NASA Goddard Space Flight Center
Search and Rescue Mission Office

NASA status for Beacon Manufacturer's Workshop

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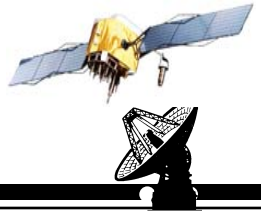
Topics



- **SARLAB**
- **DASS**
- **Beacon spec work**
- **Beacon testing**

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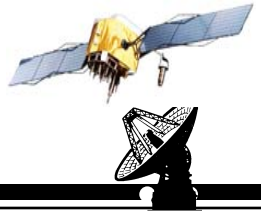
SARLab



- **SARLAB is the new facility that replaces the old SEDL satellite test site and also houses the DASS Proof of Concept ground station.**
- **A second EMS beacon simulator has been installed**
- **NASA pursuing a maintenance contract for the LUTS**
- **New real time spectrum analyzer –Tektronix RTSA 6106**
- **Advanced Beacon Emulator from TSI being delivered**
  - **To function as a reference beacon for system and spacecraft characterization measurements**
  - **Can function as beacon simulator with some other modulation schemes**
  - **Has 50ns timing accuracy**

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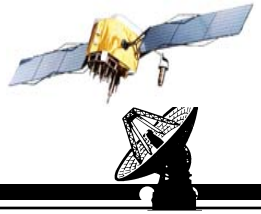
DASS Status



- **Nine DASS repeater equipped GPS satellites in orbit**
  - **Four satellite visibility for about three hours per day**
  - **Three satellite visibility for another 3-4 hours a day**
  - **Resulting Geometrical Dilution of Precision is much higher than typical GPS users see for navigation**
- **Ongoing work with Air Force to get DASS on Block . Currently on Block 3C, but need to get to Block 3B to avoid a gap in coverage**
- **Unsure whether Canada will supply DASS repeaters as they are bidding to supply repeaters for Galileo**

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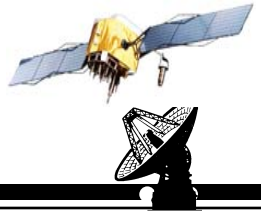
DASS (Continued)



- **Proof of Concept Ground Station**
  - **Vendor is finishing contractual acceptance tests**
  - **Ran detailed and controlled tests to look at detection rates and location accuracies**
  - **System meets DASS spec (except single burst location errors) and Cospas-Sarsat MEOSAR Implementation Plan (MIP)**
  - **Found radar interferer in Russia and noisy environment over Europe that adversely affects detection rates.**
  - **Detection rates over US much better than over Europe**
  - **Parallel effort developing improved processing techniques using a software defined receiver and multiple SV's – possible to achieve a 35-40% improvement in detection rates**
  - **Test results presented at MEOSAR meeting in March to look at future testing**
  - **Sharing data between MEOLUTS running into vendor confidentiality issues in Canada**

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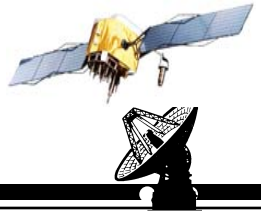
Beacon spec Work



- **Beacon Spec revision activities**
  - **RTCM SC-110 PLB spec work**
    - **New PLB spec, except for navigation section, out for committee approval**
    - **EPIRB spec next to be revised by committee**
  - **RTCA SC-204 rewrite of DO-204 ELT spec complete**
  - **Cospas-Sarsat T001/T007**
    - **Number of problems with current C/S navigation spec type approval tests presented at last June's Cospas-Sarsat JC meeting**
    - **Under consideration whether to change to each location encodes independently**
    - **Ongoing work to define new T007 test scenarios**

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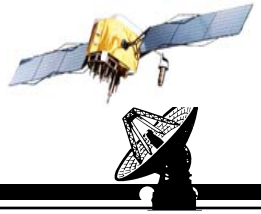
RTCM PLB Testing



- **Tested RTCM's 81 candidate GPS scenarios against 4 PLB's in an anechoic chamber using a GPS simulator**
  - **Wide range of performance –a number of scenarios with no locations**
  - **PLB with a 2006 generation U-Blox GPS receiver performed best.**
  - **PLB with unspecified receiver performed worst**
  - **No locations provided for High GDOP's**
  - **Significant first location errors for the land scenarios (mid latitude & 3-6 SV's, various GDOPs) - several violated T001 spec.**
  - **Very few location errors for Maritime scenarios (7 SV's)**
- **Have to allow for location errors when designing navigation encoding tests**
- **Ongoing discussions within RTCM as to what the recommended standards should be**
- **Need understanding from industry on how beacons encode first location from GPS receiver- very first location or wait until location converges**

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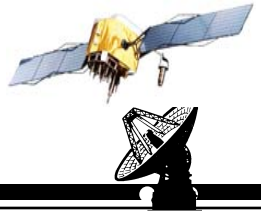
Beacon Bit Rate Tolerance Tests



- Bit rate tests a C/S JC-21 action item
- Goal to verify whether restricting beacon bit rate tolerance to ±0.1% or ±0.25% vice current ±1% will show improvements in detection rates at low C/No's
- Ran test using beacon simulator transmitting through GOES-13 of various beacon bit rates from 398 to 402 bps
  - PDCM vs.. C/No curves and
  - bit rate measurement errors vs. C/No curves
  - for the non-message integration case (raw data).
- Initial SARLab data shows curves for all bit rates adhere to theoretical curve for GEOLUT measured C/No's from 43 to 31.
- Next test going 6 dB lower and adding 396 and 404 bps scheduled for this week
- Next step is to analyze "calibrated" data and look at how much performance gain happens through message integration