



INSTALLATION SPECIFICATION

TITLE

LHO 4K ETMX INSTALLATION AND RELATED TASKS

APPROVALS:	DATE	APPROVALS:	DATE
DRAWN: Larry Jones	8/15/00	CHECKED:	
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CHECKED:			DATE

1 SCOPE

Seven tasks are to be performed in the X End Station in relation to the optics installation. These are the removal of a seismometer (special test setup), the ETMx optic installation, the ETMx telescope and beam dump installation, the arm cavity baffle installation (and moving the baffle out of the way for initial beam alignment checks), optics table access cable installation, and viewport installations for photon calibration.

2 APPLICABLE DOCUMENTS

Listed below are all of the applicable and referenced documents for this task procedure. This list gives the latest revisions of the documents; within the installation steps, only the document number (and not the revision) is quoted.

D000068-A	Access Cable
M990034-B	Contamination Control Plan
E000062-C	LOS Installation Procedures
T970151-C	ASC Initial Alignment Procedures
E000119-A	Hanford Checklist - Vent Isolatable Volumes
M980133-B	Vent Isolatable Volumes
E000121-A	Hanford Checklist - Spool Removal
E000120-A	Hanford Checklist - BSC Door Removal
M980132-B	O-Ring Installation and Flange Assembly Procedure for HAM and BSC Doors
M980101-B	Procedure for Isolatable Volume Pump Down
M980136-A	HAM Chamber Access Door Removal Procedure Note: No procedure currently exists for BSC door removal with the engine hoist; Adapt this procedure in the meantime.
E000065-04	Chamber Entry/Exit Checklist
D000459-A	Layout Drawing



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D990340-A D990350-A D990491-A	Arm Cavity Baffle Assembly Drawing
M990316-00	Standard Operating Procedure: COS Infrared Alignment Laser Operation in the Midstation and Endstation
M980047-E-W	Transition to Laser Hazard
M980048-E-W	Transition to Laser Safe
T000065-05	COS 4k IFO Alignment Procedure

3 PRE-REQUISITES

- 1. New satellite boxes with modifications.
- 2. A BSC cleanroom must be in place over WBSC 9 and operable.
- 3. The vacuum equipment purge air system must be operable before starting the task.
- 4. Perform laser safety walkthroughs per M990316 for unescorted workers in the VEA, as required.
- 5. Quad photo diode and optics for the transmission monitor
- 6. Build up of optical lever transmitter and receiver.

4 PREPARATION

All preparation must be in accordance with the Contamination Control Plan (M990034).

- 7. Clean the X End Station VEA, particularly the floor; Particulates and dust should be removed by mopping with clean water.
Clean the BSC chamber (wipe or mop with clean water) from the stiffening ring above the door down, as well as the floor in the vicinity of the chamber well in advance of the opening of the vacuum system.
- 8. Insure that there are no large openings to the exterior or the beam tube enclosure where insects or dust can get into the VEA.



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- 9. Transport the following items to the X End Station VEA:
 - Appropriate cleanroom garb, including gloves, in-chamber booties
 - Flashlights, radios, batteries
 - Arm Cavity Baffle Installation Tools
 - Arm Cavity Baffle
 - Arm Cavity Baffle hardware
 - Arm Cavity Baffle Target
 - CLASS A Ground Strip (D000068)
 - CLASS A 1/4-20x1/2" SHCS
 - Cloth Door Covers
 - COS Table Clamps
 - COS Tool pan (wrenches and allen keys)
 - Camera and lens
 - CO2 gun and portable bottle and portable N2 gun with ionizer.
 - Precision Bubble level
 - ETMx Height Adaptor
 - ETMx Suspended Optic
 - ETMx Telescope and Beam Dump
 - ETM Telescope Targets
 - BSC work stool
 - LOS Table Clamps and Fasteners
 - LOS Installation Fixtures (Lazy Susan, Lift Truck, Straddle, etc.)
 - Oscilloscope and BNC Cables
 - Sony Nightshot Videocam
 - Foil, Ameristat, and Tape
 - 2 Viewports - 1 VP800 AR 1064, 1 VP800 Uncoated
 - ETM Telescope Steering Mirror and Mount
 - Surveying equipment & laser/autocollimator equipment with LLO laser autocollimator.
 - In-chamber vacuuming system
 - Viewport copper gaskets, flange bolts and nutplates
 - Flange toolkit
 - Viewport covers

5 TASK STEPS

All tasks must be in accordance with the Contamination Control Plan (M990034).

- 10. Vent the BSC 9 Section volume per procedure M980133.



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- 11. Remove BSC East door and turn up purge air to maximum flow. **NOTE!** It is very important that we limit exposure of the vacuum surfaces to atmospheric moisture, to minimize pumping time required before gate valves can again be opened. This is largely a function of purge air flow volume and the duration of chamber open times. This procedure is written to minimize the durations of removal. **Fabric door covers afford a surprising amount of shielding (with purge), so they should be installed whenever access through the door opening is not required within a short time period. This includes the practice of installing a cover when workers are inside a chamber.**
- 12. Enter the BSC and perform applicable chamber entry tasks per E000065-04.
- 13. Install viewports at ports G2 or G5 (whichever is not being used for the optical lever) and XX of the beam manifold annulus ring for photon calibrations and for an added camera.
- 14. Remove the special test accelerometer and its clamps from the optics table and from the chamber.
- 15. Install the support beam and liftable.
- 16. Install ETMx telescope and beam dump.
- 17. Remove the spool WA-1E from the beam manifold per E000121-A.
- 18. Mark the location of the optical lever table and then move it.
- 19. Setup theodolite at spool position, on global beam line.
- 20. Install the access cable (D000068) from the kapton cable connector to the optics table. This cable is inserted into the J2 connector in the position adjacent to the Side (S) OSEM connector (see the sketch on page 9 of E000062). Record the position of the table connection of this cable as an “as-built” mark-up for drawing revision.
- 21. Install the ETMx optic per E000062-C. Note: this optic setup includes the new design OSEM heads, which will be tested later in this checklist. **Reminder: cover door opening when access is not being required.**
- 22. Assemble the Arm Cavity Baffle (as much as possible) in the cleanroom outside of the chamber.
- 23. Align ETMx optic per T970151 (ASC Alignment).
- 24. Transition to Laser Hazard.
- 25. Put M990316-00 SOP in place.
- 26. Setup COS laser autocollimator in theodolite fixture on optical beam center line.
- 27. Align ETMx telescope and beam dump, using autocollimator.
- 28. Install arm cavity baffle in beam manifold section.



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- 29. Align arm cavity baffle, using laser and target.
- 30. Transition to Laser Safe.
- 31. Install optical lever table (crane), pier and components.
- 32. Reinstall the spool WA-1E at the beam manifold per E000121-A
- 33. Setup optical lever and align; confirm arm cavity baffle does not clip beam.
- 34. Scribe arm cavity baffle parts for precision replacement (+/- 1 mm); remove baffle from frame and lay in beam manifold for later replacement. **Reminder: cover door opening when access is not being required.**
- 35. Perform applicable chamber exit tasks per E000065-04.
- 36. Re-install the chamber door per M980132.
- 37. Pump down the BSC chamber volume per M980101.
- 38. Make an Elog entry pertaining to the task completed, including any deviations, recorded values, and notes.