

Cosmonauts return with space record

THREE Soviet cosmonauts were preparing late last week to return to Earth after the longest ever mission in space. The cosmonauts started their mission on 8 February and surpassed the previous record of 211 days in space on 6 September. The experience that the Russians will gain on the effects of long-term weightlessness on the body will undoubtedly help the planning for their programme of a permanently crewed space station.

For eight months, Leonid Kizim, Vladimir Solovyov and Oleg Atkov have been aboard the Salyut-7 space station, carrying out an intensive programme of scientific research. Their flight has been notably free of the problems that have marred earlier long-duration flights. In the previous such missions, in 1983, the trip was jeopardised by a dangerous leak in the propulsion system and a failure in the launch vehicle intended to send a visiting crew to the station.

The present mission demonstrates a new maturity in the Salyut programme. It has achieved three notable successes: the link-up of five unmanned supply vehicles, the visit to the station by two manned craft, and the repair of the propulsion system in six spacewalks by two of the crew.

It is these spacewalks that have allowed the Russians to catch up with the Americans in terms of experience in working on their craft. Walking in space is important not only in repairing things that go wrong, but also for building large space stations in Earth orbit, something the USSR could be planning.

The Soviet tradition of vying with the US in space feats continues. The USSR has successfully pre-empted the US's plans for two milestones in space: the sending of a woman (Sally Ride) into space for a second mission and the plans for a woman (Kathryn Sullivan) to make a spacewalk. These feats will be attempted during the Challenger mission, due to be launched this week. But in July, Svetlana Savitskaya

Jonathan McDowell



Solovyov, Kizim, Atkov: eight months in orbit

succeeded in both records for the USSR.

The experiments aboard Salyut mimic those on shuttle flights. On this mission, the cosmonauts were reported to be producing biologically pure substances for use in medicines, something made easier in zero gravity.

On the first flight of the shuttle Discovery, astronaut Charles Walker, whose seat on the flight was paid for by McDonnell Douglas, took charge of an experiment for producing a hormone for the company. Clinical trials should begin next year.

Experiments on ways of processing materials in space have been an important part of the Salyut effort for several years. They have resulted in the creation of a number of new alloys that are impossible to create on Earth because of gravity.

The USSR is less vocal than it was about plans to begin permanently manning space stations with rotating shifts of crews. It now seems that this will not take place during the life of the present Salyut-7 laboratory and will have to wait for its successor.

The next station is likely to be an improved version of the present vehicle, but its launch may not take place until the arrival of a new large rocket.

The US Department of Defense has released detailed drawings of this booster. It says that its launch is imminent. However, British space experts point out that such

reports have surfaced repeatedly for a decade, especially when the Pentagon is about to request more funds from Capitol Hill for its own space projects.

Nevertheless, the USSR needs to modernise its ancient rocket fleet. When the new rocket is operational, we will perhaps see a continuously manned station with a resident crew of up to five cosmonauts. An unmanned ferry will supply the station with provisions. One such craft is the Cosmos-1443 vehicle tested last year, which brought supplies to the cosmonauts then on Salyut.

This huge unmanned vehicle is itself based on a Salyut station. Detailed models of the craft

made by Phil Mills of the British Interplanetary Society show that it is essentially a "sawn-off Salyut" with a cargo re-entry capsule attached.

Eventually the crews will travel to the station in a small shuttle instead of the Soyuz-T transport that is now used. Smaller models of this shuttle have already been tested in orbit and a fourth test is expected soon. While these new developments are going on, Salyut-7 will continue in service. It will probably remain unmanned for several months before a new crew takes residence and attempts an even longer, nine-month flight.

This continues the Soviet quest to see just how long humans can remain weightless before irreversible medical changes, such as loss of calcium from bones, occur. The space shuttle Challenger, due to be launched tomorrow morning from Kennedy Space Center, will make detailed observations of Earth. It is regarded as the most ambitious survey of Earth from a manned spacecraft since Skylab 10 years ago.

Eight-and-a-half hours into the flight, Sally Ride, the first American woman to make a second space trip, will use a manipulator arm to deploy the 2250 kg Earth Radiation Budget Satellite. The satellite will investigate the amount of solar energy absorbed in different regions of the Earth and the amount emitted back into space.

Her colleague, Paul Scully-Power, who works as an oceanographer for the US Navy, will study the world's oceans from space. Also on board will be an imaging radar system to provide high-resolution images of geological features, and a large format camera to provide photographs for use by cartographers.

On day five Kathryn Sullivan and David Leestma will make a joint spacewalk to demonstrate how a satellite could be serviced and refuelled in space.

The shuttle's commander, Bob Crippen, will be the first astronaut to make four shuttle flights. It will also be the first flight of a Canadian astronaut, Marc Garneau, section head of communications and electronic warfare, will supervise a series of 10 Canadian experiments including a space-vision system to improve remote manipulation of objects by astronauts, shuttle glow observations, and Sun photometer measurements. □

Computer shortage slows Soviet science

THE WEST is ahead of the Soviet Union in several key areas of science research, according to leading Soviet scientists. They have advised their country's top scientific body, the Academy of Sciences in Moscow, that basic electronics and physics research is "well behind the West". They blame the lack of computer facilities and have pleaded for more equipment. The admissions come in the Soviet physics review journal *Upsekhi*.

Professor A. A. Migdal, one of the USSR's top theoretical physicists, has told the academy that in the mid-1970s the country had many novel research projects which could not be advantageously developed in the West because of a lack of computer facilities available to Soviet scientists. He said that as far back as 1975, the USSR led the US in certain areas by

three years but lack of computing facilities "prevented us from exploiting this advantage".

Another eminent scientist, Dr E. G. Maksimov, has also complained to the academy that solid state physics has suffered. He says: "Unfortunately we are well behind the West. There are two reasons for this. The first is that we are lagging behind the West in the development of computer technology. The second reason is that the role and possibilities of computational physics are being underestimated by some members of our scientific community."

The USSR has been desperately trying to catch up with Western computer science and technology, and is worried that its basic science research has suffered because of this deficiency. □