

USA/Russia agree space deal

BY TIM FURNISS

NASA and the Russian Space Agency have formally agreed the first phase of a joint manned-spaceflight programme involving the Space Shuttle and Mir 1 space station.

It will involve up to ten Space Shuttle flights to the Mir 1 and two years' flight experience on the space station by at least four NASA astronauts.

The first step will be the flight of the second Russian cosmonaut Vladimir Titov on the Space Shuttle during mission STS63, which is scheduled to rendezvous with the Mir 1 in February 1995.

Titov will follow his colleague Sergei Krikalev, who will fly as a mission specialist aboard the STS60/Discovery mission, now due for launch on 3 February after a week's delay to check the reaction-control thrusters.

The Shuttle *Atlantis*,

Asteroid exploration

NASA's first Discovery-class, small, low-cost, interplanetary space mission to explore the asteroid Eros will be launched in February 1996 on a McDonnell Douglas Delta 2 booster from Cape Canaveral.

The mission, called the Near Earth Asteroid Rendezvous (NEAR), has leapfrogged ahead of the proposed Mars landing mission, *Mesurs*, mainly because of the loss of the Mars Observer, which would have acted as a data-relay satellite.

The NEAR will reach irregularly shaped, 36km-long, Eros in December 1998, becoming the first craft to orbit such a body. It will orbit for a year at an altitude as low as 24km, conducting long-term research, following the brief fly-bys of the asteroids Gaspra and Ida by the Jupiter-bound *Galileo*.

The craft will be equipped with a spectrometer, magnetometer, infra-red imager, laser altimeter and a multi-colour camera, with a resolution of 1m — 50 times better than that of the *Galileo* images. □

equipped with a Spacelab laboratory, will dock with the Mir 1 for a joint programme, delayed from June 1995, of scientific work on the STS71 mission in October-November 1995. The crew could include Russians and the mission may involve spacewalks.

The three-month flight by a NASA-designated astronaut, probably Dr Norman Thagard, aboard the Mir 1 in 1995, will be followed by up to four more by NASA astronauts, as they clock up their total of two years' flight experience.

Further Shuttle-Mir docking flights will be used for crew exchange, experiments, logistics and sample return. The USA will have access to two new pressurised modules, the *Priroda* and *Spektr*, and will pay Russia \$400 million. In 1996, the two countries will assemble a jointly developed solar-dynamics electrical-generation system on the Mir.

New environmental control and life-support systems and a common spacesuit will also be developed, extending the Mir 1's life to 1997. Its core module was launched in 1986. By 1997, assembly of the international Space Station is due to begin, leading to a fully operational, six-crew station in 2001, with US, Russian, European, Canadian and Japanese



Krikalev: STS60 mission specialist

modules and equipment.

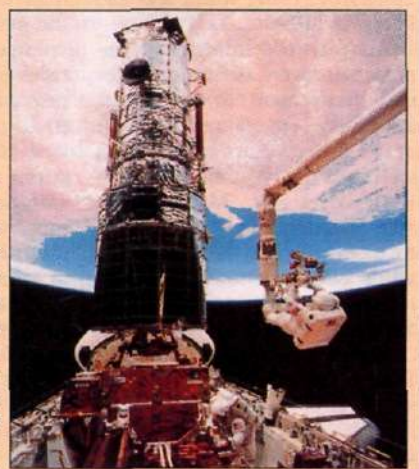
The Mir 1's new crew, meanwhile — Viktor Afanysev, Yuri Usachev and Dr Valeri Poliakov — will be launched from the Baikonur Cosmodrome on 8 January aboard Soyuz TM18. Their mission was delayed from 17 November because of budget difficulties.

Poliakov, who has already flown in space for 240 days, will attempt to remain on the Mir 1 for 480 days, while Afanysev and Usachev — who will replace present Mir residents Vasili Tsiblyev and Alexander Serebrov — will come home after 177 days. The TM18 residency will be supported by three Progress M tanker supply missions, but no spacewalks are planned. □

HUBBLE IN THE PICTURE

NASA has released new pictures of the spacewalks conducted by the STS61 crew to repair the Hubble Space Telescope 500km above the Earth in December. Astronaut Story Musgrave is pictured at the end of the Shuttle *Endeavour's* robot arm, being carried to the top of the telescope to install protective covers on magnetometers.

The picture was taken during the fifth and final spacewalk of the mission and also shows Jeff Hoffman working in the payload bay.



US companies start commercial spy challenge

Orbital Sciences (OSC), Litton's Itek Systems and GDE Systems have made the first bid to launch and operate a spy-satellite-quality commercial remote-sensing, Earth-imaging, satellite system.

Called *Eyeglass*, the craft would transmit 1m-resolution panchromatic digital imagery, primarily for rectified maps and other products.

The application to the US Department of Commerce anticipates a Government decision, expected to be made in 1994, to allow commercial-satellite operators to provide imagery once considered the domain of classified spacecraft.

The longer the US Government delays its decision, the more time competitive systems from Europe and Russia have to gain a foothold.

OSC and other companies, including Lockheed, WorldView and CTA, are proposing systems which will not only increase the commercial viability of satellite remote-sensing, but also fill the gap in data after the loss of Eosat's Landsat 6. Lockheed believes that sales of spy-quality images could reach \$1 billion in four years.

Eosat's role has changed since the loss of Landsat 6. Instead of being exclusive agent for Landsat data, Eosat will be international marketing agent for a variety of data sets.

The company has signed an agreement with India, to market data from the country's IRS spacecraft, and is negotiating to represent Russia.

Eosat is also discussing marketing for *Eyeglass* and other systems. As a result of this new market trend, the Landsat 6 may have been the last of its type to be launched.

A major difficulty for these private companies would be a decision by the US Central Intelligence Agency to sell data from its previously classified satellites, to counter moves already being made by Russia on similar lines. □