



National Optical Astronomy Observatory

Kitt Peak National Observatory • Cerro Tololo Inter-American Observatory • NOAO Gemini Science Center

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## CONFIGURATION MANAGEMENT POLICY AND HANDBOOK

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**REVISION HISTORY**

<b>Rev</b>	<b>Date Approved</b>	<b>Sections Affected</b>	<b>Remarks</b>
0	2013		Initiated
0.1	11/2014	All	reformatted
0.2	12/2014	Written Proc, Eng files Doc #, header, footer	Added sections, doc#, reflect # & title in header/ footer sections
0.3	7/2016	Added ECR Section	

Authorized by:

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*(type name, title)*

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## CONFIGURATION MANAGEMENT POLICY (Documentation Control)

### *PURPOSE:*

- ✿ Provide consistency in the day to day process operation and furnish a basis for training personnel.
- ✿ To assure minimum document requirements and methods provide the desired results of identifying, controlling and tracking throughout the life of the item.
- ✿ Provide a basis to identify and implement system improvements and normal expectations.
- ✿ Maintain accurate product configuration with traceability of changes.
- ✿ For the benefit of interdepartmental communication and centralize technical documents.

### *SCOPE:*

- ✿ Applies to all design, manufacturing, test, quality, installation, maintenance, and upgrade functions, as well as, engineering changes applicable to project teams located in Tucson, Arizona.
- ✿ Policy approach to allow tasks to be performed by subcontractors and supporting organizations.
- ✿ All originators of NN-ETS & KPNO controlled documents and person approving those documents are required to follow these processes, as well as expected to participate in regular improvements to the process.
- ✿ CM policy currently does not apply to the planning and costing of projects and upgrades.
- ✿ Architectural and facilities documents do not currently fall under the application of this policy. (currently a true statement, should define exceptions.)
- ✿ Project emails are not subject to control; although, if contents are pertinent in any way to the configuration of a controlled item, the email and/or contents shall released under document control.

### *POLICY / PRACTICE:*

- ✿ A simple, fast, accurate, systematic, flexible and well understood process approach to, identifying, controlling, and tracking our telescope and instrumentation products from inception through end of life with minimal effort and cost. Includes hardware, firmware & software to a limited extent.
- ✿ Standardize documents and provide training of policies and practices in addition to assure that the system is followed through an auditing process. Processes to include document control, hardware control, and change control.
- ✿ To consist of control, identification, traceability and reporting.
- ✿ To consist of Release, Change Request/Order, Change Control and Bill of Material processes.
- ✿ Maintain a list of Documents and approved Change Orders.
- ✿ Improve communication between internal departments, as well as the external partners or manufacturers.

- ✿ Internal document distribution is upon request and shall have traceability.
- ✿ Document distribution to an entity or organization outside of AURA is upon request and shall have traceability as well as the necessary approvals to comply with intellectual property policies.
- ✿ Technical documents shall enter the company vault upon initiation, current data management and revision control software is Enterprise Product Data Management (ePDM).
- ✿ The current documentation must reflect the current configuration.
- ✿ Digitization of legacy documents for improved user access, archive and reduced loss potential.

*PROCEDURE:*

- ✿ Issues from user input and day to day issues with potential solutions brought to document committee, through regular meetings, for discussion and review.
- ✿ Policies, practices and procedures review to include, sustainability, compliance with items stated in the policy section of this section, while maintaining effectiveness for all users.
- ✿ The CAD Lead / Configuration Manager will write up new policies and add to regularly scheduled communication and/or training to users.
- ✿ Policies with procedures not shown here are to have their own section standard covering all their procedural details.

*PRIMARY RESPONSIBILITY:*

CAD Lead / Doc Control Manager / Team

- ✿ Design and documentation of the CM processes by flow diagrams, forms, form instruction, standards and further policy as required.
- ✿ To manage the processes and report statistics as to the performance of the system.
- ✿ Gather user input, issues and solutions
- ✿ To educate and train those involved or impacted by the document control standards.

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## FORMAT OF A WRITTEN POLICY OR STANDARD

### *PURPOSE:*

- ☼ To assure consistency, ease of use, and quick reference capability on the topic of interest.

### *SCOPE:*

- ☼ Intra departmental processes
- ☼ Inter departmental processes to the extent of information exchange
- ☼ Only the most common situations to have written standard, exceptional circumstances to be handled by exception. *(During the document upgrade project it may be necessary to create a handbook for the "exceptional" situations for consistent processing.)*

### *POLICY / PRACTICE:*

- ☼ One subject or topic per standard.
- ☼ Only list statements that are important.
- ☼ Standards will take the appearance of:
  - Forms
  - Form Instructions
  - Policy Statements
  - Flow Diagrams
  - Standard Definitions
  - Standard Methods
- ☼ Include elements that are critical to the interdepartmental function of those processes.
- ☼ Keep sentences short, use bullets instead of paragraph numbering.
- ☼ Standards and forms shall be numbered; numbers to be assigned by document control.
- ☼ Forms shall have a form instruction standard and find number to easily associate instruction to the form, an online is an acceptable standard.
- ☼ Standards will be in written in the form and format herein described: Each shall contain the header, footer and subtitles: Number, Date, Title, Page of Pages, Purpose, Application, Policy / Practice, Procedure, Primary Responsibility, and Authorization. When a section is not applicable enter NA.

### *PROCEDURE:*

- ☼ Describe the process method required to interface between departments.
- ☼ Internal department practices to delineate instructions as necessary
- ☼ Flow diagrams, with minimal verbiage, are the preferred method of describing a procedure with action and title or department of responsible party. Written descriptions may accompany flow diagrams.
- ☼ Primary Responsibility lists the department that shall be responsible for keeping the standard up to date. They would draft improvements, circulate them to the document committee, train key people and implement the change.

- ✿ Authorization requires the signature of the manager in authority over this process or standard. Any management or key people affected by the standard should be given an opportunity to review and comment, but need not sign.

*PRIMARY RESPONSIBILITY:*

- ✿ CAD Lead / Doc Control Manager

Date: October 25<sup>th</sup>, 2013

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## WRITTEN PROCEDURES

### *PURPOSE:*

- ✿ Facilitate uniformity and revision control of all procedural documents

### *SCOPE:*

- ✿ KPNO Engineering and Technical Services (ETS)
- ✿ KPNO Operations
- ✿ KPNO Facilities Management (MAINT)
- ✿ KPNO Safety

### *POLICY / PRACTICE:*

- ✿ A procedure shall be written for all multi-step tasks. Exceptions must be approved by a direct supervisor or manager and configuration management.
- ✿ Each procedure will be assigned a document number and use the ETS\_ProceduralDocForm.dotx template. MAINT use form ?????
- ✿ The word “Procedures” shall appear in the document title.
- ✿ All sections of the template may not be applicable. When a section is not relevant for the procedure, the document will retain the section heading with “NA” in that section body.
- ✿ Changes after document release are required to follow the KPNO document change policy.
- ✿ Images and illustrations can be inserted directly in the procedure document; they will be labeled with verbal captions or numbered figures. Original graphics files \*.jpg shall also be placed in vault.
- ✿ Section definitions:
  - Purpose - define what the procedure is intended to accomplish. Some background information may be included in the purpose to help explain the rationale for the procedure.
  - Applicable To - specify who the procedure applies to and who is authorized to perform the procedure. It is recommended that position titles be given rather than the specific names of individuals who will perform the procedure.
  - Scope – range, scale, reach of the procedure with relevant background information.
  - Definitions – define terminology and acronyms referenced throughout the procedure.
  - Training - Provide the qualifications, training requirements and prerequisite knowledge for those responsible for performing the procedure.
  - Safety – shall include: identified hazards, available resources (safety manuals, MSDS), safety equipment requirements, personal protective equipment requirements, steps to follow in the event of an incident or emergency. This section shall include & reference the JHA (Job Hazard Analysis) & must include the daily safety briefing with toolbox /tailgate meeting form.
  - Personnel, Equipment and Materials – identify required personnel with appropriate level of qualifications, equipment, tools and materials; include number of personnel, certifications, calibration, test and maintenance



requirements for equipment and tools. When applicable, equipment operating procedures should be incorporated into the procedure or a reference made to the manufacturer's operating instructions and their location.

- Procedure – steps involved in carrying out the procedure, using a work flow approach, it is recommended that the procedure be presented in logical steps.
  - Step 1....
  - Step 2....
  - Step 3 ...

Ensure that sufficient detail is provided so that an appropriately trained person could perform the procedure without guidance. Append JHA Item numbers shall match corresponding steps (i.e. 8.6.1). As appropriate, the procedure should include safety precautions, quality control measures, clean-up requirements, and disposal of hazardous waste, and troubleshooting tips.

- Procedure Review – define a schedule the procedure shall be reviewed. Typically, procedures are reviewed every three years, undoubtedly, before engaging in an infrequent task, although they may be reviewed at any time. The procedure shall be reviewed and revised immediately if errors or changes are identified.
- Records – list the record types that are generated from the procedure, where to find and access the records. This includes training records, log books, forms and electronic records.
- References – list all references and resources related to the procedure. Include applicable standards, technical documents and legislation that may govern activities contained in the procedure.

#### *PROCEDURE:*

Note: At any time during the procedure creation process, the document can be submitted to Configuration Management for inclusion into the vault. However, once submitted, it becomes a controlled document that must be checked out of the vault to edit.

- ✿ Get procedure document template from [vault, server, web location]
- ✿ Title and fill all applicable sections, putting NA in sections that are not applicable.
- ✿ Request document number from Configuration Management or other ETS staff.  
Document number is to be used as the file name.
- ✿ Send to applicable parties for review and approval.
- ✿ After applicable parties have approved the document, request the Configuration Manager to perform the following functions:
  - Change the status of the document to “RELEASED” in the vault
  - Publish a “REFERENCE ONLY” copy of the document to the ETS released document reference website.

At this point, the document is “RELEASED” and can be used by any interested party for design or reference.

Note: After release, changes to the content of a document must be done according to the KPNO Document Change Policy, which requires the use of the KPNO Change Request Form [Location?] Exceptions to this policy include minor typographical errors; any exceptions will be reviewed by the Configuration Manager.

*PRIMARY RESPONSIBILITY:*

- ✿ KPNO-ETS, KPNO Operations, KPNO Facilities Management

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## REQUIREMENTS FOR HARDWARE CONTROL

### *PURPOSE:*

- ✿ To define minimal requirements of the document types, content and handling to ensure consistency and enable user to acquire the latest and best information available.
- ✿ Ensure that accurate technical descriptions of telescopes and instrumentation are developed, controlled and maintained.
- ✿ Mechanism for establishing document approval and release.
- ✿ Process for identifying and managing changes.
- ✿ Central technical library for reuse.
- ✿ To define approved software tools and/or methods used to convey requirements or design detail for a system or instrument.
- ✿ Provide consistent release and change policies.
- ✿ Provide consistent handling of legacy documents.
- ✿ Provide requirements guidelines to outside contractors and collaborators to ease integration of documents into our system.

### *SCOPE:*

- ✿ All groups involved in the design, manufacture, test, installation, use, upgrade and maintenance of NOAO-N telescopes and/or instrumentation.
- ✿ All administrative documents, electrical and mechanical engineering drawings, specifications, analyses, part models, pattern and symbol representation, reports or other performance measure for facility operations and instrument development by NOAO-N engineering and technical groups.
- ✿ All subcontractors and collaborators used by NOAO-N for telescope or instrumentation projects to the extent that is practical.

### *POLICY / PRACTICE:*

- ✿ All drafting practices will abide by the minimum drafting standards represented by ANSI Y14 as well as known good technical drawing practices such as those defined in “Technical Drawing” (Authors: Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak)
- ✿ Subcontractor and collaborator requirements will flow down through written Memorandums of Understanding (MOUs) and/or Statements of Work (SOWs) that are under revision control.
- ✿ All project documentation shall follow the policies and standards written in the Configuration Management Handbook and may only be excluded if a written exception has been approved and accepted by group managers and the configuration manager.

### *PROCEDURE:*

- ✿ Refer to the standard section for topics of interest as well as the ANSI Y14 standard publication for procedures.

*PRIMARY RESPONSIBILITY:*

✿ CAD Lead / Doc Control Manager

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## TECHNICAL DOCUMENT BACKUP SYSTEM

### *PURPOSE:*

- ✿ Ensure minimal loss of data after a hardware failure or other catastrophic event.

### *SCOPE:*

- ✿ All servers in use to store and maintain technical documents for the mechanical and electronic technical groups of NOAA-N, namely, as of this writing, draft3, draft4, and tiba.

### *POLICY / PRACTICE:*

- ✿ Storage method shall be evaluated each year for any necessary updates to equipment or capacity.

### *PROCEDURE:*



### *PRIMARY RESPONSIBILITY:*



### *AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## TECHNICAL DOCUMENT FORMATS AND TEMPLATES

### *PURPOSE:*

- ✿ Assure certain elements are present on drawing formats
- ✿ Uniformity, reduce the type of formats in use.

### *SCOPE:*

- ✿ Applies to all internal design, manufacturing, test, quality, installation, maintenance, upgrade and formal reporting functions, as well as, engineering changes applicable to project teams located in Tucson, Arizona.
- ✿

### *POLICY / PRACTICE:*

- ✿ Format sizes and dimensions shall abide by the appropriate section in ANSI Y14.5.
- ✿ Formats will all have a Body, Title Block and Revision Block.
- ✿ The revision shall be shown in the revision block and title block of the first page, and only in the title block of subsequent pages.
- ✿ “used on” information
- ✿ Documents will be titled according to hand book sections Drawing Title and Part Naming, Document Title Conventions.

### *PROCEDURE:*

- ✿ [where to find, what if template doesn't exist]

### *PRIMARY RESPONSIBILITY:*

- ✿ CAD Lead, ME Designer
- ✿

### *AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

				REVISIONS			
LTW	DESCRIPTION	EGR	DATE	BY	APPVD		

UNLESS OTHERWISE NOTED Dimensions are in inches 1/16" = 1:12 Copies of this drawing are for use only Information use in other drawings		  	<b>NATIONAL OPTICAL ASTRONOMY OBSERVATORIES</b> <small>OPERATED BY S&amp;C</small> <small>ASSOCIATION OF UNIVERSITIES FOR RESEARCH IN ASTRONOMY</small> <small>UNDER COOPERATIVE AGREEMENT WITH</small> <b>NATIONAL SCIENCE FOUNDATION</b>			
DO NOT SCALE DRAWING NEXT ASSEMBLY #		NAME {Drawing Type} {Title} {Title2}				
		USED ON C	REF {REV}			
Sheet1	SCALE	DESIGNED BY	DATE	CHECKED BY	DATE	DWG NO
	PCAD 2005	DRAWN BY	DATE	APPROVED BY	DATE	{Drawing Number}
		REVISED	DATE	APPROVED BY	DATE	RELEASED
						Sheet 1 of 2

<b>NATIONAL OPTICAL ASTRONOMY OBSERVATORIES</b>			
NAME {Drawing Type} {Title} {Title2}			
DWG NO {Drawing Number}	SIZE C	REF	REV {REV}
Print Date: Wed Oct 30, 2013		Sheet 2 of 2	

ADD MECHANICAL FORMAT EXAMPLES



## DRAWING TITLE & PART NAMING CONVENTION

### *PURPOSE:*

- ✿ Standardize naming terminology for drawing titles, part descriptions and bills of material.
- ✿ Aid in search function for items of interest or possible substitution

### *SCOPE:*

- ✿ All designed parts and assemblies.
- ✿ All vendor and manufacturer part models for reuse.
- ✿ Applies to both mechanical and electrical/electronic engineering groups.
- ✿ Note: Existing, or “legacy” documentation may not conform to this naming convention. Non-conforming documentation may be updated to conform to this naming convention if doing so is judged not to be excessively time consuming.

### *POLICY / PRACTICE:*

- ✿ The title should be as brief as possible but should contain sufficient information to categorize the part properly and to distinguish it from other similar parts.
- ✿ The drawing title shall consist of the following:
  - Identifying noun or noun phrase.
  - The most significant modifier or modifying phrase.
  - The next most significant modifier or modifying phrase
- ✿ The title will be shown on Drawings in upper-case letters.
- ✿ When the noun or noun phrase represents an item to which types, grades, variety, etc, are applicable, the remainder of the first part of the title shall consist of one or more modifiers.
- ✿ The modifier is separated from the noun or noun phrase by a comma and from any preceding modifier by a comma.
- ✿ Modifiers indicating what an item is, (its shape, structure or form) or what the item does, (its function) are preferable to modifiers indicating the location of the item (where it is used).
- ✿ The type designator and/or any additional modifiers required to further identify an item are separated from the first part of the title by a dash. Where applicable, the word “ASSEMBLY” shall be used as the last word of the noun phrase. The first part of the title shall be separated from the second part by a dash.
  - BRACKET, SUPPORT-MIXING VALVE
  - JUNCTION BOX, ELEVATOR UPPER LIMIT – JB5
  - COVER, PROTECTIVE, ROCKET MOTOR – FORWARD SECTION
  - TRANSPORTATION – DOLLY ASSEMBLY, EARTH SATELLITE
- ✿ The noun or noun phrase shall be used in singular form, except as follows:
  - Where the only form of the noun is plural, i.e., “TONGS”.
  - Where multiple single items appear on the same drawing, i.e., “FUSES”, “CONNECTORS”, “FASTENERS”.
  - Where the nature of the item requires the plural form, i.e., “CLIMBERS”, “GLOVES”.

- ✿ An ambiguous noun, or one which designates several classes of items, shall not be used alone, but shall be used as part of a noun phrase.

<u>Acceptable</u>	<u>Unacceptable</u>
SLIDE RULE	RULE, SLIDE
SOLDERING IRON	IRON, SOLDERING

- ✿ The title shall remain exactly the same on each sheet of a multi-sheet document.
- ✿ Nondescript items: When an item is not a container or material, but its name involves the use of a noun which ordinarily designates a container or material, a noun phrase shall be used as the basic name.

<u>Acceptable</u>	<u>Unacceptable</u>
JUNCTION BOX	BOX, JUNCTION
CABLE WRAPUP	WRAPUP, CABLE

- ✿ The following words shall never be used alone but may be the last word of a noun phrase. Exception – in certain instances, some of the listed words may be used as the first word in a basic noun phrase, i.e., “MACHINE SHOP” or “TOOL KIT”.

APPARATUS	EQUIPMENT	PLANT
ASSEMBLY	GROUP	SHIP
ASSORTMENT	INSTALLATION	SUBASSEMBLY
ATTACHMENT	KIT	TACKLE
COMPOUND	MACHINE	TOOL
DEVICE	MECHANISM	UNIT
ELEMENT	OUTFIT	VEHICLE

- ✿ The noun or noun phrase, is never abbreviated. Abbreviations are used in the modifiers only when space is limited. When used abbreviation shall conform to Abbreviations table on page 37??.
- ✿ When one drawing supersedes another, the new drawing, when practical, has the same title.
- ✿ Parentheses are not used to enclose any portion of the drawing title.
- ✿ Program/Project names should be added to the “Used On” block and not the title block; exceptions are the final or top assembly drawing.
- ✿ Hardware and fastener parts: Hardware/fastener type, type, thread, length, material/finish, specialty specifications. See Table ?? Approved abbreviations of types and materials.
  - SCREW, SHC M3.5 X 3mm SS
  - SCREW, FH 4-40 X 0.5” CR?
  - BOLT,
  - DOWEL, [DIAMETER] X [LENGTH]
  - WASHER, FLAT, [MATERIAL], [ID], [OD], [THICKNESS]
- ✿ Non-part drawings (i.e. schematics, wiring diagrams, logic diagrams, etc.) may include the drawing type as the second part of the drawing title. Second line may contain circuit function for that page of the document i.e., Control Logic, Telemetry, Power, Clocks.
  - ANALOG FRONT END – SCHEMATIC

- ✿ All electronics parts shall have a description attribute with the appropriate part description entered. (Part type, mounting & package, pertinent specifics with units relative to part should follow: value, voltage, current, lead pitch or spacing, materials,
  - IC, MSOP8 2 CH, 2.35V to 5.25V 250 KSPS 12 bit ADC
  - Cap, Cerc 1206 16V 20% X5R 22uF
  - Resistor, 0603 511 1/10W 1%

*PROCEDURE:*

- ✿ Enter the drawing title or part description into the “dwg title” custom property of the Solidworks model, it will pass to the drawing title automatically and the ePDM card.
- ✿ Vendor parts, enter the complete part description into the “dwg title” custom property of the Solidworks model, it will automatically pass to the BOM and the drawing title/description area on the file card.
- ✿ Electronics drawing title shall be entered in the appropriate manner for the software tool used. It must also be manually typed into the Document Title (Description) field of the data card in ePDM.
- ✿ Electronics parts shall have information entered into an attribute field defined as “Description”; this is what will populate the BOM.

*PRIMARY RESPONSIBILITY:*

- ✿ Part & template librarian for Mechanical documents
- ✿ Part & template librarian for electronics documents
- ✿ CM department

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## ENGINEERING FILES & DATA STORAGE

### *PURPOSE:*

- ✿ Provide common repository to store files pertaining to projects, system updates & studies.

### *SCOPE:*

- ✿ All engineering and technical service personnel that are involved in maintenance, repair or upgrade. Includes all facilities, telescopes, instruments in Tucson and on Kitt Peak.

### *POLICY / PRACTICE:*

- ✿ A folder will be created for each project or upgrade to facilities and instruments under the care of ETS. Current location is \\tiba\ETS\_Share\Projects
- ✿ First level folder is to be named using the common name of the facility or instrument, historical project number(s) should be added as a suffix to the folder name. This corresponds to the manner in which paper items were filed in cabinets.
  - 4m TCS Encoder Upgrade (2150-340, 345, 350)
- ✿ Second level subfolder should reflect the year or span of years the project took place.
  - 2014, 2013-14
- ✿ Other folders can be created as necessary to maintain logical and orderly files, avoid long folder & file names.
- ✿ Any and all information likely needed or of use in the future for maintenance, repair or upgrade shall be included. Example files: Design review material & comments, vendor contacts, communications internal & external, photos, calculation, graphs, plots, schedules, data sheets, part specifications, redline drawings, document change notes.

### *PROCEDURE:*

- ✿ Map drive to share name \\tiba\ETS\_Share (current admin Dee Stover)
- ✿ Create proper folder(s).
- ✿ Copy or move files into appropriate folders.

### *PRIMARY RESPONSIBILITY:*

- ✿ ME group manager, EM group manager

### *AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## DOCUMENT, DRAWING NUMBER STRUCTURE & ASSIGNMENT

### *PURPOSE:*

- ✿ To provide traceability, unique and precise identification of all documents and essentially the items they specify.

### *SCOPE:*

- ✿ Applies to all internal design, manufacturing, test, quality, installation, maintenance, upgrade and formal reporting functions, as well as, engineering changes applicable to project teams located in Tucson, Arizona.

### *POLICY / PRACTICE:*

- ✿ Each item shall be identified by a part number which will be the drawing/document number.
- ✿ Restricted to internally generated documents only, exceptions; alterations of purchased parts and/or contracted design parts. See standard on Altered Items and Modified parts.
- ✿ Avoid breaking the document number chain, by not changing the number of a document.
- ✿ Use Table 4.1 for guidelines to assign document numbers, and the number generator to acquire a number for documents.
- ✿ Contractor documents and documents from outside institutions shall retain their original document numbers. NOAO to assign an internal number only if the documents do not have one issued from the originator.
- ✿ Drawing number format: XXXX-AA-###-####, all sections separated by a “-“, the type section and serial number section are used only as necessary on rare occasions.
- ✿ A number should be assigned once it is known that design will be fully developed with the intentions of implementing.
- ✿ Currently numbered items to be used for another telescope or instrument may keep the existing number until such time that it has modifications that are not interchangeable to all locations of use. At this point the parts will be separated to unique numbers making sure each reflect the proper telescope or instrument designator. New drawing must be fully specified and not reference old number for any details. Exceptions may be circuit cards that carry serial numbers, essentially tabulating them and their specific configuration.
- ✿ Take out only the quantity of numbers that you need.

### *PROCEDURE:*

- ✿ Use table 4.1 to help identify the designator, category and sub-division of the item needing a number.
- ✿ Start the number generator. (describe process here)
- ✿

*PRIMARY RESPONSIBILITY:*

- ✿ CM depart with input from all of NN-ETS staff.

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

XXXX	XX	XXX	XXXX	X	XXX	
Designator						
Tele / Inst	Category	Sub-Division	Document Number	Type	Serial No.	
	AD Administrative	001 Operational Concepts (OCDD)	0001-XXXX....	P Prototype	Serial No. for EL dwg only, if req.	
		002 Functional Performance (FPRD)	0001-XXXX....			
		003 Test & Integration Plan	0001-XXXX....	N Non-Prototype		
		004 Quality Assurance Plan	0001-XXXX....			
		005 Risk Management Plan	0001-XXXX....			
		006 Users Manual	0001-XXXX....			
		007 Presentations	0001-XXXX....			
		008 Other Important Data (traceable information)	0001-XXXX....			
2000			009 Forms & templates		0001-XXXX....	2000 = 2.1 Meter
2036			010 Doc Control		0001-XXXX....	2036 = .9 meter (36")
2100			011 Published Binders & eBinders		0001-XXXX....	2100 = 4 Meter
2200			012 System configuration		0001-XXXX....	2200 = Vacuum Chamber
2205			013 Product specification (datasheet)	0001-XXXX....	2205 = 4 Meter Aluminizing Facility	
3000	AN Analysis	001 Optical	0001-XXXX....	2210 = 2 Meter Aluminizing Facility		
3075		002 Structural	0001-XXXX....	2500 = KP Site Monitoring Suite (KPSMS)		
3500		003 Thermal	0001-XXXX....	3000 = Solar		
4000		004 Design	0001-XXXX....	3075 = Vacuum- Soils		
4005	EL Electronics	010 Block Diagrams	0001-XXXX....	3500 = WIYN		
4010		020 Mechanical Assemblies electronics chassis & boxes assemblies	0001-XXXX....	4000 = Std telescope instruments & their adaptors		
4900		021 Mechanical details electronics chss & boxes	0001-XXXX....	4005 = note univ dewars		
5000		022 Mech - details of altered OEM items	0001-XXXX....	4010 = CCD Camera		
6000		023 Tools, (HW& SW), Fixtures, ETCs for elect stuff	0001-XXXX....	4900 = Misc Instruments		
7000		030 Cabling Drawings & Lists	0001-XXXX....	5000 = Mountian		
COS		040 Card Layouts - card assembly	0001-XXXX....	6000 = Tucson		
KOS		041 Card detail (fabrication)	0001-XXXX....	7000 = Optics (if ot for specific designator)		
M1U		042 Card schematics	0001-XXXX....	COS COSMOS		
MNSN		043 Card artwork	0001-XXXX....	KOS KOSMOS		
NFM		044 Card BOMs (parts lists)	0001-XXXX....	M1U = Mosaic Upgrade 1.1		
TRNT		045 Board Description Document	0001-XXXX....	MNSN = MONSOON		
		050 Interconnect & Wire Diagrams, Wire lists	0001-XXXX....	NFM = NEWFIRM		
		060 Firmware	0001-XXXX....	TRNT = TORRENT		
		070 ASSEMBLY RECORDS	0001-XXXX....			
		071 Board ASSEMBLY RECORD TAG	0001-XXXX....			
	072 Chassis ASSEMBLY RECORD TAG	0001-XXXX....				
	073 System ASSEMBLY RECORD TAG	0001-XXXX....				
	080 Functional Test Record (reports)	0001-XXXX....				
	090 OEM manuals and data	0001-XXXX....				
	100	0001-XXXX....				

XXXX - XX - XXX - XXXX		X - XXX
Designator		
Tele / Inst	Category	Sub-Division - Document Number - Type - Serial No.
		000 <u>Building &amp; Dome Structure</u> - 0001-XXXX....
		005 Civil (Site Plan) - 0001-XXXX....
		010 Architectural (building, plot, floor plans, pier & foundation, observing room) - 0001-XXXX....
		020 Mechanical (plumbing, hvac, glycol) - 0001-XXXX....
		025 Fire Protection - 0001-XXXX....
		030 Dome Systems - 0001-XXXX....
		031 Drives - 0001-XXXX....
		032 Shutter & Wind Scm - 0001-XXXX....
		033 Crane - 0001-XXXX....
2000		040 Elevator & Platform - 0001-XXXX....
2036		050 Building Electrical - 0001-XXXX....
2100		060 Structural - 0001-XXXX....
2200		
		100 <u>General Assemblies &amp; Misc</u> - 0001-XXXX....
2205		105 Base Frame - 0001-XXXX....
2210		110 Polar Axis-Azimuth - 0001-XXXX....
2500		115 Cable Wrap Up - 0001-XXXX....
3000		125 Tube-055 - 0001-XXXX....
3075		130 Center Section - 0001-XXXX....
3500		135 Counterweights - 0001-XXXX....
4000		140 Top End Assembly - 0001-XXXX....
		<u>Optical Systems (mechanical perspective)</u>
4005		200 (Cells, Accessories, support details & assemblies) - 0001-XXXX....
4010		210 Primary - 0001-XXXX....
4900		220 Secondary - 0001-XXXX....
5000		230 Tertiary - 0001-XXXX....
6000		240 Layout - 0001-XXXX....
7000		300 <u>Telescope Systems</u> - 0001-XXXX....
COS		310 Drive Systems - 0001-XXXX....
KOS		311 R.A. Drive - 0001-XXXX....
M1U		312 Dec. Drive - 0001-XXXX....
MNSN		313 Altitude - 0001-XXXX....
NFM		314 Azimuth - 0001-XXXX....
TRNT		320 Prime Focus systems - 0001-XXXX....
		321 Corrector - 0001-XXXX....
		330 Telescope Service Systems - 0001-XXXX....
		331 Oil System - 0001-XXXX....
		332 Compressed Air Sys - 0001-XXXX....
		333 Helium Sys - 0001-XXXX....
		334 Chiller Sys (telescope) - 0001-XXXX....
		335 Vacuum System (telescope) - 0001-XXXX....
		350 Control Systems - 0001-XXXX....

- Tele / Inst Designator\*
- 2000 = 2.1 Meter
  - 2036 = 9 meter (36")
  - 2100 = 4 Meter
  - 2200 = Vacuum Chamber
  - 2205 = 4 Meter Aluminizing Facility
  - 2210 = 2 Meter Aluminizing Facility
  - 2500 = KP Site Monitoring Suite (KPSMS)
  - 3000 = Solar
  - 3075 = Vacuum- Soils
  - 3500 = WIYN
  - 4000 = Std telescope instruments & their adaptors
  - 4005 = note univ dewars
  - 4010 = CCD Camera
  - 4900 = Misc Instruments
  - 5000 = Mountian
  - 6000 = Tucson
  - 7000 = Optics (if ot for specific designator)
  - COS = COSMOS
  - KOS = KOSMOS
  - M1U = Mosaic Upgrade 1.1
  - MNSN = MONSOON
  - NFM = NEWFIRM
  - TRNT = TORRENT



XXXX	-	XX	-	XXX	-	XXXX	-	X	-	XXX	
Designator											
Tele / Inst	-	Category	-	Sub-Division	-	Document Number	-	Type	-	Serial No.	
				351	Main Console	0001-XXXX....					
				352	Console Control (Standard Equip)	0001-XXXX....					
				353	Hand Paddle	0001-XXXX....					
				400	<u>Cass Systems</u>	0001-XXXX....					
2000		ME Mechanical		405	Calibration Source Assembly	0001-XXXX....		2000	=	2.1 Meter	
2036				415	Cass Guide	0001-XXXX....		2036	=	9 meter (36")	
2100				420	Dewar Mount	0001-XXXX....		2100	=	4 Meter	
2200				450	Adapters (universal type)	0001-XXXX....		2200	=	Vacuum Chamber	
2205				460	Cass Rotator	0001-XXXX....		2205	=	4 Meter Aluminizing Facility	
					600	<u>Handling Equipment</u>	0001-XXXX....		2210	=	2 Meter Aluminizing Facility
2210					655	Mirror Handling Equipment	0001-XXXX....		2500	=	KP Site Monitoring Suite (KPSMS)
2500					660	Handling Carts	0001-XXXX....		3000	=	Solar
3000					700	<u>Test Equipment</u>	0001-XXXX....		3075	=	Vacuum- Solis
3075					705	Collimation Equipment	0001-XXXX....		3500	=	WIYN
3500					710	Instrumentation Test Equipment	0001-XXXX....		4000	=	Std telescope instruments & their adaptors
4000					715	Calibration screen (white spot)	0001-XXXX....		4005	=	note univ dewars
4005								4010	=	CCD Camera	
4010		OP Optical elements & Design		000	<u>Optics &amp; Optical Systems</u>	0001-XXXX....		4900	=	Misc Instruments	
4900				001	Spot Diagrams	0001-XXXX....		5000	=	Mountain	
5000				002	Clear Apertures	0001-XXXX....		6000	=	Tucson	
6000				003	Ray Traces	0001-XXXX....		7000	=	Optics (if ot for specific designator)	
7000				004	Misc.	0001-XXXX....		COS	=	COSMOS	
COS				010	Mirrors	0001-XXXX....		KOS	=	KOSMOS	
KOS				020	Lens	0001-XXXX....		M1U	=	Mosaic Upgrade 1.1	
M1U				030	Filters	0001-XXXX....		MNSN	=	MONSOON	
MNSN				040	Windows	0001-XXXX....		NFM	=	NEWFIRM	
NFM			SW Software		001	Block Diagrams	0001-XXXX....		TRNT	=	TORRENT
TRNT				002	Source Code	0001-XXXX....					

## USAGE OF “AN” NUMBERS

(see outgoing email 2/20/2014)

### *PURPOSE:*

- ✿ Basic use to provide unique document numbers to analysis documents.
- ✿ Provide specialized models with a number enabling traceability and reuse.
- ✿ Facilitate aggregate models of assemblies for use in analysis, presentations, animation, fit and installation or pictorial instruction.

### *SCOPE:*

- ✿ Applies to all internal design, manufacturing, test, quality, installation, maintenance, upgrade and formal reporting functions, as well as, engineering changes applicable to project teams located in Tucson, Arizona.
- ✿

### *POLICY / PRACTICE:*

- ✿ A \*.sldprt model only receives an “AN” number when breaking up the unified part into pieces to enable animation, otherwise these will have the appropriate engineering, manufacturer or vendor numbers.
- ✿ The “AN” model should use real parts and assemblies from the vault.
- ✿ An item given an “AN” number is a combination of parts and assemblies that would not normally be grouped together in a technical document that represents an assembly.
- ✿ If it is a concept model it should be labeled as such and revised when its status changes.
- ✿ Items that represent a current assembly with a number shall not be assigned an “AN” number.
- ✿ In the design journal or vault comment area you must define and state the reason the model was created using a AN number.

### *PROCEDURE: create decision chart*

- ✿
- ✿ Are you trying to animate movement that can't be done in a configuration?
- ✿ Is/will this item represent a single existing part?
- ✿ Will this item represent a single existing assembly as represented in current documentation?
- ✿ Take out AN number
- ✿ Complete model
- ✿ Make entry in the design journal or card comment area stating the reason the model was created as an “AN” #.

### *PRIMARY RESPONSIBILITY:*

- ✿ CM depart with input from all of NN-ETS staff.

*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## NEW ASSEMBLIES OR PART

*PURPOSE:*



*SCOPE:*



*POLICY / PRACTICE:*



*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*



*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## APPROVED SOFTWARE TOOLS

### *PURPOSE:*



### *SCOPE:*

- ✿ Applies to all internal design, manufacturing, test, quality, installation, maintenance, upgrade and formal reporting functions, as well as, engineering changes applicable to project teams located in Tucson, Arizona.



### *POLICY / PRACTICE:*

- ✿ Internal Mechanical Details & Assemblies: Solidworks,
- ✿ Contractor and Collaborators Mechanical Details and Assemblies: Preferred- Solidworks, others accepted upon approval of compatible import capability.
- ✿ Internal Electronic documents, schematic, wiring diagram, circuit cards: Altium, PCAD
- ✿ Contractor and Collaborators Electronics: Preferred – Altium, other accepted upon approval of compatible import capability to preferred or agreed upon software, such as a .DWG file.
- ✿ BOM Preferred: MS Excel, or on drawing within Solidworks BOM function.
- ✿ Specifications, requirements, reports: MS Word or equivalent
- ✿ \*.tif editing, paint shop, adobe photoshop, acrobat writer???? May not need to standardize so long as file written out is not in some proprietary form.

### *PROCEDURE:*



### *PRIMARY RESPONSIBILITY:*



### *AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## NEW STANDARD

*PURPOSE:*



*SCOPE:*



*POLICY / PRACTICE:*



*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*



*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## INTERCHANGEABILITY STANDARD

### *PURPOSE:*

- ✿ To determine if an existing part or assembly can, in fact, be changed or if a new drawing must be prepared and assigned a new identity.
- ✿ Maintain best possible traceability under current operation methods.

### *SCOPE:*

- ✿ Applies to all internal design, manufacturing, test, quality, installation, maintenance, upgrade and formal reporting functions, as well as, engineering changes applicable to project teams located in Tucson, Arizona.

### *DEFINITION:*

Interchangeable, interchangeability: When two or more parts possess such functional and physical characteristics as to be equivalent in performance, capable of being exchanged without alteration of the parts themselves or any adjoining parts in all existing applications. See criteria in policy section. If all existing parts can be reworked to current configuration, part considered interchangeable.

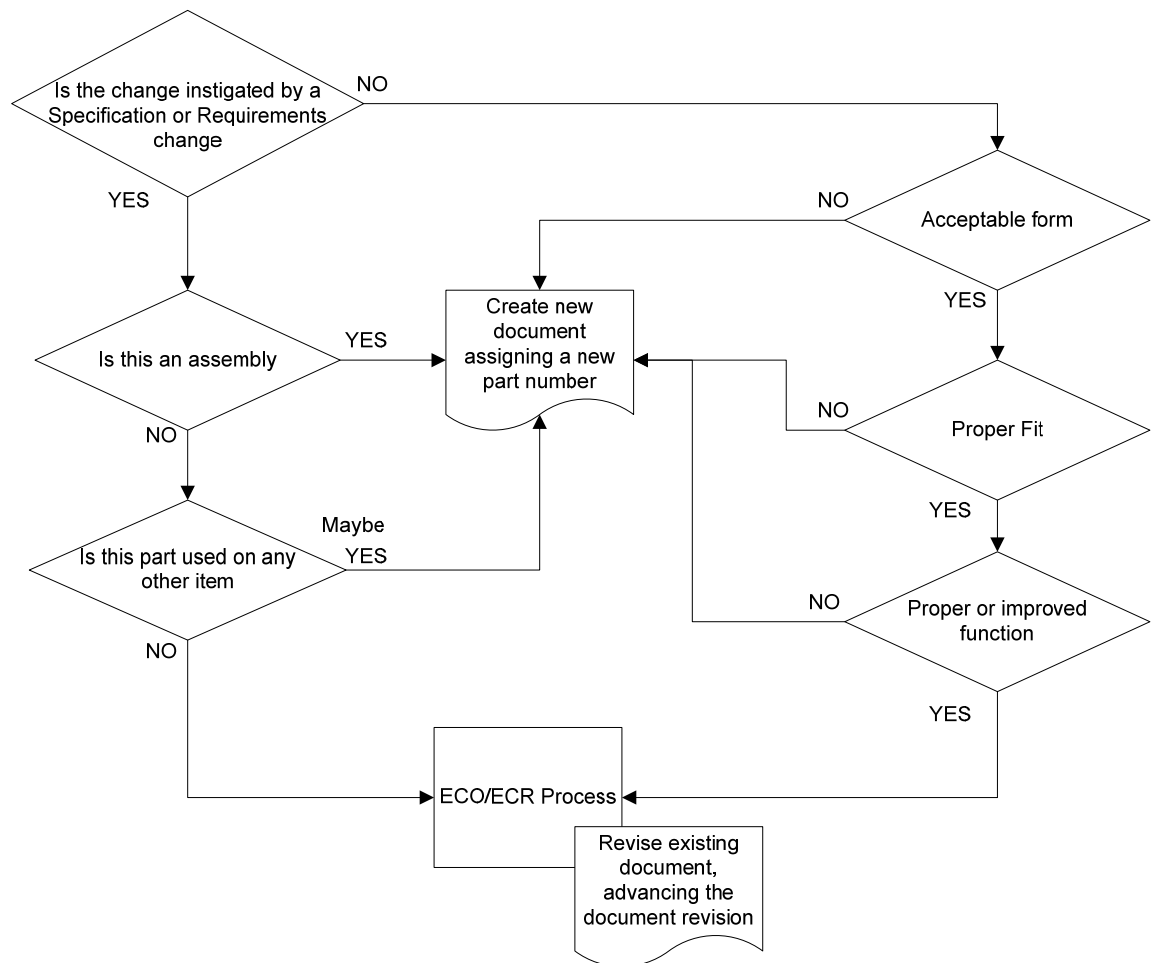
Non-Interchangeable: When a part is to be changed and the changed part does not physically fit or function as a direct replacement for the unchanged part in all applications of its previous revisions. Items meeting some, but not all, of the production specification or criteria in the policy section are considered non-interchangeable. All unchanged parts will not physically fit or function as a replacement for the changed part. The new part requires another part to be modified for it to fit properly.

### *POLICY / PRACTICE:*

- ✿ The revision letter does not serve as an identifier for non-interchangeability.
- ✿ A new item number is assigned if the parts are considered non-interchangeable attributable to not meeting the definitions, policy or criteria of this standard.
- ✿ Careful consideration is required when deciding to change or not change a part or part number. Traceability and usage must be maintained in either case.
- ✿ Interchangeable Criteria: a change in the product specification and requirements did not instigate the change and the change meets the following:
  - Of an acceptable form (appearance) to meet all esthetic requirements per the Product Specification.
  - Of a proper fit (physical) to assemble with other mating items per the drawing dimensions and tolerances without altering other items.
  - Of a proper function to meet the Product Specifications including performance, safety and reliability requirements.
  - The above criteria must be met both ways (old design in the new and vice versa) with no special adjustments, modification or alterations to the item or related items.

- Considering specification & requirement instigated changes, the part is not used on any other product and can maintain its current part number.
- ✿ The product specifications are used for form and function. The drawing dimensions and tolerances are used as the criteria for fit.
- ✿ Item change is of such a nature that direct and complete interchangeability is maintained, the item part number need not change, but its drawing revision letter advanced.
- ✿ Modified or altered items that are directly and completely interchangeable with the new item, it shall be identified by the part number of the new item.
- ✿ Changes to items which require new part numbers must be reflected in the next assembly by either a revision letter change to that assembly or new part number for that assembly.

*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*

CAD Lead/CM:

- ✿ Initiate, circulate, and arrange discussions on standard improvements.



- ✿ Implement and train key people on the changes.
- ✿ Document Control shall be authorized to take exception to this standard. A brief statement is required as to why the exception was appropriate.

*AUTHORIZATION:?*

WHO?: \_\_\_\_\_ Date: \_\_\_\_\_

## DOCUMENT MARKUPS

*PURPOSE:*



*SCOPE:*



*POLICY / PRACTICE:*



*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*



*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## ENGINEERING CHANGE REQUEST (EC / ECR)

### *PURPOSE:*

- ✿ Facilitate and record changes to all technical documents, providing the ability to track changes through time. Provide the mechanism to move a document through a workflow from “Released” to “Under Change” or “Obsolete”.

### *SCOPE:*

- ✿ All technical documents pertaining to buildings, systems, telescopes, instruments, procedures and safety in Tucson and on Kitt Peak. All personnel in the engineering and maintenance groups, and a lesser extent to facilities & safety personnel.

### *POLICY / PRACTICE:*

- ✿ All changes require an ECR unless it is considered an Administrative or document maintenance change. Defined as follows: correction of typographical errors or misspelled words, document formatting. Things that don't actually change technical content of the drawing. These changes shall be recorded in the revision table with DMC or ADMC in ECR column, description of change, revision shall remain the same.
- ✿ ECR: Engineering Change Request serves as both the request and the order for the change. Form can be found on CM file server, ETS website and in the vault.
- ✿ All fields in the form do not apply to all situations; brief instructions are on the form.
- ✿ One ECR form shall consist of only one problem, fix and/or set of revised drawings.
- ✿ One ECR form per printed circuit card document set, See Sec 2 on form.
- ✿ ECR is a living document, the information can be changed, within a reasonable time period while the ECR is consider to be open.
- ✿ Once something appears on an ECR it should not be deleted, use strikeout feature to show that a change no longer applies, adding a date and initials of person striking the change.
- ✿ ECR # consists of year, month and a serial number, YYYYMM-####.
- ✿ Any new documents initiated because of an ECR shall be given a number and listed in Sec 3, Drawing Affected, with “NEW” in the Rev column.
- ✿ Any obsolete drawings shall be listed in Sec 3 with “OBS” in the Rev column.
- ✿ Make sure all content, up and down level references remain correct and track between documents properly.
- ✿ All drawings to be revised should be listed in Sec 3 incrementing the revision by one in the Rev Column. (Rev H becomes Rev J)
  - See Interchangeability standard to make sure a document meets the standards for revisions vs. creating a new drawing.
  - Mechanical is Alpha revision scheme skipping letters: I, O, Q & X
  - Electronics documentation uses an Alpha numeric revision scheme, see above for letters that are skipped. The numeric component is for documents associated with circuit card changes between manufacturing runs. (Board set is Rev A, you change values, do wire adds or cuts, these would be Rev A01, A02 and so on until

Rev B circuit card is fabricated incorporating all valid numeric revisions.) See Figure 3

- ☼ Reason for Change: this is a general description of why the changes are being made. “As built” should be reserved for new field modifications. For changes to old items because they don’t match documents should be stated as “Field inspection modification”. Others could be, upgrades, improved function,
- ☼ Sec 5: List entry number from Sec 3 followed by drawing number, and zone location if applicable, then verbal description detailing the changes or reference a contrasting markup attached. Using best markup practices this can be any of the following markup methods; edrawings markup, scanned pencil or acrobat markup; can be multiple sheets in one file depending on the method. Markup filenames shall always start with the ecr#, and followed by attachment #, the word “redlines” or other unique and descriptive text. Marked up documents are also entered into the vault in the ECR folder.
- ☼ When possible and practical any changes made should include bringing formats and properties up to the current standard.

#### PROCEDURE:

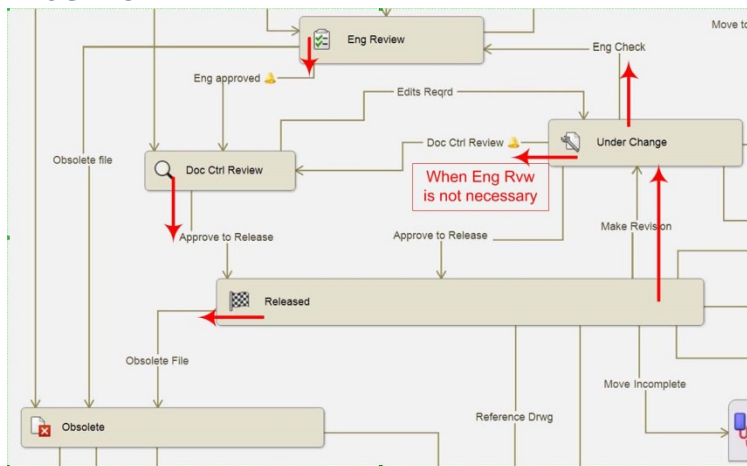


Figure 1

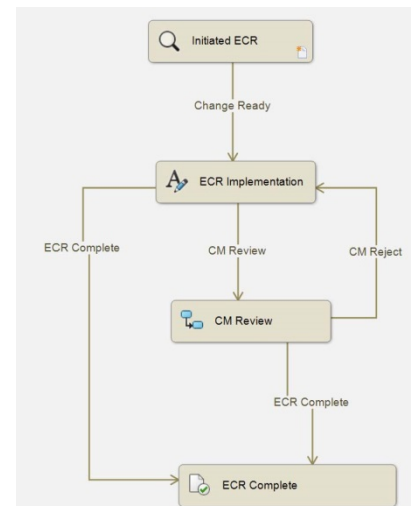


Figure 2

- ☼ Determine if a new drawing or a revision to existing drawing is needed; see section on Interchangeability.
- ☼ Retrieve latest ECR form from vault, web area, file server. See Figure 2 for ECR work flow.
- ☼ Fill out all sections as completely as possible. Sec 3 is what is used by the document control department to move documents from “Released” to “Under change”. See Figure 1 for vault work flow (WF). See form instructions for details.
- ☼ Attach all supporting information, this includes redlined documents in either electronic or hard copy.
- ☼ Submit filled form & supporting data to CM department, ECR # is assigned if it hasn’t been already, CM administrator adds ECR to vault.

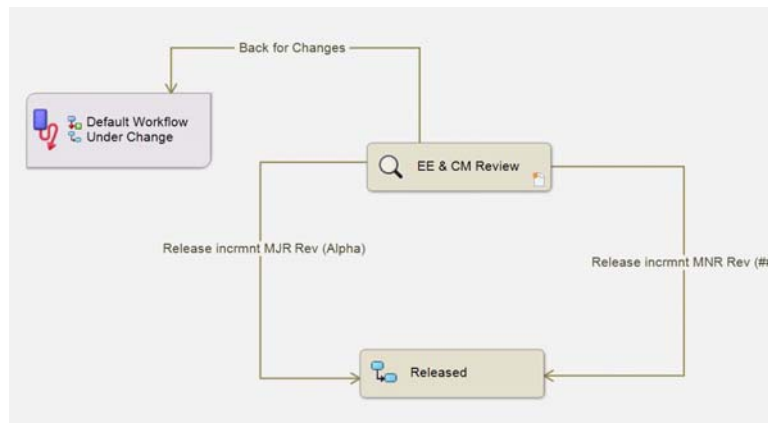


Figure 3

- ✿ CM administrator moves files to be revised from *Released* to *Under Change*, a transition comment should include, at the very least, the ECR#. A notification message is sent to all vault users about the impending changes. The message to users shall contain the document number, document title, ECR # and person initiating the ECR.
- ✿ Changes are made in a timely fashion so the official version is updated promptly. The person executing changes shall add to the ECR all descriptive change details, as well as, any addition document ripple effects that come about during the update process.
- ✿ If required, documents enter *engineering review* or go directly to *CM review*, only vault admins can move documents directly to the *Released* state.
- ✿ Document control review will take place when all items on the ECR have been completed and all engineering reviews are complete. CM may make corrections or request originator to make corrections involving documentation control traceability issues.
- ✿ CM administrator verifies that all files categorized as obsolete, are indeed obsolete and not apart of other active systems.
- ✿ Once CM has completed and signed off review of the changed documents they are transitioned to the *Released* state and the revision is incremented. The ECR is also transitions to *ECR Complete* state.

#### *PRIMARY RESPONSIBILITY:*

- ✿ This standard shall be the responsibility of the documentation control manager and participating members of the documentation committee.
- ✿ The document control manager shall be authorized to take exception to this standard by briefly stating in the ECO why the exception was appropriate.

#### *AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## METHODS OF REVISING DRAWINGS

*PURPOSE:*



*SCOPE:*



*POLICY / PRACTICE:*



*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*



*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## COLD STORAGE

*PURPOSE:*



*SCOPE:*

- ✿ EPDM vault & obsolete paper prints

*POLICY / PRACTICE:*

- ✿ Do not allow files in any Reference PDF folder to put versions in cold storage, these non-revision controlled documents may contain the originally scanned non CAD prints.

*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*



*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## NEW STANDARD

*PURPOSE:*



*SCOPE:*



*POLICY / PRACTICE:*



*PROCEDURE:*



*PRIMARY RESPONSIBILITY:*



*AUTHORIZATION:*

NN-ETS Manager: \_\_\_\_\_ Date: \_\_\_\_\_





Inch	IN			
Increment	INCR			
Incremental	INCRL			

## GLOSSARY

CM: configuration management aka documentation control

Panel: Exterior sides of chassis or box that connectors or parts mount and pass through

PDM Pro CAD Editor & Web: Supports working with all file types, including enhanced management and previewing of CAD formats such as SOLIDWORKS. CAD add-ins allow users to access SOLIDWORKS PDM Professional from within the CAD application. Remote users can search vaults and perform basic functions over the Internet using the Web and Web2 clients.

PDM Pro Contributor & Web: Supports working with all file types, including CAD files. However, the CAD add-ins are not supported in this client type. Remote users can search vaults and perform basic functions over the Internet using the Web and Web2 clients.

PDM Pro Viewer: Allows read-only access to file vaults. User can transition files through a workflow, user cannot add or modify (check out, check in, update values) files or use CAD add-ins.

Plate: interior object mounted to a panel where no objects protrude through the panel (except fasteners)

Subpanel: item considered a subpanel when mounted to a chassis panel and has objects mounted that protrude through a panel.

Vault: Location where all control documents reside.

Vault View: users view of the vault area.