



June 30, 2000

# SPACE CENTER Roundup

VOL. 39, NO. 13 LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEXAS

## Russian 'Star' takes center stage

### Countdown begins for Zvezda Service Module

Russian and U.S. engineers are making final preparations for the launch of the Russian Zvezda Service Module in July, a launch which represents one of the most anticipated events for the International Space Station Program and a move that will begin a new cascade of ISS assembly flights.

Zvezda, Russian for "Star," is the cornerstone of Russia's ISS modules. At the time of this printing, a specific launch date had not yet been announced, but a General Designer's Review and a Joint Program Review were the only remaining steps to confirming the flight readiness of the module that will provide many crucial systems to the ISS.

In the meantime, the Service Module is undergoing final checkouts to prepare for its long-awaited launch. The solar arrays were installed in early June, followed by installation of handrails and thermal blankets. Complete disinfection of the module will then protect the hardware and inhabitants from microbial contamination.

Official closeout photos and a final weight and balance calculation were to be the last steps before closing the hatches and pressurizing the module June 20, not to be viewed again until the STS-106 crew arrives on *Atlantis* in September.

Until launched, the module will rest in its protective shroud atop the Proton rocket. Now with the improved reliability of redesigned second- and third-stage engines, the Proton will propel Zvezda 250 miles into space to fulfill its destiny.

Here in Houston, the ISS flight control team has been gearing up for the launch as well. Mark Ferring, the NASA ISS flight director assigned for the launch, and his team have been working furiously the months before launch to prepare for the event.

Starting June 22, for the first time ISS flight controllers and Russian ground control teams conducted Joint Integrated Simulations for non-shuttle-related activities. The teams focused on three primary scenarios with the Russian controllers: docking of Zvezda to ISS; combining the Unity, Zvezda, and Zarya computer systems; and simulation of the Progress docking.

"Simulating mission scenarios with the Russians is one of our best methods to ensure the Russian and U.S. controllers both understand the joint procedures and plans,

and how to respond to contingency situations," said Ferring. "In particular, the simulation of the station-wide computer systems integration is a critical step and requires a complex orchestration of commands to the Unity, Zvezda, and Zarya over multiple Russian ground sites." The U.S. flight control team will continue

Similar in design to the Mir core module, the 43-foot-long Zvezda will serve as the primary living quarters for early ISS crewmembers and provide the life support system, electrical power system, data processing system, flight control system and propulsion for the orbiting station. With its four ports, Zvezda also will serve as the main docking venue for Russian Progress resupply vehicles throughout the life of the space station.

"The Service Module is a very talented spacecraft," said Gordon Ducote, NASA Service Module Launch Package manager. "In fact, it is one of the most complex spacecraft developed by either the Russians or the U.S. ever."

The Zvezda Service Module is scheduled to launch from Baikonur Cosmodrome in Kazakhstan and then will drift in free flight for almost two weeks, slowly catching up to Unity and Zarya as controllers perform various verification tests and rendezvous burns. With its delicate solar arrays deployed, measuring 97.5 feet end-to-end, the ISS will dock with Zvezda via remote control 14 days after launch at an altitude of about 245 statute miles (394 kilometers).

"The Zvezda launch has been a long time getting here but it's just the beginning for the Service Module," said Ducote. "The first crew is scheduled to go up in October and that is when the Service Module will really get tested operationally."

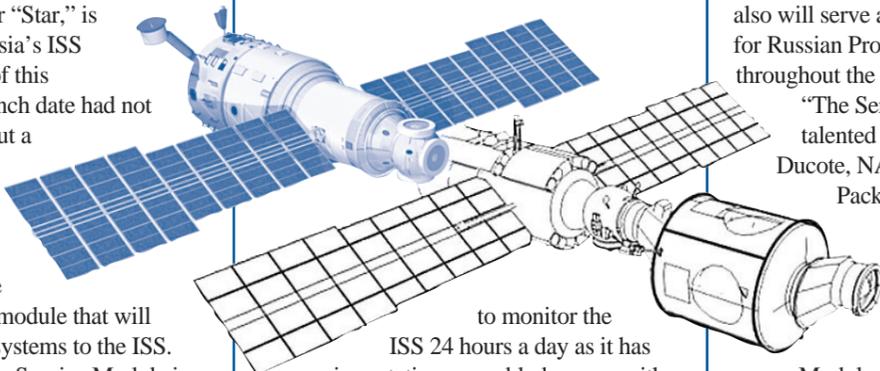
We will have a permanent human presence aboard space station and the Service Module is the crucial key to that capability."

Three weeks after the Service Module launches, the first Progress M1 cargo vehicle will dock to the aft-most port on Zvezda.

Less than two months later will be two shuttle missions in quick succession to further ready the station for its first occupants. STS-106, a logistics flight scheduled for no earlier than September 8, will deliver supplies and equipment to the newly expanded station. Later that month, the crew of STS-92 will arrive and install the first small piece of the truss structure, containing four gyroscopes and a conical docking adapter. The hardware will be attached using the shuttle's robotic arm. Crew EVAs will complete the final connections and preparations for the Expedition One crew, which arrives via a Russian Soyuz spacecraft in November.

"There is a great sense of expectation about this launch," added Ducote, who himself has been involved in the Service Module project for more than six years. In that time, he's traveled to Moscow more than 25 times to assist or monitor Zvezda testing, design and ISS interface verification. "We're all very excited to now have the launch in sight."

In the final weeks before the launch, Ducote will travel two more times to Russia; but, he says, it's the start of a long road with many important and critical milestones. ■



to monitor the ISS 24 hours a day as it has since station assembly began – with the joining of Zarya and Unity a year and a half ago. Due to the critical nature of the activation, checkout, and docking operations during the weeks following the Zvezda launch, there will be expanded controller support in Mission Control to monitor critical Russian segment operations and to provide commanding of the U.S. segment systems.

"The Zvezda module is the cornerstone to continued assembly operations and permanent crew staffing," said Ferring. "You can feel everyone's excitement level growing as we near the launch. It is time to move forward, and we are happy to be a significant part of the shift in momentum."

## Inside Zvezda

INSIDE THE ZVEZDA, which weighs 42,000 lbs., are three pressurized compartments – Transfer Compartments at each end and a long, cylindrical main Work Compartment that make up the center of the module.

Living accommodations within Zvezda are personal sleeping compartments for the crew, a toilet and hygiene facilities, a kitchen with a refrigerator, freezer and a table for securing meals while eating. The module has 13 windows, including three 9-inch diameter windows in the forward Transfer Compartment for viewing docking activities, one large 16-inch diameter window in the Working Compartment, and individual windows in each crew compartment. Other windows are positioned for Earth and intramodule observations.

Exercise equipment includes a NASA-provided treadmill and a stationary bicycle. The crew's wastewater and condensation water will be recycled for use in oxygen-generating devices on the module, but it is not planned to be recycled for use as drinking water. Space walks using Orlan-M spacesuits can be performed from Zvezda using the Transfer Compartment as an airlock. The module also will provide data, voice and television communications with Mission Control Centers in Moscow and in Houston. ■



Officials report on successful radar mapping mission.

Page 2



Aviation history made at Ellington Field.

Pages 4 - 5



Preparing for a female presence in technology.

Page 6