

**News Archive 2007**

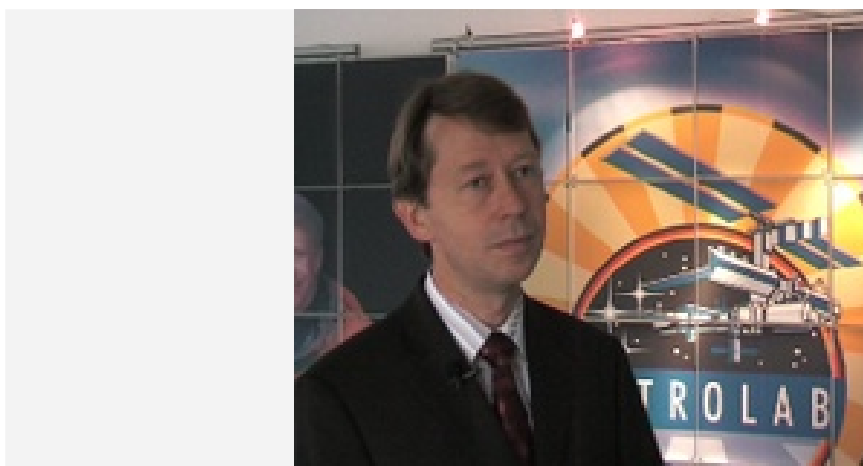
**Columbus Control Center: Europe's first 'Capcom'**

*4 December 2006*



Columbus Control Center

Inaugurated in 2004, the Columbus Control Center at the German Aerospace Center (DLR)'s Oberpfaffenhofen location is Europe's first 'capsule communicator' (Capcom) facility. The Columbus Control Center is operated by DLR under contract from ESA and Astrium and in 2007 will be responsible for science activities as well as systems and life support for the orbiting Columbus lab. But the centre is already building operational expertise during ESA's ongoing Astrolab Mission.



Dieter Sabath, head of mission operations at the Columbus Control Center

In the second half of 2007, the Columbus Laboratory, Europe's cornerstone contribution to the International Space Station, will be lifted into space and joined to the ISS. The 4.5-metre-diameter

cylindrical module is equipped with advanced science facilities and will enable Earth-based researchers to conduct thousands of experiments in life sciences, materials science, fluid physics and a range of other disciplines, all in the weightlessness of orbit.

On the ground, European controllers will be responsible for managing the crew-occupied module, meaning that the Columbus Control Center will, for the first time, permanently host the 'EUROcom,' or European Capsule Communicator, function.

Traditionally, the capcom is the only ground controller who communicates with astronauts. The function grew out of experience during the initial stages of the U.S. manned space program, when NASA felt it was important for all communication with the astronauts to pass through a single individual in the mission control centre; the role is typically filled by another astronaut.

"Columbus will be the first time we have not only coordination responsibility for the science experiments but also permanent system-wide responsibility in particular for the life-support services like air and temperature. Once Columbus is in orbit, the Columbus Control Center will be manned twenty-four hours per day," says Dieter Sabath, head of mission operations at the centre.



Thomas Kuch, head of mission operations at GSOC

### **Columbus centre designed for efficient, effective ground control**

Since 2004, the control centre has occupied two large mission control rooms housed within DLR's German Space Operations Center, or GSOC, which also houses ground control facilities for DLR missions such as the TerraSAR-X radar mapping satellite.

"Columbus Control Center now has about 80 engineers, and in 2005 and 2006 we saw a great deal of training, simulations and practices for the launch of Columbus. It's a real cooperative success for ESA, DLR and our industry partners," says Thomas Kuch, head of mission operations at GSOC.

The main Columbus control room hosts a series of large display screens on one wall, with rows of command consoles and workstations lined up beneath. Facing the display screens, on the right, are three console rows with controller positions for:

- Operations Support, responsible for logistics, inventory management and maintenance
- Systems, who also oversees ECLSS (Environmental Control and Life Support System) activities
- Operations Coordination, overseeing payload coordination and coordination with US and Russian ISS control centres

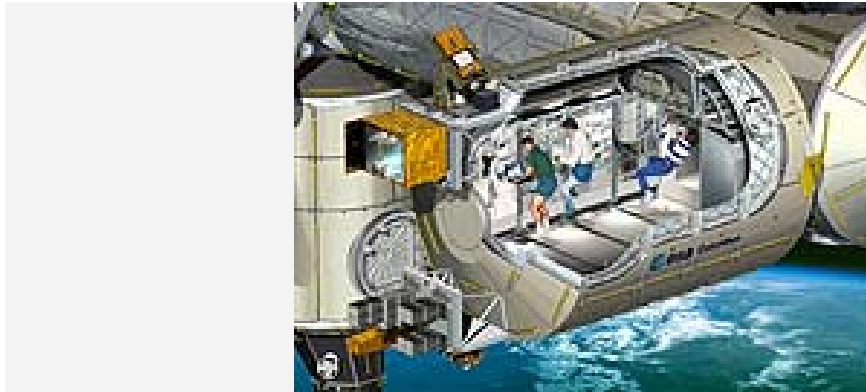
and on the left, also facing the display screens:

- Communications, overseeing the receipt and transmission of science results and scheduling
- Data Management System, responsible for the onboard fail-safe data system, the 'brain' of Columbus
- Eurocom, the capcom position, who communicates with the astronauts in Columbus
- COP, the Columbus Operations Planner, who is responsible for the planning and replanning of the European activities

The main control room is backed up by a second, smaller, but functionally identical control room, which provides redundancy as well as spare capacity for training controllers, running simulations and testing software and procedures.

### Controllers maintain real-time communications worldwide

Engineers on duty at the Columbus centre are in real-time communications via voice and video with ISS control centres in Russia (Moscow) and the US (Houston and Huntsville), as well as with European USOCs, or User Support and Operations Centres.



European space laboratory Columbus

These nine centres are located throughout Europe and provide the data interface for research scientists to access and manage science results returned by their experiments onboard Columbus. USOCs in France, Denmark, Italy, Germany and Norway are already active in receiving science results from the current Astrolab Mission.

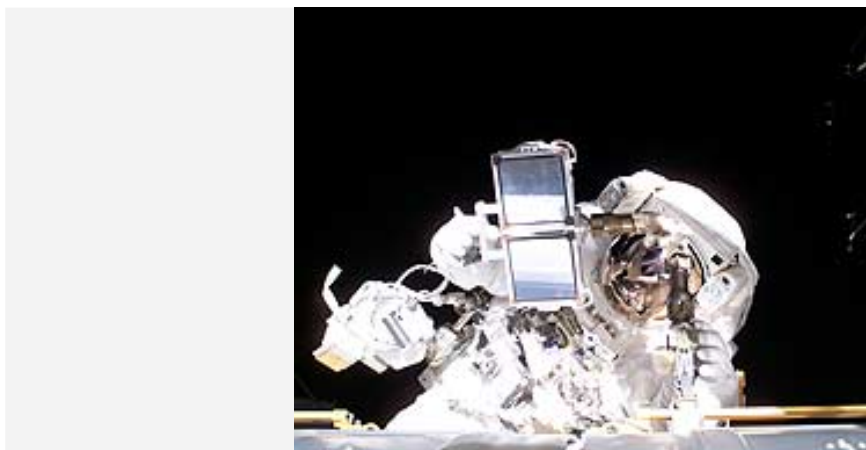
The Columbus Control Center is also connected to ESA's Crew Medical Support Office, a full-time health operations centre staffed by doctors and medical specialists and located at ESA's European Astronaut Centre in Cologne, Germany. The CMSO provides European astronauts with medical advice and monitoring while onboard the ISS.

"All our communications go via leased fibre optic lines. Our commands are actually transmitted to the ISS via mission control in Houston, then to the NASA ground station in New Mexico and up to the ISS," says Sabath, adding, "All communications via external lines are encrypted for security reasons."

He also explains that the working language for ISS controllers is English, but that the special language protocol, regional accents and the 1- to 2-second delay on the voice communications loop sometimes makes understanding difficult. "Sometimes it's tough for new controllers to listen in and understand, but they usually get pretty good at it after a few weeks of intensive training. For communication with the Russian flight controllers, ESA maintains a team of expert interpreters on duty in Moscow who understand Russian space jargon," he says.

### Columbus Control Center already in action

The centre is already building expertise during ESA's ongoing Astrolab Mission, Thomas Reiter's 6-month, long-duration science mission on the ISS that started in July 2006. The ESA operations manager at the Columbus Control Center is Reinhold Ewald, also an experienced ESA astronaut; both are from Germany.



Astronaut Thomas Reiter during his spacewalk on 3 August 2006

ESA astronaut Reiter's Astrolab science programme, ESA's first long-duration mission on the ISS, consists of experiments in physics, human physiology and biology, and as well as technology demonstrations, industrial experiments and education.

Ewald and a team from DLR as well as specialists from industry contractors are on console 10 hours each day, starting and ending around the daily morning and evening planning call (DPC) between US, European and Russian controllers and ISS astronauts (the ISS follows GMT time).

Consoles are staffed longer when required for special activities, such as Reiter's successful EVA (extra vehicular activity) in August.

Astrolab controllers are anticipating an intense period this month, when NASA Shuttle mission STS-116 will deliver the P5 Truss section to the ISS, during which ESA astronaut Christer Fuglesang, from Sweden, is scheduled to perform two EVAs. The same mission will bring Thomas Reiter back home, and then the Columbus Control Center will take a short Christmas break.

Next year, activity for Columbus and on the ISS will increase significantly. Two other ESA astronauts are scheduled to take part in ISS assembly missions, to install the European-built Node 2 in the summer and, finally, the European Columbus Laboratory itself in autumn.

"It's significant that the Columbus Control Center is here at DLR in Oberpfaffenhofen. Before Columbus, we had experience in human space flight control with Spacelab in the 1990s and now we're helping boost Europe's science activities in space," says Kuch. "It's important for the ISS and it's important for Europe."

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