

## Console Handbook

# FD

## Flight Director

The flight director (FD) console position serves as the leader of human spaceflight missions, which include the International Space Station (ISS), visiting vehicles to the ISS and any exploration-related missions. The flight director manages the entire flight control team and is the focal point for all decisions relevant to the space flight mission.



# FD

## Flight Director

### Persons Managed: Flight Control Teams and Flight Crews

#### **Flight Control Teams and Flight Crews**

*How are the flight control teams and flight crews managed by the flight director?*

The flight control team is lead by the flight director (FD), who plans, directs and controls the activities of the ground support team and onboard flight crew. This unique team consists of a group of flight controllers who are experts in specific areas.

The FD oversees the flight control team and flight crew in the development and review of procedures and checklists for both normal and contingency (back-up) operations. These procedures and checklists provide specific information for accomplishing mission operations (i.e. planning for work-arounds if case of system failure or malfunction). In order to achieve mission success, the FD coordinates the preparation and execution of plans and procedures with the international flight control team and the flight crews.

The FD also evaluates and certifies that the flight controllers are technically proficient and are able to execute their real-time assignments. The FD must have a complete understanding of the capabilities and limitations of the flight crew and all ground support team abilities, as well as the training requirements for each to complete their own assigned task.

Post-increment (or after the mission), the FD leads discussions of lessons learned and makes recommendations for future improvements of plans, procedures and execution techniques.

#### **Flight Director's Mission Responsibilities**

*What are the duties of the flight director during a mission?*

The FD develops the mission flight rules and coordinates with other programs, technical experts, the Crew Office, safety and engineering, International Partners and customers. The FD evaluates each mission objective, ensuring it is in compliance with the flight plan and mission rules' guidelines and constraints, while also maintaining the safety of the crewmembers.

The FD is responsible for maintaining knowledge of spacecraft design and operations, including its hardware and software. Other responsibilities include having detailed knowledge of orbital mechanics, trajectory processing and the relationship to spacecraft maneuver and re-entry capabilities.

The FD must have expert knowledge of communication and operations capabilities between ground network and TDRSS (Tracking Data Relay Satellite Systems) including voice, command, data, tracking and video.

The FD must also have a working knowledge of all onboard space experiments and their relationship to technological achievements. During day-to-day operations, the FD directs the flight control team and crew, ensures execution of plans and procedures, directs responses to off-nominal situations and takes any actions necessary to ensure crew safety and real-time mission success.

On a day-to-day basis, the FD leads the international flight control teams through reviews of the upcoming day's mission plans and oversees changes to plans and procedures.



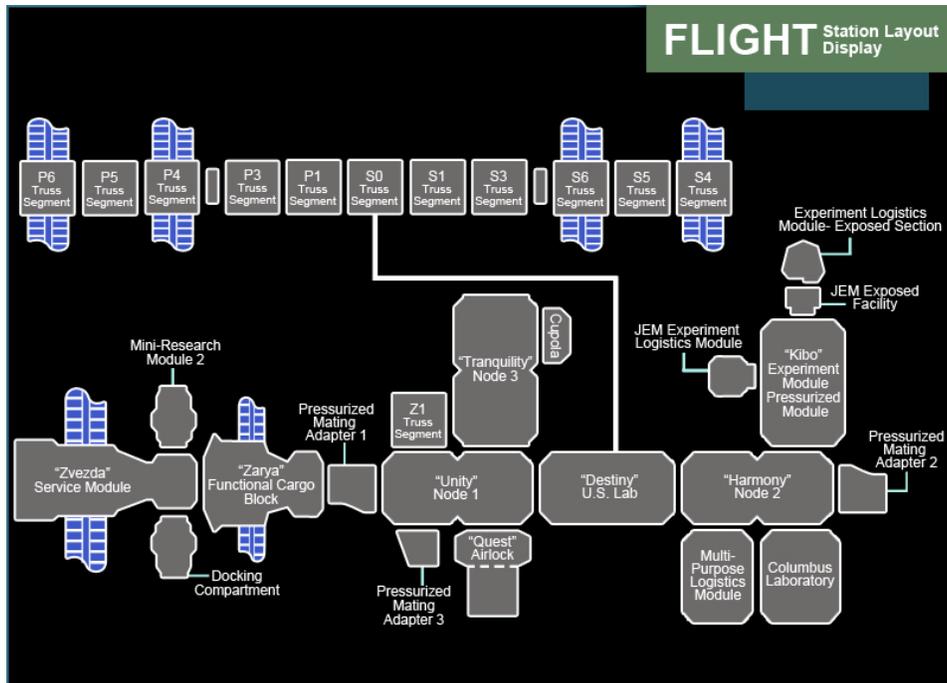
## **Other Duties of the Flight Director**

*Outside console, what are some of the other duties performed by the flight director?*

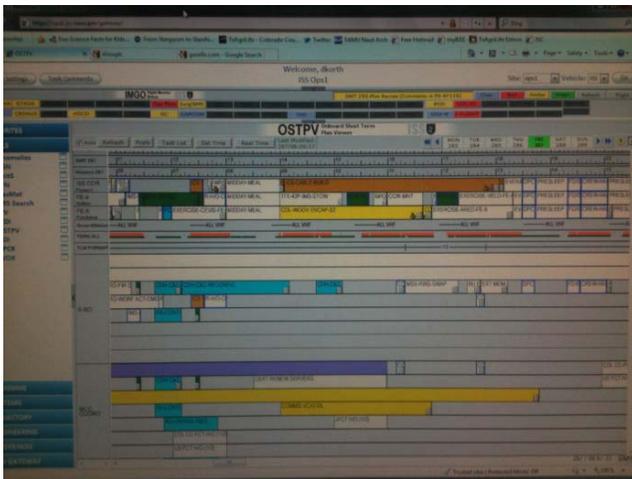
Pre-mission, the FD serves as the chairman, either of the Flight Techniques Panel or the Joint Operations Panel. The FD directs activities related to the development and coordination of the flight trajectory, attitude control (orientation) and avionics systems management for the flight phase of the program. This responsibility begins in the pre-flight operations planning, and ends when the flight techniques are mature enough to guide the development of detailed procedures and activity timelines for the mission increment. At this point, the emphasis of the FD focuses on ensuring the flight control team is ready by performing simulations, reviewing plans and procedures, and working with flight crews to prepare for upcoming missions.

## **Flight Director Console Display**

The FD uses overview displays to monitor vehicle performance, satellite communications coverage and vehicle caution and warning information in order to manage spacecraft operations. Additionally, the FD monitors the mission timeline to keep track of systems and crew operations. The FD relies on the discipline experts in the flight control teams of each mission control center to keep track of vehicle performance and to perform ground control of the ISS.



Pictured above is a simplified version of an ISS overview systems display. To view this display, return to the ISSLive! website at <http://spacestationlive.jsc.nasa.gov>. Select “Interact”, and then select “Explore Mission Control”.



Pictured above (on the left) is a view of the mission timeline used by the flight control teams and the flight crew for day-to-day execution. Pictured above (on the right) is a standard set of displays used by the FD to monitor spacecraft off-nominal systems annunciations (caution and warning announcements), TDRS communications coverage (satellite acquisition of signal/loss of signal or AOS/LOS), and spacecraft command, telemetry and voice communications status.

## Space Station Live Data

Would you like to know more about the live data streaming from the ISS to the console displays? Return to the *ISSLive!* website at <http://spacestationlive.jsc.nasa.gov>. Select “Resources”, and then select “Space Station Data”. There you will find a table which includes the names and brief descriptions of all the data values used to update the interactive Mission Control Center console displays.

## Acronyms and Abbreviations

AOS	Acquisition of Signal
FD	Flight Director
ISS	International Space Station
LOS	Loss of Signal
TDRS	Tracking Data Relay Satellites
TDRSS	Tracking Data Relay Satellite System