Payload Data Sets Blank Book

International Space Station Program

Revision C

August 2001

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas

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REVISION AND HISTORY PAGE

REV.	DESCRIPTION	PUB. DATE
--	Initial Release (Reference per SSCD 000969, EFF. 04/15/98)	06-23-98
A	Revision A (Reference per SSCD 001313, EFF. 10/28/98)	02-22-99
B	Revision B (Reference per SSCD 001865, EFF. 03/03/99)	09-20-00
	DCN 001 (Reference per SSCD 003838, EFF. 11/08/00)	12-14-00
	DCN 002 (Reference per SSCD 004986, EFF. 03/13/01)	04-19-01
C	Revision C (Reference per SSCD 005548, EFF. 08/14/01)	08-31-01

SSP 52000-PDS
Revision C

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD DATA SETS BLANK BOOK

AUGUST 2001

FOREWORD

PAYLOAD DATA SETS BLANK BOOK

This document, SSP 52000-PDS, Payload Data Sets Blank Book, contains the standard format that will be used by all International Space Station (ISS) Program Participants to define United States (U.S.) Payload Data Sets (PDSs) for the ISS. The Payload Developer (PD) shall use this book as a blank book for the development of the Payload-Unique Data Sets (PUDSs). Use of the standard format shall provide a consistent definition of the required payload data sets for the payload integrators, payload developers, and the ISS Program.

This PDS Blank Book is consistent with the processes and products to be prepared by the ISS Program Participants, as specified in SSP 50200-01, Station Program Implementation Plan, Volume 1: Station Program Management Plan. This document is under Configuration Management (CM) control of the ISS Program Payloads Control Board (PCB); any changes or revisions will be reviewed and approved by the PCB.

Richard Nygren
International Space Station Program
Payloads Office Manager

8/14/01
Date

PREFACE

PAYLOAD DATA SETS BLANK BOOK

This Payload Data Sets Blank Book defines the detailed technical requirements the Payload Developer (PD) will submit to the International Space Station (ISS) Program. It represents the agreement on the responsibilities, tasks, and requirements that directly relate to the integration and operational implementation of the payload into the ISS and Shuttle. The PDS further defines the roles and responsibilities and technical requirements to launch, operate, and return an ISS payload.

Any instructional information contained in this document is italicized and enclosed in brackets *[Example]*.

Tables and table sections that are to be completed by the ISS Program representative are shaded. The PD is instructed to leave the shaded portions of tables blank.

The Acronyms and Abbreviations list is found in Appendix A. The Glossary of the terms requiring definition is found in Appendix B. Open items that have not been determined are designated as To Be Determined (TBD) and are found in Appendix C, Open Work. Issues that need to be resolved will be designated as To Be Resolved (TBR) and are found in Appendix C. Appendix D, Non-Configuration-Managed Options Lists and Supplemental Information, is designated as supplemental information pertinent to the Data Sets but that does not fall under Configuration Management (CM).

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PAYLOAD DATA SETS BLANK BOOK

CONCURRENCE

AUGUST 2001

Prepared by:	Ben Messina BOOK MANAGER	OZ2 ORG
	Ben Messina SIGNATURE	8-14-01 DATE
Approved by:	Jim Scheib MISSION INTEGRATION AND PLANNING MANAGER	OZ2 ORG
	Jim Scheib SIGNATURE	8-14-01 DATE
NASA DQA:	Sandra Boriack NASA CM REPRESENTATIVE	OL ORG
	Sandra Boriack SIGNATURE	8/14/01 DATE

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PAYLOAD DATA SETS BLANK BOOK

LIST OF CHANGES

AUGUST 2001

All changes to paragraphs, tables, and figures in this document are shown below:

PCB	Entry Date	Change	Paragraph(s)
	June 1998	Baseline	All
	October 1998	Revision A	All
	August 2000	Revision B	All
	November 2000	DCN 001	
	April 2001	DCN 002	
	August 2001	Revision C	All

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of SSP 52000-PDS, Payload Data Sets Blank Book, is to define and control the content and format of the Payload Data Sets (PDSs). These Data Sets represent the detailed technical requirements in accordance with their applicable Payload Integration Agreement (PIA): SSP 52000-PIA-PRP, Payload Integration Agreement Blank Book For Pressurized Payloads; SSP 52000-PIA-TAP, Payload Integration Agreement Blank Book for Truss Attached Payloads; SSP 52000-EIA-ERP, EXPRESS Integration Agreement Blank Book for EXPRESS Rack Payloads; SSP 52000-PIA-EPP, Payload Integration Agreement (PIA) Blank Book for EXPRESS Pallet Payloads; and SSP 52000-PIH-WRP, Window Observational Research Facility (WORF) Rack Integration Agreement Blank Book for WORF Rack Payloads, PIH Volume V. (PIA is used as a generic term in this document.) These data sets contain the engineering, integration, and operational details agreed upon by the Payload Developer (PD) and the implementing organizations. The Payload-unique Data Sets define, on an increment- and flight-specific basis, the engineering, integration, and operations details contained in the payload's PIA Addendum. These documents also serve as the requirements documents for payload data to be collected via the Program-sponsored databases. Program-sponsored databases will reflect the baselined data field. A secondary purpose of the Payload Data Sets Blank Book is to provide a road map for the PD in the completion of payload-unique requirements. The road map defines the process flow of technical requirements and the roles and responsibilities of the International Space Station (ISS) Program and the PD for the integration and operational implementation of payload-unique requirements within the ISS.

1.2 SCOPE

The Payload Data Sets Blank Book comprises the Data Sets that collect the payload-unique technical information required for the integration and operational implementation of the payload.

1.2.1 DOCUMENTATION

The documentation required to ensure proper integration and operational implementation of the payload consists of the PIA, the PIA addenda, the payload-unique Data Sets and applicable Interface Control Documents (ICDs), and unique Payload Verification Plans (PVPs).

1.2.2 APPROVAL AUTHORITY

The Payload Data Sets Blank Book is controlled by the Payloads Control Board (PCB), and associated changes are to be approved by the Space Station Payloads Office (SSPO). The Payload-unique Data Sets will be controlled by the appropriate Level III Control Boards as identified in the individual Data Set sections.

1.2.3 CONFIGURATION MANAGEMENT

Configuration control commences upon last signature of this Payload Data Sets Blank Book. The ISS Program will maintain configuration control of this document in accordance with SSP 50123-01, Configuration Management Handbook Volume 1.

The PD shall input all payload-related Shuttle, ISS-Shuttle, and ISS on-orbit requirements data into the ISS PDSs. These Data Sets shall be controlled by a Level III Control Board, who will approve the Payload-unique Data Sets and resulting flight products. These products will be provided to the Shuttle, ISS-Shuttle, and ISS on-orbit requirements documents by the payload Data Set Managers (DSMs) on an as-needed basis.

1.3 PRECEDENCE

In the case of any variation between this PDS Blank Book and the PIA, the PIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA will not be considered binding on the National Aeronautics and Space Administration (NASA) for implementation.

1.4 DELEGATION OF AUTHORITY

The Payload Data Sets Blank Book is controlled by the PCB.

1.5 ISSUES AND OPEN WORK

Open work is identified by a "**<TBD n-n>**" in the text. Appendix C, Open Work, captures the To Be Determined (TBD) items associated with this document. Once the TBD is defined, the updated text is inserted in place of the TBD, and the item is removed from Appendix C.

Because of the complex and dynamic nature of ISS development and implementation, there can be unresolved issues concerning new or existing processes. These unresolved issues are identified by a "**<TBR n-n>**" in the text. Appendix C, Open Work, captures the To Be Resolved (TBR) issues associated with this document. Processes associated with a TBR issue are not considered baselined operating processes until the issue is resolved and the updated text is inserted in place of the TBR and the item is removed from Appendix C.

2.0 DOCUMENTS

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The current issue of the following documents is identified in the Program Automated Library System (PALS) (http://iss-www.jsc.nasa.gov/ss/issapt/pals/) or Payload Integrated Library System (PILS) (http://sspweb.jsc.nasa.gov/pils/payload.cfm). The documents listed in this paragraph are applicable to the extent specified herein. Inclusion of applicable documents herein does not in any way supersede the order of precedence identified in Paragraph 1.3 of this document.

2.1 APPLICABLE DOCUMENTS

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The current issue of the following documents is identified in SSP 50257, Program Controlled Document Index. The documents listed are applicable to the extent specified herein. Inclusion of applicable documents herein does not in any way supersede the order of precedence identified in Paragraph 1.3 of this document.

SSP 30539	User Interface Language
SSP 30573	Space Station Program Fluid Procurement and Use Control Specification
SSP 30695	Acceptance Data Package Requirements Specifications
SSP 41158	Software Interface Control Document Part I United States On-Orbit Segment to International Ground System Segment Ku-Band Telemetry Formats
SSP 50007	Space Station Inventory Management System Bar Code Label Requirements and Specification
SSP 50123-01	Configuration Management Handbook Volume 1
SSP 50200-01	Station Program Implementation Plan, Volume 1: Station Program Management Plan
SSP 50200-03 Annex 1	Station Program Implementation Plan, Volume 3: Cargo Analytical Integration Annex 1: NASA Cargo Integration Data Requirements
SSP 50200-09	Station Program Implementation Plan, Volume 9: Real-Time Operations
SSP 50252	Operations Data File Management Plan

SSP 50253	Operations Data File Standards
SSP 50254	Operations Nomenclature
SSP 50304	POIC Capabilities Document
SSP 50313	Display and Graphics Commonality Standards
SSP 50471	International Space Station Payload Mission Integration Team Execution Plan
SSP 50474	Execute Planning Process Definition Document
SSP 52000-PIA-EPP	Payload Integration Agreement (PIA) Blank Book for EXPRESS Pallet Payloads
SSP 52000-EIA-ERP	EXPRESS Integration Agreement Blank Book for EXPRESS Rack Payloads
SSP 52000-PIA-PRP	Payload Integration Agreement Blank Book For Pressurized Payloads
SSP 52000-PIA-SP	Payload Integration Agreement Blank Book for Small Payloads (Pressurized)
SSP 52000-PIA-TAP	Payload Integration Agreement Blank Book for Truss Attached Payloads
SSP 52000-PIH-WRP, Volume V	Window Observational Research Facility (WORF) Rack Integration Agreement Blank Book for WORF Rack Payloads, PIH Volume V
SSP 52005	Payload Flight Equipment Requirements and Guidelines for Safety-Critical Structures
SSP 5410X-ANX 1	Increment Definition and Requirements Document for Planning Period X, Annex 1: Station Manifest (Series of Flight-Specific Station Manifests)
SSP 57000	Pressurized Payloads Interface Requirements Document
SSP 57002	Payload Software Interface Control Document Template
SSP 57057	ISS Payload Integration Template
SSP 58303E	Team Definition Document

SSP 58304A	Ground Support Personnel Training and Certification Plan
SSP 58309	Payload Training Implementation Plan
SSP 58311	Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations
SSP 58312	Payload Operations Integration Center Payload Operations Handbook Volume 2: Increment Operations
SSP 58313A	NASA Payload Regulations
SSP 58700	U.S. Payload Operations Data File Management Plan
SSP 58700-ANX1	Annex 1 of the International Space Station U.S. Payload Operations Data File Management Plan
NSTS 07700, Volume XI	Space Shuttle System Integrity Assurance Program Plan
NSTS 08171	Operations and Maintenance Requirements and Specifications Document
NSTS 12820 Volume A	Space Shuttle Operational Flight Rules Volume A All Flights
NSTS 12820 Volume B	ISS Generic Operational Flight Rules Volume B Mission Operations Directorate
NSTS 12820 Volume C	Joint Shuttle-ISS Operational Flight Rules Volume C Joint Operations
NSTS 16007	Shuttle Launch Commit Criteria and Background Document
JSC 10506	The Drafting Standards for System Handbook Drawings
CSDL-306642	ISS User Interface Language User's Guide
H300 File VII Vol. 2	Material Science Laboratory (MSL-1) OMRSD
JHB 2000	**<TBD 2-2>**
JPG 2810.1A	**<TBD 2-2>**

K-CM-05.3.2	Guide for Space Station Processing at Kennedy Space Center (KSC)
KHB 1700.7	Space Shuttle Payload Ground Safety Handbook
KHB 1710.2	Kennedy Space Center Safety Practices Handbook
KHB 5310.1D	Reliability, Maintainability and Quality Assurance Handbook
KHB 8800.7C	**<TBD 2-2>**
KMI 1800.2	KSC Hazard Communication Program
KMI 1800.3	**<TBD 2-2>**
KMI 1860.1	KSC Radiation Protection Program
KSC ACUM	**<TBD 2-2>**
KSS-12.17	**<TBD 2-2>**
K-STSM-14.1-LSAH	Launch Site Accommodations Handbook for Payloads
K-STSM-14.1.9	Facilities Handbook for Hangar L
LS-70053-2	JSC Telescience Support Center Capabilities Document
MIL-STD-100E	Engineering Drawings
MIL-STD-1246B	Product Cleanliness Levels and Contamination Control Program
MIL-STD-1553B	**<TBD 2-2>**
NPG 8910.1	NASA Procedures and Guidelines Care and Use of Animals
POIF-OC-0010	PL MDM Timeliner Automated Procedures Operations Manual
SFOC-PM0102	Product Development Plan for Time-critical Ground Handling Requirements Table PDP MS3-012
SSP E-03	KSC Standard Practices and Procedures (SPP) Connection and Disconnection of Electrical Connectors
SPP Q-02	**<TBD 2-2>**

TSC-DOC-006	GRC Telescience Support Center User Guide
TSC-HDBK-001	MSFC Telescience Support Center Capabilities Document
79K12170	Payload Canister Standard Interface Document
No Number	Guide to Science Payload Processing
Mission-Specific	Launch Site Support Plan - Mission Integration Plan, Annex 8
	Addendum to Launch Site Support Plan - Mission Integration Plan, Annex 8

[Documents may be added to this section by CR as is necessary to support the final scope and content of this Payload Data Sets Blank Book.]

2.2 REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document. These reference documents may or may not be specifically cited within the text of this document.

SSP 50011-01	Concept of Operation and Utilization Volume I: Principles
SSP 50200-02	Station Program Implementation Plan, Volume 2: Program Planning and Manifesting
SSP 50200-04	Station Program Implementation Plan, Volume 4: Payload Engineering Integration
SSP 50200-05 Part 1	Station Program Implementation Plan, Volume 5: Logistics and Maintenance, Part 1: Maintenance
SSP 50200-05 Part 2	Station Program Implementation Plan, Volume 5: Logistics and Maintenance, Part 2: Logistics
SSP 50200-06	Station Program Implementation Plan, Volume 6: Cargo Physical Processing
SSP 50200-07	Station Program Implementation Plan, Volume 7: Training
SSP 50200-08	Station Program Implementation Plan, Volume 8: Increment Execution Preparation

SSP 50200-10	Station Program Implementation Plan, Volume 10: Sustaining Engineering
SSP 50261-01	Generic Groundrules, Requirements, and Constraints Part 1: Strategic and Tactical Planning
SSP 50277	Payloads Integrated Logistics Support Guidelines
SSP 50467	ISS Cargo Stowage Technical Manual: Pressurized Volume
SSP 52000-PAH-EPP	Payload Accommodations Handbook for EXPRESS Rack Payloads
SSP 52000-PAH-KSC	KSC Payload Launch Site Processing Payload Accommodations Handbook
SSP 52000-PAH-PRP	ISS Payload Accommodations Handbook - Pressurized Payloads
SSP 52001	Payload Verification Program Policy
SSP 52054	ISS Program Payloads Certification of Flight Readiness Implementation Plan, Generic
SSP 541XX-ANX 3	Increment Definition and Requirements Document for Planning Period XX, Annex 3: Imagery Requirements
SSP 57001	Pressurized Payloads Hardware Interface Control Document Template
SSP 57003	Attached Payload Interface Requirements Document
SSP 57004	Attached Payload Hardware Interface Control Document Template
SSP 57800	Payload Software Integration and Verification Payload Accommodations Handbook (PAH)
SSP 58700-ANX3	Annex 3 of the International Space Station U.S. Payload Operations Data File Management Plan
SSP 58700-ANX5	U.S. Payload Operations Data File Management Plan Annex 5: Payload Display Review
SSP 58700-ANX6	U.S. Payload Operations Data File Management Plan Annex 6: Payload Developers Review Guide

NSTS 07700, Volume XIV, Appendix 5	Space Shuttle System Payload Accommodations, System Description and Design Data - Ground Operations
NSTS/ISS 13830	Payload Safety Review and Data Submittal Requirements for Payloads Using the - Space Shuttle - International Space Station
NSTS 1700.7B	Safety Policy and Requirements for Payloads Using the Space Transportation System
NSTS 1700.7B ISS Addendum	Safety Policy and Requirements for Payloads Using the International Space Station
NSTS 18798	Interpretations of NSTS/ISS Payload Safety Requirements
NSTS 21000-ICA	Standard Orbiter Crew Compartment Interface Control Annex
NSTS 21000-IDD-MDK	Middeck Interface Definition Document for Middeck Accommodations
NSTS 21000-SIP-MDK	Shuttle/Payload Standard Integration Plan for Middeck-Type Payload
DOD-HDBK-763	Human Engineering Procedures Guide - Military Handbook
DoD STD 100E	Engineering, Drawing Practices
HOSC-SYS-2237	**<TBD 2-8>**
MSFC-DOC-2851	Team Definition Document (TDD) International Space Station Operations
MSFC-PLAN-2875	U.S. Payload Operations Data File Management Plan
<TBD 2-3>	User Training/Certification Plan
<TBD 2-4>	Ground Malfunctions Book
<TBD 2-6>	SPDMS Software Interface Document
<TBD 6-2>	ISS Management Operations Support Plan
<TBD 6-3>	Payload Regulations

<TBD 6-4>	Payload Systems Manual
<TBD 6-9>	Increment Definition and Requirements Document (IDRD)

[Documents may be added to this section as is necessary to support the final scope and content of this Payload Data Sets Blank Book.]

3.0 MANAGEMENT

3.1 RESPONSIBILITIES

The International Space Station (ISS) Program and the Payload Developer (PD) are responsible for ensuring the definition, control, and implementation of requirements and activities specified within this document. The ISS Program, as represented by the Increment Payload Manager (IPM), the Data Set Coordinators (DSCs), and the flight and/or increment Data Set Managers (DSMs), is responsible for the definition and integration of the detailed requirements across the payload complement.

3.1.1 DATA SET COORDINATORS

The ISS Program DSCs represent the different technical disciplines requiring payload requirement definition. The DSCs define the generic technical requirements to be collected from all payloads and insure the contents of the Payload Data Sets Blank Book are accurate and current. The DSCs are responsible for the development and population of the help fields and menus for the appropriate databases. The DSCs define generic report requirements and provide assistance to the database developers in the development of the electronic data screens.

3.1.2 DATA SET MANAGERS

The ISS Program DSMs represent the different technical disciplines and manage payload-unique requirements for each flight and/or increment. The DSMs work with the PDs to ensure the PD's submission of technical data is complete and within the agreed-to schedule for each flight/increment. The DSM integrates the payload-unique technical data across the payload complement for the flight/increment and promotes the integrated data to Configuration Management (CM) control. The DSM is responsible for providing the payload-unique data and the integrated payload complement data to the appropriate integration teams for flight product development.

3.1.3 PAYLOAD DEVELOPER

The PD is responsible for the definition, submission, and content verification of the payload-unique requirements as defined in this Payload Data Sets Blank Book. The ISS Program will, and the PD shall, staff pertinent integration activities, both analytical and physical, according to the requirements as identified within the Payload Integration Agreement (PIA), the Payload Data Set (PDS), and according to the payload-unique Payload Integration Manager (PIM) schedule derived from SSP 57057, ISS Payload Integration Template. A more detailed description of the ISS Program and PD roles and responsibilities is delineated in each data set section.

3.1.4 PAYLOAD INTEGRATION MANAGER

The PIM is responsible for the successful integration of a payload into the ISS and the launch vehicle. The PIM will ensure the PD's requirements are accurately defined,

documented, and compatible with the ISS accommodations and are properly implemented. The PIM coordinates with DSMs through the Payload Mission Integration Team (PMIT) to develop the data as required. The PIM is responsible for the review of all the PD's Data Sets to ensure that conflicting or inconsistent information is not provided between the different Data Sets. The PIM will ensure that the PD has completely and accurately submitted all required information to the appropriate program-sponsored database. The PIM represents the PD at the PMIT. The roles and responsibilities of the PIM are further detailed in SSP 50200-01, Station Program Implementation Plan, Volume 1: Station Program Management Plan, Section 4.5.1.

3.2 PAYLOAD DATA COLLECTION

The top-level process for collecting payload-unique data is specified in SSP 50200-01. Payload-unique data products will be controlled at the delegated boards described in SSP 50200-01. Detailed data collection process flows are described within each Data Set section.

The PD shall electronically input the payload-unique detailed technical requirements for each of the Data Sets into the designated recipient database as depicted in Table 3.2-1, Data Set to Database Matrix. Initially, Payload Planning data will be provided via the Interim User Requirements Collection (iURC) tool. The iURC will transition to the User Requirements Collection (URC) System as it becomes available. These systems will be further described in Section 10, Payload Planning. Details concerning the electronic input of data into the Payload Data Library (PDL) are provided within the individual Data Set sections.

TABLE 3.2-1 DATA SET TO DATABASE MATRIX

Payload Data Library (PDL)	Interim User Requirements Collection (iURC)	Payload Information Management System (PIMS)	SPDMS/OMRS/TGHR
• Training Requirements • Ground Data Services • Payload Operations Requirements • All Sections Except Payload Operations Data Files (PODFs) • KSC Technical Requirements (Inputs Only) • KSC Support Requirements • Payload Configuration • Extravehicular Activities • Extravehicular Robotics	• Payload Planning Requirements	• Payload Operations Requirements • Payload Operations Data Files (PODFs)	• KSC Technical Requirements Data Set

3.3 POINTS OF CONTACT AND PD TEAM IDENTIFICATION

For each point of contact identified in the Payload Data Sets, the PD shall provide the data required in fields A-N in Table 3.3-1, Payload Developer Point of Contact. The PD shall identify each PD team member and shall provide the data in fields B-S of Table 3.3-1.

A. Point of Contact Area - *[Identify the area for which this person is the point of contact. Choose from the following list, using as many elections as needed to support the payload. An individual may be the point of contact for more than one area.]*

1. Primary Payload Contact - The individual defined by the PD to have primary and overall responsibility for the payload.
2. Primary Training Contact - The person defined by the PD to have overall responsibility for the Payload Training Requirements.
3. Crew Training Contact - The individual defined by the PD responsible for crew training issues.
4. Training Unit Contact - The individual defined by the PD responsible for the training unit and training unit issues.
5. Ground Support Personnel (GSP) Team Training Contact - The individual defined by the PD responsible for the training of the PD team. This training contact is also responsible and will be prompted to fill out the PD Training Completion Form once a name is typed into this field.
6. Baseline Data Collection Contact - The individual defined by the PD responsible for baseline data collection implementation and issues.
7. Human Use Protocol Contact - The individual defined by the PD responsible for assurance of the Human Use Protocol implementation.
8. Ground Data Services (GDS) Representative.
9. Payload Operations Preparation Contact.
10. PODF Displays Contact.
11. PODF Procedures Contact.
12. Video/Photo Contact.
13. Payload Planning Contact.
14. Payload Planning Primary iURC Contact.
15. Payload Planning Secondary iURC Contact.
16. Real-Time Payload Operations Contact.
17. Operations Facilities Contact.

18. User Operations Team Contact.
19. Other Payload Operations Contacts.
20. KSC Technical Requirements Primary Contact.
21. Payload Drawings Contact.
22. Payload Schematics Contact.
23. Configuration Data Contact.
24. Payload Models Contact.
25. Manifest/Stowage Requirements Contact.

B. Subrack Element Payload/Experiment - *[Provide the name of the subrack element payload or experiment in which the payload training team member will be supporting.]*

C. Name - *[Provide the full name of the PD point of contact.]*

D. Title.

E. Organization.

F. Street Address.

G. City.

H. State/Province.

I. Country.

J. Zip/Postal Code.

K. Telephone Number - *[Include country code and area code.]*

L. Facsimile (fax) Number (if available) - *[Include country code and area code.]*

M. Pager Number (if available) - *[Include country code and area code.]*

N. E-mail Address (if available).

O. World Wide Web (WWW) Home Page Address (if available).

P. Function - *[Identify which functions are applicable to each payload team member. It is possible that one individual can be assigned more than one function. Choose from the following:]*

1. Management Function - Team member who will manage the team's activity during the mission and be the focal point for decision making.
2. Support Function - Team member responsible for providing direct support to the management function, but will not necessarily be responsible for Payload

Information Management System (PIMS), Air-to-Ground communications, or commanding.

3. Air-to-Ground Function - Team member identified as the prime or the backup to communicate directly with the crew on the air-to-ground loop.

4. PIMS Function - Team member responsible for interacting with PIMS. PIMS provides configuration management of documents, change requests, data product requests, and bulletins.

5. Command Function - Team member responsible for sending uplink commands to their experiment.

6. Data Function - Team member responsible for monitoring downlink data using the Huntsville Operations Support Center (HOSC) Enhanced HOSC System (EHS) Telescience Resource Kit (TreK) workstation.

7. Experiment Ground Support Equipment (EGSE)/Facility Function - Team member who will not be interfacing directly with the United States (U.S.) Partner Control Center (PCC) cadre or Payload Operations Integration Center (POIC) Systems, but is responsible for monitoring EGSE supplied by the science team or Ground Support Equipment (GSE) data relative to an onboard facility or experiment.

8. Procedures Functions - Team member responsible for updating and overseeing the crew operational procedures.

9. Crew Training Instruction Function - Team member responsible for training the crew.

10. Hardware/Software Support Function - Team member who has the expertise to troubleshoot and resolve flight hardware and/or software issues.

11. Planning Function - Team member responsible for developing payload planning inputs in support of the mission planning team.

12. Display Development Function - Team member responsible for developing the displays for the payload.

13. Other Function - Team member responsible for tasks that have not been identified in the previous selections. Specify the payload-unique function.

Q. Location of Operations - *[Identify the location of operations for each payload team member. Choose from the following locations:]*

1. MSFC - The payload team member will be supporting payload operations for a particular flight from the Marshall Space Flight Center (MSFC).

2. JSC - The payload team member will be supporting payload operations for a particular flight from the Johnson Space Center (JSC).

3. ARC - The payload team member will be supporting payload operations for a particular flight from the Ames Research Center (ARC).
4. KSC - The payload team member will be supporting payload operations for a particular flight from the Kennedy Space Center (KSC).
5. GRC - The payload team member will be supporting payload operations for a particular flight from the John H. Glenn Research Center (GRC) at Lewis Field.
6. Remote Site - The payload team member will be supporting payload operations for a particular flight. Identify the facility name, city, and state of the remote site.
7. Other - The payload team member will be supporting payload operations for a particular flight from another location not specified in the previous choices.

R. Location of Training - *[The GSP Training Coordinator will provide this information based on where the payload team member is resident and where the payload team member will support operations. The GSP Training Coordinator will determine where ground support personnel training will occur for each payload team member. More than one location may be specified.]*

S. Internal Team Position - *[Provide the position name and loop call sign of the internal PD team structure that is applicable to the function(s) identified in the PD Team Functions block.]*

T. Previous Flight Experience - *[Indicate the previous flights this individual has supported and in what capacity.]*

TABLE 3.3-1 PAYLOAD DEVELOPER POINT OF CONTACT

Point of Contact Area		
Subrack Element Payload/Experiment		
Name		
Title	**Organization**	
Street Address		
City		
State/Province	**Country**	**Zip/Postal Code**
Telephone Number	**Fax Number**	
E-mail Address	**WWW Home Page Address**	
Function		
Location of Operations	**Location of Training**	
Internal Team Position		
Previous Flight Experience		

[Expand table as necessary to include required information. Duplicate table as needed for all points of contact identified in each Data Set.]

4.0 PAYLOAD TRAINING REQUIREMENTS

4.1 INTRODUCTION

The Training Data Set provides the detailed training requirements for the Payload Developer (PD) and International Space Station (ISS) personnel, including flight crew and Ground Support Personnel (GSP). Top-level training requirements, including the integrated training location, the complexity of training, the crew training hardware, and the supporting equipment and services, are identified in the Payload Integration Agreement (PIA). The PD will provide the details of these training requirements in this section of the Payload Data Sets Blank Book.

4.1.1 PURPOSE

This section defines the format and content of the Payload Training and Simulation/Trainer Data Set required for the PD to prepare the Training Data Set. This section also defines the products, activities, roles, responsibilities, and interfaces required for training for the ISS Program. The format of this section is structured to reflect the PDL onscreen environment in which the PD will input their payload training requirements.

Questions and/or comments on the generic Training Data Set should be directed to the Training Data Set Coordinator. Increment-specific questions and comments on the Payload-unique Training Data Set data should be directed to the appropriate Training Data Set Manager (DSM) for the given flight and/or increment.

4.1.2 TRAINING DATA SET SCOPE

This section documents the detailed training requirements of the payload. It addresses the training required of the ISS and Shuttle crew and of GSP as well as any special or unique training requirements of other individuals involved in the operation of the payload.

All questions should be answered, all tables completed, and all requested data should be supplied for each section of the Training Data Set. If a question, table, or schedule is not applicable, then Not Applicable (N/A) should be recorded to indicate it was considered and not overlooked.

4.1.3 TRAINING DATA SET PRECEDENCE

In case of any variation between this Data Set and the PIA, the PIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA will not be considered binding on National Aeronautics and Space Administration (NASA) for implementation.

4.1.4 TRAINING DATA SET CONFIGURATION MANAGEMENT

Configuration control commences with the completion of signature authority of this Payload Data Set (PDS). The ISS Program will maintain configuration control of this document in accordance with SSP 50123-01, Configuration Management Handbook Volume 1. The contents of the Training Data Set section of the Payload Data Sets Blank Book are controlled by the Payloads Control Board (PCB). Payload-unique Crew Training Data Set data are controlled by the NASA Payload Operations Control Board (NPOCB) upon promotion of the integrated Training Data Set to the baseline control level. The Ground Support Personnel portion of the Training Data Set will not be baselined. The trainees' names and positions are maintained in the Payload Developer Database. The PD Ground Training Integrator (PDGTI) is responsible for this database. Lists of team names, positions, and training completed are given to the Increment Lead Payload Operations Director (POD) prior to each simulation in which the PDs participate. A final list is given to the POD six (6) weeks prior to flight. This process is documented in SSP 58304A, Ground Support Personnel Training and Certification Plan; and in SSP 58311, Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations.

4.1.5 TRAINING DATA SET MANAGEMENT RESPONSIBILITIES

The following paragraphs describe the roles and responsibilities of management positions that influence the content of the Payload Training Data Set and either control or utilize the PDS training data.

4.1.5.1 PAYLOAD DEVELOPER

The PD shall provide detailed crew payload training and simulator requirements, as delineated in SSP 58309, Payload Training Implementation Plan, to the Payload Training Data Set. The PD shall also provide PD team member names and their functions into the Payload Training Data Set. The PD input shall include information for determining individual PD team member training curriculums. These curriculums may include participation in simulations that integrate the crew and the GSP.

The PD shall electronically input the requested data directly into the PDL Training Data Set and promote the Training Data Set for integration.

4.1.5.2 INTERNATIONAL SPACE STATION PAYLOAD OFFICE RESPONSIBILITIES

4.1.5.2.1 ISS PROGRAM PAYLOAD OPERATIONS DIRECTOR

The Payload Operations Director (POD) is the certifying authority for the PD Operations Teams' interface with the crew onboard and the Payload Operations Integration Center (POIC) team. This certification is based on training requirements included in the SSP 58304A.

The POD is a member of the Flight Director Team during on-orbit operations and will certify to the Flight Director that the POIC team is ready for flight.

4.1.5.2.2 ISS PROGRAM PAYLOAD TRAINING INTEGRATOR

The Payload Training Integrator (PTI), with the cooperation of Simulation Engineer (SE), Simulation Director, and/or the GSP Training Coordinator, will coordinate a series of Training Strategy Teams (TSTs) with the PD to determine specific training plans for the crew and the GSP. The TST meetings will be scheduled to provide for the timely acquisition of detailed information required by the PTI to support ISS Program planning and documentation.

4.1.5.2.3 ISS PROGRAM PAYLOAD TRAINING DATA SET MANAGER FUNCTION

The ISS Program Payload Training DSM task is performed by the PTI. The PTI/Training DSM will review the data for ISS Program implementation and will integrate the Training Data Sets across the ISS payload complement. The SE will contact the PD if there are any questions or if negotiations of the data is required.

After concurrence from the PD, the Training DSM will recommend promotion of the Crew Training integrated payload training data to the NPOCB for baseline configuration control. The Ground Support Personnel portion of the Training Data Set will not be baselined.

4.1.5.2.4 SIMULATION ENGINEER

An SE will be assigned to each PD team and will serve as the primary contact for the PD to ISS Payload Training. The SE will chair the payload-specific TST, which defines the payloads' training requirements. The SE will act as the Integration Engineer for a specific payload's Training Data Set. Once the Training Data Set has been promoted to the integrated level and has been reviewed by the SE, the PTI will be notified that the Data Set is ready for integration into the Multilateral Increment Training Plan.

4.1.5.3 JOINT PAYLOAD DEVELOPER AND ISS PROGRAM RESPONSIBILITIES

Each PD shall support the TST process and work with the PTI to implement the results and recommendations of the TST. The SE will work with the PD through the TSTs to define training objectives and trainer requirements that define the fidelity of the payload simulator required. Assistance from the PD to the simulation engineer, in the development of a Payload Simulator Requirements Document (PSRD), a Payload Training Lesson Plan (PTLP), and other crew payload training documentation will also be required if the Simulation Engineer is tasked to develop these documents. The PD shall, as required by the TST, integrate the Payload Training Simulator (PTS) to the Space Station Training Facility (SSTF)/Payload Training Capability (PTC) as defined in the Payload User Development Guide (PUDG) for the SSTF/PTC. It should also be noted that the Payload Training Organization and the SSTF/PTC Training Systems Contractor will jointly perform acceptance testing to the Payload Training Simulator - Government Furnished Equipment (PTS-GFE) devices. The PD shall develop Payload Resource Utilization (PRU) inputs, Laboratory Support Equipment (LSE) inputs, Station Support Equipment (SSE) inputs, and inventory inputs for the payload simulator.

Additionally, PDs may have to develop training manuals, Computer-Based Trainers (CBTs), and/or other training materials in order to conduct effective payload training. In order to conduct training at the SSTF/PTC, the PD shall provide or train an instructor for their payload. PDs shall be responsible for the training of their own GSP in accordance with Payload Operations Integration Function (POIF) training and certification standards as provided by the PTI and to provide the PTI with the necessary documentation and schedules showing the accomplishment of such training. The POIF will provide, as necessary, the courseware to support the PD's POIF-provided GSP training and certification curriculum. The PD shall also team with the PTI for the purposes of PD GSP participation in both types of payload-only simulations and joint Multi-Segment Trainer (MST) as required.

4.2 TRAINING DATA SET GENERAL INFORMATION

4.2.1 TRAINING PROCESS FLOW

The training process is outlined and described fully in the NASA Payload Training Implementation Plan (PTIP). The training process is organized into five activities:

1. Payload Training Interface to Tactical Planning - The tactical planning process will be the first activity in which crew training requirements for a given payload are defined. The crew training hours are estimated and documented in the PIA/EXPRESS Integration Agreement (EIA) for each payload.
2. Payload Training Strategy Team Process - The TST process consists of three phases, each geared toward a specific group of trainees. Phase 1 for each payload will begin with a payload training overview, then address crew training curriculum development, training tools development, and training readiness planning for that payload. Phase 2 of the TST process will be conducted per payload complement and will address Payload Crew Complement training and crew participation in simulations. Phase 3 of the process will define the training plans for both cadre and science team personnel.
3. Multilateral Increment Training Plan (MITP) Development - The PTI will make inputs to the MITP using data developed during the TST process.
4. Payload Training Schedule Development - Several schedules will be created, maintained, and adhered to in order for everything to be ready for the start of crew payload training for a given set of crewmembers or GSP training.
5. Payload Training Administration and Implementation - The PTI, in coordination with the PDs, will use the products from the planning, development, and verification activities to effectively and efficiently administer and implement payload training for ISS crewmembers and GSP.

4.2.2 PAYLOAD DEVELOPER TRAINING POINTS OF CONTACT INFORMATION

The PD shall complete Table 3.3-1 for a primary training contact and other payload training contacts for the following areas:

1. Primary Contact - The individual defined by the PD to have overall responsibility for the Payload Training Requirements.
2. Crew Training Contact - The individual defined by the PD responsible for crew training issues.
3. Training Unit Contact - The individual defined by the PD responsible for the training unit and training unit issues.
4. GSP Team Training Contact - The individual defined by the PD responsible for the training of the PD team.
5. Baseline Data Collection Contact - The individual defined by the PD responsible for baseline data collection implementation and issues.
6. Human Use Protocol Contact - The individual defined by the PD responsible for assurance of the Human Use Protocol implementation.

The same individual may serve as the contact for more than one area of responsibility.

4.3 TRAINING REQUIREMENTS

4.3.1 TRAINING QUESTIONS

The PD shall answer yes or no to the following high-level questions regarding training in Table 4.3.1-1, Training Questions.

A. Remarks - Click check box to answer yes or no to a question, then enter any text in remarks (100 characters max).

TABLE 4.3.1-1 TRAINING QUESTIONS

Questions	Answers (Choose Yes or No)
1. Does the PD plan to use the JSC Instructor and Simulation (SIM) Engineer for JSC crew training? *[This question should be answered Y if a JSC instructor will be needed to perform training for the crew at JSC rather than a PD team member performing the training. If yes, complete data fields B through O in Table 3.3-1 and select the Crew Training Instructor Function for each person who will be an instructor.]*	☐ Yes ☐ No
2. Will Extravehicular Activity (EVA) training be required for the crew? [*This question should be answered Y if the crew will need training on EVAs on the payload.]*	☐ Yes ☐ No
3. Will robotics training be required for the crew? *[This question should be answered Y if the crew will need to be trained on how to operate the payload via the robotics systems.]*	☐ Yes ☐ No
4. Will the PD require the Display Development Training Course? *[Indicate with "yes" or "no" whether or not the identified team member will require Display Development Training Course. If yes, complete data fields B through O in Table 3.3-1 and select the Displays Development function for each display developer.]*	☐ Yes ☐ No
5. Is the payload a middeck locker type?	☐ Yes ☐ No
6. Is the payload a SIR drawer type?	☐ Yes ☐ No
7. Is the payload in a ISIS drawer type?	☐ Yes ☐ No
8. Has the payload flown on a previous Space Mission? If so, which one?	☐ Yes ☐ No
9. Is there an existing simulator that was used in training for a previous flight?	☐ Yes ☐ No
10. Will the payload require operation by 2 or more crew members simultaneously?	☐ Yes ☐ No
11. Will the payload be going up in the MPLM?	☐ Yes ☐ No
12. Will the payload be going up in the middeck of the Shuttle?	☐ Yes ☐ No
13. Will payload operations involve interactions with another payload or facility?	☐ Yes ☐ No
14. Will the payload use the EXPRESS laptop to run payload unique software?	☐ Yes ☐ No

4.3.2 TRAINING UNIT IDENTIFICATION

The PD shall provide the following information in Table 4.3.2-1, Training Unit Identification, for each training unit to be used to train the crew on the payload.

A. Unit ID - *[Specify the payload or payload sub-element Identification (ID) using the payload acronym and using the PD payload-unique ID number or a sequential*

number for each training unit (e.g., Human Research Facility (HRF)-01) (10 characters max).]

B. Unit Name - *[Enter a descriptive name for the training unit (e.g., Microgravity Science Glovebox (MSG) PTC simulator) (60 characters max).]*

C. Fidelity Class - *[Define the fidelity class for each training unit (2 alphanumeric characters max). Choose from the following (e.g., 1, 2A, 2B, 3A, 3B, 4, 5, Other, N/A):]*

1. Class 1: Flight-Equivalent Hardware - This is flight-like hardware that may or may not be flight-certified. Typical Class 1 simulators would be a duplicate of the flight hardware that was procured for training purposes, backup flight hardware, or an engineering model.

2. Class 2 - Class 2 simulators have flight-like hardware panels with fully functional controls and displays. Functionality for these panels is provided by PD-supplied software models that read panel switches, drive panel displays/indicators, and provide data to the crew and downlink displays. Class 2 simulators are further subdivided into Classes 2A and 2B. Please refer to the PUDG for further detail on these subdivisions.

3. Class 3 - Class 3 simulators are standalone systems with virtual panels that are driven by a software load resident on the machine. Class 3 simulators are further subdivided into Classes 3A and 3B. Please refer to the PUDG for further detail on these subdivisions.

4. Class 4 - Class 4 simulators consist of front panels that have the physical look and feel of the flight unit but no operable hardware or software behind the panel to add functionality.

5. Class 5 - Class 5 simulators consist of front panels that are a photograph or are drawn to look like the flight panel. They have no operational switches/displays or functional software.

6. Other - “Other” consists of training units that cannot be classified, i.e., a prototype which is fully functional but does not have flight-like interfaces.

   Class 1 simulators can be accommodated in the Payload Simulator Staging Area provided resources not available at the PTC are provided by the PD.

D. Primary Location - *[Define the primary location for the training unit (20 characters max).]*

NOTE: The Space Station Payloads Office (SSPO) has designated JSC as the primary training center for all United States (U.S.) or U.S.-sponsored payloads. Training at other locations will require a waiver approved by the NASA Payload Training Panel (NPTP). Choose from the following locations based on the provided descriptions or specify other:

1. Payload Development Center (PDC).

2. SSTF/PTC.
3. Space Station Mockup and Trainer Facility (SSMTF).
4. Kennedy Space Center (KSC).
5. International Partner (IP) Site.
6. Onboard.
7. Other - Any location not described above *[Specify (20 characters max).]*

E. Available Date - *[Enter the planned date when your simulator will be at the training site, i.e., SSTF, SSMTF, etc., (mm/dd/yyyy).]*

F. Stowed Items - *[Provide a list of the stowed items, such as accessory kits, that will be required for training and will be delivered with your simulator to the designated training site (20 characters max).]*

G. Stowage Locations - *[Provide training facility locations for each of the stowed items supplied with your simulator, as stated in Paragraph G (20 characters max).]*

H. Comments (Other Explanation) - *[Provide additional information that would identify the training unit's unique capabilities and functions such as transportability, weight, accessibility, flight-certified hardware, etc. (1800 characters max).]*

TABLE 4.3.2-1 TRAINING UNIT IDENTIFICATION

Unit ID	Unit Name		Fidelity Class	Primary Location
Available Date	**Stowed Items**	**Stowage Locations**	**Comments**	

[Expand table as required to document additional content. Duplicate table for each unit.]

4.3.2.1 TRAINING UNIT DELIVERY DATES

The PTI or the responsible Training DSM will complete Table 4.3.2.1-1, Training Unit Delivery Dates, as follows:

A. Rev - The PTI will input the revision (Rev) of the input (5 alphanumeric characters max).

B. Generic Date - The PTI will input the generic date at which the training unit should be ready for use at the primary location (Increment minus months (I-mm) format - 5 characters max).

C. Actual Date - The PTI will input the actual date the training unit will be required to be available for review by the PTI (mm/dd/yyyy).

TABLE 4.3.2.1-1 TRAINING UNIT DELIVERY DATES

Rev	Generic Date	Actual Date

4.4 PAYLOAD OPERATIONS CREW TRAINING

4.4.1 PAYLOAD ELEMENT/SUB-ELEMENT STATUS SELECTION

The PD shall provide the following information in Table 4.4.1-1, Payload Element Selection Status, to apply to the Payload Operations crew training curriculum:

A. Payload Sub-Element - *[Provide a descriptive name of the facility, payload, or payload sub-element for which the curriculum is being developed (60 characters max).]*

B. Acronym - *[Input the acronym for the payload or payload sub-element (10 characters max).]*

C. Element Type - *[Input the most applicable description for this element from the following choices:]*

1. Facility Payloads - A long-term or permanent ISS-resident payload that provides services for a specific type of research.

   a. Experiments - Experiments utilizing the facility payload.

2. Subrack Payloads - A payload that fits into a rack or an EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) rack but does not comply with the Launch minus (L-)11 months integration template.

3. Standard EXPRESS Payloads - Payloads located in an EXPRESS rack that fit into the L-11 months integration template.

4. EXPRESS Pallet - The external interface between ISS and the EXPRESS payload.

5. EXPRESS Sub-Pallet Payloads - EXPRESS payloads mounted externally on the EXPRESS pallet.

6. Attached Payloads - Payloads located on the unpressurized lab structure.

TABLE 4.4.1-1 PAYLOAD ELEMENT SELECTION STATUS

Payload Sub-Element	Acronym	Element Type

4.4.2 PAYLOAD DEVELOPER COURSEWARE DELIVERABLE DATES

The PTI will provide the following information to complete Table 4.4.2-1, Payload Developer Courseware Delivery Dates:

A. Training Courseware Deliverable - The PTI will identify the Training Courseware Deliverable from the following:

1. PD-provided Lesson Plans.
2. PD-provided Courseware.
3. CBT.
4. Training Video.
5. Crew Procedures.
6. Onboard Lesson Plans.
7. Onboard Courseware.
8. Other.

B. Generic Date - The PTI will input the generic delivery date for each training deliverable when the PD shall be prepared to deliver the required training courseware. *[Training minus months (T-mm) format: T-mm (5 characters max).]*

C. Actual Date - The PTI will provide the actual date the training courseware shall be available for review by the PTI. *[mm/dd/yyyy.]*

D. Other Explanation - *[Describe the deliverable identified by "Other" (1800 characters max).]*

TABLE 4.4.2-1 PAYLOAD DEVELOPER COURSEWARE DELIVERY DATES

Training Courseware Deliverable	Generic Date	Actual Date

4.4.3 PAYLOAD OPERATIONS CREW TRAINING CURRICULUM REQUIREMENTS

The PD and the PTI will identify the training curriculum requirements for crew and GSP in this section.

4.4.3.1 PAYLOAD OPERATIONS CREW TRAINING CURRICULUM

The PD shall select the Payload Operations crew training course categories applicable to the payload element chosen.

The PD shall provide the following information in Table 4.4.3-3, Payload Operations Crew Training Curriculum.

A. Session Number - *[Identify the session number being defined or edited.]* A course may have multiple sessions, which are defined by varying course objectives, media, training units, time frames, instructors, and/or locations (numeric 99.9 max).

NOTE: A session may have more than one objective and multiple sessions may have the same objective. *[Increment each subsequent session number.]*

B. Session Hours - *[Specify the session length in 0.1-hour increments for Human Life Sciences (HLS) payloads and 0.25-hour increments for non-HLS payloads (numeric 99.9 max).]*

C. Course Category - *[Select the desired training course category.]*

D. Course Objective - *[Select, for each session, the desired training course category and applicable crew training curriculum course objectives from the following table, Table 4.4.3-1, Course Category and Course Objectives. In addition to the course objectives defined in Table 4.4.3-1, the PD shall identify any additional course objectives as Other.]*

TABLE 4.4.3-1 COURSE CATEGORY AND COURSE OBJECTIVES (PAGE 1 OF 2)

Course Category	Course Objectives
1.0 Payload/Facility Overview	1.1 Purpose of Payload/Facility Background 1.2 Types of Science Payload/Facility Supports 1.3 Payload/Facility Description
Payload Science Background	1.4 Science Objectives 1.5 Science Background 1.6 Previous Studies/Flights
Payload Systems Overview	1.7 Hardware and Software Overview 1.8 Commanding 1.9 Data Collection 1.10 Payload to ISS System Interfaces 1.11 Safety Related to Hardware/Software Design
Payload Operations Overview	1.12 Activity Definitions Overview 1.13 Timeline Scheduling Requirements Overview 1.14 Nominal Operations/Routine Maintenance Overview 1.15 Corrective Maintenance/ALT/Malfunction Operations Overview 1.16 Operational Safety 1.17 Stowage and Logistics 1.18 Use of LSE 1.19 Crew to Ground Interfaces Operations 1.20 Other
2.0 Payload Science Application	2.1 Skill Building 2.2 Laboratory Work 2.3 Other

TABLE 4.4.3-1 COURSE CATEGORY AND COURSE OBJECTIVES (PAGE 2 OF 2)

Course Category	Course Objectives
3.0 Payload Nominal Operations	3.1 Nominal Operations Procedures Performance 3.2 Routine Maintenance Procedures Performance 3.3 Safety Procedures Performance 3.4 Stowage Procedures Performance 3.5 Other
4.0 Payload Malfunction Operations	4.1 Malfunction/Alternate/Corrective Maintenance and IFM Procedures Performance 4.2 Safety Procedures Performance 4.3 Stowage Procedures Performance 4.4 Other
5.0 Payload Transfer	5.1 Payload Description 5.2 Payload Transfer Overview 5.3 Payload to ISS Interfaces 5.4 Special Handling Requirements 5.5 Safety 5.6 Transfer/Installation/Connection Procedures Performance 5.7 Applicable Malfunctions Procedures Performance 5.8 Other
6.0 Payload Transport	6.1 Payload Description 6.2 Payload Transport Overview 6.3 Special Handling Requirements 6.4 Safety 6.5 Transport Operations Procedures Performance 6.6 Applicable Malfunctions Procedures Performance 6.7 Other
7.0 Baseline Data Collection	7.1 Informed Consent 7.2 Preflight BDC 7.3 Postflight BDC 7.4 Other

E. Time Frame - *[Specify the time frame when a training session will occur. Choose one of the following time frames:]*

1. I-30 to I-18 - Generally used for generic training on long-duration and facility-class payloads. This training, called advanced training, is not specific to a particular increment or crew set.

2. I-18 to I-12 - The first phase of increment-specific training. This is a training phase that includes mission-specific activities, proficiency training on skills, systems operations, and team training.

3. I-12 to I-6 - The second phase of increment-specific training. Payload PTC training begins during this time frame.

4. I-6 to I-3 - Generally reserved for payload complement and PTC proficiency training.

5. I-3 to Increment Start - There will be very limited payload crew training opportunities during this time frame, which must be approved by the PTI. Crew travel will not be permitted.

6. Onboard - Onboard training must be scheduled as an activity for the onboard short-term plan.

F. Currency - *[Specify how often this training session must be repeated to maintain proficiency after training requirements have been met or to identify the maximum interval between the last session and flight operations. Currency requirements should not be used to build flight readiness skills. Currency requirements are most often applied to complex or hazardous operations or science skills requiring repetitive reinforcement such as animal surgery, crystal growth, etc. Choose from the following frequency choices (20 characters max):]*

(example: Every __ months, Not required, Other)

G. Location - *[Identify where this training session will occur. Choose from the following locations:]*

NOTE: The SSPO has designated JSC as the primary training center for all U.S. or U.S.-sponsored payloads. Training at other locations will require a waiver and NPTP approval.

1. PDC.

2. SSTF/PTC.

3. SSMTF.

4. KSC.

5. IP Site.

6. Onboard.

7. Other.

H. Instructor - *[Identify the person responsible for presenting this training session to the crew.]* Choose from the following instructors:

1. N/A (self-study).

2. PTC training personnel (includes JSC trainers, PD trainers, and Marshall Space Flight Center (MSFC) Simulation Engineers).

3. PDC training personnel.

4. Other (specify).

I. Method/Medium - *[Select the primary method/medium for each training session.]* Training method refers to how the training is conducted. Training medium refers to what tool is used for training. *[If the same information will be delivered in multiple mediums, then create a separate session for each medium. For example, a videotape of a lecture would require two separate sessions to be defined, one for the lecture and its recording and one for videotape to be played back. If duplicate sessions are defined for separate media, then specify the primary delivery method in the "Comments" field. Select the method/medium from the following choices in Table 4.4.3-2, Methods and Medium for Training Sessions.]*

TABLE 4.4.3-2 METHODS AND MEDIUM FOR TRAINING SESSIONS

Methods	Medium
Self Study	Workbook
	Handout
	Video
	CBT
	Other
Lecture	Workbook
	Handout
	Video
	Other
Demonstration	Simulation of Flight Hardware
	Video of Engineering Hardware
	Other
Hands On	Simulator
	Flight Hardware
	Engineering Hardware
	Other

TABLE 4.4.3-3 PAYLOAD OPERATIONS CREW TRAINING CURRICULUM

Session Number	Session Hours	Course Category	Course Objective	Time Frame	Currency	Location	Instructor	Method	Medium

[Expand table as required to document additional content.]

4.4.3.2 PTI-DEFINED TRAINING PREREQUISITES

For each Training Course Objective, the PTI shall provide the following information in Table 4.4.3-4, PTI-Defined Training Prerequisites.

A. Session # - *[Specify the session number for which the training prerequisites are being defined (Numeric 99.9 max).]*

B. Course Objective - *[Select, for each session, the desired training course category and applicable crew training curriculum course objectives from Table 4.4.3-1. In addition to the course objectives defined in Table 4.4.3-1, the PD shall identify any additional course objectives as Other.]*

C. Prerequisites - *[Specify the prerequisites needed for each course session identified (60 characters max).]*

D. Proficiency Level - *[Specify the proficiency level this session is intended to achieve. This information will be used to identify individual curriculums for specific crewmember responsibilities. An individual session may support more than one proficiency level. Select from the following:]*

1. Generic - Generic training for crewmembers will consists of a basic understanding of the science, only as necessary for crewmembers' awareness and public affairs purposes, as well as the generic safety hazards presented by payloads, i.e., how to handle toxic spills. In addition, the generic level will include skill-based training of emergencies (for example: prioritizing powerdowns of systems and payloads, if needed as a result of onboard failures).

2. Prime - Each crewmember will specialize in a subset of the total payload complement and will be considered the prime crewmember for those payload activities. A crewmember who is prime for a given payload will receive all training for that payload, including nominal operations, malfunction training, and hazard recognition and safety procedures. Cross-training of payloads between crewmembers while on-orbit will be possible, assuming there are no significant safety training issues associated with that payload.

3. Backup - There may be scenarios where more than one experiment operator is necessary. In this case, one crewmember will be fully trained as the prime operator. A second operator, the backup, will be training for nominal procedures and the appropriate hazard recognition and emergency procedures (no malfunction training).

4. Subject - In those cases where crewmembers are participants in the payload investigation as subjects, they will receive a minimal level of subject training. This would only apply in those situations where the subject was not the prime operator or the backup operator.

5. Transfer Trained - The ability to perform all payload transfer operations for a specific payload.

TABLE 4.4.3-4 PTI-DEFINED TRAINING PREREQUISITES

Session #	Course Objective	Prerequisites	Proficiency Level	Training Units	Comments

[Expand table as required to document additional content.]

6. Transport Trained - The ability to perform all payload operations for a payload while onboard the transport vehicle.

E. Training Units - *[Select the training units required for this session as defined in the training units identification form. If the required training unit is not included, then input the data in the training units identification form.]*

F. Comments - *[Provide any additional information that would further explain or define the crew training curriculum requirements for this payload (1800 characters max).]*

4.5 GROUND SUPPORT PERSONNEL TRAINING REQUIREMENTS

4.5.1 PAYLOAD DEVELOPER GROUND SUPPORT PERSONNEL TEAM IDENTIFICATION

The PD shall identify members of their payload operations team by completing the following fields and select, for each team member, the appropriate functions. The payload GSP Training Coordinator shall develop a POIF provided training curriculum for each team member. The PD shall ensure compliance with the requirements defined in the Payload SSP 58304A, Ground Support Personnel Training and Certification Plan.

A. Flight ID - Select the appropriate flight for the following data.

B. First Name - First name of the GSP team member (25 characters max).

C. Last Name - Last name of the GSP team member (25 characters max).

D. Sub-rack PL/Experiment - Name the facility, sub-rack Payload (PL), or experiment being supported by the team member (20 characters max).

E. Location of Operations - Name the location the payload team will support payload ground operations. (Select from list: MSFC, JSC, ARC, KSC, Lewis Research Center (LeRC), PD Site, Other).

F. Location of Training - Name the location the payload team will train for payload ground support operations. (Select from list: MSFC, JSC, ARC, KSC, LeRC, PD Site, Other).

G. Internal Team Position - Identify the position name and loop call sign of the internal PD team structure identified in the function list (20 characters max).

H. Previous Flt Experience - Enter the previous Flights (Flts) that each team member has supported (80 characters max).

I. Functions to be performed - Identify the function the selected team member will be performing during the operation of the payload. Choose all that apply or enter another function in the “Other” field (type over).

   1. Management Function

   2. Support Function

   3. Air-To-Ground Function

4. PIMS Function
5. Command Function
6. Data Function
7. Experiment Ground Support Equipment (EGSE) Facility Function
8. Payload Crew Procedures Function
9. Crew Training Instruction Function
10. Hardware/Software Support Function
11. Planning Function
12. Display Development Function
13. Other

TABLE 4.5.1-1 PAYLOAD DEVELOPER GROUND SUPPORT PERSONNEL TEAM IDENTIFICATION

First Name	Last Name	Sub-Rack PL/Experiment	Location of Operations	Location of Training	Internal Team Position	Previous Flt Experience	Function

4.6 TRAINER/SIMULATOR REQUIREMENTS

This section discusses the responsibilities of the PD regarding the requirements of the trainer/simulator that is being provided.

4.6.1 TRAINER SUPPORT EQUIPMENT

The PD shall define Training Unit requirements for LSE, SSE, and 1-gravity (1-g) support hardware required to support experiment training sessions. The trainer support equipment selected will be scheduled by the appropriate training facilities to support the PD's training sessions.

4.6.1.1 LSE/SSE SUPPORT REQUIREMENTS

LSE and SSE are the general-purpose equipment and tool items developed to support ISS maintenance and payload operations. LSE is equipment that is shared with all payload users; SSE is equipment that is shared with payloads, systems, and crew users. The PD shall provide the following information in Table 4.6.1-1, LSE/SSE Support Requirements:

A. Required? - *[Identify with an "X" which LSE/SSE are required from the list provided. Select as many items as required. If "Other" is selected, then provide name of item*

required in the available field. If location is other than SSTF/PTC, then identify the location.]

B. Location - *[If the LSE location is other than SSTF/PTC, then identify where the LSE is required to be located (20 characters max).]*

TABLE 4.6.1-1 LSE/SSE SUPPORT REQUIREMENTS

Required?	Location	LSE/SSE ITEM
		Minus Eighty Degree Laboratory Freezer for the ISS (MELFI)
		Cryogenic Storage Freezer (CSF)
		Quick Snap Cryogenic Freezer
		Life Sciences Glovebox
		General Purpose IVA Tools
		Cleaning Equipment (Standard Consumables)
		Housekeeping Equipment
		Camera, ISS General Purpose Video
		Camera, Lab Video
		Camera, Digital Still
		Camera, Still
		Digital Thermometer
		Film Locker
		EM Shield Locker
		Passive Dosimeter Reader/Annealer
		Dissecting Microscope
		Compound Microscope
		Incubator
		Small Mass Measurement Device
		Micro Mass Measurement Device
		pH Meter
		Refrigerated Centrifuge
		Battery Charger
		Digital Multimeter
		Digital Recording Oscilloscope
		DC Power Supply
		Function Sweep Generator
		Maintenance Work Area
		Bar Code Reader
		Other:

4.6.1.2 1-G TRAINING HARDWARE

Hardware required to support operations of the simulator hardware in the SSTF/PTC and/or SSMTF 1-g environment is classified as1-g support hardware. The PD shall provide the following information in Table 4.6.1-2, 1-g Training Hardware Requirements:

A. Required? - *[Indicate with a "✓" the 1-g support hardware required from the list provided. Select as many items as required. If "Other" is selected, then provide name of the required item in the available field.]*

B. Location - *[Designate the location where this hardware will be required (20 characters max).]*

C. Provider - *[Indicate with a "✓" in the PD, SSTF/PTC, or SSMTF column for each selected item to indicate whether the PD, SSTF/PTC or SSMTF is requested to provide (select only one).]*

D. Other Explanation - *If other is selected, explain what support system is desired (500 characters max)*.

TABLE 4.6.1-2 1-G TRAINING HARDWARE REQUIREMENTS

Required?	Location	1-g Support System	PD	SSTF/PTC	SSMTF
		Telescoping Monopods/Tripods			
		Stepping Stools			
		Restraints (Bungee Cord, Velcro, etc.)			
		Other			

4.6.1.3 PD-PROVIDED COMPONENTS

The PD shall list all the components that will be a part of or accompany the training simulator/trainer when it is delivered to JSC. The PD shall provide the following information in Table 4.6.1-3, PD-Provided Components.

A. Component - *[Describe each component (50 characters max).]*

B. Quantity - *[Provide the quantity of each component (numeric 99 max).]*

C. Fidelity - *[State the simulator fidelity level of the component as stated in section 4.3.2 field C (fidelity Class). If not applicable, then state "N/A".]*

D. Delivery Date - *[State in Increment minus (I-) format the date when the component will be delivered to the SSTF/PTC (30 characters max).]*

TABLE 4.6.1-3 PD-PROVIDED COMPONENTS

Component	Quantity	Fidelity	Delivery Date

4.6.2 MALFUNCTIONS

The Training Unit provided by the PD for use in the SSTF/PTC shall support malfunction operations to the extent determined by the TST. The integrated training unit shall support training on malfunctions involving crew or equipment safety, loss of science, or failures deemed likely to occur. Control of these malfunctions shall be

initiated at the Instructor/Operator Station (IOS) and sent to the simulator software via the Payload Simulator Network (PsimNet). The training unit software shall respond to malfunction messages by modifying its data processing so that the data output reflects the malfunction. The malfunction will be reset either by performance of the proper malfunction procedures or by a reset message from the IOS. The Training Unit shall also respond to malfunctions or changes in ISS resources (from core systems models) by exhibiting the appropriate response in the simulated experiment status. The PD shall provide the following information in Table 4.6.2-1, Training Unit Malfunctions.

A. Malfunction Title - *[Provide a descriptive title for each anticipated malfunction. Malfunction listings should be brief, but descriptive, as in following: 15 Volts (V) Power Supply Failure, Moderate Cooling Loop Failure, 5 V Circuit Breaker Tripped, etc (30 characters max).]*

B. Reset Method - *[For each malfunction title, provide a procedural or IOS input as a method to reset the malfunction (500 characters max).]*

C. Malfunction Scenario - *[For each malfunction title, provide a short operational scenario of the malfunction. Include a brief description of the conditions evoking the malfunction and the process for correcting the malfunction (500 characters max).]*

TABLE 4.6.2-1 TRAINING UNIT MALFUNCTIONS

Malfunction Title	Reset Method	Malfunction Scenario

4.6.3 TRAINING FACILITY-PROVIDED COMPONENTS

The PD shall list the components required for their trainer/simulator that will be provided by the SSTF/PTC. The PD shall provide the following information in Table 4.6.3-1, Training Facility-Provided Components:

A. Component - *[Describe the component that your trainer/simulator will require from the SSTF/PTC (50 characters max).]*

B. Quantity - *[State the number of each component you will require (numeric 9999 max).]*

TABLE 4.6.3-1 TRAINING FACILITY-PROVIDED COMPONENTS

Component	Quantity

5.0 GROUND DATA SERVICES REQUIREMENTS

5.1 INTRODUCTION

The GDS Data Set provides the detailed GDS requirements for the user and International Space Station (ISS) Program personnel. Top-level GDS requirements are identified in the Payload Integration Agreement (PIA). The Payload Developer (PD) shall provide the details of these GDS requirements in the GDS Data Set.

5.1.1 PURPOSE

This section defines the format and content of the payload GDS Data Set required from the PD to prepare the GDS Data Set. This section also defines the products, activities, roles, responsibilities, and interfaces required for the provision of GDS during payload operations. The format of this section is structured to reflect the PDL on-screen environment in which the PD shall input their payload GDS requirements.

Questions and/or comments on the GDS Data Set should be directed to the GDS Data Set Manager (DSM).

All questions should be answered, all tables completed, and all requested data should be supplied for each section of the GDS Data Set. If a question, table, or schedule is not applicable, then indicate by “N/A” so that it is clear that the question, etc., was considered and not overlooked.

5.1.2 GROUND DATA SERVICES DATA SET SCOPE

This section documents the detailed GDS requirements of the payload. The GDS detailed requirements include payload services required, including network and/or hardware connectivity requirements, for PDs and scientists located in the United States Operations Center (USOC), a Telescience Support Center (TSC), or any other operating location.

This section addresses PD identification and definition of voice loop requirements, real-time data requirements, Payload Operations Integration Center (POIC) service requirements, as well as internal requirements for the USOC or one of the TSCs if that is the operational site.

5.1.3 GROUND DATA SERVICES DATA SET PRECEDENCE

In case of any variation between this Data Set and the PIA, the PIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA will not be considered binding on National Aeronautics and Space Administration (NASA) for implementation.

5.1.4 GROUND DATA SERVICES DATA SET CONFIGURATION MANAGEMENT

Configuration control commences upon last signature of this Payload Data Set (PDS). The ISS Program will maintain configuration control of this document in accordance with SSP 50123-01, Configuration Management Handbook Volume 1. The contents of the GDS Data Set section of the Payload Data Sets Blank Book are controlled by the Payloads Control Board (PCB). Payload-unique GDS Data Set data are controlled by the Payload Operations Control Board (POCB) upon promotion of the integrated GDS Data Set to the baseline control level.

5.1.5 GROUND DATA SERVICES DATA SET MANAGEMENT RESPONSIBILITIES

5.1.5.1 PAYLOAD DEVELOPER

The PDs shall define their ground data and communications services requirements in the GDS Data Set. The PDs shall provide names of their teams' representative for GDS and a representative for their ground operating locations' facilities to the Ground Support Requirements Team (GSRT). The PD shall electronically input the requested data directly into PDL and promote the GDS Data Set for integration.

5.1.5.2 INTERNATIONAL SPACE STATION PAYLOAD OFFICE RESPONSIBILITIES

5.1.5.2.1 ISS PROGRAM PAYLOAD GROUND SUPPORT REQUIREMENTS TEAM

The GSRT is responsible for collecting, processing, integrating, and coordinating the ground data and communications services requirements for the ISS payloads. The GSRT is made up of the following functional areas:

A. ISS Payloads Utilization Requirements Collection and Integration

B. Huntsville Operations Support Center (HOSC) Operations Planning and Integration

C. Communications and Network Technical Expertise

D. Intercenter Operations Planning and Integration

E. TSC Requirements Integration

F. Requirements and Response Management

G. Database Management for ISS On-Orbit Payloads

H. Network and Communication Analysis and Integration Team Representative

I. Space Operations Management Office Customer Service Representative

5.1.5.2.2 ISS PROGRAM PAYLOAD GROUND DATA SERVICES DATA SET MANAGER

The ISS Program payload GDS DSM, in conjunction with the GSRT, supports the integration of the GDS Data Set across the payload complement. The GDS DSM, along with the GSRT, will review the data for ISS implementation and will integrate the

GDS Data Sets across the manifested payload complement for a given increment. The GDS DSM will coordinate the implementation assessment from the appropriate boards and will contact the customer if there are any questions or if any negotiation is required.

The GDS DSM will recommend promotion of the integrated payload GDS data to the POCB for baseline control.

5.1.5.2.3 PAYLOAD OPERATIONS INTEGRATION CENTER PAYLOAD OPERATIONS DIRECTOR

The POIC Payload Operations Director (POD), as a member of the Payload Operations Integration Working Group (POIWG), will review the GDS Data Set in coordination with the GSRT.

5.1.5.3 JOINT PAYLOAD DEVELOPER AND ISS PROGRAM RESPONSIBILITIES

As payload users begin the integration process and are becoming familiar with the ISS ground systems, the GSRT will work with users to aid them in understanding ground system capabilities and operational implications on user requirements. The GSRT will provide technical support to the user by answering questions or by supplying additional information to ensure that their requirements are complete and accurate.

5.2 GROUND DATA SERVICES GENERAL INFORMATION

5.2.1 PROCESS FLOW

Once a payload gets manifested for a particular increment, the PD can begin inputting their ground data and communication service requirements into the PDL. The GSRT will coordinate with the PDs through telecons, POIWG meetings, etc., as they input their requirements.

Once the PD is satisfied with their inputs into PDL, the PD shall promote their data to the integrated level within PDL. At this point, an initial review will be performed by the GSRT in coordination with the Payload Operations Integration Function (POIF). An integrated set of requirements for that given increment will then be generated from the GDS requirements in PDL.

Once the integrated set of requirements is generated, the integrated requirements are assessed and forwarded to the appropriate control board for assessment and approval. Then, PDL is updated based on the approved requirements, and the requirements are submitted to the POCB. Once the requirements are dispositioned by the POCB, the DSM will promote the GDS Data Set to baselined.

Table 5.2.1-1, Real-Time Voice and Data Services Requirements, depicts the process flow for voice loop and real-time data requirements. Table 5.2.1-2, POIC Services, USOC, and TSC Requirements, depicts the process flow for POIC services requirements and USOC and TSC requirements.

TABLE 5.2.1-1 REAL-TIME VOICE AND DATA SERVICES REQUIREMENTS

	PD	DSM	Facilities (HOSC, TSC IEs)	Intercenter	POIF	Facility Configuration Control Board (HMCG, etc)	Center Customer Commitment Manager	Documentation Database Manager
Input Requirements	X							
Coordinate	X	X	X	X				
Promote to Integrated Level in PDL	X							
Facility Integration			X					
Network Integration				X				
Increment Integration		X						
Team Lead Review	X	X			X			
Initial Facility and Network Operations Assessment			X	X		X	X	
NPOCB Direction on Exceeded Capability	X	X	X					
Final Facility and Network Operations Assessment			X	X		X	X	
ECR to NPOCB to Resolve Potential Funding Issues and B/L	X	X	X	X	X	X	X	
Promote to B/L in PDL		X						
Documentation (PRD, MSP, MIPs, etc.)				X				X
Implementation			X	X				

TABLE 5.2.1-2 POIC SERVICES, USOC, AND TSC REQUIREMENTS

	PD	DSM	Facilities (HOSC, TSC IEs)	Intercenter	Facility Configuration Control Board (HMCG, etc)
Input Requirements	X				
Coordinate	X	X	X	X	
Promote to Integrated Level in PDL	X				
Facility Integration			X		
Initial Facility and Network Operations Assessment			X	X	X
Internal Control Board Direction on Exceeded Capability	X	X	X		
Final Facility and Network Operations Assessment			X	X	X
ECR to Internal Control Board to Resolve Potential Funding Issues and B/L	X	X	X	X	X
Promote to B/L in PDL		X			
Internal Facility Documentation			X		

5.2.2 PAYLOAD DEVELOPER POINT OF CONTACT

The PD shall complete Table 3.3-1 for the GDS Representative.

5.2.3 DELIVERABLES

The PD shall complete electronic data submission to the PDL according to the schedule negotiated and documented in the payload's PIA Addendum. The payload-unique GDS data is due as defined by two different data deliverable drops on the Generic Payload Integration Template. Table 5.2.3-1, Deliverables, depicts which data are included with each data drop.

TABLE 5.2.3-1 DELIVERABLES

Data	Input to PDL Complete
Voice Loop Requirements	1st Drop
Real-Time Data Delivery Requirements	
POIC Requirements	2nd Drop
USOC and TSC Requirements	

5.2.4 OPERATING LOCATION

The PD shall identify all operating locations for each operation, experiment, and engineering support team. Each payload operating location that requires services (USOC, GRC TSC, etc.) shall provide the following information in Table 5.2.4-1, Payload Developer Operating Location:

A. Location ID # - *[Provide an Identification (ID) number to distinguish between operations, experiments, and engineering support teams (2 numeric max).]*

B. Payload/Experiment Name - *[Provide the full payload/experiment name (50 characters max).]*

C. Operating Location - *[Provide all locations required to support ground operations (50 characters max).]*

D. Address - *[Provide the street address for the operating location (30 characters max).]*

E. Building - *[Provide the building name or number for the operating location (20 characters max).]*

F. Room # - *[Provide the room number where operations will occur (20 characters max).]*

G. Facility Point of Contact - *[Identify the facility representative within the operations location who will be the point of contact during operational activities (30 characters max).]*

H. Phone # - *[Provide the telephone number for the facility point of contact (20 numeric max).]*

I. E-Mail Address - *[Provide the e-mail address for the facility point of contact (35 characters max).]*

TABLE 5.2.4-1 PAYLOAD DEVELOPER OPERATING LOCATION

Location ID #	Payload/Experiment Name	Operating Location	Address	Building	Room #	Facility Point of Contact	Phone #	E-Mail Address

[Expand table if necessary to accommodate all users and operating locations.]

The operating locations provided in Table 5.2.4-1, Payload Developer Operating Location, and the classification of the payload (reference SSP 52000-PIA-SP, Payload Integration Agreement Blank Book for Small Payloads (Pressurized), for criteria for Small Payloads) determine how one goes through the remaining sections of the GDS portion of the blank book. In addition to the sections that apply to all Small Payload and Non-Small Payload users regardless of location, there are specific sections that apply only to a particular type of location. Figure 5.2.4-1 shows the GDS blank book sections that apply to a particular user depending on operating location. This flow should help a user navigate through the GDS and determine which sections apply and which can be ignored.

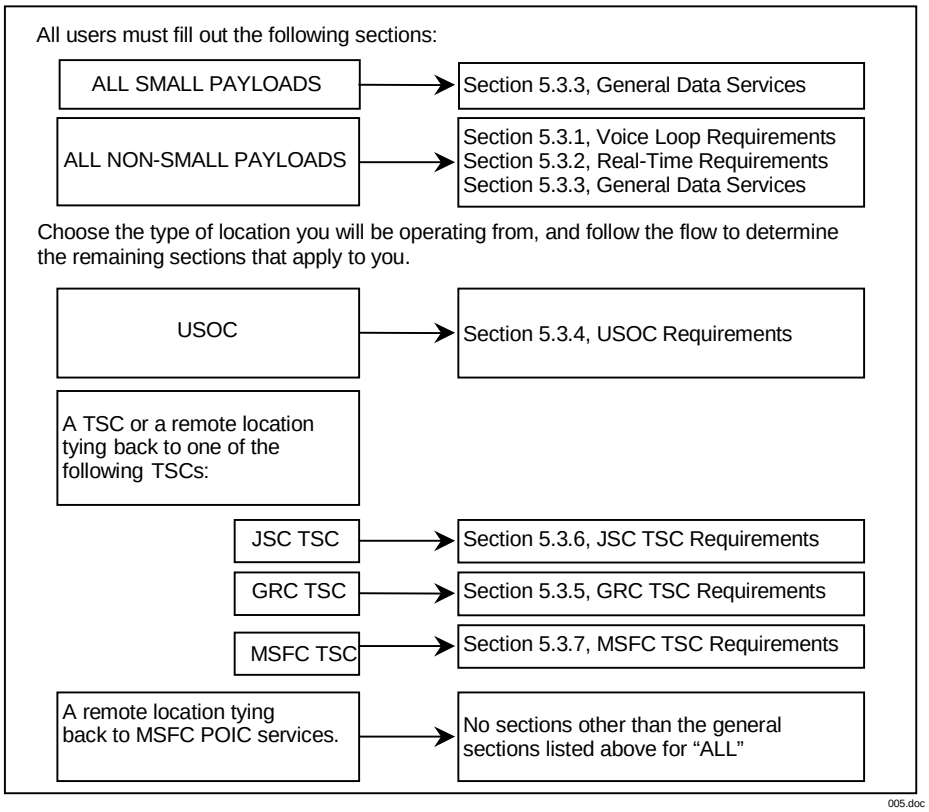


FIGURE 5.2.4-1 APPLICABLE GROUND DATA SERVICES SECTIONS FLOW

5.3 GROUND DATA SET REQUIREMENTS

This section defines the standard services that will be made available to the PDs. Nonstandard services shall be negotiated with the ISS Payload Program Office on an individual basis and shall be documented in the payload's PIA Addendum. Costs for the provision of nonstandard services shall be the exclusive responsibility of the PD.

The PD shall answer the following series of questions that will generate the answers required to identify a number of the PD's requirements for each operating location:

A. Is your payload classified as a small payload? (yes/no)

B. Will your operations, experiment, or engineering support team interface with crew activities and procedures from this operating location? (yes/no)

C. Indicate which of the following applies to your payload:

   1. New on the ISS

   2. Continued from a previous increment with GDS changes

   3. Continued from a previous increment without any GDS changes

D. Does your need for GDS at this location terminate at the end of this increment? (yes/no)

Figure 5.3-1, Voice and Real-Time Data Requirements Flow, shows which tables in this section should be completed based on a few simple questions.

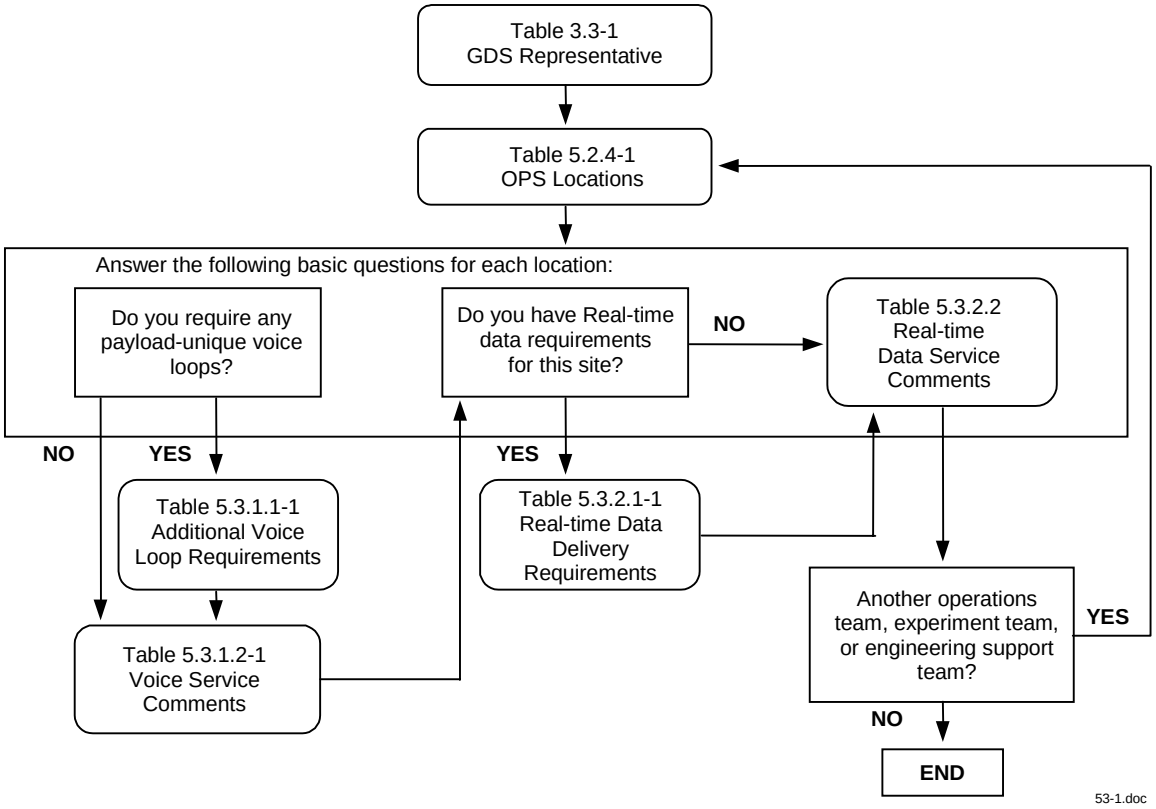


FIGURE 5.3-1 VOICE AND REAL-TIME DATA REQUIREMENTS FLOW

5.3.1 VOICE LOOP REQUIREMENTS

A voice loop is a one- or two-way communication line, typically with ground-to-ground or ground-to-space communications capabilities. While a payload is on-orbit, and especially during payload operations, PDs communicate with ISS personnel, including the ISS crew, via voice loops. The POIC cadre has defined the voice communications requirements based on a payload's operations concept (i.e., requirement to command, the need for a crew interface, and Earth-to-Orbit Vehicle (ETOV) activities). The procedures in SSP 58312, Payload Operations Integration Center Payload Operations Handbook Volume 2: Increment Operations, define the Cadre-to-user voice loop interfaces required to support the payload's operations concept. The PD can request access to other existing loops (requires voice loop owner approval) or request a dedicated loop to augment the payload's science gathering and/or payload operations activity.

5.3.1.1 ADDITIONAL VOICE LOOP REQUIREMENTS

If additional loops are required, then the PD shall provide the following information in Table 5.3.1.1-1, Additional Voice Loop Requirements.

A. Location ID # - *[Please enter Location ID # from Table 5.2.4-1 (2 characters max).]*

B. Voice Loop Name - *[Determine a name for the required payload-unique voice loop (50 characters max).]*

C. Functional Description - *[Provide a short description of the need of the specified voice loop (50 characters max).]*

D. Authorized Access - *[If this is a PD-defined voice loop, specify whom the PD authorizes for access (i.e., POIC Cadre, GRC, TSC, Remote Operating Location) (30 characters max).]*

E. Access Type - *[Indicate whether access will be Monitor (M) or Talk/Monitor (T/M).]*

TABLE 5.3.1.1-1 ADDITIONAL VOICE LOOP REQUIREMENTS

Location ID #	Voice Loop Name	Functional Description	Authorized Access	Monitor	Talk/ Monitor

[Expand table as necessary to include all information.]

5.3.1.2 VOICE SERVICE COMMENTS

The PD may include in Table 5.3.1.2-1, Voice Service Comments, any comments to further clarify the previously specified voice requirements. If specifying a note for an item in another table, the PD shall specify the table name at the start of the text *[2000 characters max]*.

TABLE 5.3.1.2-1 VOICE SERVICE COMMENTS

Voice Service Comments

5.3.2 REAL-TIME REQUIREMENTS

This section defines the PD's requirements for data to be sent real-time to the PD operations site.

5.3.2.1 REAL-TIME DATA DELIVERY REQUIREMENTS

The PD has a choice of having various types of data distributed to them. There are predefined data packets and user-defined data packets that can be distributed in real-time. The user-defined GSE data packet is an option for PDs requiring a subset of information available in any of the predefined data packets and/or additional information not available in the predefined packet but processed by the EHS. Any parameters processed by EHS can be retrieved via GSE Packets or Custom Data Packet (CDP), with the exception of proprietary data, which can only be requested by the owner of that data. As a standard, the data currently planned for EHS processing are ISS Broadcast Ancillary Data (BAD), ISS Payload Ancillary Data (PAD), Payload Multiplexer/Demultiplexer (MDM) Health and Status data packet, and selected Shuttle Operational Downlink (OD) data and ISS 1550 to 5200 Megahertz (S-Band) data. All of these streams with the exception of Shuttle OD and selected S-Band data are available as a direct output of Payload Data Services System (PDSS) in their raw values. The POIC also generates a Ground Ancillary Data (GAD) data packet available from PDSS that contains a selected set of data measurements available within EHS to include the results of ground-generated computations. The PD shall provide the following information in Table 5.3.2.1-1, Real-Time Data Delivery Requirements.

A. Data Type - *[Specify the data types from the following:]*

   1. Payload-Generated Science and/or Engineering Data.
   2. Payload MDM Health and Status Data Packet - *[Please note that this is a predefined data set of the entire Station's payloads' Health and Status (H&S) data and is significantly large.]*
   3. ISS Broadcast Ancillary Data Packet - *[Please note that this is a predefined data set of the entire Station's BAD and is significantly large.]*
   4. ISS Payload Ancillary Data Packet - *[Please note that this is a predefined data set of the entire Station's PAD and is significantly large.]*
   5. Ground Ancillary Data Packets.
   6. User-Defined GSE Packets - *[User may request more than one user-defined GSE packet. User should generate one line item in Table 5.3.2.1-1 for each GSE packet required.]*

B. Packet Correlation Number (Pkt CN) - *[The Pkt CN is only applicable for the Science and Engineering Data "Data Type." Starting with 1, sequentially number input by user to identify each "Science and Engineering Data" stream available from the user's payload/experiment (2 numeric max).]*

C. APID (GSRT Only) - *[The GSRT will populate the Application Programming Interface Definition (APID) definitions from program-approved sources (4 numeric max).]*

D. Data Mode - *[Specify which data mode is applicable: Real-Time (RT), Communications Outage Recorder (COR), Line Outage Recorder (LOR), or LOR of*

COR. COR data is the dumped data that has been recorded on-board during Loss of Signal (LOS) periods. LOR data is the data recorded at White Sands Test Facility during a ground network failure, and it can consist of RT or COR data. Teams should take into account their data processing concept when assigning Internet Protocol/Port addresses to each of these modes, since it is possible for more than one data mode to be active at the same time (10 characters max).]

E. Maximum Output Rate (bits per second (bps)) - *[This field is only applicable when Science and Engineering Data "Data Type" is selected. Network bandwidth is determined based on the maximum output rate of the payload plus associated packet overhead. This overhead includes 28 bytes of EHS overhead plus 50 bytes of User Datagram Protocol(UDP)/Internet Protocol overhead per downlinked Consultative Committee Standards for Data Systems (CCSDS) packet. If the total UDP packet length exceeds 1500 bytes, data will be fragmented into multiple UDP packets. The PD shall provide the following information in Table 5.3.2.1-2, Maximum Output Rate Worksheet. If the payload downlinks more than one packet per second, and the packet lengths vary in size, create a separate line entry to identify each packet size and number of packets per second (see Example 2). This value is calculated by PDL as the sum of Maximum Output Rates per Pkt CN in bps (8 numeric max).]*

1. Pkt CN - *[Use the appropriate Pkt CN from paragraph 5.3.2.1.B. (2 numeric max).]*

2. Maximum CCSDS Packet Length (bytes) - *[This value shall include the maximum length of the CCSDS packet (in 8-bit bytes) downlinked by the payload/experiment. The CCSDS packet definition can be found in SSP 41158, Software Interface Control Document Part I United States On-Orbit Segment to International Ground System Segment Ku-Band Telemetry Formats (8 numeric max).]*

3. Maximum Number of Packets/Second - *[This value shall identify the maximum number of CCSDS packets downlinked per second (4 numeric max).]*

4. Maximum Output Rate (bps) - *[This value shall be calculated in bps by PDL using the following formula: (Max CCSDS Packet Length) x (Max number of packets per second) x (8 bits) (8 numeric max).]*

F. Maximum GSE Ingest Rate (bps) - *[This field is only applicable when Science and Engineering Data "Data Type" is selected. This input should reflect the maximum data ingest rate of the GSE hardware and user's associated data handling software application in bps. PDSS uses this value to throttle the distribution of data to prevent overrun of the user's network or system(s) used to process or handle the data. This value must take into account that each downlinked CCSDS packet will be distributed with 28 bytes of EHS Header information. The user must also adjust this rate to accommodate the 50 bytes of UDP/Internet Protocol header that will be distributed by PDSS for each downlinked CCSDS packet. For example, a user's system will only handle a maximum ingest rate of 10,000 bps, and the downlink data*

rate from the payload is two 1172 byte CCSDS packets per second. PDSS would distribute this data at a 20,000 bps rate (1172 bytes + 28 bytes EHS + 50 bytes UDP/Internet Protocol) to the user. Since the user's interface will only support an ingest rate of 10,000 bps, the user would have to put a value of "9600" bits (1172 bytes + 28 bytes EHS) in this field to ensure no loss of data. PDSS will then throttle the output to a 10,000 bps distribution rate (1172 bytes + 28 bytes EHS + 50 bytes UDP/Internet Protocol). This will prevent the user's system/network from dropping data, although it will take twice as long for the user to receive their data packets (8 numeric max).]

G. Facility-Provided Internet Protocol Address - *[This field is not applicable to the GSE Packet "Data Type." The POIC will only distribute data packets (same Data Type, same APID, same Data Mode) to one destination at any given facility. The facility is responsible for redistribution of the data to GSE internal to the facility. To assist the facility in redistribution of the data packets, the user is requested to provide the network "Port Number" that the specified data is to be routed to. The facility will assign the network "Internet Protocol Address" to the user's GSE requiring the redistributed data packets. The facility is responsible for providing the network Internet Protocol and Port number for the device used to perform the data redistribution function within the facility. Redistribution is not required for USOC and MSFC TSC users, but network Internet Protocol addresses will be assigned by the USOC and MSFC TSC. Note: Viewing of Internet Protocol addresses is restricted to the PD, the facility supporting the PD, and limited GDS integration and engineering personnel at MSFC. Restricted access is controlled by the GDS Data Set Coordinator (15 characters max).]*

H. Internet Protocol Port Number - *[This field is not applicable to the GSE Packet "Data Type." Specify the port address of the system. Note: The same Internet Protocol Address/Internet Protocol Port Number combination cannot be used for more that one Data Type/Pkt CN/Data Mode combination. If the PD is using the TreK system, it is strongly recommended that the PD use a different Port Number per APID. This is not mandatory, but the TreK system will not perform as well if the system is not set up this way (5 numeric max).]*

I. PE&I GSRT PDL (PGP) Out - *[GSRT use only (yes/no).]*

J. Destination Termination Point - *[Identify the location of the termination point of the remote data interface (50 characters max).]*

TABLE 5.3.2.1-1 REAL-TIME DATA DELIVERY REQUIREMENTS

Data Type	Pkt CN	APID (GSRT Only)	Data Mode	Max Output Rate (bps)	Max GSE Ingest Rate (bps)	Facility-Provided Internet Protocol Address	Internet Protocol Port Number	PGP Out (GSRT Only)	Destination Termination Point

[Expand table as necessary to include all information.]

A Table Completion Example of Table 5.3.2.1-1 (available on-screen by selecting the Example button) follows:

Payload X has four GSE units located at Facility Y. Two units require receipt of Payload X's 15.250 to 17.250 Gigahertz (Ku-Band) downlinked data packets assigned with an APID of 888. The other two units require receipt of the same data packet (APID 888) if downlinked as part of an ISS COR playback. The PD would complete the table as follows:

Data Type	Pkt CN	APID (GSRT Only)	Data Mode	Max Output Rate (bps)	Max GSE Ingest Rate (bps)	Facility-Provided Internet Protocol Address	Internet Protocol Port Number	PGP Out (GSRT Only)	Destination Termination Point
Science and Engineering Data	1	888	RT	100,000	10	121.111.21.1	02031	NO	GSE #1, Facility Y
Science and Engineering Data	1	888	RT	100,000	10	121.111.21.2	02031	NO	GSE #2, Facility Y
Science and Engineering Data	1	888	COR	100,000	10	121.111.21.3	02031	NO	GSE #3, Facility Y
Science and Engineering Data	1	888	COR	100,000	10	121.111.21.4	02031	NO	GSE #4, Facility Y

The Facility will add to the Table as follows since MSFC will only distribute the data packets (per Data Mode) to one device at each operating location:

Data Type	Pkt CN	APID (GSRT Only)	Data Mode	Max Output Rate (bps)	Max GSE Ingest Rate (bps)	Facility-Provided Internet Protocol Address	Internet Protocol Port Number	PGP Out (GSRT Only)	Destination Termination Point
Science and Engineering Data	1	888	RT	100,000	10	121.111.222.1	10000	YES	Facility Y's Redistribution Server
Science and Engineering Data	1	888	COR	100,000	10	121.111.222.1	10001	YES	Facility Y's Redistribution Server

TABLE 5.3.2.1-2 MAXIMUM OUTPUT RATE WORKSHEET

Pkt CN	Maximum CCSDS Packet Length (bytes)	Maximum Number Packets/Second	Maximum Output Rate (bps)

EXAMPLE #1: Payload X has a maximum CCSDS packet length of 1280 bytes, and the payload can downlink this packet from 3 to 50 packets per second. Therefore, the maximum output for this data stream is 512,000 bps.

Pkt CN	Maximum CCSDS Packet Length (bytes)	Maximum Number Packets/Second	Maximum Output Rate (bps)
1	1280	50	512,000

EXAMPLE #2: Payload Y has 15 CCSDS packets downlinked per second. One packet has a maximum length of 1280 bytes, 4 packets have a maximum length of 640 bytes, and 10 packets have a maximum length of 320 bytes. Therefore, the maximum output for this data stream is 56,320 bps (the sum of all Maximum Output Rates for this Pkt CN).

Pkt CN	Maximum CCSDS Packet Length (bytes)	Maximum Number Packets/Second	Maximum Output Rate (bps)
1	1280	1	10,240
1	640	4	20,480
1	320	10	25,600

5.3.2.2 REAL-TIME SPACE TRANSPORTATION SYSTEM DATA REQUIREMENTS

Real-Time Space Transportation System (STS) Data Requirements consists of Shuttle telemetry that may be distributed to ISS payloads during ETOV activities via a GSE or CDP Packet (reference Section 4.1.2.2 of SSP 50304, POIC Capabilities Document, for information on data available through GSE and CDP Packets.) The PD must identify the required Shuttle telemetry parameters in the STS Ancillary Data Request table of the Command and Data Handling data set to ensure that the required parameters will be included in the increment Telemetry Data Base and available in a GSE or CDP Packet.

5.3.2.3 REAL-TIME DATA SERVICE COMMENTS

The PD may include in Table 5.3.2.3-1, Real-Time Data Service Comments, any comments to further clarify the previously specified data requirements. If specifying a note for an item in another table, then please specify the table name at the start of the text *[2000 characters max].*

TABLE 5.3.2.3-1 REAL-TIME DATA SERVICE COMMENTS

Real-Time Data Service Comments

5.3.3 GENERAL DATA SERVICES

The General Data Services consists of the POIC Services Requirements. The PD shall reference SSP 50304, POIC Capabilities Document, for a more detailed description of POIC-provided services, including interface methods used to access those services, such as X-Window or a Web Browser interface.

5.3.3.1 HUNTSVILLE OPERATIONS SUPPORT CENTER ACCOUNT

General Data Services are provided to users through the creation of HOSC Accounts on the POIC's EHS and Payload Planning System (PPS). The POIC controls access to POIC services through the creation of these accounts. The user can control local access to POIC services by identifying which POIC service is required for each account requested by the PD. The PD will complete Table 5.3.3.1-1, HOSC Account Request Information, to identify how many HOSC Accounts are required to support their payload operations activity and which POIC-provided service is required for each account requested. For security reasons, the HOSC must also control which user's GSE will require access to any provided POIC service by each account.

A. Account (Acct) Name (GSRT Only) - *[The GSRT shall define the account name per the account naming convention policy provided by the PODs (8 characters max).]*

B. Account Owner - *[Provide the following information for the person who will be responsible for controlling team access to services provided for a given account.]*

   1. First Name - *[Provide the first name of the Account Owner (30 characters max).]*

   2. Last Name - *[Provide the last name of the Account Owner (30 characters max).]*

   3. Phone Number - *[Provide the phone number of the Account Owner (25 characters max).]*

   4. E-Mail - *[Provide the e-mail address of the Account Owner (35 characters max).]*

C. Operations Change Request (OCR) Authority - *[Identify whether or not the users of this account have the authority to approve OCRs submitted by this payload/science team. All team accounts will be granted the capability to submit OCRs. By selecting "Yes" all OCRs submitted by this team must first be reviewed by personnel with access to this account before submission to the POIC Cadre for review and approval (Yes/No).]*

D. System Manager - *[Provide the following information for the person responsible for the software configuration of the GSE used to interface with the POIC services requested.]*

1. First Name - *[Provide the first name of the System Manager (30 characters max).]*
2. Last Name - *[Provide the last name of the System Manager (30 characters max).]*
3. Phone Number - *[Provide the phone number of the System Manager (25 characters max).]*
4. E-Mail - *[Provide the e-mail address of the System Manager (35 characters max).]*

E. GSE System Name - *[User will provide the GSE system name to assist the POIC in assigning services to the appropriate user system. The system name shall include the system's domain name (i.e., TREK1.GRC, ARIS1.Boeing). USOC users requesting use of EHS Workstations will enter "EHS" (20 characters max).]*

F. Internet Protocol Address - *[User will identify the Internet Protocol address for the GSE being used to support the requested service. USOC EHS Workstation users will leave this blank. TSC users should contact the TSC for this information (15 characters max).]*

G. Internet Protocol Port Number (CDP and Command Services only) - *[User will identify the Internet Protocol Port Address for GSE used to support the CDP and Command Services only (5 characters max).]*

H. POIC Services - *[User will indicate which of the following POIC Services are required.]*

1. Web Services - *[This service provides the user with access to the PIMS Document Configuration Management (DCM) process, OCR process, and the File Uplink process, as well as J-Track and Acquisition of Signal/Loss of Signal (AOS/LOS) Predict information. This service also provides access to Near Real Time (NRT) and Data Storage Manager data requests (checkbox).]*
2. PPS - *[This service provides the user with access to the URC and Product Generation (PG) capabilities within PPS (checkbox).]*
3. GSE Packet Definition and Distribution - *[This service provides the user with the capability to view the contents of the POIC Telemetry Data Base (TDB), define the contents of GSE Packets, update the telemetry measurement limits and calibration coefficients in local table operations, establish GSE Packet distribution tables, export GSE Packet definition tables, and request/monitor Near Real Time (NRT) playbacks. This service is not required for users who only want access to the distributed GSE Packet (checkbox).]*
4. CDP - *[This service provides the user with the capability to view the contents of the POIC TDB, update the telemetry measurement limits and calibration coefficients in local table operations, and request/monitor NRT playbacks. This service is not available to EHS Workstation users in the USOC (checkbox).]*

5. X-Window Services - *[This service provides the user with the capability to view Operations Control Mission Software (OCMS) products such as On-board Short Term Plan and other timeline products such as the Command Plan (checkbox).]*

6. Telemetry Services - *[This service provides the USOC EHS workstation user with the capability to view the contents of the POIC TDB, update the telemetry measurement limits and calibration coefficients in local table operations, request/monitor NRT processes, build and operate telemetry computation and displays, and have access to associated utilities such as import/export of files (checkbox).]*

7. Command Services - *[This service provides the user with uplink command operations capability, command and telemetry database view and change processes, script generation and operation, command delog and tracking services, and other associated utilities such as file import capability (checkbox).]*

8. Internet Voice Distribution System (IVoDS) - *[This service provides the user not located in the USOC or a TSC with remote access to operations voice loops. The user must make on line entry in Table 5.3.3.1-1 for each remote IVoDS interface required (checkbox).]*

TABLE 5.3.3.1-1 HOSC ACCOUNT REQUEST INFORMATION

Acct Name (GSRT only)	Account Owner				OCR		System Manager			
	First Name	Last Name	Phone	E-Mail	Yes	No	First Name	Last Name	Phone	E-Mail

GSE System Name	Internet Protocol Address	Internet Protocol Port Number (CDP and Command Services only)	POIC Services							
			Web Services	PPS	GSE Packet Definition and Distribution	CDP	X-Window Services	Telemetry Services	Command Services	IVoDS

[Expand table as necessary to include all required information.]

5.3.3.2 GENERAL DATA SERVICE COMMENTS

The PD may include in Table 5.3.3.2-1, General Data Service Comments, any comments to further clarify the previously specified data service requirements or to request access to other POIC services identified in SSP 50304 for this HOSC Account. If specifying a note for an item in Table 5.3.3.1-1, specify the table number at the start of the text *[2000 characters max].*

TABLE 5.3.3.2-1 GENERAL DATA SERVICE COMMENTS

General Data Service Comments

5.3.4 UNITED STATES OPERATIONS CENTER REQUIREMENTS

This section identifies the USOC requirements that include GSE information, power needs, and data interfaces. This section should only be completed if the PD operations site will be located in the USOC during payload operations. SSP 50304 provides detailed information about services and equipment available in the USOC. Figure 5.3.4-1, United States Operations Center Requirements Flow, shows how the following sections are related and which tables should be completed based on a few simple questions.

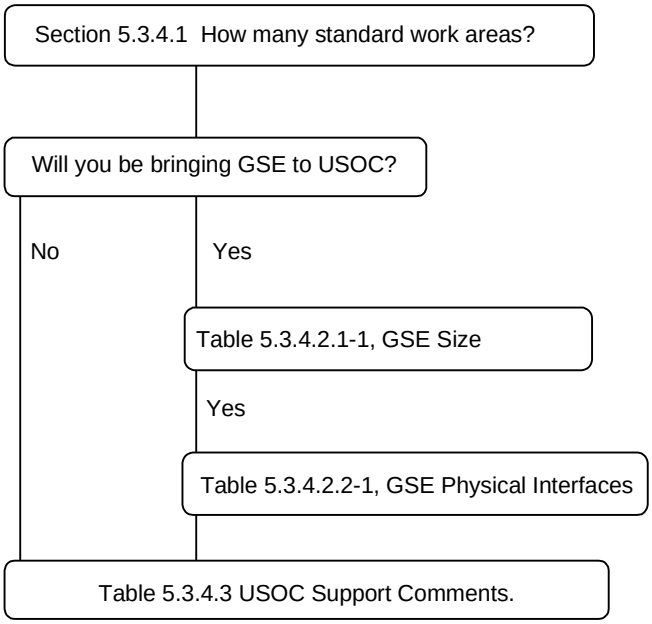


FIGURE 5.3.4-1 UNITED STATES OPERATONS CENTER REQUIREMENTS FLOW

5.3.4.1 GENERAL UNITED STATES OPERATONS CENTER QUESTIONS

A standard USOC work area will consist of tables, chairs, EHS workstations, and communications equipment. A complete list of equipment in each standard work area is provided in SSP 50304, Chapter 10.

The PD shall answer the following question with regard to the number of standard work areas the PD will require:

A. How many standard work areas are needed? *[1 numeric max]* _____

5.3.4.2 GROUND SUPPORT EQUIPMENT

If the PD will be bringing GSE to the USOC, then information about that GSE's size and interface requirements must be provided in the following two sections.

5.3.4.2.1 GROUND SUPPORT EQUIPMENT SIZE

The PD shall provide the following information in Table 5.3.4.2.1-1, Ground Support Equipment Size, to identify all equipment that the PD shall bring to the USOC and will provide information on its size and weight.

A. GSE Name - *[Give a brief name or descriptive title (50 characters max).]*

B. Dimensions - *[Specify dimensions of the GSE in centimeters.]*

   1. Width *[5 numeric max].*
   2. Depth *[5 numeric max].*
   3. Height *[5 numeric max].*

C. Weight - *[Specify the weight in kilograms of the piece of equipment (4 numeric max).]*

TABLE 5.3.4.2.1-1 GROUND SUPPORT EQUIPMENT SIZE

GSE Name	Dimensions			Weight
	Width	Depth	Height	

[Expand table as necessary to include all required information.]

5.3.4.2.2 GROUND SUPPORT EQUIPMENT PHYSICAL INTERFACES

The PD shall provide the following information in Table 5.3.4.2.2-1, Ground Support Equipment Physical Interfaces, to identify the type and number of interfaces required by the GSE for data transfer, video matrix, power, and timing.

A. GSE Name - *[Provide a brief name or descriptive title (50 characters max).]*

B. Interface Description - *[Please choose from the following list of interfaces.]*

1. Fast Ethernet (100 base-T twisted pair).
2. User GSE Video Interface (Video Matrix Input).
3. User GSE Video Interface (Video Matrix Output).
4. Power (120V, 1 phase, 20 Amps (A)).
5. Timing Signal Requirements.

C. Quantity - *[Specify quantity of each interface needed (2 numeric max).]*

D. Remarks - *[Provide short notes to clarify the requirements (50 characters max).]*

TABLE 5.3.4.2.2-1 GROUND SUPPORT EQUIPMENT PHYSICAL INTERFACES

GSE Name	Interface Description	Quantity	Remarks

[Expand table as necessary to include required information.]

5.3.4.3 UNITED STATES OPERATIONS CENTER SUPPORT COMMENTS

The PD may include in Table 5.3.4.3-1, USOC Support Comments, any comments to further clarify the previously specified USOC support requirements. If specifying a note for an item in a previous table, then please specify the table number at the start of the text (*2000 characters max).*

TABLE 5.3.4.3-1 USOC SUPPORT COMMENTS

USOC Support Comments

5.3.5 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER REQUIREMENTS

This section identifies the GRC TSC requirements that include telemetry requirements, equipment, data, power, etc. This section should only be completed if the PD operations site will be located in the GRC TSC or a remote location operating through the GRC TSC during payload operations. TSC-DOC-006, GRC Telescience Support Center User Guide, provides detailed information about the TSC system capabilities.

5.3.5.1 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER TELEMETRY SERVICE REQUIREMENTS - PAYLOAD-GENERATED DATA

This section contains additional information to help GRC TSC users complete Table 5.3.2.1-1 in Section 5.3.2.1 for data that is generated onboard and distributed by the TSC. This table is used by the GRC TSC to distribute unique data types to specific

GSE (TreK workstation, user-supplied GSE, GRC TSC data storage, etc.). Therefore, it is very important for the GRC TSC to know exactly where the data needs to go.

For each data type, PD's are required to identify each piece of hardware that will receive data. This hardware includes, but is not limited to, the following:

A. TreK workstations or user-supplied GSE workstations located inside the GRC TSC on the TSC Mission Network.

B. TreK workstations or user-supplied GSE workstations located at off-line sites (i.e., within the GRC Campus Network at either GRC or Aerospace Parkway).

C. TreK workstations or user-supplied GSE workstations located at remote sites (i.e., outside the GRC TSC and off the GRC campus).

D. GRC TSC Storage System.

E. Any other hardware that requires receipt of telemetry data.

Suggestions are listed below to assist PD's in filling out Table 5.3.2.1-1.

A. Consider each type of data listed in Section 5.3.2.1, item A. This will ensure that the user considers all data types and that a particular data type is not accidentally overlooked.

B. For each data type, be sure to identify each piece of destination hardware at each operating location required to receive that data.

C. Identify all destination hardware in the "Destination Termination Point" column with a unique name. For clarity, it is suggested that these names reflect the ownership (project acronym), type (GSE, TreK, TSC Storage System), unit number (begin with #1 for each type of hardware), and location (GRC TSC, Dynacs, Harvard, etc./ building number/room number). An example would be "PCS TreK #1 GRC TSC/ Bldg 333/Rm 150." Use the same hardware name for each data type it will receive.

D. Make sure that all systems are identified that require delivery of telemetry data to them. Don't overlook systems that are provided by the GRC TSC such as the TSC Storage System. If a piece of equipment or a system is not identified in this column, telemetry data will not be delivered to it.

E. The user does not need to identify equipment/systems in this table that are part of the GRC TSC infrastructure. This includes all data distribution equipment such as, but not limited to, communication equipment, firewalls, and data distribution servers.

F. Contact the GRC TSC Data Lead to discuss any concerns.

5.3.5.2 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER DATA MANAGEMENT SYSTEM REQUIREMENTS

The TSC Data Management System requirements include the information needed for the GRC TSC user to utilize the TSC Data Storage System and the management of science data.

If the TSC Data Storage System capabilities are required, the user shall provide the PD's projected accumulated telemetry data information in Table 5.3.5.2-1, Accumulated Telemetry Data.

A. Project Duration - *[Specify "Finite" if project has a definite start and end of operations, or "Continual" if project operates until the end of the program (9 characters max).]*

B. Telemetry Data Quantity - *[Specify quantity of expected accumulated data. For a finite project, provide total projected quantity (in Gigabytes (GB)) of data to be accumulated for the duration of the project and provide the duration of project in months. For a continual project, provide projected average quantity (in GB) of data to be accumulated for a one-week period (25 characters max).]*

C. Telemetry Data Security - *[Specify "Data Available to World" or "Data Proprietary to PI." Add any comments in Table 5.3.5.9-1, Additional Glenn Research Center Telescience Support Center Support Requirements (25 characters max).]*

TABLE 5.3.5.2-1 ACCUMULATED TELEMETRY DATA

Project Duration	Telemetry Data Quantity	Telemetry Data Security

[Expand table as necessary to include required information.]

The user shall indicate if telemetry data storage, telemetry playback, and/or telemetry archival are required in Table 5.3.5.2-2, Telemetry Storage Requirements.

A. Telemetry Storage - *[Indicate with an "X" if short-term storage is required. This storage will take a First In, First Out (FIFO) approach. Once the space begins to fill, newer data will rewrite older data.]*

B. Telemetry Playback - *[Indicate with an "X" if a playback function is needed for the short-term data storage. This will allow the user to select the data that is available in short-term storage and have it replayed to a selected piece of GSE.]*

C. Telemetry Archival - *[Indicate with an "X" if the PD wants telemetry data to be archived in a raw packet format to a form of media for the user.]*

TABLE 5.3.5.2-2 TELEMETRY STORAGE REQUIREMENTS

Telemetry Storage	Telemetry Playback	Telemetry Archival

[Expand table as necessary to include required information.]

If the user requires the TSC to provide space to place science data on the GRC External Services Local Area Network (LAN), the PD shall provide science data requirements in Table 5.3.5.2-3, Science Data Management.

A. Science Data Security - *[Indicate "Data Available to World" or "Data Proprietary to PI". This is to determine if special access permissions need to be established for the access to the data on the server located on the GRC External Services LAN from the outside world (25 characters max).]*

B. Access from GRC Campus Network - *[The science data will reside on the GRC External Services LAN. Indicate with an "X" if the science data is to be accessed from the GRC Campus Network (1 character max).]*

C. Access from TSC Mission Network - *[The science data will reside on the GRC External Services LAN. Indicate with an "X" if the science data is to be accessed from the TSC Mission Network (1 character max).]*

TABLE 5.3.5.2-3 SCIENCE DATA MANAGEMENT

Science Data Security	Access from GRC Campus Network	Access from TSC Mission Network

[Expand table as necessary to include required information.]

The user will indicate if the outside world will need access to the science data located on the GRC External Services LAN in Table 5.3.5.2-4, Outside World Access to Science Data.

A. Access from the Outside World Within U.S. - *[Indicate with an "X" (1 character max).]*

B. Access from the Outside World Outside of U.S. - *[Indicate with an "X" (1 character max).]*

TABLE 5.3.5.2-4 OUTSIDE WORLD ACCESS TO SCIENCE DATA

Access from Outside World Within U.S.	Access from Outside World Outside U.S.

[Expand table as necessary to include required information.]

5.3.5.3 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER-PROVIDED SUPPORT EQUIPMENT REQUIREMENTS

The PD shall complete Table 5.3.5.3-1, Telescience Support Center-Provided Support Equipment, to provide information on standard equipment such as standard work areas and additional tables and chairs that should be supplied by the TSC. (Note that the TreK workstations are covered in Section 5.3.5.6.) The PD shall indicate the following:

A. Equipment - *[Indicate requirements for the following types of equipment.]*

   1. Standard work areas - *[A standard work area supports 2 users and consists of 2 chairs, approximately 15 square feet of desktop area, 1 audio-video station (made up of an audio control panel and a 13 inch (in) video monitor), 2 headsets, 1 telephone, 1 two-drawer file cabinet (or equivalent file storage area), shared black/white printer, shared color printer, shared copier, and shared fax.]*

   2. Additional desktop area.

   3. Additional chairs.

   4. Additional support equipment - *[This would include additional Audio/Video (A/V) stations; headsets; video monitors; telephones; file storage; bookcase; and dedicated or additional copier, fax, or printer.]*

   5. Positions per shift - *[Number of people simultaneously supporting operations.]*

B. Quantity - *[Indicate the quantity of each of the following support equipment items (5 characters max).]*

C. Remarks - *[Provide any additional remarks for each of the following (1000 characters max each item).]*

TABLE 5.3.5.3-1 TELESCIENCE SUPPORT CENTER-PROVIDED SUPPORT EQUIPMENT

Equipment	Quantity	Remarks
Standard Work Areas		
Additional Tables		
Additional Chairs		
Additional Support Equipment		
Positions per Shift		

[Expand table as necessary to include all required information.]

5.3.5.4 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER GROUND SUPPORT EQUIPMENT

The PD shall provide the following information in Table 5.3.5.4-1, Ground Support Equipment, to identify all equipment that the PD shall bring to the TSC, including PD-provided TreK workstations.

A. GSE Name - *[Specify name given in Table 5.3.2.1-1 (50 characters max).]*

B. GSE Type - *[Specify what the piece of equipment is, such as Silicon Graphics, Incorporated (SGI) Indy workstation, Dell Personal Computer (PC), etc. (50 characters max).]*

C. Dimensions - *[Specify the width, depth, and height of the piece of equipment in centimeters or inches in the format: WWWxDDDxHHH (20 characters max).]*

D. Weight - *[Specify the weight in kilograms or pounds of the piece of equipment (10 characters max).]*

E. Power - *[Specify the power requirements in voltage (110V or 220V) and amperage for the piece of equipment. If the power is shared with another piece of GSE, specify "share with <line item number of that piece of GSE>" (200 characters max).]*

F. GSE Description - *[Specify the type of equipment (i.e., printer, computer, Video Cassette Recorder (VCR) (100 characters max).]*

G. Type of Interface - *[Specify whether the interface is video matrix input, video matrix output, 10 Base-T Network, 100 Base-T Network (100 characters max).]*

H. Interface Connector and Gender of GSE - *[Specify (RJ-45 male or female, Bayonet Nut Connector (BNC) male or female) (20 characters max).]*

I. Additional Cabling or Connector Information - *[Identify any additional requirements (2000 characters max).]*

TABLE 5.3.5.4-1 GROUND SUPPORT EQUIPMENT

GSE Name	GSE Type	Dimensions	Weight	Power	GSE Description	Type of Interface	Interface Connector and Gender	Additional Cabling Information

[Expand table as necessary to include all required information.]

5.3.5.5 PAYLOAD DEVELOPER SPECIAL GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER VIDEO REQUIREMENTS

The PD shall provide all GRC TSC special video requirements in Table 5.3.5.5-1, Payload Developer Special Glenn Research Center Telescience Support Center Video Requirements. The PD shall include all video that will be required at the TSC (i.e., NASA Television (TV), specific GRC link channel). Note that ISS RT video should not be included here. Any video recording requirements that the PD requires of the TSC should be listed *[2000 characters max]*.

TABLE 5.3.5.5-1 PAYLOAD DEVELOPER SPECIAL GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER VIDEO REQUIREMENTS

PD Special GRC TSC Video Requirements

[Expand table as necessary to include required information.]

5.3.5.6 PAYLOAD DEVELOPER TELESCIENCE RESOURCE KIT WORKSTATION REQUIREMENTS AT THE GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER

The PD shall provide the unique names and positions of the GRC TSC-provided TreK workstation requirements in Table 5.3.5.6-1, GRC TSC TreK Requirements.

A. TreK Workstation Name - *[Specify a unique name given in Table 5.3.2.1-1 for each workstation (20 characters max).]*

B. Position - *[Specify a position name for each workstation (50 characters max).]*

TABLE 5.3.5.6-1 GRC TSC TREK REQUIREMENTS

TreK Workstation Name	Position

[Expand table as necessary to include required information.]

5.3.5.7 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER NETWORK USAGE

The PD shall provide the following information to provide an estimate of GRC TSC network usage in Table 5.3.5.7-1, Glenn Research Center Telescience Support Center Network Usage.

A. Location - *[Provide the following information for these categories of locations.]*

1. TSC internal GSE to GSE.
2. TSC internal GSE to other GRC location.
3. TSC internal GSE to external location.

B. Estimated Transfer Sizes - *[Provide for applicable categories of locations (1000 characters max).]*

C. Protocols (Open System Interconnection (OSI) Layer 3) - *[Transmission Control Protocol (TCP), UDP, Hyper Text Transfer Protocol (HTTP), File Transfer Protocol (FTP), etc. (100 characters max).]*

D. Port Numbers Used - *[100 characters max]*

TABLE 5.3.5.7-1 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER NETWORK USAGE

Location	Estimated Transfer Sizes	Protocols (OSI Layer 3)	Port Numbers Used
TSC Internal GSE to GSE			
TSC Internal GSE to Other GRC Location			
TSC Internal GSE to External Location			

[Expand table as necessary to include required information.]

5.3.5.8 GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER NETWORK INTERNET PROTOCOL INFORMATION

The GRC TSC will acquire Internet Protocol addresses for all computers on its network. The PD shall complete Table 5.3.5.8-1, Network Internet Protocol Information, to provide the following information for PD-provided computers.

A. GSE Name - *[Use the GSE names from Table 5.3.2.1-1 (50 characters max).]*

B. Owner - *[NASA-owned, NASA contractor-owned, other U.S.-owned, other international-owned (30 characters max).]*

C. Control Number - *[If NASA equipment, use NASA Equipment Control Number (ECN); others use serial number (15 characters max).]*

D. Host Name - *[50 characters max.]*

E. Platform - *[PC, Macintosh, Unix workstation, etc. (40 characters max).]*

F. Operating System and Version - *[Windows 98, Windows New Technology (NT) 4.0, Macintosh Operating System (OS) 8.6, SGI Unix 6 (25 characters max).]*

TABLE 5.3.5.8-1 NETWORK INTERNET PROTOCOL INFORMATION

GSE Name	Owner	Control Number	Host Name	Platform	Operating System and Version

[Expand table as necessary to include required information.]

5.3.5.9 ADDITIONAL GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER SUPPORT COMMENTS

The PD may include in Table 5.3.5.9-1, Additional Glenn Research Center Telescience Support Center Support Requirements, comments to further clarify the previously specified GRC TSC support requirements. If specifying a note for an item in a previous table, please specify the table number at the start of the text *[2000 characters max].*

TABLE 5.3.5.9-1 ADDITIONAL GLENN RESEARCH CENTER TELESCIENCE SUPPORT CENTER SUPPORT REQUIREMENTS

Additional GRC TSC Support Requirements

5.3.6 JOHNSON SPACE CENTER TELESCIENCE SUPPORT CENTER REQUIREMENTS

This section identifies the JSC TSC requirements, which include GSE information, power needs, and data interfaces. This section should only be completed if the PD operations site will be located in the JSC TSC during payload operations. LS-70053-2, JSC Telescience Support Center Capabilities Document, will provide detailed information about services and equipment available in the JSC TSC. Figure 5.3.6-1, Johnson Space Center Telescience Support Center Requirements Flow, shows how the following sections are related and which tables should be completed based on a few simple questions.

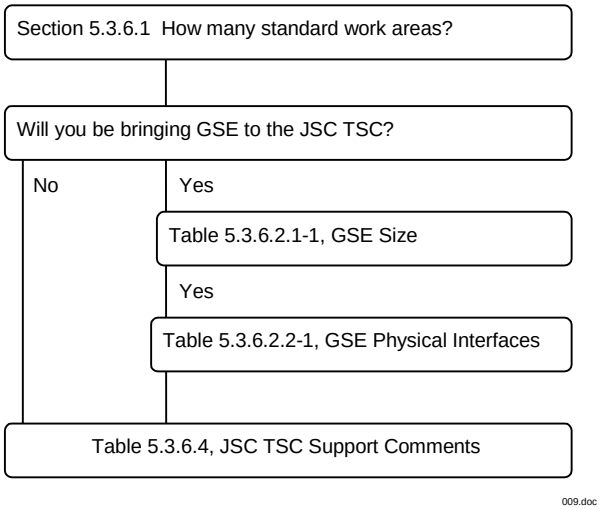


FIGURE 5.3.6-1 JOHNSON SPACE CENTER TELESCIENCE SUPPORT CENTER REQUIREMENTS FLOW

5.3.6.1 GENERAL JOHNSON SPACE CENTER TELESCIENCE SUPPORT CENTER QUESTIONS

A standard JSC TSC work area will consist of chairs, Mission Control Center (MCC) and JSC TSC workstations, and communications equipment. A complete list of equipment in each standard work area is provided in LS-70053-2.

The PD shall answer the following question with regard to the number of standard work areas the PD will require:

A. How many standard work areas are needed? *[2 numeric max]* _____

5.3.6.2 GROUND SUPPORT EQUIPMENT

If the PD will be bringing GSE to the JSC TSC, then information about that GSE's size and interface requirements must be provided in the following two sections.

5.3.6.2.1 GROUND SUPPORT EQUIPMENT SIZE

The PD shall provide the following information in Table 5.3.6.2.1-1, Ground Support Equipment Size, to identify all equipment that the PD shall bring to the JSC TSC and will provide information on its size and weight.

A. GSE Name - *[Give a brief name or descriptive title (50 characters max).]*

B. Dimensions - *[Specify dimensions of the GSE in centimeters.]*

1. Width *[5 numeric max.]*
2. Depth *[5 numeric max.]*
3. Height *[5 numeric max.]*

C. Weight - *[Specify the weight in kilograms of the piece of equipment (4 numeric max).]*

TABLE 5.3.6.2.1-1 GROUND SUPPORT EQUIPMENT SIZE

GSE Name	Dimensions			Weight
	Width	Depth	Height	

[Expand table as necessary to include all required information.]

5.3.6.2.2 GROUND SUPPORT EQUIPMENT PHYSICAL INTERFACES

The PD shall provide the following information in Table 5.3.6.2.2-1, Ground Support Equipment Physical Interfaces, to identify the type and number of interfaces required by the GSE for data transfer, video matrix, power, and timing.

A. GSE Name - *[Provide a brief name or descriptive title (50 characters max).]*

B. Interface Description - *[Please choose from the following list of interfaces:]*

1. Ethernet.
2. Fiber Distributed Data Interface (FDDI).
3. User GSE Video Interface (Video Matrix Input).
4. User GSE Video Interface (Video Matrix Output).
5. Power (120V, 10, 20A).
6. Power (120V, 10, 30A).
7. Power (208V, 10, 20A/30A).
8. Power (208V, 30, 20A/30A).
9. Timing Signal Requirements.

C. Quantity - *[Specify quantity of each interface needed (2 numeric max).]*

D. Remarks - *[Provide short notes to clarify the requirements (50 characters max).]*

TABLE 5.3.6.2.2-1 GROUND SUPPORT EQUIPMENT PHYSICAL INTERFACES

GSE Name	Interface Description	Quantity	Remarks

[Expand table as necessary to include required information.]

5.3.6.3 VOICE, DATA, AND POIC GENERAL DATA SERVICES SUPPORT

PD requirements for operations voice and data distribution services to/from the JSC TSC shall be identified in Sections 5.3.1 and 5.3.2. POIC general data services support requirements shall be identified in Section 5.3.3.

5.3.6.4 ADDITIONAL JSC TELESCIENCE SUPPORT CENTER SUPPORT REQUIREMENTS AND/OR COMMENTS

The PD may provide any additional JSC TSC support requirements or comments in Table 5.3.6.4-1. If specifying a note for an item in a previous table, then specify the table number at the start of the text. The following types of requirements/comments can be included in Table 5.3.6.4-1 [2000 characters max]:

A. Internal TSC voice coordination loops.

B. Data product requirements both short-term (near-real-time) and long-term (post-increment).

NOTE: Long-term product delivery commitments of the TSC are Program- and PD-dependent. The PD may be responsible for data product distribution to individual users.

C. Data monitoring requirements in addition to normal ISS operations (prelaunch, Shuttle, or Mini-Pressurized Logistics Module (MPLM) data, post-landing).

D. Nonstandard TSC failure/outage return-to-service time restrictions (standard return-to-service times will be listed in LS-70053-2).

TABLE 5.3.6.4-1 ADDITIONAL JSC TELESCIENCE SUPPORT CENTER REQUIREMENTS

Additional JSC TSC Support Requirements

5.3.7 MARSHALL SPACE FLIGHT CENTER TELESCIENCE SUPPORT CENTER REQUIREMENTS

This section identifies the MSFC TSC requirements, which include GSE information, communications resources, power needs, and network interfaces required by PDs to access operations voice, video, data, and general data service (PIMS, PPS, etc.) provided by the ISS Program. This section should only be completed if the PD requires operations teams, engineering support teams, or experiment teams to be located in the MSFC TSC during payload operations. TSC-HDBK-001, MSFC Telescience Support

Center Capabilities Document, provides detailed information about services and equipment available in the MSFC TSC. Figure 5.3.7-1, MSFC TSC Requirements Flow, shows how the following sections are related and which tables should be completed based on a few simple questions.

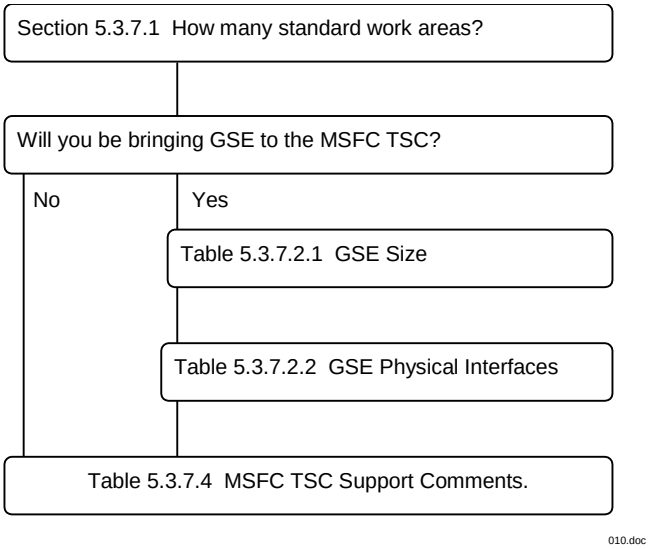


FIGURE 5.3.7-1 MSFC TSC REQUIREMENTS FLOW

5.3.7.1 GENERAL MSFC TSC QUESTIONS

A standard MSFC TSC work area consists of a user console (with documentation storage areas), chairs, 13 in color video monitor, and an operations voice communications instrument. The PD shall answer the following question with regard to the number of standard work areas the PD will require:

A. How many standard work areas are needed? *[2 numeric max]* _____

5.3.7.2 GROUND SUPPORT EQUIPMENT

If the PD will be bringing GSE to the MSFC TSC, then information about that GSE's size and interface requirements must be provided in the following two sections.

5.3.7.2.1 GROUND SUPPORT EQUIPMENT SIZE

The PD shall provide the following information in Table 5.3.7.2.1-1, Ground Support Equipment Size, to identify all equipment that the PD shall bring to the MSFC TSC and will provide information on its size and weight.

A. GSE Name - *[Give a brief name or description title (40 characters max).]*

B. Dimensions - *[Specify dimensions of the GSE in centimeters.]*

1. Width *[4 numeric max.]*

2. Depth *[4 numeric max.]*

3. Height *[4 numeric max.]*

C. Weight - *[Specify the weight of the piece of equipment in kilograms (10 numeric max).]*

TABLE 5.3.7.2.1-1 GROUND SUPPORT EQUIPMENT SIZE

GSE Name	Dimensions			Weight
	Width	Depth	Height	

[Expand table as necessary to include all required information.]

5.3.7.2.2 GROUND SUPPORT EQUIPMENT PHYSICAL INTERFACES

The PD shall provide the following information in Table 5.3.7.2.2-1, Ground Support Equipment Physical Interfaces, to identify the type and number of interfaces required by the GSE for data transfer, video matrix, and power.

A. GSE Name - *[Provide a brief name or description title (40 characters max).]*

B. Interface Description - *[Indicate the quantity required for each of the following interfaces.]*

1. Fast Ethernet - *[100 base-T twisted pair.]*

2. Video Matrix Outputs - *[National Television System Communications (NTSC).]*

3. Video Matrix Inputs *[NTSC.]*

4. Power - *[120V, 20A.]*

C. Remarks - *[Provide short notes to clarify the requirements (120 characters max).]*

TABLE 5.3.7.2.2-1 GROUND SUPPORT EQUIPMENT PHYSICAL INTERFACES

	Interface Description				
GSE Name	Fast Ethernet	Video Matrix Outputs	Video Matrix Inputs	Power	Remarks

[Expand table as necessary to include required information.]

5.3.7.3 VOICE, DATA, AND POIC GENERAL DATA SERVICES SUPPORT

The PD requirements for operations voice and RT data delivery to/from the MSFC TSC shall be identified in Sections 5.3.1 and 5.3.2 respectively. POIC general data services support requirements shall be identified in Section 5.3.3.

5.3.7.4 MSFC TSC SUPPORT COMMENTS

The PD may include in Table 5.3.7.4-1 any comments to further clarify the previously specified MSFC TSC support requirements. If specifying a note for an item in another table, then the PD shall specify the table number at the beginning of the text *[2000 characters max.]*

TABLE 5.3.7.4-1 MSFC TSC SUPPORT COMMENTS

MSFC TSC Support Comments

6.0 PAYLOAD OPERATIONS DATA SET

6.1 INTRODUCTION

The Payload Operations Data Set provides the detailed flight operations requirements for the Payload Developer (PD) and International Space Station (ISS) personnel. Top-level operations requirements and allocations are identified in the Payload Integration Agreements (PIAs) or EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Integration Agreements (EIAs). The PD shall provide the details of these flight operations requirements in this section of the Payload Data Sets Blank Book.

6.1.1 PURPOSE

This section defines the format and content of the Payload Operations Data Set. This section also defines the products, activities, roles, responsibilities, and interfaces required to implement payload operations for the ISS Program. The Payload Operations Data Set requirements reside in the Payload Data Library (PDL).

Questions and/or comments on the Payload Operations Data Set should be directed to the Payload Operations Data Set Manager (DSM).

All questions should be answered, all tables completed, and all requested data supplied for each section of the Payload Operations Data Set. If a question, table, or schedule is not applicable, then indicate by Not Applicable (N/A) so that it is clear that the question, etc., was considered and not overlooked.

6.1.2 PAYLOAD OPERATIONS DATA SET SCOPE

This section documents the detailed payload operations requirements of the payload. It addresses the flight operations interfaces between the ISS Program Payload Operations Integration (POI) personnel and the PD operations team as well as communication and coordination requirements. Payload flight operations includes detailed payload flight rules and regulations, operational actions, decisions and video/photo requirements.

The format of this section is structured to reflect the data group deliveries in which the PD shall input their payload operations requirements where possible.

6.1.3 PAYLOAD OPERATIONS DATA SET PRECEDENCE

The payload-unique PIAs and EIAs document technical agreements that must be made prior to the development of Payload Data Sets (PDSs) or International Partner (IP) equivalent. The agreements in the PIA/EIA contain top-level requirements used to develop the detailed PDSs, including payload description and objectives, manifesting requirements, onboard placement requirements, and top-level operations requirements. The PIA/EIA includes schedules for PDS delivery. In case of any variation between the Payload Data Set and the PIA/EIA, the PIA/EIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA/EIA

will not be considered binding on the National Aeronautics and Space Administration (NASA) for implementation.

6.1.4 PAYLOAD OPERATIONS DATA SET CONFIGURATION MANAGEMENT

Configuration control commences upon last signature of this PDS. The contents of the Payload Operations Data Set section of the PDSBB are controlled by the Payloads Control Board (PCB). Payload-unique Payload Operations Data Set data are controlled by the NASA Payload Operations Control Board (NPOCB) upon promotion of the integrated Payload Operations Data Set.

6.1.5 MANAGEMENT

6.1.5.1 PAYLOAD OPERATIONS MANAGEMENT

Each PD organization should understand the management structure the Payload Operations Integration Center (POIC) will use to prepare for and conduct on-orbit payload operations. The payload concept of operations includes functional disciplines that define and support POIC operations. These functional disciplines include Payload Planning, Operations Integration, Operations Control, Data Management, and Training. The POIC personnel roles and responsibilities with regard to PD interface are described in detail in SSP 58303E, Team Definition Document. PDs should account for these disciplines in their management structure, providing the appropriate interfaces for each discipline.

The following paragraphs describe ISS Program/Space Shuttle Program (SSP) management and operations organizational structure and lists requirements for the PD to define the payload interfaces to this structure. PD inputs will be used to develop the SSP 58312, Payload Operations Integration Center Payload Operations Handbook Volume 2: Increment Operations, a console tool used during real-time operations for decisions and processes involving each increment.

6.1.5.2 PAYLOAD DEVELOPER RESPONSIBILITIES

6.1.5.2.1 PAYLOAD DEVELOPER

The PD shall provide detailed team identification, functions, and point of contact information for each increment to the ISS Program POI personnel.

The PD shall support the development of flight operation rules and regulations. These will contain constraints, guidelines, and alternate plans for the safe and successful operation of their payload. Operational constraints or activities that may adversely impact the science or hardware of other payloads or themselves will be integrated by the ISS Program POI personnel and documented in SSP 58313A, NASA Payload Regulations. Payload activities that may adversely impact Shuttle, ISS systems, crew health, or safety will be integrated by the POI personnel and documented in the appropriate Flight Rules Document.

The PD shall electronically input the requested data directly to the PDL and will promote the Payload Operations Data Set for integration.

6.1.5.2.2 INTERNATIONAL SPACE STATION PAYLOAD OFFICE RESPONSIBILITIES

6.1.5.2.2.1 PAYLOAD OPERATIONS DIRECTOR REPRESENTATIVE

The roles and responsibilities of the Payload Operations Director (POD) as a member of the PMIT are detailed in SSP 50200-01, Station Program Implementation Plan, Volume 1: Station Program Management Plan, Section 4.5.3. This individual will be the primary interface with the utilization execution organizations and the ISS Program POI personnel for a specified increment. The POD will provide status, recommendations, and assessments of activities involving utilization planning, training, and real-time execution to the PMIT.

During real-time execution, the POD leads the POIC and Partner Control Centers (PCCs) in the execution of integrated payload operations on the ISS based on the input received from the PCCs. Each PCC will interface with the payload users, integrate their requirements, and provide them to the Station-wide integration performed by the POIC. The POIC POD provides the overall authority for all Station-wide payload activities that occur in real-time, near-real-time, and weekly planning. The real-time roles and responsibilities of the POD and each of the PCCs are further detailed in SSP 50200-09, Station Program Implementation Plan, Volume 9: Real-Time Operations.

6.1.5.2.2.2 ISS PROGRAM PAYLOAD OPERATIONS DATA SET MANAGER

The ISS Program Payload Operations Data Set Manager (DSM) supports the integration of the Payload Operations Data Set by reviewing the data before implementation across the payload complement. The Payload Operations DSM will contact the PD if it is determined that support requirements cannot be satisfied with ISS Program Requirements. The Payload Operations DSM will coordinate and negotiate with the PD, as required, to resolve any operational issues. The Payload Operations Directors will accomplish the Payload Operations Data Set Manager functions (except for the Video/Photo area). The Video/Photo Data Set Manager will act as the Payload Operations DSM for the Video/Photo functional area.

6.2 GENERAL PAYLOAD OPERATIONS DATA SET DELIVERABLES

The PD will submit the Payload Operations requirements data to the ISS Program via electronic entry into the PDL. The ISS Program personnel will use this information to perform integration analysis and publish required documentation. Payload Operations Data Set generic delivery dates to meet Program milestones are documented in SSP 57057, ISS Payload Integration Template. The PD shall complete their payload-unique data submittal in accordance with the dates negotiated and documented in the PD's PIM schedule. Table 6.2-1, General Payload Operations Data Set Deliverables, defines data groups which correspond with the multiple deliveries shown in the Payload Integration Template. These groupings of deliveries (called "options" in PDL) are

promoted on an option basis. The PD shall promote the data from the private level to the integrated level. Data promoted to the integrated level is considered the preliminary input to the integration teams.

TABLE 6.2-1 GENERAL PAYLOAD OPERATIONS DATA SET DELIVERABLES

Data Groups and	
Data Group 1 - Payload Operations Data Set Requirements	**Section 6.3**
Payload Operations Contacts	
-Payload Operations Preparation Point of Contact - (POC)	PDL
-Video/Photo - (POC)	PDL
Data Group 2 - Payload Operations Data Set Requirements	**Section 6.4**
Initial Video/Photo Requirements	PDL
Data Group 3 - Payload Operations Data Set Requirements	**Section 6.5**
Video/Photographic Requirements	PDL
Data Group 4 - Payload Operations Data Set Requirements	**Section 6.6**
Payload Flight Operations Actions, Decisions, and Constraints	
-Launch Commit Criteria	PDL
-ISS/SSP Operational Flight Rules	PDL
-Payload Regulations	PDL
Data Group 5 - Payload Operations Data Set Requirements	**Section 6.7**
Post-Payload Photo/Video Deliverables to Science Teams	PDL
Data Group 6 - Payload Operations Data Set Requirements	**Section 6.8**
Payload Operations Contacts (Continued)	
-Real-Time Payload Operations - (POC)	PDL
-Operations Facilities - (POC)	PDL
-User Operations Team - (POC)	PDL
-Other PD Payload Operations - (POC)	PDL
Data Group 7 - Payload Operations Data Set Requirements	**Section 6.9**
Real-Time Mission Operations Team Information	
-Payload Operations Team Structure	PDL
-Additional Payload Developer Operations Information	PDL
-Real-Time Payload Operations Direction, Authority, and Coordination	PDL

6.3 DATA GROUP 1 - PAYLOAD OPERATIONS DATA SET REQUIREMENTS

6.3.1 PAYLOAD OPERATIONS CONTACTS

Throughout the course of payload operations preparation, planning, and implementation, POI personnel will need to contact various members of the PD team. The PD shall identify which members of the PD team are authorized to speak on behalf of the payload to provide information and/or make decisions for a particular aspect of the payload.

6.3.1.1 PAYLOAD OPERATIONS PREPARATION POINT OF CONTACT - (POC)

During the early stages of Payload Operations preparation, one individual will be required to provide preliminary information regarding the payload's operations preparations. The PD shall identify the payload's primary contact for overall payload operations preparations by providing the information requested in Table 3.3-1.

6.3.1.2 VIDEO/PHOTO - (POC)

The PD shall identify the payload's point of contact for all video and photography requirements by providing the information requested in Table 3.3-1.

6.4 DATA GROUP 2 - PAYLOAD OPERATIONS DATA SET REQUIREMENTS

6.4.1 INITIAL VIDEO/PHOTO REQUIREMENTS

The PD shall input his initial generic video/photo information and indicate if he is providing his own video/photo equipment for his payload. With this input data, the Video Operations team will begin development of the TV/Photo Operations (Ops) Book, which will become part of the PODF.

The PD shall answer the following questions and shall provide the following information in Table 6.4.1-1, Initial Video/Photo Requirements:

A. Do you require ISS video/photo equipment support? *[Indicate by selecting the radio button if the answer is "yes, no, or not sure" for each photo, video, and electronic still camera.]*

B. Will the equipment be used to support your science requirements? *[Indicate by selecting the radio button if the answer is "yes, no, or not sure" for each photo, video, and electronic still camera.]*

C. Will the Payload provide any Photo/Video/Electronic Still Cameras? Film? Videotape? Electronic Still Disks? *[Indicate by selecting the radio button if the answer is "yes, no or not sure." If the answer is "yes," provide the following additional information.]*

   1. Describe the make and model of the Photo/Video/Electronic Still Cameras, the type of Film, Videotape or Electronic Still Disks to be used. *[Provide Description (300 characters max).]*

   2. Is this Payload provided equipment built into or expected to be built into the Payload? *[Indicate by selecting the radio button if the answer is "yes, no or not sure."]*

D. Describe how the ISS or PD provided video/photo equipment will support your payload. *[Provide Description (1000 characters max).]*

TABLE 6.4.1-1 INITIAL VIDEO/PHOTO REQUIREMENTS

Do you require ISS Video/Photo equipment support? [Indicate by selecting the radio button of each answer:]		
Photo Yes ◎ No ◎ Not sure ◎	Video Yes ◎ No ◎ Not sure ◎	Electronic Still Camera Yes ◎ No ◎ Not sure ◎
Will the equipment be used to support your science requirements?		
Photo Yes ◎ No ◎ Not sure ◎	Video Yes ◎ No ◎ Not sure ◎	Electronic Still Camera Yes ◎ No ◎ Not sure ◎
Will the Payload provide any Photo/Video/Electronic Still Cameras? Film? Videotape? Electronic Still Disks?		
Photo Yes ◎ No ◎ Not sure ◎	Video Yes ◎ No ◎ Not sure ◎	Electronic Still Camera Yes ◎ No ◎ Not sure ◎
Film Yes ◎ No ◎ Not sure ◎	VideoTape Yes ◎ No ◎ Not sure ◎	Electronic Still Disks Yes ◎ No ◎ Not sure ◎
Describe the make and model of the Photo/Video/Electronic Still Cameras, the type of Film, Videotape or Electronic Still Disks to be used.		
Is this Payload provided equipment built into or expected to be built into the Payload?		
Photo Yes ◎ No ◎ Not sure ◎	Video Yes ◎ No ◎ Not sure ◎	Electronic Still Camera Yes ◎ No ◎ Not sure ◎
Describe how the ISS or PD provided Video/Photo equipment will support your payload.		

[Expand table as necessary to include required information.]

6.5 DATA GROUP 3 - PAYLOAD OPERATIONS DATA SET REQUIREMENTS

6.5.1 VIDEO/PHOTOGRAPHIC REQUIREMENTS

The PDs shall define all video/photographic tasks that are required for their payload. Multiple cameras can be used per task, but for each piece of equipment, the PD shall describe the intended scene and the scene's objective.

Table 6.5.1-1, ISS Video/Photo Equipment Information, provides the PD with an example of the equipment available.

TABLE 6.5.1-1 ISS VIDEO/PHOTO EQUIPMENT INFORMATION

Camera Type	Image Product Availability	Camera System	Default Media (Film/Tape/Disk)
Still 35mm	Post-Landing	35mm	Color positive ISO 100
Electronic Still Camera	Post-Landing	Electronic Still Camera	ISS Electronic Disk
Video	In-flight Near Real-Time Post-Landing	Digital Camcorder	Hi band 8mm

6.5.2 TASK/SCENE DEFINITION

The PD shall provide the following information in Table 6.5.2-1, Task/Scene Definition:

A. Task Number - [Provide a number for each task. This field will be used to sort the defined tasks (3 digits max).]

B. Video/Photo Task Name - [Provide the exact title of the Procedure/Activity that requires imagery (30 characters max).]

C. Video/Photo Product Classification - [Identify your video/photo product classification "as defined by the Imagery Working Group." Select from list:]

   1. Shared Imagery.
   2. Restricted Imagery.
   3. Proprietary Imagery.

D. Video/Photo Product Classification Details - [If "Restricted Imagery or Proprietary Imagery" is selected in C, please provide details (500 characters max).]

E. Enter Task Specific Pictures to Provide Clarity - [Include pictures or drawings that represent the payloads desired Field of View (FOV) requirements or clarify their science. Select Load Pictures Button. After selecting the button provide the following information:

   1. Image Number *[2 digits max]*:
   2. Image Title [(Formats for pictures can be in Bit Mapped (BMP) graphics, Graphics Interchange Format (GIF), Picture (PICT), or Joint Photographic Experts Group (JPEG) as offered by the Oracle database software (30 characters max)).]

F. Scene Number - [This field is provided to allow any desired ordering of the listed scenes (3 digits max).]

G. Camera Type - [Identify the type of camera to be used in this scene. Select from list: Video-Digital Camcorder, Still - 35 millimeter (mm), Electronic Still).]

H. Number of Pictures - [If Still - 35mm or Electronic Still has been selected in G, State how many pictures will be needed to accomplish this scene (3 digits max).]

I. Scene Description - [Describe, in detail, the purpose of the scene (500 characters max).]

J. Scene Objective - [Describe the purpose of the task or scene (500 characters max).]

K. Image Product Availability - [Select the desired value from the list, if multiple selections are applicable and available to the selected Camera Type. (Reference Table 6.5.1-1).]

TABLE 6.5.2-1 TASK/SCENE DEFINITION

Task Number	Video/Photo Task Name	Video/Photo Product Classification		
		Shared Imagery	Restricted Imagery	Proprietary Imagery
			Details	Details
Task Specific Pictures to Provide Clarity				
Load Picture(s)				
Image Number	**Image Title**			
Scene Number	**Camera Type**	**Number of Pictures to accomplish Scene**		
Scene Description				
Scene Objective				
Image Product Availability (Reference Table 6.5.1-1)				

[Expand table as necessary to include all required information.]

6.6 DATA GROUP 4 - PAYLOAD OPERATIONS DATA SET REQUIREMENTS

6.6.1 PAYLOAD FLIGHT OPERATIONS ACTIONS, DECISIONS, AND CONSTRAINTS AS IDENTIFIED FOR LAUNCH COMMIT CRITERIA, FLIGHT RULES AND PAYLOAD REGULATIONS

The PD shall identify possible operations decisions, alternate plans, courses of action, or constraints that need SSP and ISS Program preflight consideration and accompanying rationale. POIC is responsible for providing Mission Operations Directorate (MOD) with the Flight Rules. These decisions may be concerned with any of the following:

A. GO/NO-GO criteria for specific payload flight phases (i.e., launch, payload activation, payload transfer to ISS, deployment/retrieval, critical payload functions or activities, vehicle docking, crew, EVA, etc.). GO/NO-GO criteria normally include SSP and ISS functional resources (flight transport vehicle, ISS element, and ground facilities) and payload safety-related criteria.

B. Alternate mission plans or objectives if major objectives or capabilities are lost.

C. Priorities of Payload Operations. The Lead Increment Scientist (LIS) is responsible for providing the priorities among payload activities and determining and providing the tradeoff rules to POIC and MOD.

D. Overall management of payload/support systems for off-nominal conditions. (As a minimum, all Operations with crew safety ramifications should be thoroughly covered.)

E. Payload operating constraints that may affect SSP or ISS operations. Payload Mission success criteria for Payload Operations that must occur to provide minimum research return.

These major decision points, alternate mission criteria, system anomalies (SSP, ISS, or payload), GO/NO-GO criteria, and payload opportunity variation conditions need to be identified to allow the SSP and ISS Program organizations to develop flight documentation to support these predictable off-nominal, as well as nominal, flight operations. These PD inputs will be utilized by the SSP and ISS Program to develop the Flight Rules, LCC, Payload Regulations, FDF, PODF, and ground documents. Implementation of PD inputs is reviewed by the PD during the normal ISS Program documentation development process, at the Increment Operational Review (IOR), and finally at the Flight Readiness Review (FRR).

6.6.1.1 LAUNCH COMMIT CRITERIA

Payloads that have onboard and/or ground systems requirements that must be operational within definable limits prior to launch will require the development and SSP approval of LCC which cover failure conditions in these systems which may occur during the launch count. Payload LCC, including rationale used for calling a hold, to include the time frame beginning at start of tanking (L-11 hours), will be described for the following areas:

A. All payload parameters utilized for safety monitoring during the count and criteria used for calling a safety-related hold.

B. Specific actions and payload commanding initiated by the PD after Launch Pad clearing which, if not successful, could cause a launch hold.

C. Orbiter payload interface services (i.e., Payload Data Interleaver (PDI), Payload MDM, etc.) and ground system requirements (i.e., POIC communication lines, aircraft, etc.) which represent GO/NO-GO decisions.

Following approval of these LCC information by the ISS Program Payload Operations Integration Team, the LCC data will be incorporated in NSTS 16007, Shuttle Launch Commit Criteria and Background Document.

Copies of payload internal documentation containing mission success LCC should be provided to the ISS Program Payload Operations DSM. These LCC are for SSP information only and will be forwarded to the SSP. The PD will provide the following information in Table 6.6.1.1-1, Launch Commit Criteria and Background:

A. Payload SubElement - *[Identify the payload subelement for which this LCC applies (60 characters max).]*

B. SSID - *[Enter the Subelement Identification (SSID) for the payload. The SSID is chosen by the PD. It is suggested that this Identification (ID) be an abbreviation of the payload name followed by a sequential numbering of the LCC (e.g., GRO-01) (12 characters max).]*

C. LCC Violation Call - *[Identify the designation that would be announced if this LCC is violated (40 characters max).]*

D. Emergency Condition - *[Select the condition indicator using the following choices:]*

1. CRITICAL - The LCC violation causes an uncontrollable hazardous situation that directly affects the survivability of the flight crew or Launch Pad personnel.

2. YELLOW - The LCC violation could affect the safety of the flight crew or Launch Pad personnel.

3. NONE - All others.

E. Redline Minimum - *[Specify the lower limit at which a violation occurs. If there is no applicable lower limit, then N/A should be placed in the minimum redline column. For all parameters that are events or subelements, the desired state should be documented in the minimum column (16 characters max).]*

F. Redline Maximum - *[Specify the upper limit at which the violation occurs should be documented in the maximum redline column. If there is no applicable upper limit, then N/A should be placed in the maximum redline column. For all parameters that are events, N/A will be placed in the maximum redline column (16 characters max).]*

G. Redline Units - *[Identify the engineering units for the measurement in the redline units column (30 characters max).]*

H. Time Period - Enter the period for which the redlines are effective.

1. Start Time *[Enter the start time (30 characters max each).]*

2. End Time *[Enter the end time (30 characters max each).]*

I. Acceptable Deviations - *[Describe any situation in which limits or conditions may be exceeded without harm. Also clarify or explain requirements that are too lengthy for the measurement category/redline columns (200 characters max).]*

J. Consequences of Exceeding Redline - *[Provide a brief statement of potential immediate results of exceeding redline. Damage, loss of capability, etc., which may result if system operation continues, should be given (100 characters max).]*

K. Causes of Exceeding Redline - *[A list of conditions that could cause violation of the redline (200 characters max).]*

L. LCC Safety Parameters - *[Provide the payload parameters utilized for safety monitoring during the launch countdown (100 characters max).]*

M. Criteria - *[Describe the criteria used to call a safety-related countdown hold (100 characters max).]*

N. Payload Commanding and Crew Actions - *[Define specific crew actions and payload commanding to be initiated after launch support personnel departure that, if not successful, could cause a launch hold (200 characters max).]*

O. Preplanned Contingency Procedure - *[Define the procedures that the payload team may attempt to improve the probability of meeting the criteria contained in this LCC (200 characters max).]*

P. Orbiter-to-Ground Interfaces - *[Describe the Orbiter payload interface services and ground system requirements that represent GO/NO-GO decisions (100 characters max).]*

Q. Notes - *[Provide any additional useful information; i.e., location/responsible party monitoring LCC. The notes section should not contain requirements or constraints (500 characters max).]*

R. Correlation Number, Measurement PUI Value, PUI Name, and PUI Description are automatically selectable from information previously loaded in PDL in the C&DH Data Set. These fields are only required if the LCC is tied to one or more associated PUI(s).

   1. Category - *[Enter the category numbers. If a measurement is singularly mandatory (i.e., launch cannot proceed if the measurement has failed), then no entry is necessary. If within a group of measurements less than all are required, then the category column should so designate (i.e., 1 of 2, 4 of 5, etc.). If special explanation is required, then a numeric reference designator (e.g., (1)) should be placed in the category column and explained in the acceptable deviations section (12 characters max).]*

TABLE 6.6.1.1-1 LAUNCH COMMIT CRITERIA AND BACKGROUND

Payload SubElement				
SSID	LCC Violation Call	Emergency Condition	Redline Minimum	Redline Maximum

Redline UNITS	Time Period	
	Start Time	End Time
Acceptable Deviations	Consequence of Exceeding Redline (Minimum or Maximum)	Causes of Exceeding Redline (Minimum or Maximum)
LCC Safety Parameters	Criteria	Payload Commanding and Crew Actions
Preplanned Contingency Procedure	Orbiter-to-Ground Interfaces	Notes

Correlation Number	Measurement PUI Value	PUI Name	PUI Description	Category

[Expand table as necessary to include all required information.]

6.6.1.2 FLIGHT RULES

Flight Operations Rules are preplanned responses designed to minimize the need to develop real-time decisions for off-nominal situations that occur during either SSP transportation, SSP-to-ISS transfer operations, or ISS on-orbit operations. This data will be used to support the real-time decision making of the POIC. Flight operations decisions that affect payload safety, SSP, or ISS Systems will be forwarded on to the JSC Flight Rules Control Board for inclusion in the increment-specific ISS Operational Flight Rules. POIC is responsible for providing MOD with the Flight Rules. The LIS is responsible for providing the priorities and determining and providing the trade-off rules to POIC and MOD.

Generic Shuttle/Station Flight Rules have been developed and baselined in three volumes. These generic rules contain Shuttle/Station systems rules; general rules for payloads; and priorities between payloads, Shuttle, and Station systems actions. These documents contain provisions for certain flight/increment-specific exceptions or options determined from previous flight experience. These generic rules are contained in:

A. NSTS 12820, Space Shuttle Operational Flight Rules Volume A All Flights.

B. NSTS 12820, ISS Generic Operational Flight Rules Volume B Mission Operations Directorate.

C. NSTS 12820, Joint Shuttle-ISS Operational Flight Rules Volume C Joint Operations.

Flight-specific Flight Rules for the payloads will be developed in a flight/increment-unique Flight Rule annex to provide flight or increment-unique information or exceptions that supplement generic Flight Rules and to provide flight/increment-unique payload rules. As required by the PD, options and exceptions to the generic rules and payload-specific Flight Rules shall be developed as PD inputs are documented in Table 6.6.1.2.1-1, Payload Operational Flight Rules, as appropriate.

If the PD develops payload-only rules or decisions that are independent of the ISS Program/SSP, these should be provided as input to the Payload Regulations (Section 6.6.1.3). These payload-only rules or decisions are for the POIC information only and will be reviewed for consistency with ISS Program/SSP documentation.

6.6.1.2.1 PAYLOAD OPERATIONAL FLIGHT RULES

The PD is responsible for identifying all known payload activities, both nominal and off-nominal, that may adversely impact Shuttle systems, ISS systems, or crew health to be integrated and documented in the appropriate Flight Rules document. The PD will provide information regarding the overall management of payload/support systems for off-nominal conditions that affect crew and/or vehicle safety particularly operational controls of hazardous conditions. This information is anything that the MCC-H or crew could do to the ISS core systems that, if not pre-coordinated with the POIC, could possibly damage payload hardware. Examples: ISS Reboost/maneuvers, power downs. Flight Rule controls as specified in the Payload Hazard Reports (PHRs), Ground actions, or decisions made during a malfunction or corrective time-frame that could affect crew or vehicle safety. Information required to keep a hazardous operation in a safe state. Examples: Corrective procedure categorization, substance toxicity levels, containment requirements. In the event of a degraded or failed ISS system(s), payload actions that need to be performed to preclude damaging payload hardware or violating payload hardware specifications. Examples: Payload pressure/temperature requirements on ISS core systems (coolant loops, heat exchangers, etc.), loss of power. Crew or ground actions/decision that could violate NASA policy. Examples: Video downlink of payload XYZ is not allowed. A daily status check of payload ABC is required. The PD shall provide the following information in Table 6.6.1.2.1-1:

A. Payload Subelement - *[Identify the particular payload subelement such as a system or experiment associated with payload (only as required) (60 characters max).]*

B. Prefix - *[Enter the Flight number on which the payload will fly (10 characters max).]*

C. Number - *[Enter a unique numerical identifier for each Payload Operations decision (2 characters max).]*

D. Title - *[Enter a title for the Flight Rule that can be used to briefly describe the condition and resolution (80 characters max).]*

E. Phase - *[Identify the particular flight phase(s) within which the decision is applicable (SSP Operations: Ascent, On-Orbit, Descent, Post-Insertion, Docked, Deorbit Prep.*

ISS Operations: Standard, Proximity Ops, Survival, Microgravity, Reboost, Assured Safe Crew Return (ASCR), External Ops)]

F. Condition/Malfunction/Constraint - *[Provide a short description of the condition, malfunction, or constraint that requires a decision (100 characters max).]*

G. Decision - *[Provide the recommended response to the stated condition/ malfunction/constraint. This can take the form of a standing rule, especially when the condition/malfunction/constraint applies to several flight phases (500 characters max).]*

H. Rationale - *[Provide the rationale and detailed support information that justifies or clarifies the Flight Operations decision. This should include references to Payload Hazard Reports or other supporting documentation (500 characters max).]*

TABLE 6.6.1.2.1-1 PAYLOAD OPERATIONAL FLIGHT RULES

Payload Subelement		
Prefix	**Number**	**Title**
Select Applicable Phase(s) for this Flight Rule		
Space Shuttle Program Operations		**International Space Station Operations**
Condition/Malfunction/Constraint		
Decision		
Rationale		

[Expand table as necessary to provide the required information.]

6.6.1.3 PAYLOAD REGULATIONS

Payload Regulations provide established priorities for payload activities, preplanned responses to off-nominal situations, as well as any payload-unique information that enhances the POIC's ability to provide immediate operational responses and to make real-time operations decisions. The PD is responsible for providing Payload Regulations for any known operational constraints or activities that may adversely affect their science or hardware up to the limits of safety and/or equipment damage, at which point Operational Flight Rules take over. In the event the POIC is providing backup command capability for the PD, the specific details will be contained in the Payload Regulations. The POIC, with the support of all the PD's involved, is responsible for integrating the Payload Regulations and ensuring compatibility. Regulations for NASA and NASA Partner payloads will reside in the NASA Payload Regulations. If the payload will be located in another partner element the regulations will also be carried forward to the Multilateral Payload Regulations. These decisions are mission success oriented, not safety related. Payload operations decisions which affect payload safety

or ISS systems will be forwarded on to the JSC Flight Rules Control Board for inclusion in the increment-specific ISS Operations Flight Rules. The PD shall provide the following information in Table 6.6.1.3-1, Payload Regulations:

A. Payload Subelement - *[Identify the particular payload subelement such as a system or experiment associated with payload (only as required) (60 characters max).]*

B. Prefix - *[Enter the Flight number on which the payload will fly (10 characters max).]*

C. Number - *[Enter a unique numerical identifier for each Payload Operations decision (2 characters max).]*

D. Title - *[Enter a title for the regulation that can be used to briefly describe the condition and resolution (80 characters max).]*

E. Phase - *[Identify the particular flight phase(s) within which the decision is applicable. Choices are Standard, Proximity Operations, External Operations, Assured Safe Crew Return (ASCR), Microgravity, Reboost, and Survival.]*

F. Condition/Malfunction/Constraint - *[Provide a short description of the condition, malfunction, or constraint that requires a decision (100 characters max).]*

G. Decision - *[Provide the recommended response to the stated condition/malfunction/constraint. This can take the form of a standing rule, especially when the condition/malfunction/constraint applies to several flight phases (500 characters max).]*

H. Rationale - *[Provide the rationale and detailed support information that justifies or clarifies the flight operations decision. This may include reference to Payload Hazard Reports or other supporting documentation (500 characters max).]*

TABLE 6.6.1.3-1 PAYLOAD REGULATIONS

Payload Subelement		
Prefix	**Number**	**Title**
Select Applicable Phase(s) for this Flight Rule		
Condition/Malfunction/Constraint		
Decision		
Rationale		

[Expand table as necessary to provide the required information.]

6.7 DATA GROUP 5 - PAYLOAD OPERATIONS DATA SET REQUIREMENTS

6.7.1 POST-PAYLOAD PHOTOGRAPHIC VIDEO DELIVERABLES TO SCIENCE TEAMS

The PDL shall auto load Table 6.7.1-1, Pre-Increment Input Screen for Post Products, from information gathered in Table 6.5.2-1. No PD input is required for electronic data entry of Task Number, Video/Photo Task Name, Scene Number, and Camera Type. The Table is broken out into two sections, one for Film and one for Video. The PD shall provide the following information to Table 6.7.1-1:

A. Copies - *[The standard payload ISS imagery plan will furnish copies of original film rolls on Compact Disk (CD), if a CD is not acceptable, then please justify in the Film Format section. Identify the required number of copies up to 4 copies. If more than 4 are requested, then please justify in Additional Copies field (2 digits).]*

B. Comments - *[Provide any additional useful information (200 characters max).]*

C. Additional Copies – *[Indicate why additional copies are required (100 characters max).]*

D. Film Format - *[Indicate why a CD copy of the original flight film is not acceptable (100 characters max).]*

E. Negative - *[Film negatives are not copied to CD, but can be requested by justifying in the Film Format section. Identify the required number of copies up to 4 copies, if more than 4, then please justify in Additional Copies field (2 digits).]*

F. Comments - *[Provide any additional useful information (200 characters max).]*

G. Additional Copies - *[Indicate why additional copies are required (100 characters max).]*

H. Film Format - *[Indicate why Negative Film is required (100 characters max).]*

I. Video Requirements - *[In pulldown menu under Tape Format, choose the type of videotape you require. If type is not Super Video Home System (VHS) NTSC without windowed time code, then please justify under Other Video Format. Audio time code will normally be on audio channel two.]*

J. Copies - *[Identify the required number of copies up to 4 copies, if more than 4, then please justify in Video Additional Copies field (2 digits).]*

K. Comments - *[Provide any additional useful information (200 characters max).]*

L. Additional Copies - *[Indicate why additional copies are required (100 characters max).]*

M. Other Video Format - *[Indicate why Super VHS NTSC is not acceptable and describe type of tape required (100 characters max).]*

N. Send To - *[Retype new information or add additional information stating who gets what if more than one address is required. Indicate name, physical address, and*

phone number of designated recipient of imagery products. The address shall not be a Post Office Box due to potential signature and size requirements. (500 characters max).]

TABLE 6.7.1-1 PRE-INCREMENT INPUT SCREEN FOR POST PRODUCTS

Task Number	**Video/Photo Task Name**		**Scene Number**	**Camera Type**
Film Requirements				
	Copies	**Comments**	**Additional Copies**	**Film Format**
CD				
Negative				
Video Requirements				
Video Tape Format	**Copies**	**Comments**	**Additional Copies**	**Other Video Format**
Send To:				

[Expand table as necessary to provide the required information.]

6.8 DATA GROUP 6 PAYLOAD OPERATIONS CONTACTS (CONTINUED)

6.8.1 PAYLOAD OPERATIONS CONTACTS

The PD shall identify which members of the PD team are authorized to speak on behalf of the payload to provide information and/or make decisions for a particular aspect of the payload.

6.8.1.1 REAL-TIME PAYLOAD OPERATIONS CONTACT

The PD shall identify the payload's primary contact for real-time payload operations. This individual will be responsible for providing information on real-time payload operations and making decisions concerning real-time operations on behalf of the payload. This contact should be available at all times (24 hours x 7 days) via either voice loop, telephone, or pager. The PD shall provide the information requested in Table 3.3-1.

6.8.1.2 OPERATIONS FACILITIES CONTACT INFORMATION

The PD shall identify the individual responsible for providing Payload Operations personnel information about the physical facility or facilities at which the PD shall be located during real-time payload operations. This individual will be authorized to define payload facilities requirements and provide payload facilities information to establish the necessary interfaces with the various Payload Operations implementation organizations. The PD shall provide the information requested in Table 3.3-1.

6.8.1.3 USER OPERATIONS TEAM CONTACT INFORMATION

The PD shall identify the individuals from the user operations team who will be supporting the payload experiments and science implementation. This individual will be authorized to define payload experiment requirements and provide payload science information to the various Payload Operations organizations. The PD shall provide the information requested in Table 3.3-1.

6.8.1.4 OTHER PAYLOAD DEVELOPER PAYLOAD OPERATIONS CONTACT INFORMATION

The PD shall identify individuals who will have a role in the payload's operational implementation and who have not been identified in previous sections. The PD shall provide the information requested in Table 3.3-1.

6.9 DATA GROUP 7 REAL-TIME MISSION OPERATIONS TEAM INFORMATION

6.9.1 REAL-TIME MISSION OPERATIONS TEAM ORGANIZATION

The conduct of real-time mission operations is performed by a Flight Control Team (FCT) composed of ISS Program/SSP and PD Flight Controllers. The FCT is responsible for all decisions regarding the conduct of the flight that are within the realm of preplanned flight rules and contingency procedures. The structure of the real-time ground control team at MSFC and all the remote facilities supporting payload hardware elements will be provided to POIC.

6.9.1.1 PAYLOAD OPERATIONS INTEGRATION CENTER FLIGHT CONTROL TEAM

The POD is located in the Payload Control Area (PCA) of the MSFC POIC. This position is the controlling authority for all ISS Program real-time payload operations. The POD leads the POIC and the PCCs in the execution of integrated payload operations on the ISS and provides the single point of contact for payload operations to the ISS Flight Director (FLIGHT). The POD has overall authority for all Station-wide payload activities that occur in real-time, near-real-time, and short-term planning. The POD leads the enforcement of payload operations compliance with established program safety requirements, Flight Rules, and Payload Regulations. The POIC will represent all ISS payloads while located on an ETOV. The POIC will coordinate with ETOV personnel whenever payload operations are ongoing, payload issues arise, or for scheduling payload operations on the ETOV.

6.9.1.2 ISS PROGRAM FLIGHT CONTROL TEAM

The ISS FLIGHT is located in the ISS Flight Control Room (FCR) of the JSC Mission Control Center - Houston (MCC-H). This position is the controlling authority for all ISS Program real-time operations. FLIGHT has final authority on decisions affecting increment safety, including situations involving conflicting requirements between ISS systems and payload operations.

6.9.2 PAYLOAD OPERATIONS TEAM STRUCTURE

Mutual understanding of real-time flight operations interfaces between ISS Program management and Flight Control personnel and the PD personnel is mandatory for a successful flight. To this end, it is necessary for the ISS Program and the PD to have insight into each other's requirements and flight management decision-making processes. The PD shall be required to organize his real-time operations team to meet the payload's operational needs and to ensure complete interfaces with the ISS Program Payload Operations Integration personnel in the PCC.

The PD shall describe, by title and task responsibilities, each position supporting the payload during real-time operations. Such team position identifications will ensure that the PD personnel and ISS Program Payload Operations personnel are referring to the same individuals and functions as they interface with the POIC. The PD shall provide the following information in Table 6.9.2-1, Payload Operations Team Structure:

A. Real-Time Ops Lead Title - *[Provide the title by which the PD refers to the Lead PD Payload Operations position during real-time Payload Operations. This individual will have overall authority for the payload and will be the final authority representing the payload (40 characters max).]*

B. Real-Time Ops Lead Tasks - *[Provide a brief description of primary tasks performed by lead PD Payload Operations position (160 characters max).]*

C. Real-Time Flight Crew Interface Position - *[Provide the position title by which PD refers to the primary point of contact for real-time Flight Crew Interface (FCI) (40 characters max).]*

D. Real-Time Flight Crew Interface Tasks - *[Provide a brief description of the primary task performed by the PD FCI position (160 characters max).]*

E. Real-Time Data Position - *[Provide the position title by which the PD refers to their primary point of contact for real-time data management (40 characters max).]*

F. Real-Time Data Tasks - *[Provide a brief description of the primary tasks performed by the PD data position (160 characters max).]*

G. Real-Time Command Position - *[Provide the position title by which PD refers to their primary point of contact for real-time payload commanding (40 characters max).]*

H. Real-Time Command Tasks - *[Provide a brief description of the primary tasks performed by the PD payload commanding position (160 characters max).]*

I. Real-Time Plans Position - *[Provide the position title by which PD refers to their primary point of contact for real-time payload planning (40 characters max).]*

J. Real-Time Plans Tasks - *[Provide a brief description of the primary tasks performed by the PD planning position (160 characters max).]*

K. Real-Time Procedures Position - *[Provide a position title by which PD refers to their primary point of contact for real-time payload procedures matters (40 characters max).]*

L. Real-Time Procedures Tasks - *[Provide a brief description of the primary task performed by the PD real-time procedures position (160 characters max).]*

M. Real-Time Payload Systems Position - *[Provide a position title by which PD refers to their primary point of contact for real-time payload systems matters (40 characters max).]*

N. Real-Time Payload Systems Tasks - *[Provide a brief description of the primary task performed by the PD real-time systems position (160 characters max).]*

O. Real-Time Other Position - *[This field provides capability for the user to define a payloads team position that is not identified otherwise in this table (40 characters max).]*

P. Real-Time Other Tasks - *[Provide a brief description of the primary task performed by the PD defined position (160 characters max).]*

TABLE 6.9.2-1 PAYLOAD OPERATIONS TEAM STRUCTURE

Real-Time Ops Lead Title	Real-Time FCI Position	Real-Time Data Position
Real-Time Ops Lead Tasks	**Real-Time FCI Tasks**	**Real-Time Data Tasks**
Real-Time Command Position	**Real-Time Plans Position**	**Real-Time Procedures Position**
Real-Time Command Tasks	**Real-Time Plans Tasks**	**Real-Time Procedures Tasks**
Real-Time Payload Systems Position	**Real-Time Other Position**	
Real-Time Payload Systems Tasks	**Real-Time Other Tasks**	

[Expand table as necessary to include all required information.]

6.9.3 ADDITIONAL PAYLOAD DEVELOPER OPERATIONS INFORMATION

During real-time operations, the ISS Program POI personnel may represent or interact with the payload or payload team in a variety of real-time activities. It is necessary that the ISS Program POI personnel have an overview knowledge and understanding of the payload. Unusual or unique payload or payload team characteristics should be provided to the ISS Program POI personnel well in advance of real-time operations. The PD shall provide any additional information regarding the payload or payload team (unique ground support procedures or interfaces) that may impact real-time operations and decision making. The PD shall describe in Table 6.9.3-1, Additional Payload

Developer Operations Information, any payload or payload team characteristics not previously described *[400 characters max]*.

TABLE 6.9.3-1 ADDITIONAL PAYLOAD DEVELOPER OPERATIONS INFORMATION

Additional Payload Developer Operations Information

[Expand table as necessary to include required information.]

6.9.4 REAL-TIME PAYLOAD OPERATIONS DIRECTION, AUTHORITY, AND COORDINATION

The PD shall provide the following information in Table 6.9.4-1, Real-Time Payload Operations Direction, Authority, and Coordination:

A. Principal Investigator - *[Describe the anticipated involvement of the Principal Investigator in the real-time operations of this payload (200 characters max).]*

B. Experimenter(s) - *[List all the payload experimenter(s) who may become involved in the real-time operation of this payload, multiple experimenters should be listed if they are involved (200 characters max).]*

C. PD - *[Describe the PD's involvement or potential involvement in the real-time operation of this payload (200 characters max).]*

D. Sponsor - *[Describe the payload sponsor's involvement or potential involvement in the real-time operation of this payload (200 characters max).]*

E. User Facilities - *[Describe any other facilities with involvement or potential involvement in the real-time operation of this payload (200 characters max).]*

F. Final User Ops Authority - *[Specify the final PD decision-making authority on matters related to the real-time operation of this payload (60 characters max).]*

G. User Approval Electronic Address - *[Provide the electronic address of the PD location that will exercise final disposition authority for Payload Operations changes within the PD's authority, multiple experimenters should be listed if they are involved (40 characters max).]*

H. User Review Electronic Address - *[Provide the electronic addresses of PD locations that will review Payload Operations changes before change goes to the "User Approval Authority" (40 characters max).]*

TABLE 6.9.4-1 REAL-TIME PAYLOAD OPERATIONS DIRECTION, AUTHORITY, AND COORDINATION

Principal Investigator
Experimenter(s)
PD
Sponsor
User Facilities
Final User Ops Authority
User Approval Electronic Address
User Review Electronic Address

[Expand table as necessary to include required information

7.0 KSC SUPPORT REQUIREMENTS

7.1 INTRODUCTION

7.1.1 PURPOSE

The Support Requirements Data Set (SRDS) documents the launch and landing site advanced planning for ground processing support requirements necessary to process a single ISS payload through the following activities: simulations, preflight, in-flight, and post-flight phases associated with launch and recovery on the Space Shuttle System. This includes both hardware and science items to be processed at the launch and landing sites. The SRDS is a tool to develop a documented agreement between the Payload Developer (PD) and the Kennedy Space Center (KSC) for ground processing. This formal agreement is documented in the KSC-developed mission-unique Launch Site Support Plan - Mission Integration Plan, Annex 8.

7.1.2 SCOPE

The SRDS includes information concerning the following:

A. The roles and responsibilities of the PD and the KSC Customer Integration Manager (CIM) in developing the SRDS.

B. A listing of support services provided by KSC.

C. A generic description of the processing scenario for payloads through the KSC facilities.

D. Data entry tables for the PD to define the payload ground processing plan and related support requirements for KSC implementation.

E. The special Customer Deliverable Documents that the PD may be required to complete, such as Process Waste Questionnaires (PWQs), Shipping Requests, etc.

The SRDS also provides a table for the CIM to enter unique PD/KSC agreements and to provide an “open items list” for formal tracking.

7.1.3 PRECEDENCE

In case of any variation between this SRDS and the Payload Integration Agreement (PIA), the PIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA will not be considered binding on National Aeronautics and Space Administration (NASA) for implementation.

7.1.4 CONFIGURATION MANAGEMENT

The overall Data Set development process and configuration control steps using the PDL is shown graphically in Figure 7.1.4-1, Support Requirements Data Set and LSSP Development Cycle. The PD shall electronically input the payload’s unique support requirements into the PDL. During this period of electronic data entry, the PD can

consult with the KSC-assigned CIM on topics related to ground processing. As specified in the Payload Generic Template, the Payload-unique Data Set is promoted from Private to Integrated and the CIM begins the KSC assessment. This phase involves the KSC preliminary review of the PD-provided information toward an assessment of capabilities to satisfy the payload requirement. The results of KSC's assessment of capability are incorporated into the payload's SRDS.

All of the manifested payload SRDSs are combined in a single integrated output report that is published by KSC as a Preliminary Launch Site Support Plan (LSSP). The Preliminary LSSP is sent out for review and comment. Comments are reviewed by KSC and, in consultation with the PD, accepted comments are incorporated into the SRDS.

The development process is complete when the SRDS is approved jointly by the PD and the CIM. PDL generates output reports that are published by KSC as the Addendum to Launch Site Support Plan - Mission Integration Plan, Annex 8. These LSSP Addenda are circulated for signature and become part of the baseline LSSP.

Once the payload hardware is delivered to KSC, the ground processing for launch begins. (Arrival for science processing will vary depending on the complexity of the experiment. The specific hardware on-dock need date will be negotiated between KSC and the PD.) During this period, changes to support requirements are provided on a real-time support basis, but a real-time update of the SRDS is not required. During a post-mission review, significant changes to the "as-run" support requirements will be added to the SRDS and the SRDS will be placed in the PDL Archive.

7.1.5 KSC SUPPORT AND INTEGRATION MANAGEMENT

The PD has prime responsibility for hardware/science payload assembly, test, and servicing while processing through KSC. Payload and Orbiter integrated activities and KSC-provided services identified herein will be the responsibility of KSC.

KSC has been delegated responsibility for mission integration management for the pre-launch and post-landing segments of ISS payloads ground processing. The KSC mission CIM possibly working with several KSC CIMs assigned to individual ISS payloads, is responsible for providing the management integration and documentation development for the combined set of manifested payloads. The Launch Site Support Plan - Mission Integration Plan, Annex 8 is the primary planning document for KSC ground processing.

The LSSP for any specific mission contains the combined Payload Data Sets (PDSs) for all ISS payloads manifested for that flight. The specific ISS mission LSSP also includes non-payload-related items, such as ISS replacement Orbital Replacement Units (ORUs) and standard resupply items for Flight Crew and Station systems. These latter manifested items are not part of the PDL Data Set.

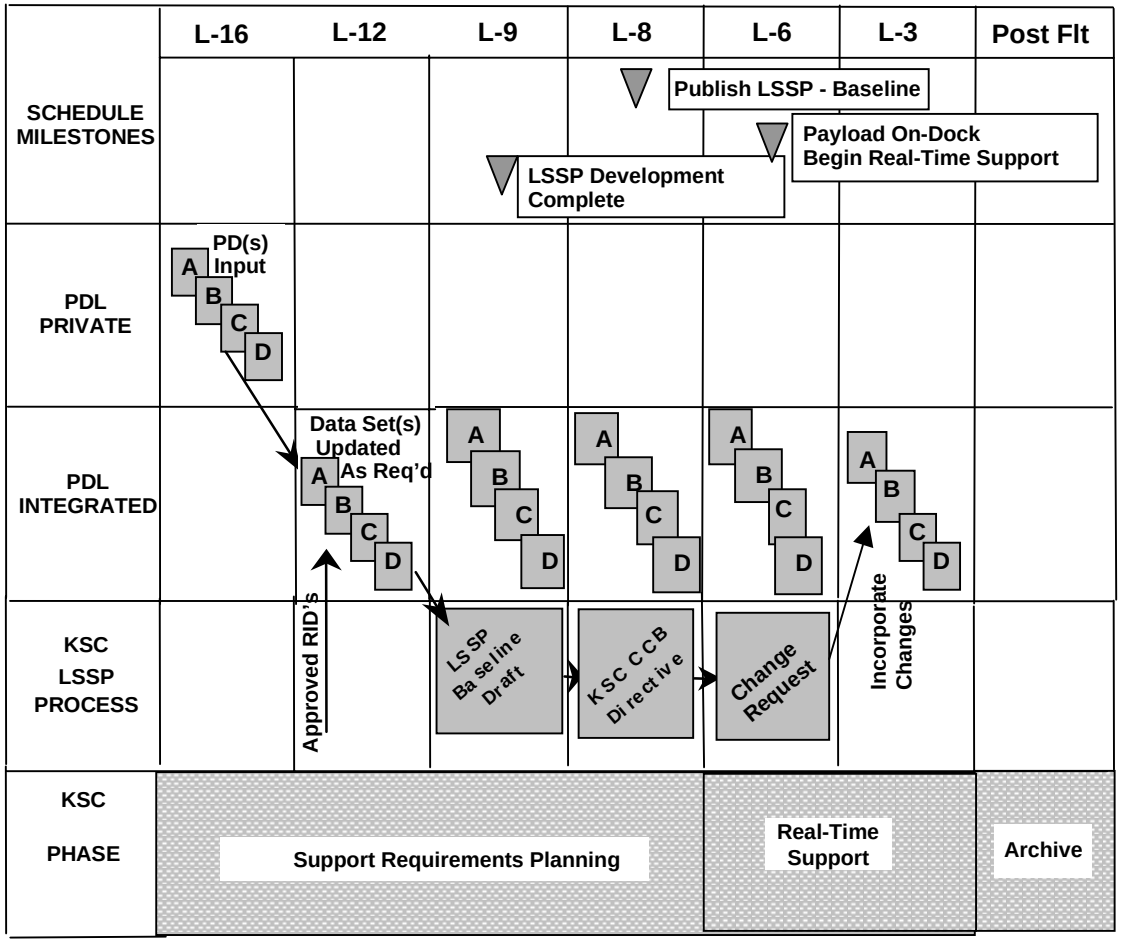


FIGURE 7.1.4-1 SUPPORT REQUIREMENTS DATA SET AND LSSP DEVELOPMENT CYCLE

7.1.6 PROCESS FLOW

The payload prelaunch and post-landing ground processing flow for generic racks and middeck experiments are shown in Figure 7.1.5-1, Space Station Payloads Generic Rack Processing Flow, and Figure 7.1.5-2, Space Station Payloads Middeck Experiments Processing Flow. After hardware turnover to KSC, operations will be scheduled and performed by KSC personnel.

KSC is delegated by the ISS Payloads Office to provide the institutional capability at KSC for processing payloads. Processing includes offline support, physical integration and deintegration, and checkout of payload interfaces to high-fidelity ISS and Orbiter-simulated interfaces, as well as actual Orbiter interfaces. The KSC ground processing capability includes facility-class payloads, EXpedite the PRocessing of Experiments to Space Station (EXPRESS) payloads, attached payloads, and middeck experiments. Payload processing activities extend from simulation(s) through preflight, inflight, and post-flight, including supporting late access to the Mini-Pressurized Logistics Module (MPLM) and to the Orbiter middeck and payload bay, as well as early access to the MPLM and to the Orbiter middeck.

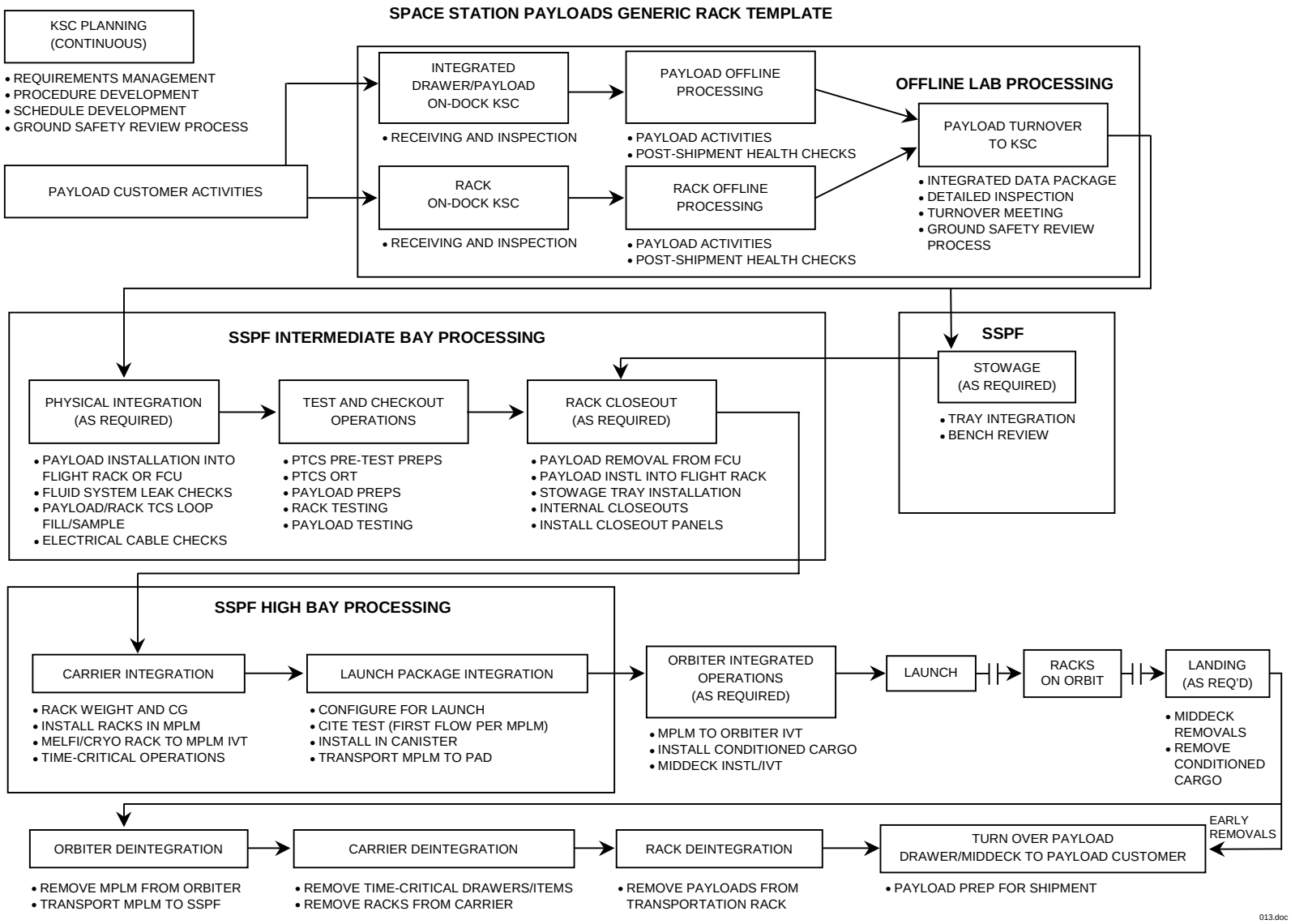


FIGURE 7.1.5-1 SPACE STATION PAYLOADS GENERIC RACK PROCESSING FLOW

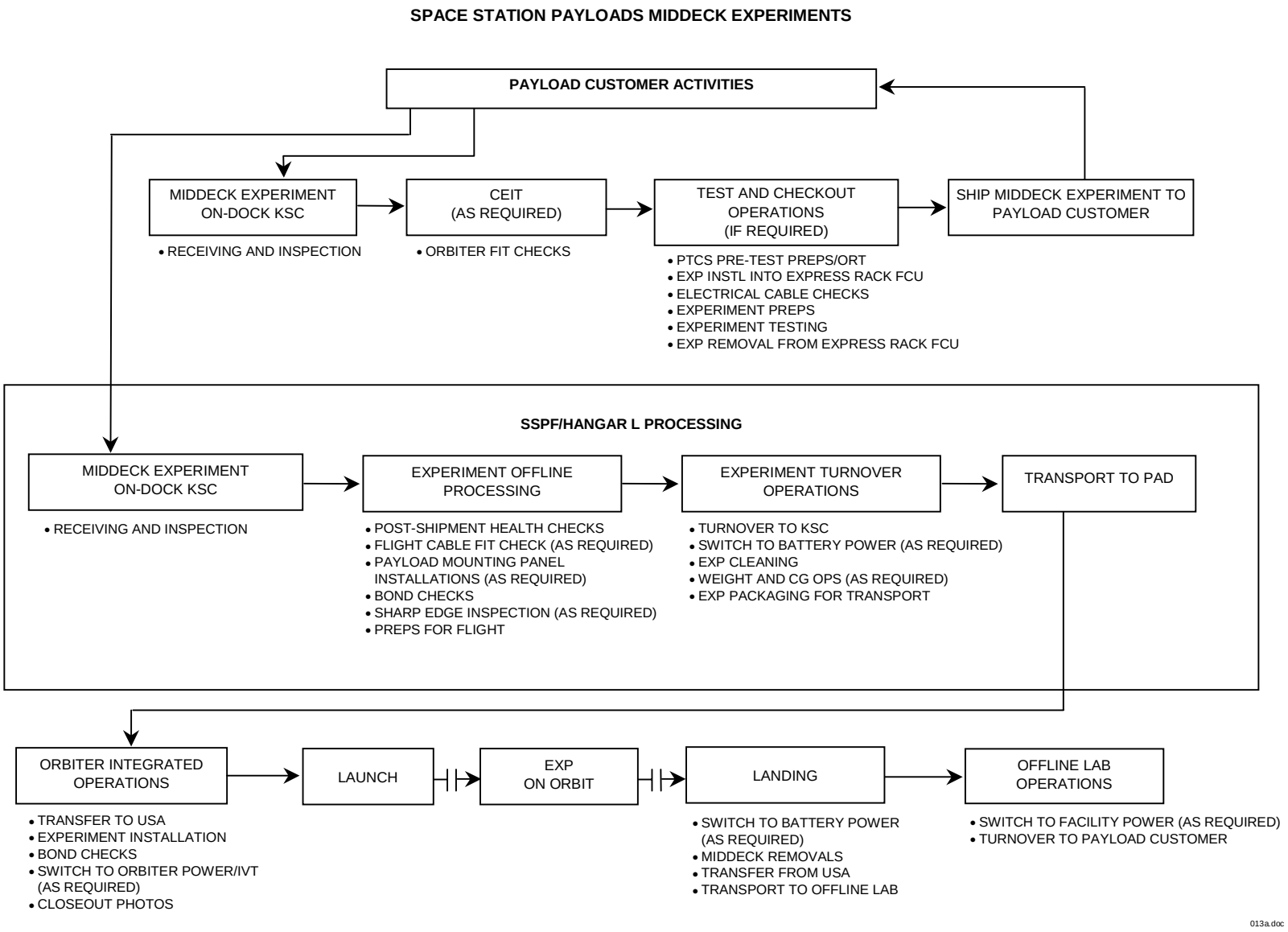


FIGURE 7.1.5-2 SPACE STATION PAYLOADS MIDDECK EXPERIMENTS PROCESSING FLOW

7.2 LAUNCH AND LANDING SITE SERVICES FOR NASA-SPONSORED PAYLOADS

The NASA ISS Payload Office and KSC budget process provides annual funding for KSC Launch and Landing Site payload processing. This processing is based on the Launch Manifest and approved support requirements as developed through this SRDS.

TABLE 7.2-1 LAUNCH AND LANDING SITE SERVICES FOR NASA-SPONSORED PAYLOADS

KSC Support Services		
Operations Support Services		**Institutional Support Services**
1. Pre-arrival planning/analysis support 2. Ground Safety Review process 3. Transportation support - Arrival-Aircraft/Barge/Truck - Facility to facility - Intra-facility 4. Facility Utilization - Space Station Processing Facility (SSPF) Offline areas - User Rooms - Life Science Processing Facility - SSPF Crane support 5. KSC Ground Support Equipment 6. Communications including Operational Intercommunication System (OIS) 7. Warehouse storage (limited) 8. Packing/crating shipping support 9. Control work area access badging 10. Training for facility access and certifications 11. Clean room garments 12. Sampling and analysis 13. Tools and special test equipment 14. Lifting equipment proof load 15. Equipment calibation 16. Technical shops 17. Office space 18. Photographic services 19. Hazardous waste disposal 20. Consumables (GN_2, He, shop air, ISS flight water) 21. Computer Ethernet connections 22. Chemicals (Select) 23. KSC Technical Document Center		1. Emergency medical 2. Copy center and self service document reproduction 3. Self service document facsimile transmission 4. Federal Telephone System 5. KSC reference library* 6. Bus service between buildings* 7. Cafeteria (first shift only)* 8. On-Center commercial travel office* 9. KSC wide security access 10. On-Center security escort for equipment moves 11. Janitorial services* 12. Mail service* 13. KSC area access badging 14. U.S. Customs planning/assistance support 15. KSC Telephone Operator Support* * Monday thru Friday, 8:00am - 4:30pm

Table 7.2-1, Launch and Landing Site Services for NASA-Sponsored Payloads, identifies existing KSC capabilities and services that are funded through the NASA budget process. If facilities, equipment, or service capabilities are requested that are greater than nominal levels of services available, then payload-unique requirements, along with the PD-unique requirement rationale, will be documented in Section 1.3 of the payload-unique PIA Addendum. The KSC-assigned CIM will assist the PD when discussing what are the nominal levels of support. Any exceptional capabilities or services will not be provided unless approved and funded through the ISS Payloads Office.

7.2.1 OFFLINE SUPPORT

7.2.1.1 PAYLOAD DEVELOPER LAUNCH SITE PROCESSING TEAM

The PD will have members of his payload project participate in payload processing at KSC Launch and Landing sites. The CIM will assist the PD in obtaining the necessary KSC access badging and any prerequisite training.

7.2.1.1.1 PERSONNEL ACCESS AND TRAINING

Personnel access badging is required for all members of the PD team who require access into KSC-secured areas. The personal information to be submitted to KSC Security is dependent upon the areas of required access and the nationality of the individual. The CIM will facilitate this process with KSC Security.

General access for attending meetings and reviews:

A. If an individual is a foreign national, KSC will verify advanced accreditation and clearance from the NASA Headquarters Office of International Affairs. Information must be provided three months prior to arrival at KSC.

B. Unescorted access into KSC Clean Work Areas (CWAs), such as the Operations and Checkout (O&C), the Life Sciences Support Facility (LSSF), and the Space Station Processing Facility (SSPF), requires additional badging from KSC Security and has some training prerequisites. The necessary training is scheduled and provided by KSC.

C. PD team members requiring unescorted CWA access must have a current certification in the NASA Personal Responsibility Program (PRP). A letter from the individual's NASA Center Security Office stating that the PRP is current provides evidence of this certification. This letter will be forwarded by the CIM to the KSC Security Office.

7.2.1.1.2 TRANSIENT OFFICE SPACE AND ADMINISTRATIVE SUPPORT

The PD launch site processing team will be assigned required transient office space and will be provided necessary administrative support while the payload team is located at KSC during their launch campaign. This requirement should be documented in

Table 7.3.1-1, Facility Support Requirements. Requested support may include office furniture such as tables, chairs, access to telephone, facsimile machine, copier, etc., and should be documented in the Specifications for Office Space.

7.2.1.2 PAYLOAD DEVELOPER EQUIPMENT DELIVERY AND OFFLINE PROCESSING

7.2.1.2.1 TRANSPORTATION AND ARRIVAL

Prior to shipping flight hardware, GSE, or experiment samples to KSC, the PD must coordinate the transportation and arrival plan with KSC.

Upon arrival, Payload Ground Operations Contractor (PGOC) Receiving, physically receives the experiment hardware and shipping documentation. The container is checked for identification and damage and prepared for transfer to the appropriate facility. PGOC Transportation is then notified by PGOC Receiving that the hardware has been received and is ready for pick up and delivery. PGOC Transportation picks up the experiment hardware from the Receiving area and delivers the hardware and shipping documentation to the identified location.

For facility deliveries, transportation normally delivers small items directly to Logistics. Items identified for use offline are delivered to the offline area assigned to the specific payload. Large items that require KSC support to unpack will be delivered to one of two locations. Items large enough to require use of the airlock will be delivered accordingly. The item will then be unpacked either in the airlock or in the highbay near the airlock, depending upon the airlock's usage schedule. Other large items will be delivered to the SSPF Receiving area and unpacked at the logistics hardware inspection area.

For experiment deliveries, basically two systems exist. NASA Transportation can provide shipping services for large, heavy, and/or palletized inventories. These also include items that require clearance through U.S. Customs. PGOC transportation performs a visible inspection of the shipment and delivers the item(s) to the appropriate location(s). Small shipments may be delivered using commercial companies (such as Federal Express, United Parcel Service (UPS), and others). For living, delicate, or environmentally monitored specimen shipments to KSC, the PD is responsible for coordinating all special-receipt activities with experiment support personnel. Receipt inspections and customer notification may be coordinated between the PD and receiving party(s).

NASA safety regulations must be followed when shipping hazardous, radioisotope, or sensitive materials. Verification of contents or identification of inter-country agreements may be required for international shipments if the U.S. Customs Service requires them.

If hardware is hand-carried to KSC by a payload representative, the hardware, along with its shipping documentation, shall be identified to the PGOC Receiving located in Building M6-698 for the purpose of documenting the arrival of the item on-site KSC.

If biological specimens and/or radio-labled samples are hand-carried by the customer, the payload representative shall complete all necessary paperwork (United States

Department of Agriculture, Center for Disease Control, Fish and Wildlife, Radiation Travel Permit) required to successfully pass airport/cargo/customs inspection(s). KSC will provide X-ray exemption letter(s) detailing as necessary items to be transported that are of a sensitive nature (i.e., temperature, rotation, vibration, etc.).

Upon receipt into Logistics or at custodial turnover, PGOC Quality Assurance (QA) will perform a receiving inspection on the items being delivered to KSC. In general, the inspector will examine the items for ID and damage, any special inspection identified on the Receiving Inspection Procedure (RIP), non-conforming hardware, flight certifications, installed non-flight items, and parts tags.

Hardware being processed offline prior to custodial turnover to KSC is monitored by NASA QA. NASA QA performs an inspection of the hardware when KSC performs unpacking operations for the purposes of ID and damage. This inspection does not take the place of the RIP performed at custodial turnover. NASA QA also functions as the user's QA personnel when so delegated.

7.2.1.2.2 PAYLOAD DEVELOPER OFFLINE PROCESSING

After arrival at KSC, payload hardware and biological specimens are delivered to an offline area (such as a lab area of the SSPF, Hangar L, or the O&C) for the PD to use as their processing area. Facilities that are used for payload processing are described in K-STSM-14.1-LSAH, Launch Site Accommodations Handbook for Payloads; K-STSM-14.1.9, Facilities Handbook for Hangar L; and the Guide to Science Payload Processing.

Responsibility for preintegration activities rests with the PD; payload-provided GSE is typically used for these activities. The PD will provide KSC an experiment ready for interface verification testing and subsequent ISS carrier integration. PD payload processing offline area activities include:

A. Post-shipment inspection.

B. Experiment preparations (science/hardware preparations).

C. Final assembly, standalone functional checkout, etc.

KSC is responsible for scheduling and providing agreed-upon support services. Normal KSC support operations are one eight-hour shift per day, five days per week, with additional shifts scheduled as required to meet launch schedules. Schedule change notification should be given to KSC a minimum of 72 hours prior to scheduled operation.

If KSC payload support is required during Offline Processing Activities, then the PD shall provide the following information in Table 7.2.1.2.2-1, Offline Processing Activity:

A. Reference No. - *[Serialized tracking number that includes a payload acronym (Field length: 30 characters).]*

B. Processing Activity Description - *[Provide a brief description of each payload processing activity that requires support (Field length: 42,000 characters).]*

TABLE 7.2.1.2.2-1 OFFLINE PROCESSING ACTIVITY

Reference No.	Processing Activity Description

7.2.1.2.3 CUSTODIAL TURNOVER TO KSC

After offline operations are complete, the PD flight hardware is ready for custodial turnover to KSC for on-line integration and/or test. KSC performs a thorough review of the flight hardware and related Integration Data Package (IDP) or IDP Supplement to the Acceptance Data Package (ADP). The PD will have their IDP ready and delivered to KSC for review one week prior to turnover. IDP reviews begin approximately three (3) days prior to turnover for middeck experiments. Refer to Section 7.4.1 for a listing of the IDP contents. After the custodial turnover is performed, KSC has custodial responsibility for the PD flight hardware. Unless PD GSE, such as integration slings, hoisting and handling adapters, and special tools, is identified in the IDP as a requirement for integration, the PD GSE is usually not turned over to KSC. Calibrated PD-provided GSE shall be turned over with a valid calibration for the duration of processing. In Table 7.2.1.2.3-1, Payload Developer Turnover Item List, the PD shall itemize all equipment items (Flight and GSE) to be turned over to KSC.

A. Reference No. - *[Serialized tracking number that includes payload acronym (Field length: 30 characters).]*

B. Quantity - *[Enter number of same item to be returned (Field length: 3 characters).]*

C. Item Description - *[Narrative description of item to be returned, such as experiment equipment, film, sample, recorded voice or videotape, etc. (Field length: 60 characters).]*

D. Special Instructions - *[Enter special instructions for return, such as "hand over to local representative" or "pack and ship to designated address" (Field length: 400 characters).]*

The following items may be retrieved from or saved to the PDL Address Book:

E. Point Of Contact (POC):

1. POC First Name - *[Identify the individual who is the recipient of the returned item (Field length: 25 characters).]*
2. POC Last Name - *[Identify the individual who is the recipient of the returned item (Field length: 25 characters).]*
3. Organization - *[POC organization (Field length: 100 characters).]*

4. Street - *[POC street address (Field length: 40 characters).]*
5. Internal Mail Code - *[POC internal mail code (Field length: 30 characters).]*
6. City - *[POC city (Field length: 30 characters).]*
7. State/Province - *[POC state or province (Field length: 20 characters).]*
8. Zip/Postal Code - *[POC zip or postal code (Field length: 20 characters).]*
9. Country - *[POC country (Field length: 15 characters).]*
10. Phone Number - *[POC phone number (Field length: 30 characters).]*

TABLE 7.2.1.2.3-1 PAYLOAD DEVELOPER TURNOVER ITEM LIST

Reference No.	Quantity	Item Description	Special Instructions	Point of Contact

7.2.2 PREFLIGHT POST-TURNOVER SUPPORT

7.2.2.1 ONLINE SSPF PAYLOAD PROCESSING

7.2.2.1.1 ONLINE PAYLOAD INTEGRATION

Integration and handling activities will be under the overall management of NASA KSC and the KSC PGOC, with all PDs participating in test procedure development and implementation.

Physical integration begins after the custodial turnover of hardware to KSC. After turnover of the rack, EXPRESS payload, or attached payload, it is moved from the offline lab/area to the Intermediate Bay for physical integration. Physical integration encompasses all operations required to assemble and prepare a payload rack, attached payload, or middeck experiment for test and checkout and prelaunch operations. Physical integration includes all of the following activities: payload integration, flow balancing, fluid system leak checks, payload stowage, payload closeouts, and payload servicing/maintenance. This section covers all of the physical integration activities that occur in the SSPF (or Hangar L for some middeck experiments) prior to integration with the overall Station carrier or with the Orbiter. Various GSE is used by KSC during the process of physical integration in the SSPF. Rack GSE includes rack access stands, rack drawer handler, drawer delivery cart, avionics airflow balancing kit, helium mass spectrometer leak detector, portable vacuum pumps, and the Internal Thermal Control System (ITCS) water servicing unit. While not in the MPLM, racks are installed in a Rack Handling Adapter (RHA). Those racks that interface with the U.S. International Checkout Unit (USICU) are integrated in an RHA upper structure assembly with a KSC base assembly. Attached payload GSE includes the attached payload support stand, attached payload adapter sling, and generic slings/web straps/shackles. Unique GSE that is required to handle a payload/experiment is to be provided by the PD.

Middeck experiment GSE includes the middeck weight and center of gravity (cg) table, batteries, battery chargers, power control boxes and cables, cradles, transportation boxes, covers, and experiment transport vans. Some Middeck GSE is stored and maintained at Dryden Flight Research Center (DFRC) for alternate landing site support.

7.2.2.1.2 PAYLOAD INTERFACE TESTING

Experiment functional testing will be performed only to the extent required to verify new hardware and software interfaces established during KSC integration or required to verify joint operations with other experiments. Any other functional testing requirements or verifications that could not be performed at the PD’s facility before delivery to KSC shall be negotiated with KSC and shall be limited to the time allowed by the KSC schedule/milestones. Additionally, this testing will provide the payload experiment developer with some confidence in their instrument. Detailed testing requirements shall be identified in the KSC Technical Requirements Data Set (TRDS). Table 7.2.2.1.2-1, Interface and Testing Cross-Reference Matrix, will be completed by the CIM for each

payload, as required to reference major integration requirements. *[Alpha-numeric; field length: 400 characters.]*

A. Reference No. - *[Serialized tracking number that includes a payload acronym (Field length: 30 characters).]*

B. Description - *[Examples: Major processing operations or integrated test (Field length: 60 characters).]*

C. Phase of Integration - *[Examples: Offline, Online, On-orbit, Post Flight (Field length: 30 characters).]*

D. KSC Commit - *[Examples: Will Commit (WILCO), No WLCO (NOWLCO), or the procedure number accomplishing the requirement. See Section 7.3 for explanation of KSC Commit codes (Field length: 60 character).]*

E. KSC Commit Source - *[KSC input that indicates the support requirements document in which the KSC Commit supplier response resides (Field length: 50 characters).]*

TABLE 7.2.2.1.2-1 INTERFACE AND TESTING CROSS-REFERENCE MATRIX

Reference No.	Description	Phase of Integration	KSC Commit	Commit Source

7.2.2.1.3 PAYLOAD CLOSEOUT AND TRANSFER FOR STATION CARRIER INTEGRATION

After test operations are completed, closeout inspections are performed. These inspections include checking the payload for any sharp areas that could injure the crew, searching for any anomalies, and ensuring that the payloads meet cleanliness requirements. Closeout photos are also taken by KSC as a standard practice and need not be documented here as a payload-unique requirement. The PD shall identify any payload closeout requirements in the TRDS.

7.2.2.1.4 STATION CARRIER INTEGRATION

SSPF Integrated Operations are all SSPF activities involved with integrating payload hardware with a carrier (e.g., MPLM or Spacelab Pallet (SLP)). These operations begin when the payload hardware is transferred to the Launch Support (Lsu) Integration Processing Team (IPT) for integration with the carrier and conclude when the carrier leaves the SSPF. Payload activities that may occur during SSPF Integrated Operation include installation, interface verification (refrigerator/freezer racks only), servicing, stowage, and closeouts.

For racks in the MPLM, an opportunity exists approximately two and one-half months prior to launch for time-critical payload installation, stowage, servicing, and closeout

operations in the SSPF. Payload installation, stowage, and closeout operations are performed by KSC. The PD shall identify those time-critical requirements in the TRDS.

7.2.2.2 CANISTER/TRANSPORTER OPERATIONS

The payload/carrier (e.g., EXPRESS pallet payload) will be transferred into the payload canister for transportation to the Launch Pad. Environmental control and monitoring will be provided during transport. Detailed descriptions of the mechanical, electrical, and pneumatic systems contained in the canister are provided in 79K12170, Payload Canister Standard Interface Document. The PD should use this document as a design reference. When all payloads have been installed into the canister, the canister moves to the Canister Rotation Facility, where it is rotated 90 degrees for vertical transport to the Payload Changeout Room (PCR) at the Launch Pad.

7.2.2.3 ORBITER INTEGRATION

7.2.2.3.1 ORBITAL PROCESSING FACILITY MIDDECK OPERATIONS

Middeck experiments that are replacements for middeck lockers are fit checked during Orbiter operations in the Orbiter Processing Facility (OPF) prior to (or during) the flight Crew Equipment Interface Test (CEIT). These fit checks are performed for the first flight of an experiment and for subsequent flights, as required.

7.2.2.3.2 LAUNCH PAD

7.2.2.3.2.1 MIDDECK PROCESSING AND ORBITER INTEGRATION

After custodial turnover for flight of middeck experiments to KSC, the middeck experiments are cleaned and weight and cg (if required) are determined. In some cases, the weight and cg data provided at turnover by the PD may be used in lieu of KSC performing weight and cg operations. Experiments that require near-continuous power are switched over from facility power to battery power. The experiments are covered to maintain cleanliness and installed in a transportation box. Experiments that require a door-down orientation are installed into a cradle prior to installation into the transportation box. An experiment transport vehicle is then used to transport several experiments to the Launch Pad.

The Space Flight Operations Contractor (SFOC) has overall responsibility for payload installation into the Orbiter. The KSC test team will develop required procedures with input from the PD.

Payload activities at the Launch Pad occurring </= 72 hours (e.g., late Installation and Interface Verification Test (IVT)) are considered Space Shuttle Program (SSP) services. Installation and IVT requirements for time-critical middecks will be identified in the TRDS. Powered payloads will require an IVT.

7.2.2.3.2.2 PAYLOAD BAY OPERATIONS

The MPLM is processed in the SSPF and then transported to the Launch Pad, where it is vertically installed into the payload bay. During active missions, Refrigerator/Freezer Racks (R/FRs) are installed into the MPLM in the SSPF, but conditioned cargo must be installed in the MPLM during Late Access Operations. Late Access Operations are performed at the Launch Pad in the PCR with the MPLM powered and the payload bay doors open. If MPLM access is required at the Launch Pad for payload operations, then it is provided through the hatch using the Payload Late Access Kit (PLAK). The PD shall identify the requirements for conditioned cargo installation in the TRDS.

7.2.2.4 LAUNCH DELAY

If KSC support will be required for contingencies such as launch delay, scrub turnaround, or launch termination, then an understanding of these activities and/or refurbishment shall be developed during the planning phase. Removal and replacement of the payload will be at Space Shuttle Program (SSP) option and on a non-interference basis with Orbiter operations.

Operations performed in the event of a launch delay are based upon the unique requirements documented in the TRDS and the length of the delay. In general, short delays will only affect middeck experiments, but a lengthy delay (e.g., greater than two days) may affect items installed in the Orbiter payload bay. The customer will have sufficient personnel, supplies, and equipment on hand to facilitate a rapid turnaround.

For middecks, those time-critical experiments identified in the TRDS will be removed for return to the PD. For experiments that require near-continuous power, the experiments are switched over to battery power prior to experiment removal. The experiments are covered to maintain cleanliness and are installed in a transportation box. Experiments that require a door-down orientation are installed into a cradle prior to installation into the transportation box.

An experiment transport vehicle is then used to transport the middeck experiment to the required facility. Upon arrival at the offline lab, the experiments are taken off of battery power and turned over to the PD via Work Authorization Document (WAD) for experiment reactivation using facility power. The PD may then refurbish the experiment. The experiment is turned back over to KSC, along with an addendum to the IDP, for reinstallation into the Orbiter per the original timeline. For short launch delays, such as 24 hours, the time available for experiment refurbishment may necessitate replacement of samples at the Launch Pad in lieu of returning the hardware to the PD. Middecks must have redundant hardware and/or biospecimens in order to facilitate an exchange at the Launch Pad.

In the event of a lengthy launch delay, additional attached payload servicing, or the replacement of conditioned cargo samples in the MPLM, the following information may be required.

If KSC payload support is required during Online Processing Activities, then the PD shall provide the following information in Table 7.2.2.4-1, Online Processing Activities:

A. Reference No. - *[Serialized tracking number that includes a payload acronym (Field length: 30 characters).]*

B. Processing Activity Description - [Provide a brief description of each payload processing activity that requires support (Field length: 2000 characters).]

TABLE 7.2.2.4-1 ONLINE PROCESSING ACTIVITIES

Reference No.	Processing Activity Description

7.2.3 ON-ORBIT GROUND PROCESSING ACTIVITIES

PDs who remain in the science support labs during the mission often conduct ground control experiments also monitor their experiment operations using downlink communications. PDs have an option of using real-time or non-real-time environmental data from a Space Shuttle flight during a ground control experiment. Environmental simulators, one a walk-in area and one a reach-in area, provide environmental parameters, including temperature, humidity, and carbon dioxide changes, which are recorded and downlinked during flight.

If KSC payload support is required during On-Orbit Ground Processing Activities, the PD shall provide the following information in Table 7.2.3-1, On-Orbit Ground Processing Activities:

A. Reference No. - *[Serialized tracking code that includes a payload acronym (Field length: 30 characters).]*

B. Processing Activity Description - [Provide a brief description of each payload processing activity that requires support (Field length: 2000 characters).]

TABLE 7.2.3-1 ON-ORBIT GROUND PROCESSING ACTIVITIES

Reference No.	Processing Activity Description

7.2.4 POST-FLIGHT PROCESSING ACTIVITIES

7.2.4.1 NOMINAL LANDING PROCESSING

After safety approval, normally within 45 minutes after landing at KSC, a conditioned GSE purge is provided to the payload bay. If landing is at KSC, Shuttle Landing Facility (SLF) time-critical middeck experiments identified in the TRDS are removed prior to Orbiter tow; then the Orbiter is then towed to the OPF, jacked, and leveled; remaining middeck items are removed; and safing/deservicing operations are completed. The remaining payloads are then removed from the payload bay and transported to the appropriate area for return to the ISS Program.

At DFRC, time-critical middeck experiments identified in the TRDS are removed prior to Orbiter tow and the Orbiter is towed to a safing/deservicing area. Following jacking and leveling, the remaining middeck items are removed and turned over to the PD representative at a predetermined location for post-flight processing or shipment to the customer's laboratory and safing and deservicing operations are completed. The Orbiter, with the payload aboard, is mated to the Shuttle Carrier Aircraft (SCA) for return to KSC. After arrival at KSC, the Orbiter is demated from the SCA and towed to the OPF. Following Orbiter jacking and leveling operations in the OPF, the payload is removed from the Orbiter and transported to the appropriate area for deintegration and return to the ISS Program. Normally, payload removal occurs approximately five days after the Orbiter arrives at the OPF.

7.2.4.2 OFF-NOMINAL LANDING PROCESSING

Should an aborted flight land at KSC or at DFRC, the SSP will remove the middeck experiments using its best efforts. If an aborted flight lands at a site other than KSC or DFRC, then the experiments stowed in the Orbiter middeck will be removed and turned over to the PD's custody at that landing site, or will be returned by the SSP separately to the launch site for custodial turnover to the PD.

If an aborted flight lands at a site other than KSC, then all returned payload complement hardware in the MPLM will nominally remain onboard the Orbiter for ferry to the launch site via the SCA. However, because of non-primary landing site locations, weight, cg, safety considerations, or mission-unique requirements, portions or all of the MPLM may be removed from the Orbiter payload bay, deintegrated (if required), and

transported in ISS Program-provided shipping containers by the ISS Program to the launch site.

An Early End of Mission (EEOM) occurs if a flight lands at KSC or DFRC before the planned End of Mission (EOM). In this case, the SSP will remove and disposition the payload using its best efforts, unless the payload requires EEOM support, which is identified in the TRDS.

7.2.4.2.1 MIDDECK EARLY REMOVAL (KSC OR DFRC)

Time-critical middeck experiments are removed from the Orbiter on the runway as identified in the TRDS. For experiments that require near-continuous power, the experiment is switched over to battery power prior to experiment removal. The experiments are covered to maintain cleanliness, if required, and are installed in a transportation box. Experiments that require a door-down orientation are installed into a cradle prior to installation into the transportation box. An experiment transport vehicle is then utilized to transport several middeck experiments to the required facility. Upon arrival at the offline lab, the experiments are taken off of battery power and turned over to the PD for experiment reactivation using facility power.

7.2.4.2.2 MPLM EARLY ACCESS IN OPF

For all active missions, the MPLM services are connected while the Orbiter is on the landing strip. When landings occur at KSC, the primary landing site, conditioned cargo is removed in the OPF with the payload bay doors open. At KSC, activities in the Payload Bay (PLB) begin when the Payload Bay Doors (PLBDs) are opened, approximately five days after arrival at the OPF.

Conditioned cargo removal is performed. Dry nitrogen dewars and drawer transport containers (may be dewars) are used to transport of the Cryogenic Storage Freezer (CSF) and Minus Eighty Degree Laboratory Freezer for the ISS (MELFI) samples from the OPF to the required payload facility. The samples are then turned over to the PD.

7.2.4.2.3 MPLM EARLY ACCESS AT DFRC

For all active missions, the MPLM services are connected while the Orbiter is on the landing strip. When landings occur at the alternate landing site (i.e., DFRC), conditioned cargo is removed at the Mate/Demate Device (MDD) with the payload bay doors closed. At DFRC, MPLM access is provided via the Dryden Early Access Platform (DEAP) approximately four days after landing.

Conditioned cargo removal is performed. Dry nitrogen dewars and drawer transport containers (may be dewars) are used to transport the CSF and MELFI samples from the MDD to the required payload facility. The samples are then turned over to the PD.

7.2.4.3 ORBITER/STATION CARRIER DEINTEGRATION

Upon completion of all early access requirements, the payload/carrier is removed, installed into the canister, and transported to the SSPF. Normally, the returning hardware may be expected at the SSPF seven days after Orbiter arrival at the OPF.

7.2.4.3.1 MPLM DEINTEGRATION

The MPLM is installed into the Element Rotation Stand in the High Bay. After gaining access to the MPLM, there is an opportunity for payload destow activities prior to rack removals. Racks are then removed from the MPLM using the Rack Insertion Device (RID) and installed in a rack handling adapter.

The carrier (if required) or attached payload is removed from the Orbiter in the OPF, loaded into the canister, and transported to the SSPF High Bay. Attached payloads and EXPRESS payloads are then removed from the carrier, if required.

7.2.4.4 EXPERIMENT DEINTEGRATION

Physical deintegration encompasses all operations required to disassemble and custodial turnover a payload rack, EXPRESS payload, or attached payload to the PD. Physical deintegration includes the following activities: payload deintegration, payload destowage, and payload custodial turnover to the PD or shipment back to the PD. If the payload is turned over to the PD for offline operations at KSC, there is a custodial turnover meeting. The IDP or IDP Supplement to the ADP is updated.

When a payload has a post-flight powered maintenance requirement, test requirement, or returns to the ground with an unresolved In-Flight Anomaly (IFA), the Utilization Integrated Processing Team (UIPT) will support post-flight testing as required. In some cases, a KSC online test may be performed as the quickest and best way to troubleshoot an IFA on a payload while maintaining the highest level of interface integrity. A KSC post-flight online test would not be performed for a payload in which the IFA-related interface has already been broken in order to transport it back to Earth or for an IFA with a low priority for resolution. Any Problem Reporting and Corrective Action (PRACA)-related photos for returning hardware are taken by KSC as standard practice and need not be documented here as a payload-unique requirement.

7.2.4.5 POST-FLIGHT TURNOVER TO PAYLOAD DEVELOPER AND RETURN SHIPPING

The PD is responsible for coordinating with KSC support personnel all special, sensitive, or unique transportation or shipping activities. Items to be returned to the PD at the post-flight turnover may include experiment hardware, science samples, crew exposed film, or other PD-requested items. List these items (equipment, samples, film negatives, etc.) in Table 7.2.4.5-1, Payload Developer Return Item List, below. This table will be used to support post-flight hardware disposition.

A. Reference Number - *[Serialized tracking number that includes payload acronym (Field length: 30 characters).]*

B. Quantity - *[Enter number of same item to be returned (Field length: 3 characters).]*

C. Item Description - *[Narrative description of item to be returned, such as experiment equipment, film, sample, recorded voice or video tape, etc. (Field length: 60 characters).]*

D. Special Instructions - *[Enter special instructions for return, such as "hand over to local representative" or "pack and ship to designated address" (Field length: 400 characters).]*

The following items may be retrieved from or saved to the PDL Address Book:

E. Point of Contact

1. POC First Name - *[Identify the individual who is the recipient of the returned item (Field length: 25 characters).]*
2. POC Last Name - *[Identify the individual who is the recipient of the returned item (Field length: 25 characters).]*
3. Organization - *[POC organization (Field length: 100 characters).]*
4. Street - *[POC street address (Field length: 40 characters).]*
5. Internal Mail Code - *[POC internal mail code (Field length: 30 characters).]*
6. City - *[POC city (Field length: 30 characters).]*
7. State/Province - *[POC state or province (Field length: 20 characters).]*
8. Zip/Postal Code - *[POC zip or postal code (Field length: 20 characters).]*
9. Country - *[POC country (Field length: 15 characters).]*
10. Phone Number - *[POC phone number (Field length: 30 characters).]*
11. Fax Number - *[POC fax number (Field length: 30 characters).]*
12. E-mail Address - *[POC e-mail address (Field length: 50 characters).]*

TABLE 7.2.4.5-1 PAYLOAD DEVELOPER RETURN ITEM LIST

Reference Number	Quantity	Item Description	Special Instructions	Point of Contact

Equipment items to be hand-carried from KSC by a payload representative shall be accompanied with a KSC-provided Form DD-1149 for property accountability. This accountability form is to be presented to NASA or United States Air Force (USAF) Security if the PD is stopped at a security checkpoint when exiting KSC or Cape Canaveral Air Force (CCAF) Base. The DD-1149 is provided by the Payload Ground Operations Contractor (PGOC) Transportation Office, located in SSPF Room 1289C.

If KSC payload support is required during Post-Flight Processing Activities, then the PD shall provide the following information in Table 7.2.4.5-2, Post-Flight Processing Activity:

A. Reference No. - *[Serialized tracking number that includes a payload acronym (Field length: 30 characters).]*

B. Processing Activity Description - *[Provide a brief description of each payload processing activity that requires support (Field length: 2000 characters).]*

TABLE 7.2.4.5-2 POST-FLIGHT PROCESSING ACTIVITY

Reference No.	Processing Activity Description

7.3 SUPPORT REQUIREMENTS

The following Support Requirements Tables are for PD entry of support requirements that are directly related to the payload processing operations in a launch campaign. These requirements are mission-specific and are phased by a typical sequence of prelaunch and post-landing activities that are associated with the type of PD equipment (e.g., facility rack, middeck, attached, or science simulation). Information is initially provided by the PD and then reviewed by KSC Launch and Landing Site personnel.

Each table line entry initiated by the PD is considered a separate, unique “requirement” for support. For each requirement, the Support Requirements Data Set table format includes fields for the following:

A. PDL system entry: Requirement number.

B. PD entry: Requirement, specification (description) of requirement, quantity, processing phase during which requirement is needed.

C. KSC entry: KSC Commit, Commit Information, Commit Source, and facility and room assignments.

Requirements submitted by the PD must be complete and detailed. For each requirement, the corresponding “Specification” and “Quantify” data set field must be completed.

Each requirement initiated by the PD will be assigned its own unique tracking number, designed to identify requirements by several criteria, as indicated in Figure 7.3-1, Support Requirements Tracking Number Format. Certain fields will be automatically completed by PDL, including Payload Acronym and Sequential Number. Based on Options selected by the PD, other fields will also automatically be completed by PDL, such as the Operations Phase and Requirement Category. The PD will enter data in fields for experiment subteam name (to identify requirements for specific experiment subteams, if applicable; Processing Support for Flight Hardware, Flight Science, or Simulation; and general Processing Location (KSC or Dryden). KSC will complete the Requirement number with the Program Requirements Document (PRD)/Ground Support Requirements Document (GSRD) code and later assign a specific processing location.

The support commitments and responses for KSC Launch and Landing payloads are as follows:

WILCO - Will commit. Used when the supplier can commit to a requirement within budget, schedule, and manpower.

NOWLCO - No WILCO. Used when the supplier cannot support a requirement because of budget, schedule, or manpower constraints.

NOACK - No acknowledgement. The supplier has not yet responded to the requirement.

NOCMT - No commit. Used when the supplier cannot commit to a requirement because of insufficient information.

OP - Optional service.

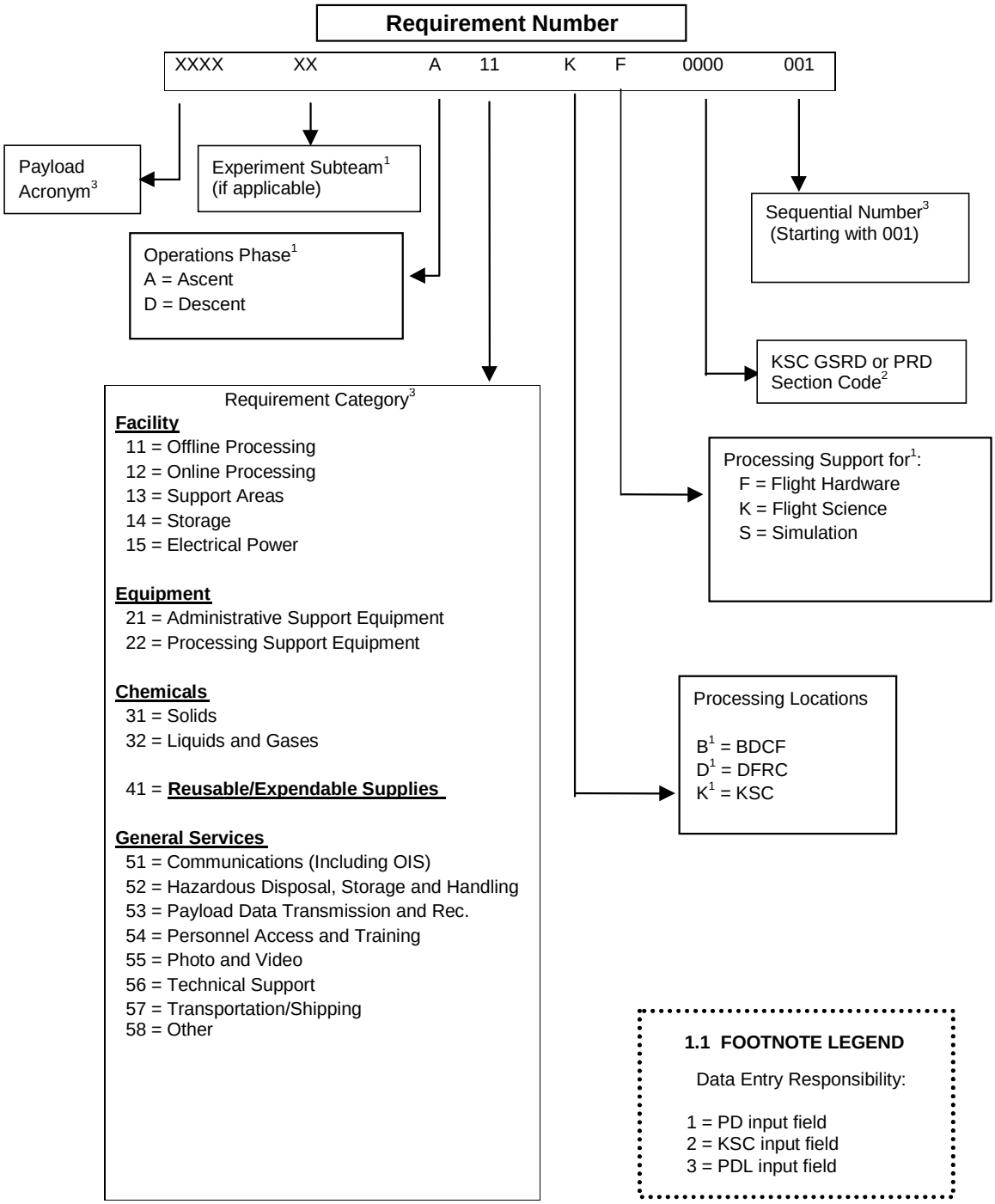


FIGURE 7.3-1 SUPPORT REQUIREMENTS TRACKING NUMBER FORMAT

7.3.1 FACILITY SUPPORT REQUIREMENTS

If the PD has a need for Facility Support Requirements (including offline processing, online processing, user room area, storage, and electrical power support), then the PD shall provide the information in Table 7.3.1-1, Facility Support Requirements:

A. Requirement Number (Req. No.) - *[Provide a unique number assigned to each specific requirement, consisting of various elements, as detailed in Table 7.3-1 (Field length: 30 characters).]*

B. Requirement - *[Specify the type of requirement needed. Should include off-line and online processing areas, general and special laboratories, user rooms, office areas, storage for particular types of flight hardware and equipment, and the electrical power (120 Volt Alternating Current (Vac) 3-phase, 15A, 60 Hertz (Hz)) required for each requested area (Field length: 40 characters).]*

C. Specifications - *[Provide the detailed technical information necessary to fully describe the requirement. For example, specify the environmental parameters (temperature, relative humidity, and cleanliness); special physical constraints (door size, maximum hook height, ceiling height); area access (security, QA); specifications of items to be stored, specify support furniture and equipment (phones, copiers, fax access, tables, chairs, cabinets); and indicate processing area for each electrical power requirement (Field length: 350 characters).]*

D. Quantity - *[Specify the quantity desired of requirement listed (Field length: 6 numeric).]*

E. Units - *[Predetermined value or list of applicable units for the requirement (Field length: 10 characters).]*

F. Processing Activity - *[Select from: Offline, Online, On-Orbit, Post Flight (Field length: 20 characters).]*

G. L- Days From - *[In L-/Launch plus (L+) days or Return plus (R+) days, specify the initial payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

H. L- Days To - *[In L-/L+ days or R+ days, specify the final payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

I. Comments - *[Enter here any other useful, clarifying information that is not provided in any of the other fields (Field length: 150 characters).]*

J. KSC Commit - *[KSC code representing the assessment of KSC capability to satisfy the support requirement (Field length: 20 characters).]*

K. KSC Commit Information - *[KSC input that provides more information about the commit (Field length: 350 characters).]*

L. KSC Commit Source - *[KSC input that indicates the support requirements document in which the KSC commit supplier response resides (Field length: 50 characters).]*

M. Facility - *[KSC Processing Facility assigned to the payload (Field length: 20 characters).]*

N. Room - *[Processing Facility Room assigned to the payload (Field length: 10 characters).]*

The following item only appears in PDL forms or tables for KSC GSRD authorized users:

O. Cost - *[KSC input that reflects cost of requested item (Field length: 6 numeric).]*

TABLE 7.3.1-1 FACILITY SUPPORT REQUIREMENTS

Req. No.	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
Offline Processing													
Online Processing													
Support Areas													
Storage (Flight Hardware, GSE, Special Test Equipment)													
Electrical Power													

[See Appendix D, Section D-4, Table D.4-1, for an example of a completed form.]

7.3.2 KSC GSE AND SPECIAL TEST/LAB REQUIREMENTS

If the PD has a need for Equipment Support Requirements (including KSC GSE support, and special test equipment support), then the PD shall provide the following information in Table 7.3.2-1, KSC GSE/Special Test/Lab Equipment Support Requirements:

A. Requirement Number (Req. No.) - *[A unique number assigned to each specific requirement, consisting of various elements, as detailed in Table 7.3-1 (Field length: 30 characters).]*

B. Requirement - *[Specify the type of requirement needed, processing support equipment. Processing support equipment includes KSC-provided GSE (such as fluids and gases GSE, access, handling and mechanical GSE, and test equipment); LSE (such as aquariums, balances, laminar flow benches, centrifuges, incubators, freezers, microscope systems, refrigerators, regulators, tables, Ultraviolet (UV) lights, water bath); and special equipment (such as sterilizers, autoclaves, facility-ducted fumehoods, vacuum vents, environmental chambers, walk-in freezers, etc.) (Field length: 40 characters).]*

C. Specification - *[Provide a short description of the actual support requirement. For a particular requirement, the detailed technical information necessary to fully describe the requested support should be supplied. For example, specify the furniture and office equipment needed (area required in square feet, number of people, quantity of desks, chairs, tables, book shelves, cabinets, etc.); number of telephones, voice lines, etc. If there is a preferred outside vendor for GSE/test equipment, then please identify them, along with the equipment part number. Some GSE resources are provided through Fleet Resource Management (FRM). These assets are scheduled through payload-unique PIA Addendum Section 3.2, Program-Furnished Equipment. These would include items such as forklifts, cranes, dollies, carts, hydra sets, leak detectors, workbenches, power supplies, MultiMates, vacuum GSE, accelerometers, temperature and humidity recorders, toxic vapor detectors, He detectors, particle counters, plant growth chambers, exhaust hoods, laminar flow benches, etc. (Field length: 350 characters).]*

D. Quantity - *[Specify the quantity desired of requirement listed (Field length: 20 characters).]*

E. Units - *[Predetermined value or list of applicable units for the requirement (Field length: 10 characters).]*

F. Processing Activity - *[Select from: Offline, Online, On-Orbit, Post Flight (Field length: 20 characters).]*

G. L- Days From - *[In L-/L+ days or R+ days, specify the initial payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

H. L- Days To - *[In L-/L+ days or R+ days, specify the final payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

I. Comments - *[Enter here any other useful, clarifying information that is not provided in any of the other fields (Field length: 150 characters).]*

J. KSC Commit - *[KSC-provided code representing the assessment of KSC capability to satisfy the support requirement (Field length: 20 characters).]*

K. KSC Commit Information - *[KSC input that provides more information about the commit (Field length: 350 characters).]*

L. KSC Commit Source - *[KSC input that indicates the support requirements document in which the KSC Commit supplier response resides (Field length: 50 characters).]*

M. Facility - *[KSC Processing Facility assigned to the payload (Field length: 20 characters).]*

N. Room - *[Processing Facility Room assigned to the payload (Field length: 10 characters).]*

The following item only appears in PDL forms or tables for KSC GSRD authorized users:

O. Cost - *[KSC input that reflects cost of requested item (Field length: 6 numeric).]*

TABLE 7.3.2-1 KSC GSE/SPECIAL TEST/LAB EQUIPMENT SUPPORT REQUIREMENTS

Req. No.	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
KSC GSE and Special Test/Lab Equipment													

[See Appendix D, Section D-4, Table D.4-2, for an example of a completed form.]

7.3.3 DRY CHEMICALS, LIQUIDS, AND GASES SUPPORT REQUIREMENTS

If the PD has a need for Chemical Support Requirements (including all chemical and fluid supplies to be used at KSC, those requested from KSC by the PD, chemicals shipped to KSC by the PD, and chemicals produced by PD processes during processing operations), then the PD shall provide the following information in Table 7.3.3-1, Dry Chemicals, Liquids, and Gases Support Requirements. (Refer to SSP 30573, Space Station Program Fluid Procurement and Use Control Specification, for additional information concerning fluid specifications.)

A. Requirement Number (Req. No.) - *[Provide a unique number assigned to each specific requirement, consisting of various elements, as detailed in Table 7.3-1 (Field length: 30 characters).]*

B. Requirement - *[Specify the type of requirement needed, such as chemicals (e.g., acids, bases, buffers, dry ice, dyes/stains, epoxy resins, fixatives, ice, radioisotopes, as well as specialty compounds) and include "fluids" (e.g., gaseous helium, dry nitrogen, liquid nitrogen, oxygen, dry air, etc.) (Field length: 40 characters).]*

C. Specification - *[Specify the concentration, Military (MIL) spec, Pounds per Square Inch (PSI), vendor (name, address, telephone), and if equivalent is acceptable (Field length: 350 characters).]*

D. Quantity - *[Specify the quantity desired of requirement listed (Field length: 6 numeric).]*

E. Units - *[Predetermined value or list of applicable units for the requirement (Field length: 10 characters).]*

F. Processing Activity - *[Select from: Offline, Online, On-Orbit, Post Flight (Field length: 20 characters).]*

G. L- Days From - *[In L-/L+ days or R+ days, specify the initial payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

H. L- Days To - *[In L-/L+ days or R+ days, specify the final payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

I. Comments - *[Enter here any other useful, clarifying information that is not provided in any of the other fields (Field length: 150 characters).]*

J. KSC Commit - *[KSC-provided code representing the assessment of KSC capability to satisfy the support requirement (Field length: 20 characters).]*

K. KSC Commit Information - *[KSC input that provides more information about the commit (Field length: 350 characters).]*

L. KSC Commit Source - *[KSC input that indicates the support requirements document in which the KSC Commit supplier response resides (Field length: 50 characters).]*

M. Facility - *[KSC Processing Facility assigned to the payload (Field length: 20 characters).]*

N. Room - *[Processing Facility Room assigned to the payload (Field length: 10 characters).]*

The following item only appears in PDL forms or tables for KSC GSRD authorized users:

O. Cost - *[KSC Input that reflects cost of requested item (Field length: 6 numeric).]*

TABLE 7.3.3-1 DRY CHEMICALS, LIQUIDS, AND GASES SUPPORT REQUIREMENTS

Req. No.	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room

[See Appendix D, Section D-4, Table D.4-3, for an example of a completed form.]

7.3.4 REUSABLE AND EXPENDABLE SUPPLY SUPPORT REQUIREMENTS

If the PD has a need for Reusable and Expendable Supply Requirements, then the PD shall provide the following information in Table 7.3.4-1, Reusable and Expendable Supply Support Requirements:

A. Requirement Number (Req. No.) - *[Provide a unique number assigned to each specific requirement, consisting of various elements, as detailed in Figure 7.3-1 (Field length: 30 characters).]*

B. Requirement - *[Specify the type of requirement needed, such as centrifuge tubes, film, glassware, gloves, ice packs, paper towels, parafilm, pipets, plasticware, etc., and reusable items such as clean room garments. The table does not require the PD to differentiate which supplies are expendable vs. reusable (Field length: 40 characters).]*

C. Specification - *[Provide a short description of the actual support requirement. For a particular requirement, the detailed technical information necessary to fully describe the requested support should be supplied. If there is a preferred outside vendor for the supplies, then please identify them, along with the equipment part number. Also indicate if equivalent substitutes are acceptable (Field length: 350 characters).]*

D. Quantity - *[Specify the quantity desired of requirement listed (Field length: 6 numeric).]*

E. Units - *[Predetermined value or list of applicable units for the requirement (Field length: 10 characters).]*

F. Processing Activity - *[Select from: Offline, Online, On-Orbit, Post Flight (Field length: 20 characters).]*

G. L- Days From - *[In L-/L+ days or R+ days, specify the initial payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

H. L- Days To - *[In L-/L+ days or R+ days, specify the final payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

I. Comments - *[Enter here any other useful, clarifying information that is not provided in any of the other fields (Field length: 150 characters).]*

J. KSC Commit - *[KSC-provided code representing the assessment of KSC capability to satisfy the support requirement (Field length: 20 characters).]*

K. KSC Commit Information - *[KSC input that provides more information about the commit (Field length: 350 characters).]*

L. KSC Commit Source - *[KSC input that indicates the support requirements document in which the KSC Commit supplier response resides (Field length: 50 characters).]*

M. Facility - *[KSC Processing Facility assigned to the payload (Field length: 20 characters).]*

N. Room - *[Processing Facility Room assigned to the payload (Field length: 10 characters).]*

The following item only appears in PDL forms or tables for KSC GSRD authorized users:

O. Cost - *[KSC input that reflects cost of requested item (Field length: 6 numeric).]*

TABLE 7.3.4-1 REUSABLE AND EXPENDABLE SUPPLY SUPPORT REQUIREMENTS

Req. No.	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit Source	KSC Commit Information	KSC Commit	Facility	Room

[See Appendix D, Section D-4, Table D.4-4, for an example of a completed form.]

7.3.5 GENERAL SERVICES SUPPORT REQUIREMENTS

If the PD has a need for General Services Support Requirements (including requirements for payload data transmission and recording; transportation/shipping; photographic and video support; communications; personnel access and training requirements; and hazardous disposal, storage, and handling), then the PD shall provide the following information in Table 7.3.5-1, General Services Support Requirements:

A. Requirement Number (Req. No.) - *[Provide a unique number assigned to each specific requirement, consisting of various elements, as detailed in Table 7.3-1 (Field length: 30 characters).]*

B. Requirement - *Select the type of requirement needed from the list provided for each of the following categories:*

   1. Communications - *[Ethernet connection, fax lines, headsets, Internet Protocol addresses, network access, Operational Intercommunication System - Digital (OIS-D) units, phone lines, two-way radio, TV/Video circuits, video monitors, voice channels (dedicated).]*

   2. Hazardous Disposal, Storage, and Handling - *[Liquid and solid biomedical and/or chemical, disposal, radioactive waste disposal, sharps disposal, other.]*

   3. Payload Data Transmission and Recording - *[audio, data, or video recording; data circuits; timing and countdown displays; etc.]*

   4. Personnel Access and Training - *[Access to CCAF, cleanroom access, KSC Industrial Area, laboratory access, OIS-D communication, OPF, PAD, other.]*

   5. Photographic and Video Support - *[35-mm or digital photography, video support, etc.]*

   6. Technical Support - *[Services such as calibration, chemical analysis, decontamination, Electromagnetic Interference (EMI), environmental monitoring, foam cutting, leak/vapor detection, machining, precision cleaning, specimen preparation, technician support, Quality support, X-ray lab, etc.]*

   7. Transportation/Shipping Receiving - *[packing, unpacking, receiving, shipping services, payload/personnel transportation.]*

   8. Other Type of General Services *Support - [Requirements not covered in any other form (Field length: 40 characters).]*

C. Specification - *[Provide a short description of the actual support requirement depending on the support categories as identified (Field length: 350 characters each).]*

   1. Communications - *[Provide specific information concerning location of requirements for payload-unique voice OIS end units and voice channels. Identify OIS headset requirements. Identify desired locations of dedicated*

telephone lines, ethernet drops, video circuits, and Internet Protocol addresses (Field length: 350 characters).]

2. Hazardous Disposal, Storage, and Handling - *[Identify hazardous materials and controlled substances, support services required (container, disposal, monitoring, storage) and quantities to be handled.]*

3. Payload Data Routing and Recording - *[Provide specific locations (circuit source and destinations), quantity, desired recording media, delivery POC, etc.]*

4. Unescourted Access and Training - *[Specify number of people needing escorted and/or unescorted access for each area. Training will be determined based on areas and types of access.]*

5. Photographic and Video Support - *[Type, size, quantity of prints, contact sheets, slides, videotapes, color, black and white, etc.]*

6. Technical Support - [*Specify detail and quantity of items to be serviced, frequency of service, reports required, technical POCs, etc.]*

7. Transportation/*Shipping/Receiving - [Specify transportation assistance required, special handling constraints/techniques, and environmental considerations (temperature, cleanliness, humidity, etc.). Also, indicate if the requirement involves shipping of animals, plants, or other perishable cargo. Detailed information concerning items to be shipped must be provided in Table 7.2.4.5-1.]*

8. Other type of General Services Support - *[Provide specific information concerning quantity, location, etc.]*

D. Quantity - *[Specify the quantity desired of requirement listed (Field length: 6 numeric).]*

E. Units - *[Predetermined value or list of applicable units for the requirement (Field length: 10 characters).]*

F. Processing Activity - *[Select from: Offline, Online, On-Orbit, Post Flight (Field length: 20 characters).]*

G. L- Days From - *[In L-/L+ days or R+ days, specify the initial payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

H. L- Days To - *[In L-/L+ days or R+ days, specify the final payload processing flow time period for which this particular support is required (Field length: 5 characters).]*

I. Comments - *[Enter here any other useful, clarifying information that is not provided in any of the other fields (Field length: 150 characters).]*

J. KSC Commit - *[KSC-provided code representing the assessment of KSC capability to satisfy the support requirement (Field length: 20 characters).]*

K. KSC Commit Information - *[KSC input that provides more information about the commit (Field length: 350 characters).]*

L. KSC Commit Source - *[KSC input that indicates the support requirements document in which the KSC Commit supplier response resides (Field length: 50 characters).]*

M. Facility - *[KSC Processing Facility assigned to the payload (Field length: 20 characters).]*

N. Room - *[Processing Facility Room assigned to the payload (Field length: 10 characters).]*

The following item only appears in PDL forms or tables for KSC GSRD authorized users:

O. Cost - *[KSC Input that reflects cost of requested item (Field Length: 6 numeric).]*

TABLE 7.3.5-1 GENERAL SERVICES SUPPORT REQUIREMENTS

Req. No	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
Communications (Including OIS-D)													
Hazardous Disposal, Storage, and Handling													
Payload Data Routing and Recording													
Unescorted Access and Training Requirements													
Photographic and Video Support													
Technical Support													
Transportation/Shipping/Receiving													
Other General Services													

[See Appendix D, Section D.4, Table D.4-5, for an example of a completed form.]

7.4 KSC-REQUIRED CUSTOMER DELIVERABLE DOCUMENTS

PDs are required to submit documents and forms, such as the Ground Safety Data Package or selected environmental permits, waste management forms, questionnaires, and medical certificates relating to PD-specific payload processing at KSC or at the DFRC alternate landing site.

These documents and forms are provided by KSC, either in hardcopy or by direction to an appropriate website (as available). As early as possible in the Data Set Review phase, KSC will place a "YES" in the "PD Applicable" column of Table 7.4-1, Customer Deliverable Documents, to indicate documentation and forms to be completed and submitted by the PD.

A. PD Applicable? *[Yes or No (KSC entered field).]*

B. Item - *[Name of customer deliverable document (Field length: 500 characters).]*

C. Requirement Reference - *[References include Shuttle, Station, or KSC applicable documents (Field length: 200 characters).]*

D. Template Submittal Time - *[Planning template for document due date referenced from years, months, or days prior to planned launch site activity (Field length: 20 characters).]*

E. Need Date - *[Calendar need date is calculated by PDL using template lead time for delivery referenced to baselined calendar date for planned launch (Field length: 11 characters).]*

F. Status/Comments - *[Field for providing status of deliverable, such as "open item" or "received" or comments. (Field length: 200 characters).]*

7.4.1 INTEGRATION DATA PACKAGE CONTENTS

The PD must have their Integration Data Package (IDP) ready and delivered for review by KSC approximately one week prior to custodial turnover for on-line integration and/or test. Mission Peculiar Equipment (MPE) and integrated stowage assemblies (excluding middeck payloads) do not require individual IDPs. However, a list of Shortages, Identification/Drawings, Limited Operating Life/Age Sensitive Items, and Proofload/Calibration Data and Diagrams from Table 7.4.1-1; and any other relevant information must be detailed and accompany the respective shippers. Payload-unique Ground Support Equipment (GSE) turned over to KSC should be detailed in the related Payload IDP. The contents of the IDP are listed in Table 7.4.1-1, KSC Integration Data Package Contents. For payload hardware that already has an associated ADP, a separate IDP or the original ADP plus an IDP supplement will be submitted to KSC prior to custodial turnover. The IDP supplement sections closely mirror the ADP sections so that in most cases only the appropriate section cross references need to be identified. ADP Section XIII (Pressure Vessel Data), Section XVII Material Safety Data Sheet (MSDS), and Section XVIII (Acceptance Requirements) are the only ADP Sections not required by the IDP supplement. IDP supplement Section 14 (Operating Test

Procedures), Section 16 (Open Items from Phase III Ground Safety Review), Section 18 (Software Configuration), Section 19 (IDP Return Preference), and Section 20 (ESD Sensitivity) are the only totally new sections that are not already addressed in a standard ADP. The contents of the IDP supplement are listed in Table 7.4.1-2, KSC Integration Data Package Supplement Contents.

TABLE 7.4-1 CUSTOMER DELIVERABLE DOCUMENTS (PAGE 1 OF 2)

PD Applicable? (Y/N)	Item	Requirement Reference	Template Submittal Time	Need Date <TBR 7-1>	Status/ Comments
	Phase 0/1 Safety Package Submittal **(see note 1)**	KHB 1700.7	1.5 years Prior to arrival		
	Institutional Animal Care and Use Committee forms	NPG 8910.1	1 year prior to arrival		
	KSC Support Requirements Customer submits **(see note 2)**	K-CM-05.3.2	12 months prior to launch		
	Phase 2 Safety Package Submittal **(see note 1)**	KHB 1700.7	9 months prior to arrival		
	Personnel Badging-Foreign Nationals (PRP input)/NASA Accreditation Request	K-CM-05.3.2	6 months prior to arrival		
	Proof Primary Animal Direct (PAD) Physical for Animal Use	KSC ACUM	6 months before need date		
	Payload Operations Network (PON) Connection Request and Account Information Sheet	K-CM-05.3.2	6 months prior to arrival		
	Network Connections (LSSC)	GSRD	6 months prior to arrival		
	U.S. Center for Disease Control Permit to Import or Transport Agents or Vectors of Human Disease	KCM-05.3.2	4 months prior to need date		
	United States Department of Agriculture (USDA): Specimen Import Permits	KCM-05.3.2	4 months prior to need date		
	United States Fish and Wildlife Service (USFWS), Specimen Import Permits	USFWS	4 months prior to need date		
	Florida Fish and Wildlife Conservation Commission Restricted Non-Native Aquatic Species Permit Application (Import or Display)	KCM-05.3.2	4 months prior to need date		
	Radiation Source (ionizing and non-ionizing)	KMI 1860.1	90 days prior to use		
	Pad Contingency Procedure/Plan	K-CM-05.3.2	90 days prior to first use		
	Phase 3 Ground Safety Package **(see note 1)**	KHB 1700.7	75 days prior to arrival		

TABLE 7.4-1 CUSTOMER DELIVERABLE DOCUMENTS (PAGE 2 OF 2)

PD Applicable? (Y/N)	Item	Requirement Reference	Template Submittal Time	Need Date <TBR 7-1>	Status/ Comments
	Material Safety Data Sheets	KMI 1800.3	60 days prior to arrival		
	Process Waste Questionnaires	KMI 1800.2	60 days prior to arrival		
	Program Assignment of Single POC for Waste Management	K-CM-05.3.2	60 days prior to arrival		
	Tool Control Plan	KHB 5310.1D	60 days prior to arrival		
	Request for Shipping Document	KSS-12.17 Rev B	up to 45 days prior to need date		
	KSC/Dryden Badging Request (Submit to resident office of sponsoring Center)	K-CM-05.3.2	45 days prior to arrival		
	Final Arrival/transportation plans and schedules for SE and Flight hardware	K-CM-05.3.2	45 days prior to arrival		
	Hurricane Plan	JHB 2000	45 days prior to arrival		
	Work Time Policy Letter and Work Time Plans	KHB 1710.2	45 days prior to arrival		
	Customer Standalone Procedures	KHB 1710.2	40 days prior to first use		
	Health Examination Request/Report (to obtain physical certifications for cranes, doors, runway operations)	K-CM-05.3.2	30 days prior to arrival		
	Personnel Training Data (for unescorted access)	K-CM-05.3.2	30 days prior to need date		
	KSC Microbiology Laboratory Support Request Form	K-CM-05.3.2	30 days prior to need date		
	Requisition and Invoice/Shipping Document (DD-1149 or equivalent)	K-CM-05.3.2	on dock and turnover		
	Integration Data Package/Acceptance Data Package	K-CM-05.3.2	arrival/turnover		

TABLE 7.4.1-1 KSC INTEGRATION DATA PACKAGE CONTENTS (PAGE 1 OF 3)

Section Number	IDP Section
1	TITLE PAGE A page that will identify the item being delivered and will be signed by the customer.
2	INDEX Table of Contents listing all sections. If an item is not applicable, it should be annotated in the index or on a page in the appropriate section.
3	COPY OF SHIPPING/TRANSFERRING DOCUMENT Document on an DD1149 or equivalent shipping document the flight and GSE items to be turned over.
4	NOTES/COMMENTS (CUSTOMER'S OPTION) Important information of which KSC should be aware. This could be specific constraints on the operations of the hardware or repair limitations. It should also include any unusual conditions.
5	WAIVERS/DEVIATIONS AFFECTING INTEGRATION Copies of waivers/deviations that affect KSC integration.
6	LIST OF SHORTAGES (SHIPPED SHORT) A listing of hardware/software which is required for integration at KSC, but is not being delivered at this time.
7	NONCONFORMANCE REPORTS (NCRs) A list and a copy of all open nonconformance items (Discrepancy Reports, problem reports, etc.) and only closed nonconformance items that affect KSC integration. Open nonconformances listed in this section need not be repeated in Section 8.
8	LIST OF DEFERRED OR OPEN WORK A listing of unplanned tasks that should have been completed by the customer prior to custodial turnover to KSC (deferred) and a list of planned agreed-to work that is not documented via the OMRSD, TGHR Table, or drawings (open). Both open and deferred work must be negotiated with KSC prior to custodial turnover. Released engineering must accompany these items. NCRs listed in item 7 do not need to be repeated here.
9	IDENTIFICATIONS/DRAWINGS A copy of the ABCL which describes the hardware being turned over to KSC. This identification shall be at the top-assembly level (including all modifications) and shall reflect the official ECL used for integration. All customer-provided drawings required for KSC integration. A detailed diagram of the front face of middeck payloads for use as a payload function/status reference during final countdown operations.
10	LIMITED OPERATING LIFE/AGE SENSITIVE ITEMS A listing of hardware which may require documenting the number of times the item has been used or operated or that are time-critical as to their usefulness or ability to perform their required function. This list should also include any specific forms/logs that KSC will be required to update/track. All tracking requirements must also be identified in the OMRSD. Information addressing the allowable and/or remaining time/cycles or shelf life should also be included.
11	PYROTECHNIC DATA Information on any pyrotechnics installed on the customer hardware. This information will include verification data, installation drawings, checkout information or constraints, and the lot certification reflecting the current status at the time of delivery. Also includes documented evidence that representatives of both NASA and the procuring agency have reviewed and accepted the described pyrotechnic device.

TABLE 7.4.1-1 KSC INTEGRATION DATA PACKAGE CONTENTS (PAGE 2 OF 3)

Section Number	IDP Section
12	NON-FLIGHT HARDWARE A listing of all non-flight items (by name, quantity, and location) installed on the hardware at the time of custodial turnover. KSC red streamers shall be installed (when applicable per SPP Q-02) after custodial turnover.
13	PROOFLOAD/CALIBRATION DATA AND DIAGRAMS Data on GSE that may require proofloading or calibration. These items must be within calibration or proofload prior to custodial turnover to KSC and must have the proper proofload drawings included in the IDP. If at all practical, user-provided GSE will be recertified by the customer prior to use at KSC. Future proofload/calibration requirements should be noted with the intervals identified, or, if recertification is not required, GSE will be clearly labeled as such. Items turned over to KSC that do not require calibration will have KSC Form 22-418, Calibration Not Required, stickers applied after custodial turnover. Identify any special equipment required for proofload/calibration.
14	OPERATING TEST PROCEDURES Procedures developed by the customer which may be of use to KSC for developing KSC procedures for planned operations, processing, or contingency operations. If these procedures have already been transmitted to KSC, a procedure listing and submittal statement indicating such is required. For middeck payloads, a nominal configuration checklist will be provided along with an off-nominal troubleshooting list for use by KSC during final countdown operations in the event of minor payload problems (alarms, error messages, etc.) after the IVT has been completed.
15	CLEANLINESS CERTIFICATION A statement that the hardware being turned over to KSC meets cleanliness specifications set forth by the Mission Manager or ISS Payloads Office for the applicable mission.
16	OPEN ITEMS FROM PHASE III GROUND SAFETY REVIEW All open items from the ground safety review must be closed out before operations at KSC can begin. If an item is not closed, a determination in writing will be provided to identify all hazardous conditions during the KSC integration process.
17	WEIGHT AND CG Weight and cg location must be provided. For experiments installed in Orbiter middeck lockers, the weight and cg should be determined with the experiment (and any inserts) installed in the locker.

TABLE 7.4.1-1 KSC INTEGRATION DATA PACKAGE CONTENTS (PAGE 3 OF 3)

Section Number	IDP Section
18	SOFTWARE CONFIGURATION A list of flight software and/or firmware to be turned over with the hardware. This includes the software/firmware already loaded onto the flight hardware, and what may be turned over separately on Compact Disk - Read Only Memory (CD-ROM) as a backup. For each software item, the list should include a description, part number, revision/serial number, document number of the corresponding Version Discription Document (VDD), or equivalent, and certification of software cleanliness (i.e., that it is virus-free). A copy of each applicable VDD, or equivalent, must be included as part of this IDP. The Software Cleanliness Certification is a statement that the software (COTS, Public Domain, and Customer/Contractor provided) has been checked for viruses and malicious software per JPG2810.1A (October, 2000), sections 6.1.1.6 through 6.1.1.8, and names the virus-checking software used. Also identify the following configuration data: For all EXPRESS Subrack Payloads: Function Code: Health and Status Packet Size: Space Station Program Change Memo (SSPCM) Current Rating: For EXPRESS Ethernet Payloads only: IP Address: Subnet Mask (should be 255.255.0.0): For EXPRESS RS-422 Payloads only: Serial Baud Rate:
19	IDP RETURN PREFERENCE Indicate the IDP return preference as either “Return IDP Post ISS Transfer” for Payloads staying on orbit long term, or as “Return IDP upon Descent” for Payloads returning to the ground on the same Shuttle mission or near term Shuttle mission (i.e., approx. less than 6 months). Also indicate the local KSC contact or Point of Contact (POC) shipping information (i.e., name, address, etc.) to receive the IDP.
20	ESD Sensitivity Identify any Electrostatic Discharge (ESD) sensitive items. If the rack, subrack payloads, boxes, and/or connectors are ESD sensitive, identify them and any related special ESD handling requirements above and beyond the KSC policy documented in SPP E-03, KSC Standard Practices and Procedures (SPP) Connection and Disconnection of Electrical Connectors. If above and beyond SPP E-03, an Operations and Maintenance Requirements Specification (OMRS) requirement or Time-Critical Ground Handling Requirements (TGHR) Table requirement via the KSC Technical Requirements Data Set is needed. Indicate if ESD conductive gloves (PD-provided), dissipative gloves, or no gloves are required. Also indicate if wrist stats are required. Also indicate if pin discharging is required. If pin discharging is required, indicate if conductive foam pin grounding, pin saver grounding, or another for of pin grounding is to be used.

TABLE 7.4.1-2 KSC INTEGRATION DATA PACKAGE SUPPLEMENT CONTENTS (PAGE 1 OF 5)

Section Number	IDP Section	IDP Supplement Section
1	TITLE PAGE A page that will identify the item being delivered and will be signed by the customer.	TITLE PAGE Title page of the IDP Supplement will identify the item being delivered and will be signed by the customer.
2	INDEX Table of Contents listing all sections. If an item is not applicable, it should be annotated in the index or on a page in the appropriate section.	INDEX IDP Supplement Table of Contents listing all IDP sections, with a cross-reference to the location of any applicable data in the ADP. If an item is not applicable, it should be annotated in the index or on a page in the appropriate section.
3	COPY OF SHIPPING/TRANSFERRING DOCUMENT Document on an DD1149 or equivalent shipping document the flight and GSE items to be turned over.	COPY OF SHIPPING/TRANSFERRING DOCUMENT Cross-reference Section I of the ADP, and clearly identify on the shipping document the flight and GSE items to be turned over to KSC.
4	NOTES/COMMENTS (CUSTOMER'S OPTION) Important information of which KSC should be aware. This could be specific constraints on the operations of the hardware or repair limitations. It should also include any unusual conditions.	NOTES/COMMENTS (CUSTOMER'S OPTION) Cross reference Section II of the ADP, and identify important information of which KSC should be aware. This could be specific constraints on the operations of the hardware and should include any unusual conditions. Cross-reference Section XII of the ADP for any applicable repair limitations.
5	WAIVERS/DEVIATIONS AFFECTING INTEGRATION Copies of waivers/deviations that affect KSC integration.	WAIVERS/DEVIATIONS AFFECTING INTEGRATION Cross-reference Section III of the ADP, and identify copies of waivers/deviations that affect KSC integration.
6	LIST OF SHORTAGES (SHIPPED SHORT) A listing of hardware/software which is required for integration at KSC, but is not being delivered at this time.	LIST OF SHORTAGES (SHIPPED SHORT) Cross-reference Section V of the ADP, and identify items which are required for integration at KSC, but are not being delivered at this time.
7	NONCONFORMANCE REPORTS (NCRs) A list and a copy of all open nonconformance items (Discrepancy Reports, problem reports, etc.) and only closed nonconformance items that affect KSC integration. Open nonconformances listed in this section need not be repeated in Section 8.	NONCONFORMANCE REPORTS (NCRs) Cross-reference Section IV and Section VI of the ADP, and identify all open nonconformance items (Discrepancy Reports, problem reports, etc.). Include in IDP Supplement only closed nonconformance items that affect KSC integration. Open nonconformances listed in this section need not be repeated in Section 8.

TABLE 7.4.1-2 KSC INTEGRATION DATA PACKAGE SUPPLEMENT CONTENTS (PAGE 2 OF 5)

Section Number	IDP Section	IDP Supplement Section
8	LIST OF DEFERRED OR OPEN WORK A listing of unplanned tasks that should have been completed by the customer prior to custodial turnover to KSC (deferred) and a list of planned agreed-to work that is not documented via the OMRSD, TGHR Table, or drawings (open). Both open and deferred work must be negotiated with KSC prior to custodial turnover. Released engineering must accompany these items. NCRs listed in item 7 do not need to be repeated here.	LIST OF DEFERRED OR OPEN WORK Cross-reference Section VI of the ADP, and identify the unplanned tasks that should have been completed by the customer prior to custodial turnover to KSC (deferred). Cross-reference Section VII of the ADP, and identify the planned agreed-to work that is not documented via the OMRSD, TGHR Table, or drawings (open). Both open and deferred work must be negotiated with KSC prior to custodial turnover. Released engineering must accompany these items. NCRs listed in item 7 do not need to be repeated here.
9	IDENTIFICATIONS/DRAWINGS A copy of the ABCL which describes the hardware being turned over to KSC. This identification shall be at the top-assembly level (including all modifications) and shall reflect the official ECL used for integration. All customer-provided drawings required for KSC integration should be included. A detailed diagram of the front face of middeck payloads will be provided for use as a payload function/status reference during final countdown operations.	IDENTIFICATIONS/DRAWINGS Cross-reference Section VIII of the ADP. Include in the IDP Supplement all customer provided drawings required for KSC integration. Include in the IDP Supplement a detailed diagram of the front face of middeck payloads for use as a payload function/status reference during final countdown operations.
10	LIMITED OPERATING LIFE/AGE SENSITIVE ITEMS A listing of hardware which may require documenting the number of times the item has been used or operated or that are time-critical as to their usefulness or ability to perform their required function. This list should also include any specific forms/logs that KSC will be required to update/track. All tracking requirements must also be identified in the OMRSD. Information addressing the allowable and/or remaining time/cycles, or shelf life should also be included.	LIMITED OPERATING LIFE/AGE SENSITIVE ITEMS Cross-reference Section IX and Section X of the ADP. Include in the IDP Supplement any specific forms/logs that KSC will be required to update/track. All tracking requirements must also be identified in the OMRSD.
11	PYROTECHNIC DATA Information on any pyrotechnics installed on the customer hardware. This information will include verification data, installation drawings, checkout information or constraints, and the lot certification reflecting the current status at the time of delivery. Also includes documented evidence that representatives of both NASA and the procuring agency have reviewed and accepted the described pyrotechnic device.	PYROTECHNIC DATA Cross-reference Section XIV of the ADP. Include in the IDP Supplement verification data, installation drawings, and checkout information or constraints.

TABLE 7.4.1-2 KSC INTEGRATION DATA PACKAGE SUPPLEMENT CONTENTS (PAGE 3 OF 5)

Section Number	IDP Section	IDP Supplement Section
12	NON-FLIGHT HARDWARE A listing of all non-flight items (by name, quantity, and location) installed on the hardware at the time of custodial turnover. KSC red streamers shall be installed (when applicable per SPP Q-02) after custodial turnover.	NON-FLIGHT HARDWARE Cross-reference Section XV of the ADP. Include in the IDP Supplement the quantity of non-flight items installed on the hardware at the time of custodial turnover. KSC red streamers shall be installed (when applicable per SPP Q-02) after turnover.
13	PROOFLOAD/CALIBRATION DATA AND DIAGRAMS Data on GSE that may require proofloading or calibration. These items must be within calibration or proofload prior to custodial turnover to KSC and must have the proper proofload drawings included in the IDP. If at all practical, user-provided GSE will be recertified by the customer prior to use at KSC. Future proofload/calibration requirements should be noted with the intervals identified, or, if recertification is not required, GSE will be clearly labeled as such. Items turned over to KSC that do not require calibration will have KSC Form 22-418, Calibration Not Required, stickers applied after custodial turnover. Identify any special equipment required for proofload/calibration.	PROOFLOAD/CALIBRATION DATA AND DIAGRAMS Cross-reference Section XI and Section XVI of the ADP for calibration and proofload certification data. Include in the IDP Supplement additional data on GSE that may require proofloading or calibration. These items must be within calibration or proofload prior to custodial turnover to KSC and must have the proper proofload drawings included in the IDP. If at all practical, user-provided GSE will be recertified by the customer prior to use at KSC. Future proofload/calibration requirements should be noted with the intervals identified, or, if recertification is not required, GSE will be clearly labeled as such. Items turned over to KSC that do not require calibration will have KSC Form 22-418, Calibration Not Required, stickers applied after turnover. Identify any special equipment required for proofload/calibration.
14	OPERATING TEST PROCEDURES Procedures developed by the customer which may be of use to KSC for developing KSC procedures for planned operations, processing, or contingency operations. If these procedures have already been transmitted to KSC, a procedure listing and submittal statement indicating such is required. For middeck payloads, a nominal configuration checklist will be provided along with an off-nominal troubleshooting list for use by KSC during final countdown operations in the event of minor payload problems (alarms, error messages, etc.) after the IVT has been completed.	OPERATING TEST PROCEDURES Procedures developed by the customer which may be of use to KSC for developing KSC procedures for planned operations, processing, or contingency operations. If these procedures have already been transmitted to KSC, a procedure listing and submittal statement indicating such is required. For middeck payloads, a nominal configuration checklist will be provided along with an off-nominal troubleshooting list for use by KSC during final countdown operations in the event of minor payload problems (alarms, error messages, etc.) after the IVT has been completed.
15	CLEANLINESS CERTIFICATION A statement that the hardware being turned over to KSC meets cleanliness specifications set forth by the Mission Manager or ISS Payloads Office for the applicable mission.	CLEANLINESS CERTIFICATION Cross-reference Section XVI of the ADP for cleanliness certification data.

TABLE 7.4.1-2 KSC INTEGRATION DATA PACKAGE SUPPLEMENT CONTENTS (PAGE 4 OF 5)

Section Number	IDP Section	IDP Supplement Section
16	OPEN ITEMS FROM PHASE III GROUND SAFETY REVIEW All open items from the ground safety review must be closed out before operations at KSC can begin. If an item is not closed, a determination in writing will be provided to identify all hazardous conditions during the KSC integration process.	OPEN ITEMS FROM PHASE III GROUND SAFETY REVIEW All open items from the ground safety review must be closed out before operations at KSC can begin. If an item is not closed, a determination in writing will be provided to identify all hazardous conditions during the KSC integration process.
17	WEIGHT AND CG Weight and cg location must be provided. For Payloads installed in Orbiter middeck lockers, the weight and cg should be determined with the Payloads (and any inserts) installed in the locker.	WEIGHT AND CG Cross-reference Section II of the ADP if weight and cg data is documented in that section. Otherwise, the IDP Supplement must include weight and cg location. For Payloads installed in Orbiter middeck lockers, the weight and cg should be determined with the Payloads (and any inserts) installed in the locker.
18	SOFTWARE CONFIGURATION A list of flight software and/or firmware to be turned over with the hardware. This includes the software/firmware already loaded onto the flight hardware, and what may be turned over separately on CD-ROM as a backup. For each software item, the list should include a description, part number, revision/serial number, document number of the corresponding Version Description Document (VDD), or equivalent and certification of software cleanliness (i.e., that it's virus-free). A copy of each applicable VDD, or equivalent must be included as part of this IDP. The Software Cleanliness Certification is a statement that the software (COTS, Public Domain, and Customer/Contractor provided) has been checked for viruses and malicious software per JPG2810.1A (October, 2000), sections 6.1.1.6 through 6.1.1.8, and names the virus-checking software used. Also identify the following configuration data: For all EXPRESS Subrack Payloads: Function Code: Health and Status Packet Size: SSPCM Current Rating: For EXPRESS Ethernet Payloads only: IP Adress: Subnet Mask (should be 255.255.0.0): For EXPRESS RS-422 Payloads only: Serial Baud Rate:	SOFTWARE CONFIGURATION A list of flight software and/or firmware to be turned over with the hardware. This includes the software/firmware already loaded onto the flight hardware, and what may be turned over separately on CD-ROM as a backup. For each software item, the list should include a description, part number, revision/serial number, document number of the corresponding Version Description Document (VDD), or equivalent, and certification of software cleanliness (i.e., that it's virus-free). A copy of each applicable VDD, or equivalent, must be included as part of this IDP. The Software Cleanliness Certification is a statement that the software (COTS, Public Domain, and Customer/Contractor provided) has been checked for viruses and malicious software per JPG2810.1A (October, 2000), sections 6.1.1.6 through 6.1.1.8, and names the virus-checking software used. Also identify the following configuration data: For all EXPRESS Subrack Payloads: Function Code: Health and Status Packet Size: SSPCM Current Rating: For EXPRESS Ethernet Payloads only: IP Address: Subnet Mask (should be 255.255.0.0): For EXPRESS RS-422 Payloads only: Serial Baud Rate:

TABLE 7.4.1-2 KSC INTEGRATION DATA PACKAGE SUPPLEMENT CONTENTS (PAGE 5 OF 5)

Section Number	IDP Section	IDP Supplement Section
19	IDP RETURN PREFERENCE Indicate the IDP return preference as either "Return IDP Post ISS Transfer" for Payloads staying on orbit long term, or as "Return IDP upon Descent" for Payloads returning to the ground on the same Shuttle mission or near term Shuttle mission (i.e., approx. less than 6 months). Also indicate the local KSC contact or Point of Contact (POC) shipping information (i.e., name, address, etc.) to receive the IDP.	IDP RETURN PREFERENCE Indicate the IDP return preference as either "Return IDP Post ISS Transfer" for Payloads staying on orbit long term, or as "Return IDP upon Descent" for Payloads returning to the ground on the same Shuttle mission or near term Shuttle mission (i.e., approx. less than 6 months). Also indicate the local KSC contact or Point of Contact (POC) shipping information (i.e., name, address, etc.) to receive the IDP.
20	ESD SENSITIVITY Identify any Electrostatic Discharge (ESD) sensitive items. If the rack, subrack payloads, boxes, and/or connectors are ESD sensitive, identify them and any related special ESD handling requirements above and beyond the KSC policy documented in SPP E-03. If above and beyond SSP E-03, an Operations and Maintenance Requirements Specification (OMRS) requirement or Time-Critical Ground Handling Requirements (TGHR) Table requirement via the KSC Technical Requirements Data Set is needed. Indicate if ESD conductive gloves (PD provided), dissipative gloves, or no gloves are required. Also indicate if wrist stats are required. Also indicate if pin discharging is required. If pin discharging is required, indicate if conductive foam pin grounding, pin saver grounding, or another form of pin grounding is to be used.	ESD SENSITIVITY Identify any Electrostatic Discharge (ESD) sensitive items. If the rack, subrack payloads, boxes, and/or connectors are ESD sensitive, identify them and any related special ESD handling requirements above and beyond the KSC policy documented in SPP E-03. If above and beyond SSP E-03, an Operations and Maintenance Requirements Specification (OMRS) requirement or Time-Critical Ground Handling Requirements (TGHR) Table requirement via the KSC Technical Requirements Data Set is needed. Indicate if ESD conductive gloves (PD provided), dissipative gloves, or no gloves are required. Also indicate if wrist stats are required. Also indicate if pin discharging is required. If pin discharging is required, indicate if conductive foam pin grounding, pin saver grounding, or another form of pin grounding is to be used.

7.5 KSC/PAYLOAD DEVELOPER AGREEMENTS AND OPEN ITEMS

This section consolidates and documents unique agreements established between KSC and the PD which are applicable to payload operations during launch and landing processing.

In addition to identifying approved unique agreements, this section also contains a listing of open items. As these items are resolved, they will be relocated to the proper section of this plan or deleted as appropriate.

7.5.1 KSC/PAYLOAD DEVELOPER AGREEMENTS

Any special agreements between KSC and the PD shall be recorded in Table 7.5.1-1, KSC/PD Agreements.

A. Reference No - *[Serialized tracking number that includes a payload acronym (Field length: 30 characters).]*

B. Title - *[Specify title for each agreement (Field length: 30 characters).]*

C. Description - *[Enter description or text of the agreement (Field length: 2000 characters).]*

TABLE 7.5.1-1 KSC/PD AGREEMENTS

Reference No.	Title	Description

7.5.2 OPEN ITEMS LIST

Any significant open items relative to this Data Set development shall be recorded in Table 7.5.2-1, Open Items List.

A. Reference No. - *[Serialized tracking number that includes a payload acronym (Field length: 30 characters).]*

B. Item Description - *[Enter description of the open item (Field length: 2000 characters).]*

TABLE 7.5.2-1 OPEN ITEMS LIST

Reference No.	Item Description

8.0 KSC TECHNICAL REQUIREMENTS

8.1 INTRODUCTION

8.1.1 PURPOSE

This section defines the format and content of the payload-unique technical requirement inputs required to develop the Kennedy Space Center (KSC) Technical Requirements Data Set. This section also defines the products, activities, roles, responsibilities, and interfaces required to develop the Operations and Maintenance Requirements Specification (OMRS) System flight products. The initial Payload Developer (PD) inputs temporarily reside on the PDL until downloaded onto the KSC Technical Requirements Data Set, which resides on the Shuttle Processing Data Management System (SPDMS) in the format of OMRS requirements or in the Time-Critical Ground Handling Requirements (TGHR) table. The input format of this data is structured to reflect the onscreen environment of the PDL into which the PD shall input their payload-unique technical requirements.

These payload-unique technical requirement inputs are the detailed Payload Operations and maintenance requirements that are to be levied on KSC. These technical requirements are those which KSC is to perform on a payload during prelaunch, launch, recovery, and turnaround operations. These technical requirements are documented and closed-loop tracked per the OMRS System, which is run on the SPDMS II computer system.

8.1.2 SCOPE

This section provides the tables which will allow the PD to electronically input the payload-unique technical requirements to be levied upon KSC in an OMRS-like format into the PDL. These requirements correspond to either NSTS 08171, Operations and Maintenance Requirements and Specifications Document, File II, Volume 2, for Orbiter impacts (either Middeck Experiment or Payload Bay) or to the OMRS File VIII, Volume 2, for KSC Standalone (non-Orbiter) impacts. The OMRS is the single authoritative source for non-drawing organizational-level operations, maintenance, data requirements, analysis requirements, and specifications (flight vehicle, payload, and ground systems) that are necessary to maintain and verify the system (element, subsystem, or Line Replaceable Unit (LRU)/Maintenance Significant Item (MSI)) operational readiness. These OMRS requirements include test, checkout, servicing, preplanned maintenance, inspection, safety, general, data, time-critical operations, and analysis requirements. Time-critical and schedule-driven requirements for payload integration into the Orbiter Middeck follow a similar process to the OMRS File II Volume 2 process, but the format follows the TGHR Table format as documented in SFOC-PM0102, Product Development Plan for Time-critical Ground Handling Requirements Table PDP MS3-012. However, the OMRS format will be accepted by KSC and converted into the TGHR Table format by KSC until the Payload Data Sets Blank Book and the PDL can be updated with this new TGHR Table format.

All KSC Technical Requirements Data will be electronically input into the PDL. The blanks provided in the following tables merely represent the definition of this Data Set's requirement content. For the PD's convenience and clarification, the table format in this section is presented in such a manner as to reflect the PDL environment into which the data will be electronically entered. These tables are not intended to collect paper inputs to the KSC Technical Data Set. All questions should be answered, all tables completed, and all requested data should be supplied for each section of the KSC Technical Requirements Data Set input.

8.1.3 PRECEDENCE

The Payload Integration Agreement (PIA) takes precedence over this Data Set except for the documentation of KSC technical requirements within the flight products. The OMRSD, File I, Introduction takes precedence over this data set for the documentation of KSC technical requirements within the OMRS File Flight Products. SFOC-PM0102 takes precedence over this Data Set for documentation of KSC technical requirements within the TGHR Table.

8.1.4 CHANGE AUTHORITY

Configuration control commences upon last signature of this Payload Data Sets document. The International Space Station (ISS) Program will maintain configuration control of this document in accordance with SSP 50123-01, Configuration Management Handbook Volume 1. The KSC Technical Requirements Data Set will utilize the existing Configuration Management (CM) process of the OMRS/TGHR flight products. The contents of the KSC Technical Requirements Data Set are controlled by the SPDMS/OMRS/TGHR Boards. The OMRS File II, Volume 2 Board is chaired by the Space Shuttle Program (SSP) Payload OMRS Working Group (POG). The OMRS File VIII, Volume 2 Board is chaired by the KSC Payload Processing Director. The TGHR Table is approved by the Johnson Space Center (JSC) United Space Alliance (USA)/Operations and Maintenance Requirements and Specifications Document (OMRSD) Project Manager for baseline. These three Boards encompass the change authority of the KSC Technical Requirements Data Set, which is resident on the SPDMS/OMRS/TGHR Systems. See Figure 8.1.4-1, KSC Technical Requirements Management Process for Station Payloads. For OMRSD details, reference NSTS 08171, File I, Introduction. For TGHR details, reference SFOC-PM0102.

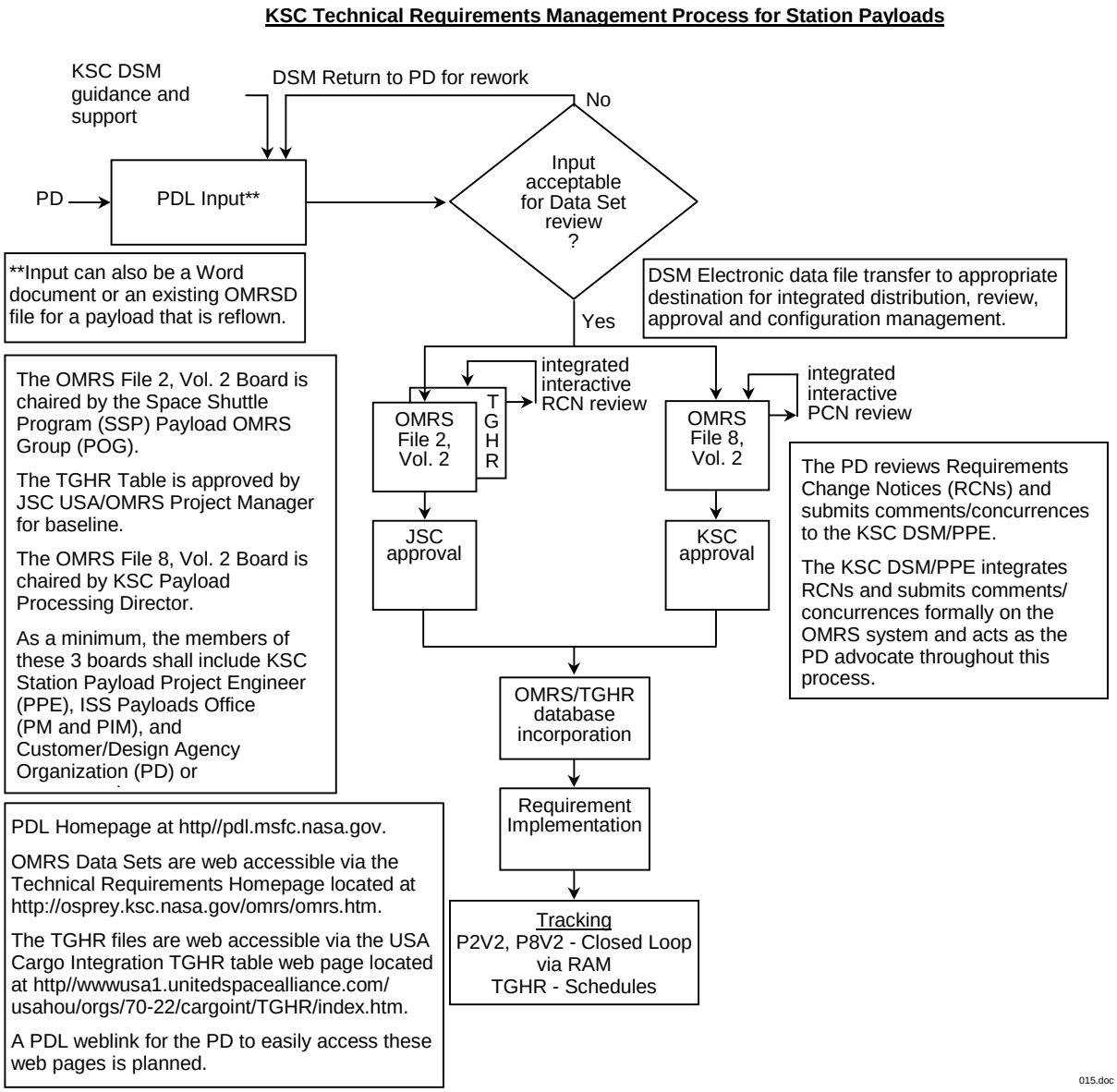


FIGURE 8.1.4-1 KSC TECHNICAL REQUIREMENTS PROCESS FOR STATION PAYLOADS

During the integrated iterative review cycle, the PD accesses the KSC requirements web site via the PDL web link. At the PD-dedicated KSC web site, all of the related PD-unique OMRS and TGHR files can be found for electronic review, comment, and approval (i.e., electronic signature). The KSC Data Set Manager (DSM) reviews the PD comments at the same web location and either agrees or disagrees via electronic signature. This process repeats until agreement between the PD and the DSM is reached. Upon agreement, the DSM notifies the KSC Analyst that the comments/votes are ready for download onto the SPDMS System. The KSC DSM will ensure proper PD coordination during the formal OMRS/TGHR Board process. The DSM will represent the PD at these boards based upon the PD/DSM electronic agreement/signature obtained earlier at the KSC web site. In this capacity, the DSM would not allow a requirement to be baselined at the board that is not consistent with the DSM/PD agreement. Any technical changes would first require a new DSM/PD agreement before board approval. PD technical requirement issues that arise during this process are worked within the Payload Mission Integration Team (PMIT). Unresolved issues are taken to the ISS Program Payloads Control Board (PCB) by the Payload Mission Integrator (PMI). The PCB is chaired by the Space Station Payloads Office Manager.

8.1.5 MANAGEMENT RESPONSIBILITY

8.1.5.1 PAYLOAD DEVELOPER

The PD shall electronically input the requested data directly to the PDL per the schedule defined by the Payload Generic Template and shall promote the payload-unique KSC Technical Requirements input to the integrated level for integration.

The PD shall review, comment to, and vote on the PD-related OMRS/TGHR flight products via the PDL web link to the KSC web site as described in the KSC Technical Requirements process flow and per the schedule negotiated in the signed payload's PIA Addendum.

The PD shall support the OMRS/TGHR board process when requested by the DSM. The DSM will act as the PD representative at the OMRS/TGHR boards based on the PD/DSM electronic agreement documented on the KSC web site.

8.1.5.2 KSC TECHNICAL REQUIREMENTS DATA SET MANAGER

The KSC Technical Requirements DSM supports the development, integration, and baseline of the KSC Technical Requirements Data Set. The DSM will assist the PD (if requested) with the review of the payload technical requirements to determine that they meet ISS Program-negotiated agreements and to determine if the payload technical requirements can be satisfied with SSP, ISS Program, and KSC resources. The DSM will also coordinate and negotiate with the PD any operational issues with the technical requirements and assist the PD with the input of these requirements into the PDL.

The KSC DSM will ensure that the PD's technical requirement inputs have been downloaded from PDL into the appropriate OMRS/TGHR System. The DSM will ensure the distribution and review of the OMRS/TGHR flight products and the subsequent baseline of the OMRS/TGHR flight products at the appropriate control board.

Questions and/or comments on the KSC Technical Requirements Data Set should be directed to the appropriate KSC Technical Requirements DSM.

8.2 GENERAL INFORMATION

8.2.1 KSC TECHNICAL REQUIREMENTS PROCESS FLOW

Payload requirements levied on KSC that are ISS Non-Standard Services or SSP Non-Standard Services will be negotiated and documented in the PIA Addendum. The corresponding details of these Addendum requirements, along with the ISS Standard Services, are initially entered as KSC Technical Requirements inputs by the PD (with DSM support) on the PDL for eventual download into the appropriate OMRS/TGHR files which serve as the final Flight Products/Data Set. (Reference SSP 52000-PIA-PRP, Payload Integration Agreement Blank Book For Pressurized Payloads.) Figure 8.2.1-1 shows the generic flow of the KSC Technical Data from the PD electronic requirement input into PDL, to the export of the promoted data to the OMRS/TGHR System, the development and baselining of the flight products/Data Set on the SPDMS/OMRS/TGHR Systems, and the access to the flight products/Data Set by the PD via the PDL web site link to the KSC Technical Requirements web site.

There are three KSC Technical Requirements process flows. The process flow for OMRS File II (Integrated OMRSD), Volume 2 (Payload/Orbiter), is shown in Figure 8.2.1.1-1. The process flow for OMRS File VIII (Non-Spacelab Shuttle Payloads), Volume 2 (KSC Standalone Requirements), is shown in Figure 8.2.1.2-1. The process flow for the TGHR Table is shown in Figure 8.2.2.1.2-3. The following sections describe these three processes in detail.

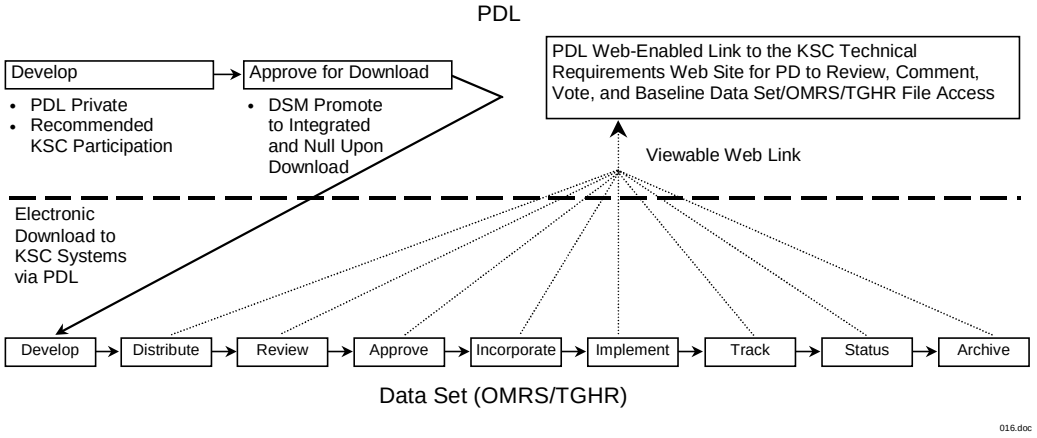


FIGURE 8.2.1-1 GENERIC PAYLOAD DATA LIBRARY TO DATA SET (OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION/TIME-CRITICAL GROUND HANDLING REQUIREMENTS) FLOW PROCESS

8.2.1.1 OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION FILE II, VOLUME 2 PROCESS FLOW

All payload technical requirements that interface with the Orbiter or affect integrated operations with the Orbiter, must go in the OMRS File II, Volume 2 (Payload to Orbiter), flight product except for Orbiter middeck time-critical/schedule-driven requirements, which must go in the TGHR Table described in Section 8.2.1.3, Time-Critical Ground Handling Requirements Table Process Flow. The PD must complete the development and input of these technical requirements using the ISS Program Payloads Office-provided PDL tool for input. This early development of the payload technical requirements occurs during the Private Phase of PDL. It is recommended that the PD temporarily promote the Data Set to the integrated level and request KSC DSM support during the early phase of PDL requirements input development. Upon completion of technical requirements input into the PDL and KSC DSM approval, the contents of the payload-unique PDL file are promoted from Private Phase to the Integrated Phase of PDL development. This integrated PDL data contains all of the payload technical requirements that are to be electronically downloaded into the OMRS System via the PDL. Upon successful download, the data is nulled on the PDL System to avoid double bookkeeping overhead and errors.

The PD formally submits the PDL requirements input to the KSC DSM (Reference NSTS 08171, File I, Introduction). After review by the KSC DSM, the requirements inputs contained in the PDL will be promoted to the Integrated Phase and approved for download into the OMRS System. The downloaded PDL data will then be released by the JSC OMRS File II, Volume 2, File Manager as an OMRS File II, Volume 2, Requirements Change Notice (RCN) for an integrated review process, which includes the PD and the OMRS community (the ISS Program, the SSP, and KSC personnel).

The JSC File Manager coordinates the integrated review of the RCN and coordinates all review comments, negotiations, and revisions of the RCN. As the PD advocate, the

KSC DSM coordinates the PD review and formally submits the PD comments and votes per the KSC Technical Requirements web site DSM/PD agreement. The RCN follows the integrated review process (if needed) until the RCN is ready for potential review at the SSP Cargo Integration Review (CIR). Changes to RCN requirements, which are negotiated and agreed to at the CIR, will be incorporated into another revision of the RCN for a final integrated review and subsequent OMRS File II, Volume 2, Board approval and OMRS baseline.

The baseline of the OMRS File II, Volume 2, requirements supports KSC procedure development and corresponding implementation of the requirements. Closed-loop accounting of the completion of all OMRS requirements is provided by the Requirements Allocation Matrix (RAM). The RAM is a listing of all OMRS technical requirements associated with prelaunch and post-landing processing for a specific mission. It lists each test requirement, the test procedure, sequence and step number, requirement status, and date of completion. It also indicates when a requirement is superseded by a waiver or exception/deviation.

Note that with OMRS File II, Volume 2, PDL inputs, the Private Phase ends. There is no extensive PDL Integrated Phase review because that process is performed within the flight product development tool (i.e., OMRS). Therefore, the PDL data is nulled upon download. The Data Set is resident only on and configuration managed by the OMRS Flight Products. See Figure 8.2.1.1-1 for the Process Flow for OMRS File II, Volume 2.

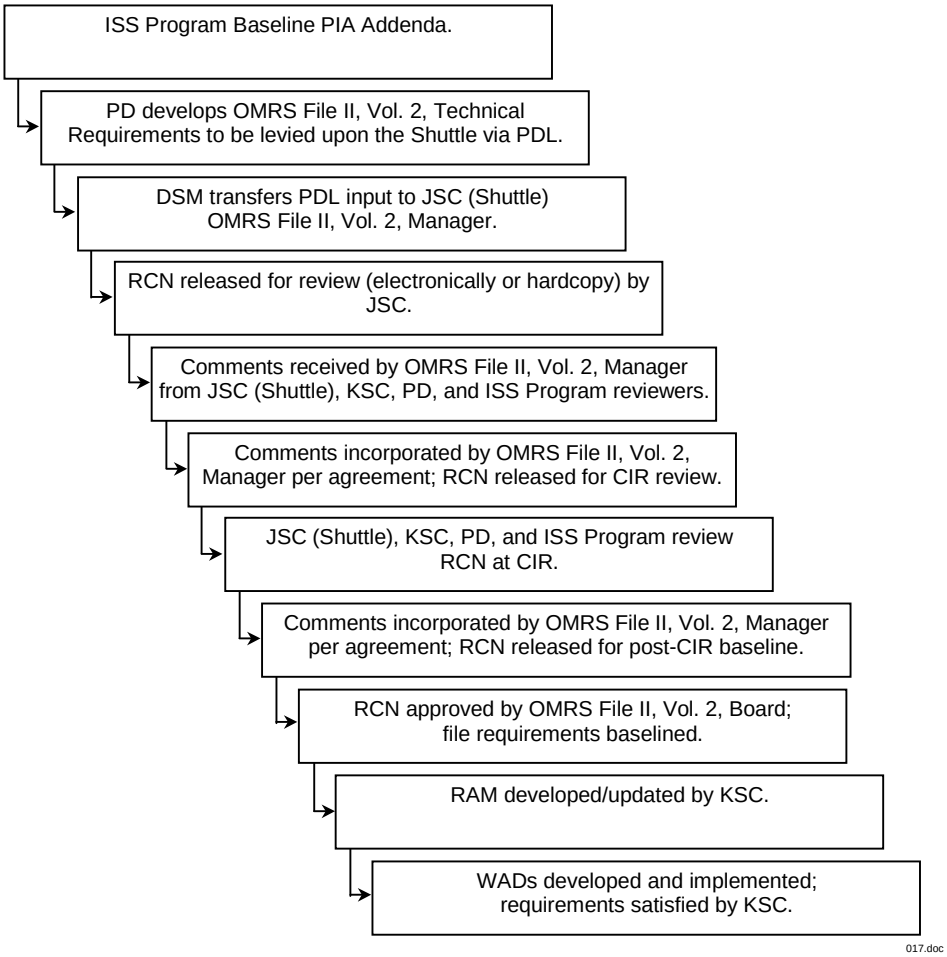


FIGURE 8.2.1.1-1 OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION FILE II, VOLUME 2, PROCESS FLOW

8.2.1.2 OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION FILE VIII, VOLUME 2, PROCESS FLOW

All payload technical requirements that do not interface with the Orbiter or affect integrated operations with the Orbiter, must go in the OMRS File VIII, Volume 2 (KSC Standalone Requirements), Flight Product. The PD must complete the development and input of these technical requirements by Launch minus (L-)12.5 months, using the ISS Payloads Office-provided PDL tool for input. This early development of the payload requirements occurs during the Private Phase of PDL. It is recommended that the PD temporarily promote the Data Set to the integrated level and request KSC DSM support during this early phase of PDL requirements input development. Upon completion of technical requirements input into the PDL and KSC DSM approval, the contents of the payload-unique PDL file are promoted from Private Phase to the Integrated Phase of PDL development. This integrated PDL data contains all of the payload technical requirements that are to be electronically downloaded into the OMRS System via the PDL. Upon successful download, the data is nulled on the PDL System to avoid double bookkeeping overhead and errors.

The PD formally submits the PDL requirements input to the KSC DSM (OMRS File VIII, Volume 2, File Manager). After review by the KSC DSM, the requirements inputs contained in the PDL will be promoted to the Integrated Phase and approved for download into the OMRS System. The downloaded PDL data will then be released by the KSC DSM, as a draft OMRS File VIII, Volume 2, RCN for an integrated review process, which includes the PD and the OMRS community (ISS Program and KSC personnel).

The KSC DSM coordinates the integrated review process so that the draft RCN is ready for potential review at the Station Cargo Integration Review (SCIR). As the PD advocate, the KSC DSM coordinates the PD review and formally submits the PD comments and votes per the KSC Technical Requirements web site DSM/PD agreement. The RCN follows the integrated review. The KSC DSM incorporates the changes from the reviews and releases the RCN for a final review and subsequent OMRS File VIII, Volume 2, Board approval and OMRS baseline.

The baseline of the OMRS File VIII, Volume 2, requirements supports KSC procedure development and corresponding implementation of requirements prelaunch to post-flight. Closed-loop accounting of the completion of all OMRS requirements is provided by the RAM. The RAM is a listing of all OMRS technical requirements associated with prelaunch and post-landing processing for a specific mission. It lists each test requirement, the test procedure, sequence and step number, requirement status, and date of completion. It also indicates when a requirement is superseded by a waiver or exception/deviation.

Note that for OMRS File VIII, Volume 2, PDL inputs, the Private Phase ends. There is no extensive PDL Integrated Phase review because that process is performed within the flight product development tool (i.e., OMRS). Therefore, the PDL data is nulled upon download. The Data Set is resident on and configuration managed by the OMRS Flight Product. See Figure 8.2.1.2-1 for the Process Flow for OMRS File VIII, Volume 2.

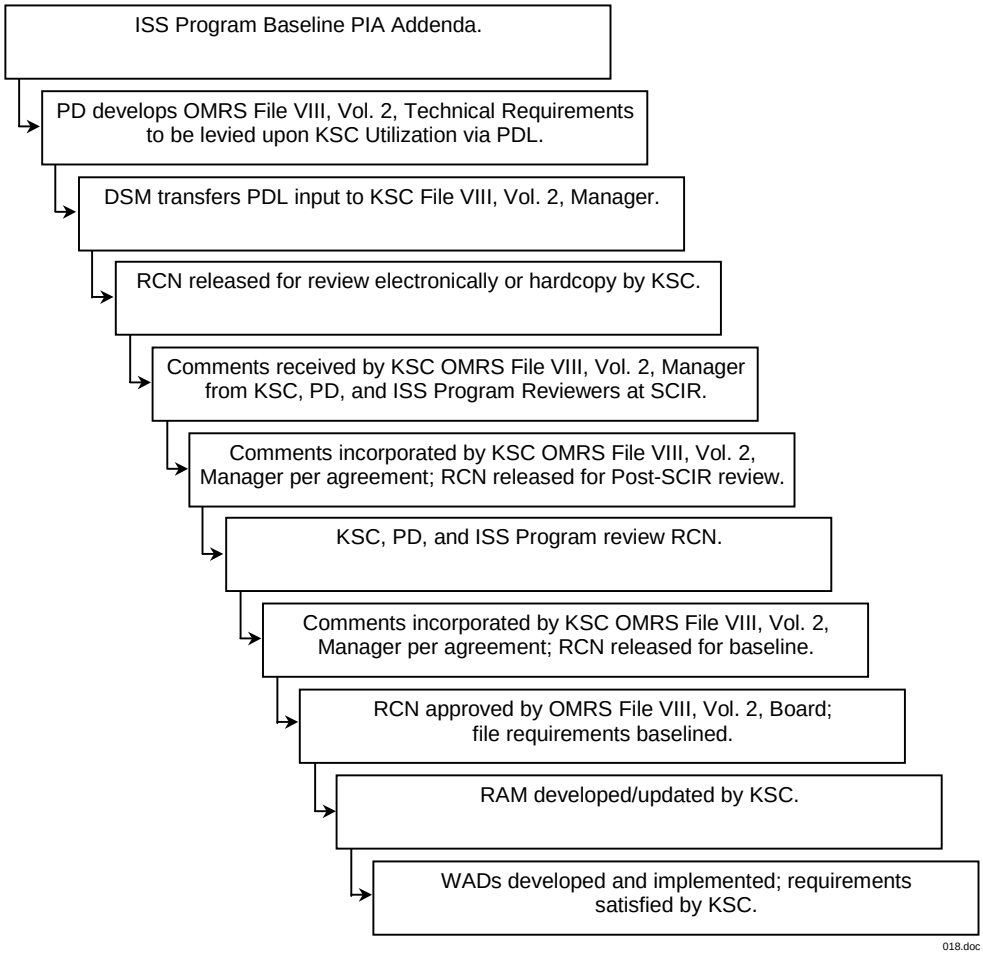


FIGURE 8.2.1.2-1 OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION FILE VIII, VOLUME 2, PROCESS FLOW

8.2.1.3 TIME-CRITICAL GROUND HANDLING REQUIREMENTS TABLE PROCESS FLOW

Middeck payload “time-critical” Orbiter requirements are documented in a mission-specific TGHR Table. The TGHR also includes time-critical requirements for other non-payload crew compartment items. Middeck time-critical requirements include late stowage, launch delay, and early destow requirements. Middeck orientation and power interrupt constraints are also documented in the TGHR. Middeck Interface Verification Test (IVT) and any other requirements will be documented in OMRS File II, Vol. II. Currently, middeck fit check requirements are documented in OMRS, but they may eventually become TGHR requirements. The PD must use the ISS Program Payloads Office-provided PDL tool to input and develop TGHR requirements. The initial input and development of these requirements is during the Private Phase of PDL.

The PDL data is promoted from Private Phase to Integrated Phase with the PD's formal submission of the PDL requirements to the KSC DSM. The KSC DSM will work with the PD during this phase to help refine and justify requirements.

Upon successful download of PDL requirements to the JSC TGHR, the PDL Integrated Phase is completed. The TGHR data in the PDL becomes null and PDL is no longer used, thus avoiding any confusion resulting from double-booking requirements. New requirements or changes to requirements shall be submitted through the TGHR review process. CM of the TGHR requirements is through the KSC TGHR process (i.e., not through the PDL Controlled Phase). The JSC TGHR Manager will release the requirements in a mission-specific proposed basic TGHR. KSC will post the requirements on the KSC Technical Requirements web site for PD review. The released proposed basic TGHR will initiate an integrated review process by the PD and TGHR community (ISS Program, SSP, KSC Payloads, and KSC Orbiter). A released TGHR may list requirements for several middeck payloads or middeck items and may have TBDs. The PD responds only to their middeck payload requirements in a released TGHR through the KSC Technical Requirements web site.

The JSC TGHR Manager coordinates the integrated review of the TGHR by negotiating any conflicting responses in the community until there is consensus. The KSC DSM represents the PD as the customer interface to the JSC TGHR Manager and responds according to PD-submitted comments and votes, and DSM/PD agreements per the KSC PDL web site. The community submits responses to the TGHR Manager by e-mail. When consensus is reached for all the requirements associated with a TGHR Table row, that row is listed in subsequent revisions of the TGHR as "Approved."

The JSC TGHR Manager obtains approval of the TGHR from the JSC/OMRSD Project Manager when there is community concurrence with the TGHR. The JSC TGHR Manager then places the approved TGHR Table on the Internet and notifies the community of its availability. KSC develops its time-critical middeck schedules and procedures based on TGHR Table and OMRS File II, Vol. II, requirements.

The JSC TGHR Manager will release a proposed revision to the TGHR when requirements are changed, new requirements are identified, or additional data is added to incomplete requirements. This initiates a review process involving only TGHR community parties associated with the revision. The statuses of previously "Approved" middeck requirements are not affected by TGHR revisions.

The POG Board and/or Mission Integrated Product Team will resolve any requirements at issue after the TGHR review process. The KSC Launch Countdown Working Group (LCWG) is involved with final approval of middeck stowage and launch delay requirements. Mission Action Request (MAR) chits may be used to modify TGHR destow requirements resulting from mission real-time on-orbit changes

KSC uses an internal “KSC TGHR Wad Tracker” document, located on a KSC web site, as a tool to list the KSC procedures used to satisfy TGHR requirements. TGHR requirements are tracked per schedules and are not closed-loop tracked. See Figure 8.2.1.3-1 for the Process Flow for the TGHR Table.

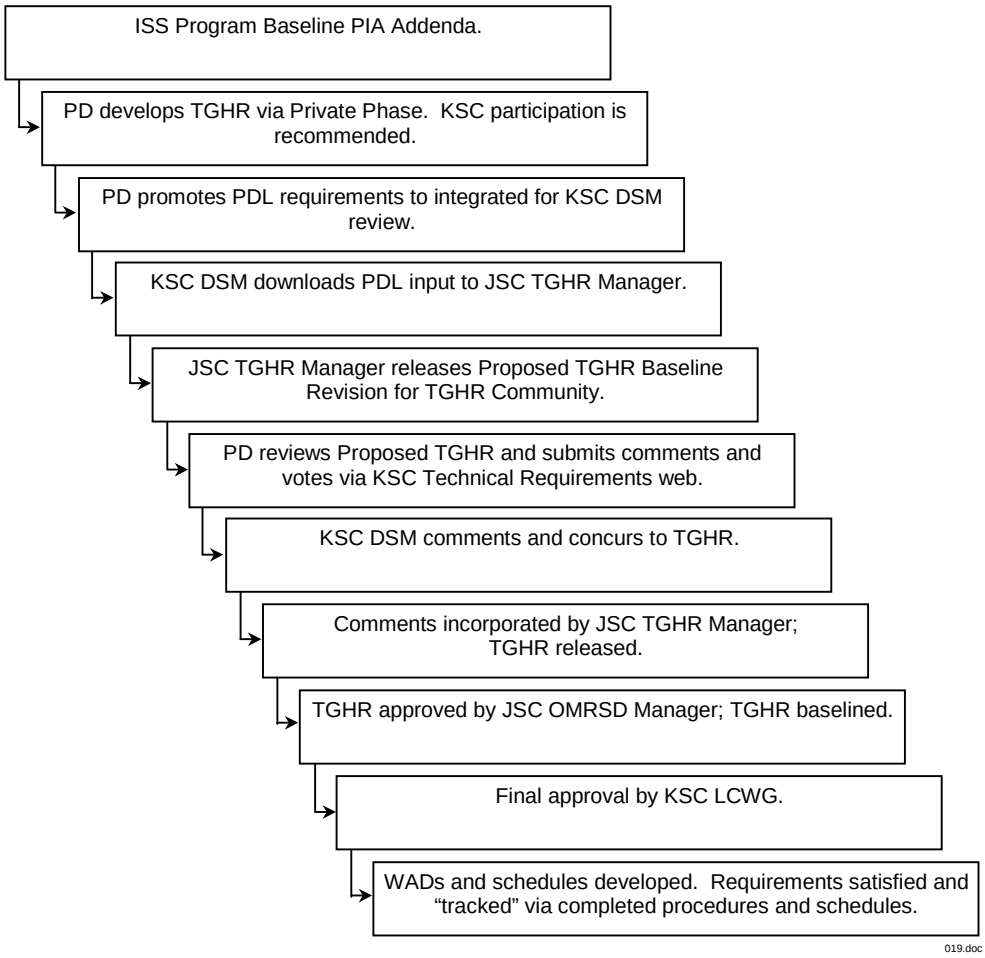


FIGURE 8.2.3-1 TGHR TABLE PROCESS FLOW

8.3 KSC TECHNICAL REQUIREMENTS DATA SET

The KSC Technical Requirements Data Set comprises four Impact Category Options. The first Impact Category is the Orbiter Middeck; the second is the Orbiter Payload Bay; the third is the Utilization Integrated Processing Team (UIPT); and the fourth is the Orbiter Middeck TGHR.

Technical requirements for the Orbiter Middeck Impact Category correspond to the Middeck OMRS File II, Volume 2, requirements. Technical requirements for International Standard Payload Racks (ISPRs), EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Rack, EXPRESS Pallet, and Attached Payloads fall into one of the remaining two categories.

There are several OMRS files that can be used to document technical requirements, depending on the category of the requirement.

A. Payload requirements that impact the Orbiter must be documented in OMRS File II, Volume 2, unless they are Orbiter Middeck time-critical or schedule-driven TGHR Table requirements.

B. Payload requirements that do not impact the Orbiter will be documented in OMRS File VIII, Volume 2 (i.e., payload requirements for testing in the Payload Test and Checkout System (PTCS) etc.).

C. Payload requirements for any standalone and customer-verified requirements performed after payload installation in the payload bay will be specified as one-liners in File II, Volume 2, and will not specify detailed requirements except for launch impact or Orbiter constraint.

D. The corresponding “one-liner” requirement details shall be documented in the OMRS File VIII, Volume 2, if these details are necessary.

Figure D.1-1, Sample Shuttle Processing Data Management System/Operations and Maintenance Requirements Specification Layout and Contents, provides a sample of a typical SPDMS/OMRS requirement layout and contents taken from H300 File VII Vol. 2, Material Science Laboratory (MSL-1) OMRSD. Figure D.3-2, Payload Data Library Input Fields Location Within the Operations and Maintenance Requirements Specification Flight Product, provides the PDL input fields location within the OMRS Flight Product. The majority of ISS Program payload requirements are expected to be satisfied in the Space Shuttle Processing Facility (SSPF) by the UIPT.

The PTCS provides final interface compatibility testing of the integrated payload prior to installation into the Multi-Purpose Logistics Module (MPLM). The ISS Program will test all integrated racks in the PTCS.

A. ITCS Water Sampling - *[Verify ITCS water via water sampling prior to PTCS integration and upon PTCS deintegration.]*

If Internal Thermal Control System (ITCS) water sampling is not performed at the PD site before shipment to KSC, then water sampling will be required at KSC prior to connection to the PTCS. Water sampling will also be required at KSC after PTCS testing is completed as defined below.

1. ITCS water shall be verified to meet specifications prior to being circulated through payload interface.
2. Effluent water shall be verified to meet specifications prior to PTCS disconnection.

The water specification is defined in SSP 30573 and MIL-STD-1246B, Product Cleanliness Levels and Contamination Control Program.

B. All PTCS test objectives limitations and/or constraints for interface testing will be documented in the applicable unique File VIII, Volume 2, (F8V2) OMRS requirement based on the payload configuration for PTCS testing.

   For integrated racks that cannot perform any PTCS test objective, the untested interfaces shall be documented in the F8V2 OMRS file with supporting rationale for not performing the test objective.

   The following PTCS test objectives shall be performed by all ISS Program integrated racks in the PTCS:

   1. Payload Electrical Power Cable Checks shall be performed to verify isolation of the ayload and the electrical continuity and insulation integrity of the power cable(s) for payload hardware (i.e., Rack, EXPRESS, EXPRESS pallet, or truss attached) integrated at KSC.
      a. Payload power cables shall be checked for proper continuity and insulation integrity (mega-ohm test).
      b. The isolation of the payload shall be checked at the power connection or through the payload power cable(s).
      c. Secondary internal power cables are not checked.
   2. Payload Electrical Power System Operation Checks shall be conducted to functionally test the payload’s electrical power system.
      a. The payload shall be powered on and the power system shall be checked to confirm that the payload receives power. Proper operation of the payload within normal power parameters shall be checked and the payload power draw shall be measured.
      b. Operation of the payload using keep-alive or continuous power shall be checked.

c. Proper operation of the payload at maximum power draw can also be checked, if required, by the PD.

3. The payload Command and Data Handling (C&DH) System Interface Check shall be conducted to functionally test the payload's C&DH interfaces.

   a. A representative set of commands are sent to the payload (via Payload Coordinate System (PCS), Payload Operations Integration Center (POIC), and timeliner scripts in the payload Multiplexer/Demultiplexer (MDM)). The appropriate response shall be checked from the payload in the appropriate telemetry stream (medium-rate data via the PEHG through the High Rate Frame Multiplexer (HRFM); low-rate data via the payload MDM through the HRFM).

   b. Rack fire detection system interfaces shall be checked.

4. POIC System Compatibility Check shall be conducted to functionally test the payload's compatibility with the POIC System. The payload POIC interface shall be checked via the use of Marshall Space Flight Center (MSFC)-supplied POIC databases, application software, and displays.

   a. File uplink/downlink to/from the payload and the associated response interfaces will be exercised.

   b. Payload commanding and command response interfaces will be exercised.

   c. The Payload Health and Status telemetry will be processed through POIC.

5. Payload Communication & Tracking (C&T) System Interface Check shall be conducted to functionally test the payload's C&T and video system interfaces.

   a. The payload high-rate data is checked for signal quality and compliance with CCSDS standards.

   b. Digitally processed downlink video and reduced frame rate effects on payload data and bandwidth are demonstrated.

   c. Payload complement or simulated complement data rate compatibility test is also performed. (High-rate data recording and playback is provided).

   d. The payload video synchronization, video quality, camera commanding, embedded camera telemetry, and address format are checked.

6. Thermal Control System (TCS) Interface Check shall be conducted to functionally test the payload's ITCS interface.

   a. The ITCS interface test will functionally test the thermal system flow rates and output temperatures for operations within normal (operating) limits.

   b. A maximum thermal load can be performed if required by the PD.

7. Rack Maintenance Switch Check shall be conducted to functionally test the Rack Maintenance Switch.

    a. Cycle the maintenance switch to “off” and confirm signal receipt by Test Checkout Monitoring System (TCMS) (i.e., voltage across corresponding J43 interface).

    b. Cycle the maintenance switch to “on” and confirm signal receipt by TCMS (i.e., no voltage across corresponding J43 interface).

    c. If required by the PD, then the PTCS 120-Volts Direct Current (VDC) power supply can be deactivated via TCMS commanding or manually to simulate Remote Power Converter/Controller (RPC) deactivation. This would physically deactivate the rack during the Rack Maintenance Switch Check.

8.3.1 PAYLOAD IDENTIFICATION, IMPACT CATEGORY, AND REQUIREMENT TITLES

The PD shall provide the following information in Table 8.3.1-1, Payload Identification.

A. Payload ID - *[Specify the name of the payload.]*

B. Payload Type - *[Select the type of payload (Middeck, ISPR, EXPRESS Rack, EXPRESS Pallet, Stowed Payload, or Attached Payload).]*

C. Flight/Increment - *[Identify the flight on which this payload will be flown.]*

D. Impact Category - *[Identify which of the four impact categories is applicable to this set of requirements.]*

    1. UIPT - OMRS File VIII, Volume 2.

    2. Orbiter Payload Bay - OMRS File II, Volume 2.

    3. Orbiter Middeck - OMRS File II, Volume 2.

    4. Orbiter Middeck - TGHR Table.

TABLE 8.3.1-1 PAYLOAD IDENTIFICATION

Payload ID	Payload Type	Flight/Increment	Impact Category

[Expand table as necessary to include all requested information.]

[Duplicate Table 8.3.1-1 for each of the three OMRS Impact Categories that are applicable for a set of Requirement Titles.] The PD shall provide information as directed in Section 8.3.3 to complete the TGHR Table fields for the Orbiter Middeck TGHR Table impact category.

E. Requirement Title

The PD may choose as many Requirement Titles as needed from the list provided in Table 8.3.1-2, KSC Technical Requirement Titles. This list of requirement titles is available on the PDL.

TABLE 8.3.1-2 KSC TECHNICAL REQUIREMENT TITLES (PAGE 1 OF 3)

Technical Requirement Titles	Required?
Adjustments	
Air Flow Balance	
Alignment/Co-alignment	
Analysis	
Bake Out	
Battery (Installation, Removal, Servicing, Checks)	
Calibration (Powered)	
Calibration (Unpowered)	
Cleanliness	
Close-outs	
Compatibility Test	
Command Capability	
Conditioning	
Contingency Operations	
Continuity Checks	
Coolant Loop Servicing	
Cover Installation	
Data End-to-End Test	
EPROM Operations	
ESD Protection	
Extended Launch Delay	
Film (Installation, Removal, Advance)	
Fit Check	
Functional Test	
Ground Bonding Resistance Check	
Handling/Orientation Requirements	
Health Check	
Inspections	
Isolation Checks	
Interface Verification Test	
Joint Operations Testing	
Launch Delay	
Leak Check	
Limited Operational Life Items (LOLIs)	
Magnetic Cleanliness	
Maintenance	

TABLE 8.3.1-2 KSC TECHNICAL REQUIREMENT TITLES (PAGE 2 OF 3)

Technical Requirement Titles	Required?
Measurements	
Meggar	
Monitoring	
MPLM Early Access for Conditioned Cargo (OPF/MDD)	
MPLM Late Access for Conditioned Cargo (PAD)	
MPLM Post Rack Installation Test	
MPLM Time-Critical Closeouts (SSPF)	
MPLM Time-Critical Destow (SSPF)	
MPLM Time-Critical Installations (SSPF)	
MPLM Time-Critical Post Flight GSE Installation (SSPF)	
MPLM Time-Critical Post Flight Removals (SSPF)	
MPLM Time-Critical Post Flight Servicing (SSPF)	
MPLM Time-Critical Servicing (SSPF)	
MPLM Time-Critical Stowage (SSPF)	
Near Continuous Power/Maximum Power Interrupts	
Orbiter Data I/F	
Orbiter Fit Checks	
Orbiter Power I/F	
Orbiter Radiator Flow (Temp. Range Constraints)	
Orbiter Temperature and Humidity Specs.	
Other	
Photo	
POIC Verification	
Position Measurement	
Prelaunch Switch Setting	
Pressure Check	
Pump Maintenance	
Purge	
Quality (Cleanliness, Hydrocarbon, etc.)	
Recording	

TABLE 8.3.1-2 KSC TECHNICAL REQUIREMENT TITLES (PAGE 3 OF 3)

Technical Requirement Titles	Required?
Remove Non-Flight Items	
Restrictions (Solvents, etc.)	
Sample Loading	
Sample Mixing	
Servicing	
Sharp Edge	
Software (Load, Update, Verification)	
Switch Settings	
T-0 IVT/Services	
Timing Verification	
Trend Analysis	
Vacuum (Service, Refresh)	
Valve Positions	
Video Verification	
Voltage/Polarity Checks	
Witness Mirrors	
Witness Samples	

The PD shall complete a corresponding OMRS-like form for each requirement applicable to the payload. The technical requirements are the detailed payload Operations and Maintenance requirements that KSC is to perform on a payload during prelaunch, launch, recovery, and turnaround operations. These technical requirements are documented and closed-loop tracked per the OMRS System, which is run on the SPDMS II computer system. However, the Orbiter middeck time-critical/schedule-driven TGHR Table requirements are not on SPDMS and are not closed-loop tracked as described in Section 8.2.1.3. The OMRS requirements include test, checkout, servicing, preplanned maintenance, inspection, safety, general, data, time-critical operations, and analysis requirements. The information that is necessary in order for KSC to satisfy the requirements is as follows: requirement number, title, description, criticality, effectivity, measurement/stimuli, specifications, constraints, cautions, warnings, and remarks. OMRS is not used to duplicate information on baselined drawings. Figure D.1-1 depicts an example of the OMRS file requirement format and content. KSC will have general requirements documented to protect hardware, to define special configuration concerns, to provide safety requirements, or to show cautions and warnings. If a reference to a general requirement is needed for a specific payload requirement, then a reference can be made under the “C:” field.

8.3.1.1 GENERAL REQUIREMENTS

Requirements are considered general if:

A. The requirement has the possibility of being performed a non-predetermined number of times during a processing flow.

B. The requirement is applicable to a wide range of specific (hard) test requirements (i.e., same criteria for numerous test requirements).

C. The requirement applies over a broad time frame during the flow (i.e., “at no time shall…”)

D. The requirement addresses a particular concern based upon experience or “lessons learned” from past similar applications.

8.3.1.2 PHOTO REQUIREMENTS

All photo requirements must be documented in the KSC Support Requirements Data Set for Launch Site Support Plan (LSSP) upload/download so that KSC can work the support aspects of the photo requirements. Photographic requirements that directly support a technical task or test should also be documented in the KSC TDRS for SPDMS/OMRS download so that KSC can work the closed-loop tracking technical aspects of the photo requirements.

8.3.1.3 SWITCH SETTING REQUIREMENTS

Switch configurations for a test requirement shall not be in the PDL and the OMRS unless there are multiple ways to configure a system and the option can affect satisfaction of the requirement. Payload OMRS requirements can reference the switch configuration specified in the Flight Data File (FDF). All Orbiter flight crew-operated devices and closeout crew switch list settings must be covered in the JSC ascent checklist and must not be in the OMRS.

8.3.1.4 PROCEDURES

Procedures for implementing the KSC technical requirements on the payload hardware and software will not be documented in this Data Set. Online KSC procedures are documented on the KSC Payload Processing Technical Documentation System located on the KSC web site at http://pdms03.ksc.nasa.gov/. Customer offline procedures are documented by the PD and copies are provided to KSC Safety for review and placed in the Integration Data Package (IDP) or ADP with IDP Supplement upon custodial turnover to KSC.

8.3.1.5 LAUNCH COUNTDOWN REQUIREMENTS

The SPDMS/OMRS shall not be used to specify requirements for continuous monitoring parameters during the launch countdown, i.e., any Launch Commit Criteria (LCC). Any

parameter with the potential of causing an automatic launch countdown hold shall be specified in the LCC in the Payload Operations Data Set. LCC effectivity period begins at the start of external tank cryogenic loading (approximately Time to launch minus (T-) 6 hours).

8.3.1.6 CHARTS, GRAPHS, SCHEMATICS

Charts, graphs, schematics, etc., required for all OMRS files will be maintained by the following in a hardcopy document rather than in the SPDMS/OMRS computer system:

A. JSC OMRS Office for Files I through V and File VIII, Vol. 1.

B. KSC for File VI, File VII, Vol. 2, and File VIII, Vol. 2.

C. MSFC for File VII, Vol. 1, and File VIII, Vol. 3.

Each figure shall be referenced to the appropriate requirement number for Files II through IX, and will be controlled by the appropriate File Manager. The figure number will be defined by the first requirement that references that figure. Changes to the document will be made by RCN. If figures are involved in the change, then it is the File Manager's responsibility to ensure that the updated figure is forwarded to all the reviewing organizations and, once approved, to update the hardcopy master file.

8.3.2 OMRS REQUIREMENT DESCRIPTIONS AND DETAILS

For each technical requirement title selected, the PD shall complete a series of tables to capture the following information regarding the payload's requirements, as well as requirement subsets.

A. Requirements and requirement subset descriptions.

B. Location and contingency words.

C. Requirement measurement stimulus and specifications.

D. Requirement constraints.

E. Requirement remarks.

F. Requirement cautions.

G. Requirement warnings.

H. Requirements source and references.

8.3.2.1 REQUIREMENTS AND REQUIREMENT SUBSET DESCRIPTIONS

The PD shall provide the following information in Table 8.3.2.1-1, Requirement Title, Description, and Requirement Subsets, for each Requirement Title selected.

A. Requirement Number - *[Enter a temporary incremental number. If the same requirement title is used more than once (with different requirement descriptions), then use a new incremented requirement number.]*

B. Requirement Title - *[Enter the requirement title and include the element to which it pertains and any payload-unique wording. For example, analysis of xyz thermal interface. Enter N/A if not applicable. (38 characters max).]*

C. Requirement Description - *[Enter a description of the requirement (400 characters max).]*

D. Requirement Location - *[Enter the location that this requirement should be satisfied in. (The location codes are **<TBD 7-4>**, but are no longer than 10 characters max).]*

E. Requirement Subset Letter - *[Enter a letter to identify this requirement subset. Increment letters for subsequent subsets within the same requirement. Enter N/A if not applicable.]*

F. Requirement Subset Title - *[Enter the title for this requirement subset. For example, an IVT may have subsets of interfaces to verify such as power, data, video, timing, etc. Enter N/A if not applicable. (38 characters max per subset).]*

G. Requirement Subset Location - *[Enter the location that this requirement should be satisfied in. (The location codes are **<TBD 7-5>**, but are no longer than 10 characters max).]*

H. Requirement Subset Description - *[Enter a description for the requirement subset. Enter N/A if not applicable (400 characters max per subset).]*

TABLE 8.3.2.1-1 REQUIREMENT TITLE, DESCRIPTION, AND REQUIREMENT SUBSETS

Requirement Number	Requirement Title	
Requirement Description		
Requirement Location	**Requirement Subset Letter**	**Requirement Subset Title**
Requirement Subset Location		
Requirement Subset Description		

[Expand table as necessary to include all required information.]

[Duplicate Table 8.3.2.1-1 for each of the requirements and each of the requirement subsets that are applicable for the set of requirement titles.]

Once the payload's top-level requirements for KSC technical support have been identified for each impact category, the PD shall define the detailed parameters for each identified requirement. Using the impact category, requirement number, requirement title, and requirement subset letter as a reference, the PD shall continue to complete Table 8.3.2.1-2, Requirement Criticality and Effectivity Codes. This table pertains to the details for each requirement identified in Table 8.3.2.1-1. Identify only those requirement subset letters that are applicable. The PD shall provide the following information in Tables 8.3.2.1-2 through 8.3.2.1-5, Requirement Reference and Source.

I. Criticality Code - *[Enter the criticality code for each requirement title. Choose from the following criticality codes taken from NSTS 07700, Volume XI, Space Shuttle System Integrity Assurance Program Plan.]*

   1. Category 1: Loss of life, vehicle, or catastrophic loss of payload complement/Station. Single failure that could result in loss of life or vehicle.

   2. Category 1R: The undetectable failure of one of the redundant set of components that perform a Category 1 function. Redundant hardware item(s), all of which, if failed, could cause loss of life or vehicle.

   3. Category 1S: Rendering inoperative a system designed to detect/combat hazards or a system needed to react to hazards; such hazards being sufficient to cause potential loss of life or vehicle. Single failure in a Ground Support Equipment (GSE) safety or hazard monitoring system that could cause the system to fail to detect, combat, or operate when needed during the existence of a hazardous condition that could cause loss of life or vehicle.

4. Category 2: Damage of flight hardware, including non-catastrophic loss of payload. Single failure that could result in loss of mission. For GSE could result in loss (damage) of a Space Shuttle Vehicle (SSV) System.

5. Category 2R: Redundant hardware item(s), all of which, if failed, could cause loss of mission (not used for GSE).

6. No: No criticality code is applicable to this requirement.

7. Category 3: All others, which includes payload loss of science.

J. Effectivity Code - The OMRS file flight product KSC DSM will input the effectivity code. This field contains provisions for computer selection of requirements based on the coded effectivity under "A:." Special stripping codes are used to allow mission kit requirements to be identified on a per-mission basis by SPDMS. Mission kit strip codes are listed in OMRS File I. Special specific task identification stripping codes shall be used to identify requirements for certain specific conditions (i.e., rollback and demate, ferry flight, etc.). Requirements shall not define the location of where it is to be performed except where mandatory. Payload standalone requirements shall have effectivities of "A:N/A" and shall not require a reply in the Operations Maintenance Plan (OMP) unless the requirement is identified as criticality 1, 1R, or 2. Criticality 1, 1R, or 2 requirements must carry the payload effectivity and will be tracked in the OMP.

K. Effectivity Code Words/Contingency Words - The KSC DSM will input the effectivity code words. If the requirement is a contingency requirement, then the PD shall enter as such in this location with the related contingency words that explain what the requirement is contingent upon (200 characters max).

L. Measurement Stimulus Description - *[Enter the measurement/stimulus description for the requirement. Shuttle measurement Ids and/or Station Payload-Unique Identifiers (PUIs) should not be listed unless the specification tolerance or requirement definition is predicated upon usage of a specific measurement or is a one-time Program measurement verification (first time usage). Shuttle payload measurement Ids and payload Station PUIs should be considered verified prior to delivery/installation of the payload (400 characters max).]*

M. Measurement Stimulus - *[Enter a specific measurement or a one-time program measurement verification (first time usage) (10 characters max).]*

N. Specification - *[Enter the function and pass/fail criteria (specification) that can be satisfied by verifiable data (i.e., verify, measure, determine, etc.). Identify the criteria necessary to satisfy the test requirements. Values and tolerances shall reflect the inaccuracies caused by environment, aging, GSE, etc. Include a data range, i.e., 28 plus or minus 2 Vdc, 350 + or - 20 pounds per square inch absolute (psia), 24,608 kg/cm^2 + or - 1406 kg/cm^2, etc. (19 characters max per line that may span more than one line, not to exceed 500 characters).]*

Any special constraints from the flight hardware standpoint that must be considered in the handling and/or use of any ground system and/or special tooling shall be identified and defined in this section.

NOTE: If a requirement can be understood and performed correctly and safely without the constraints, remarks, cautions, and warnings information requested below, then those items should be left blank.

O. Constraint Number - *[Enter a sequential number. Constraints will be numbered as C-1, C-2, C-3, etc. If the constraint only applies to a specific requirement subset, then this constraint number must be placed in parentheses i.e., (C-X), within the requirement subset description in H, above.]*

P. Constraint Description - *[Enter the description of any constraints.]* A constraint contains:

1. Any placards or limitations notes that must be verified prior to powering or operating a system or component.

2. Any placards or limitations notes that must be adhered to during the performance of a requirement.

NOTE: Placards define any special configuration that must be verified prior to powering or operating a system or component. Limitations are any constraint that must be observed during the performance of a requirement or operation of a system or component.

Remarks are explanatory information as required for clarification. Remarks are also used to identify data trend requirements criteria. Remarks may not be used to state the requirement or to establish the specification.

Q. Remarks Number - *[Enter the remark number using the R-1, R-2, R-3 format. If the remark only applies to a specific requirement subset, then this remark number must be placed in parentheses, i.e., (R-X), within the requirement subset description in H, above.]*

R. Remarks Description - *[Enter the description of any remarks.]*

The PD shall provide information to clarify the requirement and will describe the cautions and warnings that should be understood.

S. Caution Number - This number will be provided by the PD. (Cautions will be numbered as Caution-1 **<TBD 7-6>**, Caution-2, Caution-3, etc.). If the caution only applies to a specific requirement subset, then this caution number must be placed in parentheses, i.e., (Caution-X), within the requirement subset description in H, above.

Cautions are precautionary notes that must be observed during the performance of operations that could be potentially dangerous to hardware. If the requirement and/or requirement subset can be understood and performed correctly and safely without the

constraints, cautions, and warnings information, then the information should not be stated.

T. Caution Description - *[Enter the description of any cautions.]*

U. Warning Number - This number will be provided by the PD. (Warnings will be numbered as Warning-1 **<TBD 7-7>**, Warning-2, Warning-3, etc.). If the warning only applies to a specific requirement subset, then this warning number must be placed in parenthesis, i.e., (Warning-X), within the requirement subset description in H, above.

Warnings are precautionary notes that must be observed during the performance of operations that could be potentially dangerous to humans.

V. Warning Description - *[Enter the description of any warnings.]*

W. Requirement Source - *[Enter the requirement source that identifies the documentation source of requirements other than Shuttle Master Verification Plan (MVP) (i.e., Interface Control Documents (ICDs), hazards, etc.).]* It is optional for the PD to enter requirement source information. This information is only entered if the PD requires the data for cross-reference into their unique documentation system. Requirements shall not reference ICDs, Non-Level II controlled specifications, or Non-Level II controlled drawings, except under this Requirement Source section and the Requirement References section below. These will correspond to the “D” Source and “Ref” of the remarks column in the OMRS file.

X. Requirement References - *[Enter any optional requirement references for internal project/contractor numbers.]*

[For convenience and PD clarification, the letter for each parameter definition is provided in the tables in parentheses alongside each parameter.]

TABLE 8.3.2.1-2 REQUIREMENT CRITICALITY AND EFFECTIVITY CODES

Impact Category	Requirement Number (A)	Requirement Title (B)
Criticality Code (I)		**Effectivity Code (J)**
Effectivity Code Words/Contingency Words (K)		

[Expand table as necessary to include all required information.]

TABLE 8.3.2.1-3 MEASUREMENT STIMULUS

Impact Category	Requirement Number (A)	Requirement Title (B)	Requirement Subset Letter (E)

Measurement Stimulus Description (L)	Measurement Stimulus (M)	Specification (N)

[Expand table as necessary to include all required information.]

TABLE 8.3.2.1-4 CONSTRAINTS, REMARKS, CAUTIONS, AND WARNINGS

Impact Category	Requirement Number (A)	Requirement Title (B)	Requirement Subset Letter (E)

Constraint Number (O)	Constraint Description (P)
Remarks Number (Q)	**Remarks Description (R)**
Caution Number (S)	**Caution Description (T)**
Warning Number (U)	**Warning Description (V)**

[Expand table as necessary to include all required information.]

TABLE 8.3.2.1-5 REQUIREMENT REFERENCE AND SOURCE

Impact Category	Requirement Number (A)	Requirement Title (B)

Requirement Source (W)	Requirement Reference (X)

[Expand table as necessary to include all required information.]

8.3.3 TGHR REQUIREMENT DESCRIPTIONS AND DETAILS

The PD shall complete the TGHR Table columns to capture the following information regarding the payload's time-critical/schedule-driven requirements.

Note that the numbers below correspond to the TGHR Table columns shown in Table 8.3.3-1, TGHR Table Format. The PDL will provide an on-screen and output format that is TGHR-like as shown in this table.

A. Item

1. Each line item must be numbered. Item numbering will be done automatically by the PDL. A P1, P2, P3,…item numbering scheme must be used for payloads. The PDL must follow this numbering scheme, but the numbers will change in the final TGHR Table as multiple PDs are integrated into the 1 TGHR Table Mission File. (5 characters max)

2. Enter initial Crew Compartment Configuration Drawing (CCCD) nomenclature, if known; otherwise, initial PD experiment nomenclature shall be updated later to CCCD, SGD32100XXX, crew compartment nomenclature. Location, part number, or subcomponent nomenclature should not be used, unless in a NOTE. (200 characters max)

3. If there are multiple lockers with the same nomenclature, then the requirements listed in the table will be performed for all of the lockers. List the quantity of lockers within parenthesis after the CCCD nomenclature, if more than one locker.

B. Maximum Power Interrupts

1. The maximum time allowed for a powered experiment to be without power. Enter "none" if not applicable. (20 characters max)

2. Planned power interrupts occur during transfers between Orbiter and GSE battery power during late stow, scrub turnaround, and early destow.

3. 28 +/- 4 Vdc, unless modified in the NOTE section.

C. Orientation Constraints

1. If critical, identify the orientation of a locker (containing item) during late stow, scrub turnaround, and/or early destow. Orientation may be unique for each configuration. If not critical, enter "none." (50 characters max)

2. Temporary excursions may occur during weighing, cleaning, bagging, late stow, scrub turnaround, and early destow.

Options for orientations are:

a. UP, DOWN (lockers with doors or face/panel plates).

b. HORIZONTAL (landing orientation).

c. Others will be clarified in the Note section.

D. Late Stow

1. Enter the late stow time required. Enter “none” if not applicable (20 character max).

2. Stowage requirements are necessary only when hardware must be installed in a time less than or equal to 3 days prior to launch. All other hardware will be done as part of nominal stowage per CCCD and coordinated with KSC.

3. Items should be stowed in whole lockers/bags. Exceptions may be items such as refrigerator/freezer contents, etc.

4. All items may be installed earlier with ISS Payloads Office/representative approval. This will allow item installation after delivery to the Launch Pad.

5. Table lists installation times. Custodial turnover times will be coordinated with KSC. PD-to-NASA KSC payload custodial turnover times are typically 1.5 to 2 hours, but no more than 4 hours, prior to installation to accommodate KSC preparation and transportation to the Launch Pad.

6. Time units are in L- times.

   Options for late stow times are:

   a. </= x days or equivalent x hours.

   b. </= 24 hours.

   c. </= specific stow hours (less than 24 hours requires KSC countdown working group approval). (Payload middeck installation must be completed by L-15.5 hours.)

E. Launch Delay

Figure 8.3.3-1 depicts the KSC Launch Delay times.

1. Identify when the hardware must be removed for refurbishment/replacement in 24-hour increments, up to and including 72 hours, and in day increments thereafter. Reinstallation will be performed per original stowage time. Enter “none” if not applicable (20 characters max).

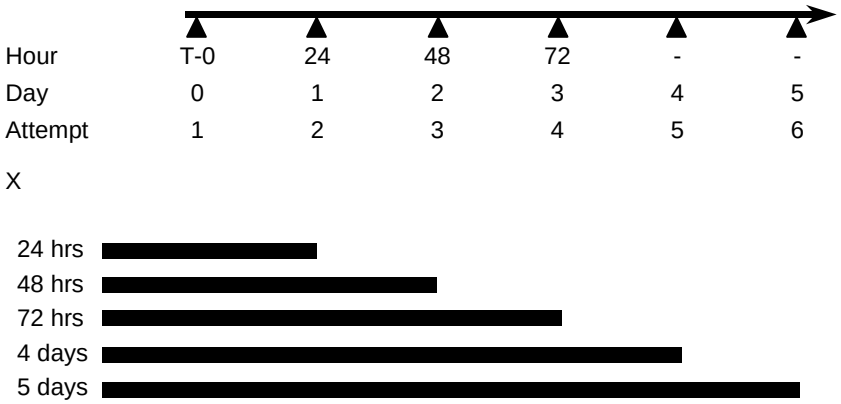
2. The maximum launch delay time that requires TGHR Table documentation is 14 days. The TGHR Table may be used for maximum launch delay times above 14 days, but it is not required.

3. Times are to be based from the initial planned T-0 time for which the item was stowed. They should not be tied to launch attempts or scrub recycle situations.

4. Launch delay time may be extended with ISS Payloads Office/representative approval.

5. If a middeck requires a 24-hour launch delay, then it is understood that the middeck has redundant hardware in order to facilitate a Launch Pad exchange.

LAUNCH DELAY TIMES



Perform destow within X hours/days after planned T-0 (destow within the bars indicated.)

020.doc

FIGURE 8.3.3-1 LAUNCH DELAY TIMES

For example: 48 hours implies that the item will be removed within 2 days after the planned T-0 the item was stowed. During this time frame there may have been none, one, or two launch attempts depending on scrubs before tanking, delays for weather or equipment problems, etc. There is a possibility the experiment may have been removed after being installed only 1 day, again depending on the type and duration of the launch scrub.

Options for Delay times are:

a. ____ hour(s).

b. ____ day(s).

F. Early Destow

1. TGHR Table requirements are needed for items that require removal from crew compartment within 2 days from landing.

2. Nominally, only full lockers are destowed. Exceptions may be items such as refrigerator/freezer contents, etc.

3. Identify removal from vehicle on runway or OPF/MDD (within R+48 hours), not custodial turnover to the customer, which is approximately 1 to 3 hours later.

4. Once the Orbiter has landed, there are three destow locations (relating to R+ times) items may be destowed: Runway, OPF, and Mate/Demate Device (MDD) facility (Dryden Flight Research Center (DFRC) only).
5. There are three Orbiter landing sites: KSC, DFRC, and All Other (White Sands Space Harbor (WSSH), or Trans-Atlantic sites).
6. Unless otherwise stated in a note, the “All Other” category of landing sites will be on a best-effort basis.
7. There are two types of mission endings: Nominal End of Mission (NEOM) and Early End of Mission (EEOM). For EEOM, science may not be viable until after a specific amount of Mission Elapsed Time (MET) has passed. For experiments in this category, specify MET > x hours/days. EEOM is supported on best-effort basis or as a non-standard service (as defined in the PIA, EXPRESS Interface Agreement (EIA), or Mission Integration Plan (MIP)) where destow personnel must be deployed to support landing. Best effort will not guarantee pre-deploy of personnel, but is used to assess priority of destow with limited personnel available.

Choose one of the following options for Destow locations for both “Early Destow KSC” and “Early Destow DFRC”:

a. Runway - Destow usually starts between R+1 and R+2 hours, but may extend due to conditions at the time such as safety concerns, crew problems, hatch problems, etc.
b. MDD (DFRC Only) - Nominal destow usually starts between R+24 and R+30 hours.
c. OPF (KSC Only) - For landings during the week, destow usually starts between 24 hours and 3 days. For landings on Fridays or during the weekend, destow does not start until Monday or later if the first opportunity is delayed.
d. None.

For Early Destow EEOM, enter one of the following: (50 characters max)

a. Applicable MET>x hrs./days.
b. “None.”

If a MET time was entered, choose from one of the following additional options to indicate the applicability to KSC and DFRC:

a. KSC only, DFRC best effort.
b. Best effort (at both KSC and DFRC).
c. Leave the field blank to indicate a non-standard service at both KSC and DFRC.

G. NOTES - Notes are to be used for the following reasons and should be considered requirements unless noted as “(reference only):”

1. To clarify requirements contained within the table.
2. To document exceptions to the ground rules.
3. To note which crew compartment payloads/experiments do not require TGHR documentation.

Document notes in alphabetical sequence following the table and make reference to the note in the applicable line item/requirement field. The original PDL note numbers assigned by PD will change as the TGHR Table is integrated into one mission file by the KSC TGHR Table process, which occurs outside of the PDL (2000 characters max per note).

General TGHR Table Flight production information is as follows:

a. Changes in the baselined TGHR Table will be identified with revision marks.
b. Once the TGHR Table is baselined, the item number and description must remain together (from baseline to flight even if items are deleted or added) to avoid incorrect translation into the KSC database.
c. Revision level of TGHR Table will be denoted by date and alphabetical sequence.

TABLE 8.3.3-1 TGHR TABLE FORMAT

Proposed Basic

No.	ITEM	MAX POWER INTERRUPTS	ORIENTATION CONSTRAINTS	LATE STOW < L- (HR)	LAUNCH DELAY (HRS/DAYS)	EARLY DESTOW		
						KSC	DFRC	EEOM
P1								
P2								
P3								
P4								
P5								
P6								

Notes:

8.3.4 FLIGHT PRODUCTS/DATA SET

The data captured by the previous forms will be put into the OMRS format and downloaded into the appropriate SPDMS/OMRS System where the Data Set is resident. Figure D.2-1 depicts a sample RCN form. Figure D.3-2 depicts a correlation between the data entered in the previous forms and their eventual location with the OMRS file flight product.

The RAM shows closed-loop traceability of the completion of the OMRS flight product requirements. The program will make available the RAM; Figure D.3-1 depicts a sample RAM.

These flight products will be made available for review, comment, and vote via a PDL web link to a PD-dedicated KSC Technical Requirements web site. This KSC web site shall contain only the flight products pertaining to the specific PD payload. The PD shall enter this KSC web site, review the flight products, provide comments, negotiate them with the KSC DSM, and vote. The final baseline flight products will be posted at this same location.

The PD TGHR Table data shall follow the TGHR Table flight product format that is shown in Table 8.3.3-1. A populated sample TGHR Table is shown in Figure D.3-3.

9.0 PAYLOAD CONFIGURATION DATA SET

9.1 INTRODUCTION

Payload Engineering, Integration, and Configuration Requirements Data comprise three main groups of data used by various teams within the International Space Station (ISS) Program:

A. Payload Drawings, Schematics, Configuration Data.

B. Payload Models.

C. Payload Manifest/Stowage Data.

These data are defined and collected in either the Payload Configuration Data Set or the Payload Interface Agreement (PIA). Table 9.1-1, Payload Configuration Data Set Contents, reflects where the Payload Engineering, Integration, and Configuration Data Set Requirements are defined and captured.

TABLE 9.1-1 PAYLOAD CONFIGURATION DATA SET CONTENTS

Description	Descriptive Paragraph	Data Input Table
Payload Developer Points of Contact	9.2.3	3.3-1
Payload Engineering Configuration Lists	9.3.1	9.3.1-1
Data Set Format Requirements	9.3.2	N/A
Assembly & Installation Drawings	9.3.2.1, 9.3.2.1.1	9.3.2.1.1-1
Electrical/Power System Schematics	9.3.2.1	9.3.2.1.1-1
Thermal Control System Schematics	9.3.2.1	9.3.2.1.1-1
Command and Data Handling Schematics	9.3.2.1	9.3.2.1.1-1
Vacuum Exhaust System Schematics	9.3.2.1	9.3.2.1.1-1
Vacuum Resource System Schematics	9.3.2.1	9.3.2.1.1-1
Resource Gas/Fluid Services Schematics	9.3.2.1	9.3.2.1.1-1
On-Orbit Operational Configuration Drawings	9.3.2.1.1	9.3.2.1.1-1
Subrack Payload Transfer Configuration Drawings	9.3.2.1, 9.3.2.1.3	9.3.2.1.1-1
Stowage Item Drawings (Complicated Stowage Items)	9.3.2.1	9.3.2.1-1
Stowage Item Drawings (Simple Stowage Items)	9.3.2.1	9.3.2.1-1
Subrack Payload Configuration Drawings	9.3.2.1.3	9.3.2.1.1-1
Payload Models	9.2.2.3	N/A
Payload Mass Properties	9.3.2.1.4	9.3.2.1.5-1
Payload Manifest/Stowage Requirements	9.3.3	9.3.3-1

The Payload Configuration Data Set collects the Payload Developer (PD) engineering drawings and schematics necessary for Payload Engineering Integration (PEI) to develop complement-level configuration drawings and schematics for the integrated International Standard Payload Rack (ISPR) and integrated EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) rack. Payload schematics are used by the Payload Operations Integration Function (POIF) to carry out the Payload Operations Plan. Payload schematics are specifically used by the PD teams and POIF personnel to communicate functional parameter monitoring features of the payload (e.g., to identify and isolate anomalies and to understand safety control features).

The configuration data is used to configure the payload during all phases of flight, including ascent, on-orbit, and return. The PD and PEI drawings and schematics result in Space Station Configuration Control Drawings (SSCCDs), Crew Compartment Configuration Drawings (CCCDs), and Assembly and Installation Drawings (A&IDs).

A. For payloads integrated directly with the Shuttle, such as Spacehab, the Unpressurized Logistics Carrier (ULC), EXPRESS pallet, or an Orbiter sidewall carrier, A&IDs will be used to integrate the payload with the Shuttle.

B. For payloads to be mounted in the middeck, CCCDs will be used.

C. For payload stowage items in the middeck, the payload stowage item CCCD will be used to integrate the stowage item with the locker.

D. For payload stowage items to be integrated into trays into a Resupply Stowage Rack (RSR) or into a bag onto the Resupply Stowage Platform (RSP), the SSCCDs will be used.

E. The Utilization Integrated Product Team (IPT) at Kennedy Space Center (KSC) uses the A&IDs to integrate the payloads.

F. The Cargo Integration (CI) team will use a combination of the SSCCDs of the RSRs and RSPs with the A&IDs of the Integrated ISPRs and integrated EXPRESS racks to develop the rack launch and return configurations of the Mini-Pressurized Logistics Module (MPLM).

Payload Manifest/Stowage Data is required by ISS Program Manifest, ISS Program CI, and the Flight Crew Support Division (FCSD). The data collected for the manifest will support the production of SSP 5410X-ANX 1, Increment Definition and Requirements Document for Planning Period X, Annex 1: Station Manifest (Series of Annexes of Flight-Specific Station Manifests). ISS Program CI requires data in order to plan and design the launch, on-orbit, and return stowage configuration of payload stowage into on-orbit modules and logistic carriers. Physical data describing each payload manifest/stowage item to be packed and delivered/returned shall be electronically entered into PDL. FCSD requires data in order to plan and design the launch/return stowage configuration of the payload in the middeck locker(s). CI also requires data in order to plan and design the launch/return stowage configuration of the payload stowage item into trays or bags.

9.1.1 PURPOSE

The Payload Configuration Data Set controls the format and content of selected Payload Engineering, Integration, and Configuration data required from the PD. Certain PD-developed engineering drawings and schematics are required by the ISS PEI organization to develop system-level drawings and schematics depicting integrated module, integrated truss, and integrated ISS systems. ISS PEI is responsible for the development of Payload Configuration Layouts depicting integrated United States Laboratory (US LAB) and Centrifuge Accommodation Module (CAM) payloads, United States (U.S.) truss-mounted payloads, payload static and dynamic envelopes, and Crew Restraints and Mobility Aids for each ISS stage flight (onboard configuration of payloads as impacted by each build sequence flight). ISS PEI is responsible for the development of systems-level schematics of the US LAB and ISS Electrical Power System (EPS), Thermal Control System (TCS), Command and Data Handling (C&DH), Vacuum Exhaust System (VES), Vacuum Resource System (VRS), and Resource Gas Services (RGS).

The drawings and schematics provided by the PD are drawings and schematics that will, in most cases, be products that shall be developed by the PD for use in other documentation (Interface Control Documents (ICDs), Safety Data Packages) or for use in the actual hardware assembly activities.

The Engineering Configuration List (ECL) is required in order to allow closed-loop tracking of the payload configuration. This list will contain information such as indentured drawing level, drawing or part number, revision level, quantity, title, next higher assembly, find number, and update date for the items that will be physically integrated by the Program. For each stage flight, the individual payload ECL lists will be consolidated into an overall ECL by Johnson Space Center (JSC). The portion of this list for which KSC is identified as the integrator will be provided to KSC Configuration Engineering. KSC Configuration Engineering will create a corresponding As-Built Configuration List (ABCL), which will be used to verify that all components identified in the ECL have been integrated.

9.1.2 SCOPE

The Payload Configuration Data Set defines individual payload configuration-related data as depicted in the Description column in Table 9.1-1. The Payload Configuration Data Set does not include vehicle descriptive data, nor does it include data captured by the Payload Hardware ICD.

9.1.2.1 PAYLOAD-PROVIDED ENGINEERING DRAWINGS AND SCHEMATICS

The PD shall electronically input payload-provided engineering drawings, diagrams, and/or schematics into the PDL. Formats other than electronic must be coordinated and approved with Configuration Data Set (CDS) management prior to submission (10-12 weeks advance notice).

9.1.2.2 PAYLOAD MODELS

Payload structural dynamic models shall be developed by the PD per SSP 52005, Payload Flight Equipment Requirements and Guidelines for Safety-Critical Structures, and delivered on a schedule per the payload PIM Schedule. Payload thermal models of external (attached) payloads and MPLM-powered payloads shall be developed by the PD per SSP 50200-03 Annex 1, Station Program Implementation Plan, Volume 3: Cargo Analytical Integration Annex 1: NASA Cargo Integration Data Requirements. Payload Kinematic Robotics Models and Payload Field of View Models of external (attached) payloads shall be developed and provided by the PD. These models are necessary for PEI to perform ISS-level clearance and field-of-view studies to ensure that sufficient clearance exists between ISS hardware and payload hardware or field-of-view zones. Model format requirements are provided in Table 9.3.2.1, Payload Data Set Format Requirements.

9.1.3 PRECEDENCE

In case of any variation between this Data Set and the PIA, the PIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA will not be considered binding on National Aeronautics and Space Administration (NASA) for implementation.

9.1.4 CONFIGURATION MANAGEMENT

Payload-unique configuration data contained in the Payload Configuration Data Set as defined in this Payload Data Sets Blank Book shall be controlled by the Payloads Control Board (PCB) as delegated to the Data Set Manager (DSM) assigned by the Payloads Office. Configuration Management of the Manifest and Stowage data collected from Section 9.3.3 is delegated to the Payloads Office's Manifest and Stowage Team with approval authority residing with the PMIT. The ISS Program will maintain configuration control of this document in accordance with SSP 50123-01, Configuration Management Handbook Volume 1.

9.1.5 MANAGEMENT RESPONSIBILITIES

9.1.5.1 PAYLOAD DEVELOPER RESPONSIBILITIES

The PD shall plan, develop, and deliver drawings and schematics in the data formats on the schedules defined in the Payload Generic Template and as negotiated and documented in the Payload PIA Addendum.

9.1.5.2 INTERNATIONAL SPACE STATION PAYLOAD OFFICE RESPONSIBILITIES

9.1.5.2.1 ISS PROGRAM PAYLOAD ENGINEERING INTEGRATION MANAGER

The NASA PEI Manager oversees the process for the management of the data contained in the Payload Configuration Data Set. The PEI Manager will ensure that the data is approved and controlled by the PEI Contractor team.

9.1.5.2.2 ISS PROGRAM PAYLOAD CONFIGURATION DATA SET MANAGER

The ISS Program Payload Configuration DSM is responsible for the management of the data contained within the Payload Configuration Data Set. The Payload Configuration DSM will provide periodic status to the ISS Payload Office and shall perform assigned Configuration Management (CM) duties as defined in the Payload Data Library Configuration Management Plan. KSC surveys the data contained in the Configuration Data Set when required for integration planning and procedure development. Cargo Integration and Shuttle Payload Integration surveys the CDS to determine what data is available when required for integration planning and implementation. PEI ensures that each of these organizations provides the data contained in the Configuration Data Set through a file transfer process or direct download from the PDL.

9.1.5.2.3 ISS PAYLOAD MISSION INTEGRATION MANIFEST/STOWAGE LEAD

The Payload Integration Manager (PIM) and the Payload Manifest/Stowage Leads are responsible for the management of the Payload Manifest/Stowage Data contained in the Payload Configuration Data Set. The PIM and the Payload Manifest/Stowage Leads ensure the data is approved and controlled by the Payload Mission Integration Team (PMIT).

9.2 PAYLOAD CONFIGURATION DATA SET GENERAL INFORMATION

9.2.1 PAYLOAD CONFIGURATION PROCESS FLOWS

9.2.1.1 PAYLOAD CONFIGURATION DATA COLLECTION PROCESS FLOW

The Payload Configuration data collection process flow is depicted in Figure 9.2.1.1-1, Drawing and Schematics Data Collection.

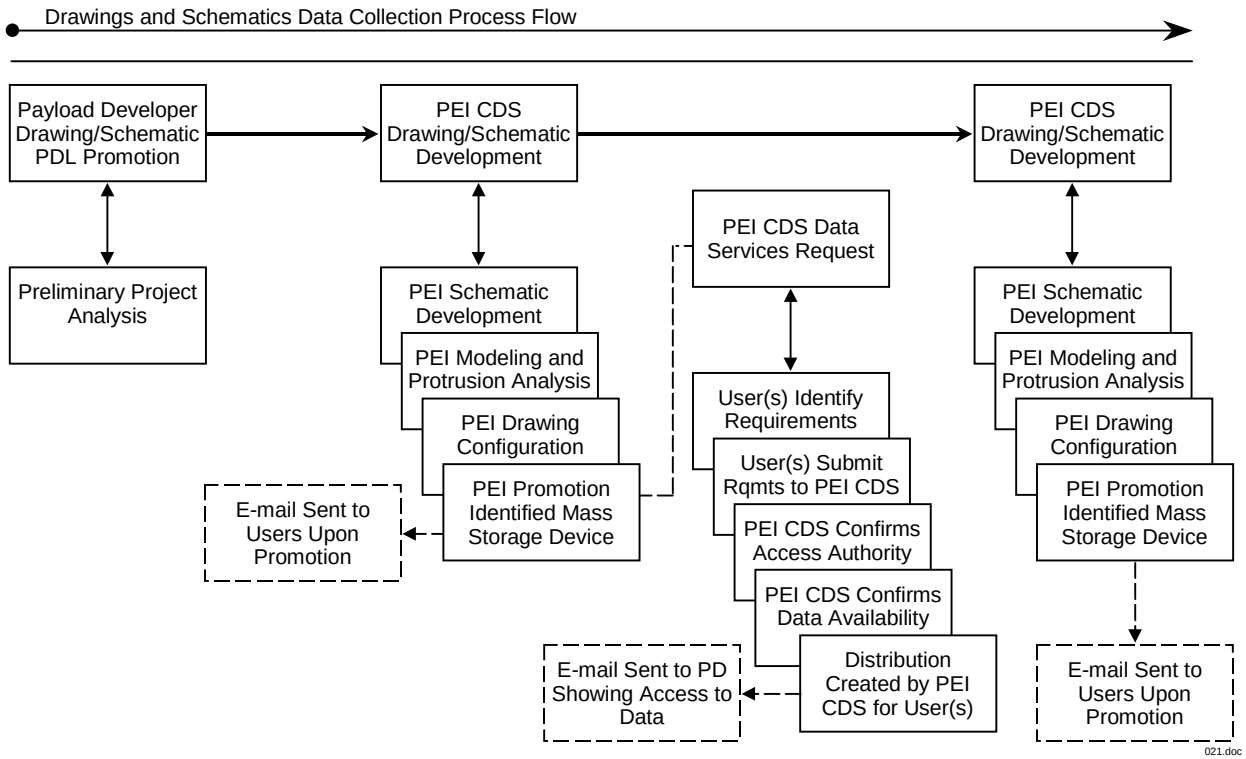


FIGURE 9.2.1.1-1 DRAWING AND SCHEMATICS DATA COLLECTION

9.2.1.2 PAYLOAD MANIFEST/STOWAGE DATA COLLECTION PROCESS

The process flow for Payload Manifest/Stowage Data collection is depicted in Figure 9.2.1.2-1.

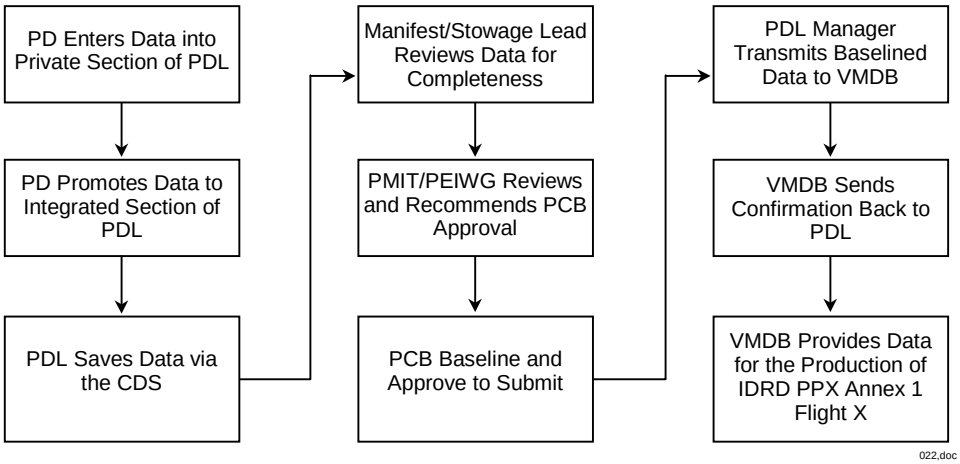


FIGURE 9.2.1.2-1 PAYLOAD MANIFEST/STOWAGE DATA COLLECTION PROCESS FLOW

9.2.2 PAYLOAD CONFIGURATION DATA SET DELIVERABLES SCHEDULES

The Payload Configuration Data Set deliverables shall be provided per the integrated schedule negotiated and documented in the payload's PIA Addendum. For planning purposes, the PD is referred to the Payload Generic Template for generic deliverable dates and programmatic milestones.

9.2.2.1 PAYLOAD DRAWINGS, SCHEMATICS, AND ENGINEERING CONFIGURATION LIST

The PD (Rack or Pallet Integrator) shall upload initial drawings, schematics, and ECL data into PDL at the first requested milestone and shall provide updates as defined in the PIA Addendum schedule under Drawings and Schematics Deliverable Dates. Data shall be delivered for subrack or sub-pallet payloads that require KSC physical integration or on-orbit installation. Additional updates to the data shall be provided if hardware changes are made by the PD or KSC after delivery. Hardware changes made by KSC shall be documented via a Field Engineering Change (FEC). The PD/Design Agency shall sign the FEC and will be provided a copy of the approved FEC so that the PD can update affected documentation and databases. As subrack, sub-pallet payload changes, or on-orbit as-builds are defined and planned by the ISPR or Attached Payload Integrator, updated rack-level or attached payload-level drawings and schematics are to be submitted for the affected ISPR rack or attached payload-level schematics based on the payload's negotiated schedule/increment. Assembly and installation drawings need to be submitted for the launch configuration and for the return configuration. Engineering configuration lists need only be submitted for the launch configuration. Assembly and installation drawings for subrack (e.g., middeck mounted EXPRESS payload) or sub-pallet payloads connecting directly to the launch vehicle or which require KSC physical integration or on-orbit installation, must be supplied by the PD.

9.2.2.2 PAYLOAD MANIFEST/STOWAGE DATA SCHEDULE

The PD shall provide preliminary inputs of the payload-unique data and provide updates as defined in the Payload Generic Template (Reference SSP 52000-PIA-PRP, Payload Integration Agreement Blank Book For Pressurized Payloads). The first set of data is required to support the development of preliminary products produced by OM/Mission Integration. The second set of data is required to support the development of baselined products produced by OM/Mission Integration. The third set of data is required as an update to the baseline product. Additional data drops may be required on an as-needed basis.

9.2.2.3 PAYLOAD MODELS

Model deliveries are defined in the unique payload verification plan and the PIM schedules.

9.2.3 PAYLOAD DEVELOPER POINTS OF CONTACT

The PD shall identify a primary point of contact for the payload drawings, schematics, configuration data, payload models, and payload manifest/stowage data. The same individual may serve as the primary contact for each discipline area. The PD shall complete Table 3.3-1 for each unique point of contact.

9.3 PAYLOAD CONFIGURATION DATA SET REQUIREMENTS

9.3.1 PAYLOAD-PROVIDED ENGINEERING CONFIGURATION LISTS

The PD shall provide the payload ECL in order to allow closed-loop tracking of the payload configuration. This list shall contain information as identified below for only those items that will be physically integrated by the Program. These items shall be fully integrated ISPRs, attached payload (pallets), subrack payloads or sub-pallet payloads, and loose flight hardware items (e.g., cable clamps, fasteners) that are to be integrated onto/into higher assembly flight systems. Stowage items that are not specified on a next higher assembly drawing (i.e., stowage tray contents) are not to be included in the ECL. These items are packed and accounted for by JSC's Stowage Integration Contractor. ECLs provided for subrack payload assemblies shall include all payload-provided hardware used to install the subrack payload. It is feasible that one PD could have more than one indenture drawing level 001 (e.g., one rack assembly and two or more subrack payload assemblies to be launched on the same flight). Note that Figure 9.3.1-1, Example Engineering Configuration List, identifies two level 001 assembles. KSC verifies that the specified parts are installed as per the ECL and certifies this through the construction of the KSC ABCL. Assembly or calibration instructions for a payload assembly shall be provided on the associated engineering drawing or in a separate procedure specified on the drawing. The PD shall provide the ECL information by completing Table 9.3.1-1.

Mandatory Field Elements:

A. Part Number - *[Specify the part number. If none, use drawing number. (Field Element - Char (35)).]*

B. Revision Level - *[Specify the minimum revision of a part (Field Element - Char (3)).]*

C. Find Number - *[Specify location on the drawing indicating the exact location and identification of a part on a drawing (Field Element - Char (3)).]*

D. Part Title - *[Specify a brief description of the drawing or part. Use drawing title if the drawing number was used in A. (Field Element - Char (60)).]*

E. Quantity - *[Specify the actual number of parts required for a given ECL line item (Field Element - Num (3)).]*

F. Indenture Drawing Level - *[Specify the sequential number that relates a line item to the logical assembly groups or next higher assemblies (Field Element - Char (3)).]*

G. Next Higher Assembly - *[Specify the drawing/part number to which a drawing/part number is assembled; i.e., parent/child relationship (Field Element - Char (35)).]*

H. Update Date - *[Identify the last change date for a given ECL/ABCL line item by the originator (Field Element date format (MM/DD/YYYY)).]*

Optional Field Elements:

A. Installation Drawing - *[Positions and fixes (installs) parts or assemblies on a major assembly. Is required if different from Next Higher Assembly (Field Element - Char (20)).]*

B. Installation Revision Level - *[Specify the latest released revision issued by the Design Center. A specific Design Center provides this field data (Field Element - Char (3)).]*

C. Manufacturer's CAGE Code - *[Specify the manufacturer's Commercial and Government Entity (CAGE) code located on the drawing (Field Element - Char (5)). A specific Design Center provides this field data.]*

D. Serial Number - *[Specify the actual serial number for a given drawing/part number (Field Element - Char. (10)).]*

E. Stowage Indicator - *[Indicates if items are to be stowed (Y/N). (Field Element - Char (1)). A specific Design Center provides this field data.]*

F. Manifest Sequence Identifier - *[A system-generated unique identifier for a specific manifest item (Field Element - Num (6)). This field is used in support of specific Design Centers.]*

G. Unreleased Engineering Flag - *[Indicates whether an ECL line item reflects unreleased engineering (Field Element - Char (1)). A specific Design Center provides this (Y/N) data.]*

H. Remarks - *[Specify pertinent information pertaining to a drawing/part number (Field Element - Char (40)).]*

Indenture Drawing Level	Drawing or Part Number	Revision	Update Date	Quantity	Find Number	Drawing or Part Title
001	410041NASA14	B	1/15/98	1	-	Physical Science Rack #14 Assembly & Installation Drawing
002	410042NASA14	B	10/8/97	1	1	Integrated Rack Assembly
002	410045NASA14	G	7/6/97	1	2	Subsystem Installation Kit 1
002	410046NASA14	F	8/5/98	1	3	Subsystem Installation Kit 2
002	410049NASA14	B	4/15/98	1	4	Subrack Payload Installation Kit 1
003	410149NASA14	C	5/5/98	1	1	Physical Science Payload 001 Assembly
003	NAS1954N16	-	-	8	2	Socket Head Cap Screw
003	NAS95006N16	-	-	8	3	Washer
002	410050NASA14	A	1/15/96	1	5	Subrack Payload Installation Kit 2
002	NAS1954N16	-	-	16	6	Socket Head Cap Screw
002	NAS14006-N18	-	-	16	7	Cable Clamp
001	410051NASA14	B	6/3/98	1	-	Subrack Payload Installation Kit A
002	410052NASA14	A	5/15/98	1	1	Physical Science Payload 002 Assembly
002	NAS1954N16	-	-	4	2	Socket Head Cap Screw
002	NAS95006N16	-	-	4	3	Washer

NOTE: The example is a partial output of the ECL. The next higher assembly and optional Field Elements are not shown.)

FIGURE 9.3.1-1 EXAMPLE ENGINEERING CONFIGURATION LIST

TABLE 9.3.1-1 PAYLOAD-PROVIDED ENGINEERING CONFIGURATION LISTS

ECL Requirements List		
*Mandatory Field Elements	Remainder Optional Inputs (Highly Desirable)	
*Drawing or Part Number	* Revision Level	* Find Number
*Drawing or Part Title		*Quantity
*Indenture Drawing Level	*Next Higher Assembly	*Update Date
Installation Drawing	Installation Revision Level	
Manufacturer's CAGE Code	Serial Number	
Stowage Indicator	Manifest Sequence Identifier	Unreleased Engineering Flag
Remarks		

9.3.2 PAYLOAD CONFIGURATION DRAWING DATA

In order to standardize the payload configuration data collection process and to facilitate the use of drawings and schematics, the PD shall adhere to their choice of the formats defined in Table 9.3.2-1, Payload Data Set Format Requirements. The most highly desired formats are provided first, and the least desired formats last. Use of alternative formats must be coordinated with ISS PEI no later than three months prior to the first delivery.

TABLE 9.3.2-1 PAYLOAD DATA SET FORMAT REQUIREMENTS

Description of Data Product	Software Format
Assembly & Installation Drawings Electrical/Power System Schematics Thermal Control System Schematics Command and Data Handling Schematics Vacuum Exhaust System Schematics Vacuum Resource System Schematics Resource Gas/Fluid Services Schematics Sub-Rack Payload Configuration Drawings Sub-Rack Payload Transfer Configuration Drawings On-Orbit Operational Configuration Drawings Stowage Item Drawings (Complicated)	Microstation (.dgn or saved as .dxf; .igs) Intergraph EMS (saved as .dxf; .igs) AutoCad (saved as .dxf; .igs) Unigraphics (saved as .dxf; .igs) Pro Engineer (saved as .dxf; .igs) Canvas V5 (saved as .dxf; .igs) dxf = Data Exchange igs = Initial Graphics Exchange Specification
Stowage Item Drawings (Simple)	(any of the above) Tagged Image File Format (.tiff) Compressed Bitmap Images (.cals) Joint Photographic Experts Group (.jpeg/.jpg) Graphical Interchange Format (.gif) Sun Raster Images (.ras) Bit-mapped Graphics (.bmp) Paintbrush Bitmap Image (.pcx) Apple Graphic File Formats (.pict)
Model Data Attached Payload Field of View Model (if required) Attached Payload Kinematic Robotics Model (if required)	As specified in the Unique Payload Verification Plan
All Other Data:	Raw data entered into PDL per prompts.

9.3.2.1 PAYLOAD CONFIGURATION DRAWINGS/SCHEMATICS DATA USAGE AND DESCRIPTION

The PD shall electronically input payload-provided engineering drawings and schematics into the PDL. All drawings shall conform to MIL-STD 100E, Engineering Drawing, or an approved equivalent. Formats other than electronic must be coordinated and approved with CDS management prior to submission (10-12 weeks advance notice). Symbology used on all schematics shall conform to JSC 10506, The Drafting Standards for System Handbook Drawings (Revision D, PCD-2; 3-91 5/1/2000). These payload-provided engineering drawings and schematics shall include only the following:

A. Assembly and Installation Drawings. Assembly and installation drawings for complete ISPR rack assemblies define the physical assembly and installation requirements for personnel at the launch site to prepare the flight hardware for launch. These drawings must include clearly defined instructions to ensure that the

final assembled and installed configuration of the flight hardware is in the same configuration as was designed, analyzed, and certified for flight. Assembly and installation drawings must describe how each subassembly or piece part appearing on the ECL is to be installed into the flight hardware final assembly. Any and all non-flight hardware (protective covers) must be red-tagged and identified in the Integration Data Package (IDP) or the IDP Supplement of the ADP.

B. Subrack Payload Configuration Drawings. Subrack payload configuration drawings are complete self-contained drawings that provide all physical information to the ISS Program to complete the physical installation of the flight hardware into the Orbiter Middeck, onto a resupply rack, onto an EXPRESS transportation rack, or into other logistics carrier rack assembly. These drawings must contain electrical connector locations, dimensions of venting ports or screens, Fire Suppression Access Ports, service panels (e.g., filters access), interface dimensions and tolerances, fastener callouts, torque values, and all assembly and installation instructions. These drawings must include clearly defined instructions to ensure that the final assembled and installed configuration of the flight hardware is in the same configuration as was designed, analyzed, and certified for flight. Subrack payload configuration drawings must describe how each subassembly or piece part appearing on the ECL is to be installed into the flight hardware final assembly. Any and all non-flight hardware (protective covers) must be red-tagged and identified in the IDP.

C. Subrack Payload Transfer Configuration Drawings. Subrack payload transfer configuration drawings which are normally called out in crew procedures. Payload transfers are defined as movement, not associated with experiment operations, of the payload device, rack, or payload consumables moved from one location to another. Payload transfer configuration drawings must show temporarily attached bumpers, guards, handles, and portable environmental conditioning hardware required during the transfer operation called out in the transfer procedures.

D. On-Orbit Operational Configuration Drawings. On-orbit operational configuration drawings showing each distinct operational configuration of the integrated ISPR. Each active operational payload or payload subsystem requiring crew operation or maintenance shall be clearly labeled (includes drawers and control panels). Deployed payload hardware, cables, brackets, crew restraints and mobility aids, ancillary equipment (e.g., computers, lights, cameras) and any other rack-mounted equipment shall be shown on the drawing. Static and dynamic operational envelopes are to be shown with dimensions and clearly labeled to identify the unique configuration being shown, caution and warning labels/indicators, fire detection indicator location, fire suppression access ports, and rack power removal switches. Control panel drawings should identify switches, switch names, switch locations, and procedure “call out” text.

E. Stowage Item Drawings. ISS Stowage Integration personnel require a minimum set of data to perform stowage design and integration activities. Engineering sketches or engineering drawings (see Figure 9.3.2-1, Example Stowage Item Drawing - Simple Item) are required to accurately and efficiently design the launch and return

stowage configuration for stowage items that have complicated shapes or are extremely heavy (see Figure 9.3.2-2, Example Stowage Item Drawing - Complicated Item). Computer-Aided Drafting (CAD) electronic drawings are required to properly design stowage accommodations for the hardware. For these complicated items, use of actual flight hardware or high-fidelity training hardware, when available, are requested by Stowage Integration personnel. Cargo Integration personnel use this hardware to determine how the hardware should be supported or stowed in a tray (with cushions or other stowage means), how it can be restrained, and if it can be removed and restowed during ground and on-orbit operations.

Payload stowage hardware items are to be fully described using Table 9.3.3-1, Payload Manifest/Stowage Data. Since ISS-provided hardware (Laboratory Support Equipment (LSE) and Station Support Equipment (SSE)) are defined by the ISS Program, PDs need only to identify the requirement for this hardware in Section 4.3 of their unique PIA. Definition of this hardware is not to be entered into Table 9.3.3-1. Hardware providers must provide any constraints in the event that soft goods, cables, or other items must be folded, rolled, stuffed, or stacked for the most efficient stowage.

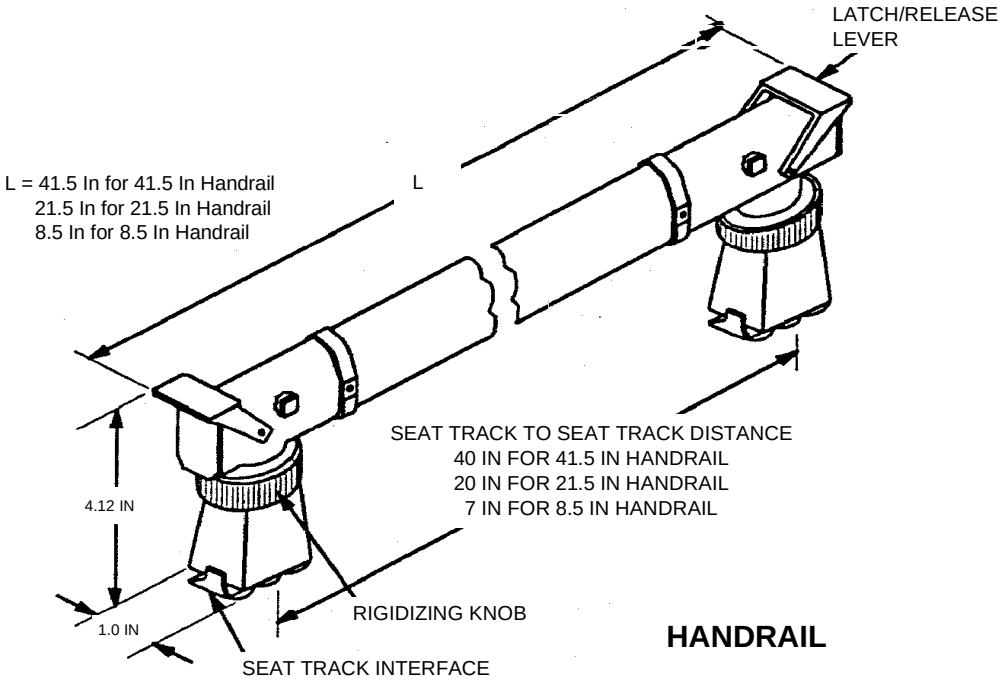
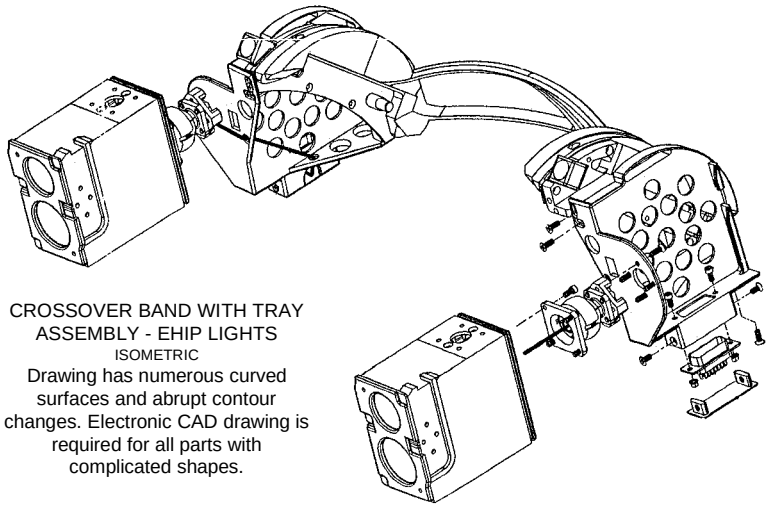
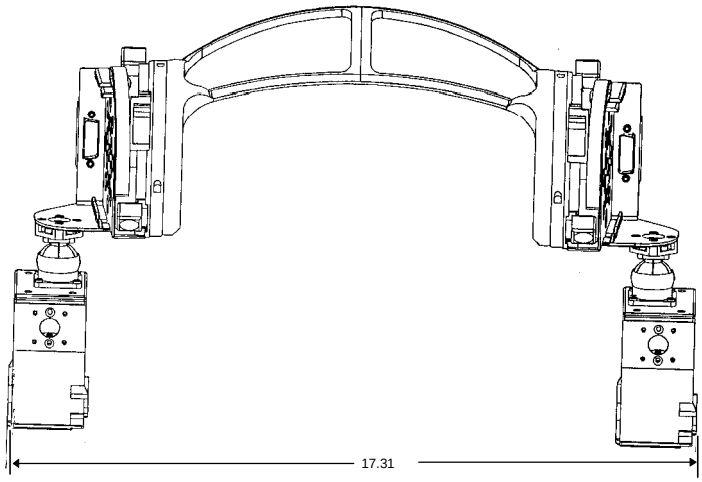
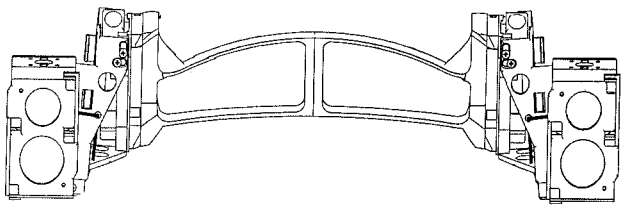
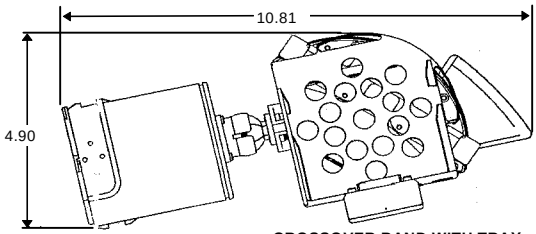


FIGURE 9.3.2-1 EXAMPLE STOWAGE ITEM DRAWING - SIMPLE ITEM









CROSSOVER BAND WITH TRAY
ASSEMBLY - EHIP LIGHTS
Drawing 4107NTB1770 Rev. B

FIGURE 9.3.2-2 EXAMPLE STOWAGE ITEM DRAWING - COMPLICATED ITEM

F. Electrical Power System (EPS) Schematics. EPS schematics shall be provided that depict all electrical power consuming equipment, their interconnectivity, functional relationships, and interfaces with equipment external to the payload. All circuit protection devices and their current ratings, wire gauge on either side of circuit protection devices, electrical power branch circuits, and the integrated rack power removal switch are to be shown. Interface panels and brackets, cables, connectors, and component labeling shall be identified on the drawing. Program-Unique Identifier (PUI), when available, for current or voltage and discrete (e.g., circuit breaker and switch status) measurement instrumentation shall be identified on drawings. Grounding is to be identified on the drawing.

G. Thermal Control System (TCS) Schematics. TCS schematics shall depict each thermal interface between the payload and any ISS element, including internal to ISPR fluid loop routing and connections, external fluid loop connections from facility or ISPR to the utility interface panel, subrack PD equipment-to-rack connector panel(s) connections, all shutoff or flow control devices, all heat exchanger devices, condensation control provisions, and unique plumbing features. Sketches or drawings depicting isolation schemes and thermal protection devices shall also be included. All fluid flow, pressure, or temperature measurement instrumentation providing data from PD equipment/facility to the ISPR or the ground shall be identified and a data PUI label noted. If the payload exhausts air to the US LAB cabin, then this shall be depicted on this schematic.

H. Command and Data Handling (C&DH) Systems Schematics. C&DH Systems schematics shall be provided that depict all C&DH components, their interconnectivity, functional relationships, and interfaces with equipment external to the payload. All memory storage devices, timing devices, and data processing devices within the payload are to be shown. Component labeling shall be identified on the drawing for all cables, connectors, and components.

I. Vacuum Exhaust System (VES) Schematics. VES schematics shall be provided depicting all significant plumbing features (e.g., connectors, valves, metering devices, pressure measurement devices, filters, mechanical caps). The schematic shall depict each interface between the payload vacuum chamber or port and any ISS element, including internal to ISPR vacuum line routing, external line connections from facility or ISPR to the utility interface panel, and subrack PD equipment-to-rack connector panel(s). All pressure, temperature, and/or flow-rate measurement instrumentation providing data from PD equipment/facility to the ISPR or the ground is to be identified.

J. Vacuum Resource System (VRS) Schematics. VRS schematics shall be provided depicting all significant plumbing features (e.g., connectors, valves, metering devices, pressure measurement devices, filters, mechanical caps). The schematic shall depict each interface between the payload and the ISS vacuum resource connection. The schematics shall also depict internal ISPR vacuum line routing, external line connections from facility or ISPR to the utility interface panel, and subrack PD equipment-to-rack connector panel(s). All temperature, flow-rate, or

any other measurement instrumentation providing data from PD equipment/facility to the ISPR or the ground is to be identified.

K. Resource Gas Services (RGS) (e.g., Nitrogen Gas) Schematics. RGS (e.g., nitrogen gas) schematics shall be provided depicting all significant plumbing features and appropriate labeling (e.g., connectors, valves, metering devices, pressure measurement devices, filters, mechanical caps). The schematic shall show plumbing originating at the Utility Interface Panel and terminating at the user-defined location. All pressure, temperature, and/or flow-rate measurement instrumentation providing data from PD equipment/facility to the ISPR or the ground shall be identified.

9.3.2.1.1 PAYLOAD-PROVIDED ENGINEERING DRAWINGS AND SCHEMATICS

The following drawings/schematics are to be submitted using Table 9.3.2.1.1-1, Payload-Provided Engineering Drawings and Schematics:

A. Assembly and Installation Drawings.

B. Subrack Payload Transfer Configuration Drawings.

C. Subrack Payload Configuration Drawings.

D. Complicated Stowage Item Drawings.

E. On-Orbit Operational Configuration Drawings.

F. Electrical Power System Schematics.

G. Thermal Control System Schematics.

H. Command and Data Handling System Schematics.

I. Vacuum Exhaust System Schematics.

J. Vacuum Resource System Schematics.

K. Resource Gas/Fluid Services Schematics.

The PD shall complete Table 9.3.2.1.1-1. All drawings shall conform to MIL-STD-100E and/or JSC 10506. All payload discipline(s) interface documentation, drawings, parts lists, and schematics to be submitted to the PDL for use by CDS management shall include the following information:

A. Payload Name - *[Provide name of the payload which is represented by the drawing or schematic as recognized by the ISS Program (20 characters max).]*

B. Contact - *[Automatically provided by database during point of contact input.]*

C. Interface Location - *[Provide the location of additional documentation and/or drawing/schematics (20 characters max).]*

D. Drawing or Part Number - *[Specify the drawing or part number.]*

E. Revision (Rev) - *[Specify the minimum revision of a part (Field Element - Char (3)).]*

F. Sheet Number - *[Indicate the number of sheets per each part/drawing/schematic set, e.g., 01 of 03; 02 of 10, assumed to be 1 of 1 if no entry made (Field Element - Char (8)).]*

G. Drawing or Part Title - *[Provide a brief description of the drawing or part (Field Element - Char-(32).]*

H. Document - *[Submit the document in one of the approved formats.]*

I. Flight Up/Down - *[Indicate if documentation is for a flight up or down and specify unique requirements.]*

J. Type of Image - *[Select one of following from a pulldown menu: Assembly and Installation Drawings, Subrack Payload Transfer Configuration Drawings, Subrack Payload Configuration Drawings, Simple Stowage Drawings, Complicated Stowage Item Drawings, On-Orbit Operational Configuration Drawings, Electrical Power System Schematics, Thermal Control System Schematics, Command and Data Handling System Schematics, Vacuum Exhaust System Schematics, Vacuum Resource System Schematics, Resource Gas/Fluid Services Schematics.]*

TABLE 9.3.2.1.1-1 PAYLOAD-PROVIDED ENGINEERING DRAWINGS AND SCHEMATICS

Type of Image

Integrated Payload Name:

Interface Location: **Contact:**

Unique Requirements:

Flight: ☐ **Up** ☐ **Down**

Drawing or PartNo.	Rev	Drawing or Part Title	Sheet Number

Document

9.3.2.1.2 SUBRACK PAYLOAD TRANSFER CONFIGURATION DRAWINGS

The PD shall take into account any special physical configuration of the payload during transfer operations. The PD shall stipulate limits for any conditions the payload may encounter during transfer, such as power, thermal, microgravity, electromagnetic, vacuum, or gases. The PD shall list any special tools or resources required for the payload during transfer, such as protective cases or bags, maneuvering handles, or cables. The PD will submit information pertaining to any special configuration of the payload during transfer operations. The PD shall submit this information into the Unique Requirements in PDL.

9.3.2.1.3 SUBRACK PAYLOAD CONFIGURATION DRAWINGS - PAYLOAD-PROVIDED ENGINEERING DRAWING AND SCHEMATICS

The PD shall submit drawings of unstowed subrack (e.g., middeck) payloads or Orbital Replacement Units (ORUs) by completing Table 9.3.2.1.1-1. Critical features such as controls, access panels, and connector location must be shown. Drawings/ schematics are to be submitted in Table 9.3.2.1.1-1. The required configuration drawings shall include the following:

A. Dimensioned drawings of subrack-type payload assemblies.

B. ORUs showing location and identification of electrical connectors.

C. Dimensioned drawings showing operational envelopes and clearances for servicing by ground and flight crews.

D. Dimensioned drawings showing the Payload Coordinate System (PCS) and the center of gravity (cg) with respect to PCS.

E. Dimensioned drawings for static or operational phases of dynamic payloads during: (prelaunch, launch, transfer to Station, transfer to Shuttle, descent, post-landing).

9.3.2.1.4 PAYLOAD MASS PROPERTIES (NON-STOWED HARDWARE)

Mass properties data is required for all integrated ISPRs for the launch, on-orbit, and return configurations. Mass properties are also required for subrack or sub-pallet payloads mounted directly to the Space Shuttle or Logistics Carrier. Mass properties data is also required for integrated attached payloads. The PD shall provide the following information in Table 9.3.2.1.5-1, Payload Mass Properties:

A. Integrated Payload Name - *[Provide name of the integrated payload which is represented by the drawing or schematic as recognized by the ISS Program (20 characters max).]*

B. Contact - *[Automatically provided by database during point of contact input.]*

C. Drawing or Part Number - *[Include the item reference part or drawing/schematic number (15 characters max).]*

D. Drawing or Part Title - *[Include the title for the referenced part or drawing/schematic (30 characters max).]*

E. Control Wt. From ICD kg. - *[State the payload control weight in kilograms (kg) (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

F. Current Total Wt. Kg. - *[State the payload current weight in kg (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

G. Describe Configuration - *[Describe the configuration from list - ISPR (Integrated ISPR), Subrack payload, Sub-Pallet payload (15 characters max).]*

NOTE: Payload manifest/stowage items described in Table 9.3.3-1 are not to be contained in this table.

H. Location (Phase) - *[Specify as to the orientation for the properties supplied: (launch; landing; on-orbit; mid-deck) (10 characters max).]*

I. Describe Configuration - *[On-Orbit Operational Configuration (30 characters max). Describe configuration of payload item for location data provided, e.g., Payload installed in ER1. Basis of estimate: [25 char max.]*

J. Maturity - *[Describe the maturity of the mass provided by selecting one of the following: Estimated % weight, Calculation by %, Actual %. (Total of estimated, calculated, and actual must be equal to 100%).]*

K. Parameters - *[Select if location data is for an integrated or on-orbit rack (10 characters max).]*

L. Time Period - *[Identify the Launch minus (L-) month time period for the estimate (L-8; L-11; L-14; L-17; L-20) (4 characters max).]*

M. Xcg (X-axis cg) - *[Specify the distance along the x-axis, in cm, between the cg of the payload item to the coordinate system defined on the specified drawing number. (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

N. Ycg (Y-axis cg) - *[Specify the distance along the y-axis, in centimeters (cm), between the cg of the payload item to the coordinate system defined on the specified drawing number. (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

O. Zcg (Z-axis cg) - *[Specify the distance along the z-axis, in cm, between the cg of the payload item to the coordinate system defined on the specified drawing number. (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

P. Ixx (Moment of Inertia with respect to the coordinate system defined on the specified drawing number) - *[Specify the moment of inertia of the payload item, in kilograms per centimeters squared (kg-cm^2). (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

Q. Iyy (Moment of Inertia with respect to the coordinate system defined on the specified drawing number) - *[Specify the moment of inertia of the payload item, in kg-cm^2. (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

R. Izz (Moment of Inertia with respect to the coordinate system defined on the specified drawing number) - *[Specify the moment of inertia of the payload item, in kg-cm^2. (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

S. Ixy (Product of Inertia about the xy-axis) - *[Specify the x-y product of inertia of the payload item, in kg-cm^2. (Identify if a positive (+) or negative (-) integral is being used for calculations). (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

T. Ixz (Product of Inertia about the xz-axis) - *[Specify the x-z product of inertia of the payload item, in kg-cm^2. (Identify if a positive (+) or negative (-) integral is being used for calculations). (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

U. Iyz (Product of Inertia about the yz-axis) - *[Specify the y-z product of inertia of the payload item, in kg-cm^2. (Identify if a positive (+) or negative (-) integral is being used for calculations). (NUMBER 15,5; 15 digits, with 4 to the right of the decimal).]*

TABLE 9.3.2.1.5-1 PAYLOAD MASS PROPERTIES

Integrated Payload Name:				
Drawing or Part Number:	Drawing or Part Title:			Control Wt. From ICD:
Estimated Wt. (kg):	Calculated Wt.by (kg):	Actual Wt., (kg):	Current Total Wt.(kg):	Margin (Control-Current):
On-Orbit Operational Configuration		Location (Phase):	Configuration:	Time Period:
		☐ Launch ☐ Middeck ☐ On-Orbit ☐ Landing	☐ ISPR ☐ Subrack ☐ Sub-Pallet	☐ L-8 ☐ L-11 ☐ L-14 ☐ L-17 ☐ L-20
		Xcg	Ycg	Zcg
Center of Gravity from PAS Origin (cm):				
		Ixx	Iyy	Izz
Moment of Inertia About cg. (kg-cm^2):				
		Ixy	Ixz	Iyz
Product of Inertia About cg. (kg-cm^2):				
(Identify if a positive (+) or negative (-) integral is being used for calculations.)				

Note: Fill in a new table for each Payload Location (as necessary) e.g., Launch; Mid-deck; On-Orbit; Landing)

9.3.3 PAYLOAD MANIFEST/STOWAGE DATA

The Payload Manifest/Stowage Data section defines the flight-specific manifest items and their characteristics which specify manifest requirements for payloads.

For more information on the payload processes, Appendix B of SSP 50471, International Space Station Payload Mission Integration Team Execution Plan, contains WI #3, Developing Payload Manifest/Stowage inputs for SSP 5410X-ANX 1 and WI #4, Payload Requirements Change Management.

All the parameters in Section 9.3.3 for all items on a flight are required to be initially promoted to the integrated level in PDL per the timeline specified in SSP 57057. The exceptions to this requirement include the subkit items, ISS bar codes, and serial numbers. A subkit item is an item located within a defined kit and its dimensional and mass envelope. The exceptions are due at later points in the SSP 57057 timeline.

In order to support transfers of data to the VMDB, all items with the same part number and cage code must have the same part name. Both the design of the VMDB and the ISS Manifest Group's database allow only one part name for items with the same cage code and part number.

Fields deemed mandatory by the Manifest Working Group (MWG) for initial Manifest Request (MR) submittal to the IDRD Annex 1 are as follows:

A. Part name

B. Part number

C. Mass

D. Dimensions

E. Certification date

F. Required by date (up/down code and flight no.)

G. Desired carrier

H. Suggested on-orbit stowage location

I. Any special requirement (power, refrig., late stow/early access, etc.)

For EXPRESS:

The kit-subkit philosophy can be applied somewhat to assembled or packed together for launch assemblies and subassemblies. The overall top-level part number and name can be used in the initial submittal in these situations. By L-8, all the data for subkit, assemblies, and subassemblies must be submitted. Each instance where only an assembly or subassembly top-level detail is used, must be discussed with and approved by the PL Manifest Lead. This philosophy does not apply in the cases where items are not flown together in the same container and/or packed with hardware from a different provider or system.

Figure 9.3.3-1, Data Input Procedure, displays the hierarchical layout of payload data to the PIA Addenda. Table 9.3.3-1 defines each parameter to be inputted by the PD at the indicated timeframe.

The Program shall provide the following information before the PD promotes data categories D through YY of Table 9.3.3-1 to the integrated status level:

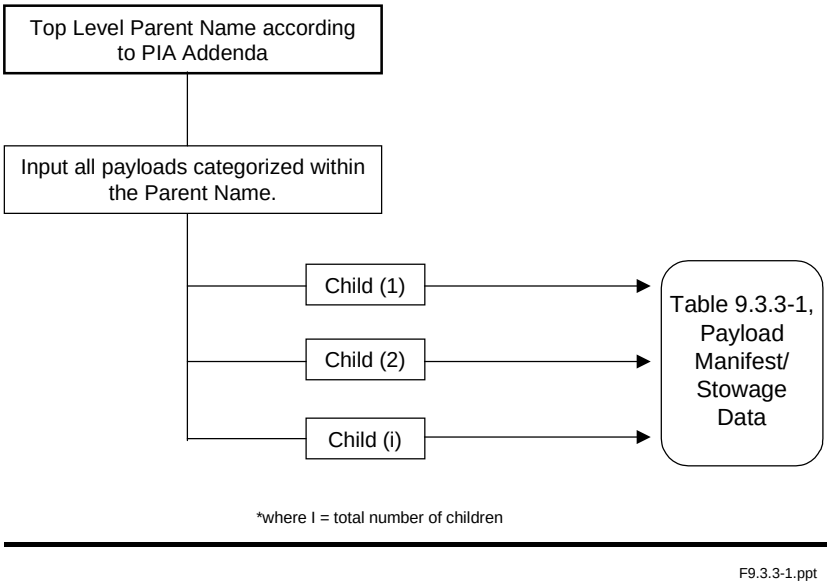


FIGURE 9.3.3-1 DATA INPUT PROCEDURE

Parent Name - *[Specify the payload item name in the PIA Addenda Table 3.1.2-1 (128 characters max).]*

Parent Mass - *[Specify the allocated mass for the payload item according to the PIA Addenda Table 3.1.2-1. The total mass of all subitems must be equal to or less than the parent mass. If this mass allocation is exceeded, a flag will indicate that a Change Evaluation Form (CEF) will be required for approval (NUMBER) 17,5.]*

Parent Volume - *[Specify the allocated volume for the payload item according to the PIA Addenda Table 3.1.2-1. The total volume of all subitems must be equal to or less than the parent volume. If this volume allocation is exceeded, a flag will indicate that a CEF will be required for approval (NUMBER) 15,4.]*

The PD shall provide the following information in Table 9.3.3-1:

A. Item Part Number - *[Specify the vendor-supplied part number associated with an item. This attribute may be the same as or different from the part number. A part number is often defined by adding a dash number to the drawing number. Hence, the drawing number and part number are different. (80 characters max).]*

B. CAGE Code - *[Commercial and Government Entity Code (organization) or IP hardware provider (5 characters).]*

C. Part Name - *[Specify the vendor-supplied item name (80 characters max).]*

For the following parameters, specify the actual weight, dimension, or volume for the item in the stowed configuration when known. Otherwise use the control value. Both weight and volume data are required before the PD promotes the data set from the private to the integrated level.

D. Weight - *[Specify the weight of the item in metric units (kg). (NUMBER 17,5) There are 17 possible digits, with 5 to the right of the decimal).]*

E. Length - *[Specify the length of the item in metric units (cm), (NUMBER 15,4).]*

F. Width - *[Specify the width of the item in metric units (cm) if applicable (NUMBER 15,4).]*

G. Height - *[Specify the height of the item in metric units (cm), if applicable (NUMBER 15,4).]*

H. Volume - *[Specify the volume of the item in metric units cubic centimeters (cm^3) (NUMBER 45,4).]*

I. Diameter - *[Specify the reference diameter of any item in metric units (cm), if applicable (Number 15,4).]*

J. Acronym - *[Specify the acronym for the item as supplied by data provider for use on the SSCCD decal (10 characters max).]*

K. ESD/EMI/Radiation Sensitivity Code - *[Specify any special handling or shielding requirements to alleviate damage from ESD, EMI, or radiation. Enter "Y" if the item is sensitive and "N" if there are no special requirements (1 character).]*

L. Quantity Per Unit Pack - *[If item requires unit packing, specify the quantity/number of items within the pack/kit (3 characters max).]*

M. Hardware Point of Contact - *[Specify the PIM/EXPRESS Payload Integration Manager (EPIM) name and phone number assigned to this hardware (40 characters max).]*

N. Hardware Classification - *[Specify using one of the following choices (10 characters max):]*

1. REFLOWN - Hardware that was previously flown on missions which specified requirements identical to those of the ISS Program and has been previously certified for those missions.

2. SERIES - Hardware that is of the exact design as hardware that has previously been certified.

3. NEW - Hardware that has not been certified for flight.

4. MODIFIED - Hardware that was previously been certified for flight, but has received modifications in either the design, operations, or environmental criteria.

O. Hardware Certification - *[Specify the date the hardware was certified by the Payload Safety Review Panel (PSRP). If the actual date is not known, then the planned date should be used. Format: DD-MM-YYYY (11 characters max).]*

P. Launch Orientation - *[Specify the text description of any special requirements for item orientation during launch. Initially set to N/A. If no constraints, do not change (80 characters max).]*

Q. Landing Orientation - *[Specify the text description of any special requirements for item orientation during landing. Initially set to N/A. If no constraints, do not change (80 characters max).]*

R. Up-Down Code - *[Specify if ascent or descent flight (L = Launch, R = Return) (2 characters max).]*

S. Flight ID - *[Specify the requested station flight the item must be flown. Options will be listed in PDL (12 characters max).]*

T. Item Bar Code - *[Specify the IMS label number when assigned (per SSP 50007, Space Station Inventory Management System Bar Code Label Requirements and Specification) (9 characters max).]*

U. Expiration Date - *[Specify the expiration date for limited shelf-life items. The Expiration Date field is used for items with shelf life concerns, (i.e., the minimum guaranteed drug strength, freshness, and/or certification life) after which date the items must be replaced. Date format is DD-MM-YYYY. Initially set to N/A. If no constraints, do not change (11 characters max).]*

V. Notes - *[Specify other important information if necessary. Used to expand on constraints not fully captured by the other parameters listed in Section 9.3.3 (500 characters max).]*

W. Item Serial Number - *[Specify the vendor-supplied serial number when assigned or known (32 characters max).]*

X. Stowage Grouping Code - *[If an item is to be stowed with another item, then use a two-character alphanumeric grouping code to assist in the identification of the match (e.g., AA, AB, AC, A1, A2, A3). Initially set to N/A. If no constraints, do not change (10 characters max).]*

Y. Late/Early Access Requirement - *[Specify if the items require late entry before launch or early access upon landing using the following choices:]*

1. N = Not Applicable.
2. L = Late access/loading before launch (within L-72 hours.).
   [If L selected, specify L- time in hours (NUMBER 4,1).]
3. E = Early access/removal after landing (within R+6 hours).
   [If E selected, specify R+ time in hours (NUMBER 4,1).]

Initially set to N/A. If no constraints, do not change.

Z. Initial On-Orbit Stowage Location - *[Specify the user's preference for on-orbit stowage (14 characters max).]*

AA. Hazardous Code - *[Specify the item as a possible hazard using the following choices (11 characters max):]*

Y = The item is hazardous

N = The item is not hazardous

BB. Drawing Reference Number - *[Specify a drawing number associated with an item. This attribute maybe the same as or different from the part number. A part number is often defined by adding a dash number to the drawing number. Hence, the drawing number and part number are different. (40 characters max).]*

CC. Drawing Revision Number - *[Specify the revision level of the drawing associated with an item. Initially set to N/A. If no revisions, do not change (20 characters max).]*

DD. Electrical Power Required During Ascent/Descent - *[Specify whether or not electrical power is required (Y = Yes, N = No) (1 character).]*

EE. Refrigeration/Freezer Resources Required During Transportation - *[Specify whether or not refrigeration/freezer resources are required (Y = Yes, N = No) (1 character).]*

FF. Stowage Accessibility - *[Specify stowage accessibility (e.g., item needs to be unstowed on-orbit quickly; therefore, it should be packed accordingly). Example: 01 = 1 hour, 02 = 2 hours, XX = Not Applicable (2 characters max).]*

GG. Unit Pack - *[Specify the item if it requires unit packing. Specify Y = Yes or N = No (1 character).]*

HH. Unit Pack Notes - *[If the item requires unit packing, specify the text description on unit pack item (255 characters max).]*

II. Trash Generated - *[Specify if item will generate trash. Specify Y = Yes or N = No (1 character).]*

JJ. Trash Notes - *[If item will generate trash, specify text description on handling trash item (255 characters max).]*

Gravity parameters are required for items above 13.6 kg (30 lbs) in the middeck and 22.7 kg (50 lbs) for items in the MPLM. Moment of Inertia and Products of Inertia are required for items above 50 lbs.

KK. X Center of Gravity - *[Specify cg(x) in SI units. The "X" cg coordinate of each payload manifest/stowage item shall be verified by actual measurement tests. The accuracy shall be +/- 0.0625 meters for a single integrated ISPR rack for actual measured "X" cg coordinate. (NUMBER (17,5)).]*

LL. Y Center of Gravity - *[Specify cg(y) in SI units. The "Y" cg coordinate of each payload manifest/stowage item shall be verified by actual measurement tests. The accuracy shall be +/- 0.0625 meters for a single integrated ISPR rack for actual measured "Y" cg coordinate. (NUMBER (17,5)).]*

MM. Z Center of Gravity - *[Specify cg(z) in SI units. The "Z" cg coordinate for each payload manifest/stowage item shall be verified by actual measurements tests. The accuracy shall be +/- 0.0625 meters for a single integrated ISPR rack for actual measured "Z" cg coordinate. (NUMBER (17,5); there are 15 possible digits, with 4 to the right of the decimal).]*

NN. I(xx) Moment of Inertia - *[Specify the subelement moment of inertia with respect to x-axis about cg (Ixx) in kg-cm^2. The moments of inertia shall be determined by analysis. They shall have an accuracy of +/- 5 percent. [NUMBER (17,5)).]*

OO. I(yy) Moment of Inertia - *[Specify the subelement moment of inertia with respect to y-axis about cg (Iyy) in kg-cm^2. The moments of inertia shall be determined by analysis. They shall have an accuracy of +/- 5 percent. (NUMBER (17,5)).]*

PP. I(zz) Moment of Inertia - *[Specify the subelement moment of inertia with respect to z-axis about cg (Izz) in kg-cm^2. The moments of inertia shall be determined by analysis. They shall have an accuracy of +/- 5 percent. (NUMBER) (17,5)).]*

QQ. I(xy) Product of Inertia - *[Specify the subelement product of inertia with respect to x- and y-axis about cg (Ixy) in kg-cm^2. (Identify if a positive (+) or negative (-) integral is being used for calculations). The products of inertia shall be determined by analysis. They shall have an accuracy of +/- 5 percent. (NUMBER (17,5)).]*

RR. I(yz) Product of Inertia - *[Specify the subelement product of inertia with respect to y- and z-axis about cg (Iyz) in kg-cm^2. (Identify if a positive (+) or negative (-) integral is being used for calculations). The products of inertia shall be determined by analysis. They shall have an accuracy of +/- 5 percent. (NUMBER (17,5)).]*

SS. I(xz) Product of Inertia - *[Specify the subelement product of Inertia with respect to x- and z-axis about cg (Ixz) in kg-cm^2. (Identify if a positive (+) or negative (-) integral is being used for calculations). The products of inertia shall be determined by analysis. They shall have an accuracy of +/- 5 percent. (NUMBER (17,5)).]*

TT. Physical Integrator - *[The ISS Program will make the input on who the physical integrator will be for the manifested item. The ISS Program will specify the group that is responsible for integrating/deintegrating and packing the manifested item. Largely, location of the item determines the group that physically integrates the manifested item (20 characters max).]*

UU. Stowed/Installed - *[Specify whether a part is to be stowed or installed. If a part is to be installed, specify the timeframe of installation (TEXT (4)).]*

STOW = Stowed
IONL = Installed On Launch
IPOU = Installed Post Undock

IPRU = Installed Pre-Undock
N = N/A

VV. Cage code Contact - *[Specify the PIM assigned to this hardware (40 characters max).]*

WW. Manifested Parent ID - *[Identifies the parent relationship in which the part is a child as a stowed item. For example, an item stowed within a kit would use the kit's part number as it's manifested parent ID. (NUMBER 22).]*

XX. On-Dock Date - *[The date the part is scheduled to arrive on dock at the facility of the packing entity. The date will be dictated by the ISS Program and will be coded in by PDL. Date format is DD-MMM-YYYY. (DATE 11).]*

Note 1: All data fields required for all stowage items except for items contained within kits. Mandatory fields for sub-kit items shall be fields: A, B,C,K,L,T,U,X,AA,II,WW.

Note 2: PDL will implement a "Duplicate" button which will duplicate a record.

YY. On-Orbit Requirements - *[Specify any special requirements/constraints for an on-orbit stowage, handling, environmental, and physical requirements (255 characters max).]*

ZZ. Scrub Turnaround Time - *[Specify the maximum time in hours after a launch delay/scrub before the experiment or samples must be replaced to preserve the experiment viability (3 characters max).]*

AAA. Late access/loading time limit. *[Specify the time limit required for ISS to complete the installation of the payload items in hours (Number 4.1).]*

BBB. Early access/removal time limit. *[Specify the time limit required for ISS to complete the removal of the payload item in hours (Number 4.1).]*

TABLE 9.3.3-1 PAYLOAD MANIFEST/STOWAGE DATA (PAGE 1 OF 2)

Field Name	Data Field
Item Part Number	
Part Name	
Cage Code	
Weight	
Length	
Width	
Height	
Volume	
Acronym	
ESD/EMI/Radiation Sensitivity Code	
Diameter	
Quantity per Unit Pack	
Hardware Point of Contact	
Hardware Classification	
Hardware Certification	
Notes	
Launch Orientation	
Landing Orientation	
Flight ID	
Item Bar Code	
Scrub Turnaround Time	
Up-Down Code	
Expiration Date	
Item Serial Number	
Stowage Grouping Code	
Late/Early Access Requirement	
On-Orbit Stowage Location	
Hazardous Code	
Drawing Reference Number	
Drawing Revision Number	
Electrical Power Required	
Refrigeration/ Freezer Resources Required	
Stowage Accessibility	
Unit Pack	
Unit Pack Notes	
Trash Generated	
Trash Notes	
X Center of Gravity	
Y Center of Gravity	
Z Center of Gravity	

TABLE 9.3.3-1 PAYLOAD MANIFEST/STOWAGE DATA (PAGE 2 OF 2)

Field Name	Data Field
I(xx) Moment of Inertia	
I(yy) Moment of Inertia	
I(zz) Moment of Inertia	
I(xy) Product of Inertia	
I(yz) Product of Inertia	
I(xz) Product of Inertia	
Physical Integrator	
Stowed/Installed	
Cage Code Point of Contact	
Manifested Parent ID	
On-Dock Date	
On-Orbit Requirements	

10.0 PAYLOAD PLANNING

10.1 INTRODUCTION

The Payload Planning Requirements Data Set provides the detailed pre-increment and real-time planning and payload resource requirements for the International Space Station (ISS) Program. The Payload Developer (PD) shall provide the detailed payload planning and resource requirements specifications to the ISS planners based on the types of inputs described within this section of the Payload Data Sets Blank Book. These requirements will be specified by the PD using the Interim User Requirements Collection (iURC) tool.

The content and format of the data parameters defined in this section drive the definition and development of the iURC and the User Requirements Collection (URC).

10.1.1 PURPOSE

This section defines the format and content of the payload planning requirements required from the PD to prepare the Payload Planning Requirements Data Set. The payload planning requirements are used for modeling the PD's requirements for onboard activities. This section also defines the products, activities, roles, responsibilities, and interfaces required for the provision of payload planning during Payload Operations.

This paper representation of the payload planning requirements provides a representation of the content and parameter format of the data inputs that will be required from the PD. It should be noted, however, that while the content and parameter format are consistent with the iURC data fields, the iURC electronic environment is relational in nature and contains embedded links interdependencies between data fields and dynamic pick lists. Therefore, the tables presented in this Payload Planning section are presented as examples only. No attempt should be made by the PD to input payload-unique planning data within the provided tabular format.

Questions and/or comments on the Payload Planning Requirements Data Set should be directed to the ISS Payload Activity Requirements Coordinator (PARC).

The PD shall provide inputs for all applicable fields and questions within the iURC tool based on the data descriptions defined within the Payload Planning Requirements Data Set.

10.1.2 PAYLOAD PLANNING DATA SET SCOPE

The Payload Planning Requirements Data Set collects detailed planning requirements for ascent/descent, transfer operations, as well as Station onboard resources such as crew time, power, thermal, commanding, and data and video downlink requirements. The ISS Mission Planners utilize these requirements to develop the On-Orbit Operations Summary (OOS), Weekly Look-Ahead Plans, Short-Term Plan (STP), and the Onboard Short-Term Plan (OSTP). PD access to the planning products such as the payload OOS, Ground Rules and Constraints (GR&C), Weekly Look-Ahead Plans, and

Short Term Plan Reports are provided via web access through the Increment Operations Plan (IOP) (http://iss-www.jsc.nasa.gov/ss/issapt/iop/homepage.html) and MCC Web pages. Execution products such as the Payload Activity Plan (PAP), which is a display of the STP and the Data Flow Plan (DFP), which is a display of the data system routing and configuration schedule, activity reports and resource reports will also be available via the web through the Product Generation component of the Payload Planning System (PPS).

10.1.3 PAYLOAD PLANNING DATA SET PRECEDENCE

In case of any variation between this data set and the Payload Integration Agreement (PIA), the iURC data shall take precedence for implementation and the PIA shall take precedence for allocation.

10.1.4 PAYLOAD PLANNING DATA SET CONFIGURATION MANAGEMENT

Configuration control commences upon last signature of this Payloads Data Set Blank Book. The ISS Program will maintain configuration control of this document in accordance with SSP 50123-01, Configuration Management Handbook Volume 1. The contents of the Payload Planning Requirements Data Set Section of the Payload Data Sets Blank Book are controlled by the Payloads Control Board (PCB). Payload-unique Payload Planning Data Set data, as submitted by the PD, is controlled by the Payload Operations Control Board (POCB).

10.1.5 PAYLOAD PLANNING DATA SET MANAGEMENT RESPONSIBILITIES

10.1.5.1 PAYLOAD DEVELOPER

The PD will define their planning and resource requirements, as defined in the Payload Planning Requirements Data Set via the iURC tool.

The PD shall electronically input the requested data directly to the iURC tool.

10.1.5.2 INTERNATIONAL SPACE STATION PAYLOAD OFFICE RESPONSIBILITIES

10.1.5.2.1 ISS PAYLOAD PLANNING DATA SET MANAGER

The ISS Payload Planning Data Set Manager (DSM) is the PARC and is responsible for collecting, assessing, processing, and coordinating payload planning requirements for the ISS. They also support the integration of the Payload Planning Data Set across the payload complement. The PARC will collect payload-unique requirements data and ensure that submitted requirements meet formatting criteria for planning and scheduling.

The PARC will contact the primary and/or secondary planning contacts identified in Table 3.3-1 if there are any questions regarding the payload-unique planning requirements or if negotiation of the data is required to meet the integrated payload planning requirements for a given increment.

10.1.5.3 JOINT PAYLOAD DEVELOPER AND ISS PROGRAM RESPONSIBILITIES

The PARCs will work with the PD to aid them in understanding payload planning requirements definition and impacts on planning and scheduling. The PD shall provide technical support to the PARCs to ensure that their requirements are complete and accurate before the payload planning process begins.

10.2 PAYLOAD PLANNING GENERAL INFORMATION

10.2.1 PROCESS FLOW

The purpose of pre-increment planning is to develop increment-specific operations products and associated information necessary to conduct real-time operations.

The increment planning template, includes the Basic cycle beginning at Increment minus (I-)12 months, and the Final cycle beginning at I-6 months.

The PD shall electronically input the payload-unique planning requirements to the iURC system for the two input cycles to support the pre-increment releases of the IOP reports as depicted in Table 10.2.1-1, Pre-Increment Planning Release Cycles. An overview of the planning process is contained in Figure 10.2.1-1, Payload Planning Template.

TABLE 10.2.1-1 PRE-INCREMENT PLANNING RELEASE CYCLES

Pre-Increment Phase	Inputs	Outputs
Basic IOP Cycle	PD submits initial payload planning requirements	OOS
	Planners assess and negotiate requirements	
	Planning requirements under POCB control	
Final IOP Cycle	PD submits updates to payload planning requirements	OOS
	PD submits OSTP parameters	
	Planners assess and negotiate requirements	
	Planning requirements under POCB control	

During the execution (real-time planning and real-time replanning) phase of planning, the PD shall submit updates to payload planning requirements and changes to OSTP parameters (procedure references) as necessary to support real-time operations. Table 10.2.1-2, Execution Planning Release Cycle, depicts the planning inputs and outputs during the execution period.

TABLE 10.2.1-2 EXECUTION PLANNING RELEASE CYCLE

Execution Phase	Inputs	Outputs
Real-Time Planning	PD submits updates to payload planning requirements	WLP, STP and OSTP
	PD submits updates to OSTP parameters as necessary	
Real-Time Replanning	PD submits updates to payload planning requirements	Updates to STP and OSTP
	PD submits updates to OSTP parameters	

The iURC tool is used pre-increment for updating planning requirements and OSTP parameters. During real-time, planning requirements updates will be submitted via PIMS OCRs. Details of execution phases of planning are described in SSP 50474, Execute Planning Process Definition Document.

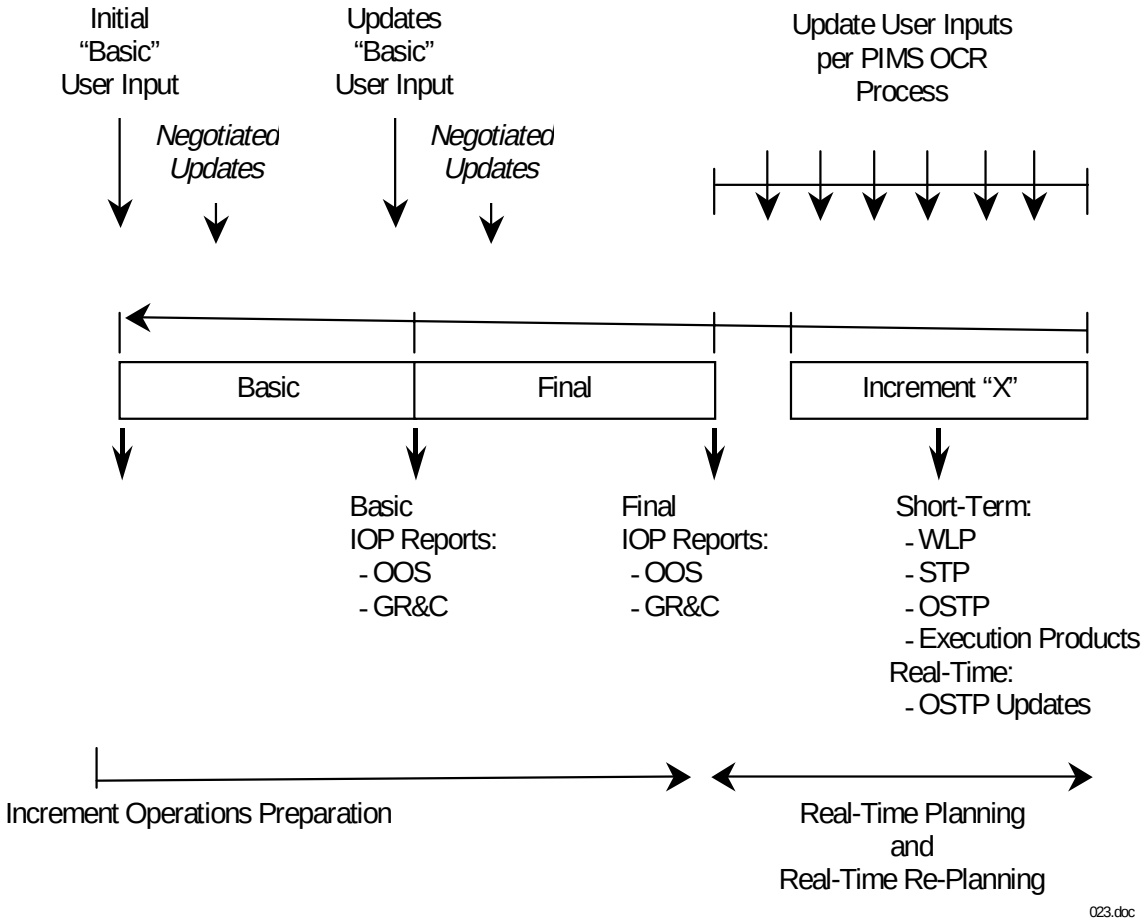


FIGURE 10.2.1-1 PAYLOAD PLANNING TEMPLATE

10.2.2 DELIVERABLES SCHEDULE

Payload planning requirements data is due in three different time intervals. Please refer to the Payload Generic Template for the generic dates.

The PD shall complete electronic data submission to the iURC tool according to the payload's PIA Addendum for flight-specific dates.

TABLE 10.2.2-1 DELIVERABLES SCHEDULE

Delivery Interval	Data Required
	General Requirements
Basic	Activity Requirements
	Sequence Requirements
Final	Activity Requirements Updates
	Sequence Requirements Updates
	OSTP Parameters
Real-Time Planning and Real-Time Replanning	Activity Requirements Updates Sequence Requirements Updates OSTP Parameters Updates

10.2.3 PAYLOAD PLANNING CONTACTS FOR INTERIM USER REQUIREMENTS COLLECTION

The PD shall provide in iURC the information necessary to complete Table 3.3-1 for the primary payload planning contact and the secondary payload planning contact. These individuals will be responsible for entering activity and sequence information in iURC and will be the individuals the mission planners will contact for clarification or negotiation of payload-unique planning requirements. The primary contact is the person who will actually enter activity and sequence information into iURC that mission planners can contact for clarification or negotiation of payload-unique planning requirements. The secondary contact is the person mission planners will contact about activity and sequence information in the event the primary contact is unavailable.

10.2.4 INTERIM USER REQUIREMENTS COLLECTION

The URC is a PPS subsystem that will be used throughout the life of the ISS Program by expert and novice users at centralized and remote locations for defining payload planning requirements. URC provides a distributed capability to collect Payload Operations scheduling requirements in a form that can be used for planning, scheduling, and data routing and configuration scheduling. It allows entry and presentation of the resource and data system requirements in a manner that is intuitive to the novice user. The products generated by URC will be used by the PPS planning and scheduling capabilities for generation of timeline data. The products will also be used to generate onboard products. An iURC system has been developed to provide the capability to collect user requirements until the final URC is completed. Initially, data will be collected in the iURC. As the URC becomes available, the collections of PD requirements will transition to the URC. The PARCs will assist the PD in the transition of requirements from the iURC to the URC. It is anticipated that the iURC tool will be used until the URC tool is available. An online demonstration is available at the

following Uniform Resource Locator (URL): http://iurc.nexus.nasa.gov. PD access to the iURC is username/password-controlled, with account request information provided at the same URL. Once an iURC account is obtained, the online help can be accessed, which contains detailed explanations as well as instructions for populating information in the iURC tool. The remainder of this document will be written based on the iURC capabilities. When the PPS URC becomes operational, these sections will be updated to reflect the more robust capabilities of the URC.

10.3 PAYLOAD PLANNING REQUIREMENTS

The PD will provide the following three types of information in defining requirements using iURC:

A. General Information - Contains information about the payload and experiment name, identification, payload acronym, and contact information.

B. Activity Information - Activities define the resource constraints of tasks to be performed. Information contained on activities such as description, duration, resource requirements, and OSTP parameters (procedure identification to be performed in the OSTP) are in this section.

C. Sequence Information - A sequence consists of one or more activities to be performed in a meaningful order of execution. Sequences describe the temporal relationships between activities. Activity sequences are developed by temporally relating two or more activities. Information on description, related activities, sequence scheduling windows, and temporal relationships (between activities or other sequences) are defined in this section. The sequence is the entity that will be planned and scheduled by the mission planners.

An overview of the data collected in iURC is contained in Figure 10.3-1, Data Collected in Interim User Requirements Collection.

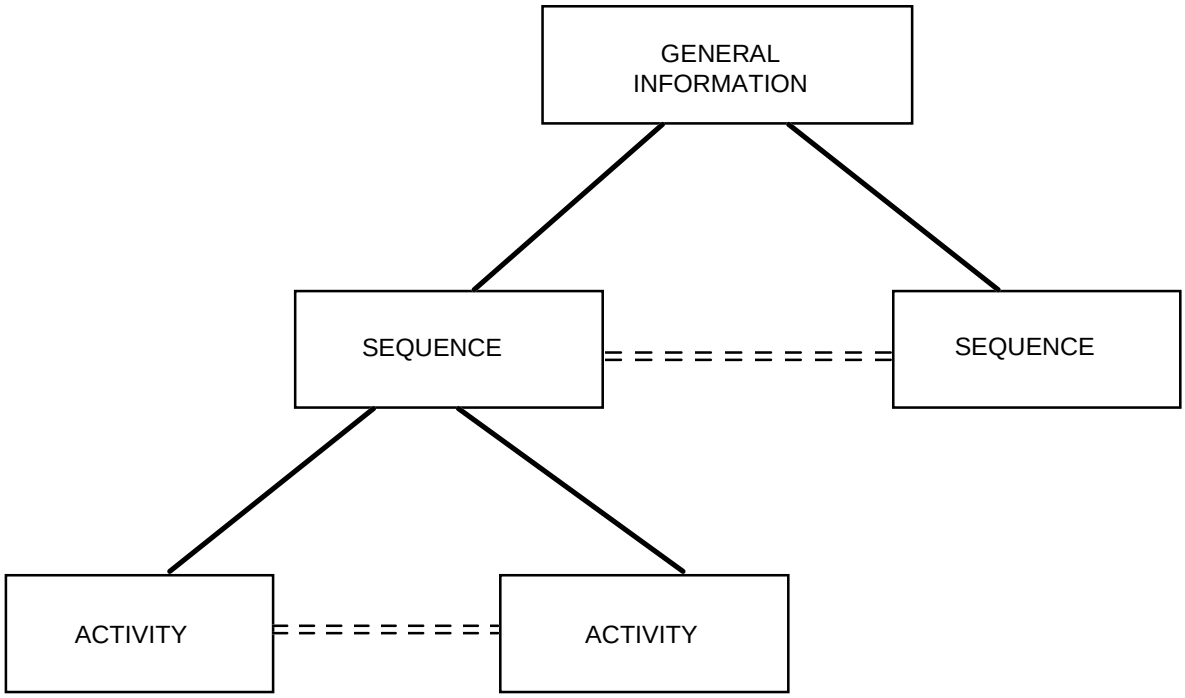


FIGURE 10.3-1 DATA COLLECTED IN INTERIM USER REQUIREMENTS COLLECTION

10.3.1 GENERAL INFORMATION

The PD shall complete the input of initial payload-unique general information into the iURC as per negotiated in the Payload PIA Addendum.

10.3.1.1 PAYLOAD INFORMATION

The PD shall provide the following information in Table 10.3.1.1-1, Payload Identification:

A. Payload ID - *[Enter the payload identification number assigned to the payload.]*

B. Payload Name - *[Enter the name of the payload/experiment (Example: Protein Crystal Growth (PCG)).]*

C. Payload Acronym - *[Enter the payload/experiment acronym (Example: PCG).]*

TABLE 10.3.1.1-1 PAYLOAD IDENTIFICATION

Payload ID	Payload Name	Payload Acronym

[Expand table as necessary to provide all requested information.]

10.3.2 ACTIVITY INFORMATION

Activities are generally the simplest or lowest-level tasks that describe resources and constraints necessary to perform that task. In order for an activity to be defined, the PD

must provide a name for the activity and begin defining the resources and other conditions required by the activity. An activity may be as simple as a 10-minute step to turn on power to an experiment, or it may be a longer-duration activity with an associated "profile." A "profile" is a required usage of some resource such as crew time, power, data downlink, etc.

10.3.2.1 ACTIVITY NAME

The name of the activity must be provided prior to any resource definition. The PD may create a name for a new activity or, if editing an existing activity, may select a name from the iURC Master List. New activity names may be added to the master list for future reference.

The PD shall input the following information into the iURC:

A. Name - *[Specify a name for the activity. The PD activity naming convention should follow the Ops Nom Standards described in SSP 50254, Operations Nomenclature. The payload experiment acronym will be listed first, followed by the object and the action of the activity (Example: "SAMS DISK EXCHANGE." The example identifies the activity as a Space Acceleration Measurement System (SAMS) experiment and its function is to perform a disk exchange. The action taken is an exchange and the object of the action is the disk) (20 characters max).]*

TABLE 10.3.2.1-1 ACTIVITY NAME

Name

10.3.2.2 ACTIVITY DURATION

A minimum, maximum, and a preferred duration can be entered for each named activity. For each activity name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.2-1, Activity Duration:

A. Minimum Duration - *[Specify the minimum amount of time, rounded to the nearest 5 minutes, required to perform the activity (Days/Hr:Min format).]*

B. Maximum Duration - *[Specify the maximum amount of time, rounded to the nearest 5 minutes, required to perform the activity (Days/Hr:Min format).]*

C. Preferred Duration - *[Specify the preferred amount of time, rounded to the nearest 5 minutes, required to perform the activity. If the activity is a non-variable fixed-duration activity, then only specify a preferred duration (Days/Hr:Min format).]*

NOTE: Crew activity durations are no shorter than 15 minutes and no longer than 2 hours. Crew monitoring activities are a minimum of 5 minutes.

TABLE 10.3.2.2-1 ACTIVITY DURATION

Minimum	
Maximum	
Preferred	

10.3.2.3 ACTIVITY LOCATION

Information concerning the location of each payload in the ISS is required by Mission planners in order to model and track resources such as power. For each activity name identified, the PD shall input into the iURC the payload location as depicted in Table 10.3.2.3-1, Activity Location.

A. Location - *[Specify the ISS rack location where it is anticipated the named activity will be performed. For example, an activity that would occur at Rack 1 in the United States Laboratory (US LAB) starboard side would so indicate with LAS1. (Valid increment-specific rack location choices will be made available to the PD in iURC for which the data is being collected).]*

TABLE 10.3.2.3-1 ACTIVITY LOCATION

Activity Location

10.3.2.4 ACTIVITY DESCRIPTION

For each activity name identified, the PD shall input into the iURC a detailed description of the activity to be performed as depicted in Table 10.3.2.4-1, Activity Description.

A. Activity Description - *[Provide a detailed description of the activity.]*

TABLE 10.3.2.4-1 ACTIVITY DESCRIPTION

Activity Description

10.3.2.5 ACTIVITY RESOURCES

Each identified activity will require the use of some type of resource, whether it is crew time, power, data downlink, etc. Resources can be classified as one of the following resource types:

A. Individual Resource - A resource that can be used or generated in integer amounts and whose maximum availability is 1. The availability of an individual resource is temporarily changed for the duration of its usage. When an individual resource is requested, the resource is continuously used for the duration of the activity or it is used during a specified sub-interval of the activity.

B. Pooled Reusable Resource - A resource that can be used or generated in real or integer amounts, whose availability is temporarily changed for the duration of its usage. When a pooled reusable resource is requested, a rate must first be provided and a time frame must be specified for that rate. Different rates can be entered for different sub-intervals of the activity.

C. Pooled Consumable Resource - A resource that can be used or generated in real or integer amounts, whose availability is permanently changed as a result of its usage or generation. When a pooled consumable resource is requested, a rate must first be provided and a time frame must be specified for that rate. Different rates can be entered for different sub-intervals of the activity.

D. Condition Resource - A resource whose availability is defined in binary terms (e.g., On or Off, Yes or No, True or False, 1 or 0) that can support the scheduling of an infinite number of concurrent activities. There are three different types of condition requirements:

   1. Induced - The scheduling of an activity may induce a certain condition such as vibration.

   2. Required - The scheduling of an activity requires the condition to occur. (Example: Commanding).

   3. Avoid - The scheduling of an activity should avoid any occurrence of the condition. (Example: South Atlantic Anomaly (SAA)).

E. Special Resources - A resource which does not readily fit into one of these generic resource types because of unique data that must be collected.

The PD may specify a sub-interval of the activity to be scheduled depending on the condition type selected. The PD may even specify a range of time for the condition to be present before or after the activity is scheduled.

Table 10.3.2.5-1, ISS Activity Resource Listing, provides a listing of ISS resources available to payloads. Note: The list of resources is dynamic and is subject to change. For the most current data, refer to the information in iURC.

TABLE 10.3.2.5-1 ISS ACTIVITY RESOURCE LISTING (PAGE 1 OF 2)

Activity Resource	Units	Individual	Pooled-Reuseable	Pooled-Consumable	Condition	Special
(1)Crew Time (Crew 1 to n)		X				
Power:						
- UIP(4)	watts		X			
- UOP(5)	watts		X			
Data Downlink:						
- High Rate Data (HRDL)	<(7,8)43.2 Mbps		X			
- High Rate Data Real-Time	<(8)43.2 Mbps		X			
- Medium Rate PEHG	<(8)4 Mbps		X			
- Medium Rate PEHG Real-Time	<(8)4 Mbps		X			
- Low Rate Data	<(6,8)0.1 Mbps		X			
- Low Rate Data Real-Time	<(6,8)0.1 Mbps		X			
Video Downlink:						
- Video	Mbps		X			
- Video Real-Time	Mbps		X			
Recorded Video						X
Consumables:						
- Water (H_2O)	kg			X		
- Nitrogen (N_2)	kg			X		
- Argon (Ar)	kg			X		
- Helium (He)	kg			X		
- Carbon Dioxide (CO_2)	kg			X		
Cameras:						
- USL Camcorder		X				
- 35mm Camera		X				
- Electronic Still		X				
Payload Support Systems:						
- (2)Vacuum: Resource (VRS)			X			
- (3)Vacuum: Waste (VES)		X				
- MELFI-access		X				
Thermal Cooling:						X
OCA File Uplink						X
OCA File Downlink						X

TABLE 10.3.2.5-1 ISS ACTIVITY RESOURCE LISTING (PAGE 2 OF 2)

Activity Resource	Units	Individual	Pooled-Reuseable	Pooled-Consumable	Condition	Special
(1)Hardware/Equipment:						
- Passive Dosimeter TLD		X				
- Passive Dosimeter PNTD		X				
- Battery Charger		X				
- DC Power Supply		X				
- Generator		X				
- ISS Vacuum Cleaner		X				
- Work Area		X				
- Bar Code Reader		X				
Conditions:						
- Voice					X	
- Commanding w/ Downlink					X	
- Commanding w/o Downlink					X	
- Vibration					X	
- SAA					X	
Other: (1)Payload-Unique Resources						

Table 10.3.2.5-2, ETOV Activity Resources, lists the ETOV resources available to payloads. Note: The list of resources is dynamic and is subject to change. For the most current data refer to the information in iURC.

TABLE 10.3.2.5-2 ETOV ACTIVITY RESOURCES (PAGE 1 OF 2)

Activity Resource	Units	Individual	Pooled-Reuseable	Pooled-Consumable	Condition
Middeck:					
(1)Crew Time (Crew 1 to n)		X			
Power	watts		X		
Cameras:					
- Camcorder		X			
- 35mm Camera		X			
- Electronic Still		X			
Video Downlink:					
- Video	Mbps		X		
- Video Real-Time	Mbps		X		
- Sequential Still Video (SSV)	Mbps		X		
Thermal Cooling:					
- Cabin Air	watts		X		
- Avionics Air	watts		X		
(1)Payload and General Support Computer (Commanding and Health and Status Monitoring)		X			
Cold Storage			X		
Conditions:					
- Voice					X
- Vibration					X
- SAA					X
MPLM:					
Power	watts		X		
Data Downlink (S-Band):					
- (9)Low Rate Data	<0.1 Mbps		X		
Commanding (S-Band) With or Without Downlink	<0.1 Mbps		X		
(1)Payload and General Support Computer (Commanding and Health and Status Monitoring)		X			
Thermal Cooling: **- Cabin Cooling** **- Water**	watts		X		

TABLE 10.3.2.5-2 ETOV ACTIVITY RESOURCES (PAGE 2 OF 2)

Activity Resource	Units	Individual	Pooled-Reuseable	Pooled-Consumable	Condition
Transfer:					
(1)Crew Time (Crew 1 to n)		X			
Power	watts		X		

Notes:

(1) These resources will be available on a given flight or increment. The actual list of increment-specific ISS and ETOV resources will be provided in iURC as a pick-list. For further information regarding online data input environment for resources, refer to the iURC online help.

(2) Vacuum Resource System (VRS) may be requested for subatmospheric pressure operations.

(3) Vacuum Exhaust System (VES) may be requested for venting waste gases.

(4) Utility Interface Panel (UIP) represents integrated rack power.

(5) Utility Outlet Panel (UOP) represents non-integrated rack power.

(6) 100 kilobits available per bus.

(7) Payload-to-Payload data routing must be < 100 Megabits per second (Mbps).

(8) This is the combined capacity that will be used for a scheduling constraint, not the capability of the hardware.

(9) This capability is available during on-orbit, not during launch or landing.

10.3.2.5.1 INDIVIDUAL RESOURCES

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.1-1, Individual Resources.

A. Resource - *[Identify the resource requirement from the Individual Resource choices provided in the iURC pick-list.]*

B. Start Time - *[Specify the start time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

C. End Time - *[Specify the end time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

D. Sub-Intervals Only? - *[Indicate with a "✔" if this resource will be required only at sub-intervals. If "Sub-Interval Only" is not selected, then the resource will be considered to be required throughout the duration of the activity.]*

TABLE 10.3.2.5.1-1 INDIVIDUAL RESOURCES

Resource	
Start Time	
End Time	
_____	**Sub-Interval Only?**

[Complete for each individual resource selected for each activity being defined.]

10.3.2.5.2 POOLED REUSABLE RESOURCES

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.2-1, Pooled Reusable Resources.

A. Resource - *[Identify the resource requirement from the Pooled Reusable Resource choices provided in the iURC pick-list.]*

B. Rate - *[Specify the rate at which this resource is to be used. (Power - watts, Data rate - Mbps, etc.).]*

C. Location - *[Indicate where this resource is required. (Choose from "Same as Activity" or any of the other valid rack locations provided).]*

D. Start Time - *[Specify the start time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

E. End Time - *[Specify the end time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

F. Sub-Interval Only? - *[Indicate with a "✔" if this resource will be required only at sub-intervals. If "Sub-Interval Only" is not selected, then the resource will be considered to be required throughout the duration of the activity.]*

G. _____ bitstream _____ packet? - *[Indicate with a "✔" whether the data will be transmitted by bitstream or packet (High Rate Data only).]*

H. Destinations - *[Indicate with a "✔" the destination for the data. Choose from Ground Application Programming Interface Definition (APID), Payload, or Monitor (video only).]*

I. Destination Location (Payload, Monitor, Ground APID only) - *[If the data destination is "Payload or Monitor", then specify the destination rack location for the specified data/video stream. If the data destination is "Ground APID", then specify the applicable APID for the specified data/video stream. (Choose from "Same as Activity" or any of the other valid rack locations provided).]*

TABLE 10.3.2.5.2-1 POOLED REUSABLE RESOURCES

Resource	
Rate	**Location**
Start Time	
End Time	
Sub-Intervals	
_____ Sub-Interval Only?	
_____ Bitstream (High Data Rate only) _____ Packet (High Data Rate only)	
Destination	
____ Ground APID ____ Payload ____ Monitor (video only)	
Destination Location (Payload, Monitor, and Ground APID Only)	

[Complete for each pooled reusable resource selected for each activity being defined.]

10.3.2.5.3 POOLED CONSUMABLE RESOURCES

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.3-1, Pooled Consumable Resources.

A. Resource - *[Identify the resource requirement from the Pooled Consumable choices provided in the iURC pick-list.]*

B. Rate - *[Specify the rate at which this resource is required.]*

C. Start Time - *[Specify the start time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

D. End Time - *[Specify the end time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

E. Sub-Intervals Only? - *[Indicate with a "✔" if this resource will be required only at subintervals. If "Sub-Interval Only" is not selected, then the resource will be considered to be required throughout the duration of the activity.]*

TABLE 10.3.2.5.3-1 POOLED CONSUMABLE RESOURCES

Resource		**Rate**
Start Time		
End Time		
_____	**Sub-Intervals Only?**	

[Complete for each Pooled Consumable Resource selected for each Activity being defined.]

10.3.2.5.4 CONDITION RESOURCES

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.4-1, Condition Resources.

A. Resource - *[Identify the resource requirement from the Condition Resource choices provided in the iURC pick-list.]*

B. Start Time - *[Specify the start time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

C. End Time - *[Specify the end time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

D. Sub-Intervals Only? - *[Indicate with a "✔" if this resource will be required only at sub-intervals. If "Sub-Intervals Only" is not selected, then the resource will be considered to be required throughout the duration of the activity.]*

E. Condition Type - *[Indicate with a "✔" the condition type that applies to this activity for the specified condition resource.]*

F. Condition Time Frame - *[Indicate with a "✔" the time frame for which the condition type or constraint is applicable. If "before" or "after" are chosen, then also provide the time before which or after which the activity condition type applies (Use Day/Hr:Min:Sec format).]*

TABLE 10.3.2.5.4-1 CONDITION RESOURCES

Resource	
Start Time	
End Time	
Sub-Interval	
_____ Sub-Intervals Only?	
Condition Type	**Condition Time Frame**
_____ Avoided _____ Required _____ Induced	_____ Before _/__:__:__ _____ During _____ After _/__:__:__

[Complete for each Condition Resource selected for each Activity being defined.]

10.3.2.5.5 SPECIAL RESOURCES

SPECIAL RESOURCE 1 - RECORDED VIDEO

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.5-1, Special Resource 1 - Recorded Video. Note that Recorded Video is different from other Video resources in that the PD is not required to input a Rate or a Destination (the Destination is assumed to be the ISS Video Recorder).

A. Resource - *[Identify the resource requirement for Recorded Video from the Resource choices provided in the iURC pick-list.]*

B. Location - *[Indicate where this resource is required. (Choose from "Same as Activity" or any of the other valid rack locations provided).]*

C. Start Time - *[Specify the start time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

D. End Time - *[Specify the end time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

E. Sub-Intervals Only? - *[Indicate with a "✔" if this resource will be required only at sub-intervals. If "Sub-Interval Only" is not selected, then the resource will be considered to be required throughout the duration of the activity.]*

TABLE 10.3.2.5.5-1 SPECIAL RESOURCE 1 - RECORDED VIDEO

Resource	**Location**
Start Time	
End Time	
_____ **Sub-Interval Only?**	

[Complete for each activity being defined which has a requirement for Recorded Video.]

SPECIAL RESOURCE 2 - FILE UPLINK OR DOWNLINK

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.5-2, Special Resource 2 - File Uplink or Downlink.

A. Resource - *[Identify the resource requirement for File Uplink or Downlink via the Orbital Communication Adapter (OCA) from the Resource choices provided in the iURC pick-list.]*

B. File Size - *[Indicate the size of the file to be transferred in the megabytes.]*

C. File Name - *[Specify the name of the file to be transferred.]*

D. File Type - *[Specify the file type (or extension), such as: doc, jpg, xls.]*

E. Transfer Requirements - *[Indicate with a "✔" if the file can be transferred during normally scheduled OCA transfer periods, or if it must be transferred at other times.]*

F. Other Transfer Times - *[If the file must be transferred at other times, specify in a note when or how soon the transfer must be done.]*

TABLE 10.3.2.5.5-2 SPECIAL RESOURCE 2 - FILE UPLINK OR DOWNLINK

Resource	**File Size**
File Name	**File Type**
Transfer Requirements	
_____ During normally scheduled OCA transfers _____ Other Times	
Other Transfer Times	

[Complete for each activity being defined which has a requirement for File Uplink or Downlink]

SPECIAL RESOURCE 3 - THERMAL COOLING

For each Activity Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.5.5-3, Special Resource 3 - Thermal Cooling.

A. Resource - *[Identify the resource requirement for Thermal Heat Dissipation from the Resource choices provided in the iURC pick-list.]*

B. Internal Air Cooling? - *[Identify with a "✔" if Internal Air Cooling is required.]*

C. Internal Air Dissipation Rate - *[If Internal Air Cooling is required, specify the heat dissipation rate in watts.]*

D. Cabin Air Cooling? - *[Identify with a "✔" if Cabin Air Cooling is required.]*

E. Cabin Air Dissipation Rate - *[If Cabin Air Cooling is required, specify the heat dissipation rate in watts.]*

F. Water Cooling? - *[If Water Cooling is required, indicate with a "✔" if using the Moderate Temperature Loop (MTL) or the Low Temperature Loop (LTL).]*

G. Water Cooling Dissipation Rate - *[If Water Cooling is required, specify the heat dissipation rate in watts.]*

H. Water Cooling Flow Rate - *[If Water Cooling is required, specify the flow rate in kg/hr.]*

I. Start Time - *[Specify the start time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

J. End Time - *[Specify the end time of the identified sub-interval relative to the activity start time (Use Days/Hr:Min:Sec format).]*

K. Sub-Interval Only? - *[Indicate with a "✔" if this resource will be required only at sub-intervals. If "Sub-Interval Only" is not selected, then the resource will be*

TABLE 10.3.2.5.5-3 SPECIAL RESOURCE 3 - THERMAL COOLING

Resource		
Internal Air Cooling?	**Internal Air Dissipation Rate**	
_____Internal Air		
Cabin Air Cooling?	**Cabin Air Dissipation Rate**	
_____Cabin Air		
Water Cooling?	**Water Cooling Dissipation Rate**	**Water Cooling Flow Rate**
_____ **MTL** _____ **LTL**		
Start Time		
End Time		
Sub-Intervals		
_____ Sub-Interval Only?		

[Complete for each activity being defined which has a Thermal Cooling requirement.]

10.3.2.6 PROCEDURE INFORMATION

Procedure information refers to information pertinent to the OSTP parameters. For each activity name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.2.6-1, Procedure Information:

A. Procedure Name - *[Specify the file name of the operating procedure associated with this activity. Procedure name must be the same as provided in the Procedure File Name field in the manual procedures or automated procedures expressed in the Payload Operations Data Set (20 characters max).]*

B. Auto/Manual - *[Indicate with a "✔"whether the procedure is an automatic procedure or a manual procedure. If an automatic procedure is selected, then additional information must be provided concerning bundle installation/removal.]*

NOTE: C, D, and E are currently "greyed out" in the iURC tool and do not require any PD input.

C. Sequence Number - *[If the procedure is automatic, then specify an index number associated with the sequence within the timeliner bundle that represents the automated procedure to be initiated. If the procedure name does not identify a bundle, then this item is zero. [This sequence number references a number within the automatic procedure bundle initiated by the onboard timeliner software. This "sequence" is different than sequences referenced in Section 10.3.3, Sequence Information.]*

D. Install Bundle - *[If the procedure is automatic, then indicate with a "✔" whether an install bundle command must be formatted and sent prior to initiating the automatic procedure.]*

E. Remove Bundle - *[If the procedure is automatic, then indicate with a "✔" whether a remove bundle command must be formatted and sent after completion of the automatic procedure.]*

F. Execution Notes - *[Provide a brief text string to convey specific execution information or parameters about the procedure for use by the crew (Optional) (38 characters max) (Example: On run 1, use filter B).]*

G. Description - *[Provide additional execution information about the procedure for use by the crew (Optional).]*

TABLE 10.3.2.6-1 PROCEDURE INFORMATION

Procedure Name		
Sequence #	____ Auto	_____ Manual
_____ Install Bundle		
_____ Remove Bundle		
Execution Notes		
Description		

10.3.3 SEQUENCE INFORMATION

A sequence is a collection of activities and/or other sequences of activities, temporally related to each other. The sequence is the entity that will be planned and scheduled by the mission planners. The steps in creating a sequence are:

A. Naming the sequence.

B. Selecting members of the sequence.

C. Defining relationships between sequence members.

D. Defining sequence constraints.

After the sequence is created, it then becomes a member of the sequence pick-list and can become a member of some other sequence.

10.3.3.1 SEQUENCE NAME

The PD shall provide sequence names in Table 10.3.3.1-1, Sequence Name, for each sequence to be defined for the payload. The sequence name must be provided prior to defining the sequence members and constraints. The PD may create a name for a new sequence or, if editing an existing sequence, may select a name from the iURC master list. New sequence names may be added to the master list for future reference.

The PD shall input into the iURC the following information:

A. Sequence Name - *[Specify a name for the sequence (20 characters max).]*

TABLE 10.3.3.1-1 SEQUENCE NAME

Sequence Name _____

10.3.3.2 SEQUENCE ELEMENTS

After a sequence name has been specified, the PD shall identify the elements or members of the sequence being defined. The PD shall select from other sequences on the iURC sequence pick-list, from the PD's activity pick-list, or from the Public Tasks pick-list. The choice of public tasks available on a given flight or increment will vary from flight-to-flight and from increment to increment. The actual list of increment-specific ISS and ETOV public tasks available on a given flight or increment will be provided in iURC as a pick-list. Public tasks include, but are not limited to, the following:

A. Crew cycle activities (Examples: Sleep, Pre-sleep, Post-sleep, Exercise, Meals, etc.).

B. Vehicle dockings and undockings.

C. Launches.

D. Increments.

E. Extravehicular Activities (EVAs).

F. Public Services (Example: Active Rack Isolation System (ARIS), SAMS, etc.).

For each Sequence Name identified, the PD shall input into the iURC the following information as depicted in Table 10.3.3.2-1, Sequence Elements:

A. Sequence Members - *[Enter the names of the sequences, activities, and/or public tasks to be included in the definition of the named sequence. (Within iURC, the PD will merely "select from a list of activities, sequences and/or public tasks." For further information regarding the online data input environment, please refer to the iURC online help. Use the Days/Hr:Min format).]*

TABLE 10.3.3.2-1 SEQUENCE ELEMENTS

Sequence Members (List of Sequences, Activities, and/or Public Tasks Associated with the Named Sequence)

[Expand table as necessary to include all sequence members for each named sequence.]

10.3.3.3 RELATIONSHIPS

Before a sequence can be scheduled, relationships must be established between the activities/public tasks, etc., that make up the sequence. A sequence may be comprised of two or more activities, public tasks, or other sequences. Relationships must be defined between any two sequence members. Furthermore, an experiment typically has an expected chain of related activities that comprise its normal operational sequence. A scenario is an alternate method of performing the sequence.

10.3.3.3.1 TEMPORAL RELATIONSHIPS

For each named sequence, the PD shall specify the appropriate temporal relationship between any two sequence members (i.e., any pairing of sequence members) identified in Table 10.3.3.2-1. There may be any number of or variety of pairings between the sequence members of a specific sequence. Temporal relationships can be defined for the following:

A. Between repetitions of the same activity (Activity A to Activity A).

B. Between two different activities (Activity A to Activity B).

C. Between an activity and a public task (Activity A to Public Task A).

D. Between an activity and a sequence (Activity A to Sequence C).

E. Between a sequence and a sequence (Sequence A to Sequence C).

Depending on the type activities, public tasks, and/or sequences used to define the named sequence, the PD shall provide the following information in Table 10.3.3.3.1-1, Temporal Relationships:

A. Activity A - *[Identify one of the two sequence members (activities, public tasks, or other sequences) for which the specific temporal relationship is being defined.]*

B. Activity B - *[Identify the other of the two sequence members (activities, public tasks, or other sequences) for which the specific temporal relationship is being defined.]*

C. Temporal Relationship - *[Indicate with a "✔" the appropriate temporal relationship from the following choices. (Choose only one relationship type per pairing of sequence members):]*

   1. Sequential.

   2. During.

   3. Overlap.

   4. Advanced.

   5. Indeterminate.

   6. None.

TABLE 10.3.3.3.1-1 TEMPORAL RELATIONSHIPS

Activity A: _____
Activity B: _____
Temporal Relationship: _____

[Complete for each pairing of sequence members within a specific sequence.]

Depending on the temporal relationship chosen, the PD shall provide the following additional information in one of the following tables:

[The PD shall complete only the table applicable to the temporal relationship chosen above. One of the following tables shall be complete for each sequence member pair defined in Table 10.3.3.3.1-1.]

10.3.3.3.1.1 SEQUENTIAL RELATIONSHIP

If the temporal relationship between Activity A and Activity B is sequential, then the PD shall indicate with a "✔" in Table 10.3.3.3.1.1-1, Sequential Temporal Relationships, which of the following is applicable to the named sequence:

A. Activity A ends before Activity B starts.

B. Activity B ends before Activity A starts.

C. Either.

The PD shall indicate with a "✔" if there can be a delay between the performance of Activity A and Activity B. If yes, then the PD shall specify the minimum and maximum separation between the two activities of the sequence. For further information regarding the online data input environment, please refer to the iURC online help. *[Use the Days/Hr:Min format.]*

TABLE 10.3.3.3.1.1-1 SEQUENTIAL TEMPORAL RELATIONSHIPS

_____ Activity A ends before Activity B starts
_____ Activity B ends before Activity A starts
_____ Either
_____ Separation?
If yes,Minimum separation: _____
Maximum separation: _____

10.3.3.3.1.2 "DURING" RELATIONSHIP

If the temporal relationship between Activity A and Activity B is a concurrent-type relationship, then the PD shall indicate in Table 10.3.3.3.1.2-1, During Temporal Relationships, which of the following is applicable to the named sequence:

A. Activity A contains Activity B.

B. Activity B contains Activity A.

C. Either.

The PD shall indicate with a "✔" if there is a start time constraint between the performance of Activity A and Activity B. If yes, then the PD shall specify the minimum and maximum separation time between the start times of Activity A and Activity B. *[Use the Days/Hr:Min format.]*

The PD shall indicate with a "✔" if there is an end time constraint between the performance of Activity A and Activity B. If yes, then the PD shall specify the minimum and maximum separation time between the end times of Activity A and Activity B. *[Use the Days/Hr:Min format.]*

For further information regarding the online data input environment, please refer to the iURC online help.

TABLE 10.3.3.3.1.2-1 DURING TEMPORAL RELATIONSHIPS

_____ Activity A contains Activity B
_____ Activity B contains Activity A
_____ Either
_____ Start Time Constraint?
If yes, Minimum separation: _____
Maximum separation: _____
_____ End Time Constraint?
If yes, Minimum separation: _____
Maximum separation: _____

10.3.3.3.1.3 OVERLAP

If the temporal relationship between Activity A and Activity B is an overlap-type relationship, then the PD shall indicate with a "✔" in Table 10.3.3.3.1.3-1, Overlap Relationships, which of the following is applicable to the named sequence:

A. Activity A starts before Activity B starts.

B. Activity B starts before Activity A starts.

C. Either.

The PD shall indicate with a "✔" if there is an overlap time constraint between the performance of Activity A and Activity B. If yes, then the PD shall specify the minimum and maximum overlap time between Activity A and Activity B. *[Use the Days/Hr:Min format.]*

For further information regarding the online data input environment, please refer to the iURC online help.

TABLE 10.3.3.3.1.3-1 OVERLAP RELATIONSHIPS

_____ Activity A starts before Activity B starts
_____ Activity B starts before Activity A starts
_____ Either
_____ Overlap Time Constraint?
If yes, Minimum overlap: _____
Maximum overlap: _____

10.3.3.3.1.4 ADVANCED RELATIONSHIP

The advanced relationship is complex. The PD may need to specify an advanced relationship if the sequential, during, or overlap relationships do not meet the PD's needs for defining requirements. If an advanced relationship is selected, then the PD shall define one or more of the following relationships in Table 10.3.3.3.1.5-1, Advanced Relationship:

A. Start to End - *[Relate the start time of Activity A to the End time of Activity B (or vice versa). If this relationship is selected, then the PD shall specify:]*

   1. Desired Offset - *[Define the amount of separation between the start time of Activity A and the end time of Activity B.]*

   2. Offset Variation - *[Provide an amount of time the desired offset can vary. The variation can be either positive or negative.]*

B. End to Start - *[Relate the end time of Activity A to the start time of Activity B (or vice versa). If this relationship is selected, then the PD shall specify:]*

   1. Desired Offset - *[Define the amount of separation between the end time of Activity A and the start time of Activity B.]*

   2. Offset Variation - *[Provide an amount of time the desired offset can vary. The variation can be either positive or negative.]*

C. Start to Start - *[Relate the start time of Activity A to the start time of Activity B (or vice versa). If this relationship is selected, then the PD shall specify:]*

   1. Desired Offset - *[Define the amount of separation between the start time of Activity A and the start time of Activity B.]*

2. Offset Variation - *[Provide an amount of time the desired offset can vary. The variation can be either positive or negative.]*

D. End to End - *[Relate the end time of Activity A to the end time of Activity B (or vice versa). If this relationship is selected, then the PD shall specify:]*

1. Desired Offset - *[Define the amount of separation between the end time of Activity A and the end time of Activity B.]*

2. Offset Variation - *[Provide an amount of time the desired offset can vary. The variation can be either positive or negative.]*

The PD may create either an avoidance relationship or an overlapping relationship by selecting two or more advanced relationships and tying the two or more relationships together with either an “And” or “Or.” For further information regarding the online data input environment, please refer to the iURC online help.

E. And/Or - *[Indicate with a “✔” either “And” or “Or”.]*

TABLE 10.3.3.3.1.5-1 ADVANCED RELATIONSHIP

Advanced Relationship	Desired Offset	Offset Variation
_____ Start to End	_____	_____
_____ End to Start	_____	_____
_____ Start to Start	_____	_____
_____ End to End	_____	_____
_____ And _____ Or		

10.3.3.3.1.5 INDETERMINATE RELATIONSHIP

The indeterminate relationship is used to show that two tasks are to be scheduled together (if one is not scheduled or cannot be scheduled, then do not schedule the other), but there is no time relationship between them. The PD shall indicate in Table 10.3.3.3.1-1 that an “indeterminate” relationship exists.

10.3.3.3.1.6 NO RELATIONSHIP

The PD shall indicate with a “✔” the absence of a temporal relationship between two activities by selecting “None” in Table 10.3.3.3.1-1.

10.3.3.3.2 RESOURCE LOCK-IN

The PD may request that the resources used by the first activity in the relationship are also used by the second activity in the relationship. The PD shall indicate with a “✔” in Table 10.3.3.3.2-1, Resource Lock-In, the PD’s requirement to reserve or lock-in resources for a defined relationship (Optional).

TABLE 10.3.3.3.2-1 RESOURCE LOCK-IN

_____ Lock in resources for Activity _____ to Activity _____

[Duplicate as necessary for each activity pairing within the specified sequence.]

10.3.3.3.3 COUNT

The PD shall provide in iURC the following information in Table 10.3.3.3.3-1, Count, to request a particular activity or sequence be required on a repetitive basis within a sequence. For further information regarding the online data input environment, please refer to the iURC online help.

A. Minimum Repetitions - *[Indicate the minimum number of repetitions required for an activity or sequence.]*

B. Maximum Repetitions - *[Indicate the maximum number of repetitions required for an activity or sequence or indicate with a "✔" if the maximum repetitions is unlimited.]*

C. Ratio - *[Indicate the ratio of the repetitions to the activities or indicate with a "✔" if the ratio must be 1-to-1.]*

TABLE 10.3.3.3.3-1 COUNT

Minimum Repetitions _____ for Activity or Sequence _____	
Maximum Repetitions _____ Unlimited Repetitions	
☐ Must be 1-to-1 Ratio	

10.3.3.4 SEQUENCE CONSTRAINTS

When the members of a sequence have been determined and temporal relationships have been defined, the PD shall specify sequence constraints.

10.3.3.4.1 SEQUENCE DESCRIPTION

The PD shall provide in iURC the following information in Table 10.3.3.4.1-1, Sequence Description, to describe sequence constraints:

A. Sequence Description - *[Provide a description of the sequence and any other pertinent information in the description text field.]*

TABLE 10.3.3.4.1-1 SEQUENCE DESCRIPTION

Sequence Description

10.3.3.4.2 SEQUENCE SCHEDULING WINDOW

The Sequence Scheduling Window defines valid time periods when the sequence can be scheduled. The PD shall provide in iURC the following information in Table 10.3.3.4.2-1, Sequence Scheduling Window:

A. Epoch - [Specify a starting point from which to base the scheduling window. (Example: if sequence activities should occur three-to-five days after UF-1 launch, then UF-1 would be chosen with a window of 3/00:00 to 5/00:00. Likewise, a particular Greenwich Mean Time (GMT) can be chosen as the starting, or reference, point on which to base all windows).]

B. Max Performances - *[Specify the maximum number of performances for the sequence.]*

C. Start Time - *[Specify the window start time for a given scheduling window relative to the epoch.]*

D. End Time - *[Specify the window end time for a given scheduling window relative to the epoch.]*

E. Performances - *[Specify the number of performances desired for each scheduling window specified.]*

TABLE 10.3.3.4.2-1 SEQUENCE SCHEDULING WINDOW

Epoch		Max Performances
Start Time	**End Time**	**Performances**

10.3.3.4.3 SEQUENCE DURATION

The PD shall provide in iURC the following information in Table 10.3.3.4.3-1, Sequence Duration:

A. Minimum Duration - *[Specify the minimum duration of the defined sequence. (Days/Hr:Min format - 0/00:00).]*

B. Maximum Duration - *[Specify the maximum duration of the defined sequence. (Days/Hr:Min format - 0/00:00).]*

TABLE 10.3.3.4.3-1 SEQUENCE DURATION

Minimum Duration	Maximum Duration

10.3.3.4.4 SEQUENCE SEPARATION

The PD shall provide in iURC the following information in Table 10.3.3.4.4-1, Sequence Separation:

A. Minimum Separation - *[Specify the minimum amount of time allowed between performance of the sequences. (Days/Hr:Min format).]*

B. Maximum Separation - *[Specify the maximum amount of time allowed between performance of the sequences. (Days/Hr:Min format).]*

TABLE 10.3.3.4.4-1 SEQUENCE SEPARATION

Minimum Separation	Maximum Separation

10.3.3.4.5 STRATEGY

If two or more scenarios have been defined for a sequence, then the PD shall indicate which scenario has priority over the other sequence. This input can be in the form of a prioritized list (e.g., Scenario A, Scenario B, etc.), to be indicated in the sequence description.

10.3.3.4.6 NOTES

The PD may provide scheduling notes in the given text field. This field may be used to define any unique scheduling constraints that could not be provided in the other data fields (Optional). The PD shall provide any scheduling notes in Table 10.3.3.4.6-1, Notes.

TABLE 10.3.3.4.6-1 NOTES

Scheduling Notes

11.0 PAYLOAD PROCEDURES AND DISPLAYS DATA SET

11.1 INTRODUCTION

The Payload Procedures and Displays Data Set provides the detailed procedures and crew display operations requirements for the Payload Developer (PD) and International Space Station (ISS) personnel. Top-level operations requirements and allocations are identified in the Payload Integration Agreement (PIA) or EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Integration Agreement (EIA). The PD shall provide the details of these requirements using this section for guidelines and instructions for the data required by the ISS Program.

11.1.1 PURPOSE

This section defines the format and content of the Payload Procedures and Displays Data Set. The format of this section is structured to reflect the delivery requirements for which the PD shall input their payload procedures and crew display information. The Payload Procedures and Displays Data Set inputs reside in the Online Project Management System (OPMS) and in the Payload Information Management System (PIMS).

Questions and/or comments on the Payload Procedures and Displays Data Set should be directed to the Payload Procedures and Displays Data Set Manager (DSM). All questions should be answered, all tables completed, and all requested data supplied for each section of the Payload Procedures and Displays Data Set deliveries.

11.1.2 PAYLOAD PROCEDURES AND DISPLAYS DATA SET SCOPE

The Payload Procedures and Displays Data Set describes PD input to the U.S. Payload Operations Data File (PODF), which includes crew, automated, and ground command procedures and related information, onboard crew displays, and payload messages. The U.S. PODF is a component of the ISS Operations Data File (ODF), which is the collection of all procedures and reference data that supports Station on-board operations. The procedures contained in the U.S. PODF are used by flight controllers, the on-board crew, and the on-board Payload Multiplexer Demultiplexer (PL MDM) automated procedure executor software (Timeliner) to operate and maintain Station payloads, Payload Support Systems (PLSSs), and Laboratory Support Equipment (LSE).

The on-board crew displays used to operate U.S. payloads are considered part of the U.S. PODF and are managed by the U.S. Payload Operations Data File (PODF) Management Plan. The Payload Display Review Panel (PDRP) advises U.S. payload display developers on standards and usability guidelines throughout display development. It provides final approval of U.S. payload displays prior to display baselining, crew training, and flight.

The overall contents of the U.S. PODF changes from flight to flight. There will also be updates during each flight. The POIF manages changes for the U.S. PODF to support crew training and flight operations, according to the U.S. PODF Management Plan.

The U.S. PODF Management Plan documents the guidelines and processes for all U.S. PODF related activities carried out under the direction of the POIF. The management plan defines the policies, guidelines, protocol, roles, and responsibilities of the ISS community members in the development, verification, validation, maintenance, and control of payload procedures and crew displays comprising the U.S. PODF. SSP 58700-ANX1, Annex 1 of the International Space Station U.S. Payload Operations Data File Management Plan, provides information on processes and requirements for automated procedures.

The requirements submitted in response to this Data Set shall comply with SSP 58700, U.S. Payload Operations Data File Management Plan, and SSP 58700-ANX1 and other references shown in Table 11.2.1-1.

11.1.3 PAYLOAD PROCEDURES AND DISPLAYS DATA SET PRECEDENCE

In case of any variation between the Payload Procedures and Displays Data Set and the PIA/EIA, the PIA/EIA shall take precedence. Any requirements submitted in this document that are not within the scope of the PIA/EIA will not be considered binding on the National Aeronautics and Space Administration (NASA) for implementation.

11.1.4 PAYLOAD PROCEDURES AND DISPLAYS DATA SET CONFIGURATION MANAGEMENT

The contents of the Payload Procedures and Displays Data Set are controlled by the Payloads Control Board (PCB). The payload procedures, payload crew displays, and other payload inputs are controlled by the U.S. Payload Operations Data File Control Board (U.S. PODFCB) with concurrence by the PCB if required.

11.1.5 PAYLOAD DEVELOPER RESPONSIBILITIES

The PD shall provide payload operating procedures, payload messages, crew displays and reference materials for the payload. The PD shall comply with SSP 58700, U.S. Payload Operations Data File Management Plan, and SSP 58700-ANX1 and other references shown in Table 11.2.1-1.

The PD shall electronically input the requested data directly to the appropriate database (OPMS/PIMS) for the Payload Procedures and Displays Data Set integration. For PIMS, the file transfer into the document Configuration Management (CM) System is equivalent to a promotion in PDL to the integrated level. For OPMS, the file transfer is equivalent. Information on OPMS and PIMS can be found in SSP 58700.

11.1.6 INTERNATIONAL SPACE STATION PAYLOAD OFFICE RESPONSIBILITIES

11.1.6.1 ISS PROGRAM PAYLOAD PROCEDURES AND DISPLAYS DATA SET MANAGER

The ISS Program Payload Procedures and Displays DSM supports the integration and review of the data for ISS implementation and integrates the Payload Procedures and Displays Data Set inputs into the U.S. PODF across the manifested payload complement.

The Payload Procedures and Displays DSM or their designated representative contacts the PD if it is determined that support requirements cannot be satisfied with ISS Program resources, if there are any questions, or if negotiation is required to resolve any operational issues.

11.1.6.2 PAYLOAD OPERATIONS INTEGRATION FUNCTION

Several teams within the Payload Operations Integration Function review and integrate the inputs provided through the Payload Procedures and Displays Data Set. The PODF team reviews the manual procedures and related information. The PDRP team reviews the operations concepts and analyses for crew tasks, crew displays, and manual procedures. The ISS Payload Label Approval Team (IPLAT) reviews the hardware drawings for label content and location. The Operations Control team reviews the manual procedures, automated procedures, ground command procedures, payload data files, and payload messages. The Safety team reviews the Procedure Hazard Control List.

11.2 PAYLOAD PROCEDURES AND DISPLAYS DATA SET GENERAL INFORMATION

11.2.1 PAYLOAD PROCEDURES AND DISPLAYS DATA SET DELIVERABLES

The PD shall submit the Payload Procedures and Displays requirement data to the ISS Program via electronic entry into OPMS/PIMS. The ISS Program personnel use this information to perform integration analysis and publish required documentation. Payload Procedures and Displays Data Set delivery (generic dates) to meet Program milestones are documented in SSP 57057, ISS Payload Integration Template. The PD shall complete their payload-unique data submittal in accordance with the dates negotiated and documented in the payload's PIM schedule. Table 11.2.1-1, Payload Procedures and Displays Data Set Deliverables, defines different data groups as they are presented in this document. This defines for the PD to what data is to be delivered in each data group. In addition, the table defines whether the data is mandatory or optional, the section of the document that describes the deliverable, what reference document to use for the details of the requirement, and what delivery tool to use.

Most of the requirements are detailed in the SSP 58700 and SSP 58700-ANX1; a table similar to this one is included there and directs the PD to the specific paragraph in the management plan where the detailed requirements reside. SSP 58700 invokes both

SSP 50252, Operations Data File Management Plan; and SSP 50253, Operations Data File Standards, which are considered required for all PODF products.

Note that not all capabilities are used by all payloads. For example, some payloads do not have automated procedures or data files. If these capabilities are not used by the payload, the products are not included in the schedule. If the capability is used by the payload, then the deliverable is mandatory for that PD, shown in the following table as Mandatory.

TABLE 11.2.1-1 PAYLOAD PROCEDURES AND DISPLAYS DATA SET DELIVERABLES (PAGE 1 OF 2)

Data Group/ Section	Deliverable	Mandatory or Optional	Reference	Delivery Tool
1/ 11.3	Operations Concept	Optional	SSP 58700	OPMS
2/ 11.4	Operations Analysis/Flows	Optional	SSP 58700	OPMS
3/ 11.5	Initial Crew Displays	Mandatory	SSP 58700, SSP 50313 (with special attention to Appendix H), SSP 50254	OPMS
4/ 11.6	Preliminary Payload Unique Operations Nomenclature	Mandatory	SSP 58700, SSP 50254	OPMS
5/ 11.7	Candidate Flight Crew Displays	Mandatory	SSP 58700, SSP 50313 (with special attention to Appendix H), SSP 50254	OPMS
6/ 11.8	Pre-released Engineering Drawings (IPLAT review)	Mandatory	SSP 58700, SSP 57000 (Appendix C)	See 11.8
7/ 11.9	Manual Procedures	Mandatory	SSP 58700, SSP 50254	OPMS
7/ 11.9	Delivered Procedure/ Display Files List	Mandatory	SSP 58700	OPMS
7/ 11.9	Reference Data	Mandatory	SSP 58700	OPMS
7/ 11.9	Validation Plan	Mandatory	SSP 58700	OPMS
7/ 11.9	Validation Record Report	Mandatory	SSP 58700	OPMS
7/ 11.9	Log Files	Mandatory	SSP 58700	OPMS
7/ 11.9	MPV Links	Mandatory	SSP 58700	OPMS

NOTES:

[1]Mandatory for payloads with operational hazard controls

The full titles for the documents in this table are as follows:

SSP 30539, User Interface Language
SSP 41158, Software Interface Control Document Part I United States On-Orbit Segment to International Ground System Segment Ku-Band Telemetry Formats
SSP 50254, Operations Nomenclature
SSP 50313, Display and Graphics Commonality Standards
SSP 57000, Pressurized Payloads Interface Requirements Document
SSP 57002, Payload Software Interface Control Document Template
SSP 58311, Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations
SSP 58700, U.S. Payload Operations Data File Management Plan
SSP 58700-ANX1, Annex 1 of the International Space Station U.S. Payload Operations Data File Management Plan
CSDL-306642, ISS User Interface Language User's Guide
POIF-OC-0010, PL MDM Timeliner Automated Procedures Operations Manual

TABLE 11.2.1-1 PAYLOAD PROCEDURES AND DISPLAYS DATA SET DELIVERABLES (PAGE 2 OF 2)

Data Group/ Section	Deliverable	Mandatory or Optional	Reference	Delivery Tool
7/ 11.9	Payload Messages	Mandatory	SSP 58700, CSDL-306642 (Revision 2)	OPMS
8/ 11.10	Preliminary Ground Command Procedures	Mandatory		OPMS
9/ 11.11	Updated Payload Unique Operations Nomenclature/ECR	Mandatory	SSP 58700, SSP 50254, SSP 58311	Email to MSCF POIF CM
10/ 11.12	Released Engineering Drawings (IPLAT review)	Mandatory	SSP 58700, SSP 57000 (Appendix C)	See 11.8
11/ 11.13	Final Ground Command Procedures	Mandatory		OPMS
12/ 11.14	ECR to Baseline Manual Procedures	Mandatory	SSP 58700, SSP 58311	Email to MSCF POIF CM
12/ 11.14	Updated Delivered Procedure/Display Files List	Mandatory	SSP 58700	Email to MSCF POIF CM
12/ 11.14	Updated Validation Record Report	Mandatory	SSP 58700	OPMS
12/ 11.14	Updated Log Files	Mandatory	SSP 58700	OPMS
12/ 11.14	Updated MPV Links	Mandatory	SSP 58700	OPMS
12/ 11.14	Updated Payload Messages	Mandatory	SSP 58700, CSDL-306642 (Revision 2)	OPMS
12/ 11.14	Procedure Hazard Control List	Mandatory[1]	SSP 58700	OPMS
13/ 11.15	Payload Data Files	Mandatory	SSP 41158 (Part 1), SSP 57002	PIMS
13/ 11.15	Payload Automated Procedures (Timeliner Files)	Mandatory	SSP 58700-ANX1, SSP 30539, CSDL-306642, POIF-OC-0010	PIMS

NOTES:

[1]Mandatory for payloads with operational hazard controls

The full titles for the documents in this table are as follows:

SSP 30539, User Interface Language
SSP 41158, Software Interface Control Document Part I United States On-Orbit Segment to International Ground System Segment Ku-Band Telemetry Formats
SSP 50254, Operations Nomenclature
SSP 50313, Display and Graphics Commonality Standards
SSP 57000, Pressurized Payloads Interface Requirements Document
SSP 57002, Payload Software Interface Control Document Template
SSP 58311, Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations
SSP 58700, U.S. Payload Operations Data File Management Plan
SSP 58700-ANX1, Annex 1 of the International Space Station U.S. Payload Operations Data File Management Plan
CSDL-306642, ISS User Interface Language User's Guide
POIF-OC-0010, PL MDM Timeliner Automated Procedures Operations Manual

11.3 DATA GROUP 1 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.3.1 OPERATIONS CONCEPT

The ISS Payload Office strongly recommends that the PD develop an operations concept for crew tasks before developing payload crew displays and procedures. The Payload Display Review Panel (PDRP) team is available to provide guidance to the PD in the development of the operations concept for crew tasks. The operations concept is at an overview level while details of the crew tasks are defined in an operations analysis or flow (see Section 11.4.1). Clearly defined crew tasks make the development of crew displays and procedures more efficient and cost effective. Having well defined crew tasks reduces development of crew displays and procedures that are later determined to not be needed for efficient operations. The operations concept helps resolve uncertainty regarding which tasks are best performed by the crew or automated versus those that should be commanded from the ground. Development of an operations concept for crew tasks and the more detailed operations analysis or flows has proven to be an effective approach to developing crew displays and procedures.

11.4 DATA GROUP 2 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.4.1 OPERATIONS ANAYLSIS/FLOWS

The ISS Payload Office strongly recommends that the PD use operations analysis or flows to define crew tasks before developing crew displays and manual procedures. The PDRP team is available to provide guidance to the PD in the development of the operations analysis or flows for crew tasks based on the payload's operations concept (see Section 11.3.1). Operations analysis or flows products may take the form of Operations Sequence Diagrams (OSDs), Decision/Action Diagrams (DADs), or other products. These products shall describe both nominal and off-nominal experiment operations. Operations analysis or flows are used as a tool to efficiently develop payload crew displays and procedures. They are also used to support the development of training material.

PDs may request POIF to develop their procedures and/or crew displays. If the POIF agrees to this development effort, the PD shall negotiate with POIF to have POIF develop the procedures and/or crew displays. The PD shall submit an operations analysis or flow to POIF in support of the development process. At a minimum, the PD shall provide a crew task list and a sequence of operations/activities necessary to identify the payload functions allocated to the crew.

11.5 DATA GROUP 3 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.5.1 INITIAL CREW DISPLAYS

The PD will deliver the Initial Crew Displays after collaboration between the payload display developer and the PDRP in the development of the payload operations concept and operations analysis/flows that identify crew tasks. The PD and PDRP will assess and refine these displays with respect to usability and adherence to display standards. Subsequently, a crew-supported usability test will be performed using the resulting displays.

11.6 DATA GROUP 4 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.6.1 PRELIMINARY PAYLOAD UNIQUE OPERATIONS NOMENCLATURE

The Payload Unique Operations Nomenclature shall be defined to ensure effective operations. Table One is for acronyms and abbreviations for the payload, from software displays and hardware panel labels. The payload name is included, if it is an acronym. Table Two is for the definition for any stowed or installed hardware that is tracked in Inventory Management System (IMS) or the Vehicle Master Data Base.

The Operations Nomenclature input is used in parallel for equipment labeling approval by ISS Payload Label Approval Team (IPLAT) and for verification of manual procedures and crew displays.

11.7 DATA GROUP 5 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.7.1 CANDIDATE FLIGHT CREW DISPLAYS

The Candidate Flight Crew Displays will support the Displays and Procedures Review Process. These displays will be used during the usability test to determine their interoperability with the crew procedures and for cross-payload commonality.

11.8 DATA GROUP 6 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.8.1 PRE-RELEASED ENGINEERING DRAWINGS (IPLAT REVIEW)

The PD is responsible for providing label content and location drawings (pre-released engineering drawings) to JSC Flight Projects Division (FPD) ISS Payload Label Approval Team (IPLAT) for review and approval. These drawings are also used for PODF/PDRP review of manual procedures and crew displays. IPLAT reviews all labels on payload hardware and equipment that the crew interfaces with during normal operations, planned maintenance, and contingency operations where a crew interface

is designed in. The IPLAT goal is standardization of payload labels to facilitate the crew's understanding, thereby increasing the amount of time spent on science. The purpose of this initial label evaluation is to identify any label requirements violations, and recommend solutions.

If the drawings are delivered to the program to meet another requirement, the PD notifies the IPLAT of their location. If the drawings are delivered strictly for IPLAT review, the delivery is made into OPMS.

11.9 DATA GROUP 7 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.9.1 MANUAL PROCEDURES

All manual procedures to operate payloads, as listed in Table 11.9.1-1, shall be provided by the PD/procedure developer. Validation of all payload manual procedures is a PD responsibility. Verification of standards conformance and safety compliance is a POIF responsibility. The file naming convention is described in SSP 58700.

The delivery of manual procedures is used to develop simulator pre-ship test procedures, training lesson plans and courseware. The delivery of manual procedures is used to prepare for the Payload Training Dry Run (PTDR) and to support all payload operations training. Manual procedures are also used to conduct crew display usability tests.

The PD/procedure developer is responsible for working with PODF to keep files current technically, including changes as a result of crew training, usability tests, and program reviews.

TABLE 11.9.1-1 MANUAL PROCEDURE TYPES

ETOV Operations Manual Procedures Types
Transfer
Installation/Deinstallation
Ascent
Joint Operations
Descent
ISS On-Orbit Manual Procedures Types
Activation and Checkout
Nominal Operations (including Deactivation)
Alternate Nominal
Quick Response
Malfunction
Corrective

11.9.2 DELIVERED PROCEDURE/DISPLAY FILES LIST

The delivered procedure/crew display files list identifies all payload manual procedure files delivered or expected to be delivered for the increment. It shall include all the varieties shown in the table above, as well as identify all payload crew display files, the Payload Hazard Control List, and all payload reference data, including electronic and paper files.

For payloads on a second or subsequent increment, only new files need to be identified.

11.9.3 REFERENCE DATA

Reference data are non-executable support information for On-Orbit flight usage. This information is used as reference material and is not part of an actual manual procedure or crew display. Examples include:

A. Lists of equipment lost when a bus malfunctions

B. Inventory and stowage lists

C. Earth observation maps

D. Definitions of text and icons used in the C&DH systems crew displays

E. Diagrams and drawings used for system familiarization and diagnostic troubleshooting.

11.9.4 VALIDATION PLAN

Validation of the manual procedures and crew displays shall be completed prior to the Data Group 7 delivery to OPMS. The Validation Plan documents plans and methods to be used by the payload to validate manual procedures and crew displays to ensure they are technically accurate, execute as written and achieve the desired scientific results. The plan includes information such as the planned levels of payload maturity and the validation processes to be performed at each level. The plan addresses all phases, from initial development to return to Earth.

11.9.5 VALIDATION RECORD REPORT

As new manual procedures and crew displays are validated or existing procedures are revalidated, a Validation Record Report is completed and submitted.

11.9.6 LOG FILES

Log files are files used by the crew to manually record data associated with a payload's activities as instructed in the manual procedure. The log file conforms to the on-board software applications.

11.9.7 MPV LINKS

Manual Procedure Viewer (MPV) links are used for hyperlinking between manual procedures, between manual procedures and reference files, or to external files for data logs, Onboard Training, and other files. The MPV Links defines all the links needed for the manual procedure.

11.9.8 PAYLOAD MESSAGES

All payload messages that require crew or ground response shall be identified. In the event an unidentified payload message occurs, the message will be ignored, unless crew safety or payload health is threatened. In the case of an unidentified payload message relating to crew safety or payload health, the payload will be safed, and no further payload operations will be scheduled until all required payload messages are fully identified, defined, and the response understood. This requires Operations Change Request processing, and could potentially take weeks to months of implementation to accomplish.

Note: This section defines the RESPONSE to the message. It will NOT get the message included in onboard software or in a TIMELINER bundle.

Message sources include Payload Multiplexer/Demultiplexer (PL MDM)-generated payload messages, Timeliner automated procedure-generated messages, front panel display messages, and payload laptop messages.

Payload messages consist of the following information:

A. Message Number

B. Message Source

C. Message Type

D. Message Text

E. Whether the Message Is Downlinked

F. Condition that Generated the Message

G. Response by Crew or Ground Controller.

11.10 DATA GROUP 8 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.10.1 PRELIMINARY GROUND COMMAND PROCEDURES

SSP 50252, Operations Data File Management Plan, mandates that all operations affecting changes to onboard systems are managed by the respective Partner's ODF Control Board. Ground commands procedures are under the control of the U.S.

PODFCB. A POIC Ground Command Procedures Book has been created to implement this requirement.

The POIC Ground Command Procedures Book is managed by the Operations Control (OC) Team Payload Rack Officer (PRO) and complies with ODF formatting standards. Exceptions to ODF standards are noted in SSP 50252, Operations Data File Management Plan. All POIC Ground Command Procedures Book (GCPB) procedures shall contain all data required for execution by the POIC PRO. If commands within payload procedures contain modifiable fields, the PD shall provide data for the modifiable command fields with submission of the procedure.

The POIC GCPB is composed of three volumes organized as follows:

Vol 1: Nominal and Alternate PLSS procedures

Vol 2: EXPRESS/ARIS procedures (Nominal, Alternate, Corrective, and Malfunction)

Vol 3: Payload procedures

Specifically, the following Payload procedures for POIC execution are required:

A. Payload procedures that affect a payload safety or hazard control as identified by the PSRP.

   NOTE: All commands within safety or hazard control procedures MUST be completely defined and may not contain modifiable fields.

B. Payload Rapid Safing procedures

   NOTE: If no payload Rapid Safing procedure is delivered, the PRO shall safe the payload by terminating power to the payload.

C. Payload Rapid Safing Recovery procedures

D. Payload Corrective Action procedures

E. Payload Malfunction procedures

   NOTE: If payload Rapid Safing Recovery, Corrective Action, or Malfunction procedures are not delivered, resumption of payload operations may be significantly delayed.

The following procedures are optional and may be included at PD discretion:

A. Selected nominal payload procedures to be executed by the POIC PRO as authorized by Payload Regulation. These procedures shall be executed by the POIC PRO only when specifically requested by the PD.

NOTE: In addition to providing the procedure, provide a Payload Regulation in the Payload Operations Data Set, Section 6.6.

NOTE: This provision has been included to accommodate continued payload operations in the event a PD is unable to command as scheduled due to technical or facility malfunction. This provision shall not be utilized for PD convenience.

B. Payload Activation and Deactivation procedures

NOTE: May be prudent to include if significant PRO to PD interactions is required

Specifically, the following procedures are not required:

A. Nominal Telescience procedures; e.g., payload procedures that alter science return, but do not alter payload resources.

11.11 DATA GROUP 9 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.11.1 UPDATED PAYLOAD UNIQUE OPERATIONS NOMENCLATURE/ECR

The Payload Unique Operations Nomenclature is submitted with the standard MSFC Engineering Change Request (ECR) form, for inclusion in SSP 50254, Operations Nomenclature. After a review, the Operations Nomenclature is presented to the U.S. PODFCB for approval.

The ECR form can be found at the following web site: http://www1.msfc.nasa.gov/POIF/forms.html. The updated Operations Nomenclature file is included with the ECR. The procedure for ECR submission is included in SSP 58311, Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations.

11.12 DATA GROUP 10 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.12.1 RELEASED ENGINEERING DRAWINGS (IPLAT REVIEW)

The PD is responsible for providing label content and location drawings to the JSC Flight Projects Division (FPD) ISS Payload Label Approval Team (IPLAT) for Final Acceptance Review (verification - based on released engineering drawings) and approval.

The PD is to notify IPLAT if label designs change, to provide updated drawings to IPLAT to review, and to place approved labels on payload hardware in accordance with approved label location drawings.

The IPLAT is responsible for providing formal verification of payload drawings, documented via Form 732, and maintaining a record of which drawings were reviewed and approved or disapproved (Final Disposition Form, Form 732).

11.13 DATA GROUP 11 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.13.1 FINAL GROUND COMMAND PROCEDURES

The PD shall provide the Final delivery of these procedures.

11.14 DATA GROUP 12 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.14.1 ECR TO BASELINE MANUAL PROCEDURES

The manual procedures are baselined by the U.S. PODFCB before creation of the flight PODF. The submission of an Engineering Change Request begins the process to baseline manual procedures.

This submittal is accomplished by using the standard MSFC Engineering Change Request (ECR) form. The form can be found at the following web site: http://www1.msfc.nasa.gov/POIF/forms.html. The updated manual procedure files are referenced in the ECR. The Updated Delivered Procedure/Display Files List is emailed with the ECR to MSFC CM. The procedure for ECR submission is included in SSP 58311, Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations.

11.14.2 UPDATED DELIVERED PROCEDURE/DISPLAY FILE LIST

The Delivered Procedure/Display File List included with the ECR form designates the PODF data to be baselined, as well as the files to be included in the MPV library for the flight PODF. It shall include all the varieties shown in Table 11.9.1-1. It shall also identify the Payload Hazard Control List and all payload reference data delivered for the increment. The list includes electronic and paper files submitted. The final delivery is required for generation of the flight PODF.

At this stage, changes to manual procedures should be made only for science impacts that would effect mission success.

For payloads on a second or subsequent increment, only new files need to be identified for baselining. All files needed in the flight PODF should be listed.

11.14.3 UPDATED VALIDATION RECORD REPORT

The PD shall submit updated information with the ECR to baseline manual procedures.

11.14.4 UPDATED LOG FILES

The PD shall submit updated information with the ECR to baseline manual procedures.

11.14.5 UPDATED MPV LINKS

The PD shall submit updated information with the ECR to baseline manual procedures.

11.14.6 UPDATED PAYLOAD MESSAGES

The PD shall submit updated information with the ECR to baseline manual procedures.

11.14.7 PROCEDURE HAZARD CONTROL LIST

The PD shall provide a list with the delivery of their manual procedures. The PD is responsible for the development of operational hazard controls as specified in the approved safety assessment hazard reports and is responsible to incorporate these operational hazard controls into the manual procedures. The tracking of these controls is done with the development of the Procedures Hazard Control List. The data to be filled out is the Hazard Report Number, Hazard Control Number, Hazard Control Summary, and the Procedure Filename(s)/Step(s).

11.15 DATA GROUP 13 - PAYLOAD PROCEDURES AND DISPLAYS DATA SET REQUIREMENTS

11.15.1 PAYLOAD DATA FILES

Payload Data Files are text, payload data, executable, or any other type of payload files that the PD requires to be uplinked to their payload during operations by the Command and PL MDM Officer (CPO) cadre position. Payload Data Files do not include a payload's automated procedure (Timeliner) files, or Log Files described in Section 11.9 or files of payload operations and/or science data that never reside on the PL MDM disk. All other files are stored temporarily on the PL MDM Mass Storage Device (MSD) until they can be downloaded to the payload processor or intermediate destination. After the files have been downloaded from the PL MDM MSD, they are candidates for deletion from the PL MDM MSD as soon as disk space becomes an issue.

SSP 41158, Software Interface Control Document Part I United States On-Orbit Segment to International Ground System Segment Ku-Band Telemetry Formats; Section 3.3.62, Payload MDM Mass Storage Device File Naming Convention; specifies the naming convention to be used for PL MDM MSD files. PL MDM MSD file names must be unique.

Payloads specify their payload data file names and other information in their Payload Data Library (PDL) inputs as defined in SSP 57002, Payload Software Interface Control Document Template. This information is used by the Payload Software Integration Verification/Facility (PSIV/F) to build a PL MDM Current Value Table (CVT) called the

File Authorization Table (FAT). The FAT table is required to allow payloads to access their files on the PL MDM Mass Storage Device (MSD) because the payload's Payload Executive Processor (PEP) service requests embedded in the rack's Health and Status is only two words long. The payload uses a file ID number in its service request because there is not enough room to send a file name. The FAT table is used by the PEP software to translate a file ID number into a file name and MSD path, and also to verify file ownership and file read/write privileges.

The actual files (content) are required to be delivered into the payload's PIMS account at launch minus two months. The payload's file names are compared against the FAT table by the CPO staff.

11.15.2 PAYLOAD AUTOMATED PROCEDURES (TIMELINER FILES)

Payload Timeliner automated procedures may be used for payload operations to automate payload functions including fully autonomous control, interactive control, or a combination of control. Examples are stepping through predefined steps of a scientific experiment, performance of subsystem checkouts, monitoring for anomalous conditions, and executing quick-response safeing functions. Automated procedures provide the same functions for sub-rack payloads, facility-class payloads, Laboratory Support Equipment (LSE) or Payload Support Systems (PLSSs). Automated procedure execution may be monitored and controlled by the CPO ground controller via the via the Automated Procedure Ground Management Tool (APGMT) software, or by the onboard crew via the Automated Procedure Viewer (APV) display on the payload Portable Computer System (PCS). Users follow the execution of automated procedures using APGMT, which is available from the PIMS launchpad. The onboard crew does not have the capability to edit (change the contents) or compile automated procedure files. Changes to the contents of automated procedure files are made by the procedure developer.

Automated procedure execution may also be initiated by CCSDS commands embedded in two of the PL MDM Current Value Tables: the Limit Check Definition Table (LCDT) and the Payload Configuration Data Table (PCDT). The LCDT command ("Start Sequence ABC") is initiated in response to a limit event when the payload requires two or more actions. The PCDT table allows startup, shutdown, and standby commands ("Start Sequence XYZ") to be initiated by a ground command (for example, the payload startup notification command) when the payload requires two or more actions.

Payload developers specify their payload Timeliner automated procedure bundle (file) names, the bundle's internal sequence names, and related information in their Payload Data Library (PDL) inputs as defined in SSP 57002, Payload Software Interface Control Document Template. This information is used by the Payload Software Integration Verification/Facility (PSIV/F) to build a Payload MDM Current Value Table (CVT) called the Procedure Information Table (PIT). The PIT table is required to allow payloads to control execution of their Timeliner automated procedures loaded in memory slots in

the Payload MDM's DRAM memory. Payloads can issue commands to start, stop, and resume sequences by requesting their Rack Interface Controller (RIC) to include those commands as PEP service requests embedded in the rack's Health and Status transmission. The embedded PEP service requests are only allowed two words, so they cannot contain the command text or sequence name text. The PIT table is used to assign each bundle and sequence a number to be used in place of the name and request codes. For example a PEP service request of "20, 405" is interpreted by the PEP software using the PIT table as "resume execution of sequence 405," where 405 is a number assigned by the PSIV/F for a specific sequence within a payload's automated procedures. Note that directives to control Timeliner automated procedures made only by the crew and/or ground controller (CPO) do not require entries in the onboard PIT table because the full command mnemonic and bundle/sequence name can be specified as part of the command.

Detailed information on payload Timeliner automated procedure development may be found in the following documents:

A. SSP 30539, User Interface Language, Revision E, February 1998. This document is the language specification (available via Draper Laboratory Timeliner web page, http://timeliner.draper.com).

B. CSDL-306642, ISS User Interface Language User's Guide, Revision 2, March 1999 (available via the Draper Laboratory Timeliner web page, http://timeliner.draper.com).

C. POIF-OC-0010, PL MDM Timeliner Automated Procedures Operations Manual, October 29, 1999 (available via the POIC web page).

D. SSP 58700-ANX1, Annex 1 of the International Space Station U.S. Payload Operations Data File Management Plan. This document contains the required file naming convention and development process (available via the POIC web page).

12.0 EXTRAVEHICULAR ROBOTICS <TBD 12-1>

APPENDIX A

ACRONYMS AND ABBREVIATIONS

APPENDIX A - ABBREVIATIONS AND ACRONYMS

1-g	1-gravity
A	Amp
A&ID	Assembly and Installation Drawing
ABCL	As-Built Configuration List
Acct	Account
ADP	Acceptance Data Package
ALT	Alternate
AOS/LOS	Acquisition of Signal/Loss of Signal
APGMT	Automated Procedure Ground Management Tool
APID	Application Programming Interface Definition
APV	Automated Procedure Viewer
Ar	Argon
ARC	Ames Research Center
ARIS	Active Rack Isolation System
ASCR	Assured Safe Crew Return
ASTRO	**<TBD A-1>**
A/V	Audio/Video
BAD	Broadcast Ancillary Data
BDC	Baseline Data Collection
BDCF	Baseline Data Collection Facility
B/L	Baseline
BMP	Bit Mapped
BNC	Bayonet Nut Connector
bps	bits per second
CAD	Computer-Aided Drafting
C&DH	Command and Data Handling
CAGE	Commercial and Government Entity
CAM	Centrifuge Accommodation Module
C&T	Communication & Tracking
CBT	Computer-Based Trainer Computer Based Training
CCAF	Cape Canaveral Air Force
CCB	Configuration Control Board
CCCD	Crew Compartment Configuration Drawing
CCM-C	Cell Culture Module - C
CCSDS	Consultative Committee Standards for Data Systems
CD	Compact Disk
CDP	Custom Data Packet
CD-ROM	Compact Disk - Read Only Memory
CDS	Configuration Data Set
CEF	Change Evaluation Form
CEIT	Crew Equipment Interface Test
cg	center of gravity

CGBA	Commercial Generic Bioprocessing Apparatus
CI	Cargo Integration
CIL	**<TBD A-1>**
CIM	Customer Integration Manager
CIR	Cargo Integration Review
cm	centimeter
CM	Configuration Management
cm^3	cubic centimeter
CO_2	Carbon Dioxide
COR	Communications Outage Recorder
COTS	**<TBD A-1>**
CPO	Command and PL MDM Officer
CRS	**<TBD A-1>**
CS	**<TBD A-1>**
CSF	Cryogenic Storage Freezer
CVT	Current Value Table
CWA	Clean Work Area
DAD	Decision/Action Diagrams
DC	Direct Current
DCE	**<TBD A-1>**
DCM	Document Configuration Management
DDR	**<TBD A-1>**
DDSA	**<TBD A-1>**
DEAP	Dryden Early Access Platform
DFP	Data Flow Plan
DFRC	Dryden Flight Research Center
DMP30	**<TBD A-1>**
DPP	**<TBD A-1>**
DQA	Data Quality Assurance
DRAM	**<TBD A-1>**
DSA	**<TBD A-1>**
DSC	Data Set Coordinator
DSM	Data Set Manager
EAR	Export Administration Regulations
ECL	Engineering Configuration List
ECN	Equipment Control Number
ECP	**<TBD A-1>**
ECR	Engineering Change Request
EEOM	Early End of Mission
EGSE	Experiment Ground Support Equipment
EHIP	EVA Helmet Interchangeable Portable
EHS	Enhanced HOSC System
EIA	EXPRESS Integration Agreement
EM	**<TBD A-1>**
EMI	Electromagnetic Interference

EMS	Engineering Master Schedule
EO	**<TBD A-1>**
EOM	End of Mission
EP	**<TBD A-1>**
EPIM	EXPRESS Payload Integration Manager
EPROM	Erasable Programmable Read Only Memory
EPS	Electrical Power System
	Encapsulated Postscript
ESD	Electrostatic Discharge
ETOV	Earth-To-Orbit Vehicle
EVA	Extravehicular Activity
Exp	Experiment
EXPRESS	EXpedite the PRocessing of Experiments to the Space Station
FAT	File Authorization Table
FCI	Flight Crew Interface
FCR	Flight Control Room
FCSD	Flight Crew Support Division
FCT	Flight Control Team
FCU	Filter Control Unit
FDDI	Fiber Distributed Data Interface
FDF	Flight Data File
FDP	Flight Projects Division
FEC	Field Engineering Change
FIFO	First In, First Out
FLIGHT	Flight Director
Flt	Flight
FOV	Field of View
FPD	Flight Projects Division
FRM	Fleet Resource Management
FRR	Flight Readiness Review
FTP	File Transfer Protocol
GAD	Ground Ancillary Data
GB	Gigabytes
GCPB	Ground Command Procedures Book
GDS	Ground Data Services
Ghe	Gaseous Helium
GIF	Graphics Interchange Format
gm	**<TBD A-1>**
GMT	Greenwich Mean Time
GN_2	Gaseous Nitrogen
GOSAMR	Gelation of Sols: Applied Microgravity Research
GR&C	Ground Rules and Constraints
GRC	Glenn Research Center
GSE	Ground Support Equipment
GSP	Ground Support Personnel

GSRD	Ground Support Requirements Document
GSRT	Ground Support Requirements Team
H&S	Health and Status
He	Helium
HI-PAC	**<TBD A-1>**
HLS	Human Life Sciences
HMCG	HOSC Management Control Group
H_2O	Water
HOSC	Huntsville Operations Support Center
HR	hour
HRDL	High Rate Data Link
HRF	Human Research Facility
HRFM	High Rate Frame Multiplexer
HRM	**<TBD A-1>**
HTTP	Hyper Text Transfer Protocol
Hz	Hertz
I-	Increment minus
ICD	Interface Control Document
ID	Identification
IDP	Integration Data Package
IDRD	Increment Definition and Requirements Document
IE	Integration Engineer
I/F	Interface
IFA	In-Flight Anomaly
IFM	In-Flight Maintenance
I-mm	Increment minus months
IMS	Inventory Management System
in	inch
IONL	Installed On Launch
IOP	Increment Operations Plan
IOR	Increment Operational Review
IOS	Instructor/Operator Station
IP	International Partner
IPLAT	ISS Payload Label Approval Team
IPM	Increment Payload Manager
IPOU	Installed Post Undock
IPRU	Installed Pre-Undock
IPT	Integrated Processing Team
	Integrated Product Team
ISIS	International Sub-rack Interface Standard
ISO	International Standards Organization
ISPR	International Standard Payload Rack
ISS	International Space Station
ITCB	International Training Control Board
ITCS	Internal Thermal Control System

iURC	Interim User Requirements Collection
IVA	Intravehicular Activity
IVoDS	Internet Voice Distribution System
IVT	Interface Verification Test
Ixx	Moment of Inertia about the cg at the xx axis
Ixy	Product of Inertia about the cg at the xy axis
Ixz	Product of Inertia about the cg at the xz axis
Iyy	Moment of Inertia about the cg at the yy axis
Iyz	Product of Inertia about the cg at the yz axis
Izz	Moment of Inertia about the cg at the ZZ axis
JA	**<TBD A-1>**
JPEG	Joint Photographic Experts Group
JSC	Johnson Space Center
kbps	Kilobits-per-Second
kg	kilogram
kg-cm_2	kilograms per centimeters squared
KMR	**<TBD A-1>**
KPRD	**<TBD A-1>**
KRS	**<TBD A-1>**
KSC	Kennedy Space Center
Ku-Band	15.250 to 17.250 Gigahertz
L-	Launch minus
L+	Launch plus
LAN	Local Area Network
lbs	pounds
LCC	Launch Commit Criteria
LCDT	Limit Check Definition Table
LCWG	Launch Countdown Working Group
LD	Launch Director
LDRL	**<TBD A-1>**
LeRC	Lewis Research Center
LIS	Lead Increment Scientist
LOLI	Limited Operational Life Item
LOR	Line Outage Recorder
LOS	Loss Of Signal
LRU	Line Replaceable Unit
LSE	Laboratory Support Equipment
LSSC	Life Sciences Support Contract
LSSF	Life Science Support Facility
LSSM	Launch Site Support Manager
LSSP	Launch Site Support Plan
Lsu	Launch Support
LTL	Low Temperature Loop
LV	**<TBD A-1>**

M	Monitor
MAR	Mission Action Request
MAX	Maximum
Mbps	Megabits per second
MCC	Mission Control Center
MCC-H	Mission Control Center - Houston
MDA-HSV	**<TBD A-1>**
MDC	**<TBD A-1>**
MDD	Mate/Demate Device
MDM	Multiplexer/Demultiplexer
MDSS	**<TBD A-1>**
MELFI	Minus Eighty Degree Laboratory Freezer for the ISS
MEMS	Micro Electro-Mechanical Systems
MET	Mission Elapsed Time
mg	**<TBD A-1>**
MIL	Military
MIP	Mission Integration Plan
min	minute
MITP	Multilateral Increment Training Plan
mm	Millimeter
MOD	Mission Operations Directorate
Mohm Res.	**<TBD A-1>**
MPE	Mission Peculiar Equipment
MPLM	Mini-Pressurized Logistics Module Multi-Purpose Logistics Module
MPV	Manual Procedure Viewer
MR	Manifest Request
MSD	Mass Storage Device
MSDS	Material Safety Data Sheet
MSFC	Marshall Space Flight Center
MSG	Microgravity Science Glovebox
MSI	Maintenance Significant Item
MSL	Material Science Laboratory
MSP	Mission Support Plan
MST	Multi-Segment Trainer
MTL	Moderate Temperature Loop
MTU	**<TBD A-1>**
MVP	Master Verification Plan
MWG	Manifest Working Group
N_2	Nitrogen
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NCR	Nonconformance Report
NEOM	Nominal End of Mission
NIH-B	National Institutes of Health - B
No.	Number

NOACK	No acknowledgement
NOCMT	No commit
NOWLCO	No WILCO
NPOCB	NASA Payload Operations Control Board
NPTP	NASA Payload Training Panel
NRT	Near Real Time
NT	New Technology
NTSC	National Television System Communications
O&C	Operations and Checkout
OC	Operations Control
OCA	Orbital Communication Adapter
Occu.	**<TBD A-1>**
OCMS	Operations Control Mission Software
OCR	Operations Change Request
OD	Operational Downlink
ODF	Operations Data File
ODIN	**<TBD A-1>**
OIS	Operational Intercommunication System
OIS-D	Operational Intercommunication System - Digital
OMP	Operations Maintenance Plan
OMRS	Operations and Maintenance Requirements Specification
OMRSD	Operations and Maintenance Requirements and Specifications Document
OOS	On-Orbit Operations Summary
OP	Optional Service
OPF	Orbiter Processing Facility
OPMS	Online Project Management System
Ops	Operations
ORT	Operational Readiness Test
ORU	Orbital Replacement Unit
OS	Operating System
OSD	Operational Sequence Diagram
OSI	Open System Interconnection
OSTP	Onboard Short-Term Plan
PAD	Payload Ancillary Data Primary Animal Direct
PAH	Payload Accommodations Handbook
PALS	Program Automated Library System
PAO	Public Affairs Officer
PAP	Payload Activity Plan
PARC	Payload Activity Requirements Coordinator
PAS	Payload Axis System
PC	Personal Computer
PCA	Payload Control Area
PCB	Payloads Control Board

PCC	Partner Control Center
PCDT	Payload Configuration Data Table
PCG	Protein Crystal Growth
PCIN	**<TBD A-1>**
PCR	Payload Changeout Room
PCS	Payload Coordinate System
	Portable Computer System
PD	Payload Developer
PDC	Payload Development Center
PDGTI	PD Ground Training Integrator
PDI	Payload Data Interleaver
PDL	Payload Data Library
PDRP	Payload Display Review Panel
PDS	Payload Data Set
PDSS	Payload Data Services System
PED	**<TBD A-1>**
PEHG	**<TBD A-1>**
PE&I	Payload Engineering and Integration
PEI	Payload Engineering Integration
	Payload Engineering Integrator
PEIWG	Payload Engineering and Integration Working Group
PEP	Payload Executive Processor
PG	Product Generation
PGBA	**<TBD A-1>**
PGIM	Plant Growth Investigations in Microgravity
PGP	PE&I GSRT PDL
PGOC	Payload Ground Operations Contractor
pH	Measure of acidity
photo	Photography
PHR	Payload Hazard Report
PI	Payload Integrator
PIA	Payload Integration Agreement
PICT	Picture
PILS	Payload Integrated Library System
PIM	Payload Integration Manager
PIMS	Payload Information Management System
PIT	Procedure Information Table
Pkt CN	Packet Correlation Number
PL	Payload
PLAK	Payload Late Access Kit
PLB	Payload Bay
PLBD	Payload Bay Door
PLM	**<TBD A-1>**
PL MDM	Payload Multiplexer/Demultiplexer
PLSS	Payload Support System
PM	Payload Manager
PMI	Payload Mission Integrator

PMIT	Payload Mission Integration Team
PNTD	Plastic Nuclear Track Detector
POC	Point of Contact
POCB	Payload Operations Control Board
POCC	**<TBD A-1>**
POD	Payload Operations Director
PODF	Payload Operations Data File
POG	Payload OMRS Working Group
POI	Payload Operations Integration
POIC	Payload Operations Integration Center
POIF	Payload Operations Integration Function
POIWG	Payload Operations Integration Working Group
PON	Payload Operations Network
PP	Planning Period
PPE	Payload Project Engineer
PPM	**<TBD A-1>**
PPS	Payload Planning System
PRACA	Problem Reporting and Corrective Action
PRCU	Payload Rack Checkout Unit
PRD	Program Requirements Document
PRO	Payload Rack Officer
PRP	Personal Responsibility Program
PRU	Payload Resource Utilization
PSI	Pounds per Square Inch
psia	pounds per square inch absolute
PsimNet	Payload Simulator Network
PSIV/F	Payload Software Integration and Verification/Facility
PSRD	Payload Simulator Requirements Document
PSRP	Payload Safety Review Panel
PTC	Payload Training Capability
PTCS	Payload Test and Checkout System
PTDR	Payload Training Dry Run
PTI	Payload Training Integrator
PTIP	Payload Training Implementation Plan
PTLP	Payload Training Lesson Plan
PTS	Payload Training Simulator
PTS-GFE	Payload Training Simulator - Government Furnished Equipment
PUDG	Payload User Development Guide
PUDS	Payload-Unique Data Set
PUI	Payload-Unique Identifier
PVP	Payload Verification Plan
PWQ	Process Waste Questionnaire
QA	Quality Assurance
QSAM	Quasi-Steady Acceleration Measurement

R+	Return plus
RAM	Requirements Allocation Matrix
RAU	**<TBD A-1>**
RCN	Requirements Change Notice
Recept.	**<TBD A-1>**
Req.	Requirement
Rev	Revision
R/FR	Refrigerator/Freezer Rack
RGS	Resource Gas Services
RHA	Rack Handling Adapter
RIC	Rack Interface Controller
RID	Rack Insertion Device
RIP	Receiving Inspection Procedure
RN	**<TBD A-1>**
RPC	Remote Power Converter/Controller
RSP	Resupply Stowage Platform
RSR	Resupply Stowage Rack
RT	Real-Time
RVCH	**<TBD A-1>**
SAA	South Atlantic Anomaly
SAMS	Space Acceleration Measurement System
SAT	**<TBD A-1>**
S-Band	1550 to 5200 Megahertz
SCA	Shuttle Carrier Aircraft
SCCS	**<TBD A-1>**
SCIR	Station Cargo Integration Review
SE	Simulation Engineer
Sec	Seconds
SFOC	Space Flight Operations Contractor
SGI	Silicon Graphics, Incorporated
SIM	Simulation
SIR	Standard Interface Rack
S/L	**<TBD A-1>**
SL	**<TBD A-1>**
SLF	Shuttle Landing Facility
SLP	Spacelab Pallet
SPDMS	Shuttle Processing Data Management System
Specs.	Specifications
SPP	Standard Practices and Procedures
sq ft	square foot
SRDS	Support Requirements Data Set
SSCCD	Space Station Configuration Control Drawing
SSE	Station Support Equipment
SSID	Subelement Identification Subsystem Identification
SSMTF	Space Station Mockup and Trainer Facility

SSP	Space Shuttle Program
	Space Station Program (for use in document numbers only)
SSPCM	Space Station Program Change Memo
SSPF	Space Station Processing Facility
SSPO	Space Station Payloads Office
SSTF	Space Station Training Facility
SSV	Sequence Still Video
	Space Shuttle Vehicle
ST	**<TBD A-1>**
STL-B	Space Tissue Loss - B
STOW	Stowed
STP	Short-Term Plan
STS	Space Transportation System
S/W	Software
SYS	**<TBD A-1>**
T-	Time to launch minus
	Training minus
TBD	To Be Determined
TBR	To Be Resolved
TCMS	Test Checkout Monitoring System
TCP	Transmission Control Protocol
TCS	Thermal Control System
TDB	Telemetry Data Base
TDD	Team Definition Document
Temp.	Temperature
TGHR	Time-Critical Ground Handling Requirements
TLD	Thin Layer Dosimetry
T/M	Talk/Monitor
T-mm	Training minus months
TRDS	Technical Requirements Data Set
TreK	Telescience Resource Kit
TSC	Telescience Support Center
TST	Training Strategy Team
TV	Television
UDP	User Datagram Protocol
UIP	Utility Interface Panel
UIPT	Utilization Integrated Processing Team
ULC	Unpressurized Logistics Carrier
UMB	**<TBD A-1>**
UOP	Utility Output Panel
UPS	United Parcel Service
URC	User Requirements Collection
URL	Uniform Resource Locator
USDA	United States Department of Agriculture
USICU	U.S. International Checkout Unit

U.S.	United States
USA	United Space Alliance
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
USL	United States Laboratory
US LAB	United States Laboratory
USOC	United States Operations Center
U.S. PODFCB	U.S. Payload Operations Data File Control Board
UV	Ultraviolet
V	Volts
Vac	Volt Alternating Current
VCR	Video Cassette Recorder
VDC	Volts Direct Current
VDD	Version Description Document
VES	Vacuum Exhaust System
VHS	Video Home System
VMDB	Vehicle Master Database
Vol.	Volume
VRS	Vacuum Resource System
w/	with
WAD	Work Authorization Document
WILCO	Will Commit
WLP	Weekly Look-Ahead Plan
w/o	without
WORF	Window Observational Research Facility
WSSH	White Sands Space Harbor
Wt.	Weight
WWW	World Wide Web
Xcg	X-axis cg
Ycg	Y-axis cg
Zcg	Z-axis cg

APPENDIX B

GLOSSARY OF TERMS

APPENDIX B - GLOSSARY OF TERMS

APPENDIX C

OPEN WORK

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C.2 TO BE RESOLVED ISSUES C-4

TABLE

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C.2-1 TO BE RESOLVED ISSUES C-4

APPENDIX C - OPEN WORK

C.1 TO BE DETERMINED ITEMS

Table C.1-1 lists the specific To Be Determined (TBD) items in the document that are not yet known. The TBD is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBD item is numbered based on the section where the first occurrence of the item is located as the first digit and a consecutive number as the second digit (i.e., **<TBD 4-1>** is the first undetermined item assigned in Section 4 of the document). As each TBD is solved, the updated text is inserted in each place where that TBD appears in the document and the item is removed from this table. As new TBD items are assigned or existing TBD items are completed/deleted, they will be added to this list in accordance with the above described numbering scheme. Original TBDs will not be renumbered.

TABLE C.1-1 TO BE DETERMINED ITEMS

TBD	Section	Description
2-2	2.1, Table 7.4-1	To be provided by book manager.
2-3	2.2	Document number for User Training/Certification Plan.
2-4	2.2	Document number for Ground Malfunctions Book.
2-6	2.2	Document Number For SPDMS S/W I/F Document.
2-8	2.2	Document title for HOSC-SYS-2237.
6-2	2.2	Document number for the ISS Management Operations Support Plan.
6-3	2.2	Document number for Payload Regulations.
6-4	2.2	Document number for Payload Systems Manual.
7-4	8.3.2.1	The requirement location codes.
7-5	8.3.2.1	The Partialized (subset) Requirement Location codes.
7-6	8.3.2.1	Numbering system for caution numbers.
7-7	8.3.2.1	Numbering system for warning numbers.
12-1	12.0	Extravehicular Robotics.
A-1	Appendix A	Acronym definitions to be provided.
TBD	Tables D.4-1, D.4-3	To be provided by book manager.

C.2 TO BE RESOLVED ISSUES

Table C.2-1 lists unresolved issues within the document. The To Be Resolved (TBR) is inserted as a placeholder at the points within the document that are affected by the unresolved issue and is formatted in bold type within brackets. The TBR is numbered based on the applicable section of the document (where the TBR issue is located) as the first digit and a consecutive number as the second digit (i.e., **<TBR 4-1>** is the first unresolved issue assigned in Section 4 of the document). As each TBR is resolved, the updated text is inserted and the issue is removed from this table. As new TBR items are assigned or existing TBRs are resolved, original TBRs will not be renumbered.

TABLE C.2-1 TO BE RESOLVED ISSUES

TBR	Section	Description
7-1	Table 7.4-1	To be provided by book manager.

APPENDIX D

NON-CONFIGURATION-MANAGED OPTIONS LISTS AND SUPPLEMENTAL INFORMATION

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APPENDIX D - NON-CONFIGURATION MANAGED OPTIONS LISTS AND SUPPLEMENTAL INFORMATION

D.1 SHUTTLE PROCESSING DATA MANAGEMENT SYSTEM/OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATIONS EXAMPLES

Figure D.1-1 provides a sample of a typical Shuttle Processing Data Management System (SPDMS)/Operations and Maintenance Requirements Specification (OMRS) requirement layout and contents taken from H300 File VII, Vol. 2, Material Science Laboratory (MSL-1) OMRSD. Figure D.1-2 provides SPDMS/OMRS Field Descriptions and Locations.

H300 FILE VII VOL. 2 MATERIAL SCIENCE LABORATORY (MSL-1) OMRSD 21 JAN 1997.

```
H300PGB.000          ASTRO / PGBA                                                  A:N/A
                     ------------
H300PGBA.100**       ASTRO/PGBA INTERFACE VERIFICATION TEST          LV4           A:PLMSL1
               0-000                                                               B:
               0-001 PERFORM PER H010EXPT.030 FOR THE                PI & TASK LEADER C: R-1: TEST WILL BE PERFORMED WITH
               0-002 FOLLOWING INTERFACES:                           TO VERIFY        GSE SIMULATOR.
               0-003
H300PGBA.100-A 0-004 ASTRO/PGBA TO POWER/EXPRESS
               0-005
H300PGBA.100-B 0-006 ASTRO/PGBA TO DATA TRANSLATOR
               0-007
H300PGBA.100-C 0-008 POCC COMMAND PER H010EXPT.020
               0-009                                                               D:
               0-010                                                               REF:
H300PHA.000          PHYSICS OF HARD SPHERES                                       A:N/A
                     EXPERIMENT (PHaSE)
                     ----------------------
H300PHAM.100         PHASE SAMPLE MIXING                             LV4LV2LV1     A:PLMSL1
               0-000                                                               B:
               0-001 PERFORM SAMPLE MIXING                           SAMPLES MIXED C: C-1: THE SAMPLES MUST BE MIXED
               0-002                                                                   AT 14 DAY INTERVALS NOT TO EXCEED
               0-003                                                                   21 DAYS. SAMPLE MIXING MAY BE
               0-004                                                                   EXTENDED WITH MISSION MANAGER/PED
               0-005                                                                   APPROVAL.
               0-006
               0-007                                                                   C-2: SL POWER IS REQUIRED FOR FIRST
               0-008                                                                   MIX IN LEVEL I ONLY.
               0-009
               0-010                                                                   R-1: REQUIRES T-0 CONNECTIONS AND
               0-011                                                                   PED GSE FOR MIXING.
               0-012
               0-013                                                                   R-2: LAUNCH PAD MIX SHOULD BE AS CLOSE TO
               0-014                                                                   LAUNCH AS POSSIBLE (4-7 DAYS).
               0-015
               0-016                                                                   C-3: SAMPLE MIXING AT LV4 (ONE
               0-017                                                                   TIME ONLY) 50% POWER DUTY CYCLE FOR
               0-018                                                                   20 AND 1/2 HOURS.
               0-019
               0-020                                                                   R-3: SAMPLE MIXING FROM LVIII/II
               0-021                                                                   UP TO LAUNCH AT 50% DUTY CYCLE FOR
               0-022                                                                   10 AND 1/2 HOURS MIX DURATION.
               0-023
               0-024                                                                   D:
               0-025                                                                   REF:
H300PHAT.010**       PHaSE INTERFACE VERIFICATION TEST               LV4           A:PLMSL1
               0-000                                                               B:
               0-001 PERFORM PER H010EXPT.030 FOR THE                PI AND TASK   C: R-1: INTERFACE EXERCISED IN LEVEL IV
               0-002 FOLLOWING INTERFACES:                           LEADER TO VERIFY AND VERIFIED IN LEVEL III/II.
               0-003
H300PHAT.010-A 0-004 PHaSE/EXPRESS TO POWER INTERFACE
               0-005
H300PHAT.010-B 0-006 PHaSE TO DT14
               0-007
H300PHAT.010-C 0-008 HRM CHANNEL, DATA RATE AND
               0-009 FORMAT CHANNEL:
               0-010    7 HI                                         1.25 MBPS
               0-012    8 LO                                         51.2 KBPS
               0-013 (REF. R-1)
               0-014                                                               D:
               0-015                                                               REF: JA-1948; 1.7.2, 4.1, 9.2.1.2
               0-016                                                                  9.2.1.3, 9.2.5.2, 9.2.5.3,
               0-017                                                                  9.2.6.2, 9.2.6.3, 9.2.7.1,
               0-018                                                                  9.2.11.1
H300PHAT.020         DELETED
H300PHAT.030         PHASE EXTENDED LAUNCH DELAY                     LV1           A:PLMSL1;C
               0-000                                                               B: CONTINGENCY: LAUNCH MINUS 7 DAYS
               0-001                                                                  FROM LAST MIX OR BEFORE NEXT LAUNCH.
               0-002 VERIFY SAMPLE MIXING IS                                       C:
               0-003 PERFORMED VIA T-0
               0-004                                                               D:
               0-005                                                               REF:
H300PHAT.040         PHASE LEAK CHECK                                LV4           A:PLMSL1
               0-000                                                               B:
               0-001 PERFORM PHASE TO EXPRESS                        MAX ALLOWABLE C: R-1: USE PRESSURIZED GHE LEAK CHECK
               0-002 RACK LEAK CHECK                                 LEAK RATE PER    METHOD.
               0-003                                                 JOINT 5.5X10-5
               0-004                                                 SCCS GHE AT
               0-005                                                 90 +/-5 PSIA
               0-006                                                               D:
               0-007                                                               REF:
```

FIGURE D.1-1 SAMPLE SHUTTLE PROCESSING DATA MANAGEMENT SYSTEM/OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION LAYOUT AND CONTENTS (PAGE 1 OF 2)

```
H300PHAT.100          PHASE SOFTWARE UPDATE VERIFICATION TEST          LV4                A:PLMSL1
               0-000                                                                       B:
               0-001 PERFORM LOAD AND VERIFICATION OF NEW             PI AND TASK        C: R-1: PI/PED TO FURNISH NEW
               0-002 EXPERIMENT PARAMETERS                            LEADER TO VERIFY      TESTING INFORMATION
               0-003                                                  EXP. PARAMETERS
               0-004
               0-005                                                                       D:
               0-006                                                                       REF:

H300QSM.000           QUASI-STEADY ACCELERATION                                           A:N/A
                      MEASUREMENT (QSAM)
                      -------------------------

H300QSMT.100          QSAM POSITION MEASUREMENT                        LV2                A:PLMSL1
               0-000                                                                       B:
               0-001 PERFORM QSAM ALIGNMENT MEASUREMENT               +/-.10 INCHES      C: R-1: LOCATION IS L4R.
               0-002 TO SPACELAB COORDINATE SYSTEM IN
               0-003 X, Y, AND Z COORDINATES
               0-004
               0-005                                                                       D:
               0-006                                                                       REF:

H300QSMT.120**        QSAM INTERFACE VERIFICATION TEST                 LV4                A:PLMSL1
               0-000                                                                       B:
               0-001 PERFORM PER H010EXPT.030 FOR THE                 PI AND TASK        C:
               0-002 FOLLOWING INTERFACES:                            LEADER TO VERIFY
               0-003
H300QSMT.120-A 0-004 QSAM TO POWER INTERFACE
               0-005
               0-006
H300QSMT.120-B 0-007 QSAM TO RAU
               0-008
               0-009
H300QSMT.120-C 0-010 PERFORM DEP OPERATIONS
               0-011 PER H010IPLT.250
               0-012                                                                       D:
               0-013                                                                       REF: JA-1948; 1.7.2, 4.1, 9.2.1.2,
               0-014                                                                            9.2.1.3, 9.2.5.2, 9.2.5.3,
               0-015                                                                            9.2.6.2, 9.2.6.3, 9.2.7.1,
               0-016                                                                            9.2.11.1

H300SAM.000           SPACE ACCELERATION MEASUREMENT SYSTEM                               A:N/A
                      -------------------------------------

H300SAMT.300**        SAMS INTERFACE VERIFICATION TEST                 LV2                A:PLMSL1
               0-000                                                                       B:
               0-001 PERFORM PER H010EXPT.030 FOR                     PI AND TASK        C: R-1: THIS REQUIREMENT WILL BE
               0-002 THE FOLLOWING INTERFACES:                        LEADER TO VERIFY      PERFORMED IN LEVEL IV BUT WILL BE
               0-003                                                                       VERIFIED DURING III/II TESTING.
H300SAMT.300-A 0-004 SAMS TO POWER INTERFACE
               0-005 (REF. R-1)                                                            R-2: THIS INTERFACE WILL BE
               0-006                                                                       EXERCISED DURING LEVEL III/II AND
H300SAMT.300-B 0-007 SAMS TO MTU                                                           LEVEL IV, BUT VERIFIED IN LEVEL I.
               0-008 (REF. R-2)
               0-009
H300SAMT.300-C 0-010 HRM CHANNEL, DATA RATE, AND                      25.6 KBPS
               0-011 FORMAT CHANNEL 9
               0-012 (REF. R-1)
               0-013
H300SAMT.300-D 0-014 RAU
               0-015                                                                       D:
               0-016                                                                       REF: JA-1948; 1.7.2, 4.1, 9.2.1.2,
               0-017                                                                            9.2.1.3, 9.2.5.2, 9.2.5.3,
               0-018                                                                            9.2.6.2, 9.2.6.3, 9.2.7.1,
               0-019                                                                            9.2.11.1

H300SAMT.330          SAMS ALIGNMENT                                   LV2                A:PLMSL1
               0-000                                                                       B:
               0-001 DETERMINE THE XYZ COORDINATES OF                 TOLERANCE          C: R-1: REFERENCE POINTS WILL BE
               0-002 THREE REFERENCE POINTS IN THE S/L                +/-.10 IN             USED TO DETERMINE LOCATION OF SAMS
               0-003 MODULE AS SPECIFIED BY MSFC                                            TRIAXIAL SENSOR HEADS.
               0-004                                                                       D:
               0-005                                                                       REF:
```

FIGURE D.1-1 SAMPLE SHUTTLE PROCESSING DATA MANAGEMENT SYSTEM/OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION FIELD DESCRIPTIONS AND LOCATIONS (PAGE 2 OF 2)

D.2 SAMPLE REQUIREMENTS CHANGE FORM

Figure D.2-1 depicts a sample Requirements Change Notice (RCN) form.

REQUIREMENTS CHANGE NOTICE (RCN) COMMENT RETURN FORM
****** REVIEW STATUS******

RCN NUMBER MP04760 **OMRS FILE F2-V2** **MISSION STS-094**

RCN TITLE P430 - ADD MSL-1R EFFECT FERRY FLT PURGE

PAYLOAD MSL-1R **RCN PRINT DATE 05/14/97**

(X) REVIEW THE ATTACHED RCN AND RETURN THIS SHEET WITH YOUR REDLINES AND SIGNATURE.

TO: ROSS NORDEEN / BE-B2 **PHONE: 867-3692** **BY: 05/15/97**

***NOTE: WHEN THE RCN STATUS IS "REVIEW, COMBINED CS-NASA AND MDSS-KSC SIGNATURES AND/OR COMMENTS ARE REQUIRED.**

( ) CHECK RESPONSES AS REQUIRED AND PROVIDE APPROPRIATE RATIONALE.

CONCURRENCE

( ) CONCUR
( ) NONCONCUR
( ) CONCUR WITH COMMENTS
( ) CONCUR WITH IMPACT
( ) CONCUR WITH COMMENTS AND IMPACT

IMPACTS

( ) MANPOWER_____MANHOURS

( ) SCHEDULE (IDENTIFY MILESTONE IMPACTED)_____
( ) DOLLARS_____

( ) NOT APPLICABLE

MDSS-KSC _____PRINT_____DATE _____MAIL STOP_____

NASA _____PRINT_____DATE_____MAIL STOP_____

FIGURE D.2-1 SAMPLE REQUIREMENTS CHANGE NOTICE (PAGE 1 OF 3)

```
                                                                     REVIEW
-----------------------------------------------------------------------------------------------------------------------
]                  ]                     REQUIREMENTS  CHANGE  NOTICE                 ] INTERNAL PROJ. CONT. NO.           ]
] RCN NO: MP04760  ]     TITLE: P430 - ADD MSL-1R EFFECT FERRY FLT PURGE              ]   NUM2                             ]
]------------------]------------------------------------------------------------------]------------------------------------]
] OMRS FILE NO: II ]OMRS SUB-  ] OMRS             ] OMRS              ] CAT: M      ] RELATED PCIN/ECP/RCN/EO NUMBER     ]
] OMRS VOLUME : II ]SYSTEM:    ] BASELINE:        ] PAYLOAD:          ] STS: 094    ]                                    ]
]                  ]           ]                  ]                   ]             ]               NUM9                 ]
]------------------]-------------------------------------------------------------------------------------------------------]
]NUMBER       ]    ]       DESCRIPTION                  ]MEAS/STIMU]  SPECIFICATION   ]  INTERVALS/CONSTRAINTS/REMARKS     ]
]------------------------------------------------------------------------------------------------------------------------]
]PRESENT                                                                                                                  ]

P430AA.030        PAYLOAD BAY FERRY FLIGHT PURGE                  ORB                A:PLM;C
          0-000                                                                      B: CONTINGENCY: FOR FERRY FLIGHT
          0-001                                                                         OVERNIGHT STOPOVERS IF SL HAS A
          0-002                                                                         SERVICED WATER LOOP AND AMBIENT
          0-003                                                                         AIR TEMPERATURE IS LESS THAN
          0-004                                                                         50 DEG. F.
          0-005   PROVIDE CONDITIONED AIR PURGE OF                                   C: C-1: FOR A PLANNED OVERNIGHT STOP-
          0-006   PAYLOAD BAY THRU T-O UMB FOR SCA                                      OVER, A PURGE SHALL BE PROVIDED
          0-007   OVERNIGHT STOPOVER                                                    WITHIN 2 HOURS OF LANDING AND
          0-008                                                                         MAINTAINED AS LATE AS POSSIBLE
          0-009                                                                         PRIOR TO SCA TAKE OFF, WHILE
          0-010                                                                         AMBIENT AIR TEMPERATURE IS LESS
          0-011                                                                         THAN 50 DEG. F.
          0-012
          0-013     FLOW RATE                                     100-180 LBS/MIN       R-1: FOR AN UNPLANNED STOPOVER,
          0-014                                                                         A PURGE WILL BE PROVIDED TO THE
          0-015     TEMPERATURE                                   70 +/- 10 DEG. F      PAYLOAD BAY ON A BEST EFFORT BASIS.
          0-016
          0-017                                                                         CAUTION: AN AMBIENT TEMPERATURE
          0-018                                                                         BELOW 32 DEG. F MAY CAUSE DAMAGE
          0-019                                                                         TO FLIGHT HARDWARE IF THE PURGE
          0-020                                                                         IS NOT PROVIDED.
          0-021
          0-022     HUMIDITY                                      </= 54 GRAINS         R-2: UNPLANNED PURGE INTERRUPTION
          0-023                                                   H2O/LB DRY AIR        TIME NOT TO EXCEED 90 MIN.
          0-024                                                   OR 50 DEG. F
          0-025                                                   MAX DEW POINT
          0-026
          0-027     CLEANLINESS CLASS                             CLASS 5000,
          0-028                                                   15 PPM MAX
          0-029                                                   HYDROCARBON
          0-030                                                                      D:
          0-031                                                                      REF:  SL CRIT:  N/A
          0-032                                                                            MDC H0399, SL HAZARD: N/A
```


```
                                                                     REVIEW
-----------------------------------------------------------------------------------------------------------------------
]                  ]                     REQUIREMENTS  CHANGE  NOTICE                 ] INTERNAL PROJ. CONT. NO.           ]
] RCN NO: MP04760  ]     TITLE: P430 - ADD MSL-1R EFFECT FERRY FLT PURGE              ]   NUM2                             ]
]------------------]------------------------------------------------------------------]------------------------------------]
] OMRS FILE NO: II ]OMRS SUB-  ] OMRS             ] OMRS              ] CAT: M      ] RELATED PCIN/ECP/RCN/EO NUMBER     ]
] OMRS VOLUME : II ]SYSTEM:    ] BASELINE:        ] PAYLOAD:          ] STS: 094    ]                                    ]
]                  ]           ]                  ]                   ]             ]               NUM9                 ]
]------------------]-------------------------------------------------------------------------------------------------------]
]NUMBER       ]    ]       DESCRIPTION                  ]MEAS/STIMU]  SPECIFICATION   ]  INTERVALS/CONSTRAINTS/REMARKS     ]
]------------------------------------------------------------------------------------------------------------------------]
]PRESENT                                                                                                                  ]

P430AA.030        PAYLOAD BAY FERRY FLIGHT PURGE                  ORB                A:PLM;C
          0-000                                                                      B: CONTINGENCY: FOR FERRY FLIGHT
          0-001                                                                         OVERNIGHT STOPOVERS IF SL HAS A
          0-002                                                                         SERVICED WATER LOOP AND AMBIENT
          0-003                                                                         AIR TEMPERATURE IS LESS THAN
          0-004                                                                         50 DEG. F.
          0-005   PROVIDE CONDITIONED AIR PURGE OF                                   C: C-1: FOR A PLANNED OVERNIGHT STOP-
          0-006   PAYLOAD BAY THRU T-O UMB FOR SCA                                      OVER, A PURGE SHALL BE PROVIDED
          0-007   OVERNIGHT STOPOVER                                                    WITHIN 2 HOURS OF LANDING AND
          0-008                                                                         MAINTAINED AS LATE AS POSSIBLE
          0-009                                                                         PRIOR TO SCA TAKE OFF, WHILE
          0-010                                                                         AMBIENT AIR TEMPERATURE IS LESS
          0-011                                                                         THAN 50 DEG. F.
          0-012
          0-013     FLOW RATE                                     100-180 LBS/MIN       R-1: FOR AN UNPLANNED STOPOVER,
          0-014                                                                         A PURGE WILL BE PROVIDED TO THE
          0-015     TEMPERATURE                                   70 +/- 10 DEG. F      PAYLOAD BAY ON A BEST EFFORT BASIS.
          0-016
          0-017                                                                         CAUTION: AN AMBIENT TEMPERATURE
          0-018                                                                         BELOW 32 DEG. F MAY CAUSE DAMAGE
          0-019                                                                         TO FLIGHT HARDWARE IF THE PURGE
          0-020                                                                         IS NOT PROVIDED.
          0-021
          0-022     HUMIDITY                                      </= 54 GRAINS         R-2: UNPLANNED PURGE INTERRUPTION
          0-023                                                   H2O/LB DRY AIR        TIME NOT TO EXCEED 90 MIN.
          0-024                                                   OR 50 DEG. F
          0-025                                                   MAX DEW POINT
          0-026
          0-027     CLEANLINESS CLASS                             CLASS 5000,
          0-028                                                   15 PPM MAX
          0-029                                                   HYDROCARBON
          0-030                                                                      D:
          0-031                                                                      REF:  SL CRIT:  N/A
          0-032                                                                            MDC H0399, SL HAZARD: N/A
```


FIGURE D.2-1 SAMPLE REQUIREMENTS CHANGE NOTICE (PAGE 2 OF 3)

```
-----------------------------------------------------------------------------------------------------------------------
]  NAME                    ] DATE   ] RESPONSE                ]  JUSTIFICATION:                                          ]
]-------------------------]--------]-------------------------]-----------------------------------------------------------]
]NAM1                      ]        ] RES1                    ]  TO ADD EFFECTIVITY CODE TO APPLICABLE REQUIREMENT TO SUPPORT      ]
]-------------------------]--------]-------------------------]   MSL-1 REFLIGHT.                                          ]
]NAM2                      ]        ] RES2                    ]                                                            ]
]-------------------------]--------]-------------------------]                                                            ]
]NAM3                      ]        ] RES3                    ]                                                            ]
]-------------------------]--------]-------------------------]                                                            ]
]NAM4                      ]        ] RES4                    ]                                                            ]
]-------------------------]--------]-------------------------]                                                            ]
]NAM5                      ]        ] RES5                    ]                                                            ]
]-----------------------------------------------------------]                                                            ]
] REQUESTED BY: D. NADROTOWSKI/MDA-HSV/05-13-97/(205)922-4585 ]                                                            ]
] APPROVED BY:  DATE/APPROVAL NUMBER                          ]                                                            ]
] LEVEL II      SYM6                                          ]                                                            ]
] LEVEL III     SYM7                                          ]                                                            ]
]                                                             ]  RCN IMPACT:                                               ]
]                                                             ]  INVALIDATES CIL RETENTION RATIONALE      _____ YES   __X__ NO     ]
]                                                             ]  INVALIDATES HAZARD CONTROLS              _____ YES   __X__ NO     ]
]                                                             ]  VIOLATES MVP                             _____ YES   __X__ NO     ]
]                                                             ]                                                            ]
]                                                             ]  RATIONALE FOR INVALIDATION OF CIL RETENTION RATIONALE, HAZARD     ]
]                                                             ]  CONTROLS OR MVP VIOLATIONS...                             ]
-----------------------------------------------------------------------------------------------------------------------

                    -- SUBMIT ALL IMPACT STATEMENTS AS OFFICIAL COMMENTS VIA THE RCN COMMENTS SCREEN --

05-13-97       TITLE:  P430 - ADD MSL-1R EFFECT FERRY FLT PURGE     SOURCE:  MARY DUNCAN/(205)922-7011/CRS 8481E

-----------------------------------------------------------------------------------------------------------------------
]  NAME                    ] DATE   ] RESPONSE                ]  JUSTIFICATION:                                          ]
]-------------------------]--------]-------------------------]-----------------------------------------------------------]
]NAM1                      ]        ] RES1                    ]  TO ADD EFFECTIVITY CODE TO APPLICABLE REQUIREMENT TO SUPPORT      ]
]-------------------------]--------]-------------------------]   MSL-1 REFLIGHT.                                          ]
]NAM2                      ]        ] RES2                    ]                                                            ]
]-------------------------]--------]-------------------------]                                                            ]
]NAM3                      ]        ] RES3                    ]                                                            ]
]-------------------------]--------]-------------------------]                                                            ]
]NAM4                      ]        ] RES4                    ]                                                            ]
]-------------------------]--------]-------------------------]                                                            ]
]NAM5                      ]        ] RES5                    ]                                                            ]
]-----------------------------------------------------------]                                                            ]
] REQUESTED BY: D. NADROTOWSKI/MDA-HSV/05-13-97/(205)922-4585 ]                                                            ]
] APPROVED BY:  DATE/APPROVAL NUMBER                          ]                                                            ]
] LEVEL II      SYM6                                          ]                                                            ]
] LEVEL III     SYM7                                          ]                                                            ]
]                                                             ]  RCN IMPACT:                                               ]
]                                                             ]  INVALIDATES CIL RETENTION RATIONALE      _____ YES   __X__ NO     ]
]                                                             ]  INVALIDATES HAZARD CONTROLS              _____ YES   __X__ NO     ]
]                                                             ]  VIOLATES MVP                             _____ YES   __X__ NO     ]
]                                                             ]                                                            ]
]                                                             ]  RATIONALE FOR INVALIDATION OF CIL RETENTION RATIONALE, HAZARD     ]
]                                                             ]  CONTROLS OR MVP VIOLATIONS...                             ]
-----------------------------------------------------------------------------------------------------------------------

                    -- SUBMIT ALL IMPACT STATEMENTS AS OFFICIAL COMMENTS VIA THE RCN COMMENTS SCREEN --

05-13-97       TITLE:  P430 - ADD MSL-1R EFFECT FERRY FLT PURGE     SOURCE:  MARY DUNCAN/(205)922-7011/CRS 8481E
```

FIGURE D.2-1 SAMPLE REQUIREMENTS CHANGE NOTICE (PAGE 3 OF 3)

D.3 SAMPLE REQUIREMENTS ALLOCATION MATRIX FORM

Figure D.3-1 depicts a same Requirements Allocation Matrix (RAM) form.

DATE: 1997/05/19 **SPDMS - OMRS FLOW PLANNING Mission OMP Report** **PAGE: 1**

TIME: 17:09:58 **OMP: 2914 STS: 094 STS094 RAM** **CLOSURE SY:** **KMR:** **PROGRAM: OMRPR44**

OMRS NO	CRIT	OMRS TITLE	OMP	WAD NO	RVCH	SEQSTEP	RN	KMR	LD	SYS	ST	R	CLS DATE	REMARKS
H300CMIT.150		CM-1 HEALTH & STATUS CHECK	2918	EP-MSL-1R-EXP-CM-1-T102		10-065	1	5O		PAY	C	A	5/9/97	
H300CM1M.020		CM-1 FSP PRESSURE CHECK	2918	EP-MSL-01R-EXP-CM-1-T102		09-041	1	5O		PAY	C	A	5/9/97	
H300CM1M.100-A		INSTALL AND TORQUE EP CHAMBER	2918	EP-MSL-01R-EXP-CM-1-T100		01-011	1	5O		PAY	C	A	4/24/97	
H300CM1M.100-B		REMOVE 3 DPP CARDS AND INSTAL	2918	EP-MSL-01R-EXP-CM-1-T100		02-026	1	5O		PAY	C	A	4/24/97	
H300CM1M.100-C		INSTALL LAUNCH DDR	2918	EP-MSL-01R-EXP-CM-1-T100		03-004	1	5O		PAY	C	A	4/24/97	
H300CM1M.100-D		INSTALL (4) FLIGHT DUMMY VCR	2918	EP-MSL-01R-EXP-CM-1-T100		04-006	1	5O		PAY	C	A	4/24/97	
H300CM1M.150		CM-1 CHAMBER CLEANING	2918	TBD		TBD-TBD	1	99		PAY	O	A		
H300DCET.150		DCE HEALTH AND STATUS CHECK	2918	EP-MSL-01R-EXP-DCE-T102		07-073	1	5O		PAY	C	A	5/12/97	
H300DTVT.020-A		HI-PAC TO POWER	2918	EP-MSL-01R0EXP-HDTV-T100		02-010	1	5O		PAY	C	A	5/9/97	
H300DTVT.020-B		HI-PAC TO RAU	2918	EP-MSL-01R-EXP-HDTV-T100		02-010	1	5O		PAY	C	A	5/9/97	
H300DTVT.020-C		HEALTH CHECK	2918	EP-MSL-01R-EXP-HDTV-T100		02-049	1	5O		PAY	C	A	5/9/97	
H300EXPM.100		RACK STRUCTURE INSPECTION	2918	SL-MSL-01R-EXPRESS-T100		02-001	1	5O		PAY	C	A	4/22/97	
H300EXPT.100		EXPRESS HEALTH AND STATUS CHE	2918	EP-MSL-01REXP-EXPRESS-T102		03-027	1	5O		PAY	C	A	5/8/97	
H300GENC.010		SEPARATED INTERFACES	2918	TBD		TBD-TBD	1	99		TBD	O	C		
H300IPLT.350		OPF MODULE STOW	2918	P9403		16-001	1	5O		PAY	O	A		
H300IPLT.580		EXPERIMENT CLOSEOUT SWITCH LI	2918	L0304		07-028	1	5O		PAY	O	A		
H300IPLT.580		EXPERIMENT CLOSEOUT SWITCH LI	2918	L0304		07-030	1	5O		PAY	O	A		

FIGURE D.3-1 SAMPLE REQUIREMENTS ALLOCATION MATRIX

```
:-------------------------------------------------------------------------------------------------------------------------------:
:----------:-------:-------------------------------------:----------:-------------------:-------------------------------------:
:                    REQUIREMENT                           :          :                   :                                     :
:-------------------------------------------------------:MEAS/STIMU:   SPECIFICATION   :   INTERVALS/CONSTRAINTS/REMARKS     :
: NUMBER    :  REV  :           DESCRIPTION               :          :                   :                                     :
:----------:-------:-------------------------------------:----------:-------------------:-------------------------------------:
PXXXAB.XXX(A)   (I)  REQUIREMENT TITLE(B)                                LOCATION(D)         A: EFFECTIVITY CODE(J)
               0-000                                                                        B: EFFECTIVITY CODE WORDS(K)
               0-001 REQUIREMENT DESCRIPTION(C)                                             C:
               0-002                                                                        CONSTRAINTS(0&P),REMARKS(Q&R),CAUTIONS
(S&T),WARNINGS(U&V)
               0-003 MEAS/STIM DESCRIPTION(L)                MEAS/STIM(M)  SPECIFICATION(N)
               0-004                                                                        D: SOURCE(W)
               0-005                                                                        REF: REFERENCE(X)


PXXXBA.XXX**(A) (I)  REQUIREMENT TITLE(B)                                LOCATION(D)         A: EFFECTIVITY CODE(J)
               0-000                                                                        B: EFFECTIVITY CODE WORDS(K)
               0-001 REQUIREMENT DESCRIPTION(C)                                             C:
               0-002                                                                        CONSTRAINTS(0&P),REMARKS(Q&R),CAUTIONS
(S&T),WARNINGS(U&V)
               0-003
PXXXBA.XXC-A(E)0-004 PARTIAL TITLE(F)     LOCATION(G)
               0-005
               0-006 PARTIAL DESCRIPTION (IF NECESSARY)(H)
               0-007
               0-008 PARTIAL MEAS/STIM DESCRIPTION(L)        MEAS/STIM(M)  SPECIFICATION(N)
               0-009
PXXXBA.XXX-B   0-010 PARTIAL TITLE    LOCATION(G)
               0-011
               0-012 PARTIAL DESCRIPTION (IF NECESSARY)(H)
               0-013
               0-014 PARTIAL MEAS/STIM DESCRIPTION(L)        MEAS/STIM(M)  SPECIFICATION(N)
               0-015
               0-016                                                                        D: SOURCE(W)
               0-017                                                                        REF: REFERENCE(X)
```

NOTE: PDL inputs in bold.

FIGURE D.3-2 PAYLOAD DATA LIBRARY INPUT FIELDS LOCATION WITHIN THE OPERATIONS AND MAINTENANCE REQUIREMENTS SPECIFICATION FLIGHT PRODUCT

Date: 07/15/99

Original Signed by Len Landers on 7/15/99
USA OMRSD Project Manager

No.	ITEM	MAX POWER INTERRUPTS (28 ± 4 VDC)	ORIENTATION CONSTRAINTS	LATE STOW < L- (HR)	LAUNCH DELAY (HRS/DAYS)	EARLY DESTOW			APPROVAL
						KSC	DFRC	EEOM	
Payload Requirements									
P1	GOSAMR (Aerogel) (h)	None	None	36 hrs	72 hrs	Runway	Runway	MET > 48 hrs KSC-only best effort-DFRC	Revision B 7/8/99
P2	PGIM	15 min max (j)	Door-down	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs best effort	Revision A 6/14/99
P3	PGIM Hardware	None	Door-down preflight Door-up post-flight	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs best effort	Basic 3/1/99
P4	STL-B	15 min max	None	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs	Basic 3/1/99
P5	CCM-C	15 min max	None	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs KSC-only best effort-DFRC	Basic 3/1/99
P6	MEMS	None	None	None (c)	6 Days	Runway	Runway	None	Basic 3/1/99
P7	CGBA (NIH-B)	15 min max	None	24 hrs	48 hrs (d)	Runway	Runway	None	Basic 3/1/99
P8	CGBA (Tissue)	15 min max	None	24 hrs	48 hrs (d)	Runway	Runway	None	Basic 3/1/99

FIGURE D.3-3 SAMPLE TIME-CRITICAL GROUND HANDLING REQUIREMENTS TABLE FLIGHT PRODUCT

D.4 SAMPLE SUPPORT REQUIREMENTS

Tables D.4-1 through D.4-5 depict sample Support Requirements.

TABLE D.4-1 FACILITY SUPPORT REQUIREMENTS

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
Offline Processing													
PRACTICE-BB-A-11-K-K-5600-001	General Laboratory	Lab with sink, two tables, six chairs, phone and Ethernet connection.	500	Sq ft	Offline	14 days	1 day	For Bonner Ball team	WILCO		SAT 5600 T1K	SSPF	1477
PRACTICE-UD-A-11-K-K-5600-002	Photo Laboratory	Photo Lab for loading light-sensitive bioreactors. Should have sink, two tables, six chairs, phone and Ethernet connection.	250	Sq ft	Offline	7 days	1 day	University of Dusseldorf team	WILCO		SAT 5600 T2K	SSPF	1407B
Online Processing													
PRACTICE-FR-A-12-K-F-5600-001	Processing Area	Space in I-Bay near USICU for GSE and test equipment	100	Sq ft	Online	120 days	110 days	For HRF rack	WILCO	Coordinate with Utilization	SAT 5600 T2K	SSPF	I-Bay
Support Areas													
PRACTICE-UA-A-13-K-K-5600-001	Control Room	Space in control room to support payload IVT	4	Occu.	Online	1 day	0 day	Can share 2 consoles	TBD		KRS 5600 K1K	SSPF	User Room 7
PRACTICE-WL-A-13-K-K-5600-001	Office space	Office space with access to fax machine, phone, computer, printer	6	Occu.	Offline	14 days	1 day		WILCO	Can use JSC Resident Office	KPRD	SSPF	
Storage (Flight Hardware, GSE, Special Test Equipment)													
PRACTICE-AS-A-14-K-F-5307-001	Storage, shipping container	Air-conditioned environment for 2 containers, 36x36x36 in and 60 lbs each	2	Items	Offline	120 days	1 day	Will need access during FCU test	WILCO		SAQ 5307 T1K		
Electrical Power													
PRACTICE-FR-A-15-K-F-5600-	Power, 120 V facility	Two 30A 120V lines	2	Recept.	Offline	120 days	110 days	Near GSE in I-Bay	WILCO		SAT 5600 T2K	SSPF	I-Bay
PRACTICE-00-A-15-K-K-5600-	28 VDC bench power supplies	Standard 6 to 7.5A, to support pre-flight activities.	1	Each	Offline	7 days	1 day		WILCO		SAT 5305 T1K	SSPF	1495

TABLE D.4-2 KSC GSE/SPECIAL TEST/LAB EQUIPMENT SUPPORT REQUIREMENTS

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
KSC GSE and Special Test/Lab Equipment													
PRACTICE-AR-A-22-K-K-5309-001	Microscope	Stereo dissecting microscope, x10 eyepiece	1	Item	Offline	14 days	1 day	For Ames Research team	WILCO	Will borrow from Hangar L	SAT 5309 T2K	O&C	1295
PRACTICE-UA-A-22-K-F-5309-002	Scale	Capable of weighing up to 25 lbs, with .1 lb accuracy	1	Each	Offline	14 days	1 day		WILCO		SAT 5309 T1K	SSPF	1477
PRACTICE-UA-A-22-K-F-5341-003	Forklift	Capacity 500 lbs	1	Each	Offline	120 days	110 days		WILCO		KPRD		
PRACTICE-UA-A-22-K-F-6000-004	Printer	One dedicated printer needed to support PRCU video testing. Jan 15-19, 2001.	1	Item	Online	110 days	100 days		WILCO	From ODIN support	KPRD	SSPF	1495

TABLE D.4-3 DRY CHEMICALS, LIQUIDS, AND GASES SUPPORT REQUIREMENTS

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
PRACTICE-AR-A-31-K-K-5310-001	Dry Ice	For science team.	4	Lbs.	Offline	14 days	1 day	For Ames Research team	WILCO		SAT 5310 T1K	O&C	1295
PRACTICE-UA-A-31-K-F-5310-002	GN_2	One K-bottle, 99.995 ultra-high purity, Grade C	1	K-bottle	Offline	120 days	110 days		WILCO		SAT 5310 T2K	SSPF	1477
PRACTICE-UA-A-31-K-F-5310-003	Liquid Nitrogen	One dewar, medical grade	1	Dewar	Offline	7 days	R+1 day		WILCO		SAT 5310 T3K	SSPF	1495
PRACTICE-GS-D-31-K-F-5310-004	Deionized water	2 Mohm Res. For post-flight processing of plant growth samples	5	Gallon	Offline	R+0 days	R+2 days		WILCO		SAT 5310 T4K	SSPF	1407
PRACTICE-AR-A-31-K-K-GSRD-005	Embedding Kit	Eponate 12-Araldite 502 kit. Includes: Eponate, Araldite, DSA, DMP30. Ted Pella 18030.	3	Each	Offline	7 days	1 day	No substitutes.	TBD	Need vendor information.	TBD	LSSF	

TABLE D.4-4 REUSABLE AND EXPENDABLE SUPPLY SUPPORT REQUIREMENTS

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
PRACTICE-00-A-41-K-K-6000-001	Lint-free wipes	For wiping down flight hardware.	1	Box	Offline	14 days	1 day		WILCO		KPRD	O&C	1295
PRACTICE-UA-A-41-K-F-6000-002	Cleanroom garments	Five medium, four large, two small	11	Items	Offline	7 days	1 da		WILCO		SAT 6000 T1K	SSPF	1477
PRACTICE-UA-A-41-K-F-6000-003	Tacky mat	At entrance to offline lab	1	Item	Offline	7 days	R+1 day		WILCO		SAT 5600 T3K	SSPF	1495
PRACTICE-GS-D-41-K-F-5310-004	Isopropyl alcohol	Squeeze bottle, prefer 80/20 alcohol/water	1	Liter	Offline	7 days	1 day		WILCO		SAT 5310 T5K	SSPF	1407

TABLE D.4-5 GENERAL SERVICES SUPPORT REQUIREMENTS (PAGE 1 OF 3)

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
Communications (Including OIS-D)													
PRACTICE-00-A-51-K-K-2700-001	Voice channel (dedicated)	Provide 3 MSG-dedicated OIS payload channels between PRCU/PTCS and User Room(s).	3	Each	Online	120 days	110 days		WILCO		SAT 2700 T1K		
PRACTICE-00-A-51-K-F-2700-002	Headsets	To support 6 personnel during testing	6	Each	Onlline	120 days	110 days		WILCO		SAT 2700 T2K		
Hazardous Disposal, Storage and Handling													
PRACTICE-AR-A-52-K-K-5307-001	Biohazard boxes	Provide biohazard boxes and bags for hazardous waste disposal in the offline lab	8	Each	Offline	14 days	1 day		WILCO		SAT 5307 T1K	O&C	1295
PRACTICE-AR-A-52-K-K-5307-002	Liquid chemical waste disposal	From experiment vacuum pump during pre-flight processing	N/A	N/A	Offline	14 days	3 days		WILCO	Customer must comply w/KHB 8800.7C	SAT 5307 T2K	O&C	1295
PRACTICE-AR-A-52-K-K-5307-003	Sharps containers	Provide sharps containers	1	Each	Offline	14 days	3 days		WILCO		SAT 5307 T3K	O&C	1295

TABLE D.4-5 GENERAL SERVICES SUPPORT REQUIREMENTS (PAGE 2 OF 3)

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
Payload Data Routing and Recording													
PRACTICE-00-A-53-K-K-2770-001	Data recording	Record data produced during on-line testing of the MSG facility and sub-rack payloads in a format compatible (PDSS Data Tape) with the MSFC POIC.	N/A	N/A	Online	120 days	110 days		WILCO		SAT 2770 T1K		
PRACTICE-00-A-53-K-K-2770-002	Video recording	Video recording of installation into MPLM – VHS format tape	N/A	N/A	Online	120 days	110 days		WILCO		SAT 2770 T2K		
PRACTICE-00-A-53-K-K-2736-003	Data circuit	Provide data between PTCS and User Room for composite data stream output containing LDRL (MIL-STD-1553B) output.	1	Each	Online	120 days	110 days		WILCO		SAT 2736 T1K		
Unescorted Access and Training Requirements													
PRACTICE-00-A-54-K-K-3450-001	KSC Online Areas	Unescorted access to SSPF I-Bay for FCU testing	4	Persons	Online	120 days	110 days		WILCO	Must complete training	KPRD		
PRACTICE-00-A-54-K-K-3450-002	OIS-D	Training for test team to participate in IVT w/Orbiter	2	Persons	Online	2 days	1 day		WILCO	Must complete training	KPRD		
PRACTICE-00-A-54-K-K-3450-003	OPF/PAD	Unescorted access to OPF and PAD	2	Persons	Online	7 days	1 day		NOWLCO	Not required for this p/l			

TABLE D.4-5 GENERAL SERVICES SUPPORT REQUIREMENTS (PAGE 3 OF 3)

Requirement Number	Requirement	Specifications	Quantity	Units	Processing Activity	L minus From	L minus To	Comments	KSC Commit	KSC Commit Information	KSC Commit Source	Facility	Room
Photographic and Video Support													
PRACTICE-00-A-55-K-K-3100-001	Photography-digital	Provide photography of final hardware configuration before turnover – cd w/JPEG files	1	Set	Offline	2 days	1 day		WILCO		SAT 3100 T1K		
PRACTICE-00-A-55-K-K-3100-002	Photography-35 mm	Provide photographs of each flight stowage container which has MSG or MSG investigation hardware after bench review.	4	Sets	Online	60 days	50 days	Provide contact sheets to MSFC Resident Office.	WILCO		SAT 3100 T2K		
Technical Support													
PRACTICE-00-A-56-K-K-5300-001	Quality support	For hardware turnover and testing	1	N/A	Offline	7 days	2 days		WILCO	To be scheduled	SAT 5300 T1K	O&C	1295
PRACTICE-HR-A-56-K-K-3500-002	Medical Monitoring	Provide Medical Monitoring Level 3 for pre-flight off-line functionals and post-flight BDC testing for H-Reflex	N/A	N/A	Offline	7 days	R+1 day	On-call support	WILCO	To be scheduled	SAT 3500 T1K	SSPF	1477
PRACTICE-BB-A-56-K-K-6010-002	Calibration	Provide calibration services for test instrumentation	N/A	N/A	Offline	110 days	100 days	If necessary	WILCO	Up to 10 requests	KPRD		
Transportation/Shipping/Receiving													
PRACTICE-00-A-57-K-K-5200-001	Transportation/ payload	Transport for payload from offline lab to launch pad, air-conditioned vehicle, vented container, and 28V power supply.	1	N/A	Online	2 days	2 days		WILCO		SAT 5200 T1K		
PRACTICE-UD-A-57-K-K-5200-002	Shipping/ receiving services	Provide assistance with return shipment of GSE to PD	4	Boxes	Offline	R+4 days	R+4 days		WILCO		KPRD		
Other General Services													
PRACTICE-00-A-41-K-K-6000-001	ESD mats	ESD mats and wrist stat tester for offine lab	2	Each	Offline	110 days	100 days		WILCO		SAT 5300 T1K	O&C	1295