

# NASA Facts

National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
Houston, Texas 77058



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**International Space Station**

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## **Flight Control of the International Space Station: Unity and Zarya**

Flight control of the Zarya module and the International Space Station following assembly with Unity is conducted from locations in both the United States and in Russia, with the primary oversight for all operations resting with NASA. Beginning with the launch of the Zarya module on Nov. 20, 1998, a new NASA International Space Station Flight Control Room began use. This new Mission Control Center at the Lyndon B. Johnson Space Center, Houston, became permanently staffed beginning with the launch of Unity on Dec. 3, 1998, about two weeks after Zarya's launch.

The primary command and control functions for Zarya are at the Zarya flight control room located in Korolev, Russia, using the Russian communications system. The Zarya flight control room is located in the same control center as the Mir flight control room.

NASA flight control operations maintain oversight and approve all plans while the Russian flight control team directs real-time ISS operations based on the approved plans. The station flight control team in Houston supports Russian flight controllers as they perform command and control over the U.S. systems. After Shuttle mission STS-98 in February 2000, when the U.S. Laboratory module is delivered along with the primary U.S. communications system, Station Flight Control in Houston will assume the direction of real-time flight operations activities as well and will have primary command and control functions.

A small NASA flight control team, designated the Houston Support Group, is stationed at the Korolev control center to facilitate communications and information exchange between Houston and Korolev.

When fully staffed, the NASA station flight control room in Houston will contain about a dozen flight controllers, led by an International Space Station flight director. At times during early station operations, when there are no highly dynamic activities planned, staffing in the Station Flight Control room may be reduced. Following Shuttle mission STS-97 in December 1999, however, the Mission Control Center will be permanently staffed - by a full Flight Control Team when required, and by a Duty Officer at other times. The station flight control room is located just down the hall from the Space Shuttle flight control room in JSC's Mission Control Center.

Flight controller positions and their call signs in the International Space Station flight control room, Houston, include:

**Flight Director (Flight)**

Primary decision-making authority for station operations. Leads flight control team. May not be on duty during some quiescent station operations, but will be on call at all times to be available when determined necessary by the station duty officer.

**Assembly and Checkout Officer (ACO)**

The Station Assembly and Checkout Officer is responsible for integration of assembly and activation tasks for all ISS systems and elements and coordinating with station and shuttle flight controllers on the execution of these operations.

**Attitude Determination and Control Officer (ADCO)**

The Station Attitude Determination and Control Officer works in partnership with Russian controllers to manage the station's orientation, controlled by the onboard Motion Control Systems. This position also plans and calculates future orientations and maneuvers for the station.

**Communication and Tracking Officer (CATO)**

The Station Communication and Tracking Officer (CATO) console position is responsible for management and operations of the U.S. communication systems, including audio, video, telemetry and commanding systems.

**Environmental Control and Life Support System (ECLSS)**

The Station Environmental Control and Life Support Systems Officer is responsible for the assembly and operation of systems related to atmosphere control and supply, atmosphere revitalization, cabin air temperature and humidity control, circulation, fire detection and suppression, water collection and processing and crew hygiene equipment, among other areas.

**Extravehicular Activity Officer (EVA)**

The Station Extravehicular Activity Officer is responsible for all spacesuit and spacewalking-related tasks, equipment and plans.

**Onboard, Data, Interfaces and Networks (ODIN)**

The Station Command and Data Handling Systems Officer is responsible for the U.S. Command and Data Handling System, including hardware, software, networks, and interfaces with International Partner avionics systems.

**Operations Support Officer (OSO)**

The Station Operations Support Officer is the console operator that is charged with those logistics support functions that address on-orbit maintenance, support data and documentation, logistics information systems, maintenance data collection and maintenance analysis.

**Power, Heating, Articulation, Lighting Control Officer (PHALCON)**

The Station Electrical Power Systems Officer manages the power generation, storage, and power distribution capabilities.

**Robotics Operations Systems Officer (ROSO)**

The Station Robotics Systems Officer is responsible for the operations of the Canadian Mobile Servicing System, which includes a mobile base system, station robotic arm, station robotic hand or special purpose dexterous manipulator. The ROSO officer represents a joint Canadian Space Agency-NASA team of specialists to plan and execute robotic operations.

**Thermal Operations and Resources (THOR)**

The Station Thermal Operations and Resource Officer is responsible for the assembly and operation of multiple station subsystems which collect, distribute, and reject waste heat from critical equipment and payloads.

**Trajectory Operations Officer (TOPO)**

The Station Trajectory Operations Officer is responsible for the station trajectory. The TOPO works in partnership with Russian controllers, ADCO, and the U.S. Space Command to maintain data regarding the station's orbital position. TOPO plans all station orbital maneuvers.

**Operations Planner (OP)**

The Station Operations Planner leads the coordination, development and maintenance of the station's short-term plan, including crew and ground activities. The plan includes the production and uplink of the onboard station plan and the coordination and maintenance of the onboard inventory and stowage listings.

**Ground Controller (GC)**

Responsible for MCC systems and coordination with the ground to space communications network.