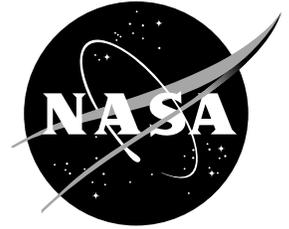


# NASA Facts

National Aeronautics and  
Space Administration

**Marshall Space Flight Center**  
Huntsville, Alabama 35812



## **Payload Operations Center** **Marshall Space Flight Center's Role in Development** **and Operations.**

The International Space Station is the most ambitious space research project in human history. The space station is a state-of-the-art space-based research facility that will open new doors in many fields of science and technology. When complete, the space station will boast six laboratory modules—containing more than 15 external locations for conducting experiments in the vacuum of space.

### **Overview**

The Payload Operations Center is the science command post for the International Space Station.

Located at NASA's Marshall Space Flight Center in Huntsville, Ala., it is the focal point for American and international science activities on board the space station. The Payload Operations Center's unique capabilities allow science experts and researchers around the world to perform cutting-edge science in the unique microgravity environment of space.

The team at the Payload Operations Center manages the operations of science and research experiments on board the station. This group of dedicated professionals coordinates the use of valuable on-orbit resources, orchestrates delivery and retrieval



The Payload Operations Center at the Marshall Space Flight Center (NASA/MSFC).

of payloads, ensures safety for space station crews while working with payloads and configures complex systems on board the station to support payloads. Other members of the Payload Operations Center team train astronauts, cosmonauts, and ground personnel on payloads and coordinate the plans for payload activities with scientists and control centers around the world.

## **Payload Operations Center: International Operations**

As the space station program's prime center for payload operations, the Payload Operations Center coordinates the payload activities of NASA's international partners. Our partners include the Russian Space Agency, European Space Agency, National Space Development Agency of Japan and Canadian Space Agency. Each of NASA's partners has a control center:

- Center for Control of Spaceflights ("TsUP" in Russian) in Korolev, Russia;
- Space Station Integration and Promotion Center (SSIPC) in Tskuba, Japan; and
- Columbus Control Center (Col-CC) in Oberpfafenhoffen, Germany.

These centers represent our international partners' interests in payloads on board the space station. The partner-centers are responsible for the planning and operations of their space agencies' modules. Marshall's Payload Operations Center is chartered to synchronize the payload activities among the partners and optimize the use of valuable on-orbit resources.

## **Payload Operations Center: United States' Operations**

The Payload Operations Center also represents NASA's interests in conducting research on the space station. The operations center plans and coordinates the details of payload activities on U.S. Destiny, NASA's science laboratory in space. Helping the operations center in these activities are three science centers, called Telescience Support Centers. Each focuses on different fields of space-based research, allowing researchers across the country to collaborate and share common hardware, facilities and resources on board the space station.

The Telescience Support Centers are:

- Marshall Space Flight Center in Huntsville, Ala., managing materials sciences, biotechnology research, microgravity research and space product development;
- John Glenn Research Center in Cleveland, Ohio, managing fluids and combustion research; and
- Johnson Space Center in Houston, managing human life sciences, including physiological and behavioral studies and crew health and performance.

## **Planning for the Future**

At the Payload Operations Center, teams of planners look days, weeks and months into the future to orchestrate the use of space station on-orbit resources such as equipment, electrical power and crew time to fulfill science and research objectives. Working with teams around the world, Payload Operation Center planners develop timelines of activities for NASA's Destiny laboratory, and then integrate those timelines with those of the other international partners to create schedules of all payload activities on board the space station.

During the development of these products, Payload Operations Center planners work closely with the Mission Control Center in Houston—responsible for overall command and control of the space station. The teams at the operations center and Mission Control in Houston must stay synchronized: Mission Control oversees and provides access to the resources required for payload operations; the Payload Operations Center planners must ensure that payload activities do not interfere with space station maintenance and assembly tasks.

## **Operating from Locations Across the U.S. and Around the World**

As a multi-national effort, the authority for the control of payloads is distributed around the world. Each international partner is responsible for the operation of its payloads in its on-orbit laboratory—within the boundaries of the overall payload timelines and under the guidance of the Payload Operations Center. As the authority for payload operations in Destiny, the operations center delegates control of NASA payloads to the Telescience Support Centers and scientists around the United States.

In addition to those facilities, payload developers also are able to accomplish space station payload activities at their home sites. Software engineers at the Marshall Center have developed the Telescience Resource Kit, or TReK, to enable the transfer of



Orbiting 220 miles above the Earth, the space station crew works together with science experts at the Payload Operations Center at the Marshall Center and researchers around the world to perform cutting-edge science experiments in the unique microgravity environment of space (NASA).

information from remote science facilities to the space station and then to the Payload Operations Center. If payload developers do not have the necessary facilities or communications capabilities at their home location, they may initiate and manage their science experiments from the Payload Operations Center as hosted investigators.

## **Payload Operations Center Capabilities**

Communications lines and computer equipment link the Payload Operations Center with Mission Control in Houston—the direct link to the space station. Within the operations center, critical payload information from the space station—reading data and telemetry signals from a variety of experiments and procedures operated by the station crew and their colleagues on Earth – is displayed on dedicated workstations. Flight controllers in the Payload Operations Center also monitor research operations on the space station via downlinked television.

State-of-the-art computers and communications equipment at the Payload Operations Center link international partners, Telescience Support Centers and remote-site researchers with their experiments and the crew on board the space station. Flight controllers and science experts staff control room consoles around-the-clock to stay in contact with and coordinate space station experiment operations.

## **Identifying the Payload Flight Control Team**

The Payload Operations Center is staffed around the clock by shifts of payload flight controllers. At any given time, four to eight flight controllers are on console, operating, planning for and controlling various systems and payloads.

The **Payload Operations Director (POD)** is the leader of the operations center flight control team. The director guides all payload activities in coordination with Mission Control in Houston, the station crew, the international partners and other research facilities.

The **Payload Communications Manager (PAYCOM)** coordinates payload-related voice communications between the Payload Operations Center and the space station crew. The PAYCOM is the “voice” of the operations center.

The **Operations Controller (OC)** coordinates the configuration of resources to enable science operations, such as power, cooling, commanding and the availability of items like tools and laboratory equipment. The OC also maintains the daily schedule of science activities and work assignments for the station crew, and works with planners at Mission Control in Houston to ensure payload activities are accommodated in overall space station plans and schedules.

The **Data Management Coordinator (DMC)** configures on-board data and video systems to ensure payloads receive their downlinked science results and experiment telemetry in a timely manner.

The **Payload Rack Officer (PRO)** is linked by computer to all payload racks on board the station. The Payload Rack Officer monitors and configures the resources and environment for science experiments, including EXPRESS Racks—multiple payload racks designed for commercial payloads. The PRO also maintains the command link between the operations center and the Mission Control Center in Houston.

Other support personnel staff the Payload Operations Center during normal business hours. This support staff performs routine functions such as planning for future weeks’ schedules, archiving data and documentation and keeping track of on-board procedures and inventory.

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