



During the D1 mission, we were in the driving seat

Interview with astronaut Ernst Messerschmid

On 30 October 1985, Space Shuttle Challenger launched with the European Spacelab research module on board. Ernst Messerschmid was on board this mission, also called D1 - the first mission under German responsibility. In this interview, the former astronaut tells us about insomnia, floating in space, 12-hour shifts, and strange expense reports.

Interview by Manuela Braun.

The number of people who have been into space and lived in zero-gravity conditions is tiny. How do you explain what it feels like?

I show films and pictures, and I try to describe situations. The launch for example: you're sitting on top of 2000 tons of explosive, and you're always aware that something could go wrong. It's unbelievably loud, the acceleration is fearsome and in just eight minutes you're up in orbit. It's only then, after the first euphoria, that you realise you're isolated. It's very quiet. The colours and the contrast between dark and light outside the capsule are much more extreme than on Earth, because there's no haze. One knows that outside, there are extremes of heat and cold. On the shadow side, down to -150 degrees Celsius, and on the Sun side, +150 degrees Celsius. No one would ever dream of getting out. You're very aware that the hull around you, the capsule, is the only safety you have. And the extreme temperature differences make the metal parts expand and contract – and you hear these loud bangs, and you think, what was that?! The Space Shuttle has a sterile atmosphere; it's a completely artificial environment. The team members become very close in space; everyone looks out for everyone else, we're all under physical and psychological stress, which relaxes only after a few days.

What are the first few minutes in zero gravity like?

Well, you practice it in innumerable parabolic flights, but this time the zero gravity condition doesn't stop after a few minutes – it just goes on and on. It takes one or two days to get used to it and to find a natural rhythm for your movements. You need only tap something lightly and you're flying off in the other direction. It took me a couple of hours just to learn how to hold still. You can only move something with one hand, as you're holding onto something else with the other. It's very interesting, and it's something you only experience in zero gravity.

You started with physics, and then went on to do research at CERN (European Organisation for Nuclear Research) in Switzerland and the German DESY electron synchrotron in Hamburg. When did you get the idea to do research in space?

I had just graduated in Freiburg and hadn't yet cleaned out my desk at the University. But on the way there, I wanted to take part in the Freiburg University ski championships in the Black Forest – I was a very good skier back then. On the way, around Schwenningen, I heard a radio interview with the then leader of the DLR's Space Medicine Department, Professor Karl-Egon Klein, about the upcoming selection of astronauts for Spacelab. He was listing the requirements that candidates had to meet: healthy, physically fit, fluent in English and preferably some other languages, qualified, experienced, determined – and I thought, if that's all they want, then I'm the perfect candidate! I applied to the DLR and a couple of weeks later it all started. I was applying to be an astronaut, along with other applications, including for a post at DESY. I got as far as the last five German applicants, but then Ulf Merbold got through as the only German astronaut on the first Spacelab mission. But I was told that two years after the first mission, there would be a second one, the German D1 Spacelab mission. And they wanted to put me on that. Until then they gave me a job at DLR – back then it was still called DFVLR, Deutschen

Forschungsanstalt für Luft- und Raumfahrt – in Oberpfaffenhofen, working on telecommunications and navigation.

Was it very disappointing to have Ulf Merbold selected over you in 1977?

They told me that I'd be back on the list of applicants for the next flight – that would be in 1982. In those five years I was occupied with quite other areas of spaceflight and had developed a career that was independent of being in orbit. You only know you're really going to launch when you're already in the capsule. It's like the national football team: you train, but if something happens, you're out. Someone else plays.

But were you sure that you wanted to be on the next mission?

That's what I wanted to do, but I have always worked on at least two tracks. I knew I had a good chance to get on. They needed a materials scientist for the first Spacelab mission, and that was Ulf Merbold. I come from engineering and physics in the areas of electrical engineering and thermodynamics.

When you were finally confirmed for the mission, how did you prepare for the flight?

The pre-selection committee had called just two people into the ministry – Reinhard Furrer and me. When we spoke together, we knew exactly what they wanted to tell us. We clapped each other on the back, so to speak. The minister then said – you're both going. That's when we went out for a drink together! That was in summer 1982. Our training at the DLR Institute for Space Simulation started in February. The first Spacelab mission with Ulf Merbold on board was a NASA mission supported by ESA, and astronaut training and ground control were based mainly in the US. But for the D1 mission, DLR was in the driver's seat. We were only using the Shuttle as a taxi. Along with the scientists who were responsible for the experiments, we built everything ourselves and worked with DLR experts on the design and implementation of the experiments. That was an exciting time. I had to get my pilot's license! And we also had to learn how to deal with the public.

I'm quite an introverted person. This was a problem for my colleague Furrer, who is quite extroverted. At the beginning they said that only one of us would fly, and that created competition between us. A year before the mission, we learned that we were both going. We had found out that an eighth seat could be built into the shuttle. Furrer and I had always said that there was so much work that it needs two astronauts to train and become experts in the 70 or so experiments we were going to run. And NASA was convinced of it too!

What was your everyday life like during the mission?

Our time was very tightly scheduled. We had three shifts. But when you finished your eight-hour shift, you had to work on stuff or run repairs that had come up during experiments. A small number of the crew slept while the rest worked. There were eight of us on the shuttle and in Spacelab. Our timeline was scheduled to the minute. You always knew what you were supposed to be doing, where there were problems, and what had to be started up. Seven to ten of the experiments, such as crystal growth and solidification of metals were running autonomously all the time, but they too had to be monitored and serviced or reconfigured. The American astronauts were our helpers in this and worked with us on experiments that didn't require so much training, or helped us prepare meals. Furrer and I were responsible for the experiments in continuous 12-hour shifts. It is quite tense to find yourself responsible for 400 million Marks of the taxpayer's hard-earned money. You also know that the professors and researchers want good results. We felt this pressure all the time and it often pushed us to deny ourselves another hour of leisure and work even harder on the experiments. We wanted to meet happy researchers after the mission, not dissatisfied ones.

What was the atmosphere like on the Spacelab? On the videos you all look so optimistic and fit...

When you train for two and half years for a of week space flight, you're so pumped up with adrenalin during the mission that secondary things simply vanish away. But there they were, no doubt about it. I noticed that my emotions were very variable. We were a good crew, we understood each other very well, and we kept our darker moments to ourselves. I had my hardest time the first night, when I couldn't fall asleep. Because of the radiation, you see flashes of light even with your eyes closed; it was freezing cold, I couldn't sleep and I had 16–17 hours of work coming up. Apart from that, we had sickness-inducing experiments with rotation, exercises and rides on a space sled – and I had symptoms of space sickness. I threw up as

soon as we were in orbit. My mucus membranes were swollen. And I couldn't help thinking – good God, what have you got yourself into? But tomorrow's another day.

How did the experiments go?

Right at the start of the first day of work I floated into the centre of Spacelab and saw many red and yellow LEDs – experiments that were not working. Then we had problems with a vacuum leak. We had to create a vacuum in the ovens on board Spacelab, and we did this by connecting them to the exterior. But there was a leakage in this connection, and ground control told us: if you don't find this leak, the mission will be over in two days, because you're losing air. And then there was MEDEA, a very expensive materials science instrument, which we couldn't get to work. We had to find the right cable out of an incredible mess of wires and cut it. It worked, but on the last day the door to the container just wouldn't open. So I – I'm an expert handyman after all – took the lock apart with a couple of micro screwdrivers and a socket wrench. That just shows how important it is to have astronauts around who have experience with experiments and can take initiative in unforeseen circumstances.

You were in space for seven days back then, nowadays astronauts spend months on the International Space Station (ISS). Would you have liked to do so at that time?

Of course. It would have been fantastic! But at the time seven days was the absolute limit with the Space Shuttle, and too short a time to enjoy your own space adventure to the full. The idea of the ISS and long periods in space was just getting underway back then.

You were involved in the development of the International Space Station. What was your contribution?

I contributed to the ISS in every way imaginable: automation and robotics, on the Hermes safety committee, in a variety of user committees in which we decided, for example, how the ISS would be operated. I also had my own experiments on MIR and the ISS. Global Transmission Services (GTS) on board the ISS transmit signals to Earth – a radio clock signal for example. Another experiment measures oxygen in the upper atmosphere and will be flying on a number of satellites in the future. So I either set up my own experiments or I consulted on other people's experiments, conceptually and in terms of implementation.

You were Director of the European Astronaut Centre (EAC) in Köln-Porz from 2000 to 2004. What can you teach candidate astronauts, and what can only be learned from experience?

At the University of Stuttgart I worked a lot on safety in space transport with the Space Shuttle and future capsules. I have given lectures to candidate astronauts. Those are things you can read about, but it's also a matter of experience, which you can't read about. For example, when you're dealing with risks or with the whole environment you're in. At that time I also ensured that ESA would pay an extra insurance for invalidity and death, on condition that the astronauts thoroughly discuss the dangers of a mission with their families. I've been to several astronauts' funerals and I know that the families are often not sufficiently prepared for what can happen.

A few months after you returned from space on Challenger, the Shuttle exploded on its next launch in January 1986. Everyone on board was killed. Did that make the risks of your job clearer?

I knew the astronauts who launched with Challenger that time. The D1 crew had turned their office furniture over to them. I gave my desk to Christa McAuliffe, the teacher. Yes, you feel it. When I tried to get an insurance policy before my mission, the insurance company told me that the German Insurance Code only envisaged coverage up to altitudes of 75,000 metres. I would have passed that limit three minutes after the launch.

Being an astronaut is not the ideal job for things like this...

We had to get two exceptions passed by the health and safety board: that we would be working for more than ten hours a day for more than three days, and that we would always be sleeping close to our work stations. And I got the Golden Potato Award for my travel expenses form. In the federal employees' business travel tariffs at that time, it was envisaged that if the employee travelled over the date line, that would be reckoned as equivalent to the time between two sunrises. In the Spacelab we had 16 sunrises and sunsets a day – so as a joke I put them all down for all seven days of my business trip in my expenses. I got the satirical Golden Potato Award from Aachen for that!

If you were a candidate astronaut today, what mission would you like to be on?

A three to six month mission on the ISS, of course. Or even further away – to an asteroid 400 million kilometres away from Earth. I'd be up for it right away. Or to repair a next-generation space telescope, four times as far away as the Moon's orbit is from Earth.

What discovery in space would you like to hear announced on the radio or TV?

That's obvious: a microbe, or a small beetle or some sign of life. That would change our whole view of the world. They'll find it sooner or later. I'm convinced of it – life exists, and it always finds new habitats.

Contacts

Manuela Braun
German Aerospace Center (DLR)
Media Relations Section
Tel.: +49 2203 601-3882
Fax: +49 2203 601-3249
Manuela.Braun@dlr.de

Ernst Messerschmid in the Spacelab module



Ernst Messerschmid flew on the D1 mission on 30 October 1985 as a scientific astronaut. The European Spacelab research module had materials- and life science, navigation, communication and technology experiments on board.

Credit: DLR (CC-BY 3.0).

Ernst Messerschmid



Born in 1945, Ernst Messerschmid was appointed research astronaut in 1983. He underwent two years of training before he flew on the Spacelab D1 mission. Along with two other Germans, Ulf Merbold and Reinhard Furrer, the aspiring astronaut underwent a comprehensive training program that included medicine and an introduction to spaceflight. He and Reinhard Furrer, were aboard the Challenger Space Shuttle mission that launched on 30 October 1985 also called the D1 mission.

Credit: DLR (CC-BY 3.0).

On board Spacelab



Ernst Messerschmid conducted numerous experiments during the mission. The orbiter encircled Earth 112 times. After seven days in space, the astronauts flew back to Earth on 11 November 1985.

Credit: NASA.

Working in Spacelab



Ernst Messerschmid conducted experiments during the D1 mission in 12-hour shifts. Back on Earth, the astronauts had trained thoroughly in implementing and conducting the experiments.

Credit: DLR (CC-BY 3.0).

Tests on Ernst Messerschmid



During the D1 mission, the astronauts also gathered data on the impact of weightlessness on the body. Here, Guion S. Bluford is testing Ernst Messerschmid's intraocular pressure.

Credit: DLR (CC-BY 3.0).

D1 mission crew



The crew of the D1 mission. Back row, from left to right: Pilot Steven R. Nagel, Mission Specialist Guion S. Bluford, Jr., Payload Specialist Ernst Messerschmid and Wubbo J. Ockels. Front row, from left to right: Payload Specialist Reinhard Furrer, Mission Specialist Bonnie J. Dunbar and James F. Buchli and Commander Henry W. Hartsfield, Jr.

Credit: NASA.

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