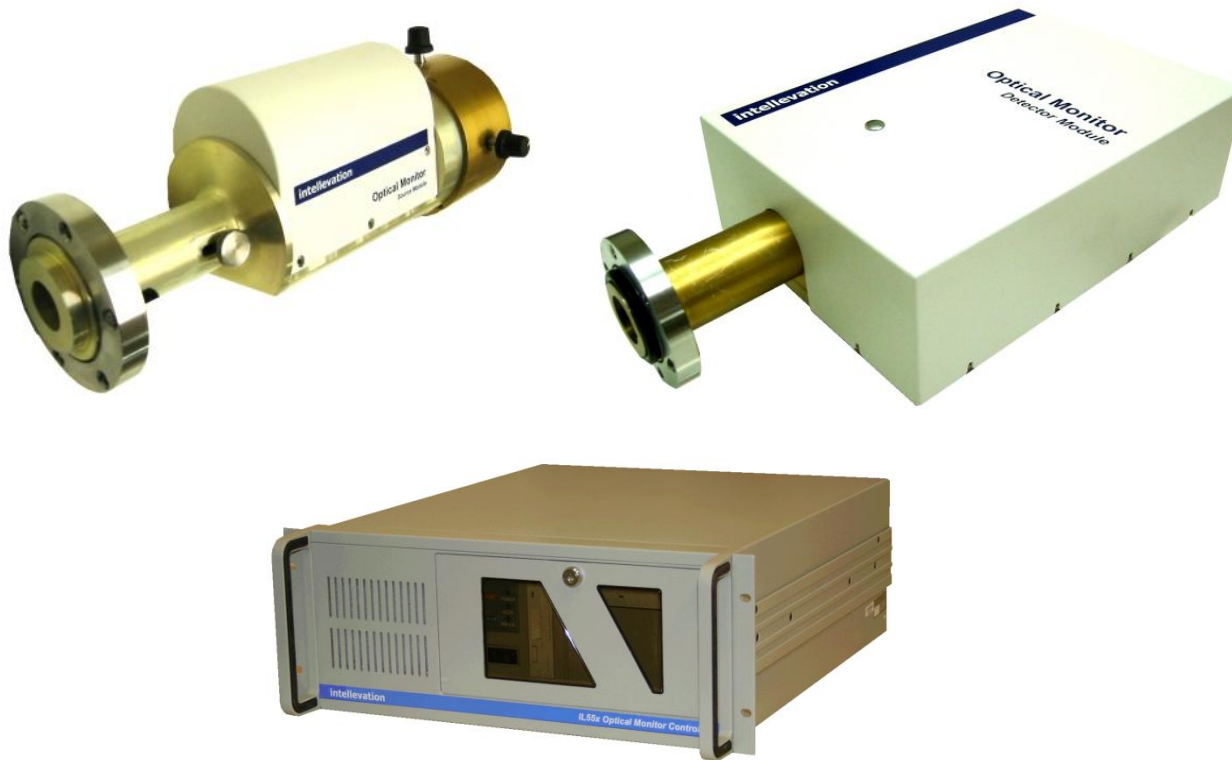
# Equipment



...a Source Module, a Detector Module, a Controller Module and a Test Glass Changer...



# Equipment



...a Source Module, a Detector Module, a Controller Module and a Test Glass Changer...

Your test glass changer may be different to the one in the picture, but the same principles of alignment will apply.



# Here are the Five Stages of Optical Alignment

1. Bulb
2. Source
3. Test Glass Changer (reflection mode only)
4. Detector
5. Reference

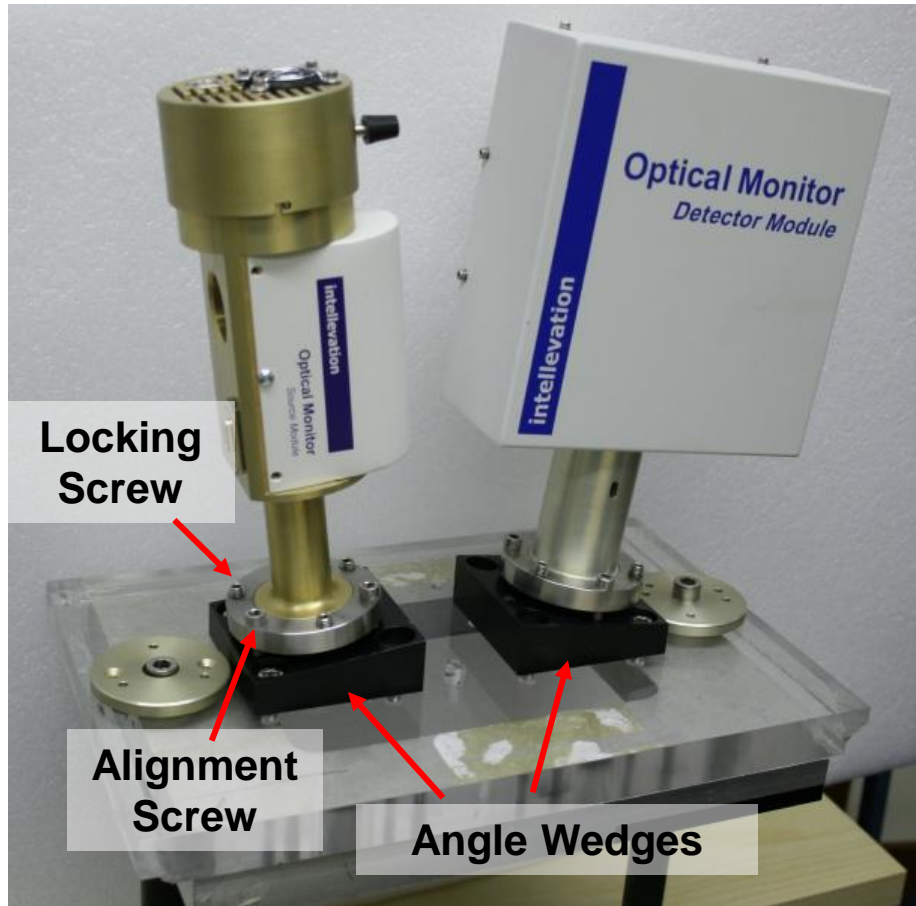


# Here are the Five Stages of Optical Alignment

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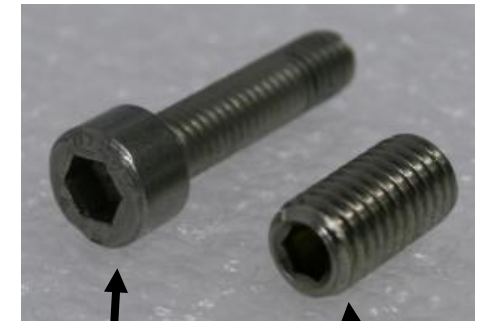
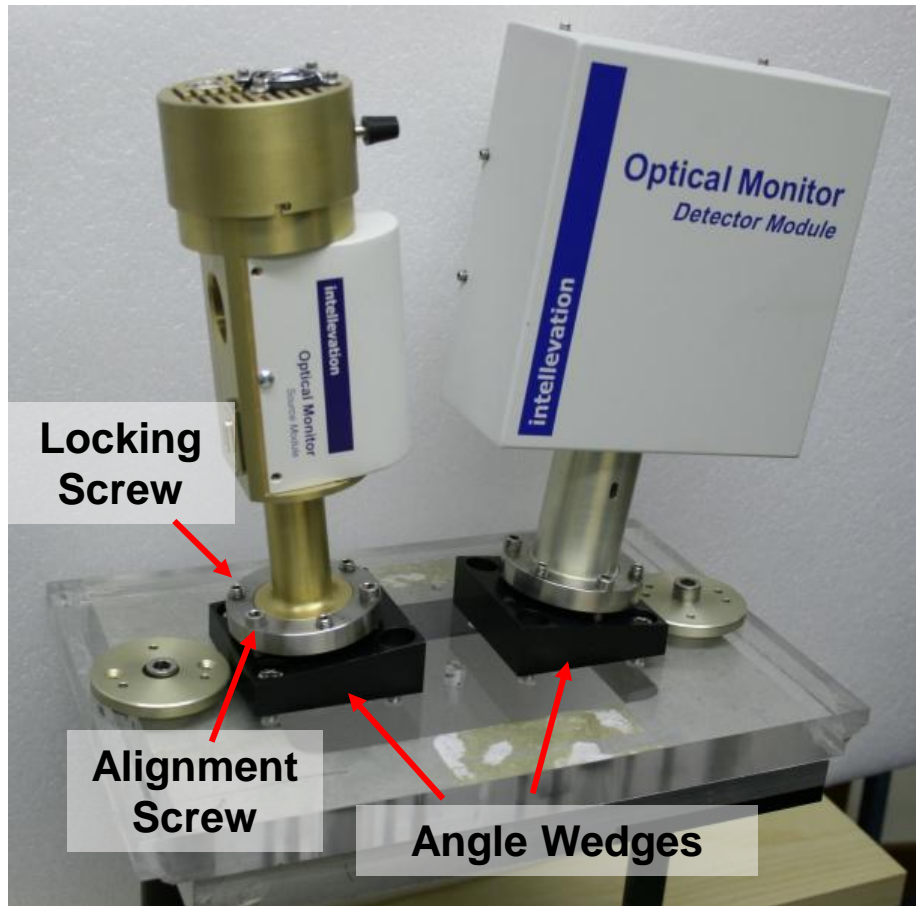
**It is critical that you perform these steps in the order above and do not skip any steps. This is the only way to ensure your system will be optimised.**

# Stage 1: Bulb



The source and detector modules should be mounted onto the chamber via the Angle Wedges. At this stage the Alignment Screws should only be 'finger tight'.

# Stage 1: Bulb

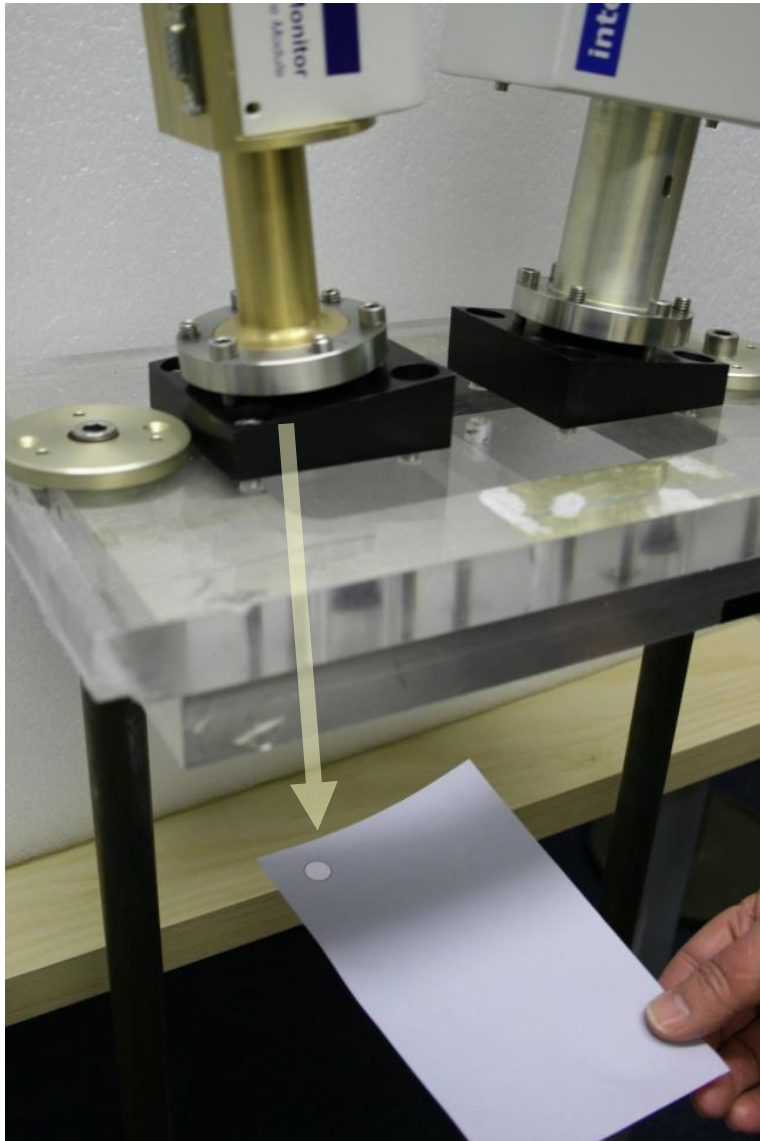


**Alignment  
Screw  
M5  
Allen Key**

**Locking  
Screw  
M4  
Allen Key**

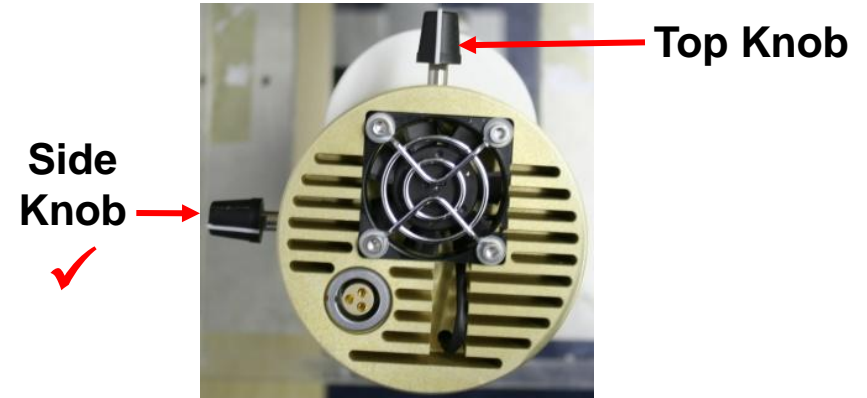
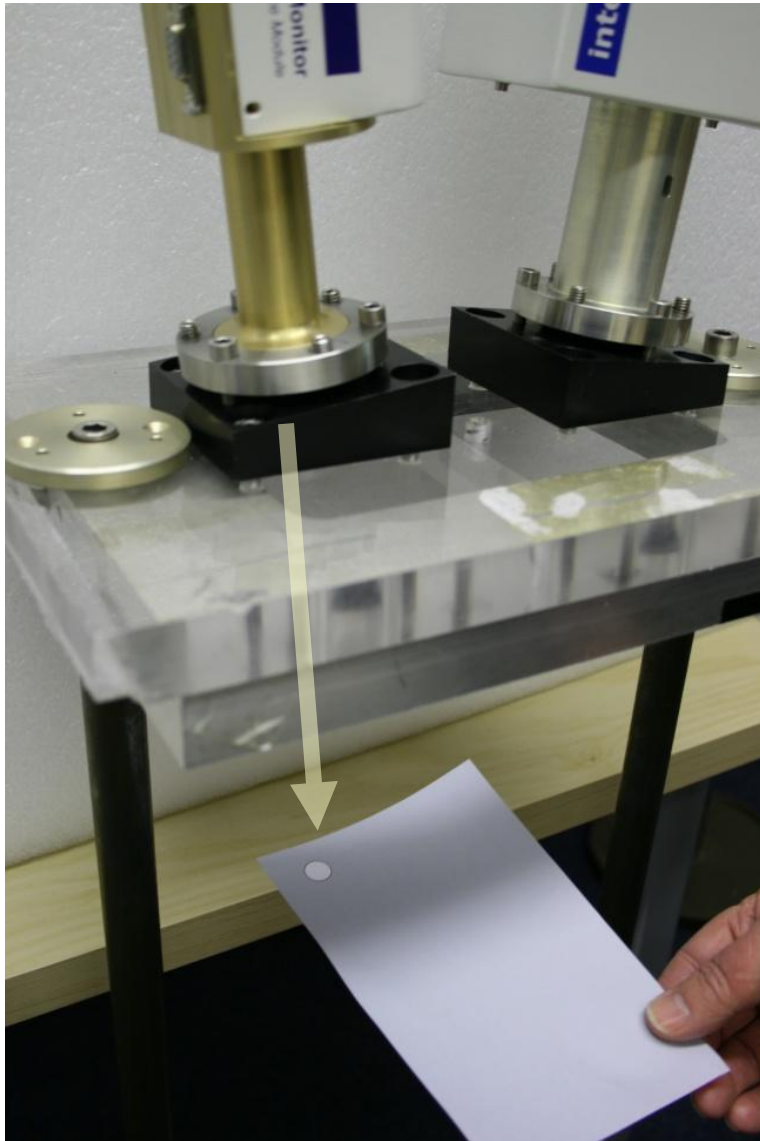
The Alignment and Locking Screws are shown in detail above. At this stage loosen the Locking Screws. Only attach the Source and Detector modules using the Alignment Screws.

# Stage 1: Bulb



Use of piece of white card or tracing paper to observe the beam shape from the Source Module. It should be circular.

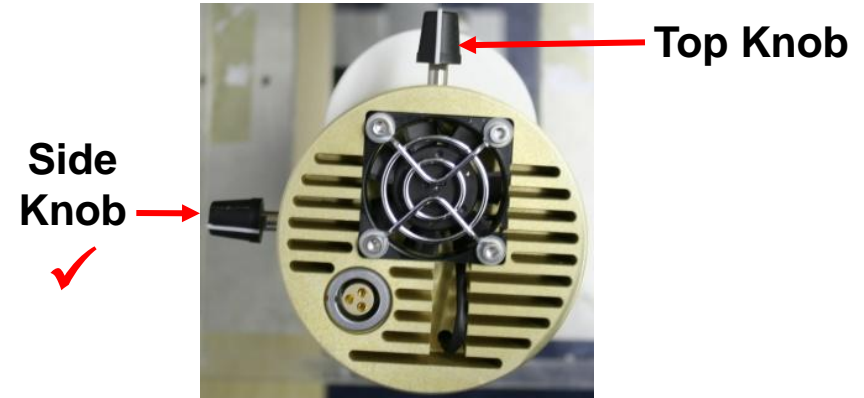
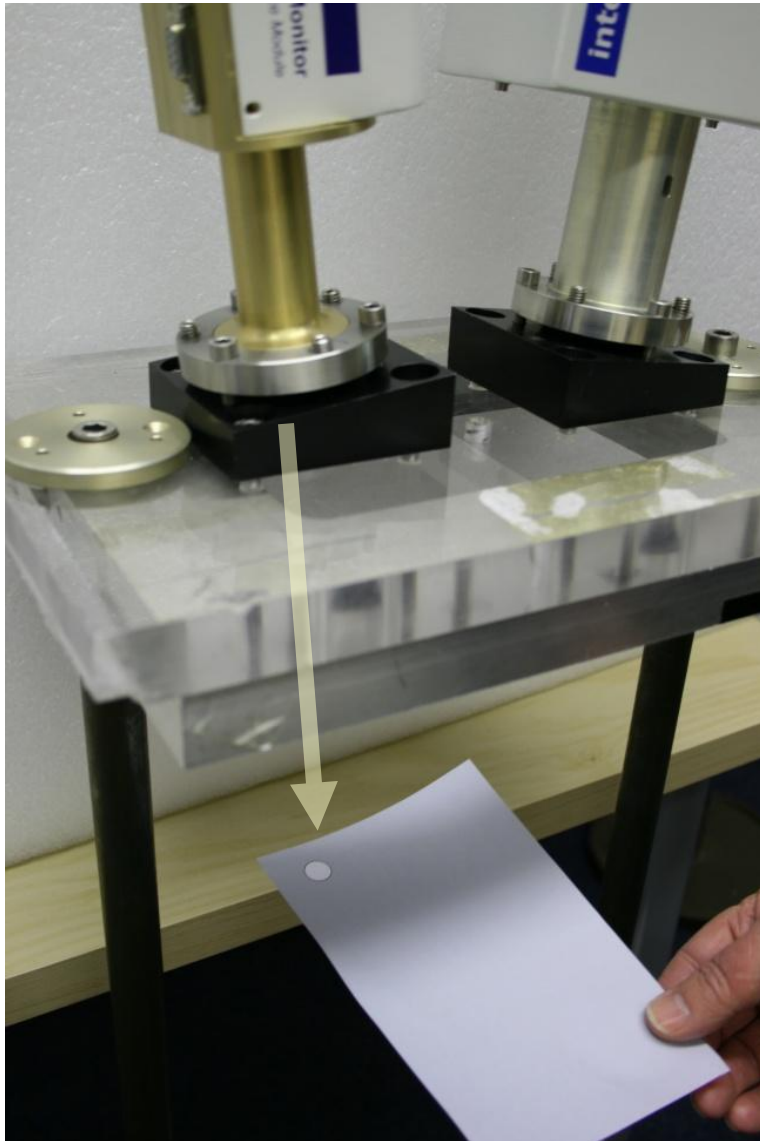
# Stage 1: Bulb



To change the beam shape, use the Side Knob on the Source Module. DO NOT adjust the Top Knob at this stage.

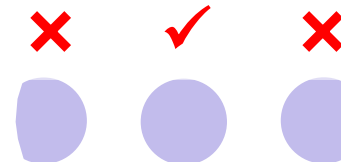


# Stage 1: Bulb

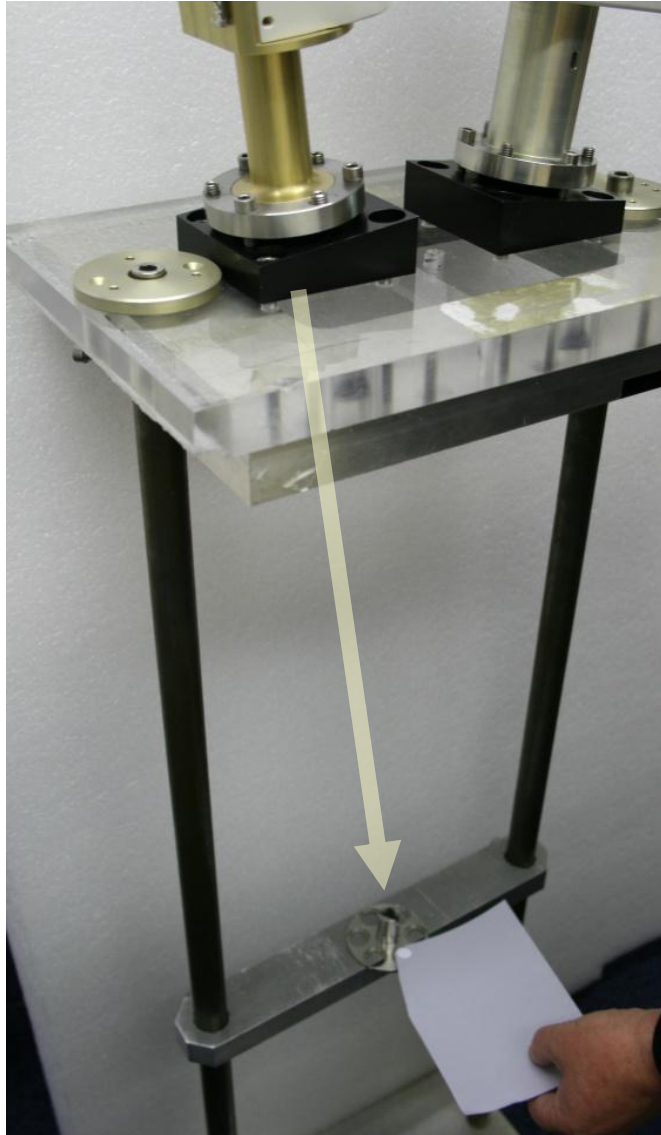


Turn the Side Knob and observe the beam shape. At some point, it will become clipped, as shown in the left hand image below. Turn the knob back until the beam becomes clipped on the other side. Then set the knob in a central position. The beam should be circular.

This is Stage 1 Completed.



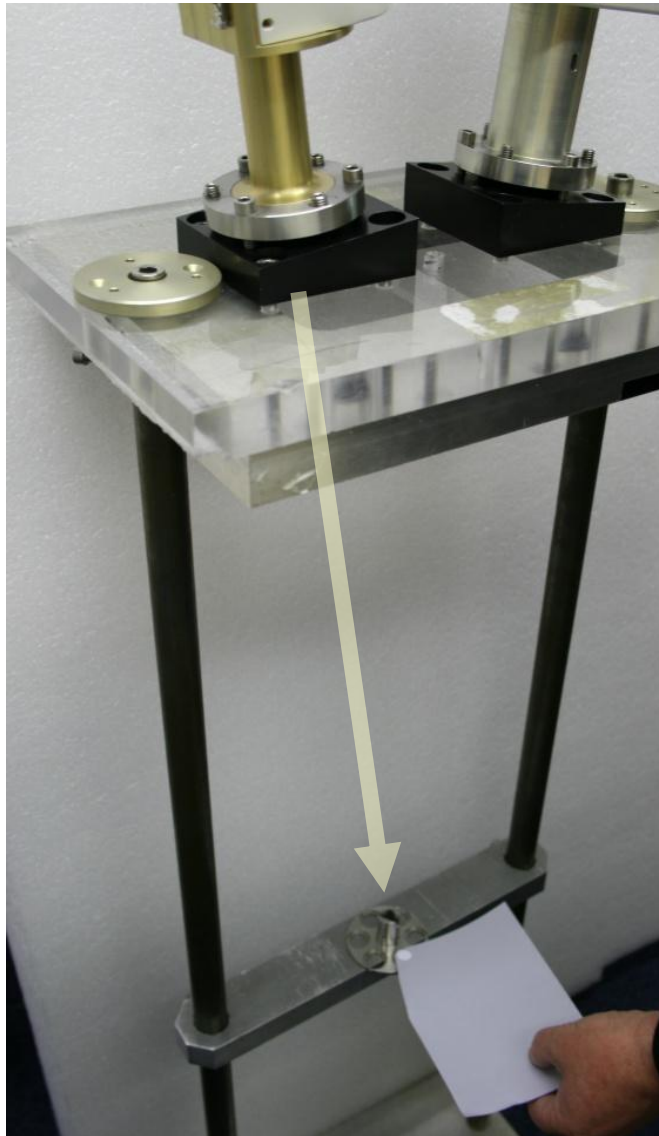
## Stage 2: Source



Stage 2 involves aligning the Source Module so that the beam is directed squarely onto the Test Glass.

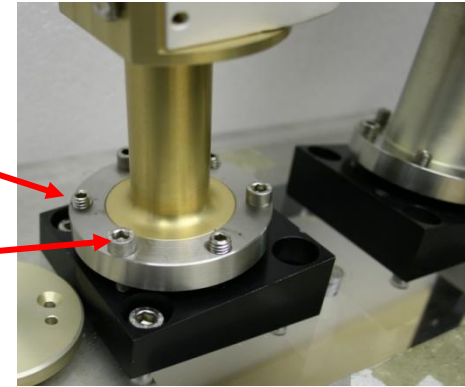
Use the piece of card to observe where the beam goes.

# Stage 2: Source



Locking

Alignment



If the beam does not fall perfectly onto the centre of the Test Glass with no overlap, then the Source needs to be aligned.

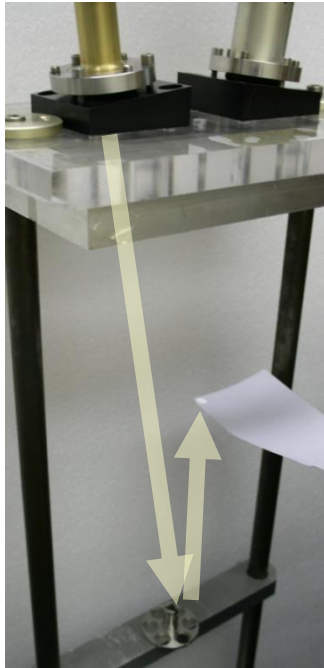
Slowly tighten the Alignment Screws, working your way iteratively around the three screws, whilst directing the beam onto the Test Glass.

Once the Alignment Screws have been tightened, and alignment achieved, tighten the Locking Screws.

Check the alignment and make any small tweaks to the Locking Screws to maintain alignment.



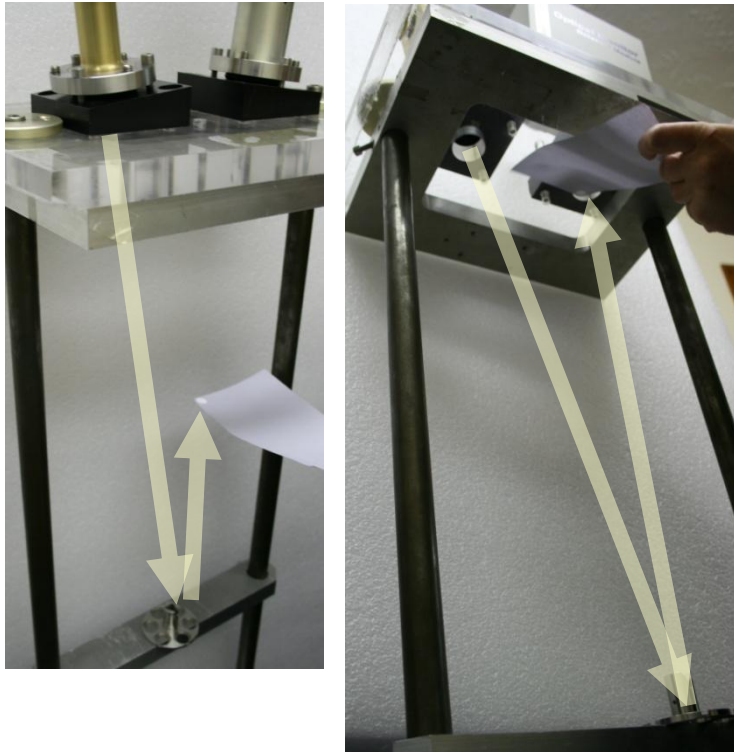
# Stage 3: Test Glass Changer



Now for Stage 3. During this stage, we will adjust the Test Glass Changer to direct the reflected beam into the Detector window.

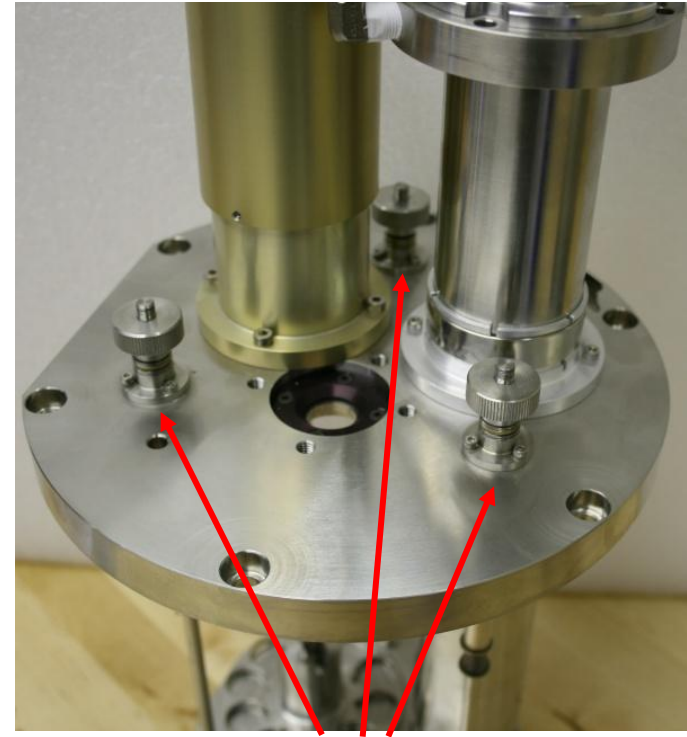
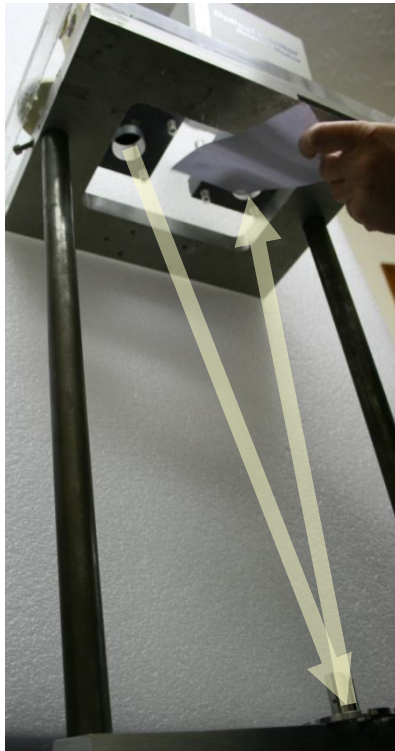
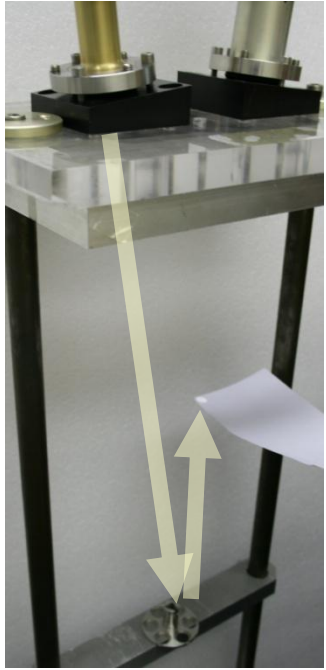
DO NOT adjust the source module during this stage.

# Stage 3: Test Glass Changer



Trace the reflected beam from the Test Glass towards the window of the Detector Module. The reflected beam may be quite low in intensity, and therefore you may benefit from switching off the room lights during this stage.

# Stage 3: Test Glass Changer



**Tilt Adjustment Knobs**

Your Test Glass Changer will have three Tilt Adjustment Knobs on it. These are used to alter the direction of the reflected beam. Use these to direct the beam into the center of the Detector Window.

**DO NOT** adjust the alignment of the Source Module during this stage.

# Stage 4: Detector



During Stage 4, we will align the Detector Module. We will use software on the Controller Module to monitor the signal level to help us achieve optical alignment.

Again, we will be using the Alignment Screws to adjust the alignment.

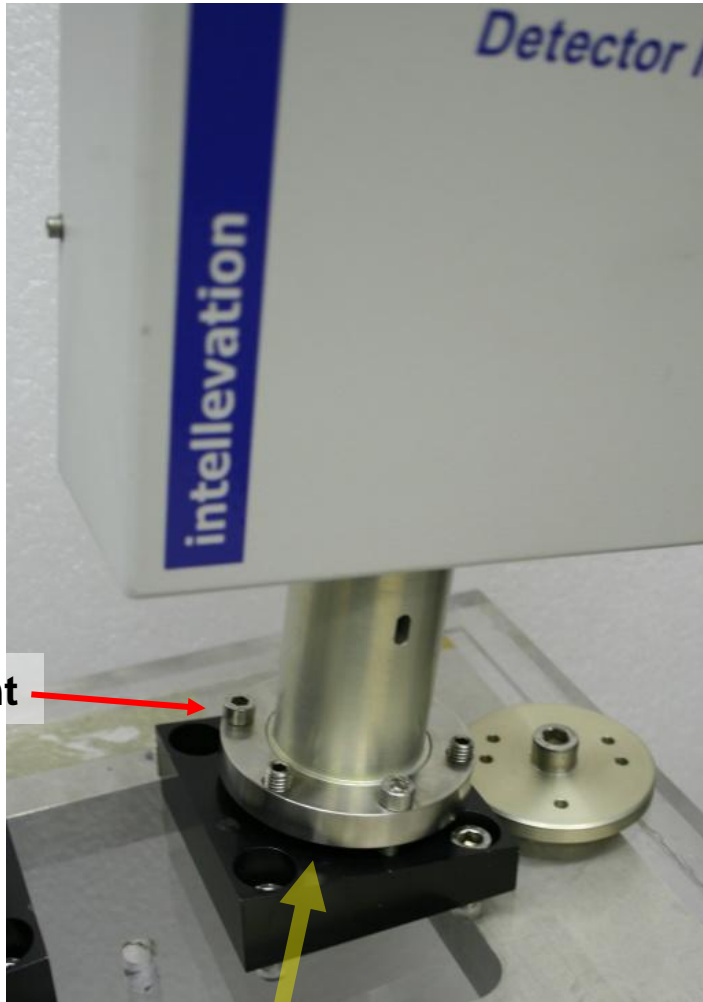
# Stage 4: Detector



On the Desktop of the Controller Module you will see the FilmDirector icon shown above.

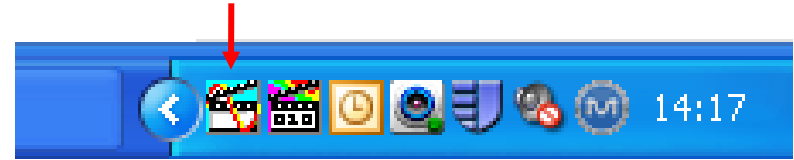
Click on the icon to start FilmDirector.

# Stage 4: Detector



Alignment

Data Acquisition Server



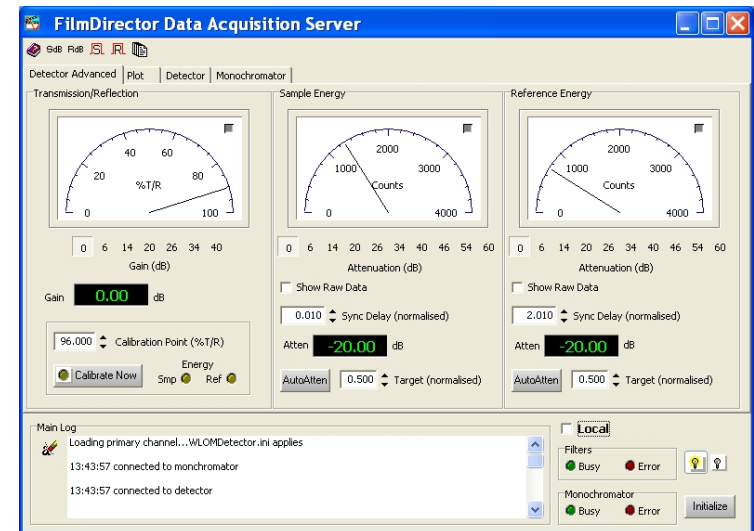
On the Task Bar you will see the Data Acquisition Server icon.

Double click on this icon.

# Stage 4: Detector

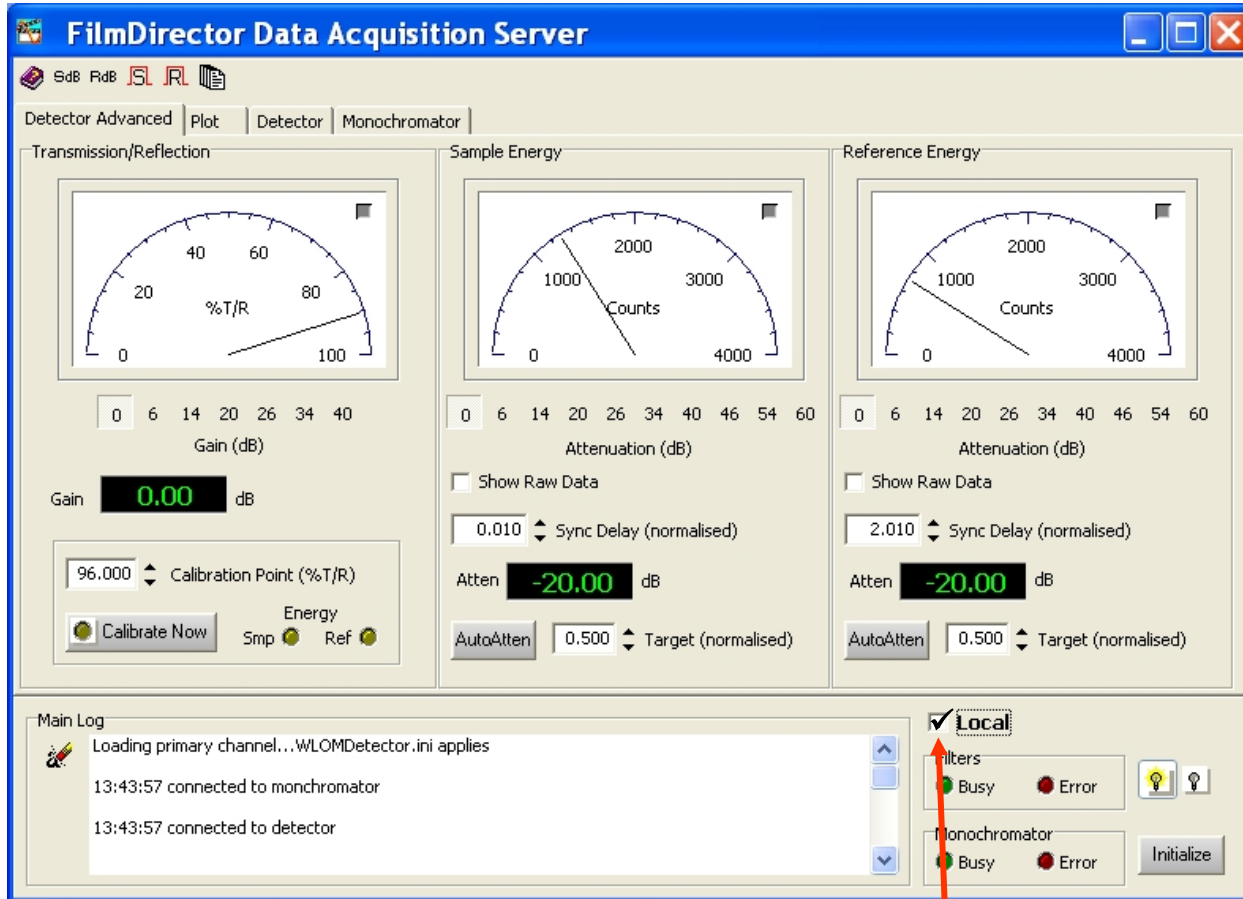


You should see a window open like the one below...this is the Data Acquisition Server.





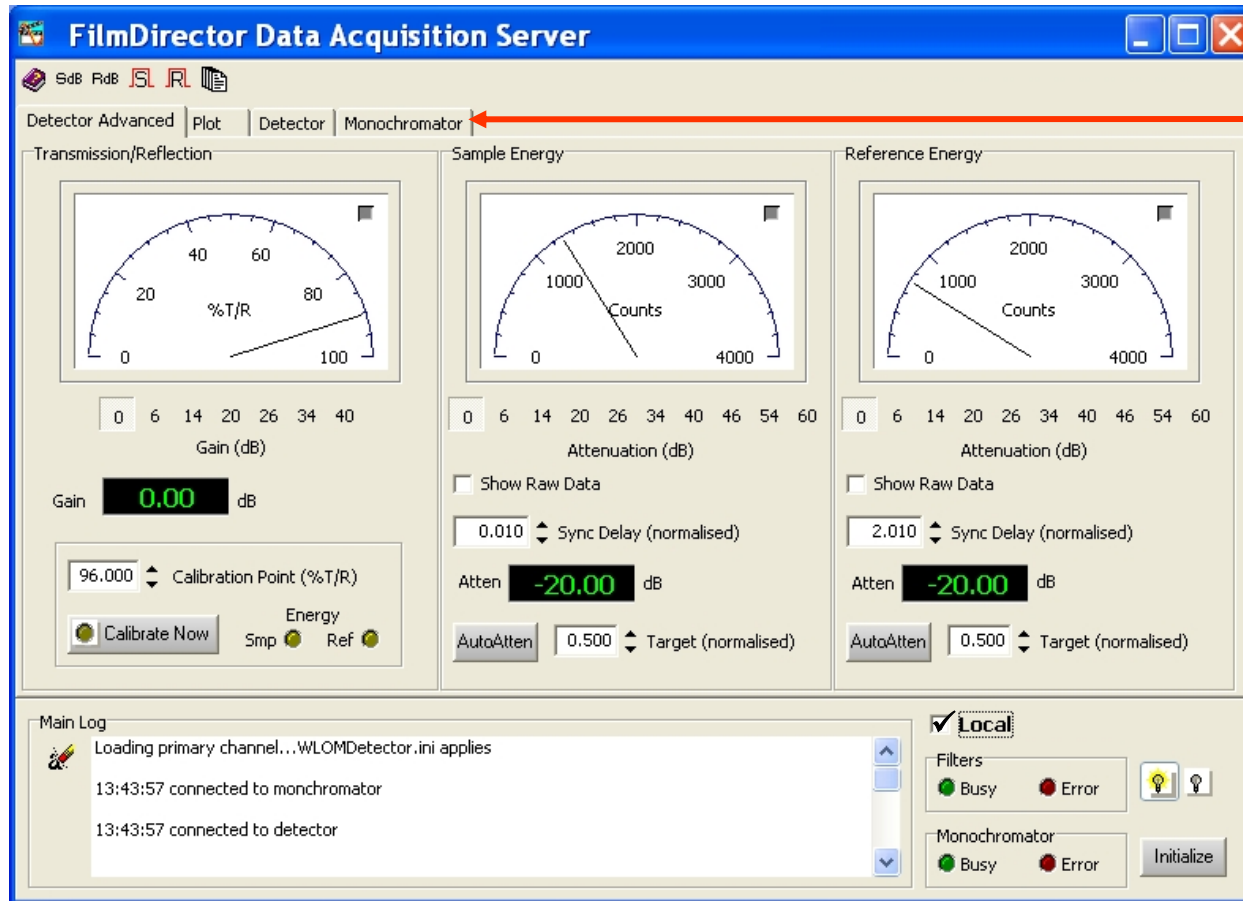
# Stage 4: Detector



Tick the Local box

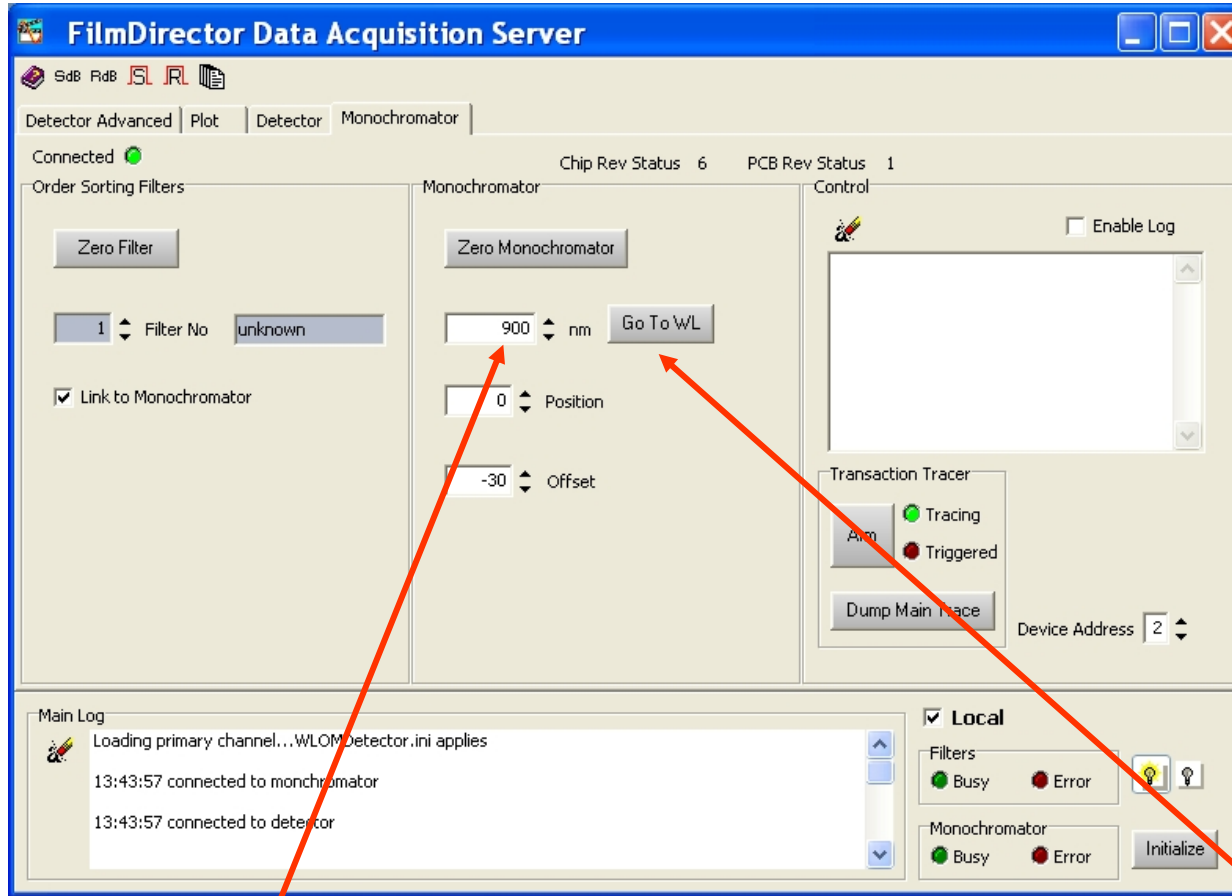


# Stage 4: Detector



Then click on the Monochromator tab

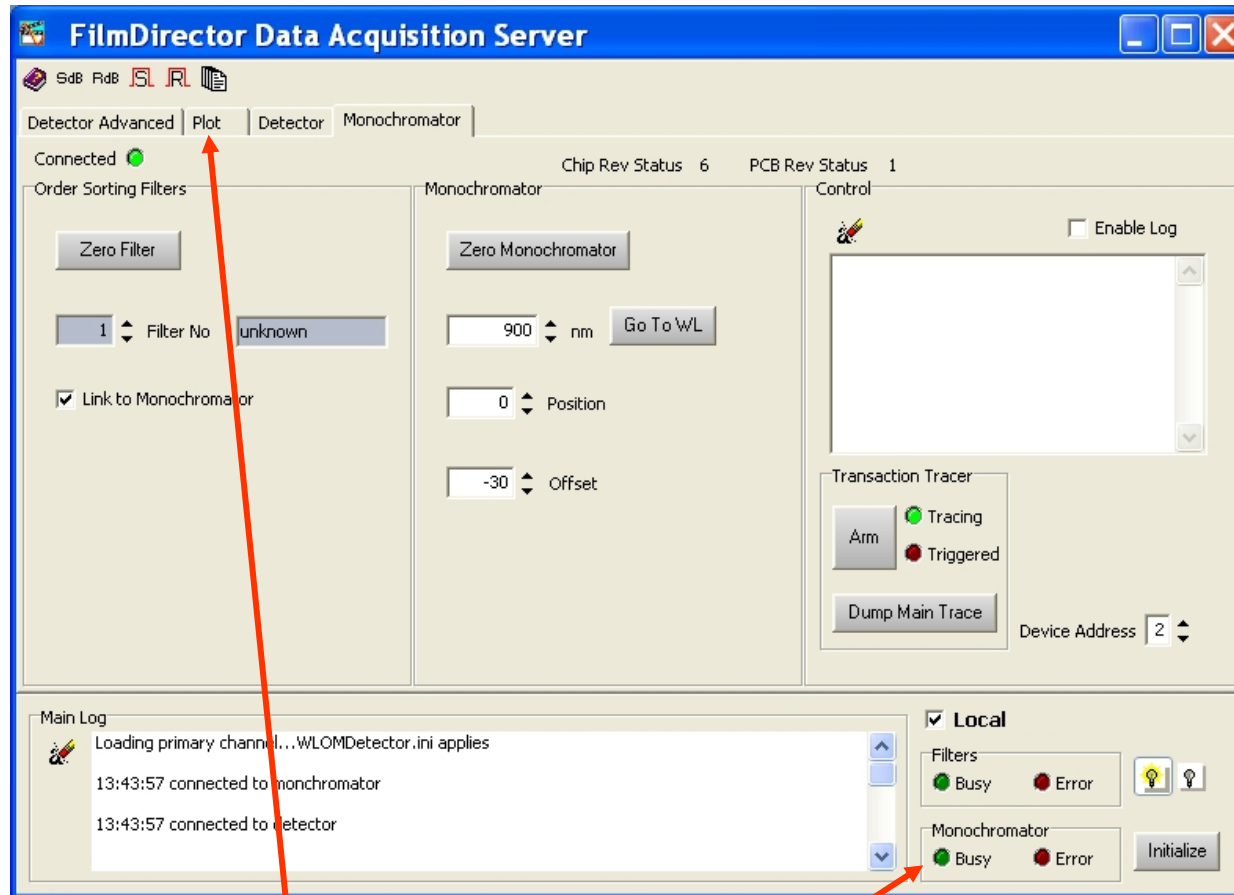
# Stage 4: Detector



Enter a wavelength...Choose a wavelength in the middle of your Detector Module's range.

Then press the GoToWL button

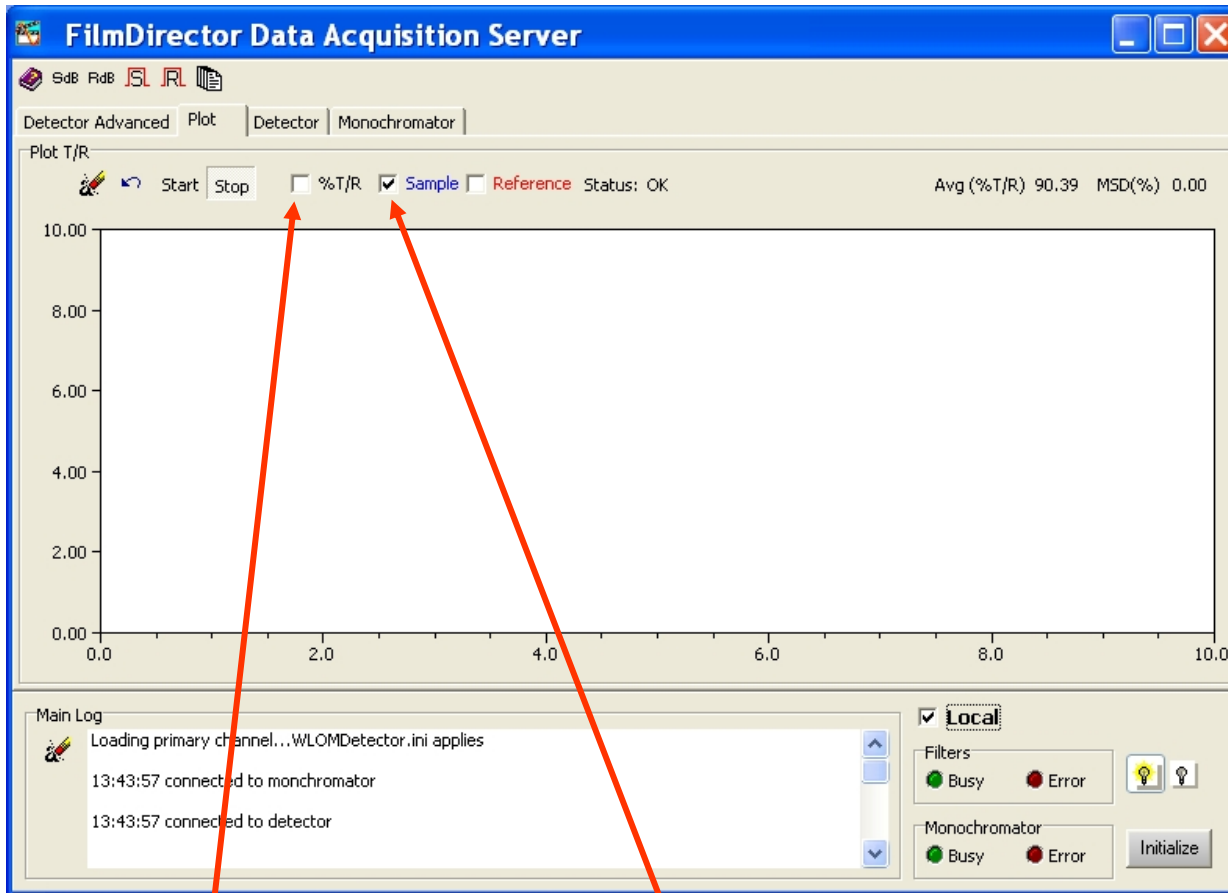
# Stage 4: Detector



Wait till the Busy light goes off

Then press the PLOT tab

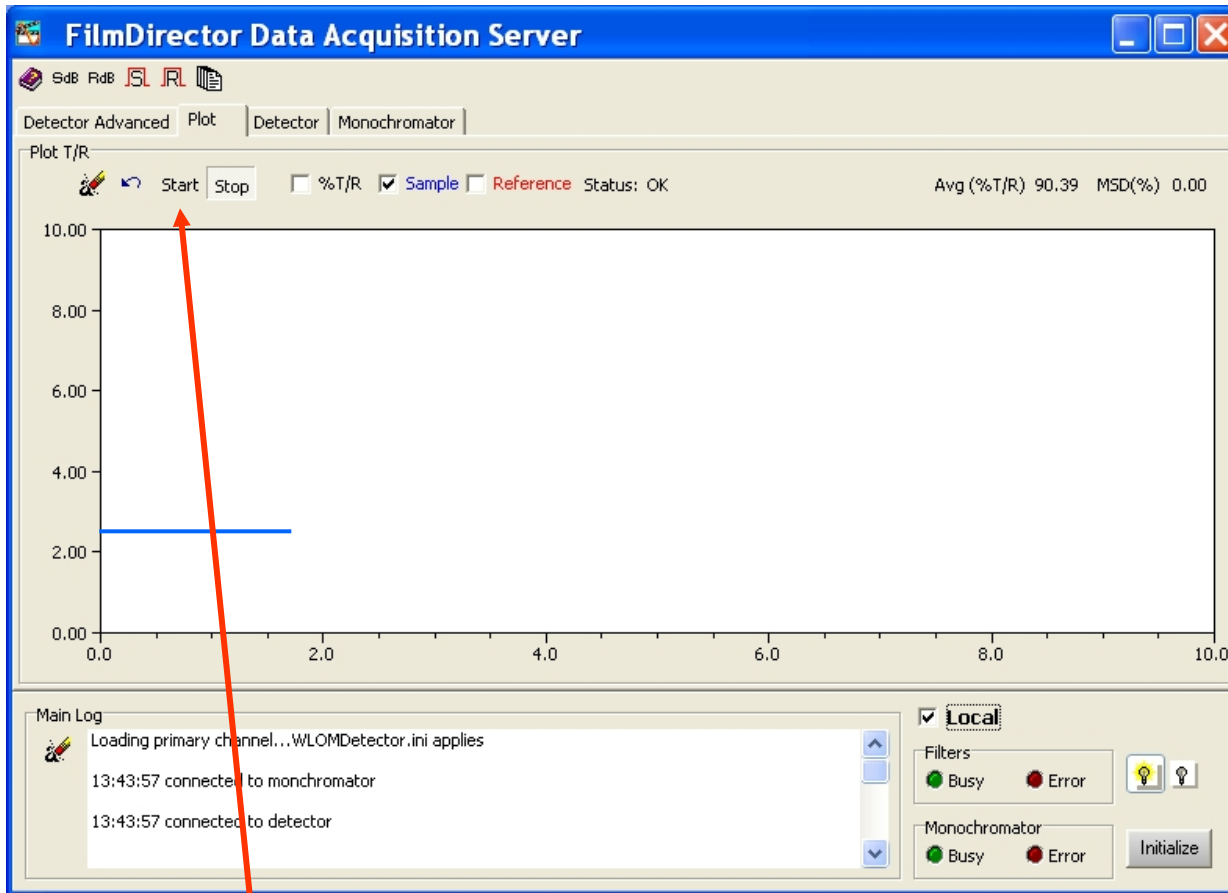
# Stage 4: Detector



Untick the %T/R box

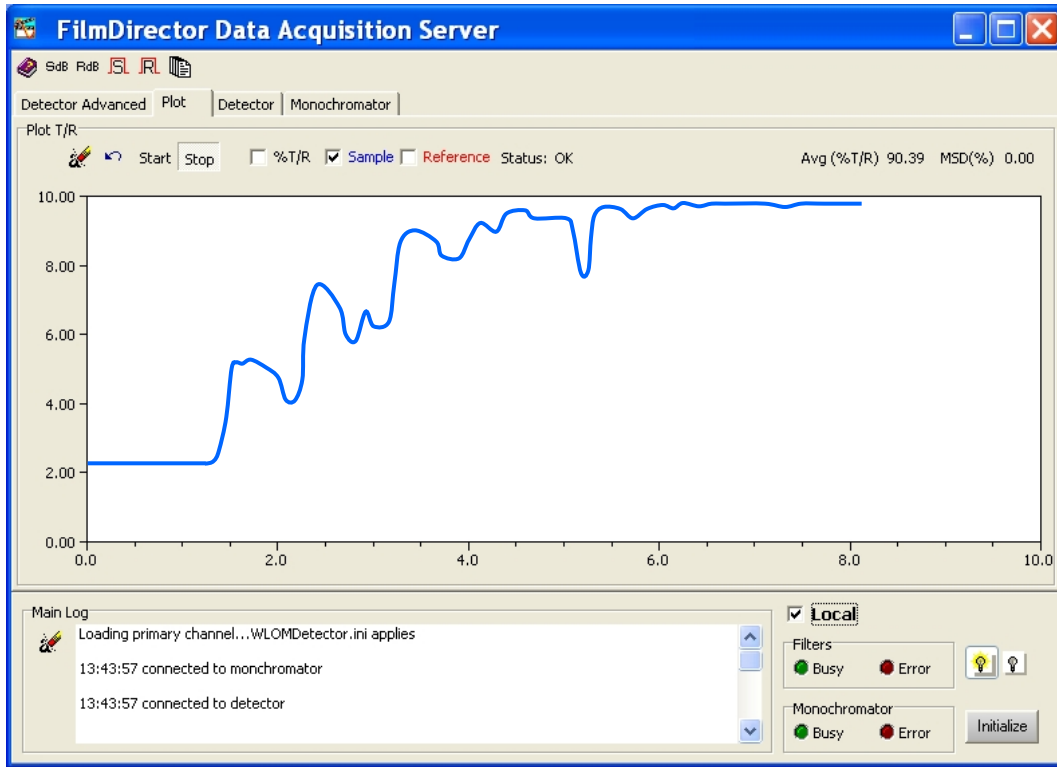
Then tick SAMPLE (untick Reference)

# Stage 4: Detector



Press the START button....we should now see a signal level in the graph window.

# Stage 4: Detector



Optimise the signal level using the alignment screws on the detector module. Remember to work your way around the alignment screws, gradually tightening each one.

Finish using the locking screws.



Locking

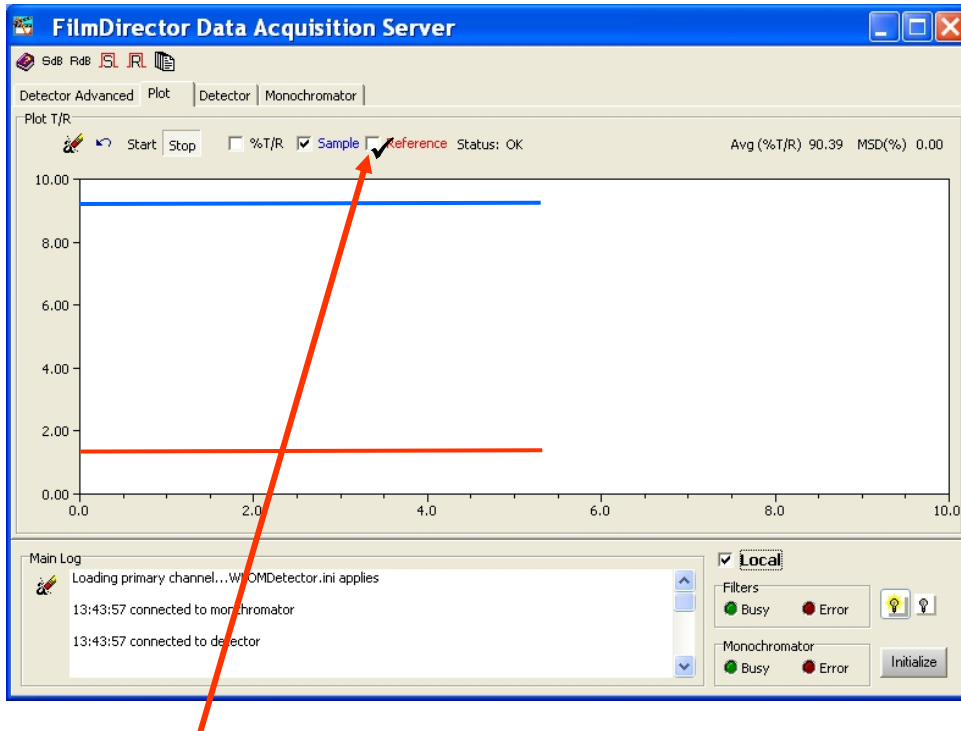
Alignment

# Stage 5: Reference

The final stage of alignment involves balancing the Reference level with the Signal Level. This is not the same as maximising the Reference level.

Again we will use the Data Acquisition Server on the Controller Module to aid us.

# Stage 5: Reference

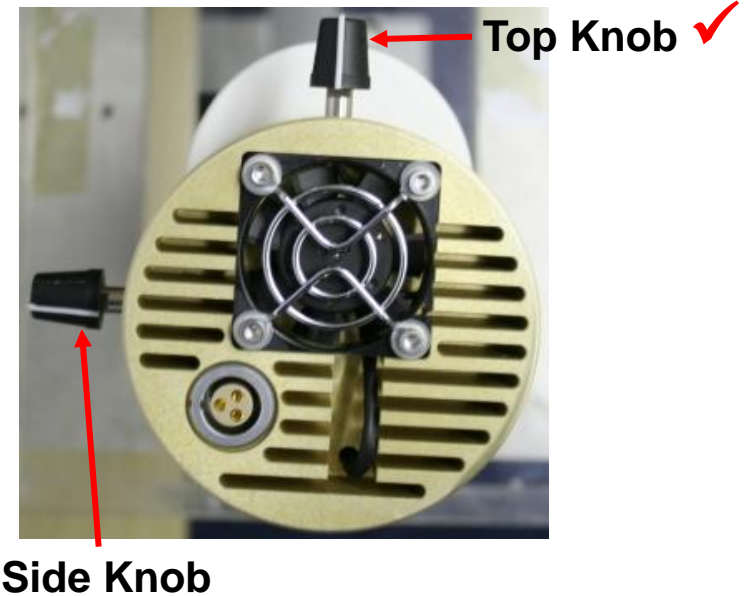
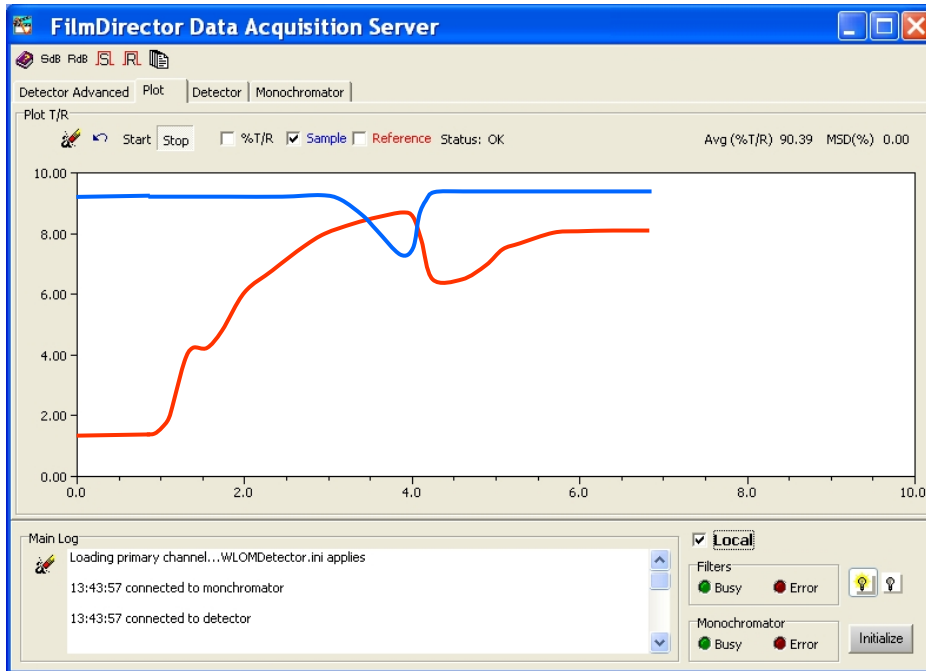


Tick the Reference box

We should now see Reference AND Signal levels in the graph window.



# Stage 5: Reference



Adjust the Top Knob on the Source Module ONLY to adjust the reference level, DO NOT use the Side Knob. Turn the knob to increase the Reference level.

At some point, further increases in Reference level lead to decreases in the Signal level. When this happens, turn the Top Knob back until the Signal level returns to its optimised level. At this point the balance between the Signal and Reference levels has been optimised.

# Summary

Well done, Optical Alignment is Complete.

Remember, whenever you do an Optical Alignment, make sure you do all 5 Stages in order and do not skip any of the stages.

Once the chamber has been pumped down, there may be a small movement of the Test Glass position due to flexure of the chamber walls. This can be tested by monitoring the Signal level (using the Data Acquisition Server) and comparing the values in air and under vacuum.

If there is a decrease in signal level under vacuum then ONLY adjust the three Tilt Adjustment Knobs on the Test Glass Changer to re-optimize the Signal level. DO NOT adjust the Source and Detector Modules.

# Thank You

For further information  
or support, please contact

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