

DRAFT

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MISSION PROGRAM DEVELOPMENT CALENDAR

Weekly

- Thursday - Erasable Control Committee meets
- Friday - Program supervisors submit change packages for
trial assembly for Mission Program Change Board
- Monday - Mission Program Change Board meets
- Tuesday - (a) New Mission Program Assemblies and
Change Notices available
(b) Mission Program Development Review Meeting

BiWeekly

Scheduled Design Reviews for each of the Mission Program
Engineering Leaders

Monthly

- (a) Specification Review Meeting with MSC
 - (b) MSC/MIT Software Development Plan Meeting
- (Both meetings in series on a Tuesday and in place of the
weekly MIT Mission Program Development Review Meeting.)

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ASSEMBLY CONTROL - CHANGE CYCLE

The Assembly Control Group reporting to the Mission Program System Integration Director has full time responsibility for the making and control of YUL assemblies.

Each Mission Program will have an updated assembly revision once per week available on Tuesday which is then the only official revision for all users for the week.

Each Mission Program Supervisor is responsible for submitting to Assembly Control each Friday the change cards for all candidate changes for the next assembly. The Program Supervisors will be responsible for determining that these candidate changes constitute a proper package. It is expected that all patches found necessary to run with the current assembly will appear in the packages of candidate changes submitted by the Program Supervisors.

The Assembly Control Group will take the candidate change packages received on Friday and generate successful trial YUL assemblies (e. g. TRIALDANCE 162, TRIALCOLOS 57, and TRIALLUM 27) for each of the mission programs. These are for the use of the Mission Program Change Board at their regular Monday morning meeting.

The Program Supervisors will be responsible for delivering to the Mission Program Change Board the Modification Sheets for each of the candidate changes in trial assembly.

The Mission Program Change Board using the trial assemblies, the Modification Sheets, and other material (see "Change Control") will select those candidate changes for next official revision for each mission program assembly.

Following the Mission Program Change Board Meeting, the Assembly Control Group will make the new YUL assemblies with the changes accepted by the board. Successful assemblies should be available Tuesday morning and become the new official revision.

The Program Supervisors will be responsible for issuing with the new assemblies on Tuesday morning the Change Notice describing the new changes incorporated and the known characteristics of the assembly.

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CHANGE CONTROL

The Mission Program Change Board is established:

Mission Program Integration Director, Chairman

Mission Program Project Managers

Program Supervisors

Mission Program Chief Engineer

Assembly Control Group Leader

Supporting Staff as assigned by above

The Mission Program Change Board meets regularly every Monday, 9:00 am. Available to the board are two listings of the trial assemblies for each of the mission programs containing the candidate changes. (See "Assembly Control ...".) Also available will be two copies of each of the Modification sheets supporting each candidate change appearing in the trial assemblies.

The modification change sheets for each candidate change will be submitted by the program supervisors. It will use a common format to list the identity and reason for the change, the effect on the word budget, the effect on erasable, and a flow diagram of changes to the intended logic achieved by the change.

Also available to the board will be the word count listings for the trial assemblies.

The board will review each of the candidate changes. The trial assemblies will permit the Board to examine the effect of the changes onto the complete integrated program. The Board will examine the suitability and correctness of the change by the systematic use of a checklist.

Typical items on the checklist are intended to force examination of the effects of the change on fixed and erasable memory, telemetry lists, extended verbs, alarms, other mission programs, etc. Alex Kosmala has prepared a draft of such a checklist which is attached . . .

The output of the Change Board is (1) the decision on each of the candidate changes, (2) further direction to and action required of the program supervisors (such as to incorporate the same change into another mission program at next opportunity), and (3) authorization to make the new official assemblies.

The Board action will allow the program supervisor to prepare the Change Notice for the new assembly. This Change Notice will list the known characteristics of the assembly; the changes incorporated; the known cautions, bad areas, and workarounds; the known discrepancies not fixed; the known restraints; and the patches left in from unaccepted changes.

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Mission Program Change Board Checklist
Assembly Control Committee Checklist

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The following itemized list is suggested as an aid to the committee in making judgment on a proposed revision to the approved assembly. The first four concern the assembly itself, and should have been thoroughly checked by the program supervisors prior to the meeting.

- 1) Quality
 - a) Is the modification report adequately made out.
 - b) Does the proposed change violate any established coding ground rules.
 - c) Has the memory map been reviewed for bank conflict, etc.
 - d) Have card numbers, DELETE's, constants, etc. been adequately checked.
- 2) Fixed Memory budget impact
- 3) Erasable allocation impact
- 4) Sealed sub-section impact

The following items concern the impact the changes may make on users of the assembly.

- 5) Testing
 - a) Has the change been advertised to all the activities that it concerns.
 - b) Does the change require changes to test decks, e. g. erasable load changes, astronaut card changes, hybrid scripts.
 - c) Does the change require the re-running of any Level 1, 2, 3, 4 or 5 Test.
 - d) Does the change require the definition of a new Level 1, 2, 3, 4 or 5 Test.
 - e) Does the change require a change to the Verification Test Plan.
- 6) Schedule impact. If any, then
 - a) Has the Program Manager been made aware of it.
 - b) If the change is in response to an MDRB, has the impact been re-assessed.
 - c) Has the Development plan been updated.

7) Documentation

- a) Has the Program Description been updated.
- b) Is a new Program Description required.
- c) Is the Henize activity impacted.
- d) Are the Discrepancy and Restraint reports affected.
- e) Does the change affect any issued Test Level 1, 2, 3, 4 or 5 document.
- f) Is the GSOP affected, e.g. flag settings, sign errors, requiring MDRB action.

8) Work arounds.

- a) Can the change be replaced by an operational procedure (Chap. 4).
- b) Can the change be made more expediently with less coding elegance.

9) Patches

- a) Have remaining patches for both Hybrid and Digital been reviewed and justified.

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ERASABLE MEMORY CONTROL - ERASABLE CONTROL COMMITTEE

The Erasable Control Group reporting to the Mission Program System Integration Director has full time responsibility in the control of the erasable memory. Responsibilities include the assignment of erasable memory locations, the resolution of erasable conflicts, and the identification of existing and potential problems in erasable memory.

The Erasable Control Committee is established:

Mission Program System Integration Director, Chairman

Program Supervisors

Mission Program Chief Engineer

Mission Program Engineering Leaders

The Erasable Control Committee meets each Thursday to provide the guidelines and budgets in the layout or distribution of erasable memory parameters, to identify and resolve problems in the use of erasable memory, and to correct unusual difficulties in erasable conflicts.

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FIXED MEMORY CONTROL

Each Log Section of each of the assemblies has been assigned a fixed memory budget. This budget is a design limit to the generation of code by the programmers. A special listing (COUNTDANCE, COUNTCOLOSSUS, etc.) is made automatically at the time of program assembly and which reveals by each log section the comparison of actual and budgeted word count. These listings are examined by the Mission Program Change Board and problems in meeting budgets are resolved by the Board.

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CONTROL OF CONSTANTS

The Assembly Control Group under the Mission Program Integration Director, will include in its responsibilities the control of all program constants. The technique to be used to make the problem manageable will be established shortly. An attempt is being made to work out an operation whereby all such constants can be pulled out into a separate listing for examination and control. Lacking this technique constants will be separated into one place in the usual listing rather than appear distributed throughout the listing as previously. The intent of the tighter control is to guarantee that each parameter representing a constant will have only one value throughout the program and that this value is that listed in official controlling documentation.

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DISCREPANCY AND RESTRAINT CONTROL AND REPORTING

Each of the Program Supervisors will maintain a master log book for entering program characteristics of the mission program under their responsibility. All persons operating with these programs in informal or formal testing are directed to enter significant "characteristics" discovered and identified by assembly number and log section. "Characteristics" can be bad operation, discrepancies from specification, or unadvertised restraints. Those characteristics which have not been fixed or to be fixed by candidate changes for next assembly revision must be examined by the Program Supervisor for his judgement of importance. Those he feels that should be advertised so as to help program assembly users, he will list in the Change Notice he issues with the next program assembly revision.

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SPECIFICATION CONTROL

The Guidance System Operation Plans, GSOP, are the specifications for the mission programs.

After approval of the GSOP by NASA, changes are requested by NASA by means of a Program Change Request (PCR) form. MIT's estimate of the impact of the change requested by the PCR and MIT's requests for changes and their impact are documented by Mission Design Review Board (MDRB) forms. The MDRBs may be submitted to MSC at any time but are not acted upon until the next monthly Specification Review Meeting held with MSC. At this time the complete set of MDRBs will be examined for their combined effect on schedule, memory, testing, etc. Direction from NASA on MDRBs approved would then allow a block change to the GSOP. The following coding change and change control activity of the program would then result.