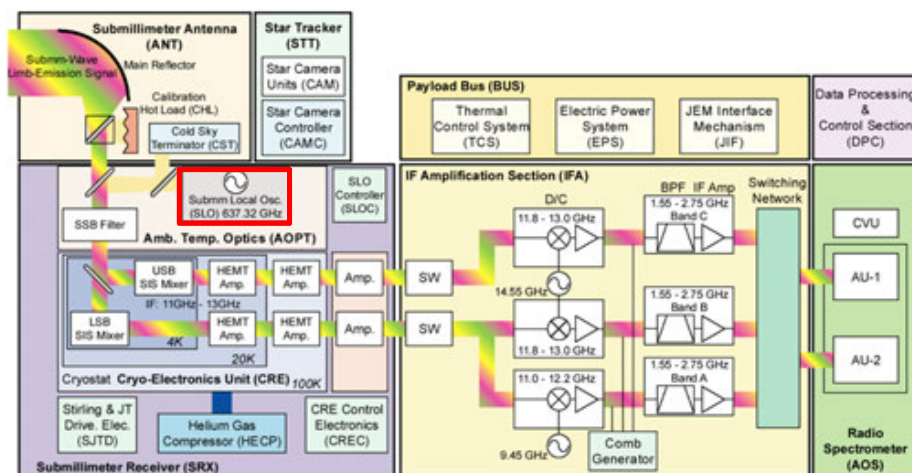


Summary of SMILES instrumental troubles in JAXA

29 March 2013

Institute of Space and Astronautical Science (ISAS),
Japan Aerospace Exploration Agency (JAXA)

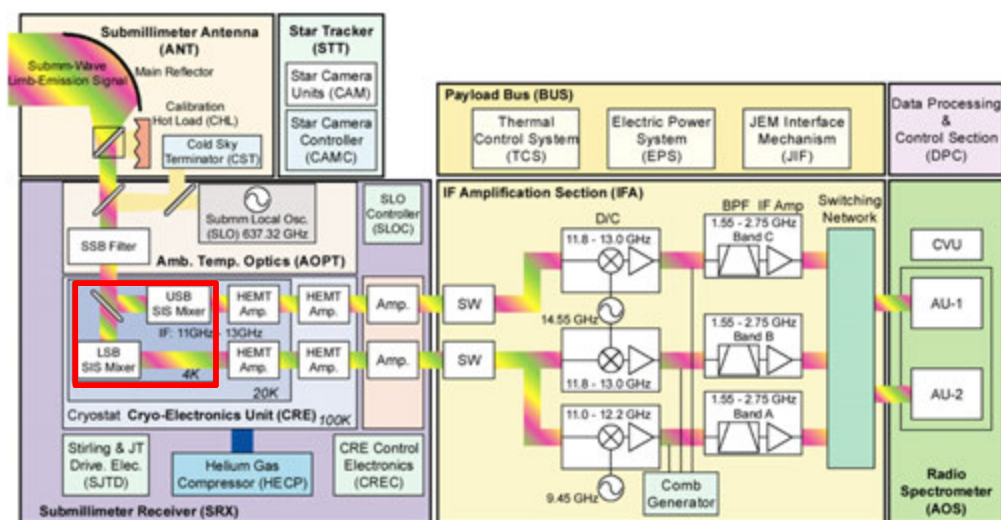
(1) Sub-mm Local Oscillator Failure



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- SLO failure resulted in discontinuation of atmospheric observation directly. (Apr. 2010)
- A task force for SLO failure had been organized inside NICT*
 - NICT was in charge of development of SLO component
- SLO failure is caused by an occasional breakdown of Gunn diode.
 - Low reliability of Gunn diode (COTS)
- Lessons learned for future missions: redundant design is necessary for such component using COTS
- NICT task force reported this conclusion to the Space Activities Commission in Japanese government. (Jan. 2011)

(2) Restart Trouble of the Cryocooler



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- After JEM thermal control trouble, SMILES' cryocooler would not get back to 4K cooling mode. (June 2010)
- A task force of cryocooler developers worked on failure analysis, including additional ground experiment.
- Cryocooler trouble is caused by increased contamination gas (CO₂) to helium gas in 4K cryocooler fluid system.
→ CO₂ gas may come from compressor components.
- The lessons learned from this trouble is utilized to the development of cryocooler onboard coming astronomy satellite; control of baked materials, additional getter to cryocooler fluid system.
- The task force discussed this conclusion with "safety and reliability" teams in JAXA, and then reported them to the Space Activities Commission in Japanese government. (Jan. 2011)

Space Activities Commission in Japan

- SAC summarized the performance of SMILES instruments including on-orbit trouble and its failure analysis
- SAC approved the achievement of SMILES' success criteria
- SAC recommended the 3-year data processing, algorithm improvement, and scientific analysis
- SAC decided to terminate SMILES on-orbit "nominal operation"

Cooperation of JAXA and NICT in SMILES mission

