



SAMS Remote Triaxial Sensors (RTS) Vibratory System Supporting ISS



Presented By:

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MEIT

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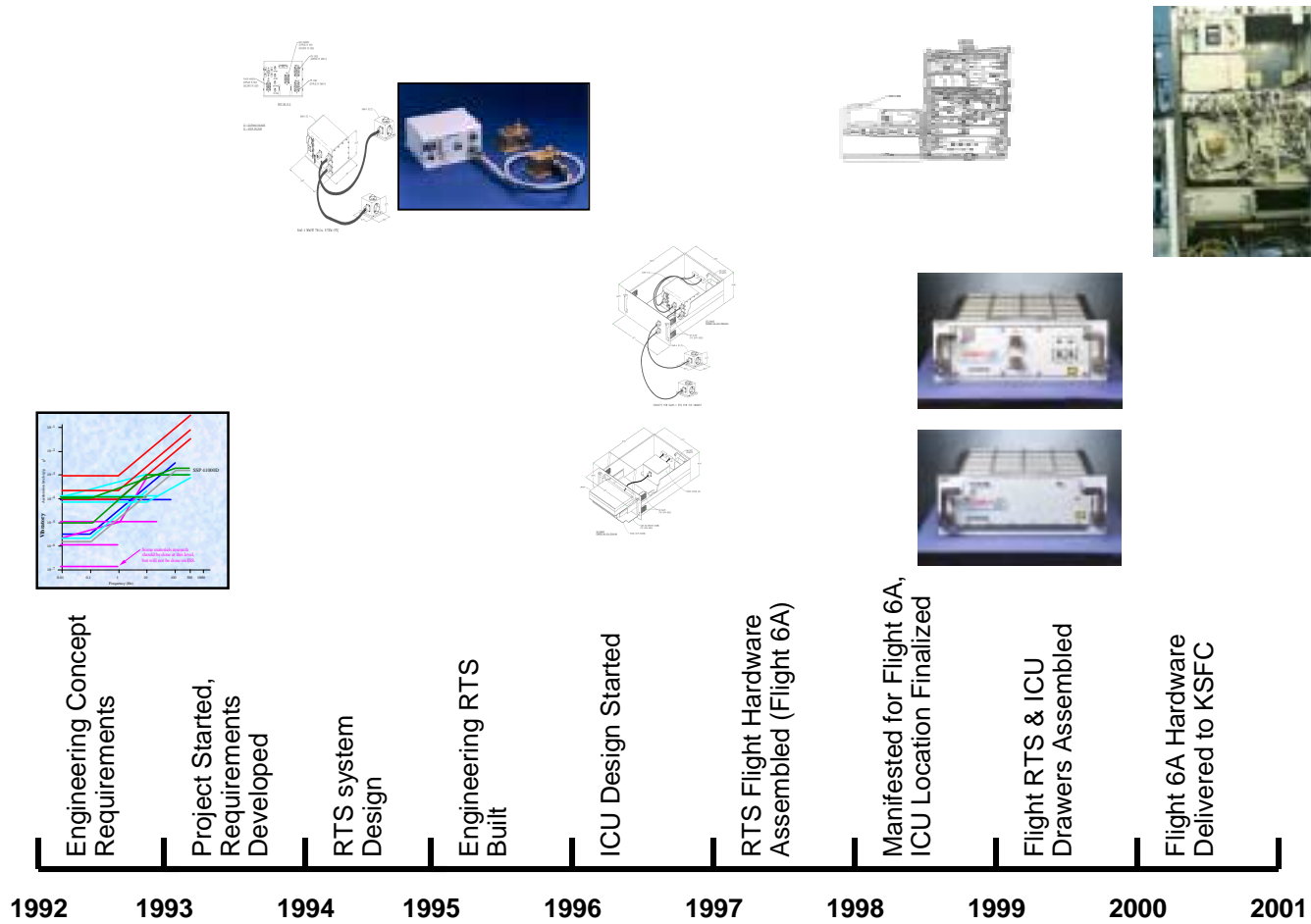


Introduction



- **The SAMS Vibratory System (RTS and ICU) for ISS will be distributed throughout ISS with data available near-real time from all units.**
- **This presentation describes the status, hardware configurations and performance verification of the RTS and ICU.**

ISS Vibratory System Development



RTS-SE (Sensor Enclosure)

- Measures general vibratory environment
- 3 Orthogonal pendulous mass force-balance accelerometers
- Each axis is digitized using 24 bit delta-sigma converter
- Each axis has a dedicated programmable gain amplifier
- Selectable bandwidth
- Interchangeable



General Description: RTS-EE

RTS-EE (Electronics Enclosure)

- **Ruggedized PC104 computer with custom cards to interface RTS-SE's.**
- **Connects to an Ethernet LAN and 28VDC power**
- **Required to interface to RTS-SE's**
- **Each RTS-EE interfaces up to 2 RTS-SE's**
- **Contains boot kernel. Code, configuration, and calibration loaded after power-up from the ICU.**



RTS Deployed in an ISIS Drawer

RTS Drawer

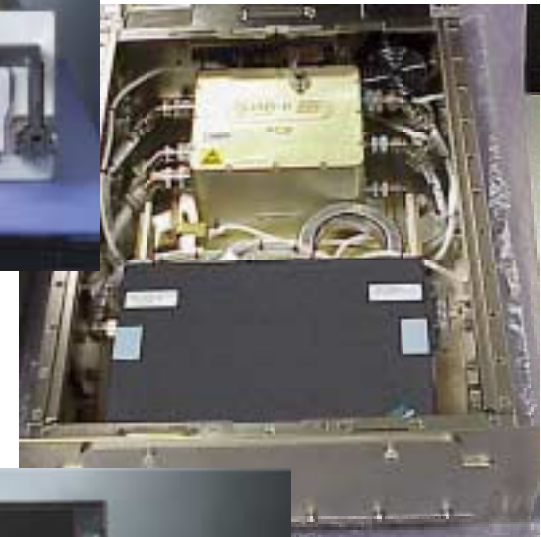
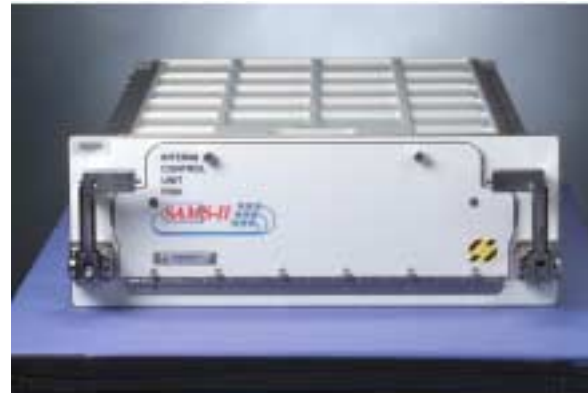
- Contains RTS-EE and two RTS-SE (active and spare)
- Ethernet and Power connections are performed in the rear
- Slides into standard ISIS drawer location.
- Modified Boeing ISIS Power/Stowage Drawer.



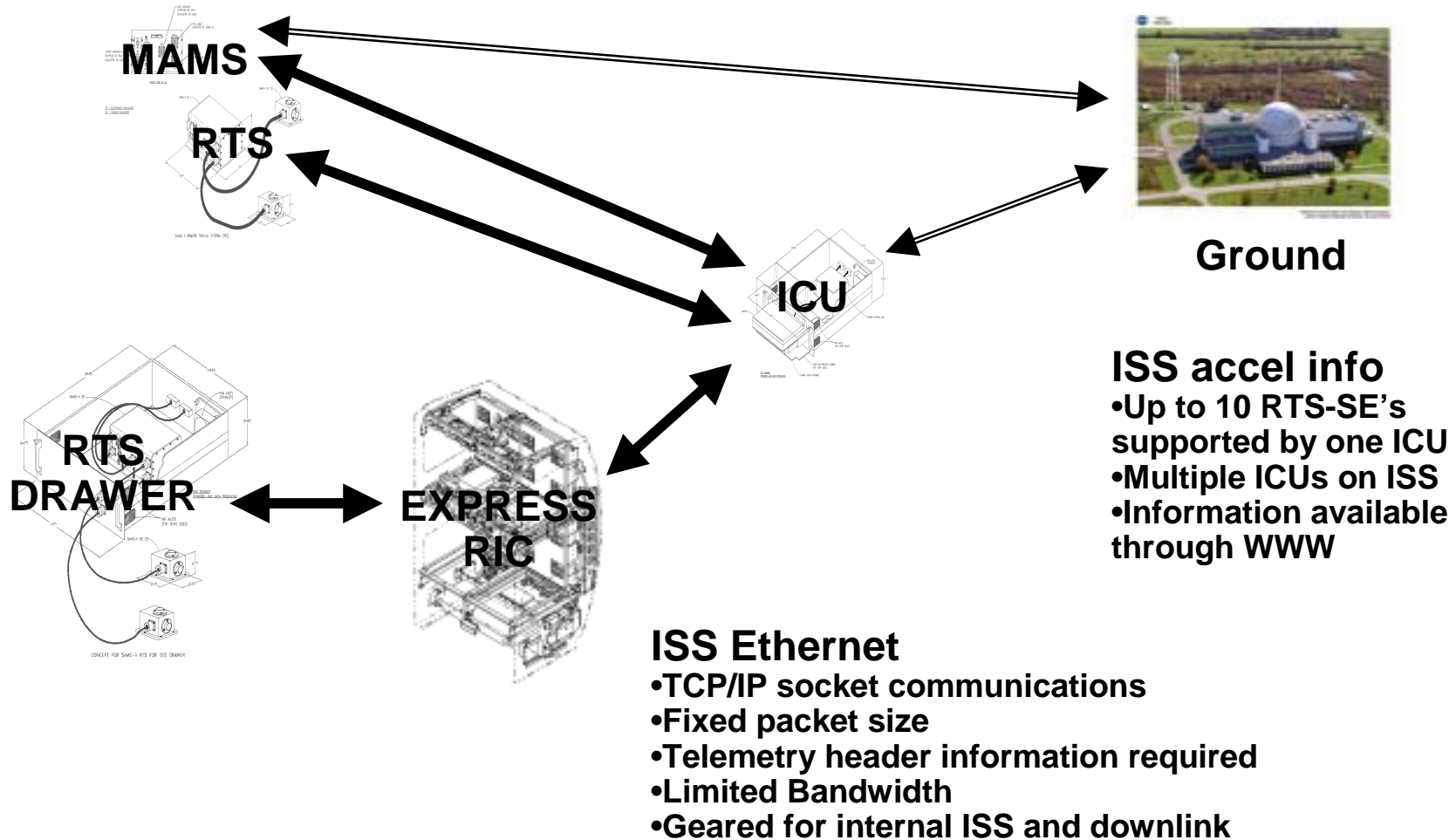
Data Handling for ISS Deployment General Description: ICU

ICU Drawer (Interim Control Unit)

- **IBM 760XD laptop, two 3GB hard drive. Modified for flight by ISS PCS**
- **Loads program and software coefficients to RTS-EE**
- **Used to buffer and transmit data for telemetry**
- **Provides a crew interface for control and data display**

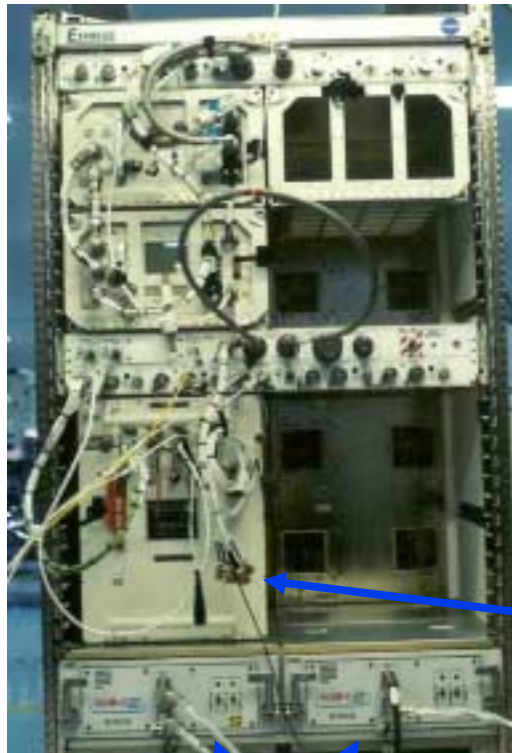


General Configuration: ISS Configuration



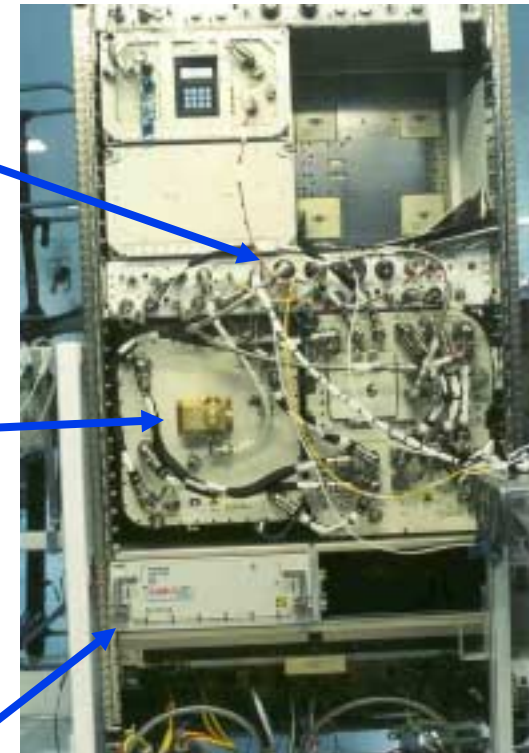
ISS Flight 6A Configuration

EXPRESS RACK #1



RTS DRAWERS

EXPRESS RACK #2



RTS-EE installed in EXPRESS rack behind panel (standard in ARIS EXPRESS racks)

RTS-SE

MAMS

ICU DRAWER



ISS Deployment Status

- **Supported:** Used to characterize ARIS systems for ground based testing.

- **Present Missions:** Flight 6A (Experiment PCS, ARIS, ARIS-ICE EXPRESS)

- **Future Support:**
 - ISS Structural Dynamics Test Objective (STD0) support
 - Microgravity Science Glovebox (MSG)
 - Materials Science Research Facility (MSRF)
 - Fluids Combustion Facility (FCF)
 - Low Temperature and Microgravity Physics Facility (LTMPF)



RTS Performance

REQUIREMENT	EXPECTED PERFORMANCE
<p>System Noise</p> <ul style="list-style-type: none"> •0.569 ugrms 0.01-0.1 hz •5.69 ugrms 0.1-100 hz •0.569 mgrms 100-300 hz 	<ul style="list-style-type: none"> •0.121 ugrms 0.01-0.1 hz •2.0 ugrms 0.1- 30 hz •4.0 ugrms 30 – 300 hz
<p>Accuracy</p> <ul style="list-style-type: none"> •10% from 0.01 to 300 hz 	<ul style="list-style-type: none"> •Analysis 4.62% (1% initial calibration, 2.6% thermal, 1.1% two year cal) •Calibration data indicates 0.1% repeatable over 1 year. •Raw data is DC-coupled, PIMS demean data



SAMS/ARIS-ICE Ground Based Testing



- **Used to provide independent verification of ARIS performance**
- **Ground based testing done at EXPRESS Avionics Test Bed at MSFC, ARIS test bed at Seattle, integrated PRCU testing at KSC, and 3-DOF test bed in Houston.**
- **Flight verification in conjunction with EXPRESS #1 and #2 ARIS-ICE**

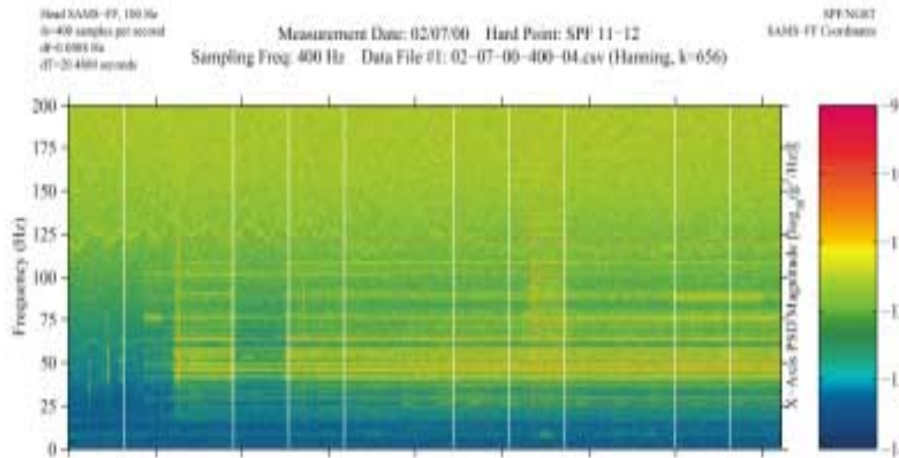
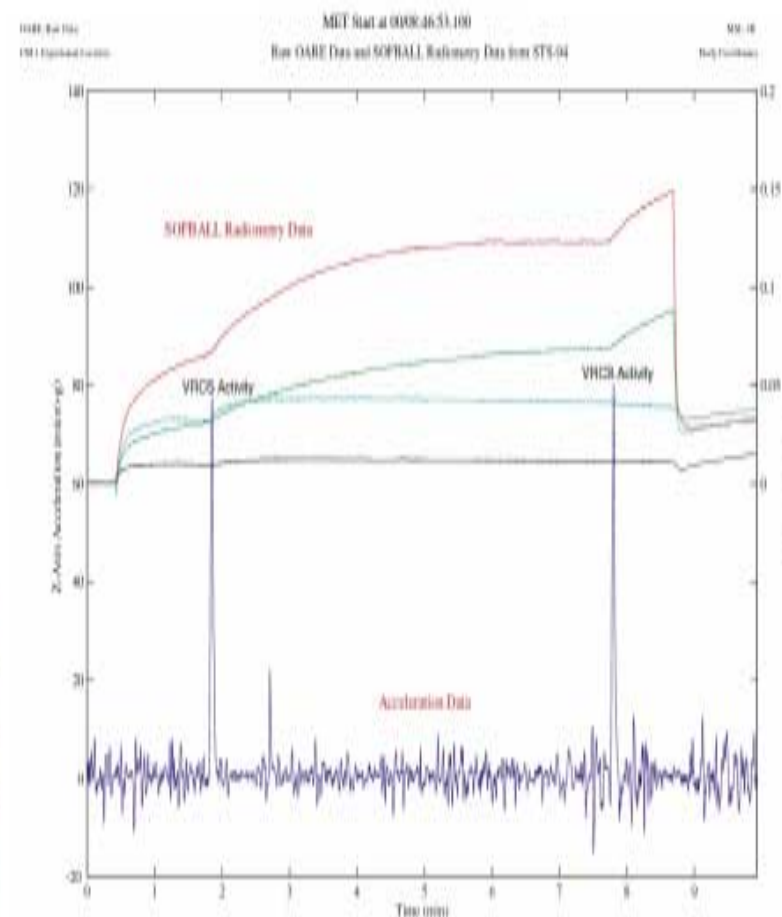
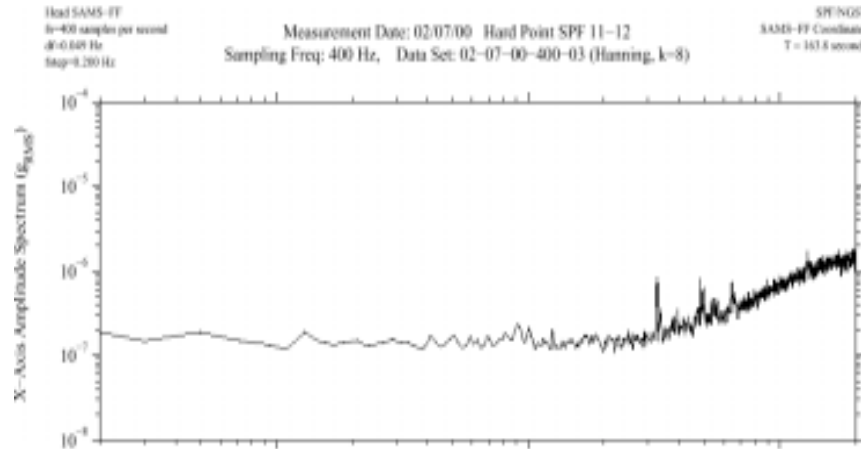




Example data

Near Real Time

Post Flight



SOFBALL Radiometry Data Interaction with Acceleration Data from MSL-1 (STS-94).



Conclusion



- **RTS system is available to support payloads on a variety of different platforms using ethernet**
- **System is easily configured to support mission requirements**
- **Complete service package including hardware and data analysis**

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