

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

FM

# APOLLO

GUIDANCE AND NAVIGATION

E-1186 (Rev. 3)

TECHNICAL DATA  
RELEASE PROCEDURES

May 1965

**MIT**

**INSTRUMENTATION  
LABORATORY**

CAMBRIDGE 39, MASSACHUSETTS

6-243

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# APOLLO

## GUIDANCE AND NAVIGATION

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## Section 1

### INTRODUCTION

#### 1.1 PURPOSE

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

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

#### 1.2 Scope

The procedure for release and revision of technical data consists of:

- (1) Establishment of the Configuration Control Board (CCB) 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 of MIT/IL and NASA for the initial release and subsequent revision of technical documentation for APOLLO Guidance and Navigation equipment. This authority may be 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 & participating members. Authorizing members shall include personnel from NASA, MIT/IL, ACSP, and the Contractor affected by the document, if different from ACSP.

Participating Members will be as follows:

NASA: NASA/RASPO and/or government inspectors or other personnel as desired

MIT/IL: Design group leader

MIT/IL: Design Review Board, systems integration engineer, or other representation as required

MIT/IL: Document controller

MIT/IL: Recorder

Contractor: Support or observer personnel as required.

#### 2.3 PROCEDURE AND RESPONSIBILITIES

The formal and complete release of technical data requires the approval of the three or four (as appropriate) Authorizing Members of the



Configuration Control Board. 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 accepting their responsibility for 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/IL. It is an MIT/IL responsibility to see that the document is approved by the cognizant design group and, when necessary, the Design Review Board prior to presentation to the CCB. Upon presenting and approving a document, the MIT/IL Authorizing Member is accepting responsibility for the following:

- (1) Proper MIT/IL coordination and design approval,
- (2) Adequacy of information provided to fulfill requirements of the documentation control system,
- (3) Design approval of planned cut-in and cut-out effectivity for configuration control.

The MIT/IL Authorizing Member of CCB has additional functions.  
He must:

- (1) Establish time and place of meetings,
- (2) Designate work load requirements,
- (3) Notify required Participating Members,
- (4) Provide support services (recorder and document controller).

2.3.1.2 Contractor. Each Contractor having responsibility for 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, 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. 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/IL. The Participating Member for MIT/IL 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 MIT/IL Authorizing Member in:

- (1) Processing the approved CCB actions and documents into the documentation control system,
- (2) Coordinating the MIT/IL Board 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 MIT/IL 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 services at CCB as required,
- (7) Distributing copies of released documents.

#### 2.4 CONFIGURATION CONTROL BOARD DOCUMENT FLOW

Figure 2-1 shows the general flow of documents to and through the Configuration Control Board.

The Engineering Change Proposal (ECP) is the method of obtaining the cost, schedule, and associated effectivity impact of an action.

The System Identification Data List (SIDL) and aperture cards made up after Board approval of a document are the entry of data into the documentation control system.

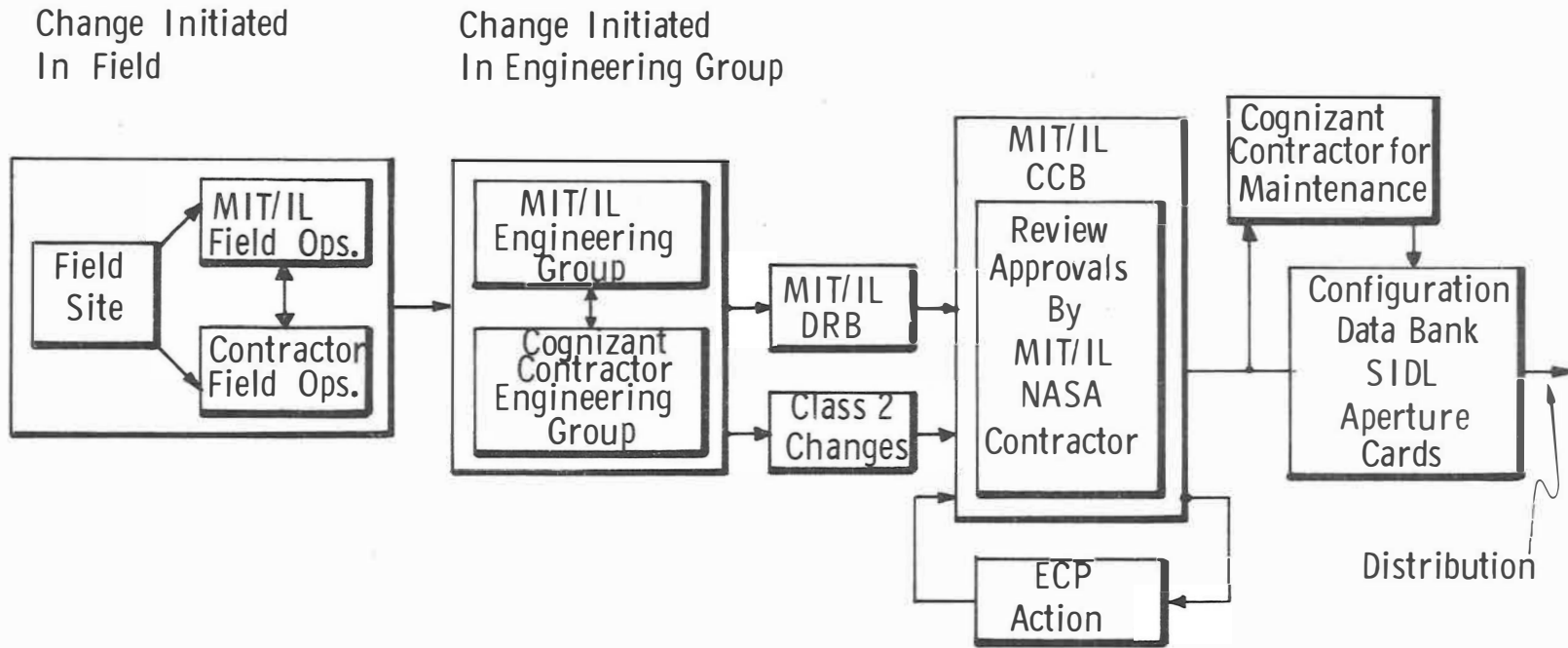


Fig. 2-1 DOCUMENT FLOW

### Section 3

#### IDENTIFICATION OF TECHNICAL DATA SUBJECT TO RELEASE AND REVISION PROCEDURES

##### 3.1 PURPOSE

The purpose of this section is to (1) 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
(8) Interface Control Documents (ICDs) and Interface Revision Notices (IRNs)	NASA/MIT Contracts
(9) Waivers/Deviations	E-1186

\*Note: See paragraph 5-7 for special procedures covering Ground Support Equipment.

(10) Retrofits	E-1186
	E-1293
(11) Manuals	NASA Contracts
(12) Qualification Status List	NPC 200-2
(13) Computer Programs	

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, I, W, AND D

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

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. Approvals are granted only in exceptional cases. Documents being initially released Class A shall receive MIT/IL DRB review and approval prior to CCB.

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 drawing standards depending upon the phase of development.

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 functional 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 should be continuously reviewed and should be upgraded to Class A releases as soon as the design becomes firm.

A Class B document can be 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 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 should not be made obsolete if any hardware has been built to the document.

A TDRR shall be prepared to obsolete documents only when a sufficient quantity has accumulated to make a worthwhile package. The TDRR processed to obsolete documents shall be reviewed and approved by MIT/IL 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) and shall serve as notice to remove the applicable aperture cards from the active file and to retain them only for reference and historical purposes. No microfilm or aperture cards will be prepared to reflect obsolescence.

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

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 and used to build, procure, test, or otherwise support hardware. The fact that the document had been "used" in the program after its release requires the Class I designation to be assigned rather than Class O.

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.

When a TDRR is processed to release a replacement document as described in items (1) and (2) above, the document which is inactivated shall be identified on the same TDRR as a separate action item. If a document is made inactive as a result of scrapping the hardware or otherwise removing the hardware from use, a TDRR shall be prepared to process the inactivation only when there is a sufficient quantity of these documents to make a worthwhile package.



The revision letter of the document shall be changed to effect the inactivation and the document is submitted with the TDRR. Review and approval by MIT/IL DRB and the CCB shall be required to establish conformance with the conditions governing inactivation.

Identification of inactive documents shall appear in SIDL and shall serve as notice to remove the applicable aperture cards from the active file and to retain them only for reference and historical purposes.

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

3.3.5 CLASS W AND D DESIGNATIONS. For the purposes of documentation control, "waiver" and "deviation" documents are considered Class W and Class D, respectively. The terms "waiver" and "deviation" are used as defined in NASA Document NPC 200-2, "Quality Program Provisions for Space System Contractors."

#### 3.4 REVISIONS TO APOLLO CLASS A AND CLASS B DOCUMENTS

All revisions to Class A and Class B documents must receive CCB approval. 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. Special procedures may be devised by the MIT/IL Management Office 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.

Class 1 changes must be approved by MIT/IL DRB prior to the CCB. The effectivity for a Class 1 change must be specified prior to the review by MIT/IL DRB. Any change made to the effectivity at the CCB may require approval of MIT/IL DRB. The effectivity stated at the time of CCB approval shall be mandatory.

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 and will not result in modification or scrap of any previously manufactured item. No effectivity is specified and the change is incorporated on the basis of no cost and no schedule impact.

When a TDRR is prepared to incorporate a Class 1 change in a document, Class 2 changes may be 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 MIT/IL 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.

A TDRR may be prepared to release Class 2 changes only when a sufficient quantity of Class 2 changes have accumulated to provide an economically worthwhile package or when a particular Class 2 change is considered important enough to process a separate change. The designation of these changes as Class 2 shall be evaluated by the CCB. If any change on the TDRR is considered by the CCB as Class 1 or if any doubt should arise concerning the Class 2 designation for a change, the entire TDRR shall be submitted to the MIT/IL DRB for evaluation and approval. Normally, Class 2 changes shall not require MIT/IL DRB approval.

3.4.3 DETERMINATION OF REVISION CLASS. It is the originator's responsibility to determine whether the change is Class 1 or Class 2. Final determination of the class change rests with the MIT/IL DRB and the CCB. Care should be taken, when designating any change, to consider the effects on interface activities including logistics, training, operation, reliability, and the like. Any change in the revision class effected at CCB shall require approval by the MIT/IL DRB.

### 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)

APOLLO Guidance Assembly Reference Index (AGARI)

#### 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 the MIT Instrumentation Laboratory 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 production 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 seven-digit drawing 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 seven-digit drawing number or a new dash number is assigned. While the processing of this new document is similar to that for an initial release, the document should not be designated as an initial release, but should be called a "noninterchangeable replacement." This different designation is used to alert those who are concerned with effectivity and spares provisioning.

The following ground 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 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 release 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.

- (3) When "noninterchangeable replacements" are being prepared, the part number of the replaced part should be referenced, and if a change in effectivity for the replaced part is required, a separate TDRR should be prepared for the part number to indicate the change in effectivity. (In most cases, a "reissue" of the most recent TDRR might suffice.)
- (4) If 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. It is possible that a reissue might require design review, but this would be an exceptional case.
- (5) All TDRRs are consecutively numbered by the CCB upon approval. The information contained in the approved TDRR is recorded and released for distribution and documentation.

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". 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 only is not adequate and will not be accepted.

- (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 MIT-maintained



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.

4.2.2.1 REQUIREMENTS FOR EFFECTIVITY. The following ground 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.

- (1) Effectivity shall be specified for all Class 1 revisions.
- (2) If the effectivity of a Class 1 revision affects spares, it shall be indicated in block 12 on the TDRR in such a way as to clarify the required changes to spares.
- (3) 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.

- (4) Care shall be exercised to identify and recertify the total applicability of a document when considering a particular change to its use: e.g., the revision of a "multiple use" SCD. All affected documents should be processed as a package change.
- (5) 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 other revisions to 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.
- (6) 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.
- (7) No effectivity shall be assigned to Class 2 revisions.

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.

- (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 non-interchangeable.
- (2) Indicate whether or not only the TDRR is being processed through CCB or whether the original documents and the TDRR are being submitted for approval at the same time. If an Engineering Change Procedure (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 action taken by CCB.

4.2.3.3 Item 3: System or Subsystem. Enter the name of the assembly or subassembly 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. Caution should be used when listing the system to see that the indication agrees with the system 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 listing should be entered under the "Description of Changes." TDRRs processing documents to be made obsolete shall have "Multiple Obsolescence" 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 the 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 the serial number of the proposed change.

A number sequence, e.g., 001, 002, plus a letter prefix forms the serial number.

A represents AC Spark Plug Division of GMC.

K represents Kollsman Instrument Corporation.

R represents Raytheon Company.

Therefore, K003 would mean the third change suggested by Kollsman.

- (2) MIT Engineer. The name of the MIT/IL engineer who will evaluate and submit the appropriate changes to CCB.
- (3) Date. The date the TDRR is prepared. Upon receipt of a TDRR prepared by a contractor, MIT/IL will stamp the date received, transmit it to the cognizant engineer, and process as described herein.

4.2.3.6 Item 6: Document Number and Dash Number. Enter the identification number and dash 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 with associated dash-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 obsoleted.

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 basic 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 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 allow judgment of the validity of the proposed change. If the TDRR is releasing the documents, "Initial Release" shall be indicated here. If TDRR is obsoleting documents, enter "Obsolete."

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. If the revision resulted in a change to these documents, indicate the revision at which this change took place. If the revision is still under preparation and the revision letter cannot be forecast, indicate this by the letters "UR" (under revision). When possible, associated drawings 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, O, W, or D, 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 5.4 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: Disposition of Parts on Hand. Furnish instructions as to the disposition of applicable equipment by marking an (X) in the appropriate square. When rework is applicable, the approved method of rework must be stated on the TDRR in Block 8.

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.

4.2.3.15 Item 15: Document Number Replaced. If the TDRR is releasing or revising a document that falls into the category of establishing a new noninterchangeable replacement part, the part number or document number of the old part shall be indicated.

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

4.2.3.17 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. Indicate "NONE" if no subsystem is affected and initial this note.

4.2.3.18 Item 18: Prepared by/Date. Indicate the name of the MIT engineer initiating the request and the date. Contractors should indicate the engineer, his affiliation, and the date.

4.2.3.19 Item 19: Engineering Approval MIT/IL and Date. The signature of the responsible Instrumentation Laboratory design engineer and the date must appear in Box 19 before the TDRR is submitted to the Configuration Control Board. The list of responsible design engineers is filed with the records of the Board.

Whenever a specification control drawing (SCD), procurement specification (PS), or a process and material specification (ND) is listed on the TDRR, the initials of the MIT/IL Reliability Group engineer shall appear in this same space to indicate that the document has been reviewed and approved by that group.

4.2.3.20 Item 20: Design Review Approval. The signature of the chairman of the MIT/IL 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. The requirements for upgrading releases are specified in paragraph 5.4. This signature is not normally required on TDRRs processing only Class 2 changes (ref. paragraph 3.4.2). "N/A" (not applicable) shall be entered by the MIT/IL Authorizing Member of the Board following approval of a TDRR containing only Class 2 changes.

Design review approval shall also be required for obsolescence, inactivation, and as further directed by MIT/IL.

4.2.3.21 Item 21: MIT Configuration Control Board Approval. The signature of the MIT/IL Configuration Control Board authorizing member and date are affixed during the CCB meeting.

4.2.3.22 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.

4.2.3.23 Item 23: NASA Approval. The signature of the designated NASA Authorizing Member of the Configuration Control Board and date are affixed during the CCB meeting.

4.2.3.24 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 three (or four) Authorizing Members of CCB shall indicate their approval by initialing in the appropriate boxes.

#### 4.3 DOCUMENTS

4.3.1 SIDL. The System Identification Data List (SIDL), MIT Report E-1113, is the official design release record for those documents which are issued



to implement MIT/IL technical direction. It identifies all drawings, specifications, and other documents released by the MIT/IL Configuration Control Board for the production, procurement, assembly, inspection, and use of APOLLO Guidance and Navigation equipment, including ground support equipment.

4.3.2 AGARI. The APOLLO Guidance Assembly Reference Index (AGARI) is a management tool that provides a comprehensive interface-control system for the documentation applicable to the APOLLO Guidance and Navigation equipment. AGARI identifies all assemblies to the associated piece parts and reference documents.

#### 4.4 PROGRESS REPORTS

The contractor will be expected to be able to discuss at each CCB meeting the status of all previously released TDRRs. He will make verbal reports immediately of difficulties experienced or anticipated to the responsible MIT/IL engineer or to an MIT/IL Authorizing Member of the Configuration Control Board.

APOLLO GUIDANCE AND NAVIGATION  
 TECHNICAL DATA RELEASE OR REVISION

PG 1 OF \_\_\_\_\_  
 TDRR NO. 2

TITLE OF DWG / DOC <u>4</u>		CONTRACTOR NO. <u>5</u> MIT ENGINEER		DOC NO. DASH NO. <u>6</u>		REVISION FROM TO	
SYSTEM OR SUBSYSTEM <u>3</u>		DATE ORIGINATED		TYPE OF DOC. <u>7</u>			
<input type="checkbox"/> INITIAL RELEASE <input type="checkbox"/> REVISION <input type="checkbox"/> NON-INTERCHANGEABLE REPLACEMENT		<input type="checkbox"/> TDRR ONLY <input type="checkbox"/> TDRR & DOCUMENT <input type="checkbox"/> ECP NO. _____		MASTER DOCUMENT LOCATION <input type="checkbox"/> MIT/IL <input type="checkbox"/> RAYTHEON <input type="checkbox"/> AC SPARK <input type="checkbox"/> KOLLSMAN			
DESCRIPTION OF CHANGES  <u>8</u>							
REASON FOR CHANGES  <u>9</u>							
DOC. CLASS _____ REV. CLASS <u>11</u>		OTHER DOCS. AFFECTED  <u>10</u>		HARDWARE EFFECTIVITY CUT-IN    CUT-OUT		SPARES EFFECTIVITY  <u>12</u>	
ORGANIZATION AFFECTED <u>16</u>		NEXT HIGHER ASSY <u>14</u>		DISPOSITION OF PARTS ON HAND			
REMARKS:		DOCUMENT NUMBER REPLACED <u>15</u>		DISPOSITION		PARTS	
		INTERFACE AFFECTED <u>17</u>		NO CHANGE		HIGHER ASSEMBLY	
				MODIFY		SPARES	
				SCRAP			
PREPARED BY <u>18</u>		DESIGN REVIEW APPROVAL MIT/IL <u>20</u>		MIT CCB APPROVAL <u>21</u>			
ENGINEERING APPROVAL MIT/IL <u>19</u>		CONTRACTOR APPROVAL <u>22</u>		NASA APPROVAL <u>23</u>			
REISSUE DATE: _____		REASON: _____		CCB INITIAL MIT- CONTR- NASA-			
<u>24</u>							

FIG 4-1 SAMPLE TDRR FORM

TDRR NO. 2

TP 8913 (REV. 1/65)

**APOLLO GUIDANCE AND NAVIGATION  
TECHNICAL DATA RELEASE OR REVISION**

PG. \_\_\_ OF \_\_\_  
TDRR NO. ②

TITLE OF DWG/DOC.  ④	DOC. NO.  ⑥	DASH NO.	REVISION	
DESCRIPTION OF CHANGES			FROM	TO
			ZONE	

TP 8913

FIG 4-2 SAMPLE TDRR FORM-SUBSEQUENT PAGES

TDRR NO. \_\_\_\_\_

## 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 # 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).

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.

5.1.1.2 RIB Numbers. Each RIB number shall be a seven-digit NASA Production number (from a series assigned by MIT/IL). 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.

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 Mods 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);

B., C., etc. - Section for each affected assembly of a console or specific instructions for the item for which there is a retrofit kit.)

VIII MODIFICATION DESIGNATION

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

IX. DISPOSITION OF PARTS REMOVED

(Scrap, return to stock, etc.)

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."

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/IL 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 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.

5.1.4 IDENTIFICATION (MARKING). The following rules shall apply for the part and drawing identification of modified components incorporated in-line and/or retroactively.

- (1) Noninterchangeable units shall be identified by a new part number up to the level of interchangeability.
- (2) Interchangeable units for retroactive incorporation shall be MD (modification) marked in accordance with paragraph 5.1.4.2. This rule shall also apply when the incorporation is for both in-line and retroactive incorporation.
- (3) Interchangeable units for in-line incorporation only shall be identified by the applicable revision letter and dash number if required.

5.1.4.1 Assignment of Modification Numbers. Modification numbers shall be assigned by the Contractor after NASA approval of the ECP and during CCB release of the engineering change for retrofit.

5.1.4.2 Application of Modification Numbers. For interchangeable units, modification numbers will be assigned in accordance with the following rules (see table 5-1).

- (1) When consecutive modifications including the first are made, only the highest modification number of the sequence shall be marked on the item. This shall indicate that all lower-numbered modifications have been accomplished.
- (2) When nonconsecutive modifications are made, the modification number of nonsequential changes preceded by "X" shall indicate that lower-numbered modifications have not been accomplished.
- (3) When consecutive modifications, excluding the first, are made, the lowest and the highest modification numbers of the sequence shall be marked on the item. The lowest modification number of the sequence shall be preceded by "X". This shall indicate that all intervening modifications have been accomplished.
- (4) Upon incorporation of missed modifications in the item, previous modification numbers denoted by "X" shall be removed and the proper designation, as described above, applied. The letters "MD" shall always be left on the item so that any new numbers need only be added after or close to them.
- (5) To positively distinguish a two-digit number from a single-digit number, two-digit numbers shall be underlined.



Table 5-1. Modification Marking

Example	Modification Accomplished	Item Marking	Rule Applied
1	1,2,3,4	MD 4	1
2	3	MD X3	2
3	1,2,3,5,8	MD 3X5X8	1 and 2
4	3,4,5,7	MD X3 5X7	2 and 3
5	1,2,3,5,6,7,8, 9,10,12	MD 3X5 <u>10X12</u>	1,2,3,5
6	Example 4 after completion of modifications 2 and 6	MD X 27	4

## 5.2 NON-CONFORMANCE DOCUMENTATION

The documentation of non-conformance 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/RASPO. The NASA/RASPO 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. If more than one G&N system incorporates the same non-conformance, 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 will be furnished to the MIT/IL Management Director, who will insure the listing of the waiver in the MIT/IL documentation record.

5.2.2.1 Apollo G&N Contractual Waivers. An Apollo G&N Contractual Waiver is originated by the Contractor when a non-conformance 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/IL through the MIT/IL resident at the Contractor facility via telephone and datafax. MIT/IL concurrence or non-concurrence is to be accomplished within 48 hours. Format, routing, distribution, and designation of authorizing signatures are a NASA responsibility. This type of waiver requires MIT/IL signature (design cognizance and reliability), NASA Contracting Office signature, and NASA engineering 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 and the Contractor Engineering Office. No MIT/IL 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 non-conformance:

- (1) Functional non-conformances 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 non-conformances 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 TDRR PROCEDURES

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

5.3.1 INITIAL RELEASE OF DOCUMENTS MAINTAINED BY MIT/IL. 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.

5.3.1.1 MIT/IL Originator. The MIT/IL 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.

5.3.1.2 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.

5.3.1.3 MIT/IL Design Group Leader. The design group leader shall:

- (1) Process copies of the proposed Class A documents through DRB,
- (2) Coordinate with the MIT/IL 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.

5.3.2 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.

5.3.2.1 Contractor. When the Contractor is the originator, he shall prepare the proposed documents to be released by MIT/IL. Blueline copies of each document to be released shall be provided to the cognizant MIT/IL engineer and to the MIT/IL Reliability Group. These blueines should be provided at the earliest possible time during preparation. The Contractor shall prepare and submit the TDRRs and the document master to the MIT/IL design group leader and prepare ECP forms if necessary.

5.3.2.2 MIT/IL Design Group Leader. The MIT/IL design group leader shall:

- (1) Review the drawing prior to submission to DRB and CCB 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/IL Engineering and Reliability Group recommendations, and submit document masters and the TDRRs to CCB.

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

5.3.3.1 Originator. Prior to DRB and CCB meetings, the MIT/IL 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.

5.3.3.2 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.

5.3.3.3 MIT/IL Design Group Leader. The design group leader 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 CCB.

After CCB approval, the design group leader shall:

- (1) Incorporate the document revision completely as outlined on the signed TDRR,
- (2) Deliver the revised documents to the chairman of the CCB for initialing of the completed revision within one week after the signed TDRR is received from CCB,
- (3) Deliver the signed documents to the document controller for microfilming.

5.3.4 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 in order to provide advance information to the following:

- (1) One reproducible copy or marked-up reproducible to the cognizant engineer at MIT/IL for evaluation of the proposed revision,
- (2) One copy for Reliability Group review. This copy then goes for system interface review at DRB,

- (3) If the revision originates at MIT/IL, 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.

For actual submittal to CCB, the Contractor shall prepare the proposed revision package and submit it to the MIT/IL cognizant engineering group through the MIT/IL APOLLO Management Office. The package shall contain a reproducible or marked-up reproducible of all revised documents and a completed TDRR form. He shall also prepare an ECP if necessary.

5.3.4.1 MIT/IL Design Group Leader. The MIT/IL Design Group Leader 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 CCB.

5.3.4.2 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 MIT/IL TDRR number to the document, raise the document revision to the next sequential 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.

#### 5.4 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) Perform the applicable revision procedure below:
  - a. Submit document directly to the CCB if document is for Block I Ground Support Equipment.
  - b. Submit document to the MIT/IL DRB and to the CCB in accordance with the normal Class A document release procedure if document pertains to anything other than Block I Ground Support Equipment.

If the document is upgraded as a separate action on a TDRR processing Class 2 changes, the "Document Class" and "Revision Class" in item number 11 on the TDRR shall be identified as "A" and "2" respectively. The effectivity in item number 12 on the TDRR shall be marked N/A (not applicable).

If the document is upgraded as a separate action on a TDRR processing Class 1 changes, the "Document Class" and the "Revision Class" in item number 11 on the TDRR shall be identified as "A" and "1" respectively. The effectivity in item number 12 on the TDRR shall be entered as dictated by the Class 1 change.

## 5.5 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.

#### 5.6 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/IL.

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 MIT/IL DRB and the CCB in accordance with the release procedures established in the preceding sections of this publication.

#### 5.7 GSE DESIGN CONTROL PROCEDURES. Series 100, Block II, LEM

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/IL, exceptions to the normal procedure may be used after being specifically & individually authorized by GSE Design (GSED) letter from the MIT/IL management office and approved by NASA/RASPO, as described below.

The MIT/GSE Group will conduct continuing periodic information exchanges with the Contractors to discuss changes to the G&N systems, G&N test requirements, GSE test requirements, 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/IL 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 Sub-System)
- (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/IL, 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/IL or the Contractor.

In the case where cost or schedule impact may result from a proposed change, the ECP procedure outlined in paragraph 5.5 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/IL to the Contractor and approval by NASA, the change may be incorporated. A TDRR will be submitted via MIT/IL 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/IL DRB approval. The DRB will be convened at MIT/IL 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.

#### 5.8 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/IL engineer. Mark "RE-ISSUE" 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/IL engineer will initial the change for processing through the CCB.

## Section 6

### GLOSSARY OF TERMS

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

**OBSOLETE.** "Obsolete" denotes any document which has been formally removed from use and is characterized by:

- (1) The document had been previously released through the Configuration Control Board at MIT/IL,
- (2) The document had never actually been used to build, procure, test, or in any way support hardware.

**INACTIVE.** "Inactive" denotes any document which has been formally removed from use and is characterized by:

- (1) The document had been previously released through the Configuration Control Board at MIT/IL,
- (2) The document had previously been used to build, procure, test, or otherwise support hardware.

**CANCELLED.** "Cancelled" denotes any document which has been removed from potential use and which had never been released through the Configuration Control Board at MIT/IL. The identification number of a cancelled document shall not be reassigned.

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

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

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.

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.

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 NASA, MIT/IL, and Contractor approved modification 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.

ENGINEERING CHANGE PROPOSAL (ECP) FORM. The ECP form described in ANA Bulletin No. 445 shall be used as required by NASA and MIT/IL. Refer to paragraph 5.5.

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

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

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

DASH NUMBER. An identification suffix used to indicate a non-interchangeable configuration of the hardware.

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

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

NAA/S&ID	North American Aviation S&ID
MSC/HOU	NASA Manned Spacecraft Center at Houston
GAEC	Grumman Aircraft Engineering Corporation
MILA	Merritt Island Launch Area



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