HTD 1403 Micro-Wireless Instrumentation System (Micro-WIS) HEDS Technology Demonstration

In-Cabin

Overview

HTD 1403 will demonstrate the operational utility and functionality of the micro-WIS on orbit, initially in the crew cabin of the Shuttle orbiter and then on the International Space Station.

The micro-WIS consists of tiny autonomous sensors for data acquisition. Two versions have been developed—a transmitter and a recorder. This HTD is designed to demonstrate the micro-WIS transmitter and recorder.

One of the objectives of this HTD is to obtain meaningful real-time measurements for use in the orbiter's environmental control and life support system (ECLSS) operations. The micro-WIS transmitter's simultaneous real-time measurements of air cabin temperatures in many interior compartments of the orbiter will help ECLSS operations personnel address issues encountered on STS-88 and early International Space Station flights. Currently, only one temperature reading in the aft flight deck of the orbiter is available for adjusting model predictions for real-time environments.

Micro-WIS will also reduce the time it takes the crew to obtain on-orbit temperature measurements and will increase the capability to monitor temperatures over long periods. On busy Space Station assembly flights, the distances traveled and the time required to make the measurements can be prohibitive.

Micro-WIS data will also be used to validate cabin air temperature models that are used to make critical predictions of the dew point on early ISS missions, which is important because orbiter cabin air exerts a significant influence on the entire station volume. Although the physical configuration of the air ducts in the orbiter cabin has been changed significantly, the sensors have remained the same and some temperature data has never been available.

History/Background

In the past, space missions have been limited by the penalties associated with weight and integration costs. However, breakthroughs in the miniaturization of very low power radio transceivers have led to the introduction of a 1-inch-diameter wireless instrumentation system that can send temperature measurements to a laptop computer for five months.

Benefits

This breakthrough in miniaturization means significant cost, weight, and power savings for current and future space vehicles and ground test facilities and should revolutionize the design of future spacecraft systems. The micro-WIS on-orbit demonstration should also increase the flexibility, reliability, and maintainability of data acquisition systems for spacecraft and lead to a reduction in vehicle turnaround time and increased reliability by eliminating cable connectors and by providing near-real-time reconfigurable data paths.