

**RUSSIAN NAVSAT**

Russia launched a Cosmos 3M booster from Plesetsk on 8 June carrying a Parus navigation satellite into low Earth orbit. It was the first launch of a 3M since the second stage failure of a booster last November which resulted in the loss of the EarthWatch QuickBird 1 commercial remote sensing satellite. The Parus launch had been delayed from 27 April due to the control system failure of the second stage vernier engines.

**ATLAS V ARRIVAL**

The core stage of the first Lockheed Martin-built Atlas V Evolved Expendable Launch Vehicle has arrived at Cape Canaveral aboard a Russian Antonov An-124 cargo aircraft. It will be launched in May next year, possibly carrying Eutelsat's Hot Bird 6 communications satellite.

**IRIDIUM INTERNET**

New Iridium operator Iridium Satellite has introduced an internet service via satellite to remote parts of the world. The service operates at a slow 10kbit/s, but Iridium Satellite believes it will be able to provide a niche service.

**SAIL AWAY IN JULY**

The Cosmos 1 sub-orbital demonstration flight of a solar sail, set for launch by a Volna booster from a submarine in the Barents Sea, has been rescheduled for July. The mission was cancelled in April due to an electrical short circuit.

**SECOND TOURIST**

South African entrepreneur Mark Shuttleworth is the second "space tourist" to be lined up for a flight aboard a Russian Soyuz spacecraft. The mission has yet to be scheduled and, if it takes place, it is likely to be on a mission unconnected to the International Space Station.

**ARIANE CONTRACT**

Norway's Kongsberg Defence and Aerospace has been awarded a \$7 million contract from EADS Launch Vehicles to supply solid rocket booster attachment and separation systems for 20 Ariane 5 boosters.

INTERNATIONAL SPACE STATION TIM FURNISS/LONDON

# NASA seeks robot arm fix

Software patch is favoured as continued problems threaten Shuttle schedule again

The Space Shuttle *Atlantis* mission STS 104 to the International Space Station (ISS) is facing further delays while NASA managers decide how to resolve continued problems with the \$600 million Canadian Space Station Remote Manipulator System (SSRMS).

STS 104 is due to be launched to the ISS no earlier than 7 July on a mission to deliver the US Airlock module, which will depend on a fully functioning SSRMS, or Canadarm 2. *Atlantis'* roll-out to the launch pad has been delayed as NASA considers repair options for the SSRMS. The mission has already been set back once due to problems with the robot arm.

The SSRMS has displayed several computer anomalies since its installation in April. A persistent problem with a backup computer unit on one of the shoulder joints could cause problems with transferring the Airlock module from *Atlantis* to the ISS. The fault appears to be a backup electronics

unit on the shoulder joint which continually puts the arm into a "safe" mode.

Plans to develop a new shoulder joint and install it during an emergency EVA by the current ISS crew have been dropped and several repair options are being considered. The primary repair option is an attempt to develop a software patch to "mask" the problem. If the software patch can be developed and tested by 18 June, *Atlantis* will be rolled to the pad for a 12 July launch. If not, *Atlantis* will move aside for *Discovery* to fly in August on a crew exchange and logistics mission while the former's launch slips to September.

Another option is to deliver a new shoulder joint during a November shuttle mission, STS 107 *Endeavour*, pushing STS 104 to February 2002. "If we can't fix the arm then we are going to have to stop and get it fixed before we start installing more modules," says NASA flight director John Curry.

■ Two small cracks found in a 47m (154ft) tall Space Shuttle external tank (ET) under construction by Lockheed Martin could result in a detailed inspection of all ETs already built.

The ET carries 2 million litres (527,700USgal) of liquid oxygen and liquid hydrogen propellants for the Shuttle Orbiter's three main engines.

■ The US Department of Defense is considering using the Space Shuttle and the ISS to operate experimental and operational payloads. It has issued a preliminary sources sought synopsis for market research purposes.

The USAF space and missiles systems centre seeks "sources that are qualified to provide operational engineering support for the DoD Shuttle/ISS human spaceflight payloads contract". The work includes the manifesting, integration and operation support of "designated DoD payloads" into space shuttle and ISS missions.

**EXPLORATION**

## Saturn rings seen at full tilt



NASA has released a composite image from the Hubble Space Telescope showing views of the planet Saturn taken each year since 1996, revealing the full tilting of the planet's dusty water-ice ring plane. The image includes the 10m (33ft)-thick ring system viewed from almost edge-on to its extreme full tilt. Scientists believe that the rings were formed by the disintegration of a solar system object which approached too close to Saturn's gravitational forces, rather than the remains of an original member of Saturn's family of moons.

**LAUNCHERS**

## Russian booster hit by delay

Russia's Khrunichev has delayed the first launch of the planned Angara satellite launch vehicle by two years, to 2003, following a lack of funding.

Although US company International Launch Services (ILS) will eventually market the launcher family, Angara relies on Russian Government funds for its development. ILS will market Angara in its stable of boosters once a model which can provide geostationary orbiting (GEO) capability is produced. The first Angara, designated 1.1, is only a low Earth orbit launcher and will likely replace Eurokot's Rokot in about 2007.

There are no firm plans yet to develop a GEO version.