Development of an Economical Field Deployable Gravimeter via the Inverse Piezoelectric Effect

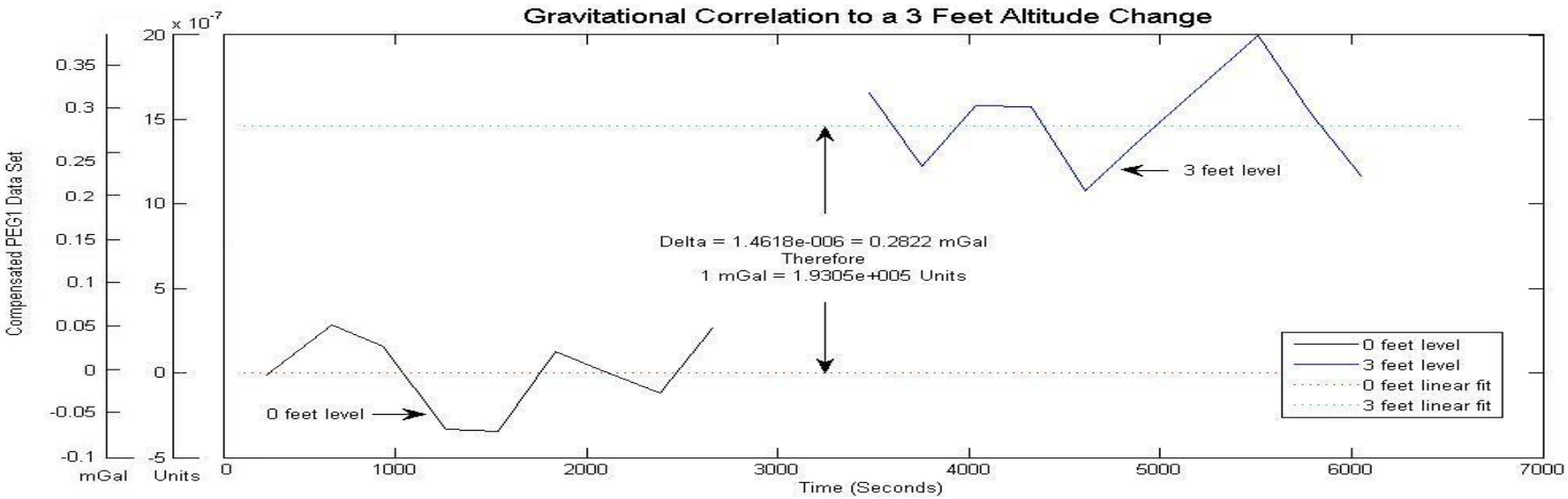
Project Lead: Scott Jensen,
Scott.L.Jensen@nasa.gov, 228-688-2102,
Engineering & Science Directorate

Lead Center: John C. Stennis Space Center

Results: 1 mGal Resolution (consistently)

- Achieved 10uGal Resolution (inconsistently)
  At times with low noise level
- Believe nGal levels achievable
  Requires hardware enhancements
  a) Higher digitizer resolution
  b) More noise reduction
  c) Higher computing power
  The technology is not the limiting factor
- Can be made into a uGal Handheld Gravimeter
  4 inch X 6 inch X 2 inch

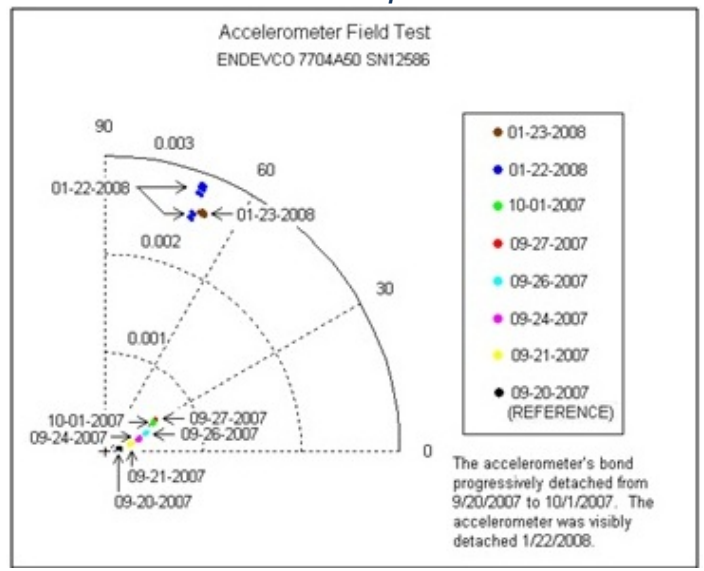
The PiezoElectric Gravimeter (PEG1)

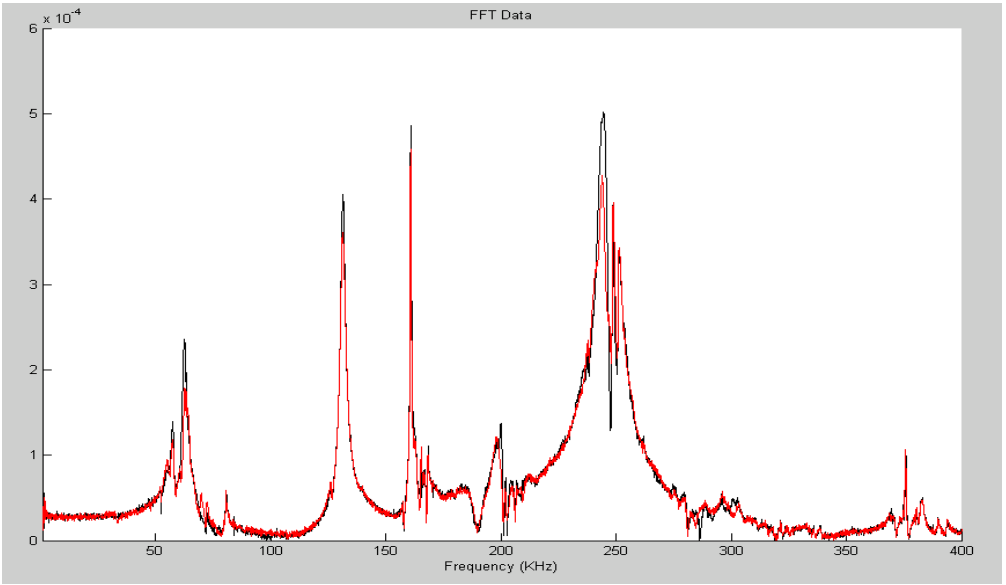


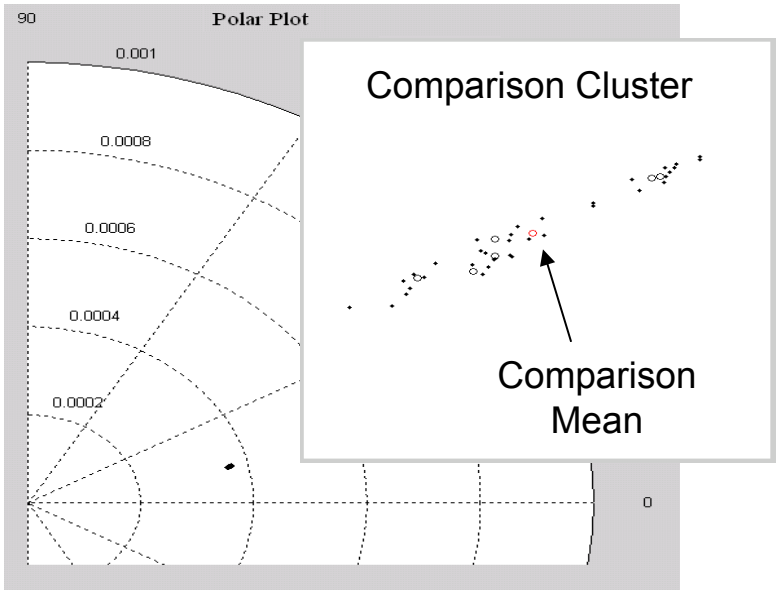
Background: The Fundamental Technology

Stennis Space Center

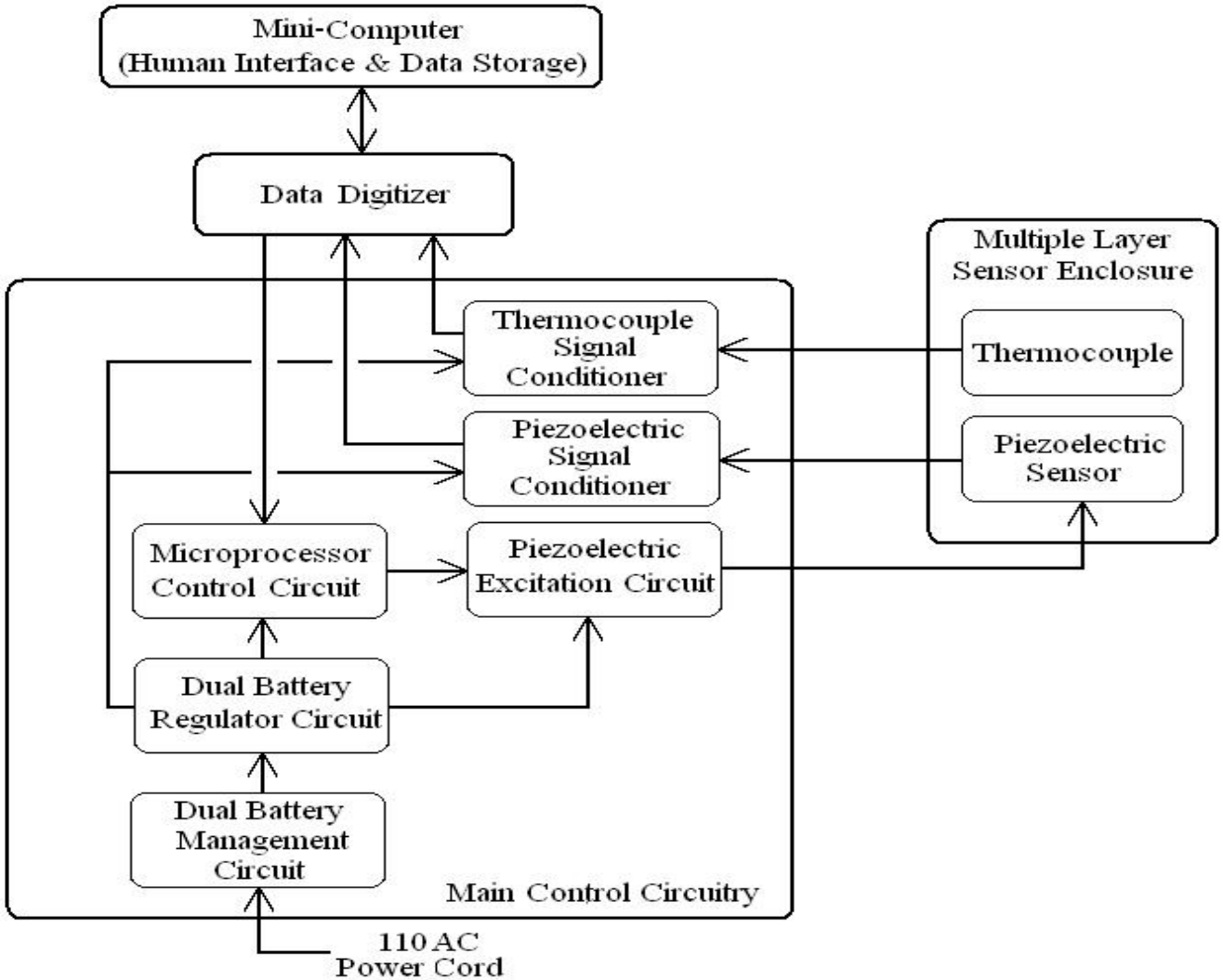
- Based on: The PiezoElectric Transducer Tester (PETT)
  - a) Developed at SSC
  - b) Excite piezoelectric elements
  - c) Reads the element's vibratory characteristics
  - d) Utilizes a Vector Analysis Technique
  - e) Reveals minuscule differences
- Gravitational effect:
  - a) Observed effect from the lunar/solar cycles (~0.162mGal)
  - b) Dampens the element's vibratory characteristics



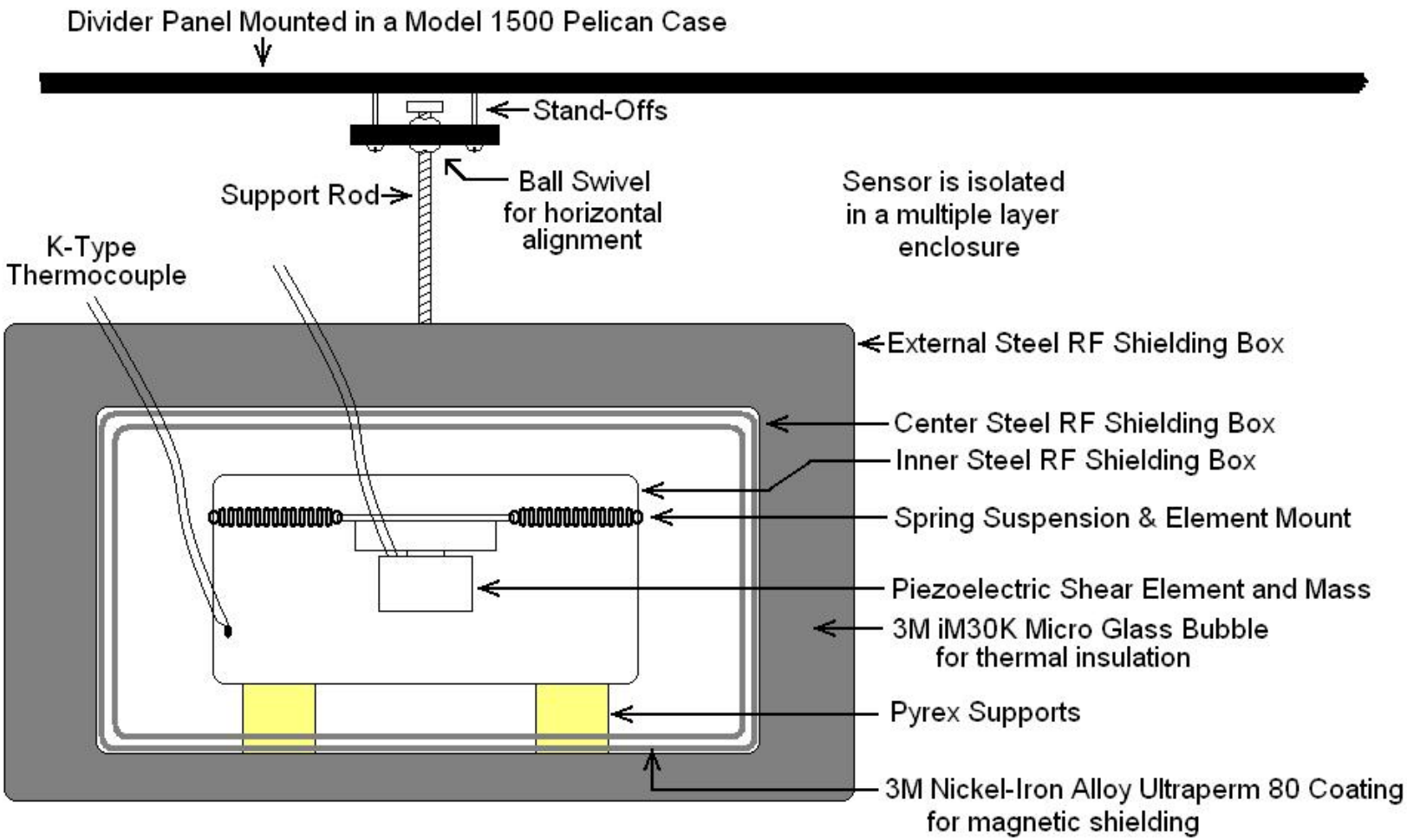


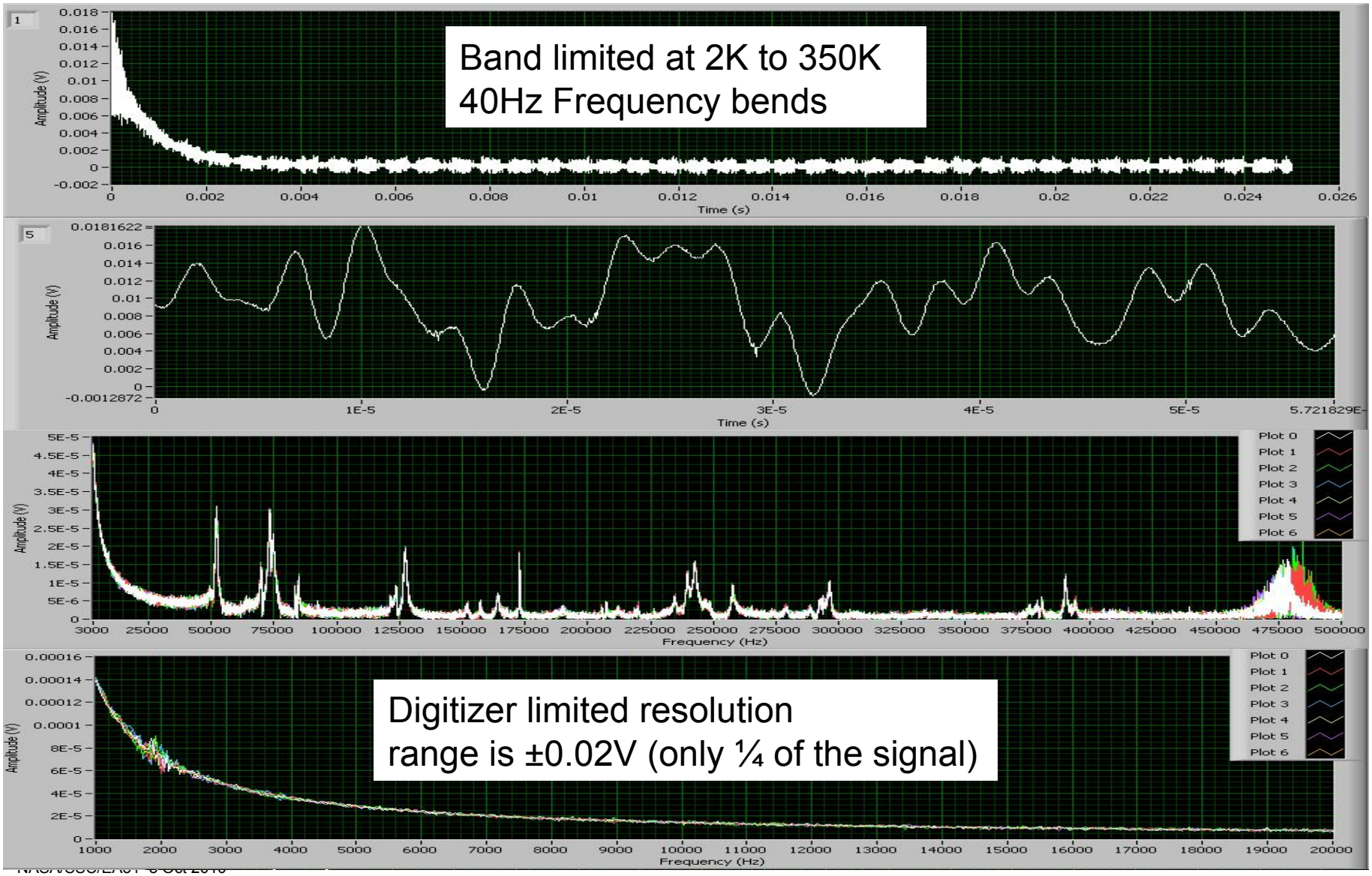


Approach: The Piezoelectric Gravimeter



Approach: The Piezoelectric Sensor



Vibratory Characteristics & Noise Levels

Stennis Space Center