MOBILE USER OBJECTIVE SYSTEM (MUOS)

Payload Processing Requirements Documentation

Prepared for:
Program Executive Office Space Systems
Navy Communications Satellite Program Office, PMW-146
San Diego, CA 92110-3127

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1. INTRODUCTION

1.1 Purpose of Document

This Payload Processing Requirements Document (PPRD) describes the environmental, operational and logistical requirements of the payload processing facility (PPF) in which the MUOS spacecraft (SC) will undergo pre-launch processing. This PPRD provides the SC requirements for supporting the creation of the Evolved Expendable Launch Vehicle (EELV)-produced PL/LV Interface Control Document (ICD) or Mission Specification. Throughout the remainder of this document, ICD will be used to refer to either the ICD or Mission Specification. The ICD will be produced at approximately Launch - 24 months. This PPRD will also be used to ensure that the PPF Contractor is aware of the MUOS Payload (PL) requirements.

2. REFERENCE DOCUMENTS

1) Evolved Expendable Launch Vehicle Standard Interface Specification (EELV SIS), Version 6, 5 September, 2000.

2) EWR 127-1, Eastern and Western Range, Range Safety Requirements, D012226 October 10, 2009.

3) Astrotech Space Operations Florida (ASO FL) Facility Accommodations Manual, SHI-ASO-M0006, Rev --, April 16, 2001.

4) MUOS Launch Vehicle Interface Requirements Document (IRD), CDRL A304.

5) [MUOS Launch Site Layout Drawing], MGSE [TBD]

6) PN20032524, A2100 Contamination Control Plan

3. ASTROTECH FACILITIES

3.1 Facilities Overview

At the launch site, the following facilities and services are required to support flight preparation of the Spacecraft (SC). The services detailed in this document, as a minimum, need to be provided for each launch campaign. The PPF and EELV Contractors will need to be capable of supporting a 24-hour-per-day, seven-day-per-week operation. The PPF will need to be able to accomplish 5-meter EELV Payload Fairing (PLF) processing. The maximum SC plus payload adapter (PLA) launch mass is less than or equal to 6,930kg.

All PPF requirements will be provided as detailed in the ASO FL Facility Accommodations Manual, SHI-ASO-M0006 (hereafter Reference Document 3). In order to accommodate a 5 meter PLF, Building 9 will be used and hazardous and non-hazardous payload processing activities will take place in either the East or West processing cell.

3.1.1 Payload Processing Facility (PPF)

The PPF Contractor will provide an air-conditioned Class 100,000 cleanroom of approximately 223 m^2 for hazardous and non-hazardous SC final integration and testing (see Section **3.1.2** for configuration requirements). Equipment access through an adjacent Class 100,000 cleanroom airlock (see Section **3.1.2.1** for further information) and an associated garment change room will be provided. A slight positive pressure will be maintained in the controlled area with respect to the surrounding areas in order to prevent entry of airborne contamination.

The PPF Contractor will provide a Satellite Checkout Station (SCS) control room located in Building 9 adjacent to the high bay and measuring at least 82.2 m^2. Elements of the SCS and fuel load monitoring equipment will be installed therein to support SEPET (Spacecraft Electrical Performance and Evaluation Test) and fuel loading activities. The PPF Contractor will provide explosion-proof cableways between the control room and the PPF to support hazardous operations. Video/audio monitors are required for viewing and recording all hazardous activities.

The PPF Contractor will provide Facility, SCAPE (Self-Contained Atmospheric Protective Ensemble) suit, and Emergency Response support for the MUOS SC propellant loading crew. The PPF Contractor will provide disposal of residual or waste hazardous materials, such as propellants and solvents, associated with processing of the SC.

The PPF Contractor will provide an RF Link, compatible with the SC telemetry and command frequencies, which will be used to support pre-encapsulation RF testing.

The Breakover Fixture shall be anchored to the floor of the High Bay with a quantity of 10 (ten), 0.75 inch concrete anchor bolts (Ramset "Red-Heads" or WEJ-IT). Ramset "Red-Head" anchors require 3.1875 inch Embedment Depth for installation and allowable loads for each insert are: 8,280lbs tension, 10,480lbs shear (in 2,000 psi concrete). WEJ-IT PD-34 anchors require 6.00 inch Embedment Depth for installation and allowable loads for each insert are: 15,800lbs tension, 13,360lbs shear. The anchors shall be positioned per Figure 1. The position of the Breakover Fixture within the High Bay will be provided by LMCSS prior to installation (Reference 5).

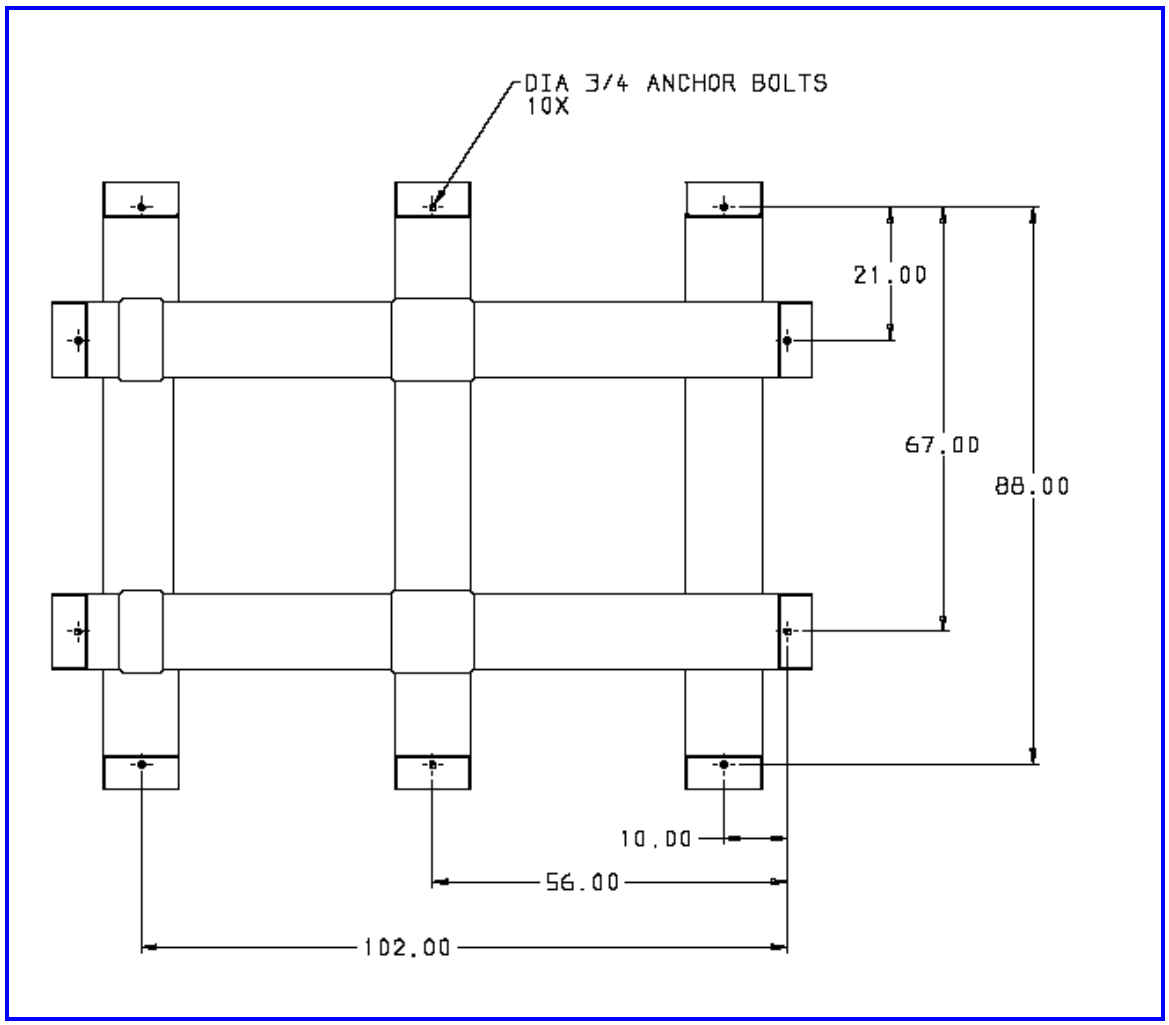

Figure 1. Anchor Bolt Hole Pattern for Breakover Fixture (dimensions in inches)

3.1.2 West Processing Cell Configuration Requirements

The PPF-provided high bay clean room will be configured as follows:

a)	Dimensions	18.4m x 15.3 m x 24.4 m height
b)	Crane Hook Height	22.3 meters
c)	Crane Capacity	25 tons
d)	Largest Door	9.1 m wide x 19.8 m high, metal roll up
e)	Temperature Control	22.5° ± 2.8° C
f)	Humidity Control	50 ± 10 %
g)	Cleanliness	Class 100,000 or better
h)	Clean Room Garments	Flame retardant garments (qty 10) and a change room will be provided by the PPF Contractor
i)	SCAPE	PPF Contractor will provide ten (10) SCAPE suits equivalent to ILC Dover model 6250/62 for SC personnel use
j)	Conductive Floor	PPF-provided high bay will have a conductive floor surface
k)	Drains/Sump	PPF-provided high bay will contain a trench system that drains fuel/ox spills into appropriate emergency spill retention systems.
l)	Water Supply	PPF Contractor will provide demineralized water per JSC SPEC-C-20
m)	House Nitrogen Supply	PPF Contractor will provide MIL-PRF-27401, Type 1, Grade B (Gaseous) Nitrogen and MIL-PRF-27401, Type II, Grade B (Liquid) Nitrogen as required

n) House Air Supplies	PPF Contractor will provide regulated compressed air in the high bay. PPF Contractor will provide regulated compressed breathing air at 862 kN/m^2 and 2.8 m^3/min. Breathing grade air will be achieved by filtering house air through a purification system that removes particulate, water vapor, and carbon monoxide. Breathing air will be continuously monitored for presence of carbon monoxide.

3.1.2.1 Airlock

The PPF Contractor will provide an air-conditioned Class 100,000 airlock of approximately 548.4 m^2 for loading and unloading of the Spacecraft and associated GSE (Ground Support Equipment). The airlock will have a crane with a capacity of 27.2 metric tons and a hook height of approximately 27.7 meters.

3.1.2.2 Crane

The PPF Contractor will provide a power crane with a minimum capacity of 22.67 metric tons (25 tons) with a clearance from the hook to the floor of 22.3 meters. The minimum lift speed will be no greater than 1.0 cm/second. Trained SC Contractor personnel will perform crane operations. The SC Contractor will provide a hydraset to support mating operations. Contingency procedures will allow the payload to be safely lowered in the event of a malfunction during the hoisting operations. Any crane used to lift the SC will have a current "proof-load" certification and be functionally checked out prior to lifting of the SC. All cranes shall have a debris shield for protection from foreign objects.

3.1.2.3 Forklift

The PPF Contractor will provide a forklift with a minimum capacity of 14,515 kg for unloading the Equipment Shipping Containers and associated support equipment. Valid proof test certifications for the forklift must be available upon request. Trained SC Contractor personnel will perform forklift operations. The PPF Contractor shall also provide a 5 ton fork lift.

3.1.2.4 Cleanliness

The high bay areas, including the airlock, must meet Class 100,000 cleanroom requirements, which must be continuously verified via a minimum of two monitors and/or chart recorders. All airborne particle counters will be certified or calibrated as required. The instrument will be capable of monitoring particles from 0.5-micron diameter in accordance with FED-STD-209. Also, a slight positive pressure will be maintained in the controlled area with respect to the surrounding areas in order to prevent entry of airborne contamination.

3.1.2.5 Outgassing

Total allowable molecular contaminant deposition from launch vehicle sources, during the time period from unpacking the Spacecraft at the PPF through CCAM (Collision and Contamination

Avoidance Maneuver), will be less than 15.0 mg/m^2 on outboard facing surfaces. Of this requirement, the allowable molecular contaminant deposition from PPF sources will be less than 2.0 mg/m^2 (from unpacking of the spacecraft up to encapsulation) and the allowable molecular contaminant deposition from LV sources (through CCAM) will be less than 13.0 mg/m^2. Witness plates will be used to verify PPF cleanliness. Three witness plates shall be used to monitor the high bay cleanliness. The monitoring shall begin 2 weeks before arrival of the SC per PN20032524. A summary of the witness plate analysis will be provided.

3.1.2.6 Personnel Blast Shield

The PPF Contractor will provide a blast shield that is suitable for pressure tests and pressurant loading. The blast shield must have dimensions of at least 2.0 meters high x 2.4 meters wide and be mobile.

3.1.2.7 Entryway Condition

The Building 9 airlock entry point must be at least 9.1 meters wide by 27.7 meters high to accommodate the MUOS Shipping Container on the flat-bed truck. The entry point to either the east or the west processing cell must be at least 9.1 meters wide by 19.8 meters high to accommodate the SC on its fixture. The floor must be level between the airlock and the high bay area so that the shipping container, SC dollies, checkout equipment, etc. can be rolled through the entryway. A slight positive pressure will be maintained in the controlled area with respect to the surrounding areas in order to prevent entry of airborne contamination.

3.1.2.8 Environment for SC Processing at PPF

Temperature Limits	22.5° C ± 2.8° C
Relative Humidity (RH) Limits	50 % ± 10%
Air Impingement Velocity (On SC)	< 6.1 meters/sec
Atmospheric Pressure Range	650 to 850 Torr

Note - the average temperature and RH during SC processing is usually 21° C at 40% RH. It is required that the PPF Contractor have equipment available to ensure the temperature and humidity conditions are maintained around the SC. Temperature and RH must be continuously verified via a minimum of two monitors and/or chart recorders. Air Cleanliness will be maintained at Class 100,000 or better per FED-STD-209 (For additional information, see the Contamination Control Plan, PN20032524).

3.1.2.9 Communications

The inter-facility communications interfaces between the Building 9 control room and the PPF, and Building 1 control room to launch site (PVAN) are described below. The PPF Contractor will provide the following communications services for use by the Spacecraft Contractor.

1) Intercom between and within the PPF (suitable for hazardous fueling operations) clean rooms and control rooms and to the PPF office areas.

2) Visual displays of launch countdown and Greenwich Mean Time (GMT) located at the PPF control room (Building 1) and at the LOC that is synchronized to SLC 41.

3) Closed-circuit TV of SC and LV processing at the launch site, viewable on monitors in the LOC and PPF control rooms and all customer offices.

4) Public address systems in the PPF, launch site, and all customer offices.

5) Operational communication systems in the PPF, launch site, PVAN (Payload Support Van) and in the LOC. Operational communications system between the PPF and Eastern Vehicle Checkout Facility (EVCF).

6) An RF link compatible with SC telemetry and command frequencies, as shown in the "MUOS Launch Vehicle Interface Requirements Document (IRD)", IRD-LV20114743 (hereafter Reference Document 4), for transmission of SC telemetry and command data within the PPF for pre- and post-encapsulation RF testing (Figures 3-4); from the PPF to the EVCF for Compatibility Testing during system test (Figure 2); from the PPF to the EVCF (telemetry only) during SLC41operations (Figure 5).

7) Telephones at the launch site, including SC access level and the PVAN.

8) Public telephone access in the control rooms, the PPF office area, PVAN, LOC and PPF.

9) IP Phone, mounted on the ASOCR located in the PVAN, connected to the ASO IP phone in the spacecraft control room.

10) Operations fiber optic links from the PVAN to ASO

(See section **3.1.5,** Office Space and Services**,** for telecommunications requirements in the offices.)

3.1.2.9.1 EVCF Panel

The PPF Contractor will provide a fiber link to the EVCF communications panel and assist in connection to CCAFS Building XY. Ortel RF converters on each end will perform the data conversion/transmissions. Figure 2 shows the required communications configuration when the Spacecraft is in the ASO facility. Figures 3 and 4 show the required communications configurations when the Spacecraft is in the Encapsulation Bay. Figure 5 shows the required communications configuration when the Spacecraft is in the VIF.

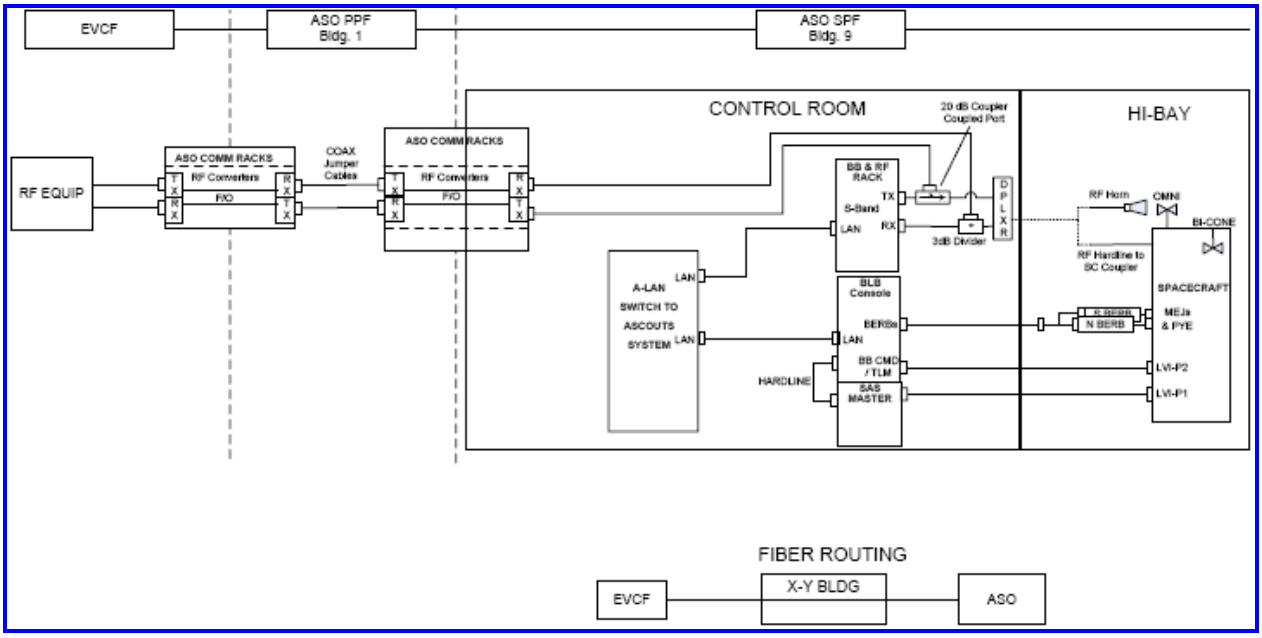

Figure 2. Astrotech Communications Diagram, SEPET/Compatibility Test

3.1.2.10 EVCF Panel

The PPF Contractor will provide a fiber link to the EVCF communications panel and assist in connection to CCAFS Building XY. Ortel RF converters on each end will perform the data conversion/transmissions. Figure 2 shows the required communications configuration when the Spacecraft is in the ASO facility. Figures 3 and 4 show the required communications configurations when the Spacecraft is in the Encapsulation Bay. Figure 5 shows the required communications configuration when the Spacecraft is in the VIF.

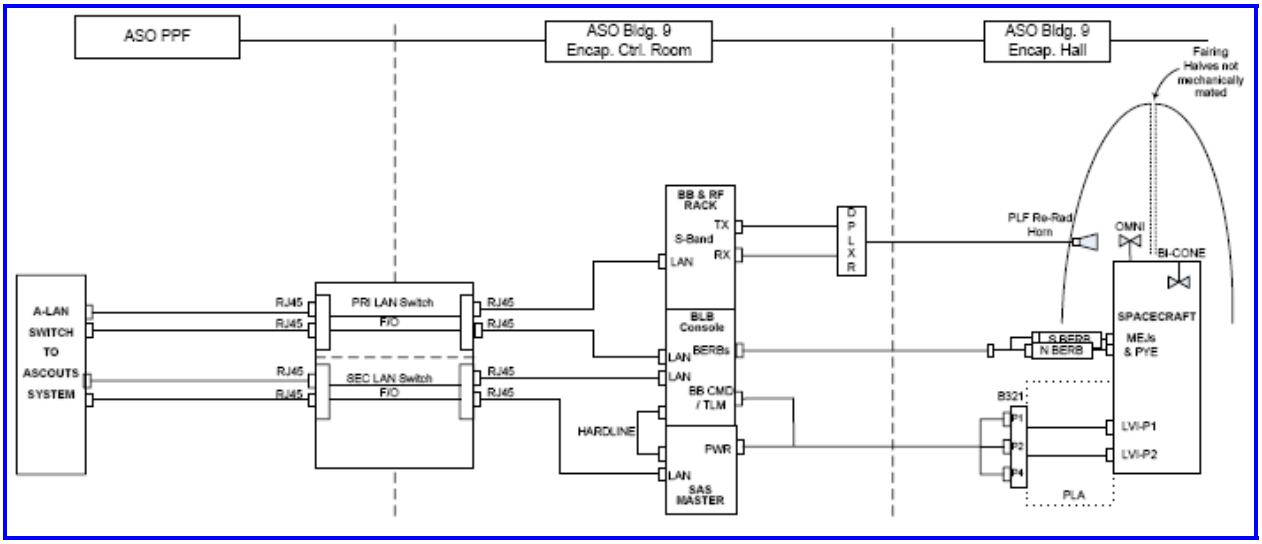

Figure 3. Astrotech Communications Diagram, Pre-Encapsulation

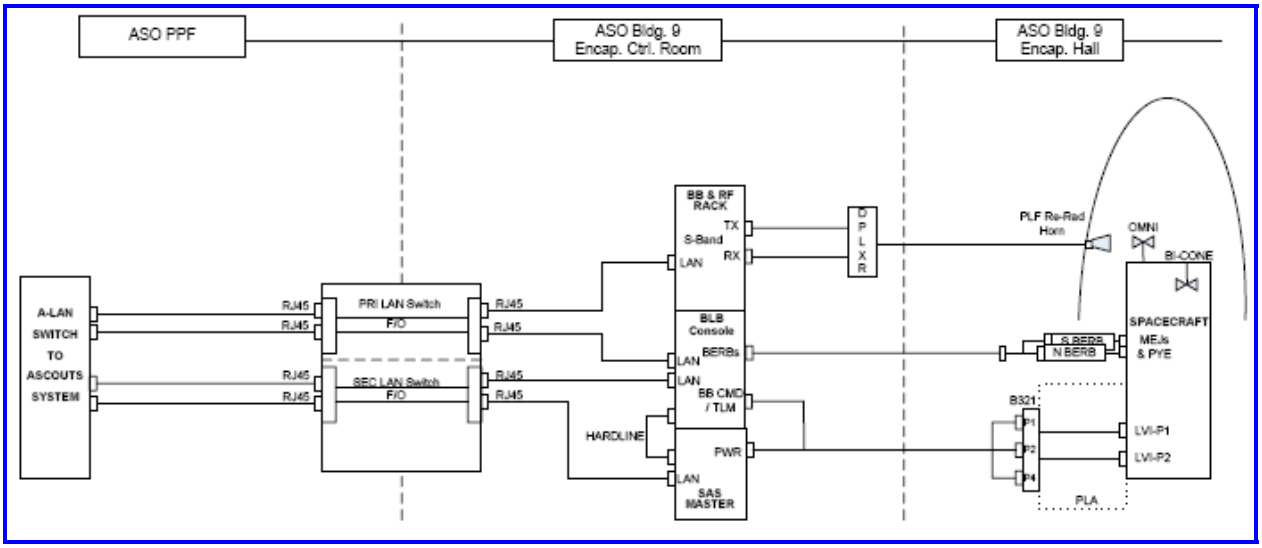

Figure 4. Astrotech Communications Diagram, Encapsulation

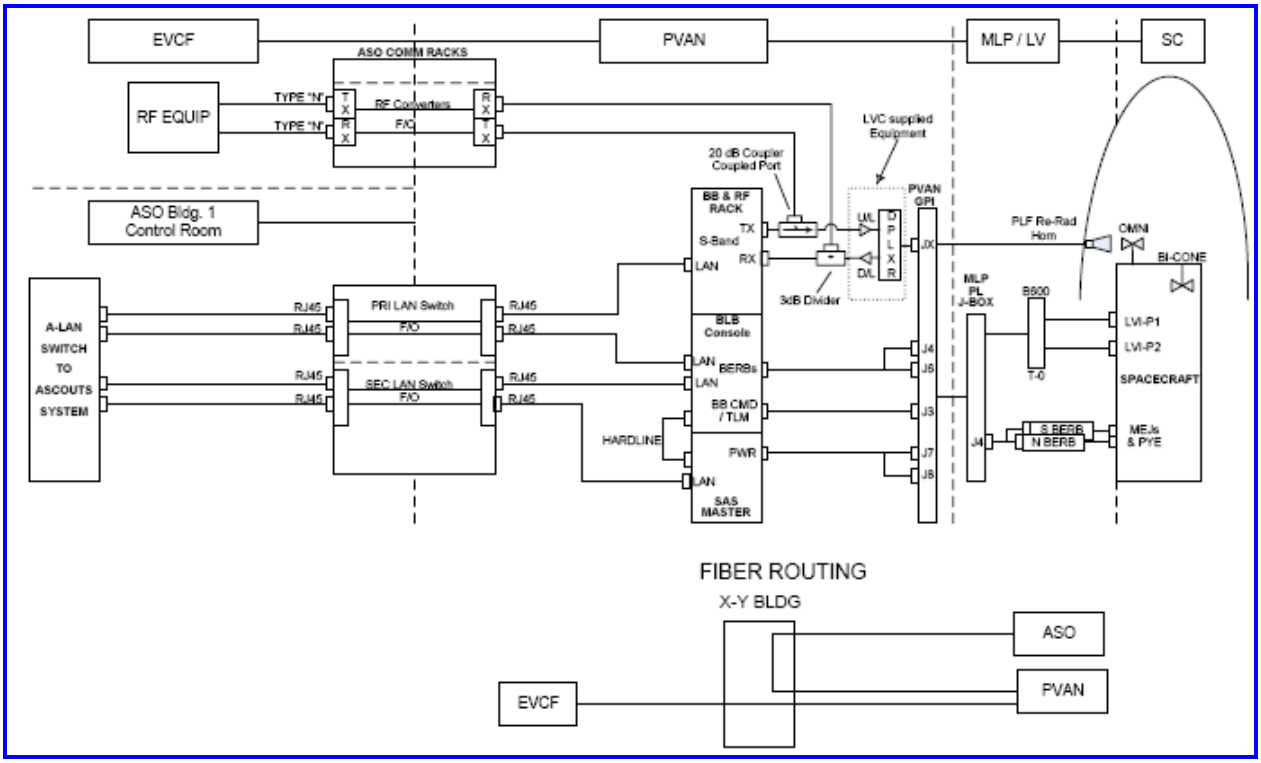

Figure 5. VIF and PVAN Communications Diagram

3.1.3 Building 1 Control Room

The PPF Contractor will provide an air conditioned control room at a temperature range of 21°C to 23.9°C. The control room will be at least 97.4 m^2. Clean room compatible tables will be available for tools, computers and documents used during test and assembly operations. A fixed CCTV (Closed Circuit Television) for remote viewing of hazardous activities from the control room will be provided. Visual displays of the countdown and GMT are required in the SCS Control Room. The PPF Contractor will also provide access to TOPS (Transistorized Operational Phone System) channels to allow the SC Contractor's participation in the launch countdown. This control room will be separate from that used at Building 9.

3.1.4 Gases and Cleaning Agents

The PPF Contractor will provide gaseous nitrogen (GN_2, per MIL-PRF-27401D, Type 1, Grade B), liquid nitrogen (LN_2, per MIL-PRF-27401D, Type 2, Grade B), gaseous helium (GHe, per MIL-PRF-27407, Type 1, Grade A), isopropyl alcohol (IPA, per TT-I-735, Grade A) and other general-purpose cleaning agents and solvents in the quantities described in Table I. Hazardous materials disposal service is included. Chemicals used in the processing of the SC will comply with the requirements concerning the use of ozone depleting chemicals.

Table I. SC Fluid and Gas Requirements

Item	Quantity
Gaseous Helium (GHe) per MIL-PRF-27407, Type 1, Grade A	14 bottles at 6000 psi (PPF)
	4 bottles at 2200 psi (PPF)
Gaseous Nitrogen (GN_2) per MIL-PRF-27401D, Type 1, Grade B	Facility source at 2200 psi (PPF)
	Facility sources for Scale and BERB purges
Liquid Nitrogen ($LN_{2)}$ per MIL-PRF-27401D, Type 2, Grade B	20 gallons (PPF)
Isopropyl Alcohol (IPA) per TT-I-735, Grade A	4 gallons (PPF)

3.1.5 Office Space and Services

3.1.5.1 Spacecraft Contractor Requirements

The PPF Contractor will also provide separate furnished office accommodations and a conference room for up to 25 members of the SC Contractor Team. A minimum of 93 m^2 of office space is required. Note that the SC Contractor Team will consist of up to 40 members, but only 25 members will require office accommodations at a time since different members of the team are required at different times during the Launch Campaign.

3.1.5.2 Spacecraft Contractor PMO Requirements

In addition, the PPF Contractor will provide offices to accommodate PMO (Program Management Office) and/or engineering support. A minimum office space for 10 persons is required.

3.1.5.3 Customer Requirements

The PPF Contractor will provide furnished office accommodations and a conference room for up to 15 Customers and/or Customer-designated personnel.

3.1.5.4 Common Office Amenities

Local administrative telephone service, telex, facsimile services, intercom, paging systems, and long distance and international telephone links will be provided in each office. Each office space will have 120V 60Hz power for the operation of the Customer and SC Contractor Team computer equipment. Each office space will have a campaign unique Ethernet LAN (T1 or better) (ISP will be provided by the PPF Contractor) required to connect the computers to the Internet. This LAN will allow computer communication via a secure VPN network.

3.2 Safety

PPF Contractor safety participation will be provided at ground safety reviews and for monitoring all hazardous SC operations at the PPF. The PPF Contractor will provide PPF safety training for

the Customer and SC Contractor Team. The PPF will provide OSHA approved storage cabinets for chemical storage and provide for hazardous chemical disposal as required.

EELV Contractor safety participation will be provided at ground safety reviews and for monitoring all hazardous SC operations from encapsulation through Launch. The EELV Contractor will provide certifications of the launch system lifting/handling equipment for use with SC Contractor hardware. The EELV Contractor will provide Launch Facility safety training for the Customer and SC Contractor Team. The EELV Contractor will coordinate and submit to Range Safety all SC and Interface System Safety Analyses and request and obtain all safety approvals.

All buildings will provide 24-hour-per-day electronic monitoring for smoke and fire detection. The SC location will have hazardous vapor detectors for personnel safety to continuously monitor hydrazine and oxidizer vapor. Emergency showers and eyewash stations will be provided near or adjacent to all SC locations. The PPF Contractor and the EELV Contractor will provide safety equipment (ELSAs) in the case of an emergency evacuation at locations where SC personnel are present. The PPF Contractor and the EELV Contractor will make prior arrangements to ensure that emergency medical services and fire protection services are available at all facilities during the time SC contractor personnel are present.

The PPF Contractor, EELV Contractor, and SC Contractor will meet the requirements of EWR 127-1 (hereafter Reference 2).

3.2.1 Lightning Strike Monitoring

The PPF Contractor shall provide 24hr/day, 7 days/week lightning alerts from Cape Weather. The warnings shall come in two (2) phases.

· A Phase I alert is called when there is the potential for lightning occurring within 5 nautical miles of the facility and within 30 minutes.

· A Phase II alert is called when there is actual lightning within the 5 nautical miles of the facility.

The PPF Contractor shall provide a lightning monitor that is available on the CCTV system throughout the facility.

3.2.2 Lightning Strike Protection

The PPF Contractor shall provide a Lightning Protection System for Building 9.

The lightning protection system for Building 9 shall consist of a grid of lightning rods at the highest elevations placed at 20 ft intervals across all of the roof areas. The grids shall be linked to each other and to ground via #2/0 down conductors.

3.3 Calibration

The PPF Contractor will provide standard equipment calibration for up to ten commercial components, if required.

3.4 Personnel Cleanroom, Protective Suiting and Training

The PPF Contractor shall supply the Customer with:

1) Cleanroom clothing (coveralls, hair covers, and booties) for nonhazardous processing operations;

2) Cleanroom coveralls, hair covers, and booties with leg-stats for hazardous processing operations (other than liquid propellant transfer);

3) Fully enclosed, air-hose type protective suits (SCAPE suits) per Section **3.1.2** for use during liquid propellant transfer operation. The suits must be equivalent to ILC Dover model 6250/62.

4) Certified Class “D” breathing air will be supplied for all SCAPE operations.

5) Anti static garments for ordnance operations.

The PPF Contractor will review the personnel physical data provided by the SC Contractor Team for personnel protective suiting and propellant handling operations.

The PPF Contractor shall also provide training for use of suits and cleanrooms.

3.5 Propellant Handling and Storage

The PPF Contractor will deliver SC propellants to the hazardous processing facility from Launch Site storage facilities. Licenses, permits and escorts will be obtained by PPF Contractor as required by Federal, Department of Defense (DoD), NASA, State and local directives. The PPF Contractor will provide for limited term storage of SC propellants.

3.6 SC Weighing

The SC Contractor Team will provide the weight and balance cart for the SC weighing. The PPF Contractor will provide an uninterruptible power supply (UPS) and a continuous GN_2 purge for the weight and balance cart. Gaseous Nitrogen will be provided per Table I. This will be required from cart calibration through SC mate to the Adapter.

3.7 Power

Power will be provided in the PPF and at the Launch Site Facilities, including an UPS, according to Table II below. The total UPS load will be less than or equal to 70 KVA. The PVAN requirements depicted in Table II are provided in this document for reference only. Refer to Reference Document 4 for detailed power requirements at the launch site.

3.8 Auxiliary Cooling

The PPF Contractor will provide auxiliary battery and SC cooling while in the PPF, if required. The EELV Contractor will provide battery and SC cooling during transit and at the Launch Complex, as required.

Table II. SC Contractor GSE Power Requirements

Name	Volts/Amps/ Phase	Connector Type (Hubbell)	Power Source	Power Location	Quantity	Note
Air Conditioner	208/60/3	HBL560R9W	SPF Utility Power	SPF Hi Bay	2	Air Rover A/C units, SEPET only
Air Conditioner	208/30/3	NEMA L21-30R	SPF Utility Power	SPF Hi Bay	2	Air Rover A/C units, SEPET only
AC Distribution Rack	208/60/3	HBL560R9W	SPF UPS Power	SPF Hi Bay	2	Solar Array Simulator, SEPET only
AC Distribution Rack	208/60/3	HBL560R9W	SPF UPS Power	SPF Hi Bay	1	Solar Array Master Console, BSS EGSE, SEPET only
AC Distribution Rack	208/60/3	HBL560R9W	SPF UPS Power	SPF Hi Bay	1	LM EGSE, SEPET only
AC Distribution Rack	208/60/3	HBL560R9W	SPF & PPF UPS Power	SPF Control Room & PPF Control Room	1	Checkout Station work stations, SEPET & Launch
Fueling Load Cells	120/15/1	NEMA 5-15R	SPF UPS Power	SPF Hi Bay	1	Fueling Scale
Alignment Equipment	120/15/1	NEMA 5-15R	SPF Utility Power	SPF Hi Bay	1	Theodolites, Computers

Worst Case UPS Power load is 70 KVA

3.9 Telemetry/Command/Data Links

The PPF/EELV Contractor will provide telemetry/command/data links for the SC continuously (with the exception of ≤ 1 second interruption) from SC to LV mate through launch (T-0), while the SC is powered up. Table III provides a description of the types and quantities of communication links provided. The RF links will meet the signal level requirements based on the SC and Electrical Ground Support Equipment (EGSE) parameters defined in Reference Document 4. SC RF links will be available until launch. The hardline links shall meet the signal level requirements based on the SC and EGSE parameters defined in Reference Document 4. The Launch Pad to PPF RF link is described in Reference Document 4.

Table III. Telemetry/Command/Data Links*

Type	Quantity	From	To	Timeframe	Data Rate	I/F Type
RF	1 TLM	ASO Bldg. 9	AFSCN I/F	SC SEPET	Reference doc. 4, LV-IRD	Type N
	1 CMD	AFSCN I/F	ASO Bldg. 9	SC SEPET		Type N
	1 TLM	Encapsulation Bay	ASO Bldg. 1	Encapsulation Operations		Type N
	1 CMD	ASO Bldg. 1	Encapsulation Bay	Encapsulation Operations		Type N
	1 TLM	SC in Fairing	PVAN	SC mate to liftoff		Type N
	1 CMD	PVAN	SC in Fairing	SC mate to liftoff		Type N
	1 CMD	AFSCN I/F	SC in Fairing	SC mate to liftoff		Type N
	1 TLM	SC in Fairing	AFSCN I/F	SC mate to liftoff		Type N
EGSE LAN	2	Launch Site	ASO Bldg. 1	SC mate to liftoff	Reference doc. 4, LV-IRD	RJ45
	2	ASO Bldg. 1	Launch Site	SC mate to liftoff		RJ45
	2	Encapsulation Bay	Bldg. 1 Control Room	Encapsulation Operations		RJ45
	2	ASO Bldg. 1 Control Room	Encapsulation Bay	Encapsulation Operations		RJ45

*Note: The launch site requirements depicted in this table are for reference only. For launch site requirements, the LV IRD takes precedence. AFSCN connectivity is via the EVCF.

4. SECURITY

The PPF Contractor will be required to provide the following security measures:

1) PPF Contractor's facility must be cleared/certified at the DoD "SECRET" level.

2) Closed areas must be certified by the Defense Security Service (DSS) as a closed area.

3) PPF Contractor's personnel must have a DoD "SECRET" clearance and a need to know in order to gain access to the closed area.

4) PPF contractor's security personnel having access to "access control systems" shall have at a minimum a DoD "SECRET" clearance.

5) Lockheed Martin Commercial Space Systems security will have overall authority on access to closed areas.

6) There shall be a formal access control system in place.

7) A four hour check of the close area after hours will be required.

8) Individual cipher locks are required on all internal and external doors leading into the SC Processing Facility.

9) The PPF contractor will provide the capability for 24-hour-per-day visual monitoring of the SC by the SC Contractor.

5. TRANSPORTATION

The SC Contractor will provide the transportation of the SC and GSE from the factory to the PPF. The EELV Contractor will provide transportation from the PPF to the launch site.

5.1 MUOS Shipping Container and Transportation

The PPF Contractor will assist and obtain permits for the transporting the spacecraft and associated hardware from the airport (CCAFS, KSC, or Orlando) to ASO.

5.2 Local Transportation and GSE Handling

The PPF Contractor will provide transportation of the suitably crated SC, and SC GSE within the PPF, to and from the designated storage and support facilities at the PPF. The PPF Contractor or EELV Contractor will coordinate outside support, if required, for transportation of SC GSE between the PPF and other Facilities.

6. LAUNCH SITE REQUIREMENTS

6.1 Launch Facilities

The PPF Contractor and EELV Contractor will provide facilities for Day of Launch Activities.

6.2 Launch Complex Services (Reference)

The EELV Contractor will provide the following launch pad service capabilities:

1) Power (see Table II**,** SC Contractor GSE Power Requirements, for further information)

2) SC compartment gas conditioning (air or GN_2). GN_2 needs to be supplied for positive pressurization of the SC Battery Enable Relay Boxes for explosion proofing.

3) SC Signals (Reference section **3.9,** Telemetry/Command/Data Links)

    a. Space at the Launch Complex for two racks of equipment and suitable personnel space.

    b. Telemetry and command signals to/from the Launch Complex and PPF.

    c. Four wire modem lines to/from the Launch Complex and PPF, if required.

    d. TCP/IP LAN connection between the Launch Complex and the PPF.

6.3 Launch Complex Technical Assistance (Reference)

At the launch site, the EELV Contractor will provide the SC Contractor the technical assistance required for preparing the SC for launch, which will include:

1) SC/Launch Vehicle umbilical line(s) validation and tests.

2) All activities associated with the testing of the Customer SC at the Launch Complex, including: providing equipment (i.e. diving board, PLF interior platform, lighting, restraints, etc… as applicable) to support access to SC Access Points. Access stands provided by the Launch Vehicle Contractor (LVC) will meet OSHA requirements. Access stands will be able to be secured to ensure no movement during use.

3) Implement quality control and interface configuration management to all SC to Launch Vehicle interfaces.

4) Range, ground, and flight safety support.

5) UPS at critical Launch Complex facilities.

6) Assist with installation and checkout of the SC Contractor provided console(s) at the Launch Complex.

7) Twenty-four-hour guard service to maintain restricted access.

8) Launch Site safety training.

APPENDIX A: ACRONYM LIST

AFSCN	Air Force Satellite Control Network
AOS	Acquisition and Operations Support
ASO FL	Astrotech Facilities in Titusville, Florida
ASOC	Atlas V Spaceflight Operations Center (Cape Canaveral)
ASOC	A2100 Spaceflight Operations Center (Newtown)
ATP	Authority to Proceed
B/S	Backshell
BB	Baseband
BERB	Battery Enable Relay Boxes
BKUP	Backup
CBOD	Clampband Opening Device
CCAFS	Cape Canaveral Air Force Station
CCAM	Collision and Contamination Avoidance Maneuver
CCB	Configuration Control Board
CCTV	Closed Circuit Television
CDR	Critcal Design Review
CDRL	Contract Data Requirement List
CG	Center of Gravity
CMD	Command
COMSEC	Communication Security
dB	Decibel
deg	Degree
DoD	Department of Defense
EED	Electro-Explosive Device
EELV	Evolved Expendable Launch Vehicle (Atlas V or Delta IV)
EGSE	Electrical Ground Support Equipment
EIRP	Effective Isotropic Radiated Power
ELSA	Emergency Life Support Apparatus
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMISM	EMI Safety Margin
EVCF	Eastern Vehicle Checkout Facility

EWR	Eastern Western Range
FDLC	Final Design Load Cycle
FM	Frequency Modulation
FMH	Free Molecular Heating
FSK	Frequency Shift Keying
GHe	Gaseous Helium
GMT	Greenwich Mean Time
GN_2	Gaseous Nitrogen
GSE	Ground Support Equipment
GTO	Geosynchronous Transfer Orbit
HPF	Hazardous Processing Facility
Hz	Hertz
ICD	Interface Control Document
ICE	SC/Launch Integrated Crew Exercise
IFD	In-Flight Disconnect
IPA	Isopropyl Alcohol
IPC	Intermediate Payload Class (Per EELV SIS)
IRD	Interface Requirements Document
IST	Integrated Systems Test
ITAR	International Traffic in Arms
KSC	Kennedy Space Center
LAE	Liquid Apogee Engine
LM	Lockheed Martin
LN2	Liquid Nitrogen
LOC	Launch Operations Center
LV	Launch Vehicle
LVC	Launch Vehicle Contractor
LVDR	Launch Vehicle Design Review
MASC	MILSATCOM Auxiliary Support Center
MATS	Miller Advanced Transportation System
MGSE	Mechanical Ground Support Equipment
MI	Mission Integration
MICD	Mechanical Interface Control Drawing
mm	Millimeter

Mps	Meters Per Second
MPTV	Multi-Purpose Transport Vehicle
MUOS	Mobile User Objective System
N	Newton
NASA	National Aeronautics and Space Administration
NAVSOC	Naval Satellite Operations Center
NON	Negative Orbit Normal
NOPS	NRO Operations Squadron
NRZ	Non Return to Zero
NRZ-L	Non Return to Zero, Phase L
NTO	Nitrogen Tetroxide
OBC	On-Board Computer
OSHA	Occupational Health and Safety Administration
PAF	Payload Attach Fitting
PL	Payload: SC and Payload Adapter (EELV PL)
PLA	Payload Adapter
PLF	Payload Fairing
PMO	Program Management Office
PON	Positive Orbit Normal
PPF	Payload Processing Facility
PPRD	Payload Processing Requirements Document
PRI	Primary
PVan	Payload Support Van
RAAN	Right Ascension of Ascending Node
RFP	Request for Proposal
RH	Relative Humidity
RHCP	Right-Hand Circularly Polarized
RPO	Radiation Protection Officer
RRDD	Risk Reduction and Design Development
SAFB	Schriever Air Force Base
SC	Spacecraft
SCAPE	Self-Contained Atmospheric Protective Ensemble
SCC	Spacecraft Contractor
SCS	Satellite Check-Out Station

SEIP	Standard Electrical Interface Panel
SEPET	Spacecraft Electrical Performance and Evaluation Test
SGLS	Space Ground Link Subsystem
SIP	Standard Interface Plane
SIS	EELV Standard Interface Specification
SLC	Space Launch Complex
SPO	System Program Office
TBC	To Be Confirmed
TBD	To Be Determined
TBR	To Be Reviewed
TBS	To Be Supplied
TLM	Telemetry
TOPS	Transistorized Operational Phone System
UPS	Uninterruptible Power Supply
VIF	Vertical Integration Facility
VLC	Verification Load Cycle
Vpp	Volts, peak to peak
W	Watt