Shuttle/Payload Standard Integration Plan for Middeck-Type Payload

Space Shuttle Program Office

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National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

DESCRIPTION OF CHANGES TO

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
--	Basic issue/B14084-1	09/01/83	All
1	Update paragraphs 10.0 and 6.0/B14084-2	09/27/83	15,18
2	Update paragraphs 2.2, 4.3.1.1, 5.4, 9.0, and 10.0/B14084-3	12/21/83	3,6,7,13, 13A,15
3	Update section 8.3/ B14084-4	09/27/84	12,12A
4	Update to configuration management procedures/B14084-6	11/27/84	2,18
5	Update sections 2.1.1 and 2.1.2/B14084-5	12/20/84	2
6	Update sections 2.1.1 and 2.1.2/B14084-7	04/15/85	1,2
7	Update section 5.4/B14084-8 Document number changed from JSC 14084 to NSTS 21000-SIP-MDK per CR B21000-SIP-MDK-12, dated 04/17/86	06/21/85	8
8	Human Research Policy and Procedures, sections 10.0 and 16.0, Change to Signature Sheet/B21000-SIP-MDK-12;-13	07/25/86	Sign. page, 15,15A,19

DESCRIPTION OF CHANGES (CONTINUED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
9	Price Summary Update, section 13.0 and figure 13-1/B21000-SIP-MDK-15	02/10/87	17,20
REV A	General revision/B21000-SIP-MDK-19	12/16/88	All
1	Update sections 6.4, 9.0, 10.5 and 16.0/B21000-SIP-MDK-21A;-22;-23	04/18/89	vii,viii, 13,13A,17, 17A,22,25, 26
	Pagination errata	05/25/89	description of changes page,vi,vii viii,ix
	Errata to correct section 16.0 item k	06/20/89	description of change page, 25,26
2	Update table of contents, sections 3.2.1, 6.4, 7.1, 7.2, 8.3, 9.0, 9.1, 10.2, and globally change NHB 1700.7 to NSTS 1700.7/B21000-SIP-MDK -024;-25A;-027;-030	10/10/89	vii,viii,3, 5,9,13,14, 16,17,17A, 20,25
3	Update table of contents and section 8.2.1; change section 4.2.2.4 to 4.2.2.5; add new section 4.2.2.4; editorial errata to include section 16.0/B21000-SIP-MDK-029;-031	11/01/89	vi,vii,8, 8A,15,C-1

DESCRIPTION OF CHANGES (CONTINUED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
4	Update sections 5.4 and 9.3 and table 5-1; add figure 15-1/ B21000-SIP-MDK-020;-032;-033	01/03/90	10,11,18, 18A,29,30, 31,32,33, 34,35,36
5	Update sections 1.0, 2.3, 4.2.2.3, 5.4, 6.3, 8.3, 9.0, 10.4 and 16.0, and figure 15-1/ B21000-SIP-MDK-028;-034;-035A;-036;-037	03/09/90	1,5,5A,8, 8A,11,13, 15,15A,17, 21,25,29, 30,31,32, 33,34,35, 36,37,38, 39
6	Update table of contents, sections 4.2.2, 5.2, 5.3, 5.5, 5.6, 7.1, 16.0, table 5-1, and figure 15-1; add sections 2.5, 2.5.1, and 2.5.2/B21000-SIP-MDK-038A; -039;-040A;-041	07/13/90	vi,vii, viii,ix,5, 5A,8,10,11, 11A,14,26, 34,38
7	Update table of contents, sections 4.1, 4.2.3, 6.3, 9.4.1, and 14.0/B21000-SIP-MDK-044;-046;-047	10/10/90	viii,7,9, 13,18A,24
8	Update table of contents, section 5.2 and figure 15-1; add new section 2.5 and renumber sections 2.5, 2.5.1, and 2.5.2 to 2.6, 2.6.1, and 2.6.2/B21000-SIP-MDK-051;-052; -053	05/21/91	vi,5,5A,5B, 10,10A,33, 37
9	Update foreword and section 2.1.1/B21000-SIP-MDK-049	12/07/90	iii,3

DESCRIPTION OF CHANGES (CONTINUED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
REV B	General revision/B21000-SIP-MDK-050	09/03/91	All
	Errata to add figure 15-1	11/06/91	33,34,35, 36,37,38, 39,40,41, 42,43
1	Update sections 4.2.1.1 and 9.3/B21000-SIP-MDK-054A	01/14/92	10,22
2	Update section 4.1/B21000-SIP-MDK-056	02/05/92	9,9A
	Errata to correct pagination	03/18/92	9B,10
3	Update sections 6.4, 9.0, and 10.3, and appendix C/B21000-SIP-MDK-048A;-059	08/18/92	16,20, 25,C-1
4	Update section 10.5/B21000-SIP-MDK-058	09/08/92	26,26A
5	Update section 9.1/B21000-SIP-MDK-061	09/28/92	21
6	Update section 10.1/B21000-SIP-MDK-060	01/26/93	24
7	Update table of contents and sections 8.2.2, 9.4, 9.4.1, and 9.4.2; add sections 8.2.3 and 9.4.3/B21000-SIP-MDK-064A;-068	05/18/93	viii,18,18A, 22,23,23A

DESCRIPTION OF CHANGES (CONTINUED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
8	Update sections 9.0 and 10.3/ B21000-SIP-MDK-067	05/25/93	20,20A,25
9	Update table of contents, sections 5.1, 5.1.1, 8.3, 9.1, and 16.0, figure 15-1, and appendix C; add section 8.6/B21000-SIP-MDK-062A; -069;-071	06/22/93	vii,viii,12, 12A,18A,19, 20,20A,21, 21A,30,33, 34,35,36,37, 38,39,40,41, 42,43,C-1, C-2
10	Update section 4.1 and figure 15-1/B21000-SIP-MDK-065A;-072	08/03/93	9,33,34,35, 36,37,38,39, 40,41,42,43
	Errata to correct section 8.3; paragraph inadvertently deleted	11/17/93	19
11	Update section 10.1 and figure 15-1/B21000-SIP-MDK-074	01/04/94	24,24A,33, 34,35,36,37, 38,39,40,41, 42,43
12	Update figure 15-1/P21000-SIP-MDK-076	02/08/94	37,41
13	Update section 6.3 and figure 15-1/B21000-SIP-MDK-079	03/08/94	16,35
14	Update table of contents, section 1.0 and add section 2.1.3/B21000-SIP-MDK-078;-080	05/03/94	vi,1,4,4A

DESCRIPTION OF CHANGES (CONTINUED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
15	Update section 6.5/B21000-SIP-MDK-073A	05/24/94	17
16	Update section 10.4/B21000-SIP-MDK-081B	06/13/94	25A
17	Update appendix C and add new section 4.2.2.5; renumber existing section 4.2.2.5 as 4.2.2.6/B21000-SIP-MDK-083	10/25/94	11,C-1
18	Update sections 9.0 and 10.3/B21000-SIP-MDK-084	11/28/94	20A,25
19	Update table of contents, section 8.2.2 and delete section 8.2.3/B21000-SIP-MDK-085	12/13/94	viii,18,18A
20	Update section 6.3/B21000-SIP-MDK-086	02/28/95	16,16A
21	Update table of contents and section 13.0 and delete figure 13-1/B21000-SIP-MDK-088	07/11/95	ix,27,28,31, 32
22	Update figure 15-1/B21000-SIP-MDK-089	08/08/95	33,40
REV C	Pagination revision to include updates to sections 2.6.1 and 2.6.2/B21000-SIP-MDK-090	09/08/95	All
1	Update sections 8.2.2 and 8.3	10/24/95	19,19A,21, 21A

DESCRIPTION OF CHANGES (CONTINUED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
2	Update sections 2.1.1 and 16.0/B21000-SIP-MDK-0093	01/19/96	3,34
3	Update sections 2.1.1, 4.1, 5.0, 5.2, 5.3, 10.2, 11.0, 14.0, 16.0; figure 15-1 and appendix C/B21000-SIP-MDK-0092	03/26/96	2,3,9,11,13, 28,30,33,37, 41,45,C-1
4	Update sections 5.3 and 16.0/B21000-SIP-MDK-0096	04/30/96	13,13A,35
5	Update section 9.1/B21000-SIP-MDK-0091	11/07/95	23,24
6	Update sections 10.1 and 16.0/B21000-SIP-MDK-0097	06/04/96	27,27A,35
7	Update table of contents, sections 2.6.2, 5.3, 6.3, 6.5, 8.2, 8.2.2, 8.3, 8.4, 8.5, 9.1, 14.0, and 16.0, figure 15-1, and appendix C; add new section 8.2.3 and table 8-1/B21000-SIP-MDK-0098;-0100;-0101	09/10/96	viii,ix,6, 13,13A,17, 19,19A,19B, 21,21A,24, 33,35,37,38, 41,42,45,46, C-2
REV D	General revision/B21000-SIP-MDK-0102	12/02/96	All
1	Update section 8.3/B21000-SIP-MDK-0103	12/17/96	21,22,22A
REV E	General revision/B21000-SIP-MDK-0105A;0106	09/19/97	All

DESCRIPTION OF CHANGES (CONCLUDED)

SHUTTLE/PAYLOAD STANDARD INTEGRATION PLAN FOR

MIDDECK-TYPE PAYLOADS

CHANGE NO.	DESCRIPTION/AUTHORITY	DATE	PAGES AFFECTED
1	Update preface, sections 2.1, 2.1.1, 2.1.2, 4.2.2, 4.2.2.3, 5.0, 5.2, 6.1, 6.3, 6.4, 8.3, 10.1, 10.2, 10.4, 10.5, 13.0, 14.0, and 16.0; table 8-1 and appendix C/B21000-SIP-MDK-0107A	03/10/98	iv,v,2,3,10, 11,15,16,19, 21,22,30,31, 32,33,35,36, 37,38,C-1, C-2
2	Update sections 2.1.1, 9.0, 9.3, 9.4.1, 9.4.3, and 14.0/B21000-SIP-MDK-108A	03/29/99	3,24,27,28, 29,36

Note: Dates reflect latest approval date of CR's received by PILS.

NSTS 21000-SIP-MDK

PAYLOAD INTEGRATION PLAN

SPACE SHUTTLE PROGRAM

AND

(PAYLOAD NAME)

(DATE)

APPROVED:

Date	Date
SPACE SHUTTLE PROGRAM OFFICE	(payload organization)

FOREWORD

This Standard Integration Plan (SIP) is intended for preparation of the primary agreement for management and technical activities required for integrated flight and ground operations of a middeck-type payload with the Space Shuttle Program (SSP). Use of the standard format will provide a consistent definition of the required integration agreements for the payload organization and SSP implementation.

PREFACE
(For Commercial or Outside NASA Customer)

This Payload Integration Plan (PIP) is the customer and National Aeronautics and Space Administration (NASA) agreement on the responsibilities and tasks which directly relate to integration of the payload into the Space Shuttle and includes identification of tasks that the NASA considers as standard and nonstandard services.

Signature of this document constitutes technical agreement on tasks to be performed, including standard and nonstandard services, but does not obligate the customer to the reimbursement price and schedule payment or the NASA to the funding and implementation of standard or nonstandard services. Upon completion of negotiations and signature of the (Launch Services Agreement (LSA) or amendments thereto, Joint Endeavor Agreement (JEA), Memorandum of Agreement (MOA), etc.) by the NASA and (payload organization) or provision of required funding under a separate letter agreement, the standard and nonstandard services identified will be implemented by the Space Shuttle Program (SSP). The launch date shown in this PIP is for planning purposes only.

Further understanding of SSP operations and the associated payload-unique requirements may indicate the need for additions to or deletions from the nonstandard services. This can be accommodated by amendment of the PIP and a launch service agreement.

[Any instructional information contained in this Standard Integration Plan (SIP) is enclosed in []. Information to be supplied is enclosed in parentheses (_). All instructional information will be removed for the flight-specific PIP's.]

Issues which are yet To Be Resolved (and labeled "TBR" in this PIP) and additional details are documented in appendix A. Information not at issue but which is yet To Be Determined is labeled "TBD" and documented in appendix B.

PREFACE
(For NASA Payloads)

This Payload Integration Plan (PIP) represents the payload-to-Space Shuttle Program (SSP) agreement on the responsibilities and tasks directly related to integration of the payload into the Space Shuttle, and includes a definition of nonstandard services.

Upon provision of the required funding by the National Aeronautics and Space Administration (NASA) Headquarters SSP, the identified nonstandard services will be implemented according to the PIP schedule.

Further understanding of SSP operations and the associated payload-unique requirements may indicate the need for addition or deletion of nonstandard services. This can be accomplished by amendment of the PIP and provision of funding by NASA Headquarters SSP. The official commitment for the launch date is reflected in the NASA Headquarters flight assignment. The launch date shown in this PIP is for planning purposes only.

[Any instructional information contained in this Standard Integration Plan (SIP) is enclosed in []. Information to be supplied is enclosed in parentheses (_). All instructional information will be removed for the flight-specific PIP's.]

Issues which are yet To Be Resolved (and designated "TBR" in this PIP) and additional details are documented in appendix A. Information not at issue but which is yet To Be Determined is designated "TBD" and documented in appendix B.

CONTENTS

1.0 INTRODUCTION

The National Aeronautics and Space Administration (NASA) and the (payload organization) plan to launch and operate a (payload name) using the Space Shuttle. [Note: If additional launches of this payload are planned, add the following statement: (no.) additional launches of this payload are planned.]

[Select the applicable paragraph:

a. The (payload name) will fly as a standard secondary payload.

b. The (payload name) will fly as a nonstandard secondary payload; i.e., the payload meets the standard middeck accommodations with some minor deviations from the Standard Integration Plan (SIP) or the middeck Interface Definition Document (IDD). Following (TBD) flights, the payload may be considered as a standard middeck payload for manifesting purposes providing there have been no significant hardware, ground processing, or on-orbit operations changes.

c. The (payload name) will fly as a complex secondary payload, i.e., the payload exceeds the standard middeck accommodations as called out in the SIP or the middeck IDD.]

[If the payload is a prepacked middeck locker, use the following:

The payload is further categorized as a prepacked middeck locker payload which has no John F. Kennedy Space Center (KSC) processing or requirements and needs only Orbiter installation/removal.]

[If the payload requires KSC processing, use the following: The payload is further categorized as a middeck payload which requires processing at John F. Kennedy Space Center (KSC) for such things as buildup, battery installation, or checkout. This payload may also require Lyndon B. Johnson Space Center (JSC) processing.]

The Space Shuttle Program (SSP) shall be composed of and represented by the Lyndon B. Johnson Space Center (JSC) and the KSC. The (payload name) shall be represented by (payload organization).

[If the payload is reimbursable, use this sentence with the appropriate agreement selected: This Payload Integration Plan (PIP) is the document identified in the (Launch Services Agreement (LSA), Joint Endeavor Agreement (JEA), Memorandum of

Agreement (MOA), etc.) between the NASA and the (payload organization).] This plan provides the management roles and responsibilities, and a definition of the technical activities, interfaces, and schedule requirements to accomplish the integration, launch, on-orbit operation, and postlanding operations of the (payload organization) payload with the Space Shuttle. All services to be furnished by the SSP to the customer under this PIP shall be furnished by the SSP using its best efforts.

2.0 MANAGEMENT RESPONSIBILITIES

The responsibility for assuring the definition, control, implementation, and accomplishment of activities identified in this document is vested with the SSP at the JSC and for (payload name) with the (responsible organization). Hereafter in this PIP, the (payload organization) will be referred to as the customer and the (payload name) will be referred to as the payload.

2.1 Joint Responsibilities

The SSP and the customer will support the necessary integration activities, both analytical and physical, identified in this plan and according to the schedule contained in section 15.0. The SSP and the customer will staff interface working groups with technical personnel responsible for accomplishment of integration tasks. Interface working groups include management, crew compartment, structural/mechanical/materials, avionics, thermal, flight planning, flight operations [delete the following if a prepacked middeck locker payload: and ground operations].

2.1.1 Documentation.- Primary documentation for payload integration into the Orbiter consists of the PIP, PIP annexes, data submittals, and appropriate Interface Control Annexes (ICA's).

The PIP, PIP annexes, data submittals, payload-unique ICA, and associated changes will be jointly approved by the SSP and the customer [except as otherwise stated in a launch service agreement]. When the customer is authorized to provide or specify requirements in a PIP annex or an ICA, these requirements are subject to SSP approval. Configuration control will be initiated upon signature approval. The SSP will maintain

configuration control of the cited documentation in accordance with Program Definition and Requirements, NSTS 07700, Volume IV, Space Shuttle Configuration Management Requirements [add the following when KSC processing is required: with the exception of Launch Site Support Plan Annex, Annex 8, which will be maintained by KSC in accordance with Payloads Configuration Management Handbook, KSC KHB-8040.4 and the Time-critical Ground Handling Requirements (TGHR) table which will be maintained by USA-Houston in accordance with PDP MS3-012].

Unless otherwise stated within this document, all inconsistencies shall be resolved by giving precedence in the following order:

a. Safety Policy and Requirements for Payloads Using the Space Transportation System, NSTS 1700.7B, and Space Transportation System Payload Ground Safety Handbook, SAMTO HB S-100/KHB 1700.7, as modified by any NASA-approved waivers.

[If applicable, insert:

b. Launch Services Agreement, Joint Endeavor Agreement, etc.]

c. Payload Integration Plan

d. Payload Interface Control Annexes referenced in the Payload Integration Plan

e. Annexes/data submittals to the Payload Integration Plan

f. Applicable documents of the Payload Integration Plan other than those above

2.1.2 Reviews.- The customer will provide support, as required, for the following reviews which will be implemented to assess the cargo integration process as described in Space Shuttle System Payload Accommodations, NSTS 07700, Volume XIV. Support may be data input, telecon, or designated representative, as agreed by the SSP and customer.

a. Payload Safety Reviews (PSR's)

b. Cargo Integration Review (CIR)

c. Flight Operations Review (FOR)

d. Ground Operations Review (GOR) [Delete if prepacked middeck locker payload.]

e. Payload Readiness Review (PRR)

f. Flight Readiness Review (FRR)

g. Flight Manager Integrated Product Team (IPT) - periodically

2.1.3 Proprietary Data.- In the event any of the data which the customer is required to furnish as part of the payload integration and safety process qualifies under the law as a trade secret or commercial or financial information and is confidential or privileged, and the customer desires to continue protection of such data, the customer shall mark the data with the following notice. NASA will thereafter treat the data in accordance with the notice.

NOTICE

These data embody trade secrets or commercial or financial information and are confidential or privileged, and shall not be used or disclosed other than for payload integration, safety, and associated launch services without prior written permission of the customer.

2.2 Space Shuttle Program Responsibilities

The SSP is responsible for integration of the payload into the Space Shuttle, including analytical integration, integrated flight design, integrated flight operations, and compatibility with other cargo elements that share the same flight. The SSP is also responsible for assuring that any other SSP activities required to support the payload flight are accomplished. The SSP is responsible for specifying to the customer all SSP requirements in the appropriate timeframe.

[If KSC processing is required, use the following paragraph:

The KSC is responsible for Space Shuttle Launch and Landing (L&L) support which includes agreed-upon facilities and services, physical integration of the payload(s) and integrated checkout, ground integration of the payload and Space Shuttle, and postlanding activities.]

[For a prepacked middeck locker payload, use the following paragraph:

The KSC is responsible for the Space Shuttle Launch and Landing (L&L) support, ground integration of the payload and the Space Shuttle, and postlanding activities.]

2.3 Customer Responsibilities

The customer is responsible for the design, development, test, performance, and safety of the payload and Ground Support Equipment (GSE), as well as for providing support to the SSP analytical and physical integration activities identified in this PIP. The customer is also responsible for the buildup and checkout of the payload and is responsible for responding in the appropriate timeframe to SSP requirements set forth in this document. The customer is responsible for identifying to the SSP all payload problems which may affect SSP milestones, as identified in section 15.0, and shall discuss with the SSP a plan to resolve the problem(s).

The customer will support the Certification of Flight Readiness (COFR) process as described in NSTS 07700, Volume XIV.

2.4 Authority and Responsibilities of the Space Shuttle Commander

The authority and responsibilities of the Space Shuttle commander are as stated in The Authority of the Space Transportation System (STS) Commander, 14 CFR 1214.7. The Space Shuttle commander has absolute authority to take whatever action is necessary to ensure the safety and well being of all personnel and equipment onboard.

2.5 Authority and Responsibilities of the Payload Commander

For missions with extensive crew training requirements and/or complex crew interactions, a payload commander may be designated. The payload commander will be responsible for working with the payload mission managers to identify and resolve issues associated with experiment assignments, training, crewmember qualification, and operational constraints. Per paragraph 2.4, ultimate onboard authority for the successful execution of the flight rests with the Space Shuttle commander.

2.6 Authority and Responsibilities of the Mission Management Team and the Cargo Management Team

2.6.1 Mission Management Team.- The authority and responsibilities of the Mission Management Team (MMT) are established in Space Shuttle Operations, NSTS 07700, Volume VIII. The MMT will function as a program-level oversight group to review the status of countdown and flight activities and to make programmatic decisions outside the authority of the launch and flight teams. When necessary to deviate from established Launch Commit Criteria (LCC) or flight rules to safely conduct SSP operations or to meet mission objectives, the single approval authority for such actions is the MMT chairman. The single representative to the MMT on matters involving the Shuttle cargo is the Flight Manager, Space Shuttle Program.

2.6.2 Cargo Management Team.- The customer's interface to the MMT is through membership on the Cargo Management Team (CMT). This team, which is chaired by the Flight Manager, Space Shuttle Program, consists of SSP and customer management representatives who have the authority and technical knowledge to make final programmatic recommendations to the MMT on issues which affect the payload. CMT membership, responsibilities, and functions are payload specific and are addressed further in the Payload Operations Workbook, JSC-27508.

3.0 PAYLOAD DESCRIPTION AND MISSION OVERVIEW

This section contains a general payload description and mission overview. It is not intended to specify requirements or constraints.

3.1 Payload Description

[Briefly describe the overall payload, identifying modules and type of control systems used. A figure showing configuration of the payload should also be included.] The payload configuration is shown in figure 3-1.

3.2 Mission Overview

3.2.1 Integrated Ground Operations.- After the payload is initially prepared, it is transported to the Orbiter integration facility. [Use the following if KSC processing is required:

The payload is installed into the Orbiter at the launch pad, and interfaces are verified.] [Use the following for a prepacked middeck locker payload: The payload is installed in the Orbiter at the launch pad.]

3.2.2 Flight Operations.- [Briefly describe the on-orbit mission activities.] The flightcrew shall be available at regular intervals to monitor and control payload/experiment operation, as negotiated between the customer and SSP through the Flight Planning Annex, Annex 2. The payload/experiment shall be deactivated and/or stowed by the flightcrew at the end of operations.

3.2.3 Postlanding.- After landing the Orbiter returns to the Orbiter Processing Facility (OPF) where the payload is removed for return to the customer.

RESERVED FOR FIGURE 3-1

TITLE: THE (payload name) CONFIGURATION

4.0 MISSION OPERATIONS

The mission operations section includes a definition of requirements and constraints by mission phase.

4.1 Payload Control Parameters

The payload control weight and payload control dimensions define maximum weight and dimensions of the payload for SSP mission planning purposes. A payload may not exceed its control weight or control dimensions without SSP approval.

The payload control weights are as follows:

Payload	- (no.) pounds ((no.) kg)
Unique integration hardware	- (no.) pounds ((no.) kg)
Total	- (no.) pounds ((no.) kg)

Payload control dimensions, including dynamic and access clearances are (no.) inches ((no.) m) or (no.) locker volume.

For payloads replacing a middeck locker, the customer shall provide weight, c.g., and configuration drawings to the Interface Control Annex, NSTS 21000-ICA. The weight and c.g. will be in accordance with NSTS 21000-IDD-MDK.

For payload items to be stowed or installed in the middeck, the customer at the time of manifesting, will submit engineering drawings of all payload-provided hardware to the Crew Compartment Engineer. The customer will provide the flight hardware to JSC no later than 6 weeks prior to launch to support final stowage for flight and the Flight Crew Bench review.

4.2 Operational Requirements and Constraints

The following payload operational requirements and constraints will be used in flight planning and implementation of the Space Shuttle and payload mission. Requirements that impose flight design and/or crew activity constraints will be implemented to the extent practical within primary payload objectives or mission objectives as determined by the SSP.

4.2.1 Launch Readiness.- The payload will be in final liftoff configuration when installed in the Orbiter. At this time, the payload will be capable of sustaining this configuration indefinitely without access or SSP support. Exceptions to this must be negotiated with the SSP and documented in section 9.3.

4.2.2 On-orbit.- The payload/experiment shall be activated by the flightcrew per a customer-provided procedure no sooner than 2.5 hours after launch. [Customer-provided displays and controls/the SSP-provided Payload and General Support Computer (PGSC)] will be used by the flightcrew to activate the payload/experiment. The flightcrew shall be available to perform operations for the payload/experiment to the extent practical within primary payload objectives or mission objectives as determined by the SSP. [Include general constraints affecting operations.]

4.2.2.1 On-orbit Attitude: Middeck payload requirements on Orbiter attitude or maneuvering shall be compatible with the primary payload objectives and pointing constraints, and/or mission objectives, and shall be negotiated between the customer and the SSP.

4.2.2.2 Thermal Environment: [Specify operational constraints.]

4.2.2.3 Photographic Coverage: [Specify any payload photographic and/or Television (TV) coverage requirements. Specific scene requirements are specified in Annex 2.]

4.2.2.4 Equipment Restraint: [Specify any special requirements associated with the payload/experiment which influence location, access, mounting, or handling during payload/experiment operations, such as cable restraint clips, velcro, bungees, tape, etc.]

4.2.2.5 Other Constraints: [Include other required payload constraints.]

4.2.3 Safe Without Services.- The SSP-provided services such as power, cooling, ventilation, etc., may not be available under certain conditions; i.e., postlanding, ferry flights, or certain KSC operations. In this event, the customer is responsible to

ensure that the payload does not present a hazard to the Space Shuttle or to personnel, while maintaining design requirements. For loss of normal services during the mission, the payload design must comply with the safety requirements as defined in NSTS 1700.7B, with contingency safing power as defined in section 5.4.

5.0 PAYLOAD-TO-SPACE SHUTTLE INTERFACES

The payload must be compatible with the Space Shuttle middeck interfaces as defined in the Middeck Interface Definition Document, NSTS 21000-IDD-MDK. The Space Shuttle-to-payload (and carrier if appropriate) standard and unique interfaces are specified in NSTS/(payload or carrier) ICA (no.). Operational interfaces will be specified in the ICA.

5.1 Structural/Mechanical/Materials Interfaces

[If the payload requires an optical quality side hatch window, add the following section:

5.1.1 Side Hatch Window Interface.- The optical quality side hatch window must be removed and replaced during the Orbiter vehicle flow prior to this payload's mission. This is a nonstandard service.]

5.2 Cable Interfaces

All customer-provided power cables using Orbiter utility outlets will have an SSP-provided identification tag attached adjacent to the connector on the Orbiter utility outlet end of the cable.

[If applicable, use the following:

The payload will use the standard SSP-provided direct current (dc) power cables to interface with a utility outlet as described in NSTS 21000-IDD-MDK.]

[If the PGSC is used, add: The payload will use the standard SSP-provided power cables to provide power to the PGSC via (the payload/an Orbiter utility outlet). The payload will use the standard SSP-provided

(RS-232C/RS-422A) data cables to interface with the PGSC as described in Shuttle/Payload Interface Definition Document for the Payload and General Support Computer (PGSC), NSTS 21000-IDD-486.]

[If applicable, use the following:

The customer shall perform the insulation resistance/high potential test as described in Payload Verification Requirements, NSTS 14046, for customer-provided dc power cables.]

5.3 Display and Control Interfaces

[If applicable, use the following:

The payload shall provide its own unique Display and Control (D&C) for interface with the flightcrew. This D&C information will be provided by the customer for documentation in the Cargo Systems Manual.

[If the PGSC is used, add the following: The SSP will provide, if requested, the use of a PGSC to support inflight payload operations. The customer is responsible for providing similar commercial computers and cables for ground development and customer-provided training. The SSP will provide a flightlike unit for a period of 2 weeks to be used for hardware/software verification test purposes. All payload software will be developed and provided by the customer. In no case will PGSC software be verified in the Orbiter itself. Success of PGSC software is considered the responsibility of the customer. If the customer requires the use of NASA facilities for the testing of PGSC software, it must be negotiated with the SSP and documented in the PIP. If customers will be using 3.5-inch diskettes, the customer is responsible for providing diskettes to support their payload. Diskette information can be located in Shuttle/Payload Interface Definition Document for Payload and General Support Computer (PGSC), NSTS 21000-IDD-486.]

Operational D&C nomenclature will be defined in the payload-unique Interface Control Annex, ICA.

5.4 Electrical Power Interfaces

[If applicable, use the following: Delete for a prepacked middeck locker payload.] Before installation in the Orbiter,

power may be supplied to the payload using customer-provided or SSP-provided GSE (nonstandard service) as negotiated in Annex 8. [Insert the following sentence, if required: During the Space Shuttle/payload ground and flight-mated operations, power will be supplied by the Space Shuttle as defined in the following paragraphs.]

The payload electrical power requirements shall not exceed the allocations defined in NSTS 21000-IDD-MDK. The maximum continuous and peak power requirements are listed in table 5-1, and the Space Shuttle/payload interface voltage for the peak power value is defined in NSTS 21000-IDD-MDK.

Table 5-1.- ELECTRICAL POWER REQUIREMENTS

	Source	Post-installation	Ascent	On-orbit			Descent	Post-flight
				Pre-operation	Operation	Post-operation		
a.	Orbiter bus (dc)	cont W (peak)W	N/A	cont W (peak)W	cont W (peak)W	cont W (peak)W	N/A	N/A
b.	Safing Power*							
c.	PGSC	N/A	N/A				N/A	N/A

*Fill in if necessary. Safing power is the power required by the payload to reconfigure from a nonsafe mode to a safe mode before permanent termination of power. Time limits shall be specified.

(cont - continuous; Value inserted where interface is required, N/A inserted where interface is not available, and N/R inserted where interface is not required; peak power values are identified by parenthesis.)

[For prepacked middeck locker payloads, delete all pre and post on-orbit power requirements.]

[If the PGSC is used and is powered through the payload, include PGSC power requirements as specified in NSTS 21000-IDD-486. If the PGSC is powered directly from an Orbiter utility outlet, list power requirements separately (refer to NSTS 21000-IDD-486).]

The values listed in table 5-1 will be verified by test of the flight configuration with the results submitted to the SSP either at or before the Flight Planning and Stowage Review (FPSR).

The specific power profile will be defined by the customer in Annex 2. Loss of Orbiter-supplied power on-orbit to the payload shall, as a minimum, require manual reconfiguration of Orbiter power to restore power to the payload. The power will nominally be restored within 15 minutes of payload power loss detection.

The total energy shall not exceed (TBD) kWh/mission.

5.5 Command Interfaces

[If the PGSC is used for commanding, so state; otherwise, this section is not applicable.]

5.6 Telemetry and Data Interfaces

[If the PGSC is used for data display, so state; otherwise, this section is not applicable. If diskettes are used to store data for postflight analysis, so state.]

5.7 Thermal Interfaces

[Specify any special interface requirements.]

The maximum continuous operating time is (TBD) hour(s) plus or minus (TBD) hour(s). The touch temperatures of crew accessible panels and controls shall not exceed 113 degrees F.

Energy dissipation rates by mission phase are listed for the payload in table 5-2:

Table 5-2.- (payload name) AVERAGE COOLING REQUIREMENTS

Source	Post-installation	On-orbit Operations	
		Pre-operations	Post-operations
Orbiter Cabin air	(no.) W	(no.) W	(no.) W	(no.) W

[Note: For all prepacked middeck locker payloads, delete all pre- and postservicing requirements.]

6.0 ENVIRONMENTAL ANALYSES AND INTERFACES

Standard Space Shuttle/payload natural and induced environmental interfaces, including structural loads, thermal, contamination, shock, vibration, acceleration and acoustics, are contained in NSTS 21000-IDD-MDK.

Environmental interface analyses will be conducted to determine physical and functional interface compatibility of the payload and the Space Shuttle. Specific analyses are described in the following paragraphs.

6.1 Structural Loads and Deflections

The customer is responsible for verifying compatibility with the Orbiter loads as defined in NSTS 21000-IDD-MDK. The customer will assure compliance of the payload by providing a test report, if required, including structural test data and analysis.

6.2 Thermal Environments and Interfaces

The customer shall provide a thermal report, if required, which includes test data and analyses to assure the payload compatibility with the SSP-defined thermal environment found in NSTS 21000-IDD-MDK. The payload thermal report will be used by the SSP to determine that the resulting thermal environments are compatible with the Orbiter. A thermal integrated assessment, if required to assure compatibility, will be performed by the SSP utilizing a payload-provided thermal report.

6.3 Electromagnetic Interference/Electromagnetic Compatibility

The customer is responsible for assuring that the payload meets the induced electromagnetic interference environment and that the payload complies with the radiated and conducted emissions and bonding requirements defined in NSTS 21000-IDD-MDK. [For complex middeck payloads, use the following: The RF Systems Data and EMC Test Data shall be required 90 days and 60 days, respectively, prior to the CIR. The specific characteristics of the payload RF Systems Data and EMC Test Data as defined in NSTS 21288 shall be submitted to Integration Engineering for review and evaluation.] [For standard or nonstandard middeck payloads, use the following: The EMC Test Data shall be required 2.5 months prior to launch. The specific characteristics of the payload EMC Test Data as defined in NSTS 21288, Required Data/Guidelines for Payload/ Shuttle Electromagnetic Compatibility Analysis, shall be submitted to Integration Engineering for review and evaluation.]

6.4 Contamination Control

The customer is responsible for assuring that the payload is compatible with the induced contamination environment and complies with offgassing requirements defined in NSTS 21000-IDD-MDK. In addition, certain materials and equipment requirements apply during ground operations in (or within close proximity of) the Orbiter. The customer will comply with these requirements as defined in Limitations for Nonflight Materials and Equipment Used in and Around the Space Shuttle Orbiter Vehicles, NSTS 08242; and conversely, the customer shall assure that the presence of any allowed material, chemical, or gas will have no adverse effect on the payload.

Prior to installation into the locker, the external surface of the payload will be visually inspected and cleaned as necessary.

[Note: If KSC processing is required, add the following: Specific facility operational requirements are contained in KSC Payload Facility Contamination Control Requirements/Plan, K-STSM-14.2.1; Shuttle Facility/Orbiter Contamination Control Plan, KVT-PL-0025; and Payload Facility Contamination Control Implementation Plan, KCI-HB-5340.1.]

6.5 Shock, Vibration, Acceleration, and Acoustics Environments

The customer is responsible for assuring that the payload is compatible with the shock, vibration, acceleration, and acoustic environments defined in NSTS 21000-IDD-MDK. Report(s) shall be provided, if required, by the customer to reflect compliance with the middeck environmental requirements of NSTS 21000-IDD-MDK. If the payload generates continuous or intermittent noise in the crew compartment, the customer shall provide an acoustics report to Payload Integration Engineering no later than 2.5 months prior to launch.

6.6 Ground Environmental Requirements

The environment of the ground operations facilities at the launch site is specified in Launch Site Accommodations Handbook for Payloads, K-STSM-14.1.

Ground handling loads are always less than flight loads.

6.7 Materials and Processes

Materials and processes will be in accordance with NSTS 1700.7B.

7.0 INTEGRATION HARDWARE

Responsibilities for integration hardware are defined in the following paragraphs.

7.1 Space Shuttle Program-provided Hardware

The following hardware will be provided by the SSP. [List any items required and identify the item's use. Examples are listed below.

a. (no.) payload mounting hardware

b. If applicable, PGSC and power and data cables]

7.2 Customer-provided Hardware

The following hardware will be provided by the customer. [List any items required and identify the item's use. Examples are listed below.

a. Harnesses and other hardware

b. Ground power supplies, etc.

c. Control panel and/or training mockup]

8.0 FLIGHT OPERATIONS

This section defines the flight design, flight activity planning, flightcrew and flight controller training, and flight operations support activities required for Space Shuttle/payload integration.

8.1 Flight Design

The SSP will be responsible for performing integrated flight design. Constraints for flight design are defined in section 4.0. The customer will provide flight design information in Annex 2.

8.2 Flight Activity Planning and Flight Operations Integration

8.2.1 Flight Plan.- The JSC will be responsible for all crew activity planning and will develop an integrated Space Shuttle/payload flight plan to support the flight. The plan will be developed using customer-supplied payload crew activity requirements. The customer will provide these requirements as part of Annex 2.

8.2.2 Data Submittal Requirements for Flight Operations Integration.- The customer is responsible for development and verification of the payload data submittals as specified in table 8-1. The customer is to provide this data to the Lead Payload Officer or designated representative per the schedule in table 8-1. At the FOR, the customer will verify and sign a written statement that all necessary payload data is implemented into the flight documentation. Details on these data submittals are available in JSC-27508.

[Flight-specific deletions or modifications should be made to this table as applicable for the flight-specific PIP.]

Table 8-1.- DATA SUBMITTAL REQUIREMENTS

Payload data	Submittal deadline	Flight document containing data
Customer Flight Control Team & Launch OPS Team/Customer Support	L-6 months	JOIP
Formal letter specifying MCC/JSC POCC/CSR support facility requirements signed by customer	L-6 months	N/A
Keyset/loop requirements	L-6 months	JOIP
Flight rules & payload facility LCC	L-6 months	Flight Rules Annex
JOIP procedures	L-6 months	JOIP
Operations support timeline	L-6 months	OST
Nominal, backup, and contingency procedures	L-6 months	a. Payload Operations Checklist b. Payload Systems Data and Malfunction Procedures
Payload switch configuration requirements (Ascent/Entry/ Postlanding)	L-6 months	a. Ascent Switchlist b. Payload Operations Checklist
Malfunction procedures	L-6 months	Payload Systems Data and Malfunction Procedures
IFM procedures	L-6 months	Payload Systems Data and Malfunction Procedures
Hazardous, MOC, Prelaunch commands	L-6 months	a. JOIP b. OST c. Hazardous Command List in Payload Hazard Report
Formal letter listing all operational hazard controls jointly signed between payload organization and DO6	L-6 months	a. Payload Operations Checklist b. Flight Rules Annex
Unique payload data collection requirements	L-6 months	a. Flight Plan b. Flight Rules Annex
PGSC/microcomputer requirements & user’s guide	L-6 months	N/A

The customer is also required to provide schematics/diagrams to support the following processes:

a. Cargo Systems Manuals

b. Flightcrew procedures development

Specific diagram/schematic requirements and delivery dates will be defined in the PIP and/or coordinated with the Lead Payload Officer or designated representative.

8.2.3 MCC/JSC Payload Operations Control Center/CSR Support Facility Requirements.- [Identify any requirement for telemetry, command, JSC Payload Operations Control Center (POCC) Workstations (WSs), or voice loops in the Mission Control Center (MCC), JSC POCC, or MCC Customer Support Room (CSR). Detailed support requirements for the JSC MCC, JSC POCC, or the MCC CSR will be provided by the customer to the Lead Payload Officer or designated representative per the schedule in table 8-1. Instructions for providing these requirements are contained in JSC-27508.]

8.3 Training

The SSP is responsible for assessing the training requirements for the flightcrew and flight controllers to support the flight. Payload-unique training will require SSP and customer resources as defined below.

The customer will provide a payload familiarization briefing at JSC to the flightcrew members, SSP flight controllers, and SSP instructor personnel. This briefing will precede other required payload training, and will be conducted according to the guidelines documented in Payload Familiarization Briefing Guidelines, JSC 25716.

To ensure that the flightcrew training schedule can adequately accommodate payload training requirements, the customer will submit the following initial estimates of payload training requirements when the PIP is baselined or earlier to the Mission Operations Directorate Spaceflight Training and Facilities Operations (SFT&FO) branch. This data will, at a minimum, include the following:

a. A customer point-of-contact for payload training

b. Estimates for the amount of time necessary for flightcrew payload training at JSC and, if required, the customer's facility

c. Tentative L- dates for such training

d. Estimates of crew travel requirements to non-JSC area facilities

The SSP will provide generic Mission Control Center-Houston (MCC-H) facility training for customer representatives resident in the MCC-H during a mission. This training will be conducted by the use of workbooks and hands-on training for each representative. Key payload representatives are encouraged to participate in an applicable payload portion of an integrated simulation(s) to become familiar with MCC-H operations.

[If a Training Annex is required, use the following:

Payload training requirements will be further documented in Training Annex, Annex 7.]

[If a Training Annex is not required, use the following:

Since a Training Annex is not required for this payload, the customer will define their training requirements by providing a training plan encompassing the following payload training details for each planned training session within 2 weeks after the decision to manifest the payload has been confirmed:

a. A short title

b. The proposed location of the training

c. A proposed comprehensive timeframe in Launch minus (preferably weeks) format

d. Which crewmembers are required to participate

e. Planned hours for each crewmember

f. A summary of the training objectives

The SSP will review the customer’s training plan proposals and reserves the right to negotiate alterations or amendments to the customer’s training plan which will be in accordance with mutually acceptable customer training goals and objectives.]

The customer will coordinate with the Mission Operations Directorate (MOD) SFT&FO branch flightcrew scheduler for selecting specific payload training dates and times and agrees to abide by established and customary scheduling protocols.

Unverified payload procedures will not be used for training. Additionally, crew training sessions are not to be used for the purpose of verifying payload operating procedures.

Required training dedicated to the payload must be planned and scheduled for completion by L-13 weeks.

[If the customer requires the use of JSC facilities such as the Crew Compartment or Full Fuselage Trainer, add a statement specifying the facility and purpose.]

The customer will provide opportunities for the flightcrew to train with the payload flight hardware. In addition, the customer will provide flight hardware or equivalent to JSC for utilization in the Full Fuselage Trainer, Crew Compartment Trainer, or Shuttle Mission Simulator (SMS) during secondary payload crew training.

If the SSP recommends integrated training among the manifested secondary payloads, the customer should support such integrated training by providing flight or equivalent payload hardware and customer personnel. Integrated training is defined as the exercising of the procedures of two or more payloads and Orbiter activities during a given time segment of the crew flight plan.

To enhance mission success, the customer should prepare a brief, concise video tape that reviews payload hardware and operating procedures. This tape should clearly show payload hardware, control panels, CRT displays, and should summarize key points required for mission success. The customer should make this video tape accessible for crew review by L-1 month.

The customer is required to provide schematics/diagrams to support the following processes:

a. Simulator model development (as applicable)

b. Crew and flight controller training

Specific diagram/schematic requirements and delivery dates will be defined in the PIP and/or coordinated with the Lead Payload Officer or designated representative.

8.4 Flight Operations Control

The SSP will be responsible for integration of flight operations. The SSP flight control operations will be conducted from the JSC MCC-H using the Space Network (SN). When considered necessary by the SSP, the customer will provide a representative(s) at the MCC-H during the Space Shuttle/payload flight to provide a contact(s) for payload decisions to the SSP, to assess flight progress, and to coordinate operations interfaces between SSP and the customer. The basic plan, payload decision points, and agreements for these operations, including necessary procedures, will be identified in the payload data submittals to the Lead Payload Officer or designated representative.

8.5 Inflight Maintenance

All payload Inflight Maintenance (IFM) shall be designed so that safety requirements will not be compromised. Only IFM procedures reviewed and approved by the safety panel will be authorized. Any payload IFM requires real-time concurrence from the Space Shuttle commander. All IFM will be provided in the IFM submittal to the Lead Payload Officer or designated representative.

[If the customer requires realtime CAS data, use the following:

8.6 Ground Data Interfaces

Real-time Calibrated Ancillary System (CAS) data is required (nonstandard service). The real-time transmission of CAS data to the assigned payload processing facility located at Cape Canaveral Air Force Station (CCAFS)/KSC is required from 24 hours before launch until 3 hours after landing. The CAS Measurement Stimuli Identification (MSID) parameters to be provided are as follows: [List as per the following examples.]

MSID	Description
V61P2405A	Cabin pressure
V61P2540A	CO_2 partial pressure
V61Q2551A	Cabin humidity (flight deck)
V61T2552A	Cabin temperature (flight deck)
V64T0130A	Temp airlock wall (middeck)
V64T0131A	Temp airlock wall (middeck)

If the customer requires realtime CAS data other than the above or has operational data requirements, then Section 8.6 should be written to reflect these requirements.]

9.0 LAUNCH AND LANDING SITE OVERVIEW

[If KSC processing is required, use the following:

Payload-unique activities and an overview of L&L site activities are presented in this section. Overall SSP policy and requirements are shown in System Description and Design Data - Ground Operations, NSTS 07700, Volume XIV, Appendix 5. Ground processing details and customer requested ground support (both nominal and contingency) are documented in Annex 8 by the Launch Site Support Manager (LSSM) according to the schedule shown in section 15.0.

In support of Annex 8 development, the customer participates in ground operations working group meetings that further define the payload L&L requirements and plan for the payload's implementation. All customer Technical Operating Procedures (TOP's) will be submitted no later than 55 days before use to the LSSM for KSC review/approval. Specific payload requirements affecting integrated operations with the Orbiter will be documented in NSTS 08171, Operations and Maintenance Requirements and Specifications Document (OMRSD) File II, Volume 2 or the mission-unique TGHR table. Prelaunch and postlanding support requirements not documented in the OMRSD or the mission-unique TGHR table will be documented in Annex 8. The customer also makes input to and supports the review schedule for SSP development of L&L operational procedures. Input could include a preliminary customer procedure 5-6 months prior to use for complicated payload test sequences or servicing activities.

The SSP will take required photographs of the payload before and after installation in the Orbiter to support Flight Data File (FDF) development, flightcrew and flight controller training, and for possible inflight contingencies. These photographic activities will be scheduled and coordinated with the customer.

Training or certification of training may be required for customer personnel performing certain payload ground processing activities. Health reports or physical examinations will be required for certain operations, such as deployment to non-Continental United States (CONUS) landing sites. Details are included in the Annex 8.]

[If a prepacked middeck locker payload, use the following paragraph:

The payload will be received at KSC as a JSC prepacked middeck locker. Installation and removal from the Orbiter are the only L&L requirements.]

The customer's management will establish work-time policies and rules that meet realistic human factors, personnel safety, and quality assurance goals. The purpose of this policy is to minimize the probability of mishaps caused by personnel in critical positions working excessive hours during operations at KSC. Certification of compliance is required in some instances. Details are in Annex 8.

9.1 Customer Processing

Upon arrival at the launch site, payload hardware is delivered to an assigned area (provided as a nonstandard service) for postshipment customer inspection, functional checkout, and preparation for transfer to SSP control. Typically, the customer is responsible for these preintegration activities and utilizes customer-provided GSE.

[For payloads containing gas, fluid, or solid media which, under multiple failures, could escape containment or become vaporized into the habitable atmosphere, insert the following paragraph:

The customer is responsible for labeling of hardware with any required toxic substance hazard decals prior to turnover to KSC or final stowage, as applicable. JSC will deliver the decals in sufficient time for affixing the decals prior to final payload stowage and closeout. More detailed information is contained in JSC-27508.]

After these activities are completed, the payload is transferred to L&L control to begin the Orbiter integration process. Agreed-upon nonstandard services to be performed before Orbiter integration are: [List as required.]

[If a prepacked middeck locker payload, retain only the second paragraph in this section.]

[If the customer requires real-time CAS data, use the following:

The customer requires real-time transmission of CAS data to the assigned payload processing facility starting at payload installation into the Orbiter and continuing throughout the mission until the payload is removed from the Orbiter at the landing site (nonstandard service). The transmission of CAS data to Hangar L will be considered on a flight-by-flight basis and will be provided depending upon availability of data lines within KSC.]

9.2 Payload Integration

Not applicable

9.3 Orbiter Integration

[If KSC processing is required, use the following:

Middeck payloads will be installed and any interface verification tests, closeout procedures, and payload-unique tests will be accomplished by the SSP.]

Agreed-upon nonstandard services to be performed at the pad for this payload are as follows: [List as required.]

[For payloads that require late installation/servicing within L-3 days but prior to L-24 hours (category 1 - installation is within launch countdown), add the following:

The payload requires late installation (nonstandard service) in the Orbiter within L-3 days (or TBD hours). The payload will be turned over from the customer to NASA KSC to allow installation in accordance with launch countdown and crew compartment stowage activities.]

[For payloads that require late installation/servicing within L-24 hours (category 2 - installation is accomplished during Flight Crew Equipment late stowage), add the following:

The payload requires late installation (nonstandard service) in the Orbiter within L-24 hours. Appropriate justification has been provided by the customer to the SSP for installation within L-24 hours. The payload will be turned over from the customer to NASA KSC to allow installation in accordance with a mission-unique late stowage schedule.]

[For payloads that require late installation/servicing at a specific time within L-24 hours but prior to the start of the ascent switch list activities (category 3 - installation is within L-24 but prior to L-18.5 hours for short launch windows (Mir or Space Station missions) or L-17 hours for nominal launch windows), add the following:

The payload requires late installation (nonstandard service) in the Orbiter within L-(TBD) hours but prior to the start of ascent switch list activities. Appropriate justification has been provided by the customer to the SSP for installation at the specified time. The requirement for this installation is applicable for mission (TBD). The payload will be turned over from the customer to NASA KSC in accordance with a mission unique late stowage schedule.]

[For payloads that require late installation/servicing (nonstandard service) during times in conflict with nominally scheduled switch list activities (category 4 - installation is within L-18.5 hours but prior to L-15.5 hours for short launch windows (Mir or Space Station missions) or within L-17 hours but prior to L-14 hours for nominal launch windows), add the following:

The payload requires late installation (nonstandard service) in the Orbiter within L-(TBD) hours and this conflicts with nominally scheduled ascent switch list activities. Appropriate justification has been provided by the customer to the SSP for installation at the specified time. The requirement for this installation time is applicable for mission (TBD). This installation time must have additional approval and be integrated with other payloads by the KSC Launch Countdown Working Group.]

For all payloads requiring late installation/servicing, add the following:

Payload installations must be completed by L-14 hours for nominal launch window and L-15.5 for short launch windows (Space Station missions). Late installation (within L-24 hours) requirements for payloads with interface verification testing may affect manifesting. Late installation requirements will require coordination with the Launch Team/Launch Director during the launch countdown planning process. Installation conflicts will be resolved using the FRD payload priority list which may result in adjustments to installation times. Details for late installation requirements will be documented in the mission-unique TGHR table. Payload turnover times will be documented in annex 8. Customer turnover times are

typically 1.5 to 2 hours prior to installation to accommodate KSC preparation and transportation to the launch pad. Fit checks will be required for all first time manifested middeck payloads that are replacements for middeck lockers. The need for subsequent fit checks with different serial numbers, Orbiters, or locations will be determined by the SSP, KSC and payload representatives. Fit check requirements will be documented in the OMRSD.]

[For a prepacked middeck locker payload, use the following:

The middeck locker containing the stowed payload will be installed by the SSP in the Orbiter middeck during normal stowage operations at the launch pad.]

[List exceptions to prelaunch constraints (reference 4.2.1), if required.]

9.4 Postlanding

[For a prepacked middeck locker payload, use only the following paragraph:

The payload will be removed from the Orbiter during normal destow operations, and returned to JSC for return to the customer.]

[For all other middeck payloads, use the following three sections.]

9.4.1 Nominal Landing Processing.- After landing at KSC, the Orbiter is towed to a safing/deservicing area. Following jacking and leveling, middeck payload items are removed and returned to the customer.

[If early postflight removal of hardware is required, use the following: If a flight ends at either KSC or Dryden Flight Research Facility (DFRF), items containing time-critical data must be offloaded from the Orbiter prior to Orbiter tow (nonstandard service). Removal of payload hardware will be top priority after necessary safing and crew egress activities are complete.]

Agreed-upon nonstandard services to be performed at the landing site for this payload are as follows: [List as required.]

Details for early removal are documented in the mission-unique TGHR table.

9.4.2 Intact Abort Processing.- If an aborted flight lands at KSC or DFRF, the SSP will remove and disposition the payload using its best efforts.

If an aborted flight lands at a site other than KSC or DFRF, payloads in the Orbiter middeck will be removed and returned by the SSP to the launch site. If requested by the customer, transportation of the payload to a location other than the launch site is a nonstandard service.

Customer requirements for SSP support which exceed planned operations are provided as a nonstandard service. The customer or the customer's representative is responsible for performing payload-unique operations (data removal, preparations for transporting, etc.) and for providing the personnel and GSE to conduct these operations. Within the transportation provisions for SSP GSE and personnel, the SSP will provide, on a space-available basis, transportation of payload-unique GSE and personnel to and from the landing site.

Specific nonstandard services and costs associated with an abort landing will be identified in a Change Request (CR) to this PIP and negotiated once the landing site, standard SSP services available at that site, and customer requirements are known.

9.4.3 Early End of Mission Support.- An Early End of Mission (EEOM) occurs if a flight lands at KSC or Dryden Flight Research Facility (DFRF) before the planned EOM.

[Select the appropriate paragraph:

a. The payload does not require EEOM support.

b. If additional funding has been provided to support early destowage at DFRF, use the following sentence: Because valuable data is obtained early in the mission, the payload requires EEOM support (nonstandard service) at KSC and DFRF beginning at L+TBD hours. Details for EEOM support will be documented in the mission-unique TGHR table.

c. If additional funding has not been provided to support early destowage at DFRF, use the following sentence: Because valuable data is obtained early in the mission, the payload desires EEOM destow on a best-effort basis. Details for EEOM support will be documented in the mission-unique TGHR table.

10.0 SAFETY

[Note: For payloads that have no KSC processing delete references to Ground Safety Reviews (GSR's) and GSE in the following paragraphs.]

10.1 General

[For customers without prior safety review experience, or if requested by the customer, add the following: Prior to the first phase safety review, the SSP shall provide an initial contact safety briefing to explain the safety review process and documentation.]

The customer is responsible for ensuring that the payload and GSE, including interfaces and operations, are safe. Payload and GSE design and operations must comply with the safety requirements defined herein. Payload compliance with the safety requirements is assessed by the SSP through flight and ground safety reviews and safety certification. Successful completion of these safety reviews and safety certifications by the customer will result in approval by the SSP for ground processing and flight.

In order to preclude hazardous operations, full disclosure of all operating parameters, including but not limited to pressures, temperatures, and voltages and power, will be required. In addition, full disclosure of the contents, flammability, and Hydrogen-Ion concentration (pH) and toxicity of all substances including proprietary material used in or produced by any payload or experiment will be made. A list of all payload or other experiment test materials and experiment-specific utility chemicals to be used in spacecraft habitable modules will be submitted to the JSC toxicologist and the Payload Safety Review Panel (PSRP) executive secretary in accordance with the checklists, general format and timelines specified in Requirements for Submission of Test-Sample Materials Data for Shuttle Payload Safety Evaluations, JSC 27472, or its subsequent revisions. The payload must comply with the toxic labeling standards defined in System Description and Design Data - Intravehicular Activities, NSTS 07700, Volume XIV, Appendix 9.

The customer is responsible for certifying that controls of hazardous material are consistent with the methods/designs approved by the PSRP. The JSC Toxicologist will develop and manage the Hazardous Materials Summary Table (HMST) from the customer-supplied list as required for the PSRP review. The

customer will verify that (1) materials that are planned to be loaded are listed on the HMST, and (2) the materials loaded are on the approved planned loading list. Following the Flight Safety Phase III Review, the JSC Toxicologist will provide the customer with the preliminary HMST. The customer will return the HMST with the signed Verification 1 form which represents the final loading plan. Following SSP approval, corrections will be incorporated into the Final HMST at L-2 months and provided to the customer. Since loading will occur at various times, the customer will return Verification 2 Forms and the As-loaded HMST when hazardous material loading actually occurs. Review and concurrence of the As-loaded list by the JSC Toxicologist will constitute the As-loaded list of Hazardous Materials for use by the flight team. Between Verification 1 and Verification 2, the SSP policy is to limit changes to the HMST to only allow deletions and/or reductions of concentration of the hazardous materials.

10.2 Payload Design and Flight Operations Requirements

The payload, including interfaces and operations will comply with the requirements of NSTS 1700.7B. The payload shall meet these requirements at the launch/landing sites and during flight and orbital operations.

All interaction/interface safety analyses will be performed by the customer for the payload interfaces with the Orbiter. In this analysis, failures identified in Shuttle Orbiter Failure Modes and Fault Tolerances for Interface Services, NSTS 16979, and the flight operations will be assessed by the customer. The analysis will define assumptions made by the customer with respect to Orbiter services and operations associated with hazardous payload functions. The analysis will identify potential payload failures which could propagate to the Orbiter and exceed the design criteria in NSTS 21000-IDD-MDK.

During real-time SSP operations, the SSP has final safety responsibilities. Payload organizations have the responsibility to support the SSP by providing expert advice on safety matters affecting the payload or its operation.

10.3 Ground Support Equipment Design and Ground Operations Requirements

[Note: If a prepacked middeck locker payload, delete the next two paragraphs and add the following: Not Applicable.]

Payload and GSE design, including interfaces and operations, will comply with the requirements of NSTS 1700.7B and SAMTO HB S-100/KHB 1700.7, for launch site processing and postlanding operations including abort, contingency, and emergency landings. Other launch/landing site safety requirements may be applicable, depending upon assessment by the SSP of payload and GSE operations.

Hazardous and nonhazardous TOP's will be submitted to the LSSM for Launch Site Safety Office (LSSO) review. Hazardous TOP's must be approved by LSSO no later than 10 days before first use.

10.4 Safety Review Requirements

Implementation of the safety requirements of NSTS 1700.7B and SAMTO HB S-100/KHB 1700.7 will be accomplished in accordance with Implementation Procedure for NSTS Payloads System Safety Requirements, NSTS 13830. Safety documentation will be provided by the customer to the appropriate SSP organization for each safety review: JSC for flight design/operations and KSC for ground design/operations. The safety review meeting will be scheduled approximately 45 days after receipt of an acceptable data submittal. Flight design and operations safety reviews will be coordinated/scheduled by the JSC safety office and the ground design and operations safety reviews will be coordinated by the KSC LSSM.

Flight and ground Phase III Safety Reviews, including closure of ground safety verification, and ground safety certification must be completed 30 days prior to payload and GSE delivery to KSC. The customer will be required to identify any open verification status items from the flight Phase III Safety Review, as reported in the Payload Flight Safety Verification Tracking Log, and provide rationale for acceptance of this condition prior to commencement of ground processing. Flight safety certification must be completed 10 days prior to the FRR.

When changes to design or operations of the payload/GSE are required subsequent to Phase III, the customer shall assess those changes for possible safety implications, including the effect on all interfaces. The assessment shall be forwarded to the JSC

and/or KSC safety panel for review and approval. The assessment shall include the reason for the change and the safety impact, if any. New or revised hazard reports and support data shall be prepared when applicable and also submitted for approval. The need for a delta Phase III Safety Review will be determined by hazard potential involved. Satisfactory completion of all this activity is mandatory prior to launch.

All verification activities including post-Phase III Safety Review operations will be reported to the SSP Payload Safety Panel by procedure numbers, location where performed, and date as described in NSTS 13830.

For changes to GSE design and ground operations, the restriction is the changes must be approved by the LSSO and KSC safety panel prior to use of the GSE or procedure.

In conjunction with the FOR, payload configuration (including systems and procedures) will be reviewed by the SSP with customer participation to highlight safety concerns and resulting operations decisions. In support of this review, the customer will provide the payload officer and the JSC SSP Payload Safety Review Panel with any additional safety-related data which may impact flight operations decisions.

[If applicable, add the following:

10.5 Biomedical Payloads/Experiments

All payload investigations involving flight personnel as test subjects or operators of payloads/experiments that have potential biological/medical risks must be approved by the JSC Institutional Review Board (IRB). Approval by the IRB will be in accordance with JSC Institutional Review Board Guidelines for Investigators Proposing Human Research for Space Flight and Related Investigations, JSC 20483.

All payloads/experiments involving live animals, primary cell cultures, or embryos which will develop to the live animal stage during the course of experimentation must be submitted for review and approval by the NASA ARC Institutional Animal Care and Use Committee (IACUC). In addition, animal activities utilizing the facilities of any NASA field installation must also be submitted for review and approval by the IACUC of the appropriate field installation. Approval by the appropriate IACUC will be in accordance with NASA Management Instruction 8910.1 and Appendices W and X of the JSC Institutional Review Board Guidelines for Investigators Proposing Human Research for Space Flight and Related Investigations (JSC 20483).

The surgeon in the JSC Mission Control Center (MCC) Flight Control Room (FCR) is the real-time authority regarding astronaut crew health and safety in flight. Real-time monitoring of biomedical payloads requiring physician monitoring on the ground, with respect to crew health and safety, will be performed by the MCC FCR Surgeon.

The JSC Medical Operations Branch will determine what the data monitoring requirements will be for particular biomedical experiments being performed. For most experiments (Intense-Exercise, Lower Body Negative Pressure, etc.) this will involve a requirement for the FCR Surgeon to receive real-time Electrocardiogram (ECG) data.

Ground network protection of inflight astronaut medical data should involve scrambling of any video data that is downlinked; e.g., echocardiogram. If researchers need to evaluate this video data, the signal can be unscrambled for their particular use. No scrambling of digital data is required due to the complexity of the signal.]

11.0 INTERFACE VERIFICATION AND TESTING

[Note: For a prepacked middeck locker payload, use only the first sentence.]

The customer is responsible for verifying compatibility with the interfaces and environments specified in this PIP and the ICA. The interface verification requirements and planning will be negotiated and concurred with the SSP and the customer.

All payload-to-Orbiter interface verification requirements are to be identified and submitted by the customer in the OMRSD, in accordance with the schedule in section 15.0. Interfaces that cannot be verified prior to flight shall also be documented in the OMRSD with supporting rationale.

12.0 POSTFLIGHT DATA REQUIREMENTS

The SSP is responsible for Space Shuttle system monitoring and anomaly resolution. In the event of a Space Shuttle anomaly which would influence the execution of payload objectives, SSP will supply the Space Shuttle data as available to the customer for evaluation.

In the event of a payload anomaly, Space Shuttle data may be required for evaluation of the payload problem.

Postflight data listed below will be provided {Mark as appropriate}.

	Reqd	N/R	Remarks
a. Closed Circuit Television (CCTV)			
b. Photographic			
c. Voice cassettes			

Note: Detailed listing of CCTV and photographic requirements will be defined in the Remarks column (i.e., number of copies of photographic prints, transparencies, etc.)

13.0 SUMMARY OF NONSTANDARD AND CUSTOMER-FUNDED SERVICES

This section of the PIP identifies and sets forth all services to be performed by the SSP for the customer that are currently identified as nonstandard or customer-funded services. Except for additional nonstandard SSP services identified in the future [Note: For reimbursable payloads, insert: in accordance with the launch service agreement], all other services to be provided by the SSP for the customer are standard services.

A summary of nonstandard services identified herein to be provided and priced to the customer for payload integration and operations follows:

[Note: When assembling the list of nonstandard services, all ground processing-related nonstandard services will be individually listed under one main title, Launch and Landing Site Support.

Example:

1. Reference paragraph 9.3 - The SSP will provide late installation/servicing at L-24 hr, as a nonstandard service.

2. Etc.]

Prior to initiation of individual nonstandard service(s), the performing SSP organization and the customer will jointly scope tasks, and the performing NASA organization will establish the estimate of governmental costs and provide it to the customer. The SSP will only initiate nonstandard service(s) with approval and funding.

14.0 PAYLOAD INTEGRATION PLAN ANNEXES/DATA SUBMITTALS

As identified in other sections of this PIP, the following annexes/data submittals are required from the customer in the SSP standard format. [Include those annexes/data submittals defined in the body of the PIP.]

Annex 2 - Flight Planning

ICA - Interface Control Annex

Annex 7 - Training (if required)

Annex 8 - Launch Site Support Plan

OMRSD - Payload Verification Requirements

TGHR - Time-critical Ground Handling Requirements

15.0 SCHEDULE

The attached schedule, figure 15-1, provides a summary of various technical areas requiring data exchange and/or products in support of the Space Shuttle/payload integration activities.

16.0 APPLICABLE DOCUMENTS

The following current issue* documents are applicable to the extent stated herein.

a. NSTS 1700.7B, Safety Policy and Requirements for Payloads Using the Space Transportation System, January 1989

b. NSTS 13830, Implementation Procedure for NSTS Payloads System Safety Requirements, current issue*

c. NSTS 21000-IDD-MDK, Middeck Interface Definition Document, current issue*

d. TBD, NSTS/(payload) Interface Control Annex

e. K-STSM-14.1, Launch Site Accommodations Handbook for Payloads, current issue*

f. NSTS 07700, Program Definition and Requirements, Volume IV-Book 1, Appendix H, Space Shuttle Configuration Management Requirements, current issue*

g. NSTS 07700, Volume XIV, Space Shuttle System Payload Accommodations, including Attachment 1 (ICD 2-19001) and Appendices 1-10, current issue*

h. KSC KHB-8040.4, Payloads Configuration Management Handbook, current issue*

i. NSTS 14046, Payload Verification Requirements, current issue*

j. JSC 20483, JSC Institutional Review Board Guidelines for Investigators Proposing Human Research for Space Flight and Related Investigations, current issue*

k. K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements/Plan, current issue*

l. KVT-PL-0025, Shuttle Facility/Orbiter Contamination Control Plan, current issue*

m. KCI-HB-5340.1, Payload Facility Contamination Control Implementation Plan, current issue*

n. SAMTO HB S-100/KHB 1700.7, Space Transportation System Payload Ground Safety Handbook, current issue*

o. NSTS 16979, Shuttle Orbiter Failure Modes and Fault Tolerances for Interface Services, current issue*

p. NSTS 08242, Limitations for Nonflight Materials and Equipment Used in and Around the Space Shuttle Orbiter Vehicles, current issue*

q. NSTS 21000-IDD-486, Shuttle/Payload Interface Definition Document for the Payload and General Support Computer (PGSC), current issue*

r. 14 CFR 1214.7, The Authority of the Space Transportation System (STS) Commander

s. NSTS 07700, Volume VIII, Space Shuttle Operations, current issue*

t. JSC 25716, Payload Familiarization Briefing Guidelines, current issue*

u. JSC 27472, Requirements for Submission of Test-Sample Materials Data for Shuttle Payload Safety Evaluations, current issue*

v. JSC 27508, Payload Operations Workbook

*Current issue includes all future changes and revisions.

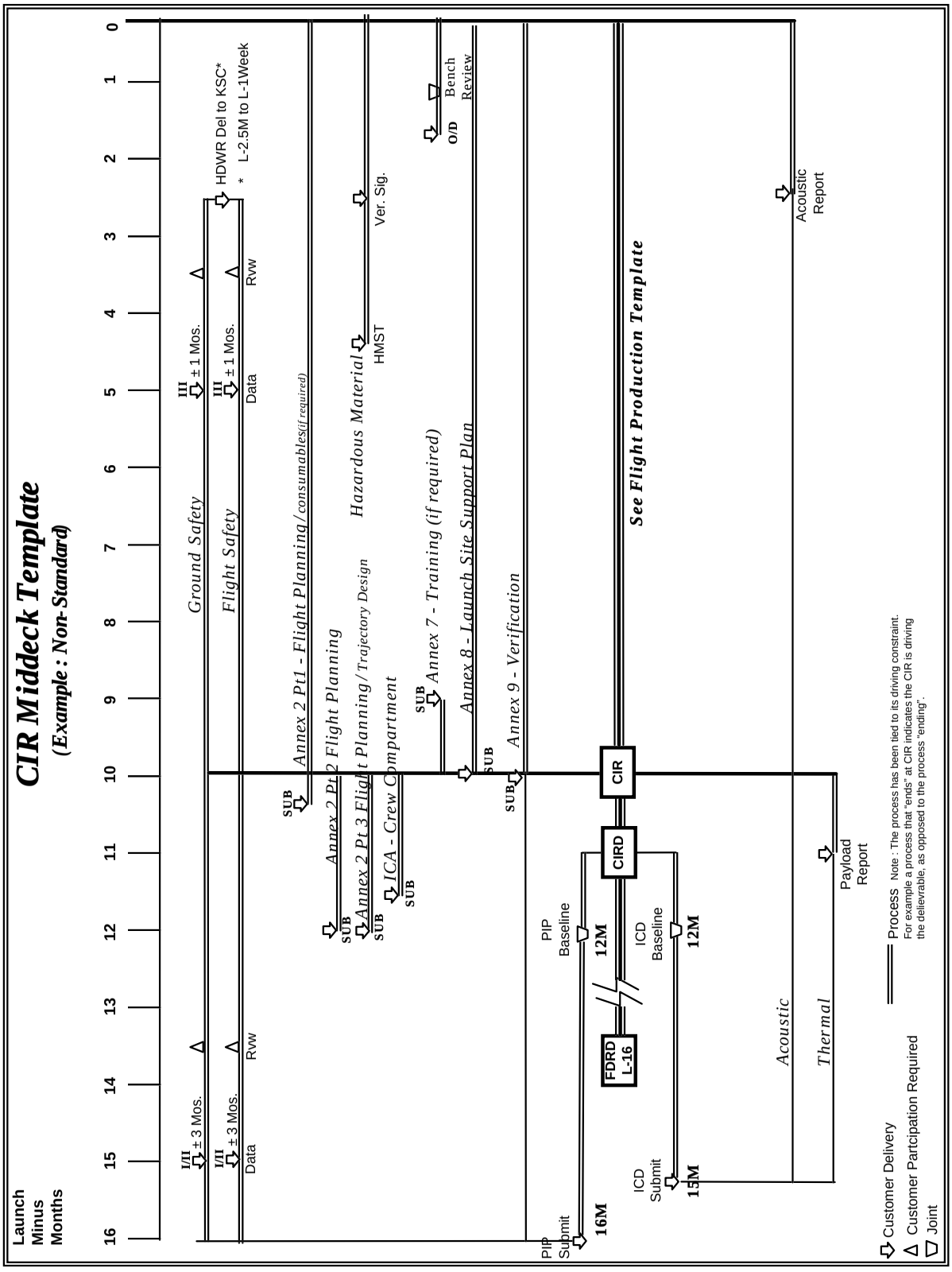

Figure 15-1.- Payload integration schedule (sheet 1 of 2).

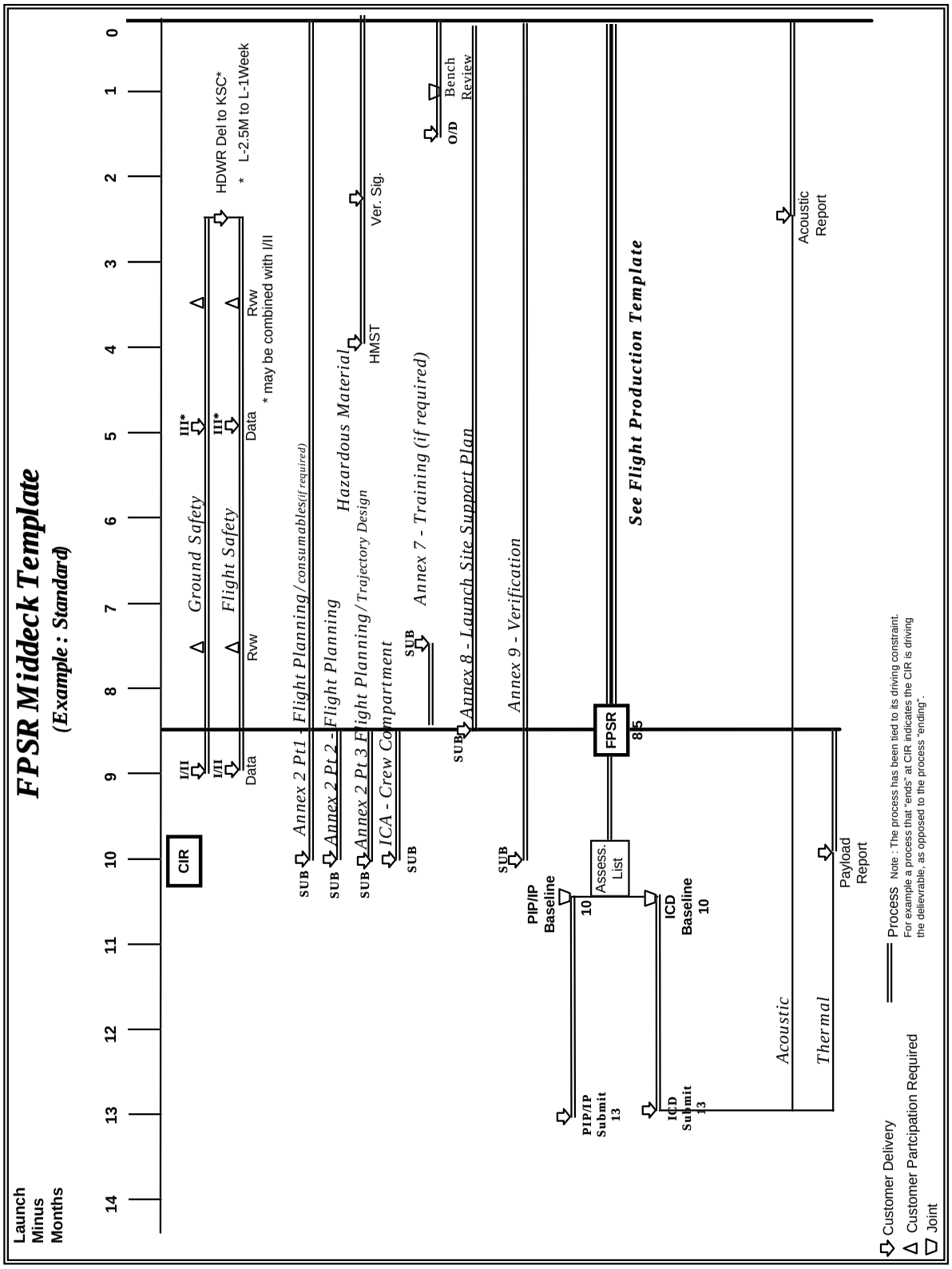

Figure 15-1.- Payload integration schedule (sheet 2 of 2).

APPENDIX A

TO-BE-RESOLVED ITEMS

TBR No. 1 Subject: (Reference paragraph XX)

[Text of issue explaining SSP and customer positions and any course of action identified to resolve.]

TBR No. 2

TBR No. 3

APPENDIX B

TO-BE-DETERMINED ITEMS

APPENDIX C

ACRONYMS AND ABBREVIATIONS

ac	alternating current
CAS	Calibrated Ancillary System
c.g.	center of gravity
CCAFS	Cape Canaveral Air Force Station
CCTV	Closed Circuit Television
CIR	Cargo Integration Review
CMT	Cargo Management Team
COFR	Certification of Flight Readiness
cont	continuous
CONUS	Continental United States
CR	Change Request
D&C	Display and Control
dc	direct current
DFRF	Dryden Flight Research Facility
EAFB	Edwards Air Force Base
EEOM	Early End of Mission
F	Fahrenheit
FCR	Flight Control Room
FD	Flight Director
FDF	Flight Data File
FOR	Flight Operations Review
FPSR	Flight Planning and Stowage Review
FRD	Flight Requirements Document
FRR	Flight Readiness Review
GOR	Ground Operations Review
GSE	Ground Support Equipment
GSR	Ground Safety Review
GSFC	Goddard Space Flight Center
HMST	Hazardous Materials Summary Table
ICA	Interface Control Annex
ICD	Interface Control Document
ICHA	Integrated Cargo Hazard Assessment
IDD	Interface Definition Document
IFM	Inflight Maintenance
IRB	Institutional Review Board

JEA	Joint Endeavor Agreement
JSC	Lyndon B. Johnson Space Center
kg	kilograms
KSC	John F. Kennedy Space Center
kWh	Kilowatt Hours
L&L	Launch and Landing
L-	Launch Minus
LCC	Launch Commit Criteria
LSA	Launch Services Agreement
LSSM	Launch Site Support Manager
LSSO	Launch Site Safety Office
m	meter(s)
MCC-H	Mission Control Center-Houston
MMT	Mission Management Team
MOA	Memorandum of Agreement
MOD	Mission Operations Directorate
MSID	Measurement Stimuli Identification
N/A	Not Applicable
N/R	Not Required
NASA	National Aeronautics and Space Administration
no.	number
O&C	Operations and Checkout
OMRSD	Operations and Maintenance Requirements and Specifications Document
OMS	Orbital Maneuvering System
OPF	Orbiter Processing Facility
OST	Operations Support Timeline
PGSC	Payload and General Support Computer
pH	Hydrogen-Ion Concentration (Alkalinity)
PIP	Payload Integration Plan
PMCR	Payload Management Countdown Review
PRR	Payload Readiness Review
PSR	Payload Safety Review
SFT&FO	Spaceflight Training and Facility Operations
SIP	Standard Integration Plan
SLF	Shuttle Landing Facility
SMS	Shuttle Mission Simulator
SN	Space Network
SRB	Solid Rocket Booster

SSP	Space Shuttle Program
SN	Space Network
TBD	To Be Determined
TBR	To Be Resolved
TOP	Technical Operating Procedure
TV	Television
VPF	Vertical Processing Facility
W	Watt
WSSH	White Sands Space Harbor

APPENDIX D

DEFINITIONS

a. Postinstallation - Period of time from installation for flight to Solid Rocket Booster (SRB) ignition.

b. Ascent - The period of time from SRB ignition through the establishment of a stable orbit (typically post-Orbital Maneuvering System (OMS) second burn).

c. Cargo Element - The minimum complement of specific structure, instruments, space equipment, and support hardware integrated into the Orbiter payload bay as a single unit.

d. Control Weight - This weight is defined as the weight for all customer-provided hardware.

e. Descent - The period of time from start of prep for entry through wheel stop.

f. Flight - That portion of a mission encompassing the period from SRB ignition (T-0) to landing (wheels stop).

g. Flight Data File (FDF) - The onboard complement of timelines, procedures, reference material, and test data available to the crew for flight execution.

h. Intravehicular Activity (IVA) - Crew shirtsleeve operations in a pressurized environment.

i. Payload Preoperation - The period of time from just after the establishment of a stable orbit until the start of the operation sequence.

j. Payload Operation - The period of time from the start of the operation sequence until the completion of the postoperation reconfiguration.

k. Payload Postoperation - The period of time from the completion of the postoperation reconfiguration to start of preparation for entry.

l. Postflight - The period of time from wheels stop to the removal of the payload from the Orbiter.