W. W. Hansen Experimental Physics Laboratory
STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305 - 4085

Gravity Probe B Relativity Mission

GSS BOARD TEST SYSTEM (GOLD SYSTEM) GSE RECERTIFICATION PROCEDURE

System SN:	
Date:	

GP-B Procedure
P0857 Rev -

Author: Scott Smader RE, Gyroscope Suspension System (GSS) Hardware	Date
Approved by: William J. Bencze RE, Gyroscope Suspension System (GSS) Group	Date
Approved by: Dorrene Ross GP-B Quality Assurance	Date

Table of Contents:

1.0 Revision History

Rev Level	Comments/notes	Date	Revised By
-	First release of this procedure	5-Dec-02	S Smader

2.0 Scope:

This procedure details the tests required to recertify a GSS flight equivalent unit, or “Gold System” for use as GSE for testing with flight or flight-spare hardware or for other quality-monitored system tests.

This procedure is to be performed whenever the configuration or contents of the gold system changes, or once per year, whichever comes first.

3.0 Definition of Gold System Components

3.1. Gold system components (PWAs, cables) are flight equivalent electronics assemblies that have been built with flight-compatible interfaces and functionality so that they may come into contact and be operated with flight components without risk of contamination or other types of damage. In almost all cases, this has been ensured by building assemblies from the flight designs, but substituting easily available, commercial-equivalent electrical components for flight-quality components. All interfaces (connectors) are flight-quality parts, or are used with connector savers when interfacing to Flight Hardware.

4.0 Reference Documents

4.1.	Gold System Certification Procedure	P0663
4.2.	Board-level test software operational procedure	P0670
4.3.	FSU Full Functional Test Procedure	P0702
4.4.	ASU Full Functional Test Procedure 2	P0772

4.5. Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment, MIL-STD-1686

5.0 Test Facilities

HEPL Room 127, Stanford University

6.0 QA Provisions:

6.1. This procedure shall be conducted on a formal basis to its latest approved and released version. The QA Program Engineer (D. Ross) and the ONR representative (R. Gurr) shall be notified 24 hours prior to he start of this procedure. QA may monitor the execution of all or part of this procedure should they elect to do so.

Date/time:_____ Date/time:_____

GP-B QA (D. Ross) ONR (R. Gurr)

6.2. Upon completion of this procedure, the GSS manager and the GP-B QA manager shall certify her/his concurrence that the procedure was performed and accomplished in accordance with the prescribed instructions by signing and dating his approval at the end of this procedure.

7.0 Test Personnel

This test procedure is to be conducted only by the following personnel:

7.1. William Bencze

7.2. Scott Smader

7.3. Ron Zilm

7.4. Lo Van Ho

7.5. Jay Dusenbury

8.0 General Instructions

8.1. Redlines can be initiated by the test personnel listed in Section 7.0 and must be approved by QA.

8.2. Test operators shall read this procedure in its entirety and resolve any apparent ambiguities prior to beginning this test.

8.3. 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.

8.4. Only the following persons have the authority to exit/terminate this test or perform a retest: Test operators listed in Section 7.0 and GP-B QA.

8.5. In this document, “Perform Flight S/W system test commands:” means to prepare the test system software as described in P0670 Board-Level Test Software Operational Procedure, and then issue the listed commands according to the procedure described in P0670.

9.0 Hardware Safety Requirements:

9.1. This assembly is ESD sensitive; special care shall be exercised per the "Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment", MIL-STD-1686

9.2. Ensure that power is removed from cable assemblies before connecting or disconnecting cable connectors.

9.3. Examine all mating connectors before attempting to mate them. Remove any foreign particles. Look for any damaged pins or sockets. Do not force the coupling action if excessive resistance is encountered. Ensure that key-ways are aligned when mating connectors.

10.0 External Test Equipment

All external test equipment that will be required is called out in the individual board test procedures that make up this qualification document.

11.0 Gold System Software Configuration:

The software routines run on the Sun workstation and the RAD6000 are configuration controlled. Software revisions used during testing are noted in the called procedures, P0772 and P0702.

12.0 Recertification Procedure:

Note: All handling of this PWA shall be performed using ESD control methods, as outlined in MIL-STD-1686. Unit shall be inspected at an ESD certified station. Wrist straps and/or heel grounding straps shall be used. An ESD approved laboratory coat shall be worn when in close proximity to this PWA.

12.1. Gold System Configuration

- Record Serial Numbers of all gold system cards and gold system components in provided locations in Table 1 (pg 9).

12.2. Gold System Assembly

- Install and remove cards in the system per the procedure given in Section 15.0.

	P/F	Notes:
12.2.1. Install gold system aft backplane per the procedure in Section 15.0.		
12.2.2. Install AMT gold system card into aft enclosure		
12.2.3. Install ACL gold system card into aft enclosure		
12.2.4. Install ACS gold system card into aft enclosure		
12.2.5. Install ATC gold system card into aft enclosure		
12.2.6. Install forward backplane per the procedure in Section 15.0.		
12.2.7. Install ADDA gold system card into fwd enclosure		
12.2.8. Install FMR gold system card into fwd enclosure		
12.2.9. Install ABU gold system card into fwd enclosure		
12.2.10. Install ARB gold system card into fwd enclosure		
12.2.11. Install MUX gold system card into fwd enclosure		
12.2.12. Install LVA gold system card into fwd enclosure		
12.2.13. Install PC630 FRM emulator into fwd enclosure.		
12.2.14. Install FCL gold system card into fwd enclosure		

12.3. Gold System Test

- Only previously tested cards may be used for this assembly.
- Install and remove cards in the system per the procedure given in Section 15.0.

	P/F	Notes:
12.3.1. Verify proper assembly of Gold System.		
12.3.2. Verify proper interconnection as in Figure 1 (section 14.0)		
12.3.3. Perform P0772. Attach completed copy of procedure to this document.		
12.3.4. Perform P0702. Attach completed copy of procedure to this document.		
12.3.5. Fill in Certificates of Compliance (page 15), and affix to ASU and FSU.		

13.0 Completion of Procedure:

I certify that this procedure was performed in whole and that the data recorded above is complete and accurate.

Test Engineer _____ Date _____

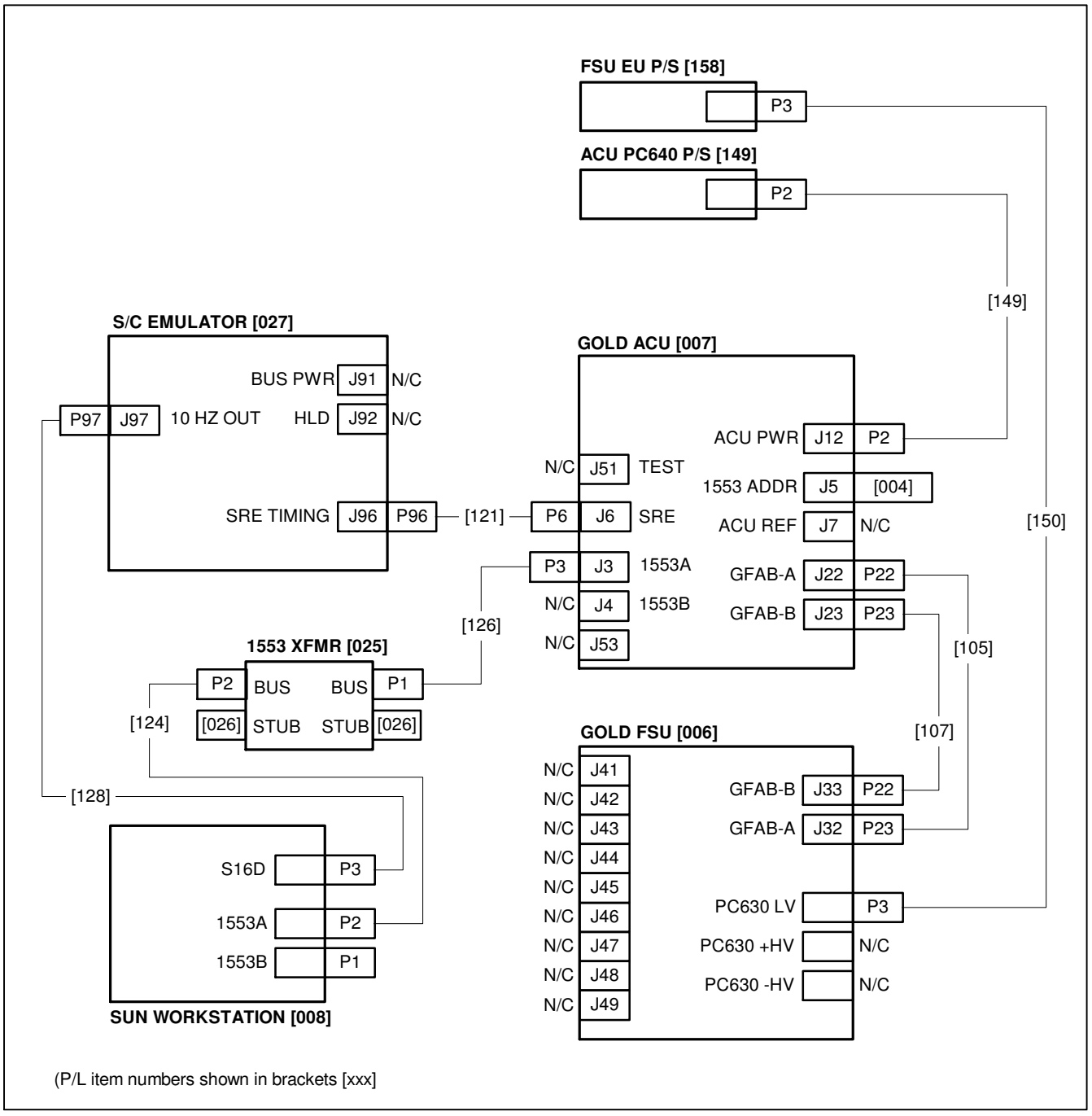
This is to certify that the information obtained under this test procedure is as represented and the documentation is completed and correct.

GSS Representative _____ Date _____

Quality Assurance _____ Date _____

14.0 Gold System PWAs plus EU RAD6000 computer. (See Figure 1.)

Complete parts lists for this configuration are given in the following table. (See Table 1.)



Numbers on the figures in square brackets [xxx] correspond to item numbers in the parts list.

Figure 1: Connection diagram for Gold System configuration

The Test Operator is to record the serial number of the listed items in the space provided. Quantities of item are noted.

Table 1: Parts List for Gold System configuration

ITEM	Qty	PART NO.	PART DESCRIPTION	SERIAL NUMBER
004	1	8A01481	Address Plug, Address 12	NA
006	1	8A01424GSE	FSU GSE enclosure	
007	1	8A01425GSE	ACU GSE enclosure	
008	1	NA	Sun Workstation	NA
025	2	90-50202	Bus Coupler, Two Port	NA
026	4	10-06403-025	Terminator	NA
027	1	NA	Spacecraft Simulator	
105		8A01473-101	Cable Assembly, GFAB-A	NA
107		8A01474-101	Cable Assembly, GFAB-B	NA
115		8A02097GSE-101	Cable Assembly, HV	NA
121	1	8A02084GSE-101	Cable Assembly	NA
124	1	CA-2014-72	Cable Assembly, 1553	NA
126	1	8A00673GSE-503	Cable Assembly	NA
128	1	NA	Cable Assembly, S16D	NA
135	1	8A10899-GS	Gold AMT card	
136	1	8A10898-GS	Gold ACS card	
137	1	8A10900-GS	Gold ATC card	
138	1	8A01901-GS	Gold ABP card	
139	1	8A01871-GS	Gold ACL card	
140	1	8A01870-GS	Gold ADDA card	
141	1	8A01891-GS	Gold FCL card	
142	1	8A01892-GS	Gold FMR card	
143	1	8A01893-GS	Gold Fwd backplane	
145	1	8A01885-GS	Gold Arbiter card	
146	1	8A10884-GS	Gold ABU card	
147	1	8A01883-GS	Gold MUX card	
148	1	8A10882-GS	Gold LVA card	
149	1	PC640-ASSY	Aft FEU power supply	

(continued)

ITEM	Qty	PART NO.	PART DESCRIPTION	SERIAL NUMBER
153	1	199A962-1	RAD6000 EU card	
154	1	8A02429GSE	FSU GSE Cover	NA
155	1	8A02430GSE	ACU GSE Cover	NA
156	1	PC610	FSU test card 1	
157	1	PC620	FSU test card 2	
158	1	E3630A	FSU PS 1	
159	1	E3620A	FSU PS 2	
160	2	E3617A	FSU PS 3,4	
161	1	PC630-ASSY	FRM emulator	
162		PC355-Assy	ATC daughter card	NA

Table 1: Parts List for Gold System (continued)

15.0 PWB Insertion/Removal Procedures:

15.1. The location and orientation of the cards in the aft Gold System enclosure (Figure 2)

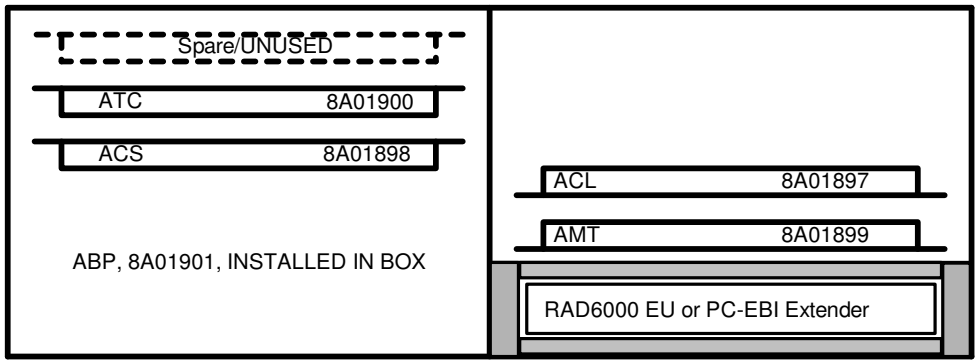


Figure 2: Location of cards in aft enclosure (view looking at the top of the backplane)

15.2. Installation of the Aft Backplane

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Remove any bracket holding the 25-pin D-connector J12.

B. Place backplane into empty aft GSE enclosure. Orient the PWB such that the 122-pin connector rests in the RAD6000 slot.

C. Install 16 4-40 x 0.375 screws and 32 NAS620C4L washers to attach the backplane to the box. Place a washer between the screw head and the PWB and one washer between the PWB and enclosure for each of the screws. Snug-tighten screws.

D. Gently move the J12 D-connector such that it is centered in J12 cutout in the box wall near the backplane.

E. Install jackpost hardware to attach the connector to the enclosure wall.

15.3. Removal of Aft Backplane

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Disconnect cables and remove covers.

B. Remove all function cards in aft enclosure.

C. Remove jackpost hardware from 25 pin D power connector J12.

D. Remove 16 4-40 screws and washers that hold the backplane into the enclosure.

E. Gently remove the J12 D-connector from its cutout in the box wall, taking care not to stress the J12 cable more than necessary.

F. Lift backplane out of enclosure, paying particular attention not to stress the J12 connector and cable.

G. Replace any bracket holding the J12 D connector.

15.4. Installation of Aft Cards

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Locate slot for the particular board of interest (refer to Figure 2)

B. Remove any existing Gold System card.

C. Inspect backplane connector pins on board of interest to ensure no pins are bent and that no debris is present in the connector.

D. Inspect backplane socket of interest to ensure no debris is present in the connector.

E. Orient card so that guideposts will properly engage when board is seated (refer to Figure 2 for orientations)

F. Slide card into slot and gently seat card once connector contacts are engaged.

G. Do not tighten wedgelocks; leave them loose.

H. Replace cover; secure around perimeter with 6 equally spaced 4-40 screws and washers.

I. Install jackposts for all connectors.

J. Gently tighten jackposts until snug. This operation will slightly unseat the backplane connector on each card with a connector protruding through cover.

15.5. Removal of Aft Cards

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Remove all jackpost on connectors.

B. Remove cover.

C. Locate board of interest (refer to Figure 2).

D. With two hands, gently rock the card back and forth in its slot to unseat the backplane connector.

E. When unseated, slide the card out of the slot and return it to its packaging.

Location and orientation of the cards in the forward Gold System enclosure (Figure 3)

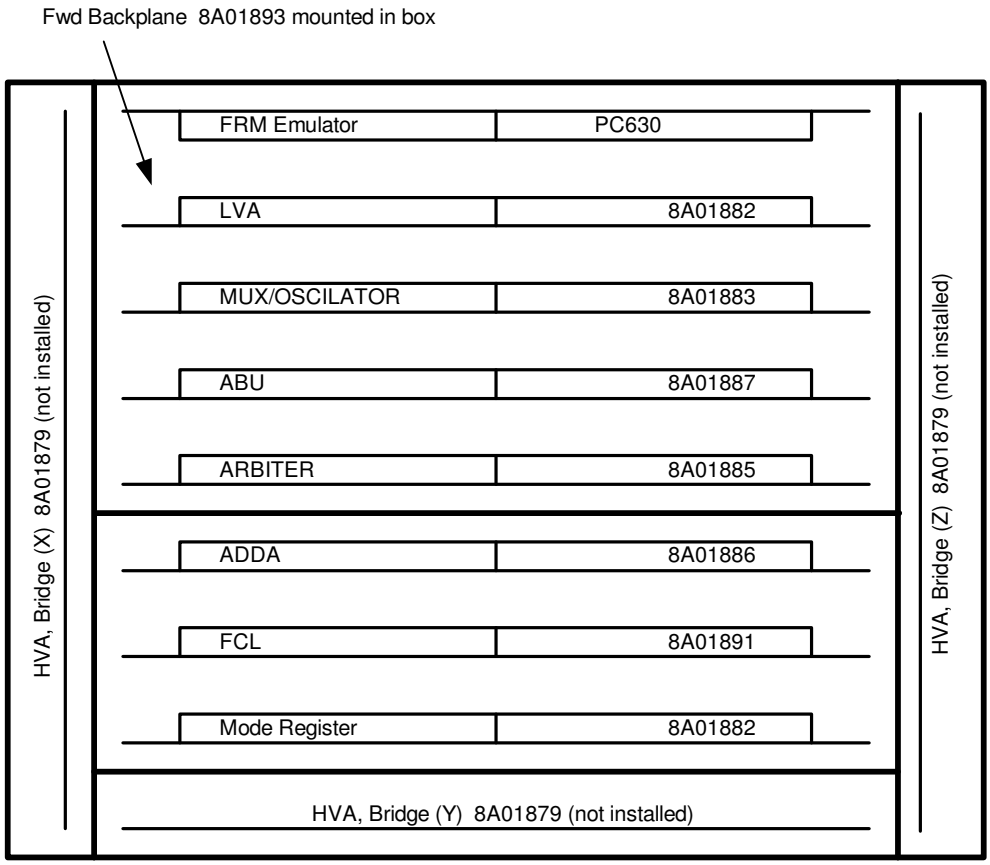


Figure 3: Location of cards in forward enclosure (view looking at the top of the backplane)

15.6. Installation of the Forward Backplane

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Place backplane into empty forward GSE enclosure. Orient the PWB such that the 90 pin 2-row connector rests in the FRM slot.

B. Install 4 4-40 x 0.375 flat head screws and 6 4-40 x 0.375 fillister or pan-head screws and 16 NAS620C4L washers to attach the backplane to the enclosure. Place a washer between the screw head and the PWB and between the PWB and the enclosure for each of the screws. Tighten screws until snug.

15.7. Removal of Forward Backplane

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Remove all function cards in fwd enclosure.

B. Remove 10 4-40 screws and washers that hold the backplane into the enclosure.

C. Lift backplane out of enclosure.

15.8. Installation of Forward Cards

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

K. Locate slot for the particular board of interest (refer to Figure 3)

L. Remove any existing Gold System card.

M. Inspect backplane connector pins on board of interest to ensure no pins are bent and that no debris is present in the connector.

N. Inspect backplane socket of interest to ensure no debris is present in the connector.

O. Orient card so that guideposts will properly engage when board is seated (refer to Figure 3 for orientations)

P. Slide card into slot and gently seat card once connector contacts are engaged.

Q. Do not tighten wedgelocks; leave them loose.

R. Replace data-side cover, secure around perimeter with 6 equally spaced 4-40 screws and washers.

S. Install screws and washers for FCL card bracket..

T. Gently tighten screws until snug. This operation will slightly unseat the FCL connector at the backplane.

15.9. Removal of forward cards

Note 1: Boards are ESD sensitive; use anti-static protection while handling these assemblies.

Note 2: Handle PWAs with ESD control-compatible rubberized gloves to minimize contamination of flight hardware.

A. Remove FCL bracket screws.

B. Remove cover.

C. Locate board of interest (refer to Figure 3).

D. With two hands, gently rock the card back and forth in its slot to unseat the backplane connector.

E. When unseated, slide the card out of the slot and return it to its packaging.

16.0 Gold System Certificates of Compliance

Fill in Certificates of Compliance below, and affix to tested ASU and FSU.

GP-B GSS ASU Gold System
P0857 Certificate of Compliance

This Certificate expires one year from Certification Date, or when configuration changes, whichever comes first.

ASU Serial #	
P0857 Revision	
Certification Date	
By	
Flight Spare Components (FS)?	

If Flight Spare components are included in this configuration, special handling may be required. Consult Test Director.

Certified Configuration

Module	FS?	S/N
R6K		
ABP		
ATC		
ACS		
AMT		
ACL		
P/S (PC640)		
Bench Supply		

GP-B GSS FSU Gold System
P0857 Certificate of Compliance

This Certificate expires one year from Certification Date, or when configuration changes, whichever comes first.

FSU Serial #	
P0857 Revision	
Certification Date	
By	
Flight Spare Components (FS)?	

If Flight Spare components are included in this configuration, special handling may be required. Consult Test Director.

Certified Configuration

Module	FS?	S/N
FBP		
FRM Emul.		
FMR		
ACL		
ADDA		
ARB		
ABU		
MUX		
LVA		
HVA X		
HVA Y		
HVA Z		
LV P/S		
HV P/S		
P50V P/S		
M50V P/S		
TC1 (PC610)		
TC2 (PC620)		
Simulator I/F		