Space Station and Payload Processing
ISS-14-UF-2/STS-111

Multi-Purpose Logistics Module “Leonardo”
Mobile Base System (MBS)
Power Data Grapple Fixture (PDGF)
Service Module Debris Panels (SMDP)
Space Station Remote Manipulator System (SSRMS) Wrist Joint

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PROCESSING MILESTONES

SSPF

• MPLM/Leonardo Available to UF-2	25 Sep ’01(A)
• MPLM F.O.D. Cleaning Completed	02 Nov ’01(A)
• MPLM Pre-Rack Installation Checkout (PICO)	18 Dec ’01(A)
• Cargo Bench Review #1	24 Jan ’02(A)
• MPLM Rack Installation Completed	02 Mar ’02(A)
• Cargo Bench Review #2	06 Mar ‘02(A)
• MPLM CBM Leak Test	07 Mar ‘02(A)
• MPLM Aft Access Closure (AAC) Installation	12 Mar ‘02(A)
• MPLM AAC Leak Test	18 Mar ’02(A)
• MPLM AAC Heater Test	20 Mar ’02(A)
• MBS Handover to KSC	20 Mar ’02(A)
• MPLM SSPF Final Stowage Completed	26 Mar ’02(A)
• MPLM SSPF Hatch Closure	03 Apr ’02 (A)
• SSRMS LON On-Dock	15 Apr ’02 (A)
• MBS Wt/CG & Transfer to Canister	17 Apr ’02 (A)
• MPLM Wt/CG & Transfer to Canister	18 Apr ’02 (A)
• UF-2 Payload to Pad	22 Apr ’02 (A)

PROCESSING MILESTONES

OPF

• PDGF & SMDP Orbiter Integration	13 Feb ’02 (A)
• APCU IVT	22 Feb ’02 (A)
• Passive FRAM Integration into Orbiter	15 Apr ’02 (A)

PAD

• MPLM/MBS Transfer to Orbiter	06 May ’02 (A)
• MBS GSE Trunnion Removal	07 May ’02 (A)
• SSRMS LON Integration into Orbiter	08 May ’02 (A)
• Orbiter to Payload IVT	10 May ’02 (A)
• MPLM Pad Stow	22 May ‘02
• Hatch Closed & MPLM Dry Air Purge/Gross Leak Test	23 May ‘02
• Payload Closeout/PLBD Closed for Flight	24 May ‘02
• Middeck Payloads Late Stow	29 May ‘02
• Launch	30 May ‘02

Orbiter Middeck Requirements

Experiment	Installation	IVT	Refurbishment for Scrub/Recycle*	Destow
KSC GN2 FRZ	</= L-40 Hrs	No	96 Hrs	Runway
CRIM-CS[b,e]	</= L-24 Hrs	Yes	None	N/A
PCG-STES[a,b,d,**]	</= L-24 Hrs	Yes	48 Hrs	N/A
ZCG-SS[a]	</= L-24 Hrs	No	48 Hrs	N/A
BCSS-CS1-Cryodewar[a]	</= L-24 Hrs	No	24 Hrs	N/A
BPS[c]	N/A	N/A	N/A	Runway
BPS ASKS[c]	N/A	N/A	N/A	Runway
CGBA[c]	N/A	N/A	N/A	Runway
CPCG-H[c]	N/A	N/A	N/A	Runway
HRF Urine Tube Dispenser Ass'y[c]	N/A	N/A	N/A	Runway
PCG-EGN Dewar[c]	N/A	N/A	N/A	Runway
ZCG-SS (diff set from launch set)[c]	N/A	N/A	N/A	Runway

[a]Ascent only, Hardware to be transferred to ISS.
[b]If payload is not transferred to ISS, powered runway destow is req'd at KSC or DFRC.
[c]Descent only, hardware to be transferred from ISS.
[d]ESD dissipative gloves req'd during all handling operations.
[e]Ascent only, hardware transferred to MPLM for return.

MPLM Pad Stow & Launch Scrub Requirements

MPLM	REQUIRED STOW	LAUNCH DELAY
ADVASC-GC (Growth Chamber)	</= L-8 days	14 days or greater
ADVASC-SS (Support System)	</= L-9 days	None
ADVASC (Nutrient Solution)	</= L-9 days	23 days or greater
BCSS-CS1 Caddy	</= L-9 days	None
CheCS (Multiple Items)	</= L-14 & L-10 days	30 days or greater
HRF Electronic Media Kit	</= L-9 days	None
MEPS	</= L-9 days	14 days or greater
PFMI	</= L-9 days	None
SUBSA	</= L-9 days	None

Engineering Status

Payload OMRSD Files (File II Vol. II and File VIII)

- **P01 Shuttle OMRSD –** Baselined
- **P321 Assembly Power Converter Unit (APCU) - Baselined**
- **P350 Multi-Purpose Logistics Module (MPLM) –** Baselined
- **P467 Launch Package to ISS -** Baselined
- **P1338 Critical Spare LON ORU –** Baselined
- **U024 MPLM Generic Stand-Alone** – Baselined
- **U467 UF2 Launch Package Management File –** Baselined
- **U5112 Rack/RSP Weight and CG -** Baselined
- **U9006 ADVASC -** Baselined
- **U9010 MEPS -** Baselined
- **U9040 PCG-STES -** Baselined
- **U9063 ARCTIC Freezer -** Baselined
- **U9111 MSG -** Baselined
- **U9908 EXPRESS Rack 3 -** Baselined
- **U9997 Utilization Stowage –** Baselined

Open Requirements Change Notices (RCNs) (File VIII, Vol. II – Payload Utilization File)

- **KU15937 ARCTIC Fluid Volume Compensator**
- **Affects only the ARCTIC Freezer**
- **RCN updates the way the compensators are filled**
- **RCN in review**
- **EAD is 5/15/02**

Open Exceptions and Waivers

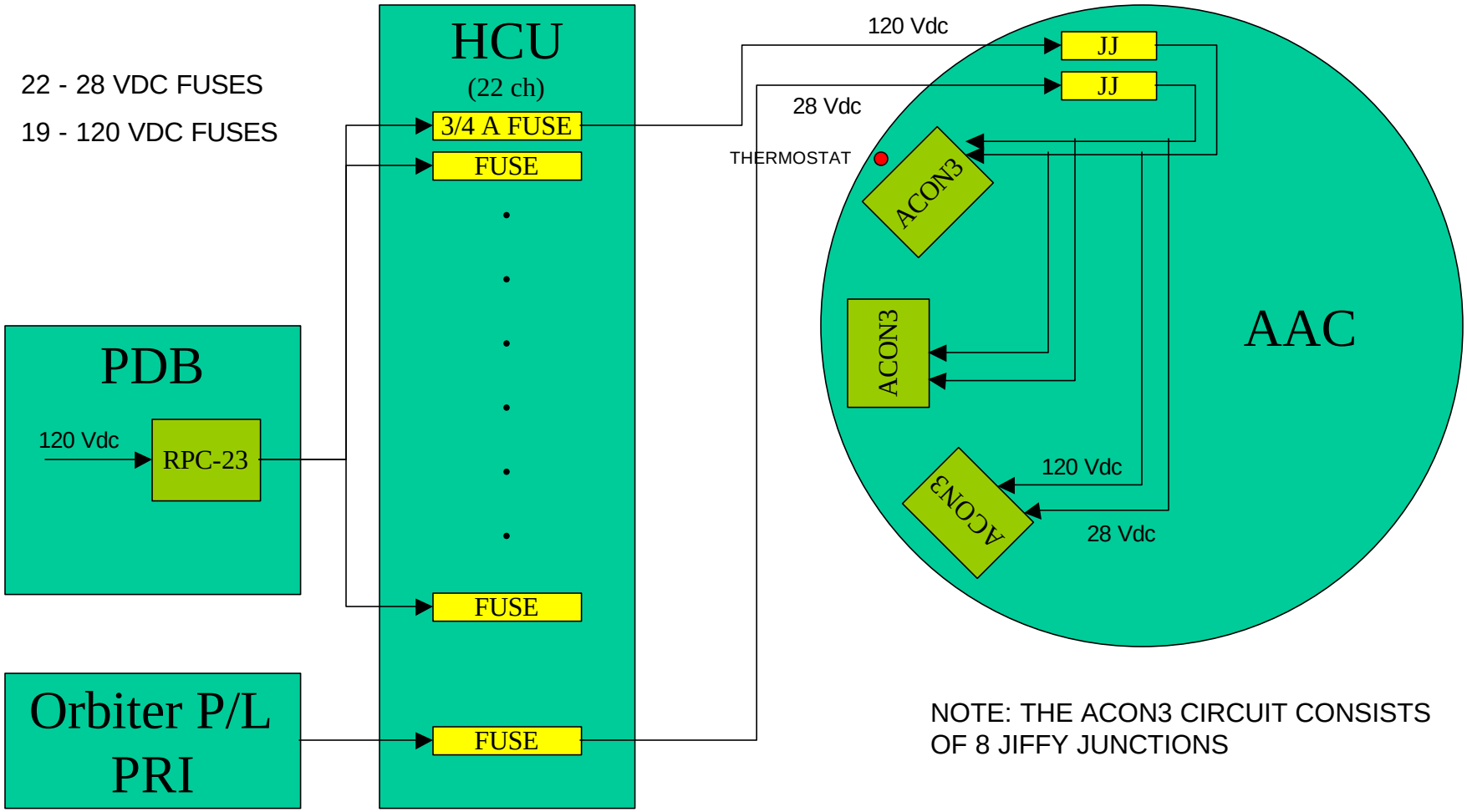
- **None**

Engineering Status

IPR

- **Problem**: 111V-0056 **-** MPLM NSTS 120 VDC Main Power out of spec. (high @ 123.6 VDC) during payload/orbiter IVT
  - Voltage reading is from MPLM Power Distribution Box (PDB)
  - OMRSD spec. is 119 – 123 VDC
  - Out of spec. value is approximately 2 volts higher than previous MPLM missions.
  - Initial troubleshooting revealed the test configuration was not the problem.
    - Test config. different from past MPLM mission due to planned active MPLM capability testing
- **Most Probable Cause**
  - LPS data reduction showed scaling coefficients changed for this mission.
  - This was verified by running the raw MPLM telemetry through both the old and current scaling coefficients and performing a compare.
  - Comparison was also made with previous MPLM orbiter IVT data.
- **Forward Action**
  - Payload team investigating why coefficients changed for this mission
  - Generate RCN to open up OMRSD voltage spec.
- **Summary**
  - Raw MPLM data shows voltage within spec.
  - This IPR will close as explained condition.
  - No impact to launch

AFT ACCESS CLOSURE (ACON3) HTR I/F DIAGRAM



NOTE: THE ACON3 CIRCUIT CONSISTS OF 8 JIFFY JUNCTIONS

Engineering Status

PR

- **Problem**: SS-ISS-FM1-ELE-P079 – Upon 120 VDC shell heater string activation, ACON3 heater did not activate (no current draw).
  - Heaters activated as part of MPLM active mission capability testing.
  - Heater power was cycled with problem recurring
  - Heaters last checked during AAC heater test in SSPF (3/02) with no anomalies
  - 120 VDC heater string not normally activated during orbiter IVT (No orbiter I/F).

- **Most Probable Causes**
  - ACON3 jiffy junction connection became de-mated.
  - Malfunctioning thermostat
  - Malfunctioning heater mat

- **Forward Action**
  - No further troubleshooting planned for UF-2 mission.
  - Will investigate upon MPLM return

- **Summary**
  - 120 VDC heater string has not been activated the past 3 MPLM missions due to “hot” orientation on orbit.
  - No impact to mission if heaters are required (per MSFC/Alenia assessment).
  - Will take PR to MERB for one flight deferral.

Options for PR SS-ISS-FM1-ELE-PO79 Resolution for UF-2

1. Operate 120 Vdc circuit with possibility of open circuit turning into short circuit after launch or blowing fuse
   - ACON3 circuit is fused with 0.75 A fuse
   - Other heater strings still work if ACON3 circuit blows fuse
   - ISS Safety Panel (OE/Nathan Vassberg) has concurred with this approach
2. Thermally condition MPLM prior to transfer to ISS to prevent condensation
   - 28 Vdc heater operation
   - Attitude control
3. Accept risk of condensation, have crew inspect on-orbit, and inspect at KSC if condensation is found on-orbit

Note: *For all options, thermally condition MPLM inlet air via reduction in the USOS LTL set-point (cabin air heat exchanger) to minimize humidity*

Recommend Option 1, Baseline Operational Procedure

Engineering Status

PR

- **Problem**: UT-MSG-MECH-P020 – Suspect retention hooks on MSG video drawer umbilical may be loose.
  - Problem recently detected on MSG “engineering unit” at MSFC during dry-run of the on-orbit video checkout.
  - Power to the MSG video drawer was lost when the umbilical connector became disconnected from the MSG rack interface.
  - Troubleshooting revealed that the retention hooks on the umbilical connector had come loose allowing the connector to demate during drawer deployment.
- **Cause**
  - Inspections revealed that the set screw on each of the two retention hooks was loose.
  - Further inspections indicated that no thread locking compound had been applied as specified in the applicable engineering documentation.
- **Acceptability for Launch**
  - The flight video drawer has successfully undergone vibration testing in the launch configuration. To date, there are no indications that the set screws are loose.
  - The Retention hooks have been exercised multiple times during KSC testing with no problems encountered.
  - Retention hooks on the umbilical connector are currently in a captive position for launch and therefore cannot become dislodged during ascent.
  - Inspection of closeout photos clearly indicates both set screws are fully engaged in the retention hooks.
- **Forward Action**
  - Plans for use of the MSG video drawer on-orbit will be developed by MSFC / JSC Payloads Office.

Engineering Status

Lost and Found

- None

Launch Commit Criteria

- None

READINESS STATEMENT

Pending completion of the identified planned forward work, ISS/Payload Processing Directorate is ready to proceed with launch of ISS-14-UF-2/STS-111.

ACRONYMS

ADVASC	ADVANCE ASTROCULTURE
BCSS-CS	BIOTECHNOLOGY CELL SCIENCE STOWAGE-COMMERCIAL STELSYS
BPS-ASKS	BIOMASS PRODUCTION SYSTEM-AMES STOWAGE KITS
CGBA	COMMERCIAL GENERIC BIOPROCESSING APPARATUS
CHECS	CREW HEALTH CARE SYSTEMS
CPCG-H	COMMERCIAL PROTEIN CRYSTAL GROWTH – HIGH DENSITY
CRIM-CS	COMMERCIAL REFRIGERATOR INCUBATOR MODULE – COMMERCIAL STELSYS
GN2 FRZ	KSC GASEOUS NITROGEN FREEZER
HRF	HUMAN RESEARCH FACILITY
MBS	MOBILE REMOTE SERVICER BASE SYSTEM
MEPS	MICROENCAPSULATION ELECTROSTATIC PROCESSING SYSTEM
MSG	MICROGRAVITY SCIENCE GLOVEBOX
PCG-EGN	PROTEIN CRYSTAL GROWTH – ENHANCED GASEOUS NITROGEN
PCG-STES	PROTEIN CRYSTAL GROWTH - SINGLE LOCKER THERMAL ENCLOSURE SYSTEM
PFMI	PORE FORMATION AND MOBILITY INVESTIGATION
PTCS	PAYLOAD TEST & CHECKOUT SYSTEM
SUBSA	SOLIDIFICATION USING A BAFFLE IN SEALED AMPOULES

BACKUP SLIDES

MICROGRAVITY SCIENCE GLOVEBOX (MSG) VIDEO DRAWER

PR UT-MSG-MECH-P020

Microgravity Science Glovebox (MSG) Rack Installed in MPLM

The Microgravity Science Glovebox (MSG) Rack is shown here as installed for flight on UF-2 (STS-111). The rack is installed in the MPLM bay 4 ceiling position. The MSG Video Drawer is installed in the lower left position of the rack.

MSG Video Drawer

Microgravity Science Glovebox (MSG) Video Drawer

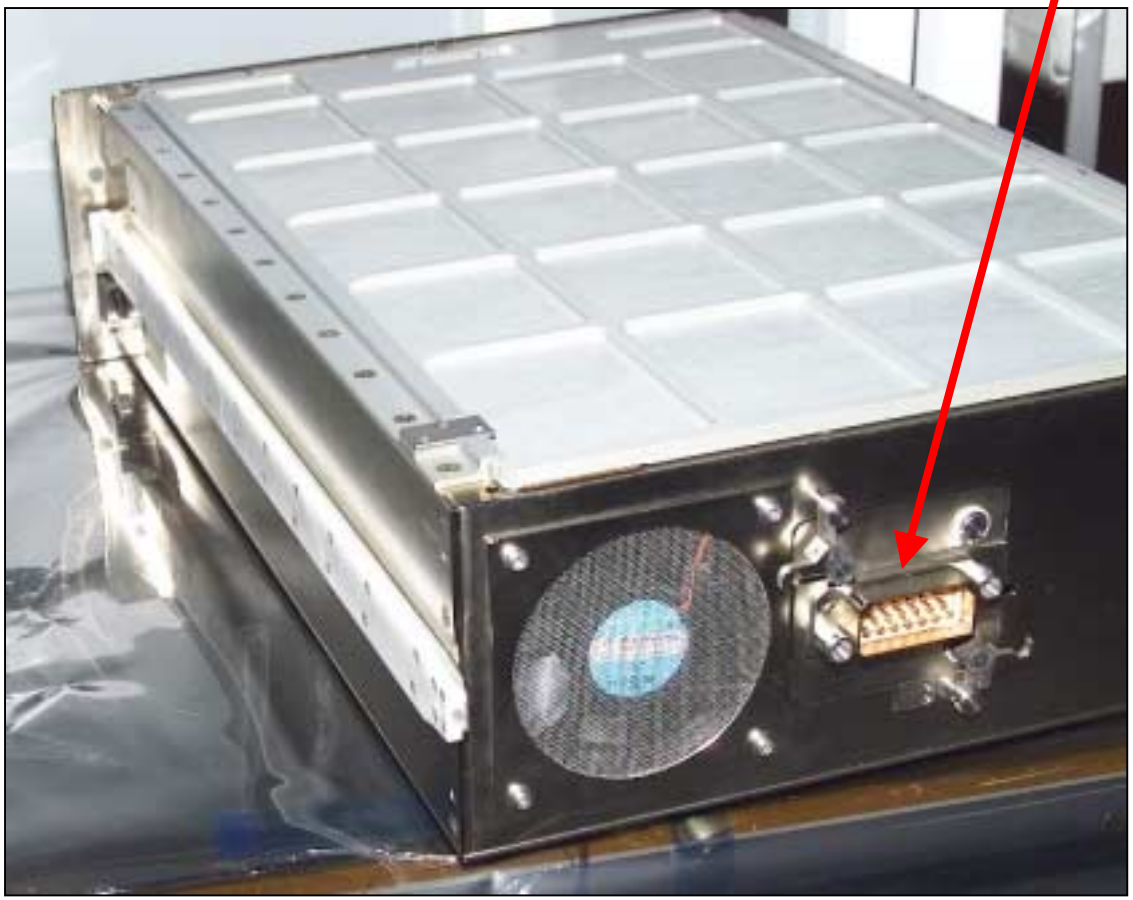
The MSG Video Drawer is a modified International Subrack Interface Standard (ISIS) drawer. The drawer houses video recording equipment used by crew members on orbit. Access to the recording equipment is gained by partially deploying the drawer from the rack and sliding the top lid of the drawer toward the back of the rack.

Power to the drawer is maintained by a telescoping umbilical that remains connected to the rack when the drawer is deployed and stowed.

Microgravity Science Glovebox (MSG) Video Drawer

(Rear View)

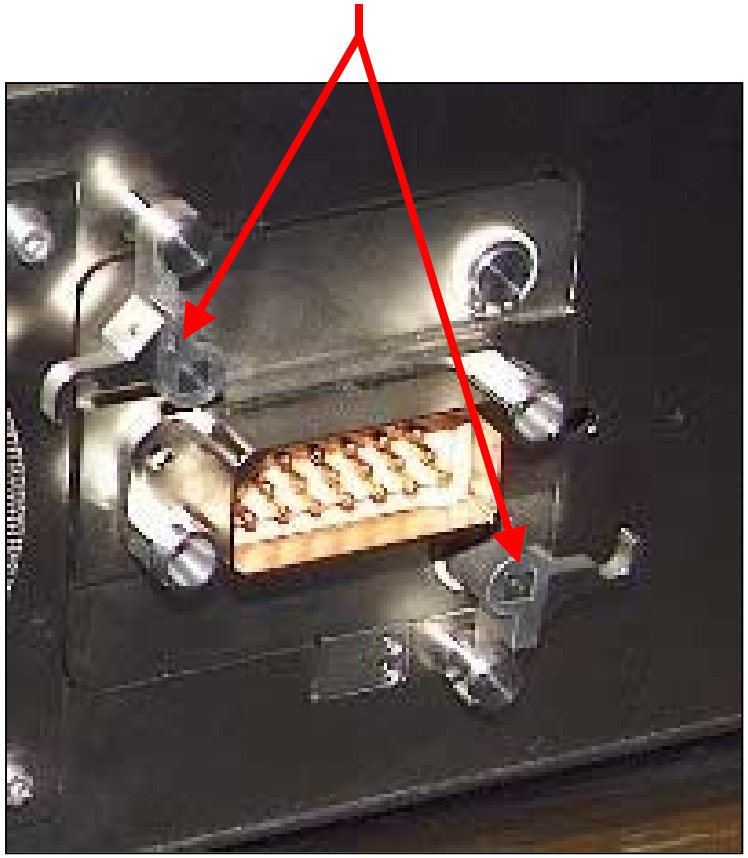
Video Drawer Umbilical Connector



Umbilical Connector Detail

Shown here is the umbilical connector with the retention hooks in the launch position. In this position, the retention hooks retain the telescoping umbilical inside the Video Drawer. On orbit, the retention hooks will be rotated to grapple the connector bar on the rack side of the interface. In that configuration, the retention hooks maintain the electrical connection when the drawer is deployed and stowed.

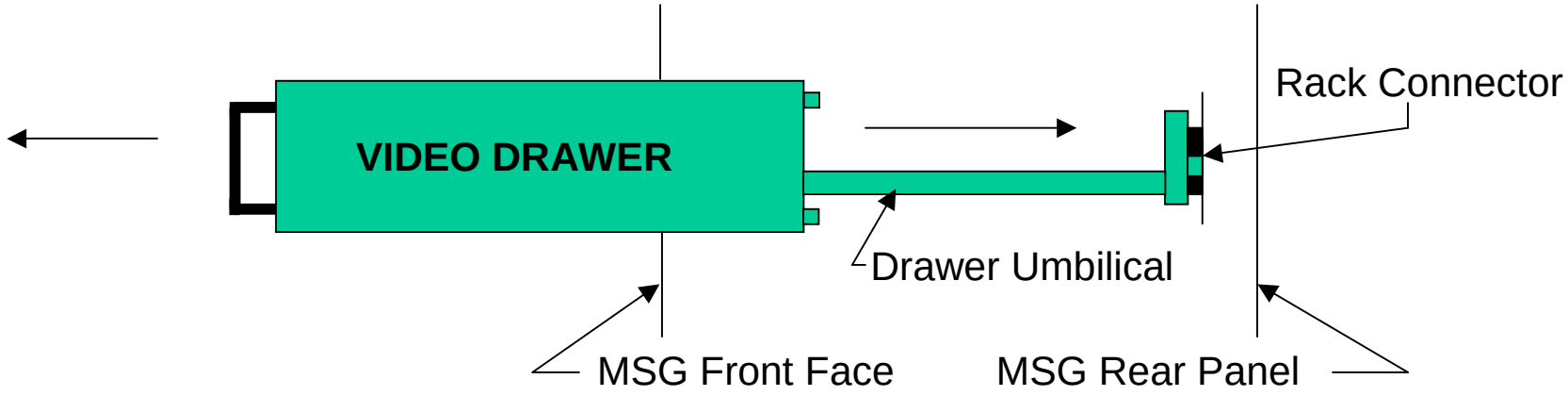
Retention Hook Assemblies



MSG Video Drawer Umbilical Connector Operation

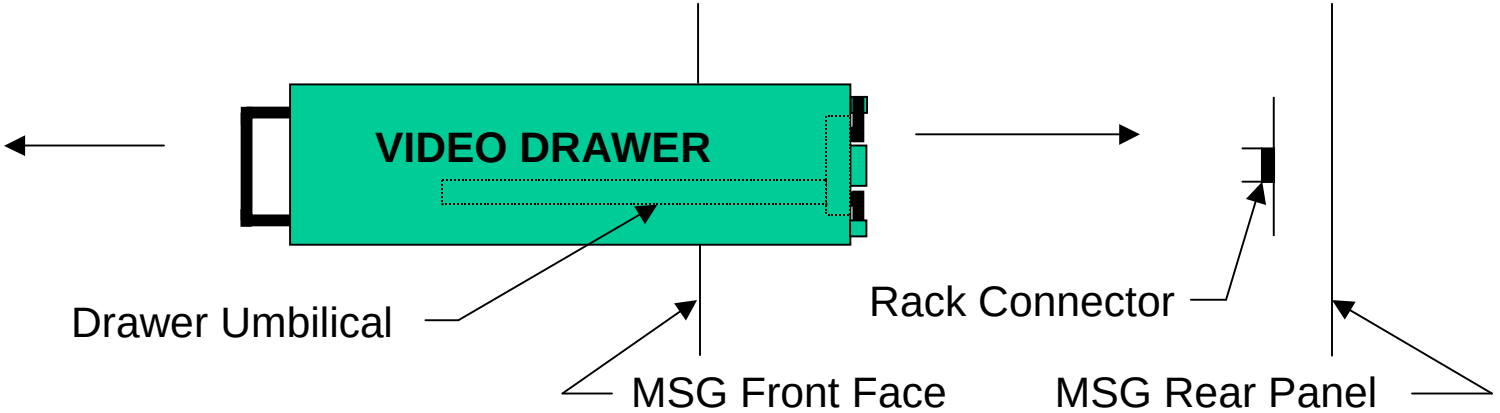
Umbilical Connector Connected to Rack Interface

- Drawer configured for powered operations.



Umbilical Connector Connected to Drawer Interface

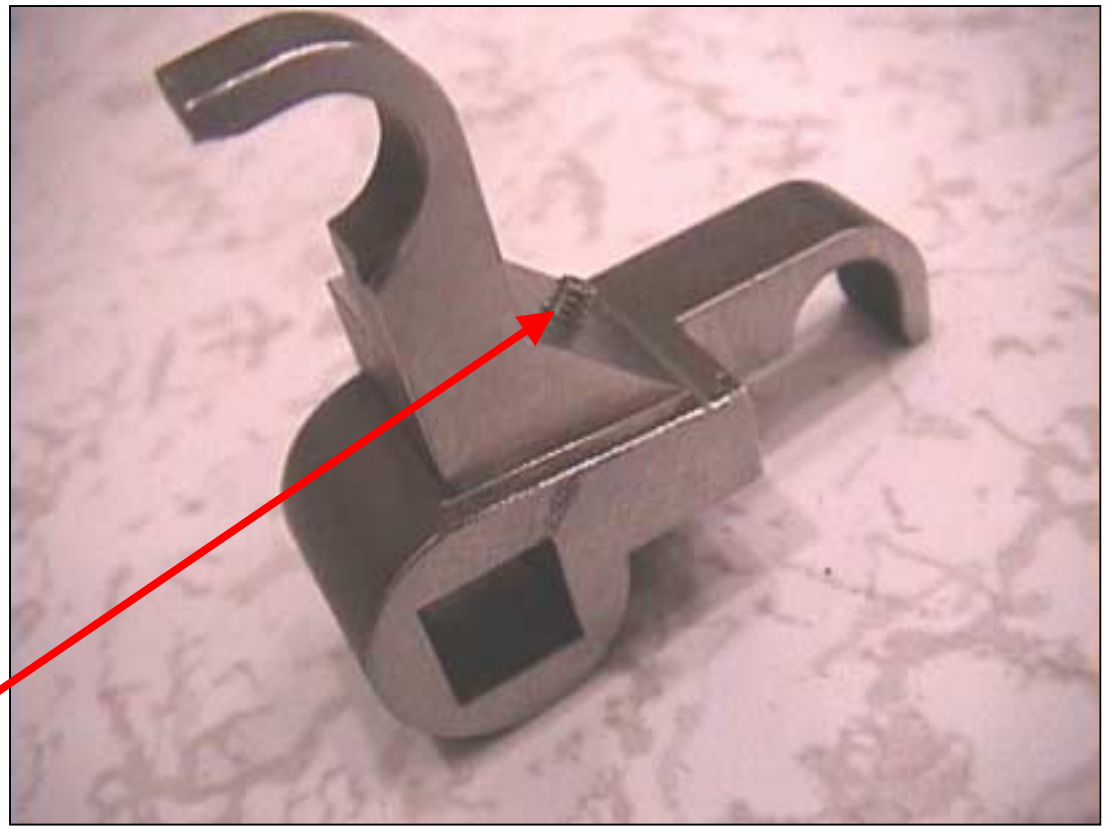
- Drawer configured for non-powered operations.



SIDE VIEWS

Retention Hook Assembly

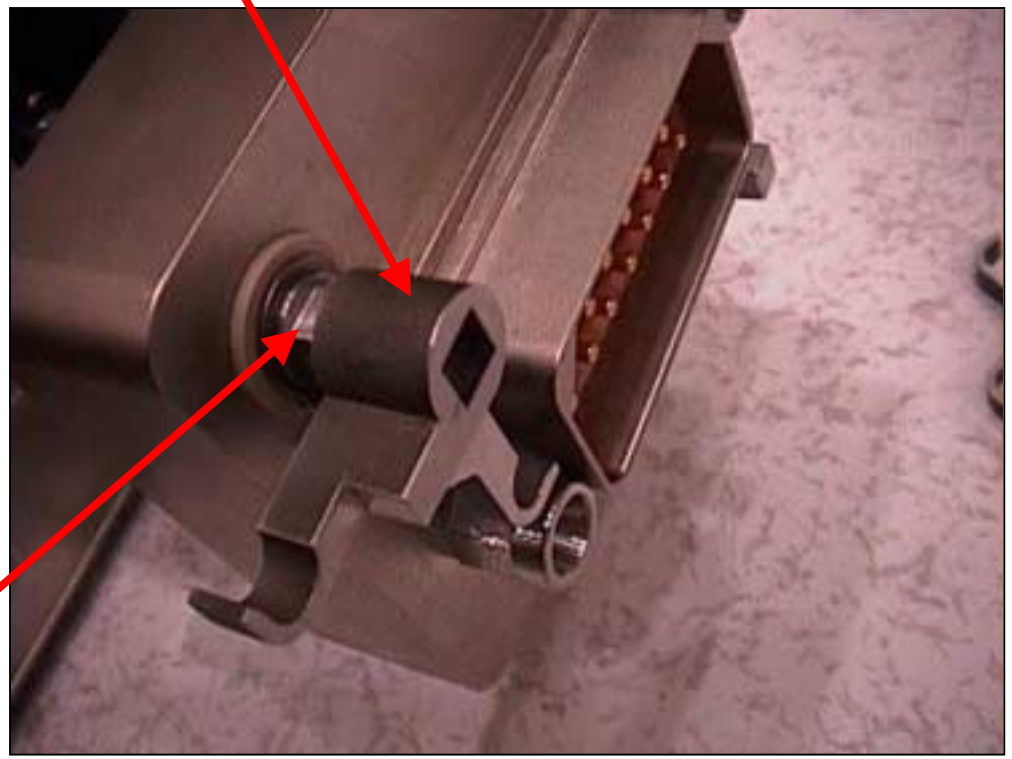
Each retention hook assembly is installed on a shaft that protrudes from the umbilical connector of the MSG Video Drawer. The retention hook is held in place with use of a small set screw as shown in the photo.



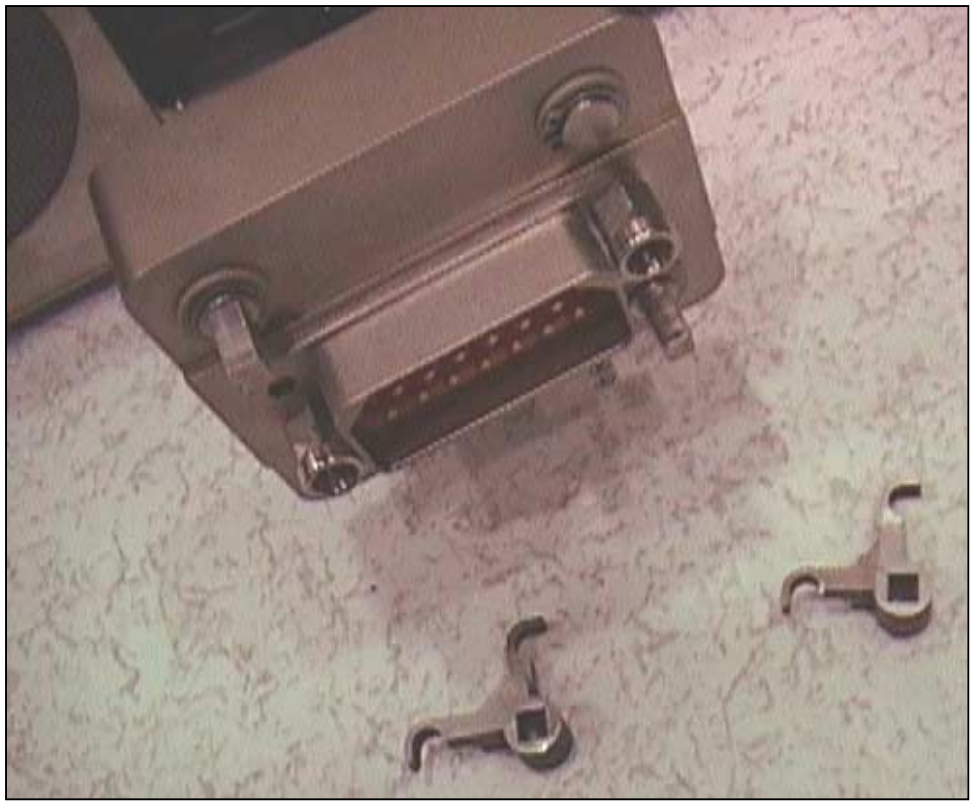
Retention Hook Assembly (1 of 2)

Retention Hook Assembly

Shown here is one of the loose retention hooks that was recently discovered on the MSG “engineering unit” Video Drawer. The exposed shaft in the photo indicates the retention hook assembly has moved from its originally installed position.



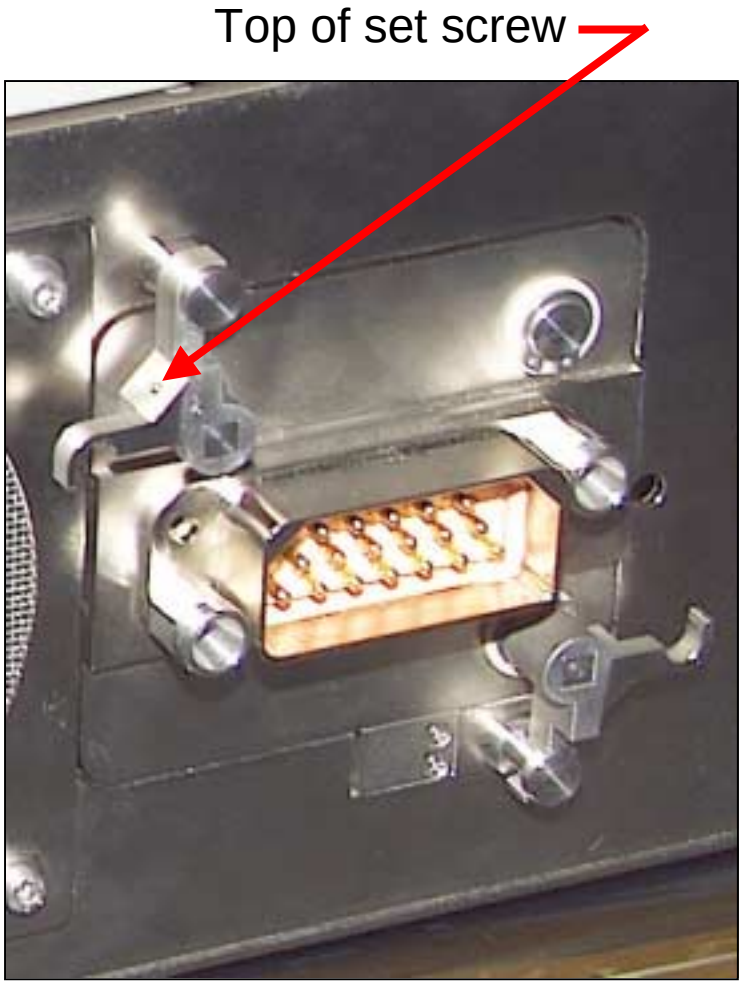
Microgravity Science Glovebox (MSG) Video Drawer



“Engineering Unit” Umbilical Connector with Retention Hooks Removed

Flight Closeout Photo "A"

This flight closeout photo shows the retention hooks in the launch configuration. Note that the hooks are in a captive position and cannot become dislodged during ascent. Also note that the set screw on the top left retention hook can be seen. The set screw is nearly flush with the retention hook, indicating the set screw is deeply seated in the body of the retention hook assembly.



Flight Closeout Photo "B"

This flight closeout photo shows a view of the retention hooks from the right side. The set screw on the bottom right retention hook can be seen in the same configuration as the set screw in the top left retention hook. Again, the set screw is nearly flush with the retention hook, indicating the set screw is deeply seated in the body of the retention hook assembly.