SU/GP-B P0989 Rev –
20 May, 2003

STANFORD UNIVERSITY
W.W. HANSEN EXPERIMENTAL PHYSICS LABORATORY
GRAVITY PROBE B, RELATIVITY GYROSCOPE EXPERIMENT
STANFORD, CALIFORNIA 94305-4085

PROOF TESTING OF GSE

P0989 Rev –

20 May, 2003

PREPARED	R. Stephenson, GMA Engineer	Date
APPROVED	K. Bower, GSE REE	Date
APPROVED	C. Gray, GMA REE	Date
APPROVED	Harv Moskowitz, LMSSC Safety Engineer	Date
APPROVED	D. Ross, Quality Assurance	Date
APPROVED	R. Brumley, Hardware Manager	Date

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REVISION HISTORY

Rev	Date	Comments
-	5/14/03	

A SCOPE

The purpose of this procedure is to provide a standard process for proof pressure testing minor GSE components that will be exposed to pressures over 150 psig. The procedure is to be used on plumbing and other equipment that must be kept clean. Due to the cleanliness requirement, this equipment cannot be hydrostatically tested. Instead, an inert gas such as Nitrogen or Helium will be used as a test medium. Nitrogen is recommended if a Helium leak check is to be performed (the optional section G.4). Multiple similar items may be tested in one run of this procedure.

B SAFETY

B.1 Ground Support Equipment (GSE)

This operation requires pressurizing systems to 1.25 times their maximum expected operating pressure. All equipment being tested will be properly secured in case of sudden depressurization. Other precautions are required similar to the normal use of a supply gas cylinder. Two or more people will be present at all times during this test. All Hardware used in support of this test shall be rated to better than the applied pressure by the manufacturer. Relief valves set at no greater than 110 % of the test pressure will be provided.

During the operation, some lines connecting equipment together will represent minor trip/snag hazards. These hazards shall be minimized by careful routing, securing, and/or marking of such lines. Only qualified personnel under the supervision of the Test Director will work directly with this equipment.

PPE will be used as required by the facility. Additional PPE may be required by the Test Director or QA.

B.2 Contamination

These operations are expected to occur in FIST Ops, a Class 100,000 clean room, but may occur in any similar environment. The operator making the connection shall visually inspect all fluid connections.

B.3 Personnel Threatening Emergencies

In the event of an emergency threatening personnel health or safety, the area shall be evacuated without regard for equipment safety. Post-emergency steps shall be documented by D-log as required.

C QUALITY ASSURANCE

C.1 QA Notification

This operation will be conducted on a formal basis to approved and released procedures. **The QA program office shall be notified 24 hours prior to the start of this procedure**. A Quality Assurance Representative, designated by D. Ross shall be present during the procedure and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Program Engineer, D. Ross or her designate, will certify her concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating in the designated place(s) in this document.

C.2 Red-line Authority

Authority to redline (make minor changes during execution of) this procedure is given solely to the Test Director or his designate and shall be approved by the QA Representative.

C.3 Discrepancies

Discrepancies will be recorded in a D-log or as a DR per Quality Plan P0108.

D TEST PERSONNEL

The Test Director shall be Rick Stephenson or an alternate that he shall designate. The Test Director has overall responsibility for the implementation of this procedure and shall sign off the completed procedure and relevant sections within it. Additional personnel shall be assigned and supervised by the Test Director.

E REQUIREMENTS

E.1 Electrostatic Discharge Requirements

N/A

E.2 Lifting Operation Requirements

N/A

E.3 Hardware/Software Requirements

- Equipment to be tested.
- Leak detector, Alcatel internally calibrated, or equivalent
- Inert gas cylinder, as appropriate, sufficiently full as to provide necessary proof pressure
- Helium gas supply, for leak checking
- Pressure gauge, NIST traceable calibrated, appropriate range for test

  Serial number: _____ cal due date: _____

- Appropriate connection plumbing (flex lines, tees, caps, plugs, elbows, valves, etc.)
- Metal tags for labeling tested parts, or other marking material as appropriate

E.4 Instrument Pretest Requirements

All test equipment used to verify test data is required to be "in calibration."

E.5 Configuration Requirements

N/A

E.6 Optional Non-flight Configurations

N/A

E.7 Verification/ Success Criteria

Proof pressure should be held for 10 minutes

E.8 Constraints and Restrictions

N/A

F REFERENCE DOCUMENTS

F.1 Drawings

N/A

F.2 Supporting documentation

N/A

F.3 Additional Procedures

N/A

G OPERATIONS

G.1 Verify Appropriate QA Notification

QA Notified_____

G.2 Proof Test Setup

Started on: _____ Test Engineer _____

G.2.1 Verify all necessary materials are present.

G.2.2 Verify inert gas is appropriate for this test. Record gas used here: _____

G.2.3 Connect equipment to be tested to the gas supply manifold as shown in figure 1 with appropriate plumbing.

G.2.4 Plug (or cap) the equipment under test as appropriate.

G.2.5 Secure all equipment to prevent uncontrolled motion in case of failure. If hoses (or similar flexible elements) are being tested, they must be secured every 4 feet.

G.2.6 Determine the desired maximum allowable working pressure (MAWP) desired for this equipment. Record in Table 1. Verify that this does not contradict the manufacturer's suggested operating pressures.

G.2.7 Verify that the relief valve setting is 110% of the proof pressure (1.25 times MAWP).

Section G.2 complete. QA _____

G.3 Proof Test

Started on: _____

G.3.1 Verify that section G.2 is complete and that all proper safety measures have been taken. This includes necessary personal protective equipment (as needed) for operators.

G.3.2 Use the gas supply regulator to increase system pressure to 1.25 times the MAWP recorded above. Do note exceed 1000 psi per minute rate of increase.
Record pressure here: _____

G.3.3 Close the Supply Valve (see figure 1).

G.3.4 Wait ten minutes.

G.3.5 Record final pressure here: _____

G.3.6 Slowly open Supply Vent (see Figure 1) to vent the pressure from the system. Use Supply Metering Valve to prevent sudden depressurization.

G.3.7 If pressure dropped more than 1% or 10 psi, whichever is greater, over ten minutes, attempt to determine cause of pressure drop, and repeat steps G.3.2 through G.3.6.

G.3.8 Disconnect equipment from supply gas manifold.

G.3.9 Record in Table 1 completion of proof test and proof pressure.

Section G.3 complete. QA _____

G.4 Leak Check (Optional)

Started on: _____

G.4.1 Connect leak detector to parts under test.

G.4.2 Perform a Helium leak check on these parts. Parts will be leak tight to better than $5x10^{-7}$ sccs.

G.4.3 Disconnect Leak detector and all other support equipment from equipment under test.

G.4.4 Record in Table 1 the maximum leak rate.

Section G.4 complete. QA _____

G.5 Labeling of Parts

Started on: _____

Note: Step G.5.3 is an optional step and may be omitted if desired.

G.5.1 Verify proof test is successfully complete (section G.3).

G.5.2 Permanently etch or scribe serial number into parts under test, if necessary.

G.5.3 OPTIONAL: Remove parts for cleaning. Clean them to level 100A or better (may be done by external vendor).

G.5.4 Label equipment using stainless steel tags. Labels shall include:

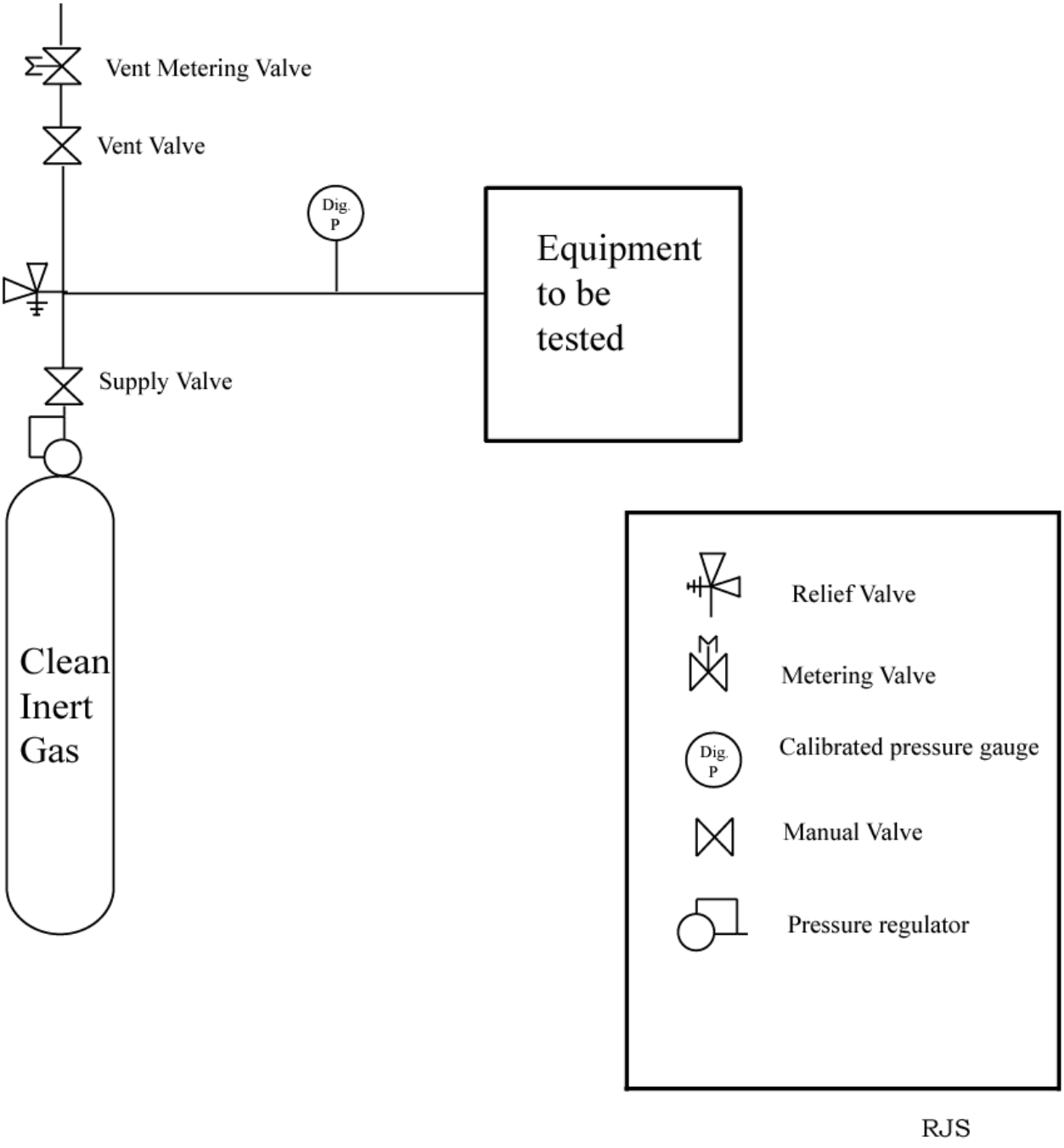
Manufacturer name
Manufacturer part number
Size (if applicable)
MAWP
Service media
Month and year of proof test
Proof pressure
Serial number

Section G.5 complete. QA _____

G.6 Table 1: Completion Table

Part Name/Description	Serial Number	Manufacturer Pressure Rating	MAWP	Proof Pressure	Proof Date	Media Used	Test Engineer	QA

G.7 Figure 1: Plumbing Set Up



H PROCEDURE SIGN OFF

The results obtained in the performance of this procedure are acceptable:

_____ date: _____
Test Director/GMA Engineer

Discrepancies if any:

Approved: _____ date: _____
C. Gray, GMA REE

Approved: _____ date: _____
QA Representative

Approved: _____ date: _____
D. Ross, QA