

*Handwritten initials*

## MODIS Team Meeting Minutes

### Minutes of the MODIS Team Meeting held on Tuesday October 17, 1995.

#### Action Items:

113. Determine the best method to display a fixed pattern noise (herringbone, Spec 3.4.5.3.3). Assigned to Knight 8/15/95. Due 10/15/95.

114. Determine the extent of ghosting from the SMIR and LWIR polished cold shields. Assigned to Waluschka 8/29/95. Due 9/22/95.

#### Distribution:

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

The following items were distributed:

- 1) Weekly Status Report #211
- 2) SBRC Memos submission from week #203
- 3) Minutes of the previous team meeting

### MODIS Technical Weekly                      November 9, 1995

sent to MODIS.Review 11/13/95 at about 8:15 am

#### **1.0 Introduction**

This report covers from October 28 through November 9, since November 11 is the Veteran's Day holiday. There was no team meeting on October 31.

Jeff Bowser documents his SBRC GSE software trip. Jose Florez and Mitch Davis provide information on conformal coating, the 184 pin connector open problems, and the problem of grounding two signals on the digital telemetry board. Ed Knight reviews the Calibration Management Plan. Bob Martineau summarizes flight model detector status, Gene Waluschka forwards an SBRC message that environmental testing is still needed for the new Barr Band 26 filters, and Dick Weber contributes portions of the summary information.

Several MODIS personnel were at Valley Forge on November 1 to discuss MODIS integration and test with the spacecraft. There was a tour of the new clean room and office space for EOS-AM integration and test and the building housing the acoustic and thermal vacuum chambers. There were useful and

productive discussions involving Goddard, SBRC, and LMAS personnel. MODIS will be at Valley Forge in about one year.

Discussions were held with Code 900 and the GSFC legal office about which MODIS documents may be available over the Internet via MODARCH. A limited list of documents for Internet accessibility has been prepared. Other pass word protected MODIS documents may be made available electronically to specific MODIS personnel.

Sal Cicchelli was at SBRC for a couple of days during the week of November 9 to observe recovery efforts related to the failed bond of the ATA fold mirror and EM NIR lens which came loose during vibration of the EM aft optics assembly. The failed ATA fold mirror bond has been repaired and thermal cycled. Sal and Tom Venator were involved in evaluating SBRC's plan for vibration testing to the new fold mirror bond. The vibration test was scheduled to start mid day November 9, pacific time.

SBRC has determined that one of the low-insertion force connectors used on the PFM was improperly crimped by the manufacturer. Testing on several unused connectors has begun. In addition, SBRC and the GSFC In-Plant QA Representative will visit the manufacturer's facility to discuss and investigate the failures (see Jose Florez's reports).

SBRC plans to leave the earth face of MODIS unblanketed under the aft optics. This will reduce the optics temperature 6 to 8 degrees, thereby reducing the IR background noise levels.

The band 26 filters for PFM, FM1, and beyond, have arrived at SBRC.

The MODIS Science Team Meeting will be at GSFC next week from November 14 through November 17, subject to government furlough. The Tuesday session will be closed door.

## **2.0 Jeff Bowser (SBRC GSE Software Trip Report)**

Subject: Jeff's Comments on SBRC Trip

Author: Jeff Bowser <jeff@styx.gsfc.nasa.gov> at Internet

Date: 10/20/95 11:15 AM

Overall there was a lot of effort put into the documentation and coding since the earlier review. My main concern is that the effort is speeding along to make all of the new deadlines, where little effort can be made in maximizing quality. In reviewing specific documents and code in DETAIL (very small percentage overall), a number of errors were found both by GSFC reviewers and the SBRC personnel. It is this kind of review that I think is being curtailed due to the schedule. Also, with some SBRC personnel and contractors having an unclear status at the end of the year or sooner, this fosters a less than ideal working environment.

Specific comments:

- 1) Due to problems found in the sample acceptance test for the TAC, it is important that the TAC algorithms be reviewed for correctness back to the source of the algorithms, through the detailed design document and then to the code. (R. Sabatino's Action Item 4?)
- 2) Several problems were found in the TAC's DN Display program that is part of the suite of tools for data analysis. These are being addressed on both ends (GSFC and SBRC).
- 3) TAC "UNIT" still defined at a higher level than "smallest compilable" piece of code. Is this acceptable?

4) Several CSCI (i.e. SIC) documents currently in early stages with very needed reviews to produce a complete, correct final document.

5) SIC was still in design stage for writing code to dump SpMA and IAC data to disk (C code vs. OASIS). Also, some of the interruptable procedures may have unknown impacts due to IEEE protocols for setup and sample being in separate CSTOL statements.

6) Overall end-to-end system testing effort seems unclear as well as how it relates to the testing on STE1 and the shipping of a similar but yet different configuration in STE2 to Lockheed-Martin.

7) Data quality flag tracking needs to be examined more closely to make sure bad data is explicitly flagged in final data sets.

**3.0 Jose Florez and Mitch Davis (conformal coating notes; open in one of the pins of the 184 pin connector of the first FIFO board tested; grounding of signals on digital telemetry board; more details on the 184-pin low insertion force "Card-to-Mother-Board" connectors open connections in the sockets)**

Author: Jose Florez at 730

Date: 11/2/95 4:40 PM

Subject: Notes on CCA Conformal Coating Stop Request

This E-mail is a collection of memos and notes on the subject of CCA conformal coating prior to module level test. It started with an E-mail from Ed Clement asking Mitch and I for an input concerning GSFC's request to not conformally coat the individual CCA's until after module level testing.

There are two schools of thought on this issue. It boils down to how much confidence exists in the design of the cards, the level of testing they receive at the bench level, and the people doing the work. There is no question that the safest way, in the case when rework is anticipated, is to wait until after the whole module is shown to operate properly before coating. On the other hand is the issue of contamination; the more the cards are handled before coating the higher the risk of introducing substances and/or particles that could result in problems. There is also the impact to the schedule pointed out by Ed Clement due to the limitation of their shop to process a large number of cards at a time.

Based on the testing performed to date Mitch and I would not expect significant problems to surface in the electronics. For that reason we would not be uncomfortable if the cards were coated prior to module level testing. However, since Bob Silva mentioned that SBRC just informed him that they are submitting several new problem reports, it is probably wise to check that there are no new issues that may require modifications to hardware.

What SBRC proposes is actually something we do in Code 738. We normally coat the cards individually after functional testing following assembly.

Jose

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These are Bob Silva's comments on this issue (he received an E-mail that was assumed to be from me but was not):

TO: Jose Florez & Mitch Davis

10/30/95

Subj: Conformal Coating of PWB's

I agree with your position that PWB's should not be conformally coated until they have successfully been integrated at the module levels. The following is justification for not coating immediately:

- a.) If a part fails, the coating has to be removed
- b.) If there is a part change, the coating has to be removed c.) If a part is stressed, the coating has to be removed
- d.) If there is a design change, the coating has to be removed
- e.) If troubleshooting is required, it is easier to troubleshoot an uncoated PWB.
- f.) Coated PWB's have a tendency to attract contaminates easier than an uncoated board if not kept in a clean controlled environment.
- g.) An uncoated PWB is easier to inspect than a coated board, when trying to locate problem areas.

Two considerations to coating PWB's immediately after PWB assembly.

- a.) The PWB's are electrically checked and no further design changes or modifications will be required. This would include tests for, EMI, Thermal, Radiation, Vibration, Software, Test Verification, and others as required for System Acceptance.
- b.) High Voltage where safety is a concern, then conformal coating or encapsulation is no exception.

For Contamination Control all PWBs should be precision cleaned after component assembly.

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Hi Jose,

10/28/95

In response to your attached e-mail reply:

1. After conformal coating, each CCA is subjected to a final, room ambient temperature acceptance test. This test is described in each test procedure but is basically the same test the CCA was subjected to at the start of temperature testing.
2. The housing backplanes and wiring are checked-out prior to insertion of CCAs in the following two ways: (1) A point-to-point continuity check is done (without power applied) according to the wire list and/or motherboard schematic diagram, and (2) a check for correct power forms for each card is performed prior to that board being integrated into the housing.

We believe that the great majority of problems with the design have been discovered and corrected as part of the Engineering Model integration process. Further, the REAs have taken great care to ensure that these corrections have made their way into the Protoflight hardware. Finally, let me stress again that the small amount of rework that will probably be required to these CCAs after they have been conformal coated does not justify, in our minds, the risk to the CCAs of contamination, the cost of updating manufacturing paperwork, and the loss of schedule due to both a mass of boards requiring conformal coating at the same time and the time necessary to find errors on the boards due to contamination. The conformal coating material and process that we employ is very amenable to our reworking process.

I was out on vacation Friday but will be in Monday and plan to discuss this with you as part of our weekly telecon. Regards Ed

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From: Jose\_Florez\_at\_730@ccmail.gsfc.nasa.gov on Fri, Oct 27, 1995 6:16 AM  
Subject: Re: Note on Conformal Coating Stop Request  
To: Clement, John E; mitchell\_I\_davis@ccmail.gsfc.nasa.gov;  
jose\_florez@ccmail.gsfc.nasa.gov

Ed, 10/27/95

Could you give us more information on what you plan to do with the boards after conformal coating but prior to integration into the flight enclosures? Are you going to perform a functional test on the cards prior to that integration?. In other words, how are you going to guarantee that the boards have not been affected by the conformal coating process?

Along the same lines, how do you intend to verify that the flight boxes are wired properly prior to insertion of the flight cards?

I think that Dick and Ken are concerned that since there were several problems with the electronics during EM integration and test that required redesign and rework, they want to allow themselves room in case not everything was resolved. We have to give them confidence that there are enough checks in place to minimize the occurrence of problems. They have to have that information in order to make a risk assessment.

Jose

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Jose and Mitch, 10/26/95

Lee Tessmer has passed on a request from Dick Weber and Ken Anderson that we not conformal coat our circuit card assemblies until they have been successfully integrated at the module levels (i.e. MEM boards will have been shown to operate in the MEM, etc.). We have temporarily put this effort on hold, however, we do not wish to delay the conformal coating process for the following reasons:

1. We believe conformal coating should be done as soon as possible to minimize

the hygroscopic absorption of moisture into the circuit card assemblies. Though they undergo a two-hour bake-out prior to coating, this is aided by the fact they have just completed a high temperature testing prior to coming back for coating.

2. Also, putting off conformal coating leaves the boards susceptible to contamination, both conductive and non-conductive. SBRC has found it to be best practice to give the boards this protection as soon as possible.

3. There will be a sizable cost hit associated with delaying conformal coating

in that the paperwork for each card assembly (48 books) will need to be revised to allow integration before this operation.

4. This will cause a significant impact to schedule. Currently we are able to run a few boards at a time through our process lab. This change would cause us to conformal coat large numbers of cards at the same

time, something our process lab does not have the capacity to do. I would estimate at least a two week schedule hit just due to this.

5. Finally, we do not see a good reason to put off conformal coating. The material that we use, a uralane, is soft and allows for fairly easy reworking of boards even after they have been coated. It is true that the older, harder coatings made rework difficult, but that is not the case now.

Please give me your thoughts on this as soon as possible. I am planning on restarting the conformal coating process by the end of next week unless you have other grave misgivings.

Thanks Ed

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Author: Jose Florez at 730  
Date: 11/3/95 4:02 PM  
Subject: Input for MODIS Weekly - 11/3/95  
Telecon with Ed Clement on October 30, 1995

Not many good news to report this week. SBRC has experienced a couple of setbacks during PFM CCA testing. The first was an open in one of the pins of the 184 pin connector of the first FIFO board tested. It was detected during testing at ambient. The open pin is in the center of the connector and the concern is that the failure may have been induced by stress on the connector. The connector was pulled from the board and sent for Failure Analysis.

The second problem involves two signals on the Digital Telemetry board being grounded to the T-bar. Washers were supposed to have been installed between the T-bar and the board to serve as spacers, but were omitted. The T-bar touched several traces and bias on the board and SBRC is currently analyzing what components may have been stressed on the board.

On the good side, SBRC is getting ready to start acceptance testing of the PFM Power Supply.

Jose and Mitch

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Author: Jose Florez at 730  
Date: 11/7/95 2:23 PM  
Subject: Re[2]: MODIS Teleconference 11/6/95

There is one major issue with the electronics this week.

The 184-pin low insertion force "Card-to-Mother-Board" connectors have open (or high impedance) connections in the sockets. The problem was detected during electrical impedance testing at the card level. To date, the problem is known to exist on the board mounted "female" connectors, the Mother Board mating male connector has not been checked. The smaller 128-pin connectors have not been checked either. These are the connectors that were selected to replace the original ITT Cannon parts due to the high insertion force these required.

SBRC first found this problem on the FIFO board, which had an open on a critical socket. Since then they have found nine open and high impedance (~ 2K ohm) connections in the sockets of the Servo Controller board, plus additional ones on the FIFO board. Presently, all assembly work with these connectors has stopped. Five connectors have been pulled from stock to be tested. They have not found the problem on the similar AEM boards, but only 2 have been tested. SBRC does not believe it is temperature testing

related because the FIFO board had not been cycled. Testing on the boards is proceeding, but this problem will soon hit the schedule.

Ed Clement could not find test data that shows the parts were tested for continuity by the manufacturer (MELCO). Apparently the SBRC procurement spec states that testing will be at the discretion of SBRC, so he is inquiring about what was actually required and done.

Once the failure analysis is completed we will be able to determine if these connectors are flight worthy. If they are not, an alternative is to go back to the old ITT Cannon parts. This second option will require removal and modification of the T-bars used as board stiffeners in addition to the replacement of the connectors. There is uncertainty as to whether all that work can be performed without damage to the flight boards.

The other topic discussed was the approval of the Power Supply Specification, and the Power Supply Acceptance Test Procedure. Ed asked permission to proceed on with testing prior to GSFC approval of the specification. I am in the process of finishing review of both documents and will forward my comments to Ken Anderson so he can make a decision as soon as possible.

Jose and Mitch

#### **4.0 Ed Knight (Review of SBRC Calibration Management Plan)**

Author: [eknight@highwire.gsfc.nasa.gov](mailto:eknight@highwire.gsfc.nasa.gov) (Ed Knight) at Internet

Date: 11/7/95 11:33 AM

Subject: Resend of Cal Management Plan comments

From eknight Mon Oct 16 17:45:15 1995

Subject: Review of SBRC CDRL 018--Calibration Management Plan

This document was reviewed by Bruce Guenther, Bill Barnes, Harry Montgomery, Paul Spyak (UA), Gerry Godden, Tim Zukowski, and myself. Attached are our questions and comments. While extensive, it is our recommendation that this document be accepted at this point in time and these comments be addressed (as warranted) through the normal Technical Memo process. SBRC may wish to update the Calibration Management Plan (hereafter referred to as the CMP) following FM1 T/V to capture the calibration as actually performed.

#### Comments/Questions

Note that some of these comments have been addressed through the Calibration Peer Review Action Items.

#### General Comments

1. There are several strong concerns about the origin, derivation, and justification of the accuracy estimates used here and summarized in Tables 1.1 and 1-3.

Specifically

A. A reference to the derivations is needed, along with the definition of terms (i.e., what amount of WL shift is assumed that gives the 0.4% radiance uncertainty).

B. There are 5 elements not included

1. SIS(100) stability
2. Size of Source effects
3. Angle of Incidence/Response vs. Scan Angle effects

4. Water Vapor Absorption/Atmospheric path effects
  5. Ice on the Cold windows.
  - C. The estimates in several categories improve for Bands 31 and 32, when we would expect the physics to be the same (i.e., BB Temp). It is not clear why this budget would be accurate.
  - D. Bands 31hi and 32hi (Table 1-1b) are more accurate than 31 and 32, which is opposite of expectations.
2. The CMP does not discuss the master curve philosophy anywhere. A summary or reference would be useful. In addition, it is very important that the BB temperature transition test be used to check the non-linear term of the thermal calibration pre-launch.
  3. An Acronym list would be helpful.
  4. Models are mentioned on Page 1-8 and in various sections of the OBC sections. Several of these models have not been described in TMs or delivered to GSFC. It would be valuable to identify the content and status of these models and their suitability for delivery to GSFC. In addition, these models will "be validated" (p.2-21), but there is no discussion or reference to a discussion on how this will be done.
  5. Sections 3 and 4 are very sketchy.

#### Comments on Specific Sections

1-6, first sentence. With the recent changes in the test baseline, it is not clear how much of a "series of repeated tests" will exist. How are uncertainties given here affected with fewer repeated measurements?

1-13, First paragraph. This refers to cross-calibration methods which are not fully defined. What values in SBRC's uncertainty estimates are based on the cross calibration and what assumptions about it are made?

Table 2-1. There is no T/V operation of the S/D & SDSM apparently. While it is true that there is no suitable source, it is not clear if there is even any functional check of the SDSM, and no plan to assess the temperature sensitivity of the SDSM detectors.

2-5, 2.2. Recent discussions have indicated that SBRC may reverse position and not purge the optical path. Further information on this decision and its effects is desired.

2-5, 2.2. With the SpMA changes, are the imaging and underfilling described here still correct?

2-5 2.2. Has the double monochromator been characterized for stability and repeatability over the entire spectral range? Typically, different wavelengths will have different stabilities and repeatabilities.

2-5 2.2. Has SBRC considered the cost of moving the SpMA to the other window, and therefore collecting the spectral profiles of the bands from 3 to 10 um?

2-9. Section 2.5. Should the Far Field Stray Response be discussed here as well?

2-9, 2.5. The ScMA description is outdated (does not include chopper and post-EM changes).

2-11. Sect. 2.6.1. It is stated that the SIS is expected to have a small degree of nonuniformity. More information (how small of a degree, are the effects eliminated through data reduction, etc.) is desired.

2-14, 2.6.3. There are concerns that the Pattern Noise test should not be measured at zero radiance, as this may not accurately represent noise as will be seen on orbit.

2-16, 2nd paragraph. We do not understand why Bands 6 and 7 cannot be measured. How are crosstalk effects accounted for?

2-18, 2.8.2. Further discussion of the details of the analysis done to establish Long Term Stability would be useful.

2-18, 2.9.3. This test clearly needs more thought to simulate the full 2.5 sr earth scene. More detail on the new possibilities is desired.

2-24. Is the "SRCA radiometric sensitivity check mode" the same as the SRCA Radiometric Mode?

4-1 A list of environmental tests would be useful here.

Table 5-1 should include vicarious and lunar calibration if it is to be inclusive of all in-flight calibrations.

Figure 5-1 refers to Albedo at two different levels when it is the radiance that has two different levels.

5-5 Spatial calibration mode applies to the LWIR too.

5-5. The spectral mode has only 1 grating.

5-5. Self-calibration mode is now part of the spectral mode and is not a fourth mode.

5-7 Section 5.2. This section is identified as incomplete and therefore not reviewed in particular detail.

## **5.0 Bob Martineau (flight model detector status)**

November 8, 1995

SUBJECT: Weekly Input for 11/8/95

### **1) Flight Model SCAs:**

- Two additional SMWIR SCAs are to be hybridized this week.

### **2) Flight Model 1 Detective Assemblies and FPAs:**

- The F1 VIS and NIR FPAs have been delivered.
- F1 LWIR testing is complete. The filter/bezel has completed thermal cycling. CTI is planned for 11/28.
- The F1 SMWIR DA is in radiometric testing. It has 2 soft pixels seen in SCA data, and one more pixel which fails uniformity at Qhi. The B26 replacement filter is expected 11/8 with filter/bezel delivery after rework following in a week. CTI is planned for 12/8.

### **3) Flight Model 2 Detective Assemblies:**

- The F2 VIS FPA has been delivered.

- The F2 NIR DA has completed radiometric and functional tests with no performance discrepancies. CTI is scheduled for 11/15.
- The F2 LWIR DA and F2 SMWIR DA have completed wire bonding. Radiometric testing will follow.

### **6.0 Gene Waluschka (Band 26 filters shipped by Barr)**

Author: Eugene Waluschka NASA/GSFC (301)286-2616  
Date: 11/8/95 11:13 AM  
Subject: Band 26 filters  
Folks:

I received this today.

EW

From: SMTP%"tkampe@msoil3.hac.com" 8-NOV-1995 10:44:26.52  
To: EUGENE  
Subj: FW: Barr - Band 26 Filters  
Date: 8 Nov 1995 07:48:21 -0800  
From: "Kampe, Thomas U" <tkampe@msoil3.hac.com>  
Subject: FW: Barr - Band 26 Filters

To: Distribution

The band 26 filters are on their way.

Eric W. - Please move these through Receiving ASAP.

Thanks,  
Tom Kampe

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From: Chandler, Steven W SB02117 on Tue, Nov 7, 1995 4:30 PM  
Subject: Barr - Band 26 Filters  
To: Kampe, Thomas U

Author: Steven W Chandler <Steven W Chandler>

Frank Long left me a message this afternoon indicating that Barr shipped the Band 26 filters today. However, it is important to note that environmental testing still needs to be performed. Barr has retained 2 parts to conduct the testing, and Frank Long has said that he will E-Mail Barr's schedule for testing tomorrow. I will contact you about the testing schedule as soon as I find out.

MR  
11/13/95