SU/GP-B P0690 Rev-

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

GEOMETRIC MEASUREMENT OF VATTERFLY VALVES FOR DR#296 INVESTIGATION

GPB ENGINEERING PROCEDURE

June 19, 2000

PREPARED _____ _____

A. Halevy , GMA Engineer Date

APPROVED _____ _____

G. Asher, GMA REE Date

APPROVED _____ _____

D. Ross, Quality Assurance Date

APPROVED _____ _____

B. Muhlfelder, Hardware Manager Date

TABLE OF CONTENTS

1. GENERAL DESCRIPTION

This procedure describes the measurements that will be taken on the flight vatterfly valves (Howden drawing #3179) in order to find the cause DR #296. These measurements will show if the opening angle was changed along with the closed position angle change (overshoot). We shall check also the opening and closing operation by the other control box. Earlier measurements show that the bonnet has a freedom of movement of roughly 0.8 degrees. If we find that the plate is out of alignment by more than this, then the offset must be coming from a distorted bellows.

2. TEST INFORMATION

- Proper care should be taken in handling components, and their cleanliness must be preserved.
- Temperature: Room temperature
- Humidity: not critical

2.2 Cleanliness

2.2.1 Normal lab environment when components are double bagged.

2.2.2 Class 1000 Clean Room, on class 100 laminar flow working table.

2.3 ESD precautions

2.3.1 None required.

ONR representative, and QA to be notified prior to beginning this procedure

2.4 Personnel, QA, and Documentation

2.4.1 Personnel Integration and Test Director

The Integration and Test Director (ITD) shall be Aaron Halevy or an alternate that he shall designate. The ITD has overall responsibility for the implementation of this procedure and shall sign off the completed procedure and relevant sections within it. The GMA REE shall also sign off the completed "As-Built" procedure.

Integration Engineers and other personnel. All engineers and technicians participating in this procedure shall work under the direction of the ITD who shall determine personnel that are qualified to participate in this procedure. Participants in this procedure are to be C. Warren and A. Halevy.

The test shall be conducted on a formal basis to approved and released procedures. The QA program office shall be notified of the start of this procedure. A Quality Assurance Representative, designated by D. Ross shall be present during the procedure (if deemed necessary) and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Manager, D. Ross or her designate, shall certify their 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. Discrepancies will be recorded in a D-log or as a DR per Quality Plan P0108. If a re-test of any or all of the hardware is necessary, the ITD will determine the appropriate changes in the procedure, with the QA Manager's approval.

2.5 Red-line Authority

Authority to red-line (make minor changes during execution) this procedure is given solely to the ITD or his designate, or the GMA Manager, and shall be approved by QA. Additionally, approval by the Hardware Manager shall be required, if in the judgment of the ITD or QA Representative, experiment functionality may be affected.

To conveniently record data directly into the procedure thus generating the "as-built" document, the procedure will be handled, if possible, in a paperless fashion until completed. A Laptop computer containing an electronic version of this procedure will be operated by the ITD or QA Representative and data shall be recorded by typing directly into the electronic file. Alternatively, an "As-Built" may be created after-the-fact from hand written notes in the approved procedure.

Following completion of the procedure and the creation of an edited electronic copy, a hard copy of the "As-Built" procedure shall be printed and ***signed off by all the designated parties.*** It shall then be filed, including an electronic copy into the data base.

The electronic editing of this document shall be as follows:

Data will be inserted into the document using normal font, i.e. non-bold, non-italic

- "Signatures" shall be designated by **BLACK CAPITAL BOLD LETTERS**.
- "Redlines" shall be in ***RED BOLD ITALICS*** to make them distinguishable in computer and on the hard copy printout.
- If available, digital pictures shall be inserted into the document where appropriate.

3. DOCUMENTS AND EQUIPMENT

3.1 Applicable Documents

Howden drawing #3179

3.2 Test Equipment

Equipment	Model and Serial Number	Calibration
Square		
Control box		
Shim assortments		
Caliper		

4 MEASUREMENT OF SOLENDOID VALVES

Started on: _____

4.1 Open position angle

4.1.1 Open V3 to the maximum open position.

4.1.2 Use caliper for checking angle between the valve outer diameter and the rotating plate.

4.1.3 Record the results in table para 5
If the difference between fully open and fully close is 90 degrees, it is a proof that the bellow distorted.
Bellow distortion may happen by exerting excessive torque.

4.2 Valve opening and closing by changing the control box

4.2.1 Replace the control box and record their identification numbers.

4.2.2 Operate the valve twice each direction to see the bouncing back phenomena that was observed in the previous test with the other control box.

5. TABLE RESULTS:

Setting angle	Height measurements (U/O)*	Control box
0 (Fully close)		
90 (Fully open)		
One step before fully close		
0 (Fully close)		
90 (Fully open)		
One step before fully close		

*The letter U indicates undershoot, and O indicates overshoot. For angle calculation, divide the height difference by the distance between measurements

6. PROCEDURE COMPLETION

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

_____ date: _____
A. Halevy, GMA Engineer

Discrepancies if any:

Approved: _____ date: _____
G. Asher, GMA REE

Approved: _____ date: _____
D. Ross, QA Representative

7 DATA BASE ENTRY

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

- Name, number and revision of this procedure
- Date of successful completion of procedure.
- Part numbers and serial numbers of Caging Units and their components