

Systems Division



STS-118/13A.1 MOD FRR

July 11th, 2007

DF1/Michael Interbartolo

DF Shuttle CoFR Status Summary

REQUIREMENT	GNC	DPS	PROP	INCO	MMACS	EGIL	EECOM	BOOSTER
Critical Processors/Applications	N/A	G	N/A	G	G	G	G	G
Non-Crit Processors/Applications	G	Y	G	G	G	G	Y	G
EMCC	G	G	G	G	G	G	G	N/A
Training - MCC/POCC	Y	Y	Y	Y	Y	Y	Y	Y
LCC/MEL/MIL	G	G	G	G	G	G	G	G
FTP - New Ops	Y	Y	G	G	G	G	Y	G
Flight Anomaly Resolution	G	Y	G	G	G	G	G	G
Anomaly – Procedures	G	G	G	G	G	G	G	G
Exceptions/Action Items from prior reviews	G	G	G	G	G	G	G	G
CIL/Hazards	G	G	G	G	G	G	G	G
No Constraints	G	G	G	G	G	G	G	G
Level II Actions	G	G	G	G	G	G	G	G
Mission Requirements	N/A	G	G	G	G	G	G	G
Engineering Drawings	G	G	N/A	G	G	G	G	G
Command Procedures	G	G	G	G	G	G	G	G
Flt Prep Process Plan Requirements Met	G	G	G	G	G	G	G	G
Contractor Process Insight	N/A	N/A	G	G	G	G	G	G
MOD Work Guidelines	G	G	G	G	G	G	G	G
SSPTS	G	G	N/A	G	G	Y	Y	N/A
Three String GPS	Y	G	N/A	N/A	G	G	G	N/A

G Ready to support flight

Y Open work with expected resolution prior to flight

R Open work without expected resolution prior to flight, or unresolvable constraint violation.

N/A Not applicable

CAF SSP Electrical Summary

Reactants	Tanks	Liftoff Load (lbm)	Min L/O (lbm)	Margin (lbm)	Padhold (hrs)
H2	5	455.5	415.1	40.4	117.7
O2	5	3886.4	3693.9	192.5	192.2

- NOTES:**
- 1) Assumes 11+3+2 day mission
 - 2) Assumes H2 target load obtained and loading completed at L- 45.0 HRS
 - 3) Assumes O2 target load obtained and loading completed at L- 47.5 HRS
 - 4) No O2 Transfer to ISS protected

SSPTS Notes:

- 1) Planned SSPTS output is 2 converters at full power from post-docking to pre-undocking, except during EVA 1 and EVA 4. SSPTS output energy required is 913.3 kWh, which is an average of 4.33 kW output for the 211.17 hrs SSPTS is activated.
There is a good possibility that ISS will be able to power a 3rd OPCU converter.
- 2) Average 120 Vdc input required from ISS at the APAS: 4.80 kW
- 3) With an on-time launch, an additional docked day with SSPTS is available.
- 4) Mission duration without SSPTS is 12+0+2 with ~33 hrs launch hold, O2 limited.
- 5) Launch hold for 11+0+2 days without SSPTS is ~130 hrs, H2 limited.
- 6) Because STS-118 is the 1st flight of SSPTS, preflight assumptions will be refined with actual flight performance data which might affect margins.

CSCS Notes:

- 1) CSCS capability without any SSPTS power transfer allows for 15 days docked with 68.2 lbm additional O2 margin and unmanned undock on FD18. O2 margin includes ISS crew metabolic for the docked duration.
- 2) Assuming the planned amount of SSPTS is available until unmanned undock can result in an additional 7 days docked in CSCS C+ powerdown with 37.4 lbm additional O2 margin and unmanned undock on FD26.

CAF SSP Environmental Summary

Consumable	L/O Load	Min L/O	Margin
N2 (lb)	387.3^{1,3}	319.7²	67.6
Supply H2O (lb)	356⁴	356	0
LiOH (cans)	61⁵	61	0

- NOTES:**
- 1) Assumes 11+3+2 day mission with 7 crewmembers.**
 - 2) N2 L/O Load reflects 6 Full N2 Tanks along with KSC 6 lbm prelaunch usage requirement.**
 - 3) N2 Loading protects for 4 ISS EVA's.**
 - 4) Supply H2O loading reflects a nominal 180 lbm offload**
 - 5) LiOH L/O load reflects planned stowage. Loading includes LiOH to replenish the stockpile and to preposition LiOH for STS-120.**

CAF SSP Prop Loading/Budget Overview

OMRSD Propellant Loading Quantities to be delivered on July 12, 2007.

FRCS= 1912 lbm ARCS= 4970 lbm OMS= 24860 lbm

FRR Design Propellant Margins

ARCS/OMS = 36 lbm

FRCS = 309 lbm

FRR Design Assumptions: STS-118 ATL, FRR Cycle Trajectory Inputs - 184 nm RNDZ, 95 sec OMS Assist, 2 mated water dumps.

PROP Real-time Propellant Margins

ARCS/OMS = 731 lbm

FRCS = 216 lbm

PROP Real-time Assumptions: OCFR2 Cycle Trajectory Inputs, 98 sec OMS Assist, 2 mated water dumps

Nominal Propellant Dump Configuration

No Dock PLS exceeds the EOM downweight limit by 800 lbm

Status of Standard Open Work Shuttle (Training – MCC)

- **MCC Team Certification Status:**

- All team member certification requirements are complete except as follows:

Various Physicals, Proficiency and Final Certifications to be completed prior to flight with backup personnel available if required for all positions.

- **MOD Work Guidelines:**

- All flight controllers meet the MOD work guidelines with the following exceptions:
 - NO DF Violations, will utilize a 4 Team Rotation

Status of Standard Open Work Shuttle (FTP- New Ops)

- **New Ops Work Status:**

Final DAP Configuration/Constraints (Awaiting C. S. Draper Laboratory Memo):

The current versions of the FDF and Flight Rules contain the preliminary data from C. S. Draper Laboratory. Upon receipt of the official memo, GNC will review the document and update any DAP constraints in the FDF and Flight Rules as required. This will include specific DAP parameters (attitude & rate deadbands, maneuver rate, ALT config, etc.), RCS jet group selection/deselection for mated control, orbiter external airlock pressurized/depressurized constraints, robotics operations DAP constraints, and any other required system constraints. ECD is approximately July 13, 2007.

Status of Non-Standard Open Work Shuttle (Flight Anomaly Resolution)

- **FLIGHT ANOMALY RESOLUTION - The following previous in-flight anomalies have not been resolved:**

FA3 MDM BITE -- This in-flight anomaly has not been totally resolved, but all evidence at this time points to a single Booster transducer failure that caused the BITE indication. This likely is not an MDM issue and not a constraint to STS-118 flight.

Dryden Time Delta discrepancy -- During STS-117 entry an approximate 2 second delta between Adjusted Ground Receipt Time and Onboard Time was observed using DPS RelativiT comp. This discrepancy is still being investigated and does not seem to be orbiter hardware related but equipment at Dryden or GSFC. Impact to STS-118 is minimal (Loss of MTU, and high drift of GPC at low altitude on entry).

Special Topic - SSPTS

- SSPTS - All MCC Tools, Flight Procedures, LCC/MEL/CIL, Flight Rules have been reviewed and verified to be ready to support the first flight of Station/Shuttle Power Transfer System (SSPTS). The flight control team has been trained and all equipment, software, and documentation has been identified and are ready for SSPTS. Exceptions are noted below:
 - Delta Certification: EGIL personnel delta certs in work - ECD 7/30
 - MCC Tools: Updates to displays, comps, plots and other data files - Complete
 - FDF: APCU and OPCU MAL procedures in Workflow - Complete
 - SSSH: checkprints will be available at EGIL consoles - Complete
 - CMD Procedures: Real Time Commands (RTCs) have been developed and incorporated in the Console Handbook – Complete
 - Projected Consumables Margin (PCM) reporting for STS-118 will be different due to SSPTS:
 - Two sets of margin numbers will provided:
 - One for number of hours the X lbs of margin will buy if used at SSPTS power levels (i.e. during the docked timeframe)
 - One for number of hours the X lbs of margin will buy if used at Non-SSPTS power levels. (i.e. after undock)
 - INCO SSPTS Commanding Display to meter SSPTS commands - Complete
 - EECOM SSPTS Monitoring and Water Production: With the fuel cells operating at a reduced power level this will result in changes to the amount of heat they typically generate during a mission. In addition, this lower power level will produce a reduced amount of supply water for transfer to the Station. The heat load cooled by the Shuttle will be the same as that cooled on non-SSPTS missions. Due to the unknown interaction of the SSPTS, the FES will be deactivated during docked operations to ensure that the Station water transfer requirements can be met. EECOM has made updates to displays to accommodate the new SSPTS parameters.

Special Topic- Three String GPS

- Three String GPS - All MCC Tools, Flight Procedures, LCC/MEL/CIL, Flight Rules have been reviewed and verified to be ready to support the first flight of Three String GPS. The flight control team has been trained and all equipment, software, and documentation has been identified and are ready for 3-GPS.
 - SAIL Testing for MTU Failure: GNC's have been trained on building Age of Aiding compensation using SAIL due to limitations with SMS.
 - Delta Certification: GNC has completed delta certs for all Ascent/Entry personnel
 - MCC Tools: Updates to displays, comps, plots and other data files are complete

Special Topic – AHMS & OMS Ballast

- AHMS – This will be the first flight with Advanced Health Management System **Actively** monitoring synchronous vibration redlines for all three SSMEs.
 - All Booster products to support active mode were completed prior to STS-116
 - Will provide 23% reduction in SSME ascent risk (10.3% reduction in overall vehicle risk)
- OMS Ballast - The EOM ballast requirements will be contained in the OMS/RCS deorbit redlines. The daily NPLS ballast requirements will be obtained from FDO and will be monitored to ensure that the ballast requirements will be met.

Info Only – New Operations with No Open Work

- MPS ECO Voltage Instrumentation - This will be the first mission with the ECO sensor circuitry installed. The issue with a potential short to ground has been resolved by installing an inline resistor. Will be used to monitor for a failed wet sensor down to T-5 minutes. Will not be used during powered flight.

Conclusion Shuttle

All identified open work will be
completed in time to support
STS-118/13A.1

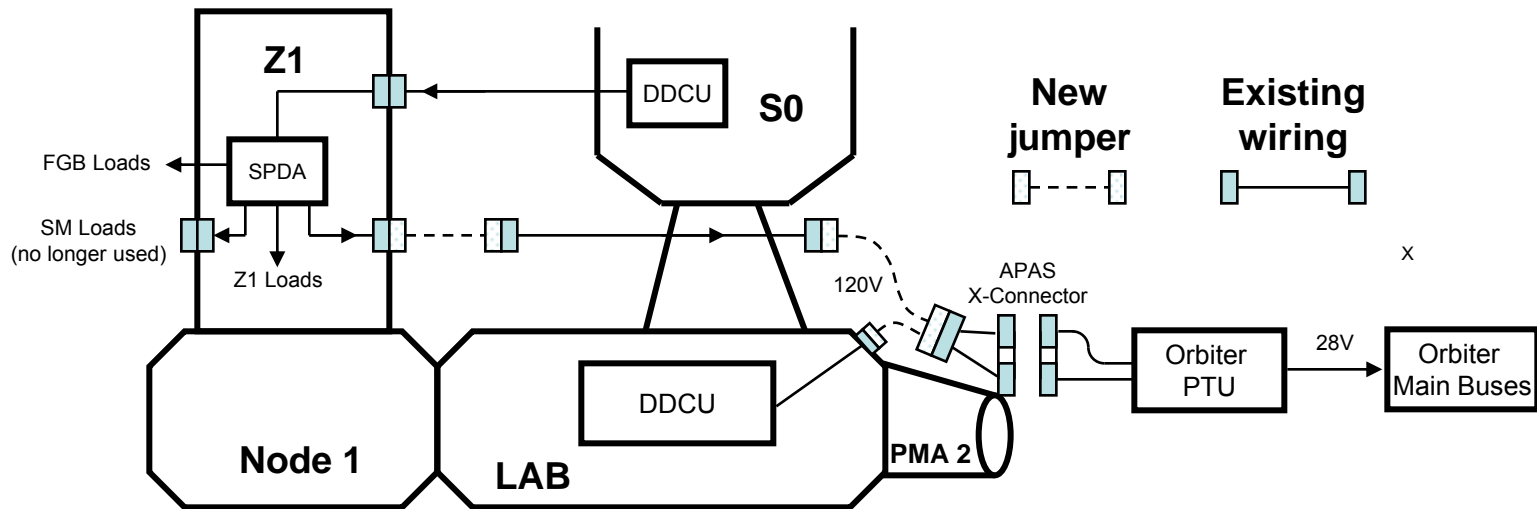
Info Only - Anomalies with No Open Work

- MLS 3 Prelaunch self-test Failure - During the final pre-launch self test of the MLS units, MLS indicated a failure in the range channel. Nineteen additional self tests were performed with nominal results. GNC MEL allows for launch with one MLS failed provided both radar altimeters function properly during countdown, which they did. DF62 received action post flight to review current MLS and RA rules and launch commit criteria and report back to daily PRCB. The 7/3/07 AEFTP decided to update the rationale only for the Flight Rule and LCC post STS-118 (4 of 5 requirement is unchanged). AEFTP also decided that GPS can not be used as an MLS replacement at this time.
- STS-117 DAP Performance - During STS-117 the mated attitude hold on VERN jet control did not match pre-flight predicts as well as had been expected. Flight Control stability was not compromised however, propellant consumption was higher than expected. It is theorized that the discrepancy may be due to ISS Mass Properties not being accurately modeled. The Flight Control engineering community is working to understand what occurred on STS-117 as well as what the implications are for STS-118.

Info Only - Anomalies with No Open Work

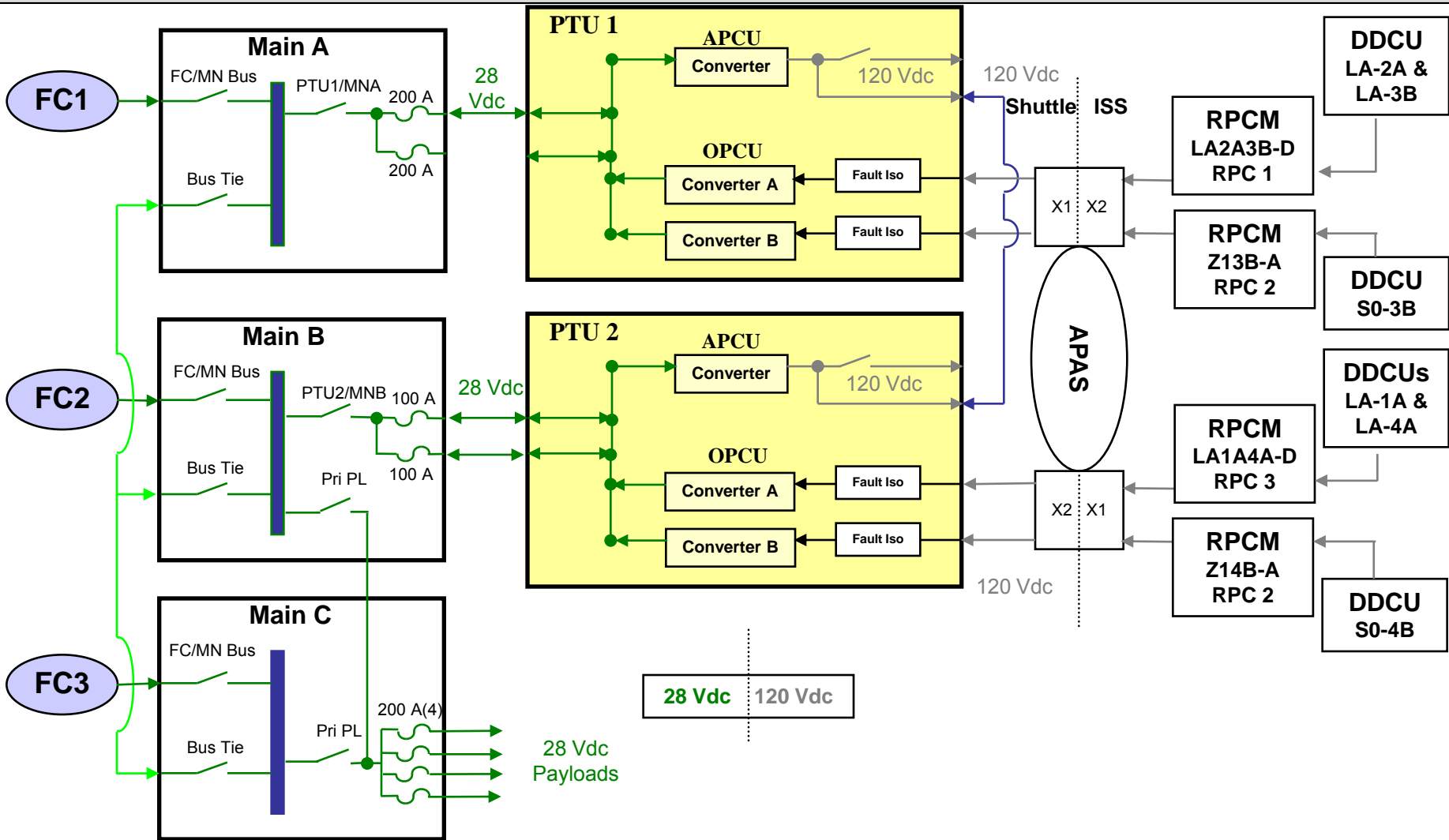
- STS-117 AR 2401 OMS Pod Thermal Blanket Torn and Lifted - During the STS-117 ascent, a blanket on the OMS pod tore and folded up such that it was ~2.1 inches above the outer mold line (OML). The crew performed an EVA to fold the blanket back down and secure it with staples and pins. The blankets on OV-105 have been inspected and some will require rework/replacement to reduce the forward facing step. The blankets are going to be attached to a gap filler with RTV. The gap filler will then be attached to the tile with RTV. An analysis is in work to verify that this repair will hold the blanket in place.

Special Topic - SSPTS

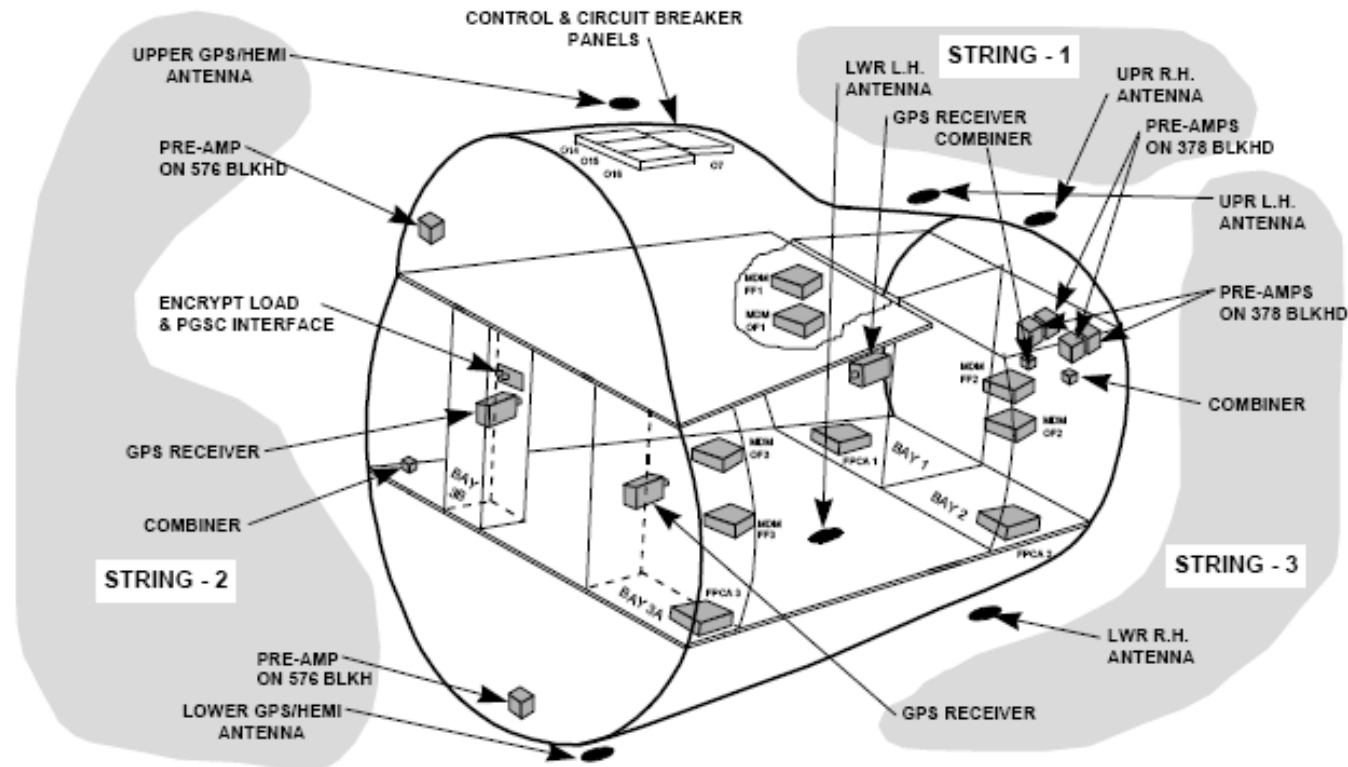


2 of 4 Power Channels Shown

Special Topic - SSPTS

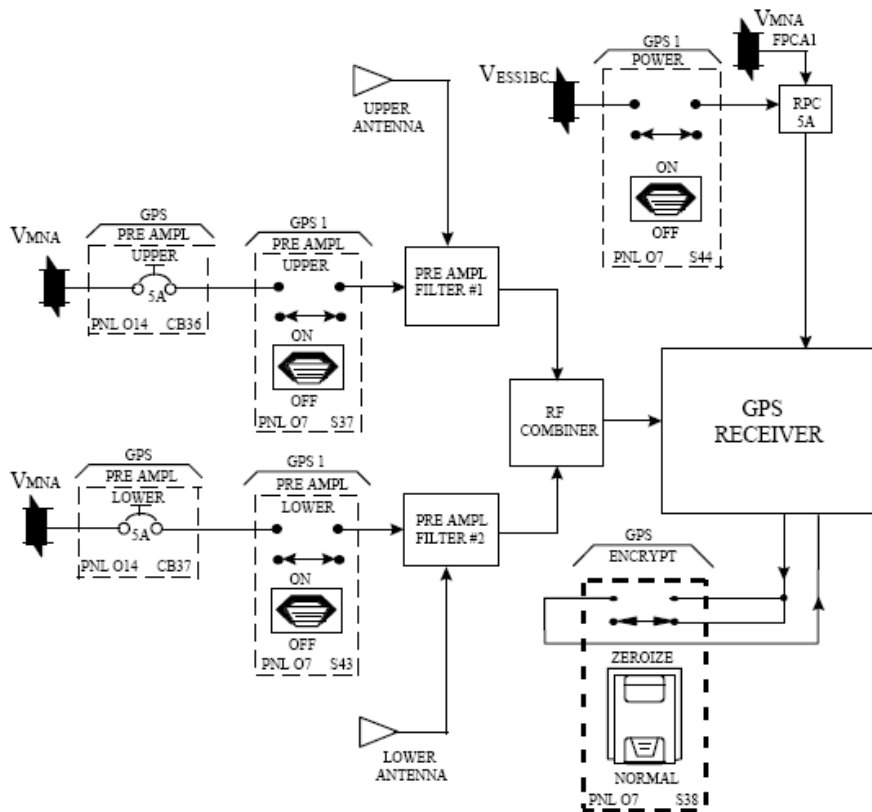


Special Topic- Three String GPS



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TYPICAL 3-STRING GPS CONFIGURATION



	GPS 1	GPS 2	GPS 3
POWER	VMNA FPCA1	VMNB FPCA2	VMNC FPCA3
CONTROL BUS	ESS 1BC	ESS 2CA	ESS 3AB
ON/OFF PNL O7	SW 44	SW 46	SW 48
DATA PATH	MDM FF1	MDM FF2	MDM FF3
< 4 SAT's	MDM OF1	MDM OF2	MDM OF3
LOCATION	AV BAY 1	AV BAY 3B	AV BAY 3A

GPS	UPPER PRE-AMPL			LOWER PRE-AMPL		
	1	2	3	1	2	3
POWER	VMNA O14	VMNB O15	VMNC O16	VMNA O14	VMNB O15	VMNC O16
CB's (5A)	cb 36 O14	cb 43 O15	cb 28 O16	cb 37 O14	cb 44 O15	cb 29 O16
ON/OFF PNL O7	SW 37	SW 39	SW 41	SW 43	SW 45	SW 47
ANTENNA	UPPER RH	UPPER HEMI	UPPER LH	LOWER LH	LOWER HEMI	LOWER RH