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Baseline
September 1998
Addendum 107 (May 2001)

Space Shuttle Program

SPACEHAB-General Research/Logistics Mission

Launch Site Support Plan

Carrier Integration Plan (NSTS 21426)
Annex 8

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ADDENDUM TO
LAUNCH SITE SUPPORT PLAN
SPACE SHUTTLE PROGRAM
AND
SPACEHAB – GENERAL-RESEARCH/LOGISTICS MISSIONS REQUIREMENTS
FOR
STS-107

May 2001

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ADDENDUM TO

SPACEHAB GENERAL RESEARCH/LOGISTICS MISSION

LAUNCH SITE SUPPORT PLAN

FOR

STS-107

This is a mission-unique addendum to the SPACEHAB-General Research/Logistics Mission (GRLM) Launch Site Support Plan (LSSP), K-PSM-11.234-BL-SH-GRLM. The sections in this addendum contain requirements unique to the STS-107 mission and are numbered to correspond to the same sections of K-PSM-11.234-BL-SH-GRLM. New numbered sections added are identified with new paragraph numbers. All sections of K-PSM-11.234-BL-SH-GRLM are applicable to the STS-107 mission except as modified by this addendum.

2.1 GENERAL

For STS-107, SPACEHAB will utilize a double module configuration known as the Research Double Module (RDM) and the unique tunnel configuration shown in Figures A107-2 and A107-3. Agreements made concerning tunnel buildup, installation, and testing are documented in Section 2.3.1. Any requirements that utilize Shuttle services will be identified in the appropriate section of this addendum.

Figure A107-1 depicts the overall RDM processing flow for the STS-107 mission.

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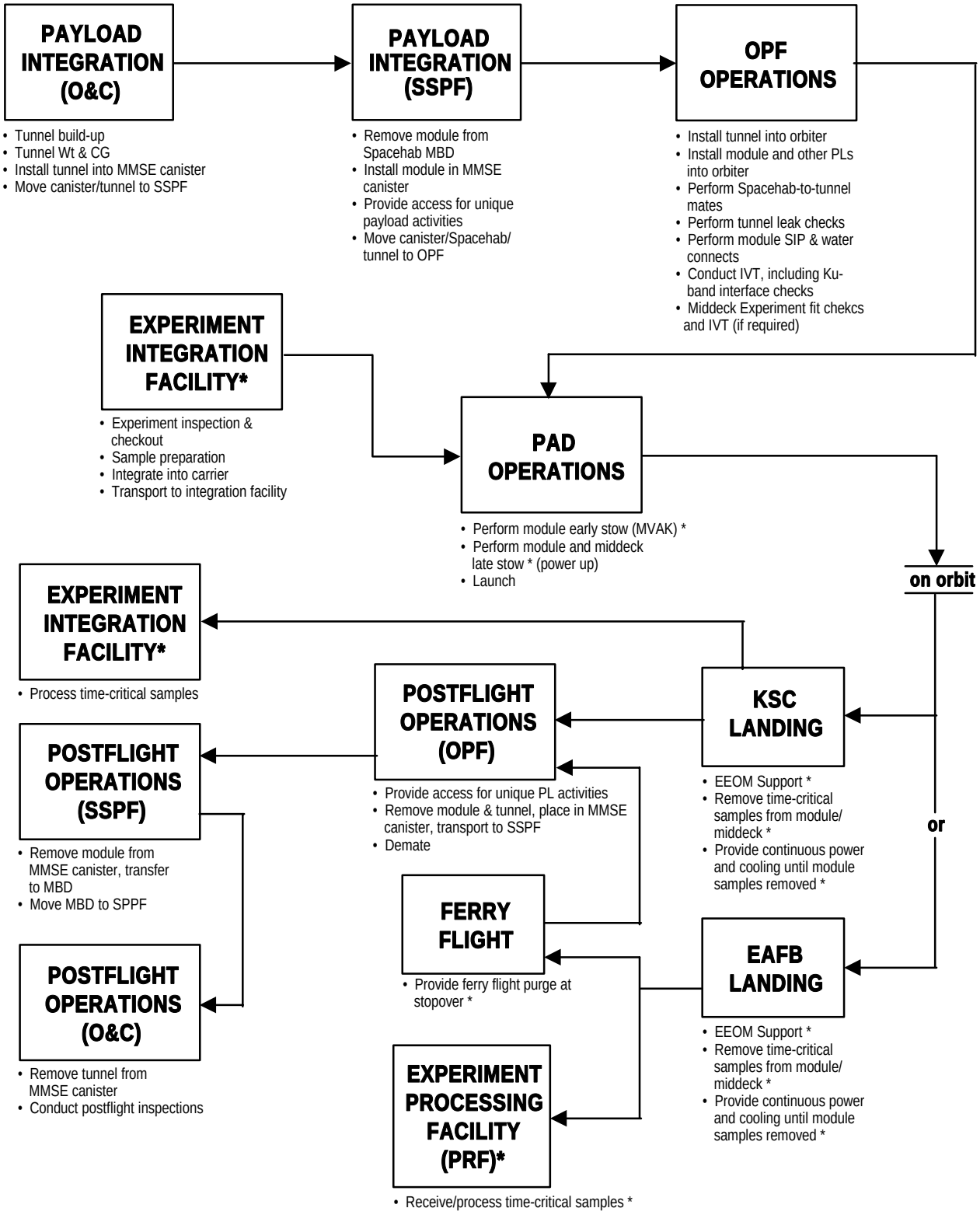

Figure A107-1. STS-107 RDM Ground Processing Flow

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2.2 PAYLOAD DESCRIPTION

STS-107 marks the first flight of the SPACEHAB RDM. The RDM is a laboratory for conducting scientific experiments on-board the Space Shuttle. The RDM provides a 10,000-pound payload capacity with a full range of power, data, commanding, video, and environmental control services. The RDM utilizes the existing Flight Unit-1 (FU-1) module for the forward module as well as both bulkheads and FU-4 for the aft module, structurally joined by the center adaptive structure (intermediate adapter) and gask-o-seals. The intermediate adapter and the aft module FU-4 are new hardware of the Logistics Double Module (LDM) design. Whereas the LDM supported one double rack per side, a new rack support structure in the RDM aft module accommodates up to two SPACEHAB racks per side. The module is connected to the orbiter through a series of rigid and flexible tunnel sections and the SSP tunnel adapter (see figures A107-2 and A107-3). For STS-107 a new SPACEHAB provided 7.87-inch tunnel segment is required to support proper location of the RDM with respect to the cargo bay. This new segment will be forward of the 65.31-inch existing SPACEHAB provided tunnel segment. Like the existing tunnel segment, the cylinder is machined from a 6061-T652 aluminum forging and has an internal diameter of 46.56 inches. Its wall thickness is 0.19 inches. The bolt pattern on the flange is arranged on a 49.0-inch circular pattern with sixty equally spaced slotted holes on the forward and aft flanges.

RDM draws its resources from the orbiter cabin and from the orbiter cargo bay payload support provisions. Payload accommodations, cooling, command/data and power provisions are included within RDM, in addition to housekeeping services such as audio, lighting, smoke detection, fire suppression, atmospheric pressure control, status monitoring and control, and thermal environmental control.

2.2.1 EXPERIMENTS

The STS-107 flight of RDM will serve as an on-orbit platform for experiments covering the following scientific disciplines: biology (general, molecular, micro, and cellular), biochemistry, animal sciences, aquatics, and physiology. These experiments are sponsored by NASA Code U, ESA, SPACEHAB, and other commercial entities.

The Space Shuttle Program has contracted SPACEHAB to act as integrator for all experiments flying on STS-107, both module and middeck. As integrator, it is SPACEHAB's responsibility to provide transportation of experiments from their offline integration facility to the location at which the experiments are integrated for flight. Many experiments will be integrated into the RDM at the SPACEHAB Payload Processing Facility (SPPF). Other experiments will be integrated at the pad during module early stow, module late stow, and middeck late stow. Integration and interface verification testing of experiments into the module will be accomplished by SPACEHAB personnel. NASA-KSC will provide Module Vertical Access Kit (MVAK) support and pad schedule time for the operation. Middeck experiments will be delivered to the white room by SPACEHAB personnel, turned over to either NASA-KSC payloads or Flight Crew Equipment (FCE)

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personnel for subsequent installation and IVT. SPACEHAB is also responsible for providing experiment transportation during scrub turnaround, End of Mission (EOM), and Early End of Mission (EEOM) at the Shuttle Landing Facility (SLF). For the alternate landing site, SPACEHAB is responsible for experiment transportation to Area A.

STS-107 offline requirements executed for NASA Code U, or under the Space Act Agreement (SAA) with Bionetics Corporation, are outside the Carrier Integration Plan, NSTS-21426; Annex 8, K-PSM-11.234-ADD-107; or the scope of the SPACEHAB Research and Logistics Support Contract. NASA Code U offline lab requirements, allocations, and support are the responsibility of NASA KSC and its support contractors, as negotiated directly with the NASA Code U Mission Manager. Experiment requirements, allocations, and support for offline processing under the SAA are the responsibility of the Bionetics Corporation. Requirements for NASA Code U and Bionetics SAA experiments are documented in L-50072.1, *Ground Support Requirements Document*, or the PRD (TBD-1). SPACEHAB Program requirements are documented in Table 4-1.

Table A107-1 contains a list of STS-107 experiments accurate at the time of this writing. See NSTS 21426 SPACEHAB – General Research/Logistics Mission Carrier Integration Plan (CIP) for up-to-date information.

Table A107-1. STS-107 Experiments

Experiment	Originator	Flight Location
APCF – Advanced Protein Crystallization Facility	ESA	Module Aft BH
ARMS - Advanced Respiration Monitoring System	SPACEHAB/ ESA	Module Fwd BH
AST 10/1 - Astroculture Plant Growth Chamber	Code U	Module Aft BH
AST 10/2 – Glovebox	Code U	Module Rack
BDS-05 – Bioreactor Development System-05	Code U	Module Aft BH & Middeck
Biobox	ESA	Module Aft BH
Biopack	ESA	Middeck
Biotube- MFA	Code U	Module Aft BH
BRIC – Biological Research in Canisters	Code U	Middeck
CIBX – Commercial (Instrumentation Technology Associates) Biomedical Experiment	Code U	Module Aft BH
CEBAS - Closed Equilibrated Biological Aquatic System	SPACEHAB/ DLR	Middeck

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CM-2 Combustion Module-2	All Code U	Module Racks
a). LSP – Laminar Soot Processes		
b). SOFBALL – Structure of Flame Ball at Low Lewis Number		
c). Water Mist		
d). OARE – Orbital Acceleration Research Experiment System (mounted in PLB)		Payload Bay
CMCPG - Commercial Macromolecular Protein Crystal Growth	SPACEHAB	Middeck
COM2PLEX – Combined 2 Phase Loop Experiment	SPACEHAB/ ESA	Module Rooftop
CPCG-PCF - Commercial Protein Crystal Growth – Protein Crystallization Facility	Code U	Module Aft BH
ERISTO – European Research In Space and Terrestial Osteoporosis	ESA	Module Aft BH
Ergometer	Code U/ESA	Module
FAST - Facility for Adsorption & Surface Tension	NASA/ESA	Module Aft BH
FRESH-2 – Fundamental Rodent Experiments Supporting Health-2	Code U	Module Fwd BH
HLS- Human Life Sciences	All Code U	
Facility: PhAB-4 – Physiology and Biochemistry - 4		Middeck, Module
a). Latent Virus		
b). PTO - Protein Turnover		
c). CaKin - Calcium Kinetics during Space Flight		
d). Renal Stone		
Facility: MPFE - Microbial Physiology Flight Experiment		Middeck, Module Aft BH
a). AMS – Automated Microbiology System		
Facility (and experiment): Sleep-3 – Sleep-Wake Actigraphy and Light Exposure During Spaceflight-3		Module FWd & Aft BH
Additional HLS Support Hardware:		Middeck & Crew
a). EOR/F – Enhanced Orbiter Refrigerator/Freezer		
b). TEHM – Thermo Electric Holding Module		
c). Centrifuge		
MGM - Mechanics of Granular Materials	Code U	Module Aft BH
MSTRS – Miniature Satellite Threat Reporting System	SPACEHAB/ DoD	Module & Rooftop

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OSTEO - Osteoporosis Experiment in Orbit	SPACEHAB/ CSA	Middeck
SAMS–FF – Space Acceleration Measuring System - Free Flyer	NASA/GRC	CM-2, Module Fwd BH, Module Aft BH
SHFDF - SPACEHAB Flight Data File	SPACEHAB	Middeck & Module rack
StarNav – Star Navigation	SPACEHAB/ CSCE/Texas A&M	
S*T*A*R*S Bootes – Space Technology & Research Students - Bootes	SPACEHAB	Module Aft BH
VCD FE - Vapor Compression Distillation - Flight Experiment	NASA/ISS	Module rack
ZCG-01- Zeolite Crystal Growth Furnace	Code U	Middeck, Module Aft BH, Module rack

2.3 PAYLOAD INTEGRATION

2.3.1 TUNNEL CONFIGURATION AND INTEGRATION RESPONSIBILITIES

For STS-107, the RDM will use a new tunnel configuration. This tunnel will be assembled with components from the existing SPACEHAB tunnel, the existing Spacelab tunnel, and new components. Figures A107-2 and A107-3 details the STS-107 cargo bay configuration and tunnel components.

The tunnel will be built-up in the Operations & Checkout (O&C) building by Payload Ground Operations Contract (PGOC) personnel using SPACEHAB engineering. Consequently, SPACEHAB bears configuration control responsibility. Special built hardware, both flight hardware and GSE, will be provided by SPACEHAB or KSC Payload Carriers Office via special agreement. Figure A107-3 is used to reference components and to outline integration responsibilities. Table A107-2 details tunnel components, origin, and integration responsibilities.

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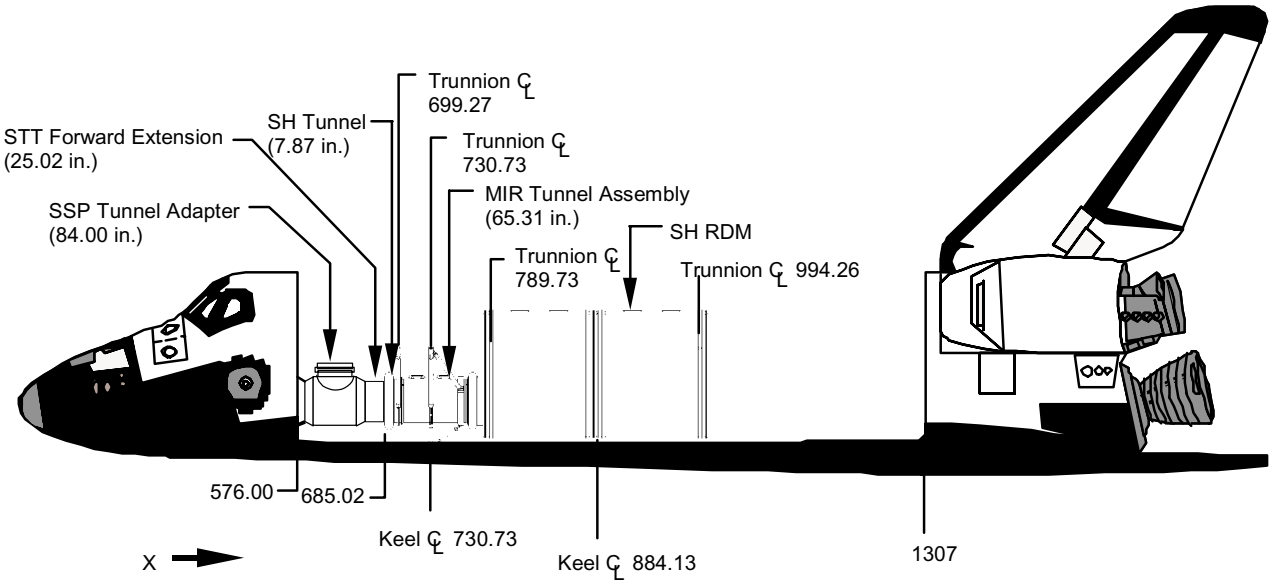

Figure A107-2. Research Double Module Cargo Bay

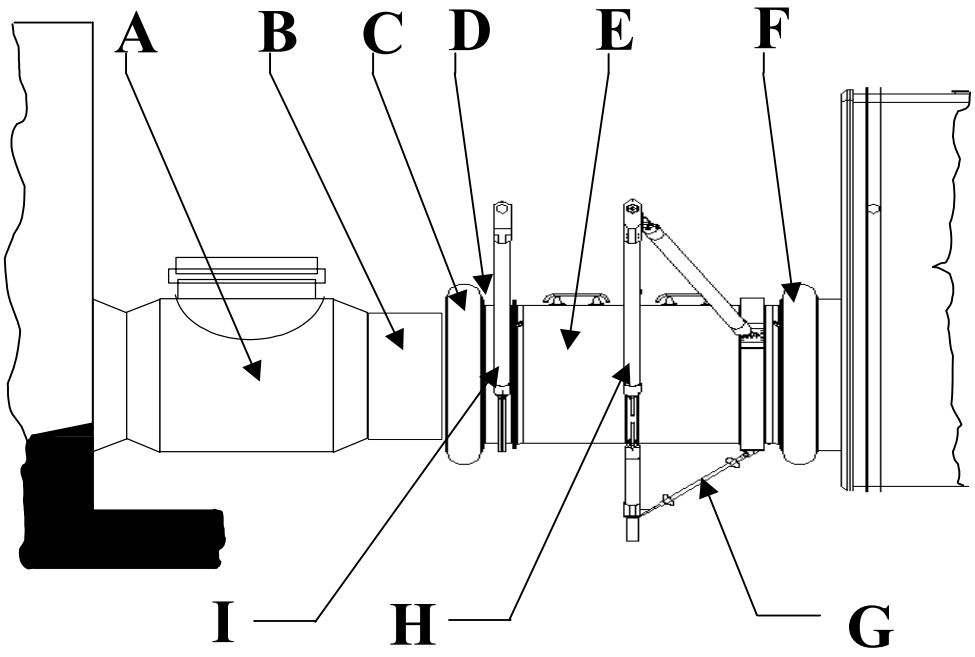

Figure A107-3. SPACEHAB – RDM Tunnel Configuration

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Table A107-2. Tunnel Build-up Responsibilities, Reference Figure A107-3

Comp	Name	Provider	Notes
A	STT Tunnel Adapter (TA)	Payload Carriers Program (PCP)	Existing hardware. Installed into orbiter prior to PL arrival. SFOC task
B	STT Forward Extension (FE)	PCP	Existing hardware. Transferred from O&C to OPF by PGOC, mated to TA (and leak check) by SFOC prior to PL arrival
C	Forward Flex Section (FFS)	SPACEHAB	Existing hardware. Integrated in O&C by PGOC. Mate to FE accomplished by PGOC. Both joints leak checked by PGOC
D	SH 7.87” Tunnel Segment	SPACEHAB	New hardware. SPACEHAB to deliver tunnel segment and related hardware to O&C for PGOC integration
E	Mir 65.31” Tunnel Segment	SPACEHAB	Existing Hardware. PGOC integration.
F	Aft Flex Section (AFS)	SPACEHAB	Existing hardware. PGOC integration. Leak check to 65.31” tunnel segment not needed if interface has not been disturbed. Mate to SPACEHAB accomplished by SPACEHAB. AFS to SPACEHAB joint leak checked by PGOC.
G	Keel Strut	SPACEHAB	New hardware. SPACEHAB to deliver strut and related hardware to O&C for PGOC integration.
H	Aft Trunnions and Struts	SPACEHAB	Existing hardware. Remains attached to Mir segment from past mission. PGOC integration.
I	Forward Trunnions and Struts	PCP	Existing hardware. Removed from Spacelab tunnel. Integrated to SH 7.87” tunnel segment by PGOC.
Not Shown	GSE Trunnion Support Struts	Boeing - KSC	Special-built hardware for new tunnel configuration

2.3.2 CANISTER OPERATIONS

The integrated tunnel will be placed in the Multi Mission Support Equipment (MMSE) canister and moved from the O&C building to the Space Station Processing Facility (SSPF). The RDM module will arrive at the SSPF in the SPACEHAB Mobile Build-up

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Device (MBD). The module will be placed in the MMSE canister and both module and tunnel will be transported to the OPF.

2.4 ORBITER INTEGRATION

2.4.1 OPF OPERATIONS

Since the RDM will utilize the orbiter high rate Ku-band system to downlink experiment data and to uplink commands, and the Ku-band system cannot be tested at the pad, the first flight of RDM must be routed to the OPF for orbiter installation and Interface Verification Testing (IVT).

At the OPF, the payload contingent will be installed into the orbiter in stages. Before canister arrival at the OPF, the tunnel forward extension will be delivered to the OPF and mated to the tunnel adapter.

Once the STT Forward Extension is installed, SH requires that the air flowrate and pressure drop be measured at the Orbiter tunnel/SH tunnel interface. The measurements will be made by SH personnel using SH provided GSE. For this test, all Orbiter/tunnel air ducts and vents will be set to the on-orbit configuration, and the Orbiter Cabin Fan will be powered on. This data will be used to properly balance SH Module airflow prior to module turnover. If necessary, SH personnel will correct the flow rate by making adjustments to the RDM Air Revitalization System (ARS).

After canister arrival, the tunnel will be hoisted out of the canister, installed into the PLB, and mated to the forward extension. When tunnel installation is complete, the module and other PL elements will be installed into the orbiter. (TBD-2) The module will then be mated to the tunnel, leak checks performed on the new tunnel interfaces, and those areas will be closed out for flight. Water line and Standard Interface Panel (SIP) connects are then completed.

As mentioned previously, the RDM IVT will include a test of the RDM to orbiter Ku-band interface. The Ku-band portion of the IVT will test the interaction between the RDM Experiment Data System Main Unit (EDSMU) and the orbiter Ku-band Signal Processor (KuSP) for both downlinking of experiment data and uplinking of commands. For the downlink, RDM will utilize KuSP channel 2 (up to 2 Mega bits per second (Mbps)) and KuSP channel 3 (up to 48 Mbps). Commands will be uplinked using the KuSP forward link, at a rate of 128 kilobits per second (Kbps). EDS GSE will be set up in the OPF C&T lab and interface directly with the Ku GSE. The EDS GSE will generate commands to be routed to the EDSMU and process EDSMU telemetry.

Prior to installation and IVT, a fit check will be required for the middeck payload Biopack and its two Payload Mounting Panels (PMPs). (TBD-3) The fit check should occur early enough to allow modification of the PMPs if necessary. As part of the test of the RDM to orbiter Ku interfaces, SH will perform a data flow test for Biopack. SH prefers that the

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cable connections to Biopack not be broken following the data flow test. However, it will not be necessary to re-perform the data flow test if the cable connection must be broken.

At the conclusion of payload testing in the OPF, payload close-out operations prior to payload bay doors (PLBD) closure will include final switch setting, sharp edge inspection, close-out photos, a crew walkdown, and final inspection. Close-out photos of SH rooftop payloads will be required.

The PLBD are closed at the completion of OPF activities, and reopening for payload activities is not the baseline from this point through launch.

The payload bay (PLB) purge will be discontinued prior to OPF rollout. The orbiter will be towed to the Vehicle Assembly Building (VAB) for integration with the other shuttle elements. The purge will be re-established after the orbiter is connected to the mobile launch platform (MLP) services. No payload operations are planned in the VAB.

2.4.2 PAD OPERATIONS

The crawler transporter moves the shuttle and MLP to the pad. Payload-unique activities are not the baseline during pad operations. Normally, the PLBD are not opened for payload activities. Access for installation or servicing of time-critical payload items at the pad is a nonstandard service.

2.4.3 LATE PAYLOAD OPERATIONS

2.4.3.1 MODULE ACCESS AT PAD

On-pad access to the RDM module for experiment operations will be provided as a nonstandard service through the crew compartment airlock using the Module Vertical Access Kit (MVAK). SPACEHAB requires two module late access opportunities for time critical payload element installation and final module stowage. The first module stowage opportunity will occur within L-2 weeks, the second will require a duration of 20 hours with completion at L-31 hours.

2.4.3.2 MIDDECK ACCESS AT PAD

Installation or servicing of payload time-critical middeck items will be performed as a nonstandard service. Late installation middeck experiments will be turned over from SPACEHAB to KSC so that installation into the orbiter middeck can be completed within L-24 hours (nonstandard service) and as scheduled by the SSP. (TBD-4?) The following experiments will require late middeck installation:

1. SH FDF: L-2 days
2. CEBAS: L-17 hours
3. CMPCG: L-24 hours
4. OSTEO: L-24 hours

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5. Biopack content: L-17 hours
6. Biopack glovebox tray: L-17 hours
7. Biopack PTCU MLSI (5°C): L-17 hours
8. Biopack PTCU (5°C): L-17 hours
9. Biopack PTCU (-10°C): L-24 hours
10. BDS-05: L-24 hours
11. HLS: L-24 hours
12. BRIC: L-17.5 hours
13. ZCG Autoclaves: L-22 hours

2.4.4 LAUNCH COUNTDOWN

The SPACEHAB RDM will be powered for launch countdown and ascent. Several mission and safety-critical systems will be operating during the countdown. As a consequence, the following Launch Commit Criteria (LCC) will be in effect and will be monitored at the Launch Control Center (LCC) console C-1. This table is for reference only, see document NSTS 16007 for details.

Table A107-3. Launch Commit Criteria

ID Number	RDM Title
RDM-01	SH HFA FAN ANOMALY
RDM-02	PDU EMERGENCY BUS VOLTAGE ANOMALY
RDM-03	SH SMOKE/FIRE ANOMALY
RDM-04	SH DMU INTERFACE/POWER FAILURE
RDM-05	PAYLOAD AFT MAIN B POWER ANOMALY
RDM-06	SH MAIN POWER ANOMALY
RDM-07	SH INDIVIDUAL HALON BOTTLE DISCHARGE INDICATION
RDM-08	SH SUBSYSTEM WATER LOOP FLOW RATE ANOMALY
RDM-09	SH SUBSYSTEM WATER PUMP ACCUMULATOR QUANTITY (high/low) ANOMALY
RDM-10	SH SUBSYSTEM WATER PUMP INLET PRESSURE (high/low) ANOMALY
RDM-11	SH SUBSYSTEM WATER PUMP OUTLET PRESSURE (high/low) ANOMALY

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ID Number	RDM Title
RDM-12	CEWPP ACCUMULATOR QUANTITY ANOMALY
RDM-13	CEWPP INLET PRESSURE ANOMALY
RDM-14	CEWPP OUTLET PRESSURE ANOMALY

2.4.5 LAUNCH DELAY CONTINGENCIES

The following was accurate at the time of this writing, please reference STS-107 Time-critical Ground Handling (TGHR) table for up to date scrub turnaround requirements for middeck payloads, and OMRSD File 2, Volume 2 for module payload scrub turnaround requirements.

24-hour launch delay – middeck experiments: The following specified experiments can only sustain initial planned launch attempt (including launch window) without refurbishment. If there is a launch delay of 24 hours or greater from the initial launch attempt these experiments must be removed, refurbished, and reinstalled:

Payload	MLE	Power IVT	Launch Delay Requirement
OSTEO	1	1	Remove locker & power cable after each scrubbed launch attempt and replace with flight ready backups
BEI Content	2		R & R content
Biopack Glovebox Tray	1		R & Refurbish at base of Pad
Biopack PTCU MLSI (5°C)	1		R & R
Biopack PTCU (5°C)	1		R & R
BRIC	1	1	R & R locker

48-hour launch delay – middeck experiments: The following specified experiments can only sustain initial planned launch attempt, plus an additional launch attempt (including launch window) 24 hours later without refurbishment. If the launch delay is 48 hours or greater, these experiments will be removed, refurbished, and reinstalled.

Payload	MLE	Power IVT	Launch Delay Requirement
CMPCG	1	1	Refurbish CRIM-M
CEBAS	1	1	Refurbish locker
BDS-05	1		Refurbish content
HLS	1.5		Refurbish content
ZCG Autoclaves	1		Refurbish content
Biopack PTCU (-10°C)	2		Refurbish content

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48-hour launch delay – module experiments: The following specified experiments can only sustain initial planned launch attempt, plus an additional launch attempt (including launch window) 24 hours later without refurbishment. If the launch delay is greater than 48 hours, these experiments will be removed, refurbished, and reinstalled. For any module scrub scenario a dwell time of up to (TBD) hours is required from module experiment destow activity complete until the start of experiment reinstallation, to provide sufficient time for experiment refurbishment in support of the next series of launch attempts. The specific dwell time will be negotiated with KSC. KSC scheduling and MVAK support will be required.

1. S*T*A*R*S Bootes
2. ERISTO
3. FAST
4. APCF
5. BioBox
6. MGM
7. BDS-05
8. TEHM contents
9. HLS contents in TEHM and EOR/F
10. AST 10/1
11. AST 10/2
12. CPCG-PCF
13. FRESH-2*
14. Biotube
15. CIBX

30 days or greater delay – module experiments
Add the following:

If there is a launch delay of 30 days or greater from the initial T-0 for which the hardware was installed, the following experiments will be removed, refurbished, and reinstalled, and the following activities will be performed:

EOR/F – Perform health check and replace limited life battery
MGM – Exercise TDLA accumulators

2.5.1 OPERATIONS AT PRIMARY AND FIRST ALTERNATE EOM AND EEOM LANDING SITE

For the STS-107 landing at KSC or Dryden Flight Research Center (DFRC) early middeck and module access is required for the following items (non-standard service). Access will be provided after either a nominal EOM or an EEOM. The SH program requires Orbiter personnel to be in place to support module access for the standard minimum duration flight beginning at L+48 hours:

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Middeck Experiments

CEBAS *	Remove aquatic system	R+3 hrs
CEBAS Stowage	Remove 8mm Tape	R+3 hrs
CMPCG *	CRIM-M	R+4 hrs
OSTEO	1 Locker	R+3 hrs
Biopack	Remove Sample Containers from BEI	R+3 hrs
HLS	1.5 Locker	R+3 hrs
BDS-05	2 Small Trays	R+3 hrs
BRIC	1 Large Tray	R+3 hrs
SH FDF	1 Double Half Tray	R+3 hrs
ZCG Autoclaves	1 Large Tray	R+3 hrs
SH Return to Houston Bag	1 Jettison Stowage Bag with SH used media	R+3 hrs
Biopack Glovebox Tray	1 Large Foam Tray	R+3 hrs
Biopack PTCU's	3 LargeTrays	R+3 hrs
Biopack PTCU MLSI	1 MLSI with PTCU insides	R+3 hrs

* Requires continuous power following removal. Battery and cables are SH provided.

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Module Experiments

MSTRS	Sealed hard drive provided to customer at launch site	R+5 hours
S*T*A*R*S-Bootes *	1 Locker	R+5 hours
ERISTO	1 Locker	R+5 hours
APCF *	1 Locker	R+5 hours
Biobox *	Biobox Unit @ KSC, Internal experiment platform @ EAFB	R+5 hours
VCD FE	Remove sample collection box from TEHM	R+5 hours
SAMS-FF	CDU Box	R+5 hours
MGM	Remove stowage hardware and test cells	R+5 hours
BDS-05 *	2 Lockers	R+5 hours
HLS	Remove all blood, saliva, and urine samples from EOR/F and TEHM 1 Soft stow bag with bar code readers and monitoring devices. Remove MPFE card trays from TEHM Remove MPFE Floppy disk kit	R+5 hours
TEHM	Remove content	R+5 hours
EOR/F	Deactivate and isolate Freon system. Remove ATR.	R+5 hours
AST 10/1 *	Plant Growth Chamber	R+5 hours
AST 10/2	Glovebox	R+5 hours
CPCG-PCF	1 CRIM-M	R+5 hours
CIBX *	1 CRIM	R+5 hours
ZCG-1	0.5 MLE soft stow bag containing ZCG stowage	R+5 hours
FRESH-2 *	3 Single Lockers	R+5 hours
Biotube	1 Locker	R+5 hours
SH FDF	1 Large Tray (Module)	R+5 hours
SH Trash	SH wet and dry trash	R+5 hours

* Requires continuous power following removal. Battery and cables are SH provided

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3.3 OPEN ITEMS

TBD-1	Methods to arrange and document SAA experiment support requirements satisfied by PGOC has not been determined.
TBD-2	Sequence of payload element installation into orbiter has not been determined.
TBD-3	Requirements for OPF fit check, installation, and testing of middeck experiments have not been solidified.
TBD-4	Exact times and durations for middeck and module stowage has not been determined.
TBD-5	Middeck and module early and late stow requirements have not been finalized in CIP 21426 and P095, OMRSD File 2, Volume 2. TGHR table has not been baselined.
TBD-6	KSC support requirements for experiments, both pre and post launch, have not been solidified.

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SECTION IV

LAUNCH AND LANDING
REQUIREMENTS/KSC COMMITMENTS

4.1 GENERAL

This section lists STS-107-specific experiment requirements sponsored through the CIP, NSTS-21426, and cross-references KSC responses and commitments. These requirements are contained in Tables 4-1 and 4-2. All services and support to be furnished by KSC to the customer will be provided by KSC on a best effort basis. Requirements satisfied by the Life Sciences Support Contractor (LSSC) are documented in L-50072.1 Ground Support Requirements Document (GSRD), an addendum to this document.

Table 4-1. Integration and Test Requirements Cross-Reference Matrix

REQ. NO.	REQUIREMENT DESCRIPTION	PHASE OF INTEG	KSC COMMIT	COMMIT SOURCE
Biopack 01	Fit check and installation of BIF and BEI	OI OPF		
Biopack 02	Data test for Biopack payload	OI OPF		
BRIC 01	Perform BRIC Middeck IVT power only	OI PAD		
CMPCG 01	Perform CMPCG Middeck IVT power only	OI PAD		
CEBAS 04	Perform CEBAS Middeck IVT power only	OI PAD		
OSTEO 02	Perform OSTEO Middeck IVT power only	OI PAD		

Table 4-2. Support Requirements Cross-Reference Matrix

REQ. NO.	REQUIREMENT DESCRIPTION	PHASE OF INTEG	KSC COMMIT	COMMIT SOURCE
Biobox 01	Extend PDI data 19.2 kbps asynchronous data between JSC Building 30/MCC Room (TBD) to KSC (Hangar L, EMA Room 180)	PRE EI IF		
Biobox 02	Provide Hangar L RS232 downlink data interface	PRE EI IF		

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Biobox 03	Provide Hangar L Ethernet connection for LOS data	PRE EI IF		
Biopack 01	Extend PDI data 19.2 kbps asynchronous data between JSC Building 30/MCC Room (TBD) to KSC (Hangar L, EMA Room 180)	PRE EI IF		
Biopack 02	Provide Hangar L RS232 downlink data interface	PRE EI IF		
Biopack 03	Provide Hangar L Ethernet connection for LOS data	PRE EI IF		
Biopack 04	Provide Hangar L CAS Data	PRE EI IF		
Biopack 05	Biopack glovebox to be refurbished at base of pad following first unsuccessful launch attempt	OI PAD		
Biotube/BRIC 01	Provide Hangar L CAS Data	PRE EI IF		
CEBAS 01	1 Middeck experiment transport container (door down)	PRE EI		
CEBAS 02	Provide Hangar L CAS Data	PRE EI IF		
CEBAS 03	Final Closeout Photo after installation	OI PAD		
COM2PLEX 01	Closeout photo at OPF/Pad	OI OPF		
HLS 01	Closeout photo following installation	OI PAD		
HLS-02	Provide all wet and dry trash disposal from orbiter after landing	POSTFL-K POSTFL-D		
MSTRS 01	MSTRS personnel will be present at early retrieval	POSTFL-K POSTFL-D		
MSTRS 02	Closeout Photo at OPF/Pad	OI OPF		
OSTEO 01	Closeout photo following installation	OI PAD		
StarNav 01	Closeout photo at OPF/Pad	OI OPF		

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5.1 GENERAL

Agreed upon nonstandard services to be performed at the pad for this cargo element are as follows:

a. Late SPACEHAB double module access via MVAK – within L-2 weeks
b. Late SPACEHAB double module access via MVAK – within L-40 hours.
c. Late middeck access – within L-24 hours
d. Early middeck and module access at both KSC and Dryden landing sites.

SSP will provide ground cooling capability for continuous electrical power and cooling for early module destow after a nominal duration mission, or in the event of an EEOM.

SSP will provide use of a ground power unit to provide continuous power and cooling for early module destow beginning at NEOM + 2 days.

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NASA

UB	Hall, Roger
UB	Romanella, Russell
UB-1	Corey, Todd
UB-B1	Sawyer, Renee
UB-B1	Skipper, Patti
UB-B1-A	Brawn, Lisa
UB-C	Gardner, Ruth
UB-C2	Bruder, Mike
UB-C2	Patel, Shirishbhai
UB-D	Alonso, Jose
UB-D	Lodge, Cynthia
UB-E	Mathis, Johnny
UB-E	Ruiz, Jeannie
UB-E	Smith, Maynette
UB-F	Jansen, Bruce
UB-F2	Reed, James
UB-F2	Scaltsas, Richard
UB-G	Galloway, Thomas
UB-G4	Link, John
UB-G4	Wahlberg, Jennifer
UB-G5	SotoCora, Heriberto
UB-H	Burnett, Josephine
UB-H	Sturm, Robert
UB-M	O'Fallon, Lee
TA-B2	Springstroh, Timothy
TA-B2-E	Caldwell-1, Debra
TA-C2	Scott, Randall
VA-B	Sawyer, Buzz

BOEING

721C-R210	Turner, Alan
721G-0005	Erickson, Jamie B.
721G-O003	Brown, Ellen
721G-O009	Sanchez, Lorenzo
721M-5115	Thomas, David
721O-C140	Sieber, Sharon
721O-C145	Hessler, Rob
721O-C175	Norgren, Jeff
721O-C250	Holder, Cassandra
721O-C310	O'Connor, Charlie
721O-C425	Augustine, Rich
721O-C425	Walters, Jeffery
721O-C500	Edwards, Mark
721S-PPF1	Brewer, Mark
721S-PPF1	Tuttle, Jeffry
721S-S130	Chauvin, Skip
721S-S140	Houck, Gerry
721S-S140	Ward, Cynthia
721S-S145	Kleba, Louise
721S-S145	Whittington, Dan
721S-S150	Patterson, Sarah
721S-S150	Setterberg, Roger
721S-S205	Schofield, James
721S-S225	Balzer, John
721S-S230	Fussell, Ron
721S-S230	Lombardo, Mike
721S-S230	Graves, John
721S-S230	VanScyoc, Neal
721S-S235	Olson, Rod
721S-S235	Kinslow, Mike
721S-S240	Fardelmann, Paul
721S-S240	Weyant, Tim
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721S-S250	McGinley, Joel
721S-S255	Page, Kim
721S-S270	Lintereur, Phil
721S-S303	Edwards, Mike
721S-S303	Geers, David
721S-S305	Jackson, Kevin
721S-S310	Zirnfus, Steve
721S-S325	Edmundson, James
721S-S335	McLean, Cheri
721S-S340	Harper, Sean

USA

USK-246	Koller, Shirley

Non-KSC

GSFC-450.C	Morris, Tom

For Distribution Changes Contact: John Balzer, Boeing-721S-S225, (321) 867-5745

ELECTRONIC DISTRIBUTION

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