S3 Installation **Operation Order No. _____**

_____

GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

AS3 INSTALLATION

P0500 REV. A

MAY 03, 2001

		Signatures:	Date:
Prepared:	Rob Bernier AS3 Setup, and Alignment Leader		
Approved:	Ted Acworth AS3 Science Test Leader		
Approved:	M. Taber Payload Systems Test Manager		
Approved:	Russ Leese QA Inspector		
Approved:	Harv Moskowitz LMSSC		
Approved:	Rob Brumley Payload Technical Manager		

NOTES:
Authority to redline this document (make minor changes during execution of this procedure): Rob Bernier, and or Ted Acworth

Level of QA required during performance of this procedure:
__√__Stanford QA Representative
___Government QA Representative All redlines must be approved by QA

Revision Record

Rev	Date:	ECO #	Summary Description	Date
-	8/25/99		Wrote Original Procedure	8/10/99
A	10 May 01	1263	Incorporated redlines, conformed to new Pdoc format, improved procedure flow	5/8/01

A Scope

A.1 This procedure covers the packaging of AS3 and removing it from End Station III. It also covers placing AS3 on top of the Gravity Probe B and powering it on.

This Procedure ☐Does☒Does not provide formal verification of GP-B requirements.
This Procedure ☐Does☒Does not include constraints and restrictions for the Payload.

B Safety Requirements

B.1 Harv Moskowitz is required before step R (AS3 Lifting Procedure in Fist Ops Lab) during the installation and removal procedures to monitor safety

B.2 Hardware Safety

B.2.1 Don't Jar the Probe with anything

C Personnel

C.1 QA Notification

C.1.1 The ONR representative and SU QA shall be notified 24 hours prior to the start of this procedure. Upon completion of this procedure, the QE Manager will certify his/her concurrence that the effort was performed and accomplished in accordance with the prescribed instruction by signing and dating in the designated place(s) in this document.

C.2 Red-line Authority

C.2.1 Authority to red-line (make minor changes during execution) this procedure is given solely to the AS3 Test Engineers or his designate and shall be approved by the QA Representatiove. Additionally, approval by the Payload Technical Manager shall be required, if in the judgement of the AS3 Test Engineers or QA Representative, experiment functionality may be affected.

C.2.2 Redlines can be initiated by Rob Bernier or Ted Acworth and must be approved by QA.

C.3 Any nonconformance or test anomaly should be reported by a Discrepancy Report. Refer to the Quality Plan, P0108, for guidance. Do not alter or break test configuration if a test failure occurs; notify quality assurance.

C.4 Test Personnel

C.4.1 Personnel Responsibilities

C.4.1.1 Qualified AS3 Operators Personnel

C.4.1.1.1 Robert Bernier

C.4.1.1.2 Ted Acworth

C.4.1.2 Crane Operation

C.4.1.2.1 Mike Taber

Mike Taber is required at the beginning of the test to operate the crane and observe the star module lifting, positioning and mounting operations onto the SMD flange. Mike Taber will also be required at test end during star module removal.

C.4.2 Only the following persons have the authority to exit/terminate this test or perform a retest: Rob Bernier or Ted Acworth.

D **Requirements**

D.1 Electrostatic Discharge Requirements:

D.1.1 Electrical mating and demating of AS3 hardware connectors

D.1.2 Grounding straps will be used when mating, or demating connectors on the probe.

D.1.3 Place cable connector A only into socket A, etc.

D.1.4 Strain relieve all cables

D.1.5 Connection and disconnection shall be performed only by Ted Acworth or Rob Bernier, and only when the equipment involved is in a powered-down state (unless otherwise noted)

D.1.6 Connectors shall be inspected for contamination and for bent, damaged, or recessed pins prior to mating.

D.2 Lifting Operations Requirements

D.2.1 The lifting operation should be QC'd by the Payload Systems Test Manager (Mike Taber) who will direct the lifting of AS3 over the SMD

D.2.2 Harv Moskowitz's presence will be necessary during lifting for safety assurance

D.2.3 Personnel should not be present beneath the AS3 star module during lifting operations

D.2.4 When pushing the control rack make sure that it doesn't topple over.

D.2.5 When maneuvering the AS3 star module be careful not to allow the accelerations to exceed 2 G to avoid shock

D.3 Required Equipment

D.3.1 Hardware Required

D.3.2 Cabling list between AS3 star module and control rack station. (clockwise from accessory cable)

Accessory A
Accessory B
Video coax 1
Video coax 2
Video coax 3
Video coax 4
Motor 1
Motor 2

Motor 3
Motor 4
Motor 5
Quad Cells
Vacuum hose for AS3 vacuum bell
Vacuum pressure sensor 1
Vacuum pressure sensor 2
Thermistor coax 1
Thermistor coax 2
Thermistor coax 3
Thermistor coax 4
Jitter A
Jitter B
Jitter C
Laser power
N_2 hose for window #4 purge, 20 foot length, 3/8 inch diameter
Vacuum hose for Window #4/AS3 window vacuum volume

D.3.3 Cabling list between AS3 control rack and TRE-GSE control rack

Quantity 9 of 20 foot coax with male BNC connectors on both ends

D.3.4 Equipment requiring formal periodic calibration

Manufacturer	Model	Serial Number	Calibr. Exp. Date
Newport Optical Power Meter	1830-C	1604	11 May 02
Newport Optical Power Meter Detector Head (quantity 2)	818-SL	7761 and 7844	11 May 02
Fluke multimeter "GPB SMD"	85	66500192	16 Nov 01
Torque wrench for tightening flange mount bolts	DA175M and DA130M	STU-0031 and STU-0030	OK to use FIST OPS wrench
Torque wrench (FIST OPS property in bonded storage)		000191	28 Nov 01

D.3.5 Special AS3 test equipment

Description	Part No.	Rev. no.	Serial No.
AS3 star module	25567	A	none
500 bomb cart for AS3 star module	none	none	none
AS3 mounted to bomb cart using three legs setup for on-cart optical transmissibility tests (tabs for holding condenser lens under the AS3 star module	none	none	none
AS3 star module mounting flange		none	none
Torque wrench for tightening flange mount bolts	DA175M	none	STU-0031
Torque wrench for tightening flange mount bolts	DA130M	none	STU-0030
10.75 inch Diameter Mylar sheet for the bottom of the AS3 mounting flange			
N_2 cylinder with valve	none	none	none
AS3 control rack including AS3-PC computer and other instruments	none	none	none

AS3 control station including: 5x video monitors and 2 switch boxes AS3-HR1510 computer, computer monitor, keyboard and mouse AS3-PC computer monitor, keyboard, mouse, and trackball	none	none	none
AS3 vacuum pumping cart:			
Vacuum pump for AS3 vacuum bell	none	none	none
220V power cord	none	none	none
20 feet of QF 50 vacuum hose	none	none	none
Vacuum pump for Window #4/AS3 window vacuum volume (available in FIST OPS)	none	none	none
30 feet of 3/8 inch diameter vacuum hose with QF 10 fittings	none	none	none
Mechanical toolbox	none	none	none
¼ inch socket adapter to 5/32 Allen. Note, due to limitation on space, max 1.100 in long.	none	none	none
Allen wrench, 5/32 (in)	none	none	none
6 inch Caliper	none	none	none
Electrical toolbox	none	none	none
Optics toolbox	none	none	none
AS3 Payload Verification test notebook	none	none	none

D.3.6 Tools

Description	No. Req'd
AS3 Mechanical Toolbox inventoried	1
AS3 Electrical Toolbox inventoried	1
AS3 Optics Toolbox inventoried	1

Toolbox content lists are contained in a separate document titled "AS3 tools list."

D.3.7 Computers and software:

Computer	**Name**	**Model**	**Software Vendor**	**Software Name**	**Version No**
WinTel	AS3-PC	Industrial PC 133 MHz NT	National Instruments and other	Lab View and other	5.0.1
WinTel	AS3-HR1510	Adsys	Various support software		

D.3.8 Expendables

Description	Quantity
Optics cleaning supplies	1 bag
JAZ® disks	4
Blank CD-R disks	20
Video camera and media	1
Still Camera and media	1

D.4 Instrument Pretest Requirements

(Documented in this procedure)

D.5 Configuration Requirements

D.5.1 (Documented in Procedure)

D.6 Optional Non Flight Requirement

D.6.1 Na

D.7 Verification / Success Criteria.

D.7.1 This procedure will be considered a success if at the end of the procedure AS3 is mounted to the probe, all of it's cables are connected, and it is ready for the P0501 the Alignment procedure.

D.8 Constraints and Restrictions:

D.8.1 Be extra careful of the vacuum connections to the Top Hat assembly. They are extra sensitive due to the Probe being sub atmospheric, leaving the possibility of air entering the well a heightened risk.

E References and Applicable Documents

E.1 Drawings, N/A

E.2 Supporting Documentation

E.2.1 Payload Test Verification NoteBook.

E.3 Additional Procedures:

E.3.1 P501 AS3 Alignment; P501 Alignment; P555 Telescope Telemetry and optical Power setup procedure; P502 Artificial Star 3 Transmissibility and acquisition range tests of telescope; p503; P504

F AS3 Vacuum Setup required prior to Delivery:

F.1 Vacuum Tests

F.1.1 Inspect the top of AS3's optical Table, remove all foreign objects.

F.1.2 Measure the appropriate distance for translation of the sliding aperture, 150 mm

translating retroreflector, and 10mm retroreflector.

F.1.2.1 Reset limit's Sliding Aperture, 150 mm retroreflector, 10 mm retroreflector.

F.1.2.2 Extend the sliding aperture, 150 mm RR, 10 mm RR to the center of their range

F.1.2.3 Sliding Aperture. Date:_____ Encoder Position: _____

F.1.2.4 150 mm RR. Date:_____ Encoder Position: _____

F.1.2.5 10 mm RR. Date:_____ Encoder Position: _____

F.1.2.6 Record Centered Motor Positions: _____

_____

F.1.2.7 Reset Limits: Sliding Aperture, 150 mm RR, 10 mm RR

F.1.2.8 Record Motor Positions: _____

_____

F.1.2.9 Date: _____Signed: _____

F.1.3 Lift AS3 bell, Inspect vacuum seal

F.1.4 Inspect and polish out the flange for the final closing procedure.

F.1.5 Cover AS3 with the Bell

F.1.6 Bolt down every hole

F.1.7 Evacuate AS3, record pressure during pump down.

F.1.7.1 Time from Initiation of Pumping :_____(Hours) Press: _____

F.1.7.2 Time from Initiation of Pumping :_____(Hours) Press: _____

F.1.7.3 Time from Initiation of Pumping :_____(Hours) Press: _____

F.1.7.4 Time from Initiation of Pumping :_____(Hours) Press: _____

F.1.8 Must be less than 500 m Torr

F.1.8.1 (Hours) Press: _____Pressure _____

F.1.9 Mechanical System Secure Signage: _____

F.1.9.1 AS3 Alignment verification:

F.1.9.1.1 Beam walked to the center:

Date:_____

F.1.10 Signed: _____

G **Focus Positions Atmospheric:**

G.1 80 mm decollimating Lens: _____

G.2 105 mm collimating Lens: _____

G.3 10 mm beam collimation performed:

Date: _____

Filename: _____

G.4 150 mm beam collimation performed:

Date**:** _____

Filename: _____

H **Setup Scan Angle Determination Procedure:**

H.1 Determination of Acquisition Scan Directions:

Measure the direction that the center of the beam walks relative to the true +X, and +Y axis of AS3. This test yields the sign polarity of the acquisition scan mirror. Measure the angle displacement as a linear translation of the 150 mm diameter beam on top of the simulator reticle. Record true direction, Verify that the sign is in the correct direction.

H.1.1 Set the optical Power at 2 Watts.

H.1.2 Start with the beam aligned to the reticle. Driving Acquisition Mirror, Measured relative to AS3's X,Y,Z Local Coordinate System:

H.1.3 + Azimuth 150,000 Tics = Y Direction:_____; Mag: _____

H.1.4 + Elevation 150,000 Tics = X Direction:_____; Mag: _____

H.1.5 Null to reticle (with the acquisition scan mirror)

H.2 Determination of Fine Focus Scan Directions. Driving Acquisition scan mirror to null out the fine focus scan plate:

H.2.1 + ff Azimuth 100,000 Tics = Acq Az Direction:_____; Mag: _____

H.2.2 + ff Elevation 100,000 Tics = Acq El Direction:_____; Mag: _____

(Note: The Directions of this scan are the exact reverse of the Nulling Direction that the Acquisition scan had to move to null out this scan. Test out referencing these to the true AS3 reference frame with motion of the Acquisition Scan mirror.)

H.3 Camera Convention + Y = observers vertical, +X = to observer's right.

H.3.1 Azimuth Polarity (Relative to AS3 Y Axis): Acq.:____ FF.:_____

H.3.2 Az. Polarity (Sensors); Ret. QCx.:___ Source QCx.: _____

H.3.3 Az. Polarity (Camera's); Inst. CCDx:____; Quad Cell CCDx:____

H.3.4 Az. Polarity; 105 Screen CCDx:____; Rotary Stage CCDx:____

H.3.5 Elevation Polarity (Relative to AS3 X Axis): Acq.:____ FF.:_____

H.3.6 El. Polarity (Sensors); Ret. QCy.:___ Source QCy.: _____

H.3.7 El. Polarity (Camera's); Inst. CCDy:____; Quad Cell CCDy:____

H.3.8 El. Polarity; 105 Screen CCDy:____; Rotary Stage CCDy:____

H.4 **Occlusion Test**, verify reticle central position, to occlusion angle based on centered beam setup.

H.4.1 Null To Reticle

H.4.2 Centered on Reticle Position Setup File Name:

Filename:_____

H.4.3 Place a piece of graph paper under AS3, on the bomb cart platform. Trace the outline of the AS3 optical beam.

H.4.4 + Azimuth (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

H.4.5 - Azimuth (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

H.4.6 + Elevation (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

H.4.7 - Elevation (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

H.4.8 Compute Angles from Reticle to first occlusion Position:

+Azimuth Angle: _____
-Azimuth Angle: _____
+Elevation Angle: _____
+-Elevation Angle: _____

H.4.9 Verify that the Max angle of +- 125 arcmin is never exceeded

Date:_____

Name:_____

I **Offline calibrate the AS3 optical transmissibility and the non-eclipsing beam scan range**

I.1 AS3 star module should be assembled on the AS3 bomb cart, with three special attachment feet with support tabs Pointing radially inward setup to hold the transmissibility testing focusing lens.

I.2 Measure the AS3 optical transmissibility

I.2.1 Retract the 1cm cc, 6" cc, and sliding aperture

I.2.2 Drive the AS3 beam to AS3 center orientation

I.2.3 Set to max AS3 optical power

I.2.4 Place the transmissibility testing condenser lens, and the second power meter head in the beam path under the star module. (fill about 75% of the optical power meter detector head sensor area with focused AS3 light.

I.2.5 Place the aperture cutout sheet on the condenser lens (to neck down the beam to the telescope entrance profile)

I.2.6 Set AS3 optical power to first test value = 2 mW.

I.2.7 Record the optical power meter readings from both detectors.

I.2.7.1 Detector 1 (at fiber source inside AS3) power = _____ W

I.2.7.2 Detector 2 (at AS3 exit beam) power = _____ W

I.2.8 Drive the AS3 beam to telescope reticle orientation

I.2.8.1 Record the optical power meter readings from both detectors.

I.2.8.1.1 Detector 1 (at fiber source inside AS3) power = _____ W

I.2.8.1.2 Detector 2 (at AS3 exit beam) power = _____ W

I.2.9 Drive the AS3 beam to telescope boresight orientation

I.2.9.1 Record the optical power meter readings from both detectors.

I.2.9.1.1 Detector 1 (at fiber source inside AS3) power = _____ W

I.2.9.1.2 Detector 2 (at AS3 exit beam) power = _____ W

I.2.10 If desired, Set AS3 optical power to a second test value and repeat test

I.2.11 See AS3 Payload Ver I Test Notebook page 65 for data reduction method..

J **AS3 System Noise Check End Station 3**

J.1 Laser off PV noise in the Quad Cell dSpace raw X position:

J.1.1 _____

J.2 Laser off PV noise in the Quad Cell dSpace raw Y position:

J.2.1 _____

J.2.2 Data file from dSpace Trace file:

J.2.3 _____

Test performed by: _____

K **Saved Motor Positions Vacuum:**

K.1 Vacuum Motor Saved Positions on Simulator Reticle:

K.1.1 Filename: _____

K.2 Vacuum Motor Saved Positions on Spot A:

K.2.1 Filename: _____

L **Packing AS3 Procedures**

L.1 Computer System Secure Procedure:

L.2 Storing AS3 Motor Position Procedure

L.2.1 Null to wedge spot A

L.2.2 Run Before Reboot

L.3 Backup and Power Down Procedure

L.3.1 Mirror AS3-PC Drive C to Drive D

L.3.1.1 Performed Date _____

L.3.1.1.1 Time _____

L.3.2 If Mirroring is not available, copy AS3 Files to D drive

L.3.2.1 Performed Date _____

L.3.2.1.1 Time _____

L.3.3 Software Power Down AS3-PC

L.3.4 Hardware Power down AS3-PC

L.3.5 Shut down AS3 UPS

L.3.6 Disconnect AS3 critical power

L.3.7 Computer System Secure Signage: _____

L.4 Mechanical System Secure

L.4.1 Check off that Mechanical system is secure

L.4.2 Signage: _____

L.5 Cabling and Umbilical Secure

L.5.1 Secure Laser Power cables and prepare for shipment

L.5.2 Secure vacuum Hoses prepare for shipment

L.5.3 Disconnect Vacuum System

L.5.4 Pack Vacuum System for transportation

L.5.5 Label and Disconnect the Cables that connect the AS3 module to AS3 rack tower.

L.5.6 Pack all cables for transportation to FIST Lab

L.5.7 Verify that there is nothing connected to AS3 at this point, Recheck Wires, Cables,

Hoses, Interference from any place

L.5.8 All Cables Secure Signage: _____

M **AS3-PC computer rack lifting procedure**

M.1 Verify all systems on the AS3 tower are secure for lifting.

M.1.1 Check out:

M.1.1.1 The power supply,

M.1.1.2 The optical power meter,

M.1.1.3 The analog box

M.1.1.4 Anything on top of the box

M.2 Label and disconnect all external cables from AS3 rack

M.3 Attach lifting hooks to 4 point strap hanging from the crane

M.4 Lift AS3 rack up to ground level

M.5 Deliver AS3-PC Tower and cables to the FIST Lab

M.6 Position AS3 Tower in the Corner of the FIST platform

M.7 Signed: _____ Date: _____

N **Pack up AS3 control Bench**

N.1 Remove all monitors and computers labeling each with name and placement

N.2 Lift with 4 straps on the corners of the table

N.3 Raise AS3 Table up to ground level

N.4 Deliver AS3-Table to the Fist Lab, Position it on the Corner of the platform next to the AS3-PC rack

N.5 Signed: _____ Date: _____

O **Assemble the AS3-PC rack tower and Table**

O.1 No Hot swapping cables on AS3-PC or on any setup system.

O.2 Place all monitors in place.

O.3 Connect up all cables and prepare for the arrival of AS3 star module.

O.4 Hook up AS3-HR1510 and AS3-PC to the Ethernet.

O.5 Lead out AS3 connectors onto the platform ready for instillation on AS3.

O.6 Attach AS3 critical power to special probe grounded outlet.

O.7 Attach AS3 auxiliary power to separate power outlet.

O.8 Signed: _____ Date: _____

P **Fist Ops Floor Test's**

P.1 Hook up AS3 in the FIST opps floor, and run the following Tests

P.2 AS3 cabling setup

P.2.1 Using a Grounding Strap for connecting all AS3 Cables to the AS3-Star Module resting on the FIST Ops Floor.

P.2.2 Connect up all cables to AS3-Star Module.

P.2.3 Strain relieve the cables so they do not rest on the probe wiring or in any way disturb the probe.

P.2.4 Go over all the cables, check them out, verify that they are all connected in the correct position.

P.2.5 Connect AS3-PC and AS3-HR-1510 to the net connectors

P.2.6 Signed: _____ Date: _____

P.3 Power on Procedure

P.3.1 Turn on the Power to AS3-PC and it's related equipment

P.3.2 Power up the monitors

P.3.3 Power up AS3 HR1510

P.4 AS3 Vacuum operation

P.4.1 Setup AS3 Vacuum pump next to Star Module

P.4.2 Connect Q50 vacuum hose from AS3 to the vacuum pump

P.4.3 Connect the Vacuum sensor cable to AS3's sensor

P.4.4 Power on the vacuum pump

P.4.5 After 5 minutes note the vacuum on the flange space gage.

P.4.5.1 Vacuum gage reading: _____(psi)

P.4.5.2 Electronic Vacuum gage reading: _____(milliTorr)

P.4.5.3 Verify that there is no leaks

Signed: _____ Date _____

Discrepancies if any:

P.5 Set up Matlab

P.5.1 Run Matlab, change path to AS3-PC C:\Artificial Star 3 Files\Prog Files\Full with the command cd('Prog Files\Full') at the Matlab command prompt. The default directory is C:\Artificial Star 3 Files so this switches it to the correct working directory.

P.5.2 Run Simulink with the icon, or type 'simulink' at the Matlab command prompt.

P.5.3 run jitter.mdl. (It's in the working directory)

P.5.4 Run RTW build (In the simulink menu on the right). It builds the Jitter program, links it to the dSPACE processor, and downloads to the dSPACE boards.

P.6 Set Up LabView

P.6.1 Run AS3_FRONT_END_F.vi (it's in C:\Artificial Star 3 Files\Prog Files\Full) It's also usually on the desktop. It will prompt for the following procedures.

P.6.2 Find: C:\Artificial Star 3 Files\Data\Reboot\Before Reboot after kill motors. (Latest File)

File Name:_____

P.6.3 Run After_Reboot_F.vi pulling in the files that are listed as last saved in the C:\Artificial Star 3 Files\Data\Reboot\Before Reboot after kill motors. Then move the motors to Before Reboot Before Kill Motors

P.7 **Occlusion Test**, verify reticle central position, to occlusion angle based on centered beam setup.

P.7.1 Null To Reticle

P.7.2 Centered on Reticle Position Setup File Name:

Filename:_____

P.7.3 Place a piece of graph paper under AS3, on the bomb cart platform. Trace the outline of the AS3 optical beam.

P.7.4 + Azimuth (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

P.7.5 - Azimuth (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

P.7.6 + Elevation (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

P.7.7 - Elevation (Point of beginning Occlusion between AS3 beam and internal interference)

Filename:_____

P.7.8 Compute Angles from Reticle to first occlusion Position:

+Azimuth Angle: _____
-Azimuth Angle: _____
+Elevation Angle: _____
+-Elevation Angle: _____

P.7.9 Verify that the Max angle of +- 125 arcmin is never exceeded

Date:_____

Name:_____

Q **Offline calibrate the AS3 optical transmissibility**

Q.1 AS3 star module should be assembled on the AS3 bomb cart, with three special attachment feet with support tabs Pointing radially inward setup to hold the transmissibility testing focusing lens.

Q.2 Measure the AS3 optical transmissibility

Q.2.1 Retract the 1cm cc, 6" cc, and sliding aperture

Q.2.2 Drive the AS3 beam to AS3 center orientation

Q.2.3 Set to max AS3 optical power

Q.2.4 Place the transmissibility testing condenser lens, and the second power meter head in the beam path under the star module. (fill about 75% of the optical power meter detector head sensor area with focused AS3 light.

Q.2.5 Place the aperture cutout sheet on the condenser lens (to neck down the beam to the telescope entrance profile)

Q.2.6 Set AS3 optical power to first test value = 2 mW.

Q.2.7 Record the optical power meter readings from both detectors.

Q.2.7.1 Detector 1 (at fiber source inside AS3) power = _____ W

Q.2.7.2 Detector 2 (at AS3 exit beam) power = _____ W

Q.2.8 Drive the AS3 beam to telescope reticle orientation

Q.2.8.1 Record the optical power meter readings from both detectors.

Q.2.8.1.1 Detector 1 (at fiber source inside AS3) power = _____ W

Q.2.8.1.2 Detector 2 (at AS3 exit beam) power = _____ W

Q.2.9 Drive the AS3 beam to telescope boresight orientation

Q.2.9.1 Record the optical power meter readings from both detectors.

Q.2.9.1.1 Detector 1 (at fiber source inside AS3) power = _____ W

Q.2.9.1.2 Detector 2 (at AS3 exit beam) power = _____ W

Q.2.10 If desired, Set AS3 optical power to a second test value and repeat test

Q.2.11 See AS3 Payload Ver I Test Notebook page 65 for data reduction method..

Q.3 Fist Lab Floor Focus Test

Q.3.1 Align AS3 beam normal to telescope reticle

Q.3.1.1 Run Labview "Align To Reticle_F.vi" Version F

Q.3.1.1.1 Data file name: _____

Q.3.1.1.2 Run “SnagIt.exe” to capture the screen window

Q.3.1.1.2.1file name: _____

Q.3.2 Collimate 150 mm beam Run it Three Times

Q.3.2.1 Run Labview “Focus Automatic_F.vi” Version F with “150 mm Beam Sliding Aperture” setting of method selection switch

Q.3.2.1.1 Data file name: _____

Q.3.2.1.2 Data file name: _____

Q.3.2.1.3 Data file name: _____

Q.3.2.1.4 Run “SnagIt.exe” to capture the screen window

Q.3.2.1.4.1file name: _____

Q.3.2.2 (optional) 6“ cube corner collimation test

Q.3.2.3 Knife edge collimation test

Q.3.2.3.1 Do Both Sides colinear, and Then Separate both sides

Q.3.2.4 File Names: _____

Q.3.2.5 File Names: _____

Q.3.2.6 File Names: _____

R **Intermediate Shutting down AS3 Motor Control box:**

R.1 Storing AS3 Motor Position Procedure

R.1.1 Run Before Reboot

R.2 Backup and Power Down Procedure

R.2.1 Mirror AS3-P Drive C to Drive D

R.2.2 If Mirroring is not available, copy AS3 Files to D drive

R.2.3 Leave AS3 PC running!

R.2.4 Shut down Jitter Amplifier

R.2.5 Shut down Camera Power

R.2.6 Shut down monitors.

R.2.7 Shut Down Motor Power

R.2.8 Shut down Optical Power System.

R.2.9 Shut down Jitter Power Supply.

R.2.10 Leave AS3 PC running!

R.3 Signed: _____ Date: _____

S **AS3 lifting Procedure**

S.1 Verify that The Star Module is free of cables, and hoses.

S.2 Unbolt AS3 feet from the simulator

S.3 Verify that AS3 feet are free

Performed By: _____

S.4 Store AS3 mounting hardware in the AS3 Toolbox

S.5 Attach AS3 lifting 5/8 (in) shackle to AS3 Bell top

S.6 Attach AS3 ¾ (in) shackle to AS3 5/8 (in) shackle

S.7 Attach AS3 lifting shackle to 5 (ft) strap.

S.8 Gently lift AS3 from Simulator

S.9 Lower AS3 until the bottom of AS3 is 6 feet off the floor.

S.10 (Optional if it's already on) Install AS3 attachment flange and O-ring

S.11 Clean the vacuum window as well as the surrounding area with methanol

S.12 Install AS3 Legs with tabs for holding the optical power calibration equipment.

S.13 Attach a mylar cover on the bottom of AS3 to keep out foreign objects using tape around the edges.

S.14 AS3 Anti Contamination Procedure

S.14.1 Verify that the mylar cover is placed between the window #4 flange and the window # 4 cover plate.

S.14.2 Signed: _____ Date: _____

S.15 Place AS3 on the bomb cart

S.15.1 Remove the towing handle from the bomb cart

S.15.2 Note Clocking AS3 in order to avoid damage to the vacuum hardware

S.15.3 Bolt AS3 down to the dolly make sure all 3 bolts are secure.

Performed By: _____

S.16 Lift AS3 and the bomb cart from the Lab floor up to ground level

S.17 Lower AS3 down to the ground

S.18 Disconnect the crane, leaving the lifting ring and lifting strap with AS3

S.19 Signed: _____ Date: _____

T **Transporting AS3 on the ground**

T.1 Attach AS3 towing handle

T.2 Slowly walk AS3 over to the Fist OPS building never exceeding 5 mph

T.3 Station AS3 inside the garage door of the FIST Ops lab under the crane

T.4 Signed: _____ Date: _____

U **AS3 lifting Procedure in Fist Ops Lab**

U.1 Unbolt AS3 feet.

Performed by: _____

U.2 Verify that AS3 Feet are free and clear for lifting

U.3 Attach AS3 5/8 shackle to AS3 Bell top.

U.4 Attach AS3 ¾ shackle to 5/8 shackle.

U.5 Fist OPS Crane Operation Lifting AS3:

U.5.1 Mike Taber should operate the crane to lift AS3 up over probe C

U.5.2 Attach FIST ops cane hook to the AS3 ¾ shackle.

U.5.3 Lift AS3 up off of the bomb cart.

U.5.3.1 Inspect the bottom of AS3 to make sure that there is no dirt or contamination present from the trip

U.6 Signed: _____ Date: _____

V **Inspect the Probe prior to mating with AS3**

V.1 **Warning** (The Probe is now at Sub Atmospheric Pressure of around 14 Torr. And touching the QF 40 or 50 hoses that are attached to the probe could cause them to leak, so don't touch them at all.)

V.2 Visually inspect the sunshade cover to make sure that there is no contamination present

V.3 Verify that the Mylar cover and tape are placed between the sunshade cover and the probe flange

V.4 Unbolt the Probe Flange:

V.5 Remove the screws from the screws noting the position each came from and keeping track of them in order.

V.6 Remove the Probe Flange (Black) noting the orientation.

V.6.1 Store it in a safe place.

V.6.2 Store the cover (Placed in a Ziploc bag) for replacement when the test ends.

V.7 Remove Second Plate- Probe Flange Adapter.

V.7.1 Store it in a safe place.

V.7.2 Store the cover (Placed in a Ziploc bag) for replacement when the test ends.

V.8 Observe the window of the probe.

V.8.1 Visually check the probes window number 4 and look down into the telescope.

V.8.2 Using the video camera SN: _____

V.8.2.1 Focus the camera on window # 4 for any sign of contamination.

V.8.2.1.1 Still Picture Roll #: _____, and Image Number: _____

Still Picture Roll #: _____, and Image Number: _____

Digital Download #: _____, Frame #, _____
Video Start: _____ and End: _____

V.8.2.1.2 Focus the camera down the probe as far as possible.

Still Picture Roll #: _____, and Image Number: _____

Digital Download #: _____, Frame #, _____

Video Start: _____ and End: _____

V.9 Remove the tape on the Probe mylar cover except for 2 opposite positions.

V.9.1 Blow Dust off mylar with compressed air

W **AS3 Lift over the probe**

W.1 Verify that Harv Moskowitz LMMSSC Systems Safety is in the lab.

W.2 Signed:_____ Date:_____

W.3 Lift up AS3 over the probe and position 5 inches above the sunshade flange.

W.4 Turn on the Helium regulator to 30 (psi) and wait 1 minute to purge the lines of dust or contamination.

W.5 Reduce HELIUM pressure to 5 (psi.).

W.6 Attach HELIUM pressure hose to AS3's Helium connector.

W.7 Open HELIUM valve and pressurize the cavity with 30 (psi.) HELIUM

W.8 Verify that Helium is flowing out of the bottom of AS3.

W.9 Remove the Mylar cover from the bottom of AS3 by removing the tape

W.10 Verify that AS3's vacuum O-ring is in place and secure

W.11 Lift over probe complete:

W.12 Document Orientation with Digital Images:

W.12.1 Download #:_____ Image #_____

Test Director:_____ Date:_____

QA: Signed: _____ Date: _____

Safety:_____ Date:_____

X **AS3 attachment procedure**

X.1 Cut the tape on the Probe's mylar cover leaving the cover in place.

X.2 Lower AS3 down to 250 mm above the probe.

X.3 Using lift opposite tabs on the cover and slowly lift it into a shallow U then remove it allowing flowing HELIUM to keep the area clean. Take care not to rub the cover on either the top, or bottom flange as particles will be generated and drop into window #4.

X.4 Lower AS3 down to within 2 mm of the probe.

X.5 Perform AS3's final alignment sequence aligning +x on AS3 with the –x axis (note sign reversal!) on the probe sunshade flange. (The Probe Marking is incorrect: +X is marked on the –X axis)

X.6 Place the cover in a clean container for later usage.

X.6.1 Take the cover for cleaning

X.6.2 Return it to FIST lab in a clean bag

X.7 Allow dust to purge from the cavity for 1 minute

X.8 Verify that AS3 is oriented with the Probe –x axis, telescope +x orientation

X.9 Gently Lower AS3 onto the dewar aligning the holes by hand

X.10 As AS3 contacts the dewar reduce the Helium pressure to 2 psi

X.11 Place the same screws that came out of the cross flange back into the cross flange.

X.12 Using Torque wrench SN: _____

X.12.1 Attach 10-32 bolts with 30 (in-lbs) on each head tightening in a star pattern to distribute the load on the flange.

X.13 Shut off the Helium pressure.

X.14 Shut the Helium valve.

X.15 AS3 attachment completed:

Test Director: _____ Date: _____

QA: _____ Date: _____

Safety: _____ Date: _____

Y **AS3 cabling setup**

Y.1 Using a Grounding Strap for connecting all AS3 Cables to the AS3-Star Module resting on the Probe

Y.2 Connect up all cables to AS3-Star Module.

Y.2.1 With the exception of the Track Ball on Com 1 which should be disconnected during power on.

Y.2.2 Optical Power meter should be on Com 1 for startup (Check)

Y.2.3 Mouse should be on Com 0,

Y.3 Strain relieve the cables so they do not rest on the probe wiring or in any way disturb the probe.

Y.4 Go over all the cables, check them out, verify that they are all connected in the correct position.

Y.5 Connect AS3-PC and AS3-HR-1510 to the net connectors

Y.6 Signed: _____ Date: _____

Z **Power on Procedure**

Z.1 Turn on the Power to AS3-PC and it's related equipment

Z.2 Power up the monitors

Z.3 Power up AS3 HR1510

AA **AS3 Vacuum operation**

AA.1 Setup AS3 Vacuum pump in the location provided See AS3 front Matter for floor plan

AA.2 Connect Q50 vacuum hose from AS3 to the vacuum pump

AA.3 Connect the Vacuum sensor cable to AS3's sensor

AA.4 Start the Pressure gage VI

AA.5 Power on the vacuum pump

AA.6 Connect the small vacuum hose to AS3's flange

AA.7 Turn on the vacuum to the small line evacuating the flange space over window number 4

AA.8 After 5 minutes note the vacuum on the flange space gage.

AA.8.1 Vacuum gage reading: _____(psi)

AA.8.2 Electronic Vacuum gage reading: _____(milliTorr)

AA.8.3 Verify that there are no leaks

Signed: _____ Date _____

Discrepancies if any:

BB **Procedure Completion.**

Completed by: _____
Witnessed by: _____

DATE: _____
Time: _____

Quality Manager _____ Date _____
Payload Test Director _____ Date _____