

NICI Cryostat Filter, Dichroic and Pupil Mask Change Procedure



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1.0 Introduction

NICI is designed to allow relatively easy changes of the filters, dichroics and pupils that are mounted internal to the NICI cryostat. This document describes the procedures for making these changes.

2.0 Safety issues

Refer the the NICI safety document before performing any operation on NICI.

NICI is a large instrument with individual elements weighting more than 200 Lbs. A very strong table must be used for assembly. Two overhead cranes are required for some operations. Lifting straps rated for 2,000 lbs are recommended.

NICI contains static sensitive elements. Proper static procedures must be followed or valuable detectors and circuits can be damaged.

NICI contains high quality optical elements that cost up to \$25,000. Extreme care must be taken not to damage the optical element surfaces.

NICI uses many Orings and has many oring surfaces that have been careful polished. Care must be taken not to damage these oring surfaces.

NICI has many highly polished surfaces inside the cryostat. Gloves should be worn at all times when working in the cryostat.

3.0 NICI Cryostat Filter, Dichroic and Pupil Mask Change Procedure

Starting with the cryostat fully warm in a clean, dry dust free area back fill the cryostat with dry nitrogen to vent it.

Screw the four legs onto the black vacuum jacket section and position the cryostat as shown below.

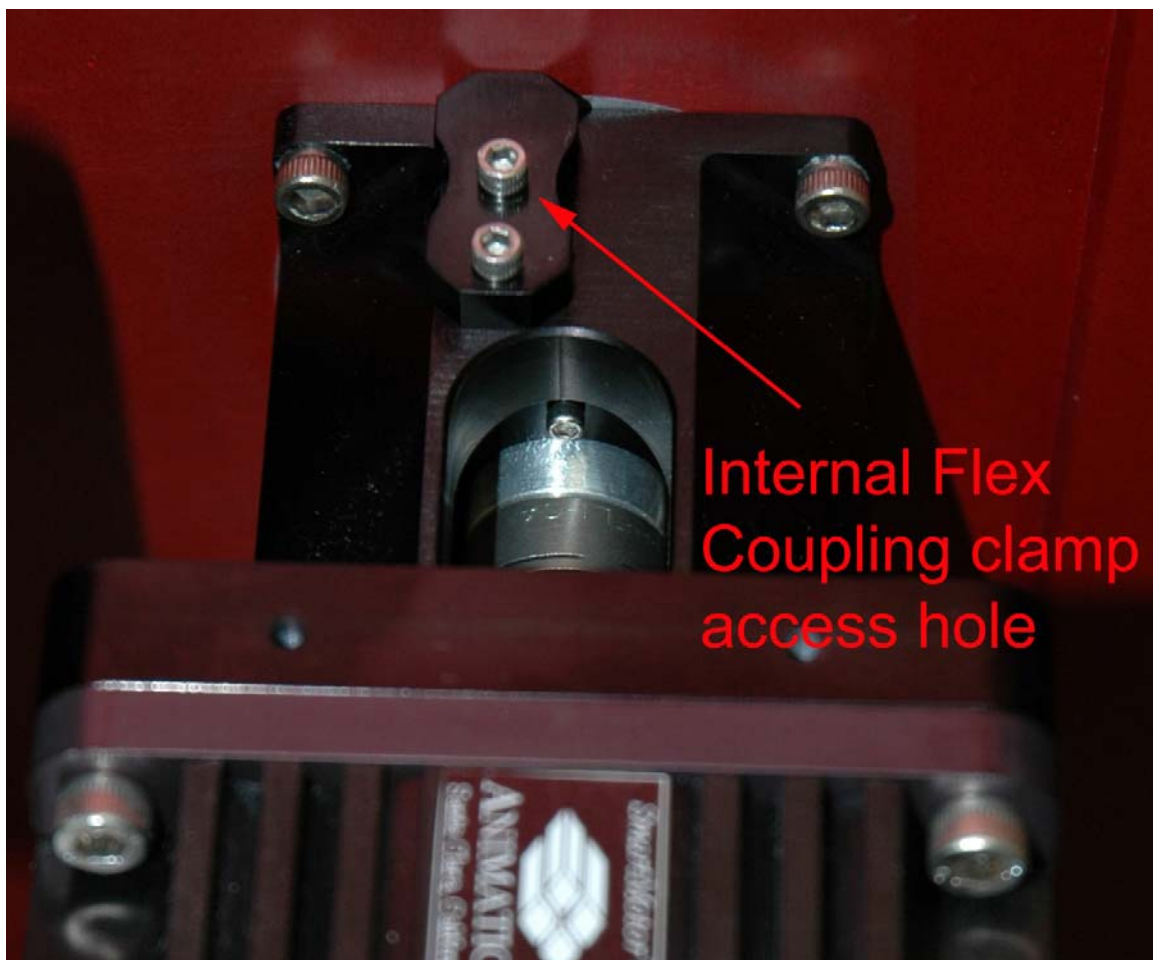


Note: Legs, closed cycle coolers and Motor mounts are missing in this photo. They will still be in place at this point of the filter change procedure.

First the four motor mounts on the raised red vacuum jacket cover and the one motor mount in the flat red vacuum jacket cover must be removed.

Remove the motor mounts by first removing the cover to the internal flex coupling clamp shown below. Turn the shaft until the flex coupling clamping screw is visible through the access hole. Loosen but do not remove the flex coupling clamping screw. Then remove the mount and motor together by removing the four screws that mount the motor mount to the vacuum jacket and pulling the motor mount straight out away from the vacuum jacket.

Note the orientation of the motor mounts for reassembly. The access cover must be positioned correctly so that the motor mount will fit and that there is easy access to the hole.



Next remove the two red vacuum jacket covers. NICI will now look like the picture below.

Note: the vacuum jacket covers use two dowel pins to help with alignment during assembly. These are loose fitting dowel pins.

Remove and bag the orings.



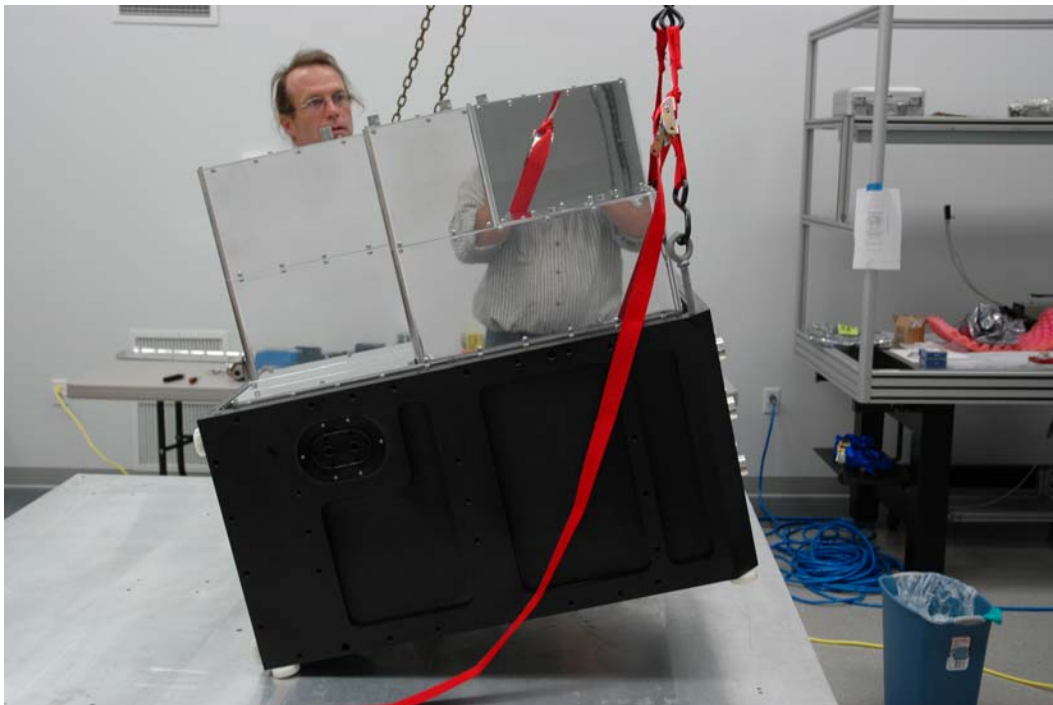
Next remove the Blue vacuum jacket spacer by removing all of the screws around the edges and lifting straight up. Either an overhead crane or three people are required to lift this cover off. This vacuum jacket element is also attached with dowel pins.

Remove and bag the Orings.

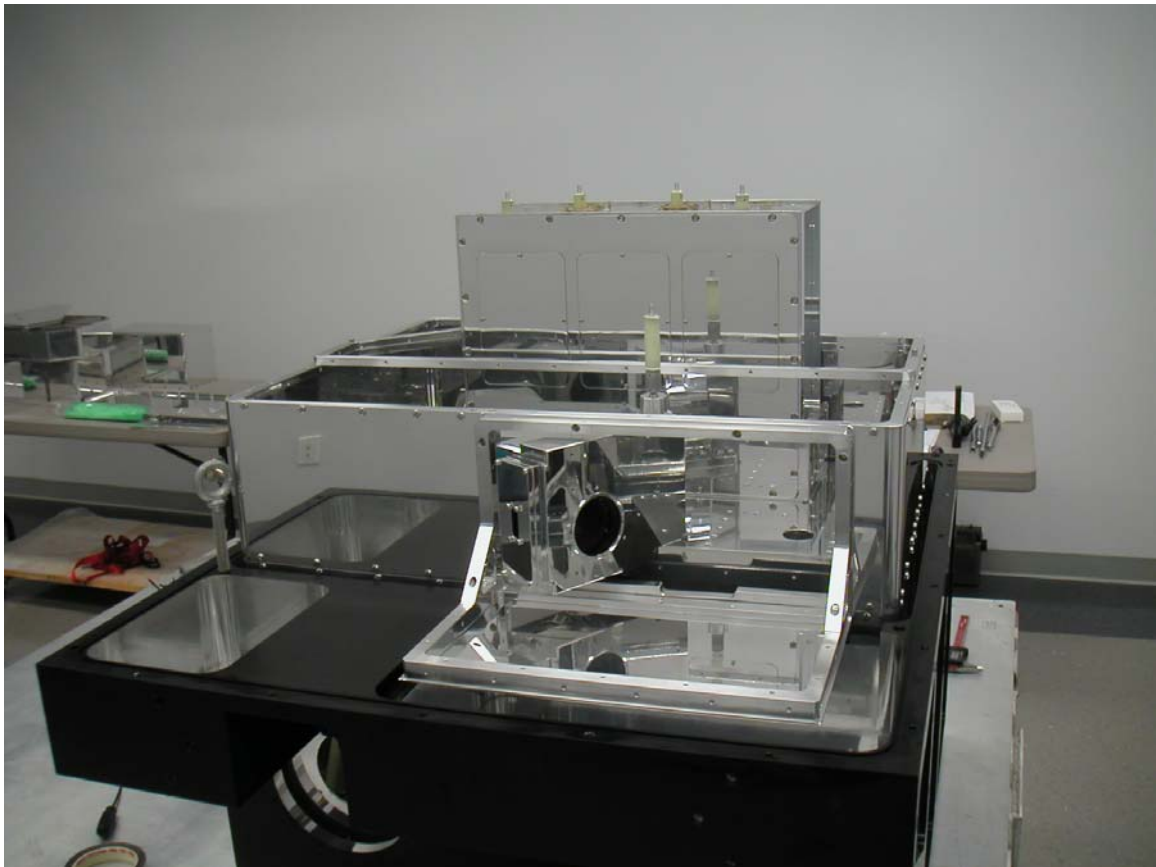
NICI will now look like the pictures below.



While the rest of the procedure can be performed with the cryostat in this position it is more convenient to tip it up. Using an overhead crane flip the cryostat up into the position shown below.

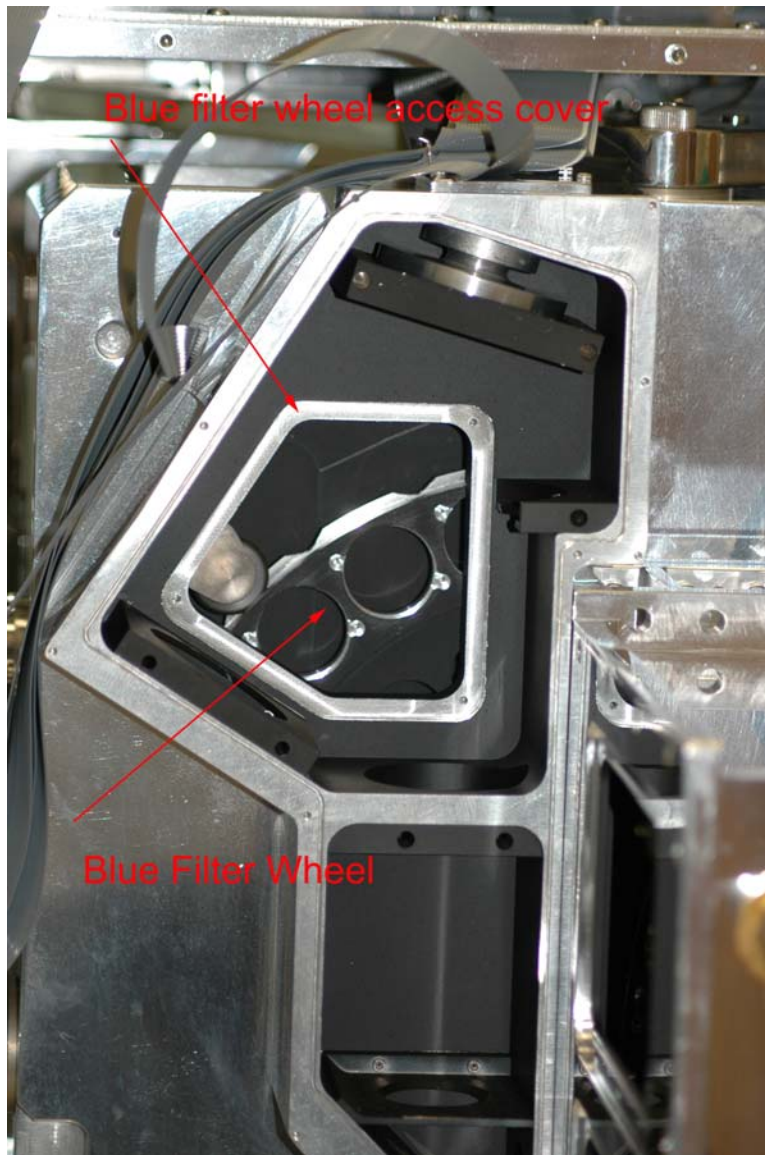


Remove the radiation shield that covers the mechanism box area. This is the shield with the four motor shafts protruding. Remove the flat cover and the first section of the shield together by loosening the screws at the base of the first section. The picture below shows the cryostat in the horizontal orientation which is not consistent with the described procedure but shows the level to which the shields are removed. In the picture the detector shield and detector assembly have also been removed which is not required for filter or dichroic changes.



Another way to state this is that assembly #4900 and piece #5007 must be removed. Refer to the NICI radiation shield assembly drawings if there is any confusion about which pieces to remove.

The next part of the procedure depends on which wheel the element is going to be installed in.



Blue filter Wheel Access

Access for the blue filter wheel is shown in the picture below.

Remove cover # 5207

Remove cover # 5204

Blue filter wheel is now accessible for changing filters.

Remove and change filter carrier assembly #8700

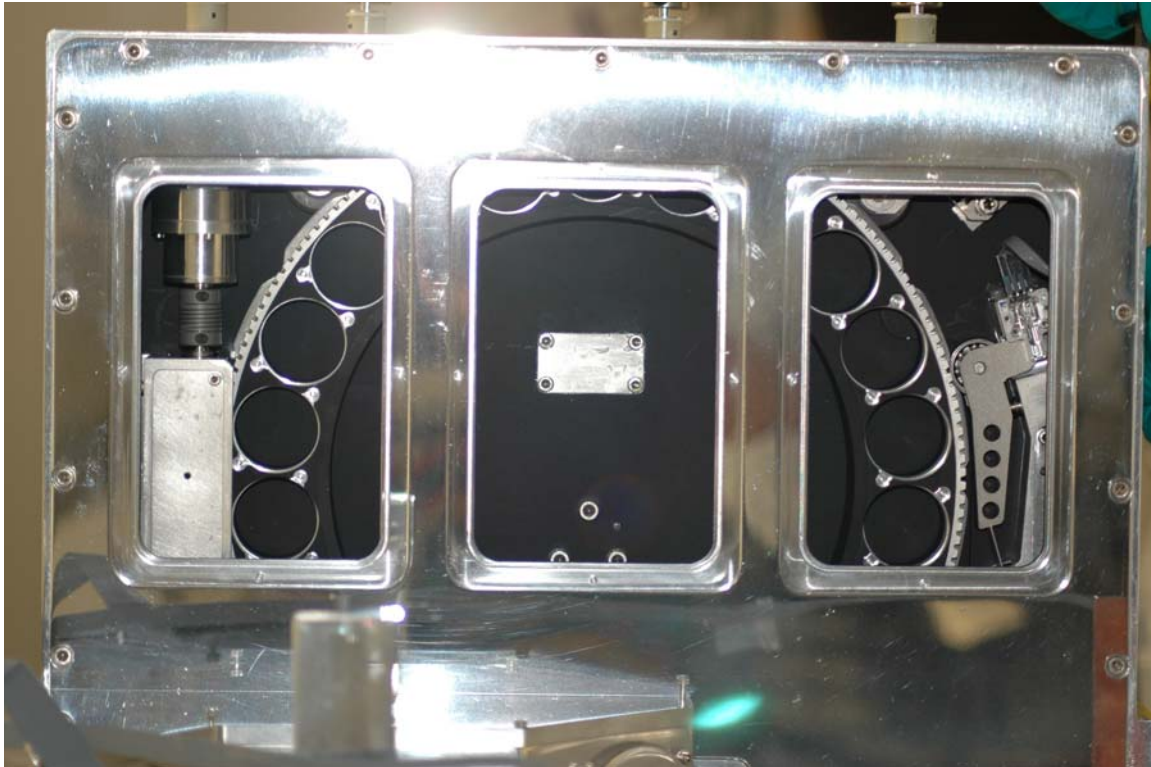
Replace new filter already mounted in assembly # 8700

Make sure the filter carrier sits flush in the wheel when the installation is complete or it will hit on the baffle. Turning the wheel, by hand, before closing up the cryostat is a good idea.

Note: the screws in the filter carriers are captive

Red Filter Wheel Access

The Red filter wheel is accessed through sub-covers into the mechanism box covers. The red filter wheel side is the one away from the cryostat window with the three sub covers in a row. Remove the far left or far right cover to change filters. These covers also give access to the worm drive and the detent/hall effect assembly.



Remove and change filter carrier assembly #8700

Replace new filter already mounted in assembly # 8700

Make sure the filter carrier sits flush in the wheel when the installation is complete or it will hit on the baffle. Turning the wheel, by hand, before closing up the cryostat is a good idea.

Note: the screws in the filter carriers are captive

Dichroic or Pupil Mask Access

The dichroic and pupil mask wheels are both accessed from the side of the mechanism box toward the cryostat window. The picture below shows what is visible with all three sub covers removed. Only the middle cover is required for access to these two wheels. The other covers give access to the drives and hall effects for the three mechanisms on this side of the mechanism box.

Pupil mask

The pupil masks are in carriers like the filters with captive screws. Remove the carrier of choice and replace with the new carrier.

The carrier must be flush when finished to avoid interference with the baffles.

Dichroic or beamsplitter element

The dichroics are not mounted in carriers. Remove the #7001 dichroic cover plate. Remove the #7002 Preload leaf spring. Remove the metal dummy dichroic. Install the new dichroic and replace the leaf spring and cover plate.

Note – Dichroic covers plates are matched to the hole that they go into. Change only one at a time to avoid any confusion. They are numbered on the bottom edge of the cover and position one on the wheel is marked with a center punch on the top surface.

The cover must be flush when finished to avoid interference with the baffles.

