SPIRE-RAL-REP-002386
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Summary of progress during Didier's Support of PFM-I Test Campaign

Diary of Events

Monday 28 Feb 2005

Late evening arrived;
Saw large current oscillations on both BSM axes
Diagnostic: Power supply not well tuned according to cold conditions of coils. R~0.8 Ohm plus ~70mH

Time constant ~ L/R ambient 500Ohms to 0.8Ohms

Tuesday 1 March 2005

Added 37-Way BOB with 180Ω series resistors which fixed the problem.

Swapped jiggle sensor polarity (Sensor power supply) to allow closed loop operation.

Brian Stobie arrived late in afternoon

Wed. 2 March 2005

Tuned closed loop on the chopper.
Reported glitching effects on motor current, motor voltage and position sensor output (closed and open loop). It was worse in closed loop.
Checked the secondary power supply to verify that the voltages were clean. This was OK
Found that the glitch problem was due to the concurrent generation of MCU HK and DSP.

Thursday 3 March 2005

Perform SMEC functional test at 4K (no HK)
Recorded encoder levels at 4K (First time – LAM only 5K). There is a temperature exponential effect of LED illumination power
The general offsets were higher than the LAM 5K tests. Indicating LED is dissipating more energy and generating strong optical output in the RAL test cryostat.
The sine amplitude from the photodiodes are 50% less than expected. However the signal level was acceptable.
Made some successful SMEC functional tests in closed loop

Friday 4 March 2005

Due to the glitch problem decided to concentrate on the detectors and Didier worked on the analysis of the glitch problem and software. Diagnostic at this point: it was a commanding issue. 150 HK interrupts per second. The LAM EGSE can only generate HK interrupts at 5Hz

Sat/Sun 5/6 March 2005
Make a new issue of the software.
- Made the interrupt cycle very short
- Put the command interpretation in the main DSP program

Four Changes from existing QM1 software

1. The programming of the polarity of the chopper and the jiggle was incorportated. (now able to switch sense of signal) Commands 0x20E and 0x20F
2. De-synchronised TM packets. When many packets arrive in the software simultaneously (BSM and SMEC) the FPGA did not have to resources to add the three additional words (checksum and transmission time)
3. Shortened the length of the IRQ command and placed it in the main program.
4. Added an sensor offset to set the chopper signal to zero when the BSM is pointing 0,0. Jiggle was not done as it has less stringent control requirements. This helps to tune the control of the chopper to 20mS (requirement)

Mon. 7 March 2005

AM: burnt EPROM and inserted into MAC QM1
Carried out test with QLA without cryoharness
There were less glitches, but there were still some left, so continued to look at the problem

Tues: 8 March

Identified the problem with the occasional glitches was the fact that the MUX was being readout before the signal had settled causing MUX cross coupling between signals. The statistical variation of the time of the start of conversion and readout was ~ 20uS occasionally. Need at least 12uS. Only needed to reprogram one EPROM to fix problem.

Reprogrammed the EPROM. It was h0 which is the least significant bit.

This fixed the problem definitively

Tuned chopper and jiggle PID with sub-optimal values. Better values will take more test time later.

Tues: PM, generated Spect First Light.

Wed: 9 March 2005

Performed SMEC functional test with automatic initialisation scenario

PM:

Analysing data with J-P Baluteau

Thursday:10 March 2005

Analysing data with J-P Baluteau

Friday: 11 March 2005

Packup and summary

Remaining Tasks:

Fine tuning of BSM to prime chop pixels to get Ts<20mS
Additional TM testing to fix software
Try SMEC parameters that should reduce the position jitter by a factor of ~ 3
Bring a new BSM board to run the BSM without the series resistors to damp oscillations
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