Shuttle Atlantis To Get New Cockpit, Improved Navigation Capabilities During 60-Million-Mile Tune-Up

Twenty successful missions and more than 60 million miles under her belt, America's Space Shuttle orbiter Atlantis arrived home to the Boeing Orbiter Major Modification Facility here today atop a Boeing 747 Shuttle Carrier Aircraft for a nine-month, approximately $70 million makeover highlighted by the installation of a new, state-of-the-art cockpit and a cutting-edge satellite-based navigation system.

During its once-every-three-year orbiter major modification (OMM), Atlantis will receive a comprehensive structural inspection and more than 100 modifications designed to reduce program maintenance costs and improve operations, safety and reliability. Included are upgrades that will enable Atlantis to support construction of the International Space Station (ISS). The overall OMM will be the most extensive yet performed. Atlantis is scheduled to return to NASA's Kennedy Space Center (KSC), Fla., next August.

Under contract to United Space Alliance (USA), a team of more than 350 Boeing technicians and engineers -- many of whom built Atlantis -- will literally take the vehicle apart and reassemble it. Inspectors will survey every nook and cranny of the 12-1/2-year-old ship, using their eyes, borescopes, X-rays, ultrasonic waves, and other techniques to search for possible fatigue, corrosion, or broken rivets or welds.

The OMM also provides NASA and USA an ideal opportunity to install major modifications aimed at better, safer and more efficient vehicle performance and expanded mission capabilities.

A highlight of this OMM -- Atlantis' second -- will be the Shuttle fleet's first installation of the Multifunction Electronic Display Subsystem (MEDS), commonly called the "glass cockpit." MEDS will replace Atlantis' four existing cathode ray tube screens, mechanical gauges and instruments with full-color flat-panel displays like those currently in use on modern commercial and military aircraft. These glass screens -- the only space-qualified, flat-panel displays in the world -- will also provide Shuttle crews with information such as attitude-display, Mach-speed and horizontal-situation indicators.

"The change to MEDS is necessary because present electro-mechanical devices are becoming obsolete and increasingly expensive to maintain," said Russ Turner, Boeing Reusable Space Systems vice president and general manager. "Besides reducing maintenance costs, MEDS will reduce vehicle weight and power consumption, improve Shuttle reliability and performance and be capable of expansion for future applications."

When MEDS is installed, Atlantis' forward flight deck will have nine displays, while two MEDS displays will be installed in the aft flight deck to support payload operations. Information will be interchangeable between screens depending upon mission needs, allowing crews to select the display format that best suits their needs. MEDS hardware was developed by Honeywell Satellite Systems Operations, Glendale, Ariz.

Atlantis is also set to become the first orbiter to be guided solely by satellite-based navigation. The current TACAN navigation system will be removed and replaced with a triply-redundant system that operates through signals from the Boeing-built Navstar Global Positioning System (GPS) satellites, the world's most accurate navigation system. The three-string GPS system will provide accurate vehicle attitude and location data. It promises to reduce Shuttle program costs by eventually allowing removal of several ground stations at NASA KSC as well as at the trans-Atlantic abort landing sites, which are becoming obsolete and costly to maintain. Together with other planned navigation enhancements, the three-string GPS system could one day enable Shuttle landings in poor visibility conditions.

An additional series of modifications will enable Atlantis to join sister ships Discovery and Endeavour in supporting ISS construction, which begins next summer. The docking system Atlantis has used for seven missions to Russia's Mir space station will be modified to become a fully functional airlock complete with spacesuit services and crew communications capabilities and will be relocated within Atlantis' payload bay to provide adequate structural clearance with the ISS exterior. Additional ISS-related modifications will increase the orbiter's cooling and power capacities to support ISS payloads and upgrade the ship's UHF space communications system.

Operational enhancements include increasing the vehicle's load carrying capability, a series of measures to reduce the orbiter's weight and upgrades to the ship's thermal protection system tiles and blankets.

Safety and reliability enhancements include provisions to protect the orbiter's cooling system and wing leading edges from space debris, a structural beef-up of the crew module floor and enhancements to the vehicle's auxiliary power units and hydraulic system.

For the first time ever, Boeing Palmdale orbiter modifications personnel will also perform preflight vehicle checkouts. The move is expected to reduce the time required to process the vehicle for its next flight by up to two months.

The third operational orbiter, Atlantis rolled out of the Boeing Palmdale facility on April 6, 1985, and made its debut flight on mission STS-51-J on October 3, 1985. Among its accomplishments have been five missions for the Department of Defense;

deployment of the Magellan, Galileo and Gamma Ray Observatory spacecraft; and all seven missions conducted to date to dock with Russia's space station Mir. Atlantis' next scheduled mission will be STS-92 in January 1999, an ISS assembly mission to deliver Station hardware, including a DC-to-DC power conversion unit.

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