

A photograph of a Space Shuttle External Tank (ET) and Solid Rocket Booster (SRB) in space. The ET is a large, cylindrical, white structure with a blue and white striped pattern. The SRB is a long, cylindrical, white structure with a blue and white striped pattern. The background is the blackness of space with the Earth's blue and white clouds visible on the left side.

# Safety Panel Resources

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# Introduction

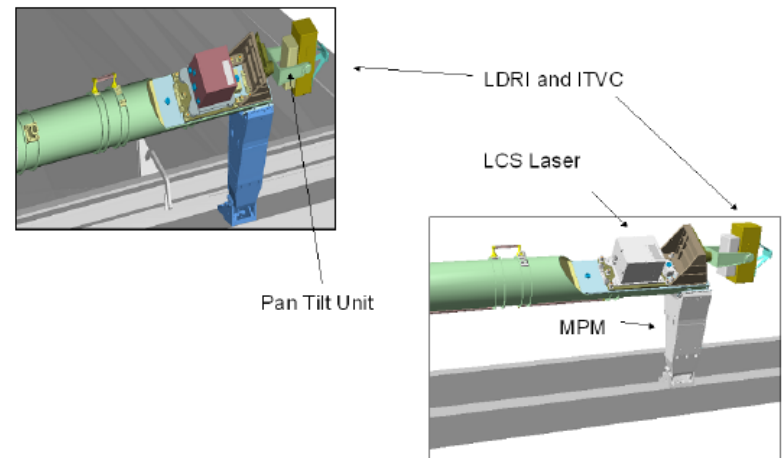
- Safety Panel has several standard members
  - Program
  - S&MA
  - Engineering
  - MOD
  - Crew
  - Life Sciences
- Safety panels ensure program requirements are met
- Frequently necessary to ask experts in various disciplines to assist the safety panel
- Examples NASA safety panels have seen include GFE, payloads, and ISS hardware

# GFE Hardware

- Flight Equipment Safety Reliability Review Panel (FESRRP) examples
  - Orbiter Boom Sensor System (OBSS) Lasers
  - Re-inforced Carbon Carbon (RCC) Plug Repair
  - Tiler Repair Ablator Dispenser (T-RAD)
  - Enhanced Right Angle Drive (ERAD)
  - Pan Tilt Unit (PTU) Straps
  - Solar Array Rotary Joint (SARJ) repair tools
  - Hand Held Microphone (HHM)

# OBSS Lasers

- Laser Dynamic Range Imager (LDRI) and Laser Camera System (LCS)
  - Consulted expert in non-ionizing radiation for hazard level of each
  - Engineering expert for the Orbiter windows also consulted to clarify window light transmission properties
  - Integrated panel review needed with ISS and Orbiter safety panels
  - MOD EVA experts advised on utilization of operational controls



Inspections Sensors

# OBSS Lasers (cont)

- Integrated safety review with all three safety panels and experts led to much more efficient resolution of issues
  - Helped clarify that hazard level was catastrophic due to potential loss of crew vision EVA
  - Clarified when the EVA crew would need to enter keep-out zones (KOZ) and that the KOZ was accurate
  - Clarified level of controls necessary for crew IVA when lasers came close to the Orbiter

# T-RAD

- Toxicity concerns
  - Consulted JSC toxicologists
    - Needed to clarify hazard level due to lack of current documentation
    - Toxicologists ran test to clarify
  - MOD EVA experts and crew consulted
    - Use of tool for on-orbit test required breaking opening two levels of containment
    - Operational controls required to mitigate the risk
  - Without the above expertise, safety panel would have been unable to
    - Clarify what levels of containment required
    - Determine viability of operational controls
    - Accurately document the risk
  - Presence of experts also allowed the experts to understand the concerns of the safety panel
    - MOD EVA more able to incorporate warnings into procedures

# HHM

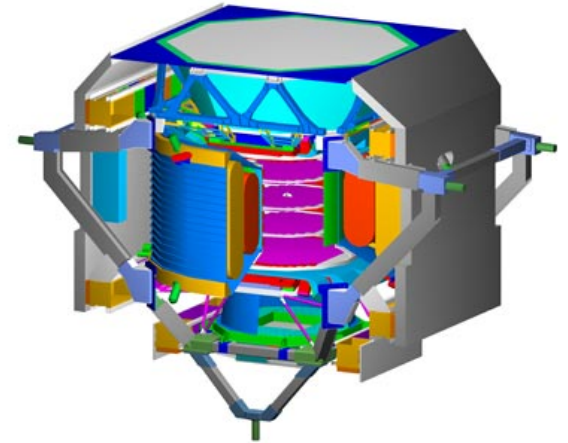
- HHM experienced several failures during acceptance and qualification testing
  - Due to incorrect installation of capacitor
- Safety panel reviewed the failures and needed clarification for how the failure would be prevented in future
- JSC Receiving and Test Facility (RITF)
  - Reported test results
  - Independent test facility
  - Increased panel understanding of available verifications and what occurred with the failure

# Payloads

- Payload Safety Review Panel (PSRP) examples:
  - Alpha Magnetic Spectrometer (AMS)
  - Plasma Contactor Electrical Grounding Payload (PLEGPay)

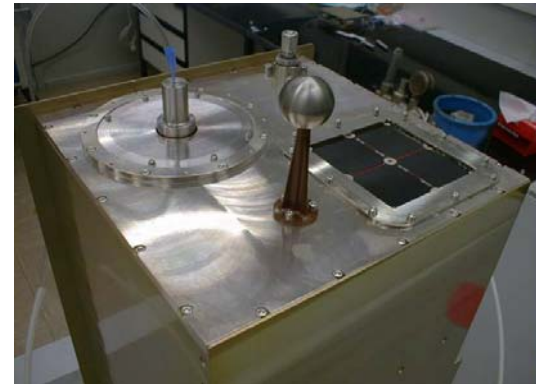
# AMS

- AMS has a very strong magnetic field
- PSRP EVA representative asked the EMU engineers and MOD EVA for assistance
- Test run on EMU allowed update in EMU certification to 300 gauss
- MOD EVA working with AMS project established that the EVA translation routes on ISS did not expose EMU to greater than 300 gauss



# PLEGpay

- PLEGpay located on Columbus external facility during 1E flight
- Real-time the space environments group identified an impact to the plasma environment
- NASA environments expert came to the safety panel
  - Clarify hazard and potential operational controls
- Plasma environment > 40V higher than ISS structure results in potential electrical shock to the EVA crewmember
- Panel agreed to power removal during EVA



# ISS

- ISS Safety Review Panel (SRP) example:
  - Solar Array Repair
    - Post STS-116 EVA repair to stow the P6 solar array the SRP addressed necessary controls for future solar array EVAs
    - Primary concern was electrical shock
    - Asked JSC environments expert, EMU engineers, MOD EVA and EVA crew to attend
    - Clarified need for isolation of EVA tools, EVA wrist rings
    - Without the experts present, safety panel would have been unable to determine the necessary operational controls

# Conclusion

- Important to involve the experts as early as possible
- Experts should be present at the safety panel for most effective discussion
- Panel representative may reach inside his organization for expertise
- If integrated issue, need to involve the other safety panel that is impacted

# Questions?

## Contact information

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