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MODIS Technical Weekly 10 February 95

1. Jose Florez

The following is an email from Jose Florez at 7:03 AM on 2/13/95 regarding the MEM problems:

The MEM was received on Tuesday (1/31) with the new top, new ACTEL, heaters, and temperature sensors. Grounding bars were added but removed later. At that time it was determined to be working, but not functionally tested.

Telecon with Ed Clement, February 9, 11:30 AM

The decision was made not to integrate the MEM to the structure last Friday (2/3) after TAXI violations were detected during testing. Troubleshooting disclosed a combination of mechanical and electrical problems; a problem with the communication between the Formatter and the FDDI was solved by re-seating the FDDI in the backplane connector, and by moving some wires in the backplane. It was at this time that they noticed TAXI violations were detected every 9 minutes and 51 seconds.

The TAXI violations were still present at cold start on Saturday morning, but cleared up in the afternoon. The system ran for four hours on Sunday without violations. The problem returned during testing this week. At this point SBRC believes the problem is not in the FDDI transmitter section, but thinks it is caused by the data being corrupted in the FIFO causing illegal symbol sequences to be sent.

At first they suspected the problem to be an environmental issue. Now they don't believe that is the case since it has been determined that they can cause it to happen by turning on the subsystems in a given sequence. Turning on the scan mirror will cause the errors to occur.

Telecon, February 9, 1:30 pm, (E. Clement, J. Auchter, J. Florez, W. Miller)

Since the telecon this morning the TAXI violations are not periodic but come and go randomly. Discussion regarding the TAXI interface centered around maintaining synchronization of the clock between packet transmissions, and the importance of the pairwise order of command words sent. SBRC indicated they send JK symbols between packets followed by a packet preamble of 20 II symbols for every packet. They indicated the 20 II symbol preamble is a requirement of the GISS. Another topic centered around the allowable transmitter-receiver clock frequency variation before the interface loses lock.

Call to Juan Rodriguez, February 9, 2:15 pm

Juan works in Code 735 and has experience with the TAXI interface as implemented in EOS. He indicated that he would be available to

talk to SBRC about his experience interfacing to the S/C simulator. He pointed out that the correct communication sequence with the S/C is 20 II symbols at powerup followed by a packet start symbol (6), the packet, and a stop symbol (2). After that point JK symbols are sent as fill data between packets with the 6-packet-2 sequence. I could not reach Ed Clement so I left a message for him with the above information.

Call from Ed Clement, February 9, 8:50 pm

Ed indicated that the 20 II symbols are all 1's before final encoding, at which time they are converted into alternating 1's and 0's

for transmission, therefore providing the optimum number of transitions for clock synchronization. They are going to pursue other clues as to what could be causing the problem internally at a meeting Friday morning.

Call to Juan Rodriguez, Friday 2/10, 8:15 am

Juan stated that the variation in frequency between the transmitter and the receiver is a critical issue that caused problems for them. He said the two have to be within +/- .1% for the interface to operate properly. I talked to Ed before their morning meeting and gave him that information, he felt their clock is fine and there is some other cause for the problem.

Call from Ed Clement, Friday 2/10, 5:00 pm

Ed indicated that the meeting taking place today and tomorrow is a peer review involving experts from other areas of SBRC to take a fresh look at the problem. They are presenting the system level requirements, top level design, status of problems encountered, and approach to finding the cause. They seem to have a well structured approach to finding the cause of the problem. At this point they feel the problem is not in the TAXI interface, but rather in the data handling prior to the FDDI board. One area that has been identified as a potential source is the software not having enough time to perform all of its tasks. I asked if the margin for software execution time had been measured. The answer is no, most of the effort up until now has gone into documenting the software and getting it to run. This is an area that deserves a lot of attention at this point. Margins for at least the portions of the software related to the problem at hand will be looked at. Ed is going to call me tomorrow at the end of their meeting with an update on the outcome. Based on the information he provides a decision can be made as to who could be of help out there next week.

Call from Ed Clement, Monday 2/13, 12:00 am

As a result of the meeting held at SBRC last week, the timing around the pixel clock and encoding clock interrupts that start the software data collection for the calibration and earth sectors was looked at. Joe Auchter used a logic analyzer to trace the execution of the code around that time for both scheduled and unscheduled interrupts, and found out that the s/w is trying to do too much around that period. Joe modified some of the code generated by the compiler to make it more efficient, and moved some of the code to other parts of the program where there is more margin. He finally got the it to work so that the encoder interrupt is always serviced.

The OASIS system had a crash on Sunday morning, and when it came back up FIFO flop errors were present for FIFOs 2 and 4 every scan.

At this point they are trying to determine if damage was done to the FDDI board, or a problem has surfaced in the backplane for the circuitry that determines how quickly the data is read out of the FIFOs.

2. David Jones

The following are excerpts from David Jones' weekly:

Detector Division QA Audit: The SBRC Detector Division was subjected to an intensive audit by the GSFC team during 7-8 Feb. SBRC gave a 4 hour presentation of their own review of the failure history associated with the MODIS FPAs. This was critiqued by the GSFC team, who then proceeded with a tour of the labs, and a review of the process and QA documentation.

The meeting culminated with a brief presentation by GSFC of their findings, which was summarized in a draft report (a copy has been given to SBRC, and also Emailed to GSFC). The meeting was attended by 15 SBRC persons (including Mr. Bob Knowles, Deputy to the President). 8 persons representing GSFC, and 3 from DCMC. The GSFC team critique was received by SBRC as positive, constructive comment.

It was of note that there was no person from the SBRC-ETM+ team present at the review. Presumably, the Audit was looked upon by SBRC, as being limited to the MODIS Program.

Thermal Blanket Activity: Carl Brazier Jr. (x7756), the SBRC-MODIS QA Rep. has received all necessary paper-work to satisfy the SBRC QA shipment received legalities. Diane Schuster from GSFC, did an outstanding job of fitting the thermal blankets, without interrupting the MODIS electronics investigation. The blankets have been removed and stored, for attachment later by SBRC.

3. Systems Telecon

Participants: GSFC: Bill Barnes, Mike Roberto, Harry Montgomery, Ed Knight, John Barker, Gerry Godden, Rick Sabatino, Jeff Bowser, Tim Zukowski; SBRC: Tom Pagano, Jim Young, Neil Therrien

Mike:

- 1) Thermal blanket fit checks and any needed modifications are being made today and tomorrow by Diane Schuster.
- 2) As Gene Waluschka has mentioned, would like to measure polarization at 360 degrees as well as zero degrees as a check. Tom: this will be done.
- 3) Rick Mills is now supporting us in I&T. Rick and I will be at SBRC on February 21 thru 23;
- 4) interested in hearing about integration effort when you present.

Harry: How will the TAC software be delivered and when will Tom come to GSFC? Tom: Preference is to send software as it becomes available along with data so the software can be run. Ed: Concerned about waiting for TAC education. May need more question and answers if we wait.

Ed:

- 1) SRCA bulbs - 50 minutes for 10 and 1 watt radiometric mode because not used at night.
- 2) MSAP - question about the Code V model for the second window material and the material used in MSAP.

- 3) Sometimes reflectance and transmission do not sum to 1. Tom: some lenses have absorption. Jim: Would expect that absorption is several percent or more in some bands.
- 4) Aliveness at Martin. What tests? Tom: Working on it. Will have this information in about 4 months.
- 5) Usable size of the BB? Jim: has not come to a firm conclusion.
Ed: What is the definition of a clean frame? Bill: Can rounded corners be eliminated on future BBs?
SBRC: BB blanks have been cut for all models.
- 6) We would love to have polarization data. Tom: would like to dig up early data across the scan line (3, 4, and 8 were good). GSFC could look at polarization across the field for multiple pixels (along track).

Tim: They will fax TAC questions to SBRC. We may not have all the right template files.

Rick: any impact on EM testing of TAC S/W modules coming in a little late? Tom: the S/W will be ready when needed by the instrument.

Gerry:

- 1) Looking for floppy disk from Tom Kampe regarding aft optics scatter data. 2) Got drawing on solar diffuser from Cushman. Looks like no problem for extended door. Still looking for scatter analysis. Tom: will send scatter analysis when he gets the results.
- 3) Would like product information on silicon photodiodes on SRCA and SDSM. Tom: should go thru GSFC program office.

Jeff: Who should I send questions on the TAC to? Tom: To me.

John Barker:

- 1) When will we get real rather than theoretical reflectance and transmission data? Jim: Linda Fulton will be making some of the measurements. John: Would like measurements already made on the EM. Tom: Will get them to you ASAP.
- 2) For the 1 km Monte Carlo simulations, for a single 1x1 km pixel input onto detector 5, I expect an asymmetrical response in adjacent detectors 4 and 6 in the same band because symmetry on this LWIR focal plane is around 5.5.

Jim: Calibration of sphere. Most of the data measured. Will have to interpolate results (nth order polynomial with an expression comparable to Planck: see memo N04627 for the details). If we use analytical functions suggested by NIST, there is +/- 0.5% to +/- 1% uncertainty in the results. Using Jim's fit gives uncertainty of 0.1%. Bill: Slater, etc. want to compare NIST and Jim's fits. Jim: does not want to do this on the EM because of short cuts.

Neil: Electronics integration in the high bay continues. Jitter fix found and corrected. Can get 1 to 100% phase delay. Mid and LWIR work for charge subtraction. Three main things:

- 1) SAM modification reduced 240 Hz noise by 50%. Bill and Mike: This means noise is about 6 or 7 counts. Need to get down to 1 count.
- 2) FDDI TAXI violations. occur at about 10 minutes or multiples of 10 minutes. 3) Cable length from MEM to analog electronics now 6 foot length. Plan to integrate MEM in the next couple of days. Scatter data at end of week.

Jeff and Tim will call Tom at 1 pm Wednesday regarding TAC questions.

MR

2/13/95