

## News Archive

### Formation flying trials

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By Manuela Braun

In Control Room 2 at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), the clock has been put forward to October 2010. Then, Earth monitoring satellites TerraSAR-X and TanDEM-X will be orbiting in close formation, recording continuous streams of data. The control room staff need orbit simulations to prepare for the real thing.

The small letter panels above the consoles in the dimmed lighting of Control Room 2 glow neon orange. At the panel showing 'CMD CTRL1', B.T. Yugar concentrates his gaze on the three screens with columns of alphanumeric characters. His name is Bernhard, but his colleagues at DLR call him B.T.



Control Room 2 in Oberpfaffenhofen

#### Strict hierarchy in the control room



'Command Control' – B.T. Yugar

Yugar is the 'CMD CTRL' – the Command Control for this mission. He is the link between the Command Operator, who sends the commands to the satellites, and the Flight Operations Manager, who approves them all. The hierarchy in the control room is strict. "Can you please sign off this command?" asks B.T. as he glances across at Harald Hofmann, the Project Manager. In turn, Hofmann opens a window on his screen, and then adds his name. Only then can the Command Operator press the OK button and send it to the satellite out in space.

"In the old days, a runner used to rush paper from place to place to transfer the commands," states Hofmann with a grin. Now almost everything is done straight from the terminal. Questions in English, comments in Bavarian dialect and a mixture of both resonate around the control room. Satellite control requires teamwork – with everyone an expert in his or her own field. "You come to develop great confidence in each other," says B.T.

The giant projection screens and computer monitors feature columns of densely packed figures. No fewer than 25 000 parameters, ranging from battery temperature to antenna noise ratio, are sent to Earth by the satellites every time contact is made. More than 1400 defined command sequences are used to control the flight of TanDEM-X and TerraSAR-X. When TanDEM-X is orbited, the control room will be filled with team members. "There will then be two employees at almost every one of the 22 consoles," says Hofmann. For five consecutive days, during the launch and early orbit phase, the team will be working twelve-hour shifts. Hofmann and Michael Steinhoff will alternate as Mission Operation Director, while Edith Maurer and Steffen Zimmermann will share the role of Flight Operations Manager. How do you get such a job? "Oh that," says Hofmann, nonchalantly shrugging his shoulders. "If you've always had a liking for science fiction, and then went on to study physics..."

#### Tension before contact



Contact with the satellites

Tension in the control room is rising once again. Shortly, the simulated satellites will again be making contact with one of the ground stations. These are in Neustrelitz, Weilheim, Spitzbergen, the Antarctic, Canada and other locations. The satellites will link with one for just 30-60 minutes a day. "This is the only time we receive status data and are able to send up commands," explains Project Manager Hofmann. A red dash on a diagram on one of the giant screens moves ceaselessly. Whenever it reaches one of the red bars it signifies a virtual contact.

The satellites must receive all commands during the short contact time. "Everything needs to be well prepared," states B.T. "Linking up to the satellite – that's the really busy time. The period of contact is something completely different from the other phases for which we plan."

Even though TerraSAR-X has been functioning successfully in space since 2007, joint operation of it and TanDEM-X is going to be challenging. Never before has such a dense stream of satellite information required assimilation. The radar satellites will be as close as 200 metres as they record data for a three-dimensional image of Earth from an altitude of 500 kilometres. Even though the team has managed to gain experience with TerraSAR-X. "We still need to keep training to ensure that we are well able to contend with the task of controlling two satellites at the same time," emphasises Hofmann. "Later, during routine operations, a much smaller team will be able to keep an eye on the satellites around the clock from our control room."

**"It's actually great fun"**



B.T. puts his earphones back on. Contact with the satellites is imminent. The coffee cup is pushed aside. Now the American has eyes and ears only for the satellites. Once TanDEM-X goes into space for real, he will be at his console from 4 a.m. every morning. He will monitor the two satellites with his team for a twelve-hour period. "This is going to be an exciting time." Then he pauses, thinks for a moment, grins and then says: "It's actually great fun."

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