

# MODIS TEAM MEETING

## Distribution:

ANDERSON, KEN	<u>GUENTHER, BRUCE</u>	<u>ROBERTO, MIKE</u>
BARNES, BILL	<u>JOHNSON, ERIC</u>	<u>SABATINO, RICK</u>
<u>BOLTON, JOHN</u>	<u>KIWAK, BOB</u>	SAFREN, HARVEY
<u>CICCHELLI, SAL</u>	<u>KNIGHT, ED</u>	SHEARS, LISA
CONGEDO, CHERIE	<u>MARTINEAU, BOB</u>	<u>SILVA, BOB</u>
<u>DAELEMANS, GEORGE</u>	<u>MAXWELL, MARVIN</u>	THOMPSON, LES
DAVIS, MITCH	<u>MOCARSKY, BILL</u>	<u>WALUSCHKA, GENE</u>
<u>FLOREZ, JOSE</u>	<u>MONTGOMERY, HARRY</u>	<u>WEBER, DICK</u>
<u>GODDEN, GERRY</u>	<u>PARK, HONGWOO</u>	<u>JAROSZ, ERIC</u>
GRAZIANI, LARISSA	<u>PHILLIPS, HELEN</u>	

March 5, 1996 Attendees are marked in **BOLD and Underlined**

The Following items are included in this package:

- 1) SBRC Weekly Submission Memos form week 223
- 2) CDRL-521 - MODIS Weekly Status Rpt. week ending 3-8-96
- 3) MODIS Technical Weekly

**MODIS Technical Weekly**                      **March 8, 1996**  
sent to MODIS.Review on 3/11/96 at about

The retirement luncheon for John Bauernschub was held on Wednesday, March 6, at the 94 th Aero Squadron. John and his wife, Bette, enjoyed the luncheon and the turnout of many good friends.

Last week a Microsoft Word virus spread through members of the MODIS team (including myself) to the AM Project office. This virus allows files to be saved only as templates. The virus is spread merely by opening an infected document. Although this virus is relatively benign, this has served as a reminder to me that we all need to use virus detection and removal software. We also need to alert others. If you think your Word program may have this virus, please contact Paula Salvi on X-7823. She has the Microsoft software to eradicate this virus and prevent future infection.

SBRS is considering going directly to use of PFM electronics, instead of using EM electronics. Also, SBRS is considering acceptance testing the Main Electronics Module (MEM) without Calibration Control 2, and possibly Calibration Control 1 Circuit Card Assemblies (CCAs) installed. We have discussed with SBRS the possibility of using resistors on the boards to be installed in their places to simulate the power which these CCAs would dissipate.

Sal Cicchelli has a question regarding whether or not the MEM workmanship vibration as planned by SBRS (with intensity below GEVS-SE workmanship level) is a worthwhile filter for the next test which is at acceptance level. Sal also provides comments on D008B, Modification to MODIS Optical Bench Assembly (OBA) Vibration Levels (Sal's inputs are later included with comments from Eric Johnson and Cherie Congedo).

Mitch Davis reports on the weekly electronics telecon with SBRS. The PC amplifier boards have two technical problems, each of which has several solutions. SBRS is looking into the lowest impact solution(s). SAM testing was stopped due to a failure in the Special Test Equipment (STE). The MEM test procedure is being dissected to accelerate testing.

Jose Florez expands on the PC amplifier boards pixel clock delay problem with input from Ed Clement.

The latest from Eric Johnson, Cherie Congedo, and Sal Cicchelli concerning comments on waiver D008B, Modification to MODIS Optical Bench Assembly (OBA) Vibration Levels is found in a draft memo from Eric Johnson. They feel approving D008B is reasonable, but attach several conditions.

John Mehrten has some questions for Claire Wilda concerning the initial activation scenario mapped out for the instruments.

Tom Pagano provides the minutes of the March 4 Systems and Calibration telecon.

MR

3/11/96

## APPENDIX

### I. Ken Anderson (Use of PFM Electronics for Testing)

Author: Ken Anderson at 420/421/422/424

Date: 3/7/96 12:24 PM

Subject: Calibration Electronics Power Dissipation

----- Message Contents -----

FYI

This describes a recent idea at SBRS: namely, don't use the EM electronics for testing, instead, go straight to the PFM (since we've already lost schedule because of the optical bonding problems). The issue is whether or not to go forward even if not all the PFM cards are ready (Cal Control 1 and 2 are the issue).

Ken

#### Forward Header

Subject: Calibration Electronics Power Dissipation

Author: jclement@CCGATE.HAC.COM at Internet

Date: 3/5/96 6:39 PM

SBRS is considering, and asking Goddard to consider as well, the option of performing MEM acceptance testing without the Calibration Control 2, and possibly the Calibration Control 1 CCAs installed. We would do this in the likely event that the rest of the MEM was ready to begin temperature acceptance testing but was waiting for the Calibration cards to complete subassembly acceptance testing. We are experiencing very minor technical problems in the completion of the Calibration Control 2 card that make it extremely unlikely it will be ready when necessary to support the current MEM test schedule.

We believe this to be low risk for the following reasons:

1. The Calibration Control cards interface to the SRCA and the SDSM: they have very little interaction with the rest of the MEM or the instrument.
2. These cards only dissipate about 21 watts: Calibration Control 1 dissipates 2.9 watts during calibration, 0.8 watts in standby; Calibration Control 2 dissipates about 18 watts during calibration, I am guessing that standby dissipation is approximately 2-3 watts. Therefore, during normal imaging operations these boards only dissipate together about 3 watts out of a predicted

MEM dissipation of 80 watts.

3. Again, the calibration mode is very low duty cycle. Even though we must understand the thermal interactions in this mode, it would be a small part of overall MEM acceptance testing even with these cards installed in the MEM.

The CCAs are located between the Power Supplies and the rest of the MEM circuit card assemblies. Therefore it would probably be a good idea to put some type of heat shield in their place when they are not present during acceptance testing.

Another option to consider is to allow us to complete all but the last hot and cold cycles without these cards present: they would then see one temperature cycle and one last ambient acceptance test in the MEM. This would still allow some schedule improvement.

Ed Clement 805/562-4017

## **II. John Bauernschub (Thanks for the Retirement Luncheon)**

Author: Richard Weber at 420/421/422/424

Date: 3/7/96 3:22 PM

Subject: Retirement Luncheon

----- Message Contents -----

Thanks also to Debbie for working out the details with the restaurant and for being treasurer.

RRWeber ..

Forward Header

---

Subject: Retirement Luncheon

Author: "John P. Bauernschub, Jr." <gulfsier@mail.erols.com> at Internet

Date: 3/7/96 11:55 AM

Dear Dick,

That was a great luncheon you arranged for me. Bette and I really enjoyed it. Thank you.

I was very happy with the turnout of so many of my good friends. It was good to see them again. I only wish I had more time to talk to them.

Thanks also for picking out such nice gifts. I appreciate them and will put them good use.

Thanks for all you did to make it a very memorable day.

3/11/96 11:28 AM

A 2

John

\* \* \* \* \*

\* John P. Bauernschub, Jr. Custom PC Software Development  
 \* Gulf Sierra gulfsier@mail.erols.com  
 \* 14809 Clavel Street CompuServe: 73270,77  
 \* Rockville, Maryland 20853 301-460-0354, 301-460-5679  
 \* \* \* \* \*

**III. Sal Cicchelli (Findings on MODIS Monthly Report #52 Vibe Testing; Comments on Waiver D008B)**

Author: Sal Cicchelli <scicchel@div720.gsfc.nasa.gov> at Internet

Date: 3/3/96 3:40 PM

Subject: **Findings on MODIS Monthly Report #52 MEM Vibe Testing**

----- Message Contents -----

A. Reference Related Correspondence With Mike Roberto:

\*\*\*\*\*

From: mroberto@ccmail.gsfc.nasa.gov  
 Message-Id: <9600318231.AA823134925@ccmail.gsfc.nasa.gov>  
 To: Sal Cicchelli <scicchel@div720.gsfc.nasa.gov>  
 Cc: ken.anderson@ccmail.gsfc.nasa.gov, richard.weber@ccmail.gsfc.nasa.gov  
 Subject: Re: MODIS Monthly Report # 52 Comments

Sal,

b) 1. Workmanship and acceptance random vibration level profiles (50 pounds or less) are shown in the GEVS-SE (Jan 1990), Appendix A-2 and A-3. The acceleration spectral density is the same from 160 to 250 Hz, but outside this region, the acceptance level ASD is higher.

b) 2. I agree with you that this does not look right. I believe the MEM with PFM electronics should be tested at acceptance level. The entire instrument will be tested at qualification levels. Please follow up with Al DeForrest.

Thanks,

Mike

\_\_\_\_\_ Reply Separator \_\_\_\_\_  
 Subject: MODIS Monthly Report # 52 Comments  
 Author: Sal Cicchelli <scicchel@div720.gsfc.nasa.gov> at Internet  
 Date: 1/31/96 12:04 PM

In MODIS monthly report # 52:

b. Ref. "Vibration Testing - MEM : ...upcoming workmanship and qualification/protoflight tests. "

QUESTIONS: 1. Is "workmanship " the same as " acceptance "

2. According to the Weinstein test strategy, this COMPONENT = MEM should be tested only to acceptance levels. Why is there a plan to test to qualification levels too ?

\*\*\*\*\*

B. 1. With regard to Question (1.), above, I now understand the difference between workmanship and acceptance levels, as you have stated.

2. With regard to Question ( 2. ) above, I spoke with Ed Clement at SBRC and he indicated the following:

a. there are no plans to do component qualification testing on the MEM, SAM, or FAM. There are no component tests planned for the CLAM.

b. The MEM will see a workmanship level in the y-direction only. This ( apparently custom spec ) from Jose Florez is :

FREQ. ( Hz )	ASD Level
20	.016
50	.05
100	.05
130	.02
987	.02
2000	.01

RMS = 5.8 ; duration = 1 minute

My question here: This spec intensity is below the GEVS -SE workmanship level. Is it a worthwhile filter for the next test which is the acceptance level ? I recognize that this is a moot point if the test has already been done.

c. The MEM, SAM and FAM will then see acceptance level, per SBRC document 152450.

d. I suppose that " qualification/protoflight tests" in MODIS report # 52 can be interpreted as the full up instrument qual test, which is planned.

-----  
Author: Sal Cicchelli <scicchel@div720.gsfc.nasa.gov> at Internet

Date: 3/1/96 5:09 PM

Subject: **Review of Proposed Waiver D008B**

----- Message Contents -----

Ref: GSFC memo " Review of MODIS OBA Random Test Levels" , from  
Eric Johnson et al. to Mike Roberto et al., dated 3-1-96

I have additional comments concerning the waiver D008B associated with the

Reference:

A Item 22: Description of Deviation/Waiver:

- a. D008B is not a revision to D008A; it is a revision to the original waiver D008. "Current " levels indicated by Table 8 and 11 and Figures 2 and 5 of D008B do not include the notch extension from 120 Hz to 80 Hz, as was requested in D008A. The change is therefore from the original waiver, not from Rev A. Further, in D008B, the "current" Table 10, and Fig 4 "Current" line is from D008A; these items should be corrected to reflect to the proper starting baseline D008.
- b. The contractual status of D008A needs to be finalized.

B. Item 14 This waiver is for the Protoflight, Flight 1 and Flight 2 units. I do not recommend approval of the waiver with the qualification level Tables 1,2,3,7,8 and 9 and Figures 1,2 and 3 included because :

- a. The notch extension rationale addressed by SBRC memo R05572 dated 1-2-96 uses ACCEPTANCE inputs at the mainframe to derive the notch extension. It is not clear that the notch extension specification would be the same when using QUALIFICATION levels at the mainframe. The uncertainty comes from the methodology by which the notch is converted from acceptance to qualification level ( Ref. SBRC memo R03816, dated 4-8-94), and the fact that the mainframe input qualification spectrum has an up and down ramp at its ends, whereas the acceptance spectrum does not.
- b. There are no OBA component qualification tests planned for the Protoflight or Flight Units. These curves should not be part of the waiver. If there develops a need to do component qualification, then

part ( a. ) needs to be addressed before additional waiver approval for qualification.

- c. Any qualification strength calculations should be done with the original 120 Hz notch and not the 80 Hz extension, until part (a.) is addressed.

#### **IV. Mitch Davis (Electronics Telecon)**

Author: Mitchell L Davis at 730

Date: 3/4/96 3:32 PM

Subject: Weekly Telecon w/ SBRC

----- Message Contents -----

Reported Status for March 4, 1996.

FAM/CLAM:

The PC Amp boards currently have two technically problems.

- 1, If Pixel Clock is delayed the full 30 usec allowable delay, then the A/D output inputs missing codes.
- 2, Channel 6 output includes missing codes which is dependent on the Pixel Clock duty cycle.

Both of these problems have several solutions, SBRC is currently looking into the lowest impact solution(s).

SAM:

There are no open technical problems. Testing has been stopped due to a part failure in the special test equipment. However, the SAM should not slip beyond the current slipped schedule.

MEM:

- The MEM test procedure is being dissected to accelerate the testing. The (removed) CCA test procedures from the MEM test procedure will be completed as a Special test procedure.

-All CCA Test Procedures have been release except for Temp Controller, Cal 1 Controller and Cal 2 Controller.

- Joe Kleeburg has taken over the Temp Controller, Cal 1 Controller and Cal 2 Controller CCAs. These are the only cards not tested in the EM.

- SBRC picked up the Power Supply from Hughes Torrance last week. It has not been officially accepted due to an illness with the key engineer, Jim Brewer.

END

**V. Jose Florez (Comments on Pixel Clock Delay Problem)**

Author: Jose Florez at 730

Date: 3/5/96 4:03 PM

Subject: Re: Questions on FAM PC Amp Boards Pixel Clock Delay Problem

----- Message Contents -----

3/5/96

Mike,

The following message is from Ed Clement. It expands on the Delayed Pixel Clock problem in the FAM.

Jose

---

---

The PC Amplifier problem is as follows:

The data acquisition cycle in the FAM is controlled by the Delayed Pixel Clock (DPC). This clock is produced on the FAM Timing and Control CCAs and sent to the six PC Amplifier CCAs. The rising edge of DPC triggers a set of one-shots located inside of the Postamplifier hybrids that control: (1) transfer of the integrated signal from the integration capacitor to a sample-and-hold capacitor, and (2) clearing of the integration capacitor in preparation for the next pixel acquisition.

We have determined that if the integration one-shot is changing state during the time when the ADC is converting the output signal for channel 1, it will cause a very small level shift in the hybrid output that in turn causes missing bits in the ADC digital output. Also, if the high-to-low transition of DPC occurs during any of the subsequent ADC conversion periods, it also causes a hybrid output level shift of approximately 1.5 millivolts that results in ADC output missing codes.

Mike did a test this morning that determined the trailing edge of DPC can be no closer to the time the input multiplexor selects channel one than about 6 usecs.

If this is closer, we start seeing missing codes. This really restricts the amount of delay we can put on DPC, probably down from 30 to 5 usecs, before we start seeing missing codes. It is an on-off problem - if the delay of DPC is short enough to keep its edges out

of the sensitive areas there is no problem, once DPC is delayed enough to put it into the sensitive areas we start seeing problems.

We are not sure what the exact mechanism is, but believe it is related to grounding of the one-shot transistors in the hybrids and the grounding of the sample-and-hold capacitor and buffer amplifier, also in the hybrids.

Ed

---

Subject: Questions on FAM PC Amp Boards Pixel Clock Delay Problem  
From: Jose\_Florez\_at\_730@ccmail.gsfc.nasa.gov at CCGATE  
Date: 3/5/96 11:14 AM

Ed,

Sorry I could not be at the telecon yesterday, I got tied up in another meeting. Mitch briefed me on the topics you two discussed.

Maybe you can give us a few more details on the FAM PC Amp boards pixel clock delay problem. How sensitive is the circuit to the programmed delay? In other words, do the missing codes appear at the end of the range (i.e., 30 microseconds) or is the problem present all the time? Have you identified the source of the problem?

Jose

**VI. Eric Johnson (Review of MODIS test levels for Aft Optics Assembly Vibration)  
Draft Memo**

Date: Thu, 7 Mar 96 16:29:27 EST

From: "Eric Johnson ( 301 ) 286 - 3703" <ejohnson@meb13.gsfc.nasa.gov>

To: Mike Roberto, Ken Anderson, Dick Weber

From: Eric Johnson, Cherie Congedo, Sal Cicchelli

Subj: Review of MODIS OBA random test levels

Ref: 1) SBRC Request for Deviation/Waiver VJ50-D008B

2) Memo from T. M. Endo to A. L. DeForrest, "AOA Random Vibration Notch Rationale", 1/2/96.

The proposed OBA test levels are given in reference 1 and explained in some detail in reference 2. We are concerned about several issues:

1) The high frequency roll-off of the proposed test levels reflects the low-pass-filter effect from the fixed base random vibration test of the mainframe mounted on kinematic mounts. However, the random test data does not include direct impingement acoustics

effects that may drive OBA response above the proposed OBA tests levels at frequencies above about 400 Hz.

- 2) The analysis does not correlate well with the test data, especially frequency response. In reference 2, the analytic fundamental frequency prediction is much higher than test response (70 Hz v. 45 Hz). This may be because the test set up included non-flight steel kinematic mounts and a test fixture with significant flexibility, which may not match the boundary conditions assumed in the analysis. Modal survey data report first mode frequencies of 50 Hz for a flexure mounted instrument, and over 60 Hz for a titanium KM mounted instrument, which raises additional questions about the fidelity of the test data and analytic predictions in reference 2. We can conclude that OBA response during instrument random vibration testing on flight titanium mounts and a rigid test fixture will vary from the previous test measurements obtained from the mass loaded mainframe test.
- 3) The tests will be conducted at acceptance levels, which may not envelope OBA response during instrument level qualification testing.

Because of these issues, a successful OBA random test does not insure a successful instrument level qualification test. But since approving reference 1 does not invalidate the planned instrument qualification tests, approving it is reasonable with the following conditions:

- a) SBRC should reconsider and re-evaluate the consequences, if any, of higher levels on the OBA in the high frequency region
- b) SBRC should strength qualify the CV2500 optics bond design for the maximum expected loads via analysis and test.
- c) SBRS should provide instrument level vibroacoustic qualification test procedures well in advance of the test dates.
- d) There is apparently no need to agree to qualification levels in reference 1 since protoflight unit OBA component testing is to acceptance levels.
- e) The waiver should only be granted for the protoflight unit because of the unique history leading up to this test. The acceptance levels for flight units 1 and 2 should be revisited prior to these tests.
- f) SBRS should recognize that the test levels in reference 1 do not constitute a notching criteria for instrument qualification testing. SBRC should recognize that OBA responses during instrument acoustic and random vibration testing will vary from the current test measurements, particularly in the frequency range above about 400 Hz.

## **VII. John Mehrten ( EOS AM Initial Instrument Ops)**

Author: "Mehrtten, John A" <jmehrtten@msmail3.hac.com> at Internet

Date: 3/7/96 3:16 AM

Subject: EOS-AM Initial Instrument Ops

----- Message Contents -----

Claire, Maybe it's available, and I just missed it. Has there been an initial activation scenario mapped out for the instruments?

- o I assume the S/C has main priority to get it properly configured and oriented.
- o After that I assume for the most part, it would be parallel ops for all instruments. But some may have some subsystem that needs priority care in the early activation process.
- o The kind of thing I wonder about
  - > What orbit would instruments first be turned ON for the first quicklook at their tlm, which in most cases is going to be like a SAFE mode configuration.
  - > Then probably go to some in-between level of config.
  - > Do all instruments have outgassing conditioning of some form (which might be passive for some)?
  - > For MODIS, when might we unlatch our doors, and start outgassing? Are we talking a few orbits or a few days?

### **VIII. Tom Pagano (Weekly Systems and Calibration Telecon Minutes)**

Author: "Pagano, Thomas S" <tpagano@mssmail3.hac.com> at Internet

Date: 3/4/96. 5:37 PM

Below are minutes from the 3/4/96 NASA teleconference. These are not direct quotes of the individual, but my attempt to convey their meaning.

Pagano: TAC SW. Plan to complete a single Unit/Acceptance test procedure this month. Will send modules as they are complete for draft preliminary review.

Pagano. Suggest NASA consider the ramifications of deletion of mass properties measurements and acoustics test. Shall we use PVS as medium?

Roberto: Yes, submit request for NASA review. Charlie to provide information on acoustics in next few days.

Guenther. Acoustics may not be worth doing in light of schedule constraints.

Therrien. EM electronics in high-bay; integration with SAM in progress. Rotary /T-table move later this week. NIR finished integration , VIS today

3/11/96 11:28 AM

complete. Cold obj's on platform. LW focus today; SW/MW vibed last week, vibe AOA on 3/8. Pointing: glued shim into SMA/Mainframe. ATA shows 80 arcsec pre to post vibe. Plan is to re-vibe.

Young. Heat guns not used in removal of lenses. Great pains taken in rework to have no elements see > 60C (lamps and fans).

Guenther. Do we have confidence that procedures to remove optics preserve characteristics of elements?

Young. All lenses replaced with new elements.

Young. Revised equations for RVS in work. BB temp; we would heat a small amount to keep on scale; believe we have data that shows good uniformity.

Waluschka. Got 8% radiometric error in solar calculation of mirror flatness.

Godden. You have colder instrument temperatures, how does that affect assumptions in MWIR/LWIR at the hot case thermal vacuum tests?

Pagano. We will run the instrument at qualification levels which will be 10#161#C beyond worst case acceptance levels. We should have enough margin to saturation at the hot qual case with the new design.

Guenther. Putting together a matrix of ideas for priorities of testing. We will review them by teleconference with the science team, then pass them on to SBRS. Plan for a 1/2 day discussion before the QMR. Concern of relative time on calibration and characterization tests.

Pagano. Please consider the impact to our requirements when developing this matrix. A change in test requirements will impact how we verify compliance and may require a requirements change. Also we have found that the time allocated for actual instrument verification (both environmental and performance) is less than 50% of the total time in the schedule. About 1/4 of the total time is non-environmental related, and this is split between functional and performance. We don't gain much schedule cutting performance tests and we're at about our limit for compliance verification. Need to look at environmental performance assurance requirements.

Guenther. Like Dr. Park's measurement approach; more direct.

Dr. Park. We may need some form of compromise scenario that allows for imperfect mirror flatness.

Roberto. How do we show compliance to reflectance spec.

Pagano. By analysis using MSAP.

Young. Concern over our ability to show compliance to the BRDF requirement of the diffuser. Significant variability in data obtained in previous round robins.

Guenther: What may be more important is for your facility to demonstrate precision. Need to show precision of your setup.

Young. Do you mean precision as repeatability, or shape with respect to wavelength or both.

Guenther. Both