SU/GP-B P0424 Rev ____

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

CAGING SPRING FORCE VS. TRAVEL TEST

GP-B SCIENCE MISSION PROCEDURE

5 October, 1998

PREPARED _____
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PREPARED _____
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APPROVED _____
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APPROVED _____
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1 SCOPE

This document provides the procedure for testing the force produced by the Spring, Caging, P/N 22796-101, when the Spring is compressed to its required travel for caging. This test is a go/no-go test for the springs, prior to its installation into the Actuator Assembly. It assumes the springs have been cleaned, magnetically screened, and released.

2 REFERENCES

Drawing 22796, Spring, Caging
Memo dated 10 Sep 93, "Gyro Caging Mechanism Design", J. Turneaure and J. Stamets
P0059 GPB Contamination Control Plan
P0057 GPB Magnetic Control Plan

3 GENERAL REQUIREMENTS

3.1 Environmental Requirements

This procedure will be conducted in the Stanford Class 1000 cleanroom, on a HEPA laminar flow bench.

3.1.1 Cleanliness

The Class 1000 clean room where this integration takes place shall be maintained at the cleanliness levels per GPB Contamination Control Plan P0059. Minimum protective garments for personnel working in the clean room shall be the standard Tyvek clean room apparel for room classes from 10,000 to 1000.

3.1.2 Particulate Contamination

All parts and tools shall be cleaned at least to the cleanliness levels of the rooms where they are used for assembly or testing. In addition, all flight parts shall be maintained at level 100 cleanliness per GP-B Contamination Control Plan (P0059). Take all necessary precautions to keep tools and handling equipment free of particulate contamination.

3.1.3 Magnetic Contamination

All parts and tools shall be cleaned using methods consistent with achieving Mil Spec Level 100 cleanliness. In addition, all parts shall be maintained at level 100 cleanliness per GP-B Magnetic Control Plan, P0057. Take all necessary precautions to keep tools and handling equipment free of particulate contamination. Tools to be sprayed with Freon from Pressure can (filtered to < 0.5 micron) prior to use, or when contaminated.

3.2 Personnel

John Stamets is the Caging REE and has overall responsibility for the implementation of this procedure. He shall sign off the completed procedure.

3.3 Safety

3.3.1 Hardware Safety

Special care must be taken not to drop, scratch, or overstress the flight hardware.

3.4 Quality Assurance

This test shall be conducted on a formal basis to approved and released procedures. A Quality Assurance representative designated by B. Taller shall review any discrepancy noted during this procedure, and approve its disposition. Redlines shall be stamped by the QA rep. The QA representative will nominally be A. Nakashima. Upon completion of this procedure, the QA program engineer, B. Taller or P. Unterreiner, will certify his 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.

3.5 Red-line Authority

Authority to red-line (make minor changes during execution) this procedure is given solely to the REE . Approval by the Hardware Manager shall be required, if in the judgment of the REE or QA program engineer, experiment functionality may be affected.

4 REQUIRED EQUIPMENT

Flight Hardware
Spring, Caging, P/N 22796-101

GSE
Starrett No.25-231 Dial Indicator, Calibrated 7/9/98.
Omega Transducer #13683-52, Calibrated 4/21/98
Omega Force Readout, #13683-52, Calibrated 4/21/98
Aluminum Spring Holder
Rod Simulator on Transducer
Spring Tester Stand

5 SPRING FORCE TEST

- Insert the Omega Transducer load cell with Caging Rod Simulator into the platform of the Spring Test Stand. Place the Force Readout on the bench in an easy-to-read location.

- The Springs should be in marked, cleanroom bags, in a container on the bench.
- Remove a Spring from its bag, and place it in the aluminum spring holder in the center of the spring tester fixed platform. Tighten the threaded retainer finger tight.
- Slowly lower the adjustable upper platform until it just touches the Spring, such that the force reads 0.1 +/- 0.05 lbs.
- Reset the Travel Counter of the Platform to Zero.
- Compress the Spring by slowly lowering the adjustable platform until the Travel Counter reads 0.010 inch. Record the force in Table 1.
- Compress the Spring so that 13 lb Force is read on the force gauge. Record travel in Table 1.
- Compress the Spring further to 0.016 inch and record force in Table 1.

The nominal spring force requirement is 13 lb at 0.013 inch travel. The acceptance criteria is 13 lb force at a travel in the range of 0.012 inch to 0.014 inch.

- Decompress the spring so that the force gauge reads 0.1 +/- 0.05 lb. Record the displacement in Table 1.

The travel upon decompression must be 0 +/- .001 inch .
- Repeat for each Spring until all are completed.

SPRING ID # / LDC	FORCE at 0.010 inch (lb)	TRAVEL at 13 lb force (mils)	FORCE at 0.016 inch (lb)	TRAVEL at 0.1 lb upon decompression (mils)	PASS / FAIL*

* Pass implies travel at 13 lb is 12-14 mils, plus travel upon decompression is 0 +/- 1 mil.

Table 1. Spring Force and Travel Results

6 PROCEDURE COMPLETION

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

Responsible Engineer _____ Date _____

Integration or Hardware Manager: _____ Date _____

The information obtained under this assembly and test procedure is as represented and the documentation is complete and correct.

QA Representative _____ Date _____

QA Program Engineer_____ Date _____

7 DATA BASE ENTRY

The following data shall be entered into the GP-B Data Base:

1) Name, number and revision of this procedure

2) Date of successful completion of procedure.