The Japanese Engineering Test Satellite-VIII (ETS-VIII) is scheduled for launch into geostationary orbit in 2004 by the Japan Aerospace Exploration Agency (JAXA).

The purpose of ETS-VIII is experiments and space demonstrations of 13 meter aperture deployable antenna technology, high power transponders, and switching systems. The goal is to acquire the basic technologies for future space development including large-scale deployable structures, satellite positioning with a high accuracy clock, and the development of a mobile satellite communications system capable of supporting portable terminals.

L-3 Communication Systems-East is responsible for RF subsystem integration for the ETS-VIII High Accuracy Clock (HAC). The HAC system will carry an atomic clock to generate extremely accurate time signals. The spacecraft will conduct positioning experiments, combining the clock signal with GPS data to study basic satellite positioning systems. The HAC RF subsystem hardware was designed, developed, and manufactured by L-3 Communications.
**S-BAND AND L-BAND TRANSMITTER FUNCTION**

- Simultaneous L-Band and S-Band transmission.
- Modulates and transmits GPS data received from the baseband processing unit at four data rates between 1.023 and 5.115 Mbps using BPSK modulation.
- Switch allows 2500 and 2505 MHz Mobile Communication Subsystem signal to be transmitted.
- BPSK modulated GPS signal received from the ground can be turned around and transmitted through the S-band and L-band amplifiers.
- S-Band output signal is coupled into the Time Comparing Equipment (TCE).

**SYNTHESIZER FUNCTION**

- A 10.23 MHz frequency from a Cesium Frequency Standard or the received Pilot Tone from the Pilot receiver is used to derive 8 frequencies.
- The frequencies provide up/down conversion references for the RF subsystem and references for other spacecraft subsystems and equipment.

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**S-BAND RECEIVER FUNCTIONS**

**Receive Frequencies**
- 2655 to 2660 MHz PSK modulation Time Comparing Subsystem signal.
- 2659.8 MHz pilot signal.
- 2656.39 MHz BPSK modulation GPS signal.

**Retransmit Function**
- A 2656.39 MHz S-Band GPS data signal is received and converted to the S-Band and L-band transmit frequencies.

**Pilot Tone Function**
- A 2659.8 MHz S-Band CW pilot signal is received and detected to recover a 10.23 MHz frequency tone used to control the frequency synthesizer.

**Other S-Band Receive Functions**
- Signals between 2655 and 2660 MHz are received, filtered amplified and output to the Time Comparing Equipment (TCE) and Mobile Communication Equipment (MCE).
- A 2655 to 2660 MHz S-Band calibration signal from the Time Comparing Equipment can be coupled into the S-Band receiver.

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**RF SUBSYSTEM HARDWARE**

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**For Additional Information Contact:**
Samuel Ximenes
L-3 Communication Systems-East
One Federal Street, Camden, NJ 08103
Telephone: 856-338-2823  Fax: 856-338-2741
E-Mail: samuel.ximenes@L-3Com.com
www.L-3Com.com/Space

Cleared by DoD/DFOISR for Public Release under DFOISR case number 05-S-0145 on November 2, 2004
All Data and Specifications Subject to Change