

8.4 Internal Structure Removal & Installation

1. Introduction

Section 8.4 addresses the removal of components that are internal to the GNIRS dewar and is the 2nd of 3 sections that cover instrument disassembly. All the procedures in this section and Section 8.5 are to be conducted in a Class 10,000 clean room environment to minimize risk of contamination to sensitive optical components.

In the preceding section (8.3), the disassembly procedures are conducted in a non-clean room environment. Up to that point the dewar is sealed and no risk to contaminating sensitive internal optical components exists. In the subsequent sections, the dewar is opened and the sensitive internal optical components are exposed and at risk to contamination.

In Section 8.4, all disassembly procedures are to be conducted in a Class 10,000 Clean Room. Prior to moving the instrument into clean room, it is necessary to clean external surfaces of instrument to minimize contamination to clean room. Additionally, the instrument internal structure must be at ambient temperature and purged with dry Nitrogen to ambient pressure before opening instrument. If the procedures outlined in Section 8.2 have been followed, the instrument will be at ambient pressure and temperature. However, it is imperative to verify that it is in this condition prior to further disassembly. Follow the procedures below to prepare the instrument for clean room disassembly.

Preparing Instrument For Disassembly In Clean Room

1. Remove dust/particulate matter from external surfaces of instrument with compressed air and/or wiping with clean cloth. Clean external surfaces using soap and water and a clean cloth. Refer to NOAO specification 89-NOAO-4205-0005 Cleaning For Vacuum Environment Specification for further information.
2. Move instrument to Class 10,000 clean room using Instrument Handling Cart (89-NOAO-4202-0003) prior to removing dewar shells. If instrument is not currently mounted to Instrument Handling Cart, reinstall instrument mounting trusses as described in Section 8.3.4 and lift instrument onto cart using crane with straps attached to lifting points. Remove instrument mounting trusses after mounting instrument to Handling Cart.
3. Ensure instrument has been warmed and purged as described in Section 8.2.6 and 8.2.7.
4. Instrument is now ready for further disassembly.

8.4.1. Detector Assembly & Detector Focus Assembly

1. Description

This section describes the procedures to remove the Detector Focus Assembly from the GNIRS optical bench. This procedure must be conducted in a Class 10,000 clean room environment.

Caution: It is imperative that the detector be removed prior to further instrument disassembly. Failure to remove the detector at this point will subject the detector to risk of damage from electrostatic discharge.

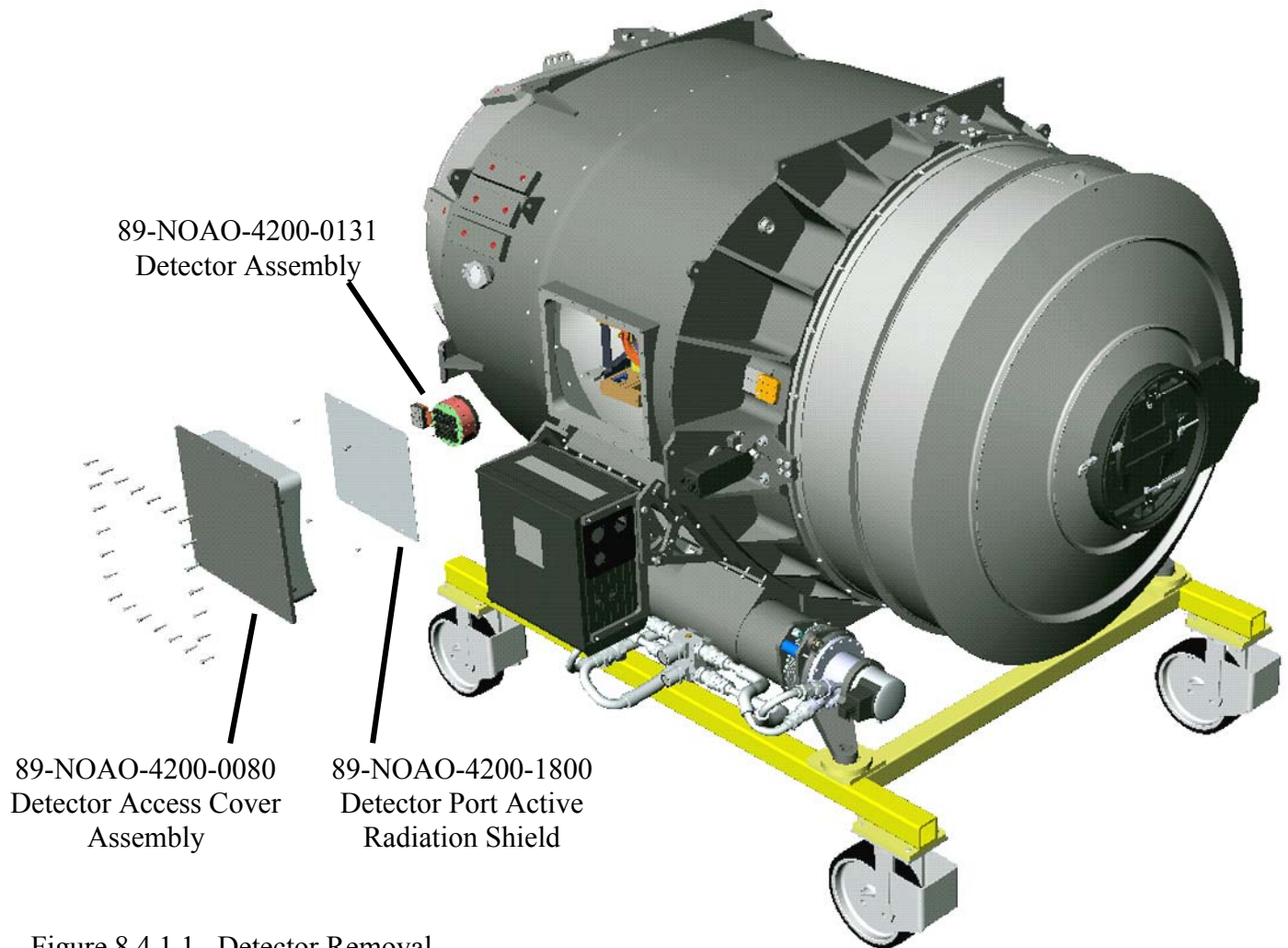


Figure 8.4.1.1. Detector Removal.

2. Nomenclature

89-NOAO-4200-0037	Detector Focus Assembly
89-NOAO-4200-0131	Detector Assembly
89-NOAO-4200-0080	Detector Access Cover Assembly
89-NOAO-4200-1800	Detector Port Active Radiation Shield
89-NOAO-4202-1111	Detector Port Cover
89-NOAO-4202-0032	Detector Mount Removal Fixture
	Detector Pre-Amp Box
	OIWFS Detector Controller Box

3. Safety Precautions

Electrostatic sensitive device: Follow proper grounding procedures prior to handling components.

Delicate vacuum seal surfaces: Do not damage O-ring sealing surfaces of components. Vacuum leaks can result from damage.

Risk of opening instrument under vacuum and cold environment: Ensure instrument has been warmed and purged as described in Section 8.2.



Figure 8.4.1.2. Removal of Detector Focus Assembly, Detector Preamp box, and OIWFS Controller box.

4. Special Tools / Fixtures

89-NOAO-4202-0032 Detector Mount Removal Fixture

5. Personnel Recommended/Required To Complete Task

The required number of personnel needed to complete this task is 2.

6. Procedures

Detector Removal

- A. **WARNING: Ensure instrument is properly grounded as described in Section 8.3.1.**
- B. Ensure instrument has been warmed and purged as described in Section 8.2.
- C. Remove 89-NOAO-4200-0080 Detector Access Cover Assembly.
- D. Remove 89-NOAO-4200-1800 Active Radiation Shield.
- E. Install 89-NOAO-4202-0032 Detector Mount Removal Fixture onto the detector access port O-ring surface.
- F. Disconnect cold strap from 89-NOAO-4200-0131 Detector Assembly.
- G. Remove Detector Array per Section 8.8.1.

- H. Remove the array removal bracket from 89-NOAO-4202-0032 Detector Mount Removal Fixture in order to gain access to the rest of the detector focus assembly.
- I. Disconnect J714, J715, and J716 inside the Detector Preamp from the forward bulkhead feed thru assembly.
- J. Remove Detector Preamp Box and mounting brackets.
- K. Disconnect Detector focus assembly motor cold strap from active shield.
- L. Disconnect J21LS and J21M from 89-NOAO-4200-0037 Detector Focus Assembly.
- M. Disconnect P1, P2, P3, P4, P5, P6, P7, P8, P9, and P10 from 89-NOAO-4200-0131 Detector Assembly.
- N. Loosen the four captive retainer screws that fasten the focus baffle to the main optical bench.
- O. Loosen the four captive retainer screws that fasten 89-NOAO-4200-0037 Detector Focus Assembly to the main optical bench.
- P. Remove 89-NOAO-4200-0037 Detector Focus Assembly.
- Q. Remove OIWFS Detector Controller Box and mounting brackets.

7. **Summary**

This section outlined the procedures to remove the detector from the optical bench. The instrument is first prepared for clean room by removing dust, debris, and oily residues by washing with soap and water. Next the instrument is moved to a Class 10,000 clean room. If the internal optical bench structure has not yet been warmed to ambient temperature and purged with dry Nitrogen to ambient pressure, these procedures are followed as described in Sections 8.2.6 and 8.2.7. The detector port cover and active shield are removed exposing the detector. The Detector Assembly is removed, followed by the Detector Preamp Box and OIWFS Detector Controller Box.

After completion of this task, proceed to Section 8.4.2 to continue with instrument disassembly procedures.

8.4.2. Aft Dewar Shell and Molecular Sieve

1. Description

This section describes the procedures to remove the Aft Dewar Shell and Molecular Sieve from the GNIRS dewar. This procedure must be conducted in a Class 10,000 clean room environment. Note: If any procedure requires opening the dewar for periods longer than a few hours, the molecular sieve can get saturated with contaminants in the air and it will have to be removed, vacuum baked and reinstalled prior to closing dewar. In general, the molecular sieve should be removed when breaking the vacuum seal on the dewar.

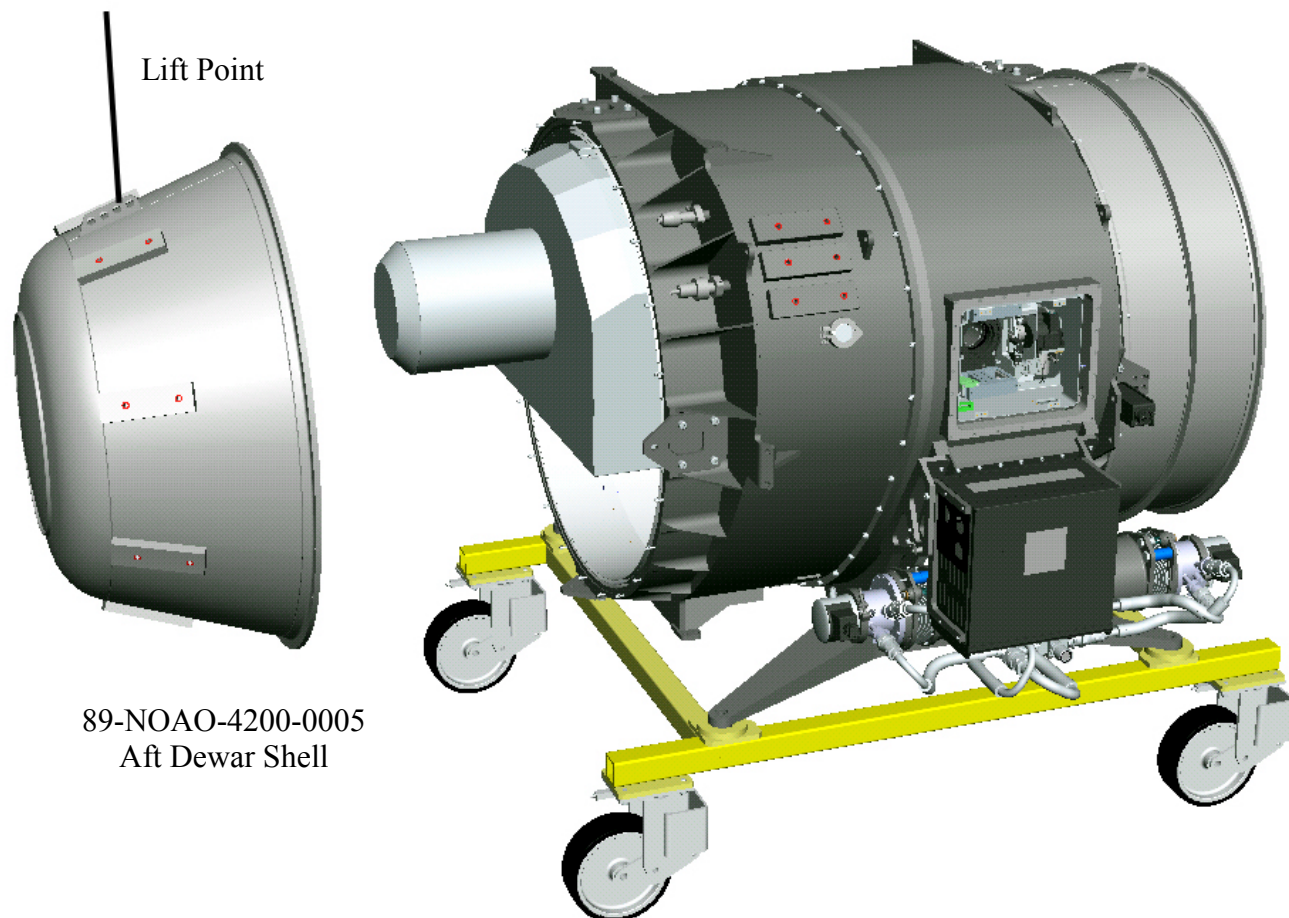


Figure 8.4.2.1. Aft Dewar shell removal

2. Nomenclature

89-NOAO-4200-0005	Aft Dewar Shell Assembly
89-NOAO-4200-0222	Molecular Sieve Assembly

3. Safety Precautions

Heavy components: Do not attempt to lift components manually. Use proper lifting equipment.

Item

Aft Dewar Shell Assembly

Weight

95 Lbs (43 Kg)

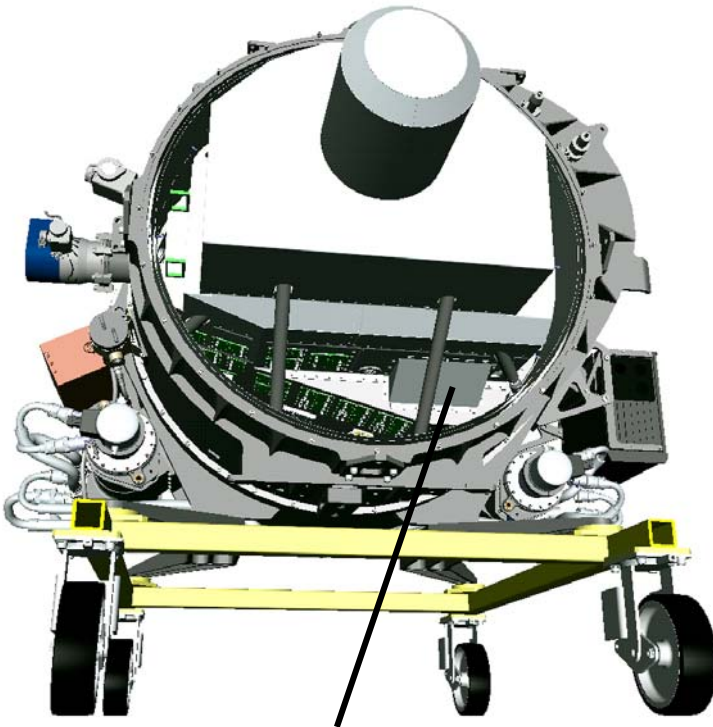
Delicate vacuum seal surfaces: Do not damage O-ring sealing surfaces of components. Vacuum leaks can result from damage.

4. Special Tools / Fixtures

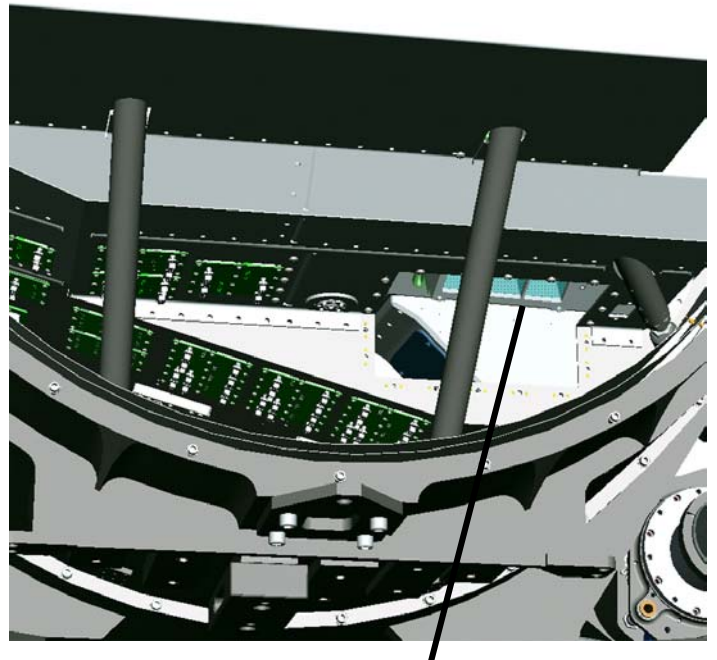
Crane
Lifting Straps

5. Personnel Recommended/Required To Complete Task

The recommended number of personnel needed to complete this task is 2.



89-NOAO-4200-0222 Molecular Sieve Cover



89-NOAO-4200-0222 Molecular Sieve Assembly

Figure 8.4.2.2. Molecular Sieve removal.

6. Procedures

Aft Dewar Shell and Molecular Sieve Removal

- A. Attach strap to lift point on Aft Dewar Shell and connect strap to crane.
- B. Lift crane until sufficient preload on strap is achieved to support weight of Aft Dewar Shell.
- C. Remove socket head cap screws around perimeter of Aft Dewar Shell flange.
- D. Carefully move dewar shell away from instrument using caution not to bump adjacent components.
- E. Use caution when handling dewar shell so as not to damage O-ring groove or adjacent mating surfaces.
- F. Remove 89-NOAO-4200-0222 Molecular Sieve Cover shield.
- G. Remove temperature sensor connector on Molecular Sieve.
- H. Disconnect cold strap from Molecular Sieve.

- I. Loosen bolts on Molecular Sieve mounting brackets and slide brackets to free up Molecular Sieve.
- J. Remove 89-NOAO-4200-0222 Molecular Sieve and put into sealed storage container or vacuum oven. Note that desiccant in Molecular Sieve can saturate with water vapor and should be sealed in dry environment as soon as possible.

7. Special Reassembly Instructions

Carefully wipe O-rings and mating surfaces with methanol or ethanol (do not use isopropyl alcohol). Visually inspect O-ring seal surfaces for scratches or other damage. If damaged, surfaces must be repaired to insure vacuum integrity.

When re-installing Aft Dewar Shell, torque fasteners in a circular pattern progressively increasing torque until required torque is obtained in order to ensure a uniform vacuum seal is achieved.

8. Summary

This section outlined the procedures to remove the Aft Dewar Shell and Molecular Sieve from the GNIRS dewar. The Aft Dewar Shell is removed using a crane exposing the internal optical bench structure. The Molecular Sieve is removed and put into a sealed dry container. The Molecular Sieve gets vacuum baked prior to re-installation. This procedure is conducted in a Class 10,000 clean room.

After completion of this task, proceed to Section 8.4.3 to continue with instrument disassembly procedures.

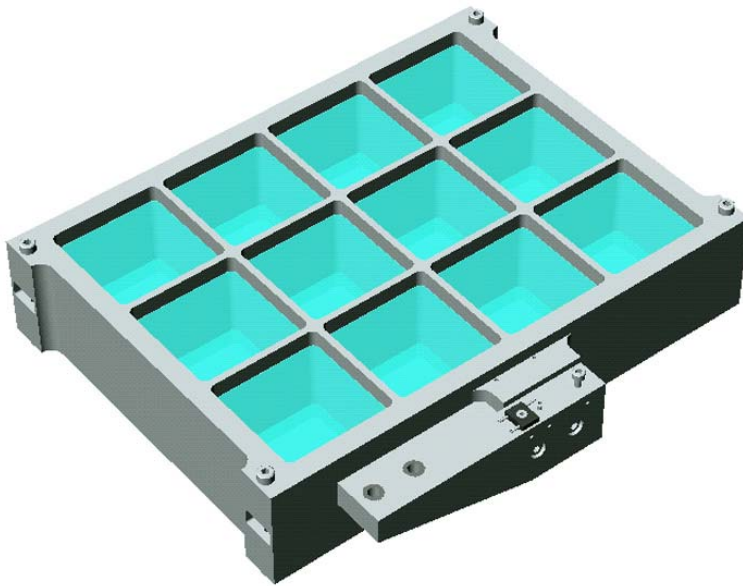


Figure 8.4.2.3. Molecular Sieve.

8.4.3 Forward Dewar Shell and Aft Bulkhead

1. Description

This section describes the procedures to remove the Forward Dewar Shell and Aft Bulkhead from the GNIRS instrument. This procedure must be conducted in a Class 10,000 clean room environment.

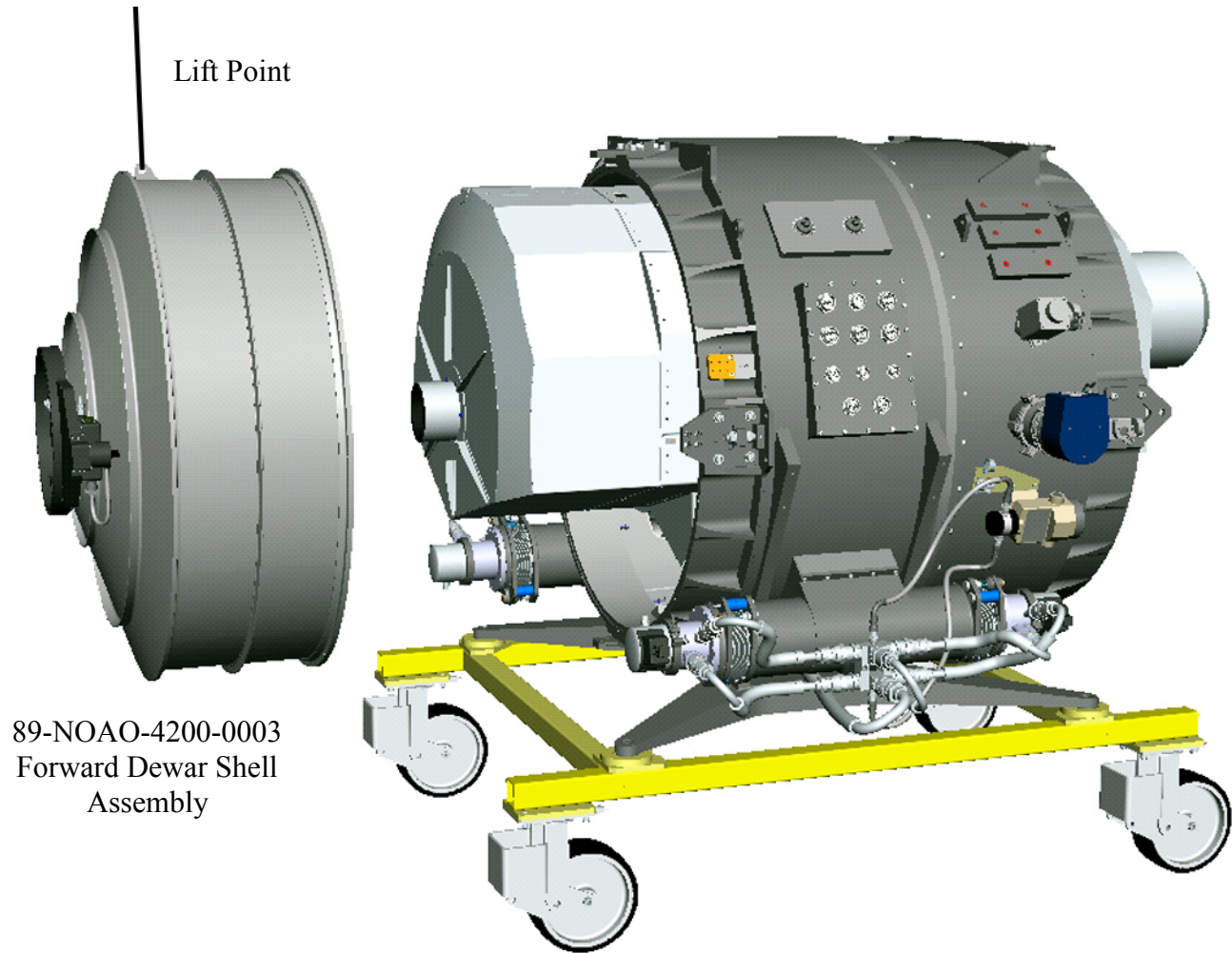


Figure 8.4.3.1. Forward Dewar Shell Removal.

2. Nomenclature

89-NOAO-4200-0017	Aft Bulkhead Assembly
89-NOAO-4200-0003	Forward Dewar Shell Assembly

3. Safety Precautions

Heavy components: Do not attempt to lift components manually. Use proper lifting equipment.

Item

Aft Bulkhead Assembly

Forward Dewar Shell Assembly

Weight

245 Lbs (110 Kg)

130 Lbs (60 Kg)

Delicate vacuum seal surfaces: Do not damage O-ring sealing surfaces of components. Vacuum leaks can result from damage.

Clean room environment: Use gloves when handling components. Observe guidelines for clean room attire and conduct.

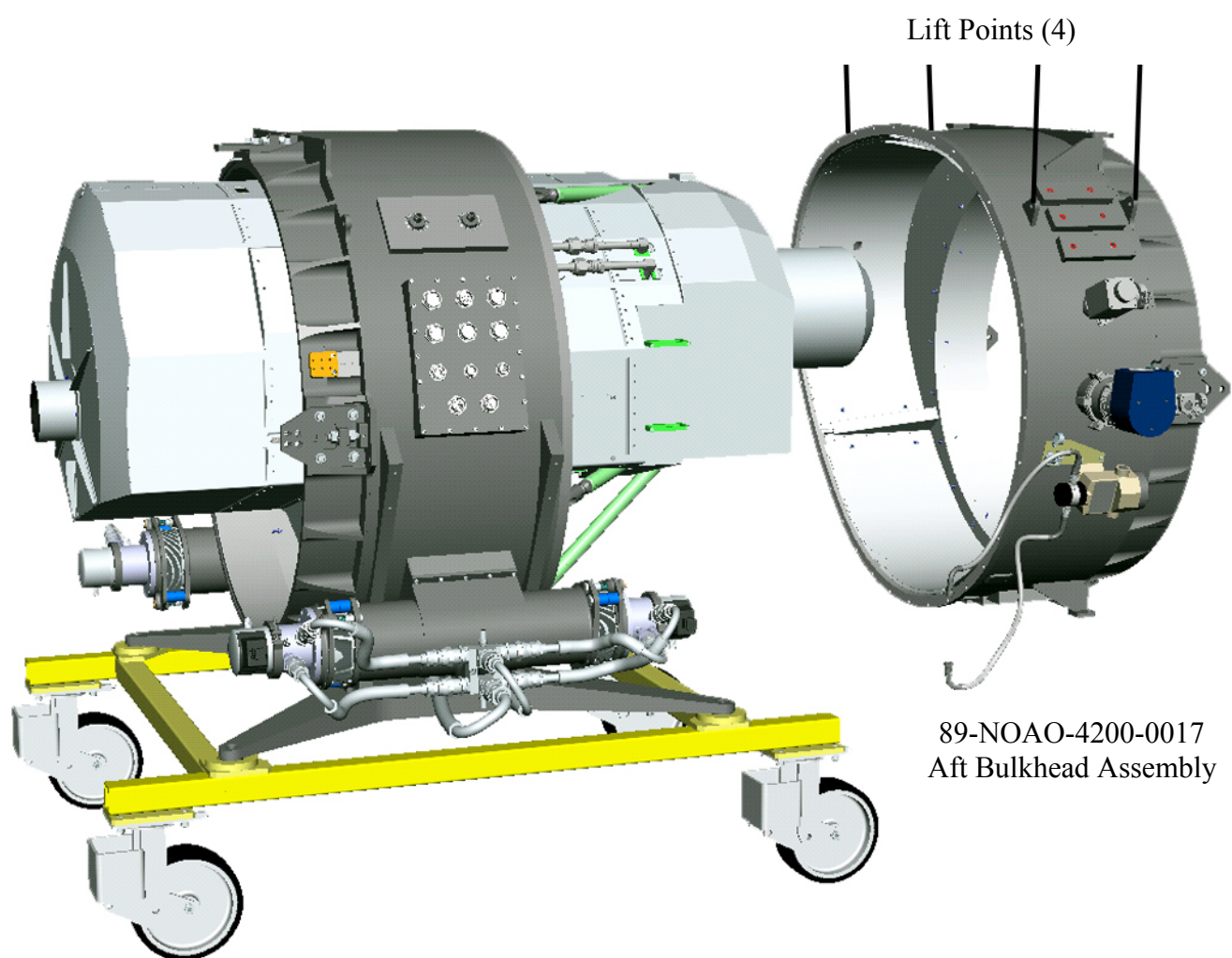


Figure 8.4.3.2. Aft Bulkhead Removal.

4. Special Tools / Fixtures

Crane

Lifting Straps

5. Personnel Recommended/Required To Complete Task

The recommended number of personnel needed to complete this task is 2.

6. Procedures

Forward Dewar Shell Removal

- A. Verify that environmental cover is closed. If cover is not closed and power cables have been disconnected, manually turn knob located on motor mounted to back side of environmental cover assembly until cover is closed. Use caution not to touch dewar entrance window.
- B. Ensure all cables, hoses, etc are disconnected from Forward Dewar Shell.
- C. Attach strap to lift point on Forward Dewar Shell and connect strap to crane.
- D. Lift crane until sufficient preload on strap is achieved to support weight of Forward Dewar shell.
- E. Remove socket head cap screws around perimeter of Forward Dewar shell flange.
- F. Carefully move dewar shell away from instrument using caution not to bump adjacent components.
- G. Use caution when handling dewar shell so as not to damage O-ring groove or adjacent mating surfaces.

Aft Bulkhead Removal

- A. Ensure that all helium hoses and electrical cables are disconnected from Aft Bulkhead Assembly (89-NOAO-4200-0017) prior to removal.
- B. Install Aeroquip connector covers to helium hose connectors after disconnecting helium hoses to ensure connector interfaces remain clean.
- C. Attach straps to lift points (4) on Aft Bulkhead Assembly (89-NOAO-4200-0017) and connect straps to crane.
- D. Lift crane until sufficient preload on straps to support weight of component is achieved.
- E. Remove (16) M10x25 Lg Socket Head Cap Screws.
- F. Carefully move Aft Bulkhead Assembly away from dewar using caution not to bump adjacent components.

7. Special Reassembly Instructions

Prior to re-assembling components, wipe O-rings and mating surfaces with methanol or ethanol (do not use isopropyl alcohol). Visually inspect O-ring seal surfaces for scratches or other damage. If damaged, surfaces must be repaired to insure vacuum integrity.

When re-installing Forward Dewar Shell, torque fasteners in a circular pattern progressively increasing torque until required torque is obtained in order to ensure a uniform vacuum seal is achieved.

8. Summary

This section outlines the procedures to remove the Forward Dewar Shell and Aft Bulkhead from the instrument. The Forward Dewar Shell and Aft Bulkhead are removed using a crane and straps. This procedure is conducted in a Class 10,000 clean room.

After completion of this task, proceed to Section 8.4.4 to continue with instrument disassembly procedures.

8.4.4 Forward and Aft Active Shields

1. Description

This section describes the procedures to remove the forward and aft active shields from the GNIRS optical bench. This procedure must be conducted in a Class 10,000 clean room environment.

2. Nomenclature

89-NOAO-4200-0228	Active Radiation Shield Assembly 1
89-NOAO-4200-0263	Active Radiation Shield Assembly 11
12-P-203	Fast lead screw

3. Safety Precautions

Clean room environment: Use gloves when handling components. Observe guidelines for clean room attire and conduct.

4. Special Tools / Fixtures

Philips head screw driver

5. Personnel Recommended/Required To Complete Task

The required number of personnel to complete this task is 1. The recommended number is 2.

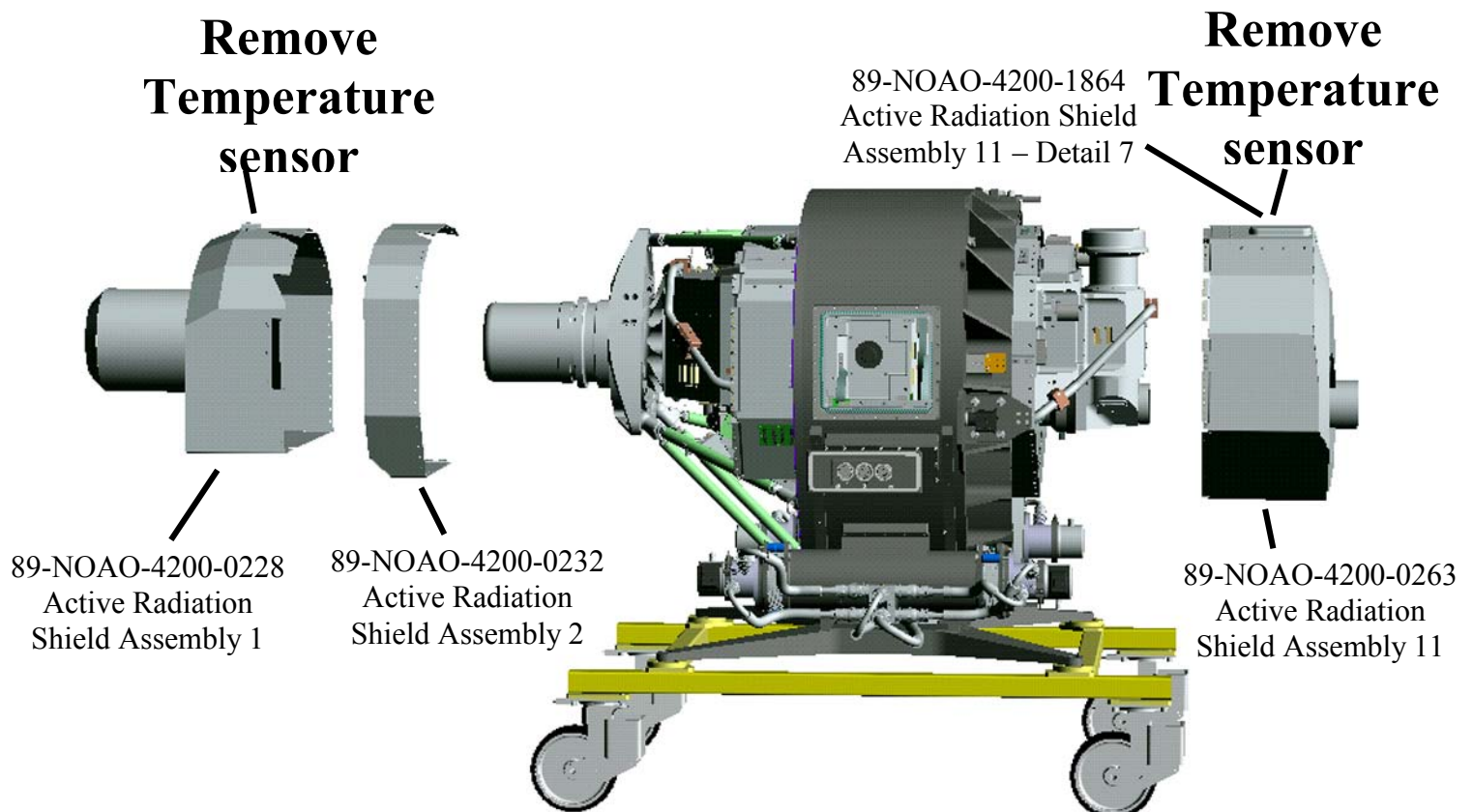


Figure 8.4.4.1. Forward and Aft Active Shield Removal.
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6. **Removal Procedures**

- A. Remove 12-P-203 Fast lead screws from the temperature sensor assembly cover from the top of 89-NOAO-4200-0228 Active Radiation Shield Assembly 1. Disconnect temperature sensor.
- B. Remove 12-P-203 Fast lead screws from (89-NOAO-4200-0228) Active Radiation Shield Assembly 1 and remove shield.
- C. Remove 12-P-203 Fast lead screws from (89-NOAO-4200-0232) Active Radiation Shield Assembly 2 and remove shield.
- D. Remove 12-P-203 Fast lead screws and (89-NOAO-4200-1864) Active Radiation Shield Assembly 11 – Detail 7 and disconnect temperature sensor assembly from under side of shield.
- E. Remove 12-P-203 Fast lead screws and (89-NOAO-4200-0263) Active Radiation Shield Assembly 11.

7. **Special Reassembly Procedures**

- A. Follow removal procedures in reverse order.
- B. After installing (89-NOAO-4200-0263) Active Radiation Shield Assembly 11, visually align entrance baffle tube on (89-NOAO-4200-0263) Active Radiation Shield Assembly 11 with adjacent opening on Pre-Slit bench by loosening clamp screws on baffle tube and retightening them after adjusting.

8. **Summary**

This section outlined the procedures to remove forward and aft active shields from the optical bench. During reinstallation of the forward active shield the entrance baffle tube gets visually aligned with adjacent opening in Pre-Slit bench. No special fixtures or tools are required to complete this task. This procedure is conducted in a Class 10,000 clean room.

After completion of this task, proceed to Section 8.4.5 to continue with instrument disassembly procedures.

8.4.5 Pre-Slit Bench

1. Description

This section describes the procedures to remove the Pre-Slit Bench from the GNIRS instrument. This procedure must be conducted in a Class 10,000 clean room environment.



Figure 8.4.5.1. Fore Optics Module removal and Pre-Slit Bench Lift Fixture installation.

2. Nomenclature

89-NOAO-4200-0025	Pre-Slit Optical Bench Assembly
89-NOAO-4200-0078	OIWFS Field Lens Tube Assembly
89-NOAO-4200-0299	Active Radiation Shield 12 Assembly
89-NOAO-4200-1698	OIWFS Tube Clamp

3. Safety Precautions

Heavy components: Do not attempt to lift components manually. Use proper lifting equipment.

Item
Pre-Slit Optical Bench Assembly

Weight
205 Lbs (93 Kg)

Fragile optical components: Use extreme caution when handling components.

Clean room environment: Use gloves when handling components. Observe guidelines for clean room attire and conduct.

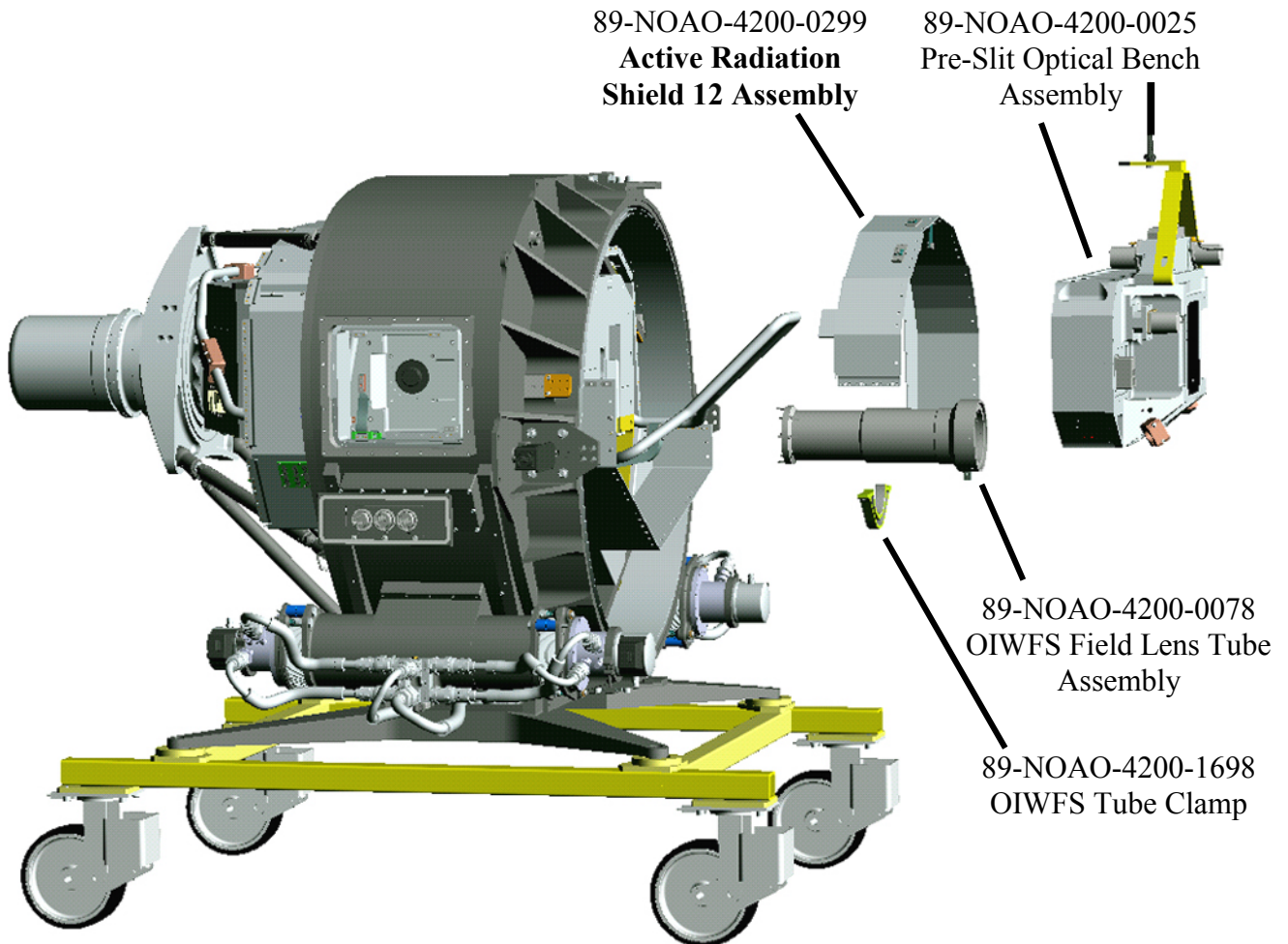


Figure 8.4.5.2. Removal of Pre-Slit Optical Bench and OIWFS Field Lens Tube Assembly.

- 4. Special Tools / Fixtures**
 - 89-NOAO-4202-0021 Pre-Slit Optical Bench Lift Fixture
 - 89-NOAO-4202-1113 OIWFS Field Lens Cover
 - Crane
 - Lifting Straps
- 5. Personnel Recommended/Required To Complete Task**

The required number of personnel to complete this task is 2.

6. Procedures

- A. Remove top halves of LN₂ Pre-cool blocks on (89-NOAO-4200-0027) Foreoptics Module Assembly and (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly.
- B. Disconnect warm up heater wires and temperature sensor wires from Offner and remove (89-NOAO-4200-0027) Foreoptics Module Assembly.
- C. Cover Field Lens with (89-NOAO-4202-1113) OIWFS Field Lens Cover.
- D. Loosen but do not remove captive screws on (89-NOAO-4200-0078) OIWFS Field Lens Tube Assembly.
- E. Support (89-NOAO-4200-0078) OIWFS Field Lens Tube Assembly by hand and remove (89-NOAO-4200-1698) OIWFS Tube Clamp. Remove (89-NOAO-4200-0078) OIWFS Field Lens Tube Assembly.
- F. Remove cold strap from (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly.
- G. Disconnect 3 motor cold straps from (89-NOAO-4200-0299) Active Radiation shield 12 Assy.
- H. Disconnect all electrical connectors from interconnect panel and warm up heater connectors mounted on (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly.
- I. Attach (89-NOAO-4202-0021) Pre-Slit Optical Bench Lift Fixture to (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly.
- J. Attach lift strap to (89-NOAO-4202-0021) Pre-Slit Optical Bench Lift Fixture and apply preload to strap with crane.
- K. Remove bolts from (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly.
- L. Using crane, move (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly forward approximately 6" and disconnect Slit Slide motor cold strap from motor.
- M. Ensure no wires are connected to (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly and remove (89-NOAO-4200-0025) Pre-Slit Optical Bench Assembly.
- N. Remove (89-NOAO-4200-0299) Active Radiation Shield 12 Assembly.

7. Special Reassembly Procedures

- A. Follow removal procedures in reverse order.

8. Summary

This section outlined the procedures to remove the Pre-Slit Bench from the instrument. Pre-Slit Bench is removed using a crane and straps. This procedure is conducted in a Class 10,000 clean room.

After completion of this task, proceed to Section 8.4.6 to continue with instrument disassembly procedures.