MIT Management Development Plan Meeting #6

R. Larson

21 November 1967

It was stated by C, Kraft of NASA/MSC that the performance of the AS-501 Mission was perfect and that MIT was to be congratulated.

2. SUNDANCE

1.

The LM DAP design review was held the week of 11/8/67. Several NASA (K. Cox) action items resulted from this review. These items are itemized in the minutes of the review meeting and on the weekly NASA Action Item TWX. NASA was asked that immediate attention be given these items. The publishing of Section 3 of the GSOP for the LM DAP has slipped to 12/29/67.

MIT is to provide GAEC with the erasable initialization and a Program Tape of the LM DAP on 1 December 1967.

MIT desires the Astronaut to fly the manual DAP on the Hybrid. The LM DAP verification tests do vary the slosh and bending.

A review of the SUNDANCE Development Plan was given and the major problem areas discussed.

The alignment programs P51, P52, (P57 Luminary) have slipped causing the delivery of SUNDANCE to be now scheduled for 3/15/68. The slippage in P51 and P52 was caused by a misunderstanding by the programmer as to the actual logic of these programs. In addition a PCR was received from NASA affecting these programs, but because of the re-work resulting from the misunderstanding these changes caused by the PCR could be implemented without any additional slippage for the PCR. Additional personnel have been assigned by MIT to this area.

PCRs' 3, 4, 5 and 6 for SUNDANCE were discussed and the tentative visability impact presented for each.

PCR #3 is a proposed change to provide "Fly to" Display on the FDAI needles. This change seems to be in conflict with the polarities

specified on the current ICD's. Action - NASA is to investigate and if necessary originate the required ICD changes. The visability impact is that no schedule impact would result from this change. MIT should also review the CSM to see if a similar problem exists.

PCR #4 is a proposed change to place into erasable, the time for which the DPS is held at 10% thrust. The visability impact is one week.

PCR #5 is a proposed change so that the display of the optics angle in the alternate LOS Mark routine (R56 in PCR should be R 53) be moved till after the "mark" has been taken. Visability impact is 10 days.

PCR #6 is adding the capability of manually selecting either 5° or 30° dead band in the Rendezvous Navigation Program. Visability impact is 2 weeks.

PCR Procedure

3.

NASA/MSC is to develop and document a change procedure to assure the proper control and understanding of PCR's and MDRB's.

The initial schedule impact assessment for PCR's should be MIT/IL's best estimate (visability impact) using a minimum investment of time to predict schedule changes. Final schedule assessment should only be done after receipt of a go ahead from NASA CCB on the PCR. PCR's should be received by MIT/IL via data fax on Tuesdays following NASA's CCB meetings. MIT's visability impact should be in NASA's hands the following Monday to be presented to the Tuesday CCB for final action. The NASA flowcharts attached to PCR's are for information and clar-ification of changes only and are not to be interpreted as specific direction on how to implement the changes. MIT should review these and make recommendations based on their knowledge of the change and the best way to integrate the change into the program on the MDRB's.

It was again stressed that MIT should not take direction from the Astronauts or any other section of NASA for program changes. The Astronauts and other sections should be referred to the NASA Software CCB organization for any such requests and action will only be taken by

÷

-2-

Mtg. #6 21 Nov. 1967

MIT/IL upon receipt of a PCR.

4. COLOSSUS

The CSM DAP for Colossus will be the same DAP that is presently in Sundisk except for some minor clean up and the change to R03 for loading of autopilot data.

In response to a question about the simultaneous use of propulsion systems similar to the capability in the LM it was stated that . the RCS and TVC autopilots are completely independent and no simultaneous operation is presently possible.

The Chapter 3 for Sundisk should go to the publishers in about 3 weeks. Chapter 3 of Colossus should in general be a duplicate of the Sundisk Chapter 3.

The question as to what to use as the specification for initiating PCR's in the CSM DAP area was mentioned. Until the Chapter 3 for Sundisk and Colossus are printed the specification for the DAP should be the DAP that is in Revision 267 of Sundisk. MIT is to issue a memo to this effect. Also the DAP's are available for control in the form of Flowcharts.

The current Development Plan for Colossus was reviewed and discussed. The planned FACI for Colossus is 6/13/68. Additional forms to be added to the plan to provide further insight to program development were presented and explained. The descriptions of VHF Ranging presently in Chapters' 4 and 5 are assumed to be correct and are the present specifications for VHF ranging for the Colossus Program.

MIT is to review the possible schedule impact if the data requested in Action Item 3 (V-Gamma polynomials coefficients and ranging functions) of the Development Plan is not received until December 15th or after.

LUMINARY

5.

The current Development Plan for LUMINARY was reviewed and

and discussed. The planned FACI for Luminary is 7/24/68, which does not meet the present NASA required date by about 2 weeks.

Concern was expressed by NASA on the availability of the landing and ascent programs for training. The present schedule shows that these sequences should be available for training about 3/15/68. If descriptions of these programs are necessary for programming training simulators, data and descriptions are available in Chapter 4 and 5 of the Luminary GSOP. In addition the preparation of Flowcharts in this area could be given a priority.

PCR #11 for Range Free and PCR #12 for Throttling at the top was discussed and a preliminary visability impact of 3 weeks planning, 2 weeks programming and 4 weeks planning, 3 weeks programming respectively was given.

6. SOLARIUM

NASA stated that the Solarium Program would fly the AS-502 mission without any changes. MIT would like more information on the 502 trajectory so that minor testing can be preformed to assure the capability of Solarium for the AS-502 mission and the generation of the erasable load.

The Simflight of AS-501 was discussed and it was suggested by NASA that future Simflights be changed to provide more realistic type data from the computer. Reasons and explainations for the type of data received on AS-501 was given and MIT will follow up with its position on Simflights.

7. SUNBURST

The remaining 4 discrepancies on the Sunburst Program were reviewed for information purposes. None of these discrepancies are considered important and no program changes are planned. Restart

Mtg. #6 21 Nov. 1967

protection is good. The remaining tasks for MIT are the generation of the erasable load and program support before and after the flight.

-5-

8. SUNDISK

Sundisk Revision 267 has been released and sent to Raytheon; upon receipt of direction from NASA/MSC rope manufacturing will begin. Level V testing consisted of 160 test runs which took 6 weeks to complete. Future individual test runs should be shorter in duration thus providing greater efficiencies in testing.

There were 103 discrepancies recorded during Level IV and V testing. These discrepancies have been corrected by either program fixes, operational constraints or considered as being insignificant. Remaining outstanding MDRB's were discussed and action should be taken to close these out.

One ground rule adopted by NASA/MSC for Sundisk is that no LM rescue rendezvous is necessary. It would be by ground control and not G&N control when Sundisk is aboard.

There are presently 5 PCR's being reviewed for impact on Sundisk, 3 are mandatory and 2 are for impact only if implemented.

The Sundisk program is presently being maintained and tested by 4 people. Test results should be received by NASA by December 1st. After review, a CARR meeting should be scheduled.

9. IBM 360/75 Status

The full plotter capability should be available December 1st. A workable GAP should be ready 31 December. The complete General Assembly Program (GAP) should be available March 31, 1968. This includes the preparation of memory wiring tapes. GAP improvements will provide additional capabilities of:

- retaining any number of prior program revisions.

- assembling individual testing assemblies that may be used for testing and debugging by the programmer yet not impacting the total program assembly.

- Provide some automatic documentation and easier understanding of program content.
- Automating the management of erasable storage.

In addition, work is being done to improve the IBM operating system, provide better accounting of computer usage, establish a computer controlled priority system for computer usage, and development of information retrieval system and computer design aids.

Exploratory meetings have been held with AVCO on the possibility of using their computer during the possible saturation period of MIT's computer if necessary. The possibility of using their installation looks favorable and additional work will be done in this area in case the need arises.

R. C. Millard

RCM/KG/km

cc: NASA

*C. Kraft *W. Tindall *J. Stokes *T. Gibson *G. Sabionski *J. Williams *G. Kimball *R. Spaulding <u>BELLCOM</u> *G. Heffron * R. Ragan * F. Martin * J. Nevins * N. Sears * S. Copps * R. Millard * P. Peck J. Dahlen R. Scholten J. Sutherland C. Schulenberg G. Levine

MIT/IL

*D. Hoag *G. Cherry *E. Copps *J. Vittek *L. Larson *W. Marscher *K. Greene J. Kernan R. Morth J. Saponaro J. Henize P. Engle *R. Battin
*J. S. Miller
*M. Johnston
*D. Lickly
*J. Shillingford
*A. Kosmala
W. Kupfer
P. Felleman
L. Linehan
R. Larson
M. Hamilton

* Attendees of Meeting

-6-