

## User Alignment of an X8 PROTEUM on a FR591, MICROSTAR or MICROSTAR-H generator

### Required tools:

1. Fluorescent pipe
2. Beam stop override
3. Beam attenuator
4. Open beam pipe
5. Half beam pipe
6. Half beam absorber



Figure 1. l.t.r. Fluorescent pipe, Beam stop override



Figure 2. l.t.r. Beam attenuator, Open beam pipe, Half beam pipe, Half beam absorber

### Warning

Some procedures require an activated open beam key switch. This enables the safety shutter to open with an open radiation enclosure. This is a potentially dangerous situation and may only be performed by properly trained personnel.

### General

The following descriptions assume that the system has been installed by a qualified Bruker AXS service engineer, who set the goniometer height and level and bolted down the hover unit bar to the table top according to the procedures described in the Service pages.

**Align table**

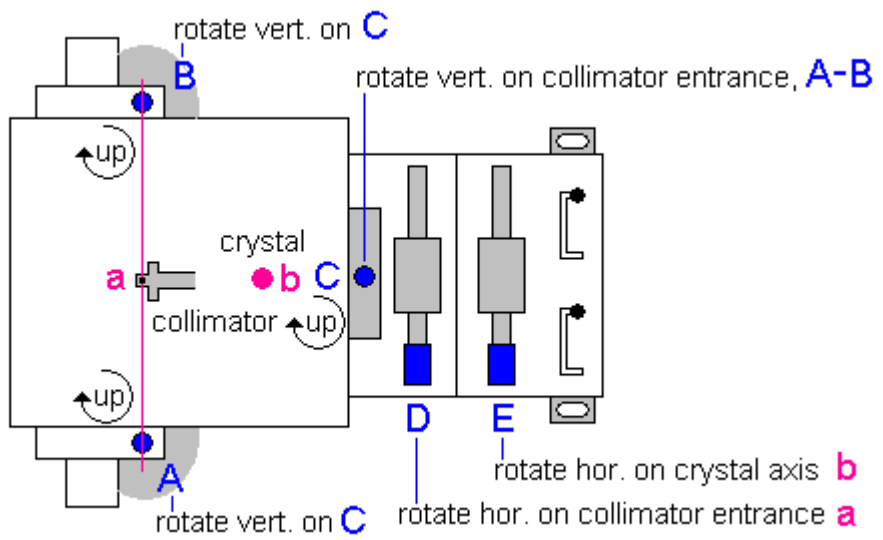


Figure 3. Alignment table, with adjustments indicated.

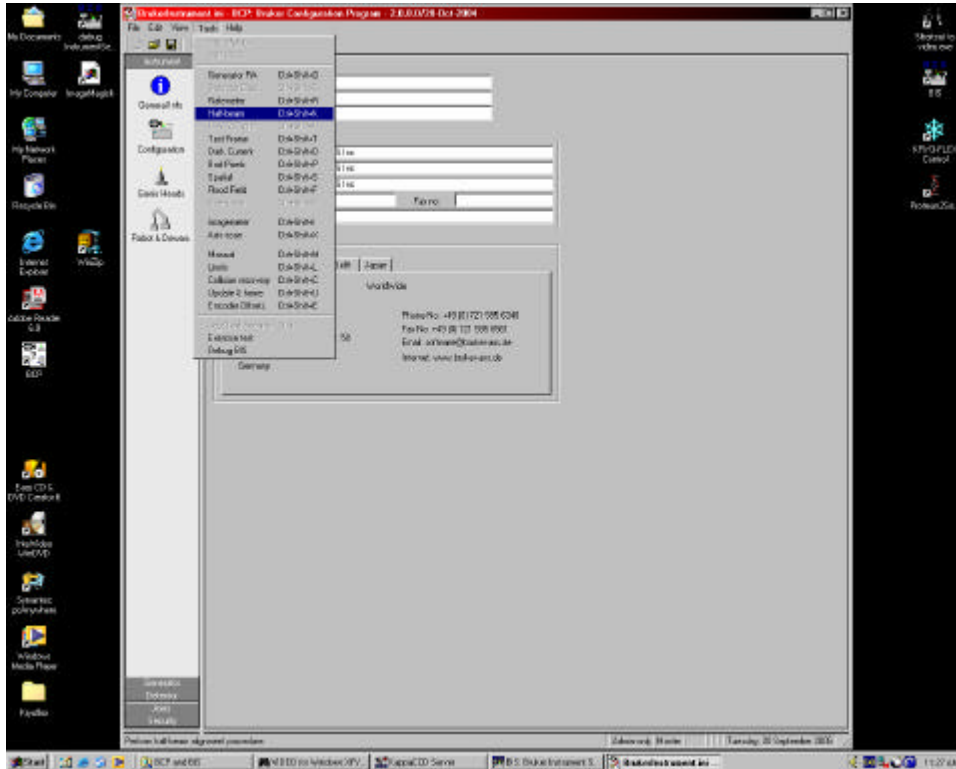


appears) until the spot disappears again and note again the micrometer value. Set the inner-micrometer at the average value.

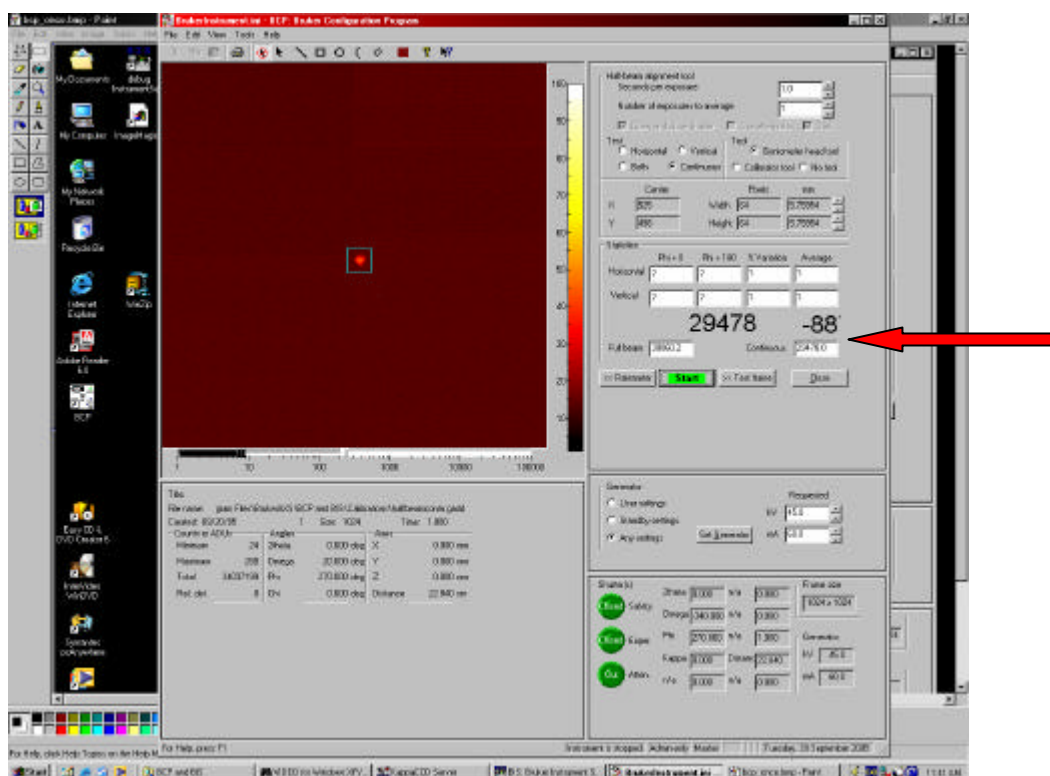
13. Repeat the previous step for the outer-micrometer (E).
14. Disable the hovers, close the shutters (press Toggle Shutter again) and set the open beam key in the safe position.

#### 4. Optimization of mirror alignment

Start BCP and choose Tools > Half-beam



1. Place the open beam pipe in the collimator stand and mount the beam attenuator.
2. Place the beam stop override in the beam catcher position.
3. Set the generator at operating power, for instance full power (MICROSTAR: 45 kV-60 mA) and let the system stabilize for ~60-90 min.
4. Switch on the open beam key (open beam lamp flashes). Warning: this enables open beams. Be sure not to hold your hands in-between the collimator stand and detector.
5. Measure the beam intensity continuously:
  - a. Seconds per exposure 1.0
  - b. Test: Enable Continuous
  - c. Tool: Enable Goniometer head tool
  - d. Press START button



6. The intensity is shown by the program, in the window marked with a red arrow above. The visualization window (on the left) shows the beam and integration window on the detector. Be sure that the beam is within the integration window. Enlarge the integration window to 100X100 pixels if necessary. If the beam is still not in the window, but clearly on one of the edges, repeat the 'Rough alignment' part. If this does not help, the goniometer pitch might be wrong and you should contact a Bruker AXS service engineer for assistance to set the goniometer pitch and level. This will also require a complete realignment of the mirrors.
7. Slightly change both the vertical and horizontal mirror adjustments such that the intensity is maximized.
8. Make a note of the intensity and abort the intensity measurement, by pressing STOP.
9. Set the 'open beam' key in the safe position (open beam lamp does not flash).

## 5. Fine alignment

This procedure is performed with the open beam key in the safe position (lamp does not flash). For each measurement the enclosure must thus be closed. The procedure requires an iterative alignment, starting with alignment at the crystal position; being followed by alignment at the collimator entrance and finally ending with alignment at the crystal position.

Alignment at crystal position:

1. Place the open beam pipe in the collimator stand and mount the beam attenuator.
2. Place the beam stop override.
3. Set the generator at operating power, for instance full power (Microstar: 45 kV-60 mA) and let the system stabilize for 60-90 min.
4. Place the half beam absorber on the crystal position.
5. Use the video microscope and the crystal alignment routines (ProteumServer: Center Crystal plug-in) to align the half beam absorber such that it obscures half of the beam.
6. In BCP > Half-Beam procedure, Choose:

- a. Seconds per exposure: 1.0
  - b. Test: Vertical
  - c. Tool: Goniometer head tool.
7. Press START to measure the beam intensity above and below the half beam absorber with the automated beam alignment routine.

Half-beam alignment tool

Seconds per exposure: 1.0

Number of exposures to average: 1

Open and close shutter  Use attenuator  Dark

Test:  Horizontal  Vertical  Both  Continuous

Tool:  Goniometer head tool  Collimator tool  No tool

	Center		Pixels	mm
X	525	Width	64	5.75954
Y	498	Height	64	5.75954

Statistics:

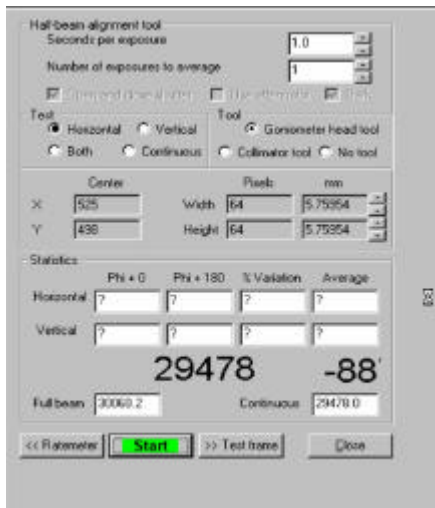
	Phi + 0	Phi + 180	% Variation	Average
Horizontal	?	?	?	?
Vertical	?	?	?	?

29478      -88

Full beam: 30060.2      Continuous: 29478.0

<< Ratemeter   **Start**   >> Test frame   Close

8. Slightly adjust the height of the goniometer at the crystal position (outer height adjustment C) to reduce the Vertical % Variation.
9. Repeat steps 6 - 8 until the intensity above and below the half beam absorber differ less than 10 %.
10. In BCP > Half-beam procedure choose:
  - a. Seconds per exposure: 1.0
  - b. Test: Horizontal
  - c. Tool: Goniometer head tool.
11. Measure the beam intensity left and right of the half beam absorber by using the automated beam alignment routine by pressing START.



12. Activate the hovers and slightly adjust the inner-micrometer (D) of the goniometer to reduce the Horizontal % Variation. Then disable the hovers.
13. Repeat steps 10 – 12 until the intensity left and right of the half beam absorber differ less than 10 %.
14. Remove the half beam absorber.

#### Alignment at collimator entrance

1. In BCP > Half-beam procedure choose:
  - a. Seconds per exposure: 1.0
  - b. Test: Vertical
  - c. Tool: Collimator tool.
  - d. Press START.
2. Place the half beam pipe in the collimator stand with the dots pointing in the direction according to the software instructions and mount the attenuator.
3. Slightly adjust the height of the goniometer at the collimator entrance (A and B), to reduce the Vertical % Variation. Be sure to adjust the two height adjustments equally such that the roll of the goniometer does not change.
4. Repeat steps 1 to 3 until the intensity above and below the obstruction differ less than 5 %.
5. In BCP > Half-beam procedure choose:
  - a. Seconds per exposure: 1.0
  - b. Test: Horizontal
  - c. Tool: Collimator tool.
  - d. Press START.
6. Place the half beam pipe in the collimator stand with the dots pointing in the direction according to the software instructions and mount the attenuator.
7. Activate the hovers and slightly adjust the outer-micrometer (E) of the goniometer to reduce the Vertical % Variation. Then disable the hovers.
8. Repeat steps 5 to 7 until the intensity left and right of the obstruction differ less than 5 %.

Repeat the alignment at the crystal position, reducing the % Variation to less than 5%.

If the alignment was changed significantly it is advisable to repeat the procedure. Always end the alignment at the crystal position.