

MWI 8060.3

REVISION A

EFFECTIVE DATE: May 10, 2004

EXPIRATION DATE: May 10, 2009

MARSHALL WORK INSTRUCTION

QD01

Requirements and Design Reviews, MSFC Programs/Projects

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		03/28/03	
Revision	A	5/10/2004	Changed "NPG" to "NPR" throughout the document. Numerous editorial changes including elimination of redundant direction in sections 6.2.8 and CH1.6.3, and 6.2.12 and CH1.6.4. Added Appendix E, Sample RID Form. Clarified requirements for combination of RIDs in CH1.4.2.2. Clarified use of "Disapproved" RID classification in CH1.6.2. Added the "Approved for Study" classification in CH1.6.7. Added language prohibiting team leads from serving as Pre-board or Board members in CH1.8.3. Added language requiring independent representation on the Pre-board and Board, and representation by the NESC on Pre-boards and Boards in CH1.8.4.

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1. PURPOSE

This Marshall Work Instruction (MWI) provides instructions for planning and conducting both formal Requirements and Design Reviews. It provides a consistent and disciplined process to assure thorough technical review and adequate management oversight prior to authorization for Programs/Projects to proceed to the next stage of development.

2. APPLICABILITY

This instruction applies to all formal Requirements and Design Reviews conducted at the system and subsystem level for Programs, Projects or activities governed by MPG 8060.1. This instruction does not apply to informal reviews, audits, acceptance reviews, pre-ship reviews, or flight readiness reviews.

3. APPLICABLE DOCUMENTS

- 3.1 MPG 1150.1, "Establishment of Councils, Boards, and Committees"
- 3.2 MPG 7120.1, "Program/Project Planning"
- 3.3 MPG 8040.1, "Configuration Management"
- 3.4 MPG 8060.1, "Flight Systems Designs/Development Control"
- 3.5 NPR 1441.1, "NASA Record Retention Schedules"

4. REFERENCES

MSFC-HDBK-3173, "Project Management and System Engineering Handbook"

5. DEFINITIONS

- 5.1 Board - The management panel that serves as the final disposition authority for Review Item Discrepancies (RIDs). This is an ad hoc Board, in accordance with MPG 1150.1, Establishment of Councils, Boards, and Committees.
- 5.2 Data Package - Package of Review Documentation, supporting Reference Documents, and data provided as part of the review.
- 5.3 Developer - Individual or organization involved in development of the documents comprising the Data Package.

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5.4 Disposition - Approval of a suitable plan of action to resolve a RID, including actionee and suspense date.

5.5 Lead Directorate - Directorate with responsibility for management of the Project.

5.6 Pre-board - The panel that serves as an intermediate management review authority between the Review Committee and the Board. The Pre-board recommends RID Dispositions to the Board, or forwards RIDs to the Board for review and disposition.

5.7 Reference Documentation - Documentation against which the Review Documentation is assessed for compliance.

5.8 Review Committee - Committee that assesses the Data Package for compliance with the criteria established in the Review Plan.

5.9 Review Documentation - Documentation provided to the Review Committee to be evaluated in accordance with the Review Plan.

5.10 Review Item Discrepancy (RID) - A formal finding of noncompliance that meets criteria established in the Review Plan.

5.11 RID Actionee - Individual who is assigned a formal action item required to correct a deficiency identified in a RID.

5.12 RID Closure - Formal approval of RID resolution, based upon documented evidence of completion of actions required by the RID Disposition.

5.13 RID Coordinator - Individual responsible for administering the RID tracking process.

5.14 RID Criteria - The criteria, defined in the Review Plan, used to determine whether or not a valid RID exists.

5.15 Review Plan - Document provided by the Project Manager (PM), that establishes the objectives and scope of the Review, entrance and exit criteria, Data Package Contents, RID Criteria, Review Committee/Team roles and responsibilities, and other plans and ground rules for the Review.

5.16 Review Team - Subset of the Review Committee that assesses a specific area of the Data Package.

5.17 Screening Official - The single authority appointed by the PM to review and determine validity of proposed RIDs for compliance with RID criteria.

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6. INSTRUCTIONS

6.1 Review planning

During the formulation phase, the PM shall establish the formal Requirements and Design Reviews to be held for the Program/Project, in accordance with MPG 8040.1, MPG 8060.1, and MPG 7120.1. Guidelines for determining which reviews should be included are available in MSFC-HDBK-3173, "Project Management and Systems Engineering Handbook." Formal Requirements and Design Reviews ensure that system and subsystem design requirements and objectives are clearly stated, and that the design meets these requirements. Design reviews result in engineering release of the documentation which establishes the configuration baselines defined in MPG 8040.1. Reviews also serve as control gates for management to assess the status of the Program/Project at various stages of formulation and implementation, and determine readiness to proceed with successive stages of development.

- 6.1.1 Program/Project Manager (PM) Determine readiness for the Review. Guidance for assessing readiness may be found in MSFC-HDBK-3173 Section 4.3.6 and Appendix A, and in Appendices A and D of this document. The Review shall not be scheduled unless there is reasonable assurance the Data Package will meet the review entry criteria.
- Prepare draft Review Plan in accordance with Chapter 1 of this MWI.
- Provide draft Review Plan to Lead Directorate Head along with a request for appropriate support to conduct the review.
- 6.1.2 Lead Directorate/Project Office Head/or Designee Appoint Board and Pre-board Chairpersons in accordance with the Review Plan and CH1.8.4 of this MWI.
- Request support from other Directorates and organizations in accordance with the draft Review Plan and CH1.8.

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6.1.3 Supporting Directorate/Organization Heads/or Designees Provide review participants in accordance with the draft Review Plan and CH1.8.

6.1.4 PM Concur with review participant appointments or negotiate alternate selections with the Supporting Directorates/Organizations.

Appoint the RID Screening Official in accordance with CH1.8.1.

Incorporate names of appointees into the final Review Plan and distribute to all participants.

Note: Late changes to review participants may be documented in the kickoff presentation or review results documentation.

6.1.5 RID Coordinator Set up RID processing and tracking system in accordance with the Review Plan.

6.1.6 Program/Project Personnel and Document Developers Prepare kickoff presentation and Data Package in accordance with the Review Plan.

6.2 Conducting the Review

6.2.1 Program/Project Personnel and Document Developers Distribute Data Package in accordance with the Review Plan. Conduct the kickoff meeting to present the Review Committee with the review objectives, scope, organization, ground rules and an overview of the system and/or subsystems under review. Guidelines and an agenda template for the kickoff meeting are in Appendix B.

Note: Attendance by the Review Committee and Review Team Leads

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is required.

6.2.2 Review Team Leads

If the Review Committee is organized into teams, the Team Leads shall provide leadership and direction to their Review Teams to monitor progress, ensure complete and thorough review of the Data Package, provide guidance, and facilitate discussions between reviewers and Document Developers in compliance with the Review Plan.

Note: If the Review Committee is not organized into teams, the Lead Systems Engineer (LSE) or designee shall perform the Team Lead Function.

6.2.3 Review Committee Members

Assess Review Documentation for compliance with Reference Documentation, and ensure technical accuracy and completeness in accordance with review objectives. Identify and discuss potential issues with Document Developers. Submit proposed RIDs when issues meet the criteria in the Review Plan.

6.2.4 Document Developers

Provide support and clarification to Review Committee members in order to facilitate an effective review.

6.2.5 RID Screening Official

Screen all proposed RIDs against the pre-established criteria, and assign valid RIDs to appropriate Review Committee members or Review Teams for Disposition in accordance with the Review Plan.

Assign screening and tracking classifications to all valid RIDs as required by the Review Plan.

If the Review Plan stipulates a

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Screening Committee, the Screening Official shall coordinate and facilitate Screening Committee meetings. The RID Screening Official shall have the decision authority for screening all proposed RIDs.

The RID Initiator shall have the authority to modify and resubmit RIDs that do not meet the criteria any time prior to the deadline imposed by the RID Screening Official.

The RID Initiator shall have the authority to withdraw RIDs at any time prior to the Pre-board.

6.2.6 RID Coordinator

Track all RIDs from submission to closure utilizing the process established in the Review Plan.

6.2.7 Document Developers

Provide required responses to RIDs in accordance with RID processing requirements in the Review Plan. As a minimum, the cost and schedule impacts and suggested corrective action shall be provided.

6.2.8 Review Committee/Teams

Recommend Dispositions for RIDs according to the processing requirements established in the Review Plan.

If a suitable Disposition recommendation cannot be established, or if the team determines that the RID is not valid, the RID shall be disapproved and forwarded to the Pre-board.

All RIDs approved or accepted for study shall be presented to the Pre-board.

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All RIDs that exceed thresholds for cost and schedule impacts established in the Review Plan shall be forwarded to the Pre-board.

All open RIDs from previous reviews shall be forwarded to the Pre-board.

The PM may require that RIDs with suspense dates exceeding pre-established thresholds be presented to the Pre-board.

Team leads may determine that Pre-board review of a RID is needed even though the criteria above are not met.

The RID initiator shall have the authority to appeal Disposition recommendations to the Pre-board and Board, provided the RID meets the Review Plan criteria. If the RID initiator exercises this authority, they or their designee shall be present during the Pre-board and Board in order to defend their position and discuss potential solutions.

6.2.9 RID Initiator

The RID initiator shall have the authority to request that a rejected RID be reviewed by the Pre-board. This request shall be submitted to the Pre-board member representing their organization.

6.2.10 Pre-board Members

Review any requests from RID initiators for review of rejected RIDs. If the Pre-board member determines that the RID should be reviewed by the Pre-board, the rejected RID shall be presented.

6.2.11 PM or Designee(s)

Present a summary of the Review to the Pre-board. The summary

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shall include a complete list of all valid RIDs, the recommended dispositions, and associated cost and schedule impacts. A total of the cost impacts shall be presented. RIDs forwarded to the Pre-board for review and action shall be presented individually in sufficient detail to facilitate Pre-board decisions regarding Disposition recommendations.

6.2.12 Pre-board

Recommend Dispositions for all RIDs or forward to the Board for review and Disposition.

The Pre-board may change action items or Disposition recommendations previously established by the Review Committee or Review Teams.

In accordance with 6.2.10, the Pre-board may review rejected RIDs and concur with rejection, over-rule the decisions of the RID Screening Official and accept or approve the RID, or forward to the Board for review.

If a suitable Disposition recommendation cannot be established, or if the Pre-board determines that the RID is not valid, the RID shall be disapproved and forwarded to the Board.

All disapproved RIDs and RIDs exceeding thresholds for cost and schedule impacts established in the Review Plan shall be presented to the Board.

All RIDs accepted or approved for study shall be presented to the

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Board.

The RID initiator shall have the authority to appeal Disposition recommendations for any RID deemed valid by the screening official to the Pre-board.

Review open RIDs from previous reviews and determine if they shall be forwarded to the Board.

The chairperson may determine that Board review of a RID is needed even though the criteria listed above are not met.

Determine whether the entry and exit criteria, as stated in the Review Plan, have been met, and whether the Program/Project is ready to proceed to the next stage of development.

If the Pre-board finds that the entry and exit criteria have been met, that the Program/Project is ready to proceed to the next stage of development, and that there are no RIDs requiring Board review, they may recommend that the Board not convene.

If the Pre-board finds that the Program/Project is not ready to proceed, or finds that entry and/or exit criteria have not been met, or that specific RIDs must be reviewed by the Board, the Board shall convene.

6.2.13 Pre-board Chairperson

Publish Pre-board meeting minutes and distribute to the PM, LSE, Lead Subsystem Engineer (LSSE) (for subsystem reviews), the Pre-board and the Board. The minutes shall include a listing and summation of cost and schedule

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impacts and recommended disposition classifications for all RIDs, and a description of any RIDs requiring Board review. The minutes shall list all open RIDs from previous reviews, and whether or not Board review is required.

The minutes shall state whether or not the Pre-board considers the entry and exit criteria to have been met, and their recommendation regarding the readiness of the Program/Project to proceed to the next stage of development. The minutes shall also state whether or not the Pre-board recommends that the Board convene.

See Appendix C for suggested Pre-board concurrence sheet format.

Note: The Board chairperson may decide to convene the Board, even if the Pre-board did not recommend a Board meeting.

6.2.14 PM or Designee

If a Board meeting is held, present a summary of the Review. The summary shall include a complete list of all valid RIDs, the recommended Dispositions, and associated cost and schedule impacts. A total of the cost impacts shall be presented. RIDs forwarded to the Board for review and action shall be presented individually in sufficient detail to facilitate Board decisions regarding Disposition.

6.2.15 Board

Establish Disposition for all RIDs.

The Board may change action items previously established by the

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Pre-board, Review Teams, or Review Committee, and may accept the Pre-board Disposition recommendations or establish Dispositions that differ from the Pre-board recommendations.

The Board may over-rule the decisions of the RID Screening Official regarding rejected RIDs forwarded by the Pre-board for review.

The Board is the final RID Disposition authority.

6.2.16 Board Chairperson

At the conclusion of the Board meeting, the Board Chairperson shall publish the meeting minutes. The minutes shall include a listing of all RIDs, their Disposition classifications, and associated cost and schedule impacts.

The minutes shall state whether or not the Board considers the entry and exit criteria to have been met, and their finding regarding readiness of the Program/Project to proceed with the next stage of development. If the stated criteria have not been met, or the Program/Project is not ready to proceed, then the minutes shall state the required corrective actions.

The Program/Project shall not proceed further until the conditions established by the Board have been fulfilled.

If the Board did not convene, the Board Chairperson shall publish a list of Dispositions, cost and schedule impact for all RIDs, and confirmation that the entry and

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exit criteria as stated in the Review Plan have been met, and that the Program/Project is ready to proceed to the next stage of development based upon the recommendations of the Pre-board.

See Appendix C for suggested concurrence sheet format.

6.2.17 RID Actionees/Document Developers

Complete actions to resolve RIDs and provide documented evidence such as revised drawings or other documentation.

Note: Actionees shall provide closure data to the RID initiator for information. The Review Plan may require RID Initiator concurrence prior to RID closure.

6.2.18 Review Committee/Review Team Leads/Program/Project Personnel

Review closure data and provide concurrences to close RIDs in accordance with the requirements of the Review Plan.

6.2.19 PM

Review and approve closure of RIDs. Closure shall be based upon documented evidence that the RID has been resolved. RIDs shall not be closed based upon a plan of action for RID resolution.

The documented evidence required for closure, along with the completed RID form shall be maintained as a record.

Document results of the Review in accordance with MPG 8060.1 and section 9 of this MWI. If the Board Chairperson did not issue a positive finding of Program/Project readiness to proceed, a plan for repeating the review or a portion of the review, or other corrective

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actions assigned by the Board shall be included.

Documentation of review results constitutes formal completion of the Review. Closure of RIDs does not have to be complete prior to formal Review completion, however all RIDs must be dispositioned.

7. NOTES

None

8. SAFETY PRECAUTIONS AND WARNING NOTES

None

9. RECORDS

The following records are required by this MWI:

Record	Custodian
Data Package	PM or designee
Review Plan	PM or designee
Kickoff Presentation	PM or designee
RIDs and associated closure data	PM or designee
Pre-board minutes	PM or designee
Board minutes	PM or designee
Review results	PM or designee

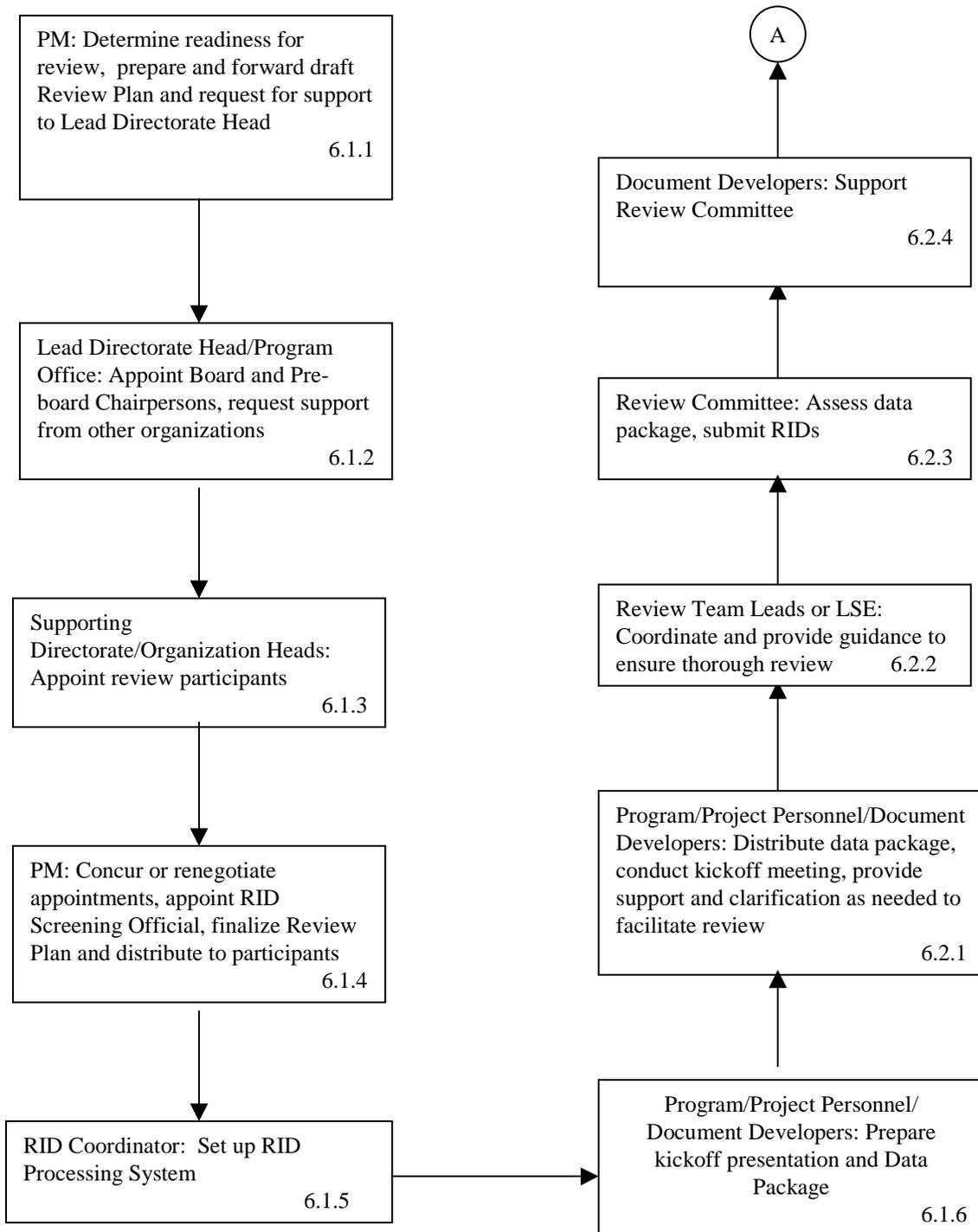
The PM will designate a custodian for these records, and document the designation in the Program/Project Plan, Data Management Plan, or Records Management Plan. The records will be retained and dispositioned in accordance with NPR 1441.1, "NASA Records Retention Schedules" (NRRS) 8, Item 5.

10. PERSONNEL TRAINING AND CERTIFICATION

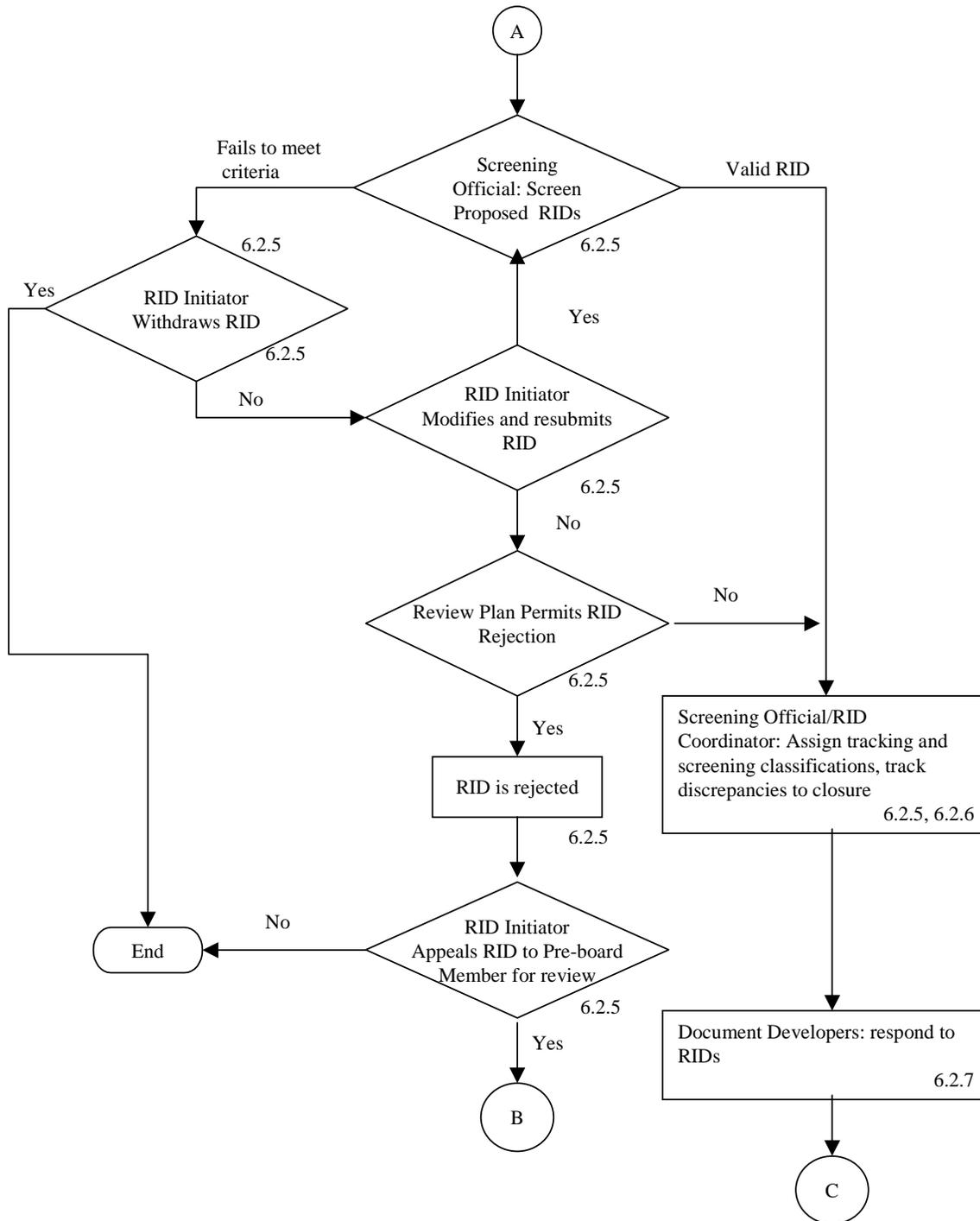
Review personnel shall be trained in use of the RID processing system specified in the Review Plan. No certification shall be required.

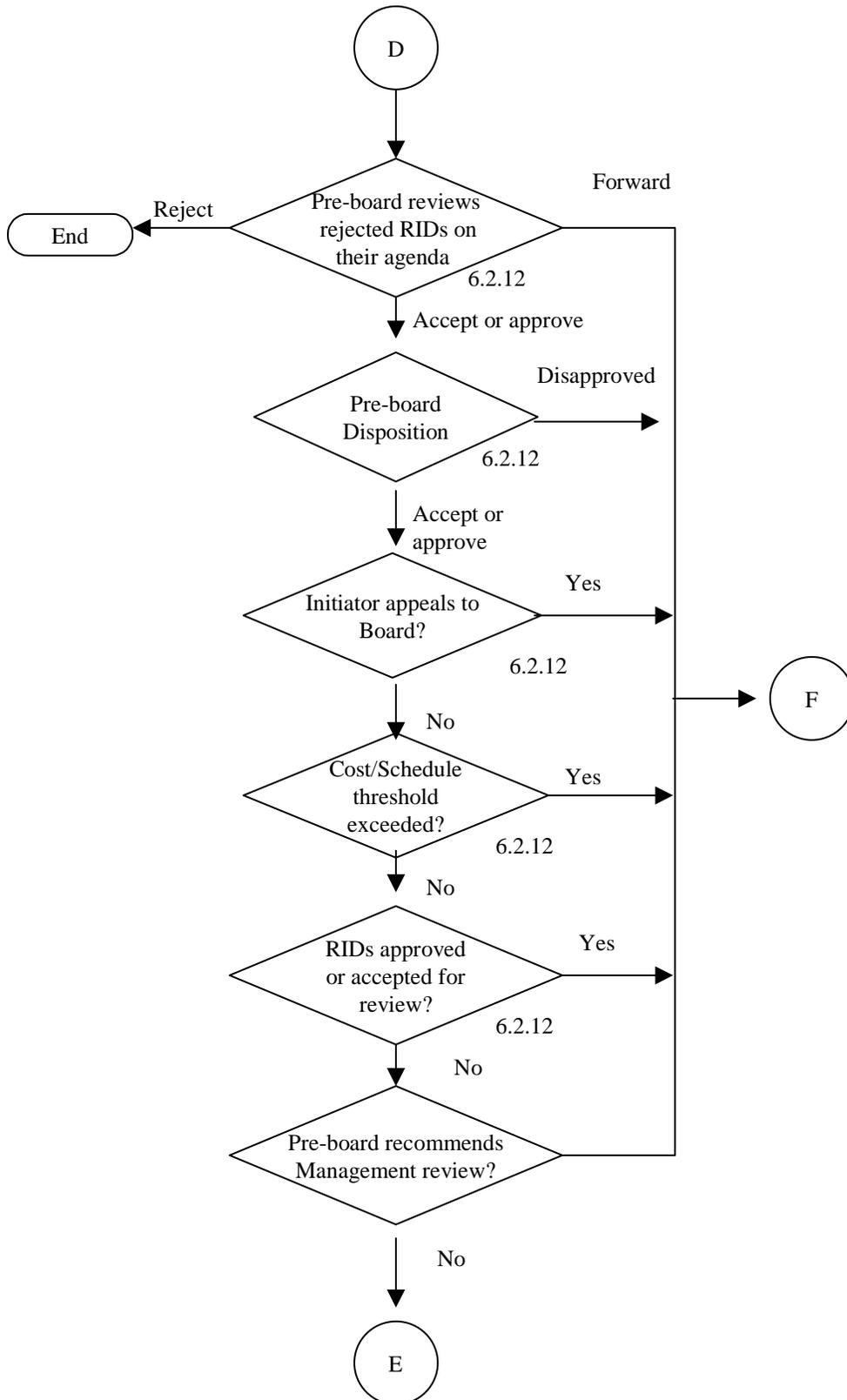
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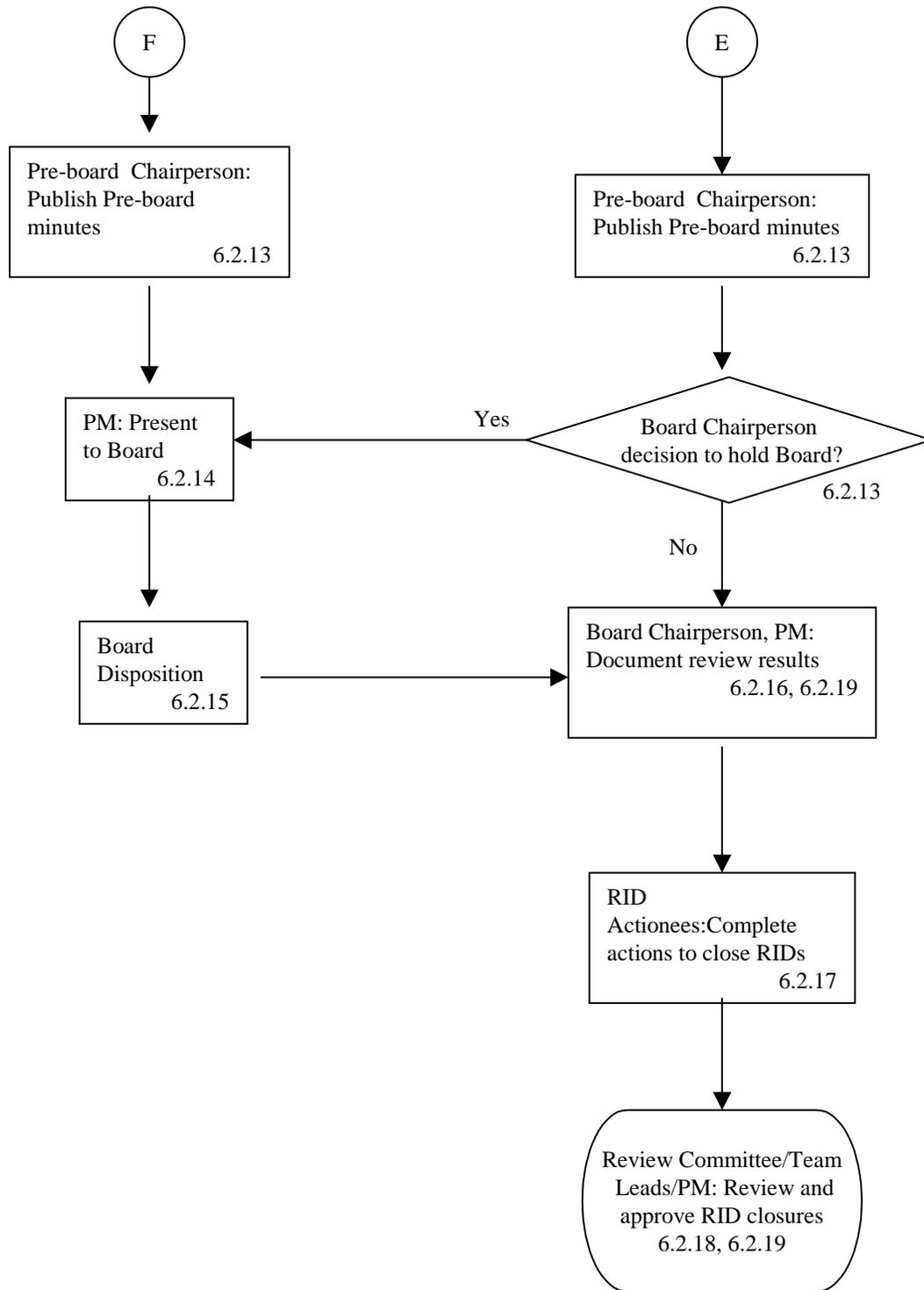
11. FLOW DIAGRAM



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12. CANCELLATION

MWI 8060.3 dated March 28, 2003

Original signed by
Axel Roth for

David A. King
Director

Chapter 1	The Review Plan
Appendix A	Guidance for Conducting Successful Reviews
Appendix B	Review Kickoff Meeting
Appendix C	Template for Pre-Board/Board Certification
Appendix D	Review Checklists
Appendix E	Sample RID Form

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CHAPTER 1. THE REVIEW PLAN

The Review Plan shall be established by the PM and shall contain the review objectives, scope, entry and exit criteria; Data Package contents; RID criteria, screening and tracking classifications, processing requirements; the review organization; and the review schedule. The plan shall be provided to the review participants prior to the kickoff meeting. Additional information and requirements for the contents of the Review Plan are provided in the following paragraphs.

CH1.1 Objectives, Scope, Entry and Exit Criteria

Objectives, scope, entry and exit criteria for the review must be clearly stated in the Review Plan in order for the Board to determine whether or not the review was successful. Guidance on objectives, scope, entry, and exit criteria for specific reviews is available in MSFC-HDBK-3173. Appendix D of this document may also be consulted in development of specific objectives, scope and criteria.

CH1.2 Data Package

A list of Review Documentation and Reference Documentation and their maturity levels shall be included. Typically Reference Documents are base lined and are not RID-able. The Data Package shall be provided to the Review Committee no later than the kickoff meeting. Guidance on data package contents for selected reviews may be found in MSFC-HDBK-3173, Appendix A. Appendix D of this MWI may also be consulted to determine data requirements and appropriate maturity for specific reviews.

CH1.2.1 Technical Standards Screening

The Data Package shall be screened and all technical standards, whether included in the package directly or as applicable or reference documents, will be entered on the NASA Standards Update Notification System <http://standards.nasa.gov> to determine if the technical standards are the most current versions available.

CH1.3 RID Criteria

RID criteria are used to determine whether or not a valid discrepancy exists between the Reference Documentation and the Review Documentation. Typical examples of RID criteria for selected reviews are listed in Appendix A.

CH1.4 RID Screening

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CH1.4.1 Screening functions shall include:

CH1.4.1.1 Review each RID against the RID criteria to determine if the RID is valid.

CH1.4.1.2 Assign screening and tracking classifications as described in CH1.4.2, CH1.5.1, and CH1.5.2.

CH1.4.2 Screening Classifications

CH1.4.2.1 Mandatory Screening Classifications

a. Valid RID

b. Withdrawal of RID by the RID initiator (Note that the initiator is the sole authority for withdrawal.)

CH1.4.2.2 Optional Screening classifications:

a. Rejection of RIDs that fail to meet the RID criteria (Note that the screening official is the sole authority for rejection). RID initiators, and other review members may not appeal the screening official's decision except in accordance with 6.2.9 and 6.2.10.

b. Combination with another RID is permitted when the corrective action will close both RIDs. This classification is most effectively used during the Review Team activity rather than in the initial screening. RID initiators must be notified when their RIDs are combined and they have the opportunity to appeal to the Pre-board and Board.

CH1.5 Tracking Classifications

Tracking classifications help the Program/Project to track RID status and focus attention on major RIDs or problem areas.

CH1.5.1 Mandatory Tracking Classifications

Mandatory tracking classifications are assigned to valid RIDs by the RID Screening Official.

CH1.5.1.1 RID identification number.

CH1.5.1.2 Assignment of valid RIDs to a review team or review committee member for disposition.

CH1.5.2 Optional Tracking classifications

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Optional tracking classifications may be assigned by the RID Screening Official, but are typically assigned by the Review Teams during the disposition process.

CH1.5.2.1 Subsystem or WBS element responsible for resolving the RID

CH1.5.2.2 Significant cost or schedule impact

CH1.5.2.3 Closure suspense date exceeds 90 days or other threshold established by the PM.

CH1.5.2.4 RIDs representing major technical risk.

CH1.5.2.5 Other classifications as required

CH1.6 Disposition Classifications

Disposition classifications characterize the findings of the Review Committee, Review Teams, Pre-board and Board.

CH1.6.1 Approved or accepted

The RID is approved or accepted as written or as modified, and an agreed to action, actionee, and suspense date has been assigned.

CH1.6.2 Disapproved

The Review Committee, Review Team. Pre-board, or Board has determined that the RID is not valid; or the Review Committee, Review Team, or Pre-board has failed to agree on the description of the RID, or has failed to reach agreement on an appropriate action, actionee or suspense date for resolution of the RID. Disapproved RIDs shall be presented to the Pre-board and Board.

CH1.6.3 Present to Pre-board

RIDs shall be presented to the Pre-board in accordance with 6.2.8.

CH1.6.4 Present to Board

a. RIDs shall be presented to the Board in accordance with 6.2.12.

CH1.6.5 Combined

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A RID may be combined with another RID when the corrective action will close both RIDs. Initiators of combined RIDs must be notified and given the opportunity to appeal to the Pre-board and Board.

CH1.6.6 Withdrawn by initiator

CH1.6.7 Approved for Study

If it is not possible to determine validity without further study, a RID may be approved or accepted for study. This practice is discouraged, and the Review cannot be officially completed until all such studies are complete, and the subject RIDs are approved (or accepted) or closed based on failure to validate the discrepancies. At a minimum, the Pre-board and Board membership must be notified in writing of the results of the studies, and the Board chairperson must issue amended Board minutes approving or accepting the dispositions.

CH1.7 RID Processing Requirements

A process must be established by the PM to enable orderly and efficient submission, screening, disposition, tracking and closure of RIDs. Typically, these processes refer to the initial RID submissions as pre-RIDs or Candidate RIDs (CRIDs). The process must clearly establish closure ground rules, such as required concurrences. The process shall be established by the PM, and shall utilize a form and system to record and track the following data:

CH1.7.1 Project Name

CH1.7.2 Type of Review

CH1.7.3 RID Number, and if used in the process, pre-RID or CRID Number

CH1.7.4 Name and contact information for RID initiator

CH1.7.5 Description of the discrepancy

CH1.7.6 Review documentation and location containing the discrepancy

CH1.7.7 Reference documentation and location of requirement being violated (this can include violation of the Review Plan when required data is not available, or upper level applicable documents not included in the Data Package when issues are

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discovered that would prevent the Program/Project from meeting its upper level requirements).

CH1.7.8 Screening and Disposition Classifications

CH1.7.9 Document developer's suggested corrective action, and associated cost and schedule impacts of resolving RID. (The PM shall establish thresholds for cost and schedule impacts which, if exceeded, require RIDs to be forwarded to the Pre-board or Board. Cost/schedule thresholds for Board review should be based upon the cost and schedule reserve available to the PM.)

CH1.7.10 Action, actionee and suspense date

CH1.7.11 Record of closure concurrences, approval, dates and associated evidence of closure.

CH1.8 Review Organization

The review organization shall be established by the PM based on the review objectives, scope, the amount and complexity of the review data, anticipated size of the Review Committee and the time allotted for review. As a minimum, the review organization shall consist of the Review Committee, Screening Official, RID coordinator, Pre-board, and Board.

CH1.8.1 Screening Committee/Screening Official

The PM may appoint a Screening Committee to review and make recommendations on the screening classifications of RIDs. The PM shall appoint a single Screening Official with the authority to conduct the screening meeting and rule on the screening classifications of all proposed RIDs. The PM may elect to serve as the Screening Official, or may delegate this responsibility to another individual, such as the LSE for a system level review, or a LSSE for a subsystem level review. The Screening Official shall be a senior Program/Project team member sufficiently familiar with all technical aspects of the Program/Project within the review scope to determine if proposed RIDs meet the criteria established in the Review Plan. If an individual serves as a Review Team Lead, Pre-board Chairperson, or Board Chairperson they shall not serve as the Screening Official, but may serve on the Screening Committee. The PM may give the Screening Official the authority to reject RIDs that fail to meet the criteria established in the Review Plan. Rejected RIDs shall not be forwarded through the disposition process (see 6.2.10 and 6.2.12).

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CH1.8.2 Review Committee

The Review Committee shall consist of project personnel and independent reviewers to ensure a thorough and independent review. Committee members shall be functional/technical experts capable of performing a detailed evaluation of the Data Package. Safety & Mission Assurance and the customer shall be represented on the review committee.

CH1.8.2.1 Review Committee Responsibilities

Review committee responsibilities shall include:

- a. Review of the Data Package in accordance with PM or Team Lead direction
- b. Discuss issues with Document Developers and generate RIDs in accordance with the RID criteria

Additional responsibilities that may be determined by the PM and listed in the Review Plan:

- c. Participate in developing disposition recommendations for RIDs with PM or team lead direction
- d. Discuss disapproved or controversial RIDs at the Pre-board and/or Board
- e. Review and concur with RID closures.

CH1.8.3 Review Teams

The PM may organize the Review Committee into teams based on functional areas, disciplines, subsystems, organizations or other categories. If the PM organizes the committee into teams, Review Team Leads shall be appointed to manage each team's review. Team Leads shall be functional/technical team leads or senior level engineers. Team leads shall not serve as Pre-board or Board members. If the Review Committee is not organized into teams, the PM shall perform the functions of review team leads. The PM may delegate this responsibility to the LSE, or LSSEs.

CH1.8.3.1 Review Team Leads

Review Team Lead responsibilities shall be determined by the PM and may include:

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- a. Plan and coordinate thorough review of documentation, including conducting tabletop reviews with Program/Project personnel and Review Team as required to ensure detailed and thorough review.
- b. Provide guidance to Review Team and facilitate discussions on difficult or controversial RIDs
- c. Prescreen RIDs
- d. Lead team in determining RID disposition recommendations.
- e. Consolidate similar RIDs
- f. Present results of their team's review to the Pre-board
- g. Review and concur with RID closures if required by the Review Plan.

CH1.8.4 Board and Pre-board

A majority of the Board and Pre-board shall consist of institutional or functional managers that are not part of the project or program team. Each organization represented on the Review Committee shall be represented on the Pre-board and Board. If non-MSFC organizations participate on the Review Committee, then the PM shall state in the Review Plan whether or not the non-MSFC Pre-board and Board members hold voting or non-voting positions. The Systems Management Office shall be represented on the Board and Pre-board in a voting capacity. The MSFC Center representative for the NASA Engineering and Safety Center (NESC) shall be invited to attend as an ad hoc (non-voting) member of the Pre-board and Board.

CH1.8.4.1 Typically, the Board Chairperson is a manager two levels above the PM and the Pre-board Chairperson is a manager one level above the PM.

CH1.8.4.2 Typically, Board members are managers two levels above Review Team Leads and Pre-board members are managers one level above Review Team Leads. If the Review Plan does not stipulate review teams, Board members should be managers two levels above Review Committee members, and Pre-board members should be managers one level above Review Committee members. The same individual shall not serve as an organization's Pre-board and Board member.

CH1.9 Schedule

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The PM shall establish the review schedule. As a minimum, the schedule shall include:

CH1.9.1 Data Package availability - The data package shall be available to the Review Committee no later than the kickoff meeting.

CH1.9.2 Kickoff meeting

CH1.9.3 RID submission deadline

CH1.9.4 RID screening meeting(s)

CH1.9.5 Pre-board meeting

CH1.9.6 Board meeting

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APPENDIX A

Guidance for Conducting Successful Reviews

A.1 Program/Project Readiness

Ensuring adequate project maturity is crucial to the successful completion of the review. Conducting the review before the Program/Project is sufficiently mature will most likely result in large numbers of legitimate RIDs and/or RIDs that require lengthy study, analysis, or prerequisite work. The PM is encouraged to conduct an internal audit of review documentation prior to scheduling the review to ensure that the requirements and/or design are sufficiently mature for the review, and that the documentation of the data accurately reflects the configuration. The PM may elect to establish a threshold for RID suspense dates, such as 90 days. RIDs which are anticipated to exceed the threshold for resolution may need review by the Pre-board and/or Board to determine if the RID is valid for the subject review, and if the Program/Project is mature enough to meet the intent of the review milestone.

A.2 RID Criteria

Clear and effective RID criteria are crucial to the success of the review. Ambiguous RID criteria will likely result in a large number of RIDs of limited value to the project. It is important to keep in mind that every issue should not be worked as a RID. For instance, during a design review new requirements or design changes to improve the product should be incorporated through the engineering change process, rather than through the RID process. RIDs shall not be accepted against presentation packages because presentations do not constitute official requirements or design documentation which can be updated per a RID action to correct discrepancies. Appropriate RID criteria for selected reviews include the following:

A.2.1 Technical Requirements Review

A.2.1.1 A requirement is not necessary, achievable, verifiable, clear or consistent with agency policy or higher-level requirements.

A.2.1.2 One or more requirements have not been properly flowed to the next lower-level.

A.2.1.3 Requirements are inconsistent.

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A.2.1.4 Missing or incomplete requirements.

A.2.1.5 Lack of sufficient information (sufficient basis for RID only if the review committee has exhausted all reasonable means to obtain information, and the requirement for the information is reasonable based on the project maturity, review scope, objectives and entry criteria).

A.2.2 Project Requirements Review

A.2.2.1 Inadequate or ineffective project planning.

A.2.2.2 Planning is not in compliance with upper level requirements.

A.2.2.3 Lack of sufficient information (sufficient basis for RID only if the review committee has exhausted all reasonable means to obtain information, and the requirement for the information is reasonable based on the project maturity, review scope, objectives and entry criteria).

A.2.3 Design Review

A.2.3.1 A finding that a deficiency exists in meeting requirements.

A.2.3.2 Addition of or change in requirements is a valid basis for a RID only if such action is required for the system to meet its overall safety or performance requirements, and only if the requirements documentation is not base lined. Changes to base lined requirements are to be incorporated through the Engineering Change Process to ensure proper identification and review of affectivity and impacts.

A.2.3.3 Lack of sufficient information (sufficient basis for RID only if the review committee has exhausted all reasonable means to obtain information, and the requirement for the information is reasonable based on the project maturity, review scope, objectives and entry criteria).

A.2.3.4 Improvements to baselined requirements or baselined design implementation are not valid RIDs. Suggestions for improvements should be submitted through the Engineering Change Process. This can be accomplished by assigning an official non-RID action item as part of the review, or using the program/project action item tracking system to submit an ECR. The change process should provide sufficient review to determine whether or not the change can or should be approved.

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A.3 RID Screening

Screening is another crucial element of a successful review. RIDs should be screened to ensure that they really document a technical deficiency between Reference and Review Documentation, and that they are founded on reasonable expectations based on the objectives and scope of the review. If the RID screening is just a rubber stamp approval of all proposed RIDs, then the project may be burdened with large numbers of trivial or inappropriate RIDs, diverting resources to administrative RID processing, as well as working through actual technical changes and refinements of the design. When conducting the screening, the screening official should consider the following:

A.3.1 Does the proposed RID meet the RID criteria established in the Review Plan?

A.3.2 Does the proposed RID document a technical deficiency, or does it reflect a political issue? The RID process is not the appropriate avenue for working political issues.

A.3.3 Is the proposed RID based upon accurate requirements? A RID based upon a "potential" change in Reference Documents is not appropriate.

A.3.4 Will the RID require lengthy study or analysis to resolve (i.e., longer than 90 days)? This could indicate that the RID is not appropriate for the review objectives (i.e., a CDR level RID written at PDR), or that the Program/Project has not reached the appropriate maturity level for the review.

A.4 RID Tracking

Tracking RID closure is a valuable Technical Performance Metric that PMs are encouraged to utilize as part of the regular project status. This is easily done by using the RID suspense dates for the "planned" performance, and obtaining status from the RID coordinator on "actual" closures. RID closure tracking by WBS is an effective means of determining technical areas that require management attention. An example of typical RID tracking chart is shown in figure A-1.

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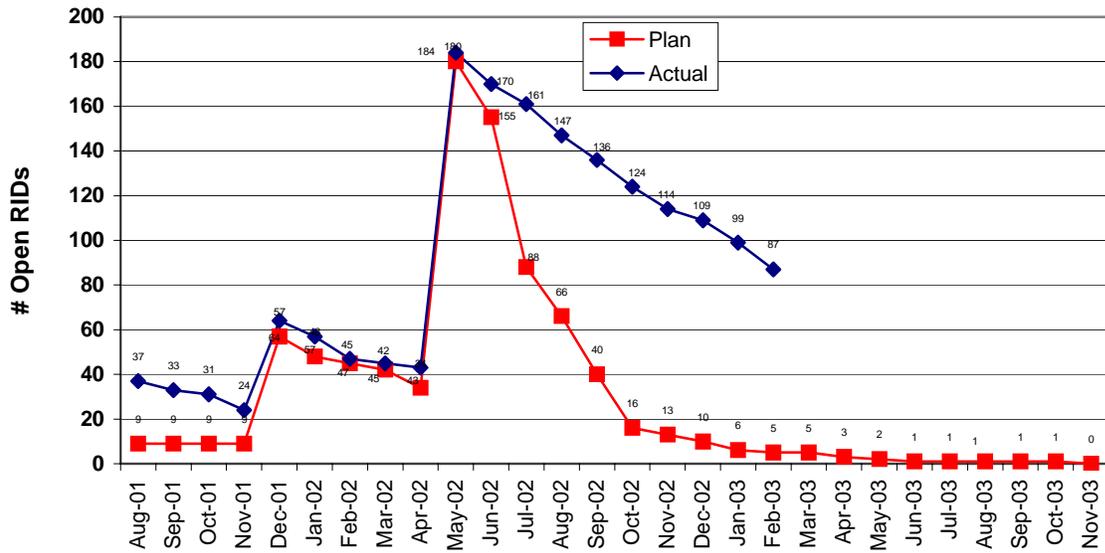


Figure A-1

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APPENDIX B

Review Kickoff Meeting

B.1 Purpose

The purpose of the kickoff meeting is to provide the Review Committee with an overview of the objectives, scope, ground rules and processes of the review; and a top level understanding of the system and subsystems under review. The committee should be presented with the driving requirements, and how they are implemented. Block diagrams, signal flow diagrams, schematics, logic flow diagrams, and results of analyses, models and simulations should be presented. Estimates of mass, power, volume, crew time requirements and other constrained resources, and the basis for estimates should also be presented. Parts selection, de-rating, radiation hardness, identification of single point failures, high risk and life-limiting aspects of the design should be covered as well.

B.2 Agenda

A typical agenda for a design review kickoff:

Introduction/Welcoming Remarks	Project Manager
Safety Procedures (protected areas/evacuation routes, etc)	
Project Overview	
Review Scope and Objectives	
Review Teams/Responsibilities	
Review Process/Ground rules	
RID Criteria and other Ground rules	

RID Processing	RID Coordinator
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System Overview	Lead Systems Engineer
Requirements/Verification Flow	
Design Overview	
Interfaces, Integration and Test	
Issues/Concerns	

Subsystem A	Lead Subsystem Engineer
Requirements/Verification	
Design Overview	
Interfaces	
Manufacturing, Integration and Test	
Issues/Concerns	

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Other Subsystems as Applicable

Lead Subsystem
Engineers

Operations

Requirements/Verification
Concept/Planning Overview
Training
Issues/Concerns

Lead Operations
Engineer

Safety and Mission Assurance

Lead S&MA Engineer

Concluding Remarks

Project Manager

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APPENDIX C

Template for Pre-Board/Board Certification

Program/Project Name

Name of Review

Pre-Board or Board Findings

Date

The Pre-Board/Board Chair recommends the following:

_____ The Project has demonstrated successful completion of the Entry Criteria defined in the Review Plan.

_____ The Project has demonstrated successful completion of the Exit Criteria defined in the Review Plan and it is recommended that they proceed to the next major milestone.

_____ The Project has not demonstrated successful completion of the defined Criteria. In order to address these issues the following actions are required:

- a. List issues and corrective actions required

_____ Rationale/Additional data as needed...

Pre-Board Member Concurrences:

Board Member Concurrences:

Attach list of all RIDs, disposition classifications (or disposition classification recommendations by Pre-board), and cost/schedule impacts.

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APPENDIX D

Review Checklists

The following review checklists are provided to assist the Program/Project personnel in planning and conducting the review, and to assist the Review Committee, Pre-board and Board in evaluating the Program/Project.

D.1 Program/Project Requirements Review (PRR)

D.1.1 Roles and Responsibilities

- Are roles and responsibilities, including PM, LSE, LSSEs and line organizations well-defined and communicated?
- Are appropriate agreements or planning for agreements in place?
- Are accountability and responsibility at the right levels?
- Are reporting mechanisms to Project, Center, and Program Management in place?
- Are cost, schedule, and technical issues and associated risks presented as an integrated picture?

D.1.2 Requirements and Mission Success Criteria

- Are Level I requirements clear and consistent? Are they clear and traceable from Agency policy?
- Are Level I requirements reasonable and achievable?
- Are requirements flowed down from Level I through the appropriate lower-level?
- Are requirements specific and realistic at the appropriate level? Are they verifiable?
- Do minimum and full mission success criteria exist? Are the criteria relevant and measurable? Is "Mission Success First" reflected in the top-level requirements?

D.1.3 Management

- Have the Program Commitment Agreement (PCA)/Program Plan been approved? Is the Project Plan ready for submission to the approval process?
- Are the levels of insight established?
- Are project management processes in place?
- Is there a product oriented WBS?
- Is there a credible cost estimate based on the WBS?

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- Are there identified reserves in the budget, and are they adequate?
- Is the staffing plan adequate? Is funding adequate for staffing levels?
- Are adequate Earned Value Management measures in place?

D.1.4 Analysis and Trade Studies

- Is there sufficient technical analysis in all elements, systems, subsystems and technical disciplines to provide appropriate assurance of the ability to meet requirements?
- Have sufficient trade studies been completed at the mission, element, system, and subsystem level?

D.1.5 System Engineering and Verification

- Are systems engineering processes in place?
- Has verification planning been developed, including interfaces?
- Has independent verification and validation been planned?
- Is a rigorous change control process in place?
- Have technical performance metrics been defined and plans for regular tracking put in place?

D.1.6 Technology

- Is any new technology needed that has not adequately matured? Does it represent acceptable deployment risk? Has project identified clear technology readiness level (TRL) transition criteria?
- If there are foreign or commercial partners, are safeguards in place to prevent proliferation of sensitive technologies?

D.1.7 Schedule

- Is the schedule based on an integrated logic network rather than just a task list?
- What is the critical path? What is the difficulty level of items on the critical path? What are the high-risk items on the critical path?
- What are constrained dates on the schedule
- How much slack is carried in the schedule? Where is it located?
- What is the calendar for the schedule? Does it allow for holidays, and other downtime?

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- Does the schedule reflect the WBS?
- Is the schedule resource loaded?
- Is there a process for schedule management and reporting in place?
- Are time scales for development decisions in technology readiness reasonable and credible?

D.1.8 Risk

- Is there a credible Risk Management Plan?
- Has the acceptable level of risk been identified and bought into by all management levels?
- Are risks integrated with cost and schedule estimates?
- Are risk management tools in place (e.g., requirements for failure modes and effects analysis (FMEA), fault tree analysis (FTA), hazard analysis, and probabilistic risk assessment?)

D.2 System Requirements Review (SRR)

D.2.1 General

- Did the project conduct a PRR? If not, checklist for PRR is appropriate for SRR, in addition to SRR checklist.
- Have all open RIDs from PRR been closed? Open RIDs should be presented to Preboard and Board and appropriate actions taken, but should not be readdressed by the review committee.

D.2.2 Requirements

- Are all requirements flowed down and appropriately allocated in the system specification? Is there a Requirements Traceability Matrix?
- Are requirements specific and realistic at the appropriate level? Are they verifiable?
- Are requirements developed for special test equipment, ground support equipment, flight support equipment, crew/ground support personnel trainers and ground data systems?

D.2.3 Analysis and Trade Studies

- Is there sufficient technical analysis in all elements, systems, and technical disciplines to provide assurance of the ability to meet requirements? Analyses should include:
 - o mission operations
 - o logistics
 - o electrical systems

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- o command, data handling and software systems
- o maintainability
- o reliability
- o safety
- o structures and dynamics
- o materials, contamination control, manufacturing and other processes
- o human factors
- o acoustics
- o electromagnetic compatibility
- o radiation effects
- Is functional flow analysis of sufficient detail to ensure appropriate requirements allocations and derivations? Is it based on the design mission analysis?
- Have sufficient trade studies been completed at the mission, element, system, and subsystem level?

D.2.4 Systems Engineering and Verification

- Have verification methods been determined, including interfaces, and are they appropriate? Are necessary agreements in place with partners to accomplish total system level verification?
- Does the system engineering management plan include adequate emphasis on mechanical and electrical integration?
- Is the qualification approach adequate and appropriate for the level of complexity of the systems and subsystems?
- Is there a preliminary error budget?
- Are resource allocations established?

D.3 Preliminary Design Review (PDR)

D.3.1 General

- Are there open actions and RIDs from previous reviews? If so, they should be reviewed by the Preboard and Board, but not readdressed by the review committee.

D.3.2 Requirements

- Have all system Requirements been allocated to the subsystem and component levels and is the flow down adequate to verify system performance?
- Are all interface requirements firmly established? Are draft Interface Control Documents ready for release at completion of the review?

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D.3.3 Analysis and Systems Engineering

- Is Proof of Concept Engineering Analysis based upon the Design Reference Mission Document, or Reference Mission Scenario?
(Proof of Concept Engineering Analysis includes models, analyses, schematics and other engineering data such as system connectivity diagrams, end to end functional schematics, thermal analysis, electrical power analysis, dynamics analysis, stress analysis, data handling and system software analysis, functional description of system and subsystem operations, etc.)
- Does Proof of Concept Engineering Analysis indicate that selected design approach will meet established requirements?
- Have system and subsystem performance and resource budgets been established (weight, power, data rate, central processing unit loading, acoustic, etc.)? Do analyses of subsystems and system indicate that final product will meet requirements?
- Does mission architecture provide adequate data for failure investigation?
- Are logistics, maintainability and sparing plans consistent and appropriate to meet established lifetime requirements?
- Are verification pass/fail criteria established, including those for interfacing subsystems?
- Have the submitted safety (FTA, Hazard Analysis) and reliability (FMEA) assessments been addressed by the design, and have any residual issues been assessed by the risk management process?

D.3.4 Design

- Are models used to conduct analyses based upon the appropriate criteria and constraints and of appropriate fidelity for 50% design completion?
- Have breadboards and/or development units been built and tested as required to drive out design issues prior to development of detailed design drawings?
- Is there sufficient detail and maturity in design to demonstrate 50% design completion, 10% drawing completion, and readiness to proceed to detail design?
- Is appropriate planning in place for long lead items? Are there any issues with availability of parts that meet qualification requirements?
- Are ground operations and test plans consistent with verification planning, and are GSE designs mature enough to support availability of required GSE and test equipment when needed?

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- Are designs developed for crew/ground support personnel trainers and ground data systems?
- Are there sufficiently detailed system and subsystem error budgets established? Will the designs fall within these budgets with adequate margins?
- Are qualification test levels appropriate?
- Is the Design verifiable? Are there aspects of the design that could cause major problems with potential schedule delays and cost overruns?

D.4 Critical Design Review (CDR)

D.4.1 General

- Was a PDR held for the subject system or subsystem? If not, PDR checklist should be included for CDR.
- Are there open actions and RIDs from previous reviews? If so, they should be reviewed by the Preboard and Board, but not readdressed by the review committee.
- Have all recommendations from Design audits been addressed, and action items closed?

D.4.2 Analysis and Design

- Will the detail design at the system, subsystem, and component levels meet performance and functional requirements within cost and schedule constraints?
- Are models used to conduct analyses based upon the appropriate criteria and constraints and of appropriate fidelity for 90% design completion?
- Is design maturity at 90% completion, including final design drawings? Are drawings ready for release and manufacturing? Are fabrication drawings essentially complete, including complete bill of materials? Typically, the following details are expected for CDR drawings:
 - Dimensions are complete, concise and properly specified.
 - Tolerances are properly specified.
 - Inspectability of applicable attributes
 - Reference dimensions are properly shown.
 - Flag notes are clear and concise.
 - When a flag note is referenced, there is a corresponding flag note in the note section.
 - All flag notes in the notes section are properly referenced in the body of the drawing or parts list.
 - All material callouts are correct.
 - Find numbers are properly referenced.

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- o Electrostatic discharge susceptibility requirements are properly referenced.
- o All special processes (soldering, crimping, finish, etc) reference a MSFC approved procedure.
- o Special handling and cleanliness requirements are specified.
- o Test requirements are referenced and properly specified.
- Is the detail design based upon completed engineering analyses?
- Will combined error budgets result in a total system performance that meets requirements?
- Are performance, schedule, and cost margins adequate?
- Are the system, subsystem, and component designs of sufficient detail to allow orderly hardware manufacturing, software coding, integration, and test within acceptable risk levels?
- Do software simulations and prototyping indicate acceptable risks to proceed?
- Do the submitted safety (FTS, Hazard Analysis) and reliability (FMEA) assessments indicate that residual issues from PDR have been addressed, and that risks are acceptable?
- Does the integrated logistics analysis indicate complete spares provisioning?

D.4.3 Test and Verification

- Has a comprehensive system verification approach been established?
- Are qualification/environmental test plans and test flow adequate to ensure smooth transition to product delivery?
- Are tests repeated after configuration changes? Are adequate end-to-end tests planned?
- Have engineering models/prototypes been built and tested as required to drive out issues prior to development of flight system?

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APPENDIX E - Sample RID Form

Header	1. PreRID Number: (Use initials + sequence # - ABC-01 - then hit Enter) (PreRID Number) <input type="text"/>		REVIEW ITEM DISCREPANCY (RID)		4. RID Number: (Will be assigned by the system) (RID Number) <input type="text"/>		
	2. Project:		Note: Optional fields have a darker background.		5. Date:		
	3. Review Type:				6. RID Status:		
	7. PreRIDs/RIDs Combined with this RID:						
Block A - Initiator	8. Initiator Name - First:		9. Last		10. Site: (Site) <input type="text"/>		
	12. Phone:		11. Org:				
	13. E-mail:						
	14. Reviewed Item: (RIDable Document) <input type="text"/>						
	15. Page/Sheet:		16. Para/Zone:		17. Sec/Vol/Part:		
	18. Assigned Team:						
	19. RID Subject: (200 characters max.)						
	20. Discrepancy: (Fully describe the problem/discrepancy - 65K characters max.)						
	21. Reference Document: (Document that contains the requirement not met by Reviewed Item.) (Reference Document) <input type="text"/>					22. Para.:	
	23. Consequences if Not Corrected: (2000 characters max.)						
24. Initiator's Recommended Corrective Action: (Where appropriate, use "From-To" Language - 2000 characters max.)							
25. Remarks: (2000 characters max.)							
Block B - Screening	26. RID Screening Disposition: <input type="radio"/> Withdrawn by Initiator <input type="radio"/> Cancelled - 27. Rationale: <input type="radio"/> Combined With - 28. RID#:						
	29. Track as <input type="text"/> (Tracking Classification) <input type="text"/>						
	30. Sorting Category: <input type="text"/> (Sorting Category) <input type="text"/>						
	31. Remarks: (May be added by any reviewer with screening access. Remarks will be date/time-stamped - 2000 characters max.)						
	32. Screening Lead's Approval: (Signature will promote the RID to the next status level)					33. Date:	

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Block G - Implem.	57. RID Implementation Information: (Summarize RID Actions. Where appropriate, use "From-To" language - 65K characters max.)	
	58. System Engineer's Approval: (Signature will promote the RID to the next status level)	59. Date:
	60. RID Implementation Concurrence	61. RID Implementation Closure
	<input type="radio"/> Yes <input type="radio"/> No Initiator:	Close RID? <input type="checkbox"/> Yes
	<input type="radio"/> Yes <input type="radio"/> No Reviewer:	Proj. Mgr.: Date:
62. RID Implementation Remarks: (May be added by Implementation reviewers and Approval Authority - 2000 characters max.)		