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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

APOLLO

GUIDANCE, NAVIGATION AND CONTROL

E-1186
(Rev. 6)

TECHNICAL DATA
RELEASE PROCEDURES

MARCH 1970

MIT

**CHARLES STARK DRAPER
LABORATORY**

CAMBRIDGE MASSACHUSETTS 02139

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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GUIDANCE, NAVIGATION AND CONTROL

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Section 1

INTRODUCTION

1.1 PURPOSE

This procedure, MIT Report E-1186, establishes the method for the release and revision of the technical data necessary to fulfill the design responsibility assigned to MIT on the Apollo Guidance and Navigation system and the NASA approval requirements as related to these data. It establishes the method by which MIT will control the design configuration as represented by the technical data released.

This procedure is an integral part of MIT Report E-1087, "Documentation Handbook and Plan".

1.2 SCOPE

The procedures for release and revision of technical data require the:

- (1) Establishment of a Configuration Control Board (CCB) as an adjunct of the Configuration Management Office (CMO) for the formal processing of documents,
- (2) Identification and definition of documents which must be processed under this procedure,
- (3) Establishment of responsibilities in processing the release and revision of technical data,
- (4) Establishment of necessary forms and the distribution of data.

Section 2

CONFIGURATION CONTROL BOARD

2.1 FUNCTION

The Configuration Control Board (CCB) is the authorizing agency for the initial release and subsequent revision of technical documentation for Apollo Guidance and Navigation equipment. This authority is delegated to members as necessary to expedite the flow of technical documentation; however, the designated members must have approval authority commensurate with their responsibilities.

2.2 CONFIGURATION CONTROL BOARD MEMBERSHIP

CCB membership is comprised of authorizing and participating members.

Authorizing members include personnel from NASA, MIT, AC Electronics, and the Contractor affected by the document release or revision.

Participating Members are as follows:

NASA:	NASA/RASPO and/or government inspectors or other personnel as desired
MIT:	Design Review Board, systems integration engineer, or other representation as required
AC Electronics:	Document controller
AC Electronics:	Recorder
Contractor:	Support or observer personnel as required.

The organization of the Configuration Management Organization is shown in Figure 2-1.

2.3 PROCEDURE AND RESPONSIBILITIES

The formal and complete release of technical data requires the approval of the Authorizing Members as appropriate of the Configuration Control Board (See paragraph 2.4). If any one approval is withheld, an agreement must be reached on the further action or disposition of the document, and responsibility for completing the action shall be assigned by the Board.

The Configuration Control Board functions on the basis that complete coordination and understanding has been attained prior to presentation of the document for formal release. The formal meeting of the Board presents the opportunity for the Authorizing Members to query in detail the other organizations involved as necessary before approval of a document.

The technical data released by the Configuration Control Board constitute the authenticated sources of design data to be used in the Apollo Guidance and Navigation equipment.

The names of the Authorizing Members and their alternates designated by each organization shall be formally submitted to the chairman of the Configuration Control Board for inclusion in the administrative record of the Board.

2.3.1 AUTHORIZING MEMBERS. The responsibilities of the Authorizing Members in order of their approval of documents are as follows:

2.3.1.1 MIT. It is an MIT responsibility to assure that all initial releases, all Class 1 and designated Class 2 revisions (see paragraph 2.4), of a document are approved by the cognizant design group and, when necessary, by the Design Review Board prior to presentation to the CCB.

The MIT/CCB signature represents MIT technical and managerial approval of the document, and clearance through the MIT Documentation Control Center.

The AC Electronics Authorizing Member of CCB has the following functions:

- (1) Establish time and place of meetings,
- (2) Designate work load requirements,

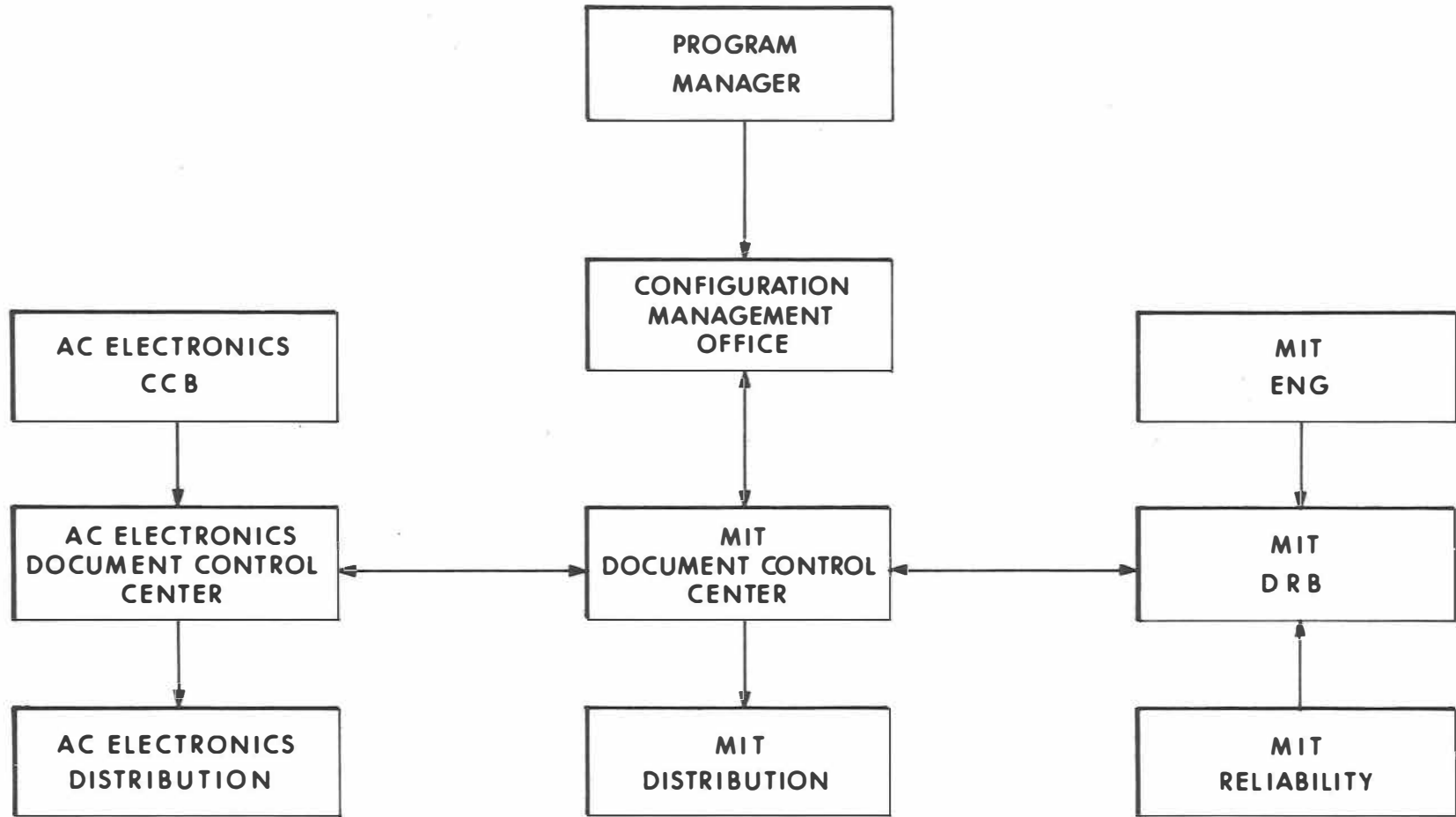


Fig. 2-1. Configuration Management Organization

- (3) Notify required Participating Members,
- (4) Provide support services (recorder and document controller),
- (5) The AC Electronics CCB signature accepts the responsibility for correctness of all documentation to insure applicability of NASA- approved effectivities, completeness of all documentation changes, and proper accountability.
- (6) Perform Contractor responsibilities as detailed in 2.3.1.2.
- (7) Assure that all Class 1 and initial release TDRRs have received the approval of MIT or AC Electronics DRB signifying acceptance of the design responsibility for the release or change with (when required) a DRB-recommended effectivity.

2.3.1.2 Contractor. Each Contractor having responsibility for preparing and accepting technical data shall have an Authorizing Member of the Board in attendance when documents for which he has cognizance are being considered. Upon approval of a document, this member shall be responsible for:

- (1) Accepting the technical data as binding within the cost, schedule, and effectivity designated. If, for a reason acceptable to NASA, the impact cannot be fully recognized at the time the document is considered, modifying conditions may be made on the TDRR.
- (2) Presenting to the Board any problems his organization foresees in carrying out the design intent, effectivity, or any other considerations being imposed.
- (3) Accepting the documentation requirements for correctness, format, and distribution when applicable by contract.

2.3.1.3 NASA. The NASA Authorizing Member, as Chairman of the Board, gives final approval to the document to signify the Government's acceptance of the technical data and the possible program impact on cost, schedule, and effectivity per authorizing documents (ECP/CCA). The NASA approval also permits the designation of the document as a "NASA Document" (Master copy in the case of original release).

2.3.2 PARTICIPATING MEMBERS. The Participating Members are in direct support of the Authorizing Members.

2.3.2.1 NASA. The NASA Participating Member, who may be associated with other agencies of the Government, shall act as requested by the Authorizing Member to support the Authorizing Member or to observe proceedings.

2.3.2.2 Contractor. The Participating Member shall act in support of the Contractor's Authorizing Member, particularly in presenting the data.

2.3.2.3 MIT. The Participating Member for MIT shall be the cognizant design group leader, system integration engineer, and/or other personnel required to present documents and supply additional information to the Board.

2.3.2.4 Document Controller. The Document Controller is a required Participating Member to support the AC Electronics Authorizing Member in:

- (1) Processing the approved CCB actions and documents into the documentation control system,
- (2) Coordinating the AC Electronics support function of reproducing and distributing documents,
- (3) Checking documents for completeness and the accuracy of managerial information.

2.3.2.5 Recorder. The Recorder is a required Participating Member and provides services assigned by AC Electronics under the direction of the Document Controller. His activities will include, but not be limited to, the following:

- (1) Preparing for the CCB meeting and coordinating the schedule by ascertaining the number and types of releases, communicating with CCB members, and the like,
- (2) Assisting the Document Controller,
- (3) Maintaining a complete log of all items brought before CCB and the actions resulting,
- (4) Assigning TDRR numbers to completed CCB actions,

- (5) Maintaining and publishing a record of CCB actions on a weekly basis, indicating TDRR actions completed and reasons for rejection or delays of any unfinished TDRR action,
- (6) Providing typing and other clerical services at CCB as required,
- (7) Distributing sepias of released documents,
- (8) Assure sequential revision letter assignment.

2.4 CCB RELOCATION

With the move of the CCB to AC Electronics the following exceptions to normal CCB procedures apply:

- (1) MIT shall Design Review Class 1 changes to the Airborne and Ground Support Equipment and sign them for CCB action, except JDCs, Manuals, and Documentation for items for which AC Electronics has received contractual design responsibility.
- (2) MIT shall Design Review Class 1 and Class 2 changes to the airborne computer (AGC and LGC) and shall sign them for CCB action.
- (3) MIT shall Design Review Class 1 and Class 2 changes to NDs and SCDs, obtain NASA concurrence, and sign them for CCB action. This review shall continue until such time as the NASA MSC considers suitable for discontinuing in terms of design and drawing stability. The contractors shall be notified in writing when this judgment is made.
- (4) MIT signature is not needed for other Class 2 changes. Only AC Electronics, NASA, and Subcontractor approval, as applicable, is required to process this type of change through the CCB.
- (5) All initial releases and changes to MIT-maintained documents, including Contract Technical Specifications, K-Start tapes, Computer Programs, etc., shall be approved by MIT DRB and released with only the completed TDRR to AC Electronics CCB through the MIT Document Control Center.

AC Electronics CCB approval on these TDRRs will constitute accountability into the document control system.

- (6) After 1 September 1966 MIT will microfilm all releases and changes to MIT-maintained documents, and forward through MIT Document Control Center to AC Electronics for distribution of aperture cards. This submittal will consist of two silver-halide exposures of each frame plus one positive copy roll.

- (7) Exceptions to the submission of Initial Release or Revision TDRRs for MIT DRB approval will include documents for those items for which AC Electronics has received contractual design responsibility. Initial Release and Revision TDRRs for these items will receive Design Review Board at AC Electronics DRB followed by submission to NASA CCB for approval.

Section 3

IDENTIFICATION OF TECHNICAL DATA SUBJECT TO RELEASE AND REVISION PROCEDURES

3.1 PURPOSE

The purpose of this section is (1) to identify the documents which are subject to the Technical Data Release Procedure, (2) to define the release and revision classifications, and (3) to identify the requirements unique to each classification.

3.2 DOCUMENTS

The following must be processed through the Technical Data Release Procedures to become approved documents for use in the design, development, production, testing, and acceptance of the Apollo Guidance and Navigation system and/or any related equipment.*

	Applicable Documents
(1) All drawings and drawing revisions: schematics, assemblies, parts lists, layout, packaging, and the like	E-1167
(2) Procurement Specifications (PSs)	E-1087
(3) Specification Control Drawings (SCDs)	E-1167
(4) Assembly Test Procedures (ATPs)	E-1087
(5) Job Description Cards (JDCs) and Data Sheets	E-1087
(6) Process and Material Specifications (NDs)	E-1087
(7) Final Test Methods (FTMs)	E-1087

*Note: See paragraph 5.5 for special procedures covering Ground Support Equipment.

(8)	Interface Control Documents (ICDs) and Interface Revision Notices (IRNs)	NASA/MIT Contracts
(9)	Waivers/Deviations*	E-1186
(10)	Retrofits	E-1186 E-1293
(11)	Manuals	NASA Contracts
(12)	Qualification Status List	NPC 200-2
(13)	Computer Programs	E-1087

This list does not preclude the addition of other documents for which a review cycle and document control may be desirable or mandatory.

3.3 IDENTIFICATION OF DOCUMENT RELEASE CLASSIFICATIONS A, B, O, AND I.

Documents referred to herein are grouped into four classifications: Class A, Class B, Class O, and Class I.

3.3.1 CLASS A RELEASE. Class A documents are those which the project or design engineer designates as representing the design configuration to be used for "flight hardware" and its supporting equipment. Revisions to Class A documents must be rigidly controlled since such revisions may affect interfaces, procurement specifications, tooling, and the like. Incomplete initial releases shall be subject to management approval prior to CCB action, and shall be approved only in exceptional cases. MIT DRB shall review and approve all initial Class A releases for which they have design responsibility prior to CCB action. All assembly drawings shall be released as "dash-number" drawings.

3.3.2 CLASS B RELEASE. Class B documents are essentially drawings and supporting documentation generated during the research and development stages of the program. They shall meet normal document standards. Depending upon the phase of development, they may only partially fulfill the complete requirements of the document standard.

* Per paragraph 5.2.2 Waivers/Deviations are not subject to CCB action.

Class B documents are representative of the current status of design development and are released in advance of completed design in order to permit breadboarding and evaluation and to initiate planning and advance procurement in areas that are critical from a schedule standpoint.

It is normally expected that there may be numerous revisions to Class B documents, particularly drawings, before completion of design and Class A release. However, in order to meet schedules, Class B documents must be released at the earliest possible date. Limited advance procurement and/or fabrication of parts and assemblies built to Class B documents can be authorized whenever it is considered essential to maintain schedules. Acceptance testing and assembly of items procured, fabricated, or assembled from this advance procurement based on Class B documentation shall meet the requirements of the resultant Class A releases. Drawings and documents issued as Class B releases for the purpose of breadboarding or evaluation of proposed design are to be continuously reviewed and should be upgraded to Class A releases as soon as possible.

A Class B document is upgraded to a Class A document when appropriate by approval of the Design Review Board (DRB) and upon release by the CCB.

3.3.3 CLASS O. Class O denotes an obsolete document. The class O designation shall prevent the use of a document which had been previously released through the Configuration Control Board but never actually used to build, procure, test or support hardware. Documents shall not be made obsolete if any hardware has been built to the document.

3.3.4 CLASS I DESIGNATION. Class I (eye) indicates an inactive document. The Class I designation shall prevent further use of a document which has been released through the Configuration Control Board.

3.4 REVISIONS TO APOLLO CLASS A AND CLASS B DOCUMENTS

Since Class A and Class B documents represent two distinct phases of Apollo documentation, revisions to each class of document must of necessity be accomplished in such a manner as to support and implement the basic intent of the two classes of release. No changes to Class A documents can be made prior to CCB approval. Changes to Class B documents are handled in the same way as changes to Class A documents, but special procedures may be devised by the MIT Management Office and coordinated with AC Electronics to handle special situations concerning Class B revisions.

In addition to the two classes of document release, revision to either class of document shall be divided into two broad categories, Class 1 and Class 2, as defined below:

3.4.1 CLASS 1 CHANGE. (Ref. ANA 445) Any proposed engineering change to (1) an accepted or unaccepted end item (system, equipment, unit, or subassembly) or (2) an accepted or unaccepted part listed on a provisioning list(s), whether such part is to be incorporated in the end item or stocked in the supply system, shall be designated a Class 1 change when one or more of the following is affected:

- (a) Contract specification, contract price or fee with increase or decrease, contract weight, contract guarantees, contract delivery, or contract test schedules,
- (b) Contract-specified reliability and/or contract-specified maintainability,
- (c) Performance as stated either in definite terms, or goals, or as experienced in items in service use,
- (d) Interchangeability, or a change in category regarding substitutability or replaceability,
- (e) Safety,
- (f) Electrical interference to communications-electronic equipment or electromagnetic radiation hazards,
- (g) Aerospace Ground Equipment/Support Equipment (AGE/SE), trainers, training devices, or Government Furnished Equipment (GFE),
- (h) Preset adjustments or preset schedules to the extent that (1) new identification must be assigned or (2) operating limits are affected,
- (i) Systems, equipments, or facilities produced by other contractor(s) to the extent that the affected other contractor(s) must accomplish an engineering change to maintain compatibility at the interface(s),
- (j) Operational computer programs,
- (k) Any proposed change involving retrofit of an accepted item,
- (l) Interface activities of logistics, training and reliability.

Class 1 changes must be approved by MIT DRB or AC Electronics DRB depending on design responsibility prior to the CCB. The effectivity for a Class 1 change must be specified prior to the review by the DRB. Any change made to the effectivity at the CCB shall require approval of DRB and/or be in accordance with NASA Contract Change Authorization. The effectivity stated at time of CCB approval shall be mandatory. See paragraph 2.4.

Any proposed changes to NDs which MIT considers mandatory and which affect manufacturing processes, workmanship requirements, inspection criteria, flight processing specifications shall be transmitted to the NASA MSC for review and technical concurrence before being transmitted to the industrial contractor for any action on his part. Such concurrence shall be obtained in writing from the NASA MSC before any further action is taken. Technical explanation and justification of necessity shall be furnished in writing as part of the submission to the NASA MSC. MIT shall be prepared to participate in technical reviews of these changes at the MSC as necessary.

All proposed Class 1 changes shall be prepared as complete package changes. The changes must be defined in all areas of the drawing structure through the highest assembly affected including ATP, PS, FTM and ND. The effect on GSE must be defined in the package. "Retrofit" will normally be a separate package handled by use of ECP.

3.4.2 CLASS 2 CHANGE. (ref.: ANA 445) Any engineering change not falling within Class 1 as defined above shall be designated as a Class 2 change. Generally Class 2 changes are those changes which are desirable but not technically necessary from a system function standpoint. Changes required to comply with documentation format specifications would be in this class. A Class 2 change cannot change form, fit, function, or reliability so as to affect interchangeability. No effectivity is specified and the change is incorporated on the basis of no change in contract cost and no schedule impact.

When a TDRR is prepared to incorporate a Class 1 change in a document, Class 2 changes are sometimes incorporated on the same TDRR. Class 2 changes released in this manner automatically become Class 1 changes and are subject to all the requirements imposed for a Class 1 change, including DRB review and approval prior to the CCB. Care must therefore be exercised that true Class 2 changes processed by this method do not produce a cost or schedule impact or result in non-essential changes to hardware.

If any change on the TDRR is considered by the CCB to be Class 1 or if any doubt should arise concerning the Class 2 designation for a change, the entire TDRR shall be submitted to the DRB for evaluation and approval. Class 2 changes so designated by AC Electronics under NASA rules specified in Paragraph 2.4 shall not require MIT DRB approval.

3.4.3 DETERMINATION OF REVISION CLASS. AC Electronics is responsible for insuring that Class 2 changes are truly Class 2. The NASA MSC shall notify AC Electronics in writing of any disagreement regarding classification of Class 2 changes within 30 days of CCB action. If any corrective action is a result of such notification, AC Electronics shall accomplish this effort within the present scope of the contract.

3.5 EXCEPTIONS

Some documents are processed through CCB for record purposes only and to insure distribution throughout the system. Documents falling into this category are Interface Control Documents (ICDs) and Interface Revision Notices (IRNs). When documents of this type are submitted to CCB, the TDRR should be boldly marked in the "Description of Changes" column "For Information Only", thus indicating that the signatures of the Contractor and NASA are not required.

Section 4

TECHNICAL DATA RELEASE AND REVISION DOCUMENTS

4.1 INTRODUCTION

The purpose of this section is to relate the Technical Data Release and Revision (TDRR) form and the system documents to the procedures required for the release, revision, and recording of technical data.

The required TDRR form provides the means of processing data and the documents provide a record of approved technical data. The one form and the two documents are the following:

FORM: Technical Data Release and Revision form (TDRR)
DOCUMENTS: System Identification Data List (SIDL)
Engineering Master File (EMF)

4.2 TECHNICAL DATA RELEASE AND REVISION FORM

The Technical Data Release and Revision form is the sign-off form for the Configuration Control Board. It is serialized and recorded when approved as part of the Board's record and provides the only authority for the release or revision of Apollo Guidance and Navigation equipment technical data.

All the documents listed in Section 3 of this procedure require processing by TDRRs for approval. The person who prepares the TDRR form is responsible for assuring that there is a mutual understanding of the reason for the change and the effect of the change by the responsible engineering personnel at MIT and at the Contractor's facility. If documents are applicable to other systems, the changes should be coordinated through the associated groups.

4.2.1 TDRR FORM RULES. An initial release is defined as the procedure followed the first time a NASA identification number is assigned to a part or assembly and the document is processed through CCB. Subsequent revisions to the document

which do not affect interchangeability are called "revisions" and are indicated by using the same identification number with appropriate change made to the revision letter. If a document has already been released and must be revised in such a manner as to cause a noninterchangeability of parts, a new identification number or a new dash number is assigned. If a new identification number (seven digits) is assigned to a replacing part, the new drawing shall be released through CCB as an initial release.

If a new dash number is assigned to a replacing part, the action on that drawing is a revision through CCB.

The action of replacement with a noninterchangeable part is evidenced on the next higher assembly where a new dash number must also be added to show noninterchangeability at this level, and progressively up to the level where interchangeability is re-established (Ref 500-1 Para 6.5 EXH,X). To alert those who are concerned with effectivity and spares provisioning, the TDRR may emphasize by note that the revision adding a new dash numbered configuration creates a noninterchangeable replacement.

The following rules apply for TDRRs:

- (1) Each TDRR may include more than one document for initial release; however, when revisions affect more than one drawing, a separate TDRR shall be prepared for each revised drawing except in the following cases:
 - (a) All drawings to be made obsolete or inactive may be listed on one TDRR.
 - (b) On package changes for which the effectivity, overall reason for the change, and the disposition of parts are identical for several different drawings, even though the specific changes listed for each drawing may differ, a single TDRR may be used for processing the entire revision at CCB. The changes to each drawing itemized on the TDRR must be completely described. The revision letter changes to each drawing shall be tabulated in the "Description of Changes" block.
- (2) Each TDRR for a revision must carry a complete description of the proposed change so that it is possible to effect the revision without further information. The change shall be fully described on the TDRR and a marked-up reproducible shall accompany the TDRR except when, in the

judgement of the originator the TDRR is prepared in sufficient detail and clarity as not to be subject to misinterpretation, in which case the marked-up reproducible may be omitted at the originator's risk.

- (3) A "reissue" of a TDRR is used to correct errors which were present on it when it was originally issued. The original TDRR is brought to CCB where it is marked and initialed by those concerned to indicate the correction which is made. The document itself is not affected because the error exists only on the TDRR. If the CCB review reveals a possible Class 1 change resulting from the correction, the TDRR shall be processed through DRB before reissue.
- (4) All TDRRs are consecutively numbered by the CCB upon approval.
- (5) GYRO and PIP changes shall be processed through CCB and will comply with contract requirements for Class 1 and Class 2 changes.

4.2.2 ASSIGNMENT OF EFFECTIVITY. The following rules apply for assigning effectivity on TDRRs.

- (1) Effectivities associated with airborne equipment shall be assigned in accordance with the sequence of system or subsystem (as applicable) end-item numbers specified in E-1087, "Documentation Handbook and Plan". If "cut-in" only is indicated on the TDRR, the effectivity applies to the number entered and to all equipment which follows for the same block and series as identified under "Effectivity Sequence" in E-1087.

Assignment of effectivity on the TDRR by block or series reference only is not adequate and will not be accepted, except in the case of "mechanization drawings" used for a block or series.

- (2) Effectivities associated with Ground Support Equipment shall be assigned in accordance with the GSE serial numbers used for each of the GSE end items identified on the top GSE Drawing (No. 1900030). If only "cut-in" is specified, the effectivity applies to the serial number entered for "cut-in" and all subsequent equipment. When an effectivity is required to be assigned to a subassembly or component of a GSE end item or to any GSE support documentation, only the serial numbers of the appropriate GSE end item shall be used as applicable. If the subassembly, component, or support documentation applies to more than one GSE end

item, each end item and its applicable serial numbers must be individually identified on the TDRR.

- (3) The "cut-out" effectivity must be supplied whenever it is necessary to limit procurement to an amount less than the total contract buy. The omission of a "cut-out" will be interpreted in accordance with item (1) for G&N equipment and in accordance with item (2) for GSE.
- (4) To change the effectivity specified for a previous revision to a document, the TDRR will be reissued. (Ref: 4.2.1(3)).

4.2.2.1 Requirements for Effectivity. The following rules identify the minimum requirements for the assignment of effectivity and do not preclude conformance with additional requirements, not stated herein, which are also contractually imposed: e.g., NPC 200-2, NPC 200-3, NPC 250-1 and NPC 500-1. Revisions to "mechanization drawings" are exempted from this requirement.

- (1) Effectivity shall be specified for all Class 1 revisions. Revisions to "mechanization drawings" shall be exempted from this requirement.
- (2) If a change results in a noninterchangeable item, the identification number of the noninterchangeable item, of its next higher assembly, and of all progressively higher assemblies shall be changed up to the level where interchangeability is re-established. The effectivity changes shall be assigned as required to identify the new configuration or application. These changes shall be processed as a package change.
- (3) The total applicability of a document when considering a particular change to its use shall include all related documents. All affected documents shall be processed as a package change.
- (4) Effectivity of a revision to a dash-number type of document applies only to the dash-number specified on the TDRR, and does not affect the effectivity of the other dash-number configurations on the drawing. When more than one dash-number is affected by the revision, the effectivity for each of the affected dash-numbers shall be indicated. See paragraph 4.2.3.6.
- (5) No effectivity shall be identified for the release of a Job Description Card (JDC). The use of a JDC is determined by the parent document(s)

which identifies a requirement for the JDC. If the revision to a JDC would make the JDC noninterchangeable with the application(s) of the previous revision, a new JDC number shall be assigned unless the revised JDC is to be used with the first issue of the end item.

- (6) No effectivity shall be assigned to Class 2 revisions.
- (7) No effectivity shall be assigned to a piece part initial issue. Effectivity for such parts is determined by reference to the assembly drawings which call out the piece parts.

4.2.3 INSTRUCTIONS FOR PREPARATION OF TDRRs. Instructions for preparing a TDRR are detailed below (see Figures 4-1 and 4-2 for the sample TDRR form).

4.2.3.1 Item 1: Conditions of Release. Check the appropriate boxes to indicate the conditions under which the TDRR is being released by CCB. Drawings being initially released shall accompany the TDRR.

- (1) Indicate whether the TDRR is releasing a new document or a revision to an existing document. Also indicate whether the action of the TDRR makes the hardware noninterchangeable.
- (2) If an Engineering Change Proposal (ECP) is originated because of the TDRR, the assigned ECP number should also be added.
- (3) Indicate the location of the original documents being processed by the TDRR.

4.2.3.2 Item 2: TDRR No. A five-digit TDRR number will be assigned by CCB for each TDRR.

4.2.3.3 Item 3: System or subsystem. Enter the name of the system or subsystem on which the item appearing under "Title of Dwg/Doc" will be used. For example, if the item listed under "Title of Dwg/Doc" were "Stable Member", the system would be the IMU. The name used shall agree with the system name assigned at the time of initial release and subsequent revision.

4.2.3.4 Item 4: Title of Drawing/Document. Fill in the complete title of the document. If the TDRR is for an original release and if more than one document is released, this line should be marked "Multiple Release" and a complete

APOLLO GUIDANCE AND NAVIGATION
 TECHNICAL DATA RELEASE OR REVISION

PG 1 OF _____
 TDRR NO. ②

TITLE OF DWG / DOC. ④		CONTRACTOR NO. ⑤ MIT ENGINEER	DOC. NO. ⑥	REVISION FROM TO																
SYSTEM OR SUBSYSTEM ③		DATE ORIGINATED	TYPE OF DOC. ⑦																	
<input type="checkbox"/> INITIAL RELEASE ① <input type="checkbox"/> REVISION <input type="checkbox"/> NON-INTERCHANGEABLE REPLACEMENT	<input type="checkbox"/> TDRR ONLY <input type="checkbox"/> TDRR & DOCUMENT <input type="checkbox"/> NECP NO. _____	MASTER DOCUMENT LOCATION <input type="checkbox"/> MIT/IL <input type="checkbox"/> RAYTHEON <input type="checkbox"/> AC ELECTRONICS <input type="checkbox"/> KOLLSMAN <input type="checkbox"/> GAC <input type="checkbox"/> NR																		
DESCRIPTION OF CHANGES ⑧																				
REASON FOR CHANGES ⑨																				
DOC. CLASS _____ ⑪ REV. CLASS _____	OTHER DOCS. AFFECTED ⑩	EFFECTIVITY <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">HARDWARE</th> <th colspan="2">SPARES</th> </tr> <tr> <td>CUT-IN</td> <td>CUT-OUT</td> <td colspan="2" style="text-align:center">⑫</td> </tr> <tr> <td> </td> <td> </td> <td colspan="2"> </td> </tr> </table>			HARDWARE		SPARES		CUT-IN	CUT-OUT	⑫									
HARDWARE		SPARES																		
CUT-IN	CUT-OUT	⑫																		
ORGANIZATION AFFECTED ⑬	NEXT HIGHER ASSY ⑭	DISPOSITION OF PARTS ON HAND <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>DISPOSITION</th> <th>PARTS</th> <th>HIGHER ASSEMBLY</th> <th>SPARES</th> </tr> <tr> <td>NO CHANGE</td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>MODIFY</td> <td style="text-align:center">⑮</td> <td> </td> <td> </td> </tr> <tr> <td>SCRAP</td> <td> </td> <td> </td> <td> </td> </tr> </table>			DISPOSITION	PARTS	HIGHER ASSEMBLY	SPARES	NO CHANGE				MODIFY	⑮			SCRAP			
DISPOSITION	PARTS	HIGHER ASSEMBLY	SPARES																	
NO CHANGE																				
MODIFY	⑮																			
SCRAP																				
REMARKS:	DOCUMENT NUMBER REPLACED ⑯	INTERFACE AFFECTED ⑰																		
PREPARED BY ⑱	DESIGN REVIEW APPROVAL ⑲	CCB APPROVAL ⑲																		
ENGINEERING APPROVAL ⑲	CONTRACTOR APPROVAL ⑲	NASA APPROVAL ⑲																		
REISSUE DATE: _____ REASON:		⑲	CCB INITIAL MIT - CONTR - NASA -																	

TP8913-1 (REV. 3/70)

TDRR NO. ②

APOLLO GUIDANCE AND NAVIGATION
TECHNICAL DATA RELEASE OR REVISION

PG. OF _____
TDRR NO. ②

TITLE OF DWG / DOC. ④	DOC. NO. ⑥	REVISION	
		FROM	TO

DESCRIPTION OF CHANGES

SAMPLE

TP8913-2 (REV. 3/70)

listing should be entered under the Description of Changes. TDRRs processing documents to be made obsolete or inactive shall have "Multiple Obsolescence" or "Multiple Inactivation" entered in this line and the complete list entered under the Description of Changes.

4.2.3.5 Item 5: P/C No., MIT Engineer, and Date. If the TDRR is prepared by a contractor, he shall enter the following information:

- (1) P/C No. The number assigned by the Contractor to the TDRR to indicate the Contractor involved and his serial number of the document. A number sequence, e.g., 001, 002, plus a letter prefix forms the serial number.

A represents AC Electronics

K represents Kollsman Instrument Corporation.

R represents Raytheon Company.

M represents MIT.

- (2) MIT Engineer. The name of the MIT engineer who will evaluate Class 1 and initial releases to documents reviewed at MIT.

- (3) Date. The date the TDRR is prepared. Upon receipt of a TDRR prepared by the Contractor, MIT will transmit it to the cognizant engineer, and process as described herein.

4.2.3.6 Item 6: Document Number. Enter the identification number of the document being processed by the TDRR. Insert the current revision letter under "Revision From"; insert the new revision letter under "To". Should this block be of insufficient size to accommodate a complete listing, indicate the number of documents, e.g., 13 drawings. The complete listing of item numbers and their corresponding document numbers (and revisions) should appear in the "Description of Changes" block before the items themselves are listed. This entry shall state "list below" when processing documents to be made obsolete. Changes affecting specific dash numbers shall be delineated in Item 8 of the TDRR.

4.2.3.7 Item 7: Type Document. Indicate the type of document being released by the TDRR. Example: Dwg, SCD, ICD, Retrofit kit (RFK), etc.

4.2.3.8 Item 8: Description of Changes and Zone. Under "Description of Changes" supply a complete description of the changes, indicating the present condition (from) and the specific way the document is to be revised (to). Supplementary

reproducible sheets 8-1/2 by 11 inches in size may be included to amplify the description when the change involves extensive modifications. In certain cases, reduced-size (D-size maximum) marked reproducible copy of the drawing is permitted to serve as a second page of the TDRR. The description of the desired change must be complete enough to allow incorporation without any further clarification. If the document to be revised is a drawing, indicate the location of the change in the column marked "Zone". Example: 3-C.

- 4.2.3.9 Item 9: Reason for Change. Enter the precise reason for the change. This reason must be complete enough to permit the CCB evaluation of the proposed change. If the TDRR is releasing the documents, "Initial Release" shall be indicated here. If TDRR is making the documents obsolete or inactive, enter "Obsolete" or "Inactive".
- 4.2.3.10 Item 10: Other Documents Affected. Indicate all other drawings, specifications, or documents that are affected as a result of this revision. When possible, associated documents which must be revised as a result of the described revision shall be submitted simultaneously with the original change. The complete revision then shall be submitted as "a package".
- 4.2.3.11 Item 11: Document Class and Revision Class. Indicate under "Document Class" the appropriate document classification, i.e., Class A, B, I, or O, as defined in paragraph 3.3. Indicate under "Revision Class" the appropriate revision classification, i.e., Class 1 or Class 2, as defined in paragraph 3.4. Refer to paragraph 4.4 for requirements imposed when upgrading a release from Class B to Class A.
- 4.2.3.12 Item 12: Effectivity. Refer to paragraph 4.2.2 for rules governing assignment of effectivities.
- 4.2.3.13 Item 13: Recommended Disposition of Parts on Hand. Furnish instructions as to the disposition of applicable equipment by marking an (X) in the appropriate square.
- 4.2.3.14 Item 14: Indicate the next higher assembly for the document being processed by the TDRR. If more than one document is processed and the next higher assembly is not common to each document, the word "Multiple" shall be entered and the next higher assemblies tabulated opposite the itemized list of documents in the "Description of Changes" block. SCDs and NDs are an exception. Usage for SCDs and NDs is not required.

4.2.3.15 Item 16: Organization Affected. Indicate the Contractor(s) affected, either directly or through an interface, by the issuance of the TDRR, i.e., MIT, AC Electronics, Raytheon, Kollsman, North American, or Grumman.

4.2.3.16 Item 17: Interface Affected. If a physical or electrical change affects the interface with another subsystem of the G&N, GSE, or spacecraft, indicate the title of the affected subsystem and the ICD if known. Indicate "NONE" if no subsystem is affected.

4.2.3.17 Item 18: Prepared by/Date. Indicate the name of the engineer, his affiliation, and the date.

4.2.3.18 Item 19: Engineering Approval and Date. The signature of the responsible engineer as applicable and the date must appear in Box 19 before the TDRR is submitted to the Configuration Control Board.

- a) For TDRRs submitted to MIT DRB, for which MIT has design cognizance, the responsible MIT design engineer will sign in this block.
- b) For TDRRs submitted to MIT DRB for interface review and for which AC Electronics has design cognizance, the responsible AC Electronics engineer will sign in this block.
- c) For all other Class 2 changes which are not required to be submitted to MIT DRB in accordance with paragraph 2.4, the responsible AC Electronics engineer will sign in this block.

Whenever a specification control drawing (SCD), or a process and material specification (ND) is referenced on the TDRR, the initials of the MIT Reliability Group engineer shall appear in this same space to indicate that the document has been reviewed and approved by that group. GSE SCDs are exempted from this requirement except for certain designated SCDs, by special arrangement with the Reliability Group.

4.2.3.19 Item 20: Design Review Approval. The signature of the chairman of the MIT or AC Electronics DRB, or his designated alternate, and the date will be entered to indicate design approval. His signature shall be required for all Class A initial releases and all Class 1 changes as specified in paragraph 3.3 and 3.4. The requirements for upgrading releases are specified in paragraph 4.4. This signature is not required on TDRRs processing only Class 2 changes

(ref. paragraph 2.4 and 3.4.2). "N/A" (not applicable) shall be entered on a TDRR containing only Class 2 changes.

4.2.3.20 Item 21: (a) MIT will sign after DRB and prior to forwarding to AC Electronics on all documents processed through MIT.

(b) AC Electronics will sign for all documents.

4.2.3.21 Item 22: Contractor Approval. The signature of the appropriate Contractor Authorizing Member(s) of the Configuration Control Board, his affiliation, and the date are affixed during the CCB meeting.

4.2.3.22 Item 23: NASA Approval. The signature of the designated NASA Authorizing Member of the Configuration Control Board and date are required for all TDRRs except for K-start tape TDRRs and revisions to Spacecraft Installation List Drawings.

4.2.3.23 Item 24: Reissue. If it becomes necessary to reissue a TDRR to correct information contained on it, this Block (24) shall be used. CCB shall indicate the date of the reissue and the reason. The Authorizing Members of the CCB as applicable shall indicate their approval by initialing in the appropriate boxes.

4.3 TDRR PROCEDURES

TDRR forms and the documents being processed for approval may be originated by MIT or the Contractor responsible for Apollo Guidance and Navigation equipment in question.

4.3.1 INITIAL RELEASE OF DOCUMENTS MAINTAINED BY MIT. Class A and Class B documents shall be released by the following procedure except that the DRB review is not required for Class B release.

4.3.1.1 MIT Originator. The MIT originator of the document shall provide blue-line copies (or reproducible on request) to the Contractor and to the MIT Reliability Group of each document to be released. These copies should be provided at the earliest possible date prior to submission to DRB and CCB. The TDRR forms shall be prepared by the originator.

4.3.1.2 Contractor. The Contractor shall review the blue-line copies of drawings prior to CCB action and prepare any pertinent comments relative to, but not limited to, production, design, interface, cost, effectivity, or schedule impact.

If cost or schedule impact is foreseen, he must be prepared to complete an ECP form.

4.3.1.3 MIT. MIT shall:

- (1) Process copies of the proposed Class A documents through DRB,
- (2) Coordinate with the MIT Reliability Group for specification control drawings (SCDs), procurement specifications (PSs), and process and material specifications (NDs),
- (3) Consolidate Design Review Board, Contractor, and Reliability Group recommendations and submit documents and TDRRs to CCB through MIT Documentation Control Center.

4.3.2 INITIAL RELEASE OF DOCUMENTS MAINTAINED BY THE CONTRACTOR. Class A and Class B documents shall be released by the following procedure, except the DRB function is not necessary for Class B release.

4.3.2.1 Contractor. When the Contractor is the originator, he shall:

- (1) Prepare the proposed document and TDRR to be released and submit the TDRR and the document master to MIT or AC Electronics Documentation Control Center and prepare ECP/RECP forms if necessary.
- (2) After CCB, the originating contractor shall prepare and forward to MIT Documentation Control Center one reproducible copy of all NDs, PSs, ATPs, FTMs, and JDCs released through CCB.

4.3.2.2 MIT. MIT shall:

- (1) Review the drawing prior to submission to DRB and prepare any pertinent comments relative to, but not limited to, production, design, interface, and effectivity.
- (2) Process the proposed documents through Design Review Board for Class A release,

- (3) Consolidate Design Review Board, MIT Engineering and Reliability Group recommendations, and submit document masters and the TDRRs to AC/CCB through MIT Documentation Control Center.

4.3.3 REVISIONS TO DOCUMENTS MAINTAINED BY MIT. Revisions to documents maintained by MIT shall be accomplished in the manner described below.

4.3.3.1 Originator. Prior to DRB and CCB meetings, the MIT originator of the proposed revision shall supply copies of each revision in order to provide advance information to the following:

- (1) One reproducible copy to the Contractor for planning purposes and cost estimation,
- (2) One blueline copy for reliability review. This copy then goes for system interface review at DRB.

4.3.3.2 Contractor. The Contractor shall review a copy of the revision prior to CCB action and prepare any pertinent comments relative to, but not limited to, production, design, interface, cost, effectivity, or schedule impact and prepare an ECP if necessary.

4.3.3.3 MIT. MIT shall:

- (1) Process the proposed document revision through DRB if necessary,
- (2) Coordinate with the Reliability Group for PSs, SCDs, and NDs,
- (3) Consolidate Design Review Board, Contractor, and Reliability Group comments,
- (4) Group recommendations and submit documents with their TDRRs to AC/CCB through MIT Documentation Control Center.

After the CCB approval, MIT shall:

- (1) Incorporate the document revision completely as outlined on the signed TDRR,

- (2) Add the TDRR number to the document, raise the document revision to the TDRR-assigned revision letter and affix his initials. The initial indicates that the approved revision has been incorporated completely and accurately in the master document.,
- (3) Deliver the signed documents to the Document Controller for microfilming; microfilm will be delivered to AC Electronics Documentation Control Center.

4.3.4 REVISIONS TO DOCUMENTS MAINTAINED BY THE CONTRACTOR. Prior to DRB and CCB meetings, the Contractor who originates the proposed revision shall provide copies of each drawing as required in order to provide advance information to the following:

- (1) One marked-up reproducible for evaluation of the proposed revision,
- (2) If the revision originates at MIT, the procedure is similar to that described in paragraph 5.3.3 except that the Contractor will finally incorporate the change as specified in this section.

4.3.4.1 MIT. MIT shall:

- (1) Process the proposed documents through DRB if necessary,
- (2) Coordinate with the Reliability Group for PSs, SCDs, and NDs,
- (3) Consolidate Design Review Board, cognizant engineer, and Reliability Group recommendations, and submit documents with the associated TDRRs to AC/CCB through MIT Documentation Control Center.

4.3.4.2 Contractor, after CCB. Upon receipt of the approved TDRR, the Contractor shall perform the following:

- (1) Incorporate all approved changes as specified by the signed-off TDRR and supported by a marked-up drawing or specification when necessary.
- (2) Add the TDRR number to the document, raise the document revision to the TDRR-assigned revision letter, and affix his initial. The initial indicates that the approved revision has been incorporated completely and accurately in the master document.

- (3) Deliver microfilm as directed in the Statement of Work.
- (4) Deliver to MIT Documentation Control Center one reproducible copy of revised pages for all changes to NDs, ATPs, FTMs, and JDCs, processed through CCB.

4.3.5 PROCEDURE TO MAKE DOCUMENTS OBSOLETE. A TDRR shall be prepared to make documents obsolete only when a sufficient quantity had accumulated to make a worthwhile package. The TDRR shall be reviewed and approved by MIT DRB and the CCB.

The revision letter on a document which is made obsolete shall not be changed to effect the obsolescence. However, the word "OBSOLETE" and the date of obsolescence shall be written on the master of the document. The document is submitted with the TDRR only upon request.

Identification of the obsolete documents shall appear in the System Identification Data List (SIDL). No microfilm or aperture cards will be prepared to reflect obsolescence.

The identification number assigned to a document shall not be reassigned after the document is made obsolete.

4.3.6. PROCEDURE TO MAKE A DOCUMENT INACTIVE. A document shall be inactivated only if one of the following conditions exists:

- (1) The document is being replaced by another document which shall be used for all former applications of the inactive document, or
- (2) All hardware supported by the document has been retrofitted and subjected to the requirements of a new document, scrapped, or otherwise removed from use.

Identification of inactive documents shall appear in SIDL.

The identification number assigned to a document shall not be reassigned after the document is made inactive.

4.4 UPGRADING RELEASES

When a release is being upgraded from Class B to Class A, the originator shall perform the following tasks:

- (1) Remove the "Class B for Information Only" designation from the document.
- (2) Enter the TDRR number that originally released the document in the top margin above the revision block, and erase the TDRR number and date from the main body of the document.
- (3) The originator will submit the document master and revising TDRR to the MIT or AC Electronics DRB as applicable and then to the CCB in accordance with the normal release procedure.

4.5 DOCUMENTS

4.5.1 SIDL. The System Identification Data List (SIDL) is the official design release record for those documents which are issued to implement CCB technical direction. It identifies all drawings, specifications, and other documents released by the Configuration Control Board for the production, procurement, assembly, inspection, and use of Apollo Guidance and Navigation equipment, including ground support equipment. The SIDL and aperture cards made after the CCB approval of a document are the entry of the data into the document control system.

4.5.2 Engineering Master File. The Engineering Master File is a management tool that provides a comprehensive interface-control system for the documentation applicable to the Apollo Guidance and Navigation equipment. It identifies all piece parts and reference documents to the associated assemblies, and is available in printed form on request.

4.6 APERTURE CARD. Aperture card forms will be used to facilitate the storage and retrieval of design information. Each aperture card will be punched and printed with information obtained from the TDRR and analysis of the document. It will contain the following information:

- a. A preprinted SIDL "Line" at the top of the card for complete visual reference.

- b. A 35-mm microreproduction of the document mounted within the aperture.

- c. Punched selective information for sorting purposes to include the following:
 - 1. Type of document
 - 2. Frame Number
 - 3. Number of Frames
 - 4. Document Number
 - 5. Sheet Number
 - 6. Revisions Letter/Number
 - 7. TDRR Number
 - 8. Release Class
 - 9. Total Number of Sheets
 - 10. Document Description

Section 5

SPECIAL INSTRUCTIONS

5.1 RETROFIT KIT RELEASE, REVISION, AND MARKING

When it is proposed that a retrofit modification is required or desired in delivered equipment, action is necessary to insure proper documentation of the change. This procedure identifies the necessary documentation and approvals for retrofit actions. Every retrofit action will carry an ECP as defined by NASA procedures (ref., NPC 500-1, MSC Supplement No. 1) to recognize any required work requirements for contract purposes.

5.1.1 RETROFIT KIT CONTENT. The retrofit kit will contain all the necessary parts, unique tools, and necessary engineering drawings required to accomplish the modification. In addition, each kit will contain a Retrofit Instruction Bulletin (RIB) when the retrofit is to be accomplished at field locations.

5.1.1.1 Retrofit Instruction Bulletin (RIB). The Retrofit Instruction Bulletin shall be prepared by the Contractor for modification of hardware for which he has cognizance. The RIB shall contain all required instructions (special disassembly or assembly techniques, and the like) for installation of the kit. It shall also contain descriptions of the required retesting to insure that the modified equipment adheres to all specification requirements. The retesting requirements may be specified as certain paragraphs of ATPs, PSs, or FTMs. However, if special retest procedures are required, they shall be detailed in the RIB, as either revised or new JDCs supplied with the kit.

Retrofit or Repair Compliance forms are to be completed when the retrofit (or repair) is accomplished: reference, ND-1002345-completing ACC Form 1 (revised). This form must be a vellum reproducible and can contain information such as ECP No., Kit, etc., preprinted. These forms are used to give detailed information regarding parts added and/or removed from Apollo GFP equipment. Extra copies of these forms are available at all field sites and contractor plants.

5.1.1.2 RIB Numbers. Each RIB number shall be a seven-digit NASA Production number (from a series assigned by AC). The RIBS will be written for the level of a highly skilled technician. Exhibit 5-1 is an example of the format and types of information required in a RIB.

5.1.1.3 Contractor In-house Retrofit. RIBs are not required for contractor in-house retrofit. However, a retrofit kit drawing listing all parts and/or assemblies required to accomplish the retrofit must be processed through DRB and CCB. The elimination of RIBs for contractor in-house retrofit is predicated on the following actions:

- (1) AC Electronics is responsible to insure that adequate procedures are instituted and followed both internally and at Raytheon and KIC to properly accomplish these in-house retrofits.
- (2) Retrofit kits with RIBs are still required for all field retrofits.
- (3) Retest of modified equipment which consists of a complex functional test to the level of assembly modified is required.
- (4) Deviation to item 3 shall be with the written prior concurrence of the NASA/MSC.
- (5) All critical processing which has depotting, weld repairs, etc., shall be accomplished per CCB released ND documents or the procedure must be approved by the NASA/MSC.

5.1.2 ACCEPTANCE DATA PACKAGE. Each deliverable retrofit kit shall require an Acceptance Data Package (ADP) to be delivered with the hardware. In addition, a Unit History Record shall accompany each article in accordance with MIT Report E-1087, "Documentation Handbook and Plan".

5.1.3 DRAWINGS AND DOCUMENTS. All new drawings and revisions to documents necessary for the retrofit kit shall be prepared in accordance with MIT Report E-1167, "Drawing Standards", and shall be released through CCB by means of the TDRR Procedure. The agency responsible for maintenance of the master drawings shall establish two "top retrofit kit drawings" against which all retrofit kits will be released, i.e., one top kit drawing will be established for the release of all flight hardware kit assemblies and the other top kit drawing will be established for the release of all ground support equipment kit assemblies. The top retrofit kit drawings

RETROFIT INSTRUCTION BULLETIN (RIB) OUTLINE

I. PURPOSE

(A brief description of what the retrofit is to accomplish.)

II. AUTHORITY

(The ECP number.)

III. UNITS affected

(Name, part number, serial number, and new part number of the units to be modified, in indenture order.)

IV. PRIORITY CHANGES

(Any Modification which must be incorporated prior to the incorporation of this retrofit.)

V. RELATED CHANGES

(Any other RIBs for the same ECP.)

VI. MATERIAL REQUIRED

(List of kit contents and a list of required, but not supplied, items, in indenture order of equipment affected.)

VII. PROCEDURE

(Instructions for accomplishment:

A. General — Applies to all sections if required or top kit retrofit procedure (Console, system, etc., of ECP); Statement of re-test requirements and procedures.

B.,C.,etc. — Section for each affected assembly of a console or specific instructions for the item for which there is a retrofit kit. Statement of re-test requirements and procedures.)

VIII. MODIFICATION DESIGNATION

(Application of new nameplates, marks, or harness tags for the console or end item. Console subassemblies will be given modification designation in their respective procedures.)

IX. DISPOSITION OF PARTS REMOVED

(Scrap, return to stock, etc.)

X. REPORT OF ACCOMPLISHMENT

EXHIBIT 5-1

will list all applicable subkits necessary to modify components, assemblies, subassemblies, and spares. For each retrofit, a retrofit kit assembly drawing shall be established which shall contain a listing of all the subkit part numbers applicable to the ECP.

5.2 NONCONFORMANCE DOCUMENTATION

The documentation of nonconformance is not processed through the Configuration Control Board, but because these documents form a part of the Acceptance Data Package for each deliverable end item, a brief mention of the documentation is included.

The documents involved are:

- (1) MRB Reports
- (2) Apollo G&N Contractual Waiver
- (3) Apollo G&N Engineering Waiver

5.2.1 MRB REPORTS. The reports of Material Review Boards are usually in the form of Variation Permits, requested by the Contractor and approved by NASA/MSC, or authorized NASA representative at the Contractor's Facility. The NASA/RASPO or representative at each Contractor facility controls format and procedure.

5.2.2 WAIVERS. All waivers are identified to part number and serial or lot number of the part, assembly, or end item involved. No waiver may be written to cover more than one single system or subsystem. No "blanket waivers" are permitted except those written for SCDs, ND processes and piece parts. If more than one G&N system incorporates the same nonconformance, separate waivers are required for each of the systems. No additional changes shall be made to the face of the Waiver after it has been put in process. If substantiating technical data are considered necessary, attachments shall be made to the waiver. A sepia copy of the complete waiver shall be furnished to the MIT Management Director.

5.2.2.1 Apollo G&N Contractual Waivers. An Apollo G&N Contractual Waiver is originated by the Contractor when a nonconformance exists that adversely affects the safety, reliability, performance, interchangeability, weight, or any other basic objective of the contract. Coordination of the waiver is accomplished with MIT via telephone and datafax. Format, routing, distribution, and designation of authorizing signatures are a NASA responsibility. This

type of waiver requires NASA Engineering Office Signature, and may receive MIT concurrence signature.

5.2.2.2 Apollo G&N Engineering Waiver. Apollo G&N Engineering Waivers shall have no contractual implications, therefore cost and schedule impact are not a consideration. These waivers are initiated by the Contractor, and are effective and authorized when signed by the NASA Engineering Office or its designated representative, and the Contractor Engineering Office. No MIT signature is required. Format, routing, distribution, and designation of authorizing signatures are a NASA responsibility.

This type of waiver is initiated when material or items are to be used "AS IS" and when they possess the following kinds of nonconformance:

- (1) Functional nonconformances other than those defined in paragraph 5.2.2.1 provided there is no adverse effect on the safety, performance, weight, interchangeability, durability, reliability, or G&N system performance for customer acceptance of demonstrable parameters and the nonconformances do not have an unsatisfactory contract cost or schedule impact.
- (2) When Job Description Cards (JDC), Procurement Specifications (PS), Final Test Method (FTM), Assembly Test Procedure (ATP), or drawing errors exist for which a TDRR request has been initiated.
- (3) Performance of the deliverable equipment is out-of-tolerance and the condition is defined to be caused by a test equipment inadequacy.

5.3 ENGINEERING CHANGE PROPOSAL (ECP)

The Engineering Change Proposal and the form used to implement the proposal are described in ANA Bulletin No. 445 and shall be implemented as directed by NASA.

Initiation of an ECP shall be required for, but not limited to, the following actions.

- (1) Determining the cost and/or schedule impact of a proposed change.
- (2) Evaluating the complete impact of a retrofit.

5.3.1 PRIORITY FOR ECPs. ECP priorities of "Compatibility", "Emergency", "Urgent", and "Routine" shall apply as defined in ANA Bulletin No. 445. The initiation, submission, coordination, and expediting of ECPs shall be performed as outlined in ANA Bulletin No. 445 except that the suffix letter designations are not required. Expedited action for emergency, urgent or compatibility priority shall be coordinated through the MIT CMO and the AC Electronics Division Program Office using the most expedient means for coordination and reporting to NASA/MSC.

5.4 FIELD INITIATED CHANGES

The procedures for controlling changes to hardware and/or documentation at the field sites shall be defined in the Logistics Support Plan prepared by Contractor and shall be implemented subsequent to approval by NASA and MIT.

Formal approval of all field-initiated changes to hardware and/or documentation shall require the preparation of a TDRR(s) by the cognizant Contractor and submittal of the TDRR(s) to the DRB and the CCB in accordance with the release procedures established in the preceding sections of this publication.

5.5 GSE DESIGN CONTROL PROCEDURES. Series 100, Block II, LM

GSE documents are processed through DRB and CCB in exactly the same way as described in the earlier sections of this document. However, to expedite the development of GSE by the Contractor and retain design review and control at MIT, exceptions to the normal procedure may be used after being specifically and individually authorized by GSE Design (GSED) letter from the MIT management office with the concurrence of NASA/RASPO, as described below.

The MIT/GSE Group will conduct continuing periodic information exchanges with the Contractors to discuss G&N system changes, G&N test requirements, GSE test requirements, and problem areas, and to review the design status.

The Contractors will define to MIT/GSE the documentation release schedule required to comply with detailed design initiation of GSE in order to meet the scheduled GSE delivery. MIT/GSE will supply the required documentation disclosures according to a negotiated release schedule. This documentation will take the form of released NASA drawings, either as initial releases, or portions of existing MIT or Contractor releases, or other authorized recorded communications.

MIT/GSE disclosure will include:

- (1) G&N Mechanization Drawings
- (2) G&N Test Requirements (System and Subsystem)
- (3) G&N Outline and Mounting Dimensions
- (4) End-Connector and Harness Wiring Lists
- (5) GSE Design Specifications
- (6) GSE Mechanization Requirements
- (7) GSE Fixture Requirements
- (8) G&N and GSE Interface Definition
- (9) Test Station Layout Requirements

The Contractor will generate GSE Mechanization Drawings, compatible with the MIT/GSE disclosure, and they will be submitted through regular channels for normal processing through DRB and CCB for release. These drawings will control the Contractor's GSE detailed design. On the basis of CCB releases and an authorizing "GSED" letter from MIT, detailed design will be initiated by the Contractor, parts procured, etc. The authorizing letter shall specifically define each addition, deletion, or modification to the GSE design control procedure described herein, and will be identified as a "GSED" letter.

Changes to released Mechanization Drawings will be expedited through the use of a "Request for Change" (RFC) procedure. The RFC changes are the result of new information, technical errors, or mutually agreeable product improvement changes, and may be initiated by either MIT or the Contractor.

In the case where cost or schedule impact may result from a proposed change, the ECP procedure outlined in paragraph 5.3 must be used.

RFC changes will be coordinated with MIT/GSE and NASA, and upon approval as signified by either a DRB signature or a letter from MIT to the Contractor and approval by NASA, the change may be incorporated. A TDRR will be submitted via MIT for CCB release to cover the change within seven (7) days of the initial approval. All TDRRs will be prepared by the Contractor.

The maintenance of the detailed GSE design drawings may remain a Contractor responsibility up to a date no later than eight weeks before delivery of the first production article. At this date, complete detailed design documentation must have been submitted for MIT DRB approval. The DRB will be convened at MIT or at the Contractor's plant, as is most expeditious. Upon DRB approval, the documents will be processed as Class A documents through the normal CCB release procedure.

It is the intent to accomplish the complete document release at least four weeks before delivery of the first production article.

5.6 TDRR CORRECTIVE ACTIONS

This procedure outlines the corrective action to be followed when the issued TDRR and drawing are not in accord with each other at the same revision letter.

The two situations and the applicable procedures are identified as follows:

- (1) New TDRR. If the TDRR is correct but the drawing does not reflect the change shown on TDRR:
 - (a) Make out a new TDRR.
 - (b) Cross-reference should be made to old TDRR by stating in the "Reason for Change" block that "above changes listed on TDRR were not incorporated on the drawing at Rev.".
 - (c) List on new TDRR only those changes that were omitted on the drawing.
- (2) Reissue TDRR. If drawing is correct but TDRR is not correct:
 - (a) Mark up a copy of original TDRR to correct the TDRR errors for reissue of TDRR.
 - (b) In the "Reissue" block give reason why TDRR is being reissued; this shall be validated by signature of the cognizant MIT engineer if appropriate. Mark "Reissue" in top border of TDRR. At least one day prior to the next scheduled CCB meeting a list of all the TDRR numbers being reissued will be given to the CCB recording secretary. This will give the secretary ample time to have original TDRRs available for the CCB meeting.

During the CCB meeting a marked-up copy of the TDRR will be presented to the board by the design group representative. If approved, a CCB member will transfer this information to the original TDRR with the reason for being reissued and cognizant MIT engineer if appropriate will initial the change for processing through the CCB.

Section 6

GLOSSARY OF TERMS
and
ABBREVIATIONS

The following definitions shall apply to the use of terms as they appear in this publication.

CANCELLED. "Cancelled" denotes any document which has been removed from potential use and which had not been released through the Configuration Control Board. The identification number of a cancelled document shall not be reassigned, and will not appear in formal documentation records.

CLASS OF CHANGES. The classification of changes shall be in accordance with paragraph 3.4 of this publication.

DASH NUMBER. An identification suffix used to indicate a noninterchangeable configuration of the hardware.

DEVIATION. A specific authorization, granted by NASA and MIT before the fact, to depart from a particular requirement of specifications or related documents. Ref. NPC 200-2.

EFFECTIVITY. Effectivity identifies the application to a stated designed configuration of all the information in a particular revision of a document.

ENGINEERING CHANGE PROPOSAL (ECP) FORM. The ECP form described in ANA Bulletin No. 445 shall be used as required by NASA and MIT. Refer to paragraph 5.3.

FIELD SITE. Field Site shall denote any location other than MIT, AC Electronics, Raytheon Company, or Kollsman Instrument Corporation, where G&N equipment is operated. These sites include, but are not limited to, the following:

NAR	North American Rockwell
MSC/HOU	NASA Manned Spacecraft Center at Houston
GAC	Grumman Aerospace Corporation
MILA	Merritt Island Launch Area

INACTIVE. "Inactive" denotes any document which has been formally removed from use and the document had been previously released through the Configuration Control Board, and the document had previously been used to build, procure, test, or otherwise support hardware.

INTERCHANGEABLE ITEM. When two or more items possess such functional and physical characteristics as to be equivalent in performance, reliability, and durability, and capable of being exchanged one for the other without alteration of the items themselves or of adjoining items except for adjustment, and without selection for fit or performance, the items are interchangeable. Ref. MIL-STD-447.

OBSOLETE. "Obsolete" denotes any document which has been formally removed from use, and the document had been previously released through the Configuration Control Board, and the document had never actually been used to build, procure, test, or in any way support hardware.

REPLACEMENT ITEM. An item which is functionally interchangeable with another item, but which differs physically from the original part in that the installation of the replacement part requires operations such as drilling, reaming, cutting, filing, shimming, etc., in addition to the normal application and methods of attachment, is known as a replacement item. Ref. MIL-STD-447.

RETROFIT. "Retrofit" denotes a modification, approved by NASA, MIT/IL, and Contractor, to be incorporated in equipment which had previously been accepted by NASA.

RETROFIT INSTRUCTION BULLETIN (RIB). A RIB is all the instructions required for the incorporation of a retrofit and for the recertification of the hardware. Refer to paragraph 5.1.1 and Exhibit 5-1 for further details.

REVISION LETTER. An identification of the status of the document.

SCHEDULE. Schedule is interpreted in accordance with the delivery requirements established by the contracts of the Contractors. Schedule impact identifies the fluctuation about these contractual delivery requirements.

SUBSTITUTE ITEM. Where two or more items possess such functional and physical characteristics as to be capable of being exchanged only under certain conditions or in particular applications and without alterations of the items themselves or of adjoining items, they are substitute items. This includes the definition of one-way

interchangeability such as, item B can be interchanged in all applications for item A, but item A cannot be used in all applications requiring item B. Ref MIL-std-447.

TECHNICAL DATA RELEASE AND REVISION (TDRR FORM). The TDRR form (Fig. 4-1) is used to process data through the Configuration Control Board.

WAIVER. Granted use or acceptance by NASA and MIT of an article which did not meet specified requirements. Ref. NPC 200-2.

The following abbreviations are used in this publication.

AC	AC Electronics
ADP	Acceptance Data Package
AGE/SE	Aerospace Ground Equipment/Support Equipment
ATP	Assembly Test Procedure
CCB	Configuration Control Board
DRB	Design Review Board
ECP	Engineering Change Proposal
EMF	Engineering Master File
FTM	Final Test Method
G&N	Guidance and Navigation Equipment
GAC	Grumman Aerospace Corporation
GFE	Government Furnished Equipment
GSED	Ground Support Equipment Design letter
ICD	Interface Control Document
IRN	Interface Revision Notice

JDC	Job Description Cards
KIC	Kollsman Instrument Corporation
LM	Lunar Module
MD	Modification
MILA	Merritt Island Launch Area
MIT	Massachusetts Institute of Technology Charles Stark Draper Laboratory
MRB	Materials Review Board
MSC/HOU	NASA Manned Spacecraft Center at Houston
NAR	North American Rockwell
NASA	National Aeronautics and Space Administration
ND	Process and Material Specification
PS	Procurement Specification
RAY	Raytheon Company
RFC	Request for Change
RFK	Retrofit Kit
RIB	Retrofit Instruction Bulletin
SCD	Specification Control Drawing
SIDL	System Identification Data List
TDRR	Technical Data Release and Revision form
UHR	Unit History Record

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