



Astronaut Training



Fig. 1-1 Training for an extravehicular activity (EVA) (Image: NASA)

Astronaut Training

Training astronauts for space flight missions has always been a key competence and skill of DLR Institute Space Operation and Astronaut Training. DLR has a long history in instructing astronauts on what they need to know for their time in space. At DLR, astronauts were trained for the German D-1 and D-2 missions flown in 1985 and 1993, for flights to the Russian MIR-Station, namely the missions MIR-92 and MIR-97, and later on, in close collaboration with ESA, the Spacelab mission IML-2 in 1994 and the MIR missions EUROMIR-94 and EUROMIR-95.

Astronaut training starts with a phase of basic training since all astronaut candidates typically come with a different professional background, language skills and work related experience. It continues with space system related and experiment infrastructure training as well as, once assigned for a specific mission, experiment content related training. Nowadays, the DLR Astronaut Training team together with specialists from other European space agencies has jointly been integrated into the "European Astronaut Centre (EAC) Integrated Team". As such, DLR Astronaut Training has been involved in the preparation and implementation of more than 20 short- and long-duration missions of ESA astronauts during the past 20 years: as member of the EAC Integrated Team, DLR is involved in the systematic analysis of task related astronaut training requirements, the development of training materials and schedules and the implementation of astronaut training as well as Ground Support Personnel Training.



Fig. 1-2 Inside European Astronaut Center (EAC) (Image: ESA)



Fig. 1-3 Neutral Buoyancy Facility (NBF) (Image: ESA)

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Fig. 1-4 ESA-BME/EUROCOM console support (Image: ESA)



Fig. 1-5 European Astronaut Center (EAC), Cologne

At the European Astronaut Centre EAC, the following infrastructure is used for astronaut and ground controller training: the Neutral Buoyancy Facility (NBF), a 10m deep scuba diving pool to prepare astronauts for subsequent EVA (Extra-Vehicular-Activity)-training at NASA's Neutral Buoyancy Laboratory (NBL); several Columbus Module mock-ups, Columbus experiment rack training infrastructure and experiment training models. Well-established interfaces to language and piloting schools in the area as well as a close contact to DLR's Flight Medicine Clinic for physical and physiological testing complement the services provided by the DLR Astronaut Training department. Additionally, EAC hosts several classrooms as well as a library of astronaut training material. Astronaut support comprises spaceflight mission or, nowadays for the ISS, increment oversight, launch campaign

▶ Since at EAC not only Astronaut Training is performed, DLR also comes up with competences in the areas of astronaut support and astronaut medical operations.

support, space food coordination, as well as coordination of an astronaut's post-flight direct return to EAC. The team also provides support to astronauts family, on crew discretion organizes crew inflight events with celebrities or VIPs, plans and organizes family in-flight calls, so called "Private Family Conferences (PFC)", and equips and maintains so called "crew web pages" that provide astronauts with targeted information about topics they are interested in or that are able to cheer them up.

Astronaut medical operations comprises the medical certification of astronauts according to the established international standards for human spaceflight. Astronaut annual medicals are organized and the respective astronaut medical record is maintained. Documentation required for the respective medical commissions granting "Readiness for flight" is prepared and presented. In-flight medical supervision is planned for and implemented. Depending on the duration of the space-flight mission of an astronaut, this in-flight medical supervision includes regular in-flight calls between astronaut and earth-bound Flight Surgeon, regular physical exercise sessions, several medical in-flight exams, supervision of astronaut nutrition and respective consultancy, and measuring and assessment of radiation impacts the astronaut experiences. The organisation of pre- and post-flight medical measures to protect the astronaut from infections right before launch as well as performing medical screening at the landing site right after landing is also part of medical operations support provided.

During an astronaut's spaceflight, certified ground controllers support the mission from several console rooms at EAC. A team of Ground Segment experts set-up the necessary infrastructure, interface with other ground controllers and ensure technical infrastructure readiness for mission support.

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