ULF-1 Utilization Overview

ULF-1 Utilization Overview Outline

- **Payloads**

  Facility Class Racks

  – EXPRESS Rack 6 (used for testing only)

  – Human Research Facility 2 (HRF-2) Sub-Rack

  Integrated Payloads

  - Refrigerated Centrifuge (RC)
  - Space Linear Acceleration Mass Measurement (SLAMMD)
  - Rack 2 Workstation (R2WS)
  - Pulmonary Function Module (PFM)
  - Gas Delivery System (GDS)

  – Minus Eighty Degree Celsius Laboratory Freezer for the ISS (MELFI)

  – Window Observational Research Facility (WORF)

  EXPRESS Sub-Rack Payloads

  – Advanced Astroculture-Growth Chamger (ADVASC-GC)

  – Commercial Protein Crystal Growth (CPCG-H, CPCG-V)

  – Protein Crystal Growth – Single Thermal Enclosure System (PCG-STES)

  – Space Dynamically Responding Ultrasonic Matrix System (Space-DRUMS^{Tm})

- **EXPRESS Transportation Rack**
- **Payload Interfaces**
- **Fluids**
- **Additional Hardware**

Expedite the Processing of Experiments to Space Station (EXPRESS) Rack 6

- EXPRESS Rack 6 (ER6) is an International Standard Payload Rack (ISPR)
- The EXPRESS Rack has 8 locker locations and 2 drawers
- This allows it to take several small payloads or larger payloads that are integrated into more than one locker
- Some payloads may even take up all of the EXPRESS Rack
- ER6 has already been tested in PTCS (including Joint Ops using 8A subrack payloads)
- Originally manifested for ULF-1 but will be replaced by MELFI (not official as of 3/28/02)

EXPRESS Rack Overview (cont):

The 8/2 EXPRESS rack provides standard interfaces to mid-deck locker compatible payloads or small payloads encapsulated in a drawer

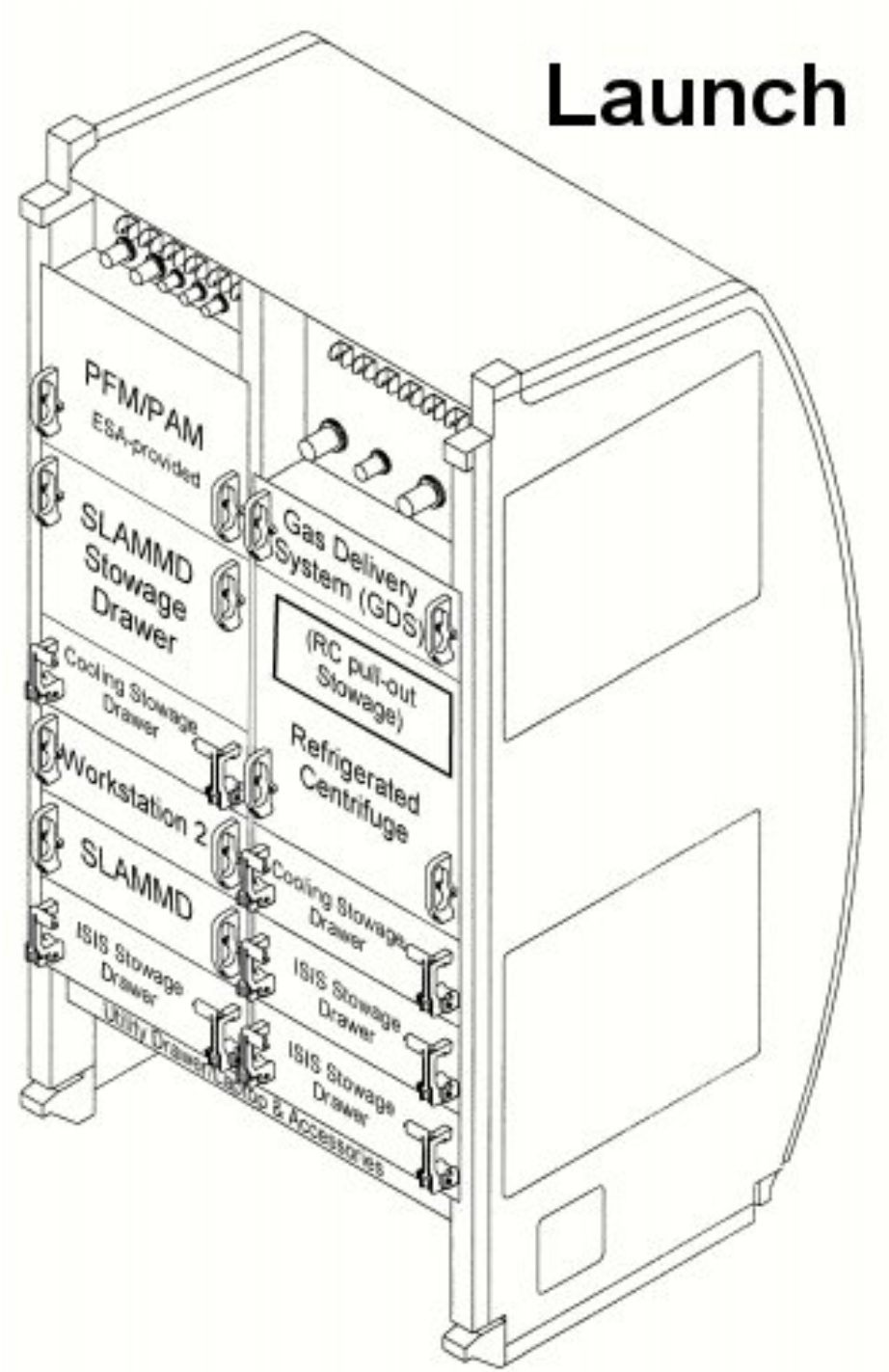
EXPRESS Rack Overview (cont):

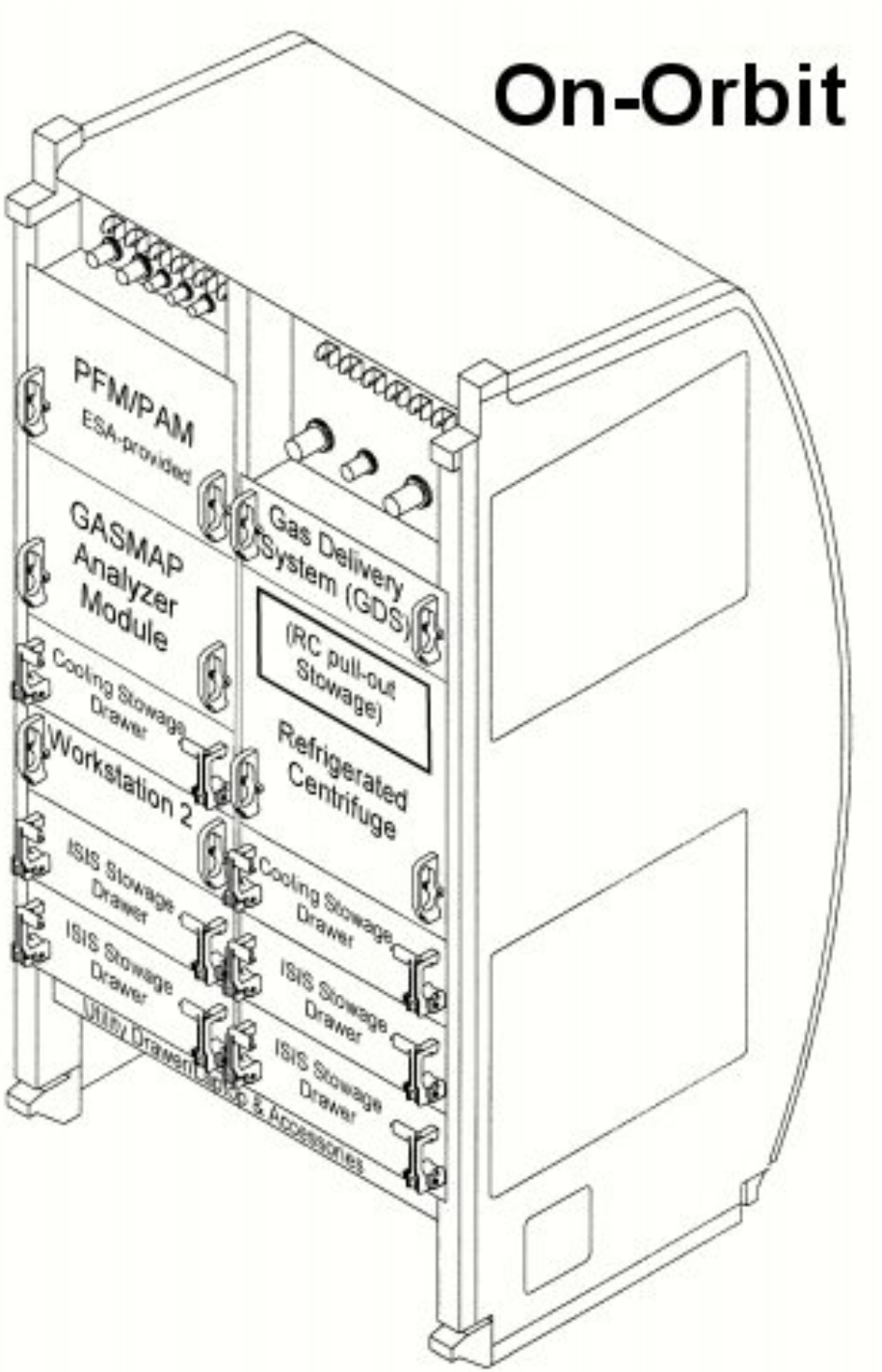
Some primary subsystems for the EXPRESS rack are the:

- AAA – Avonics Air Assembly
- SSPCM – Solid State Power Controller Module
- RIC – Rack Interface Controller
- PEHB – Payload Ethernet Hub Bridge
- EMU – Express Memory Unit
- ELC – Express Laptop Computer

Human Research Facility (HRF)
Developed by JSC

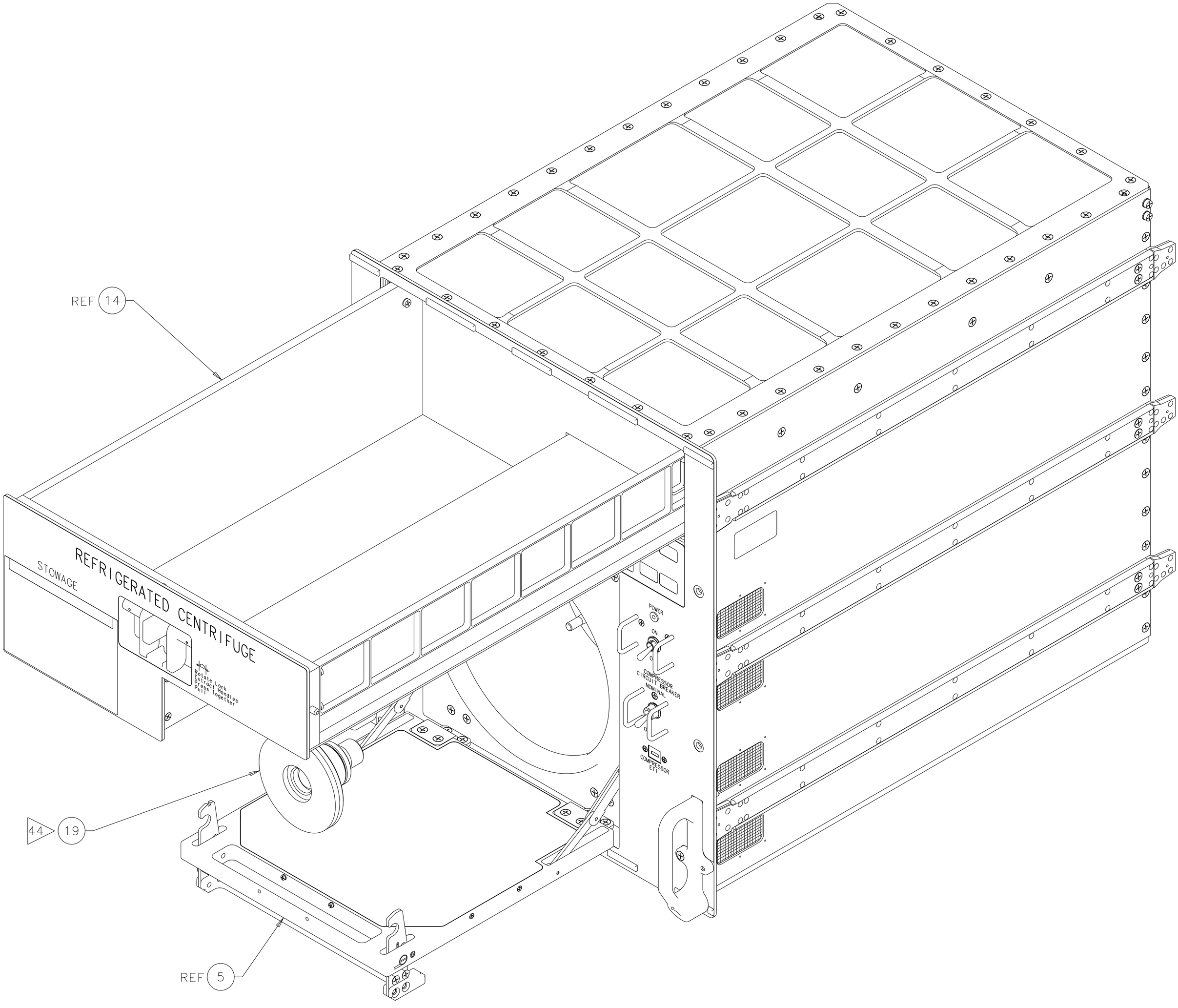
- The HRF contains numerous experiments that study the physiology, behavior, and chemical changes in the human body while in a microgravity environment.
- HRF Rack 1delivered and installed on mission 5A.1.
- HRF Rack 2 to be delivered and installed on ULF-1.


Launch
PFM/PAM
ESA-provided
SLAMMD
Stowage
Drawer
Gas Delivery
System (GDS)
(RC pull-out
Stowage)
Cooling Stowage
Drawer
Refrigerated
Centrifuge
Workstation 2
SLAMMD
Cooling Stowage
Drawer
ISIS Stowage
Drawer
ISIS Stowage
Drawer
ISIS Stowage
Drawer
Utility Drawer, Laptop & Accessories


On-Orbit
PFM/PAM
ESA-provided
GASMAP
Analyzer
Module
Gas Delivery
System (GDS)
(RC pull-out
Stowage)
Cooling Stowage
Drawer
Refrigerated
Centrifuge
Workstation 2
ISIS Stowage
Drawer
Cooling Stowage
Drawer
ISIS Stowage
Drawer
ISIS Stowage
Drawer
ISIS Stowage
Drawer
Utility Drawer, Laptop & Accessories

Refrigerated Centrifuge (RC)

- Refrigerated Centrifuge (RC) is a mechanical device used to separate biological substances of differing densities.
- Selectable speeds from 1000 RPM to 5000 RPM.
- Accommodates sample sizes from 0.5 mL to 50 mL.
- Provides programmable centrifugation protocols.
- Provides refrigeration of rotor chamber from ambient to +4° C.

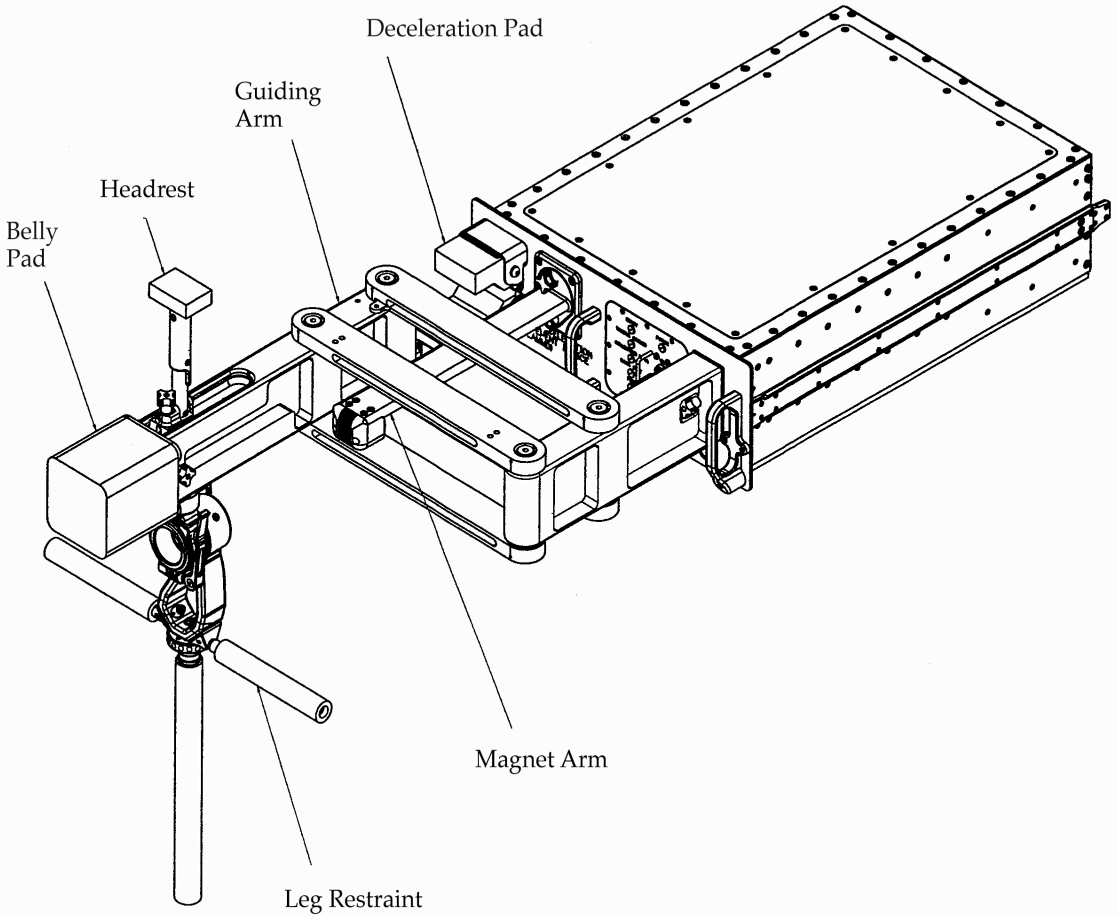

REF 14
REFRIGERATED CENTRIFUGE
STOWAGE
Rotate Lock Retract Handles pulls together
POWER
ON
COMPRESSOR CIRCUIT BREAKER NOMINAL
COMPRESSOR ETT
44 19
REF 5

Space Linear Acceleration Mass Measurement Device (SLAMMD)

- SLAMMD, which will be rack mounted, is intended to provide an accurate means of determining on-orbit mass of humans.
- Newton's Second Law → m = F / a
- Force generated by 2 internal springs.
- Acceleration is averaged over several runs, measured using precise optical instruments.

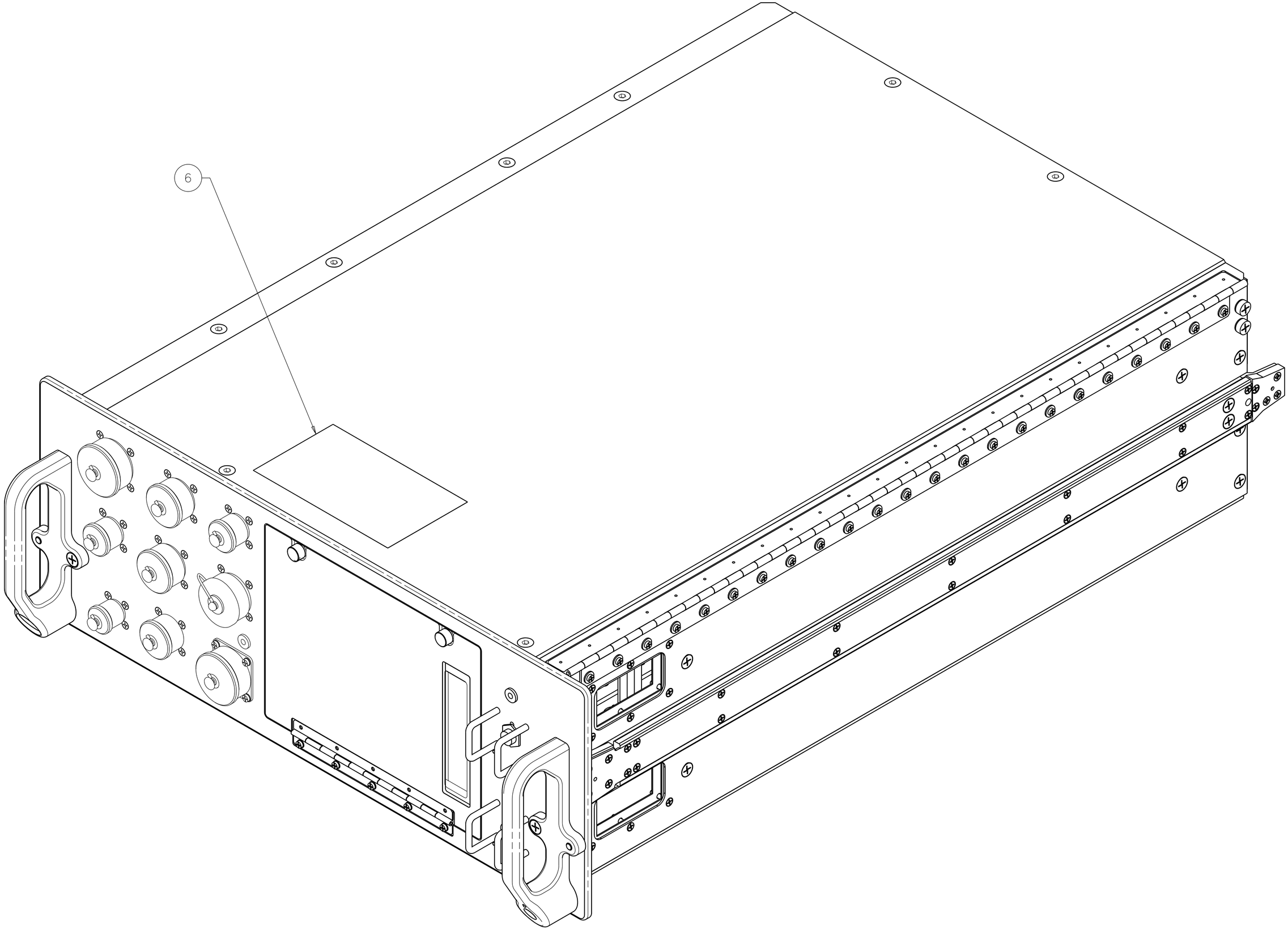
SLAMMD

Space Linear Acceleration Mass Measurement Device (SLAMMD)



Rack 2 Workstation (R2WS)

- R2WS will provide a platform for installing and executing HRF experiment software, controlling and monitoring HRF equipment and rack, collecting and archiving experiment data, crew tests, crew notes.
- Graphics support for a 3D virtual Environment.
- Audio and video processing.
- 800 MHz Dual Pentium III CPU, 1 Gbyte RAM.
- Provides user with various serial data connections, analog/digital channels, as well as 28 Vdc power.
- Much, much more …

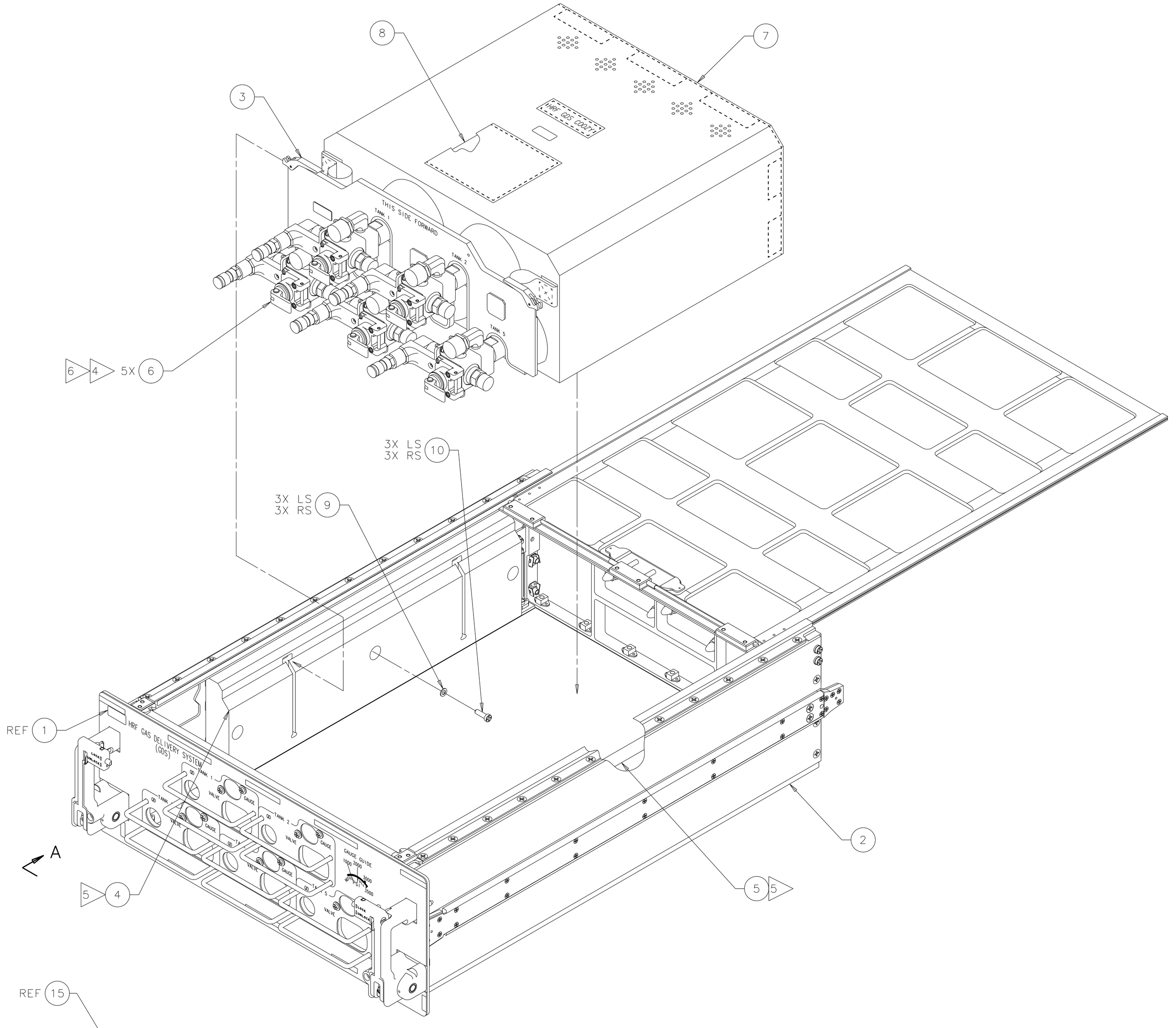

6

Pulmonary Function Module (PFM)

- Subsystem of Pulmonary Function System (PFS).
- Used for a wide range of metabolic physiology experiments studying human cardiovascular and respiratory parameters.
- 2 basic configurations:
  - Photoacoustic-based Analyzer System (PAS) —portable for use in & out of rack.
  - Mass-spectrometer-based Analyzer System (MAS) — in-rack only operations.

Gas Delivery System (GDS)

- Provides calibration and respiratory gases for calibration of the PFS complement of gas analyzers.
- Accommodates 5 gas cylinders with associated plumbing.
- Designed to 2400 psi working pressure.
- 2-fault tolerant with relief valves sized and set to insure that outlet pressure for each cylinder will not exceed 70 psi .


8
7
3
HRF GDS C002Y1
THIS SIDE FORWARD
TANK 1
TANK 2
TANK 5
6 4 5X 6
3X LS
3X RS
10
3X LS
3X RS
9
REF 1
HRF GAS DELIVERY SYSTEM
(GDS)
LOCK
UNLOCK
QD
TANK 1
VALVE
GAUGE
TANK 2
TANK 5
GAUGE GUIDE
1000 2000 3000
PSI
3500
Block
Unblock
A
5 4
5 5
2
REF 15

Minus Eighty Degree Laboratory Freezer for ISS (MELFI)

Developed by ESA Deliverable
(under JSC Project Management)

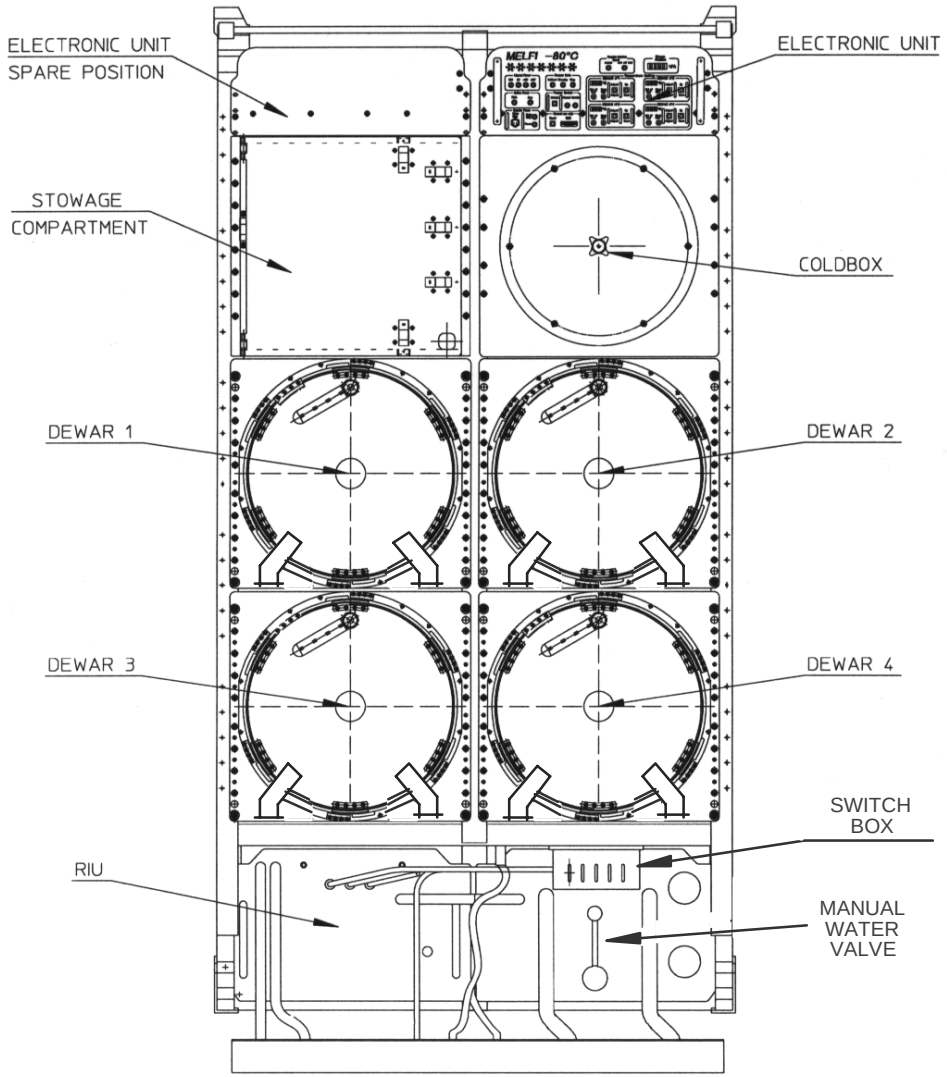
Science Objectives

- Low temp storage and transportation of biological material, reagents, and perishable items
- Provide cooling and storage of samples
- Temps (in °C): -80, -26, +4

MELFI

Hardware Description

- BRAYTON SUBSYSTEM consists of the Cold Box and the Brayton Machine Cartridge.
- DEWAR SUBSYSTEM is comprised of four cylindrical, vacuum-insulated containers.
- ELECTRICAL SUBSYSTEM is comprised of the Electronic Unit (EU) and the Rack Interface Unit (RIU) Switch Box.



MELFI PTCS TESTING

- ISS Mode
  - Test on-station interfaces including PCS
- MPLM Mode: C&DH Test

  Interface for:

  1) Pre-launch operations (T-O)

  2) Powered Shuttle transport

  3) Runway operations (MSV)
- UF-3: First MPLM/MELFI powered mission

Window Observational Research Facility (WORF)

Developed by MSFC

Science Objective

- Provide a facility so the nadir viewing research window can be utilized for research
- Standardized hole configuration
- Minimizes transmission of vibration
- Provides flexibility to earth viewing payloads such as still cameras, telescopes, remote sensing payloads
- Utility Outlet Panel (UOP) Interface

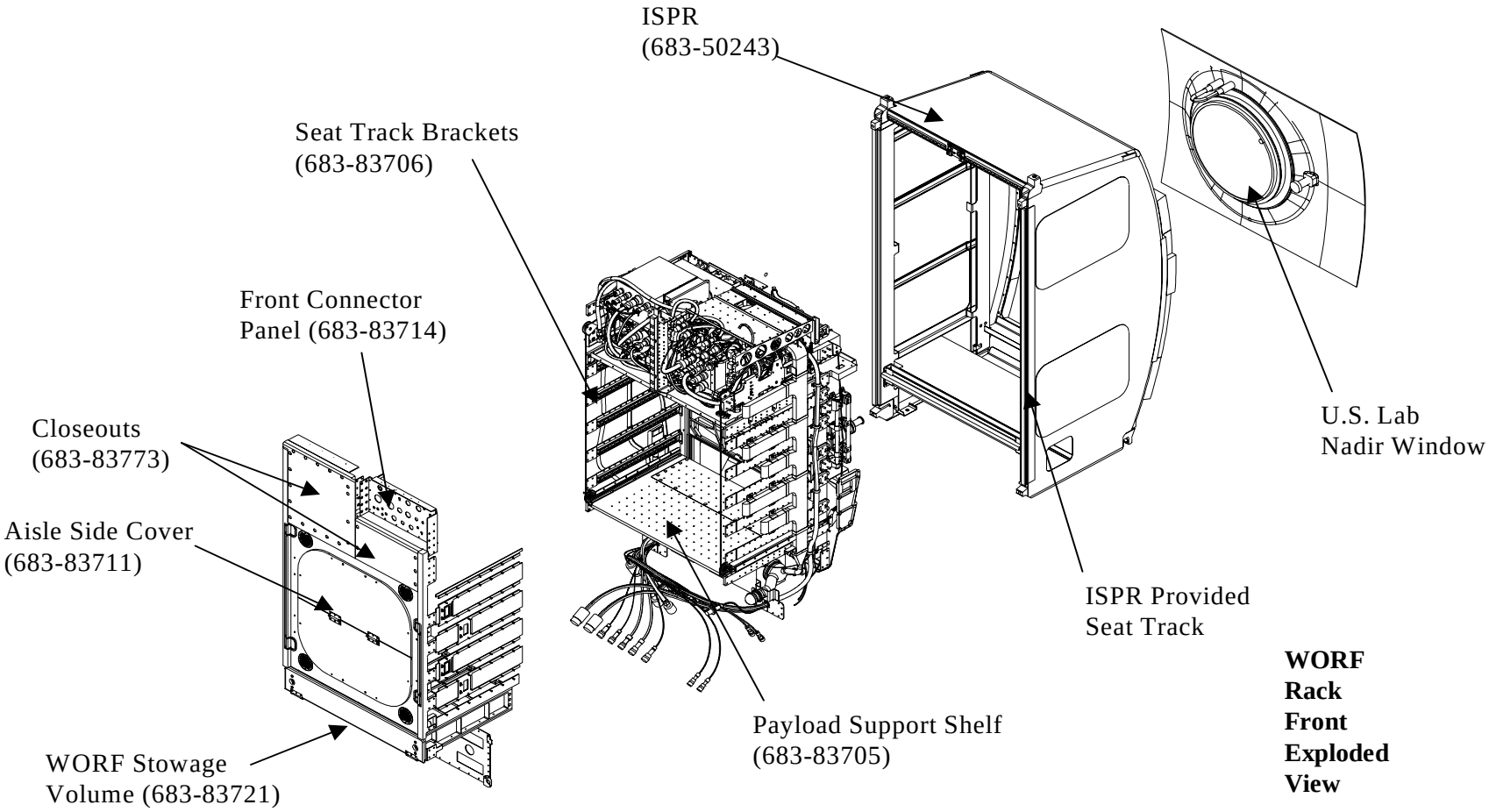
WORF Composition

- ISPR based structure
- EXPRESS Rack avionics
  - Power conditioning/distribution
  - Data collection/conversion
  - Thermal conditioning
- Window & Camera protection devices
  - Camera shield
  - Bump shield
  - Aisle side closeout—prevents unwanted illumination during autonomous or remote controlled payload operation
  - Payload shroud—prevents unwanted illumination when crew member is manually operating payloads
- Stray & Back light shielding
- Camera mounting interfaces

WORF PTCS Testing

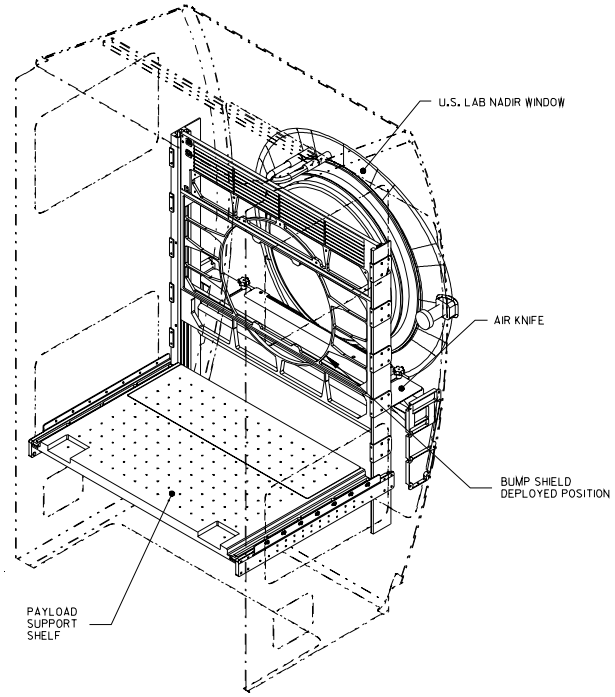
Interface	**Check Out H/W**
RS-422 and Ethernet	Payload Simuators
Power I/F	EarthKam (Ground Equivalent Unit)
UOP	Payload Utility Light

WORF

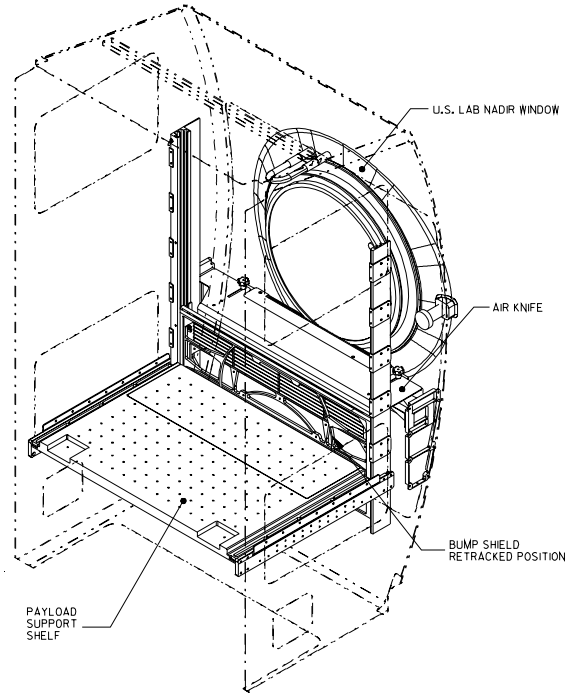


WORF Rack Front Exploded View

WORF



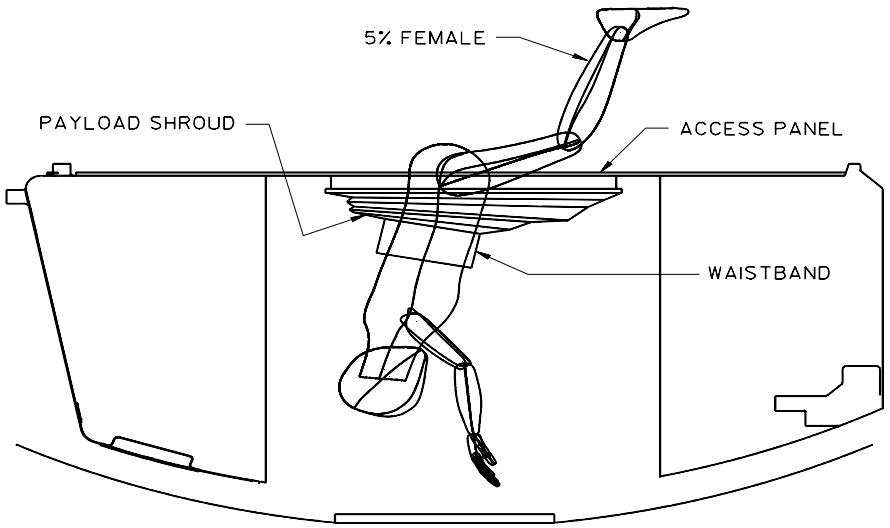
BUMP SHIELD IN DEPLOYED POSITION



BUMP SHIELD IN RETRACKED POSITION

BUMP SHIELD DEPLOYMENT

WORF

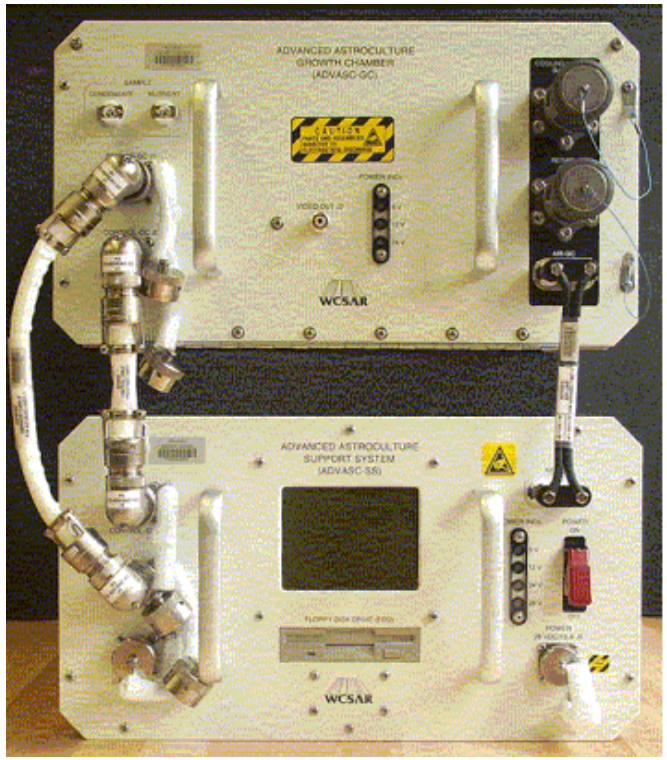


PAYLOAD SHROUD Small Payload Configuration

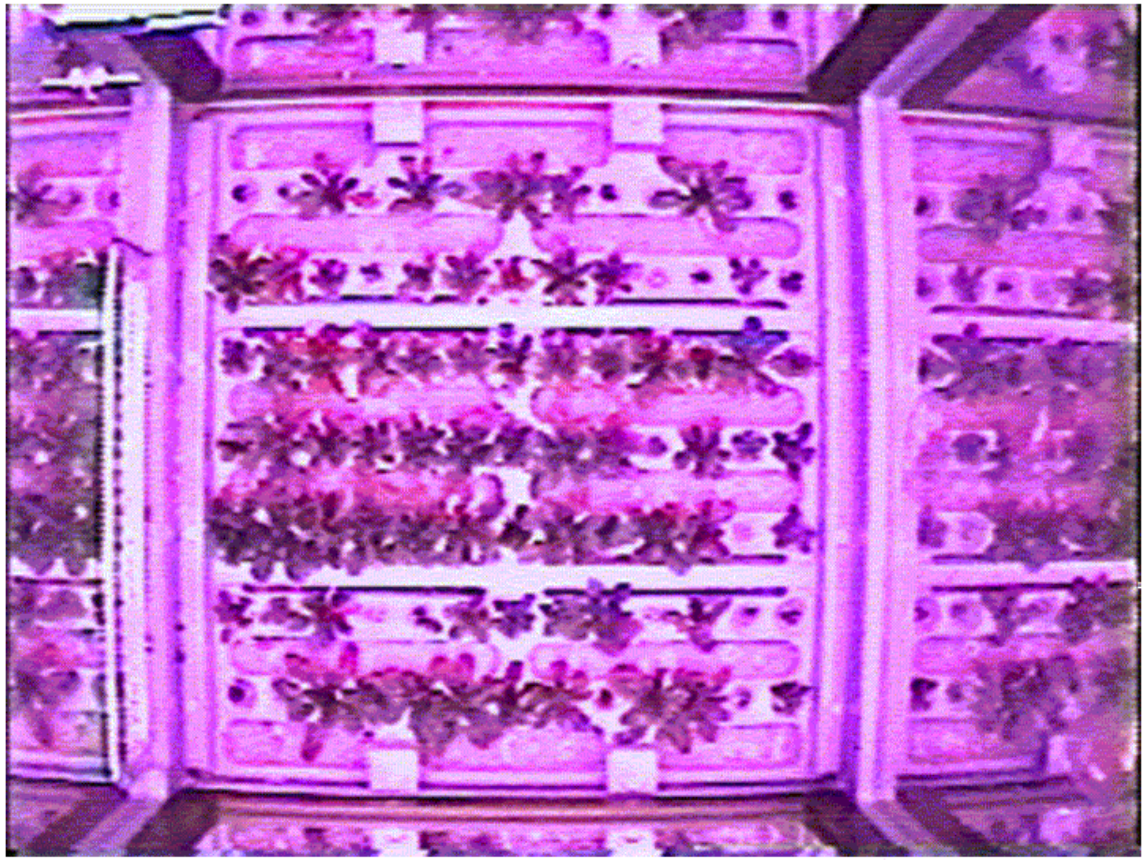
Advanced Astroculture (ADVASC)

Developed by WCSAR (Wisconsin Center for Space Automation and Robotics)

- ADVASC Components
  - Growth Chamber (GC) Unit plant growth chambers
  - Support System (SS) Unit, computers, electronics, cooling, and other systems
- Plant Growth Research using red and blue LED's and a hydroponic type nutrient delivery system
- ADVASC flew to station on 6A
  - First science returned on 7A
  - Grew Arabidopsis thaliana seed to seed in microgravity
- A filter used on ADVASC may have commercial use in killing Anthrax spores



Arabidopsis in Growth Chamber



6A – 7A

ADVASC Processing at KSC

- Two sets of SS and GC units
- SS units remain in orbit one to two years
- GC units returned more frequently to start new experiments
- All ADVASC units will have been tested and flown before ULF-1
- KSC processing of ULF-1 ADVASC hardware may require a full or partial test depending on hardware changes
- OMRS updates will allow bypass of PTCS test
- UF-2 and ULF-1 will study soybean plants

Commercial Protein Crystal Growth- High Density Protein Crystal Growth (CPCG-H)

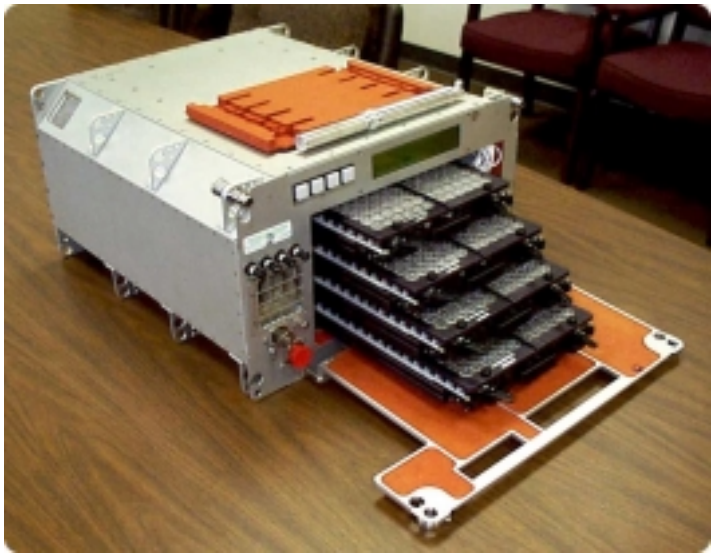
Center for Biophysical Sciences and Engineering: Birmingham, AL

RESEARCH OBJECTIVE

- To use the microgravity environment to grow large, high quality crystals of proteins and other macromolecules for use in x-ray diffraction studies. This structural information may lead to greater understanding of various diseases and design of new treatments
- The CPCG-H experiment will consist of a macromolecular crystal growth hardware contained in the Commercial Refrigeration Incubator Module - Modified (CRIM-M). Hardware systems that will be used include:
  - High Density Protein Crystal Growth System (HDPCG)

KSC TESTING

- Payload Developer is requesting a bypass of PTCS due to no hardware and no software changes since last successful flight



Pictured above is the Commercial Protein Crystal Growth – High Density Protein Crystal Growth Apparatus inside the CRIM-M.

PREVIOUS MISSIONS: The CPCG-H first flight was ISS Inc 2, Stage 6A-7A.1. The CRIM-M hardware has flown multiple Shuttle missions and ISS Inc 2, Stage 6A-7A.1, and Inc 3, Stage 7A.1-UF-1

INCREMENT ASSIGNMENTS

- CPCG-H-01: Inc 4, Stage 8A-UF2
- CPCG-H-01: Inc 7, Stage ULF1- 12A

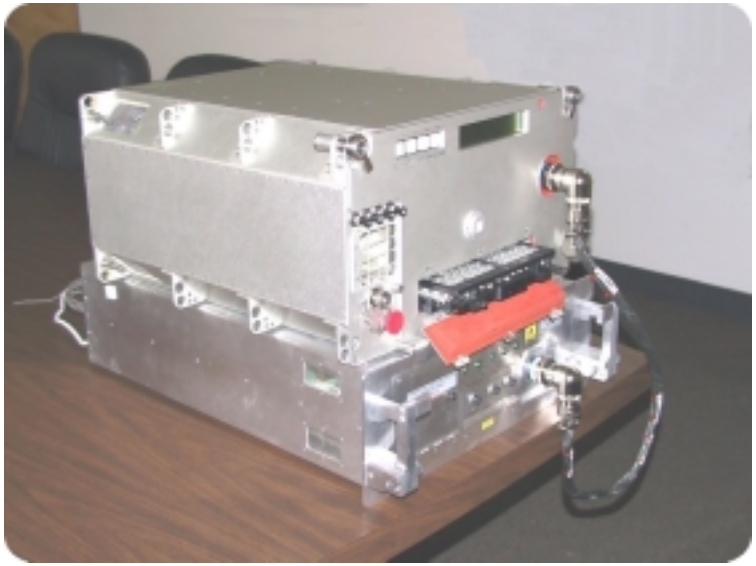
Commercial Protein Crystal Growth- Video (CPCG-V)
Center for Biophysical Sciences and Engineering: Birmingham, AL

RESEARCH OBJECTIVE

- CPCG-V will be used to help evaluate protein crystal quality, size, location within the CPCG-H Tray, and potential for X-ray data collection. CPCG-V is used in conjunction with the CPCG-H experiment. One CPCG-H Tray will occupy the CPCG-V at a given time, and other CPCG-H Trays can be interchanged when scheduled or requested for periodic digitized images of growth cells within an area of camera coverage provided by the CPCG-V system.
- The major science objective of the CPCG-V experiment is to observe the protein crystal size and quality. The monitoring of growth cells via down-linked digitized video provides earth-based scientists with video images of protein crystal growth.
- The CPCG-V consist of the CPCG-V Locker, CPCG-V Drawer, and stowage items. The CPCG-V Locker consists of the Experiment Assembly contained in a CRIM-M. The CPCG-V Drawer consists of the Control Assembly contained with in a 4PU Powered ISIS Drawer.

FLIGHT OPERATIONS SUMMARY

- Nominal testing for first time flow



Pictured above is the Commercial Protein Crystal Growth – Video experiment showing camera system inside the CRIM-M and Control Electronics in the 4PU Powered ISIS Drawer.

PREVIOUS MISSIONS: The CRIM-M hardware has flown multiple Shuttle missions and ISS Inc 2, Stage 6A-7A.1, and Inc 3, Stage 7A.1-UF-1

INCREMENT ASSIGNMENTS

- CPCG-V-01: Inc 7, Stage ULF1- 13A.1
- CPCG-V-01: Inc TBD, Stage 1J/A – UF5

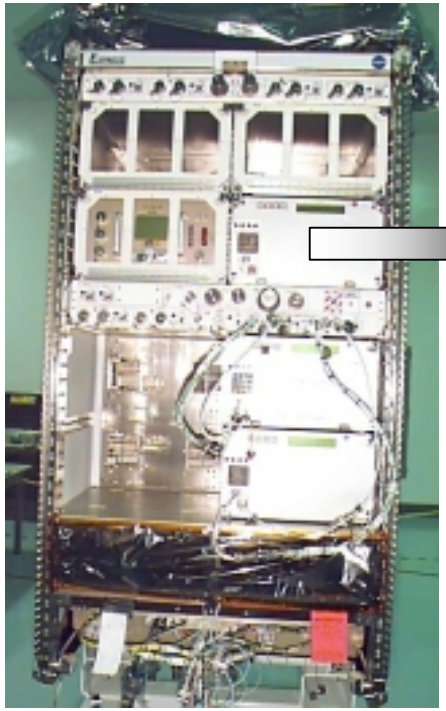
Protein Crystal Growth—Single Locker Thermal Enclosure System (PCG-STES)

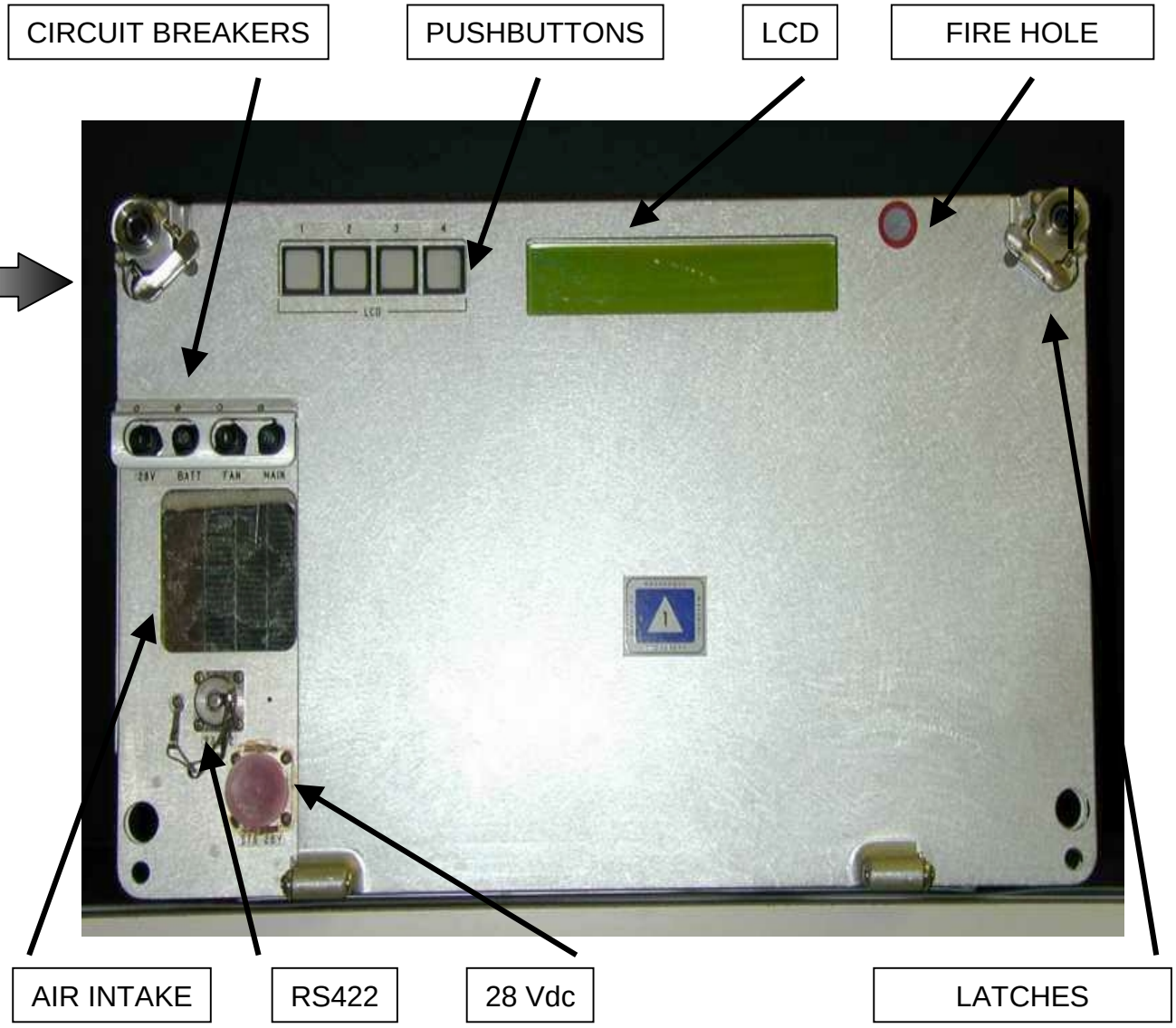
Developed by MSFC

- The PCG Experiment consists of the STES and the experiments that operate inside it (for example, DCAM, PCAM, and VDA-2). The STES simply provides a temperature controlled environment for various experiments (+4 deg C to +40 deg. C).
- The primary objective of the hardware is to produce high-quality, well-defined crystals of selected proteins in a controlled microgravity environment. The findings will assist biological & physical science research for various applications in medicine, agriculture, & manufacturing.

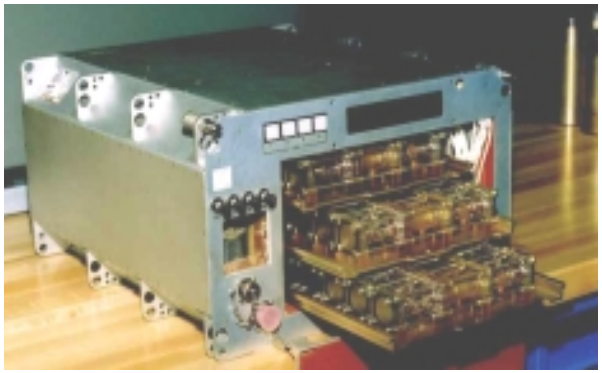
PCG-STES

Installed in an ISS EXPRESS Rack

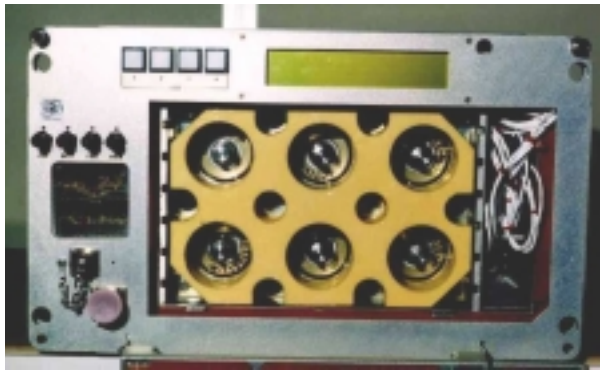




EXAMPLES OF PCG EXPERIMENTS



Protein Crystallization Apparatus for Microgravity (PCAM)



Diffusion Controlled Apparatus for Microgravity (DCAM)

Vapor Diffusion Apparatus (VDA-2)

PCG-STES

- All 4 PCG-STES Units underwent stand alone PTCS Testing under 6A on-orbit flight configuration at KSC.

- For UF-2, an OMRS Exception was taken to bypass KSC testing since the Units were a re-flight from 6A. However, a PCG-STES Unit did participate in Joint Operations Testing for EXPRESS Rack 3 at the request of the EXPRESS Project Office.

- For ULF-1, the OMRS has been updated to allow bypassing of PTCS testing with a written request from PD.

Space Dynamically Responding Ultrasonic Matrix System

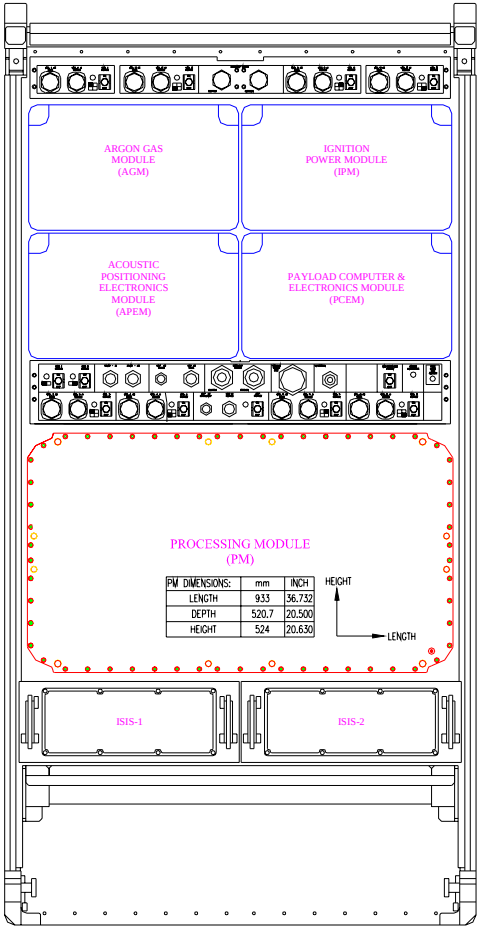
Developed by Guignè

- Containerless Processing:
  - Uses acoustic energy to keep samples in a suspended position
  - Avoids contaminants and physical defects
- Scientific Objectives:
  - Development of Advanced Materials
  - Exploration of Fluid Physics
  - Initially used for the sustained combustion of non-toxic pellets
  - Eventually certified for materials which are toxic

Space DRUMS

- Ground initiated but functionally autonomous
- EXPRESS Rack
- Designed to be launched and returned 3 times
- Duration of on-orbit operations may be up to 60 months

Space DRUMS



- Five Active Modules:
  - Processing Module (PM)
  - Ignition Power Module (IPM)
  - Acoustic Positioning Electronics Module (APEM)
  - Payload Computer and Electronics Module (PCEM)
  - Argon Gas Module (AGM)

EXPRESS Transportation Rack

- ULF-1 will be first use
- Four ETR’s are in KSC logistics
- ETR’s are completely passive, no electrical interfaces
- ETR’s duplicate EXPRESS Rack mechanical interfaces
- Each ETR weighs 391 lbs., a weight savings of 394 lbs. over an EXPRESS Rack
- On ULF-1, the ETR will transport Space-DRUMS, consisting of one quad locker and four single lockers

Payload Interfaces & Services Used

Utilization Fluids

- Internal Thermal Control System (ITCS) fluid sampling performed for all payloads to satisfy ACOMC/OMRSD requirements
- Space-DRUMS
  - MTL—Servicing of ITCS performed by KSC
  - Waste gas
- HRF-2
  - MTL—Servicing of ITCS performed by PD off-site
  - Vacuum and waste gas
  - GN2
- WORF
  - MTL—Servicing of ITCS performed by PD off-site
- MELFI
  - Low Temperature Loop (LTL) for cooling
    - Servicing of ITCS performed by PD off-line
- ADVASC
  - MTL – Servicing of ITCS performed by KSC

Additional ULF-1 Payload Hardware

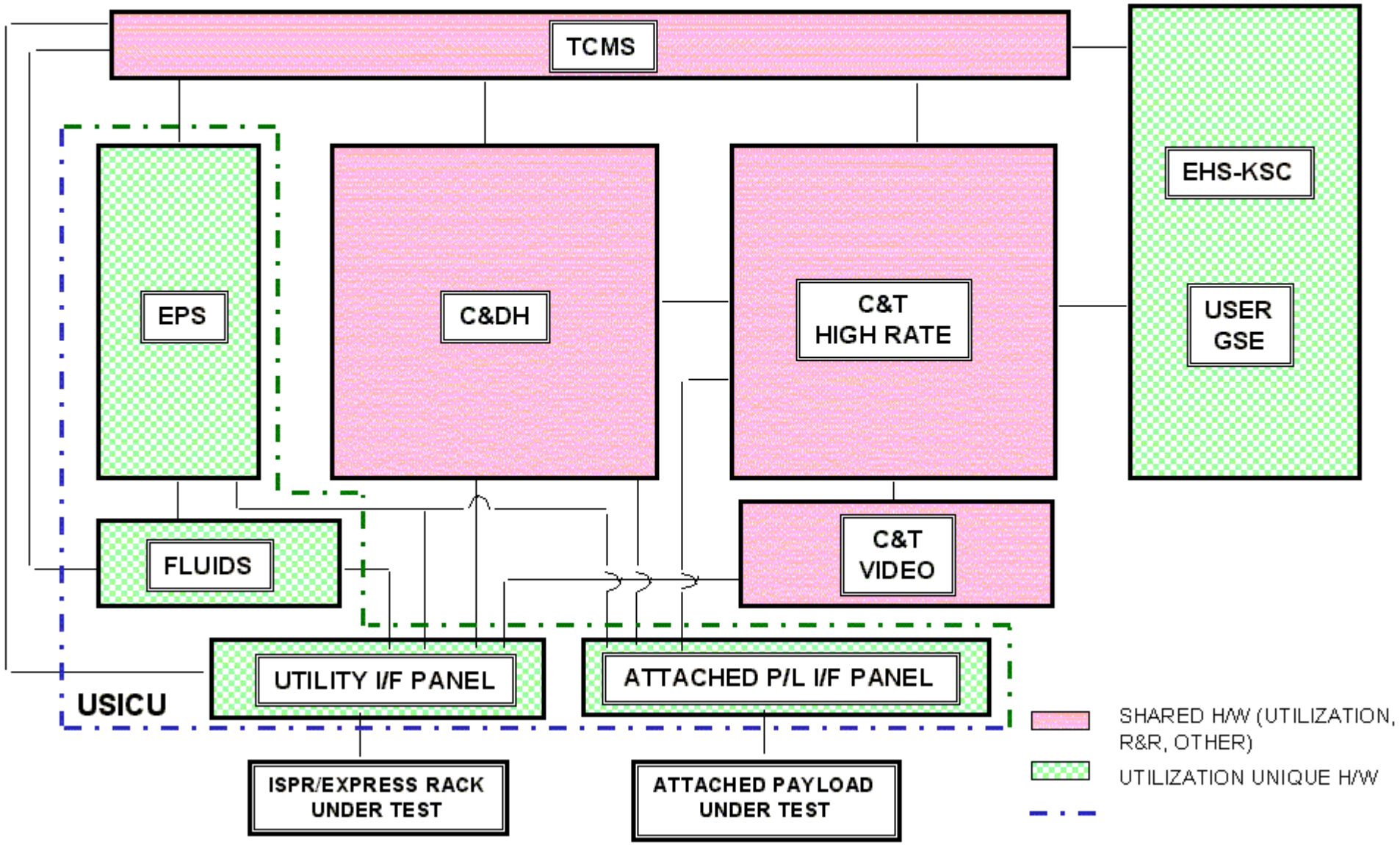
- Middeck
  - HRF-I6 Media Kit & Renal Stone K/Cit Placebo Kit
  - Payload Mounting Panel-3
- MPLM (ETR, RSP & RSR)
  - 4-Panel Unit ISIS Drawer-2 & -6
  - Rack Knee Braces
  - Single Stowage Locker Assembly-4
  - ESTER (Earth Sciences Toward Exploration Research)
  - Hand Posture Analyzer
  - HRF Stowage
  - M-ISS-E Passive Experiment Container-3 & -4
  - M-ISSE Clamp-Pointer Assembly-3 & -4
  - MSG Facility Stowage
  - SAMS-II Sensor Enclosure
  - SDRUMS Stowage
  - WORF Outfitting Hardware Kit
- Note: ULF-1 is currently oversubscribed for weight

Payload Test and Checkout System (PTCS)

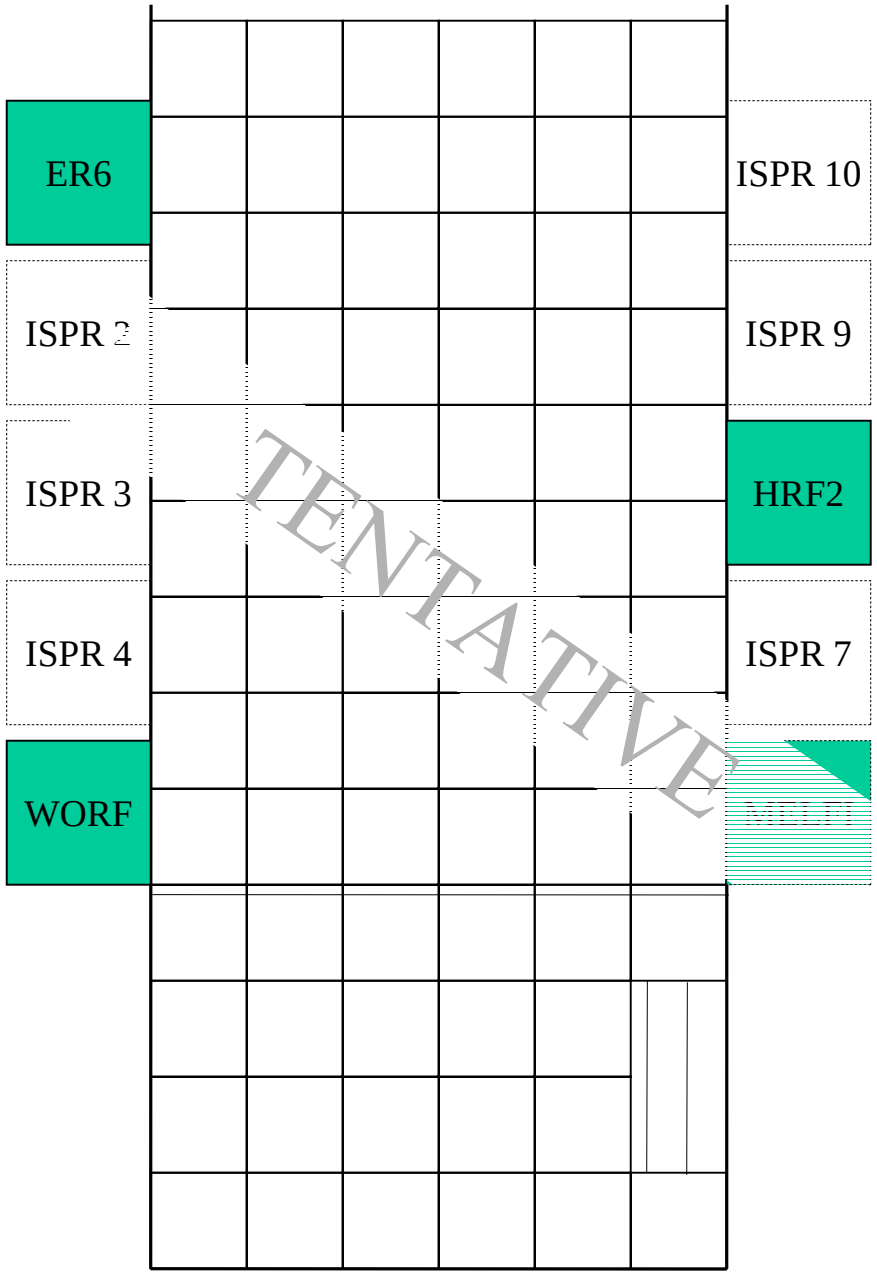
PTCS PROVIDES:

- Final functional checkout of payload to space station interfaces for U.S. Payloads (ISPR, EXPRESS, or Attached) operating in the U.S. Lab, International Partner (IP) Labs, the Truss, or IP Exposed Facilities
- Single payload - multi rack active checkout
- Patchable to multi rack locations
- Subsystem interface testing
  - Fluids/Structures
  - Power
  - Communication and Tracking (C&T)
  - Command and Data Handling (C&DH)
- Services provided:
  - Payload Data Services System (PDSS-KSC)
  - Enhanced HOSC (Huntsville Operations Support Center) System (EHS-KSC)
  - Test Control & Monitoring System (TCMS)

System Configuration



PTCS USICU Floor Configuration



03/19/02

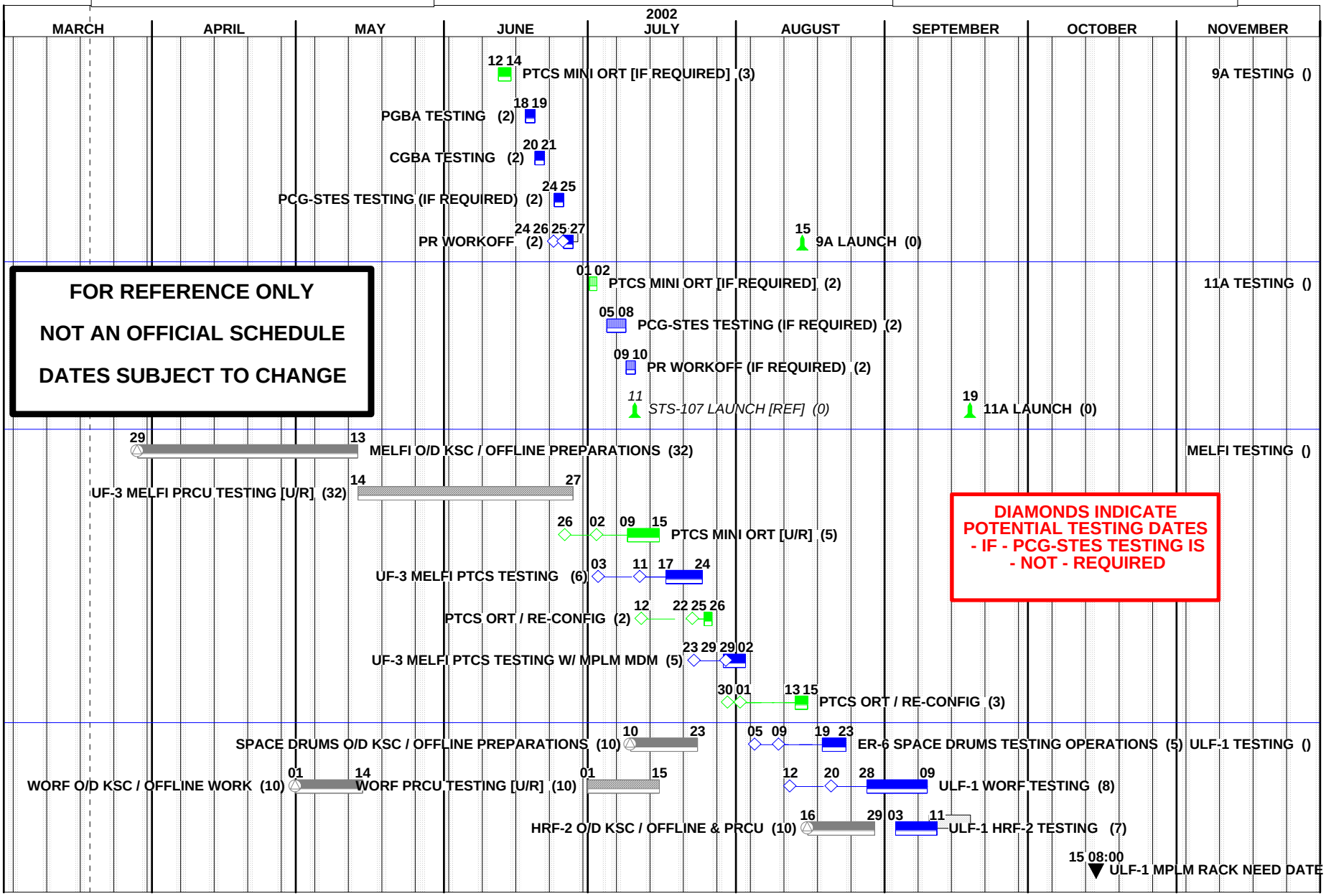
BARS INDICATE PERIODS OF EXPERIMENT TESTING AND TROUBLESHOOTING ONLY.

TEST DAYS ARE 12 HOURS IN LENGTH, 5 DAYS A WEEK, NO HOLIDAYS.

SUBJECT TO CHANGE.

UTILIZATION TESTING SCHEDULE
POWER ON TESTING MAR 2002 - JAN 2003

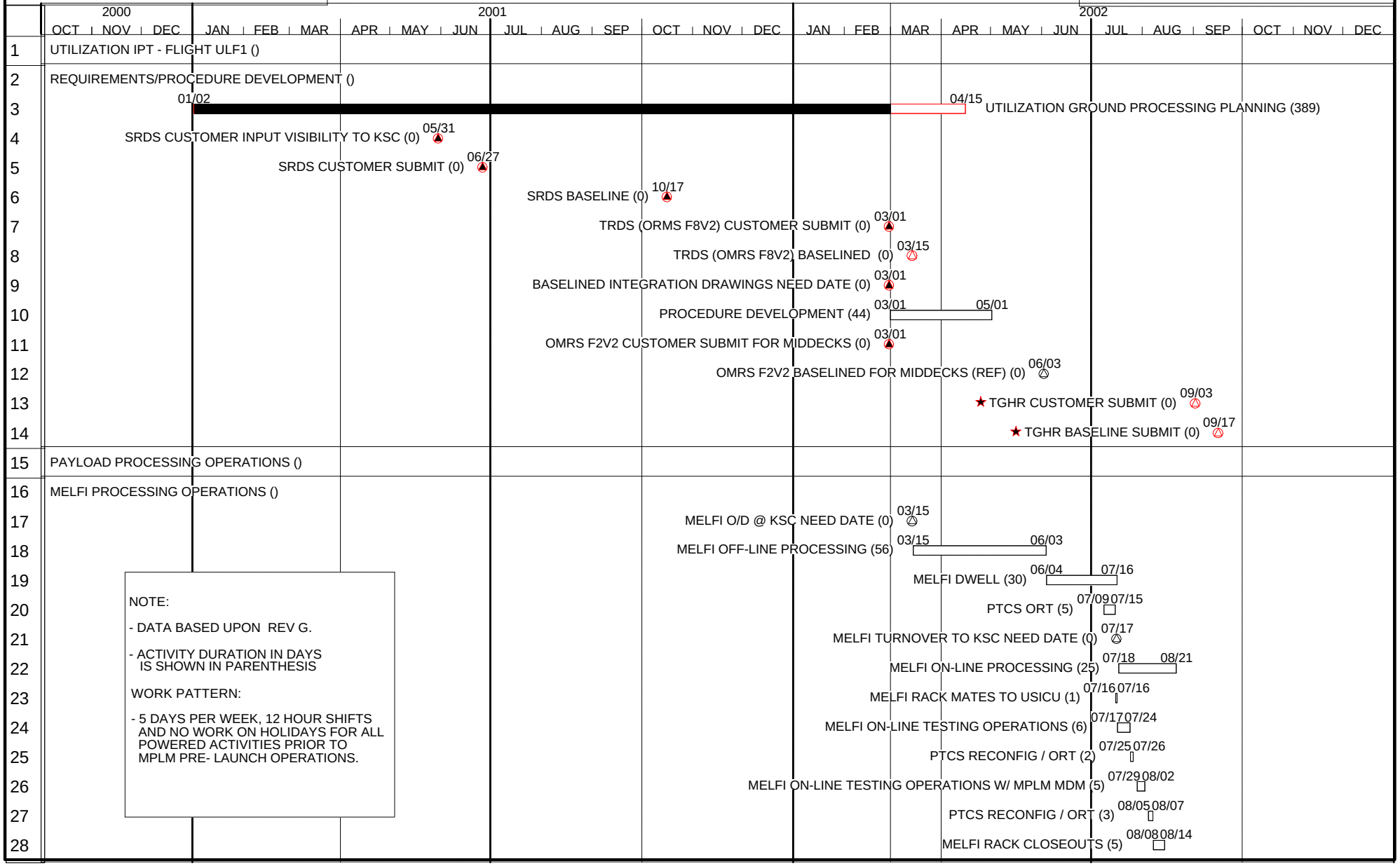
ASSUME SLIPS IN LAUNCH DATES AS INDICATED IN REV G MANIFEST.



The NASA / BOEING Co.
KENNEDY SPACE CENTER

INTERNATIONAL SPACE STATION
ULF1 PAYLOAD PROCESSING SCHEDULE
ER # 6 / SPACE DRUMS / WORF / HRF2 / MELFI

UTILIZATION IPT
REVISED: 01 MAR 2002



NOTE:

- DATA BASED UPON REV G.
- ACTIVITY DURATION IN DAYS IS SHOWN IN PARENTHESIS

WORK PATTERN:

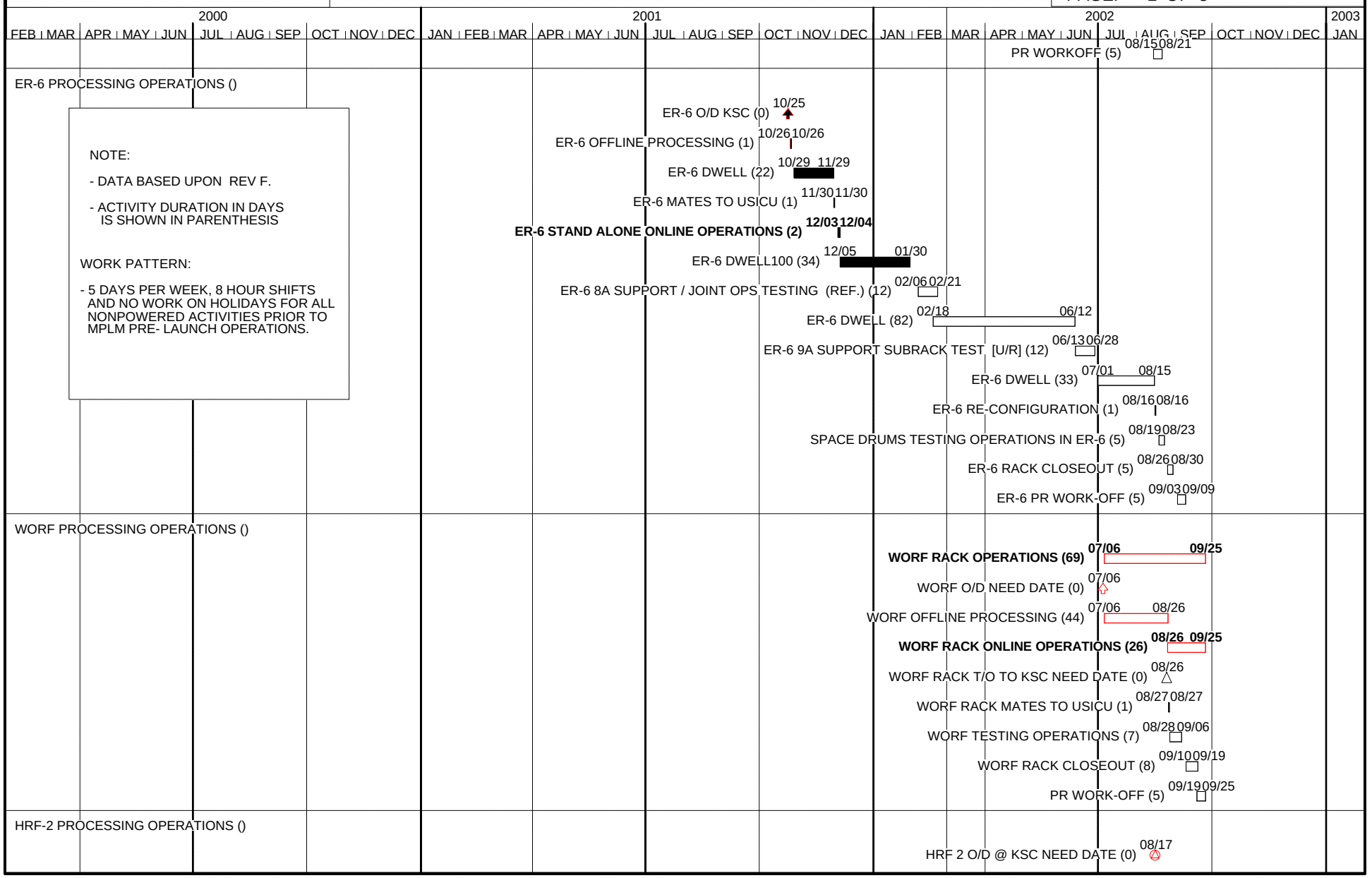
- 5 DAYS PER WEEK, 12 HOUR SHIFTS AND NO WORK ON HOLIDAYS FOR ALL POWERED ACTIVITIES PRIOR TO MPLM PRE- LAUNCH OPERATIONS.

The
NASA / BOEING Co.
KENNEDY SPACE CENTER

INTERNATIONAL SPACE STATION
ULF1 PAYLOAD PROCESSING SCHEDULE
ER # 6 / SPACE DRUMS / WORF / HRF2 / MELFI

UTILIZATION IPT

REVISED: 01 MAR 2002



The
NASA / BOEING Co.
KENNEDY SPACE CENTER

INTERNATIONAL SPACE STATION
ULF1 PAYLOAD PROCESSING SCHEDULE
ER # 6 / SPACE DRUMS / WORF / HRF2 / MELFI

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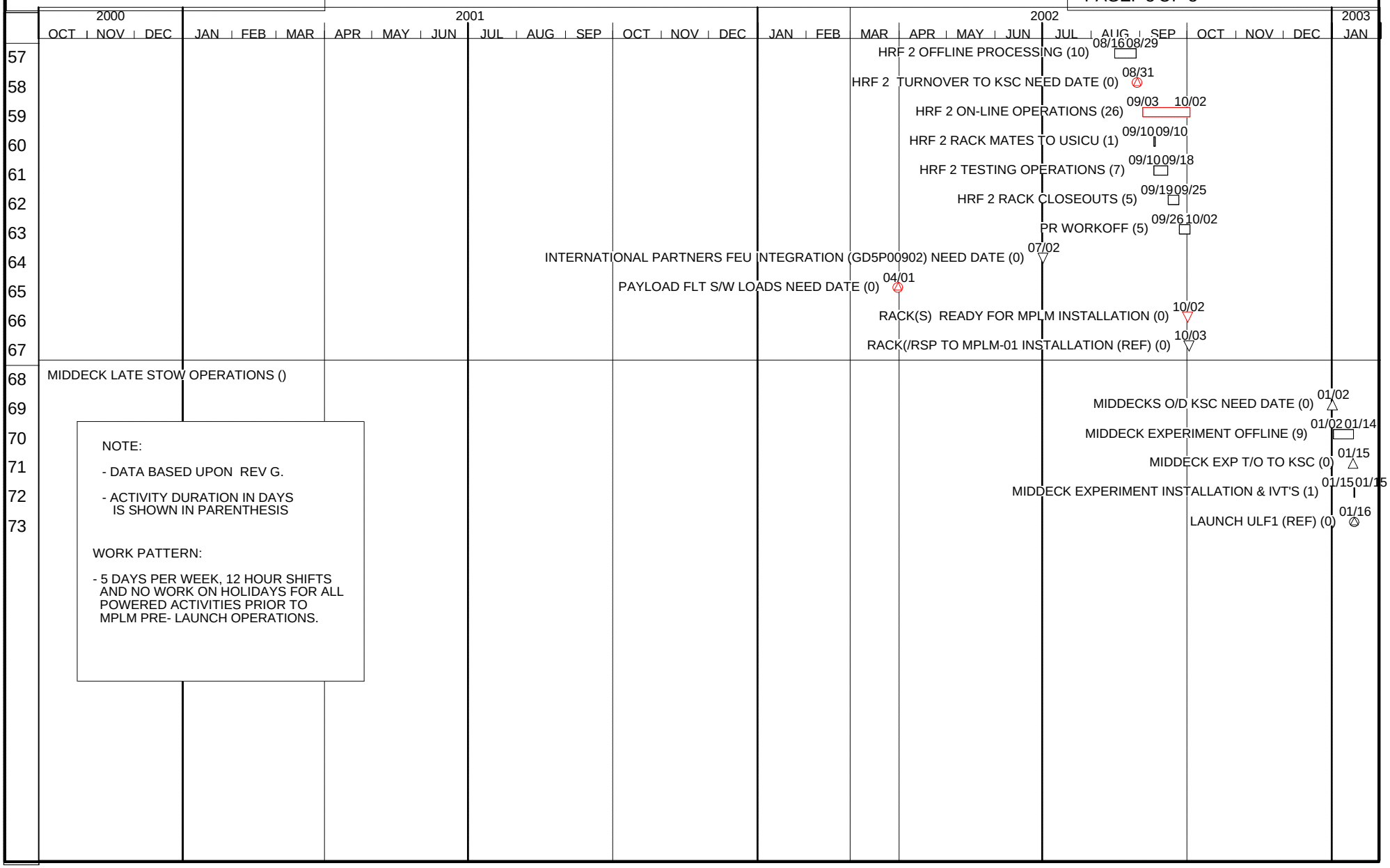

KSC Utilization Primary Contacts

Position	Contact	Phone	Roles and Responsibilities
Customer Int. Mgr	Welmon Speed	7-6043	Main KSC Point of contact and customer advocate for Payload Developers throughout entire KSC Processing flow. Establish KSC on dock date. KSC Leader during KSC Offline Processing. Manage Support Requirements. Ensures customer completes/satisfies appropriate Customer Deliverable Documents
Technical Int. Mgr	Ross Nordeen	7-5826	Lead Technical Requirements Management, Turnovers, and Engineering Integration across development, implementation and CoFR
Ops and Test Mgr	Mike Generale	7-5829	Manages Utilization Schedule including PTCS processing, Stowage/MPLM Util. Operations, and Middeck Operations . Test Conductor for Online Operations. Layout for User Room
Electrical Lead	Tracy Gill	7-5824	Leads all Payload Test Engineers in procedure development and test implementation. Assists Utilization in all electrical related items.
Mechanical Lead	Mike Haddock	7-5853	Leads all Mechanical Engineers in procedure development and implementation. Assists Utilization in all mechanical related items.
Fluids Lead	Robert Wark	7-5864	Lead all water sampling to be satisfy ACOMC spec. and all payload fluid servicing
Software Lead	Sue Sitko	7-5934	Works with team to identify flight software requirements & ensures delivery of flight software to KSC. Works w/ test team to ensure software configuration management practices are followed.
ER6 PTE	Morgan Simpson	7-5857	
ER6 Mech Eng	Elaine Voll	7-6083	
HRF2 PTE	Dan Clark	7-5925	
HRF2 Mech Eng	Mike Haddock	7-5853	
MELFI PTE	Susan Hutchison	7-5828	
MELFI Mech Eng	Jennifer Wahlberg	7-5854	
WORF PTE	Susan Hutchison	7-5828	
WORF Mech Eng	Ken Mathews	7-5851	
ADVASC-GC PTE	Gloria Vigilante	7-6571	
CPCG-H/-V PTE	Robert Wark	7-5864	
PCG-STES PTE	Myphai Tran	7-5952	
Space-DRUMS PTE	Patricia Langwost	7-5846	
ETR w/SDRUMS Mech	Jennifer Wahlberg	7-5854	
Cargo/Stowage	Randy Gordon	7-5852	Supervises the packing of stowage bags per Space Station Configuration Control Drawings, and serves as Bench Review task leader during crew inspection of bags.
PTCS Lead	Joanna Johnson	7-5297	
Quality Engineer	Roger Setterberg	7-0785	

Key Utilization Web Sites

Discipline	Web Sites\Links
KSC Schedules	http://www-ss.ksc.nasa.gov/UTILIZATION/Schedules.htm
Technical Requirements\OMRS	http://heron.ksc.nasa.gov/omrs/sts111_PCGSTES.htm
	http://www.usa1.unitedspacealliance.com/usahou/orgs/7022/cargoint/TGHR/index.htm
KSC Procedures	http://spoo.ksc.nasa.gov:8080/missions/issutil/TAPS/STS111/
Utilization	http://www-ss.ksc.nasa.gov/UTILIZATION/DEFAULT.HTM
Payloads Office	http://iss-www.jsc.nasa.gov/ss/issapt/payofc/payoff.html
HRF-2	TBD
EXPRESS	NA
MELFI	TBD
WORF	TBD
ADVASC	http://wcsar.engr.wisc.edu/advasc.html
PCG-STES	http://microgravity.msfc.nasa.gov/pcg.html
	http://pcg.tecmasters.com/pcg_main.html
CPCG-H/CPCG-V	http://www.cbse.uab.edu
Space-DRUMS	http://www.guigne.nf.ca/SpaceDrums.htm
Stowage	Packing Plan (unofficial list of stowage hardware per mission):
	http://iss-www.jsc.nasa.gov/ss/issapt/mio/cargo/MPLMmain.htm
	MPLM Image Maps (unofficial summary/schematic of "what is where")
	http://jsc-ard-0hab.jsc.nasa.gov/sf_intra/csig/station/scsig.htm
	Official Drawings:
	http://edcc.jsc.nasa.gov/edccsearch/
MSFC Microgravity Research Program Office	http://microgravity.nasa.gov

Back-Up Charts
(PTCS Subsystems)

- FLUIDS/STRUCTURES (USICU)
  - System Capabilities:

    Includes GN_2, Vacuum Exhaust, Vacuum Resource, Thermal, Raised Access Floor, and Support Structure
- POWER SUBSYSTEM (EPS-USICU)
  - System Capabilities:

    Provides Interface B and Interface C power from Power Distribution Assembly (PDA)

    Allows local control via panel and remote control via TCMS

    Provides RPCM emulation for soft start/stop capability
- COMMUNICATION AND TRACKING (C&T)
  - System Capabilities:

    System provides high fidelity compliment of on-orbit interfaces through the use of Program FEUs (HRFM, VBSP)

    Provides services to verify video and telemetry pathways/interfaces

    Continuous recording of video and telemetry data on High Density Ground Recorder System (HDGRS)

Back-Up Charts
(PTCS Subsystems)

- COMMAND & DATA HANDLING (C&DH)
  - System Capabilities:

    System provides high fidelity compliment of on-orbit interfaces through the use of Program FEUs (PL MDM, PEHGs)

    Provides services to verify command and data pathways/interfaces for multiple RTs

    Uses most current PL MDM Payload Executive Processor (PEP) software

- PDSS/EHS-KSC (Payload Data Services System/ Enhanced HOSC System - KSC)
  - System Capabilities:

    PDSS-KSC provides payload telemetry routing and distribution to EHS-KSC and User GSE.

    EHS-KSC provides a user interface for uplinking data to ISPR/AP and accepting health and status data from the ISPR/AP

    PDSS-KSC is a subset of the MSFC PDSS system (H/W and S/W)

    EHS-KSC is a subset of the MSFC EHS system (H/W and S/W)

Back-Up Charts
(PTCS Subsystems)

- TEST CONTROL MONITOR SYSTEM (TCMS)
  - –System Capabilities:

    Utilization: Payload to station interface tests
    - C&C MDM simulation for PL MDM
    - Lab Systems MDM simulation for Fluids and Power
    - Archive and Retrieval system for 1553 control and payload local bus data
    - Provides database built from ISS program Standard Out to support PTCS functions

    Resupply/Return; MPLM post delivery verfication, prelaunch checkout, and launch operations