

Non-Measurement Sensitive

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MILITARY SPECIFICATION

MANUALS, TECHNICAL; GENERAL STYLE AND FORMAT OF
(Work Package Concept)

This specification is approved for use within the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE.

1.1 Scope. This specification prescribes the general format for the preparation of technical manuals to the Work Package (WP) concept. This specification shall be used to prepare aircraft weapon systems, aeronautical equipment, airborne missiles, guided weapons, and related support equipment technical manuals.

1.2 Types of manuals.

1.2.1 Organizational level. WP organizational level manuals may be either a single manual or a series of manuals covering organizational level operations and maintenance and its associated illustrated parts breakdown (IPB) data. Organizational level information shall normally be defined as "on" aircraft or equipment tasks arranged on a systems concept.

1.2.2 Intermediate and depot level. WP intermediate and depot level manuals shall be prepared as either individual maintenance level coverage or combined maintenance level coverage manuals, and associated IPB data, based on their application and the approved maintenance plan or logistics support analysis (LSA). The documents will normally cover "off" aircraft or "off" equipment tasks arranged by weapons repairable assembly (WRA). That is, component or assembly maintenance shall be covered instead of the system concept used at organizational level.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Commanding Officer, Naval Air Engineering Center, Systems Engineering and Standards Department (SESD), ATTN: Code 53, Lakehurst, NJ 08733-5100 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

AREA TMSS

DISTRIBUTION STATEMENT A.

Approved for public release; distribution is unlimited.

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1.2.3 Combined maintenance levels. WP format manuals may consist of any combination of level coverage and associated IPB data, predicated on the approved maintenance plan or the LSA, facility requirements, support equipment required, and the volume of information to be presented. Combined maintenance level manuals are most practical when maintenance requirements at each level are fairly consistent, the same support equipment is applied, the same facility requirements are used, and when the overall data volume permits. Organizational level normally shall not be combined with intermediate or depot level data for an aircraft weapon system manual. Combination manuals covering all levels of maintenance are acceptable when specified in the contract (see 6.2.1).

2. APPLICABLE DOCUMENTS.2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified in the contract, the issues of these documents shall be those listed in that issue of the Department of Defense Index of Specifications and Standards, the (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

MILITARY

MIL-M-81929	Manuals, Technical; Illustrated Parts Breakdown, (Work Package Concept); Preparation of
MIL-M-85337	Manuals, Technical; Quality Assurance Program, Requirements for

STANDARDS

FEDERAL

FED-STD-313	Material Safety Data Sheets; Preparation and the Submission of
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MILITARY

MIL-STD-12	Abbreviations for Use on Drawings, Specifications, and in Technical Documents
MIL-STD-17-2	Mechanical Symbols for Aeronautical Aerospacecraft, and Spacecraft Use
MIL-STD-1840	Automated Interchange of Technical Information
DOD-STD-100	Engineering Drawing Practices

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2.1.2 Other Government publications. The following other Government publications form a part of this specification to the extent specified herein. Unless otherwise specified in the contract, the issues shall be those in effect at the date of the solicitation.

PUBLICATIONS

FEDERAL

Public Law 91-596	Occupational Safety and Health Act, dated December 29, 1970, and Executive Order 11807
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DEPARTMENT OF DEFENSE

DOD 5200.1R	Information Security Program Regulation
DOD 5220.22M	Industrial Security Manual for Safeguarding Classified Information
DOD 6050.5 Series	Hazardous Material Information System
H4/H8	Commercial and Government Entity Codes (CAGE)
H-6	Federal Item Name Directory for Supply Cataloging

DEPARTMENT OF THE NAVY

OPNAVINST 5100.23	Navy Occupational Safety and Health (NAVOSH) Program
OPNAVINST 5510.1	Information and Personnel Security Program Regulation
N0000-00-IDX-000/TMINS	Description and Application Guide and Index for Standard Technical Manual Identification Numbering System (TMINS)

NAVAL AIR SYSTEMS COMMAND

NAVAIR 00-25-700	Technical Manual Preparation Guide for Technical Writers, Editors, and Illustrators
NAVAIRINST 4423.3	Policies, Procedures and Responsibilities for Assignment and Application of Uniform Source, Maintenance, and Recoverability (SM&R) Codes.

NAVAL SUPPLY SYSTEMS COMMAND

NAVSUPINST 5100.27	Navy Hazardous Material Control Program
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(Copies of specifications, standards, publications and other Government documents required by the preparing activity in connection with specific procurement functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following other documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adapted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

ANSI Y10.5	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering
ANSI Y14.2	Line Conventions and Lettering
ANSI Y14.5	Dimensioning and Tolerancing
ANSI Y14.15	Electrical and Electronics Diagrams

(Application for copies should be addressed to American National Standards Institute Incorporated, 1430 Broadway, New York, New York, 10018.)

LIBRARY OF CONGRESS

CATALOG No. Z 253.U58	U.S. Government Printing Office Style Manual
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(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

IEEE Std. 91-84	Graph Symbols for Logic Functions
IEEE Std. 200	Reference Designation for Electrical and Electronics Parts and Equipments
IEEE Std. 260	Letter Symbols for Units of Measurement
IEEE Std. 315	Graphic Symbols for Electrical and Electronic Diagrams Including Reference Designation Class Designation Letters

(Application for copies should be addressed to Institute of Electrical and Electronic Engineers Inc., 345 East 47th Street, New York, New York, 10017.)

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AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA (AECMA)

AECMA Simplified English;	A Guide for the Preparation of Aircraft
AECMA Document:	Maintenance Documentation in the Inter-
PSC-85-16598	national Aerospace Maintenance Language

(Application for copies should be addressed to Aerospace Industries Association of America, 1725 DeSales Street, NW Washington, D.C. 20036.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS.

3.1 Copyrights and advertising. Copyright material shall not be included in any publication prepared in accordance with this specification without written permission of the copyright owner. Proprietary legends shall not be shown. The manual shall not contain advertising matter. All material prepared in accordance with this specification shall be Government property.

3.1.1 Proprietary data. The Government shall have unlimited right to the data prepared under this specification. Proprietary legends are not acceptable in technical manuals. The preparing activity should disclose, in narrative or pictorial display, that information necessary to fulfill the requirements of this specification without disclosing that portion of the manufacturing process that the preparing activity wishes to safeguard.

3.2 Technical manuals in work package format.

3.2.1 Work package concept. WP concept is defined as a logical combination of requirements analysis and improved presentation techniques. It has been specifically designed to enhance documentation usability in performance of aeronautical maintenance. WP usability is keyed to three primary elements, (1) a logical organization and arrangement, (2) an easily understood comprehensive style, and (3) a highly visible, eye attracting format.

3.2.1.1 Work package format. A work package technical manual is specifically designed to respond to work tasks. The usability of the WP is the direct result of applying coordinated techniques to improve access of technical information and simplifying presentation methods. This is accomplished through controlled text legibility, highly visible primary and secondary headings, coordinated and consolidated text and illustrations by task, improved line art presentation and more effective indices requirements.

3.2.1.2 Work package technical manual organization. WP technical manual organization shall be by system or equipment and arranged by functional task in logical task order sequence. Functional tasks and related data include but are not limited to:

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- a. Operation procedures (if required).
- b. Description and principles of operation (with block diagram).
- c. Testing and troubleshooting (with schematics and wiring data).
- d. Maintenance with illustrated parts breakdown.

3.2.1.3 Work package technical manual organizational arrangement. Information shall be functionally divided into individual task packages in the logical order of work sequence. These WP's shall be stand alone maintenance units containing all information required for directing task performance. The manual arrangement shall be responsive to the needs of the user. It shall reflect the engineering design, the approved maintenance plan/LSA, and the defined maintenance concept. It shall accurately reflect the requirements of each maintenance level and the environment and skills for each task performance. Testing and maintenance shall be described using approved support equipment, established facility requirements, and applicable parts replacement as identified by the item source selection criteria (provisioning).

3.2.1.4 Work package definition. Based on the criteria presented above, WP documents shall be defined as follows:

a. A WP manual shall consist of a functionally assembled technical manual containing individual packages covering independent tasks grouped by system or equipment.

b. A WP shall consist of an individual unit of information containing all data necessary for a technician to perform a specific task. There shall be minimum referencing. Referencing within the description of direct procedural steps should not occur except as defined in 3.5.1

3.2.2 Work package technical manual preparation. The preparing activity must concentrate and apply the requirement of system or equipment engineering design to the development of the technical manual. The guidelines set forth in the LSA or the approved maintenance plan shall also apply. General guidelines for planning and preparation of WP manuals are defined in NAVAIR 00-25-700.

3.2.2.1 Technical manual outline. The first step in the construction of a WP manual is the development of an outline to be reviewed and approved by the requiring activity. The outline shall be developed from an analysis of available source data. The most appropriate method of determining maintenance requirements and the sequencing of maintenance tasks is a task analysis, as required in NAVAIR 00-25-700. Normally, the source of information used for the task analysis is the LSA. If an LSA has not been performed, the preparing activity shall follow the approved maintenance plan identified by the requiring activity. The depth and scope of the task analysis will depend on the sophistication of the design of the equipment and the depth of the required maintenance coverage as determined by the LSA or maintenance plan.

3.2.2.2 Content of manual outlines. A manual outline shall list all WP candidates by title in the proposed order of arrangement. It must identify, by appropriate title and number, the intended coverage of each WP within a manual. Outlines for one WP manuals shall substitute paragraph titles for WP

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titles. The approved outline shall include changes/corrections requested by the requiring activity following review.

3.2.2.3 Task development. The task development phase of technical manual preparation is critical because it will reflect the arrangement and alignment of technical information. Based on maintenance requirements identified by the LSA or approved maintenance plan, all tasks and support data should reflect end item operation and fault isolation/maintenance criteria at the appropriate level(s) of maintenance. As required in NAVAIR 00-25-700, task analysis is the most appropriate method of establishing a matrix of task requirements and the sequence of task actions. The depth and scope of task analysis depends on hardware sophistication and the magnitude of effort defined in the LSA or approved maintenance plan.

3.2.3 Task grouping within a work package. Ideally, each WP in the manual will be an independent, self-contained data unit. Following the criteria defined in NAVAIR 00-25-700, the writer will be required to group some tasks and divide others into WP's of suitable length. Division or selection of coverage will depend on the item covered, such as operational modes, complexity of maintenance actions, level(s) of maintenance covered, and the specific requirements of the applicable detailed content specification.

3.2.3.1 Page count of a work package. Each WP shall contain only that data which is essential to performance of the task, or group of tasks contained in the WP. The desired page count of any one WP is 30 pages. If it is anticipated that any one WP will exceed this limit, a logical division of the information to be covered should be established and the WP should be divided into two or more WP's. In the event that no logical division can be made, authorization to exceed 30 pages shall be requested by the preparing activity from the requiring activity. These limitations do not apply to alphabetical index, numerical index of part numbers, numerical index of reference designations, or wire lists.

3.2.4 Digital format. When specified in the contract, digital format of the technical manuals shall be in accordance with MIL-STD-1840 (see 6.2.1).

3.2.4.1 Digital text. Text shall be delivered in ASCII code, formatted onto an American National Standard Institute (ANSI) standard tape with Standard Generalized Markup Language (SGML) tagging described in MIL-STD-1840.

3.2.4.2 Digital illustration. Line art illustrations and artwork shall be delivered in vector format. The illustrations shall be delivered in accordance with the Initial Graphics Exchange Specification (IGES) or Computer Graphics Meta (CGM) file specifications described in MIL-STD-1840.

3.3 Illustrated parts breakdown.

3.3.1 Relationship between the illustrated parts breakdown and the work package concept. The illustrated parts breakdown (IPB) is an integral part of the technical manual data to be prepared in support of maintenance tasks. Therefore, it is essential that the intent of the WP concept is followed in the development of the supporting IPB. Emphasis shall be placed on the accessibility of data, comprehensibility of supporting illustrations, and the

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use of the information presented. The IPB shall be prepared as part of a maintenance WP, a separate WP, or a separate manual.

3.3.1.1 Part of a maintenance work package. When the IPB data is included in a maintenance WP, it shall follow the applicable maintenance data.

3.3.1.2 Separate work package(s). When IPB is prepared as one or more WP's, the IPB WP shall follow the maintenance WP. When more than one IPB WP's are required, the IPB WP's shall be presented immediately following each applicable maintenance WP, or all IPB WP's shall follow the last maintenance WP in the manual.

3.3.1.3 Separate illustrated parts breakdown manual. When specified in the contract, a separate IPB manual shall be prepared in accordance with MIL-M-81929 (see 6.2.1).

3.3.2 Illustrated parts breakdown figures. The format of IPB figures shall be compatible with all reproduction mediums. This shall be accomplished through control of legibility of the Group Assembly Parts List (GAPL), improved line art techniques in the preparation of supporting illustrations, and coordinated GAPL entries with illustrations (see 3.9 and NAVAIR 00-25-700).

3.3.3 Development of the illustrated parts breakdown. The general organization of a separate IPB manual shall be in accordance with MIL-M-81929. However, the organization of the maintenance manual shall be followed in organizing the technical content of the IPB. That is, the system or aeronautical equipment breakdown in the maintenance manual and the IPB shall be identical.

3.3.4 Preparation of the illustrated parts breakdown. The preparing activity shall follow the general guidelines described herein for the preparation of a WP manual when preparing an IPB manual. IPB WP's contained in WP manuals shall be prepared in the same manner as other WP's in the manual. The source data used for maintenance task development shall also be used for development of the IPB. That is, if the maintenance tasks were developed through the LSA, the same set of documents shall be used in the development of the IPB. Consistency of information contained in the maintenance WP and the IPB is essential.

3.3.5 Development of the illustrated parts breakdown group assembly parts list. The assembly of data shall follow the same pattern established in the development of the maintenance tasks. Once the task analysis has been completed and the outline of the manual has been approved, the properly prepared GAPL will track the maintenance tasks it is intended to support. If a discrepancy between the maintenance task and the supporting GAPL is uncovered, the source data used must again be reviewed and a determination made of the cause of the conflict. It shall not be automatically assumed that the GAPL or the maintenance information is incorrect and adjust one to meet the other.

3.4 Style of writing.

3.4.1 Response to intended user. The style of writing shall be in accordance with NAVAIR 00-25-700 and the techniques used to produce a readable and comprehensive technical manual shall be commensurate with the capability of

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the targeted audience for which they are intended. Text shall be factual, concise and readily understandable. Unnecessary lead-in sentences, descriptive phrases, and vague and ambiguous terms shall not be used. Technical phraseology, requiring specialized knowledge, shall be used only when no other word or phrase will convey the intended meaning. Words which have more than one meaning such as "replace" instead of "reinstall," shall not be used. Third person indicative mood shall be used for descriptive text. Second person imperative mood shall be used for instructions and shall be written as commands; for example: "install power supply." Articles shall be omitted except when required to prevent ambiguity or to facilitate understanding of the instruction. When space conservation is desirable, the verb may also be omitted; for example: "power switch ON." The verb may be omitted only if the intent of the statement is clear to the user. The rules and features of Simplified English written in AECMA Simplified English Document may also be used as guidelines in the preparation of technical manuals.

3.4.1.1 Work package comprehensibility. Comprehensibility is mandatory in the preparation of all text and illustrations. It is imperative that documents be prepared in an easily understood manner to permit rapid detection and comprehension of all procedures. Concentration shall be exercised during the writing phase to ensure adequate paragraphing and sentence structuring. Sentencing shall be directive in nature, short, clear and concise so it supports data retention. Preferred verbs (see Appendix) should be used. Arrangement of information in procedural step format vice narrative descriptive material also enhances comprehension. Text and illustrations shall be closely coordinated. Graphics data is of equal importance to text. Simple, improved graphics reduces text requirement and raises the level of comprehension.

3.4.1.2 Readability. Readability is measured using criteria based on the readers/users ability to comprehend and retain the written information. To ensure that text material is both readable and comprehensive, the overall writing style shall be directed toward specific standards that will guarantee accomplishment of these objectives. Controlling factors include word length, sentence length, paragraphing, and word usage. Prepared text shall conform to the following readability standards:

a. Word length. The length of a word is measured by its number of syllables. Simple common words of a few syllables shall be used to convey the intended meaning. The average word length shall not exceed 1.60 syllables. The desired average word length is 1 to 1.5 syllables, but 1.51 to 1.60 is acceptable. Military terms and mandatory technical words are excluded from this restriction.

b. Sentence length. Sentences shall be short and concise in order to facilitate ease of understanding and retention of thought. The average sentence length shall not exceed 20 words. The desired average is 17 words or less, but 18 to 20 words is acceptable. The use of compound and complex sentences shall be avoided in order to achieve maximum comprehensibility.

c. Paragraphing. Paragraphs shall deal with a single subject and shall include only as much information as the average reader can comfortably retain. The desired paragraph length is three to four sentences, but five to six sentences is acceptable.

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d. Word usage. It is important to choose the correct word for each meaning, situation, or occasion. The consistent choice of correct words and the use of simple or preferred words will reduce a potential source of confusion. The quality of sentence structure and the correct choice and position of words in a sentence will reduce sentence complexity.

e. Use of shall, will, should, may. Use the word "shall" to express a mandatory or binding provision. "Will" may be used to express declaration of purpose. It may be necessary to use "will" in cases where simple futurity is required, such as: "Power to the bombing mode will be provided through the navigational system." Use "should" and "may" whenever it is necessary to express nonmandatory provisions, or an acceptable or preferred means of accomplishment.

f. Use of indefinite words. Indefinite words (such as approximately and about) shall not be used to express specific limits, such as measurements, tolerances and values. A range of allowable limits shall be used.

g. Removal and installation procedures. Removal and installation procedures shall be complete. Instructions such as "Reverse removal procedure," shall not be used. If a removal or installation procedure is obvious, the primary step shall be given as a command but the details shall not be required; for example: "remove attaching bolts," is sufficient when the method of removal will be obvious to the technician.

h. Verb list. The Appendix lists preferred verbs commonly used in technical manuals to promote clear understanding of the intent of a command or descriptive sentence. Each verb listed is defined in terms of one or more meanings associated with operation and maintenance of the end item and components. A simple sentence is included for each usage. Where necessary, notes are included.

i. Writing guides. Detailed information on the above writing styles are contained in NAVAIR 00-25-700.

j. Capitalization and punctuation. Detailed information on capitalization and punctuation is contained in the U.S. Government Printing Office Style Manual, Library of Congress Publication 2 253.U58

3.4.2 Abbreviations. The use of abbreviations not listed in MIL-STD-12 shall be held to a minimum and each shall be defined the first time it appears in each WP. The complete technical expression shall be fully spelled out followed by the abbreviation or acronym in parentheses. Abbreviations shall be used in accordance with the requirements of MIL-STD-12. In the event that a nonstandard abbreviation must be used because the manual is being prepared on composing equipment that cannot produce a certain abbreviation or symbol, the abbreviation must also be explained the first time it appears in each WP.

3.4.3 Warnings, cautions, and notes. (see figure 3.) Procedures or practices that, if not correctly followed, could result in injury to personnel or damage or destruction of equipment, shall be highlighted by notes, cautions, or warnings. Warnings, cautions, and notes shall precede the text to which they apply. Warnings, cautions, and notes shall not contain procedural steps, or direct maintenance actions, nor shall they be numbered. When a warning, caution, or note consists of two or more paragraphs, the applicable

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heading shall not be repeated above each paragraph. If it is necessary to use a combination of data, it shall appear in this order: warning, caution, note. Such inserts in text shall be concise and shall be used to emphasize important and critical instructions. Headings for warnings, cautions, and notes shall be prepared in accordance with figure 1, with the exception that for copy prepared on automated equipment, over/underscoring warnings with uppercase 12 point boldface type and underscoring of caution with uppercase 10 point boldface type may be used. Explanation of usage is as follows:

a. Warning: Refers to a procedure or practice that, if not correctly followed, could result in injury, death, or long term health hazard.

b. Caution: Refers to a procedure or practice that, if not correctly observed, could result in damage to or destruction of equipment.

c. Note: Refers to a procedure or condition that requires emphasis.

3.4.4 Health hazard precaution data. Procedures prescribed for the operation and maintenance of equipment shall be consistent with the safety standards established by the Occupational Safety and Health Act, Public Law 91-596 and Executive Order 11807. Appropriate warnings shall be included, when hazardous chemicals, adverse health factors in the environment, or use of the equipment cannot be eliminated; see 3.4.4.1. Warnings and cautions applicable to hazardous materials shall be based on information contained in Material Safety Data Sheets (MSDS). Under the provisions of Federal Standard No. 313 MSDS are required to be submitted for hazardous materials. In turn, MSDS must be entered into the Hazardous Material Information System as required under the provisions of DOD 6050.5 series and OPNAVINST 5100.23. Appropriate personnel protective devices shall be included.

3.4.4.1 Warnings applicable to hazardous materials. Complete warnings applicable to all hazardous materials addressed in the manual shall be provided in the Warnings Applicable to Hazardous Material page(s). (See 3.7.4.4.) The warnings shall be developed from information provided by chemical manufacturers in material safety data sheets (MSDS) required by 29 CFR 1910.1200. MSDS's used within DOD are required to be entered into the Hazardous Materials Information System (HMIS) which is addressed in DOD 6050.5 series publications. The DOD 6050.5 series publications contain MSDS's submitted under the provisions of Federal Standard No. 313. Additional information related to hazardous material requirements is provided in OPNAVINST 5100.23, Navy Occupational Safety and Health (NAVOSH) Program Manual and NAVSUPINST 5100.27, Navy Hazardous Material Control Program.

a. A complete warning shall be provided for all hazardous materials addressed in the manual. Appropriate personnel protective equipment requirements shall be included.

b. Warnings applicable to hazardous materials shall be presented in technical manuals by the use of icons (nonverbal graphic symbols), nomenclature and specification or part number of the material, and an Arabic numeral identifier.

c. Starting with the number 1, the warnings shall be sequentially numbered within the manual. The warnings shall have a numeric identifier assigned in the order of their appearance in the manual. Each hazardous

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material shall be assigned only one numeric identifier. Repeated use of a specific hazardous material shall reference the numeric identifier assigned at its initial appearance. Warnings added to the technical manual after the initial issue shall be assigned the next consecutive number regardless of its order of placement in the manual.

3.4.4.1.1 Icons applicable to hazardous material warnings. Figure 2 depicts icons and their application that are approved for use in association with warning for hazardous materials. The introduction of another icon must have prior approval of the requiring activity.

a. Icons shall be not less than 3/8 inch in height and 5/8 inch in length. The images shall be sharp and clear. The graphic design shall be in accordance with the above dimensions and maintain quality in the image to provide almost instant recognition.

b. More than one icon shall be used for a warning for a hazardous material when the user will be exposed to more than one hazard (see figure 3).

3.4.4.2 Nuclear hardness. (Nuclear Survivability Requirements, such as Overpressure and Burst, Thermal Radiation, Electro Magnetic Pulses (EMP) and Transient Radiation Effects on Electronics (TREE)). If equipment to be operated, maintained or overhauled has nuclear survivability requirements, applicable warnings shall be incorporated into technical publications to ensure that hardness of equipment is not degraded during operation and maintenance. Caution shall be taken not to include classified information in an unclassified publication.

3.4.4.2.1 Symbol. All hardness critical processes/steps/items will be marked with the symbols **HCP** / **HCI** as follows:

a. In maintenance manuals, when entire paragraph, including all subparagraphs, is considered hardness critical, only major paragraph will be marked. The symbol **HCP** shall be placed between paragraph number and title.

b. When only certain processes/steps within a paragraph are hardness critical, only the applicable process/step will be marked. The symbol **HCP** shall be placed between the step number and title.

c. In the illustrated parts breakdown, when survivability considerations are specified and Hardness Critical Items (HCI) are identified on drawings and parts lists (refer DOD STD-100), they must also be marked and identified in the description column of the GAPL. It is preferred that the symbol **HCI** be boxed (**HCI**) however, other methods of highlighting the symbol to call attention to its importance is acceptable.

d. The introduction of the maintenance manual and illustrated parts breakdown will include a listing and explanation of the symbols **HCP/HCI** respectively and other pertinent information as necessary to emphasize specialness of hardness features. This will include an explanation statement that the symbols establish the requirement that all paragraphs and processes/steps in the maintenance manual and the items in the illustrated parts breakdown identified by the symbols, must be followed as written to ensure nuclear hardness is not degraded. This statement will be preceded by a caution.

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3.4.4.3 Electrostatic discharge (ESD) sensitive parts. If electronic equipment to be handled, inspected, repaired, or assembled is ESD sensitive, the items must be marked and identified with the symbol **ESD** as follows:

a. In maintenance manuals, when entire paragraph, including all subparagraphs, is considered hardness critical, only major paragraph will be marked. The symbol **ESD** shall be placed between paragraph number and title.

b. When only certain processes/steps within a paragraph are hardness critical, only the applicable process/step will be marked. The symbol **ESD** shall be placed between the step number and title.

c. In the illustrated parts breakdown, ESD sensitive items shall be identified in the description column of the GAPL. It is preferred that the symbol **ESD** be boxed (**ESD**); however, other methods of highlighting the symbol to call attention to its importance is acceptable.

d. The introduction of the maintenance manual and illustrated parts breakdown will include a listing and explanation of the symbol **ESD** and other pertinent information as necessary to emphasize uniqueness of ESD components. This will include an explanation statement that the symbols establish the requirement that all paragraphs and processes/steps in the maintenance manual and the items in the illustrated parts breakdown identified by the symbols, must be followed as written to ensure ESD components are not degraded. This statement will be preceded by a caution.

3.4.5 Nomenclature consistency. Nomenclature of identical systems, subsystems, equipment, support equipment, components, and parts of the end item shall be consistent throughout a manual, volumes of a manual, and manuals that are a part of a set of manuals covering an end item. The preparing activity shall develop nomenclature lists for associate preparing activities and sub-preparing activities to ensure such consistency. The correct nomenclature shall be derived from one of the following sources (listed in the order of precedence): "AN" nomenclature, nameplate nomenclature, H-6 assigned nomenclature, or nomenclature on the drawing from which the item was manufactured. Noun modifiers shall be added to the description of parts as required to assure positive identification, such as cotter pins/taper pins. These modifiers need not appear on the preparing activities drawing. Noun modifiers, once added for clarity, shall be used throughout the technical data. Simple identifying modifiers provided for parts may be dropped after the first full identification of the item in the WP. For example, "Remove attaching bolt" is acceptable and preferred to "Remove cadmium plated steel bolt", unless specific identification of one bolt within a group of similar objects is required. When an item is identified by a common name, both this name and the correct technical name shall be clearly identified the first time it appears in the text of a WP. The listing of common names in IPB's shall not be required. Nomenclature corresponding to that appearing on the equipment in the form of name-plates, decals, engraved legends or other markings shall be stated in text exactly as it appears on the hardware. All hardware items involved in a task shall be specifically mentioned unless the task is self-explanatory, or obvious.

3.4.5.1 Nameplate nomenclature. If a portion of the name of a control or display appears as a label on the equipment, that portion shall be written

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exactly as on the label; for example: "POWER switch", "MAIN PWR circuit breaker."

3.4.5.2 Designation of equipment. The official designation of aeronautical equipment shall be expressed in specific terms such as model number, type, serial number range, or similar terms.

3.4.5.3 National stock numbers. National stock numbers shall not appear in WP manuals.

3.4.5.4 Part numbers. Part numbers shall not be used in text or on illustrations except for the following:

a. Part numbers identifying specific support equipment are acceptable in text and on illustrations when more than one item has the same nomenclature; for example: "Position clamp, part number 2468-10, over retaining fixture."

b. When more than one item of support equipment is assigned the same nomenclature, part numbers identifying items contained in support equipment kits shall be used in text and on illustrations. The kit part number shall be included in the "Support Equipment Required" list.

c. When the requirement is for a separate maintenance manual and separate IPB, part numbers may be included in legends on, or adjacent to, the associated art work in the maintenance WP.

d. When necessary for clarity, (more than one item is assigned the same nomenclature) the specification, standard, or part number of consumable/expendable items shall be included in text and on illustrations.

3.4.6 Symbols. Graphic symbols shall be used in the manual in accordance with the standards specified in 3.4.6.1 through 3.4.6.3. If possible, new or unusual symbols shall be avoided. When new or unusual symbols are required, they shall be identified at each occurrence or in a key or legend on a diagram. It is permissible to spell out symbols that cannot be reproduced on the machine on which the manuscript or reproducible copy is being prepared; for example, plus for +.

3.4.6.1 Electrical and electronic symbols. Graphic symbols for electrical and electronic parts shall be in accordance with IEEE Std. 315, ANSI Y10.5 and IEEE Std. 260, as applicable.

3.4.6.2 Logic diagram symbols. Graphic symbols for logic diagrams shall be in accordance with IEEE Std. 91-84.

3.4.6.3 Mechanical symbols. Unless otherwise specified in the contract, graphic symbols for mechanical parts shall be in accordance with MIL-STD-17-2 (see 6.2.1).

3.4.7 Reference designations. Electrical and electronic reference designations shall be in accordance with IEEE Std. 200.

3.4.8 Dimensions and tolerances. Dimensions and tolerances shall be shown in limits dimensions in accordance with ANSI Y14.5.

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3.4.9 Footnotes. Footnotes shall not be used. Notes may be placed in text, tables, or on illustrations, but not at the bottom of a page deliberately separated from the applicable text, table, or illustration to which they apply.

3.4.10 Assignment of titles. Easy access to the data contained in the technical manual cannot be stressed too strongly. The construction of titles, such as titles of a WP, IPB figure, illustration, or tables and the placement of that title in an index will often be the key to a successful search for information. Titles shall be assigned with full consideration of the importance they have in finding information. Titles shall describe the contents of the data element in definitive terms. Ambiguous titles shall be avoided.

3.5 References.

3.5.1 Reference procedures. The following guidelines apply to both WP manuals and separate IPB manuals. However, the limited requirement for text in separate IPB manuals does not justify a detailed discussion in the use of references in introductory matter for IPB manuals. The use of references in text can create undue hardship for the user of the technical manual. It is recognized that use of this technique is required to avoid inordinate duplication of data; however, references shall be kept to a minimum. The following guidelines apply to the use of references.

a. Standard maintenance tasks that may be committed to memory through use and training and are explained in general information manuals available to the technician shall not be detailed; for example, NAVAIR 01-1A, General Series Manuals. The primary step shall appear in text; for example: "Connect external electrical power." A simple task shall not be illustrated or described in detail if a brief statement shall suffice. A simple task that is almost self explanatory but requires an illustration for clarification shall not be detailed. The primary step should be stated with reference to the illustration. Minimum information shall be presented to ensure the step is clear and sufficient for its purpose.

b. Principles of operation shall not be duplicated in other maintenance WP's. When required, they shall be referenced on the WP title page. Normally, they shall not be referenced in the text.

c. Procedures that require performance of tasks by technical personnel other than those normally assigned to the subject task shall be referenced on the WP title page and in the text. For example, if the primary task is removal of a component of the flight control system that is inaccessible without removal of the power plant, a preparatory step of the procedure would be, "Remove power plant (A1-F77AA-220-300, WP094 00)."

d. Maintenance procedures that are required to complete maintenance tasks that are contained in another maintenance manual shall be referenced by publication number and work package number. These references shall appear in the applicable WP. Short procedures of two pages or less may be duplicated when required for safety, clarity or continuity of task performance.

e. Procedures that require the assistance of additional technical skills other than those primarily assigned to the subject task and are considered a

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team effort, should appear in the same WP. For example, if the task is removal of an electromechanical pump, both the electrical and mechanical tasks shall appear in the same WP.

f. Procedures within a task that require an inordinate amount of duplication shall be referenced. Generally, maximum duplication should be no more than two pages (including text and illustrations) for any one task.

g. Replacement or repair instructions in troubleshooting procedures shall be referenced in one of the following methods: on the fault logic diagram, in the fault logic text, in the troubleshooting table, or in tabular form in the WP.

h. Except as noted above, duplication of short procedures, rather than reference to them, is preferred. The decision to duplicate or reference shall not be influenced by the requirement to limit the size of the WP. Rather, the package shall be planned to include all information required, including duplication. The goal of self-contained, task-oriented WP's with minimum references shall be the prime consideration. WP's that have a minimum of text and a long list of references shall be considered unacceptable.

3.5.2 References to other manuals or volumes. (see figure 1.) References in the text shall be made as follows:

a. For non WP publications, reference shall be made by publication number; for example: "Refer to AE-172AA-720-100."

b. By publication number and WP number when referring to a manual prepared in WP format; for example: "Refer to NAVAIR 05-14ADG-2.4, WP098 00" or "Perform operational checkout of the hydraulic power system (NAVAIR 01-F14AAA-2-19, WP231 00)."

c. Reference shall not be made to a paragraph, figure (except separate IPB manuals), or table number. Reference to paragraph numbers in testing and troubleshooting procedures is authorized.

d. When reference is made to a classified supplement and the discussion is incomplete without the data contained in the supplement, the classified supplement shall be listed under "Reference Material" on the WP title page.

3.5.3 References within a manual or volume. (see figure 1.) References in the text shall be as follows:

a. WP number; for example: "Remove wing pylon (WP089 00)" or "Install 78A1 flap position transmitter (WP114 00)."

b. Paragraphs within a WP by primary sidehead; for example: "Refer to INSTALLATION, this WP." Reference may be made to a paragraph by number within a WP only if the paragraph is untitled.

c. Index numbers on illustrations, followed by the figure number; for example: "(23, figure 12). If a paragraph contains several references to the same figure, only the first index number shall include the figure number. Additional references to index numbers shall be by index numbers only; for example: "Remove four nuts (25) and eight washers (24) from four bolts (26)."

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If the quantity for each index number is the same, the quantity is listed only for the first; for example: "Remove four nuts (25) and washers (24) from bolts (26)." The sequence shall continue until the procedure is complete or until the sequence is broken by reference to another figure; for example: "Remove retaining bolts (30) and lift air valve (4) from the support bracket." Next step, "Disassemble air valve (1, figure 13)."

d. Figures within a WP by number; for example: "Lubricate sliding gage (figure 3)." Sheet numbers shall be included for multisheet illustrations.

e. Tables within a WP by number (if assigned). If tabular data is not assigned a table number, reference to the table shall not be made other than in text adjacent to the tabular data.

f. Materials such as lubricants, cleaning fluid, or fuel by Government specification number, when applicable. When the preparing activity cannot ascertain the Government specification, it shall request this information from the Government representative, providing complete information concerning the material; such as composition, properties, characteristics, applications, or manufacturer's specification number.

g. Government specifications and standards by the basic number unless it is essential to reference a specific revision to the specification or standard. The words Military Specification, Specification, Military Standard, or similar terms shall not precede the basic number in text; for example, MIL-STD-445, not Military Standard MIL-STD-445.

h. Temperature readings, as indicated on the equipment. General temperature readings shall be given in degrees Fahrenheit with Celsius in parentheses.

i. Weights and measures, in U.S. standard units and speed, distance, and meter readings as indicated on the equipment. Conversion to U.S. standards shall follow in parentheses if the equipment is designed and manufactured to the metric system. Metric values are not required unless the equipment is designed and manufactured to the metric system.

j. Parts on diagrams by complete reference designation.

k. Switch positions and panel markings, exactly as marked on the equipment except that it is permissible to spell out the word for a symbol that cannot be reproduced by the machine used to prepare the manuscript or reproducible copy.

l. Tolerances, limits, and torque values shall be expressed in limit dimensions and in terms compatible with the equipment authorized at the maintenance level to which the tolerances and limits apply.

3.5.4 Reference material list on work package title pages. (see figure 1.) The reference material list shall be prepared within the following guidelines in the sequence listed as they apply:

a. The maintenance level of publications listed shall not be required.

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b. Additional WP's within the same manual that are required to complete the task or discussion shall be presented first, in numerical sequence, by the WP title and WP number only. The publication number is not required.

c. Publications prepared in WP format required for reference shall be presented by title, publication number, WP title and WP number. When two or more WP's are referenced in the same manual, they shall be listed in numerical sequence; repetition of the manual title and publication number shall not be required.

d. Publications, other than technical manuals prepared in the WP format, shall be listed by title and publication number.

e. Other publication numbers referenced in testing and troubleshooting procedures shall be listed.

f. Government specifications required to support the task or discussion presented in the WP shall be listed in the list of Reference Material by title and specification number.

3.6 General format.

3.6.1 Manuscript copy. (see figure 4.) Manuscript copy may be prepared single column double-spaced, double column single-spaced or single column single-spaced, justified left hand margin only, depending on method of preparation. Typing shall be on one side only on standard bond paper with a page size of approximately 8 1/2 x 11 inches. Binding edge shall not be less than 1 inch, and the outside edge not less than 1/2 inch. Tabular data shall be single spaced to conserve space. When included, IPB GAPL pages shall be single spaced. Normally double column single-spaced is provided for in-process reviews.

3.6.1.1 Manuscript, completeness of. The manuscript shall be complete in all respects and shall be fully edited and proofread. Front matter, text, illustrations and tables shall also be in accordance with the technical content specification. Any method of covering and binding that incorporates legible, collated copy will be acceptable. In the event any required data is not available during scheduled in-process reviews, the preparing activity shall define those portions of the manual that are still to be prepared. If a figure (illustration), table, or text is not included, a statement to that effect shall appear in text. For example: "Figure 6. Assembly of Air Valve. (Not Available)." Blank illustration pages, replacing missing illustration pages, shall not be required. Full page illustration pages, which if not accounted for would break page continuity, may be noted on the previous page. For example: "Figure 6. Assembly of Air Valve. (Page 12 - Not Available)."

3.6.1.2 Marginal copy and identification of manuscript pages. (see figure 4.) The marginal copy of manuscript pages shall be as described in 3.6.3 and shall be the same font and type size used for text.

3.6.2 Reproducible copy. Reproducible copy shall consist of all text pages, including tabular data and illustrations, in a form suitable for eventual reproduction. Text for manuals shall be double column, single spaced, with the left margin justified. The right margin may be justified whenever available equipment permits without an increase in cost. Text shall be double spaced between paragraphs, procedural steps, and before and after

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the headings "WARNING," "CAUTION," and "NOTE." Reproduction area shall be as noted in 3.6.2.3. Binding edge margin shall be not less than 1 inch, and the outside edge not less than 1/2 inch. All tabular data shall be single spaced or as specified by the applicable technical content specification.

3.6.2.1 Reproducible copy preparation methods. Equipment used for preparing reproducible copy shall produce clear, legible, usable technical manuals at the most economical cost regardless of reproduction media. Type sizes are identified in 3.6.2.4. Reproducible copy shall be prepared in accordance with requirements defined within this specification. The following also apply:

a. The page elements not imprinted on the page, including corrections, shall be fastened to the page in a manner that will permit repeated handling of the reproducible copy over a period of years without the possibility of losing attached page elements.

b. Page elements shall be mounted in a manner that will not impair legibility after reproduction.

c. Not more than a total of ten page elements may be attached to any one seven by ten-inch image area. If more than ten attachments are required on any page, the page shall be replaced. Replacement pages may be produced by photo-graphic process if there is no loss of legibility in the resulting positive copy. Normally, the page shall be restructured by actions such as retyping all or portions of the text appearing on the page, or replacement of marginal copy.

d. If reproducible copy for a foldout page is required, the restrictions for page element attachments shall apply to each page segment of the foldout.

e. Individual letters or numerals, small groups of letters or numerals, or single words shall not be mounted on the reproducible page. Instead of correcting words, letters, or numerals individually, a paragraph or a portion of a paragraph shall be retyped and then mounted on the reproducible page. Certain symbols or special usage words such as preprinted headings for notes, cautions, and warnings and change bars may be attached to the reproducible page in single units.

f. Such items as callouts, index numbers, or leader lines shall not be individually mounted on the reproducible page. Such items shall be inked on the illustration or, if "rub on" letters, numerals, or symbols are used, the illustration shall be photographed and a positive copy shall be mounted on the reproducible page.

3.6.2.2 Page size of reproducible copy. Page sizes authorized for use in manuals prepared to this specification are: 4 x 8 inches, 5 x 8 inches, 5 1/2 x 7 inches, 8 1/2 x 11 inches, and 17 x 11 inches. The technical content specification or contract will indicate when a 4 x 8 inches, 5 x 8 inches, 5 1/2 x 7 inches, or a 17 x 11 inches size manual is required; otherwise 8 1/2 x 11 inches size is required. A foldout illustration for a manual shall not exceed the overall dimension of 45 inches in width and 11 inches in length (45 inches in width includes a blank apron).

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3.6.2.3 Image area of reproducible copy. (see figure 5.) The image area shall be as follows:

<u>Page Size</u> <u>Inches</u>	<u>Width-Text/Art</u>		<u>Length-Text/Art</u>		<u>Length-With Marginal Copy</u>	
	<u>Inches</u>	<u>Picas</u>	<u>Inches</u>	<u>Picas</u>	<u>Inches</u>	<u>Picas</u>
4 X 8	3 1/8	19	6 1/4	38	7	42
5 X 8	4	24	6 1/4	38	7	42
5 1/2 X 7	4 1/2	27	5 3/4	35	6 1/4	38
8 1/2 x 11	7*	42	9	54	10	60
17 x 11	15 1/4**	91	9	54	10	60

*Single column width is 7 inches. Each column of a double column format shall be 20 picas (approximately 3 5/16 inches) wide with a 2 pica (approximately 5/16 inch) gutter between.

**The image area for illustrative material is 15 1/4 inches. Columns of text shall be constructed as directed for a standard double column format page. In a 15 1/4 inch image area, there may be up to four 20 pica columns of text or tabular matter. These columns shall be placed on the reproducible copy in the same format as two 7 inch image areas separated by a 1 1/4 inch gutter between the second and third column. If less than four columns of text or tabular matter is to appear on the page, placement of galleys shall start at the left margin of the page and continue to the right, as described above. One or more columns of text or tabular data shall be "centered" on the page. For information on foldout illustrations see 3.9.15.

3.6.2.3.1 Authorized printed manual size by thickness. The thickness of a printed copy shall not exceed the following limits:

<u>Page Size</u> <u>(Inches)</u>	<u>Thickness</u> <u>(Inches)</u>	<u>Approximate Sheet Count</u> <u>(Sheets of Paper)</u>
4 X 8	2	400
5 X 8	2	400
5 1/2 X 17	2	400
8 1/2 x 11	3	600
17 x 11	1	150*

*Heavy Stock Paper

3.6.2.4 Type size. (see figures 6, 11 and 22.) Text typeface size is one of the controlling factors of legibility. The text type size for all manuals prepared to this specification shall have a minimum typeface of 9 1/2 points and a maximum of 10 1/2 points in the prepared products such as manuscript or reproducible copy. IPB GAPL pages shall be considered text. The

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typeface size for text, dimensions and callouts on illustrations, including schematics and diagrams, shall be a minimum typeface of 8 points and a maximum typeface of 9 1/2 points. The typeface size for tables and tabular listings, including numerical and reference designation indices, shall be a minimum of 8 points and a maximum of 10 points.

3.6.2.5 Reproducible copy leading and spacing. (see figure 6.) Layout shall conserve space without lessening usability or clarity of material. Leading and spacing shall be used for best legibility and conservation of space. Double spacing of text within a paragraph, or similar wastefulness, is unacceptable. Blank space on reproducible copy shall be avoided whenever possible. Slight variations are permitted in order to avoid layout practices that would result in:

- a. The first line of a paragraph being at the bottom of a page column.
- b. The last line of a paragraph being at the top of a new page.
- c. A sidehead falling on the last line of a page or column.
- d. Warnings, cautions, and notes being divided so that first lines appear on one page and remaining lines on another. (First lines may appear in the left column, and remaining lines in the right column on the same page.)

3.6.2.6 Oversize reproducible copy. Reproducible copy may be prepared oversize. One-to-one copy (reproducible material the same size as the required page size) is preferred. If prepared oversize, the actual area utilized shall be of such size that, when the copy is photographically reduced to the prescribed image area for the manual, the type size will meet the minimum type size requirements described herein.

3.6.2.7 Paragraph division and sideheads. (see figure 6.) Introductory matter and technical content text shall contain one or more main paragraphs which may be divided into subordinate paragraphs, as required. Major paragraphs shall have a brief title describing the content or action portrayed. Identical or miscellaneous headings shall be avoided whenever possible. Paragraphs are referred to as primary sidehead, secondary sidehead, tertiary sidehead, quaternary sidehead, and untitled paragraphs.

a. Primary sideheads. Primary sideheads are used to divide the text into primary subjects. There shall be at least one primary sidehead in each WP containing text. Primary sideheads shall stand alone (are not run in with text), shall be in capital letters, and shall be underlined.

b. Secondary sideheads. Secondary sideheads are used to divide text where there are two or more subjects covered under one primary sidehead. Secondary sideheads shall be run in with text, shall be in capital letters, and shall not be underlined.

c. Tertiary sideheads. Tertiary sideheads are used to divide text where there are two or more subjects covered under one secondary sidehead. Tertiary sideheads shall be run in with text, shall appear in upper and lower case letters, and shall be underlined.

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d. Quaternary sideheads. Quaternary sideheads are used to divide text where there are two or more subjects covered under one tertiary sidehead. Quaternary sideheads shall be run in with text, shall appear in upper and lower case letters, and shall not be underlined.

e. Untitled paragraphs. Untitled paragraphs are used to divide text that does not warrant the assignment of sideheads.

3.6.2.7.1 Procedural steps. (see figure 6.) The contents of a paragraph may be divided into procedural steps. Lead-in sentences are not required when the paragraph title is self-explanatory. Procedural steps are normally used to present step-by-step procedures, such as disassembly, alignment, and removal procedures. Procedural steps may be divided into subordinate steps and sub-subordinate steps.

3.6.2.7.2 Quality assurance procedures. (see figure 6.) Procedures that are essential to equipment performance or to safety of personnel shall be observed or checked by a quality assurance inspector prior to the technician proceeding to the next step. Examples are: torque indicators, required gauge readings, and tasks that will be subsequently covered and the quality assurance requirements cannot be verified. Therefore, quality-assurance-required procedures shall be highlighted by the addition of the abbreviation "(QA)," following the procedure/step. An explanation of the highlighting shall be given in the introduction to the manual.

3.6.2.8 Indentation. (see figure 6.) Paragraphs shall begin at the left margin. The first line of a procedural step shall be indented three spaces (or approximately 1.5 picas) from the left margin. Subordinate steps shall be indented five spaces (or approximately 2.5 picas) and sub-subordinate steps seven spaces (or approximately 3.5 picas) from the left margin. The second and subsequent lines of procedural, subordinate, and sub-subordinate steps shall be flush with the left margin. The titles warning, caution and note shall be centered in the column and the text for the warning, caution, and note shall be indented three spaces (or approximately 1.5 picas) from the left margin and shall be approximately 15 picas in width (for type set copy, 1 pica shall be equal to 2 spaces or characters).

3.6.3 Marginal copy pages of work package manuals. (see figure 7.) The marginal copy for pages of manuals prepared in WP format consists of the items listed below, placed as required:

a. Publication number. (All pages) - The publication number shall be assigned by the requiring activity and shall be placed in the extreme upper left corner of the reproduction area in 16-point bold type. If the publication is jointly used, the requiring activity's publication number shall be placed as noted and the other service's publication number placed below the requiring activity's publication number in the same type size. Publication numbers derived by utilizing the Standard Technical Manual Identification System (TMINS) shall not be preceded by the authorizing activities acronym.

b. Work package number. (All WP pages) - The WP number shall be assigned by the preparing activity and shall be placed in the extreme upper right corner of the reproduction area in 16-point bold type, identical to the size of the publication number.

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c. Publication date or revision date. (WP title pages and first pages of the Numerical Index of Effective Work Packages (A Page) - On each WP title page and each A Page, the publication date or revision date shall be placed in the upper left corner of the reproduction area in 10-point bold type, below the publication number. Publication or revision dates shall not be placed on the second or subsequent pages of the WP or the A page.

d. Change number. When a WP is changed, the change number shall appear on the WP title page and A Page in lieu of the publication or revision date. The change number shall appear in the upper left corner of each changed page in 10-point bold type.

e. Revised WP as part of a manual change. Each page of a revised WP prepared as part of a manual change shall carry the change number on each page.

f. Page number. Pages shall be numbered consecutively within each WP using Arabic numerals beginning with the number one. The page number shall be placed below the WP number in 10-point bold type.

g. "Blank" page numbers. "Blank" WP pages shall be assigned page numbers, but the number shall appear on the preceding pages; for example: "Page 27/(28 blank)."

3.6.4 Marginal copy - separate illustrated parts breakdown manuals. (see figure 8.) The marginal copy for pages of separate IPB manuals consists of the items listed below, placed as required:

a. Publication number. The publication number shall be assigned by the requiring activity and shall be placed in the extreme upper left corner of the reproduction area in 16-point bold type. If the publication is jointly used, the requiring activity's publication number shall be placed as noted and the other service's publication number placed below the requiring activity's publication number in the same type size.

b. Page identification. The following shall be placed in the extreme upper right corner of the reproduction area in 16-point bold type:

(1) Introduction pages - the word "INTRO", followed by the page number (see 3.6.6.2)

(2) Alphabetical index pages - the word "INDEX", followed by the page number (see 3.6.6.1)

(3) Numerical Index of Part Number pages - the page number prefixed by the letter "N"; for example: "N0001-00" (see 3.6.6.3)

(4) Numerical Index of Reference Designation pages - the page number prefixed by the letter "R"; for example: "R0001-00" (see 3.6.6.3)

(5) IPB Figure Pages - the figure number preceded by the letter "F"; for example: "F0001-00" (see 3.6.6.4)

c. Publication date, revision date, or change number and date. (First page of introduction, indexes, and figures only) - On the first page, the

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publication date or revision date shall be placed in the upper left corner in 10-point bold type, below the publication number or the joint usage publication number, as applicable. When the first page is changed, the change number and date shall replace the publication date or revision date.

d. Change number and date. (Second and subsequent pages of introduction, indexes, and figures) - The publication date or revision date shall not be placed on the second and subsequent pages. When changed, the change number and date shall be placed on the title page and the change number only each changed page in the upper left corner, in 10-point bold type.

e. Revised figures as part of a manual change. The first page of a revised figure prepared as part of a manual change shall carry the change number and date. Second and subsequent pages of the same figure will carry the change number only.

f. Page number. The page number shall be placed in the extreme upper right corner of the reproduction area below the figure number in 10-point bold type. The GAPL is to be considered a part of the IPB figure and shall be numbered accordingly.

g. "Blank" page numbers. "Blank" figure pages, alphabetical index pages, and introduction pages shall be assigned page numbers, but the number shall appear on the preceding pages; for example: "Page 27/(28 blank)," "R2001-01/(02 blank)," "TPDR-1/(2 blank)."

3.6.5 Numbering - work package manuals.

3.6.5.1 Work package numbers. Each WP shall be assigned a permanent number. The WP number shall be considered permanent upon distribution of the basic issue of the manual. Once considered permanent, the WP number shall not change. In cases where revision to a manual requires a complete rewrite, the WP numbers may be changed when authorized by the requiring activity.

3.6.5.2 Work package numbering system. Each WP number shall be a five digit number, beginning with the number 001 00. There shall be one blank space between the third and fourth numerals. When required, the alphabetical index WP shall be the first WP in the manual and shall be assigned the number 001 00. If a numerical index of part numbers and a numerical index of reference designations is required, and these lists are to be placed at the front of the manual, they shall be assigned the numbers 001 01, 001 02, respectively. If so placed, these last two lists shall be the only exceptions to the assignment of the last two digits of the WP number in the basic issue of the manual. When required, the introduction WP shall be assigned the number 002 00. The numbers 003 00 through 999 00 shall be assigned to following WP's as required. These numbers shall be assigned in numerical sequence of the first three digits; for example: 003 through 999.

a. WP numbers may be reserved for future use for expansion purposes, provided that the numbers reserved and not titled are accounted for and marked "Reserved" in the numerical index of effective work packages. If a WP number has been assigned a title and technical content is not available at the time of distribution, the deficiency shall be noted in the numerical index of effective work packages by the statement "To Be Provided".

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3.6.5.2.1 Assignment of the last two digits of the work package number. Except as noted in 3.6.5.2 the last two digits of the WP number shall be reserved during the preparation of the basic issue of the manual to permit unlimited expansion of the manual to incorporate changed or new configuration data without affecting the WP numbers previously assigned. In any change cycle following distribution of the basic issue, the last two digits of any previously assigned WP number may be assigned as follows:

a. The first WP number to be assigned after an existing basic WP number shall be identified as "01"; for example, "WP029 00" shall be followed by "WP029 01".

b. Subsequent WP numbers to be assigned after 01 shall be 02 through 99; for example, "WP029 02 " through "WP029 99."

c. One or more WP's may be added after any existing WP. The placement within the manual shall depend on the technical content task arrangement and its relationship to the existing WP and the WP(s) to be added.

d. As required by 3.6.5.2, WP numbers shall be assigned in numerical sequence, initially by the first three digits, and then by the last two digits.

3.6.5.2.2 Numbering of list of technical publications deficiency reports incorporated pages. The list of technical publications deficiency reports incorporated pages shall be numbered using the word TPDR, followed by the page number; for example: "TPDR-1, TPDR-2" (see 3.7.5.1).

3.6.5.2.3 Work package numbers - division of an existing manual. When an existing manual is divided because it exceeds the three inch limitation, the previously assigned WP numbers shall not be reassigned or renumbered. The first volume shall contain the front matter and as many WP's as appropriate beginning with WP001 00. The second and subsequent volumes shall contain an alphabetical index for the volume and the remaining WP's.

3.6.5.3 Work package page numbers. The pages of each WP shall be numbered consecutively in Arabic numerals beginning with the number one (see 3.6.3f).

3.6.5.3.1 Foldout illustration page numbers. Each continuous foldout illustration shall be assigned a page number. The page number for a foldout page shall be so placed that the number will be visible when the page is folded. The reverse side of foldout pages shall be blank. Each foldout page number shall include a blank page notation; for example: "26/(27 blank)". When a foldout consists of several sheets, the sheets will be numbered in consecutive order following the figure title (see 3.6.5.6).

3.6.5.4 Paragraph numbers. Paragraphs within a WP shall be numbered consecutively in Arabic numerals beginning with the number one.

3.6.5.5 Procedural step numbers. Procedural steps shall be assigned lowercase letters; for example: "a," "b". Steps may be divided into subordinate steps, which shall be assigned Arabic numerals in parentheses; for example: "(1)," "(2)". Subordinate steps may be subdivided into sub-subordinate steps, which shall be assigned lowercase letters in parentheses; for example: "(a)," "(b)".

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3.6.5.6 Figure and table numbers. (see figure 7.) Figures and tables within a WP shall be numbered consecutively in Arabic numerals beginning with the number one. Tables that are not referenced except from an adjacent paragraph and are one column in width shall not require a table number. Tables that are referenced in two or more paragraphs, and tables that are full page width shall be assigned table numbers. Each page of a multisheet illustration shall be identified by a sheet number following the figure number and title. The first sheet of the figure shall include the total number of sheets that make up the figure; for example: "Figure 6. Fuel System Schematic Diagram (Sheet 1 of 5)." The second and subsequent frames shall be numbered consecutively; for example: "Figure 6. Fuel System Schematic Diagram (Sheet 2)".

3.6.5.7 Detail views in maintenance manuals. Detail views of an assembly or subassembly shall be prepared and identified when the subject matter cannot be clearly illustrated in the main view of the figure. The subject assembly or subassembly shall be identified either with a capital letter adjacent to the applicable index number on the main view, or a bracket with a leader line from the index number to the bracket (see MIL-M-81929, 3.6.1.4).

3.6.6 Numbering - separate illustrated parts breakdown manuals.

3.6.6.1 Alphabetical index pages. The pages of the index shall be numbered consecutively in Arabic numerals, beginning with the number one, and preceded by the word "INDEX"; for example: "INDEX-1."

3.6.6.2 Introduction. The pages of the index shall be numbered consecutively in Arabic numerals, beginning with the number one, and preceded by the word "INTRO"; for example: "INTRO-1."

3.6.6.3 Numerical index of part number and numerical index of reference designation pages. Numerical index pages shall be numbered using a six digit numbering system. The intent of this numbering system is to reduce revision and/prenumbering of a substantial number of pages when adding or deleting tabular data. The pages shall be numbered as follows:

a. The first page of the index shall be numbered "0001-00." The second and subsequent pages shall be numbered consecutively; for example: "0002-00," "0003-00," "0004-00."

b. If a page must be added between existing pages of index, the two digits following the dash (-) shall be used; for example, if a page must be added between page "0020-00" and "0021 00," the page shall be numbered "0020-01."

c. If a page must be added between existing expansion pages, two or more pages shall be revised until the added information appears in the index in proper sequence. For example, if expansion of the tabular data on existing page "0300-06" causes an overrun and the next existing page is "0300-07," pages "0300-06" and "0300-07" would be revised and any overrun from the revised pages would appear on "new" page "0300-08."

d. If a page is added or revised in accordance with b and c above, partial pages of tabular data are acceptable.

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e. Blank pages shall be assigned a page number; however, it shall appear on the preceding page; for example, if page "0904-00" is blank, page "0903-00" shall bear the number "0903-00/(0904-00 blank)." For expansion pages, the two digits following the dash (-) shall suffice for identification of a blank page; for example: "0405-01/(02 blank)."

f. All pages of the numerical index of part numbers shall be preceded by the letter "N"; for example: "N0001-00."

g. All pages of the numerical index of reference designations shall be preceded by the letter "R"; for example: "R0001-00."

h. If both indexes are contained in one volume or in separate volumes, each shall be considered separately and begin with the number "0001-00" and the applicable letter prefix.

3.6.6.4.1 Numbering of list of technical publications deficiency reports incorporated pages. In a separate IPB manual, the list of technical publications deficiency reports incorporated page(s) shall be numbered using the word TPDR, followed by the page number; for example: "TPDR-1, TPDR-2" (see 3.7.5.1).

3.6.6.5 Numbering - separate illustrated parts breakdown manual technical content figures. The figure number shall appear in the top right-hand corner of each page of the figure, preceded by the letter "F"; for example: "F0041-00." The first technical content figure shall be numbered "F0001-00." The second and subsequent figures shall be numbered consecutively. There shall be a dash (-) between the fourth and fifth digits. In the basic issue of the manual, the figures shall be assigned numbers in numerical sequence of the first four digits; for example: "F0001" through "F9999").

3.6.6.5.1 Assignment of the last two digits of the illustrated parts breakdown manual technical content figures. The last two digits of the figure number shall be reserved for expansion of the manual during subsequent change cycles. This system provides unlimited expansion without the need to renumber previously assigned figure numbers. In any change cycle, following the distribution of the basic issue, the last two digits following the dash (-) of any previously assigned figure number may be assigned as follows:

a. The first figure number to be assigned following an existing figure number shall be "01"; for example, figure "F0029-00" shall be followed by "F0029-01."

b. Subsequent figure numbers to be assigned after "01" shall be "02" through "99"; for example, figure "F0029-01" through "F0029-99."

c. One or more figures may be added after any existing figure. The placement of a figure in a manual shall be dependent upon the technical content of the existing figure and the figure(s) to be added.

d. As required by 3.6.6.5, figure numbers shall be assigned in numerical sequence by the first four digits and then by the last two digits. Figure numbers may be reserved for future use (see 3.6.5.2a for reserve accountability requirements).

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3.6.6.5.2 Numbering - illustrated parts breakdown manual technical content figures when an existing manual is divided. If an existing IPB is divided into volumes, the previously assigned figure numbers shall not be renumbered.

3.6.6.5.3 Numbering - illustrated parts breakdown manual technical content figure pages. The pages of each figure shall be numbered consecutively in Arabic numerals beginning with the number one (see 3.6.4f and 3.6.4g).

3.6.6.5.4 Numbering - illustrated parts breakdown when part of a maintenance WP or separate IPB WP. The illustration and GAPL are to be considered one figure and pages are to be numbered sequentially.

3.7 Technical manual arrangement.

3.7.1 General arrangement of work package manuals. The parts of the WP technical manual shall be arranged in the following order:

- a. Front Matter.
- b. Alphabetical index, WP001 00.
- c. Numerical index of part numbers (WP manual with IPB) WP001 01 (see 3.7.7).
- d. Numerical index of reference designations (WP manual with IPB) WP001 02 (see 3.7.8).
- e. Introduction, WP002 00.
- f. Technical content, WP003 00 and subsequent, as required.

3.7.2 Single work package manuals.

3.7.2.1 Arrangement of single work package manuals. (see figure 9.) When the intent of the manual to be prepared is coverage of a noncomplex end item, (a page count of 30 pages or less), the detailed arrangement described in 3.7.1 may not be cost effective and a single WP manual shall be developed. Single WP manuals containing 16 pages or less shall not be changed but shall be revised. Single WP manuals containing more than 16 pages may be changed or revised. The manual shall be revised when the cumulative total of existing changed pages and the pages affected by the current change exceeds 60 percent of the total pages.

3.7.2.2 Single work package manual format and content. Single WP manuals shall be prepared in the general style and format of multi-work package manuals with the following exceptions:

- a. There shall be no numerical index of effective pages for single WP manuals containing 16 pages or less. For single WP manuals containing more than 16 pages, a title page and a list of effective pages (A-page) shall be prepared in accordance with 3.7.4.2 and figure 10, with the exception that the requirement to cover data elements as separate WP's shall be interpreted as being presented in separate paragraphs. The following statement shall be placed below the current change list as shown on figure 10: "Only those pages

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assigned to the manual are listed in this index. If changed pages are issued, insert the changed pages and dispose of superseded pages. The portion of text affected by the change is indicated by change bars or the symbol "R" in the outer margin of each column of text. Changes to illustrations are indicated by pointing hands or change bars, as applicable. The column titles shall be "Page Number" and "Change Number."

b. The WP shall be numbered 001 00.

c. The requirement to cover data elements in separate WP's shall be interpreted as being presented in separate paragraphs.

d. The alphabetical index shall be placed on the WP title page in accordance with 3.7.10.1h. This requirement applies to single WP manuals of 16 pages or less.

e. The introduction shall be the first paragraph in the WP and shall contain the information in 3.7.9.2 except as follows. For single WP manuals of 16 pages or less, the Introduction shall immediately follow the title information and may appear on the WP title page. The Introduction shall include a listing of technical publication deficiency reports and a listing of the hazardous materials referenced in the manual (see 3.7.5 and 3.4.4). The following information is not required:

- (1) Explanation of the SM&R codes.
- (2) Complete list of SE, MR and referenced material.
- (3) Historical record of technical directives.
- (4) A numerical index of part numbers and reference designators.

f. IPB's shall follow the maintenance data for the end item and each repairable component.

g. For single WP manuals containing more than 16 pages, a manual title page and numerical index of effective pages shall be prepared in accordance with 3.7.2.2.

3.7.3 Division of an existing work package manual into volumes. An existing manual may be divided into two or more parts (volumes). This may be required due to bulk. When divided, the WP numbers shall not change (see 3.6.5.2.3). The first volume shall contain the front matter and as many WP's as appropriate beginning with WP001 01. The second and subsequent volumes shall contain the remaining WP's, in numerical order. The title page of each volume shall contain a statement that the applicable volume is incomplete without the other volumes of the set. Each volume will be assigned a publication number by the requiring activity upon request.

a. List of effective WP's/pages for multivolume manuals. A list of effective WP's/pages shall be prepared for the entire manual (all volumes) and shall be included in Volume I. All WP's and their titles for the entire manual (all volumes) shall be listed in Volume I. Only the accountability of changes for Volume I shall be listed. Each of the subsequent volumes; such as Volume II, Volume III, and Volume IV, shall include a list of effective

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WP's/pages listing those WP's/pages contained in that particular volume and indicate the accountability of changes for that volume.

b. Alphabetical index for multivolume manuals. An alphabetical index (WP001 00) shall be prepared covering all WP's within the set of manuals and shall be included in Volume I. A separate alphabetical index shall be prepared for each volume covering the WP's contained in that volume. WP001 00 shall be assigned as the alphabetical index in each volume.

c. List of TPDR page and HMWS page. A TPDR page and HMWS page shall be included in each manual (see 3.7.4.3 and 3.7.4.4).

d. Changes to multivolume manuals. Multivolume manuals shall be considered as separate independent manuals. Only the volume(s) affected by the change shall be assigned a change number and date.

3.7.4 Front matter - work package manuals. The front matter shall consist of the following items:

- a. Title page.
- b. Numerical index of effective work packages/pages (A page).
- c. TPDR page.
- d. HMWS page.

3.7.4.1 Title page - work package manuals. (see figure 11.) A title page shall be prepared for all manuals. The reproducible copy shall be prepared as follows:

a. The publication number assigned by the requiring activity shall be placed in the extreme upper left corner of the page. Each manual or volume thereof, shall have a separate publication number assigned. If the manual is to be used jointly with other services, the requiring activity's publication number shall be placed above the other activity's publication number. Both publication numbers shall be in 18- to 20-point bold type.

b. If the manual has been renumbered, the former publication number will appear below the new number and shall be preceded by the work "Formerly" in 18- to 20-point bold type. At the next change/revision, only the new number shall appear.

c. The publication date or revision date shall be placed in the upper left corner, below the publication number, joint usage number, former publication number, or all three, in 14-point bold type.

d. The change number and date shall be placed in the upper left corner, below the publication date, in 14-point bold type.

e. A 1-point rule shall be placed across the page below the publication date or revision date or the change number and date, as applicable.

f. The words "TECHNICAL MANUAL" shall be centered on the page below the 1-point rule in 14-point type.

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g. The publication title shall be placed on the reproducible material as follows:

(1) The maintenance level coverage (if applicable), shall be centered below the words "TECHNICAL MANUAL" in 18-point type, For example: "INTERMEDIATE MAINTENANCE WITH ILLUSTRATED PARTS BREAKDOWN."

(2) The end item nomenclature such as the system, subsystem, or model, shall be centered below the maintenance level coverage in 18- to 20-point type. Spacing shall be determined by the number of additional items required on the title page. When applicable, the model(s), and part number(s) shall be placed below the nomenclature. The model(s) and part number(s) shall be in 14- to 18-point type, depending on the number of entries. When a large number of part numbers are involved, the title page may reflect the generic name of the equipment and omit the part numbers. All part numbers should then be listed in the introduction of the manual. A statement shall be placed on the title page as follows: "The part numbers contained within this manual are listed in the introduction WP." The list of part numbers should be presented in a visible manner such as a table or chart.

h. When a manual is revised, a supersedure notice (see figure 11) shall be placed below the end item nomenclature, designator (if applicable), and part number(s) in 10-point bold type. The notice shall always include the publication number and date, and if applicable, the change number and date of the superseded manual. For example: "This manual supersedes AE-172AA-720-100, dated 15 November 1978." If a classified manual is being revised, the supersedure notice shall include the following statement: "This manual supersedes (publication number) (dated), which should be destroyed in accordance with applicable security regulations."

i. When required, cross reference notices to supplements shall be placed below the supersedure notice or publication title in 10-point bold type.

j. When a manual must be divided, a continuation notice shall appear on the title page of each volume below the supersedure notice or publication title in 10-point bold type (see 3.7.3). The title page of each volume shall contain a statement that the applicable volume is incomplete without the other volume(s) of the set.

k. A distribution statement and destruction notice shall be placed above the authority notice. The type size shall not be greater than 10-point nor less than 6-point. The distribution statement shall read as follows:

DISTRIBUTION STATEMENT C. Distribution authorized to U.S. Government agencies and their contractors to protect publications required for official use or for administrative or operational purposes, determined on (date). Other requests for this document shall be referred to Commanding Officer, Naval Air Technical Services Facility, 700 Robbins Avenue, Philadelphia, PA 19111-5097.

The determination date shall be the date of the publication (basic, revision, change date as applicable) when the distribution statement is applied. If the distribution statement is changed, the determination date will be the date of issue that effected the change.

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The destruction notice shall be placed directly below the distribution statement and shall read as follows:

For classified manuals:

DESTRUCTION NOTICE - For classified documents follow the procedures in DOD 5220.22M, Industrial Security Manual, Section II-19 or DOD 5200.1R, Information Security Program Regulation, Chapter IX (Chapter 17 of OPNAVINST 5510.1).

For unclassified manuals:

DESTRUCTION NOTICE - For unclassified, limited documents, destroy by any method that will prevent disclosure of contents or reconstruction of the document.

When a supersedure notice is included, the distribution statement shall be placed below the supersedure notice.

1. A 1-point rule shall be placed 1 1/2 inches above the bottom of the page.

m. The authority notice shall be centered above the 1-point rule in 10-point bold type.

3.7.4.1.1 Title page - classified work package manuals. (see figure 11.) The title page of a classified manual shall show the classification of the equipment nomenclature as specified in DOD 5220.22M. The following additional data is applicable to classified manual title pages:

a. The security classification assigned by the requiring activity shall be placed on the top and bottom of the title page in the same or larger type size as the publication number.

b. Classified text may not appear on the last page of a classified manual. A blank page shall be furnished as the last page of a classified manual. The overall classification of the manual shall be placed at the top and bottom center of the back page.

c. Manuals classified Top Secret shall have the statement "This publication consists of ___ Top Secret pages of ___ total pages. Copy No. ___ of ___ copies" placed on the title page in 10-point bold type.

d. The applicable downgrading and declassification notation in accordance with DOD 522.22M shall be placed at the bottom of the page below the classification marking in 10-point bold type. The notation shall be boxed.

3.7.4.2 Numerical index of effective work packages/pages (A page). (see figure 10.) Except for manuals containing one WP of 16 pages or less, a numerical index of effective WP's/pages (A Page) shall be included for all manuals prepared to WP format. The A page shall back up the title page and shall be prepared as follows:

a. The publication number shall be placed in the extreme upper left corner of the page in 16-point bold type.

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b. The publication date, revision date, or change number and date, as applicable, shall be placed below the publication number in 10-point bold type.

c. The page identification shall be placed in the upper right corner of the page on the same line as the publication date, revision date, or change number and date in 10-point bold type.

d. When applicable, the security classification shall appear on the top and bottom of the page in 16-point bold type.

e. The title "NUMERICAL INDEX OF EFFECTIVE WORK PACKAGES/PAGES" shall be centered below the marginal copy in 10-point type. The title shall be underlined.

f. The subtitle "List of Current Changes" shall be centered below the title. A list of current changes to the manual, including the basic issue or revision, which shall be identified by the word "Original" and the numeral "0", shall be listed under this title. The list of current changes shall account for and include the numbers and dates of all rapid action changes (RAC's) issued and all interim rapid action changes (IRAC's) incorporated since the basic manual or its latest revision. All subsequent changes to manuals and manual revisions shall reflect the cumulative status of all RAC's issued and incorporated. To maintain continuity of all issued RAC numbers, cancelled RAC numbers, including those assigned but never issued are to be included in the cumulative status of RAC's incorporated. "Original" work package pages shall be identified by the numeral "0" in the "Change Number" column of the numerical index of effective work packages/pages. The word "RAC" shall appear before the RAC number, which shall be listed opposite the applicable WP page number(s) (see figure 10).

g. The following statement shall be placed below the current change list as shown on figure 10: "Only those work packages/pages assigned to the manual are listed in this index. Insert Change ____, dated _____. Dispose of superseded and deleted work packages/pages. Superseded and deleted classified work packages/pages shall be destroyed in accordance with applicable regulations. If changed pages are issued to a work package, insert the changed pages in the applicable work package. The portion of text affected in a changed or revised work package is indicated by change bars or the change symbol "R" in the outer margin of each column of text. Changes to illustrations are indicated by pointing hands or change bars, as applicable." On basic issues the change number and date citation will be blank.

(1) Column heads "WP Number" and "Title" shall be placed below the information required by 3.7.4.2g. A one-point rule shall be placed above and below the column heads.

(2) A numerical listing of WP's assigned to the manual and their titles shall be placed below the applicable column heads.

(3) The following statement shall be placed below the information required by 3.7.4.2g(1) and 3.7.4.2g(2): "Total number of pages in this manual is _____ consisting of the following:"

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h. Column heads "WP/Page No." and "Change No." shall be placed below the total page statement. Additional sets of columns may be used depending on the size of the manual. A one-point rule shall be placed above and below the column heads.

i. A numerical listing of WP/pages assigned to the manual shall be placed below the applicable column heads. Title pages and "A" pages shall be listed. All WP/pages shall be listed with no break in sequence. Grouping of consecutively numbered pages of the original manual or same change effectivity, without a blank page, is allowed. If all WP/pages are not available, a notation to this effect shall be entered (see 3.6.5.2.a). Deleted WP/pages shall be accounted for by the entry "Deleted" and the applicable change number for the WP/pages shall be listed in the change number column.

3.7.4.3 Technical publication deficiency reports (TPDR) incorporated pages. A list of TPDR's incorporated shall be prepared for all changed/revised manuals. The TPDR page(s) shall follow the "A" page (numerical index of effective WP/pages). In multivolume manuals, each volume shall contain a list of technical publication deficiency reports incorporated for the volume.

3.7.4.3.1 Technical publication deficiency reports incorporated pages preparation. (see figure 12.) Technical publication deficiency reports incorporated pages shall be prepared as follows.

a. The publication number shall be placed in the extreme upper left corner of the page in 16-point bold type.

b. The publication date, revision date, or change number and date, as applicable, shall be placed below the publication number in 10-point bold type.

c. The page number identification; such as TPDR-1, TPDR-2, or TPDR-3, shall be placed in the upper right corner of the page on the same line as the publication date, revision date, or change number and date in 10-point bold type.

d. When applicable, the security classification shall appear on the top and bottom of the page in 16-point bold type.

e. A 1-point rule shall be placed below the marginal copy.

f. The title "LIST OF TECHNICAL PUBLICATION DEFICIENCY REPORTS INCORPORATED" shall be centered below the 1-point rule.

g. The publication title shall be centered below the title.

h. A 1-point rule shall be placed below the title information.

3.7.4.3.2 Development of the list of technical publications deficiency reports incorporated. The list shall reflect the data incorporated in the technical manual resulting from valid technical publication deficiency reports (TPDR's). A double column format shall be used. Column headings shall be "Identification No./QA Sequence No." and "Location". The identification number shall indicate the reporting activity and its TPDR file number. The QA

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sequence number is the TPDR file number assigned by the Naval Air Technical Services Facility. Under the column heading "Location" the work package number (WP)/page No. (pg)/paragraph No. (p)/figure No. (F)/table No. (T) shall be indicated as appropriate, identifying the location in the manual where the data has been incorporated. The list shall reflect the data that has been incorporated in that particular issue. The list shall not be cumulative. The TPDR page shall be prepared at the first formal change to the manual. If no TPDR's are to be incorporated, the word "NONE" shall be included.

3.7.4.4 Warnings applicable to hazardous materials page(s). The warnings applicable to hazardous material page(s) shall be placed in the manual immediately following the TPDR page and shall be prepared as follows:

a. The marginal copy shall be in accordance with 3.6.3, with the exception that a WP number will not be assigned. The acronym HMWS (hazardous materials warning sheet) will be used followed by an Arabic numeral.

b. The pages shall be numbered in consecutive order, i.e., HMWS-1, HMWS-2, HMWS-3, etc.

c. A 1-point rule shall be placed below the marginal copy.

d. The title "WARNINGS APPLICABLE TO HAZARDOUS MATERIALS" shall be centered below the 1-point rule.

e. A 1-point rule shall be placed below the title information.

f. The following introductory paragraphs shall be placed below the 1-point rule:

"Warnings for hazardous materials listed in this manual are designed to warn personnel of hazards associated with such items when they come in contact with them by actual use. Additional information related to hazardous materials is provided in OPNAVINST 5100.23, Navy Occupational Safety and Health (NAVOSH) Program Manual, NAVSUPINST 5100.27, Navy Hazardous Material Control Program, and the DOD 6050.5, Hazardous Materials Information System (HMIS) series publications. For each hazardous material used within the Navy, a material safety data sheet (MSDS) is required to be provided and available for review by users. Consult your local safety and health staff concerning any question on hazardous chemicals, MSDS's, personal protective equipment requirements, and appropriate handling and emergency procedures and disposal guidance.

Complete warnings for hazardous materials referenced in this manual are identified by use of an icon, nomenclature and specification or part number of the material, and a numeric identifier. The numeric identifiers have been assigned to the hazardous materials in the order of their appearance in the manual. Each hazardous material is assigned only one numeric identifier. Repeated use of a specific hazardous material references the numeric identifier assigned at its initial appearance. The approved icons and their application are shown in figure 2.

In the text of the manual, the caption "warning" will not be used for hazardous materials. Such warnings will be identified by an icon and numeric identifier. The material nomenclature will also be provided.

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The user is directed to refer to the corresponding numeric identifier listed below for the complete warning applicable to the hazardous materials."

g. Complete warnings shall be provided for all hazardous materials addressed in the manual. The caption "HAZARDOUS MATERIALS WARNINGS" shall be centered on the first full page following the introductory paragraph and figure 1. The column headings "Index", "Material," and "Warning" shall appear below the caption (see figure 3).

3.7.4.5 Hazardous materials referenced in text. (see figure 13.) In the text of the manual, the caption "warning" shall not be used for hazardous materials. Such warnings shall be identified by an icon, nomenclature of the material and a numeric identifier (see 3.4.4.1b and 3.4.4.1c). Complete warnings shall be provided in the HMWS pages in the manual for each hazardous material.

3.7.4.6 Multivolume manuals. In multivolume manuals (sets), each volume shall contain Warnings Applicable to Hazardous Materials pages for the hazardous materials referenced in that particular volume. In cases where manuals have been volumized because of bulk (exceeding 3 inches), the Warnings Applicable to Hazardous Materials data shall be repeated in all volumes regardless of whether all numbered warnings do appear or do not appear in each volume. A note shall be placed at the bottom of the first page of the complete warnings stating that all numbered warnings may not appear in all volumes of the manual.

3.7.5 Alphabetical index work package. (see figure 14.) Except for one WP manuals, the alphabetical index WP shall be the first WP and shall begin on the first right-hand page.

3.7.5.1 Alphabetical index work package title page. The first page of the index shall be a title page. The title page shall be prepared as follows:

- a. The marginal copy shall be in accordance with 3.6.3.
- b. The WP number shall be 001 00 (see 3.6.5.2).
- c. The pages shall be numbered in accordance with 3.6.5.3.
- d. A 1-point rule shall be placed below the marginal copy.
- e. The WP title "ALPHABETICAL INDEX" shall be centered below the 1-point rule.
- f. The publication title shall be centered below the WP title.
- g. A 1-point rule shall be placed below the title information.
- h. The column heads "Title," and "WP Number," shall be placed below the title block. The column heads shall be underlined.
- i. Main entries in the title column shall begin at the left margin. Subordinate entries listed below a main entry shall be indented four spaces (approximately 2.5 picas) from the left margin.

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3.7.5.2 Second and subsequent pages of the alphabetical index work package. On the second and subsequent pages of the index, the column heads "Title" and "WP Number" shall be placed below the marginal copy. The column heads shall be underlined.

3.7.5.3 Development of alphabetical index work package. The primary consideration in the development of the alphabetical index shall be the accessibility of the data. The following guidelines apply:

a. Titles shall be arranged with the noun name preceding the modifiers; for example: "Power Driven Rotary Vacuum Pump" should be listed as "Pump, Vacuum, Rotary, Power Driven." Titles shall also be listed under significant modifiers as cross-reference entries; for example: "Vacuum Pump, Rotary, Power Driven."

b. "AN" nomenclature shall not be used as a main alphabetical listing, but shall be used as a cross-reference entry; for example: "Mount, Antenna, Switch, UHF, MT-1995/A" would be preferred to "MT-1995/A UHF Antenna Switch Mount."

c. Subsystems and equipment components shall be listed alphabetically as subordinate entries to the system or equipment of which they are a part and also as main entries in the manual's alphabetical index (see figure 14).

Entries shall be obtained from the WP titles and subsystems and components covered in the WP alphabetical indexes.

3.7.6 Numerical index of part numbers work package. (see figure 15.) One WP manual and manuals having only one IPB figure (see 3.7.2.2) shall not have a numerical index of part numbers WP. Multiple WP maintenance manuals containing more than one IPB figure shall have a numerical index of part numbers WP. The number of this WP shall be WP001 01.

3.7.6.1 Numerical index of part numbers work package title page. The first page of the index shall be a title page. The title page shall be prepared as follows:

- a. The marginal copy shall be in accordance with 3.6.3.
- b. The WP number shall be 001 01 in accordance with 3.7.5.
- c. The pages shall be numbered in accordance with 3.6.5.3.
- d. A 1-point rule shall be placed below the marginal copy.
- e. The WP title "NUMERICAL INDEX OF PART NUMBERS" shall be centered below the 1-point rule.
- f. The nomenclature of the end item shall be centered below the WP title.
- g. A 1-point rule shall be placed below the nomenclature title.
- h. The column heads "PART NO.," and "WP NO./FIG. NO./INDEX NO." shall be placed below the title block. The column heads shall be underlined.

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3.7.6.2 Second and subsequent pages of the numerical index of part numbers work package. On the second and subsequent pages of the numerical index, the column heads "PART NO.," and "WP NO./FIG. NO./INDEX NO." shall be placed below the marginal copy. The column heads shall be underlined.

3.7.6.3 Development of the numerical index of part numbers work package. The list of part numbers shall be developed in accordance with the requirements of MIL-M-81929.

3.7.7 Numerical index of reference designations work package. (see figure 16.) One WP manuals and manuals having only one IPB figure (see 3.7.2.2) shall not have a numerical index of reference designations WP. The number of this WP shall be WP001 02. It shall immediately follow the numerical index of part numbers (see 3.7.6).

3.7.7.1 Numerical index of reference designations work package title page. The first page of the index shall be a title page. The title page shall be prepared as follows:

- a. The marginal copy shall be in accordance with 3.6.3.
- b. The WP number shall be 001 02 or assigned in accordance with 3.7.7.
- c. The pages shall be numbered in accordance with 3.6.5.3.
- d. A 1-point rule shall be placed below the marginal copy.
- e. The WP title "NUMERICAL INDEX OF REFERENCE DESIGNATIONS" shall be centered below the 1-point rule.
- f. The nomenclature of the end item shall be centered below the WP title.
- g. A 1-point rule shall be placed below the nomenclature title.
- h. The column heads "REF DES," "WP No./Fig. No./Index No." and "Part No." shall be placed below the title block. The column heads shall be underlined.

3.7.7.2 Second and subsequent pages of the numerical index of reference designations work package. On the second and subsequent pages of the numerical index, the column heads "REF DES," WP No./Fig. No./Index No." and "Part No." shall be placed below the marginal copy. The column heads shall be underlined.

3.7.7.3 Development of the numerical index of reference designations work package. The index of reference designations shall be developed in accordance with the requirements of MIL-M-81929.

3.7.8 Introduction work package. (see figure 17.) Except for one WP manuals, an introduction WP shall be included in all manuals prepared to WP format. The introduction WP shall be WP002 00. WP002 00 and subsequent WP's shall always begin on a right-hand page.

3.7.8.1 Introduction work package title page. The first page of the introduction shall be a title page. The title page shall be prepared as follows:

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- a. The marginal copy shall be in accordance with 3.6.3.
- b. The WP number shall be 002 00 (see 3.6.5.2).
- c. The pages shall be numbered in accordance with 3.6.5.3.
- d. A 1-point rule shall be placed below the marginal copy.
- e. The WP title "INTRODUCTION" shall be centered below the 1-point rule.
- f. The nomenclature of the end item shall be centered below the WP title.
- g. A 1-point rule shall be placed below the nomenclature title.
- h. The technical content shall begin below the title block.

3.7.8.2 Content of introduction work package. The introduction WP shall include the following:

- a. The purpose and scope of the manual with approved nomenclature.
- b. An explanation of the record of applicable technical directives on WP title pages.
- c. The introduction to the IPB (MIL-M-81929) shall be contained in the introduction to the manual and not repeated in each IPB WP figure or each WP with IPB. The explanation of source, maintenance, and recoverability (SM&R) codes shall include reference to an explanation table titled "Navy Application of Joint Services Uniform SM&R Codes" (see figure 17).
- d. The method of highlighting quality assurance provisions (3.6.2.7.2).
- e. Cross-reference of abbreviations, symbols, new and unusual terms used in the manual and not included in MIL-STD-12.
- f. Any specific requirements imposed by the technical content specification.
- g. Complete list of "Support Equipment Required." This is a consolidated list of support equipment required for each applicable work package in the manual.
- h. Complete list of "Materials Required." This is a consolidated list of materials required for each applicable work package in the manual.
- i. Complete list of "Reference Material." This is a consolidated H4/H8 list of all reference material cited in each work package and shall include the cataloging handbooks and NAVAIRINST 4423.3, Uniform Source, Maintenance and Recoverability (SM&R) codes.
- j. The following statement relative to requisitioning and automatic distribution of NAVAIR technical publications:

"Procedures to be used by naval activities and other department of defense organizations requiring NAVAIR technical publications are

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defined in the NAVAL AIR SYSTEMS COMMAND TECHNICAL MANUAL PROGRAM manual, NAVAIR 00-25-100 and NAVAIRINST 5605.4A, distribution of aeronautical technical publications."

When an activity has a continuing requirement for automatic distribution of technical publications NAVAIR 00-25-DRT-1, NAVAL AERONAUTIC PUBLICATIONS AUTOMATIC DISTRIBUTION TABLES shall be used. For complete information on distribution refer to NAVAIR 00-25-100.

NOTE

The following shall not be included in the introduction: An illustration of the equipment and lists of manuals that make up a set of manuals.

k. When an item of support equipment is not available, an approved alternate identified in the activity's Individual Material Readiness List (IMRL) may be substituted.

3.7.8.2.1 Historical record of applicable technical directives - work package manuals. (see figure 17.) The introduction to the manual shall contain a historical record of applicable technical directives. This record shall be prepared as follows:

a. The title "Historical Record of Applicable Technical Directives" shall be centered on the page. Two clear spaces shall appear above the title and one clear space shall appear below the title.

b. The column heads "Type/No.," "Date," "Title and ECP No.," "Date Inc.," and "Remarks" shall be placed below the title as shown on figure 17. The column heads shall be underlined. The following information shall be listed under the column heads:

NOTE

Approved ECP's that have no effect on retrofit of the end item; for example, no technical directive will be issued, shall not be listed in the record of applicable technical directives. However, ECP's incorporated during the production cycle shall be listed.

(1) "Type/No." - The type and number of the directive; for example: "AFC 54". If a technical directive is not issued and ECP incorporation is listed, a dash (-) shall be placed in the "Type/No." column.

(2) "Date" - The date of issue of the directive. If the number of the technical directive has been assigned but the directive has not been issued, the directive number shall be listed and a dash (-) shall be placed in this column.

(3) "Title and ECP No." - The title of the directive and the engineering change proposal (ECP) number, if applicable, shall be listed. If a technical directive listed is the direct result of an approved ECP, the ECP number shall be shown in parentheses following the technical directive title.

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(4) "Date Inc." - The date the information affected by the technical directive or the ECP was incorporated into the manual. If the technical directive number has been assigned and the directive has not been issued (retro-fit program), but the ECP that incorporates the change in the production program has been approved, the ECP coverage shall be indicated by the date listed in this column and a notation in the remarks column; for example: "ECP coverage only." When the technical directive is approved and incorporated in a later change or revision, the date of issue shall be entered, the date of incorporation shall be listed in this column (in lieu of the ECP coverage incorporation date), and the notation shall be removed from the Remarks column.

(5) "Remarks" - Applicable remarks shall be entered. If no remarks apply, a dash (-) shall be placed in this column.

c. Until the first technical directive or ECP has an effect on the manual, the word "None" shall be centered below the title.

d. The technical directives and ECP's listed shall remain in the record during the life-cycle of the manual.

3.7.9 Technical content work package. (see figures 1 and 4.) Generally, all WP's numbered 003 00 and above shall be considered technical content WP's and shall begin on a right-hand page. Exceptions to this rule are discussed in 3.7.2.2. If the manual contains an introduction WP (see 3.7.8), an "introduction" paragraph shall not be required for each technical content WP. If the title of the WP defines the general content and coverage of the WP, an opening statement essentially repeating the title of the WP is unnecessary repetition. However, an introduction may be used when it clarifies the title of the WP.

3.7.9.1 Technical content work package title page. The first page of the technical content WP shall be a title page. The title page shall be prepared as follows:

- a. The marginal copy shall be in accordance with 3.6.3.
- b. The WP number shall be assigned in accordance with 3.6.5.2.
- c. The pages shall be numbered in accordance with 3.6.5.3.
- d. A 1-point rule shall be placed below the marginal copy.
- e. The following information shall appear in the title block, in the order listed. The information shall appear in 10-point type. Boldface type may be used for items appearing in all capital letters.

(1) If one or more maintenance levels are assigned, the maintenance level shall be centered on the page. For example: "ORGANIZATIONAL MAINTENANCE," "INTERMEDIATE AND DEPOT MAINTENANCE," or "DEPOT MAINTENANCE WITH ILLUSTRATED PARTS BREAKDOWN."

(2) The general subject shall be centered on the page. For example: "PRINCIPLES OF OPERATION," "TESTING AND TROUBLESHOOTING," "ILLUSTRATED PARTS BREAKDOWN," "MAINTENANCE," and "AIRCRAFT OPERATIONAL & EMERGENCY DEFUELING."

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(3) The nomenclature of the system, equipment, or component shall be centered on the page. For example: "INERTIAL NAVIGATION SYSTEM," "HYDRAULIC PUMP," "SEMI-AUTOMATIC COMPONENT TEST SET," or "FUEL SYSTEM." The "AN" designation(s), if applicable, and part number(s) shall be placed below the nomenclature. For example: "PART NO. 12345." On IPB WP's and WP's which include an IPB, the manufacturer's name shall be placed below the part number in parentheses; for example: "(Northern Industries)." If there is more than one manufacturer of the end item, the manufacturer's name shall not appear in the title block.

(4) If applicable, an effectivity notice shall be centered on the page. For example: "EFFECTIVITY: Serial Nos. 23456 through 34567" or "EFFECTIVITY: Aircraft Serial No. 567890 and subsequent."

(5) If applicable, a supersedure notice shall be placed below the effectivity notice. If the WP supersedes a WP in the same manual, the supersedure notice shall be as follows: "This WP supersedes (WP number), (dated)." If the superseded WP is contained in another manual, the notice shall include the publication number as follows: "This WP supersedes (WP number), (dated), contained in NAVAIR 01-F14AAA-2-4." If an unclassified or classified WP supersedes a classified WP, the notice shall be as follows: "This WP supersedes (WP number), (dated), which should be destroyed in accordance with applicable security regulations."

(6) If applicable, cross-reference notes to supplements shall be included; for example: "This WP is incomplete without WP042 00 contained in confidential supplement, NAVAIR 16-30XYZ-20."

f. A 1-point rule shall be placed below the last line of information in the title block.

g. Except on IPB WP's, the title "Reference Material" shall be centered below the title block. Reference material required to complete the task or discussion shall be listed in accordance with 3.5.4. If no reference material applies, the word "None" shall be centered below the title. One clear space shall appear below the title and the first line of reference material or the word "None," as applicable. The title "Reference Material" shall not be required on IPB WP's.

h. Except on IPB WP's, the title "Alphabetical Index" shall be centered below the list of reference material or the word "None", as applicable. Two clear spaces shall appear above the title "Alphabetical Index" and one clear space shall appear below this title. The column heads "Subject" and "Page No." shall be placed below the title. The column heads shall be underlined. An alphabetical list of the contents of the WP shall be provided, with the applicable page number on which the information will be found. The minimum requirement shall be a listing of primary and secondary sideheads; however, access to data shall be the prime requirement of the index. The title "Alphabetical Index" shall not be required on IPB WP's.

i. The record of technical directives shall be prepared in accordance with the following as applicable:

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NOTE

Approved ECP's that have no affect on retrofit of the end item; for example: "no technical directive will be issued", shall not be listed in the record of applicable technical directives. However, ECP's incorporated during the production cycle shall be listed.

(1) The title "Record of Applicable Technical Directives" shall be centered below the alphabetical index. Two clear spaces shall appear above the title "Record of Applicable Technical Directives" and one clear space shall appear below the title.

(2) The column heads "Type/No.," "Date," "Title and ECP No.," "Date Inc.," and "Remarks" shall be placed below the title. The column heads shall be underlined. The following information shall be provided under the column heads:

(a) "Type/No." - The type and number of the directive; for example: "AFC 12."

(b) "Date" - The date of issue of the directive. If the number of the technical directive has been assigned but the directive has not been issued, the directive number shall be listed and a dash (-) shall be placed in this column.

(c) "Title and ECP No." - The title of the directive and the ECP number, if applicable, shall be listed. If a technical directive listed is the direct result of an approved ECP, the ECP number shall be shown in parentheses following the technical directive title.

(d) "Date Inc." - The date the information affected by the technical directive or the ECP was incorporated in the WP. If the technical directive number has been assigned and the directive has not been issued (retrofit program), but the ECP that incorporates the change in the production program has been approved, the ECP coverage shall be indicated by the date listed in this column and a notation in the remarks column; for example: "ECP coverage only." When the technical directive is approved and incorporated in a later change or revision, the date of issue shall be entered, the date of incorporation shall be listed in this column (in lieu of the ECP coverage incorporation date), and the notation shall be removed from the remarks column.

(e) "Remarks" - Applicable remarks shall be entered. If no remarks apply, a dash (-) shall be placed in this column.

(3) If no technical directives (or ECP's as noted above) affect the text or illustrations in the WP, the word "None" shall be centered below the title.

(4) Technical directives shall be removed from the record of applicable technical directives during the next change or revision cycle after rescission of the technical directive.

3.7.9.2 Content of technical content work package. The technical content shall be prepared in accordance with the content specification designated by

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the requiring activity. "Support Equipment Required," "Materials Required," and "Reference Material," lists shall be included in individual WP's and only as specifically applicable to the subject matter of the technical content WP.

3.7.9.3 Technical content work package - illustrated parts breakdown. (see figure 18.) The format of either an IPB WP or an IPB that is part of a WP shall be as follows:

- a. The marginal copy shall be in accordance with 3.6.3.
- b. The WP number shall be numbered in accordance with 3.6.5.2.
- c. The pages shall be numbered in accordance with 3.6.5.3.
- d. The format shall be prepared in accordance with 3.7.9.1.
- e. The GAPL shall follow related illustrations. The GAPL shall be prepared in accordance with MIL-M-81929.

3.8 Security classification markings. The security classification markings for manuals shall be identified in accordance with DOD 5200.1R, DOD 5220.22M and OPNAV 5510.1. These identifications shall be placed on the reproducible copy as defined herein.

3.8.1 Overall Classification. (see figure 11.) The overall classification assigned to a technical manual or volume (each volume of a multivolume manual shall be considered independently) shall be placed at the top and bottom of the title page. When this results with the title page being marked with a higher classification than that assigned to the contents of that page, an explanation of the higher classification shall be made beneath the bottom classification marking; for example:

CONFIDENTIAL
(This page is UNCLASSIFIED)

or

SECRET
(This page is CONFIDENTIAL)

3.8.2 Classification of titles. (see figure 11.) The titles of technical manuals, WP's, paragraphs, illustrations, and tables and the contents of paragraphs, illustrations, and tables shall be identified in accordance with DOD 5200.1R, DOD 5220.22M and OPNAV 5510.1.

3.8.3. Classification of pages. (see figure 7.) Each page (other than the title page) shall be marked according to its highest content, and this classification marking shall be placed at the top and bottom of the page, except when the classification of two pages of one sheet (the two pages being back to back) differ, the higher classification shall be placed on both pages. A blank page, backing up a classified page, shall show the classification of the classified page. Un-classified sheets (both pages being unclassified) shall be so marked. If the classification shown on the last page of a manual is not the same as that shown on the title page, then a blank sheet shall be added to the back of the manual which shows the same classification (excluding Restricted Data notations, if applicable) as on the title page. No text shall appear on the last page of a classified manual. A blank page shall be

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provided as the last page. Overall classification shall be marked at the top and bottom center of the page. When any page, except a blank page, is marked with a higher classification than that assigned to its contents, an explanation shall be made on that page beneath the bottom classification marking; for example:

CONFIDENTIAL
(This page is UNCLASSIFIED)

or

SECRET
(This page is CONFIDENTIAL)

3.8.4 Downgrading/declassification. (see figure 11.) As applicable, downgrading/declassification markings shall be applied in accordance with DOD 5200.1R and DOD 5220.22M and as implemented by OPNAV 5510.1.

3.8.5 Classified manuals or supplements with TMINS identification. (see figure 11.) TMINS numbers on classified manuals or supplements require the addition of appropriate classification suffixes in accordance with N0000-00-IDX-000.

3.9 Artwork requirements.

3.9.1 Style and technique. Illustrating style and technique shall be of a quality which will produce artwork that clearly, adequately, and economically portrays the information to be illustrated. Illustration material shall be used to: describe an item or idea when this can be done more effectively and efficiently by graphic methods; clarify text; present phases difficult to describe the text alone; call attention to details; and furnish graphic identification of parts and tools. Illustrations shall be placed as near as possible to where they are first referenced. Foldout illustrations shall be placed at the end of the manual. When a full page illustration is more effectively presented sidewise on a page (turn page), it shall be turned 90° counterclockwise.

3.9.2 Scale. Illustrations shall be prepared to as small a scale as possible consistent with effective portrayal of the intent of the illustration, with all essential detail clear and legible. If prepared oversize, the illustration shall meet all requirements stated herein after reduction to proper image size. The desired sizes of illustrations are 3 3/8" X 4 1/4" (1/4 page image), 7" X 4 1/4" (1/2 page), and 7" X 9" (full page). Although not desired, the vertical dimension of 1/4 and 1/2 page illustrations may be exceeded. The horizontal dimension shall not be exceeded.

3.9.3 Use of photographs and halftones. Unless specifically approved by the requiring activity for special usage, photographs, photographic (halftone) artwork, or prescreened photographs shall not be included in manuals prepared to this specification. Line drawings shall be used in lieu of photographs (halftones) when practicable. Line tracings of photographs are acceptable. When a photographic line tracing is prepared, proper definition of line work shall be used in lieu of photo retouching. The intended subject matter shall be highlighted and unnecessary background shall be eliminated. Items required for reference (location) shall be subdued (see 6.2.1).

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3.9.3.1 Exceptions to use of halftone illustrations. In certain instances, such as the requirement to illustrate corrosion damage or wear patterns, a line drawing or a line tracing of a photograph will not contain the necessary detail and clarity. When such illustrative material must be contained in a technical manual, photographic (halftone) illustrations or color overlays (see 3.9.6.4) may be used. Such information may be contained in a supplement to the maintenance manual if approved by the requiring activity. The supplement shall contain sufficient information on the purpose of the supplement and technical data (test) to ensure understanding and maintain continuity of information. The basic manual shall identify the supplement and its usage (see 6.2.1).

3.9.3.2 Halftone illustrations. When approved by the requiring activity, (see 3.9.3) the halftone illustration shall be detailed and sharp, free of heavy shadows, distorted objects, cluttered foregrounds or backgrounds, and shall give good contrast from white, middle tones, and black.

3.9.3.3 Retouching. Photographic retouching shall be used to emphasize detail, exclude unwanted detail, correct slight photographic defects and eliminate undesirable shadow. Quality of retouched photographs shall be such that tonal values are held when retouched.

3.9.4 Multiple use of illustrations. Whenever possible, one illustration shall be used in support of two or more requirements. For example, illustrations prepared to support IPB's should be used to support maintenance procedures when the illustration meets both requirements. Clarity of presentation to the user shall be the prime requirement. The preparing activity should plan illustrations to meet dual usage. The following guidelines apply:

a. Duplication of an IPB illustration that contains many index numbers (required for IPB application) but would be considered cluttered for maintenance use (only a few of the index numbers would be used in maintenance application) is unacceptable. In this case, the basic illustration shall be duplicated and reindexed.

b. An illustration prepared for a specific maintenance level(s) IPB shall not be duplicated in a lower level maintenance manual if the illustration depicts a breakdown of the item beyond that which is allowed at the lower level.

c. Use of IPB figures (illustrations) as reference material in maintenance procedures is acceptable only if the clarity of presentation is not affected. If more than one figure is required in support of a single maintenance action (for example: a "top" figure and a "detail" figure), either a new illustration shall be prepared (and the IPB not used) or the IPB figure(s) shall be modified, as required.

d. Duplication of IPB illustrations without modification, except for marginal copy, is acceptable if the clarity of presentation is not effected. All index numbers shown need not be referred to in the procedure. If only a "detail" figure is used, the index numbers (of the original illustration) shall be reindexed.

3.9.4.1 Make from illustration. (see figure 11A.) The illustration shall contain all information required to fabricate an item SM&R coded MO, MG, MF, or MH.

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3.9.4.2 Assembly item illustration. (see figure 11B.) Assemblies SM&R coded AO, AF, AG, or AH must be supported by sufficient IPB information to requisition all parts required for the assembly. Some items (e.g. fuses, tubes, electrical cables) may need an illustration and assembly information.

3.9.5 Types of illustrations. A manual may contain the following types of illustrations, as necessary: assembled view, detail, exploded, operational, procedural, functional, lubrication, cutaway, waveform, multiple-view, electrical wiring diagram, electrical schematic, fluid schematic, mechanical schematic, foldout, and halftone. (See 3.9.3.1 and 3.9.3.2 for acceptable use of halftone illustrations.) Preparation of cutaway illustrations for manual use shall require approval of the requiring activity.

3.9.5.1 Lead lines. (see figure 19.) Lead lines shall be used on exploded views to show the item disassembled when it is not obvious where the exploded part(s) belong.

3.9.6 Line drawings. (see figure 18.) Line drawings shall be prepared using suitable materials that will produce products capable of maintaining consistent high-density tonal values.

3.9.6.1 Darkness and sharpness of lines. (see figure 18.) The darkness and sharpness of lines shall be sufficient to reproduce clearly at required reproduction size without additional treatment. Line width shall be in accordance with ANSI Y14.2. Parallel lines on wiring and schematic diagrams shall be no less than 1/16 inch apart when reduced to printed size. Secondary lines, such as those used to indicate extensions or measurements, shall be lighter yet strong enough to reproduce clearly. Accented lines may be used to emphasize essential detail. If it is required to use a mechanical pattern to "code" lines, such as fluid, mechanical linkage, and electrical wiring, or to use such patterns to accentuate illustrations, such patterns shall be clearly defined. All types and sizes of lines used on oversized illustrations shall be clearly defined after reduction to required image size. Shading may be used to give substance and form to the item depicted, to sharpen the contrast between the subject and its background or to increase effectiveness. Shading effects shall not be used for decorative purposes.

3.9.6.2 Use of human figure. When it is necessary to illustrate an operation, procedure or installation, illustrations may include a human figure or parts of the body. Jewelry shall not appear in any illustration. The human figure shall not be permitted to obscure details of the equipment necessary for a complete understanding of its operation. The human figure shall be in regulation clothing designated by the requiring activity.

3.9.6.3 Text on artwork. Legends, notes and procedural steps shall be considered text. Text and callouts on artwork (including schematics and diagrams) shall not be less than 8-point type, or 8-point after reduction if prepared oversize.

3.9.6.4 Use of color. Color may be used in artwork only with specific authorization, for each use, of the requiring activity (see 6.2.1).

3.9.6.5 Credit lines. The photographer's or artist's name shall not appear on artwork; neither shall a manufacturer's name, symbol, or trademark appear

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thereon for the purpose of identifying the illustration. A preparing activity's illustration identification number may be used for artwork; if used, the number shall be placed in the right, lower corner of the illustration and shall be no larger than 8-point type.

3.9.6.6 Callouts. (see figure 19.) Items such as index numbers, reference designators, nomenclature, leader lines, legends, keys, and procedures shall be used to identify significant features. Lettering shall be in upper case. Crowding shall be avoided when nomenclature is placed on illustrations. Callouts shall be placed in the background area close to, but not touching the illustrated item.

3.9.6.6.1 Index numbers. (see figure 19.) Index numbers for each separate figure shall begin with number one and continue consecutively. All sheets of a multiple-sheet illustration shall be considered one figure. Sequence of procedures shall be the preferred method for illustrations prepared in support of maintenance procedures.

3.9.6.6.2 Legends (keys). (see figure 19.) A legend consisting of a numerical listing and associated identification shall be included on, or adjacent to the artwork, except IPB illustrations. Nomenclature used on legends and in text shall be identical.

3.9.6.7 Leader lines. (see figure 19.) Normally, leader lines shall touch the object to which the lines apply. Lines shall be uniform, short, and as straight as possible. "Dog-legs" shall be avoided except when a straight line is not practical because of the required layout. Lines shall not cross or come in contact with other callout lines, nor shall they obscure essential details. A line shall be highlighted if it will be easier to follow. Arrowheads are preferred for clarity.

3.9.6.8 Grid lines. Grid lines on charts of graphs shall be lighter in weight than the axes and data presented.

3.9.6.9 Locator views. (see figure 19.) When required by the complexity of the equipment, detail-view illustrations shall contain a locating view in the top left-hand or right-hand corner. The view shall consist of a small outline view of the overall aircraft or equipment with the area covered by the view highlighted.

3.9.6.10 Procedures on illustrations. (see figure 20.) When required, procedural-step illustrations shall have one or more brief instructions with each illustrated step. The instruction shall be as close as possible to the illustrated step.

3.9.6.11 Detail views. (see figures 8 and 19.) A detail view of a part or subassembly shall be illustrated when the subject matter cannot be clearly illustrated in the main view of the figure. The desired subject matter may be identified with a detail letter and index number on the main view and illustrated, as required, in the detail.

3.9.7 Multiple view illustrations. (see figure 19.) Multiple views shall be prepared when necessary to identify significant features on an illustration. Each view shall be oriented and enlarged as necessary to identify

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significant features. Each view shall be identified by a capital letter. Orientation shall be by use of arrows as shown on figure 19, or by text (for example: "Rotated 180°") as it relates to the main illustration. Views may or may not be captioned, but if one view is captioned, all shall be captioned. The caption, with the identifying letter as its first character, shall be centered with respect to the view to which it applies. Where captions are not used, the identifying letter shall be so centered. Identifying letters and captions shall be larger and bolder than any other lettering on the illustrations.

3.9.8 Figure titles. Illustrations shall be assigned figure titles. The title shall follow the figure number and shall be placed below the applicable illustration. Figure titles shall begin with an identifying name; for example: "Indicator, Fuel."

3.9.9 Troubleshooting diagrams. (see figure 21.) Troubleshooting diagrams shall be prepared in either logic tree, logic text, or fault-probable cause format. The use of "fault-probable cause" troubleshooting tables is acceptable provided that a clearly defined path is evident from the fault description to its probable cause and correction. The path must lead the technician logically to a definite and positive conclusion. Troubleshooting matrix tables intended to support electronic sensor fault identification devices are acceptable. When troubleshooting diagrams are required, each box (logic tree format) or each step (logic text format) shall include all necessary information, abbreviated where possible to save space. For example, test and decision boxes/ steps shall identify the type of test or inspection, identification of the test point, and expected reading and tolerances. Replacement boxes/steps shall identify the item to be replaced; applicable WP reference for the indicated repair shall be presented in accordance with 3.5.1g. All test and decision boxes/steps shall be written to permit only two outcomes.

3.9.10 Schematic diagrams. (see figure 22.) All electrical and electronic schematics, electrical wiring diagrams, functional block diagrams, and fluid and mechanical schematic diagrams shall conform to circuit or system flow without regard to physical arrangement of components and parts and their relative locations. The flow should read; from left to right and from top to bottom. Ideally arranged schematics, including multiframe drawings, should show the primary inputs in the upper left corner and should flow across and down the page to end with the primary outputs in the lower right corner of the diagram. The schematic shall consist of symbols grouped as circuit entities; for example, amplifiers and power supplies. Each group shall be located on the schematic so that the complete schematic requires a minimum amount of wiring (electrical and electronic diagrams) or the shortest lines (fluid or mechanical diagrams). All wires (lines) should be routed as directly as possible so that they cross the fewest wires (lines) possible.

3.9.10.1 Electrical wiring and schematic diagrams. Electrical wiring and electrical schematic diagrams shall be prepared in general accordance with ANSI Y14.15 and the specific format requirements contained herein.

3.9.10.1.1 Circuit parameters. Circuit parameters shall be marked according to their reference designation (if applicable), type, and value. When these markings tend to clutter the field of the illustration, a table of these markings, in order of reference designation (electrical or electronic diagrams) or nomenclature (fluid or mechanical diagrams), shall be included for

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all circuit parameters. Reference designations shall agree with those used in related engineering drawings. Nomenclature shall be in accordance with 3.4.6. Normal operating conditions and other conditions specified by the applicable technical content specification shall be indicated.

3.9.10.1.2 Test point identification symbols. Identification of test points by symbols shall not be employed where the test points are readily identifiable by other means; for example: "Test jacks (TP-5)," "Connector pins (J100-M)," and "Component pins (K4-2, Q1-E, and Z5-14)" are readily identifiable points and do not require symbols. Test points that are not otherwise identifiable (artificial test points) shall be identified by test point symbols. The test point symbol shall be an encircled uppercase letter and an Arabic numeral (figure 22). These test points will be referred to in the text such as "Test point A2" and/or "Test point A3." Artificial test points shall be used when specific voltage and resistance test points, used in checking a circuit, are otherwise unidentifiable. Different letters shall be assigned to each component (on a diagram); for example: test points A1, A2, and A3 in component 1, test points B1, B2 and B3 in component 2.

3.9.10.2 Components shown on schematic diagrams. (see figure 22.) When it is necessary to show components of a system on a schematic diagram, the general shape of the component and a minimum amount of detail shall be illustrated. This requirement applies to those components that will be easily recognized by the reader and therefore, would assist him in interpreting the diagram. It does not apply to components without definitive shapes or recognizable detail. For example, if an electronic component is located in a container that is essentially a box without dials or switches, an outline of a "box" will suffice. The nomenclature of the component shown shall appear adjacent to the item.

3.9.11 Wiring diagrams. (see figure 22.) Wiring diagrams, as required, shall be prepared to illustrate the wiring of the systems, subsystems, and equipment. Wiring diagrams are not required for simple interconnect devices which are supported by wire lists (see 3.9.12.1). A table of components shall be included with the diagram. The table shall be identified by the same figure number as the diagram. The reference designation and nomenclature of each component shown on the diagram shall be listed. In aircraft weapon system manuals (organizational level maintenance), the aircraft location and access cover or door covering the component shall also be listed, as applicable. The diagram shall be arranged as follows:

- a. Each line representing the wires and interconnections shall be coded or otherwise identified.
- b. Each wire shall be shown individually.
- c. Each wire shall be drawn so that it can be traced from point of origin to destination.
- d. Wires located within a cable harness shall be shown as a single wire; wire bundling techniques shall not be used.
- e. In the table of components, the column headings "REF DES," "NOMENCLATURE," "LOCATION" (if required), and "ACCESS COVER/DOOR" (if required), shall be placed below the marginal copy. A 1-point rule shall be placed between

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columns. A 1-point rule shall be placed below the column headings and after each general location, if required (see 6.2.1).

f. Computer Graphic Augmented Design and Manufacture (CADAM) drawings are acceptable as long as they meet the legibility and usability requirements of the specification.

3.9.12 Wire Lists. (see figure 23.)

3.9.12.1 Application of wire lists. Wire lists, as required, shall be prepared in support of maintenance procedures. A wire list is intended to present the same type of information as a wiring diagram but in tabular form (see 3.9.11). Wire lists shall not be considered illustrations. Generally, wire lists and wiring diagrams shall not be prepared in support of the same end item. However, an end item may be supported by either a wiring diagram or a wire list and one or more if its components may be supported by the alternate item at the more detailed coverage level. Normally, wire lists are supported by schematics. Wire numbers, cross-referenced to wire junction points and wire junction points, cross-referenced to wire numbers, shall be listed in separate tables.

3.9.12.1.1 Wire number to junction point list. The specific format and column headings shall be in accordance with requirements of the technical content specification (see figure 23 for general format). The column heads shall be "WIRE NUMBER," "EFFECTIVITY" (or modified to apply to specific usage; for example: "AIRCRAFT EFFECTIVITY"), "WIRE TYPE," "FROM REF DES," and "TO REF DES." The columns shall contain the following information:

- a. Wires shall be listed in alphanumeric sequence by wire number.
- b. When applicable, end item effectivity shall be indicated by code. The code shall be explained in the introductory matter of the WP or, if a separate volume contains all of the lists for the end item, in the introduction WP.
- c. The wire type shall be indicated by military specification code. The code shall be explained in the introductory matter of the WP, or in the introduction WP, as applicable.
- d. The point of origin reference designation number shall be listed.
- e. The point of termination (of the wire segment) reference designation number shall be listed.

3.9.12.1.2 Junction point to wire number list. The specific format and column headings shall be in accordance with requirements of the technical content specification (see figure 23 for general format). The column heads shall be "FROM REF DES," "WIRE NUMBER," "EFFECTIVITY" (or modified to apply to specific usage; for example: "AIRCRAFT EFFECTIVITY"), "CABLE ASSEMBLY" or "HARNESS NO." (if applicable), "TO REF DES," and "TO AREA" (if applicable). The columns shall contain the following information:

- a. All reference designations shall be listed in alphanumeric order (point of origin).
- b. The applicable wire numbers shall be listed.

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c. When applicable, end item effectivity shall be indicated by code. The code shall be the same as that used in the wire number to junction point list.

d. When applicable, the cable assembly or harness number shall be listed. If the end item covered does not utilize cable or harness installations, this column shall not be required.

e. The point of termination (of the wire segment) reference designation number shall be listed.

f. When applicable, the area location of the point of termination shall be indicated by code. The code shall be explained in the introductory matter of the WP or, if in a separate volume, in the introduction WP. Normally, this column shall not be required except for major end items, such as an aircraft weapon system.

3.9.12.1.3 Placement of wire list. When wire lists are prepared, the length of such lists may require placement of the lists in a separate volume of the manual. Since the wire list is essentially reference material, no limit shall be placed on the page count of the WP containing such lists.

3.9.13 Engineering drawings. Engineering drawings, which may not have been prepared primarily for illustration purposes but which comply with the applicable military engineering drawings preparation specification, are acceptable as illustrations provided they support the particular element. The copy print must conform to the type size requirements for reproducible material and it shall be legible for reproduction when reduced to technical manual size. Borders, title blocks, manufacturer's notes, and irrelevant material shall be removed. Grid locations, if provided, shall not be removed.

3.9.14 Cartoons. Use of cartoons and similar material is unacceptable.

3.9.15 Foldout illustrations. (see figure 22.) Foldout pages may be prepared for 5 1/2 by 7 inch and 8 1/2 by 11 inch manuals. All foldout pages shall be prepared for printing on one side only as right-hand pages and shall be backed up by a blank page. An apron is required for each foldout. Foldout illustrations shall be placed at the end of the applicable WP. Foldout-foldup pages are not permitted. Maximum foldout page size and maximum printable area for foldout pages shall be as follows:

<u>Manual size</u>	<u>Foldout maximum size (including blank apron)</u>	<u>Foldout maximum printable area</u>
5 1/2 by 7	30 by 7	24 3/4 by 6 1/4
8 1/2 by 11	45 by 11	36 by 10 1/4

Minimum margins for the volume: 1/4 inch, head and side opposite binding and 1/2 inch bottom.

3.9.15.1 Oversize illustrations. Illustrations prepared for 17 x 11 inch page size manuals shall be planned so that the number of illustrations prepared to present the required information on one figure is four or less. That is, two sets of two "facing" pages.

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3.9.16 Copy Prints. When specified by the requiring activity, copy prints of line drawings shall be required with manuscript copy or as reproducible copy. When manuscript copy is required, each line drawing copy print shall be approximately the same size as a page of text, except for copy prints, of foldout size, which shall not exceed maximum foldout dimensions. When reproducible material is required, each line drawing copy print shall be of the proper size (reduced, as necessary) and mounted in the designated space on the reproducible material (see 6.2.1).

3.9.17 Identifying artwork. (see figure 24.) Artwork not affixed to reproducible material shall bear the publication number, WP number, and figure number outside the reproduction area. The security classification, if applicable, shall be centered at the top and bottom of the page, as well as outside the reproduction area. In cases where the correct orientation of an illustration is not obvious, the word "TOP" shall be placed at the top of the artwork.

3.9.17.1 Crop and size marks. Each separately supplied illustration shall have the reproduction area defined by crop marks appearing on each of the four corners marking the horizontal and vertical dimensions of the area to be reproduced. The lines shall extend no closer than 1/4 inch from the outside of the reproduction area. The exact reproduction size shall be indicated between the crop marks.

3.9.17.2 Covering the artwork. (see figure 24.) All board-mounted artwork shall be protected by an inner flap of non-oil tissue or vellum and an outer flap of heavy paper. In the outside upper right corner of the outer flap shall appear the publication number, WP number, and figure number (maintenance manuals). The security classification, if applicable, shall also be centered at the top and bottom of the outer flap, and at the top and bottom of the back of the art board. Computer generated artwork will not require an inner flap of non-oil tissue or vellum.

3.9.18 Unacceptable reproducible artwork. The following shall not be acceptable as reproducible artwork:

- a. Continuous tone film negatives.
- b. Film positives.
- c. Brownline prints, photostats, bromides, and prints made by similar reproduction processes.
- d. Line illustrations containing weak or broken lines.
- e. Illustrations containing illegible lettering.

3.10 Changes to work package manuals.

3.10.1 Changes to single work package manuals containing 16 pages or less. Single WP manuals containing 16 pages or less shall not be changed but shall be revised.

3.10.2 Changes to manuals or volumes containing more than 16 pages. When a change is prepared to a WP manual or volume the change may consist of one or more revised, added, or changed WP's/pages. When required, WP's/pages may be

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deleted from the manual during a change cycle. Since WP's are assigned permanent numbers (see 3.6.5.1), deleted WP numbers shall not be reassigned to added WP's. The numerical index of effective work packages/pages (see 3.7.4.2) shall account for all revised, added, changed, or deleted WP's/pages affected by the change as well as previous changes to the manual, if applicable.

3.10.2.1 Changed manual title page. The WP manual title page shall be prepared in accordance with 3.7.4.1.

3.10.2.2 Manual change number and date. The change number and date shall be assigned by the requiring activity. The first change following the basic issue to the manual shall be numbered "Change 1." Subsequent changes issued shall be numbered consecutively.

3.10.2.3 Changed work package. A WP may be changed when one or more pages have been affected by the current change to the WP manual, or when a WP must have a rapid action change issued against it. A changed WP shall consist of a changed WP title page and those pages affected by the change to the WP, including unchanged backup pages, if applicable. A WP consisting of 10 pages or less should always be revised and not changed.

3.10.2.3.1 Changed work package title page. The changed WP title page shall be prepared in accordance with 3.7.9.1. The WP change number and date shall be the same as the manual change number and date (see 3.10.2.2). Changed WP pages shall be listed in the numerical index of effective work packages/pages (see 3.7.4.2).

3.10.2.3.2 Second and subsequent pages - changed work package. (see figure 25.) The change number shall be placed below the publication number on all pages effected by the change. If a page has been previously changed, the previous change number shall be removed and replaced by the current change number.

3.10.2.3.3 Renumbering during a change to a work package. A changed WP shall incorporate changed or added material and delete material no longer applicable to the subject of the WP. Paragraphs, illustrations, tables, pages, and index numbers on illustrations added between existing ones shall be assigned the preceding number plus consecutive capital letter suffixes; for example, 3A and 3B might be added between existing numerals 3 and 4. Suffix letters I and O shall not be used. Other than the addition of suffix letters, existing identification numbers and suffixes shall not be renumbered.

3.10.2.3.4 Added or deleted material - changed work package. Added or deleted material in a changed WP shall be prepared as follows:

a. Added material shall be placed in proper sequential order within the WP. If this causes an overrun, the material that will not fit on the existing page shall be placed on an added page. If blank space is available on either the preceding or following page of the one affected, this space may be used for overrun material; however, correct sequential order of material must be maintained. Pages shall not be added between a right-hand (odd numbered) and a left-hand (even numbered) page. If additional copy is added to a right-hand page, the overrun shall be carried to the next left-hand page and the overrun

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from this page shall be placed on an added page. Therefore, such added pages shall always be assigned even numbers; for example: "2A, 2B, 4A, or 4B."

b. Deleted paragraphs, procedural steps, or callouts following index numbers on illustrations shall be indicated by placing the word "Deleted" after the effected item; for example: "r. Deleted." or "2. Deleted."

c. Deleted pages shall be accounted for by placement of a note at the bottom of the preceding page or at the top of the succeeding page; for example: "Page 7 Deleted." The note shall be placed within the required image area (with marginal copy) (see 3.6.2.3).

d. Deleted illustrations in a separate IPB manual shall be accounted for on the "A" page by indicating the figure as deleted.

3.10.2.3.5 Change symbols - changed work package. Changes to text, tables, and illustrations (including new material on added pages) shall be indicated by change symbols. All existing change symbols shall be eliminated from pages effected by the current change. After removal of previous change symbols, new change symbols shall be inserted, highlighting material changed or added during the change to the WP.

3.10.2.3.6 Change symbol format. (see figure 25.) The text and tabular data affected by a change to a WP shall be indicated by the letter "R" or a change bar in the outer margin of double column format material and in the outer margin of single column format material. Change symbols for illustrations shall be as follows:

a. Change symbols shall not be required for IPB illustrations or technical manual numerical index of effective WP's/pages.

b. On line drawings, other than schematic diagrams and wiring diagrams, a miniature pointing hand shall be used to highlight the area containing the changed material. When several changes are made in one area, or the area is congested, a change bar may be used to indicate a general area. The change bar shall also be used on graphs to indicate a change. The change bar shall be placed in such a manner as to clearly indicate "change" without confusing the reader. If an illustration has been extensively changed, a change bar may be placed across the top of the illustration (full page illustration) or in the applicable margin (partial page illustration). An acceptable alternate method for use with an extensively changed full page illustration is the use of the words "Major Change" with a miniature pointing hand adjacent to the words. The symbols and the words shall be placed in a clear space of the reproduction area.

c. On schematic diagrams and wiring diagrams, shading and screening shall be used to indicate the changed or added material. If the use of this method will not be effective due to the material illustrated, or if extensive changes have been made, the same techniques used for extensively changed line drawings may be used. Changes to wiring diagrams may also be indicated by the use of a screen border around the affected area. Care shall be exercised in the selection of material and its placement when this alternate method is used.

d. Change symbols shall not be required when an illustration is added to a WP.

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e. "Deleted" illustrations shall be shown by a note near the original location of the illustration; for example: "Figure 6. Deleted." If the illustration has been deleted and replaced by a new illustration, the note shall not be required.

3.10.2.4 Revised work package. A WP shall be revised when the cumulative total of existing changed pages and pages affected by the current change exceed 60 percent of the total WP pages. Except for required renumbering, a revised WP shall be prepared in accordance with 3.7.5 through 3.7.9.3 as applicable.

3.10.2.4.1 Renumbering within a revised work package. A revised WP shall incorporate changed or added material and delete material no longer applicable to the subject of the WP. If a WP has been previously changed (see 3.10.2.3) all pages, paragraphs, illustrations, and tables shall be renumbered, as necessary, to eliminate suffixes and to establish correct sequence. All previous change numbers and change dates shall be removed. The current change number and the date of the change to the WP manual shall be placed on the WP title page and the current change number on all subsequent pages.

3.10.2.4.2 Change symbols - revised work package. Unless otherwise specified, all existing change symbols shall be removed (see 6.2.1).

3.10.2.4.3 Revised work package title page. (see figure 1.) The WP title page shall be prepared in accordance with 3.7.9.1 and a supersedure notice shall be placed below the title of the WP (see 3.7.4.1h).

3.10.2.5 Added work package. WP's added during a change cycle shall be prepared in accordance with 3.7.5 through 3.7.9.3, as applicable.

3.11 Revisions to work package manuals. When directed by the requiring activity, a revision shall be prepared (see 6.2.1).

3.11.1 Revised work package manual title page. (see figure 11.) The WP manual title page shall be prepared in accordance with 3.7.4.1.

3.11.2 Work package manual revision date. The revision date shall be assigned by the requiring activity. No revision number shall be assigned.

3.11.3 Renumbering within a revised work package manual. The revision shall incorporate all changed or added material and delete material no longer applicable to the subject of the manual. All pages, paragraphs, illustrations, and tables shall be renumbered as necessary to establish correct sequence. See 3.6.5.1 for WP numbering within a revised manual.

3.11.4 Change symbols - revised work package manual. Unless otherwise specified, all existing change symbols shall be removed (see 6.2.1).

3.12 Supplements.

3.12.1 Supplements to unclassified manuals. When directed by the requiring activity, a supplement shall be prepared. The supplement shall conform to the same requirements specified for the manual it is intended to supplement. Cross-reference notes shall be placed on the supplement and the basic manual

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title page and each applicable WP, as applicable in accordance with 3.7.4.1i and 3.7.9.1e(6) (see 6.2.1).

3.12.2 Supplements to classified manuals. Where classified information will comprise 10 percent or less of the information contained in a manual, such information shall not be included in the basic manual and shall be prepared as a classified supplement. This will permit the basic manual to be issued as an unclassified publication (see 3.12.1).

4. QUALITY ASSURANCE PROVISIONS.

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the preparing activity is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the preparing activity may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements (see 6.2.1).

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the preparing activity's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the preparing activity of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

5. PACKAGING

5.1 Packaging requirements. The material prepared in accordance with this specification shall be packaged as specified in the following paragraphs:

5.2 Manuscript copy. The artwork and text material may be separated in one container or may be in separate containers. Copies of large artwork, for review purposes only, may be folded. The containers shall protect the material against forms of damage that frequently occur during shipping.

5.3 Reproducible material. Reproducible material shall be packed flat and double packaged. Artwork shall not be folded or rolled. The interior material shall be waterproof and free of any chemical substance that would discolor or otherwise render the reproducible copy useless. The exterior package shall be a standard commercial carton at least equal to interstate commerce standards and of sufficient strength to protect the reproducible copy against forms of damage that frequently occur during shipping.

5.4 Classified material. Classified material shall be packaged in accordance with DOD 5220.22M, DOD 5200.1R and OPNAV 5510.1.

5.5 Shipping container information. In addition to sender and addressee information, the exterior of each container shall bear the following:

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- a. Publication number.
- b. Contract or purchase order number.
- c. The words Manuscript Copy, when applicable.
- d. The words Direct Image Copy, when applicable.
- e. The words Reproducible Material, when applicable.
- f. Number of containers in shipment.

5.6 Packing list. A copy of the letter of transmittal, or the packing list, shall be placed inside the carton or container. When a shipment consists of several containers, the letter of transmittal or packing list shall be enclosed in the first container and shall identify the material that was packed in each container.

6. NOTES.

6.1 Intended use. Technical manuals prepared in accordance with this specification are intended for use in the operation and maintenance of equipment in military use.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of the specification.
- b. Whether a combination manual is required (see 1.2.3).
- c. Whether a separate IPB is required (see 3.3).
- d. Alternate for MIL-STD-17-2, if required (see 3.4.6.3).
- e. Whether photographs or halftones are acceptable (see 3.9.3 and 3.9.3.1).
- f. Use of color, if required (see 3.9.3.1 and 3.9.6.4).
- g. Copy prints as manuscript copy or reproducible copy, if required (see 3.9.16).
- h. Whether change symbols are required for revised WP's (see 3.10.2.4.2).
- i. Whether change symbols are required for revised WP manuals (see 3.11.4).
- j. A revision of a manual, if required (see 3.11).

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k. A supplement to a manual, if required (see 3.12).

l. Responsibility for inspection (see 4.1).

6.3 Definitions.

6.3.1 Reproducible copy. Reproducible copy consists of text pages and artwork suitable for use in the development of printing plates.

6.3.2 Functional block diagram. A modified schematic diagram in which each group of maintenance significant components that together perform one or more functions is represented by a single symbol or block. The block or symbol representing the group of components shows all input and output signals.

6.3.3 Schematic diagram. A diagram which shows by means of graphic symbols, the electrical connections and functions of a specific circuit arrangement. The schematic diagram facilitates tracing the circuit and its functions without regards to the actual physical size, shape, or location of the component device or parts.

6.3.4 Requiring activity. The organization of a using military service or that organization delegated by a using service, which is responsible for the selection of and determination of requirements for a specific support element.

6.4 Figures contained in this specification. The figures contained in this specification are examples intended to illustrate style, format and sample content. They shall not be used for interpretation of specific technical content or exact scale requirements.

6.5 Subject term (key words).

artwork, requirements
 changes
 classification
 figure titles
 foldout illustrations
 format
 front matter
 functional block diagram
 illustrated parts breakdown
 image area
 indentation
 maintenance work package
 ordering data
 outline
 procedural steps
 publication number
 line drawings
 manuscript copy
 nomenclature
 references
 reproducible copy
 revisions
 schematic diagram

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style
supplement
text
type size
type size
warnings
warnings
wiring diagram
work package
writing guide

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Preparing activity:

Navy - AS

(Project TMSS N201)

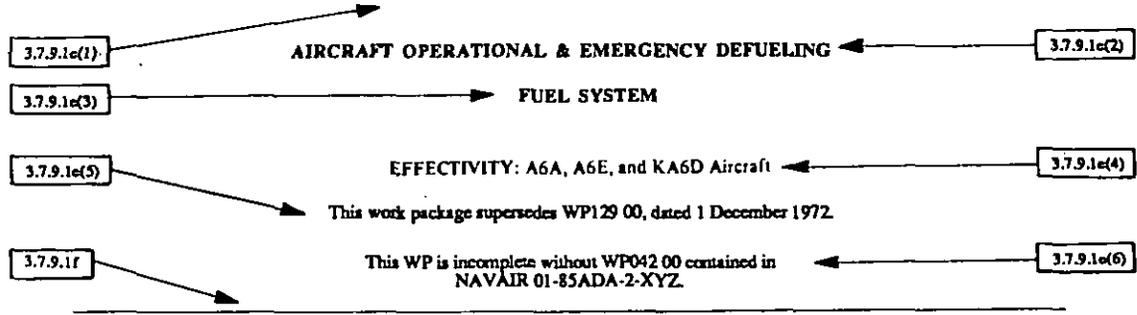
NAVAIR 01-85ADA-2-4

129 00

CHANGE 3 - 15 JULY 1974

Page 1

ORGANIZATIONAL MAINTENANCE WITH ILLUSTRATED PARTS BREAKDOWN



3.7.9.1g Reference Material

Fuselage Tank Removal	014 00
Defueling and Inflight Refueling	NAVAIR 01-85ADA-2-4-1
Defueling	044 00

3.7.9.1b Alphabetical Index

<u>Subject</u>	<u>Page No.</u>
Emergency Defueling	2
External fuel tanks, defueling	2
Illustrated parts breakdown	4
Operational Defueling (Fuselage tanks only)	1

3.7.9.1i Record of Applicable Technical Directives

<u>Type/No.</u>	<u>Date</u>	<u>Title and ECP No.</u>	<u>Date Inc.</u>	<u>Remarks</u>
AFC 206	28 Nov 69	Power Plant-Ground Fueling Cap, Replacement of (ECP No. GR-A6A-597)	1 Apr 74	-

- 3.5.2b
- 1. OPERATIONAL DEFUELING (FUSELAGE TANKS ONLY)**
- a. Check that fueling nozzle, aircraft, and defueling unit are grounded.
 - b. If a centerline external fuel tank in-flight refueling store is installed, defuel (NAVAIR 01-85ADA-2-4-1(WP 044 00) and remove tank (WP 014 00).
- 3.5.3a

Figure 1. Example of technical content.

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NAVAIR 17-40MIARS-1

014 00

Page 9

3.5.3c

- d. Remove mode selector shaft assembly (102).
 e. Remove mode selector shaft (1, figure 7) from mode selector lever (2) by removing pin (3).

13. **CARTRIDGE HOLDER ASSEMBLY ADJUSTMENT.** Adjust cartridge holder assembly as follows:

3.4.3c

NOTE

This adjustment is required only if cartridge holder mounting blocks have been replaced.

- b. Position mode selector shaft assembly (102, figure 5) and scan mirror support assembly (98) and install screws (99) and washers (100).

c. Check that mode selector shaft assembly operates properly.

- d. Install TOA cover assembly per paragraph 7.

3.5.3b

e. Install TOA into housing assembly per WP 013 00.

38. **DRIVE BELTS.**

39. **DISASSEMBLY.**

Insert end of cutter cable assembly (32, figure 5) through front panel of print processor assembly.

- b. Install plate and cutter assembly (35) per paragraph 25.

23. **PLATE AND CUTTER ASSEMBLY.**

24. **DISASSEMBLY.**

3.4.3a

WARNING

Support shall be provided for the print processor assembly when it is withdrawn from the housing to avoid a dangerous crash of the parts to the floor.

CAUTION

Lifting the pressure roller handle too high before lifting the cutter assembly can cause damage to parts of the plate and cutter assembly.

3.4.3b

- h. Lift pressure roller handle one half to one inch.

i. Pull upward simultaneously on the cutter assembly and the pressure roller.

Figure 1. Example of technical content. - Continued

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Biological		Fire	
Chemical		Poison	
Explosion		Radiation	
Eye Protection		Vapor	

EXPLANATION OF HAZARD SYMBOLS

	The abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to your life or health.
	The symbol of drops of a liquid onto a hand shows that the material will cause burns or irritation of human skin or tissue.
	The rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition, or high pressure.
	The symbol of a person wearing goggles shows that the material will injure your eyes.
	The symbol of a flame shows that a material can ignite and burn you.
	The symbol of a skull and crossbones shows that a material is poisonous or is a danger to life.
	The symbol of a three circular wedges shows that the material emits radioactive energy and can injure human tissue or organs.
	The symbol of a human figure in a cloud shows that vapors of a material present a danger to your life or health.

Figure 2. Icons for hazardous materials and examples of application.

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HAZARDOUS MATERIALS WARNINGS

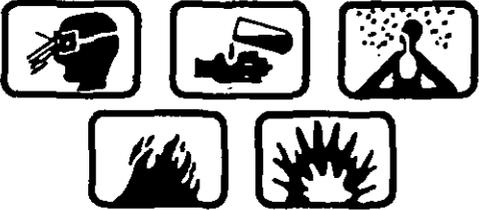
<u>Index</u>	<u>Material</u>	<u>Warning</u>
1	CHROMIC ACID, 0-C-303 	<p>Chromic acid, 0-C-303, is toxic and a strong oxidizing agent. It may ignite combustible material or organic substances. When mixing with water, always add acid to water. Protection: chemical splashproof goggles, acidproof gloves, face shield, apron and footwear, and forced ventilation (or respirator). Keep acid off skin, eyes, and clothes. Wash exposed skin areas thoroughly.</p>
2	DRY CLEANING SOLVENT, P-D-680 	<p>Dry cleaning solvent, P-D-680, Type II, is toxic and combustible. Protection: chemical splashproof goggles and forced ventilation (or respirator). Keep container closed; keep sparks, flames, and heat away. Keep solvent off skin, eyes, and clothes. Wear gloves.</p>
3	EPOXY PAINT REMOVER, MIL-R-81294 	<p>Epoxy paint remover, MIL-R-81294, is toxic. Protection: chemical splashproof goggles, gloves, and forced ventilation (or respirator). Keep paint remover off skin, eyes, and clothes. Wash hands thoroughly after handling.</p>
4	HYDROCHLORIC ACID, 0-4-765 	<p>Hydrochloric acid is a severe eye and skin irritant. In contact with some metals, can generate hydrogen, which is explosive. Keep away from acids, metals, explosives, organic peroxides, and easily ignitable substances. When mixing with water, always add acid to water. Protection: face shield and forced ventilation (or respirator). Keep hydrochloric acid off skin, eyes, and clothes; do not breathe vapors. Wear gloves.</p>

Figure 3. Example of complete warnings for hazardous materials.

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3.6.1.2	3.6.1	405 00
NAVAIR 16-30AWM85-1		Page 2
15 November 1977		
checkout procedures, lotic-tree-format troubleshooting figures, and an integrated closed-loop functional diagram of the navigation system.		
<p>3. Testing and troubleshooting includes pretest setup, operational checkout, and troubleshooting (fault-isolation) procedures. The operational checkout verifies system operation. Encircled uppercase letters key malfunction symptoms to appropriate troubleshooting procedures. Troubleshooting procedures assume that only one malfunction exists at a time. After correction of the failure, the system is checked for flight readiness by performing the operational checkout procedure.</p>		
<p>5. Table 1 identifies the WRA that comprise the compass system and those that must be installed in the aircraft for system checkout.</p>		
TABLE 1. WEAPON REPLACEABLE ASSEMBLIES		
Ref Des	Nomenclature	Common Name
<u>Compass System</u>		
01A5	Bearing Distance Heading Indicator ID-633C/U	HSI
02AR1	Electronic Compass Amplifier ASK-24/U	AHRS amplifier
02A3	Control Panel C-257/U	COMP control panel
02A4	Compensator MXU-394/A	AHRS compensator
02A5	Induction Transmitter TRU-79/A	Flux valve

Figure 4. Example of technical content manuscript.

MIL-M-81927B (AS)

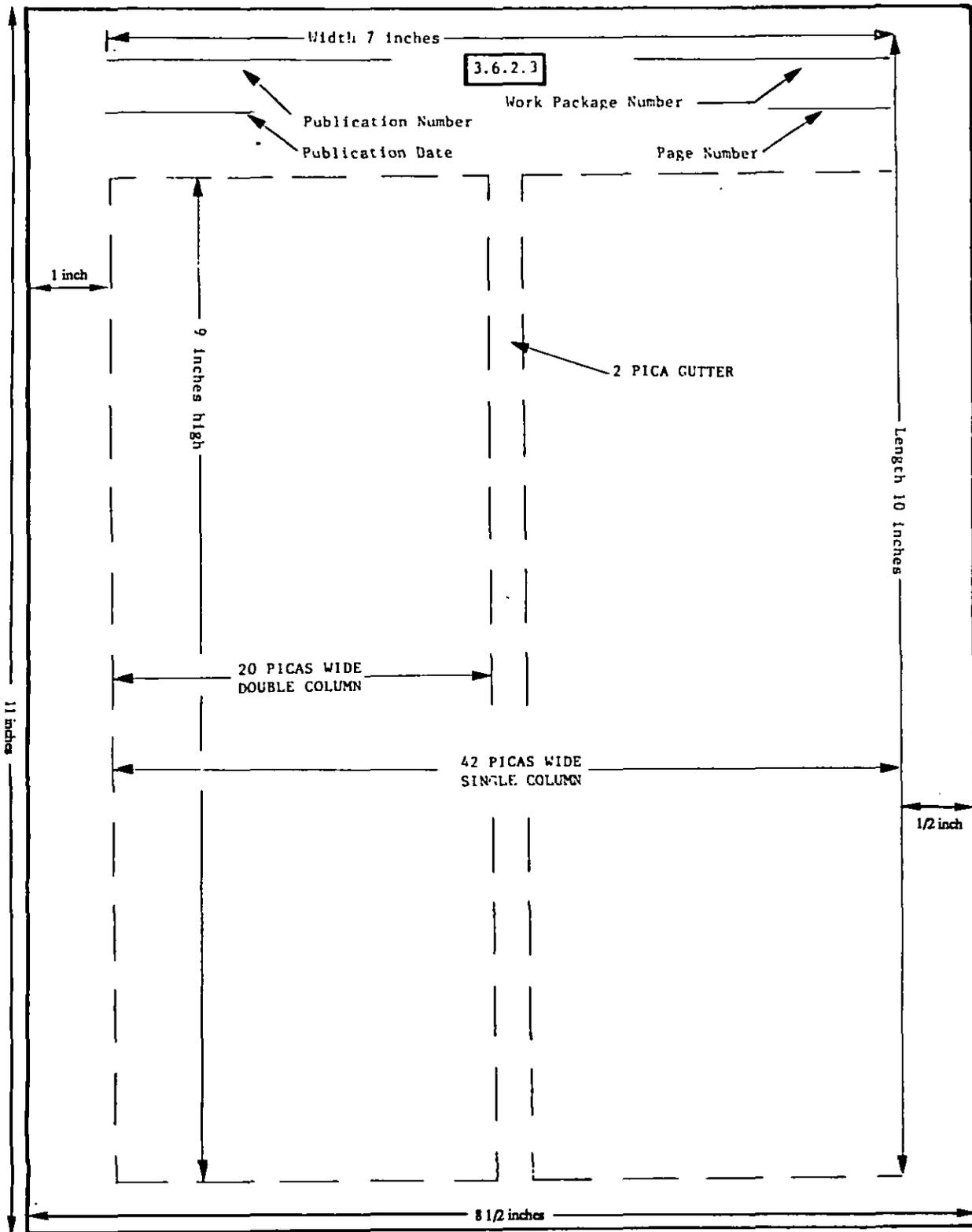


Figure 5. Example of image area.

MIL-M-81927B (AS)

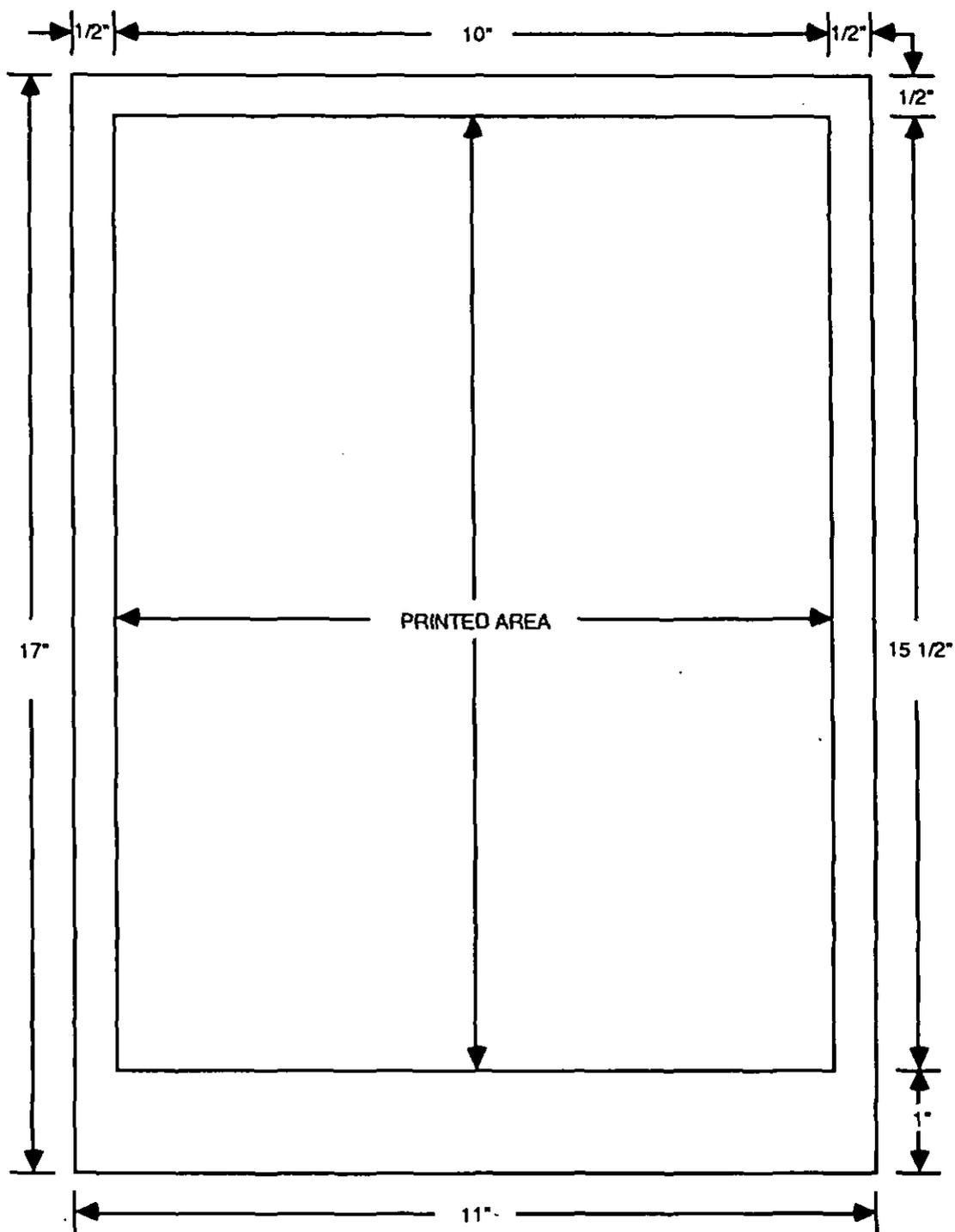


Figure 5. Example of image area. - Continued

MIL-M-81927B (AS)

NAVAIR 17-40MIARS-1

3.6.25

009 00

Change 1

Page 3

3. TEST PROCEDURES.

3.6.27a

3.6.27a

4. The tests outlined in this work package check the operation of the film control assembly and its major assemblies and components. The tests are arranged to facilitate fault isolation to major assembly/component level. The tests outlined should be performed in sequential order to ensure maximum effectiveness. When a malfunction is indicated, fault isolation is accomplished using the troubleshooting chart and input/output pin signal lists identified in paragraph 11.

5. INITIAL SET-UP. Accomplish the following

3.6.27b

a. Set POWER switch to ON.

b. Install test cartridge TC-1 in cartridge holder as illustrated in figure 1.

3.6.27.1

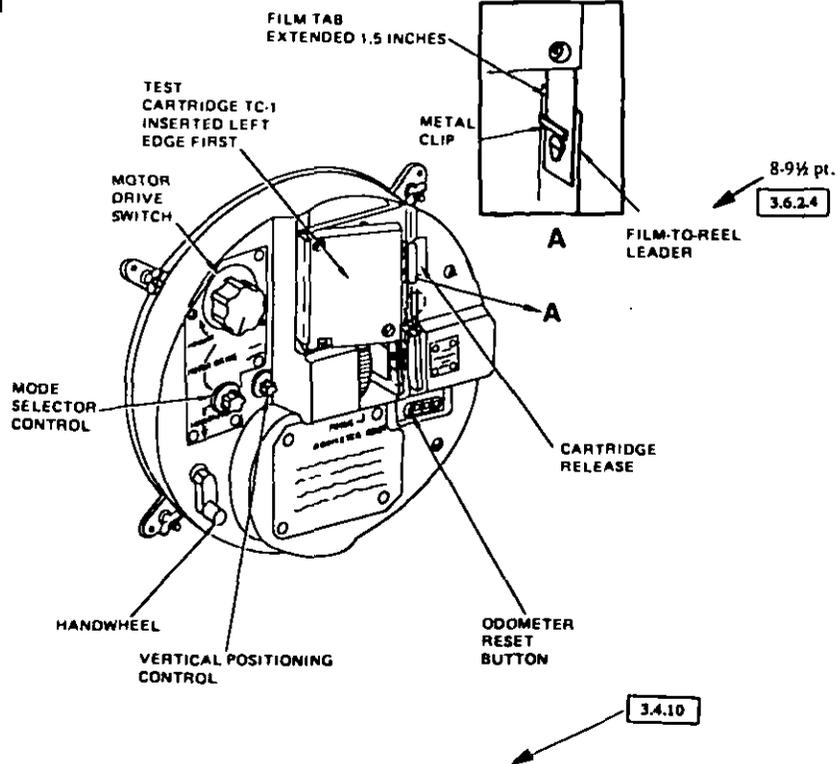


Figure 1. Test Cartridge (TC-1) Installation

c. Position mode selector CONTROL to the MOTOR DRIVE position.

d. Position the POS/NEG switch to the NEG position.

e. Place the motor drive switch to the OFF position.

f. Turn BRIGHTNESS control fully CW.

g. Enter 2490 in the keyboard and depress SRCH button. Film frame 2490 should be retrieved and displayed.

h. Enter 1000 in the keyboard and depress SRCH button. Film frame 1000 should be retrieved and displayed.

Figure 6. Example of technical content work package page.

MIL-M-81927B (AS)

3.6.2.7b 10. INSTALLATION OF TELEMETERING UNIT.

11. PREPARATION. Prior to installation of the telemetering unit, the antenna coupler and rod antenna must be removed from the guidance-control section of the missile and the antenna cavity must be inspected and repaired, as required.

12. Removal of Antenna Coupler and Rod Antenna.

a. Remove tunnel fairing (figure 1) from a guidance-control section.

b. Disconnect cable connector 13P3 (figure 2) from receptacle 13J3.

CAUTION

Telemetering transmitter TT-128 shall be installed in all QXN units prior to adjustment.

14. INSTALLATION OF TELEMETERING TRANSMITTER.

a. Position transmitter (1, figure 7) on antenna coupler shelf (2).

b. Secure transmitter with four bolts to prevent unnecessary vibration on the antenna coupler shelf (2).

3.6.2.7a 16. REMOVAL OF TELEMETERING UNIT.

17. PREPARATION.

18. Removal of ARN-94X Control Section.

a. Remove tunnel fairing (figure 1) from guidance-control section. **3.6.2.7c**

b. Remove desiccant container (figure 10) from the aft end of the control section.

22. Inspection of ARN-94X Control Section. The ARN-94X control section must be inspected for cable and connection integrity prior to storage. **3.6.2.7d**

30. TESTING AND TROUBLESHOOTING.

31. PRESSURE LEAKAGE TEST.

a. Cap inlet and outlet ports of water separator using plug and clamp end seals, or equivalent. Cap drain port.

b. To remove fiber glass condenser (10), remove spring (9) from small end of condenser, unhook spring (12) from chain assembly (11), and carefully peel condenser off support assembly (5).

c. To remove valve assembly (6), first remove ring (7).

33. CLEANING.

Support Equipment Required

Nomenclature	Part No./Type Designation	CAGE
Stopwatch	GG5764A(GGS764)	XXXXXX
Shutoff Valve		XXXXXX

Materials Required

Nomenclature	Specification/Part Number
Dry Cleaning Solvent	P-D-680
Packing (2)	AN123907

WARNING

Use solvent in a well-ventilated area. Avoid breathing fumes. Keep away from flame.

3.6.2.8

a. Wash all disassembled parts except condenser (10, Figure 2) with dry cleaning solvent P-D-680.

b. Wash condenser (10) in a mild detergent solution, rinse, and dry with compressed air.

34. INSPECTION.

a. Check mounting hole areas of shell assembly (2) for cracks or other signs of damage. (QA) **3.6.2.7.2**

Figure 6. Example of technical content work package page. - Continued

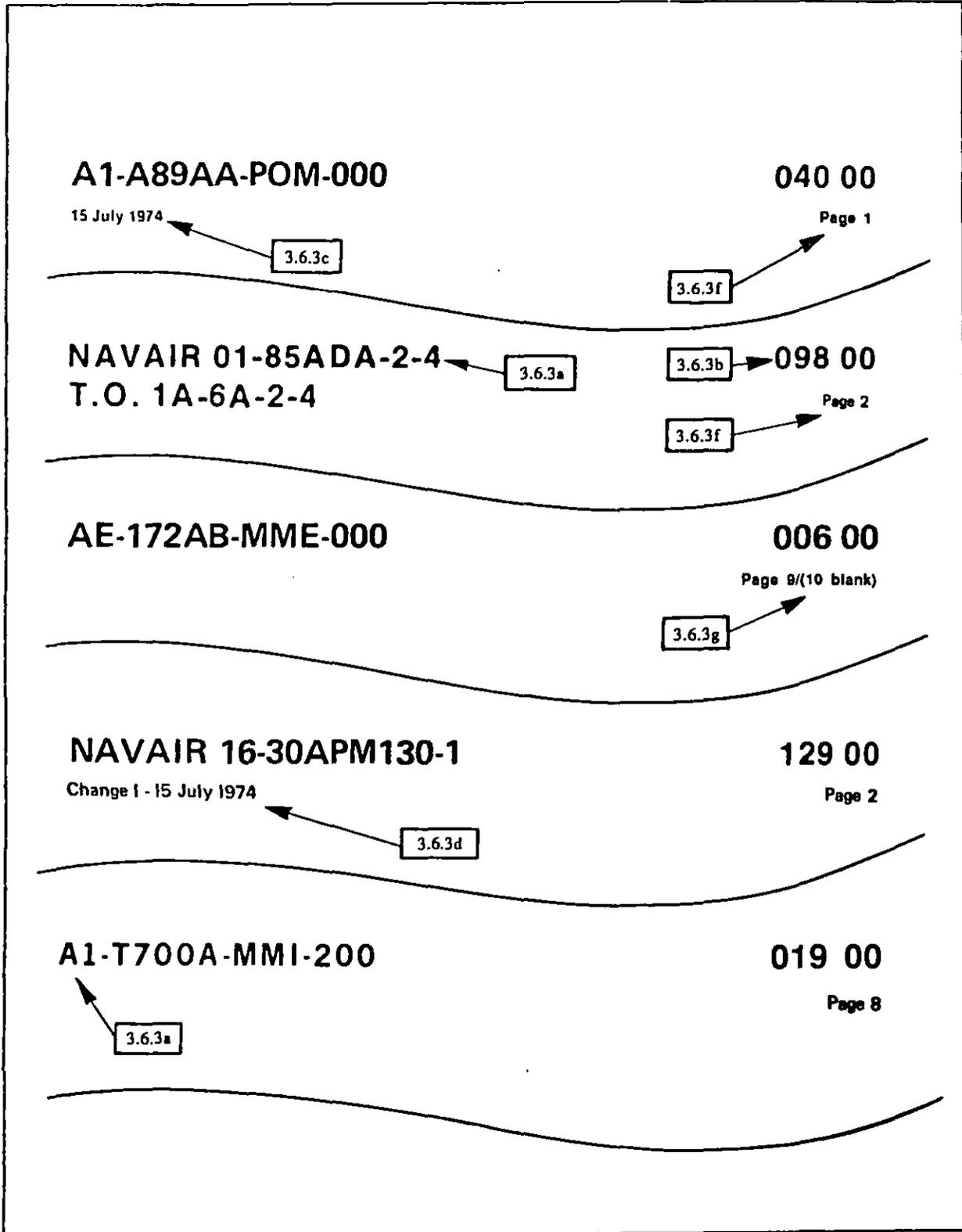


Figure 7. Example of marginal copy - work package manual.

MIL-M-81927B (AS)

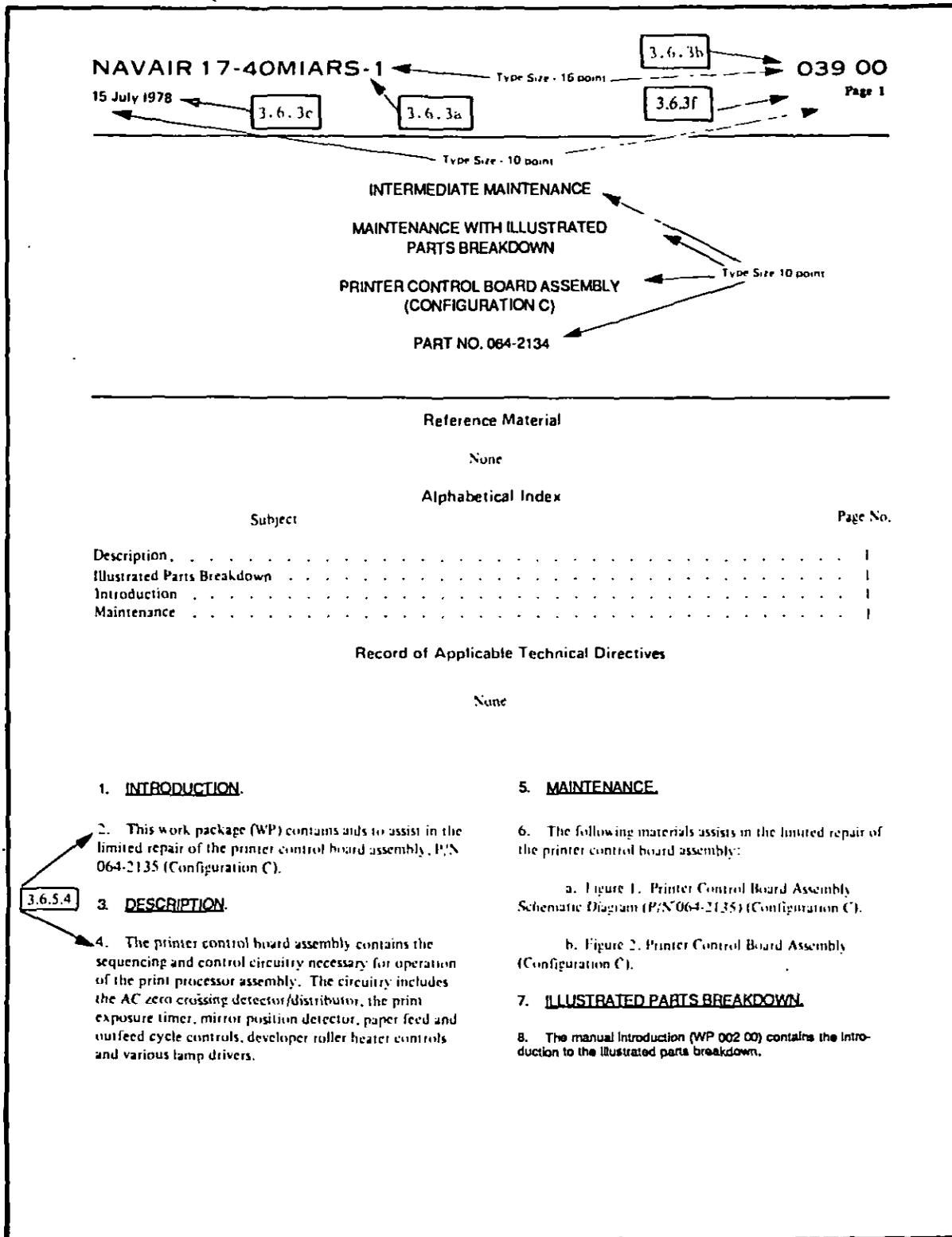


Figure 7. Example of marginal copy - work package manual. - Continued

MIL-M-81927B (AS)

3.6.5.6

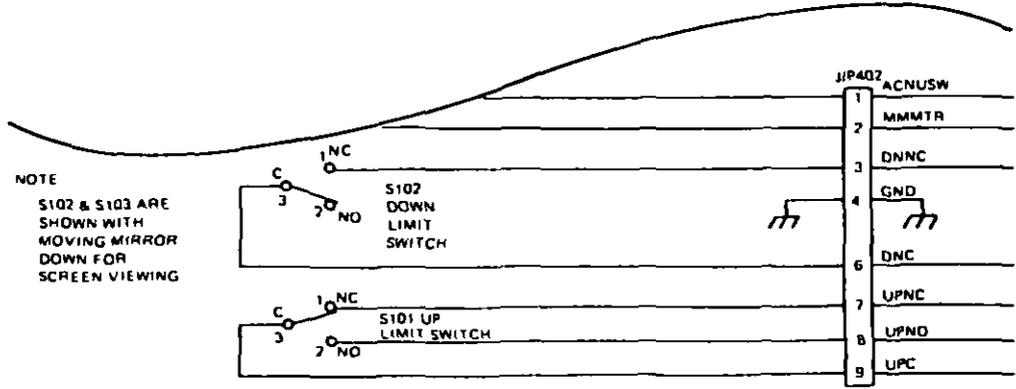


Figure 5. Diagram, Print Processor Assembly Schematic (Configuration A) (Sheet 1 of 4)

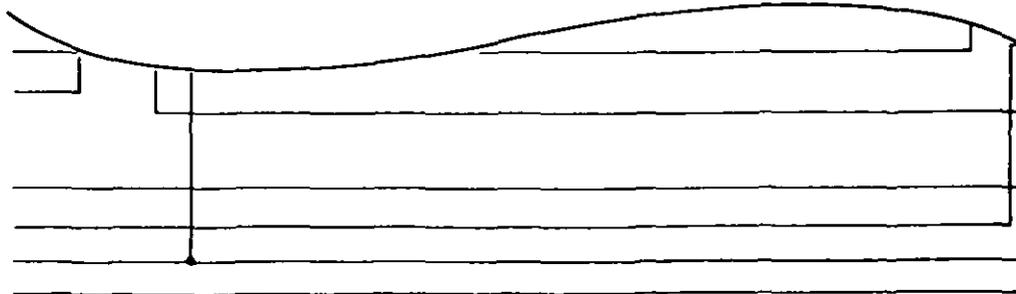


Figure 5. Diagram, Print Processor Assembly Schematic (Configuration A) (Sheet 2)

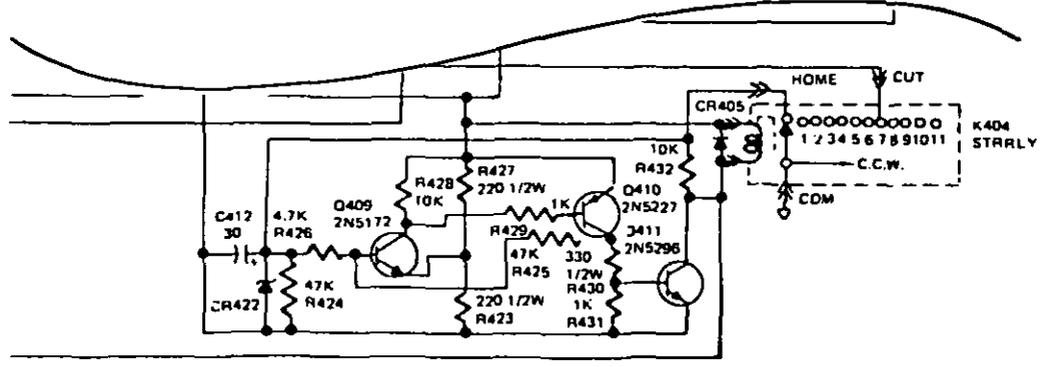


Figure 5. Diagram, Print Processor Assembly Schematic (Configuration A) (Sheet 4)

Figure 7. Example of marginal copy - work package manual. - Continued

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CLASSIFICATION

3.8.3

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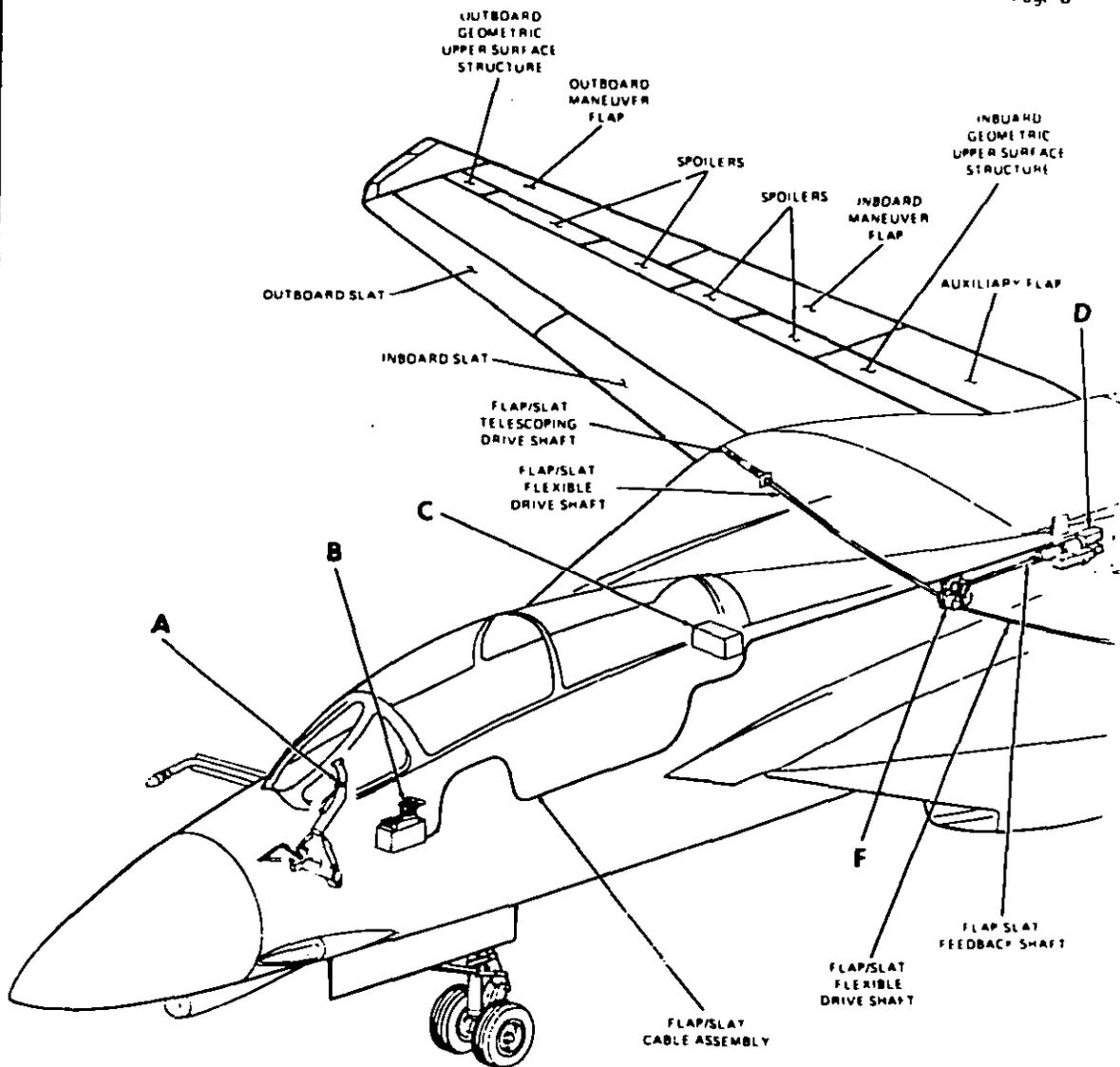


Figure 1. Flap/Slat Control System Components

CLASSIFICATION

(This page is UNCLASSIFIED)

Figure 7. Example of marginal copy - work package manual. - Continued

MIL-M-81927B(AS)

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Page 3

rotary pump driven by a 3-hp. motor, and 4 shutoff valves, 2 relief valves, and 3 check valves for controlling the flow of the coolant. There are 5 filters in the cart's tubing to ensure maximum cleanliness, a Hydropack moisture adsorptive filter with a molecular sieve element, a Clay Pack ionic adsorptive filter, a 3 Pall-Aircraft Porous Media 3-micron absolute particulate filters. Supply and return pressure are measured

by two pressure gages. Overall flow is monitored by a flow meter. The unit also stores its own hoses and power cables. Schematic placards of both fluid and electrical systems are permanently mounted to the rear external panel of the unit. The unit contains chassis mounted controls and indicators which are shown in figure 2. Their function is described in table 1.

TABLE 1. CONTROLS AND INDICATORS

Control Indicator	Function
PUMP INLET SHUT OFF Valve (SOV-1)	Main shut off valve for unit located on control panel. It interrupts coolant flow at reservoir outlet.
SUPPLY SHUT OFF Valve (SOV-2)	Secondary shut off valve for unit located on control panel. It interrupts coolant flow at quick disconnect.
MNL PRESS MOD Valve (SOV-3)	Manual by pass valve. It forces coolant to return to reservoir without passing through filters 1 and 2.
Three Position Return Valve (SOV-4)	Three position valve which directs coolant returning to the unit either back to the reservoir or overboard.
START Button	Push button start switch which energizes unit pump and elapsed time meter.
STOP Button	Push button stop switch which terminates pump operation and elapsed time meter.

3. PRINCIPLES OF OPERATION. (Figure 3.)

4. The Liquid Coolant Service Cart provides flushing, filling, circulating, sampling, or draining the dielectric silicate-coated tubing through, or

SHUT OFF valve (SOV-2) is opened allowing coolant to leave the unit through SUPPLY LINE (QD-1) after passing through a filter (FLTR-5). The supply pressure is monitored by the PRESS PUMP AND SUPPLY GAGE (CA-1). Coolant returning through by positioning the Three Position

MIL-M-81927B (AS)

A1-A89AA-IPB-000

INTRO-1

1 January 1975

3.6.4c

3.6.4b(1)

INTRODUCTION
MODEL XYZ AIRCRAFT

1. PURPOSE AND SCOPE.

2. This volume is one of a series of volumes that comprise the Illustrated Parts Breakdown Manual for Navy Model XYZ aircraft. The organizational-level illustrated parts breakdown is aircraft system oriented. The arrangement and coverage of each aircraft system is compatible with that contained in the associated Principles of Operation Manual, Testing and Troubleshooting Manual, and Maintenance Manual for the aircraft. However, the figure numbers in the Illustrated Parts Breakdown do not correspond to applicable work package numbers in the Principles of Operation, Testing and Troubleshooting, and Maintenance manuals. Airframe structure parts are listed in NAVAIR XXXXXXXX, Structure Repair Manual with Illustrated Parts Breakdown for the XYZ Aircraft. The Illustrated Parts Breakdown Manual is intended for use in the requisition, storage, issue, and identification of parts. All applicable electrical and mechanical parts are included.

3. SUPPORT EQUIPMENT. Support equipment, required for organizational-level maintenance of the aircraft is listed in NAVAIR XXXXXXXX.

4. NUMERICAL INDEXES. The numerical index of part numbers and the numerical index of reference designations are contained in this volume.

4. NUMERICAL INDEXES. The numerical index of part numbers and the numerical index of reference designations follow the introduction to this manual.

MANUAL DIVIDED
INTO VOLUMES

5. The Publication/Figure/Index Number column of the indexes contains an abbreviated publication number which should be prefaced by NAVAIR 01-XXXXXX to obtain the complete publication number.

6. USABLE ON CODE.

7. The usable on code provides suitable coding for assemblies and parts to indicate specific usability of aircraft serial number. The absence of a code in the Usable On Code column indicates that the parts so shown are usable as replacements on all aircraft covered by this manual. The appearance of an (*) asterisk in the Usable On Code column indicates that parts, having identical nomenclature are interchangeable and the parts which are not asterisked are both interchangeable and preferable to the asterisked parts. Where all parts are asterisked, they are completely interchangeable and no part is preferable. The appearance of an asterisk and a code symbol; for example, "*B", indicates that interchangeability is limited to the extent of the Usable On Code.

8. The usable on codes applicable to each volume are listed in the introduction to the volume.

8. The usable on codes applicable to this manual are listed in Table 2.

9. VENDOR CODES.

10. Part numbers, other than those of the prime contractor, are identified by vendor codes, in parenthesis, following the description of the part. Refer to

SINGLE MANUAL

Figure 8. Example of marginal copy - separate illustrated parts breakdown manual.

MIL-M-81927B (AS)

AI-T700A-IPB-400

3.6.4b (2)

INDEX-1

15 April 1980

 ALPHABETICAL INDEX
 POWER PLANT AND RELATED SYSTEMS

<u>Title</u>	<u>Figure Number</u>
Afterburner Fuel and Exhaust Control System	F0057-00
Fuel Control, Afterburner	F0058-00
Fuel Hydraulic Pump, Afterburner	F0060-00
Fuel Ignition Valve, Afterburner	F0061-00
Fuel Oil Cooler, Afterburner	F0062-00
Fuel Pump, Afterburner	F0059-00
Air Inlet Control System	F0078-00
Air Relief Valve, Air Inlet Control System	F0081-00
Angle of Attack Probe, Air Inlet Control System	F0080-00
Pneumatic Reservoir and Relief Valve, Air Inlet Control System	F0079-00
Pressure Gage, Air Inlet Control System	F0083-00
Programmer, Air Inlet Control System	F0082-00
Sensors, Air Inlet Control System	F0080-00
Air Relief Valve, Air Inlet Control System	F0081-00
Angle of Attack Probe, Air Inlet Control System	F0080-00
Anti-ice and Ice Detection System, Engine	F0090-00
Anti-ice Shutoff and Regulator Valve, Engine	F0090-00
Bleed Exit Door, Engine Compression Bleed System	F0096-00
Bleed Exit Door Servocylinder, Engine Compression Bleed System	F0096-01
Boost Pump, Fuselage	F0055-00
Dump Switch, Fuselage	F0049-00
Engine (TF 66-180)	F0030-00
Engine Anti-ice and Ice Detection System	F0090-00
Anti-ice Shutoff and Regulator Valve, Engine	F0090-00
Engine Compression Bleed System	F0095-00
Bleed Exit Door, Engine Compression Bleed System	F0096-00
Bleed Exit Door Servocylinder, Engine Compression Bleed System	F0096-00
Mid Compression Bleed Control, Engine Compression Bleed System	F0097-00

Figure 8. Example of marginal copy - separate illustrated parts breakdown manual (alphabetical index). - Continued

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3.6.4b(3)

N0007-00

<u>PART NUMBER</u>	<u>PUBLICATION/ FIGURE/INDEX NUMBER</u>	<u>PART NUMBER</u>	<u>PUBLICATION/ FIGURE/INDEX NUMBER</u>
AN940C509	4-2/F0200-02/20	GS520U-1	4-2/F0200-02/20
AS1A10268-1	4-2/F0200-02/9	GS830C09W2	4-2/F0200-02/9
AS1A10269-1	4-2/F0203-20/1	GS830C09W4	4-2/F0203-20/1
AS1A10270-1	4-2/F0020-00/40	GS830C19W4	4-2/F0020-00/40
AS1B10260-00		GS830K1H	4-4/F0100-00/4

GC811A1E	4-9/F0202-90/60	RV65A1030ZC	4-2/F0225-00/5
GC830A1	4-20/F0006-00/3	R3-16/2	4-2/F0225-00/73
GC830B1	4-20/F0006-00/14	107	4-19/F0076-00/10
GH3-1/2	4-2/F0030-60/12A	42M36-04-1-4S	4-5/F0300-02/60
GK-800A1-28	4-2/F0030-00/10	420HG	4-9/F0080-00/10

A1-A89AA-IPB-000

3.6.4b(4)

R0004-00

<u>REFERENCE DESIGNATION</u>	<u>PUBLICATION/ FIGURE/INDEX NUMBER</u>	<u>PART NUMBER</u>	<u>REFERENCE DESIGNATION</u>	<u>PUBLICATION/ FIGURE/INDEX NUMBER</u>	<u>PART NUMBER</u>
O2A2A1	4-4/F0200-00/10	AN960C716	O2A5	4-2/F0119-00/6	MS404MK-4
	4-9/F0117-00/23		O2A5A1	4-1/F0201-01/19	MS404LF-3
O2A2A1C1	4-2/F0193-00/68	MS15012-903		4-2/F0076-01/23	
O2A2A1C2	4-20/F0200-00/10	MS15012-906	O2A5A2	4-2/F0110-00/74	MS404LF-6
				4-2/F0008-00/7	MS404LF-7

Figure 8. Example of marginal copy - separate illustrated parts breakdown manual. - Continued

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3.6.4b(5)

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Change 2

Page 2

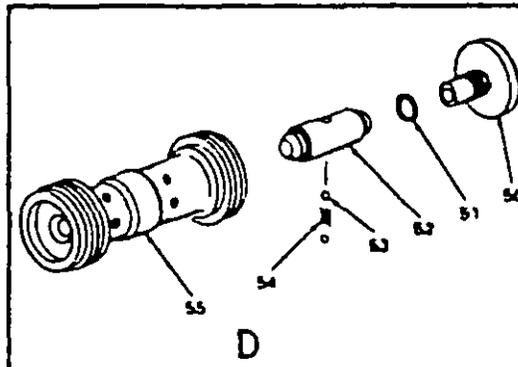
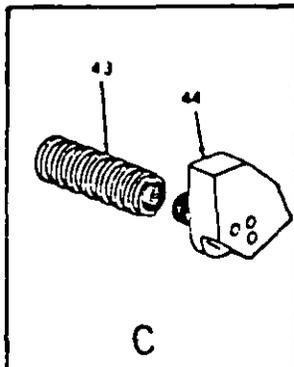
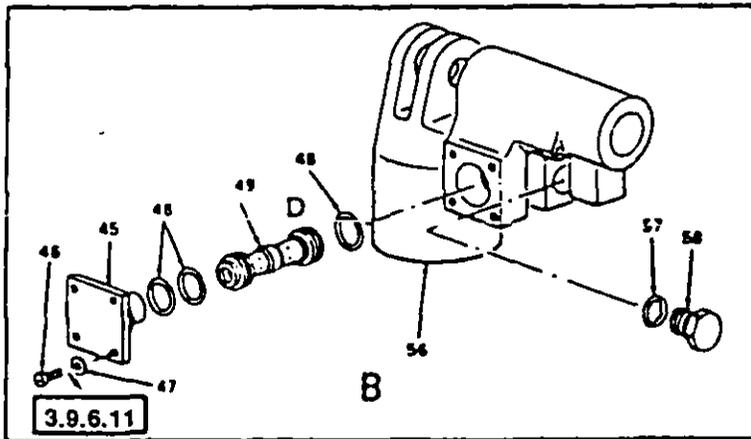
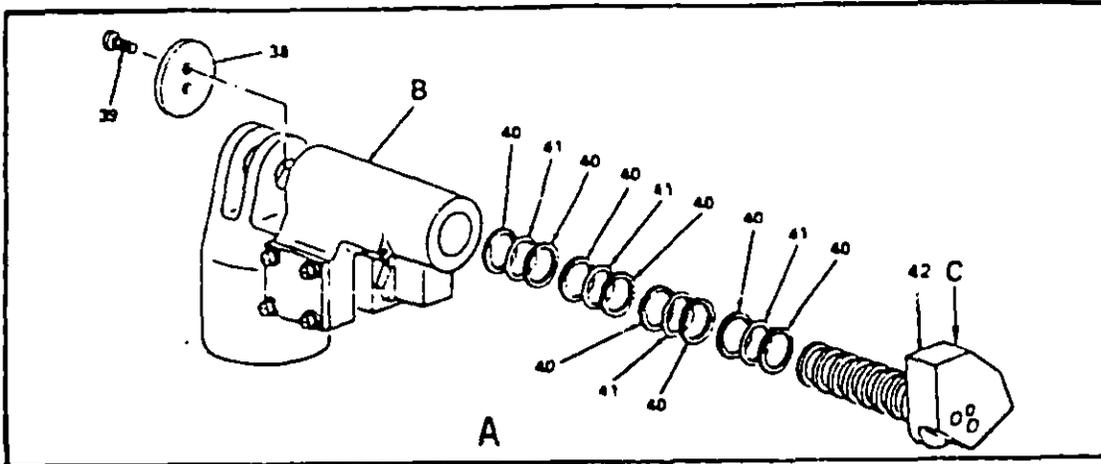


Figure 5. Actuator Assembly Main Landing Gear Uplock Hydraulic, Part Number 12345 (Sheet 2)

Figure 8. Example of marginal copy - separate illustrated parts breakdown manual. - Continued

MIL-M-81927B (AS)

NAVAIR 03-30XY-25

15 July 1972

001 00

Page 1

TECHNICAL MANUAL
DEPOT MAINTENANCE WITH ILLUSTRATED PARTS BREAKDOWN
3 WAY SELECTOR POSITION VALVE

Part No. HGB6104

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Reference Material

None

Alphabetical Index

<u>Title</u>	<u>Page No.</u>
Assembly	8
Description	1
Disassembly	6
Illustrated Parts Breakdown	9
Inspection	7
Introduction	1
Principles of Operation	1
Repair	7
Testing	3
Troubleshooting	4

Record of Applicable Technical Directives

None

1. INTRODUCTION.
2. This manual provides depot maintenance instructions and illustrated parts breakdown for the 3-way selector position valve, part number HGB6104.
3. DESCRIPTION.
4. The 3-way selector position valve is a double acting valve that consists of a body assembly, an adjustable terminal assembly and a swivel which attaches to the aft end of the valve body. The valve is 6.2 inches long.
5. PRINCIPLES OF OPERATION. (Figure 1.)
6. The valve is operated by 3,000-psi hydraulic pressure delivered to the inlet port of the valve. The swivel directs fluid flow to the adjustable terminal assembly.
7. During valve operation, the swivel remains stationary, but permits the valve to open in either an upward, downward, or neutral position. To open the upward position, 3,000-psi hydraulic pressure is applied against the adjustable terminal head. The rod end of the valve is open to return through the retract line. The force on the adjustable terminal head moves the valve to the upward position. This action displaces the fluid on the vented side.
8. To open the downward position, the hydraulic fluid is directed to the rod end of the valve. The adjustable terminal head is vented to return through the upward position vent line. The pressure on the rod end of the adjustable terminal head.

Figure 9. Example of arrangement of work package manuals containing 16 pages or less.

A1-H2FAA-XXX-000 ← 3.7.4.2a Type Size 16 point bold
 Change 2 - 1 December 1988 ← Type Size 10 point bold → Page A

3.7.4.2b **NUMERICAL INDEX OF EFFECTIVE WORK PACKAGES/PAGES** ← 3.7.4.2c

List of Current Changes ← 3.7.4.2f

Original 0.....	15 February 88 INCL previously Inc RAC's 1 through 3	IRAC 5.....	Cancelled (Never Issued
Change 1.....	15 March 88 (RAC 4 Inc)	RAC 6.....	1 July 88
		Change 2.....	1 December 88

3.7.4.2g Only those work packages/pages assigned to the manual are listed in this index. Insert Change 2 dated 1 December 1988. Dispose of superseded and deleted work packages/pages. Superseded and deleted classified work packages/pages shall be destroyed in accordance with applicable regulations. If changed pages are issued to a work package, insert the changed pages in the applicable work package. The portion of text affected in a changed or revised work package is indicated by change bars or the change symbol "R" in the outer margin of each column of text. Changes to illustrations are indicated by pointing hands or change bars, as applicable. ← 3.7.4.2g

WP Number	Title	WP Number	Title ← 3.7.4.2g(1)
	3.7.4.2g(2)		
Title		004 00	Collective Input Rods, Collective Friction, Break Input Rod, Assembly and Collective Friction Break Assembly
Page A	Numerical Index of Effective Work Packages/pages	005 00	Engine Oil System
Page B	Numerical Index of Effective Work Packages/pages	006 00	Pressure Relief Valve (To be provided)
TPDR-1	List of Technical Publications Deficiency Reports Incorporated	007 00	Propulsion System
001 00	Alphabetical Index	008 00	Automatic Stabilization Equipment
002 00	Introduction	009 00	Inspection
003 00	Pilot/Copilot Directional Input Crank, Crank Support, and Break Cylinder Support Assemblies		

3.7.4.2g(3) Total number of pages in this manual is 297 consisting of the following: ← 3.7.4.2h

WP/Page No.	Change No.	WP/Page No.	Change No.	WP/Page No.	Change No.
Title	2	002 00	2	005 00	2
A	2	1 - 21	2	1 - 10	2
B	1	22 - 26	1	006 00	0
C Blank	1	003 00	1	1 - 8	0
001 00	1	1 - 3	1	007 00	1
1	1	4 - 6	0	1 - 10	1
2 Blank	1	004 00	2	008 00	3
3 - 6	0	1 - 3	2	1 - 12	3

Figure 10. Example of numerical index of effective work packages/pages.

MIL-M-81927B (AS)

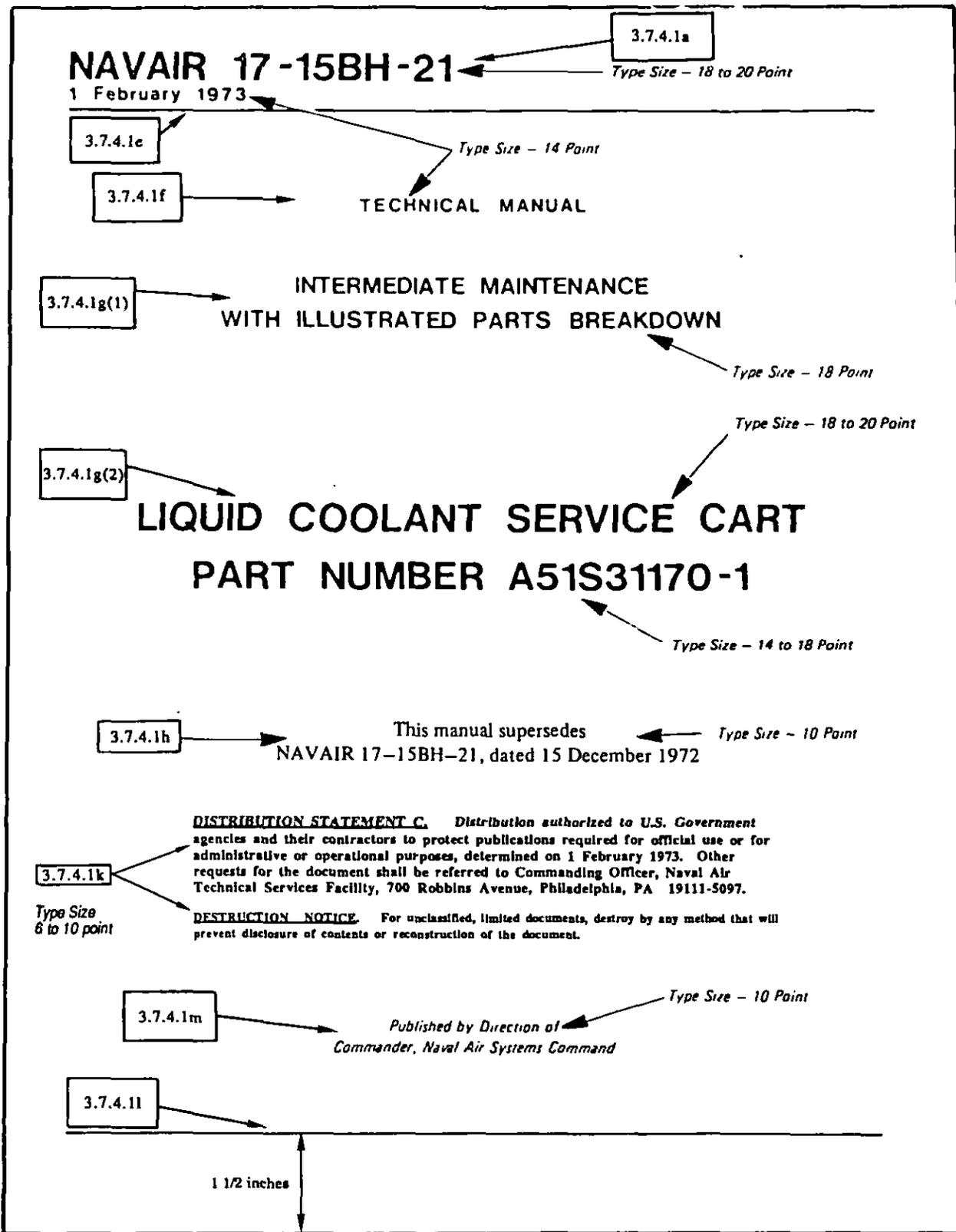


Figure 11. Example of title page - work package manual.

MIL-M-81927B (AS)

A1-A89AA-MM0-000

15 July 1978

TECHNICAL MANUAL ← 3.7.4.1f

ORGANIZATIONAL MAINTENANCE WITH ILLUSTRATED PARTS BREAKDOWN ← 3.7.4.1g(1)

FLIGHT AND IN-FLIGHT REFUELING SYSTEMS

← 3.7.4.1g(2)

NAVY MODEL ← Type Size - 14 to 18 Point

X-XXX

This volume is one of a series of ___ volumes and is incomplete without A1___, A1___, and A1___.

3.7.4.1i

Type Size - 10 Point

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3.7.4.1m

1 1/2 inches

Figure 11. Example of title page - work package manual. - Continued

MIL-M-81927B (AS)

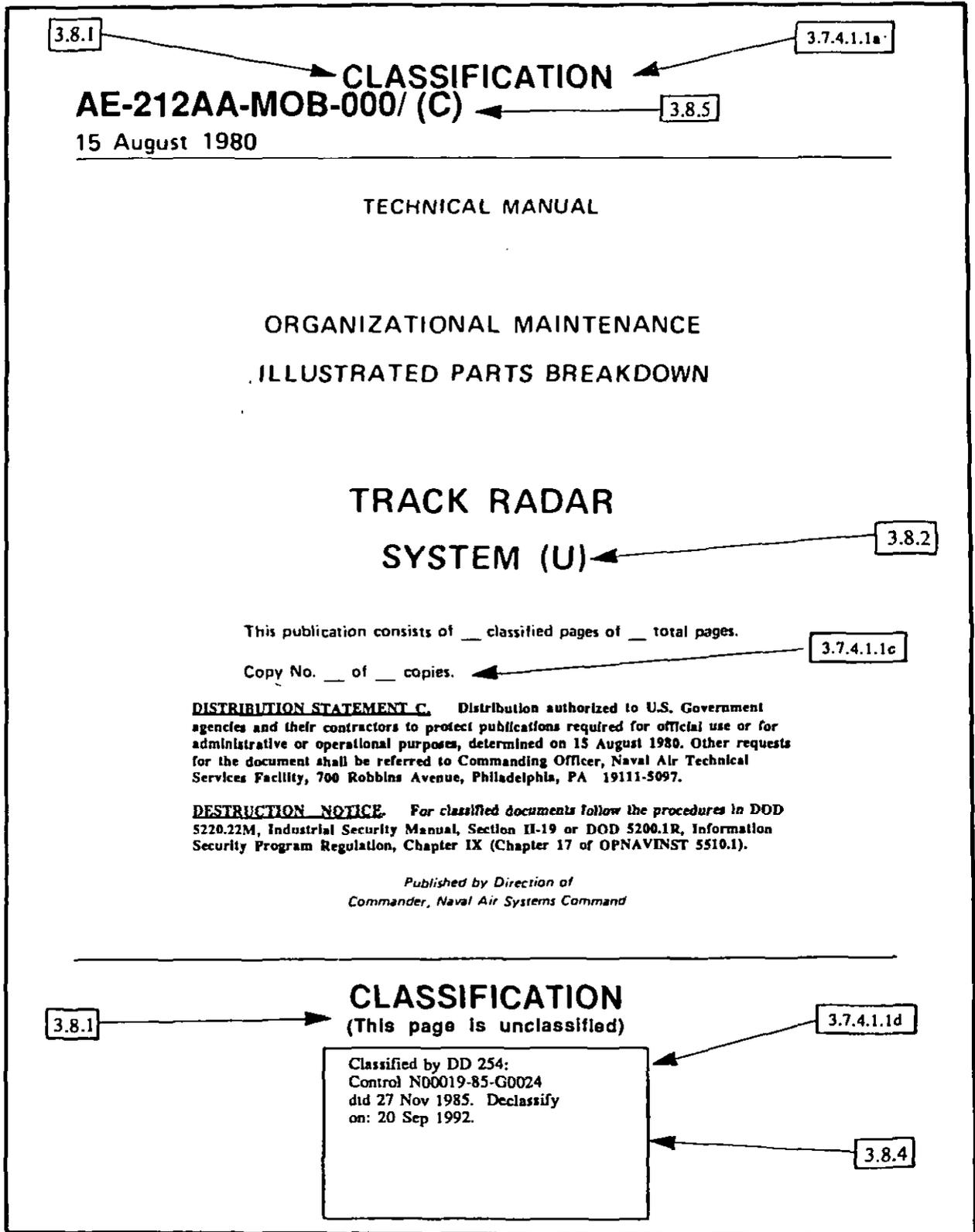


Figure 11. Example of title page - work package manual. - Continued

MIL-M-81927B (AS)

AG-526AC-S35-000

007 00

Page 73

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5-66.
2. DIMENSIONS LOCATING TRUE POSITION ARE BASIC.
3. "Z" INDICATES THE POINT OF INTERSECTION OF DIMENSIONS FROM BASE LINES.
4. CHEMICAL FILM PER MIL-C-5541 CLASS 1A.
5. ONE COAT OF PRIMER PER TT-P-1757, PLUS TWO COATS OF LIGHT GRAY SEMI-GLOSS ENAMEL PER TT-E-529, COLOR NO. 26307 OF FED-STD-595, NEAR SIDE AND EDGES INCLUDING HOLES, EXCEPT SURFACE AREA E.
6. MARK "89954-937E746G1" PER M50G80920.
7. RIVET PER M-2825.

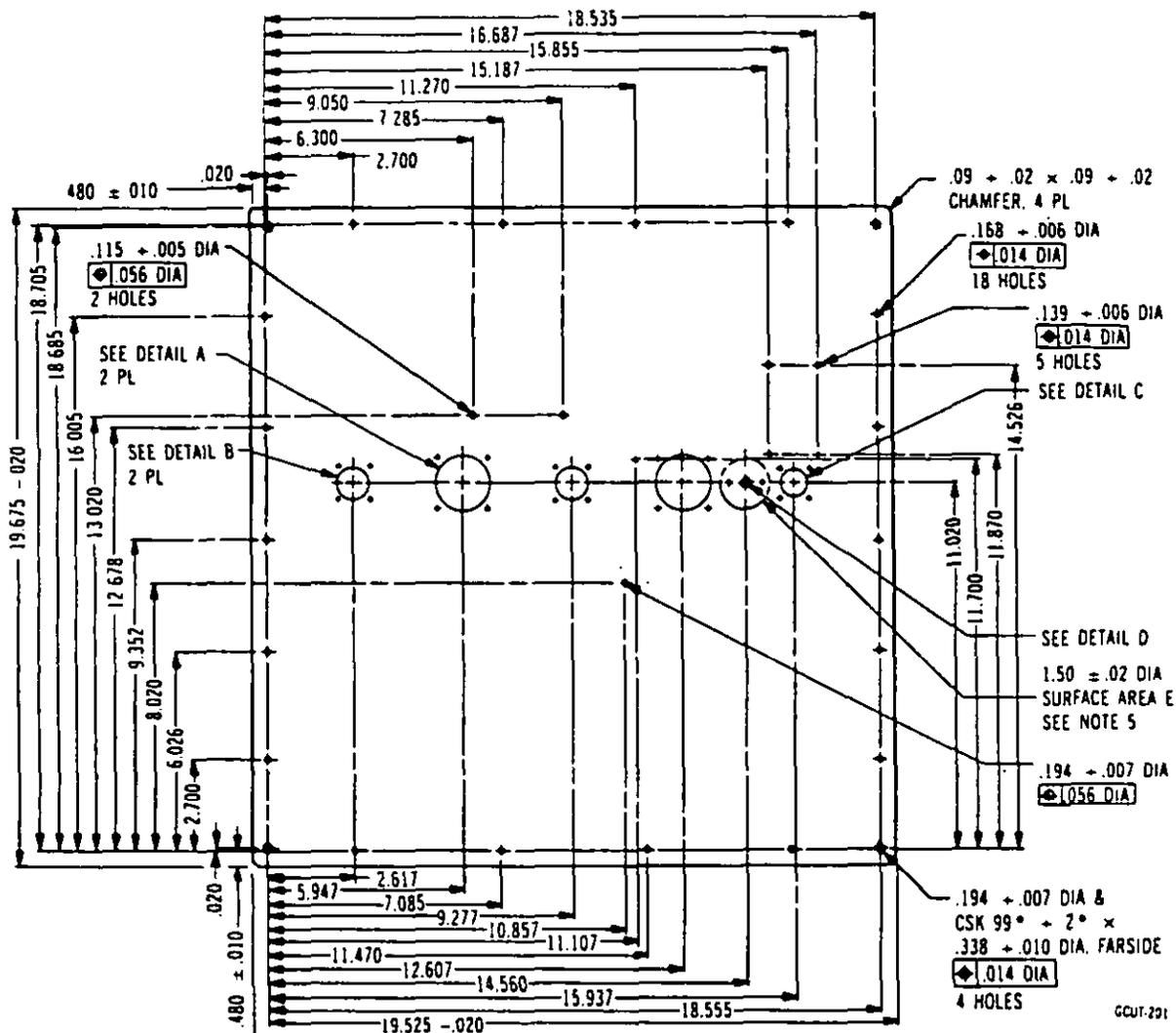


Figure 19. Rear Panel (P/N 937E746P1) (Sheet 1 of 2)

Figure 11A. Make from illustration.

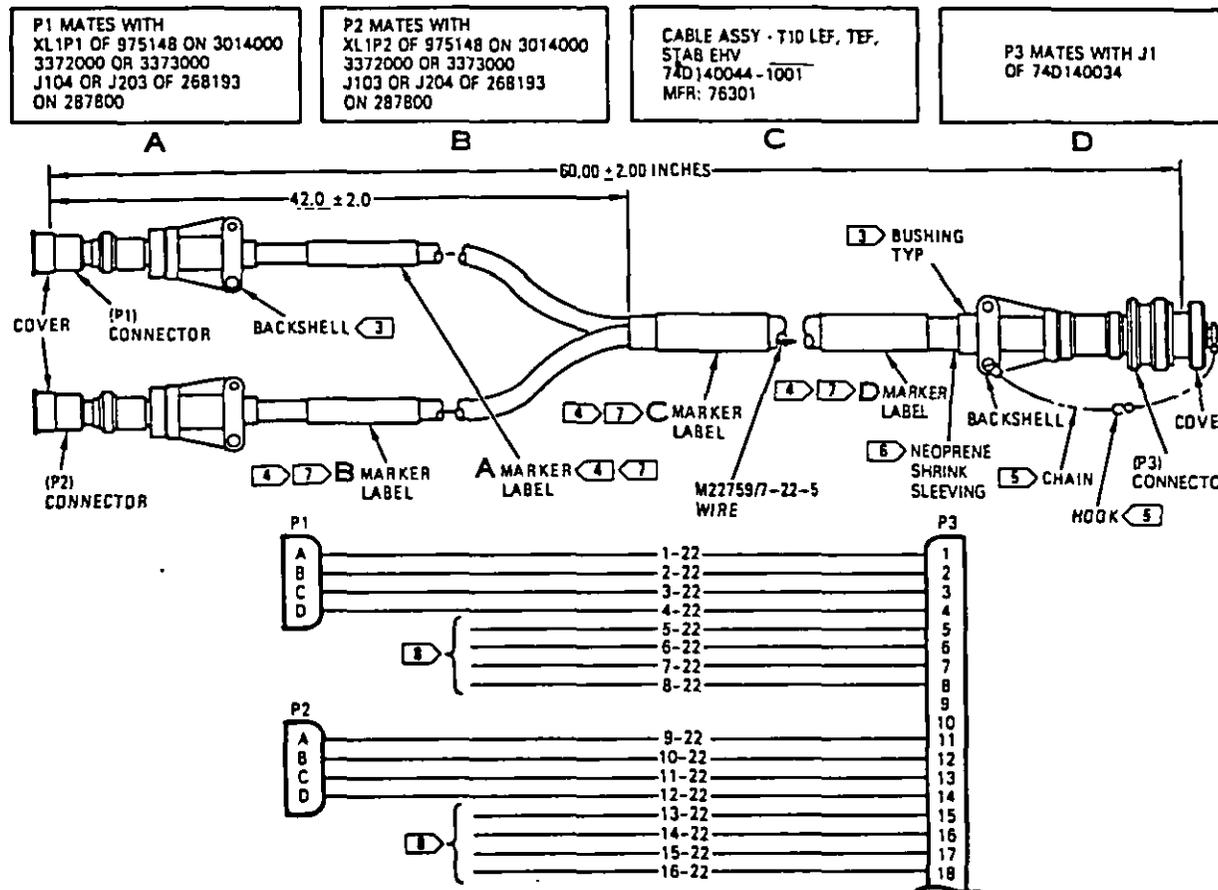
MIL-M-81927B (AS)

AG-000AC-GSE-000

108 00

Change 6

Page 4



LEGEND

1. ALL WIRES ARE 22 AWG INSULATED SILVER COATED WIRE.
2. WIRE NUMBER INDICATES CIRCUIT AND WIRE SIZE: 1-22 INDICATES WIRE NO.1 AND 22 AWG.
3. DO NOT BUILD UP UNDER BACKSHELL CLAMPS WITH TAPE. USE MS3420 BUSHING AS REQUIRED PER NAVAIR 01-1A-505.
4. LOCATE APPROXIMATELY AS SHOWN.
5. USING NAS1090-2 HOOK AND NAS1455C35-10 CHAIN AS REQUIRED TO ATTACH COVER TO BACKSHELL. CLOSE HOOK LOOPS AND REMOVE CHAIN LINKS TO PROVIDE ADEQUATE CHAIN LENGTH.
6. TERMINATE SLEEVING FOR EACH CONNECTOR WITHIN THE CONNECTOR BACKSHELL.
7. MAKE FROM GRAY VINYL TAPE 1.75 INCHES WIDE, TAPE NO. 474 MINNESOTA MINING AND MFG. CO. LAMINATE TRANSPARENT TAPE OVER PRINTED GRAY VINYL TAPE. AVOID WRINKLES IN TRANSPARENT TAPE. AVOID OVERLAP AT EDGES OF PRINTED TAPE. AVOID TOUCHING OF TAPE ADHESIVES. PARTICULARLY AT EDGES OR ENDS. FOR LAMINATION TAPE, USE TRANSPARENT MYLAR TAPE, NO. 853 MINNESOTA MINING AND MFG. CO. OR NO. 6401 BORDON CHEMICAL CO.
8. RUN UNDERMINATED WIRES UNDER CLAMP OF BACKSHELL.

AG-000AC-GSE-000-(172)

Figure 1. Cable Assembly Wiring Diagram, Marker Fabrication and Component Location

Figure 11B. Assembly item illustration.

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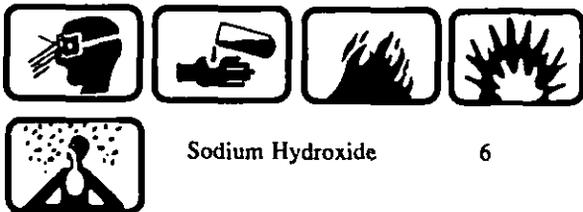
CLASSIFICATION	
NAVAIR XXXXX	TPDR-1
1 June 1985	
ACCUMULATOR TEST SET AN/AWM-85 PART NUMBER W105067	
LIST OF TECHNICAL PUBLICATION DEFICIENCY REPORTS INCORPORATED	
<u>Identification No./ QA Sequence No.</u>	<u>Location</u>
USS AMERICA No. 1004/37352	WP001 02, pg. 2
VF-24 NO. 0151/40062	WP005 00, pg. 4
NAS WHIDBEY ISLAND No. 0047/33456	WP013 00, pg. 6
VF-65 No. 0032/35098	WP009 00, pg. 3
CLASSIFICATION	

Figure 12. Example of list of technical publication deficiency reports incorporated.

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5. CHEMICAL TESTS FOR DAMAGED ALCLAD.

6. GENERAL CHEMICAL TEST FOR DAMAGED ALCLAD. To determine whether coating on alclad aluminum alloys has been penetrated by scratches, proceed as follows:



Sodium Hydroxide 6

a. Prepare solution of 10% sodium hydroxide and clean distilled water by slowly dissolving 10 grams of sodium hydroxide pellets in 100 cc of distilled water. Do not allow pellets to stick to bottom of mixing container.



Dry cleaning Solvent, 2

b. After blending and polishing scratches or corrosion, clean area with dry cleaning solvent.



Sodium Hydroxide 6

CAUTION

Because of its corrosive action, sodium hydroxide solution shall not remain on test area more than 2 minutes.

NOTE

In step d if scratch or corrosion has penetrated alclad, black or brown discoloration will appear.

d. Apply sodium hydroxide solution to blended scratch or corroded area and allow solution to remain on test area for 2 minutes.

NOTE

In step d, if white residue remains at base of damage, alclad material has not been fully penetrated. If black residue remains at base of scratch or corroded area, base metal is exposed and shall be repaired.

e. After determining result of test, wash test area thoroughly with water. If applicable, repair area as directed in WP026 00.

7. CHEMICAL TEST FOR DAMAGED ALCLAD 2024 ALUMINUM ALLOY. To determine whether a scratch or cleaned corroded area has penetrated the coating of alclad 2024 aluminum alloy:



Sodium Hydroxide 6

a. Prepare sodium hydroxide solution by slowly dissolving 25 grams sodium hydroxide pellets in 100 cc distilled water. Do not allow pellets to stick to bottom of mixing container.



Dry cleaning Solvent, 2

b. After blending and polishing scratches or corrosion, clean area with dry cleaning solvent.

c. Remove dry cleaning solvent with dry, clean, cheesecloth.

d. Place drop of sodium hydroxide solution in blended, scratch or corroded area and allow solution to remain on test area for 2 minutes.

Figure 13. Examples of warnings for hazardous materials (text).

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ALPHABETICAL INDEX
POWER PLANT AND RELATED SYSTEMS
NAVY MODEL A-42B

<u>Title</u>	<u>WP Number</u>
Afterburner Fuel and Exhaust Control System	027 00
Fuel Control, Afterburner	028 00
Fuel Hydraulic Pump, Afterburner	030 00
Fuel Ignition Valve, Afterburner	031 00
Fuel Oil Cooler, Afterburner	032 00
Fuel Pump, Afterburner	029 00
Air Inlet Control System	048 00
Air Relief Valve, Air Inlet Control System	051 00
Angle of Attack Probe, Air Inlet Control System	050 00
Pneumatic Reservoir and Relief Valve, Air Inlet Control System	049 00
Pressure Gage, Air Inlet Control System	053 00
Programmer, Air Inlet Control System	052 00
Sensors, Air Inlet Control System	050 00
Air Relief Valve, Air Inlet Control System	051 00
Angle of Attack Probe, Air Inlet Control System	050 00
Anti-ice and Ice Detection System, Engine	060 00
Anti-ice Shutoff and Regulator Valve, Engine	060 00
Bleed Exit Door, Engine Compression Bleed System	066 00
Bleed Exit Door Servocylinder, Engine Compression Bleed System	066 01
Boost Pump, Fuselage	025 00
Dump Switch, Fuselage	079 00
Engine (TF 66-180)	010 00
Engine Anti-ice and Ice Detection System	060 00
Anti-ice Shutoff and Regulator Valve, Engine	060 00
Engine Compression Bleed System	065 00
Bleed Exit Door, Engine Compression Bleed System	066 00
Bleed Exit Door Servocylinder, Engine Compression Bleed System	066 01
Mid Compression Bleed Control, Engine Compression Bleed System	067 00

Figure 14. Example of alphabetical index work package.

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NAVAIR 16-30AWM85-1		15 NOVEMBER 1977	
NUMERICAL INDEX OF PART NUMBERS		Page 1	
ACCUMULATOR TEST SET AN/AWM-85			
Part Number W104067-3			
PART NO.	WP NO./FIG. NO./ INDEX NO.	PART NO.	WP NO./FIG. NO./ INDEX NO.
AN4-4A	004 00/11/98	D110277	005 00/3/14
ANS65E6H3	006 00/7/10		005 00/4/18
AN6207-4	004 00/11/117	D110278	006 00/8/4
AN816-4-4J	004 00/11/75	FHN55W	004 00/11/51
AN816-4J	004 00/11/15	FT-950-DTUR	004 00/11/96
AN832-4J	004 00/11/66	F02A250V	004 00/11/52
AN832-8J	004 00/11/33	F02A32V10AS	004 00/11/17
AN917-2J	004 00/11/78	GC680-1	004 00/11/16
AN924-4J	004 00/11/67	IN4570A	004 00/4/89
AN924-8J	004 00/11/34	IN5297	004 00/4/90
AN929-A4J	004 00/11/51	IN5308	005 00/4/113
AN929-A8J	004 00/11/31	IN5416	005 00/3/15
AN936A6	004 00/11/105	IN5550	004 00/11/97
AN960PD4	004 00/11/40	IN5807	005 00/3/46
A1628-1	006 00/9/2	IN645	005 00/4/139
CD4011AD	005 00/4/62	IN751	005 00/4/96
CD4019AD	005 00/4/72	IN914	
CD4023AD	005 00/4/70		
CD4025AD	005 00/4/109		
CD4027AD	005 00/4/43		
CD4047AD	005 00/4/43		

Figure 15. Example of numerical index of part numbers.

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NUMERICAL INDEX OF REFERENCE DESIGNATIONS

3.7.7.1

ACCUMULATOR TEST SET AN/AWM-85

PART NUMBER W105067

REF DES	WP NO./FIG. NO./ INDEX NO.	PART NO.	REF DES	WP NO./FIG. NO./ INDEX NO.	PART NO.
A1	004 00/11/23	W104172-1	A1T1	005 00/3/11	40P18CT
A1C1	005 00/3/44	MS9003/01-2552	A1T2	005 00/3/33	W104177-1
A1C2	005 00/3/54	M39014/01-1571	A2	004 00/11/28	W104173-1
A1C3			A2A1	005 00/4/8	M39006/09-6
				005 00/4/5	4821-1

	005 00/3/23	4862-1-0510			
	005 00/3/23	4862-1-0516	A2A1CR1	005 00/4/29	1N5807
A1E11	005 00/3/23	4862-1-0516	A2A1CR2	005 00/4/29	1N5807
A1E12	005 00/3/23	4862-1-0516	A2A1CR3	005 00/4/26	1N751
A1J1	005 00/3/52	MS24308/4-3	A2A1CR4	005 00/4/24	1N914
A1Q1	005 00/3/39	2N3715	A2A1CR5	005 00/4/24	1N914
A1Q2	005 00/3/39	2N3715	A2A1CR6	005 00/4/24	1N914
A1Q3	005 00/3/29	2N3789	A2A1Q1	005 00/4/39	2N3735
A1R1	005 00/3/45	RCR20G101JS	A2A1Q2	005 00/4/39	2N3735
A1R2	005 00/3/45	RCR20G101JS	A2A1R1	005 00/4/28	RCR07G221JS
A1R3	005 00/3/21	RCR20G360JS	A2A1R2	005 00/4/37	RCR07G821JS
A1R4	005 00/3/48	RER70F12R1R	A2A1R3	005 00/4/37	RCR07G821JS

Figure 16. Example of numerical index of reference designations work package.

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Page 1

INTRODUCTION

ROLL TRIM ACTUATOR ASSEMBLY

PART NUMBERS

A28507-1

A28507-2

1. PURPOSE.

2. This manual provides depot maintenance instructions and an illustrated parts breakdown for the roll trim actuator assembly (actuator), part numbers A28507-1 and A28507-2, manufactured by Moog Inc., East Aurora, New York 14052-0081, for Sikorsky Aircraft, Division of United Technologies Corporation, Stratford, Connecticut 06601-1381.

3. SCOPE.

4. This manual is divided into work packages (WPs) which are self-contained procedures that may be used to support specific tasks. Each WP is maintained separately. Normally, a change results in a reissue of a specific WP. The WPs are identified by five-digit numbers in the upper right corner of each page. This number aids in rapid assembly of a complete manual and is used for referencing within the manual.

5. QUALITY ASSURANCE REQUIREMENTS.

6. Procedures identified by (QA) following the step or procedure will receive an inspection by a designated quality assurance inspector before starting the next step, unless it has been determined that the inspection can be performed after completing the entire procedure.

7. ILLUSTRATED PARTS BREAKDOWN.

8. GENERAL. The illustrated parts breakdown lists and describes, in disassembly order, all assemblies and parts necessary for support of the actuator.

9. INDEX NUMBER COLUMN. This column keys a part to an illustration.

10. PART NUMBER COLUMN. This column contains Government Standard, vendor, and Moog part numbers. If the item is a commercial part with no designated part number, COML will appear in this column. The symbols *, +, @, and \$ indicate a footnote at the bottom of the page.

11. DESCRIPTION COLUMN. This column lists the complete description by Government Standard, vendor, and Moog drawing titles.

12. Indentation System. For proper identification of detail parts and next assemblies, listings are in the following indentation system:

```

1  2  3  4  5  6  7
ASSEMBLY
  /ATTACHING PARTS/
ATTACHING PARTS FOR ASSEMBLY
  ---*---
SUBASSEMBLY
  /ATTACHING PARTS/
ATTACHING PARTS FOR
SUBASSEMBLY
  ---*---
DETAIL PARTS
  /ATTACHING PARTS
ATTACHING PARTS FOR
DETAIL PARTS
  ---*---

```

Determine the next higher assembly (NHA) of any detail part by locating, in the next column to the left (excluding any attaching parts), the first item above the questioned detail part.

13. Attaching Parts. Attaching parts appear in the same indentation column immediately after the phrase /ATTACHING PARTS/. A terminal dash (---*---) appears under the last attaching part of any item.

Figure 17. Example of introduction.

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14. **Quantities of Attaching Parts.** Quantities of attaching parts are listed per unit. For example, if two fittings are required for each assembly and one bolt is required to attach each fitting, the correct listing would be:

FITTING ASSY, HINGE	2
/ATTACHING PARTS/	
BOLT	1
*	

15. **Manufacturer's Code Symbols.** The code follows the description of an item and consists of a five-digit number within parentheses. The codes are defined in handbook H4/H8.

16. **UNITS PER ASSEMBLY COLUMN.** This column lists the number of units required per assembly and sub-assembly. If more than one assembly is required, the total of such assemblies is shown. For details of subassembly parts of a major assembly, the quantity required for one major assembly is shown.

17. **USABLE ON CODE COLUMN.**

18. The appearance of an asterisk (*) in the Usable on Code column indicates that parts having identical descriptions are interchangeable, and the parts that are not asterisked are both interchangeable and preferable to the asterisked parts.

19. When an * appears on all parts, they are completely interchangeable and no part is preferable.

20. The appearance of an * and a code symbol, for example, *B, indicates that interchangeability is limited to the extent of the Usable on Code.

21. **SOURCE, MAINTENANCE, AND RECOVERABILITY (SM&R) CODE COLUMN.** Definitions and explanations of SM&R codes are contained in NAVAIR-INST 4423.3. See Table 5 for additional information.

22. **NUMERICAL INDEX OF PART NUMBERS.**

23. **GENERAL.** The numerical index of part numbers is a listing of part numbers that appear in Illustrated Parts Breakdown WPs. The numerical index is contained in a

subordinate work packages (SWP) to the Alphabetical Index WP.

24. **PART NUMBER COLUMN.** This column lists, in alphabetical and numerical sequence, all Government Standard, vendor, and Moog part numbers.

25. **PART NUMBER ARRANGEMENT.** Part numbers are arranged from extreme left position and continue from left to right, one position at a time, until all parts are arranged in sequence. The order of precedence for the extreme left (first) position is:

Space (blank)
Diagonal Line (/)
Point (.)
Comma (,)
Dash (-)
Letters A through Z
Numerals 0 through 9

NOTE

Alphabetical letters Os are listed as numerical zeros.

26. Commercial (COML) and dash (-) parts are listed in the PART NUMBER column and are arranged in alphabetical sequence by the identifying noun.

27. **WORK PACKAGE/FIGURE/INDEX NUMBER COLUMN.** This column specifies where parts appear in Illustrated Parts Breakdown WP. For Government Standard parts, only their first appearance is listed. When a part number other than the original manufacturer's has been assigned, both numbers are shown.

28. **ABBREVIATIONS/SYMBOLS AND DEFINITIONS.**

29. Table 1 lists abbreviations/symbols and definitions that do not appear in MIL-STD-12.

30. **SUPPORT EQUIPMENT REQUIRED.**

31. Support equipment required is listed in Table 2.

Figure 17. Example of introduction. - Continued

AN-300QA-MDB-300**002 00****Page 3****32. WARNINGS AND CAUTIONS APPLICABLE TO HAZARDOUS MATERIALS.**

33. WARNINGS APPLICABLE TO HAZARDOUS MATERIALS. Complete warnings applicable to all hazardous materials addressed in the manual shall be provided in the Warnings Applicable to Hazardous Material pages(s). The warnings shall be developed from information provided by chemical manufacturers in material safety data sheets (MSDS) required by 29 CFR 1910.1200. MSDS's used within DOD are required to be entered into the Hazardous Materials Information System (HMIS) which is addressed in DOD 6050.5 series publications. The DOD 6050.5 series publications contain MSDS's submitted under the provisions of Federal Standard No. 313. Additional information related to hazardous material requirements is provided in OPNAVINST 5100.23, Navy Occupational Safety and Health (NAVOSH) Program Manual and NAVSUPINST 5100.27, Navy Hazardous Material Control Program.

34. MATERIALS REQUIRED.

35. Materials required to support WP maintenance procedures are listed in Table 3.

36. REFERENCE MATERIAL.

37. Reference material cited in WP's is listed in Table 4.

38. HISTORICAL RECORD OF APPLICABLE TECHNICAL DIRECTIVES.

39. Historical record of applicable technical directives is listed in Table 5.

40. REQUISITIONING AND AUTOMATIC DISTRIBUTION.

41. Procedures to be used by Naval Activities and other Department of Defense organizations requiring NAVAIR technical publications are defined in the NAVAL AIR SYSTEMS COMMAND TECHNICAL MANUAL PROGRAM manual, NAVAIR 00-25-100 and NAVAIRINST 5605.4A, Distribution of aeronautical technical publications.

42. When an activity has a continuing requirement for automatic distribution of technical publications NAVAIR 00-25DRT-1, Naval Aeronautic Publications Automatic Distribution Tables shall be used. For complete information on distribution refer to NAVAIR 00-25-100.

Table 1

Abbreviations/Symbols and Definitions	
<u>Abbreviation/Symbol</u>	<u>Definition</u>
C	Celsius
CW	Clockwise
CCW	Counterclockwise
DMM	Digital Multimeter
dpm	Digital Panel Meter
F	Fahrenheit
ID	Inside Diameter
OD	Outside Diameter
para	Paragraph
psi	Pounds Per Square Inch
•	Degrees
rms	Root Mean Square
SIE	Standard Inspection Equipment
SM&R	Source, Maintenance, and Recoverability
SWP	Subordinate Work Package
WP	Work Package

Figure 17. Example of introduction. - Continued

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Table 2

Support Equipment Required	
<u>Nomenclature</u>	<u>Part No. Designation</u>
Electronic Test Console	A08856-1 (94697)
Test Cable	A08989 (94697)
Lee Installation/Extraction Tool Set	CUTA 1250103B
Lee Installation/Extraction Tool Set	CUTA 1870104C
Lee Installation/Extraction Tool Set	CUTA 1870103B
Lee Installation/Extraction Tool Set	CUTA 2180103B
Lee Installation/Extraction Tool Set	CUTA 2810114C
Installation Tool	E02903-26 (94697)
Installation Tool	E02903-27 (94697)
Mandrel	E05466 (94697)
Frame Holding Fixture	E05796 (94697)
Retainer Nut Installation	E05801 (94697)
Housing End Cap Removal Tool	E05802 (94697)
Orifice Body Removal Tool	E05803 (94697)
Bushing Puller Gear/Down Removal Tool	E05813 (94697)
Potentiometer Set Up Fixture	E05814 (94697)
Installation Tool	E05815 (94697)
Bearing Installation Tool	E05816 (94697)
Bearing Installation Tool	E05817 (94697)
Rig Pin	E05818 (94697)
Spring Pin Gage Fixture	E05819 (94697)
Torque Adapter	E05822 (94697)
Piston Sleeve Removal and Installation Tool	E05823 (94697)
Seal Installation Tool	E05825 (94697)
Seal Installation Tool	E05826 (94697)
Seal Installation Tool	E05827 (94697)
Hydraulic Test Bed	E05833 (94697)
SAS Test Block	E05834 (94697)
Hydraulic Test Panel	E06104 (94697)
Manifold Adapter	E06105 (94697)
Pulse Flush Cleaning Machine	E09469 (94697)
Pulse Flush Fixture	E09470 (94697)
Swage Tool	E09511 (94697)
Swage Tool	E09512 (94697)
Seal Installation Tool	E09513 (94697)
Staking Tool	E09780 (94697)
Teflon Rod	E09874 (94697)
Torque Wrench (0 to 10 inch-pounds)	GGG-W-00686
Torque Wrench (0 to 30 inch-pounds)	GGG-W-00686

Figure 17. Example of introduction. - Continued

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Table 2 (Cont)

<u>Nomenclature</u>	<u>Part No. Designation</u>
Torque Wrench (0 to 75 inch-pounds)	GGG-W-00686
Torque Wrench (0 to 150 inch-pounds)	GGG-W-00686
Torque Wrench (0 to 250 inch-pounds)	GGG-W-00686
Torque Wrench (0 to 300 inch-pounds)	GGG-W-00686
Torque Wrench (0 to 300 foot-pounds)	GGG-W-00686
AC High Voltage Tester	Model 103 - 2.5
Resistance Bridge	Model 6100 (54294)
Function Generator	Model 5100B (88865)
Ultrasonic Vapor Rinse System Model	VR-12 (89878)
Megohmmeter, Type 1864-C	
Test Plugs	082-68335-008 (94697)
Pressure Plug	093-59828-2 (94697)

NOTE: When an item of support equipment is not available, an approved alternate identified in the activity's Individual Material Readiness List (IMRL) may be substituted.

Table 3

<u>Materials Required</u>	
<u>Nomenclature</u>	<u>Type Designation/ Part Number</u>
Screw	A01408-108
Shipping Plug	A24394-1
Shipping Plate	A24395-1
Abrasive Mats	MIL-A-9962
Interior Packaging Bag	MIL-B-117
Barrier Material	MIL-B-121, Type I, Grade A
Soft Bristle Nonmetallic Brush	MIL-B-15319
Chemical Conversion Materials for Coating Aluminum Alloys	MIL-C-81706
Low-Lint Cleaning Cloth	MIL-C-85043, Type II
Hydraulic Fluid, Testing and Preservative	MIL-H-46170
Hydraulic Fluid, Fire Resistant, Synthetic	MIL-H-83282
Plate, Identification, Metal Foil, Adhesive Backed	MIL-I-19834
Insulation Sleeving, Heat-Shrinkable	MIL-I-23053
Polyurethane Foam	MIL-P-265144, Type II, Class 3

Figure 17. Example of introduction. - Continued

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Table 3 (Cont)

Primer	MIL-S-22473, Grade T
Locking Compound	MIL-S-22473E, Grade E
Tape	MIL-T-22085
Trichloroethane	MIL-T-81533
Lockwire	MS20995C20
O-Ring	MS28775-011
Technical Acetone	O-A-51G
Crocus Cloth	P-C-458
Fiberboard Shipping Box	PPP-B-636
Solder	QQ-S-571
Isopropyl Alcohol	TT-I-735A
Zinc Chromate Primer	TT-P-1757
Deodorized Kerosene	VV-K-220A
Backup Ring	082-45200-011
Washer	092-06131-253-3752

Table 4

Reference Material	
Abbreviations for Use on Drawings, and in Specifications, Standards, and Technical Documents	MIL-STD-12
Chemical Conversion Coatings on Aluminum and Aluminum Alloys	MIL-C-5541
Commercial and Government Entity (CAGE)	Cataloging Handbook H4/H8
General Installation of Heli-Coil Inserts (WP)	NAVAIR 02-1-19
General Practices for Safety Wiring and Cotter Pinning	MS33540
Hazardous Materials Information System (HMIS)	DOD 6050.5
Inspection, Fluorescent Penetrant	MIL-I-6866
Navy Occupational Safety and Health (NAVOSH) Program	OPNAVINST 5100.23
Nondestructive Inspection Methods	NAVAIR 01-1A-16
Penetrant Method of Inspection	MIL-STD-6866
Source, Maintenance, and Recoverability (SM&R) Codes	NAVAIRINST 4423.3
Screw Threads, General Specification for	MIL-S-8879

Figure 17. Example of introduction. - Continued

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Table 5

Historical Record of Applicable Technical Directives				
Type/No.	Date	Title and ECP No.	Date Inc.	Remarks
-	12/12/85	Power Plant - Installation of Ice System (ECP 14)	12/20/85	ECP Coverage Only
AFC 5	12/15/85	Canopy System - Revision to Existing Canopy Actuator and Incorporation of Percussion Fixed Cartridge (ECP 24)	12/20/85	-
AFC 6	1/15/86	Armament - Installation of Common Adapter for Bullpup "A" and "B" Capability	2/15/86	Partial coverage
AFC 9	2/5/86	Installation of AN/APN-501 Electrical Altimeter	3/15/86	-
-	6/28/86	Airframe - Speed Brake Control and Indication; Modification of (ECP 56)	8/15/86	ECP Coverage Only
AFC 13	7/30/86	Control and Fluid Power - Hydraulic Ram Air Turbine; Deletion of (ECP 99)	8/15/86	-
AFC 29	7/30/86	Fuel System - Addition of Fuel Cell Pressure Monitoring System (ECP 100)	8/15/86	-
AFC 35	8/1/86	Relocation of Airspeed System Pitot Static Head (ECP 55)	10/15/86	-
AFC 36	7/30/86	Avionics - Improvement of Tail Position Light (ECP 102)	10/15/86	-
AFC 40	9/15/86	Relocation of Fuel Discharge From Fuselage Tank Vent Outlet (ECP 46)	10/15/86	-

Figure 17. Example of introduction. - Continued

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Table 6

Navy Application of Joint Services Uniform SM&R Codes

SOURCE (D012)		MAINTENANCE				
		USE (D013A)		REPAIR (D013B)		
1st POSITION		2nd POSITION		3rd POSITION	4th POSITION	
P	PROCURE	A	REFLENSH	O	Z	NO REPAIR (CONSUMABLE)
		B	INSURANCE			
		C	CURE-DATED			
		D	INITIAL	F	B	RECONDITION BY ADJUSTMENT, CALIBRATION, LUBRICATION, PLATING, ETC.
		E	END ITEM GSE/STOCKED			
		F	GSE/NOT STOCKED			
K	REPAIR	F	ORG/IMA	L	O	REPAIR AT ORG. LEVEL
	KIT	D	DEPOT			
M	MANUFACTURE	O	ORG	D	F	REPAIR
		F	AFLOAT			
A	ASSEMBLE	H	ASHORE	D	H	AT
		G	BOTH			
		D	DEPOT			
X	MISC	A	REQUEST NHA	Z	D	REPAIR AT DEPOT OR COMMER.
		B	OBTAIN FROM SALVAGE OR ONE TIME BUY			
		C	DIAGRAMS-SHEMATICS INSTALL. DWGS.			

RECOVERABILITY (D013C)		SERVICE OPTION (D012A)	
	5th POSITION		6th POSITION
O	REPAIRABLE ITEM. CONDEMN AT ORGANIZATIONAL LEVEL.	1 2 3	APPLIES TO ENGINES ONLY. IDENTIFIES THE HIGHEST (1) TO LOWEST (3) LEVEL OF MAINTENANCE WHICH CAN REPLACE (3RD POSITION OF SMR CODE) THE ITEM.
F H G	REPAIRABLE ITEM. CONDEMN AT INTERMEDIATE LEVEL INDICATED	4 5 7	SAME AS ABOVE. IN ADDITION, ITEM IS A FLR WITH A UNIT COST OF OVER \$5,000. THESE CODES ARE NO LONGER ASSIGNED TO NEW, NON-FAMILY RELATED ITEMS.
L	REPAIRABLE ITEM. CONDEMN AT SPECIALIZED INTERMEDIATE LEVEL.	6	NORMALLY PROCURED AND STOCK NUMBERED BUT ORGANIC CAPABILITY EXISTS FOR EMERGENCY STOP-GAP REQUIREMENTS.
		E	END-TO-END TEST REQUIRED BY IMA PRIOR TO BCM ACTION.
D	REPAIRABLE ITEM. CONDEMN AT DEPOT OR CONTRACTOR FACILITY.	J	FLR OR CONSUMABLE ITEM. CHANGE 5th POSITION OF SMR CODE TO "D" UNDER PICA/SICA. NAVAIR APPROVAL REQUIRED.
		8 9	SAME AS "J" ABOVE EXCEPT USED FOR ENGINES ONLY. APPLIES TO 2nd LEVEL OF IMA.
A	SPECIAL HANDLING REQUIRED. CONTACT ITEM MANAGER FOR DISPOSAL INSTRUCTIONS.	M	ITEM IS A FLR WITH A UNIT COST OF OVER \$5,000. THIS CODE IS NO LONGER ASSIGNED TO NEW NON-FAMILY RELATED ITEMS.
		N	ASSIGNED TO XB SOURCE CODE AND INDICATES ITEM IS PROCURED LOCALLY, NOT STOCKED IN THE SUPPLY SYSTEM.
Z	NON-REPAIRABLE ITEM. CONDEMN AT LEVEL INDICATED IN 3rd POSITION	T	ASSIGNED TO TRAINING DEVICES WITH SOURCE CODE OF "PD". INDICATES ITEM IS NOT A PROCURABLE SPARE. NSN IS ASSIGNED ONLY TO PERMIT VISIBILITY OF REPAIR PART RELATIONSHIP.

Figure 17. Example of introduction. - Continued

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NAVAIR 17-40MIARS-1

061 00

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3.9.6

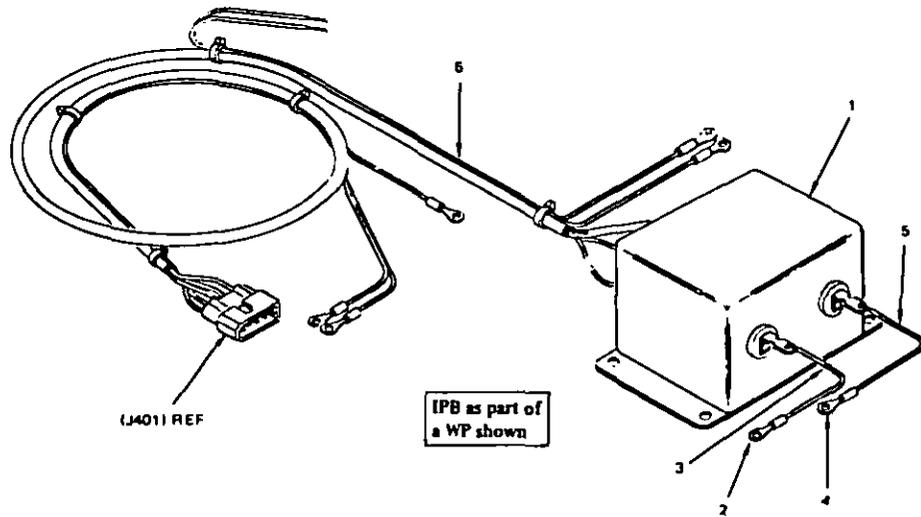


Figure 7. Filter Wiring Harness

INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SM & R CODE	
						1
	325-0089	FILTER-WIRING HARNESS . . . ASSEMBLY, power supply (See WP048 00 for NHA)	REF	C	AGGGG	
1	NF10431-82	. FILTER, Power supply (93790) .	1		PAGZZ	
	981-0026	. WIRE ASSEMBLY	1		AGGZZ	
2	R-4147-S	. . TERMINAL, Crimp (17426) . .	1		XBGZZN	
3	MW-C18(16)U6	. . WIRE, 18 AWG, blue (4 7/8 in) (W194) (MIL-W-76)	1		PAGZZ	
	981-0128	. WIRE ASSEMBLY	1		AGGZZ	
4	R-4147-S	. . TERMINAL, Crimp (17426) . .	1		XBGZZN	
5	MW-C18(16)U9	. . WIRE, 18 AWG, white (4 7/8 in) (W195) (MIL-W-76)	1		PAGZZ	
6	986-0068	. WIRING HARNESS suppl				

Figure 18. Example of artwork - general requirements.

MIL-M-81927B (AS)

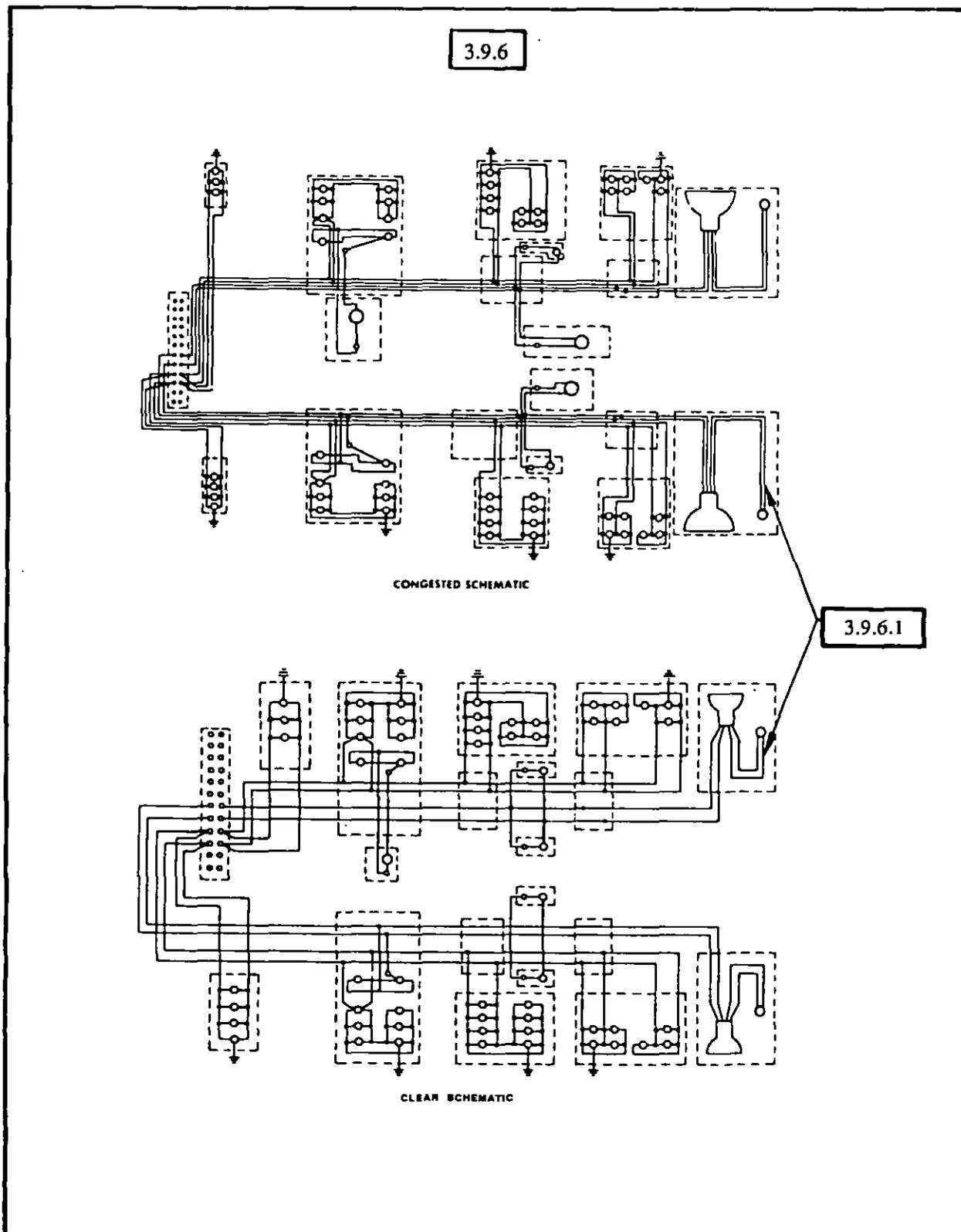


Figure 18. Example of artwork - general requirements. - Continued

MIL-M-81927B (AS)

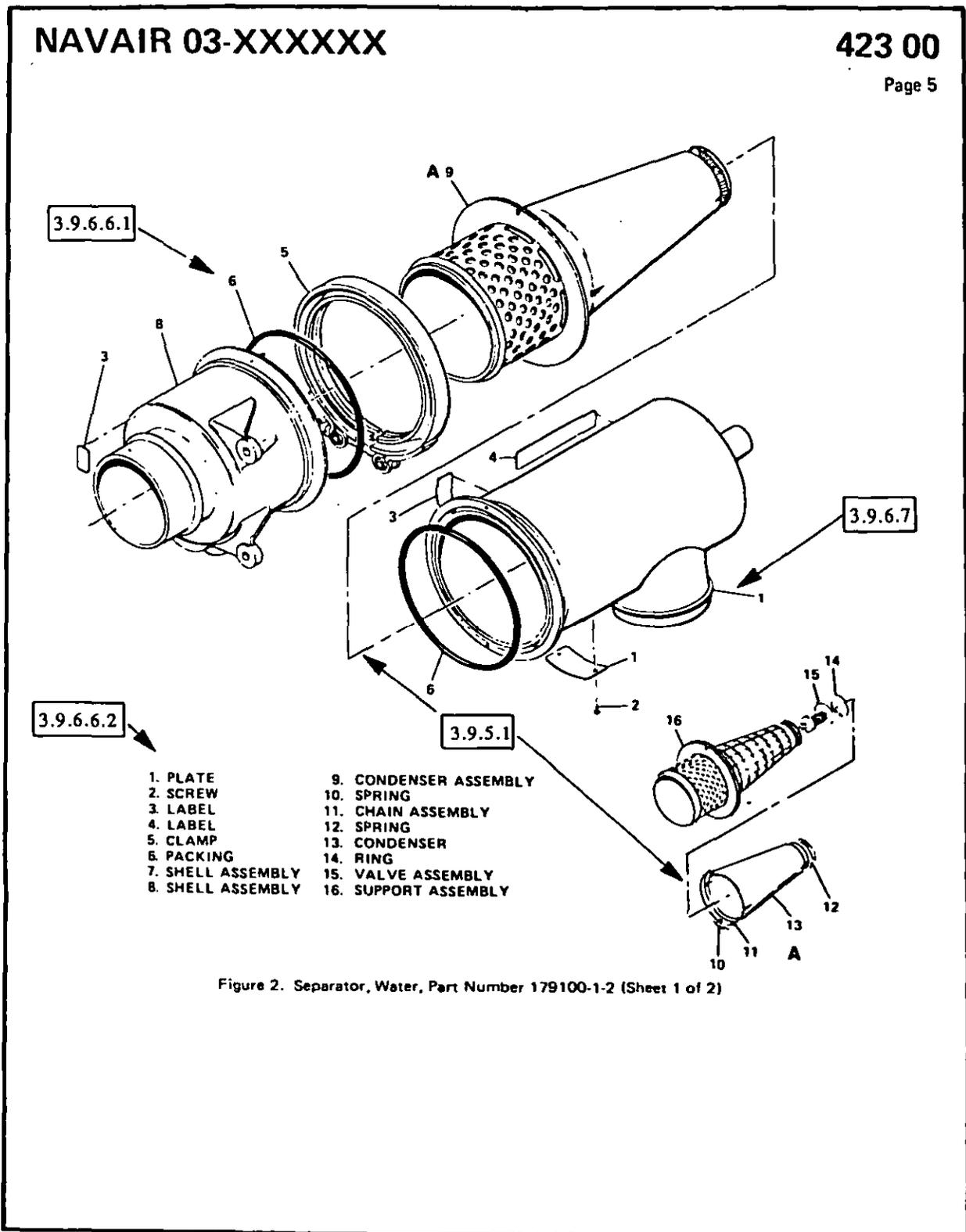


Figure 19. Example of line drawings.

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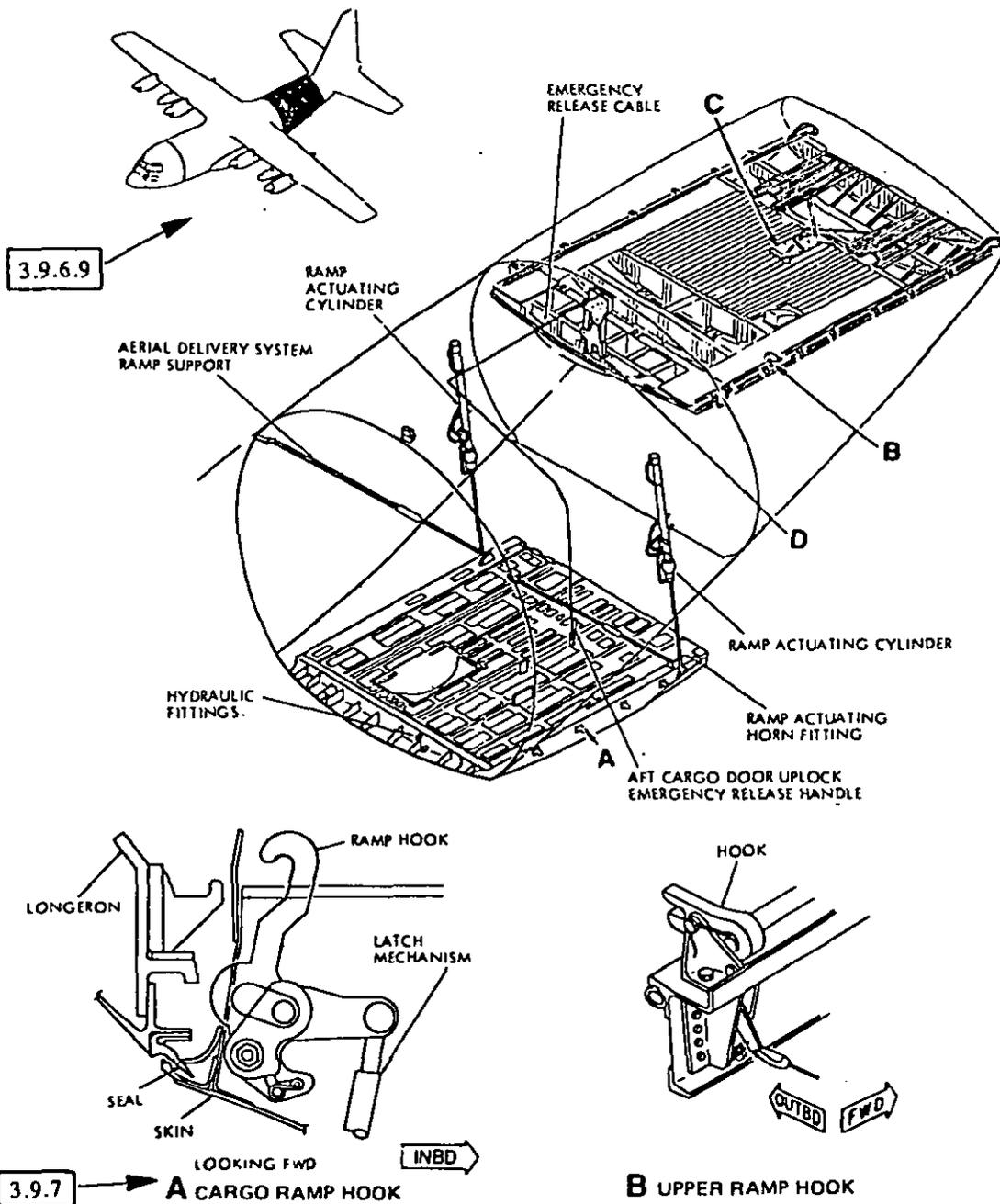


Figure 5. Location, Ramp and Aft Cargo Door (Sheet 1 of 2)

Figure 19. Example of line drawings. - Continued

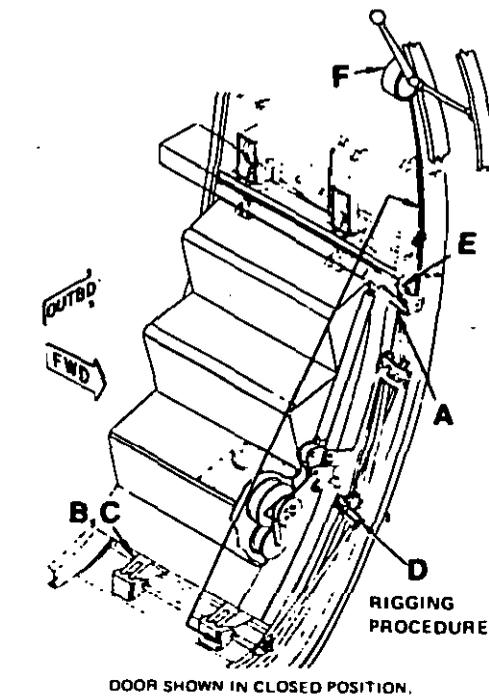
MIL-M-81927B (AS)

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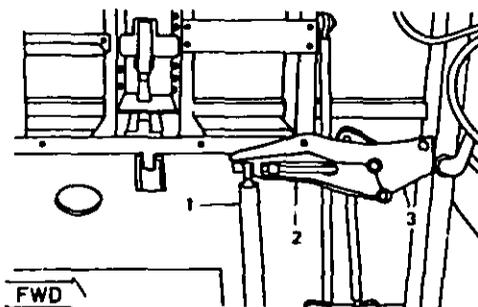
3.9.6.10

309 00

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**STEP 1**

SUPPORT THE CREW DOOR AND REMOVE THE PIN (2) SECURING THE UPPER END OF THE TELESCOPING ARM (1) TO THE HOUSING (3).



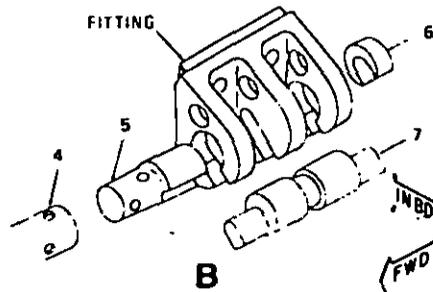
LOOKING OUTBOARD

STEP 2

PLACE THE DOOR IN THE JETTISON POSITION AND REMOVE THE DOOR

STEP 3

ROTATE THE LOWER TORQUE TUBE (4) TO THE JETTISON POSITION. CHECK THAT THE YOKES (5) AND BUSHING (6) ARE POSITIONED TO LET THE HINGE PINS (7) FALL FREELY.

**STEP 4**

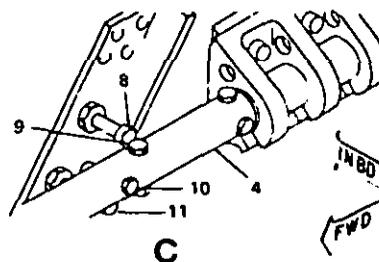
ADJUST THE STOP BOLT (8) AGAINST THE TUBE BOLT (9) WITH THE TUBE (4) HELD IN THE JETTISON POSITION.

STEP 5

LOOKING FORWARD, ROTATE THE LOWER TORQUE TUBE (4) COUNTERCLOCKWISE 90 DEGREES TO THE DOOR KEPT POSITION.

STEP 6

CLAMP THE TUBE IN THIS POSITION, AND ADJUST THE OTHER STOP BOLT (11) AGAINST THE TUBE BOLT (10) WITH TUBE (4) HELD IN DOOR-KEPT POSITION.

**STEP 7**

AT THE OUTSIDE OPERATING HAND, INSERT A RIG PIN THROUGH THE RIGGING HOLE IN THE BRACKET (12) AND THE LOWER HOLE IN THE LEVER (13).

STEP 8

CLAMP LEVER (14) IN POSITION SO THE GAP BETWEEN THE BOLT HEAD (15) AND LEVER (14) IS 0.00 TO 0.10 INCH.

STEP 9

MARK POSITION REFERENCE POINTS ON HANDLE AND ADJACENT STRUCTURE TO PERMIT CHECKING HANDLE POSITION THROUGH SUBSEQUENT RIGGING STEPS.

Figure 4. Rigging, Crew Door (Sheet 1 of 4)

Figure 20. Example of procedural steps.

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AT-824M0-MIB-060

005 00

Page 3

Table 1. Symptom Versus Fault Isolation Action (Contd)

FAULT TYPE	SYMPTOM	PROBABLE CAUSE	PERFORM TEST PROCEDURE
Front panel fault	ELAPSED TIME meter M1 does not work	Meter	Paragraph 9, step b
Front panel fault	60HZ POWER UTILITY indicator XDS5 does not light.	Indicator lamp	Paragraph 9, step a
Front panel fault	60HZ POWER RACK indicator XDS3 does not light.	Indicator lamp	Paragraph 9, step a
Front panel fault	EMERGENCY SHUTDOWN switch S2 does not shut off all station power.	Switch, CCA A1	Paragraph 9, step g
Front panel fault	Audible alarm XDS11 does not work.	Speaker, CCA A1	Paragraph 9, step h

8. POWER-UP TEST PROCEDURE.

a. Turn on 60HZ and 400HZ POWER FACILITY ON/OFF circuit breakers.

b. Turn on RACK 1 POWER PANEL ON/OFF circuit breaker and turn on computer using procedures in AT-824M0-MIB-000, WP 004 00.

c. Check that POWER 60/400HZ FACILITY indicator is lit.
Refer to figure 1 ③

d. Check that FAULT PCU indicator is lit.
Refer to figure 1 ④

e. Press MAIN STATION POWER ON switch.

f. Check that MAIN STATION POWER ON switch indicator is lit.
Refer to figure 1 ⑤

9. FRONT PANEL TEST PROCEDURES.

a. Indicators listed below are not shop replaceable. Press indicator lens. If indicator does not light, substitute functional PCU using procedures in AT-824M0-MIB-000, WP 024 00. Send faulty PCU to depot for maintenance of the following indicators:

1) FAULT PCU indicator XDS6

2) POWER 400HZ RACK indicator XDS2

Figure 21. Example of testing and troubleshooting (logic tree format).

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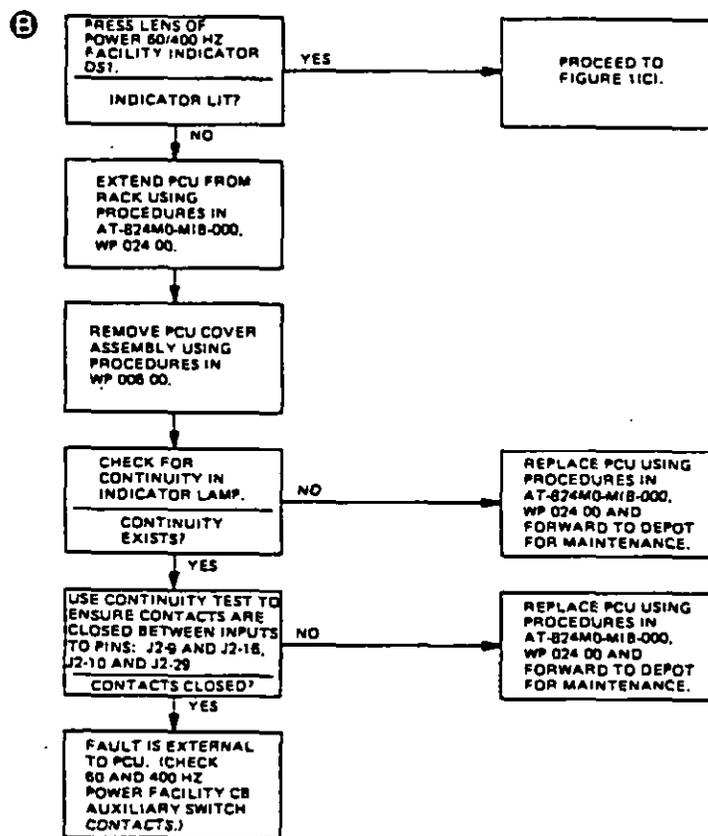


Figure 1. PCU Power-Up Test
(Sheet 2)

Figure 21. Example of testing and troubleshooting (logic tree format). - Continued

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NAVAIR 03-30VB-3

003 02

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21. EXCESSIVE PORT LEAKAGE.

a. With shutoff valve pressurized per conditions of paragraph 6, check for leakage from ball valve vent using leak detection compound (MIL-L-25567, Type I). Is ball valve leaking?

NO | YES

b | c

b. Check for leakage past poppet (29, figure 6, sheet 5). Is poppet leaking?

d | e

c. Determine if solenoid assembly is operating. Is solenoid operating?

f | g

d. Eliminate leakage in test facility air lines.

- | -

e. Check for binding guide (28). Is guide binding?

h | i

f. Repair solenoid assembly.

- | -

g. Replace seat (18) and ball (19).

- | -

h. Lap poppet (29) to body (36) or replace poppet and body. Check for leakage past poppet (29). Is poppet leaking?

- | j

i. Bend ears of guide (28) slightly or replace guide. Ensure guide is snug but not binding in body after bending ears.

- | -

j. Replace spring (5, figure 6, sheet 1).

- | -

22. EXCESSIVE MINIMUM OPENING PRESSURE.

a. Check for air venting from ball valve vent with shutoff valve pressurized per conditions of paragraph 7. Is air venting from ball valve vent?

NO | YES

b | c

b. Check for guide (28, figure 6, sheet 3) binding. Is guide (28) binding?

d | e

c. Replace rings (32, 33, 34). Check for air venting from ball valve vent with shutoff valve pressurized per conditions of paragraph 7. Is air venting from ball valve vent?

b | f

d. Bend ears of guide (9, figure 6, sheet 2) slightly or replace guide. Ensure guide is snug but not binding in body after bending ears.

- | -

e. Bend ears of guide (28, figure 6, sheet 3) slightly or replace guide. Ensure guide is snug but not binding in body after bending ears.

- | -

f. Lap ball (19) to seat in adapter (23 or 24) or replace ball and adapter.

- | -

Figure 21. Example of testing and troubleshooting (logic text format). - Continued

MIL-M-81927B (AS)

A1-E6AAA-270-100

013 00

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Table 1. Bleed Air System Testing and Troubleshooting

STEP	PROCEDURE	NORMAL INDICATION	IF NORMAL	IF ABNORMAL
CAUTION				
To prevent nose wheel scuffing and/or side loading damage, a symmetrical engine must be running with BLEED AIR OFF prior to accomplishing next step.				
1	Start and operate one engine (WP004 00).		Step 2	
2	Observe HI STG OPEN light with engine idling and BLEED AIR valve closed.	Light cycles on and off (panel P11).	Step 3	Replace 9th stage shut-off valve (A1-E6AAA-270-300, WP017 00).
3	Advance thrust lever to obtain 75% N2 RPM and observe bleed duct pressure with BLEED AIR and ISOLATION valve open.	40-64 psig (panel P11).	Step 4	<p>a. If pressure is high, replace pressure regulating valve (A1-E6AAA-410-300, WP005 00).</p> <p>b. If pressure is low, replace 9th stage shutoff valve and/or controller (A1-E6AAA-270-300, WP017 00).</p> <p>c. If pressure is extremely low, replace 5th pressure check valve (A1-E6AAA-270-300, WP017 00).</p>

Figure 21. Example of testing and troubleshooting (fault probable cause format). - Continued

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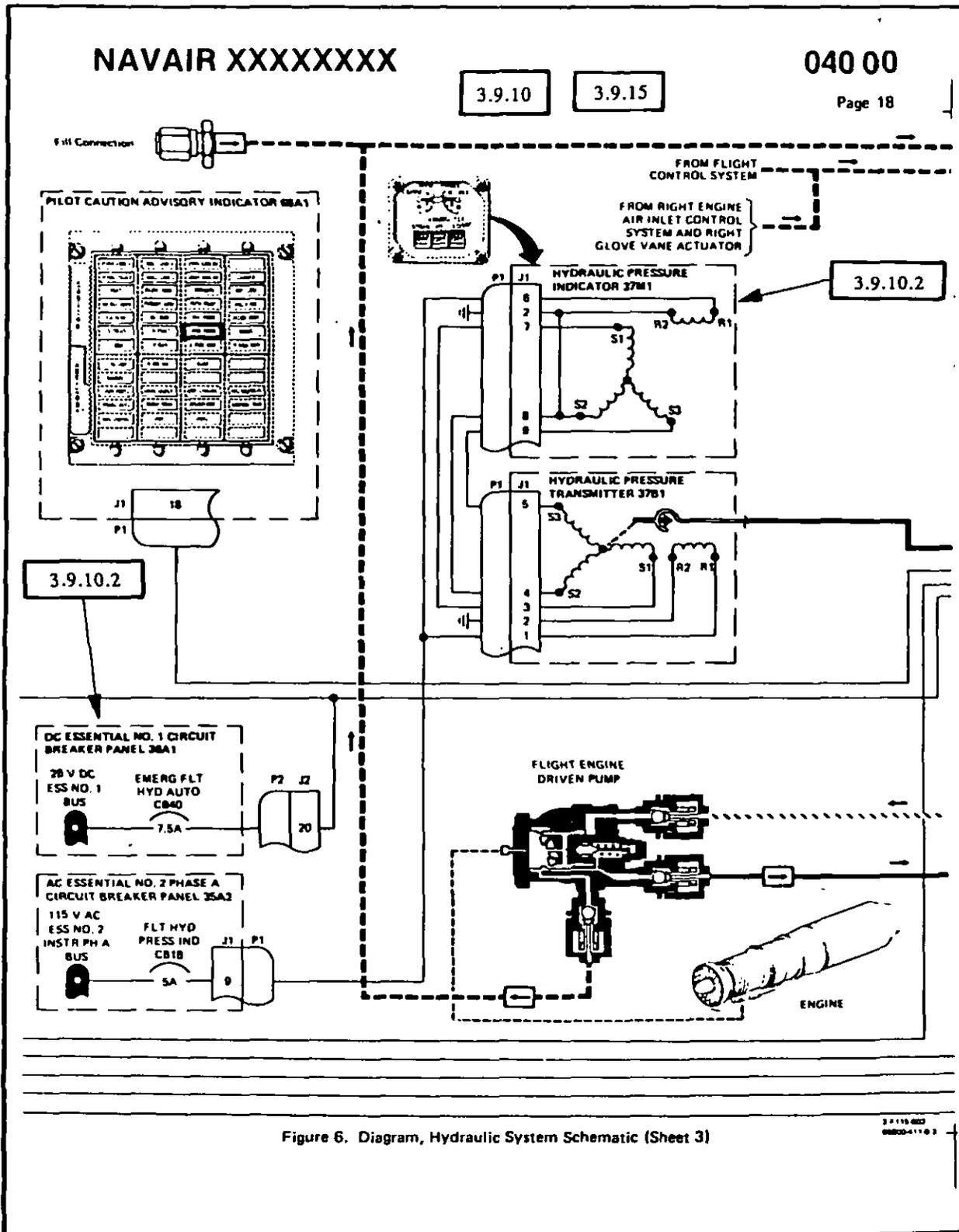


Figure 6. Diagram, Hydraulic System Schematic (Sheet 3)

Figure 22. Example of schematic diagram.

MIL-M-81927B (AS)

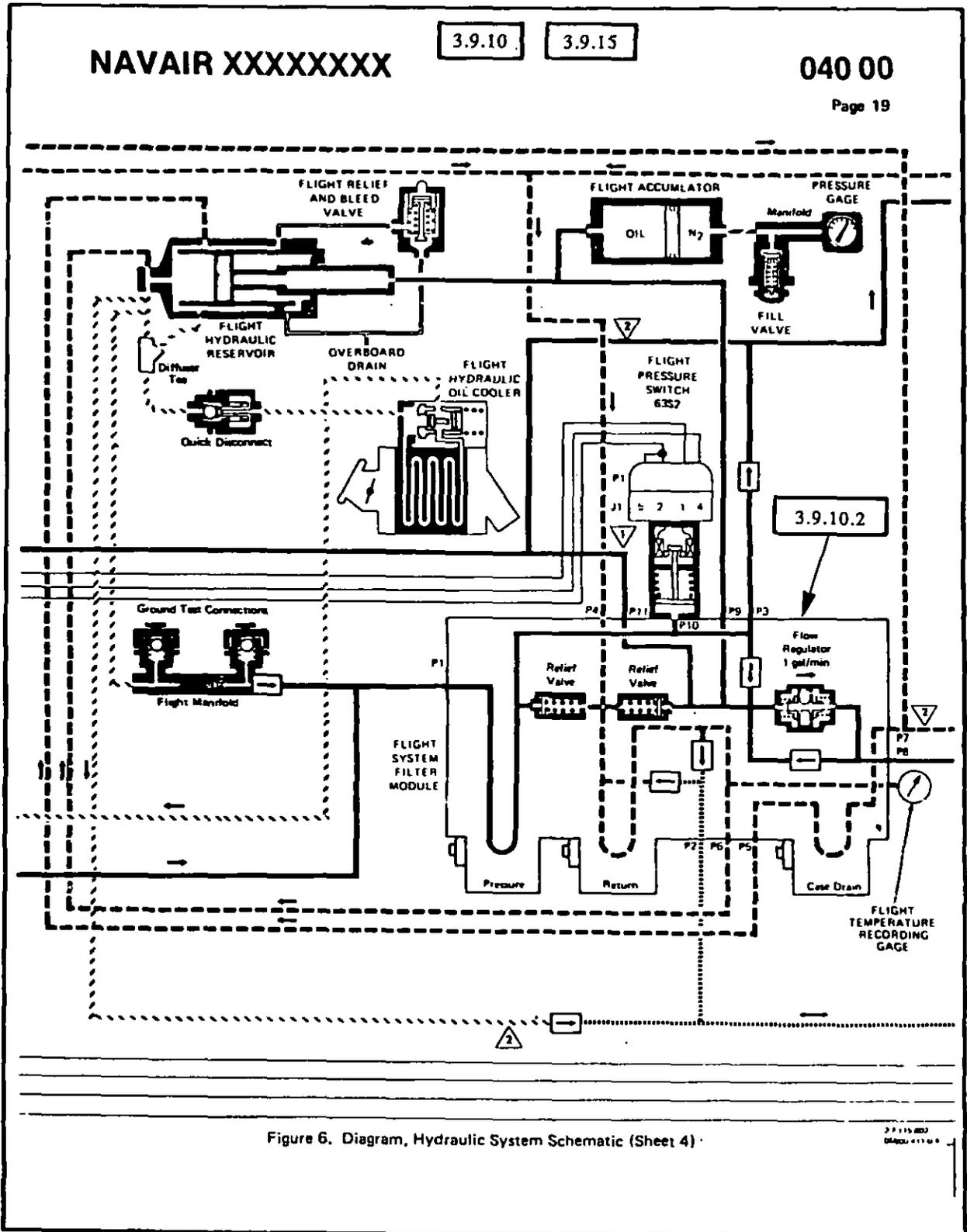


Figure 6. Diagram, Hydraulic System Schematic (Sheet 4)

37 115 800
04000 411 G 4

Figure 22. Example of schematic diagram. - Continued

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3.9.15

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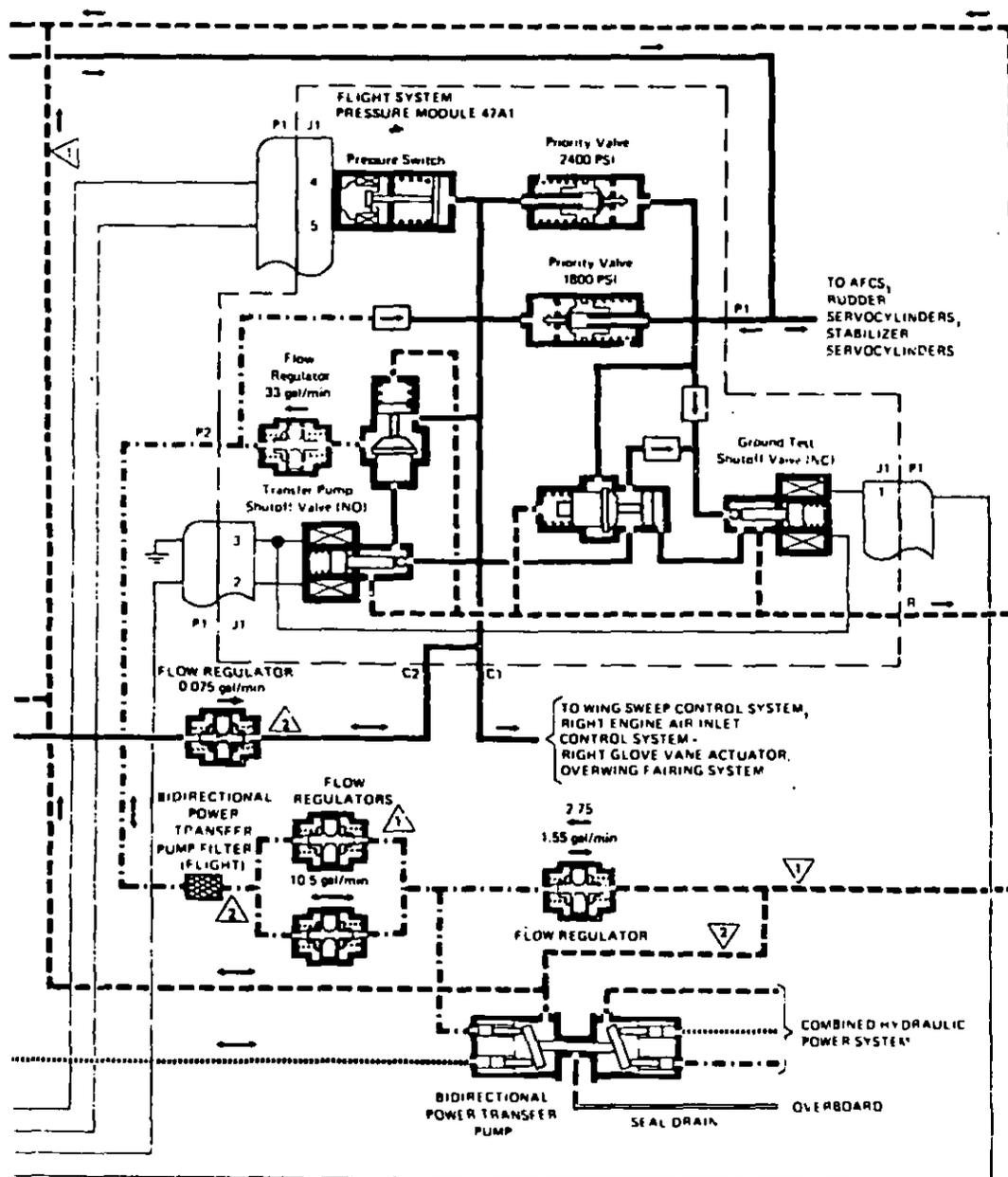


Figure 6. Diagram, Hydraulic System Schematic (Sheet 5)

Figure 22. Example of schematic diagram. - Continued

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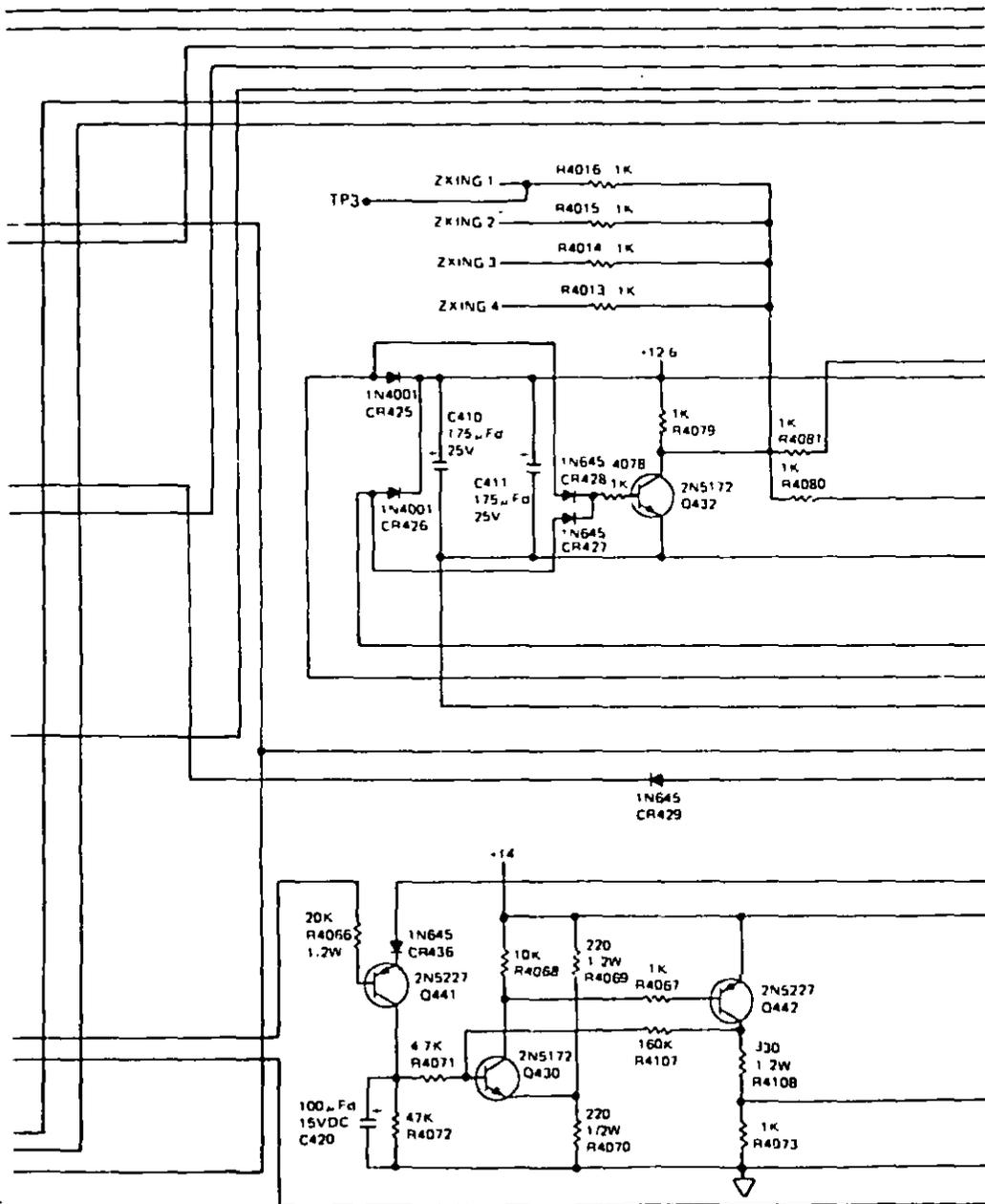


Figure 1. Diagram, Printer Control Board Assembly Schematic, 1A2 (Sheet 4)

Figure 22. Example of schematic diagram. - Continued

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3.9.15

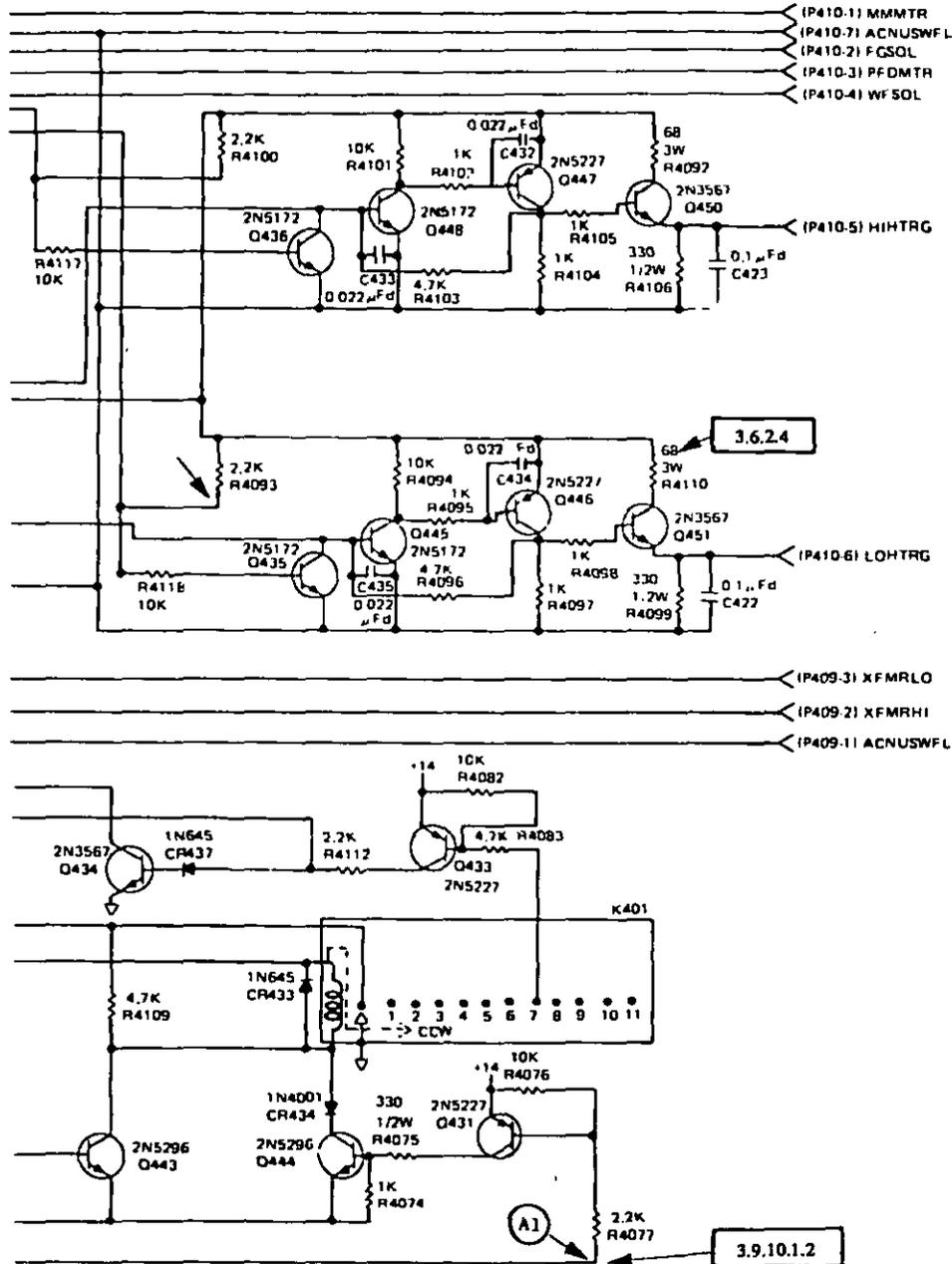


Figure 1. Diagram, Printer Control Board Assembly Schematic, 1A2 (Sheet 5)

Figure 22. Example of schematic diagram. - Continued

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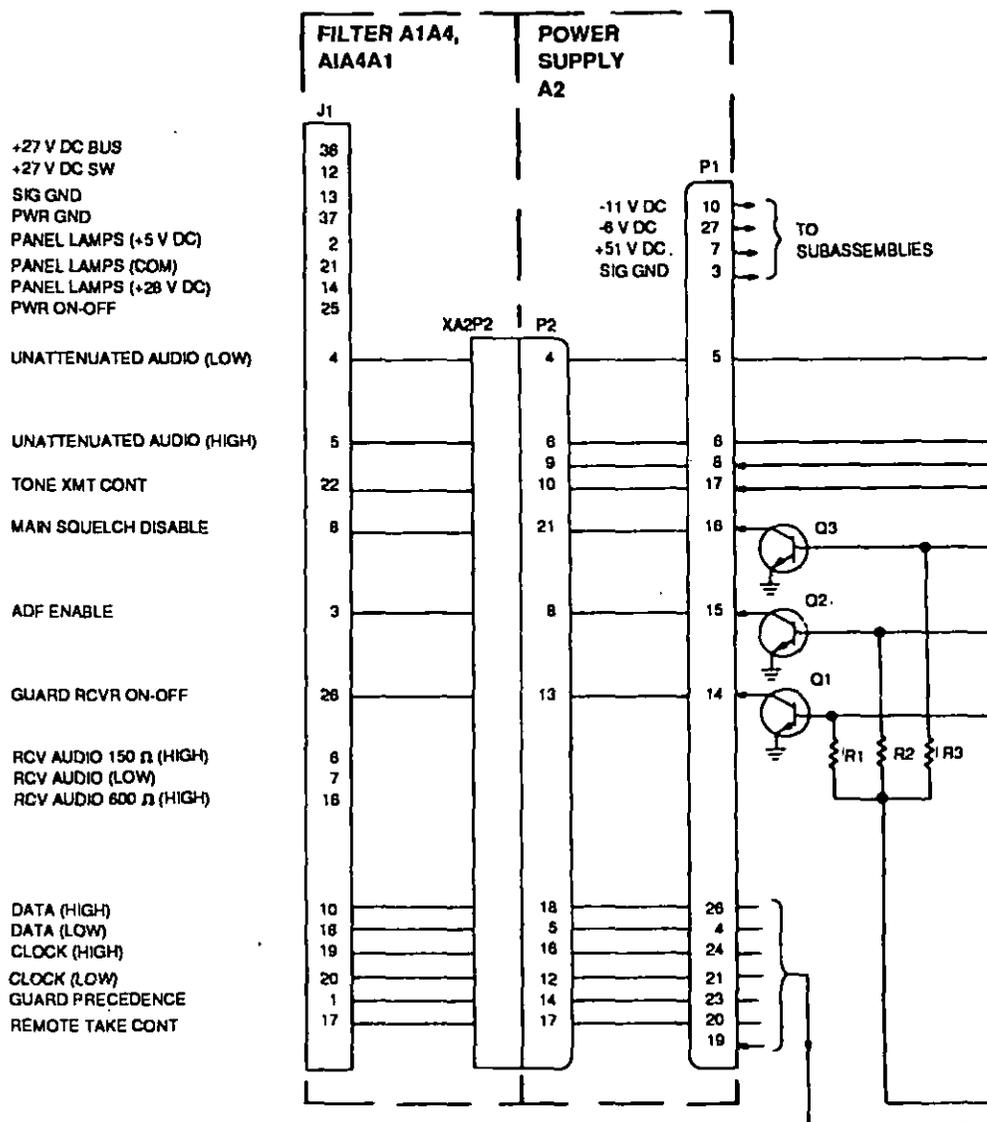


Figure 3. Diagram, Radio Set Control, Functional Block (Sheet 1 of 5)

Figure 22. Example of schematic diagram. - Continued

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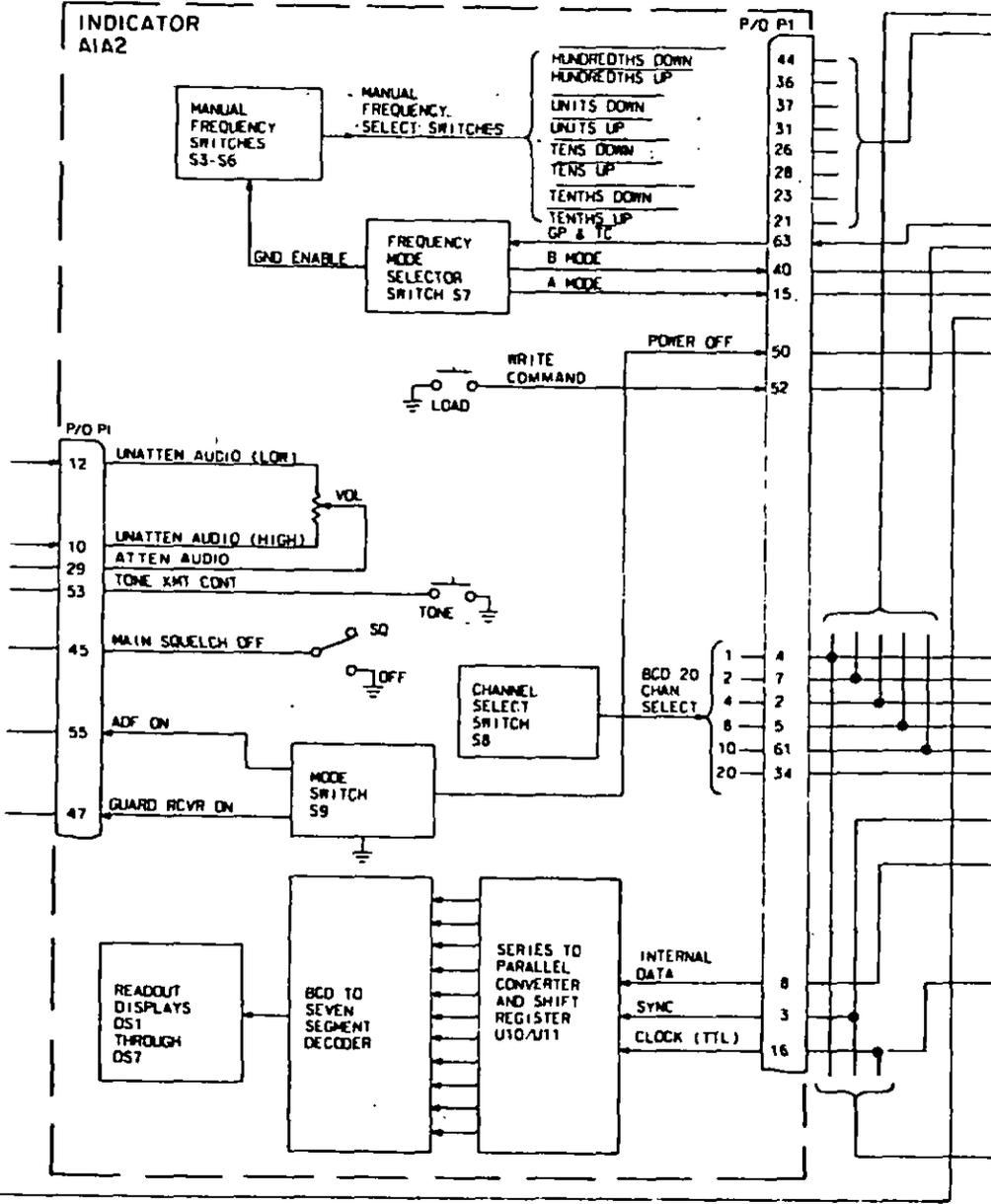


Figure 3. Diagram, Radio Set Control, Functional Block (Sheet 2)

Figure 22. Example of schematic diagram. - Continued

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006 00

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WIRE NUMBER	AIRCRAFT EFFECTIVITY	WIRE TYPE	FROM REF DES	TO REF DES
ARC51-115A22	009 THRU 009	M61044/18-22-9	15A1P1-L	726A1P2-29
ARC51-115B26	004 THRU 004	M61044/19-26-9	726A1J2-29	726A1XA4-66
ARC51-115B26	007 THRU 007	M61044/19-26-9	726A1J2-29	726A1XA4-66
ARC51-115B26	009 THRU 009	M61044/19-26-9	726A1J2-29	726A1XA4-66
ARC51-115C22	004 THRU 004	M61044/16-22-9	15A1P1X-L	15A1J1X-L
ARC51-115C22	009 THRU 009	M61044/16-22-9	15A1P1X-L	15A1J1X-L
ARC51-116A20N	001 THRU 001	M61044/16-20-9	15A2P2-C	E421
ARC51-116A22N	007 THRU 007	M61044/17-22-9	15A2P2-C	E421

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3.9.12.1.2

072 00

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FROM REF DES	WIRE NUMBER	AIRCRAFT EFFECTIVITY	CABLE ASSEMBLY OR HARNESS NO.	TO REF DES	TO AREA
E2021	L455E22N	006 THRU 006	A51A12644-6	60E42	6B
E2021	L455E22N	007 THRU 007	A51A12644-5	60E42	6B
E2021	L455F22N	007 THRU 007	A51A12644-5	60E44	6B
E2021	ASN92-102A22N	007 THRU 007	A51A12644-5	06A2P1-E	2A
E2021	2K510A22N	007 THRU 007	A51A12606-5	32A2P1-12	2A
E2021	2K506A22N	007 THRU 007	A51A12606-5	32A1P1-12	2A
E2021	L455E22N	006 THRU 006	A51A12644-6	60E42	6B
E2021	L455F22N	006 THRU 006	A51A12644-6	60E44	6B

A1-F18AA-WRM-070

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FROM REF DES	PIN	TERM CODE	USE ON CODE	WIRE IDENTIFICATION	WIRE IDENT CODE	WIRE TYPE	TO REF DES	PIN	TERM CODE	DWG NOTE
52TBE059	9	01	AE	H474A	22	677	52TBE059	6	01	
52TBE059	10	01	AE	H475A	22	677	52TBE059	7	01	
52TBE059	11	01	AE	H470A	22	677	22K-E144	C3	359	
52TBE059	12	01	AE	H479A	22N	677	GND7-E001	2	09	YB
52TBE059	13	01	AE	H480A	22	677	22K-E001	B2	359	
52TBE059	14	01	AE	H476A	22	677	22K-E145	C3	359	
52TBE059	14	01	AE	H476B	22	677	52J-E059	36	364	
52TBE059	15	01	AE	H477A	22	677	22K-E145	D3	359	
52TBE059	15	01	AE	H477B	22	677	52J-E059	25	364	

Figure 23. Example of wire lists.

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Table 1. Wire Number to Reference Designation List for Wiring Harness, Part No. 470AS95-202-001

WIRE NUMBER	FROM REF DES	TO REF DES	WIRE TYPE CODE	AWG	WIRE COLOR CODE	WIRE LENGTH (INCHES)
1	J7-215	J2-1	1	24	2	28
2	J7-214	J2-3	1	24	2	28
3	J7-212	J2-5	1	24	2	28
4	J7-216	J2-8	1	24	9	28
5	J7-49	J2-12	1	24	9	28
6	J7-148	K4-B1	1	24	9	18
7	J7-207	J2-21	1	24	9	28
8	J7-206	J2-23	1	24	9	28
9	J7-149	K4-A1	1	24	9	18
9A	J7-152	K4-X2	1	24	9	18
10	J7-25	J2-30	1	24	9	28
11	J7-30	J2-32	1	24	9	28
12	J7-29	J2-47	1	24	9	28
13	J7-209	J2-36	1	24	9	28
14	J7-213	J2-38	1	24	2	28
15	J7-201	J2-39	1	24	9	28
16	J7-219	J3-2	1	24	9	34
17	J7-183	J3-5	1	24	9	34
18	J7-23	J3-7	1	24	9	34
19	J7-218	J3-12	1	24	9	34
20	J7-182	J3-13	1	24	9	34
21	J7-22	J3-14	1	24	9	34
22	J7-217	J3-16	1	24	9	34
23	J7-191	J3-17	1	24	9	34
24	J7-21	J3-18	1	24		
25	J7-221	J3-22	1			
26	J7-211	J4-2				
27	J7-184					
28	J7-210					

Figure 23. Example of wire lists. - Continued

MIL-M-81927B (AS)

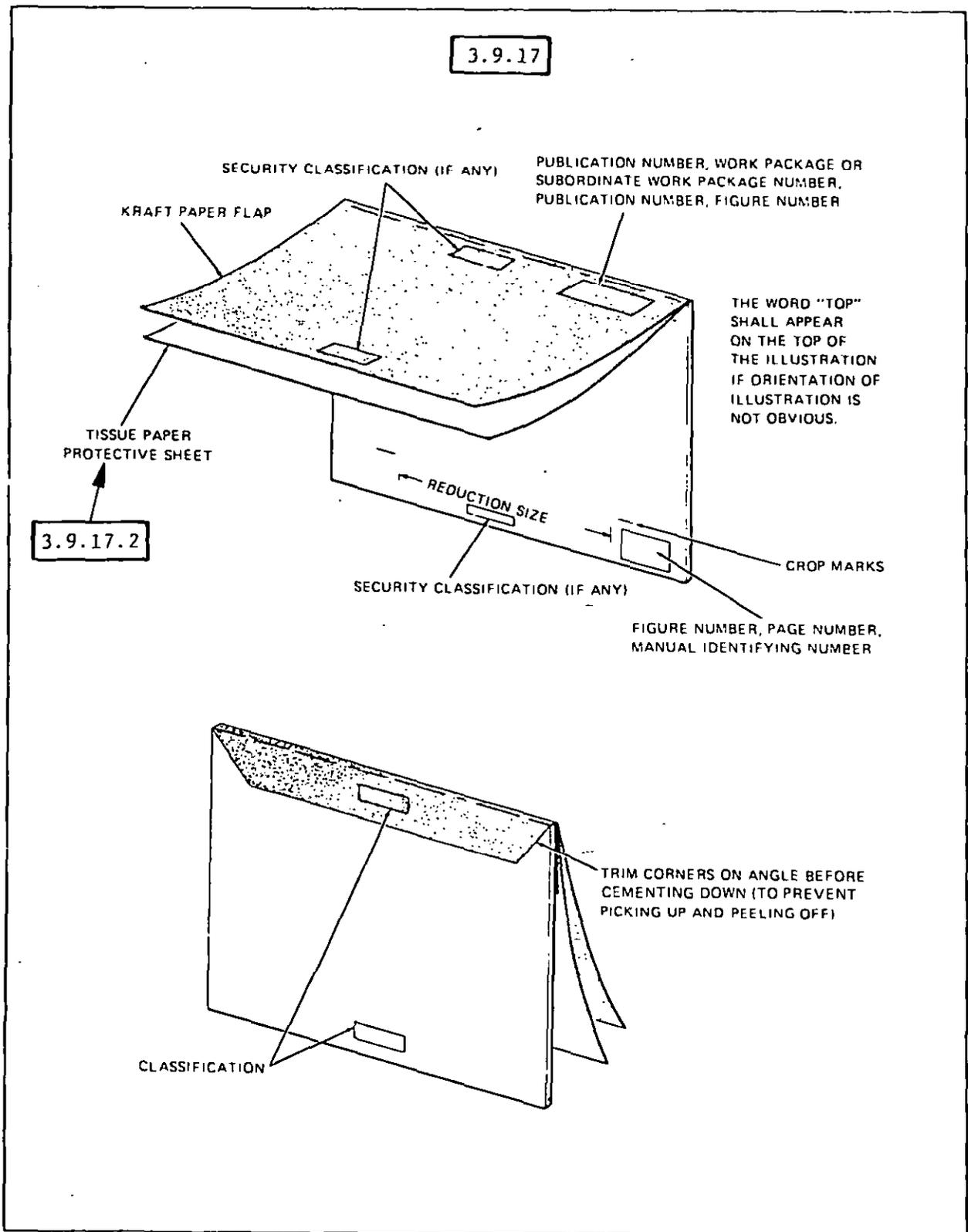


Figure 24. Example of identifying and covering artwork.

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Change 4 - 15 July 1974

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Page 1

ORGANIZATIONAL MAINTENANCE

TESTING AND TROUBLESHOOTING

COMPASS SYSTEM

Effectivity: Aircraft Serial No. 567890 and subsequent.

Reference Material

General Aircraft Information NAVAIR 01-F14AAA-2-1

Alphabetical Index

<u>Subject</u>	<u>Page No.</u>
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Description	1
Disassembly	16
Inspection	15
Principles of Operation	2
Repair	15
Testing	2
Troubleshooting	9

Record of Applicable Technical Directives

None

1. DESCRIPTION. at either end of the system, which aid in the securing of the system. To read
2. The compass system consists of three

Figure 25. Example of changed work package.

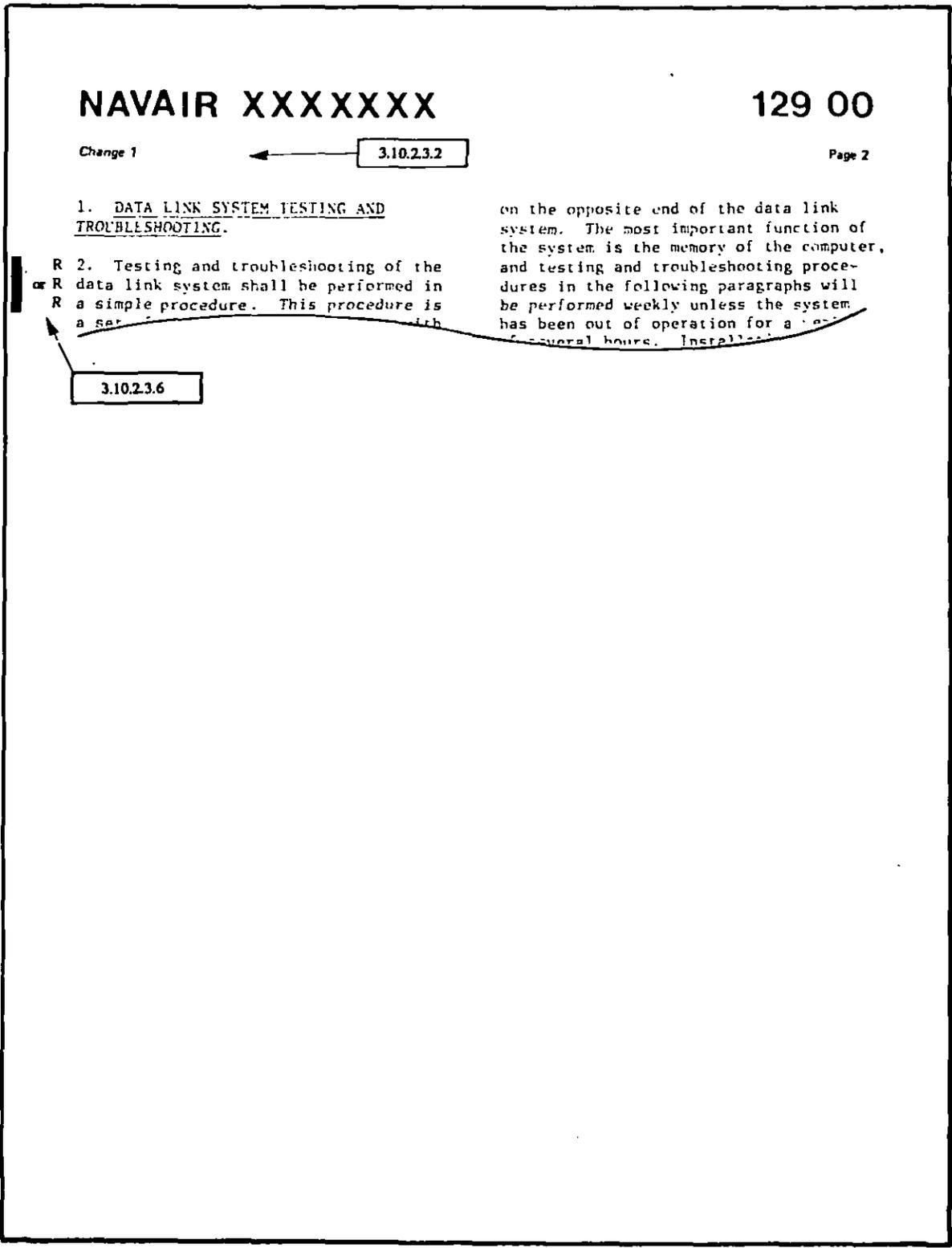


Figure 25. Example of changed work package. - Continued

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APPENDIX

VERBS

10. SCOPE

10.1 Scope. Procedures contained in manuals written in accordance with the specification shall use the verbs defined in Table 1 in order to promote clear understanding of the intent of the procedural statement. The verb which best describes the intended action shall be used in all cases; synonyms shall not be used for the express purpose of avoiding repetitive appearances of a verb within a procedure. The examples are intended to illustrate but not limit the usage of the verbs.

Table 1. List of preferred verbs.

Verb	Definition	Example
Actuate	To put into mechanical motion or action; to move to action.	Actuate the handpump until pressure gauge indicates 50 psi.
Adapt	To make fit a new situation or use, often by modifying.	Use the bushing to adapt the fuse to the projectile.
Add	To put more in.	Add electrolyte to battery.
Adjust	1. To bring to a more satisfactory state; to manipulate controls, levers, or linkages; to return equipment from an out-of-tolerance condition to an in-tolerance condition. 2. To bring to a specified position or state.	1. Adjust ATTEN control to -10DB. 2. Adjust position of break assembly to align with mount bracket.
Advance	To move forward; to move ahead.	Advance the throttle.
Alert	To warn; to call to a state of readiness or watchfulness; to notify (a person) of an impending action.	Alert personnel to clear area.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Align	To bring into line, to line up; to bring into precise adjustment, correct relative position.	Align slot in turnbuckle barrel with slot in cable terminal.
Allow	1. To permit, to give opportunity to. 2. To allot or provide for.	1. Allow the sediment to settle. 2. Allow a 2-inch slack in the line.
Alternate	To perform or cause to occur by turns in succession.	Alternate between pilot's and copilot's instrument test.
Analyze	To determine and interpret test or inspection results to determine system or equipment condition or capabilities.	Analyze metal particles to determine source of containment.
Apply	1. To lay or spread on. 2. To energize.	1. Apply sealant to gap between windshield and aircraft structure. 2. Apply power and observe input reading on INPUT gauge.
Arrange	To group according to quality value or other characteristics; to put into proper order.	Arrange components by size from smallest to largest.
Assemble	To fit and secure together the several parts of; to make or form by combining parts.	Assemble valve.
Assign	To apportion to for a specific purpose or to a particular person or thing; to appoint to a duty.	Assign the task to the electrician.
Assist	To give support or help; to aid.	Assist the AM2 to remove forward brace.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Attach	To join or fasten to.	Attach electrical leads to the multimeter.
Back off	To cause to go in reverse or backward.	Back off nut to nearest castellation.
Balance	To equalize in weight, height, number, or proportion.	Balance whaleboat so that it is stable.
Be sure	To confirm that a proper condition exists, to find out with certainty.	Be sure that warning light is out.
Be careful	To exercise caution, to take care.	Be careful not to inhale fumes.
Bend	To turn or force from straight to curved or angular; to force back to an original position.	Bend sheet metal until it meets curve on bracket.
Bleed	To extract or let out some or all of a contained substance.	Bleed off tank air pressure.
Blow	To send forth air, particularly from the lungs through the mouth.	Check for obstructions by disconnecting the hose and blowing through it.
Break	1. To separate into parts with suddenness or violence. 2. To pull away.	1. Break seal and disconnect line. 2. Break the bead of the tire.
Buck	To seat or tighten rivets from the shank side.	Buck rivets to stop leaks.
Calculate	To determine by arithmetic processes.	Calculate the voltage in a circuit with 10 amps of current and 5 ohms of resistance.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Calibrate	Determine accuracy, deviation or variation by special measurement or by comparison with a standard; to restore to standard.	Calibrate torque wrenches once per operating period.
Cap	To provide with a covering; to install or provide with a device for closing off the end of a tube which has a male fitting.	Cap all exposed lines.
Catch	To prevent from falling to the ground; drip to capture.	Catch any fluid drippings in a pan.
Center	<ol style="list-style-type: none"> 1. To adjust so that axes coincide. 2. To place in the middle of. 	<ol style="list-style-type: none"> 1. Center the nose wheel. 2. Center the pointer on the dial.
Channel	To form, cut, or wear a groove in.	Channel the rods so that they can be inserted easily.
Charge	To restore the active minerals in a storage battery by the passage of a direct current through in the opposite direction to that of the discharge.	Charge the battery.
Check	To test or verify.	Check continuity.
Checkout	<p>To perform specified operations to verify operational readiness of a subcomponent, subsystem, or system.</p> <p>Note: Use "checkout" not "check" to ensure "inspect" is not intended.</p>	Checkout the hydraulic system.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Chock	To place a blocking device, designated as a chock, adjacent to, front of or behind to keep from moving.	Chock main and nose landing gear wheels.
Choke	To enrich the fuel mixture of an engine by partially shutting off the air intake of the carburetor.	Choke the engine as required to start.
Clamp	To fasten or press two or more parts together so as to hold them firmly.	Clamp the tensiometer to the cable.
Classify	To put into categories or general classes.	Classify components by their function.
Clean	To wash, scrub or apply solvents to; remove dirt, corrosion or grease.	Clean parts in solvent bath.
Clear	<ol style="list-style-type: none"> 1. To move personnel or objects away from. 2. To open the throttle of an idling engine to free it from carbon. 	<ol style="list-style-type: none"> 1. Clear the area. 2. Clear the engine.
Close	<ol style="list-style-type: none"> 1. To block against entry or passage; to turn, push or pull in the direction in which flow is impeded. 2. To set a circuit breaker into the position allowing current to flow through. 	<ol style="list-style-type: none"> 1. Close the valve. 2. Close the circuit breaker.
Coat	To cover or spread with a finishing, protecting layer.	Coat battery cables with grease.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Code	To put into the form or symbols of a system used to represent words; to mark with identifying symbols.	Color code wires.
Collect	To bring together into one place; to accumulate.	Collect required hand tools.
Compare	To examine the character or qualities of two or more items to discover resemblances or differences.	Compare the readings from protractor and template.
Compile	To compose or put together out of materials from several sources.	Compile records of all maintenance actions on the aircraft.
Condition	To put into proper state for work or use.	Condition components before installation.
Conduct	To lead, manage, or direct.	Conduct the class in proper servicing procedures.
Connect	To bring or fit together so as to form a unit, to coupled keyed or matched equipment items.	Connect antenna cable to radio transmitter.
Coordinate	To bring into a common action, movement, or condition.	Coordinate activities of aircraft handlers.
Copy	To make a transcript or reproduction of.	Copy the serial number of the part on the MAF form.
Correct	To make or set right; to alter or adjust so as to bring to some standard or required condition.	Correct error in magnetic reading.
Cover	To protect or shelter by placing something over or around.	Cover tires prior to performing maintenance.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Crack	To open slightly (the throttle), of an aircraft engine preparatory to starting the engine.	Crack throttle to open start-fuel valve.
Crimp	To compress or deform a connection barrel around a cable to make an electrical connection.	Crimp a connector on the yellow wire.
Cut	To divide into parts using a sharp instrument such as a scissors or knife.	Cut both ends of gasket material evenly.
Cycle	To operate an item through its entire range.	Cycle the landing gear.
Deflate	To release air or gas from.	Deflate the shock strut to check out fluid level.
Deplete	To lessen markedly in quantity, content, or power.	Deplete system pressure.
Depress	To press or push down.	Depress both brake pedals.
Depressurize	To release gas or fluid pressure from.	Depressurize the hydraulic system.
Destroy	To ruin, demolish, or put out of existence, presence or fact of.	Watch very carefully so as to detect any needle movement.
Detect	To discover or determine the existence, presence or fact of.	Watch very carefully so as to detect any needle movement.
Determine	To investigate and decide to discover by study or experiment.	Determine the amount of tension on a cable by following specified procedures.

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APPENDIX

Table 1. List of preferred verbs - Continued

Verb	Definition	Example
Develop	To set forth or make clear by degrees or in detail.	Develop procedures fully.
Devise	To form by new combinations or applications of ideas or principles; to invent.	Devise new methods of troubleshooting the system.
Diagnose	To recognize or identify the cause or nature of a condition, situation or problem.	Diagnose the malfunction by examination or analysis.
Disassemble	To take to pieces; to take apart to the level of the next smaller unit or down to all removable parts.	Disassemble the valve.
Disconnect	To sever the connection between; to separate keyed or matched equipment parts. Note: Use "unplug" when detaching or separating an electrical device from a service outlet.	Disconnect the bleed air hose from the leading edge anti-icing system.
Dispatch	To send off or away with promptness or speed.	Dispatch report to supervising technician.
Dispose of	To get rid of.	Dispose of unused hydraulic fluid left in the can.
Distribute	To divide among several or many; to divide or separate, especially into kinds.	Distribute paint for various sections of the aircraft.
Drain	To draw off (liquid) gradually or completely.	Drain servicing hose after removing it from the filter valve.
Draw in	To pull (liquid) up into a container through suction.	Fill hydrometer by drawing in electrolyte.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Dry	To cause to be free from water or air.	Dry bearings with low-pressure liquid.
Eliminate	To expel; to ignore or set aside as unimportant.	Eliminate all unnecessary movement.
Enforce	To compel or constrain.	Enforce safety regulations.
Engage	To cause to interlock or mesh.	Engage threads of turn-buckle with threads of cable terminal.
Ensure	To make someone sure or certain; to inform positively.	Ensure that all warning lights are off.
Enter	1. To go or come in. 2. To put on record.	1. Enter the aircraft through the troop doors. 2. Enter the data on the form.
Erase	A process to remove stored data from a storage medium and on a CRT display or magnetic tape.	Erase image from CRT screen.
Erect	To put up by fitting together.	Erect a special maintenance stand.
Establish	To set on a firm basis.	Establish safety rules.
Estimate	To judge or determine roughly the size, extent or nature of.	Estimate amount of cleaning solvent which will be necessary.
Evaluate	To determine the importance, size or nature of; to appraise; to give value or appraisal to on the basis of collected data.	Evaluate the condition of the damaged aircraft.

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APPENDIX

Table 1.. List of preferred verbs. - Continued

Verb	Definition	Example
Expedite	To accelerate the process or progress of.	Expedite the activity by assigning two men.
Extend	To cause to be drawn out to fullest length.	Extend the main landing gear.
Extract	To draw forth; to pull out forcibly.	Extract the cotter pin.
Fabricate	To construct from standardized parts.	Fabricate rig pins from 0.25 inch rod.
Figure	To determine by arithmetic processes.	Figure the voltage in a circuit with 10 amps of current and 5 ohms of resistance.
File	To rub smooth or cut away with a file (such as a tool with cutting ridges for forming or smoothing surfaces).	File one end of the rod to a point.
Fill	To put into as much as can be held or conveniently contained, or to a specific level.	Fill oil and de-icing tanks.
Flush	To pour liquid over or through; to wash out with a rush of liquid.	Drain and flush the hydraulic system if it is serviced with a wrong fluid.
Fold	To lay one part over another part; to reduce the length of bulk by doubling over.	Fold sides of curtain on creases.
Follow	To accept as authority, to obey; to confirm with directions or rules.	Follow directions.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Form	To give a particular shape to; to shape or mold into a certain state; to make up.	Form the compound so that it will fill the hole completely.
Furnish	To supply what is needed, to equip.	Furnish a flashlight for man B.
Go to	To proceed to; to transport oneself to a given destination.	Go to the control pedestal and position switches as directed.
Ground	To connect a current, wire, or a piece of electrical equipment to land or other specified surface.	Ground the servicing cart.
Guard	To protect from danger, to defend.	Guard the area while maintenance is taking place.
Guide	To manage or direct the movement of.	Guide the maintenance stand safely to its new position.
Hand	To give, pass or transmit with the hands.	Hand the refueling hose to the technician stationed on the wing.
Handle	To manipulate (such as load, turn, or raise) objects and equipment manually or with specially designated equipment, such as hoists.	Handle charger cylinders carefully.
Hang	To fasten to some elevated point without support from below; to suspend.	Do not hang tools on projecting parts of the aircraft.
Hold	To have or keep in the grasp.	Hold the power switch in position until the voltmeter stabilizes.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Identify	<ol style="list-style-type: none"> 1. To establish the identity of. 2. To determine the classification of a supply item. 	<ol style="list-style-type: none"> 1. Identify components by name and function. 2. Identify the component to be ordered from supply.
Idle	To run an aircraft engine under reduced power without sufficient power being developed for movement of the aircraft.	Idle the engine for five minutes at 800 rpm.
Immerse	To plunge into something that surrounds or covers, especially to plunge or dip into a fluid.	Immerse component in solvent.
Improve	To make greater in amount or degree; to make better.	Improve procedures whenever feasible.
Indicate	To point out.	Indicate which dial should be monitored.
Inflate	To fill with a given amount of gas or air.	Inflate tire to desired pressure.
Inform	To make known to; to give notice or report the occurrence of.	Inform man B that the brakes have been set.
Inject	To throw, drive or force in.	Inject lubricant into proper joint.
Insert	To put or thrust in, into or through.	Insert a wire through the hole in the turnbuckle.
Inspect	To perform a critical visual observation or check for specific conditions; to test the condition of.	Inspect the components for deterioration or defects.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Install	<p>1. To perform operations necessary to properly fit an equipment unit into the next larger assembly or system.</p> <p>2. To place and attach.</p> <p>Notes:</p> <p>a. For wiring a circuit, use "wire" rather than "install wiring" when appropriate.</p> <p>b. For safety wiring, use "safety wire" rather than "install safety wire" when appropriate.</p> <p>c. For screws, use "install screws" rather than "screw."</p> <p>d. Use "cap" or "plug" rather than "install cap (plug)," when appropriate.</p>	<p>1. Install fuel manifold.</p> <p>2. Install nuts on bolts.</p>
Intercept	To stop or interrupt the progress or course of.	Intercept messages between flight station and tail section technicians.
Interchange	To put each in the place of the other.	Interchange printed circuit A2 and A3.
Interpret	To explain the meaning of.	Interpret instructions for inexperienced technicians.
Investigate	To observe or study by close examination and systematic inquiry.	Investigate the cause of the breakdown.
Isolate	To use test equipment to identify or select a source of trouble.	Isolate the source of the malfunction using pressure gauges.
Jack	To use one or more jacks (such as mechanisms for exerting pressure to lift all or part of an aircraft).	Jack and level the aircraft in accordance with specified procedures.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Keep	To remain; to continue in a place.	Keep away from the danger area.
Kick	To strike against with a foot.	Kick the wheel lightly if the strut binds.
Latch	To catch with a device which holds a door when closed, even if not bolted.	Close and latch the aft doors.
Leave	To go away from; depart. Note: When the intent is to allot, provide for, or to give opportunity to; use "allow."	Do not leave the area until this activity is complete.
Level	To cause an object to become even or parallel with the plane of the horizon.	Jack and level the aircraft in accordance with specified procedures.
Lift	To move or cause to be moved from a lower to a higher position.	Lift the spoiler control lever to the ARMED position.
Light	1. To cause to illuminate. 2. To ignite.	1. Light the field indicator light. 2. Light the afterburner.
Listen	To pay attention to sound.	Listen to the engine while it is operating.
Load	To place in or on a means of conveyance; to place cargo or aircraft components on an airplane or other vehicle.	Load and secure aircraft components on specified truck.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Locate	To find, determine or indicate the place, site or limits of. Note: When the intent is to set or establish in a particular spot or to station, use "position."	Locate the No. 9 fitting.
Lock	To hold fast or inactive; to fix.	Lock the throttle after it has been properly set.
Look for	To visually search for.	Look for cracks, corrosion and damage during inspection of wheels and tires.
Loop	To make into the form or shape of a loop (such as a fold or doubling of line leaving an aperture between the parts through which another line can be passed.	Loop the wire.
Loosen	To release from restraint; to cause to become less tight fitting.	Loosen the lock nut on the relief valve.
Lower	To cause to move down; to depress as to direction.	Lower the exhaust stack into the stowed position.
Lubricate	To put lubricant on specified locations.	Lubricate the wheel bearings.
Maintain	1. To hold or keep in any particular state or condition, especially in a state of efficiency or validity. 2. To sustain or keep up.	1. An aircraft mechanic maintains aircraft. 2. Maintain standard forms on power plant operations.
Make	To carry out or cause to occur.	Make corrections where necessary.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Mark	To label, to provide with an identifying or indicating symbol.	Mark each component before removing it.
Measure	To determine the dimensions, capacity or amount by use of standard instruments or utensils.	Measure voltage drop across each unit of resistance.
Mix	To combine or blend into one mass.	Never mix oxygen with other gases.
Modify	To alter or change somewhat the form or qualities of.	A jet engine mechanic modifies turbofan engines.
Monitor	To continually or periodically attend to displays to determine equipment condition or operating status.	Monitor all engine instruments while starting the engines.
Moor	To secure an aircraft to the ground by tying it down by ropes, chain, or cables.	Moor the aircraft when it is to be parked for an extended period of time.
Mount	To attach to a support.	Mount the split-type wheel.
Move	To change the location or position of.	Move and position a B-4 maintenance stand.
Neutralize	To destroy the effectiveness of, to nullify, to make chemically neutral or electrically inert.	Neutralize the solution before applying it to aircraft surface.
Notify	To make known to; to give notice or report the occurrence of.	Notify man B that the brakes have been set.
Observe	1. To conform one's actions or practice to. 2. To visually take note of, to pay attention to.	1. Observe precautions. 2. Observe the indicator for changes in airspeed.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Obtain	To gain or attain.	Obtain the necessary supplies before starting on maintenance.
Open	<ol style="list-style-type: none"> 1. To move from closed position; to make available for passage by turning in an appropriate direction. 2. To make available for entry or passage by turning back, removing or clearing away. 3. To disengage or pull. 	<ol style="list-style-type: none"> 1. Open the valve. 2. Open the troop door. 3. Open the appropriate circuit breakers.
Operate	To control equipment in order to accomplish a specific purpose.	Operate crew stands and auxiliary equipment.
Order	To requisition or request from supply.	Order three cans of appropriate solvent.
Organize	To arrange elements into a whole of interdependent parts; to form into coherent unity; to integrate.	Organize the activities of the assisting technicians.
Overhaul	The act of disassembling equipment units down to all removable parts; cleaning; critically inspecting, repairing, restoring and replacing where necessary; assembling, adjusting, aligning, recalibrating and verifying operation readiness by test or checkout; and packaging for transportation storage.	Overhaul the engine in accordance with applicable instructions.
Pack	To fill completely with grease.	Pack the bearings.
Paint	To apply color or pigment (suspended in suitable liquid) to the surface of.	Paint all exposed surfaces.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Park	To bring (an aircraft) to a stop and leave it standing for a time, usually without a pilot, in a specified area.	Park the aircraft between the yellow lines.
Patch	To mend, cover, or fill up a hole or weak spot.	Patch the tubes where necessary.
Perform	To do, carry out or bring about; to reach an objective.	Perform a periodic inspection on the landing gear.
Plan	To devise or project the achievement of.	Plan the day's schedule for the technicians.
Plug	To provide with a device for closing off the end of a tube which has a female fitting.	Plug all lines which have exposed female fittings.
Plug in	To attach or mate (an electrical device) to a service outlet.	Plug in the soldering iron at the service power outlet.
Position	To put or set in a given place, to locate.	Position the test equipment so that it can be seen by both technicians.
Post	To station at a given place.	Post one man in front of the aircraft.
Prepare	1. To make ready; to arrange things in readiness. 2. To prepare or make ready for a maintenance activity.	1. Prepare the surface for paint. 2. Prepare the Trunion Shaft Kit for removal of the MLG shock strut.
Pre-set	To put in a desired position, adjustment or condition beforehand.	Pre-set tension indicator dial.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Press	<p>To act upon through thrusting force exerted in contact.</p> <p>Note: For circuit breakers use "close."</p>	Press the blower start button.
Pressurize	To apply pressure within by filling with gas or liquid.	Pressurize the booster hydraulic system.
Prevent	To keep from happening or existing.	Prevent oil from spilling on components.
Probe	To investigate thoroughly with a long, pointed device or by direct feeling.	Probe the tube with fingers.
Process	To submit to a series of actions or operations leading to a particular end.	Process the forms so they will be compatible with new recording methods.
Program	To work out a plan or procedure or a sequence of operations to be performed.	Program the maintenance activity in logical sequence.
Provide	To supply what is needed, to equip.	Provide a flashlight for man B.
Pull	To exert force upon an object so as to cause motion toward the force.	Pull out knob No. 6 on the oxygen servicing cart.
Pump	<p>1. Raise or lower by operating a device which raises, transfers or compresses fluids by suction, pressure or both.</p> <p>2. To move up or down or in and out as if with a pump handle.</p>	<p>1. Pump up the ramp several inches.</p> <p>2. Pump engine primer knob.</p>

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Puncture	To pierce with a pointed instrument or object.	Be careful not to puncture tube while probing the inside of it.
Purge	1. To free of sediment or trapped air by flushing or bleeding. 2. To remove fuel or fuel vapors from engine by motoring engine with fuel switch off.	1. Purge fuel tanks. 2. Purge engines.
Push	To move away or ahead by steady pressure.	Push the servicing cart toward the aircraft.
Put	To deposit or leave.	Put tools out on the bench.
Qualify	To declare competent or adequate.	Qualify components which check out successfully.
Raise	To move or cause to be moved from a lower to a higher position, to elevate.	Raise the spoiler control lever to the ARMED position.
Read	To interpret the meaning of by visual observation.	Read the ammeter.
Readjust	To adjust again, to move back to a specified condition; to bring back to an in-tolerance condition.	Readjust the voltage after performing an operational check of the system.
Reassemble	To refit and secure together the parts after they have been taken apart.	Reassemble component before installation on aircraft.
Recall	To call back.	Recall parts which have not been modified.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Recap	To cap again; to replace a covering; to reinstall a fitting for closing the end of a tube.	Recap the filler valve.
Receive	To come into possession of; to get.	Receive supplies as they arrive.
Recognize	To perceive to be something previously known or designated.	A jet engine mechanic recognizes troubles through evaluation of engine operational checks.
Recommend	To urge the acceptance or use of.	Recommend procedure changes where appropriate.
Recondition	To renew; to bring or put back into good condition.	Recondition the pilot's and copilot's seats.
Reconnect	To rejoin or refasten that which has been separated.	Reconnect aft pistons to forward pistons.
Record	To set down in writing.	Record maintenance time on appropriate form.
Reduce	To cause to be diminished in strength, density, or value.	Reduce pump flow.
Refuel	To put fuel into the tanks (of an aircraft) again.	Refuel the system as outlined from applicable technical manuals.
Regulate	To fix or adjust the time, amount or rate of; to exercise restraining or directing influence over.	Regulate electrical current generation and distribution.
Reinflate	To refill with a given amount of gas or air after deflation has occurred.	Reinflate tires to specified psi value.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Reinstall	To return to a former place or position.	Reinstall (caps) plugs on all hydraulic lines.
Reject	To refuse to have, use or take for some purpose.	Reject components which show excessive wear.
Relay	To pass along by stages.	Relay the message to man D.
Release	<ol style="list-style-type: none"> 1. To set free from an inactive or fixed position. 2. To let go of. 3. To take or move away. 	<ol style="list-style-type: none"> 1. Release the parking brake. 2. Release tensiometer handle. 3. Release pressure.
Relieve	To ease or set free of a burden; to partially release.	Relieve hydraulic pressure before working on a system.
Remove	<ol style="list-style-type: none"> 1. To perform operations necessary to take an equipment unit out of the next larger assembly or system. <p>Note: For screws, use "remove screws" rather than "unscrew."</p> <ol style="list-style-type: none"> 2. To take off or eliminate. 3. To take or move away. 4. To take off devices for closing off the end of a tube. 	<ol style="list-style-type: none"> 1. <ol style="list-style-type: none"> a. Remove bleed air shutoff valves. b. Remove nuts from bolts. 2. Remove paint. 3. Remove jacks. 4. Remove caps (plugs) from all hydraulic lines.
Repair	To restore damaged, malfunctioning equipment to a serviceable, usable, or operable condition.	Repair engine by replacing parts and removing defects.
Repeat	To make, do or perform again.	If keys do not engage lugs, remove wheel assembly and repeat procedure.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Replace	1. To restore to a former place or position. 2. To serve as a substitute for.	1. Replace covers on jacks. 2. Replace the switch contact points.
Replenish	To fill or build up again.	Replenish drinking water when supply runs low.
Report	To describe as being in a specified state. To make known to; to give notice or report the occurrence of.	Report when ready.
Repressurize	To reapply pressure within by filling with gas or liquid after pressure has been released.	Repressurize the utility hydraulic system.
Request	To ask for.	Request further information if necessary.
Reset	To put back into a desired position, adjustment, or condition.	Reset the field after performing an operational check of the generator.
Resolve	To clear up or find an answer to; to reach a decision about.	Resolve the inconsistency before proceeding with maintenance activity.
Restore	To bring back or put back into a former or original state.	Restore hydraulic pressure.
Retard	To manipulate so as to hold back or slow down.	Retard the throttle.
Retract	To draw up against or into an aircraft.	Retract the landing gear.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Return	To bring, send or put back to a former or proper place.	Return the horizontal stabilizer to the neutral position.
Review	To examine again; to go over or examine critically or deliberately.	Review procedures which have not been performed for more than two months.
Rework	To reprocess for further use; to revise.	Rework the report forms.
Rig	To assemble, adjust and align the major components of an aircraft (such as airfoils or other surfaces); to fit out (an aircraft) with items such as control cables, bracing cables, pulleys and turnbuckles.	Rig and adjust the mechanical linkage in the flight control system.
Rinse	To cleanse (as from soap used in washing) by clear water.	Rinse the battery after cleaning it with soda water solution.
Rope off	To partition, separate or divide by a rope (such as a large stout cord of strands of fibers or wire twisted or braided together).	Clear and rope off an area around the aircraft and post warning signs.
Rotate	To cause to revolve about an axis or center.	Rotate the door handle counterclockwise until catches retract.
Route	To send by a selected course of travel; to divert in a specified direction.	Route the memo to all effected personnel.
Rub	To move along the surface of a body with pressure.	Rub hands around connections.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Safety	To secure an aircraft part against loosening from vibration. Note: When the intent is to make fast, secure, or safe against loosening from vibration with safety wire, use "safety wire." When the intent is to make fast, secure or safe against loosening from vibration with a cotter key, use "secure."	Safety the lock nut on the relief valve.
Safety wire	To use safety wire to make an aircraft component fast or safe or secure against loosening from vibration.	Safety wire the bolts.
Salvage	To rescue or save (as from discard, wreckage or ruin).	Salvage fuel which is drained from tanks.
Scan	To make a wide, sweeping search of; to look through or over hastily.	Scan the flight engineer's panels before beginning maintenance activity.
Schedule	To appoint, assign or designate for a fixed future time; to make a timetable of.	Schedule maintenance activities for the day.
Screw	1. To attach, fasten or close by means of a screw. 2. To attach by means of a twisting motion in the proper direction.	1. Screw the ram safety lock to the ram. 2. Screw in jack pad.
Scrub	To clean with hard rubbing.	Scrub all metal parts with a white powder deposit on them.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Secure	1. To make fast or safe. 2. To safety (with cotter pin) to make aircraft component fast or safe or to keep it from loosening during vibration.	1. Load and secure components on trucks. 2. Secure the bolt with a cotterpin.
Select	To take by preference or fitness from a number or group, to pick out, to choose.	Select a battery cell and insert hydrometer nozzle in the cell.
Service	To perform such operations as cleanup, lubrication and replenishment to prepare for use.	Service each battery cell to only 3/8 inch above the plates.
Set	To put a switch, pointer or knob into a given position; to put equipment into a given adjustment, condition or mode.	Set PWR switch to ON.
Shake	To move or cause to move to and fro in a quick, jerky manner.	Shake the container so that the paint will be well mixed.
Signal	To notify or communicate by signals (such as a prearranged sign, notice or symbol conveying a command, warning, direction or other message).	Signal the pilot to move the aircraft to the left.
Simulate	To give the appearance or effect of.	Simulate doppler radar signals.
Slide	To cause to move in a smooth manner over a surface.	Slide the stand in close enough to do the work.
Specify	To name or state explicitly or in detail.	Specify the manufacturer's number of the multimeter.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Spill	To cause or allow to fall, flow or run out.	Be careful not to spill battery acid on clothing or hands.
Spin	To cause to revolve rapidly.	Spin wheel by hand until a bearing drag is noticed.
Spray	To apply with a device which disperses a jet of finely divided liquid.	Spray the fuselage and tail sections moving from center.
Start	To perform actions necessary to set into operation, to set going, to begin.	Start the powered support equipment.
Stay	To remain, to continue in place.	Stay away from the danger area.
Stimulate	To excite to activity or greater activity.	Stimulate flow by warming the lines.
Store	To deposit or leave in a specified place for future use.	Store the wheel covers after maintenance activity is completed.
Strike	To deliver or aim a blow or thrust, to hit.	Strike the designated spot with a hammer.
Submit	To make available, to offer.	Submit request for modification of procedures.
Suggest	To propose as desirable or fitting; to offer for consideration.	Suggest any changes which might be helpful.
Supervise	To oversee; to have or exercise the charge of.	Supervise the repair of the engines.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Support	To hold up or provide a foundation or props for.	Support the elevator at both ends.
Survey	To examine comprehensively as to condition, situation or value.	Survey entire aircraft surface.
Synchronize	To cause to happen with a specific time relationship.	Synchronize the activities of man A and man B.
Tabulate	To set up in the form of a table (with rows and columns); to compute by means of a table.	Tabulate maintenance times for each occurrence of the various maintenance activities.
Tag	To provide with an identifying or indicating symbol with or as if with a tag (such as a cardboard, plastic or metal marker used for identification or classification); to label.	Tag each hydraulic line before removing it.
Take	1. To get into or carry in one's hand or one's possession. 2. To get or find out by observation or special procedures.	1. Take supplies out to the aircraft. 2. Take a reading on the outside circle of the tensiometer.
Tap	To strike lightly.	Tap the eye of the cotter pin to seat it.
Tie	To fasten, attach or close by means of a line or cord.	Tie mooring ropes to tie points under wing and nose.
Tighten	To perform necessary operations to fix more firmly in place.	Tighten all screws.
Tilt	To cause to slope, lean or incline.	Tilt maintenance stand backwards until wheels contact the ground.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Torque	To apply a specified amount of force to produce a rotation or twisting motion to fix more firmly in place.	Torque the nut to 1000 inch-pounds.
Tow	To pull along (an aircraft) by means of a towing vehicle and tow bar.	Tow aircraft to the washrack.
Trace	To follow or study out in detail or step by step.	Visually trace the wiring diagram.
Transfer	To convey or cause to pass from one place to another.	Transfer fuel and oil from one place to another.
Transmit	To send out a signal by radio waves or wire.	Transmit message to control tower.
Transport	To carry by hand or in a vehicle or hoist, or in a container, etc.	Transport landing gear to shop on dolly.
Trim	1. To free of extraneous matter by or as if by cutting. 2. To adjust (a jet engine) to compensate for wear.	1. Trim patch to fit. 2. Trim the No. 1 engine.
Troubleshoot	To localize, isolate and correct the source of a malfunction or breakdown.	Troubleshoot the landing gear control circuit.
Tune	To adjust for precise functioning.	Tune the transmitter for maximum output.
Turn off	To shut off or stop the flow of by or as if by moving a control to its OFF position.	Turn off power to the signal generator.

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APPENDIX

Table 1. List of preferred verbs. - Continued

Verb	Definition	Example
Turn on	To cause to flow or operate by, or as if by moving a control to its on position.	Turn on power to the signal generator.
Unplug	To detach or separate (an electrical device) from a service outlet.	Unplug the soldering iron.
Unscrew	To loosen or withdraw by turning in the proper direction.	Unscrew the jack pad.
Unwind	To cause to uncoil or unroll.	Unwind hoses from hose rack.
Use	To put into action or service; to avail oneself of; to carry out a purpose or action by means of.	Use only antimagnetic fasteners.
Verify	To establish the truth or accuracy of.	Verify the readings before recording them.
Wait	To suspend activity in a sequence of activities until a given condition occurs, or a given time has elapsed.	Wait five minutes before performing the next task.
Wash	To cleanse by or as if by the action of liquid; to remove (dirt) by rubbing or drenching with liquid.	Wash the battery with a cleaning solution and a stiff brush.
Wire	To provide with wire, to use wire on.	Wire the circuit.
Withdraw	To take back, away, or out.	Withdraw the bar magnet from the center of the coil.
Wrap	To wind, coil or twine as to encircle or cover something.	Wrap the wire around the terminal.
Zero	To bring to a desired level or null position.	Zero the protractor to the surface.

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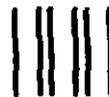
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3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

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b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

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