Wireless Acoustic Measurement System

This system supplants older, less-capable, cable-connected systems.
Stennis Space Center, Mississippi

A prototype wireless acoustic measurement system (WAMS) is one of two main subsystems of the Acoustic Prediction/Measurement Tool, which comprises software, acoustic instrumentation, and electronic hardware combined to afford integrated capabilities for predicting and measuring noise emitted by rocket and jet engines. The other main subsystem is described in "Predicting Rocket or Jet Noise in Real Time" (SSC-00215-1), which appears elsewhere in this issue of *NASA Tech Briefs*.

The WAMS includes analog acoustic measurement instrumentation and analog and digital electronic circuitry combined with computer wireless local-area networking to enable (1) measurement of sound-pressure levels at multiple locations in the sound field of an engine under test and (2) recording and processing of the measurement data. At each field location, the measurements are taken by a portable unit, denoted a field station. There are ten field stations, each of which can take two channels of measurements.

Each field station is equipped with two instrumentation microphones, a micro-ATX computer, a wireless network adapter, an environmental enclosure, a directional radio antenna, and a battery power supply. The environmental enclosure shields the computer from weather and from extreme acoustically induced vibrations. The power supply is based on a marine-service lead-acid storage battery that has enough capacity to support operation for as long as 10 hours.

A desktop computer serves as a control server for the WAMS. The server is connected to a wireless router for communication with the field stations via a wireless local-area network that complies with wireless-network standard 802.11b of the Institute of Electrical and Electronics Engineers. The router and the wireless network adapters are controlled by use of Linux-compatible driver software. The server runs custom Linux software for synchronizing the recording of measurement data in the field stations.
The software includes a module that provides an intuitive graphical user interface through which an operator at the control server can control the operations of the field stations for calibration and for recording of measurement data.

A test engineer positions and activates the WAMS. The WAMS automatically establishes the wireless network. Next, the engineer performs pretest calibrations. Then the engineer executes the test and measurement procedures. After the test, the raw measurement files are copied and transferred, through the wireless network, to a hard disk in the control server. Subsequently, the data are processed into 1/3-octave spectrograms.

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Inquiries concerning rights for the commercial use of this invention should be addressed to the Intellectual Property Manager, Stennis Space Center, (228) 688-1929. Refer to SSC-00215-1.

Note to All Concerned Must be published in the same issue as that of SSC-00215-1.