MODIS Team Meeting Minutes

Minutes of the MODIS Team Meeting held on Tuesday January 24, 1995.

Action Items:

94. Provide a detailed (high fidelity) analysis of scatter in the scan cavity. The results would determine the need for PF near field scatter measurements vs scan angle. Assigned to Guenther 8/23/94 Preliminary results due 10/15/94. Final due 2/28/95.

101. Provide an assessment of the SBRC test plan to measure radiometric accuracy as a function of scan angle position (sections 11.6.3 and 11.7 of the Performance Verification Plan). Assigned to Guenther 10/25/94. Due 11/29/94. Revised due date 1/17/95

108. Prepare a report addressing the status of the MODIS Reliability Program. Reliability elements will include: FMEA, Worst Case, CIL, Reliability Assessment and Parts Device Stress Analysis and Trend Analysis. Assigned to Silva 1/ 3/94. Due 1/17/95

109. Determine if there are any technical problems associated with the different instrument orientations with respect to gravity when testing MODIS at SBRC versus testing MODIS at the spacecraft integrator. Assigned to Roberto 1/10/95. Due 2/13/95

110. Write up the disposition of the reduced -5°C torque margin on the scan mirror, given increasing torque requirement of test bearings. If the decision is to accept as is, document the rationale. Assigned to Roberto 1/17/95. Due 1/31/95

Attendees:

✓ Richard Weber	✓ Bruce Guenther	✓ Larissa Graziani
✓ John Bauernschub	✓ George Daelemans	✓ Bob Martineau
✓ Rosemary Vail	Patricia Weir	✓ Bob Silva
Lisa Shears	Mitch Davis	Robert Kiwak
✓ Mike Roberto	✓ Ken Anderson	✓ Harvey Safren
Nelson Ferragut	✓ Rick Sabatino	✓ Ed Knight
Gene Waluschka	Cherie Congedo	✓ Harry Montgomery
✓ Bill Barnes	Jose Florez	Marvin Maxwell
✓ Les Thompson	Gerry Godden	Bill Mocarsky
John Bolton	✓ Sal Cicchelli	Helen Phillips

The following items were distributed:

1) Weekly Status Report #173
2) SBRC Memos submission from week #165
3) Minutes of the previous team meeting

Hughes Videos (Static Electricity and Contamination)

Hughes videos on the threat of static electricity and contamination were viewed during the meeting. These were shown primarily for team members who plan to be in the vicinity of the MODIS flight hardware. Bob Silva and Larissa Graziani provided additional remarks.

Bob Martineau

SBRC has two SMWIR SCA's in line, SN 109 and SN 110. The prime unit, SN 109, has gone through testing, and data acquisition is completed. Preliminary examination of test data indicates no pixel outages at this time. The backup unit, SN 110, is in test, with test completion due Wednesday. Joe states that there are 5 Hi- quality sets of subarrays, and 12 sets of lesser quality for further builds. Those of lesser quality would depend on activation baking to bring some of the diodes into spec. Joe will be making a presentation to Lee in 2 weeks concerning the need for an additional lot of SMWIR detectors.

SBRC has decided not to retest the SMWIR readouts before hybridization. Joe said the main issue is the time it would take, but there might also be another issue associated with the presence of indium bumps on the chips. The chips that have been diced have indium bumps and therefore could not be easily probed. Joe did not know whether all wafers had indium bumps, or whether all had been diced. My position is that if some readouts do not have indium bumps and can be retested, they should be retested. The SMWIR subarrays are too valuable to allow hybridization to uncertain readouts if something can be done about it.

Ed Knight

On January 16-21, 1995 I traveled to SBRC to observe the system level testing of MODIS. The intent was to observe the near field response test, originally scheduled during this time. Due to problems in electronics and software, only a preliminary measurement of near field response was made during the time I was there. Instead, I observed the polarization test, gain and offset selection tests, and data reduction with the TAC. Several smaller side discussions with various SBRC personnel took place as well. This report highlights key points in these tests and in my discussions with SBRC personnel. In addition, I sent two faxes back as progress reports during the trip.

Polarization

Gene Waluschka has reported on this test in great detail in the MODIS Team Meeting Minutes put out by Mike Roberto. Due to time problems, the "preliminary" data set has become the definitive one. The full blown test uses three PSA alignments at several scan angles. What was collected was one PSA alignment (therefore only getting some bands) at 4 scan angles. Reduction of this data shows good agreement with both predicted results and specification requirements for Bands 8 and 2. The signals in bands 1, 3, and 4 were dominated by noise. Bands 13 and 14 were saturated. SBRC planned to do another run to collect a SWIR band and get 13 and 14 unsaturated at a single scan angle (+45 degrees, the most extreme). While not adequate for characterization, this should be sufficient for confirming that polarization is not a problem.

Gains and Offsets

Substantial difficulty was encountered in setting the appropriate gains and offsets for MODIS. One result is that the polarization data was collected with non-optimal gains. Several problems contributed--in two

occasions, the flight software tables were loaded incorrectly. Registration problems in the VIS focal plane (due to the circuit timing) complicated the task. Finally, the analysis software had an error in it. At one point, SBRC ran tests with the IAC, PSA, and ScMA to compare all of their modeled output vs. the theory. I assisted Tom Pagano in reducing this data and we were able to determined that the problem was not in the source. Ultimately, the final problem was found in the software and SBRC now has correctly set the gains and offsets.

Data Reduction and TAC Software

Due to the fact that the TAC was still being completed, it was common for Tom Pagano to reduce data using the command line interface rather than the windows interface. However, the TAC software was capable of reducing the data when the appropriate routines were complete.

Development on the TAC software was proceeding at a frenetic pace, but hit some problems in debugging the code. As a result, the Near Field Response code had not been completed at the time I left. The gain and offset code had an error in it. The scan angle variation software and test results had some non-standard data files which Tom Pagano wished to analyze further before releasing it. However, the user interface was completed and working well.
The Digital Number Analyzer worked well. The polarization routine
accomplished its goal, although the curve fit routine within it could be improved. Several other routines were well on their way to completion. Tom anticipated being able to FTP us the programs and data by tomorrow with a more complete delivery, including a trip out by the appropriate SBRC personnel, in two weeks.

Side Issues

I have received the most recent MSAP update from Tom Kampe.

I had a short discussion with Karen Olin about the functions of the PIC and the format of data stored on the archive.

Eric Johnson indicated that the lifetime of the 10 W bulbs may be shorter than originally anticipated. He indicated he would be examining this in the coming week.

I was able to pick up copies of the Near Filed Response Test Procedure (ALPC- 04). Copies have been distributed to relevant MCST personnel.

John Mehrten and I had a short discussion about updates to CDRL 308. John has furnished me with some updated tables and an electronic version of CDRL 308. I discussed my plans for a MODIS Operations Concept document with him.

Tom Kampe and Sam Pellicori will be going back and looking at the MWIR bands. Tom Kampe intends to compare the SBRC measured data with the Barr data to determine if the observed shifts in all six bands are real or a result of differences in the measurement conditions.

End of Ed Knight's main report.

Thermal Blanket Bakeout

Larissa Graziani has been orchestrating the bakeout of the MODIS thermal blankets. The blankets went into a dedicated thermal vacuum chamber on Saturday, January 21, for bakeout. Pumpdown of the

chamber started just after midnight on Monday morning. The bakeout was a little better than the qualification level for flight which is a QCM rate of 28 Hz/hour at 60 degrees C. The bakeout was complete on Wednesday morning and the blankets were double bagged. The blankets were ready for shipment to SBRC on Friday, January 27.

Spacecraft Orientation in Testing at SBRC and at MMAS

Most instrument testing at MMAS will be done with the instrument Earth pointing aperture either in the up (+Z point up) or down direction. Some S/C testing is done with the S/C vertical. Testing at SBRC is with the instrument Z axis horizontal. In some orientations, special ground operations may be needed to operate one or more MODIS mechanisms. As Nelson Ferragut pointed out, there could be a problem even for mechanisms which can operate in any orientation. There could be some offset not accounted for which could cause a jam when an attempt was made to operate in the another 1 G orientation. One G release will have an impact on registration of the focal planes. The collection of some sensor data and the operation of all mechanisms at SBRC with the instrument in the +Z up and +Z down orientations is needed to minimize gravity related testing problems at MMAS.

On January 26, there was a discussion with Duane Bates on the need to test all mechanisms in both the -Z up and +Z up orientations. The SBRC MODIS rotation table can orient MODIS with +Z up or down. Timing changes for the motor drive for one or more mechanisms may be required to allow these mechanisms to work against gravity. Duane will determine if these changes can be made by software modification. This special ground software for mechanism operations would then need to be tested. Duane agrees the instrument mechanisms should be tested at SBRC in all orientations in which they will be operated at the spacecraft integrator. We need to assure this is done.

Scan Mirror Torque Margin

The torque margin specification for the scan motor is an internal SBRC spec based on verbal GSFC recommendations. According to Scott Milne (1/25/95), the plan for the next issue of the GEVS is to include a torque ratio requirement (torque ratio = torque margin + 1). At this time, the torque ratio numbers planned for the GEVS update are the same as those recommended by Casey deKramer in a memo dated 6/4/93. Torque ratio testing is at worse case predicted (not qualification) temperatures, etc. As Nelson Ferragut mentioned, our scan motor is a system dominated by resistive torque due to a combination of both inertia and friction. For this system, Casey's recommended test verified torque ratio is 2.25. A higher torque ratio is needed if there is an unusually large amount of uncertainty in the characterization of resistive torques, when torque ratio testing is not performed in the required environmental conditions or is not repeatable, or when torque ratio testing is performed at the component level.

The scan mirror motor/encoder in thermal vacuum had a measured torque margin of 198% (torque ratio of 2.98) at the qualification low temperature of -5 degrees C. This ratio is better than the planned recommendation of 2.25 and was met at qualification temperature level rather than predicted temperature level.

Based on the proposed recommended torque ratio values planned for the next GEVS, the measured torque margin value was acceptable. However, since the scan mirror is a single point failure, the addition of a thermistatically controlled or command controlled heater to the bearing housing would provide additional margin.

MR
1/30/95