
Mainstream
Conference
"Houston, we've had a problem."
When 'Remote Location' Means Something Entirely Else
COURTENAY McMILLAN
NASA Johnson Space Center, Flight Director
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CONFERENCES
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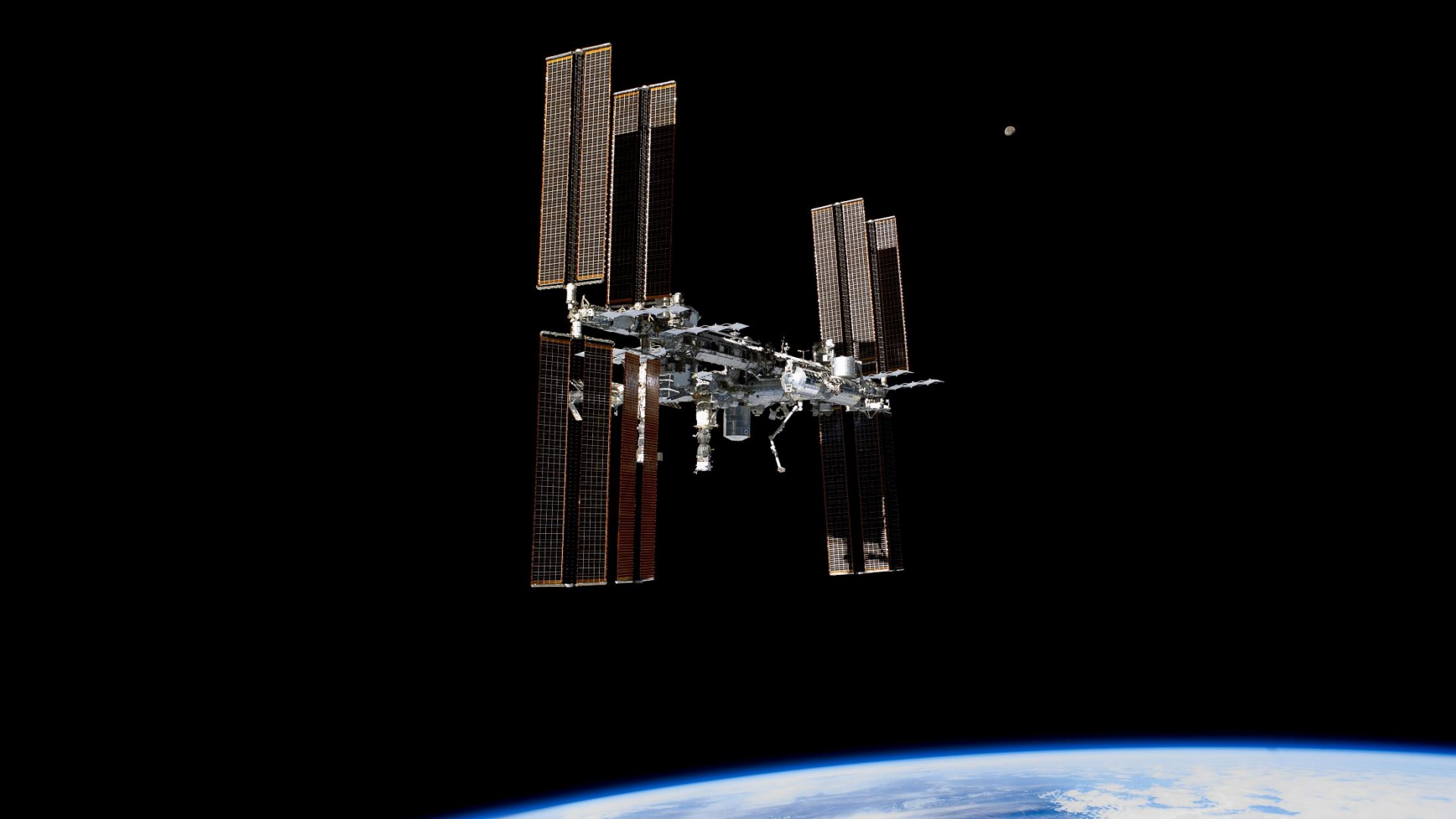
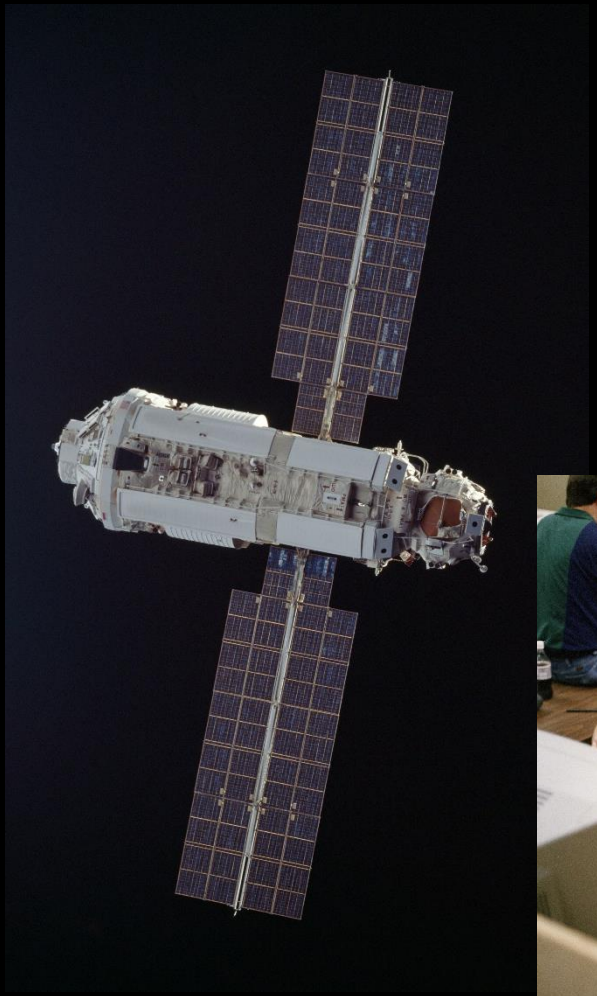
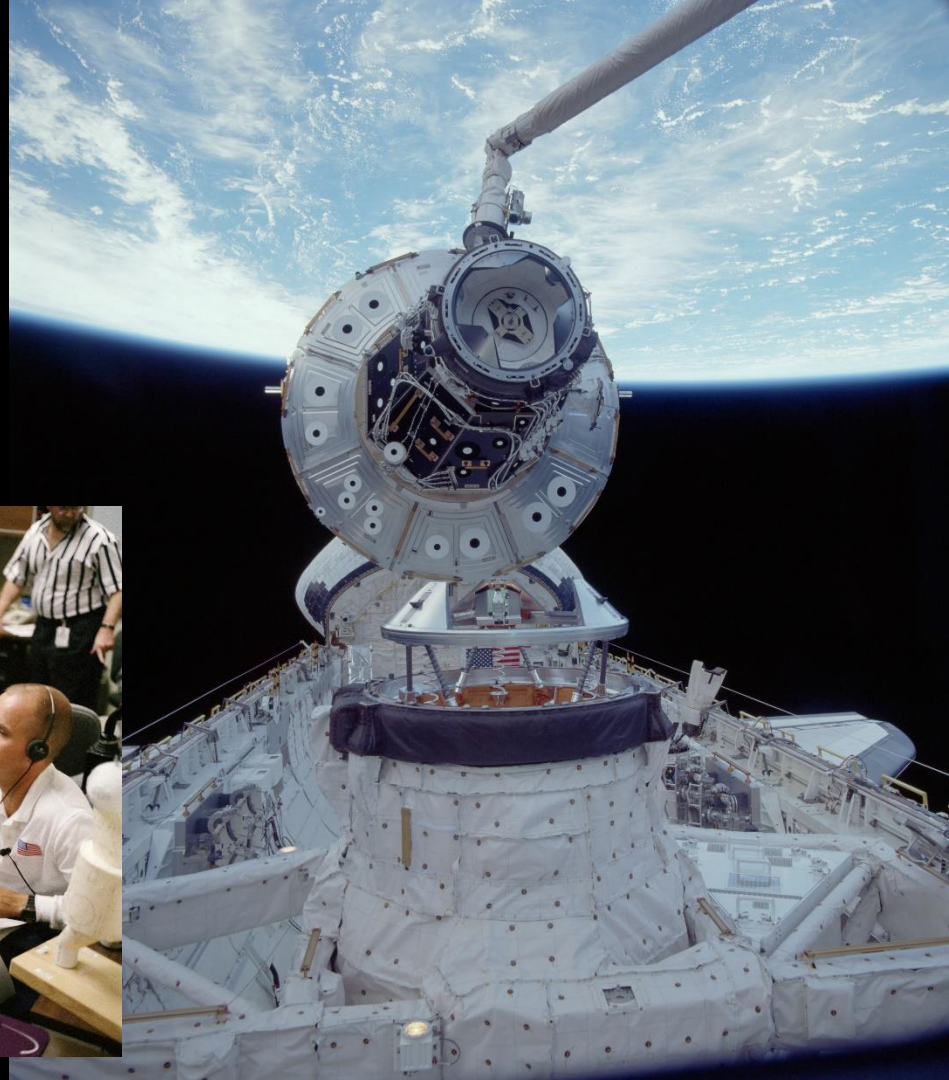
Reliability in Space Starts with Work on Earth

- No matter how ingenious or robust the design, **failures happen.** NASA's history shows that achieving mission success takes **reliable, inventive, motivated teams**.

- Every mission objective, every failure tests the system and the team in a different way
- Learn – deliberately – from last time to improve next time
- Reinforce foundations at every opportunity

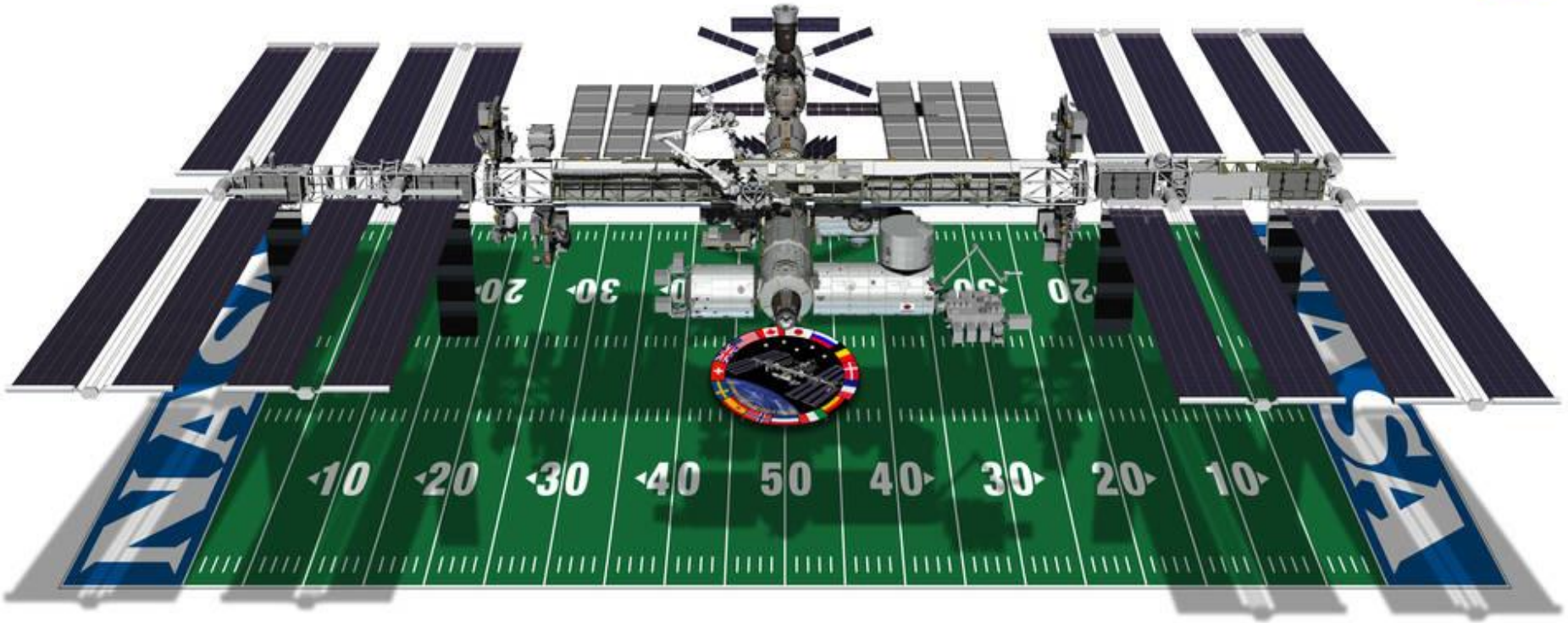




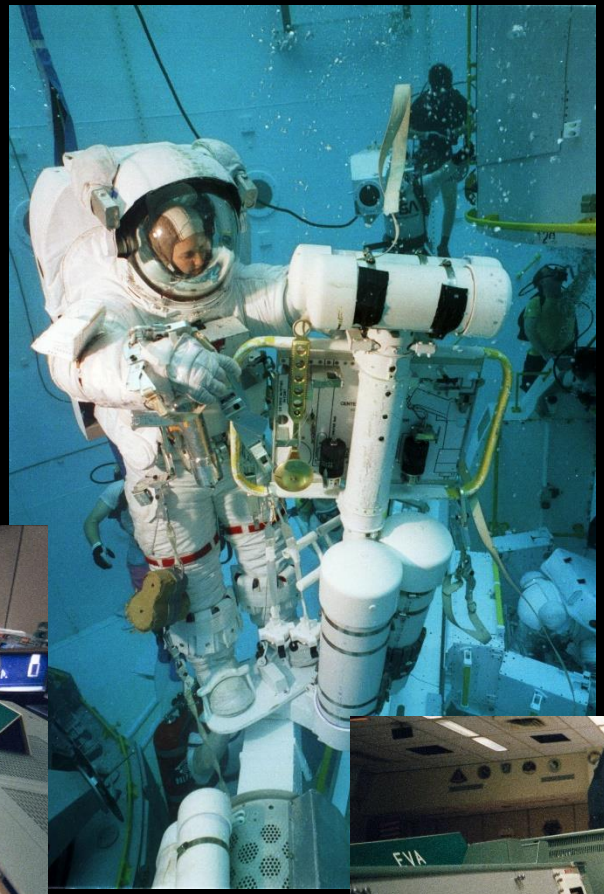


UNITY

National Aeronautics and Space Administration



www.nasa.gov



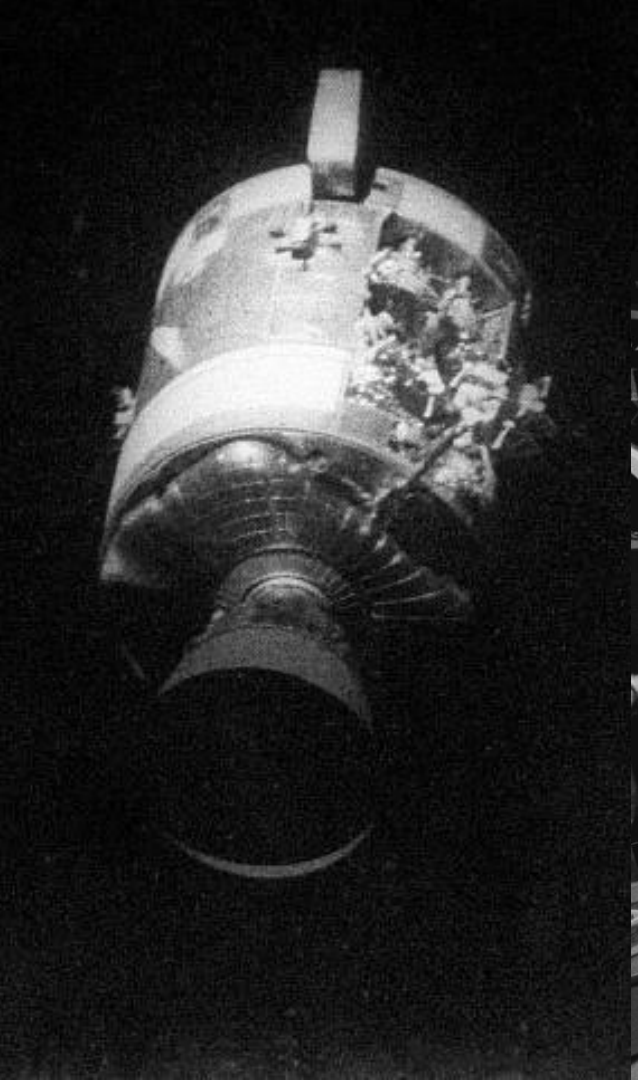

EPDM


EVA

PLAN, TRAIN, FLY

- Put enough work into PLAN and TRAIN so that when you FLY you have the bandwidth to handle the unexpected.

- PLAN: Figure out how the mission needs to be run
  - Build the timeline, write the procedures, agree on the rules
- TRAIN: Develop skills and techniques as a team
  - Every team member plays a part in mission success – or failure
- FLY!

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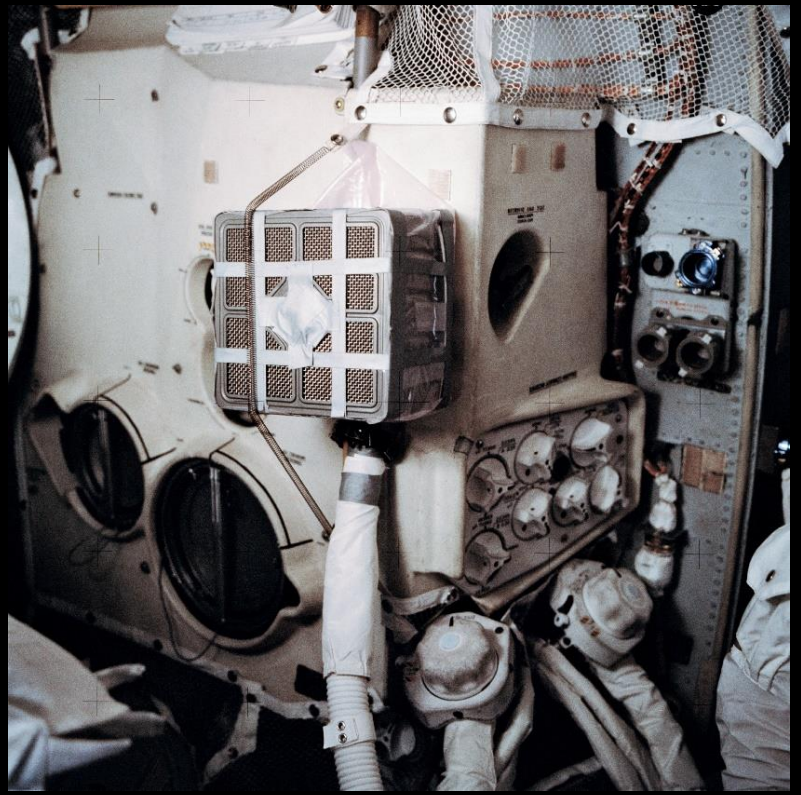

Maintenance in Space

- Understand your hardware – and your software
  - What must work? How must it work? (Corollary: how may it work?)
- Understand the tools / skills / etc available onboard
  - How familiar is the crew with the hardware (and/or software)?
  - What tools, equipment, etc is available to fix the problem
- Put the pieces together – communicate clearly what needs to be done and why


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THOR
FLIGHT DIRECTOR
CAPCOM
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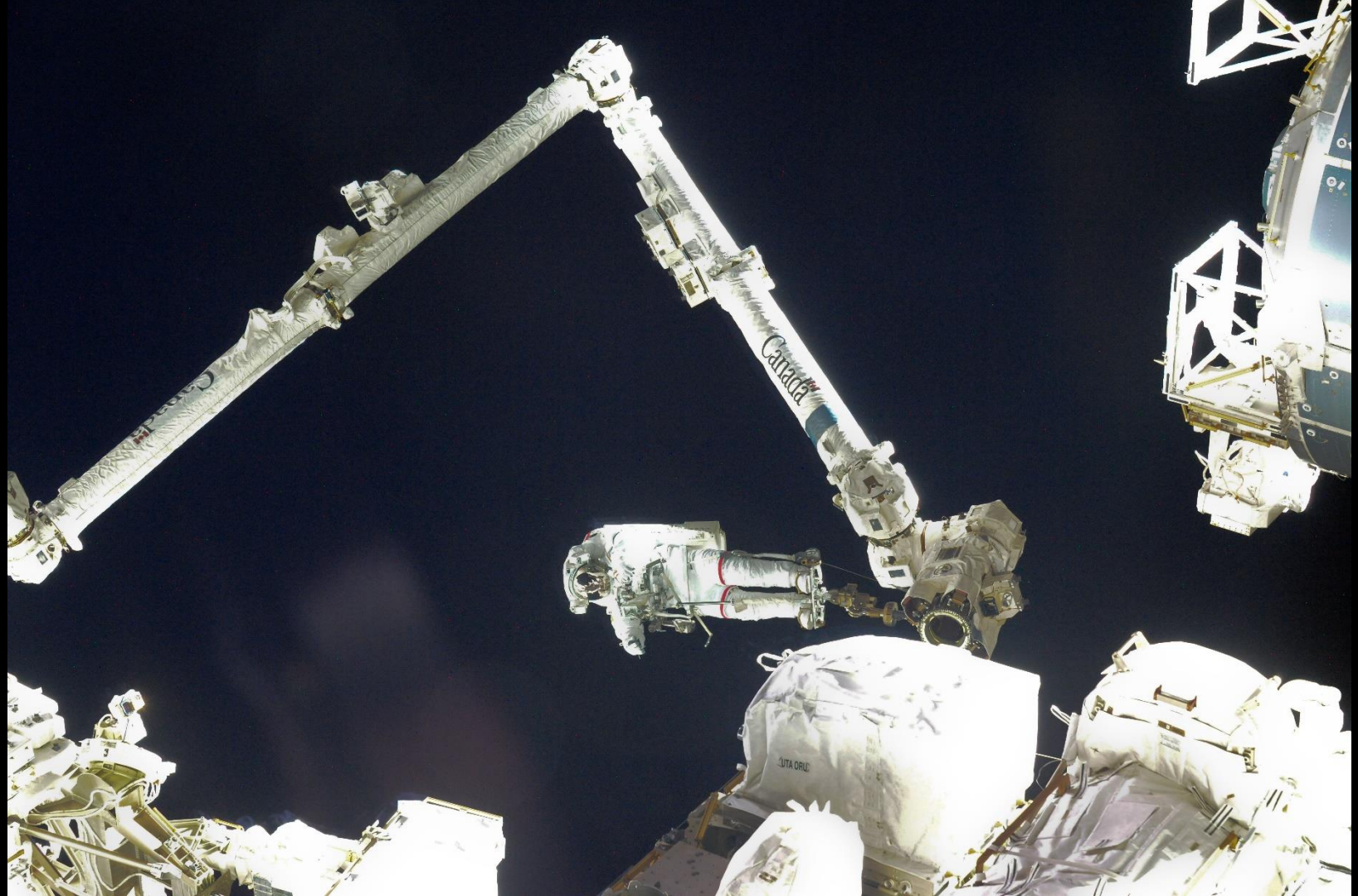
BME


Canada
Canada

Following the 2010 Contingency Spacewalks…

- The lessons we learned revitalized our analysis and response plans for major systems failures.
  - A team of engineers, flight controllers, instructors, and astronauts keep track of the skills and tools needed to get the job done in each case
  - Team members write procedures and get specialized training on the tasks they need to perform
  - When failures happen, we build the response plan, check and double-check the training and procedures, and execute.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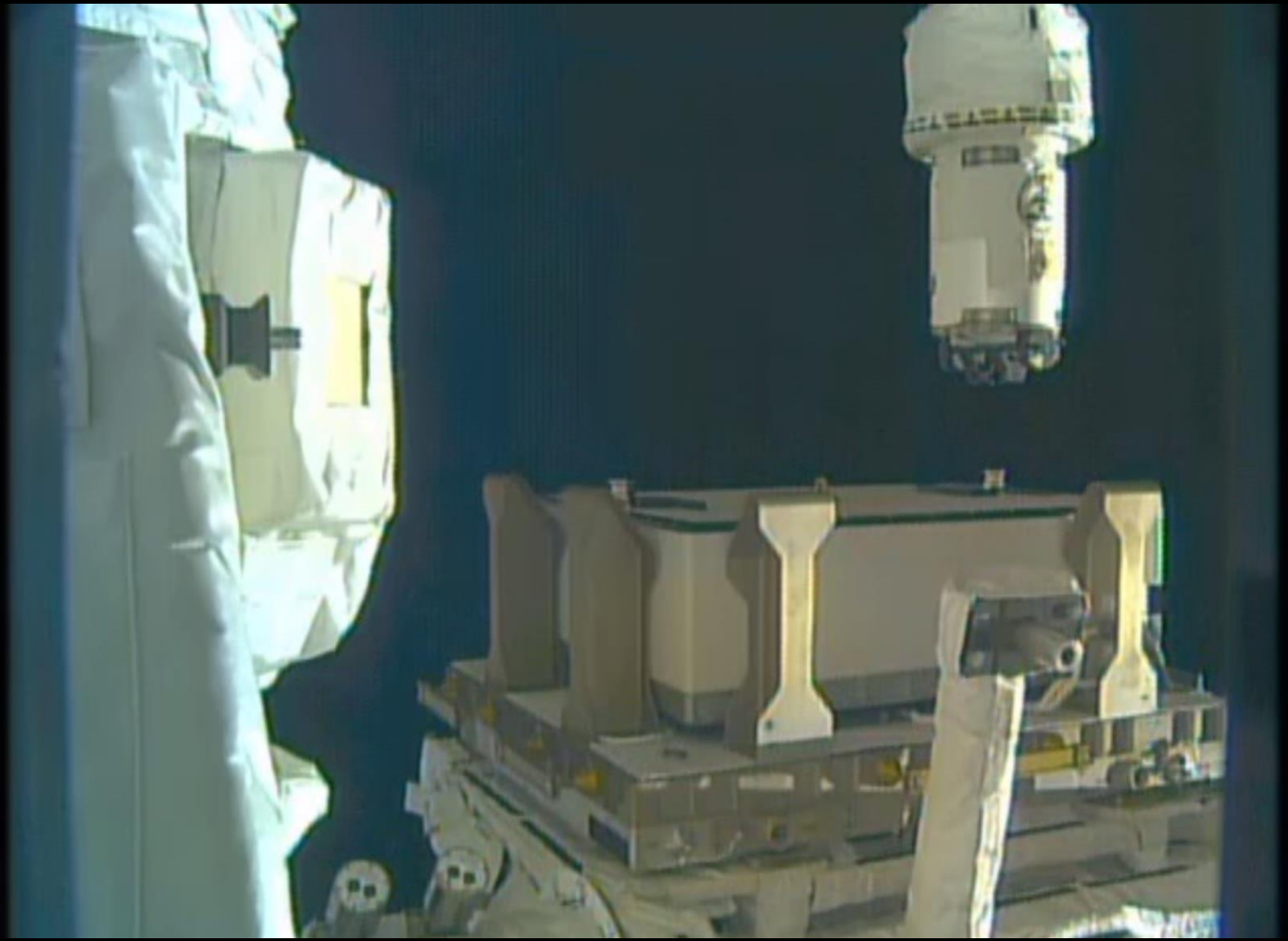
EVA
OPS PLANNER



https://blogs.nasa.gov/stationreport/2017/05/05/iss-dai

ISS Daily Summary Report – ...

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ISS On-Orbit Status Report

HOME

ISS Daily Summary Report – 5/05/2017

Posted on May 5, 2017 at 4:00 pm by HQ.

Main Bus Switching Unit (MBSU)2 Robotic Remove & Replace (R&R): Last night, Robotics ground teams completed the extraction of the spare MBSU Flight Releasable Attachment Mechanism (FRAM) from External Stowage Platform 2 (ESP-2) and successfully relocated it on the Special Purpose Dexterous Manipulator (SPDM) Enhanced ORU Temporary Platform (EOTP). Then, the SPDM was used to unfasten the secondary H1 bolts and to break torque on the primary H2 bolts on both, the new spare and the failed unit. Ground teams are currently executing steps to remove the failed MBSU from the S0 truss and install the spare. Power up of the new MBSU is expected to occur tomorrow morning, followed by the powerdown and power up of the Direct Current Converter Units (DDCU) S02B to remove the Lab Truss Contingency Jumper (LTCJ) and return the external loads to their nominal configuration. The removal of the Lab Secondary Power Distribution Assembly (SPDA) jumper and associated DDCU LA2B powerdown is planned for Monday..

OsteoOmics: The crew thawed BioCells and injected them into growth media inside the Microgravity Science Glovebox (MSG). After six BioCells are processed they are placed into BioCell Habitat 4, which is then placed in the Space Automated Bioproduct Lab (SABL). Later in the day crewm removed a media kit from a Microgravity Experiment Research Locker / Incubator (MERLIN) and inserted it into a Cargo Transfer Bag at ambient temperature for

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May 2017

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Archives

May 2017
April 2017

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Act, Learn, Apply, Act

- We may know more tomorrow than we do today – but if we wait to find out, we may lose the chance to act.
- We will act today, based on the best knowledge we have.
- What we learn by our actions today will improve our options and opportunities tomorrow.


MISSION CONTROL CENTER
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EVA
ISE

FOUNDATIONS OF FLIGHT OPERATIONS

1. **To instill within ourselves these qualities essential to professional excellence**

   Discipline…Being able to follow as well as to lead, knowing that we must master ourselves before we can master our task.

   Competence…There being no substitute for total preparation and complete dedication, for flight will not tolerate the careless or indifferent.

   Confidence…Believing in ourselves as well as others, knowing that we must master fear and hesitation before we can succeed.

   Responsibility…Realizing that it cannot be shifted to others, for it belongs to each of us; we must answer for what we do or fail to do.

   Toughness…Taking a stand when we must; and to try again and again, even if it means following a more difficult path.

   Teamwork…Respecting and using the abilities of others, realizing that we work toward a common goal, for success depends upon the efforts of all.

   Vigilance…Being always attentive to the dangers of flight; never accepting success as a substitute for rigor in everything we do.

2. **To always be aware that, suddenly and unexpectedly, we may find ourselves in a role where our performance has ultimate consequences.**

3. **To recognize that the greatest error is not to have tried and failed, but that, in the trying, we do not give it our best effort.**


AD ASTRA PER ASPERA - SEMPER EXPLORO
APOLLO 1 - CHALLENGER - COLUMBIA


1

The President of the United States of America

Awards this

Presidential Medal of Freedom

To

The Apollo XIII Mission Operations Team

We often speak of scientific "miracles"--forgetting that these are not miraculous happenings at all, but rather the product of hard work, long hours and disciplined intelligence.

The men and women of the Apollo XIII mission operations team performed such a miracle, transforming potential tragedy into one of the most dramatic rescues of all time. Years of intense preparation made this rescue possible. The skill, coordination and performance under pressure of the mission operations team made it happen. Three brave astronauts are alive and on Earth because of their dedication, and because at the critical moments the people of that team were wise enough and self-possessed enough to make the right decisions. Their extraordinary feat is a tribute to man's ingenuity, to his resourcefulness and to his courage.

The White House
Washington, D. C.
April 18, 1970

Richard Nixon

Questions?

How to Contact Me:
courtenay.r.mcmillan@nasa.gov
+1 (281) 483-7370
linkedin.com/in/mcmillancr
https://www.nasa.gov/station