



SUPPLIER FIRST ARTICLE INSPECTION (FAI) REQUIREMENTS

ROTARY & MISSION SYSTEMS (RMS)

Abstract

This document serves to provide entities fulfilling FAI Requirements under Procured Goods and Services to RMS a comprehensive breakdown of FAI requirements.

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APPLICABILITY

This document applies to Rotary & Mission Systems (RMS) procured material.

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INTRODUCTION

Purpose

This document defines Lockheed Martin Rotary Mission Systems (LM RMS) supplier quality requirements.

For Sikorsky purchase orders, [reference Sikorsky Supplier Quality Requirement \(SSQR-01\)](#) access via Sikorsky Supplier Portal.

This document provides directions on how to identify, plan for and satisfy Rotary & Mission Systems (RMS) specific requirements for completing a compliant First Article Inspection (FAI). It is based on the latest revision of AS9102, Lockheed Martin Purchase Order Text Note FAI_REQD, QA-RQTS, and overall RMS expectations.

A FAI is performed to provide objective evidence that:

- All engineering, design, contractual and specification requirements are correctly understood, accounted for, verified and recorded.
- Materials, tooling, processes, documentation and personnel are capable of consistently producing compliant hardware.
- Part/assembly is 100% compliant, defined, base-lined and repeatable.

This document applies when FAI_REQD and QA-RQTS is required by the Purchase Order or any reference documents (such as a Statement of Work) and applies to all sub-tiers who produce design characteristics and/or sub-assemblies.

Benefit

The benefit acquired from this document will result in improved 1st pass yield of first article document reviews in association with continuous deliveries of compliant material that enhance a supplier's reputation.

Target Audience

The document is addressed to RMS external Supplier Quality managers, Quality Engineers, and Manufacturing Engineers.

REFERENCES

Reference Documents

- International Aerospace Standard 9102 Latest Released Revision
- Lockheed Martin Purchase Order Requirement References
 - QA-RQTS
 - FAI_REQD
 - TDFAIREV
 - ALISFAIREV
 - SQBMP13800
 - SSQR-1
 - TCRL08

Required Forms

Description AS9102 Forms:

- **AS9102 Form 1: PART NUMBER ACCOUNTABILITY**
 - This form is used to identify the product that is having the First Article Inspection (FAI) conducted on (e.g., detail part, subassembly, assembly) referred to as “FAI part.”
- **AS9102 Form 2: PRODUCT ACCOUNTABILITY - MATERIALS, SPECIAL PROCESSES, AND FUNCTIONAL TESTING**
 - This form is used if any materials, special processes, or functional testing is defined as a design characteristic.
- **AS9102 Form 3: CHARACTERISTIC ACCOUNTABILITY, VERIFICATION and COMPATIBILITY EVALUATION**
 - This form is used to record inspection results for the design characteristics and to document any applicable non-conformances.

A Template of the preferred forms can be found in the Quality Assurance Section of the RMS Business Area Procurement Website:

<https://www.lockheedmartin.com/en-us/suppliers/business-area-procurement/rms.html>

REQUIREMENTS

The RMS First Article Process and Workflow

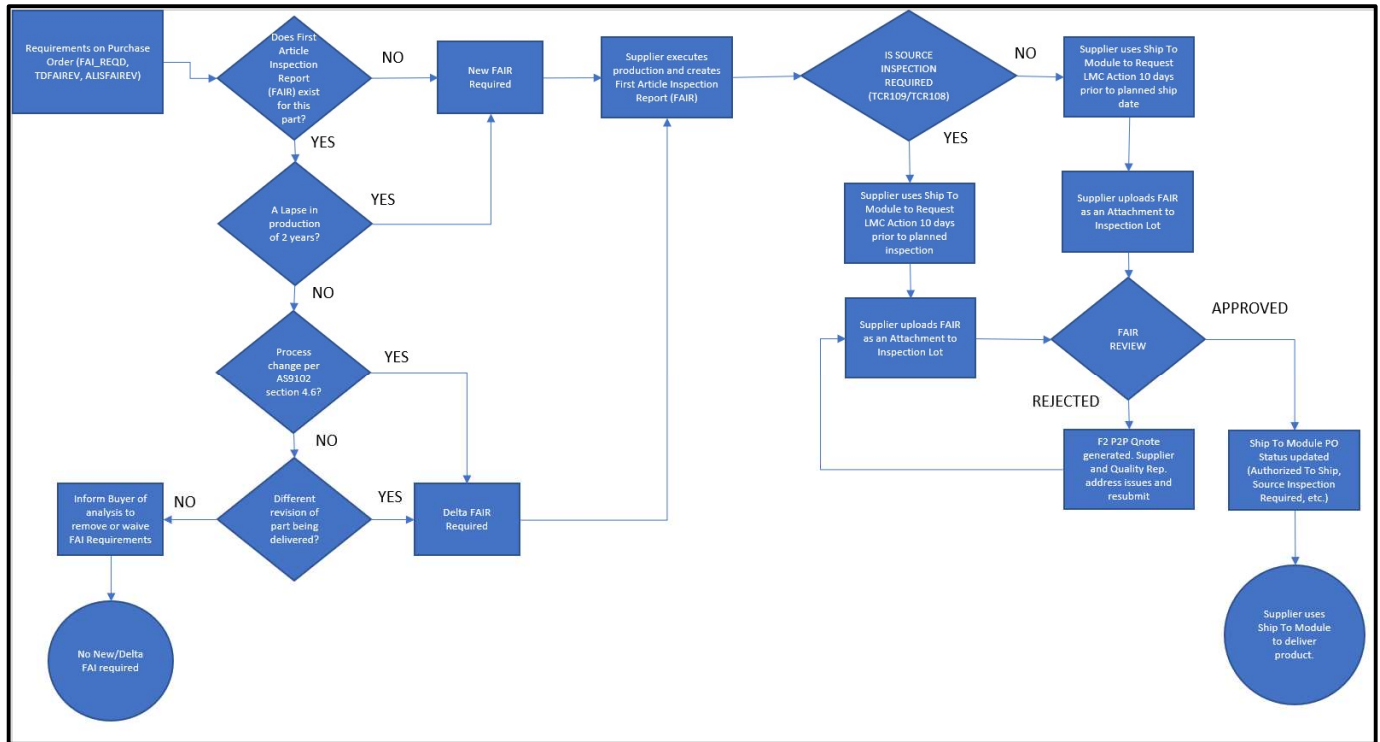


Figure 1. First Article Process (Inspection Lot Generation)

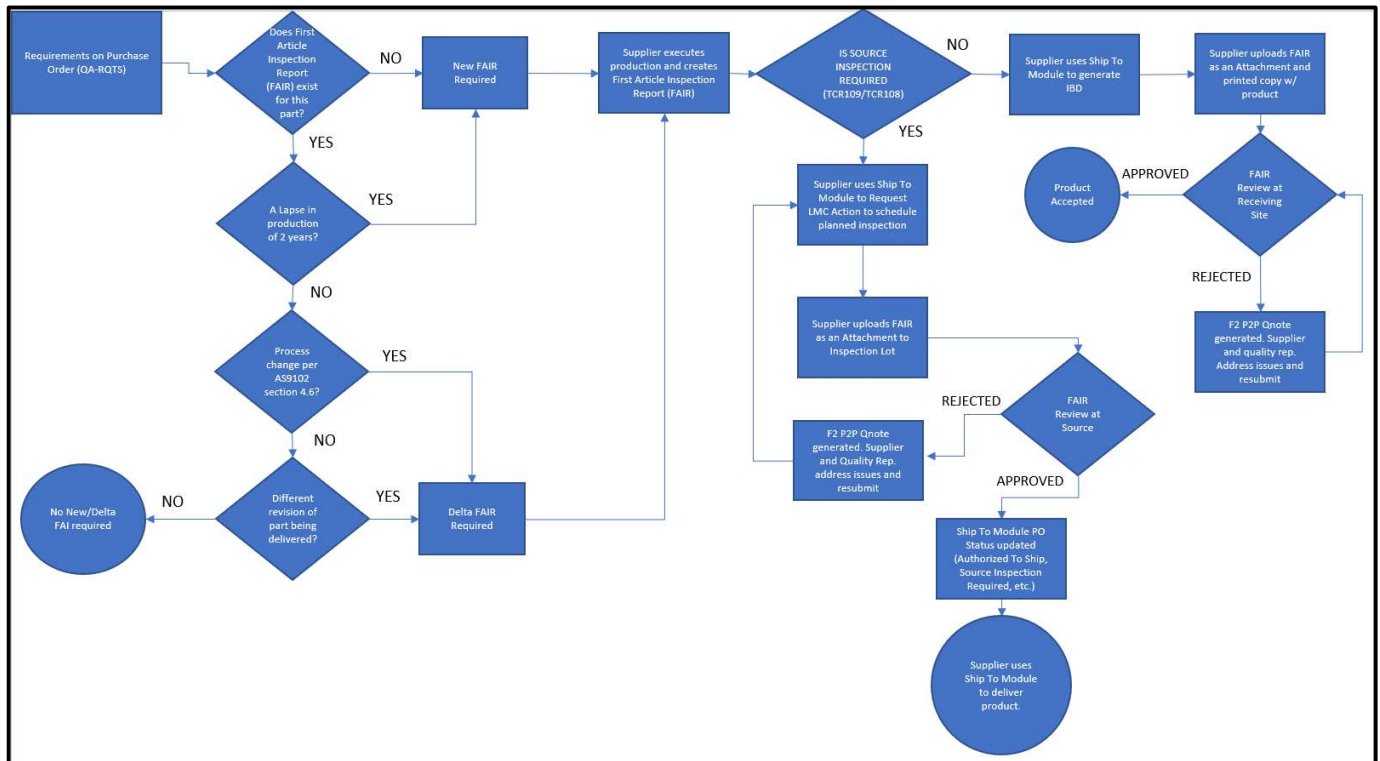


Figure 2. First Article Process (Standard Delivery)

Purchase Order FAI Requirement

In accordance with FAI Review PO Requirement (FAI_REQD) an FAI shall be conducted by the seller and the documented results shall be accepted by a RMS Supplier Quality Representative prior to any material shipment. FAI shall be required in accordance with AS9102 Section 4.6 First Article Inspection process is a RMS requirement that conforms to AS9102.

- Additional clarification.
 - Production shall be defined as an active manufacturing process that changes the state of raw material, or components, or the assembly of components (Date of Work commencement).
 - Activities such as ordering material and issuing travelers DO NOT constitute production. All other change requirements per AS9102 section 4.6.f apply. Questions regarding FAI requirements shall be directed to the buyer/procurement representative.

Program(s) may have requirement to conduct on-site FAI witnessing at supplier's facility.

FAI Planning

The following items shall be taken in to consideration prior to manufacturing compliant hardware and completing a FAI:

Pre-Planning Activities:

- Ensure that the process, planning and tooling that will produce the part being presented is one that is repeatable enough to consistently yield compliant hardware.
- Ensure that the Engineering package utilized is “Released,” and the revision is per the Purchase Order requirement.
- Hardware utilized for a FAI shall be part of the first production run and may be part of the first lot of deliverable units. This FAI part should not be a qualification unit since ordinarily qualification is completed prior to FAI.
- Ensure all parts and materials included on Parts List are part of the FAI package and include a Certificate of Conformance for each.
- Verify 100% of drawing characteristics, notes, embedded specifications and subassemblies are achievable and supported with objective evidence. Ensure all process measurements are accounted for and verified prior to final assembly.
- Identify special processes for Lockheed Martin approved Special Processors in accordance with Purchase Order requirements. For LM unique special processes, such as, welding, brazing, or additive manufacturing requirements, that include industry specifications for which Nadcap does not provide accreditation, Exostar must be used to view current approvals. For Nadcap special processes accepted by Lockheed Martin, verify that the vendor is accredited and current for the special process(es) specified by using eAuditNet.
- Ensure applicable FAI requirements are flowed down to sub-tiers and reviewed for compliance upon completion.
- Ensure controls and documented processes are in place to fulfill drawing requirements such as:
 - Quality Management Systems
 - Documented Production Processes
 - Qualification
 - Testing
 - Counterfeit Part Prevention
 - Inspection and acceptance tooling
 - Sub-tier Management
 - Appropriate training of all personnel
 - Approved Acceptance Test Procedure (ATP)/Verification Test Procedure (VTP)
- Ensure production baseline process controls are in place to achieve and maintain compliance to PO process change control requirements as defined by Purchase Order Text Notes.
- When Purchase Order Text Note "PO Review" applies, a PO Requirement review is required after PO has been accepted by the Supplier and prior to manufacturing. PO Requirement Review shall be completed in advance of the start of the manufacturing process. FAI applicability and planning should be discussed during this review.
- When Purchase Order Text Note(s) TCR109 Source Inspection applies. Lockheed Martin may re-inspect characteristics on a sample basis or witness the First Article Inspection (notification shall occur per applicable PO Text Note).

NOTE: To determine if source inspection is required, you must log into your Exostar account and access the

RMS P2P Ship To portal.

Documentation

- Ensure all documentation associated with the special processes and materials used are provided for review. This should include a certificate of conformance (CofC), material certifications, special process certifications, test data, etc.

Equipment

- Have appropriate measurement equipment/methodology listed for each characteristic. Ensure all equipment is calibrated.
- Ensure equipment accuracy (i.e., at least 10X accuracy), and ensure it is capable of performing the measurement. Supplier should always consider measurement system analysis studies for close tolerances such as Gage R&R.

Electronic Media Software

- Ensure use of RMS supplied models (this should be the latest approved model, revision, and version provided in accordance with the Purchase Order), software, etc.
- Ensure supplier is approved to special process/PO text note SQBMP13800 for Reduced Dimension Drawing (RDD) when required by drawing. Refer to the RDD Section of this document for additional requirements.
- Referenced model is not to be used for manufacturing or acceptance except when noted by the Reduced Dimension Drawing and Model Based Design Requirements.
- Software/Firmware –If applicable, the PO lists the Statement of Work (SOW) or Drawing, which contains the FAI software/firmware requirements. In the case of a SOW, the document provides detailed instructions on the process and methods that shall be used when conducting a FAI for software/firmware requirements. Software/firmware revisions must comply with appropriate forms and specifications.
- Include required Model/Software/Gerber file revision in Form 2 (Product Accountability – Materials, Special Processes and Functional Testing).

FAI Submittal

In accordance with QA-RQTS First Article Inspection requirements:

- FAI Reports, when applicable, shall be uploaded to the inspection lot during the “Ship-To LMC” process. Where FAI Reports cannot be uploaded electronically, the supplier shall send the report with the material shipment. LM Customer signature will occur upon receipt.

NOTE: For additional guidance on how to upload FAIRs into Inspection lots, refer to Page 79-84 of the P2P Reference Guide for Suppliers "Ship to LMC" found here:

http://css.lmco.com/lmp2p/QRG/Supplier/Ship_to_LMC.pdf

NOTE: For latest QA-RQTS requirements, please refer to the Quality Assurance Section of the Business Area Procurement Website, select " Quality Requirement Procure 2-011":

<http://www.lockheedmartin.com/en-us/suppliers/business-area-procurement/rms.html>

In accordance with FAI_REQD First Article Inspection requirements (When this PO Code/Text Key is applicable):

- For parts that require FAI and Source Inspection, requests must be made no less than 10 working days in advance of the planned inspection to allow for Buyer's participation if required. Scheduling shall accommodate any in process inspections identified during PO review. Requests are via P2P Ship To module by accessing your Exostar account at <http://portal.exostar.com>.
 - CAUTION: Export Control Documentation cannot be uploaded into Exostar. Please refer to any additional PO Requirements outlining the handling of Export Control Data or reach out to the buyer listed on the PO.
- The FAI report shall be reviewed and approved by a RMS Supplier Quality Representative prior to any material shipment. Material received without an approved FAIR is subject to immediate return and formal Supplier Corrective Action Request (SCAR). Permission to ship shall come from the procurement representative/buyer after the FAI has been reviewed and approved by a supplier quality team member, or after supplier has received authorization via P2P Ship To module.
- All documentation associated with the FAI shall be submitted with the completed FAI report for review, verification, and approval.
- Questions regarding FAI submittals should be directed to the buyer listed on the Purchase Order.

NOTE: For additional guidance on how to upload FAIRs into Inspection lots, refer to Page 79-84 of the P2P Reference Guide for Suppliers "Ship to LMC" found here:
http://css.lmco.com/lmp2p/QRG/Supplier/Ship_to_LMC.pdf

Partial/Delta FAI

The FAI requirement, once invoked, shall continue to apply even after initial compliance.

The FAI requirements may be satisfied by a partial FAI that addresses differences between the current configuration and prior approved configurations. When a partial FAI is performed, the organization shall complete only the affected fields in the FAI forms. FAI requirements may also be satisfied by previously approved FAI(s) performed on identical characteristics of similar parts produced by identical means. When FAI requirements (partial or complete) are satisfied in this manner, identify the approved configuration in the index of part numbers on Form 1.

A Partial/Delta FAI is required when:

- A change in design potentially affects form, fit or function and/or interchangeability of the part.
- A change in design (including Software/Firmware), technical specifications, component sourcing, manufacturing source(s), process(es), inspection method(s), tooling, material, facilities or location (from original manufacturing location).

- A change to numerical control program(s) or translation to another media potentially affects form, fit or function.
- A natural or man-made event may adversely affect the manufacturing process.
- An implementation of a corrective action required to complete a previous FAI.
- For MOTS (Modified Off-the-Shelf) or AID (Altered Item Drawing) items, FAI of the modified portion at a minimum is required.
- A lapse in Production of two years, or as specified by the customer. Refer to the Definitions section of this document for further definition of Production.

REDUCED DIMENSION DRAWING (RDD) AND MODEL BASED DEFINITION (MBD) FIRST ARTICLE INSPECTION (FAI) REQUIREMENTS.

Applicability: The following process applies when completing a First Article Inspection Report (FAIR) for materials defined by Reduced Dimension Drawings (RDD) or Model Based Definition (MBD).

Overview

A **Reduced Dimension Drawing Package** consists of an Engineering Drawing, 3D Part Model and a Parts List. A **Model Based Definition Package** consists of a 3D Part Model, Parts List and a Data Sheet. An RDD or MBD part requires that the model be queried for part dimensions and features. Remaining part dimensions, notes, raw materials, and special processes are on the part drawing, parts list, data sheet and other documents as applicable.

Suppliers must be approved by RMS Supplier Quality to be able to receive and work with RDD or MBD parts; approval code: SQBMP13800. Suppliers who use a sub-tier supplier for complete manufacture of parts must ensure that the sub-tier supplier is approved by LM RMS for the requirements of RDD/MBD parts.

The supplier is required to submit their Inspection Plan documents for approval on each RDD/MBD part. The completed Inspection Plan documentation (excluding actual measured data) is to be submitted to Supplier Quality Assurance (SQA) as soon as available, but not later than thirty (30) days prior to scheduled delivery.

Required FAI Documentation

AS9102 forms 1, 2, and 3 (or equivalent) accounting for all drawing/model features.

- a. **AS9102 Form 1 –**
 - **RDD parts:** Fields 5 & 7 will show the revision letter of the RMS drawing. Field 6 will show just the drawing number.
 - **MBD parts:** Field 5 will show the part revision letter from the model. Field 6 will be marked "N/A". Field 7 will show both the Data Sheet revision and the Model revision. (Data Sheet and Model revision may not be the same).
 - **RDD and MBD parts:** Field 11 will list the supplier code. Field 12 will list the purchase order number. Fields 15 and 16 will list the detail parts with RMS part numbers (including castings and forgings used for machined parts) and industry standard (COTS) parts.
- b. **AS9102 Form 2 -** Column 5 will list the raw materials and special processes used to make the part/assembly. Column 6 will list the specification(s) that apply per the drawing/model along with type, class, method, etc. Column 7 will list the special process code(s) from the purchase order.

- c. **AS9102 form 3** - Column 10 will list the MOI tool number for any characteristics accepted using MOI tooling. Column 14 will be divided into two columns (14a/14b) with the following column headers: FAI Inspection measuring equipment, Inspector Stamp/Signature.

Validation Points in XYZ format. The Validation Point File is a listing of nominal points on the model used for digital inspection methods (CMM, Inspection arm, scanner, laser tracker, etc.) This file consists of the actual programmed points used to inspect the part. Points must be on the surface of the model or define the center point of a hole. RMS SQA reviews validation points for deviations from the model.

The Validation Point file requirements:

- Electronic format in spreadsheet (Excel or similar) with X, Y, and Z coordinates for each point. The X coordinates will be in the first column, the Y coordinates in the second, and the Z in the third.
- Drive-to points on the drawing or model. The drive-to points are the minimum requirements for inspection of parts. Points must be accurate to four decimal places.

```
Document Type: Validation Points
Supplier:      XYZABC Corp.
Prepared by:   John Doe
Date prepared: 10/04/2006
Time prepared: 03:25 pm
Sikorsky part no: 99999-99999-999
Sikorsky dwg rev level: J
Sikorsky model part geom: 99999-99999-999-01

File (010)
Axis "Setup 1"
XYZ format
  X      Y      Z
-0.00114 9.21896 0.00000
-7.41613 1.06509 -0.00000
-3.74963 1.06434 0.00000
3.09781 1.06373 -0.00000
7.14144 1.06290 -0.00000
```

Figure 3. Example Validation Point Data

Balloon/Bubbled Drawing and/or Model. These sheets identify each part feature, dimension, and tolerance, including features found in the drawing title block, parts list, data sheet, etc. (ex. marking, processing, weight, edge breaks).

Digital Inspection Setup Sheet - The digital inspection setup sheet(s) (Figure 3) for Coordinate Measuring Machines (CMM's) or Portable Coordinate Measuring Machines (PCMM's - Inspection Arms, Laser Trackers/Scanners) are used by the Supplier's inspector when setting up the part for digital inspection. At a minimum each digital inspection setup sheet must contain the following information:

- Part datums (when defined) which must be used for inspection alignment.
- A top and side view of the part depicting each setup on the CMM or PCMM showing the inspection axis and datums used. Note: When a part requires multiple setups to inspect all features and surfaces, each setup must be shown. It is acceptable to show inspection fixtures or tooling and clamping locations as desired.
- The inspection axis should be aligned with datums from the drawing or model, the axis origin being at the intersection of the datum planes. The setup graphics must clearly show the part/model, datums, and axis system showing the positive X, Y, and Z axis directions.

Document Type:	Digital Inspection Setup
Sheet	
Supplier:	XYZABC Corp.
Prepared by:	John Doe
Date prepared:	10/04/2006
Time prepared:	03:25 pm
Sikorsky part no:	99999-99999-999
Sikorsky dwg rev level:	J

Figure 5. Digital Inspection Setup Sheet

FIRST ARTICLE INSPECTION EXAMPLE

Ballooning an Engineering Drawing

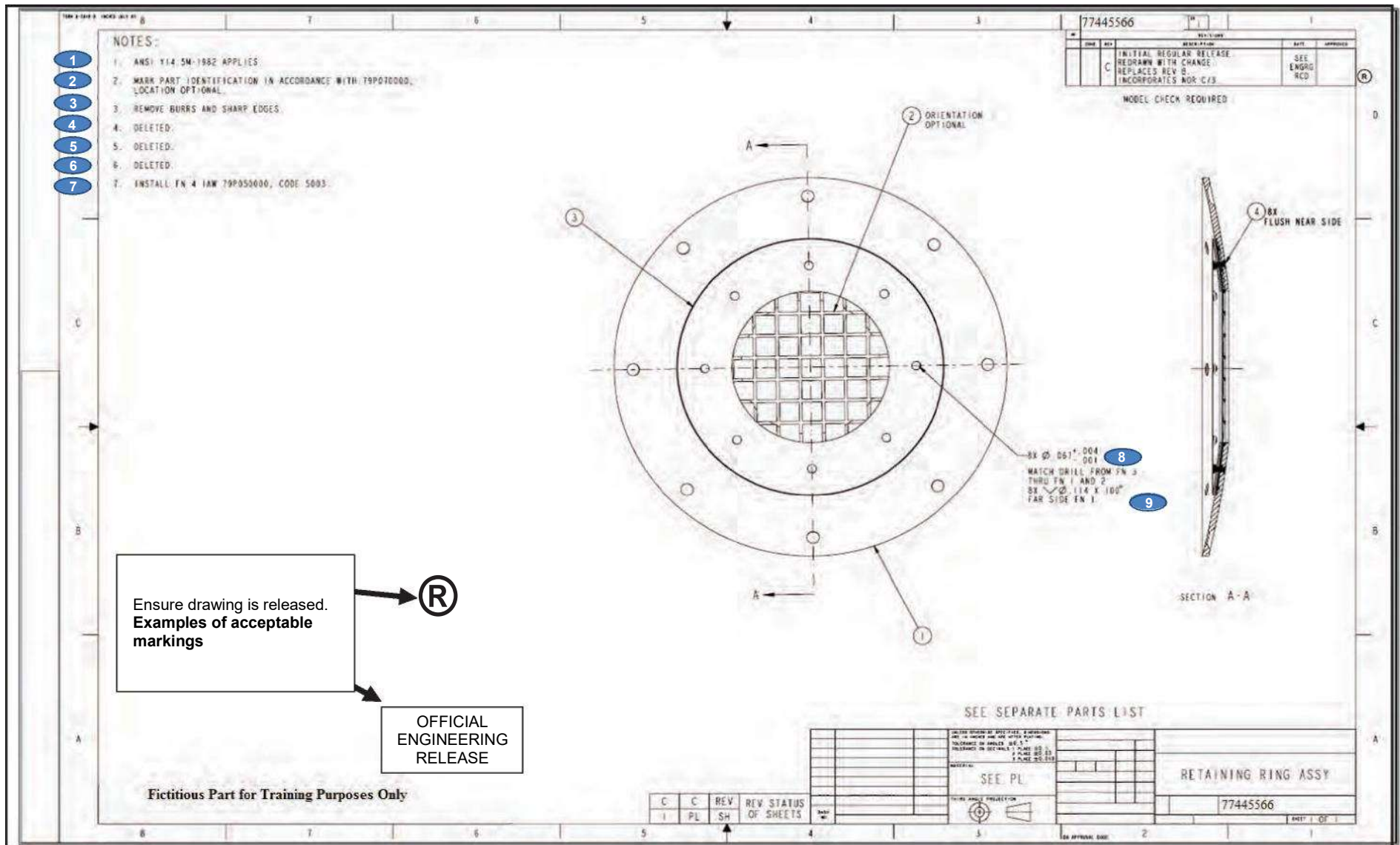
While conducting the FAI a common technique called “ballooning” is used to identify each characteristic on the drawing; this establishes an organized method to capture objective evidence that each drawing requirement is met. Ballooning is recommended to ensure accuracy and completeness. It is preferred if a ballooned drawing of the accepted FAI is submitted as part of the officially documented FAI package. An alternate method to “ballooning” is to reference drawing sheet and zone location(s).

The below example highlights a top assembly drawing (with one sub-assembly) and illustrates how each required FAI form is filled out based on the example drawing requirements.

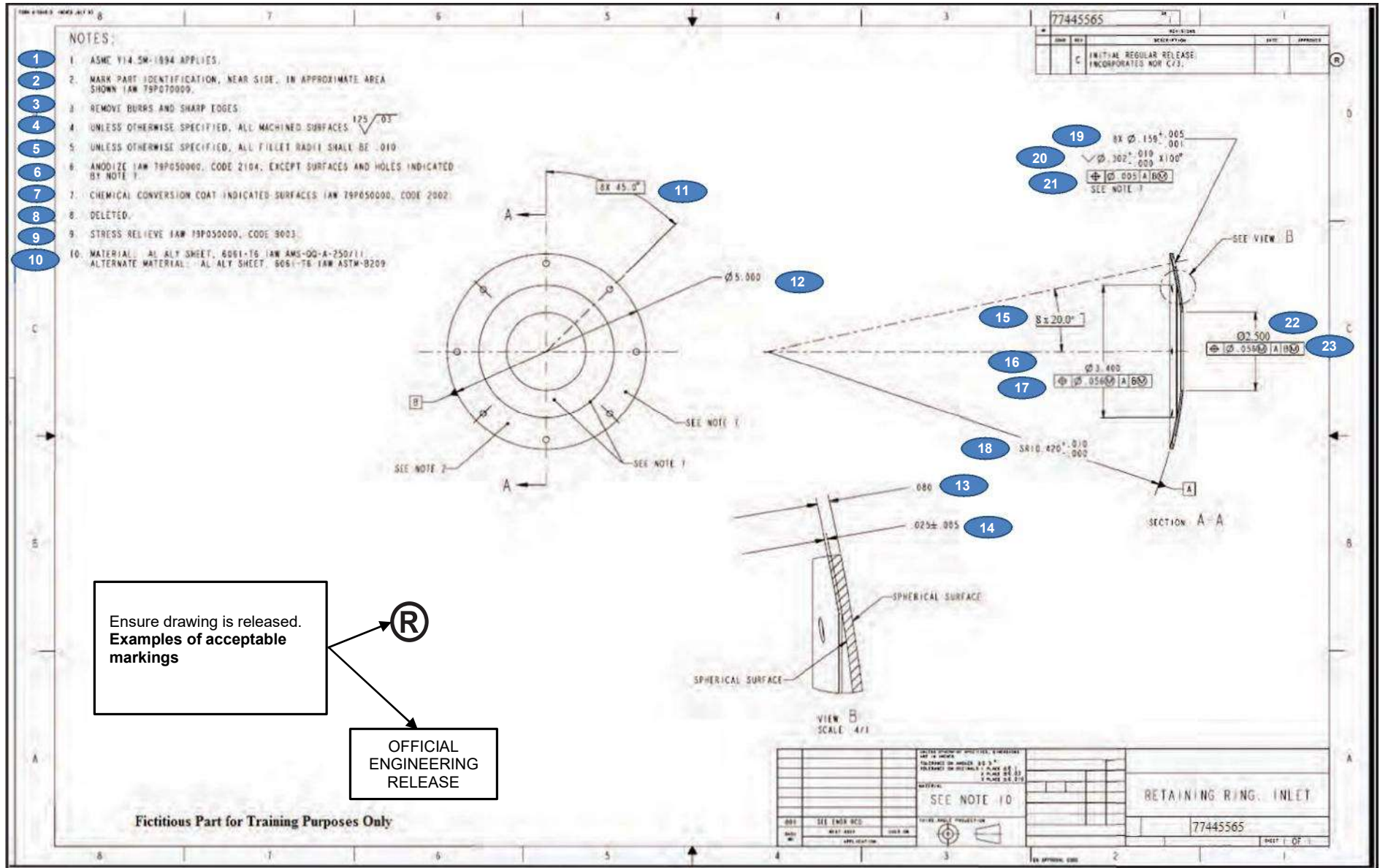
NOTE: Assembly and sub-assembly FAIs are required for all RMS designed details, and sub-assemblies that constitute the end item as demonstrated in the example. First Article Inspection for RMS designed details and sub-assemblies shall be performed as required by the RMS PO. All characteristics on the face of a drawing must be documented and verified via the applicable FAI form.

The example FAI contained herein will map from initial drawing ballooning all the way through completion of the FAI. The “balloons” in the example below are used to reference the item numbers listed on Form 3 (Characteristic Accountability, Verification and Compatibility Evaluation).

Top Assembly



Sub-Assembly



FAI FORM TEMPLATES

The recommended form templates can be accessed from the Quality Assurance section of the RMS Business Area Procurement website below.

<https://www.lockheedmartin.com/en-us/suppliers/business-area-procurement/rms.html>

FAI FORM REQUIREMENTS

FORM 1 PAT NUMBER ACCOUNTABILITY

FORM 2 PRD

FORM 3 CHARACE

Each field in the forms below will be identified as:

- (R) Required: This is mandatory information.
- (CR) Conditionally Required: This field must be completed when applicable.
- (O) Optional: This field is provided for convenience.

Items that are Optional (O) or Conditionally Required (CR) per AS9102, but are Required by Lockheed Martin RMS will be identified by an Asterisk (*).

AS9102 Form 1: Part Number Accountability

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FORM 1 - PART NUMBER ACCOUNTABILITY

Sheet ____ of ____

1. Part Number: 77445566-001	2. Part Name: Retainer Ring Assembly	3. Serial Number: 1	4. FAIR Number: 12345-67
5. Part Revision Level: Parts List Revision C	6. Drawing Number: 77445566	7. Drawing Revision Level: Revision C	8. Additional Changes: N/A
9. Manufacturing Process Reference: 1234	10. Organization Name: Supplier 123 Inc.	11. Supplier Code: LM00123	12. P.O. Number: 41000000, Line Item 1
13. Detail Part: <u>X</u> Assembly FAI: _____	14. Full FAI: <u>X</u> Partial FAI: _____ Baseline Part Number (including revision level): Reason for Partial FAI:		
a) If above part number is a detail part only, go to field 19. b) If above part number is an assembly, go to the "INDEX" section below.			
INDEX of part numbers or sub-assembly numbers required to make the assembly noted above.			
15. Part Number: 77445565-001	16. Part Name: Retainer Ring	17. Part Serial Number: N/A	18. FAIR Number: 12345-89
19. Signature: <i>John Smith</i> <u>X</u> , FAI Complete _____ FAI Not Complete			20. Date: 05/03/2015
21. Reviewed By: Jane Doe <i>Jane Doe</i>			22. Date: 05/03/2015
23. Customer Approval :			24. Date:

RMS Requirements for Proper Form AS9102 Form 1 Completion

NOTE: An Asterisk (*) is used to show fields that are Required by Lockheed Martin RMS, but may be considered Optional (O) or Conditionally Required (CR) by AS9102 Standards.

1. (R) Part Number: Enter the number of the part (FAI part).
2. (R) Part Name: Enter the name of the part as shown on the drawing.
3. (CR) Serial Number: Enter the serial number of the part, if parts are serialized.
4. *(R) FAIR Number: Enter the reference number that identifies the FAI. This may be an internal report number.
5. *(R) Part Revision Level: Enter the latest part revision that affects the part being first article inspected and include the parts list revision level as needed. If there is no revision, indicate as such (e.g. "-").

NOTE: The latest drawing revision (Field 7) does not always affect all parts contained on a drawing.

6. *(R) Drawing Number: Enter the drawing number associated with the FAI part.
7. *(R) Drawing Revision Level: Enter the revision level of the engineering drawing. If there is no revision, indicate as such by inputting "-".

NOTE: Specify parts list revision level (if applicable) in addition to the drawing revision level.

8. *(R) Additional Changes: Enter the reference number(s) of any changes that are incorporated in the product but not reflected in referenced drawing/part revision level (e.g., change in design, engineering changes, manufacturing changes, deviation or exclusion from certain drawing requirement, etc.).
9. (R) Manufacturing Process Reference: Enter a reference number that provides traceability to the manufacturing record of the FAI part (e.g., router number, manufacturing plan number, etc.).

NOTE: Add the Manufacturing Work Order Number information as required.

10. (R) Organization Name: Enter the name of the organization performing this FAI and program name if available.
11. *(R) Supplier Code: Enter the supplier code which is a unique number provided by RMS to the Supplier.

NOTE: It is sometimes referred to as a vendor code, vendor identification number, supplier number, LMID etc. This unique code begins with LM or Q and is followed by a distinct grouping of numbers for each supplier (LMXXXXXX or QXXXXX).

12. *(R) P.O. Number: Enter the Customer Purchase Order number/Item number, if applicable or required.
13. (R) Detail FAI or an Assembly FAI: Check as appropriate.
14. (R) Full FAI or Partial FAI: Check as appropriate.

NOTE: For a partial FAI, provide the baseline part number (including revision level) to which this partial FAI is performed and the reason for it. For example, changes in design, process, manufacturing location, etc.

Data Fields 15, 16, 17, and 18: This section is required only if the part number identified in field 1 is an assembly requiring lower level parts (i.e., detail parts) to be installed.

15. (CR) Part Number: Enter the detail or next level sub-assembly part number to be included in the assembly.

16. (CR) Part Name: Enter the part name as shown on the drawing.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

17. (CR) Part Serial Number: Enter the serial number of the part that is installed in the assembly, when applicable.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

18. (CR) FAIR Number: Enter the FAI report number for detail part, when applicable.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

19. (R) Signature: Printed name or unique identification, and signature of the person approving the FAIR. This signature certifies the evaluation activities in AS9102, Section 4.5 are complete and the FAIR is approved. The preparer may be the Supplier. Check "FAI Complete", if all characteristics are conforming. Check "FAI Not Complete", if nonconforming characteristics are documented in accordance with AS9102

NOTE: Electronic identification or signature are both acceptable.

20. (R) Date of Preparation: Date when field 19 was signed.

21. *(R) Reviewed by (Quality Management or Designee): Printed name or unique identification, and signature of the person from the Supplier's organization who approved the FAIR.

NOTE: This individual should not be the same person that generated the FAIR under section 19.

22. *(R) Date of Approval: Date when field 21 was signed.

23. *(R) Reviewed by Lockheed Martin Supplier Quality Engineer or Representative. Printed name or unique identification, and signature of the Lockheed Martin Supplier Quality Engineer or Representative who approved the Supplier FAIR.

NOTE: Electronic identification or signature are both acceptable. LM representative will sign upon review of Supplier submitted FAIR and acceptance.

24. *(R) Date: Date when field 23 was signed.

AS9102 Form 2: Product Accountability – Materials, Special Processes and Functional Testing

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FORM 2 - PRODUCT ACCOUNTABILITY - MATERIALS, SPECIAL PROCESSES, AND FUNCTIONAL TESTING

Sheet ____ of ____

[illegible]

RMS Expectation for proper AS9102 Form 2 Completion

NOTE: An Asterisk (*) is used to show fields that are Required by Lockheed Martin RMS, but may be considered Optional (O) or Conditionally Required (CR) by AS9102 Standards.

1. (R) Part Number: Enter the number of the part (FAI part).
2. (R) Part Name: Enter the name of the part as shown on the drawing.
3. (CR) Part Serial Number/*Lot Number: Enter the serial number/lot number of the part.
4. (CR) FAI Report Number: Enter the reference number that identifies the FAI. This may be an internal report number.
5. *(R) Material or Process: Enter the name of material or process.

NOTE: List material certifications and any special process referenced on the engineering drawing and/or PO.

6. (CR) Specification Number With *Revision: Enter all material and/or process specification numbers (include permitted alternates, if used), as listed on the engineering drawing, PO and/or parts list and revision level.
 - a. Add AS9102 material specifications and material form reqs.
7. (O) Code: Enter any required code from the Customer for material or process listing.
8. (CR) Supplier: Enter the Customer given Supplier LM Vendor code, Supplier Name & address for the organization performing special process(es) or supplying material, as applicable.

NOTE: When manufacturing using special processes, verify that the vendor is approved and current for the special process(es) in block 5 by using Exostar. Please refer to PO Note QA-RQTS or other PO Requirements governing special processes.

9. (CR) Customer Approval Verification: Indicate if the special process or material source is approved by Nadcap or the Customer for Block 8 (see notes above). Write "NA" if Customer approval is not required.
10. (CR) Certificate of Conformance/*Compliance (Yes/No): Record the number of the certificate, if available. (e.g., special process completion certification, raw material test report number, Standard Catalog hardware compliance report number, traceability number, P.O. number, lot number, job number etc.).
11. (CR) Functional Test Procedure Number: Enter the Functional Test Procedure.
12. (CR) Acceptance Report Number: Enter the functional test certification indicating that test requirements have been met.
13. (O) Comments: Enter and comments as applicable.
14. (R) Signature: Enter printed name or unique identification, and signature of the person who prepared and approved this form. Signature indicates that all applicable materials, special processes, and functional testing are accounted for, meet requirements, are properly documented, and all associated nonconformances are documented on Form 3.
15. (R) Date: Enter the date when this form was completed (when block 14 was signed).

AS9102 Form 3: Characteristic Accountability, Verification and Compatibility Evaluation for Top Assembly Part

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FORM 3 - CHARACTERISTIC ACCOUNTABILITY, VERIFICATION, AND COMPATIBILITY EVALUATION

1. Part Number 77445566-001		2. Part Name Retainer Ring Assembly		3. Serial Number/Lot Number 1		4. FAI Report 12345-67	
Characteristic Accountability				Inspection/Test Results		14. Additional Data/Comments	
5. Item No.	6. Reference Location	7. Characteristic Designator	8. Requirement	9. Results	10. Design Tooling	11. Non-Conformance Number	
1	Note 1		ANSI Y14.5:1982 applies and dimensions were taken after all special processes (Chem Film & Anodizing)	Accept			N/A
2	Note 2		Mark part IAW	04939-79705682-019			Visual
3	Note 3		Removed burrs and sharp	Accept			Visual
4	Note 4		Deleted	N/A			N/A
5	Note 5		Deleted	N/A			N/A
6	Note 6		Deleted	N/A			N/A
7	Note 7		Install F114IAW79P050000	Accept			Visual
8	Sheet 2 Zone J5		8 X .087 (+.004/- .001)	.071, .070, .066, .068, .068, .070, .068, .066			Plug Gage
9	Sheet 2 Zone G9		8 X $\varnothing$.114 x 100°	.115/.118 x 101°			CMM
(Use additional sheets as necessary)							
12. Signature John Smith				13. Date 5/3/2015			

Top Assembly Part Example

AS9102 Form 3: Characteristic Accountability, Verification and Compatibility Evaluation for Sub-Assembly Part

1. Part Number		2. Part Name		3. Serial Number		4. FAI Report	
77445585-001		Retainer Ring		N/A		12345-89	
Characteristic Accountability				Inspection / Test Results			
5. Item No.	6. Reference Location	7. Characteristic Designator	8. Requirement	9. Results	10. Designed Tooling	11. Non-Conformance Number	12. Additional Data/Comments
1	Note 1		ANSI Y14.5 1982 applies and dimensions were taken after all special processes (Chem Film & Anodizing)	Accept			N/A
2	Note 2		Parts marked 123456-01 in designated area Mark IAW 79P070000	Accept			Visual
3	Note 3		Removed burrs & sharp edges	Accept			Visual
4	Note 4		All machined surfaces exhibit 125 $\sqrt{0.3}$	Surface Finish $\sqrt{0.2}$			Profilometer
5	Note 5		Unless otherwise specified (UOS) Fillet Radii .010	Less than 0.01			Radius Gage
6	Note 6		Anodized IAW 79P050000 Code 2104	Accept			Certificate of Conformance from Plating Supplier (See attached certification)
7	Note 7		Chemical Filmed IAW 79P050000 Code 2002	Accept			Certificate of Conformance from Plating Supplier (See attached certification)
8	Note 8		Dated	N/A			N/A
9	Note 9		Stress Relief IAW 79P080000 Code 9003	Accept			Certificate of Conformance from Heat Treat Supplier (See attached certification)
10	Note 10		Material AL ALY Sheet 6061-T6 IAW AMS-QQ-A-250/11 used for parts	Accept			Certificate of Conformance from Raw Material Supplier (See attached certification)
11	Sht. 1 Zone C5		8 x 45.0" (Basic Dimension)	44.7/45.3"			CMM
12	Sht. 1 Zone C4		ϕ 5.000 (+/- .010)	5.004			CMM
13	Sht. 1 Zone B3		0.080 (+/- .010)	0.087			CMM
14	Sht. 1 Zone B3		0.025 (+/- .005)	0.027			CMM
15	Sht. 1 Zone C3		8 x 20.0" (Basic Dimension)	20.3/20.5"			CMM
16	Sht. 1 Zone C2		ϕ 3.400 (+/- .010)	3.406			CMM
17	Sht. 1 Zone C2		ϕ .056 A/B	0.063			CMM
18	Sht. 1 Zone B2		SR 10.420 (+.010)	10.428			CMM
19	Sht. 1 Zone D2		ϕ 8 x .159 (+.005/-0.01)	0.16			Pin Gage
20	Sht. 1 Zone D2		8x $\sqrt{\phi}$.302 (+.010/- .000) x 100" (+/- .5")	.311 x 100 % .302 X 100"			CSK Micrometer
21	Sht. 1 Zone D2		8x ϕ .005 A/B	0.003/0.002			CMM
22	Sht. 1 Zone C1		ϕ 2.500 (+/- .010)	2.506			Caliper
23	Sht. 1 Zone C1		ϕ .086 A/B	0.099			CMM

(Use additional sheets as necessary)
12. Signature
John Smith

13. Date
05/03/2015

Sub-Assembly Part Example

RMS Expectation for Proper AS9102 Form 3 Completion

NOTE: An Asterisk (*) is used to show fields that are Required by Lockheed Martin RMS, but may be considered Optional (O) or Conditionally Required (CR) by AS9102 Standards.

1. (R) Part Number: Enter the number of the part (FAI part).
2. (R) Part Name: Enter the name of the part as shown on the drawing.
3. (CR) Part Serial Number/*Lot Number: Enter the serial number/lot number of part.
4. *(R) FAIR Number: Enter the reference number that identifies the FAI. This may be an internal report number.
5. (R) Char. Number: Enter the unique assigned number for each Design Characteristic.
6. (CR) Reference Location: Enter the location of the Design Characteristic (e.g., drawing zone (page number and section), specification, etc.).

NOTE: If drawing is not ballooned, reference locations are required.

7. (CR) Characteristic Designator: If applicable, enter the characteristic type (e.g., key characteristic, flight safety, critical, major, etc.).
8. (R) Requirement: Enter the specified requirement for the Design Characteristic (e.g., drawing dimensional characteristics with nominal and tolerances included, drawing notes, specification requirements, etc.).
9. (R) Results: Enter measurement(s) obtained for the Design Characteristics. For marking, document actual part marking in Results field.

NOTE: For Multiple Characteristics, list each characteristic as an individual value or list with the minimum and maximum of measured values attained. If a characteristic is found to be non-conforming, then the results for that characteristic must be listed individually with the measured value(s).

When qualified tooling is used as a go/no-go gage (reference 9102, 4.7.3), record the results as an attribute (e.g. pass/fail)

*If a Design Requirement requires verification testing, then the actual results shall be recorded on the form. If a laboratory report or certificate of test is included in the FAI, then these results need not be written on the form, record the reference number in this field. The laboratory report or certificate of test must show specific values for requirements and actual results. Attach copies of reports or certificate, as applicable.

*For metallurgical characteristics with visual verification requirements that are rated against standard photographs, list the photo number of the closest comparison. A statement of conformance is acceptable (record the reference number in this field).

For processes that require verification per Design Characteristic, include statement of compliance/conformance (e.g., certification of compliance, verification indicator such as "accept," etc.).

*For part marking, ensure that marking is legible, correct in content and size and properly located, per applicable specification.

10. *(R) Designed/Qualified Tooling: If a specially designed tooling (including Numerical Control (N/C) programming) is used as a media of inspection, enter the tool/N/C identification number and *revision level.
11. *(R) Non-Conformance Number: Record a non-conformance document reference number if the characteristic is found to be non-conforming.

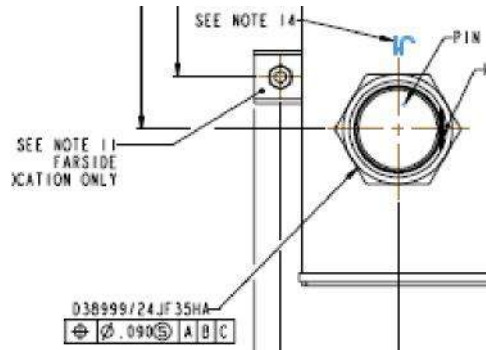
NOTE: Any non-conformances must be dispositioned and closed out per internal requirements (i.e. MRB, RC/CA, etc.). Supporting documents should be added to FAI package. If this is a Lockheed Martin part number, MRB authority must be granted by Lockheed Martin.
12. (R) Signature: Printed name or unique identifier, and signature of the person who prepared this form.
 - a. *NOTE:* Electronic identification and signature are both acceptable.
13. (R) Date: Enter the date when this form was completed. (Date Block 12 was signed.)
14. *(R) Inspection Methodology: Identify and record specific gages, tooling, set-up method, visual inspection, and populate inspection methodology field of FAI Data Sheet with the type of equipment used to inspect the feature (i.e., if method is visual, document "visual" in the inspection methodology field of the FAI Data Sheet).

NOTE: All supporting documentation associated with the drawing requirements must be submitted with the FAI report for verification, review, and approval.

COMMON ERRORS WHICH CAUSE FAI REJECTION

The topics listed below are common mistakes found in submitted FAI packages.

- Missing or hidden requirements for Detailed Commercial Off the shelf “COTS” Parts where dimensions are not included on the assembly drawing.
 - When required, requirements for detail parts/hardware installation must comply with the document specified. In this example, D38999 requires a hole for the installation of the connector to the assembly. The dimensions are located in the D38999 spec and not the drawing.
 - These dimensions shall be included in the FAI package.



Example: MIL-DTL-38999 has the requirements for the hole size for the connector illustrated as well as torque requirements.

- All Dimensions and/or notes not accounted for.
 - Any notes that contain a dimension shall have a physical measurement recorded. The use of “accept” or “OK” is not permitted.
- Incorrect or missing special process flow down requirements such as:
 - Special process supplier shall be RMS approved per purchase order requirements.
 - Supplier shall be certified to build to RDD (Reduced Dimension Drawing) per purchase order requirements.
- Incorrect tolerances assigned to dimension resulting in part non-conformance.
 - Standard dimension tolerances such as .100 (three place decimal meaning +/- .010) are found in the tolerance block located in the lower right part of the drawing as shown below.
- Basic dimensions are normally defined as a dimension surrounded by a box as shown. 4.156 Tolerances assigned to this dimension are defined by the Feature Control Frame associated with the Basic Dimension. The Geometric Symbol associated with the Feature Control Frame could be True Position, Profile, Flatness, etc.

NOTE: This is an example of a true position calculator:

https://www.engineersedge.com/calculators/true_position_pop.htm

- Incorrect Raw material/adhesives information provided.
 - Shelf life shall not be expired; appropriate adhesive shall be used on labels, etc.
 - Raw Material required to be indicated on form RMS-0293/AS9102 Form 2.
- Parts for an assembly identified on the wrong form.
 - Parts for an assembly are required to be indicated on form AS9102 Form 1.

- Incorrect revision level.
 - Ensure PO revision matches released engineering specified for item(s) on FAI report. If Material revision is not identified on the PO, contact RMS Buyer prior to initiating FAI submittal.
 - Verify the required revision of RMS specifications, like 79P050000, by using the link provided on the PO or by contacting the RMS Buyer. Indicate all revision levels in block 6 of AS9102 Form 2.
 - Ensure through RMS Procurement that you are working to the latest released engineering.

NOTE: There are many types of drawings and release processes. Most drawings will have an (R) symbol normally at the top right of the first page of the drawing indicating released. If this does not appear, check with RMS Procurement.
 - Special Process certifications should be to the latest revision. This is a standard PO Note for all PO's (QA-RQTS – Section 3.2 Special Processes).
- Incorrect inspection equipment used or not noted on FAI report.
 - When inspection equipment is listed, ensure that inspection equipment has sufficient measurement accuracy for requirements being measured and ensure it is recorded on Form RMS-0294/AS9102 Form 3 (block 14). Use of Gage Repeatability and Reproducibility (R&R) to validate measurement repeatability should be a part of the process development effort.
- Wrong part number identified on FAI form(s).
 - There shall be no typo's, missing dash numbers, and/or missing designators such as Q1, D1, TPSS, etc.

Example: If the purchase order requires P/N 7979797-003 Q1 the FAI form shall read the full P/N: 7979797-003 Q1.
- Missing Certificates of Conformance, test reports, and FAI forms as part of the FAI package.
 - Ensure there is no Missing/Incomplete sub-tier supplier data such as:
 - Improper material alloy listed
 - Incorrect special process used
 - Incorrect specification revision levels listed
 - Ensure supplier equivalent forms meet the RMS/AS9102 form requirements.
 - Ensure all forms are provided in the FAI package.
- FAI form(s) not signed/approved by appropriate representative and/or dated.
 - Form(s) 1, 2 and 3 should be signed by the preparer of the FAI.
- Incomplete recording of "multiple actuals."
 - A feature that is required multiple times requires recording multiple actuals.

Example: FIN #6 must be installed in 12 places (need to indicate 12 places or measurements as defined by engineering). This can include a range with max/min indicated.
- Requesting FAI via P2P Portal with no attached documentation

FREQUENTLY ASKED QUESTIONS

The items listed below describe and answer FAQs concerning Supplier First Article Inspection.

- What forms are required for a partial/delta First Article Inspection?
 - Forms 1 through 3 and RMS Form (First Article Inspection: Product/Process Verification Checklist) are required for all First Article Inspections. Complete only the affected fields for the characteristics that need to be revalidated. Revised/new FAI report shall have a new "FAI Report Number" (all 3 Forms), or a method of indicating an FAI version in Box 4, the title of the electronic report file, and new signature date in Box 20.
- Do drawing notes that contain dimensions need to have a measurement recorded?
 - Yes. All dimensions shall have a measurement, tolerance and inspection method recorded.
- Do Basic Dimensions need to be measured?
 - Not the Basic Dimension itself, but the associated tolerances in accordance with the Geometric Dimensioning and Tolerance blocks.
- Do requirements for COTS items not included on the assembly drawing need to be included?
 - Yes. When details for part/hardware installation are contained within that specification and produced on our assembly the dimensions shall be included.
- Will use of unapproved Lockheed Martin Special Processors cause my First Article to be rejected?
 - Yes. This is also considered a part nonconformance.
- Why was the equipment or instrument recorded under inspection methodology rejected?
 - The Supplier Quality Engineer reviewing the First Article does not have confidence a valid, repeatable and reproducible measurement is obtainable.
- What are the most common documentation errors that cause a First Article Inspection Report to Fail?
 - Typo errors: (inverted numbers and tolerances, etc.)
 - Part numbers and subassembly parts missing (form 1)
 - Incorrect revision level (form 1)
 - Missing specification revision (form 2)
 - Accompanying measurement reports missing (example; CMM Reports)
 - Visual inspection method used for a dimension (form 3)
 - Special process hierarchy not complete (form 2)
 - Special process supplier code & supplier missing (form 2)
- When a feature indicates multiple places are measurements required for each place?
 - Yes. A feature that is required multiple times requires multiple actual or a min-max range of the lowest/minimum measurement to the largest/max measurement taken.
- If material certifications, test reports are not included will my first article be rejected?
 - Yes. All documentation is required for objective evidence to demonstrate the First Article meets requirements.

- Can I develop my own acceptance tooling for use without Lockheed Martin approval?
 - No. All supplier self-developed acceptance tooling must be approved by Lockheed Martin.
- If a an assembly drawing has other assembly drawings or piece parts with their own manufacturing characteristics, do they need to have their own/separate FAIR?
 - Yes. Subassemblies and piece parts called out on the BOM of the End Product Top Assembly shall have their own separate FAIR containing Forms 1,2 & 3 provided. The FAIR Number shall be recorded on Form 1 Section 18 of the End Item FAIR.
- What is the best process to ensure a measurement process will produce repeatable and reproducible results?
 - A Gage Repeatability and Reproducibility study.
- What if I have additional questions concerning the completion of a First Article Inspection?
 - Questions can be directed to Lockheed Martin Procurement.
- If a Supplier plans to deliver excess stock from a previous production run with an Accepted FAIR, from which the previous delivery occurred more than 2 years ago, do they still have to conduct/create a New FAIR for this upcoming delivery?
 - No
- For any additional questions, please contact the Buyer and/or Supplier Quality Representative

DEFINITIONS

1. **Approved FAI:** Documented approval from RMS Supplier Quality representative. Approval is required to ship material unless otherwise directed by RMS.
2. **Ballooning:** This technique establishes an organized method to capture objective evidence that each drawing requirement is met. Ballooning is recommended to ensure accuracy and completeness. It is preferred if a ballooned drawing of the accepted FAI is submitted as part of the officially documented FAI package.
3. **Certificates of Conformance (C of C):** The Contractor shall submit with each shipment, a Certificate of Conformance which shall be dated and bear the signature, electronic equivalent, or electronically generated title of an authorized contractor's Representative, stating that the materials furnished to Lockheed Martin are in conformance with applicable requirements of the Contract, drawings, and specifications, and that supporting documentation is on file and will be made available to Lockheed Martin or Government Representatives upon request. Certification shall include name of contractor of materials being supplied, quantity shipped, and Contract number.
 - 3.1. An example of an acceptable statement of Certification of Conformance is as follows: "This is to certify that all items noted are in conformance with the Contract, drawings, specification and other applicable documentation, that all process certifications, chemical and physical test reports, are on file at this facility and are available for review by Lockheed Martin."
4. **Change Control:** Formal process used to ensure that changes to a product or system are introduced in a controlled and coordinated manner throughout the life cycle. This includes flowing the change through the appropriate channels within Lockheed Martin before incorporation.
5. **Corrective Action:** Action(s) to eliminate the cause(s) of a detected nonconformity or other undesirable situation in order to prevent recurrence. The extent of corrective actions shall be proportional to the effects of related nonconformities. The FAI is not complete until the organization closes all non-conformances affecting the part and implements corrective actions. The organization shall re-do a FAI for those affected characteristics and shall record the results.
6. **Equivalent Form:** Interchangeable AS9102 or company specific forms that include the additional requirements discussed in this document.
7. **First Article Inspection:** A procedure that provides objective evidence that all engineering, design and specification requirements are correctly understood, accounted for, verified, recorded, and that the combination of material, tooling, processes, documentation and personnel is capable of producing compliant hardware. FAI includes the manufacturing/inspection planning, manufacturing processes, tooling and software, (Numerical Control (N/C) tapes and Coordinate Measuring machine programs), test, inspection methods and equipment used in the fabrication of products.

8. **FAI Plan:** A documented plan for the company's FAI procedure. Preparation requires gathering all source documents including: Contract requirements (Purchase Order), Ballooned engineering drawings, specifications referenced in drawings, embedded or layered specifications, raw material certifications, Capability Maturity Model data, planning/shop routers, documentation validating integrity, production processes (i.e., soldering, plating, heat treating, etc.)
9. **FAI Rejection:** First Article Inspection Reports where nonconformance/s are identified shall have the status of Rejected. Nonconforming product shall not be delivered to the Buyer without required Material Review Board approval (Buyer approved Waiver or other document). The FAI shall remain in a rejected status until the corrective actions associated with nonconformance have been completed, a subsequent build has been accomplished and an acceptable Delta FAI has been completed. Any non- conformances must be dispositioned and closed out per internal requirements (i.e. MRB, RC/CA, etc.). Supporting documents should be added to the FAI package.
10. **Manufacturing Suffix Part Number:** A part number with a qualifier at the end (such as Q1, D1, TPSS). Part numbers with a manufacturing suffix have additional documentation indicating the part will deviate from engineering in some way. Ensure the technical data or engineering package received includes the required documentation. Contact the buyer if the documentation is missing.
11. **Partial/Delta FAI:** See above section on partial/delta or complete re-accomplishment of a FAI.
12. **Reduced Dimension Drawing (RDD):** Drawings that do not contain all the information required to fabricate and inspect the part but must be used in conjunction with the computer-generated model file.
13. **Source Inspection:** LMC supplier quality reserves the right to perform in- process inspection, in-process surveillance and/or audits at any time during the life of the purchase order. Parts, assemblies, processes and tests are subject to detailed inspection by the LMC quality representative prior to assembly, test and/or delivery when required. Such inspections, tests and mandatory inspection points (MIPs) shall be identified during the purchase order review process, and failure to comply with agreed upon MIPs with LMC supplier quality shall be cause for rejection of completed end items.
14. **Special Process:** A documented method used to manufacture products where a product undergoes a physical, chemical or metallurgical transformation where conformance to the specification cannot be readily verified by normal inspection methods, and the quality of the product depends on use of specific equipment operated in a specific manner, under controlled conditions, by trained personnel with instructions, procedures and standards. All special processes must be performed at a RMS approved supplier.
15. **Sub-tier:** Any and all suppliers that the contracted supplier uses for products and/or services.
16. **Variables Data:** Quantitative measurements taken on a continuous scale.
For example, the diameter of a cylinder or the gap between mating parts.
16. **Production:** Production shall be defined as an active manufacturing process that changes the state of raw material, or components, or the assembly of components (Date of Work commencement). Activities such as ordering material and issuing travelers DO NOT constitute production.