

State-of-the-Art Facilities Located on Redstone Arsenal



The Huntsville Operations Support Center, or HOSC, is a 24/7, multi-mission, ground systems operations facility which provides user-oriented, highly reconfigurable services. The HOSC provides secure and centralized gateway services and communications infrastructure to a globally dispersed user community. Our facilities offer custom solutions to your mission requirements.

- **Configurable Control Rooms**
Allow flexibility and shared cost across PMOD projects and programs
- **Test and Readiness Room**
In-house ISS command and telemetry testing
- **Data Operations Control Room**
Ground systems support of all PMOD programs and projects
- **Mission Training Complex**
Basic trainer for ground support personnel and flight control team



1998 – Future

International Space Station

- International Space Station payload operations planning and execution
- FASTSAT science operations planning and execution

Next Generation

- Engineering support for Space Launch System and Commercial Crew Programs
- Near-Earth Asteroid Scout mission operations
- Artemis projects
- Gateway payload operations
- Human Landing System payload operations
- Solar Cruiser Mission



National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Huntsville, AL 35812
www.nasa.gov/marshall

www.nasa.gov

Customer Testimonials



Thanks for everything. The ability to interact with the crew and cadre real time and adapt on the fly has made us 100% successful. You have made it work so well for us. Thank you. Thank you. Can't say it enough.

Mark Weislogel, Ph.D., Principal Investigator,
Plant Water Management Team

The HOSC team has really stepped up to support the Commercial Crew Program. Marshall's HOSC support team was attentive for the preparation, lessons learned, simulations, and upgrades required to make the agency's SpaceX Demo-2 and Crew-1 missions a success.

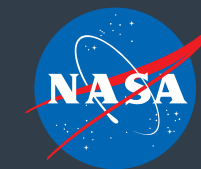
Steve Gaddis, MSFC Lead,
NASA's Commercial Crew Program
and Deputy Manager, MSFC Launch
Vehicle Systems Office

The HOSC plays a critical role in the SLS Program and the ARTEMIS missions of the future. The SLS Engineering Support Team has used a HOSC control room to support Green Run, and we are looking forward to supporting tests, joint simulations, and launch in the coming months. We are positioned to continue to rely on the HOSC's unique capabilities as we send humans back to the moon and on to Mars as part of NASA's future.

Jennifer Vollmer, Stages HOSC
and Mission Operations Support Lead
SLS Stages Office

For business inquiries, contact:
MSFC-PMOD@nasa.gov

National Aeronautics and
Space Administration



Advancing Human Exploration and Discovery

Payload and Mission Operations Division



MARSHALL
SPACE FLIGHT CENTER

Connecting Space and Science for More Than 60 Years



From the Apollo era to the Artemis Generation and beyond, the Payload and Mission Operations Division (PMOD) at NASA's Marshall Space Flight Center connects science to space from the ground up. PMOD offers a suite of mission operations capabilities through its experienced team and state-of-the-art facility.

Decades of plan-train-fly experience have led to an ever-growing list of operational successes.

We plan.

We take requirements and turn them into mission timelines. We use automated tools to help customers with turnkey, planning solutions.

We train.

Whether we meet in person or remotely, we can assess our customers' needs to develop a customized training plan. We provide instruction to prepare teams for operations.

We fly.

Whether a mission is crewed or uncrewed, our ground systems operators and flight controllers are expert mission integrators. We can connect customers to a near-Earth or deep space platform, develop operations products and plans, and optimize execution utilizing a global team to ensure any mission's success.

**Let us connect you today
to the space of tomorrow.**

1960 – 1975

Mission Operations Growth

- Redstone
- Atlas
- Saturn 1/1B engineering support
- Skylab mission design
- Saturn V flight control and engineering support

1975 – 2011

Space Shuttle Program

- Spacelab science operations planning and execution
- Shuttle propulsion elements engineering support
- Shuttle payload operations, engineering support
- Chandra X-ray Observatory engineering support, science operations planning/execution

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PLAN

Mission Operations Planning



We make it our mission to know what you use and how you use it to help you create the best plans, procedures, and tools to ensure mission success. We work with teams worldwide to translate experiment requirements into executable plans, efficient procedures, and tools.

Planning Capabilities

- Logistics during all flight phases across various delivery schedules and vehicles
- Customize experiment plans based on specific needs
- Integrate requirements for many experiments into a cohesive schedule of crew and ground activities
- Evolve as needs evolve, before and during missions
- Expertise in development of safe and efficient crew and ground command procedures
- Quality control on crew procedures to ensure tools and hardware are gathered, used, and returned in order

Hardware and Tools Expertise

- Track hardware (arrival/genesis to departure/re-entry) and maintain large inventories, leveraging years of ISS experience
- Intimate knowledge of tools, supplies, and hardware storage locations to ensure most effective use
- Expertise in payloads display development and NASA usability standards

Innovation

We are continuously improving and developing tools as technology and standards evolve. Incorporating automated planning toolsets ensures we can respond to customers' needs in a timely manner while lowering their costs.

TRAIN

Mission Operations Training



Standards-driven, high-quality training leads to successful mission operations. With more than two decades of experience, we can train your flight and mission operations crews, including astronauts, payload developers, principal investigators, and flight control and ground teams.

Training Capabilities

- Science operations curriculum development and related instructional design
- Flight and ground controller training and certification
- Payload instructor assessment, training, and certification
- Remote science user, ground systems interface training on NASA tools and displays
- Critical thinking, situational awareness, and anomaly response training
- Joint, multi-partner payload operations simulations
- Leadership and team skills workshops
- Small-to-large-scale mockup development
- XR (virtual and augmented) training assessment
- Trainer development (full-time, part-time, glass rack)

Facilities/Hardware

- EXPRESS Rack and Glass Rack trainers
- Microgravity Science Glovebox trainer
- ISS LAN trainer
- Mission Training Complex, Simulation Support and Data Rooms
- 3D printer for equipment mockup



FLY

Mission Operations Execution



With a proven history of flight mission support, the Payload and Mission Operations Division provides a one-stop-shop infrastructure supporting customers' mission needs with everything from command and telemetry to voice, video, and storage. In addition, PMOD provides:

- **Flexible Operations**—Turnkey operations areas, connectivity to offsite locations, and ability to host customers' systems onsite
- **Extensive Connectivity**—Existing connections to NASA spaceflight networks and capability to expand to commercial or Department of Defense facilities
- **Safety and Security**—24/7/365 monitoring from a secure, reliable facility, and mission execution by operators who specialize in science mission operations

Expertise

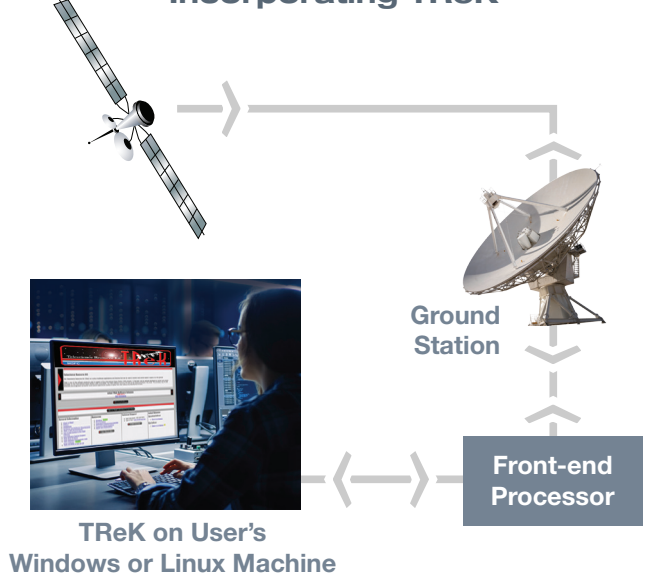
- **Data Systems**—Modern designs and fast resolutions
- **Cyber Security**—In-house IT/security specialists
- **Imagery**—Use of NASA's in-house imagery experts
- **Voice**—Decades of voice communications experience
- **Protocols and Standards**—Engineering expertise
- **Ground Systems and Mission Operations Integration**—Proven record of excellent collaboration and integration

Innovation

- Data reliability
- Mission flexibility
- Operations efficiency
- High capacity
- Modularity



Generic Mission Architecture Incorporating TReK



Telescience Resource Kit

The Telescience Resource Kit (TReK) is a comprehensive software solution for vehicle/payload operations commanding, monitoring, and payload activities. It allows users to monitor and control assets in space or on the ground. TReK benefits include:

- An easy-to-use interface
- Extensive applications and libraries for integration with vehicle systems
- Flight proven on both crewed and uncrewed missions
- Supports local and remote users
- Integrates easily with customer ground systems
- Includes support for CCSDS, Delay Tolerant Networking (DTN) protocols, and CFDP File Transfer
- Highly portable ground system that can run on a laptop

General Capabilities

- Communication
- Packet Support
- Data and Metadata
- Command
- File Transfer
- DTN
- Application Programming Interface
- Environments
- Cryptography Services

<https://trek.msfc.nasa.gov>



Partnerships

Collaborations with educational institutions such as Alabama State University, The University of Alabama in Huntsville, University Nevada Las Vegas, and Auburn University allow the Payload and Mission Operations Division to explore new technologies and offer customers unique operations solutions while keeping costs low.



INTEGRATE + VALIDATE