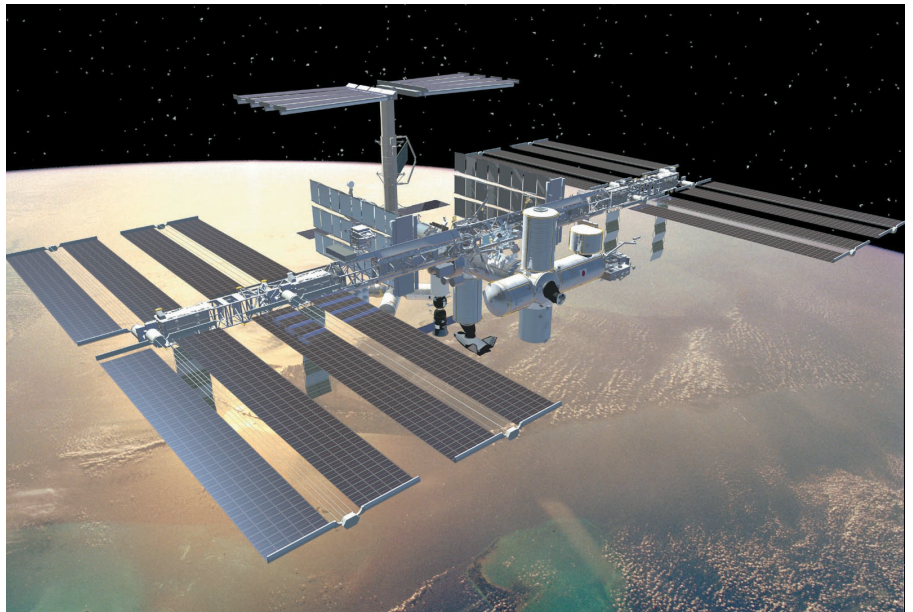


Space Communications International Space Station

Communication & Tracking System



FEATURES

- **Ku-Band Subsystem** for transmission of video and high speed data to earth
- **S-Band Subsystem** for transmission of two-way voice commands to the space station and telemetry from the space station
- **External Video Subsystem** for visual surveillance of all exterior space station areas in support of assembly activities and astronaut extra-vehicular activity

*...continuing our long-standing tradition of
supplying communications for
human space flight*

ISS PROGRAM

The International Space Station (ISS) is a multi-national effort to design and build an earth orbiting facility to support research and experimentation in a micro-gravity environment.

L-3 Communication Systems-East (CS-E) is responsible for the design, development, fabrication, integration and testing of the ISS Communication and Tracking System. This system provides realtime, space-based communications and external video from the space station to earth through the Tracking and Data Relay Satellite System (TDRSS).

The ISS Communication and Tracking hardware and software enable the transmission, reception, signal processing and distribution of audio, telemetry, command, payload, video, text and graphics data.

Signal processing functions include timing, synchronization, error detection, error correction, multiplexing/de-multiplexing and privacy protection.

System Product Description

ISS Communication & Tracking System

S-BAND SYSTEM



- Full duplex audio and data transmission via TDRSS
- All Solid State Design
- Link Data Rates:
192 Kbps Downlink
72 Kbps Uplink

The S-Band Subsystem provides the uplink and downlink communication path for command and control data using the S-Band single access TDRSS service. The subsystem consists of two fully redundant strings of hardware. Each string contains a baseband signal processor, a transponder and an antenna group consisting of low and high power amplifiers, a high gain gimbaled antenna, a low gain antenna and antenna controller.

KU-BAND SUBSYSTEM



- High Rate Payload Data Streams
- All Solid State Design
- Link Data Rate:
50 Mbps Downlink

The Ku-Band Subsystem operates at 15.001 GHz and provides the communication downlink from the space station through TDRSS to the ground control and data processing sites for video and scientific payload data. The subsystem flight hardware consists of a Ku-Band high gain antenna, a transmitter receiver/controller, a high rate modem, a high rate frame multiplexer and a video baseband signal processor. This subsystem provides data and TV transmission downlink service at selectable rates up to 50 Mbps with an expansion capability to 150Mbps.

EXTERNAL VIDEO SUBSYSTEM



- External Video Cameras, 4 Units
- External GaAs Video Switch

The External Video Subsystem consists of four external, relocatable camera groups and three video switches. The subsystem uses a fiber optic network and the video switches to distribute video and synchronization signals throughout the space station. Each camera group consists of a solid state color TV camera, a pan-tilt unit and an interface unit. The camera and pan-tilt units are controlled with the time-tagged synchronization signal. The interface unit removes the pan tilt and camera commands from the synchronization signal and sends the corresponding control signals to the pan tilt and camera. The interface unit also adds telemetry data to the video signal from the camera. The solid state video switches are designed around a custom 32 x 32 GaAs non-blocking crosspoint switch.

ISS SUPPORT ACTIVITIES

Ground Support Equipment:

Full scale emulation of ground processing for integrated testing.

Maintenance Depot:

Maintenance of processes and facilities required to repair and upgrade ISS communications orbital replacement units when returned from on-orbit service. High Rate Payload Data Streams

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