

Minutes of Teleconference on ALMA OSF Holography Planning

Thursday, May 25 2006, 16:00 UTC.

(Minutes written by DTE, last revised 2006-05-31, version 1.1)

Participants: Crady, Donoso, Emerson (chair), Glendenning, Kern, Mangum, Michalski, Perfetto, Ramirez, Sakamoto, Sramek, Webber & Wootten .

Minutes of our last (2005-04-12) meeting, including the AI list, are at:
http://www.tuc.nrao.edu/~demerson/osfholo/mins2006-04-12_1.pdf

AGENDA:

1. Status of all relevant ICDs.
2. The holography tower: see the Call-for-Tender docs forwarded to this group on 2006-05-21. Do we give this our blessing?
3. Schedule for holography, both at the ATF and at the OSF.
4. Action Items from the last meeting
5. New Action Items

1. Status of ICDs

Antonio outlined the status of his ICDs:

- i. The Holography Receive to Computing, ICD 33B. The hardware details of the control points are not yet known – for example, better temperature stability is needed in Chile than on the existing system. Antonio will define the points and give details to Brian. However, the changes are so minor that it is not a real new ICD draft, just minor enhancements to the original version. Brian Glendenning is happy with this approach. Stefan will complete the ICD draft once the data has been submitted to computing.
- ii. Holography transmitter to computing, ICD 67. The transmitter is very much a standalone system, and is not connected at all to the ALMA M&C system.

Therefore, no ICD as such is needed. There will be remote control, including of the antenna positioner, but this involves RS232 interfaces that will communicate over a fiber, which will be independent of the M&C system. Therefore, this ICD is not now needed.

Brian pointed out that the fiber link does need to be put into the OSF Network Topology, and ditto for the ATF. Brian volunteered to look after this.

Stefan and Antonio will complete all ICD tasks in IPS, or remove the ICD tasks from IPS. ICD 67 can be cancelled in ALMA EDM.

- iii. Holography to site ICD 65. This ICD needs to address the mechanical interface between the transmitter and the holography tower, primarily the hardware at the top and at the bottom of the tower – cable requirements, etc. The mass to be at the top of the tower is still uncertain. Antonio needs one more week to finalize this. Antonio will keep in close contact with site. Stefan and Antonio will check in ALMA EDM and with C. Ocampo to confirm the purpose of this ICD. *Is the site representative the prime author?*
- iv. Holography receiver to antenna, ICD-5. Antonio does not yet have the necessary information for the Japanese antenna. This is however a simple task, and will be taken care of by 2006-06-06..

2. The Holography Tower

The Call-for-Tender docs had been forwarded to this group, with the intention that they be sent out this week.

Claus was unable to attend the meeting, but Eduardo has already forwarded the following comments made at the teleconference to him:

- 1) Make sure that the tower can be disassembled and relocated un the future to another location. (Darrel Emerson)
- 2) Make sure that the tower supports the equipment loads that will be installed and a person installing them. The person weight seems not to be clear. (Darrel Emerson)
- 3) Make sure that the tower meets the specification requirements. Eduardo asked which, and the answer was all (including wind load lateral movements, etc.) (Jeff Mangum). [The point here is that THE CONTRACTOR should verify and demonstrate that the assembled tower meets the specifications. D.]

Immediately after the meeting, by email Pedro Ramirez added the following points:

- 1) If the antenna Tx tower needs to be moved in the future, perhaps some special design considerations are necessary to make easier (minimize: time needed to disassemble and relocate, damage of the tower, etc) the movement process.

2) I could not find specifications about the special storage constructions needed for the hardware of the antenna Tx (on the base of the antenna, and in the top). There is only a requirement of a duct that goes from base to top of the antenna, for the cables installation. There are not specifications about the diameter, electrical/electromagnetic/humidity/temperature isolation, type of material to use, etc., for the duct.

3) The installed hardware (on the base of the tower) will be stored in a special installation (underground), by safety?.

With those caveats, the group gives their blessing to the Call-for-Tender documents.

3. Schedule for Holography, at the ATF and at the OSF

Dick Sramek summarized the current schedule for the ATF:

| | |
|------------------|---|
| 10 Aug | Holo Rcvr, Xmtr and positioner received at AOS |
| 21 Aug to 28 Aug | Software checkout |
| 29 Aug to 02 Nov | Install on VA antenna; Holo system verification |
| 02 Nov | Ship Holo System to OSF |

Stefan Michalski provided a schedule as of 2006-05-24, in which Antonio and the Front End group has updated its activities. Some parts for the 2nd receiver are 5 years old and there has been trouble procuring some of these components. As a result, the 2nd holography system will be delivered directly to the OSF rather than to the ATF, but not later than the ship date for Holography System #1 from the ATF to the OSF. Stefan & Cesar will update IPS activities and their links. (See the Appendix at the end of these minutes for that schedule.)

Backend: Neither Clint nor Rodrigo were able to attend the teleconference, but Clint sent the following just before the meeting:

JAO has approved the SoW for BE deliverables to the holography work. BE has ordered parts or its deliverables and the parts are in. As a result, the 1st of 2 holo. racks is scheduled for delivery to FE IPT as early as June of this year. FE and Computer will then need to do their thing to the boxes before checkout.

Action Items from the previous meeting

1. Antonio and John W. will confirm the precise date for delivery of holography systems to the ATF.

Done: see above. The first system will be shipped from CV to the ATF to arrive by 2006-08-10. The 2nd system will be shipped 2 – 3weeks later.

We also need to confirm the best dates for a representative from SE&I to come to CV.

2. *Antonio will keep ALMA-J informed on the holography interfaces.*

See above. By email after the meeting, Seiichi Sakamoto gave Masahiro Sugimoto (cc; to Seiichi) as the Japanese contact person for this.

3. *Dick S. will notify antenna vendors – and anyone else concerned – of the current August-September schedule status.*

Done

4. *Tower siting: the proposal needs to be circulated, and Darrel volunteered to provide at least a cursory check on whether reflections from the power line will be a problem. Eduardo will provide details of the line (wire diameter, wire height) as soon as available, and will look into possible alternate routes for the power line.*

Darrel has performed a cursory check and things looked ok. However, shortly after the meeting, Eduardo gave the following information: “There will be no line. Will install the gensets close to the Vertex and ACA sites, behind the line of view to the test pads. There is no way to transport 1 MW from the power station in 380 V. Too many losses in the transmission line. Easier to install the gensets closer to the load demand.”

Accordingly, this Action Item is closed.

5. *Rick will explain more about the two-tower vs. one-tower issue at our next telecon.* Rick was unable to attend this telecom, but sent the following by email before the meeting:

We know we will need two transmitter locations: one for illuminating Vertex and MEICo SEFs the second for our OSF lab. I understand the AEC SEF location is not yet finalized, drawings I've seen suggest it might go further into our Southern corner than we (the holography group) were expecting making the illumination of it and OSF-TF from one transmitter a more difficult problem than we had anticipated. A location for tower 2 remains to be determined.

Anyway, the reason for preserving the option of operating two towers at once is to keep scheduling flexibility in view of how ragged things will really get when parts start arriving. The second tower would go into operation after the OSF-TF is established, outfitted and ready, not earlier than Jan 08, and in a period when we should be receiving routine delivery of Vertex and MEICo antennas. Shutting down one tower, moving it, assembling, installing and aligning and qualifying the holography system in the second place may take longer than the delivery span of antennas and would need to be done by the same people who are trying to test the characteristics of the first antenna pair that have now become available to them. Secondly, we don't yet know how long the first antenna acceptance testing period may be (I know what the schedule says, and also how long all the AEG/ ATEG etc. work too, it'll be somewhere between the two and hence a large uncertainty). This causes another schedule crunch if we need to examine the AEM antennas for a lengthy period while processing the Vertex/MEICo ones.

We'll know better the answers to both of the above uncertainties: how long to set up and

establish a holo system, how long is AT on the first antenna; once those are done for Vertex. With that information, with final AEM SEF location and OSF pad locations, we can make the decision to go for two simultaneous towers or to move the sole tower hardware. Until then we need to preserve the need to operate two towers simultaneously.

6. *Antonio will work with Claus confirming the tower specs, in view of the increased tx mass.*

See Agenda Item 1, with Antonio's ICD (iii), above. Antonio said he needed one more week from today to complete this.

7. *Brian to arrange for discussions to reconfirm or change the baseline plan to have the first tests between holography hardware and CIPT software at the AOC/ATF (vs. NTC).*

Done. (We also need to confirm the best dates for a representative from SE&I to come to CV.)

8. *Darrel will coordinate with the scientists to provide scientific manpower for tests at the ATF from August 2006.*

Darrel commented: While things are still being got going, we will need several scientists on site. Once things have more or less settled down, then perhaps we only need one or two scientists on site, for things like long-term stability tests. And then test results need to be written up.

So, about 3 scientists there more or less most of the time from T=0 for the first 2 or 3 weeks, then shifts of 2 scientists down there at a time for most of the continued testing? All will be involved during and immediately after the tests, for writing up results.

It is absolutely essential that a software engineer with expertise in the realtime system also be available for most of the time, working closely with the scientists on site.

Brian mentioned that for the first period (~2 weeks) at the ATF the software group (probably including Robert L, but as a computing person rather than scientist) will need to do the first testing/integrating, and then the scientific debugging should start.

Similarly, frontend, backend and holography transmitter support for the first week or so will be needed.

Dick Sramek confirmed that he is the one with overall responsibility for arranging appropriate manpower at the ATF for all stages of holography and other tests.

4. New or Continuing Action Items

1. Antonio & Stefan: To complete the ICDs as indicated above (1. i-iv).
2. Brian Glendenning is to discuss who is responsible for the OSF network diagram so we can put things like the Holography transmitter control computers on it.

3. Darrel will organize another meeting as the need arises, but probably in about 4 weeks.

DTE, 2006-05-25

Appendix

Schedule, with latest FE updates.

Stefan Michalski provided the schedule below for dates as of 24May06. Antonio and Front End group has updated its activities. Note that Antonio has chosen to deliver each Holography System separately to the ATF as opposed as both systems together. This should enable testing to begin and finish on-time.

Integrated Project Schedule Subsection by WBS

| Row | Activity ID | Description | O Dur | Start | Finish | TF | % Comp | 2004 | | | | | | | | | | | | 2005 | | | | | | | | | | | | 2006 | | | | | | | | | | | | 2007 | | | | | | | | | | | | |
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| | | | | | | | | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| 1 | 1.02.025.0240 -- Operations Support Facility (OSF) | | | | | | | | Time Now - 14May2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 1.02.1.2.18 | OSF Holography Towers | 350d | 04Jul05A | 03Nov06 | 5d | 0.00 | OSF Holography Towers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 1.02.1.2.18.02 | Holography Tower #1 - High Level Design | 50d | 04Jul05A | 31Aug05A | 0 | 100.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1.02.1.2.18.04 | Holography Tower #1 - Location and Steel Tower Design Period | 152d | 01Sep05A | 24Mar06A | 0 | 100.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 1.02.1.2.18.06 | Holography Tower #1 - Basic Design for HT Complete By Planning Group | 0 | 24Mar06A | 24Mar06A | 0 | 100.00 | 24Mar2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 1.02.1.2.18.08 | Holography Tower #1 - Steel Tower Fabrication (Procurement Period) | 80d | 22May06 | 08Sep06 | 23d | 0.00 | 22May2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 1.02.1.2.18.10 | Holography Tower #1 - Facilities Construction - Call for Tender | 40d | 22May06 | 14Jul06 | 5d | 0.00 | 22May2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 1.02.1.2.18.12 | Holography Tower #1 - Facilities Construction (Tower Foundation, Trenching, roads, FO and Power) | 112d | 15Jul06 | 03Nov06 | 9d | 0.00 | 15Jul2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 1.02.1.2.18.14 | Holography Tower #1 - Tower Erection | 32d | 09Sep06 | 10Oct06 | 33d | 0.00 | 09Sep2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 1.02.1.2.18.16 | Holography Tower #1 - Complete - Ready for Instrument | 0 | 03Nov06 | 03Nov06 | 9d | 0.00 | 03Nov2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 1.03.045 -- Antenna Contract Tendering/Supervision | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 1.03.1.05.20.45 | ICD 5 ANTE-Antenna & FEND-Holography Receiver - Receive Approval | 0 | 13Dec03A | 13Dec03A | 0 | 100.00 | CD 5 ANTE-Antenna & FEND-Holography Receiver - Receive Approval | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 1.03.050.0500 -- Production Antennas North Am. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 1.03.1.25.05.010.70 | Start Contractor Testing (AIPC) - NA Antenna 1 | 0 | 17Feb07 | 17Feb07 | -84d | 0.00 | 17Feb2007 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 1.04.075.0640 -- NA Front End Subsystem Engineering | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 1.04.4.08.15.07 | ICD 5 ANTE-Antenna & FEND-Holography Receiver Received Approval | 0 | 13Dec03A | 13Dec03A | 0 | 100.00 | CD 5 ANTE-Antenna & FEND-Holography Receiver Received Approval | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | 1.04.4.08.15.33.06 | ICD 33-B FEND Holography Receiver & COMP-Control Draft | 30d | 01Feb06A | 05Jun06 | 50d | 95.00 | 01Feb2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 1.04.4.08.15.33.07 | ICD 33-B FEND Holography Receiver & COMP-Control Submit to SE&I | 0 | 05Jun06 | 05Jun06 | 50d | 0.00 | 05Jun2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | 1.04.4.08.15.67.03 | ICD 67 FEND- FEND & Comp Control - Holography Transmitter Assembly Draft | 22d | 27Feb06A | 31May06 | -22d | 0.00 | 27Feb2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 1.04.4.08.15.67.06 | ICD 67 FEND- FEND & Comp Control - Holography Transmitter Assembly Submit to SEI | 0 | 31May06 | 31May06 | -22d | 0.00 | 31May2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | 1.04.4.08.15.67.09 | ICD 67 FEND- FEND & Comp Control - Holography Transmitter Assembly Approval Received | 0 | 21Jun06 | 21Jun06 | -22d | 0.00 | 21Jun2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 1.04.075.0668 -- Front End OSF and PSI Support | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | 1.04.4.75.40.20 | Holography System - Front End | 140d | 26Jan06A | 14Aug06 | -22d | 0.00 | Holography System - Front End | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | 1.04.4.75.40.20.05 | FEND Holography System - Receive Updated Specification for ATF Receiver | 0 | 26Jan06A | 26Jan06A | 0 | 100.00 | 26Jan2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 1.04.4.75.40.20.10 | FEND Holography System - Develop Transmitter Electronics | 124d | 01Feb06A | 27Jul06 | -22d | 0.00 | FEND Holography System - Develop Transmitter Electronics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | 1.04.4.75.40.20.10.5 | FEND Holography System - Design Holography Transmitter | 30d | 01Feb06A | 21Jun06 | -22d | 85.00 | 01Feb2006 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Integrated Project Schedule Subsection by WBS

| Row | Activity ID | Description | O Dur | Start | Finish | TF | % Comp | 2004 | | | | | | | | | | | | 2005 | | | | | | | | | | | | 2006 | | | | | | | | | | | | 2007 | | | | | | | | | | | |
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| | | | | | | | | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N |
| 53 | 1.08.1.2.10.30.758 | ICD 33 FEND Holography Measure Equip & COMP-M/C CCB Approval | 0 | 29Jul04A | 29Jul04A | 0 | 100.00 | 29Jul2004 ▲ ICD 33 FEND Holography Measure Equip & COMP-M/C CCB Approval | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 54 | 1.08.1.2.10.30.760 | ICD 33-B FEND Holography Measure Equip & COMP-M/C ICD Submitted | 0 | 31May06 | 31May06 | 54d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 31May2006 △ ICD 33-B FEND Holography Measure Equip & COMP-M/C ICD Submitted | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 1.08.1.2.10.30.762 | ICD 33-B FEND Holography Measure Equip & COMP-M/C DAR Review | 25d | 01Jun06 | 05Jul06 | 54d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 01Jun2006 △ ICD 33-B FEND Holography Measure Equip & COMP-M/C DAR Review | | | | | | | | | | | | 05Jul2006 | | | | | | | | | | | |
| 56 | 1.08.1.2.10.30.766 | ICD 33-B FEND Holography Measure Equip & COMP-M/C CCB Approval | 0 | 05Jul06 | 05Jul06 | 54d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 05Jul2006 △ ICD 33-B FEND Holography Measure Equip & COMP-M/C CCB Approval | | | | | | | | | | | | | | | | | | | | | | | |
| 57 | 1.08.370.3000 -- Prototype System Integration EU & NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 58 | 1.08.1.5.6.22.28 | PSI ATF - Receive FEND Holography Electronics | 0 | 10Aug06 | 10Aug06 | -22d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 10Aug2006 △ PSI ATF - Receive FEND Holography Electronics | | | | | | | | | | | | | | | | | | | | | | | |
| 59 | 1.08.1.5.6.22.30 | PSI ATF - Integrate & Test Holography Electronics | 57d | 11Aug06 | 01Nov06 | -22d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 11Aug2006 △ PSI ATF - Integrate & Test Holography Electronics | | | | | | | | | | | | 01Nov2006 | | | | | | | | | | | |
| 60 | 1.08.1.5.6.22.32 | PSI ATF - Ship Holography Electronics to OSF | 20d | 02Nov06 | 01Dec06 | -22d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 02Nov2006 △ PSI ATF - Ship Holography Electronics to OSF | | | | | | | | | | | | 01Dec2006 | | | | | | | | | | | |
| 61 | 1.08.1.5.6.22.34 | PSI ATF - Holography Electronics Delivered to OSF | 0 | 01Dec06 | 01Dec06 | -22d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 01Dec2006 △ PSI ATF - Holography Electronics Delivered to OSF | | | | | | | | | | | | 31Oct2006 | | | | | | | | | | | |
| 62 | 1.08.375.3020 -- ALMA System Integration EU & NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 63 | 1.08.1.8.6.18.1.2.36 | OSF Holography Tower #1 Complete Ready for Instruments - AIV Receive | 0 | 03Nov06 | 03Nov06 | 9d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 03Nov2006 △ OSF Holography Tower #1 Complete Ready for Instruments - AIV Receive | | | | | | | | | | | | | | | | | | | | | | | |
| 64 | 1.08.1.8.6.18.1.2.40 | OSF Holography System - AIV Complete to AIPC | 0 | 03Jan07 | 03Jan07 | -32d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 03Jan2007 △ OSF Holography System - AIV Complete to AIPC | | | | | | | | | | | | 03Dec2006 | | | | | | | | | | | |
| 65 | 1.08.1.8.6.18.4.52 | FEND Holography Equipment from OSF - AIV Receive | 0 | 01Dec06 | 01Dec06 | -23d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 01Dec2006 △ FEND Holography Equipment from OSF - AIV Receive | | | | | | | | | | | | 31Oct2006 | | | | | | | | | | | |
| 66 | 1.08.1.8.6.18.4.54 | FEND Holography Equipment OSF - AIV Lab Check-In | 8d | 04Dec06 | 14Dec06 | -23d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 04Dec2006 △ FEND Holography Equipment OSF - AIV Lab Check-In | | | | | | | | | | | | 31Oct2006 | | | | | | | | | | | |
| 67 | 1.08.1.8.6.20.08 | OSF Holography System - Reconfigure Software, Install,- AIV Test Functionality | 20d | 15Dec06 | 03Jan07 | -32d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 15Dec2006 △ OSF Holography System - Reconfigure Software, Install,- AIV Test Functionality | | | | | | | | | | | | 13Nov2006 | | | | | | | | | | | |
| 68 | 1.08.1.8.6.20.50.62 | OSF Temp. Lab Integration/Outfitting - Complete | 0 | 27Jul07 | 27Jul07 | -237d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 27Jul2007 △ OSF Temp. Lab Integration/Outfitting - Complete | | | | | | | | | | | | 03Dec2006 | | | | | | | | | | | |
| 69 | 1.08.1.8.6.20.50.64 | 30 days Prior to Ant #1 ACC - Milestone | 0 | 26Aug07 | 26Aug07 | -237d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 26Aug2007 △ 30 days Prior to Ant #1 ACC - Milestone | | | | | | | | | | | | 02Jan2007 | | | | | | | | | | | |
| 70 | 1.08.1.8.6.20.50.66 | 30 days Prior to Ant #1 ACC | 30d | 27Aug07 | 25Sep07 | -237d | 0.00 | | | | | | | | | | | | | | | | | | | | | | | | | 27Aug2007 △ 30 days Prior to Ant #1 ACC | | | | | | | | | | | | 02Jan2007 | | | | | | | | | | | |
| 71 | 1.09.380.3040 -- Phase 2 Science Support | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 72 | 1.09.9.2.80.1 | Draft of Holography Requirements Document | 45d | 05Jul05A | 25Jan06A | 0 | 100.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 73 | 1.09.9.2.80.2 | Internal Review of Holography Requirements | 5d | 25Jan06A | 26Jan06A | 0 | 100.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 74 | 1.09.9.2.80.3 | Update to Front End to Develop Holography Electronics | 0 | 26Jan06A | 26Jan06A | 0 | 100.00 | | | | | | | | | | | | | | | | | | | | | | | | | 26Jan2006 △ Update to Front End to Develop Holography Electronics | | | | | | | | | | | | | | | | | | | | | | | |