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

Gravity Probe B Relativity Mission

MANUFACTURING INSTRUCTIONS
GSS FORWARD SUSPENSION UNIT

PWA 26225 Rev - S/N:

GP-B Procedure
P0802 Rev A

Prepared by: William Bencze Date
RE, Gyroscope Suspension System (GSS) Group

Approved by: William Bencze Date
Payload Electronics Manager

Approved by: Dorrene Ross Date
GP-B Quality Assurance

Table of Contents:

1.0 Revision History

Rev Level	Comments/notes	Date	Revised By
-	First release of this procedure	16-Jan-01	WJ Bencze
A	Updates following assembly of first FSU FU	31-Jan-01	WJ Bencze

2.0 Scope:

This procedure describes the steps required to assemble a GSS FSU flight unit, PN 26225-101.

All data recorded during this procedure is recorded in this document; each assembled unit will use its own copy of this procedure, and will be identified by serial number on the cover sheet.

3.0 Reference Documents

3.1. Assembly drawing, GSS Forward Suspension Unit, 26225.

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

4.0 Assembly Facilities

4.1. GP-B GSS Flight Electronics Laboratory, HEPL Rm 127, Stanford University.

4.2. Code FMX electronics assembly area, Bldg 220, NASA Ames Research Center , Moffett Field, CA 94035.

4.3. Zentek Scientific, 27738 Industrial Blvd, Hayward CA 94545.

5.0 QA Provisions:

5.1. This procedure shall be conducted on a formal basis to its latest approved and released version. The QA Program Engineer (D. Ross) and the government representative (E. Ingraham) 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.

QA notified at date/time:

Date/time:_____ Date/time:_____

GP-B QA (D. Ross) Government Rep. (E. Ingraham)

5.2. 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.

6.0 Test Personnel

This procedure, in whole or part, is to be conducted only by the following personnel:

6.1. William Bencze (Stanford)

6.2. Lorin Belanger (NASA/Ames)

6.3. Zentek Scientific (Neil Davies or designee)

7.0 General Instructions

7.1. Redlines can be initiated by the test personnel listed in Section 6.0 and must be approved by QA.

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

7.3. 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.

7.4. Only the following persons have the authority to exit/terminate procedure: Test operators listed in Section 6.0 and GP-B QA.

7.5. Epoxy mixing operations shall be witnessed by QA.

7.6. Only edges of screws shall be staked. Do not fill or contaminate the tool slots on screw heads when staking into position.

8.0 Hardware Safety Requirements:

8.1. 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

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

8.3. 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.

8.4. Connector savers shall be used on all flight interfaces unless otherwise specified.

9.0 Equipment list

The following support hardware, test equipment, or software will be used and the applicable information for the instruments shall be recorded below. Hand-written additions to this list may be made in the space provided. Only equipment that require calibration or other such certification/control shall be recorded here:

Equipment Description		Make	Model	SN	Cal Due
9.1.	Torque wrench				
9.2.	Multimeter	Fluke			
9.3.	Contact Crimper	Daniels MFG	M22520/2-01		
9.4.	Locator head	Astro	M22520/2-09		NA
9.5.	Contact insertion tool for FN 39				
9.6.					
9.7.					
9.8.					
9.9.					
9.10.					

10.0 Bill of Materials

The following list of parts are required for fabrication of this unit. GP-B bonded stores to shall fill in material traceability data in last three columns at right of this matrix for this specific unit.

FN	Qty	Part Number	Description	Material Spec	LDC/SN	Mass/ea (gram)	Checkout date	Notes
1	X	-101	GSS Fwd suspension Unit					
2	123	AN960C4	Washer, Flat, #4					
3	32	NAS620C4L	Washer, Flat, #4 thin (reduced dia)					
4	8	NAS1101E04-4	Screw, Fillister head 4-40 x 0.250					
5	111	NAS1101E04-5	Screw, Fillister head 4-40 x 0.312					
6	1	8A01424-101	FSU enclosure					
7	1	8A02426-101	FSU aft cover					
8	1	8A02425-101	FSU fwd cover					
9	1	8A02429-GSE	FSU aft cover, GSE					
10	1	8A01893-101	Fwd backplane					
11	18	AN960C2	Washer, #2, flat					
12	1	8A01886-101	PWA, ADDA					
13	1	8A01892-101	PWA, FMR					

FN	Qty	Part Number	Description	Material Spec	LDC/SN	Mass/ea (gram)	Checkout date	Notes
14	1	8A01885-101	PWA, ARB					
15	1	8A01884-101	PWA, ABU					
16	1	8A01883-101	PWA, MUX					
17	1	8A01882-101	PWA, LVA					
18	1	8A01891-101	PWA, FCL					
19	1	BE06898113	Module, FRM					
20	3	8A01879-101	PWA, HVA					
21	AR	2216 A/B	Epoxy, Grey	MFGR: 3M Alternate to FN 46				
22	2	8A02537-101	Cable, HV patch, short					
23	1	8A02536-101	Cable, Gyro ground	Mates: FBP J1				
24	1	8A02538-101	Cable, FSU ground	Mates: FBP J3				
25	1	8A02539-101	Cable, Charge bias	Mates: FBP J2				
26	2	8A00845-101	Vent housing					
27	2	20012 V884-75	O-ring	MFGR: Bay Seal				
28	2	8-I/FCR-510	Porous plug	MFGR: Capstan				
29	-	(reserved)						

FN	Qty	Part Number	Description	Material Spec	LDC/SN	Mass/ea (gram)	Checkout date	Notes
30	AR	01-0104-0064	Wire mesh gasket, 0.062 in dia	MFGR: Chomerics				
31	1	212559-2	Connector saver, 37 pin	MFGR: AMP				
32	15	1617751-006	Cable tiedown block, glue-on	LMMS PN				
33	4	NAS1102E04-4	Screw, flat head, 4-40 x 0.250					
34	3	RER65F3R16R	Resistor, 3.16 ohm 10 W	MFGR: Dale				
35	0	NAS620C4	Washer, Flat, #4		xxxxx	xxxxx	xxxxx	
36	AR	PLT.6SM-C	Cable tie	MFGR: Panduit				
37	12	MS51975-1	#2 Screw, pan head, 2-56 x 0.125					
38	2	CTL-22	Jiffy connector	MFGR: Deutch				
39	4	MS39029/22-191	Contact, 22 AWG					
40	3	D20418-77	Jackscrew, female (kit)	MFGR: ITT Cannon				
41	AR	M22759/44-22-1	Wire, 22 AWG	-2 thru -9 OK substitutes				
42	18	NAS1101E02-4	Screw, Fillister, 2-56 x 0.250	For HV frame, FRM				
43	12	NAS620C2	Washer, #2					
44	AR	22-282-0XXXXXX	Shrink tube, various dia.	LMMS PN.				
45	12	NAS1101E02-6	Screw, Fillister, 2-56 x 0.375	For heater mounting				

FN	Qty	Part Number	Description	Material Spec	LDC/SN	Mass/ea (gram)	Checkout date	Notes
46	AR	1210A+9615A	Epibond (Ciba)	Alternate: FN 21				
47	12	NAS671C2	Nut, #2					
48		(reserved)			xxxxx	xxxxx	xxxxx	
49	1	26240-101	Insulator insert, 6.00 in wide	FR-4, 0.031 thk				
50	2	26240-102	Insulator insert, 6.75 in wide	FR-4, 0.031 thk				
51	3	NAS1101E04-6	Screw, 4-40 x 0.375					
52	5	MS21045-L04	Nut, 4-40, self-locking					
53	2	SS-9412-01	Jackpost	MFGR: Lyn-tron				
54	AR	M-9-N	Epoxy ink, white					
55	2	8A02537-102	Cable, HV patch, medium					
56	2	8A02537-103	Cable, HV patch, long					
57	7	178-6157	Connector saver, HV	MFGR: Reynolds				
58	1	212552-2	Connector saver, 9 pin	MFGR: AMP				
59	1	212563-2	Connector saver, 50 pin	MFGR: AMP				
60	0	(reserved)			xxxxx	xxxxx	xxxxx	
61	12	NAS1101E04-7	Screw, 4-40 x 0.438					

FN	Qty	Part Number	Description	Material Spec	LDC/SN	Mass/ea (gram)	Checkout date	Notes
62	3	NAS1101E04-8	Screw, 4-40 x 0.500					
63	3	26243-101	Screw, 2-56 x 0.125; machined head	Make from MS51975-1				
64								
65								
66								
67								
68								
69								
70								

11.0 Assembly operations:

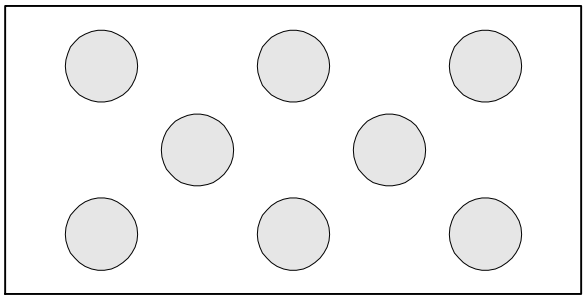
#	Operation	Initials /Date	Inspect /Date	Extension
N	***Assembly must occur in the order specified in this Manufacturing Instruction (MI). Please read through and understand this MI completely before starting assembly.*** ***Assembly sub-operations may be performed in parallel (each sub operation is identified by a letter prefix, A, B, C, etc)*** ***Cleanliness during the assembly process is essential to ultimate reliability and performance. Please follow cleaning and handling instructions carefully*** ***Facilities shall be ESD compliant per NHB530.4 (3L).*** ***Modifications, additions or deletions to this MI shall be recorded on the attached extension sheet and be given a unique extension number denoting the point of entry from this main procedure. The extension sheet may also be used to record hardware specific information. All information recorded on the extension sheet shall be maintained as a permanent part of this MI.*** ***Screw lengths may be changed at build time to accommodate slight differences between the engineering print and as built hardware. Changes from the values noted in this MI shall be noted in the extension sheets.*** ***All torquing of screws and nuts shall be witnessed by QA.*** ***Mixing of epoxies/glues shall be witnessed by QA*** ***Items designated as "N" are notes, and are listed in bold italic font.*** ✈ ***Inspection/QA witness steps are flagged with a star.***	XXXXX	XXXXX	XXXXX

11.1. Enclosure pre-assembly

#	Operation	Initials /Date	Inspect /Date	Extension
A1.	Install two vent assemblies onto housing wall. Pre-assemble 2ea vent housing FN 26, disk FN 28, and o-ring FN 27. Place disk vent assembly against the outside of the enclosure wall at mounting locations in the backplane cavity. (Screw heads on the inside of the box) Secure with screws FN 4 and washers FN 3. ✈Torque vent housing fasteners to 6 to 8 in-lbs plus any necessary run-through torque. Run-through torque: _____ in-lbs.			
A2.	✈Apply epoxy FN 46 to one surface of an insulator insert FN 50 in a polka-dot pattern (Figure A-1) with each dot approximately 1 inch in diameter so that after installation, there will be no epoxy-enclosed pockets of air between enclosure and insulator.			
A3.	Insert insulator X channel bay (Figure A-2) with epoxy surface oriented toward the center of the box in the X HV amplifier bay. Orient the enclosure as needed to use gravity as an aid to keep the epoxy away from the surfaces of the HV bay.		XXXXX	
A4.	Orient the enclosure to bring the epoxy surface of the insulator in contact with the inboard wall of the HV bay.		XXXXX	
A5.	Gently press the insulator against the enclosure surface to ensure all epoxy dots are in contact with the enclosure. Use weights as required to hold insulator in place.		XXXXX	
A6.	✈Attach tie blocks FN 32 to the aft end of the Z bay at locations shown in Fig A-5 using epoxy FN 46.			
A7.	Allow epoxy to cure 2 hours at room temperature prior to subsequent assembly operations.		XXXXX	
A8.	✈Apply epoxy FN 46 to one surface of an insulator insert FN 50 in a polka-dot pattern (Figure A-1) with each dot approximately 1 inch in diameter so that after installation, there will be no epoxy-enclosed pockets of air between enclosure and insulator.			

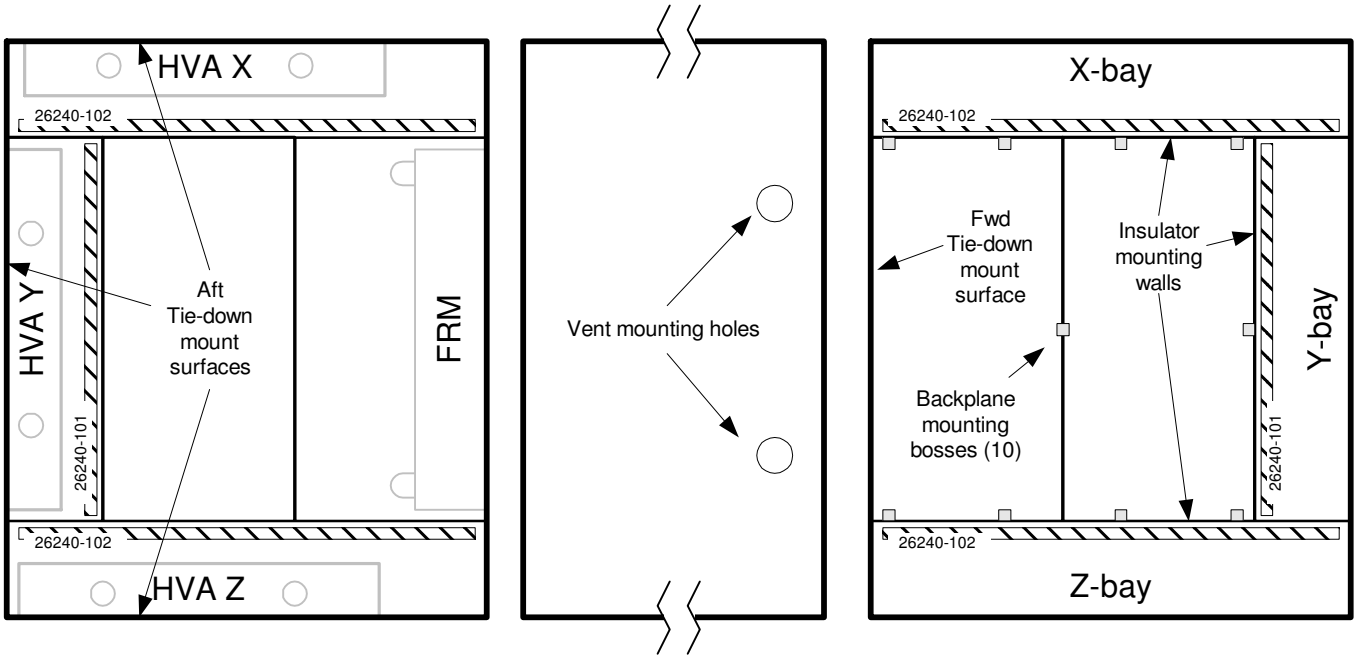
#	Operation	Initials /Date	Inspect /Date	Extension
A9.	Insert insulator Z channel bay (Figure A-2) with epoxy surface oriented toward the center of the box in the Z HV amplifier bay. Orient the enclosure as needed to use gravity as an aid to keep the epoxy away from the surfaces of the HV bay.		XXXXX	
A10.	Orient the enclosure to bring the epoxy surface of the insulator in contact with the inboard wall of the HV bay.		XXXXX	
A11.	Gently press the insulator against the enclosure surface to ensure all epoxy dots are in contact with the enclosure. Use weights as required to hold insulator in place.		XXXXX	
A12.	✈Attach tie blocks FN 32 to aft end of the X bay at locations shown in Fig A-5 using epoxy FN 46.			
A13.	Allow epoxy to cure 2 hours at room temperature prior to subsequent assembly operations.		XXXXX	
A14.	✈Apply epoxy FN 46 to one surface of an insulator insert FN 49 in a polka-dot pattern (Figure A-1) with each dot approximately 1 inch in diameter so that after installation, there will be no epoxy-enclosed pockets of air between enclosure and insulator.			
A15.	Insert insulator Y channel bay (Figure A-2) with epoxy surface oriented toward the center of the box in the Y HV amplifier bay. Orient the enclosure as needed to use gravity as an aid to keep the epoxy away from the surfaces of the HV bay.		XXXXX	
A16.	Orient the enclosure to bring the epoxy surface of the insulator in contact with the inboard wall of the HV bay.		XXXXX	
A17.	Gently press the insulator against the enclosure surface to ensure all epoxy dots are in contact with the enclosure. Use weights as required to hold insulator in place.		XXXXX	
A18.	Allow epoxy to cure 2 hours at room temperature prior to subsequent assembly operations.		XXXXX	
A19.	✈Mount tie-down blocks FN 32 in forward enclosure at locations specified in Figure A-3 using epoxy FN 46. Keep epoxy clear of the vent enclosure assemblies.			
A20.	✈Attach tie blocks FN 32 to the aft end of the Y bay at locations shown in Fig A-4 using epoxy FN 46.			

#	Operation	Initials /Date	Inspect /Date	Extension
A21.	Allow epoxy to cure prior to handling of the enclosure.		XXXXX	
A22.	✈.**Inspect Point: Enclosure bonding**	XXXXX		



26225MI-A1

Figure A-1 – Epoxy dot pattern (for reference only)



Aft (Connetor) End View

Side View - Vent hole side

Forward (Backplane) End View

26255MI-A2

Figure A-2 – Mounting locations for Insulator Inserts, PN 26240

For Fwd Tie-down mounting details, see Fig A-3
For Aft Tie-down mounting details, see Fig A-4, A-5

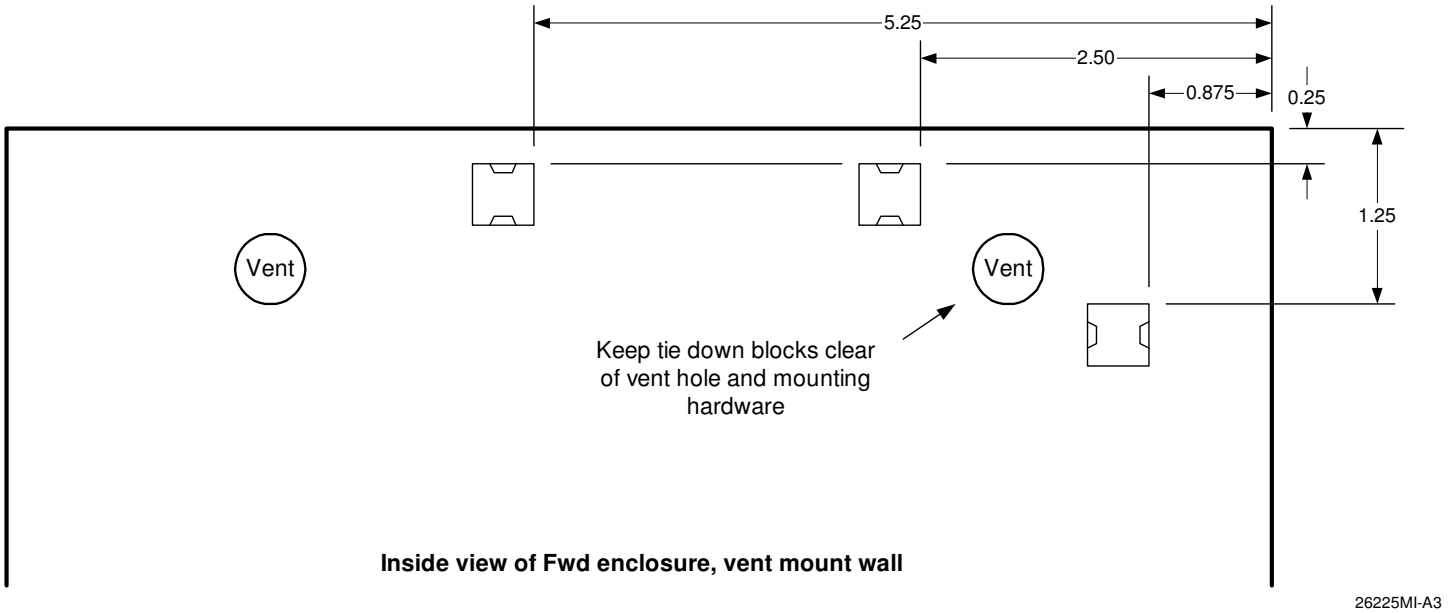


Figure A-3 – Tie block mounting locations inside FSU enclosure, Fwd (backplane) End
(Fine detail omitted for clarity)

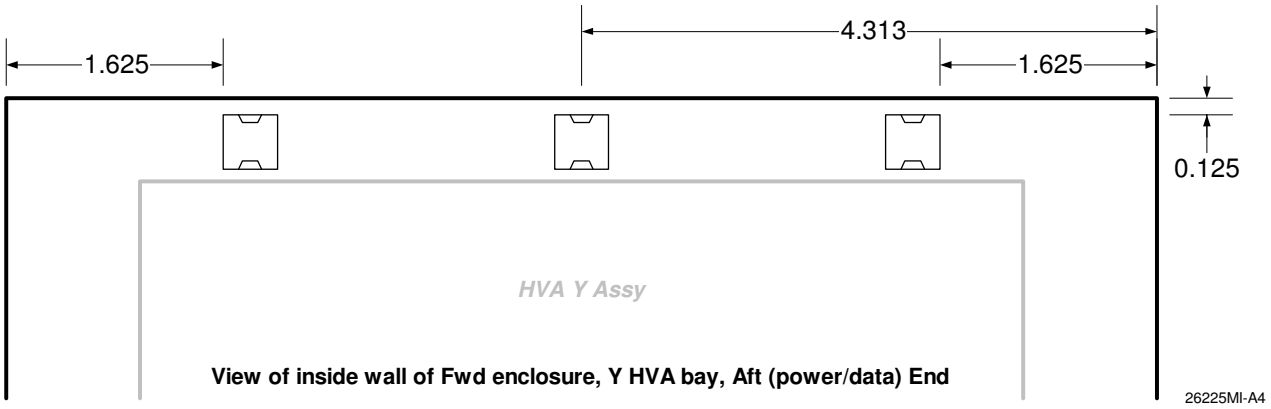


Figure A-4 – Tie block mounting locations inside FSU enclosure, Y HV Bay, Aft end
(See Fig A-2)

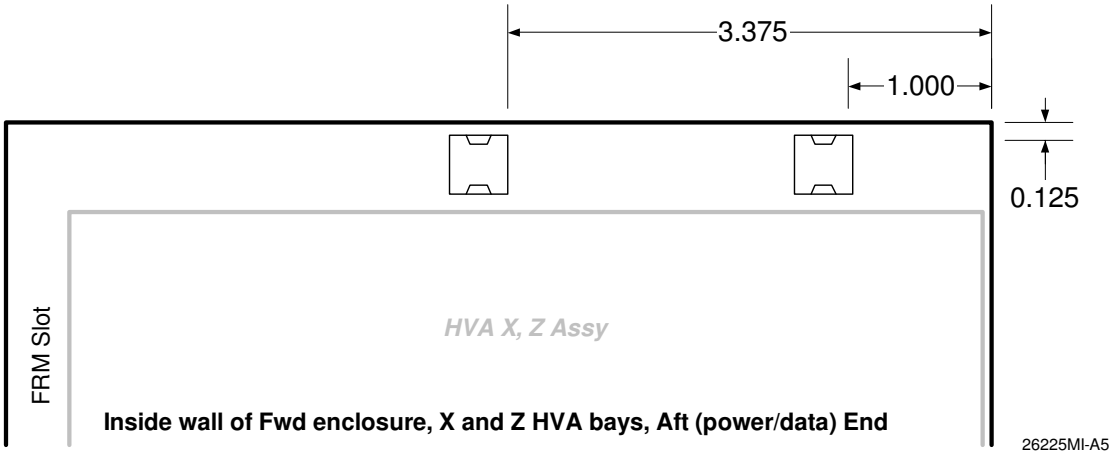


Figure A-5 – Tie block locations inside FSU enclosure, X and Z bays HV Bay, Aft end
(See Fig A-2)

11.2. Aft Cover Pre-assembly

#	Operation	Initials /Date	Inspect /Date	Extension
B1.	Ink stamp connector labels on outside surface of forward cover per Figure B-2 using epoxy ink FN 54. Label REV field with the revision level of this procedure. Serialize the plates in the SN field starting with 01.		XXXXX	
B2.	✈Bond cable tie down block FN 32 to inside aft cover FN 8 at approximate location shown in Figure B-1 using Epoxy FN 46. Keep Epoxy and block outside of depicted keep-out region.			
B3.	Cure epoxy per mfgr recommendations prior to subsequent assembly operations.		XXXXX	
B4.	Mount RER-type resistors FN 34 to inside of forward cover FN 8 using 2-56 screws FN 45, washers FN 43, and nuts FN 47. Orient screws so that the heads are on the outside of the lid. Place one washer between the screw head and cover, one washer between nut and resistor body. ✈Torque screws on nuts to 4 to 5 in-lbs.			
B5.	Fill remaining resistor mount holes with screw, washer, nuts as specified in previous step. ✈Torque screws on nuts to 4 to 5 in-lbs.			
B6.	Wire resistors in series using wire FN 41. At the ends of the string, attach 2 foot length of wire.		XXXXX	
B7.	Strain relieve the joints between the long end wires and the resistor bodies using shrink tube FN 44.		XXXXX	
B8.	Route wires on lid so that the jiffy connectors FN 38, when installed, are centered over the tie-down block. ***Note keep out regions on cover (Figure B-1)***		XXXXX	
B9.	✈Strip and crimp on contacts FN 39 to each wire end.			
B10.	Mate a Jiffy connector FN 38 to each wire. (requires insertion tool)		XXXXX	
B11.	Loosely tie jiffy connectors at tie-down block using cable tie (do not tightly cinch or clip end of cable tie)		XXXXX	

#	Operation	Initials /Date	Inspect /Date	Extension
B12.	✈Stake wires and screws as required to cover using Epoxy. FN 46.			
B13.	✈.**Inspect Point: Aft Cover**	XXXXX		

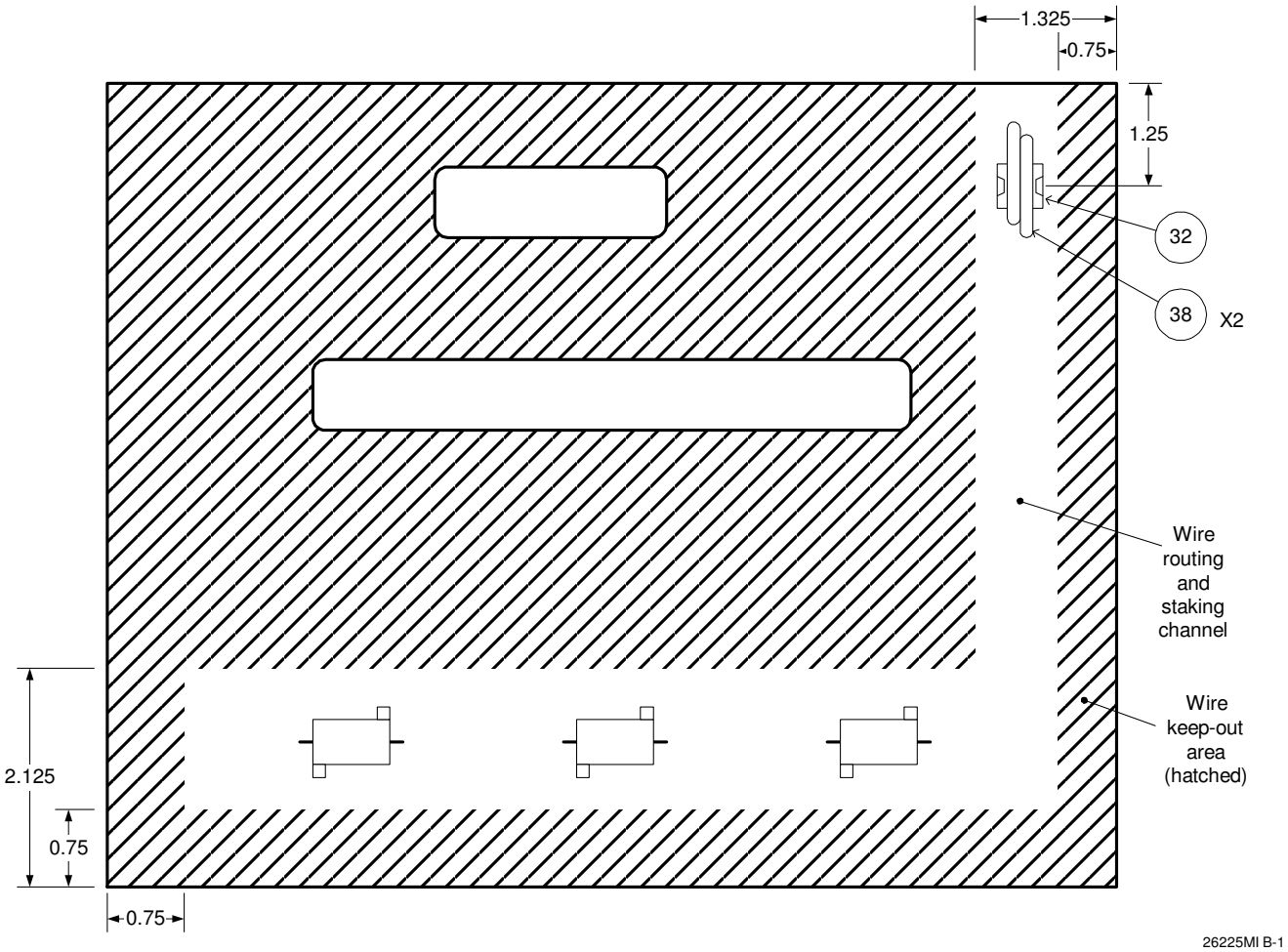
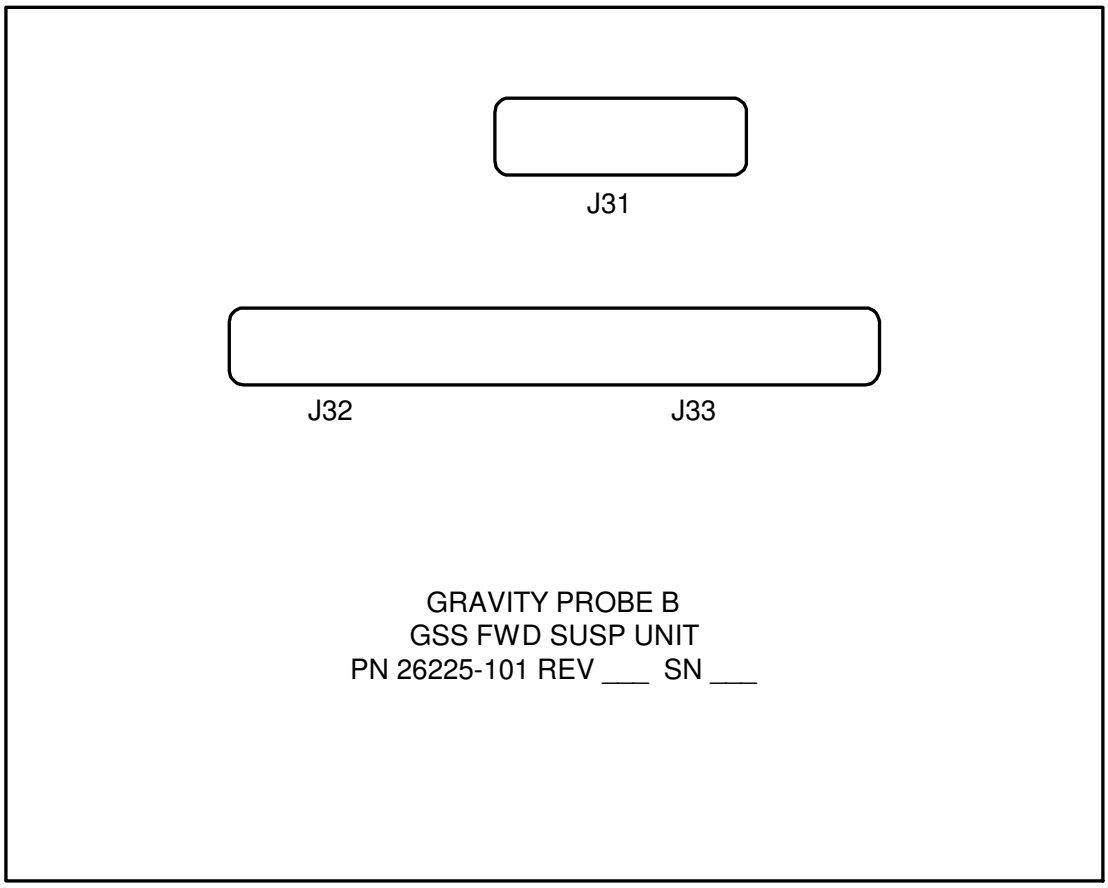


Figure B-1 – Aft cover wire routing channel and tie-down mount location

(Fine detail omitted for clarity; note left/right position of small cutout at the top of the figure)



26225MI B-2

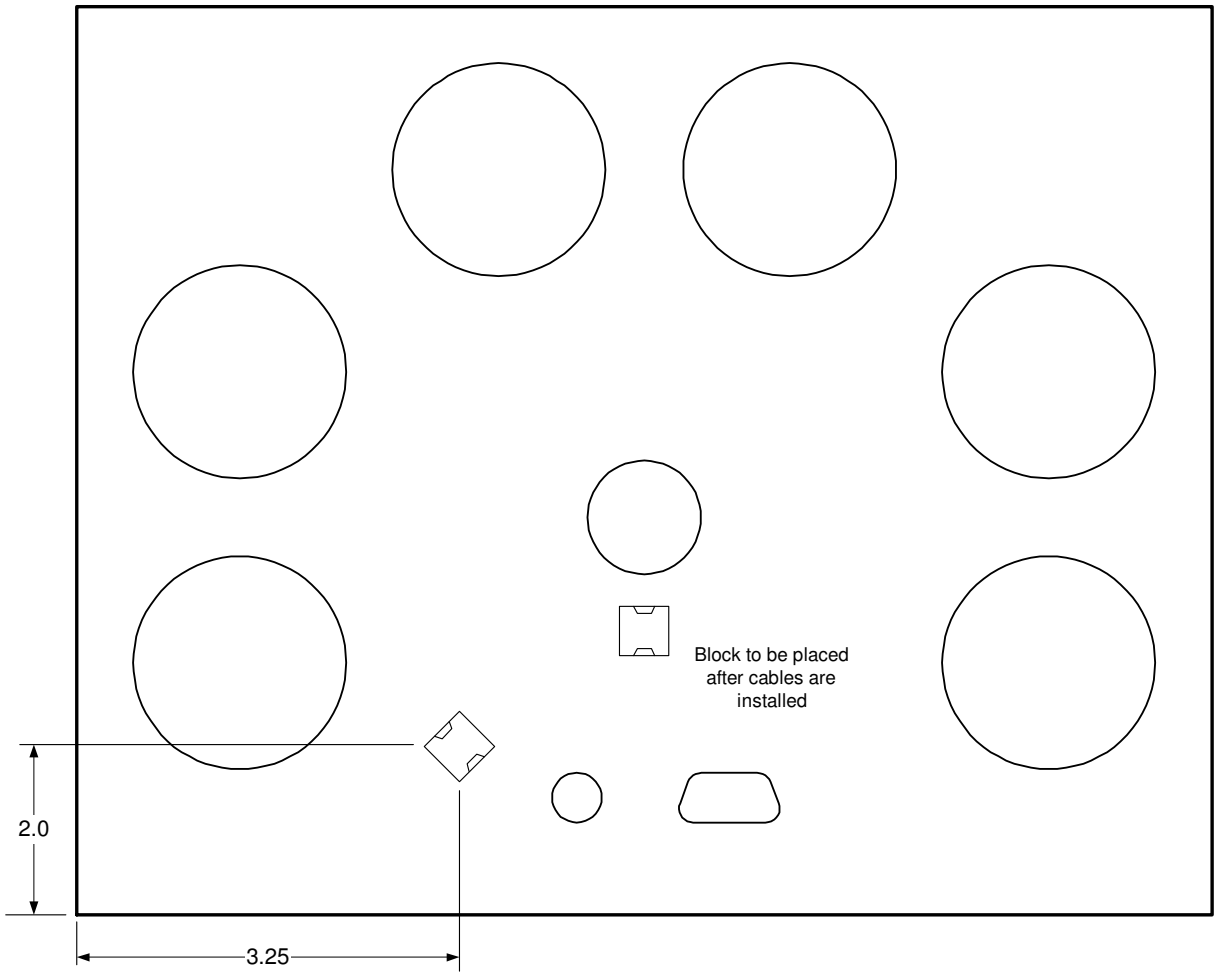
Figure B-2 – Aft Cover Labeling Schematic

(Outside surface shown)

11.3. Forward cover Pre-assembly

#	Operation	Initials /Date	Inspect /Date	Extension
C1.	Ink stamp connector labels on outside surface of forward cover per Figure C-2 using epoxy ink FN 54. Ensure that label for J47 will not be covered by the connector body of cable FN 23 after assembly		XXXXX	
C2.	✈Bond cable tie-down block FN 32 to inside aft cover FN 8 at approximate location shown in Figure C-1 using Epoxy FN 46. Second tie block shown: Do not bond at this time.			
C3.	Cure epoxy per mfgr recommendations prior to subsequent assembly operations.		XXXXX	
C4.	Mount gyro ground cable FN 23 to cover using 3 screws FN 62, 3 nuts FN 52, and 6 washers FN 3. Connector flange is in contact with the outside of the cover. ✈ Torque screws on nuts to 6 to 8 in-lbs.			
C5.	Mount FSU ground cable FN 24 to cover. O-ring seal shall be in contact with inside surface of cover. Remove and discard star washer supplied with TNC connector ✈ Torque nut on connector body to 6 to 8 in-lbs.			
C6.	Mount charge bias cable FN 25 to cover using 2 jackposts FN 53, nuts FN 52, and washers FN 3. The connector flange shall be in contact with the inside surface of the cover The jackposts bases shall be in contact with the outer cover surface; use no washers between the jackpost base and the cover's outer surface. Secure with a washer and nut. ✈ Torque nut on jackpost to 6 to 8 in-lbs. ***(any threading in the jackpost mount holes may be removed with a reamer or hand drill)***			
C7.	✈Once cables are in place, mount additional tie down block FN 32 at approximate location specified in Figure C-2. Additional blocks may be used as required.			
C8.	Loosely secure cables using temporary cable ties to two tie blocks bonded to the cover for their protection.		XXXXX	

#	Operation	Initials /Date	Inspect /Date	Extension
C9.	✈Stake all screws and nuts with Epoxy, FN 46			
C10.	✈**Inspect point: forward cover pre-assembly.**			



26225MI-C1

Figure C-1 – Forward cover tie-down mount location

Detail omitted for clarity; inside (non-anodized) surface shown

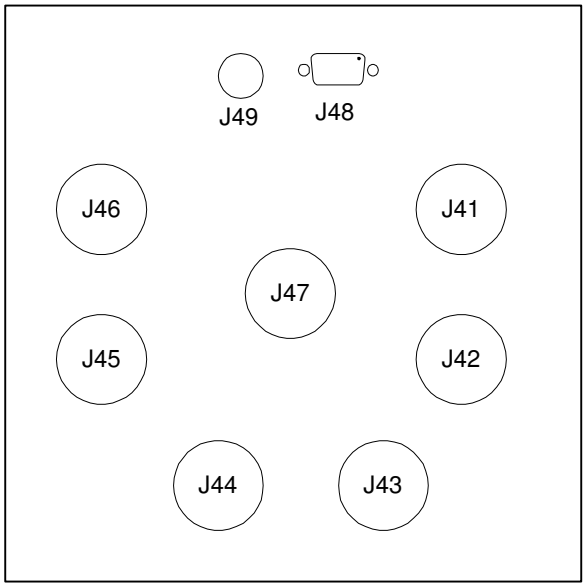


Figure C-2 – Forward Cover Labeling Schematic

(outside surface shown; exact locations to be determined at time of assembly)

11.4. FRM Pre-assembly

#	Operation	Initials /Date	Inspect /Date	Extension
D1.	Remove female D-shaped alignment socket (guide socket) on 90 pin edge connector and install a round alignment socket (guide socket) in place. Hand snug nut and stake access hole with Epoxy FN 46 (Ref DR 361)		XXXXX	
D2.	Remove 3 #2 screws along the center of the module cover and replace with screws FN 63. Hand snug and stake with FN 46. Do not cover screw driver slot with staking material. (Ref DR 363)		XXXXX	
D3.	✈Solder 12 inch lengths of wire FN 41 to both FRM heater lugs FL8 and FL9 (Figure D-1).			
D4.	Strain relieve the joints between the wires and the heater lugs using shrink tube FN 44.		XXXXX	
D5.	✈Trim wires to length, strip, and crimp-on contacts FN 39			
D6.	✈Bond cable tie-down block FN 32 to side of FRM FN 19 at approximate location shown in Figure D-1 using Epoxy FN 46. Ensure that the wedge lock screw is not obscured by the tie down block.			
D7.	Allow epoxy to cure prior to subsequent assembly operations.		XXXXX	
D8.	Loosely secure wires/contacts to installed tie block with cable tie. Do not trim end of cable tie.		XXXXX	
D9.	Isolate and bag contacts on ends of heater cables to electrically insulate them from each other and surrounding conductors.		XXXXX	
D10.	✈**Inspect point: FRM pre-assembly**	**XXXXX**		

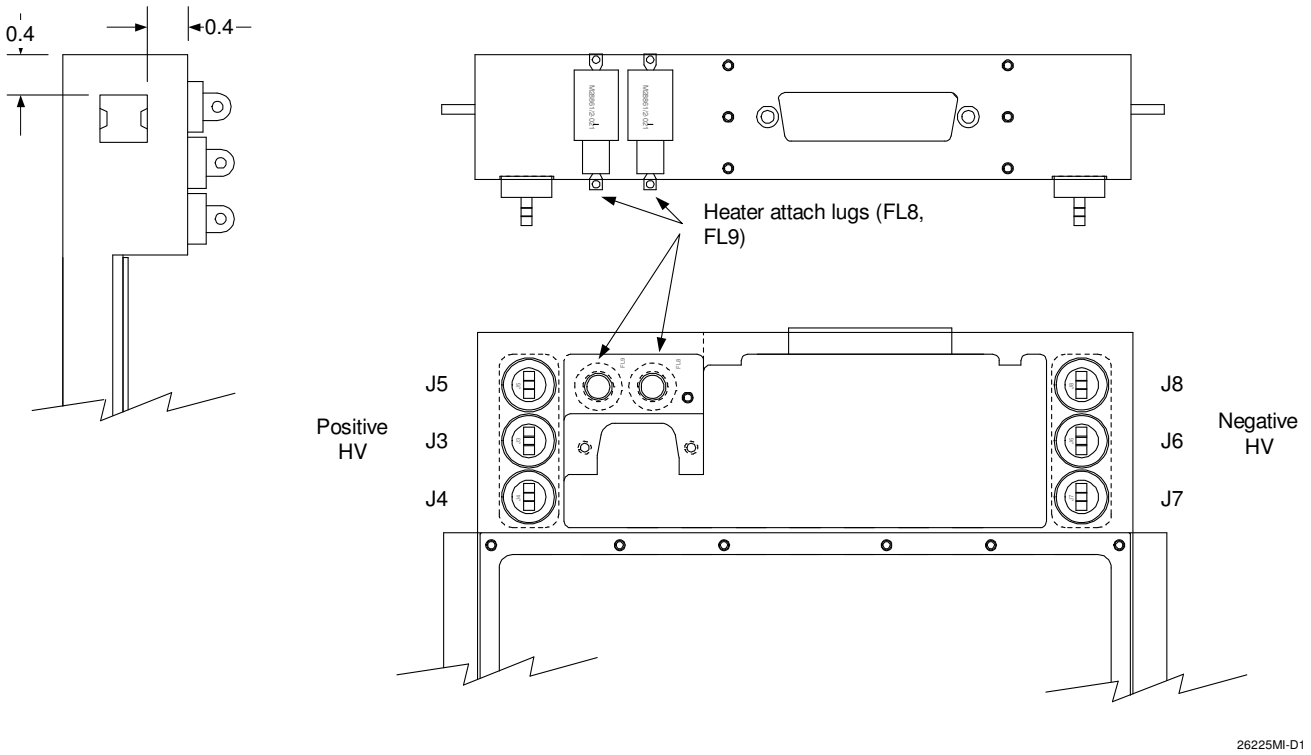


Figure D-1 – FRM tie-down, heater attach, HV lug locations

11.5. Main assembly

#	Operation	Initials /Date	Inspect /Date	Extension
	All pre-assembly steps shall be complete prior to starting this sequence.	XXXXX	XXXXX	XXXXX
1.	***Backplane installation:*** Place a washer FN 3 over each of the 10 backplane mount points in the enclosure Place backplane FN 10 over washers; ensure that the washers remain aligned with the holes after placement of backplane. Secure with four flat head screws FN 33 in the countersunk mounting holes Secure with six screw FN 4 and six washers FN 3 in the non-countersunk mounting holes. **Snug fasteners finger tight; do not torque at this time.**		XXXXX	
2.	✈**Inspect point: Verify proper installation of backplane and associated washers.**	XXXXX		
3.	***FMR installation:*** Insert FMR card FN 13 into FMR slot in enclosure (slot nearest to HVA Y card slot) Do not torque wedge locks at this time.		XXXXX	
4.	***ADDA installation:*** Insert ADDA card FN 12 into ADDA slot in enclosure (In same cavity as FRM, next to cavity wall) Do not torque wedge locks at this time.		XXXXX	
5.	***ARB installation:*** Insert and seat ARB card FN 14 into ARB slot in enclosure (First slot in cavity next to ADDA card) Do not torque wedge locks at this time.		XXXXX	
6.	***ABU installation:*** Insert and seat ABU card FN 15 into ABU slot in enclosure (Next to ARB card) Do not torque wedge locks at this time.		XXXXX	
7.	***MUX installation:*** Insert and seat MUX card FN 16 into MUX slot in enclosure (Next to ABU card) Do not torque wedge locks at this time.		XXXXX	

#	Operation	Initials /Date	Inspect /Date	Extension
8.	***LVA installation:*** Insert and seat ABU card FN 17 into LVA slot in enclosure (Next to MUX card) Do not torque wedge locks at this time.		XXXXX	
9.	***FCL installation*** Insert and seat FCL card FN 18 into FCL slot in enclosure (between FMR and ADDA cards). Take care not to put a torque on the connector bracket during handling. Do not torque wedge locks at this time.		XXXXX	
10.	Connect FRM HV outputs to HV wires using screws FN 37. (refer to Figure D-1 for FRM pinout) FRM J3 using FN22 (short HV wire) FRM J4 using FN55 (med HV wire) FRM J5 using FN56 (long HV wire) FRM J6 using FN22 (short HV wire) FRM J7 using FN55 (med HV wire) FRM J8 using FN56 (long HV wire) Finger tighten screws		XXXXX	
11.	***FRM installation*** Insert and seat FRM module FN 19 into FRM slot in enclosure (Slot adjacent to outside enclosure wall). Temporarily route HV wires along box edge above the HVA slots. Secure if necessary with cable ties to tie block on wall Do not torque wedge locks at this time.		XXXXX	
12.	✈Tighten backplane mounting screws to 6-8 in-lb (10 places)			

#	Operation	Initials /Date	Inspect /Date	Extension
13.	FCL gap measurement. Ensure that the FCL card is firmly seated against the backplane. With a straight edge and feeler gauges, measure the gap between the plane of the cover flange on the aft end of the box and the FCL connector bracket. Measure the gap at the midpoint between the two D-connectors. ✈Average gap shall be between 0 and 30 mils. Record FCL gap: _____			
14.	FRM gap measurement. Ensure that the FRM module is firmly seated against the backplane. With a straight edge and feeler gauges, measure the gap between the plane of the cover flange on the aft end of the box and the FCL connector bracket. ✈Average gap shall be between 0 and 30 mils. Record FRM gap: _____			
15.	✈ Torque wedge locks on the following PWAs to 6-8 in-lbs. • LVA (Low Voltage Amplifier) • MUX (Multiplexer/oscillator) • ABU (Analog backup) • ARB (Arbiter) • ADDA (Analog/Digital) • FMR (Fwd Mode Register)			
16.	Install Aft GSE cover FN 9 using 3rd or 4th fastener FN 4 and washer FN 3. Snug fasteners tight.		XXXXX	
17.	Using six fasteners FN4 and washers FN 3, draw FCL card up to GSE cover FN 9. ✈Tighten FCL wedge locks to 6-8 in-lbs.			
18.	Using six fasteners FN 42 and washers FN 11, draw FRM card up to GSE cover FN 9. ✈Tighten FRM wedge locks to 6-8 in-lbs.			

#	Operation	Initials /Date	Inspect /Date	Extension
19.	Remove external retaining hardware GSE cover.		XXXXX	
20.	Record SN of module to be inserted: 8A01879 Rev _____ SN: _____ Insert HVA module into X HV bay and slide into position. Secure with 21 screws FN 5 and washers FN 2 (perimeter) Secure with 4 screws FN 42 and washers FN 11 (Center web); **Do not tighten screws at this time.**		XXXXX	
21.	Record SN of module to be inserted: 8A01879 Rev _____ SN: _____ Insert HVA module into Y HV bay and slide into position. Secure with 21 screws FN 5 and washers FN 2 (perimeter) Secure with 4 screws FN 42 and washers FN 11 (Center web); **Do not tighten screws at this time.**		XXXXX	
22.	Record SN of module to be inserted: 8A01879 Rev _____ SN: _____ Insert HVA module into Z HV bay and slide into position. Secure with 21 screws FN 5 and washers FN 2 (perimeter) Secure with 4 screws FN 42 and washers FN 11 (center web); **Do not tighten screws at this time.**		XXXXX	
23.	Temporarily mount the aft cover FN 7 to the cover mounting flange of the enclosure to establish a “hinge line” as shown in Figure 1. Secure the cover in place with 3 temporary screws FN 4 and washers FN 2.		XXXXX	

#	Operation	Initials /Date	Inspect /Date	Extension
24.	Connect FRM HV outputs to the HV amplifiers as follows using screws FN 37. Route wires along edge of box wall and secure to tie-down block and other HV wires as required using cable tie FN 36. See Figure 1. Do not cinch cable ties until all wires are in place and screws tightened. (refer to Figure D-1 for FRM pinout) FRM J3 to HVA X CN30 using FN22 (short HV wire) FRM J4 to HVA Y CN30 using FN55 (med HV wire) FRM J5 to HVA Z CN30 using FN56 (long HV wire) FRM J6 to HVA Z CN31 using FN22 (short HV wire) FRM J7 to HVA Y CN31 using FN55 (med HV wire) FRM J8 to HVA X CN31 using FN56 (long HV wire) ✈ Torque screws to 4-5 in-lbs.		XXXXX	
25.	Connect the heater wires from FRM FL 8 and FL 9 to the two jiffy connectors on mounted on the inside of the aft cover (see dash-dot box in Figure 1). Once connected, secure the wires with a cable tie FN 36 to the tie block mounted on the side of the FRM. Allow enough slack in the cable to permit the cover to hinge closed along the hinge line.		XXXXX	
26.	Connect 20 pin pendant connector to HVA X module directly above the surface above the Fwd backplane. Slowly and alternately tighten screws on connector one half turn until connector is completely mated. ✈ Torque screws to 6-8 in-lbs.		XXXXX	
27.	Connect 20 pin pendant connector to HVA Y module directly above the surface above the Fwd backplane. Slowly and alternately tighten screws on connector one half turn until connector is completely mated. ✈Tighten screws to 6-8 in-lbs.			
28.	Connect 20 pin pendant connector to HVA Z module directly above the surface above the Fwd backplane. Slowly and alternately tighten screws on connector one half turn until connector is completely mated. ✈Tighten screws to 6-8 in-lbs.			

#	Operation	Initials /Date	Inspect /Date	Extension
29.	Temporarily mount the fwd cover FN 8 to the cover mounting flange of the enclosure to establish a “hinge line” as shown in Figure 2. Secure the cover in place with 3 temporary screws FN 4 and washers FN 2.		XXXXX	
30.	Mate cable FN 23 (Gyro ground) SMA connector to J1 on FSU backplane. ✈Tighten SMA connector to 6-8 in-lbs.			
31.	Mate cable FN 25 (charge bias) SMA connector to J2 on FSU backplane. ✈Tighten SMA connector to 6-8 in-lbs.			
32.	Mate cable FN 24 (FSU ground) SMA connector to J3 on FSU backplane. ✈Tighten SMA connector to 6-8 in-lbs.			
33.	Loosely secure cables to the tie block on FSU backplane and the three on the hinge line wall using cable ties FN 36. Secure cables to each other as required using cable ties. Prior to cinching the cable ties, establish a cable hinge zone in the are specified in Figure 2; be sure that the cables will clear the HVA flange when the cover is closed. Cinch the cable ties on the cover and on the enclosure in place once hinge line is established.		XXXXX	
34.	✈**Inspect point: Cabling installation, Fwd and Aft covers**	XXXXX		
35.	Stake all screws, nuts, wedgelocks as required with Epoxy FN 46 inside of both aft and fwd covers.		XXXXX	
36.	✈**Inspect point: Staking**	XXXXX		
37.	Remove temporary hardware on forward cover.		XXXXX	
38.	Cut to length and install gasket mesh FN 30 into groove in the flange for the forward cover.		XXXXX	
39.	Hinge cover closed. Secure in place with 24 screws FN 5 and washers FN 2. ✈Torque fasteners to 6-8 in-lbs.			
40.	Secure HV modules to cover using 12 screws FN 7 and washers FN 2. ✈Torque fasteners to 6-8 in-lbs.			

#	Operation	Initials /Date	Inspect /Date	Extension
41.	Remove temporary hardware on aft cover.		XXXXX	
42.	Cut to length and install gasket mesh FN 30 into groove in the flange for the aft cover.		XXXXX	
43.	Hinge cover closed. Secure in place with 24 screws FN 5 and washers FN 2. ✈Torque fasteners to 6-8 in-lbs.			
44.	Secure FRM to cover using 6 screws FN 42 and washers FN 11. ✈Torque fasteners to 4-5 in-lbs.			
45.	Tighten the 21 #4 mounting screws on HVA X module; ✈Torque to 6-8 in-lbs.			
46.	Tighten the 21 #4 mounting screws on HVA Y module; ✈torque to 6-8 in-lbs.			
47.	Tighten the 21 #4 mounting screws on HVA Z module; ✈torque to 6-8 in-lbs.			
48.	Tighten the 4 #2 mounting screws on HVA X module; ✈torque to 4-5 in-lbs.			
49.	Tighten the 4 #2 mounting screws on HVA Y module; ✈torque to 4-5 in-lbs.			
50.	Tighten the 4 #2 mounting screws on HVA Z module; ✈torque to 4-5 in-lbs.			
51.	Install 7 ea connector savers FN 57 onto J41 through J47 on fwd cover. Finger tighten both inner connector and outer ring.		XXXXX	
52.	Install 9 pin connector saver FN 58 to J47 and secure with jackscrews FN 40. ✈Torque jackscrews to 4-5 in-lbs			
53.	Install 37 pin connector saver FN 31 to J32 and secure with jackscrews FN 40. ✈Torque jackscrews to 4-5 in-lbs			
54.	Install 50 pin connector saver FN 59 to J33 and secure with jackscrews FN 40. ✈Torque jackscrews to 4-5 in-lbs			

#	Operation	Initials /Date	Inspect /Date	Extension
55.	✈Stake all external screw, nuts as required with Epoxy FN 46. Do not fill screw heads with epoxy when staking.			
56.	**✈Inspect point: external staking**	**XXXXX**		
57.	**Engineering build complete: GSS RE signoff:**		**XXXXX**	**XXXXX**
58.	**Engineering build complete: GP-B QA signoff:**	**XXXXX**		**XXXXX**

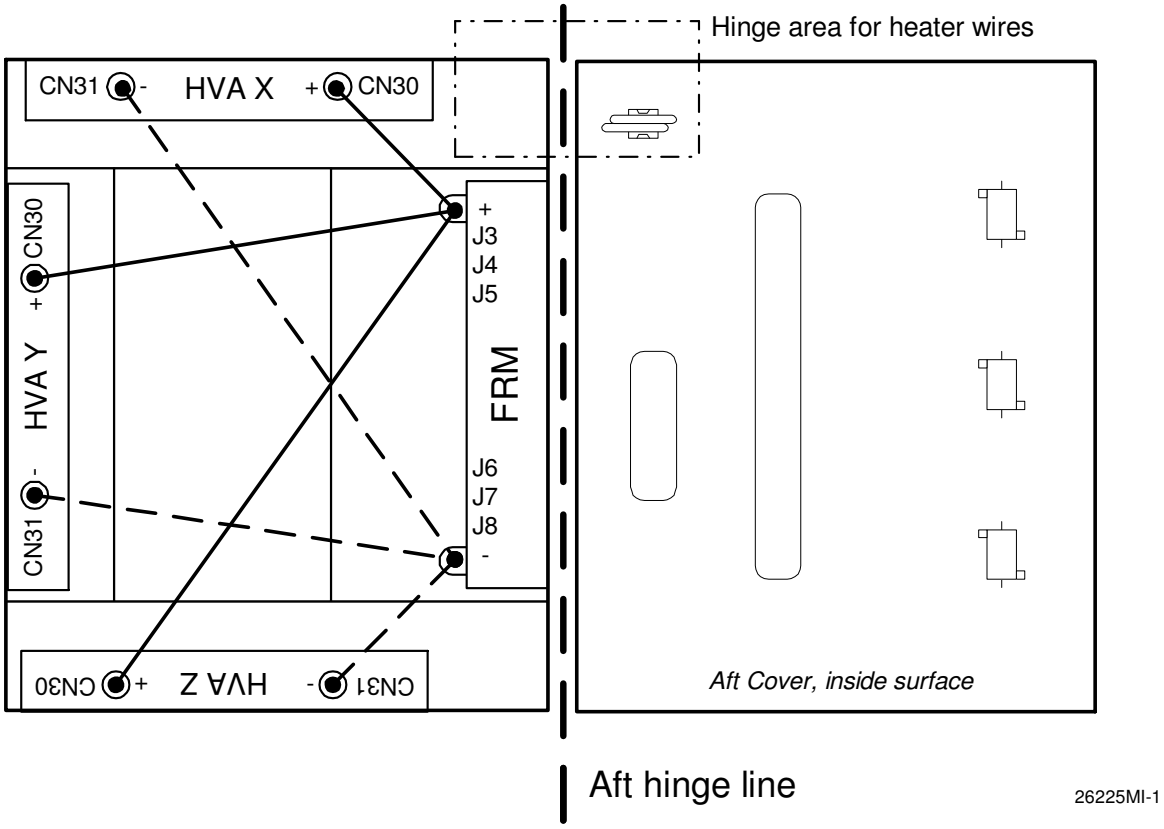


Figure 1 – HV Jumper wiring schematic, Aft cover hinge line

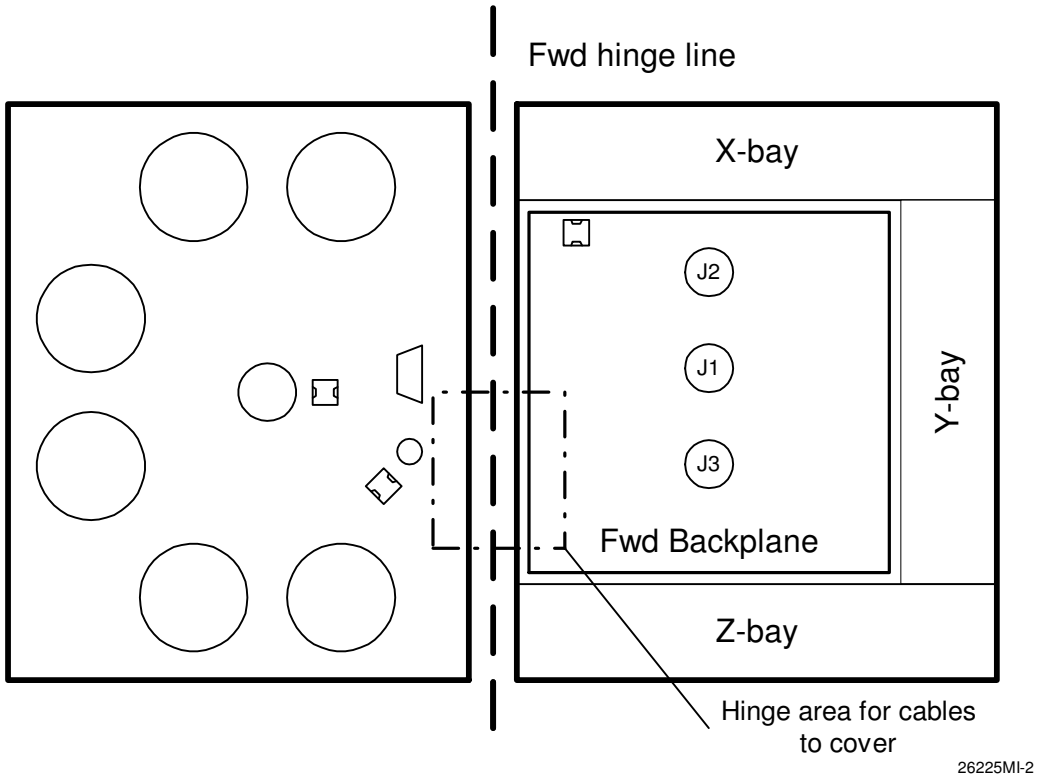


Figure 2 – Fwd cover hinge line, cable hinge area

12.0 Certification:

This procedure was executed in full.

Test Engineer		Date	

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

GSS Representative		Date	
Quality Assurance		Date	

Extension Sheet

E#	Extension Description	Initials /Date	Inspect /Date

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Extension Sheet

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