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**SOFIA
MAINTENANCE MANUAL
DEVELOPMENT GUIDE**

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UNITED AIRLINES
MAINTENANCE OPERATIONS

SOFIA
MAINTENANCE MANUAL
DEVELOPMENT GUIDE

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Purpose

2. General

- A. This document is a guide to developing Science Instrument maintenance documents. This document has five distinct sections.
 - (1) The first section develops the concept of critical process development. Just as Scientific Method has certain standard processes, aircraft manual development has standard processes.
 - (2) The second section deals with standard writing styles. It is important that simple and direct writing styles be used. Even when the instrument will be maintained and used by a single user, the documents are subject to review and therefore commonality is beneficial.
 - (3) The third section is a sample maintenance Manual derived in general from the previous example.
 - (4) The fourth section gives a more detailed review of the individual aspects of a Maintenance Manual.
 - (5) The fifth section is a glossary of terms. It is derived from UAL GN/MM 8-0-1-1. It is intended to give a list of commonairling and UAL terms. This glossarry
- B. The Science Instruments have historically been maintained by the builder and not subject to review by outside agencies or personnel.
- C. The Science Instruments on the SOFIA project will require review for Airworthiness and Compliance to specific documents. This can easily be verified if the documents adhere to standard formats.
- D. The intent is for each instrument to use the commercial aircraft industry format. This document layout conforms to the general layout of a maintenance manual.
- E. While reading the following document always keep in mind that any document developed will be a living document that will change. The establishment and control of feedback and revision systems is integral to any process and in general and legal items will be subject to the UAL revision service.
- F. As with any living document any comments to improve clarity or enhance usability will be appreciated. Contact the SOFIA Science Instrument Airworthiness IPT with any comments.

CRITICAL PROCESS METHODOLOGY

1. General

- A. The critical process system, as defined by UAL, is a guide and not a requirement. The process has been used to great effect both in whole and in part.
- B. The critical flow development process starts by first finding what is important, and then incrementally defining the process into finer details.
- C. Assurance that all steps are covered in development may require that some steps will be stated and then determined to be 'Not Applicable' (NA). Often the fact that an step is NA is important in itself.
- D. The critical process tends to be recursive and should be treated as ongoing and open ended. Do not hesitate to return to the beginning or change findings as a system is analyzed.

2. Definition

- A. Critical processes are procedures which if not accomplished correctly will result in deficiencies with one or more of the following conditions:
 - (1) Subsequent testing will not confirm function until use.
 - (2) The process must be accomplished using trained or qualified persons.
 - (3) Requires monitoring during all or portions of the process.
 - (4) Has specific parameters which are required prior to or during specific tasks.
- B. If safety, reliability or legal issues are impacted by improper procedures the process is critical.
- C. Critical processes must be controlled. Control does not mean restriction.
- D. All important steps in a critical process must be clearly defined.

3. Methodology

- A. Flow chart the process. (Refer to Figure 301)

Note: The process flow chart is not static, steps can be added or subtracted as the process is defined. Consider this step a brainstorm.

- B. Find the key characteristics of each step by determining if they have an impact on form, fit or function. Be free to add anything a in step, it will be further analyzed at a later step.
- C. For each step in the process determine and define the important requirements and parameters. (Refer to Figure 302)
 - (1) Equipment (Items not consumed in process)

- (a) Equipment needs and availability.
- (b) Support requirements for equipment such as calibration.
- (2) Material (Items consumed in process)
 - (a) Form of material is needed: Powder, liquid, paste, etc.
 - (b) Unit amounts per process: Can, ounce, inch, bulk, etc.
 - (c) Storage requirements: Shelf life, hazardous goods, etc.
- (3) Technique
 - (a) Availability at process point.
 - (b) Repeatability.
 - (c) Controllability.
 - (c) Specifications.
 - (d) Verifiability.
 - (e) Preparation
- (4) Operator
 - (a) Qualifications.
 - (b) Training requirements.
 - (b) Staffing levels.
- (5) Environment
 - (a) Cleanliness.
 - (b) Lighting (radiation -UV readings).
 - (c) Noise.
 - (d) Humidity.
 - (e) Ventilation minimums.
 - (f) Work area.
- D. Define the limits of above requirements. Clarify the above by defining minimums and maximums of identified parameters. (Refer to Figure 303 example.)
- E. Determine controls for parameter limits (Refer to Figure 304 example.)
 - (1) Owner: Responsible party for step

- (2) Change process: How changes are incorporated and controlled.
 - (3) User feedback process: How user communicates to owner.
 - (4) Product performance feedback loop from customer (end user).
- F. Document the above in the applicable manuals, drawings and handbook. Documentation must have all of the following as applicable:
- (1) Key characteristics and process parameters must be defined.
 - (a) Controllable limits.
 - (b) Uncontrollable limits.

Note: The definition of an uncontrollable characteristic will allow the process user to decide if a process can be continued or if a another part or process needs to used.

Example: If a Paint application cannot be accomplished at temperatures below a certain point then a process will need to delayed or a different type paint used.
 - (c) Processes used.
 - (d) Assumptions.
 - (2) Periodic checks established.
 - (3) Start up / Shut down process steps.
 - (4) Certification controls / audits.
 - (5) Maintenance frequency based upon findings or experience.
- G. Changes to the characteristics or process parameters require:
- (1) The change be prototyped to substantiate the outcome
 - (2) The documentation reviewed and revised as needed.
 - (3) The revisions be reviewed and approved by the appropriate groups or individuals.

Note: Often a minor change will require extensive rewrite. Avoid partial revisions for fundamental changes of a document, as it will only lead to confusion and more work for all parties.

4. Outline for a Critical Process Maintenance Manual.

- A. The general outline for a critical process will address the all the pertinent subjects and have a layout as follows:
 - (1) General:

- (a) Give background and purpose for the process. It is not always obvious to the user or reviewer. This will also promote buy-in by the user.
- (b) Basic assumptions should be stated.
- (c) State limits or legal requirements. Exclusions from these should also be stated.

(2) Table of Contents (optional).

Note: Only include if the process is long. In general Science Instruments processes will not need a Table of Contents.

(3) Special Tools and Materials:

- (a) Tools that are generally not found in a tool box or bench should be listed.
- (b) Tools that are often found in a toolbox or bench but will be very useful, such as a '00' Phillips or swivel adapter.
- (c) Material that needs special handling or is usually not stocked must be listed. The document should also include data to support the special characteristics.
- (d) Material that will be used up, consumed or become unable to return to stock even if it is not special should be listed.
- (d) Reference material such as drawings or Aide Books should be listed.
- (e) Complete part numbers are required. There should not be a need to decode or use reference material to find any part or material.

Note: If the part or tool number is hard for you to find, it will also be hard for the person accomplishing the task to find.

(4) Safety Precautions:

- (a) Do not assume that every user is familiar with safe or unsafe conditions or processes.
- (b) Name reference sources for safety requirements.
- (c) State results of unsafe conditions: Loss of life, Injury, etc.

(5) Use of Signal Words WARNING, CAUTION and NOTE must be in accordance with UAL's processes.

- (a) WARNING - Calls attention to methods, procedures or limits which must be followed precisely to avoid INJURY OR DEATH.
- (b) CAUTION - Calls attention to methods, procedures or limits which must be followed precisely to avoid DAMAGE TO EQUIPMENT.
- (c) NOTE - Call attention to methods which make the job easier.

(6) Definitions:

- (a) Do not assume that any special term is known or remembered by the process user.
- (c) Acronyms should always be defined here or in the text.
- (c) Special units or equivalents need to be stated. Use the same units consistently in the process.

(7) Facility Controls:

- (a) Environmental requirements and conditions need to be clearly defined.
- (b) Power needs must be defined and warnings or safety issues should also be noted.

(8) Process Requirements:

- (a) References for all processes used within the process by source and location need to be defined.
- (b) Critical or important parameters need to be defined.
- (c) Critical processes need to be highlighted with explanation of their limits.

(9) Quality Requirements:

- (a) Define expectations, this defines quality.
- (b) Objective and measurable results need to be fixed and stated.
- (c) Steps that can be excluded may be so stated.
- (d) Define relation between the process and inspection criteria.
- (e) Data should be easily used and found by the operator and inspector.

(10) Inspection and Test Methods.

- (a) Define quantitative parameters must be defined.
- (b) Define tolerance and rejection limits.
- (c) Define type and alternate forms of test and inspection methods.
- (d) Define resulting action, if any, must be defined.
- (e) Define allowable deficiencies are to be defined and so stated.
- (f) Define tooling requirements and calibration.

Note: Some of the preceding sections may not be applicable to all processes. If not applicable, list the section heading followed by

"Not applicable to this specification" immediately under the section heading or leave it out.

5. Other Guidelines

- A. Determine the "Must Haves" of the process
- B. Determine the "nice-to-haves" of the process
- C. Review process for repeatability.
- D. Review process for redundancy and clarity.
- E. Review the process for appropriate level of control.

6. Example of Science Instrument Installation Flowchart.

Note: This example is intended to help start developing a process, to be an actual mounting process only. No similarity to existing SI's is intended.

A. Flow chart the basic process. Figure 301.

- (1) Put every process step into the diagram. It is easier to remove a step than than to insert it later.
- (2) Assume that the person accomplishing the step is unfamiliar with the process and the systems.
- (3) Assume minimal skill level.
- (4) Assume no specialized parts or tools.

B. Key Characteristics desired of the Science Instrument Installation:

Note: The following is not a complete list. In general the focus of each group is on their own desired characteristics. What each group is looking for, and addressing these characteristics, will allow the group to focus on the observatory as a whole. An observatory view will add value to all.

Example: The AMT is most interested in ease of mount and conformity, while the Principle Investigator (PI) is interested in science time and quality. Therefore a complete installation process will give the PI more time if the AMT is able to mont an SI quickly and effeciently.

- (1) Safety. (Always first)
 - (a) Pressure seal.
 - (b) Cryogenic containment.
 - (c) Personnel safety.
- (2) Science Acquisition.

- (a) Alignment.
 - (b) Data transfer mode.
 - (c) Temperature stability.
- (3) Schedule.
- (a) Timely SI mounting.
 - (b) Calibration.
 - (c) Personnel
 - (d) Aircraft systems.
 - (e) Route planning.

C. Put in the important parameters. Determine the things that affect the key characteristics. (Refer to Figure 302)

- (1) Take nothing for granted. Once again it is easier to remove a step later than to try and insert a forgotten step.
- (2) If a step is forgotten go back and insert it.
- (3) If unfamiliar with a process get information from someone who has accomplished the task. Ask them about tools and things they would improve.

Note: A person who is familiar with a process may have discovered another more efficient process. Try and understand these steps and include them in yours.

- (4) If possible prototype the task by doing it or a similar one. Take notes and remember that a problem confronted and answered now will never be repeated.

Example: If problem is discovered while prototyping, correct it. If a part was hard to locate during the prototype then better descriptions will avoid repeating this problem.

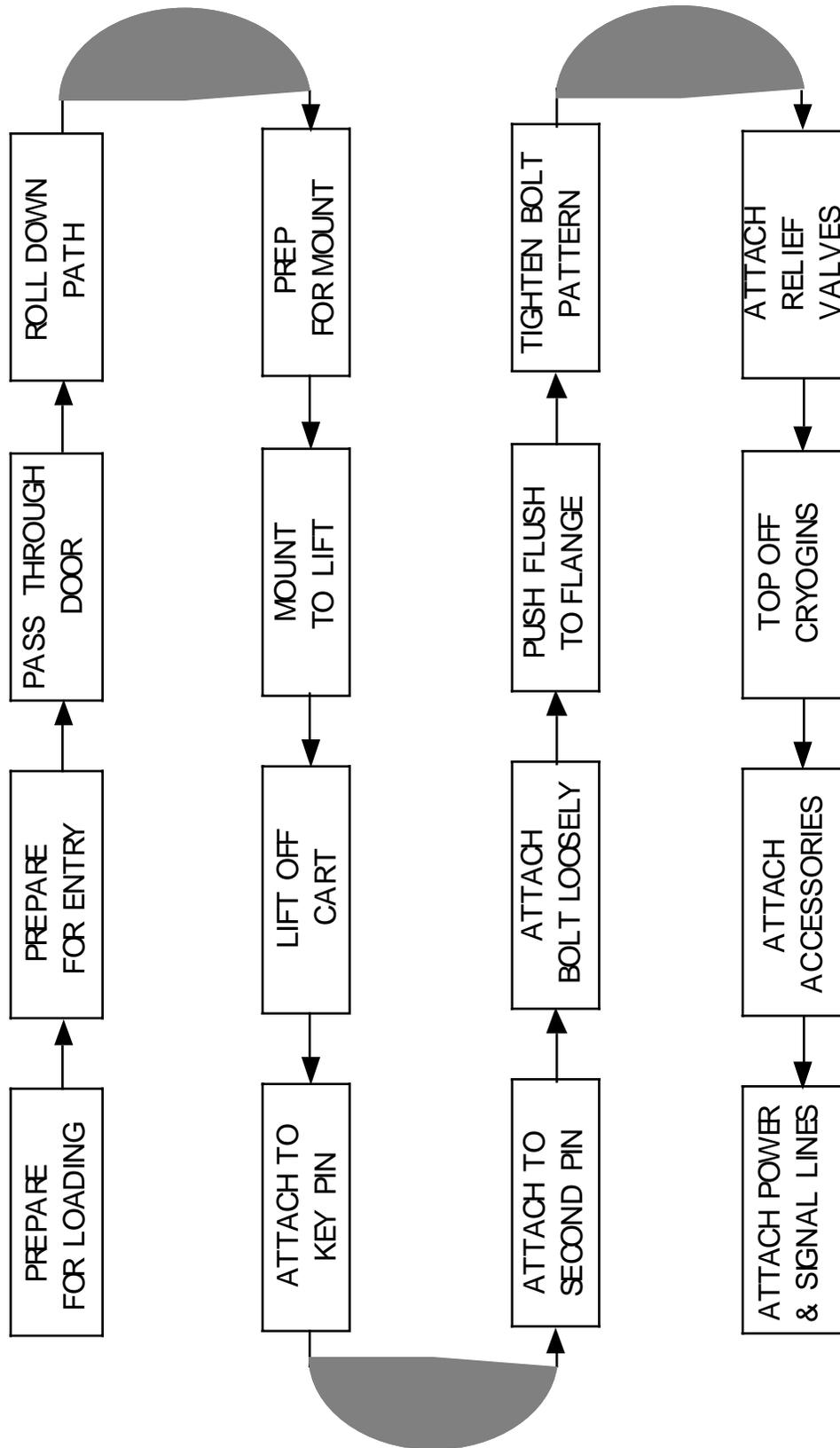


FIGURE 301 - FLOW CHART PROCESS

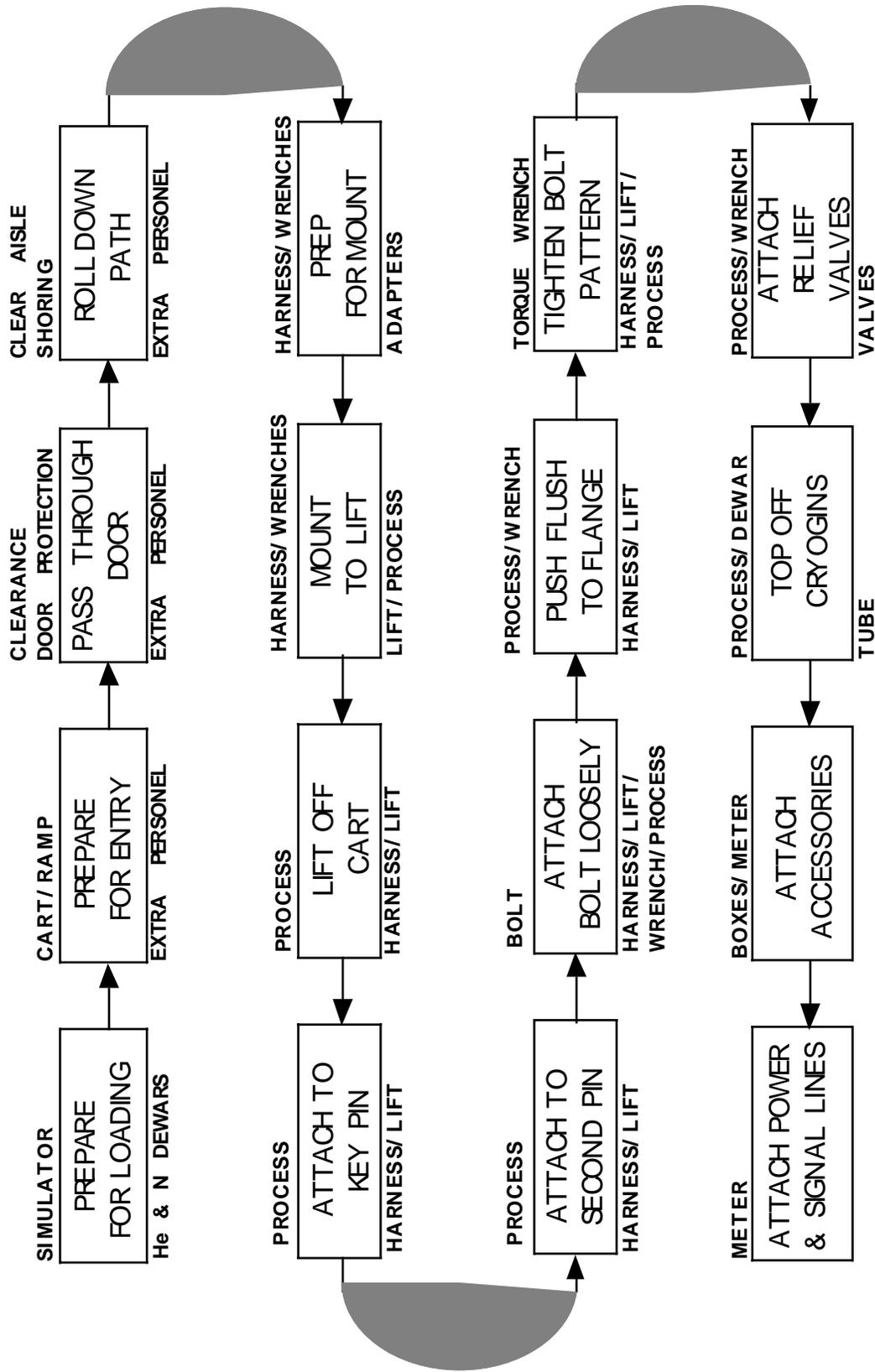


FIGURE 302 - KEY CHARACTERISTICS

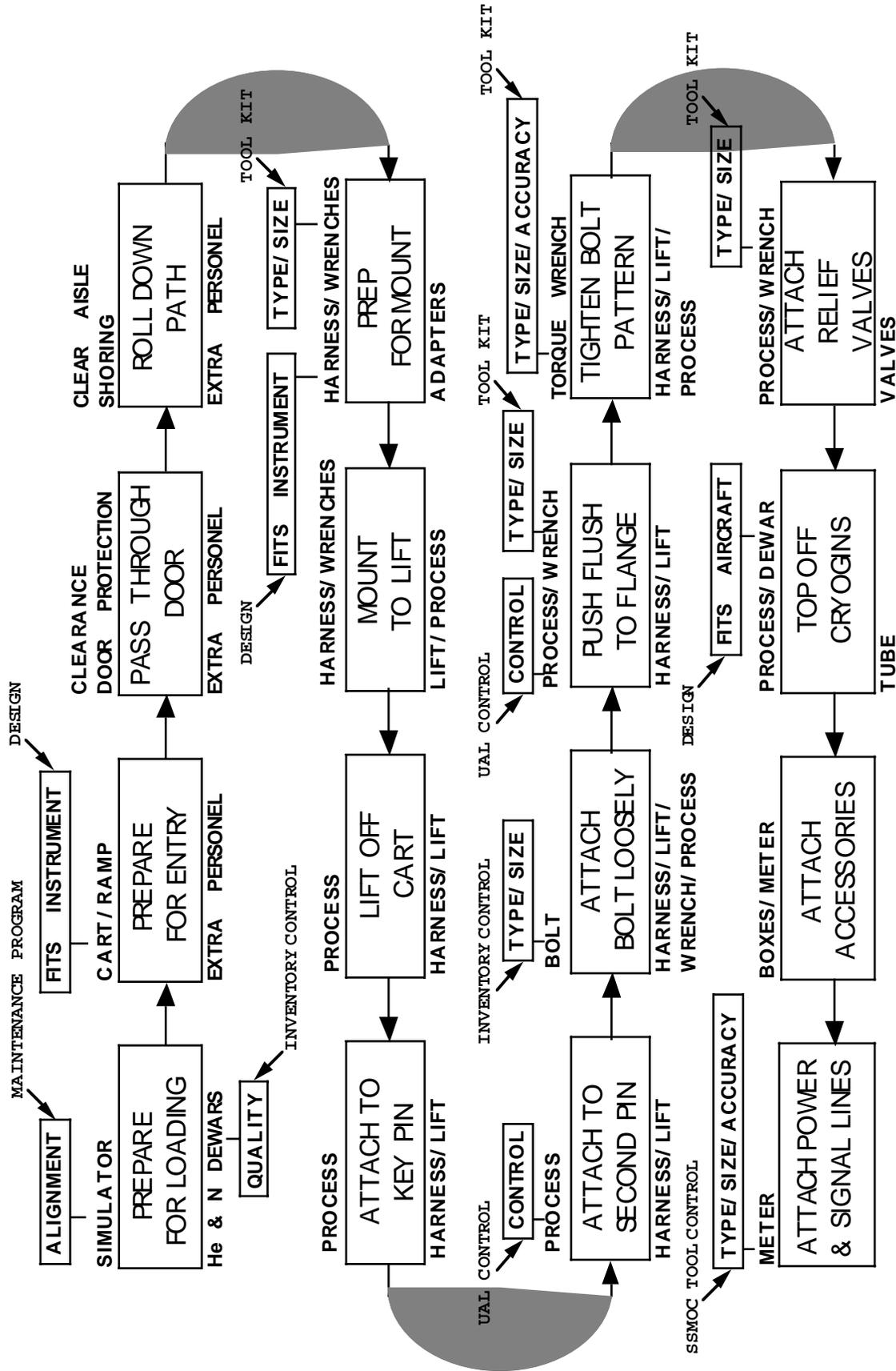


FIGURE 304 - KEY PARAMETER CONTROL

Appendix A

Sample Maintenance Manual

1. General.

- A. The following is intended as an example document and general guide.
- B. Consider the following to be a starting point for a living document.
- C. There is no requirement for minimum or maximum length however a task should not be open ended or never ending.
- D. The quoted references and parts are fictitious and are meant only as examples.

2. Notes:

- A. The process is expected to be improved (revised) and UAL's document configuration control department publishes and assists in this area. Control does not mean static.
- B. A controlled document does not mean that the manual is an FAA required document. It means that it is a document published by UAL.
- C. If a document is published, it will be automatically distributed in a form that is easily reproduced by the Observatory operators.
- D. Each process must meet the needs of the Observatory and Science Instrument first and foremost.
- E. All manuals will be reviewed for compliance with format and clarity.
- F. After publication the original will be returned to the originator of the document. This will alert the originator of the publication and to the changes made for form or order. Any changes made to the document should reviewed at this time.

3. Hints

- A. After accomplishing a critical flow path per the previous section simply sit down and write. Use the flow chart as a guide.
- B. If the following example is close, start by revising the document and conform it to specific requirements.

4. Sample Document

Sample Document		
1. General		
A. This document is intended for installation of the Bolometric Occultation Zoom Observatory (BOZO).		
B. This Science Instrument (SI) installation requires sign-off by a Certificated Aircraft Maintenance Technician (AMT).		
C. The SI is assumed to be calibrated on the Simulator and is in good working order. No SI repair or calibration data is included in this document.		
2. Special Tools and Materials.		
A. Special Tools ¹⁰¹ .		
(1)	BOZO SCIENCE INSTRUMENT BC9201F ¹⁰² ,	
(2)	BOZO Cart, BC9205F,	950-1234 ¹⁰³
(3)	Transition Ramp, 9F1234-501 ¹⁰⁴ ,	950-4567
(4)	Door Protector, 9F1234-502,	950-4321
(5)	BOZO Harness, BC9223F,	950-1235
(6)	SI Tool Kit, 9F7658-501,	950-1234
(7)	Aircraft LHe Dewar, 9F8282-501	950-7474
(8)	Aircraft LN Dewar, 9F8282-502	950-7475
(9)	Double Neck Kit, 9F7452-503	950-3715
B. Standard Tools.		
(1)	Bonding Meter,	Local Supply

¹⁰¹ The following layout is standard. Often the PCN (See notes below) is not included in the text.

¹⁰² BCXXX numbers are intended to simulate BOZO SI drawing numbers. Important drawings are kept in the tool crib under UAL control and sometimes are considered tools.

¹⁰³ XXX-XXXX simulate UAL stock numbers, and are referred to as PCN numbers. Items stocked, stored or supplied by UAL will have this number supplied to you by UAL. Application in the example is to show how a final manual will look and assistance throughout observatory operation is part of UAL's mandate

¹⁰⁴ 9FXXXX-501 numbers simulate UAL drawing numbers and would usually be UAL supplied items.

- (2) Torque Wrench, 30-40 pound-inches,
6F4181-78G-30G056-0893

C. Materials.¹⁰⁵

- (1) LHe, as required.
- (2) LN, as required.
- (3) SI Flange Bolt Kit, 9F7976-501.
- (4) Thread Sealant, Local Supply.
- (5) SI Flange O-Ring 3M-RND-42D-125T

D. Referenced Procedures.

- (1) 52-95-99¹⁰⁶, DR 1 LEFT RAMP INSTALL.
- (2) 52-95-94, DR 1 LEFT SI PROTECTION INSTALL.
- (3) 95-61-03 SI FLANGE MOUNTING GENERAL PRACTICES.
- (4) 95-61-03, SI FLANGE BOLT INSTALL.
- (5) 95-61-11, SI DOUBLE NECK RELIEF VALVE INSTALL.
- (6) 95-62-01, AIRCRAFT SI LIQUID HELIUM TRANSFER
- (7) 95-62-02, AIRCRAFT SI LIQUID NITROGEN TRANSFER.
- (8) 95-63-04, CABLE DRAPE GENERAL PRACTICES.

3. PROCEDURE

A. Preparation.

- (1) Determine that BOZO is mounted on BOZO Cart.
Reference: FIGURE 401, 'BOZO Simulator Attachment Document' and BC9201F BOZO Cart.

¹⁰⁵ The materials listed include items used by procedures called out in the following procedure. Anticipate materials that might be used. Acquiring parts is often the most time consuming item.

¹⁰⁶ XX-XX-XX is standard ATA chapter reference numbers These are not official and are intended to simulate actual documents . Example: 52-95-XX chapter 52 is doors, 95 is subchapter specific to the telescope, XX is a number assigned to the subchapter. 95-XX-XX are those items specific to the Telescope.

CAUTION: Verify that restraint strap is securely fastened.
failure to fasten restraint strap can lead to injury,
and aircraft or SI damage

- (2) Determine that the Science Instrument (SI) ramp is installed on left hand door 1.
Reference: 52-95-99, DR 1 LEFT RAMP INSTALL.
- (3) Determine that the door protection panels are properly installed on left hand door 1.
Reference: 52-95-94, DR 1 LEFT SI PROTECTION INSTALL.
- (4) Verify He and N dewars are no more than half full.
Remove excess as required.
Reference: 95-62-01, AIRCRAFT SI LIQUID HELIUM TRANSFER and 95-62-02, AIRCRAFT SI LIQUID NITROGEN TRANSFER.

CAUTION¹⁰⁷: Dewars more than half full could damage instrument while transporting or mounting on flange.

B. Entry

- (1) With two persons at lead of cart and two persons at back of cart, slowly push cart up to top of ramp.

WARNING: The cart is heavy and it requires four people to move the cart safely. If fewer people are used, the cart can roll freely injuring persons; and/or damage the aircraft or dock structure.

Note: It is helpful to also have a spotter to assure clearance and help in critical areas.

- (2) Slowly enter aircraft through door one left and turn cart in the aircraft's aft direction.
- (3) With a minimum of two persons steering the cart, proceed down aircraft SI aisle to the Telescope Flange.

¹⁰⁷ This 'Caution' is an example of the 'Caution' format only. It is not assumed that a Dewar will need to be half full to transport.

C. Mounting Preparation.

- (1) Clear area around Telescope Flange.
- (2) Determine that the aircraft is level and will not be moved during installation.
- (3) Determine that the Telescope is 'Caged' and secure.
- (4) Notify Flightdeck that 'Science Instrument Mounting' is about to occur.
- (5) Verify that the TA Flange O-Ring is properly installed with adequate grease.
Reference: 95-61-03, SI FLANGE MOUNTING GENERAL PRACTICES.
- (6) Push BOZO SI as close to Telescope Flange as possible.
- (7) Raise lifting jacks until gentle pressure is applied to both Lifting Harness pins.

D. Pin Mount

- (1) Verify upper and lower pins are:
 - (a) Clean.
 - (b) Smooth (no scratches or corrosion on plating).
 - (c) Not Loose.
- (2) Verify SI alignment pin holes are not obstructed.
- (3) Release restraint straps.

CAUTION: The SI is now supported by the Lifting Jacks and the jacks must be raised so as to keep the instrument level. If one jack is raised too quickly the instrument will become unbalanced, tip over and cause damage.

- (4) Keeping the jacks level raise SI Upper Alignment Hole up to Upper pin.
- (5) Push SI until the SI Flange gently touches the Upper Pin.
- (6) Carefully lift or lower SI until Upper Pin will slide into Upper Alignment Hole.
- (7) Gently push SI onto Telescope Flange until Lower Pin touches SI Flange.

- (8) Assign a person to assure that the SI will not slip off of Upper Pin.
- (9) Lower Lifting Jacks Until the Lower Pin can freely enter Lower Alignment Hole.
- (10) Gently Push SI until Both Flanges are flush.

WARNING: The SI is only supported by the Upper and Lower Pins. If not quickly secured, injury or damage can occur.

E. Install and tighten flange bolts per¹⁰⁸ 95-61-03, SI FLANGE BOLT INSTALL.

F. Attach Accessories.

- (1) Remove Lifting Harness.
Reference: BOZO Harness, BC9223F.
- (2) Attach the following Instrument Boxes to BOZO Instrument brackets.
Reference: BOZO SCIENCE INSTRUMENT, BC9201F.
 - (a) Amplifier, Radio Shack STA-95B.
 - (b) Data Processor Box, Heath Kit X-56A.
 - (c) Fiber Optic Adapter, Mag-Lite 3D-Ce-LL.
 - (d) Cable Drape Adapter, Levelor 72-X48.

WARNING: Do not attach SI to aircraft systems unless approval from Cockpit Crew and Mission Director. Damage to aircraft or SI could occur if proper preparations are not accomplished.

- (3) Top off He and N dewars as required.
Reference: 95-62-01, AIRCRAFT SI LIQUID HELIUM TRANSFER and 95-62-02, AIRCRAFT SI LIQUID NITROGEN TRANSFER.
- (4) Attach Relief Valves.
Reference: 95-61-11, SI DOUBLE NECK RELIEF VALVE INSTALL.

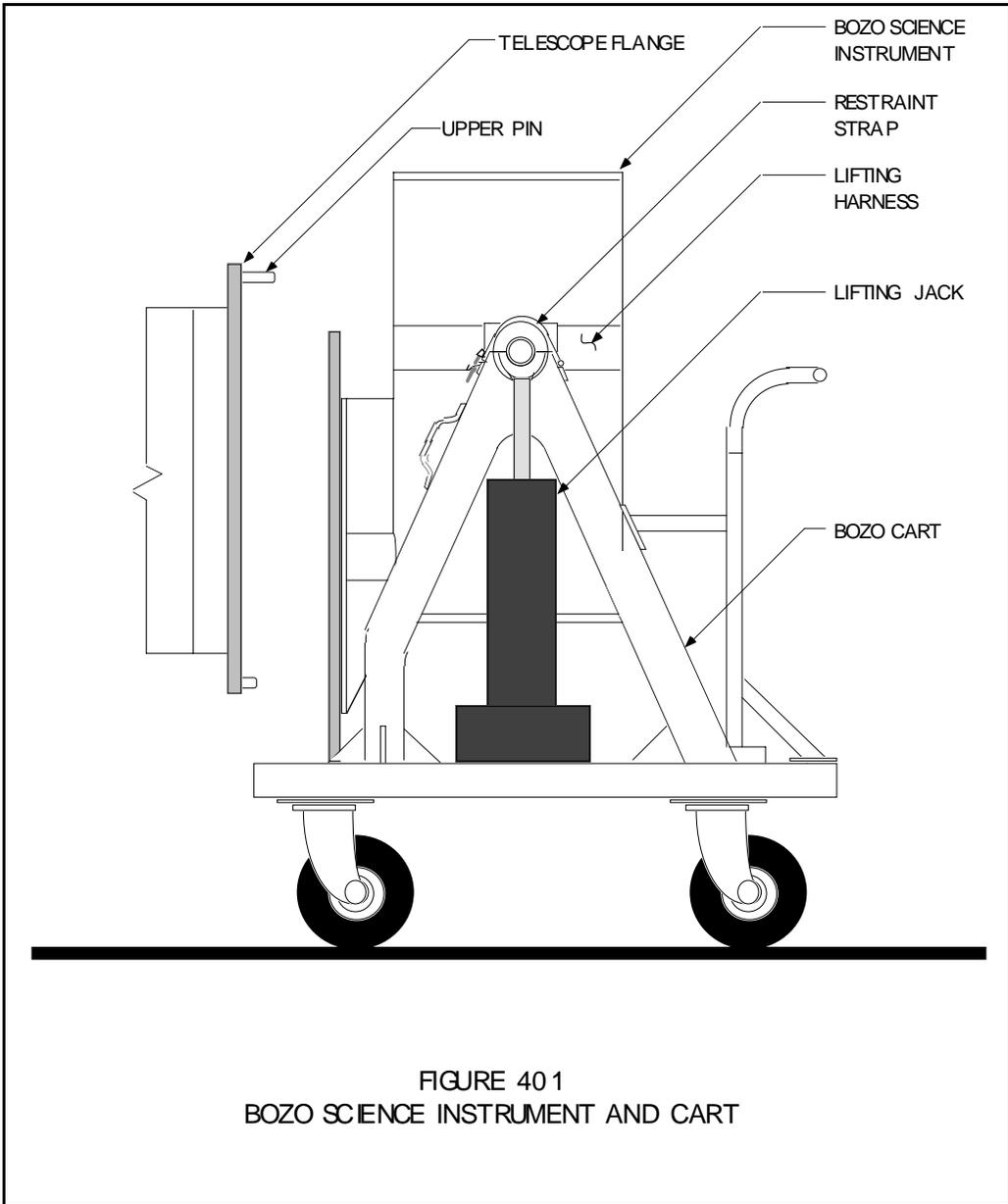
G. Inspect or determine the following:

¹⁰⁸ Use of the term 'per' requires that the item be accomplished exactly as written. 'Reference' means to use the quoted document as a guide. Accomplishment referencing or per a controlled documented process will allow changes to the process without having to revise every location it is used. The process could include special inspections and requirements and as such tooling or parts should be referenced early in the primary document.

- (1) The Flange Bolt installation is correct.
- (2) All SI wiring is secure.
- (3) Relief Valve is secure.
- (4) Accessories are secure with lanyards attached.
- (5) Area around Telescope Flange is free and clear of debris and other items

H. Post Installation.

- (1) Remove and store BOZO Cart.
- (2) Remove and store tooling and kits.
- (3) Notify the Flightdeck that the 'SI is mounted and secure'



Apendix B

WRITING STYLE GUIDE

Appendix B WRITING STYLE GUIDE

1. General

Note: The purpose for discussing writing style is to permit all authors to produce documents that are consistent in presentation and thus more easily understood by the user(s).

- A. The maintenance manual is designed to provide step-by-step procedures for technicians who are familiar with science instrument or aircraft maintenance. A user may not have the practical experience or training on the specific task, but has accomplished similar tasks on other instruments.
- B. The manual is not intended to be a training guide. Therefore it is not appropriate to present explanations as to why something is done, unless necessary to emphasize a potential safety hazard.
- C. Special emphasis must be placed on accomplishing tasks in the most efficient and logical manner possible, consistent with safety.
- D. Procedures must provide sufficient information to enable the technicians to accomplish the entire task at hand without reference to other sections of the manual.

E. EXCEPTIONS:

- (1) Removal or installation of other components; refer to the appropriate MM to gain access both for the removal/ re-installation and any operational checks that may be necessary.
Example: The installation of the ramps to and from the entry door would not need to be repeated only referenced when loading an instrument.
 - (2) Lengthy processes covered by special specifications. Refer to those specifications.
Example: Standard calibration of a TA interface would be a step referenced.
- F. Meaningful illustrations are to be used where they can convey a message more clearly than words. Often the illustration is used supporting text.
 - G. New procedures must be verified on the airplane or science instrument before being approved for publication. This assures that all the parts fit, the procedure is correct and that the instructions are clear to the user.

Appendix B
WRITING STYLE GUIDE

2. Writing Style Specifics

- A. Technical writing is a precise, concise and direct form of writing.
 - (1) Instructions shall be written so that there can be no doubt as to the meaning.
 - (2) Steps will be simply stated and arranged to minimize time and motion, yet attain maximum safety.
 - (3) Words shall be carefully chosen to avoid ambiguity and usage of chosen words shall be consistent throughout the procedure.
- B. Presumption is forbidden. Personnel safety and care of the airplane and science instrument depend upon the exactness and completeness of instructions.
 - (1) This is particularly true of acronyms. If you intend to use acronym(s) spell the item in words at the first opportunity, followed by the acronym in parentheses. Then the acronym may be used throughout the procedure. If more than one procedure, repeat the process in each procedure.
 - (2) Acronym(s) or other specific items can also be listed in a specific location for reference.
- C. Sentences shall be concise and contain one thought. The simple declarative sentence is the most adaptable (and easily understood) form of sentence construction. i.e. SUBJECT-VERB-OBJECT.
- D. Sentences shall be written in the present tense. The future tense can be misleading and may be used only when there will be an appreciable delay between the action and the result of the action.
- E. Instructions shall be written in the strict imperative form. i.e. ACTIVE VERB - OBJECT. (Remove Bolt).
- F. Instructions shall impart decisive actions. Statements of what might, should or would occur shall be avoided.
- G. Instructions shall not contain alternative or optional procedures. Assuming they are written in the most logical and efficient manner, there is no need for options.
- H. Instructional steps shall contain only one action. Multiple actions in one step are permitted only if they are necessary and an immediate consequence of the first. (Remove Bolts. Retain for re-installation).
- I. Grammatical articles (the, a, an, etc.) shall not be used in procedures, except when needed for clarity.
- J. Avoid the use of pronouns, especially the word "it": Use the name of the object.
- K. Abbreviations in text shall be kept to a minimum.
 - (1) Those which have become standard through usage, may be used without exception. (Examples: rpm, psi, etc.)

Appendix B
WRITING STYLE GUIDE

- (2) Standard abbreviations that represent proper nouns shall be capitalized (Examples: FAA, UAL, USPS, etc.)
- (3) No period shall follow an abbreviation unless it ends a sentence or spells another word. (Examples: no., in., fig., etc.)
- (4) Common scientific or aircraft abbreviations should not be assumed to be understood.

3. Draft Preparation

- A. Format shall be in accordance with following MAINTENANCE MANUAL section.
- B. Draft copy shall be typed or printed, exactly as you want it to appear in published form. Don't assume that it will be proof read or that mistakes will be corrected. Pay particular attention to punctuation, spelling and upper/lower case letters.
- C. Use of Signal Words WARNING, CAUTION and NOTE must be in accordance with AOP.
 - (1) WARNING - Calls attention to methods, procedures or limits which must be followed precisely to avoid INJURY OR DEATH TO
 - (2) CAUTION - Calls attention to methods, procedures or limits which must be followed precisely to avoid DAMAGE TO EQUIPMENT.
 - (3) NOTE - Call attention to methods which make the job easier.
- E. Locate circuit breakers or other power control devices by illustration, chart, panel location or grid number.
- F. When referring to circuit breakers, grounds, panels, instruments, etc., use nomenclature (in caps) exactly as it appears in the airplane.

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Example:

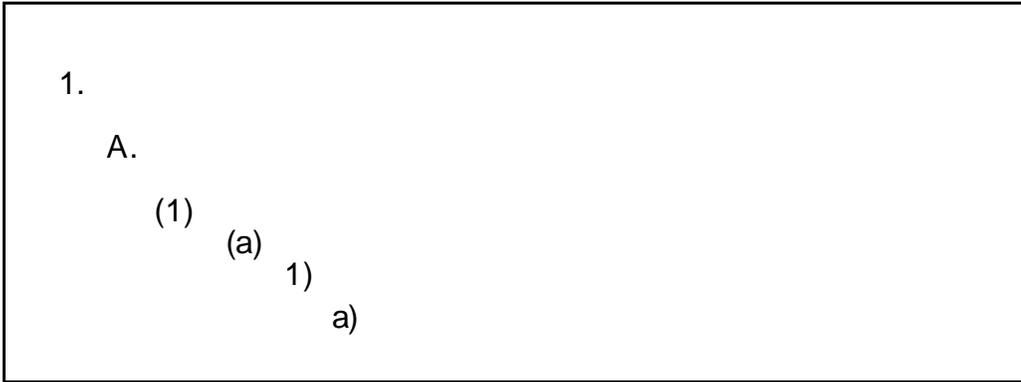
- | |
|--|
| <ul style="list-style-type: none">(1) Open the following Circuit Breakers<ul style="list-style-type: none">(a) P415 POWER DISTRIBUTION PANEL - RIGHT:<ul style="list-style-type: none">1) 415L36, FLT RCDR DC(b) P6 Main Power Distribution Panel:<ul style="list-style-type: none">1) 6C33, AOA HEAT L2) 6C34, AOA HEAT R |
|--|

- G. Each time you revise a procedure, update the "Special Tools and Materials paragraph with stocked equivalents if they aren't currently listed.
- H. Provide the best possible copy for illustrations. It has to be fit for reproduction. If a paper copy is supplied, two copies are necessary: the master with only graphics and a second copy showing how the text will appear.

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4. Format

- A. For Writing Methods and "Style" refer to WRITING STYLE GUIDE above.
- B. Paragraphing will be as follows in all maintenance manual documents.



Example Layout

- C. Page identification is at right side of the footer and includes:

Note: The page bottom is a function of publication. You may include it for clarity or not include if you wish.

- (1). ATA based subject number such as 95-11-01
- (2). Configuration number located under fleet ID if more than one configuration involved.
- (3). Page number (see D. following, for page series requirements).
- (4). Date of origination or revision.

EXAMPLE: Right Hand Corner (Footer)

		END
	BOZO	95-11-01
	Page 201	APR 18/03

- D. Selection of a Subject Number shall be as follows:

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		95		11		09/		401	
<u>Chapter</u> (System) _____									
<u>Topic</u> (Subdivision of a Chapter) _____									
<u>Subject</u> _____									
<u>Page Series</u> (Part of Document Designator) _____									

- (1) Chapter: The first element of the document identifier identifies the chapter in which the material is properly classified. Pre-assigned chapter names are per ATA definitions. The observatory specific section list is per Table A.
- (2) Topic: The second element identifies the topic within the assigned chapter.
 - (a) The first digit is per the ATA Turbine Aircraft Index. The second is a manufacturer's topic number. The manufacturer's topic number shall be used whenever possible.
 - (b) The Observatory breakdown is shown in Table A.
- (3) Subject: The third number classifies the material more precisely than by Chapter-Topic.
 - (a) Use the manufacturer's number whenever possible.

E. Page numbering is by page series as determined by the "Action".

ACTION	PAGE SERIES
Description and Operation	1 - 99
Troubleshooting	101 - 199
Maintenance Practices	201 - 299
Servicing	301 - 399
Removal/Installation	401 - 499
Adjustment/Test	501 - 599
Check (or Operational Check)	601 - 699
Cleaning/Painting	701 - 799
Approved Repairs	801 - 899
illustrated Parts List	1001 -1999

F. Illustrations.

- (1) A Figure number shall always appear immediately preceding the Figure title. Figure numbers shall correspond to document page numbering series.
- (2) Figure Format.
 - (a) All Illustrations shall follow standard Drafting Manual practices and shall not require rotation to read if possible.

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- (b) Every effort shall be made to not crowd the figure. The use of "details" and "views" (i.e., Sheet 1 of 2, Sheet 2 of 2, etc.) is encouraged.

G. References to Other Documents.

- (1) References to other documents will be limited to:
 - (a) Other Documents within the same Maintenance Manual.
 - (b) UAMM Volume I, Books 1, 2 and 3
 - (c) Structural Repair Manual
 - (d) UA Illustrated Parts Catalog and Illustrated Parts List
 - (e) Wiring Diagrams
 - (f) CRT Displays
 - (g) Instrument Drawings
- (2) Engineering References such as AD notes.
- (3) Reference to other documents shall be listed in the Referenced Procedures section of the task document.

H. Service Tips.

- (1) Service Tips are Alpha pages against the parent page series.
- (2) Service Tips should only be used to provide information that does not fit within the basic subject. Examples are helpful hints or trouble shooting shortcuts which cannot permanently replace the basic procedures.

Appendix C
GLOSSARY OF UAL
ACTION VERBS, ACRONYMS, ABBREVIATIONS AND TERMS