The DORIS « DGXX » instrument

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- **High precision Doppler measurements and on-board navigation**
  - simultaneous measurements on two frequencies : 401.25MHz and 2036.25MHz
  - provides elementary velocity measurements with an accuracy better than 0.3mm/s
  - delivers real time PVT information in ITRF and J2000 reference frames with sub metric to centimetre accuracy depending on orbit and spacecraft characteristics
  - capacity to provide geodesic data to help altimeter tracking
- **Beacons tracking capability :**
  - up to 7 beacons simultaneously (7 dual frequency channels)
    - increases the number of passes and measurements
    - increases geometric diversity
    - decreases tracking conflicts and consequently allows lower elevation measurements and a wider coverage
- **Autonomous operation (Switch ON and forget it !) :**
  - routine high precision navigation mode reached autonomously
  - only Manoeuvre prediction TC needed in routine, if any
- **Power supply :**
  - 22 - 37 V DC
  - 23 W typical ; 30 W at Warm up, less than 2 hr
- **TM/TC I/F:**
  - MIL-STD-1553 / CCSDS packet terminal protocol
  - max TM rate < 4kbits/s (all TM activated)
  - 2 Bi-Level status per chain (power and software status)
- **10 MHz reference signal distribution :**
  - high stability
  - monitored with an accuracy of 10-12
  - Internally cross-strapped
- **On board time tagging capacity :**
  - external pulse time tagging capacity or pps distribution
  - microsecond accuracy W.r.t. International Atomic Time Scale
- **CPU/SW :**
  - rad tolerant design with SPARC ERC32 processor and memory fault detection and recovery
  - whole software stored twice in 2 redundant banks of EEPROM ; may be fully uploaded w/o any mission interruption

THALES

DORIS DGXX BDR (DORIS Redunded Box)

- 18Kg
- 390 x 370 x 165 (mm)
- cold redundancy of receivers and Oscillators
- Automatic switch of the antenna signal to the active receiver
- 3rd order phase loop
  - band width filter : 25 Hz @ 2036.25MHz
- Ultra Stable Oscillators (C-MAC Frequency Products)
  - frequency stability of 2.10-13 over 10s
  - Thanks to lessons learnt from Jason1, a Hardening process has been applied to decrease the sensitivity to the radiations by a factor of 10

DORIS antenna

(CHELTON Antennas)

- 2Kg
- high 420mm x ϕ160mm

- **Will fly on board :**
  - Jason2 (NASA/NOAA/Eumetsat/CNES Altimetry Mission
  - Cryosat2 (ESA Ice monitoring Mission)
  - AltiKa/SARAL (ISRO/CNES Altimetry/Argos Mission
  - …

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