ORBITAL UAV

AS9102 FIRST ARTICLE INSPECTION REPORT HANDBOOK

First Article Inspection Report
Form 1: Part Number Accountability

1. Part Number	2. Part Name		3. Serial/Lot Number	4. FAI Report Number
530-002963-000	MODULE ASSEMBLY, EXTENSION - REAR, 5.75 IN, 6 PLY		4DG17-41033	530-002963 REV01 AS9102 FAIR Rev3.xls
5. Part Revision Level	6. Drawing Number		7. Drawing revision level	8. Additional Changes
000	530-002963		01	No Changes
9. Manufacturing Process Reference (WO#)	10. Organization Name		11. Supplier Code	12. P.O. Number
4DG17-41033 / WO#10516	Orbital Australia		Z1L24	PO-063000

13. Detail FAI	14. Full FAI	X	Baseline Part Number including revision level
	Partial FAI		N/A
Assembly FAI X	Reason for Partial FAI: N/A		

   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	16. Part Name	17. Part Serial Number	18. FAI Report Number
530-003141-000	MODULE SLICE, EXTENSION - REAR, 5.75 IN, 6 PLY	4DG17-41033	25-10019AB REV01 AS9102 FAIR
001-390000-000	NUT, FLOATING, SELF-LOCKING - 8-32 UNC-2B	N/A	N/A
001-002685-000	NUTPLATE, FIXED, 8-32 UNC-2B, SST	N/A	N/A
001-000793-000	ADHESIVE, METAL BONDING, METHACRYLATE	N/A	N/A

1) Signature indicates that all characteristics are accounted for; meet drawing requirements or are properly documented for disposition.

2) Also indicate if the FAI is complete per Section 5.4:   FAI complete ☑   FAI not Complete ☐

19. Report Completed By:		20. Date
Callum Franey - Component Engineer		22/08/2019
21. Report Reviewed by (Quality Representative): Andrew Mills - Quality Manager	**Andrew Mills** Digitally signed by Andrew Mills Date: 2019.11.22 15:46:44 +08'00'	22. Date 22/08/2019
23. Customer Approval and Stamp (if applicable):		24. Date

FAI Status: ☐ FAI Acceptable   ☐ FAI Pending   ☐ FAI Rejected

CHANGE LOG

Date	Version	Modified By	Summary	Section Modified
14 Aug 2020	1.2	PK	General Updates	7.1 #1, 7.3 #7
2 Oct 2020	1.3	PK	Added Hood River Cage Code	7.1 #11
12 May 2021	1.4	PK	Minor revisions to align with current FAIR requirements/methodology	6, 7.1, 7.2, 7.3, 8.1, 8.5, Appendix A
25 May 2021	1.5	PK	Revised to align revision number to PDF version	None

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1 Purpose

This handbook serves as a guide to completing a FAIR on detail parts and assemblies to the requirements of AS9102.

2 Scope

This procedure applies to Orbital UAV Engineering and Metrology staff who are routinely involved in completing FAIRs, as well as other Orbital UAV employees who are required to contribute to a FAIR.

The scope of this handbook extends to suppliers and contractors of Orbital UAV who are required to complete FAIRs on parts supplied to Orbital UAV.

3 Glossary

The following terms are used in this document.

Table 1: Glossary of Terms

Term	Description
BOM	Bill of Materials
COTS	Commercial Off The Shelf
FAI	First Article Inspection
FAIR	First Article Inspection Report
May	An allowable action
Must	A mandatory action
N/A	Not Applicable
NC	Non-Conformance
UAV	Unmanned Aerial Vehicle
VICD	Vendor Item Control Drawing
WO#	Work Order Number

4   Associated Documents

The following documents are associated with this procedure.

Table 2: Associated Orbital Documents

Doc. Number	Title
DOC0153	Non-Conformance and Improvement
DOC0328	Supplier Quality Requirements

4.1   Key Legislation

Key legislation, standards, and guidelines applicable to this procedure include, but are not limited to, the following. This is also referenced in the authorisations register.

Table 3: Key Legislation, Standards and Guideline Units

Doc. Number	Title
AS9102	Aerospace First Article Inspection Requirement
AS9100	Quality Management Systems – Requirements for Aviation, Space and Defense Organizations
ASME Y14.41	Digital Product Definition Data Practices
ISO 9000	Quality Management Systems – Fundamentals and Vocabulary
ISO 16792	Digital Product Definition Data Practices

5   Introduction to AS9102 FAIRs

The main purpose of conducting a FAIR is to indicate that a supplier is capable of producing a part or assembly that meets engineering and design requirements. A FAIR provides objective evidence that a manufacturer's processes can produce a compliant product and that they have understood and incorporated all associated requirements.

Conducting a FAIR helps to prevent manufacturing issues, risks, and total costs, and well as improve quality, delivery, and customer satisfaction. AS9102 has been established to set the baseline requirements for conducting and documenting First Article Inspection to an acceptable standard.

6   When is a FAIR required?

A FAIR is required for parts or assemblies from a first production run. A FAIR is not required for development or prototype parts that are not considered part of the first production run. Similarly, a FAIR is not required for single run production orders that are not intended for ongoing production. A FAIR is not required for standard catalogue items, COTS parts, or deliverable software.

Under certain conditions, a FAIR must be repeated. These circumstances are:

- A change to the design of the part or assembly affecting form, fit or function

- A change in manufacturing source, process, inspection method, location, tooling, or materials that can potentially affect form, fit, or function

- A change in numerical control program or other media that can potentially affect form, fit or function

- A natural or man-made event that may impact the manufacturing process

- A non-conformance was found in the original FAIR

- Any lapse in production for two or more years. This time is from the completion of the last production run to the actual restart of production (Full FAIR must be completed)

Under these circumstances, a partial FAIR is acceptable in lieu of a full FAIR if the circumstance has affected some but not all aspects of the FAIR. In the partial FAIR, only the aspects of the part's manufacture that have changed need to be verified. For guidance on completing a partial FAIR, see Section 8.1.

7   Structure

An AS9102 FAIR is split into three separate forms. Each of these forms performs a different function in the FAIR and has its own requirements.

Form 1   Part Number Accountability

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

Form 3   Characteristic Accountability, Verification, and Compatibility Evaluation

Additional documentation must also be supplied when referenced in the FAIR, such as balloon drawings, certificates of conformance, material certificates, special process certificates, functional test reports, job travellers, etc. The FAIR forms and supporting documentation must be combined and submitted as a single PDF document to be accepted.

7.1   Form 1

Form 1 is used to identify the part or assembly that is being inspected, as well as provide some additional information on the nature of the product. An example of Form 1 is shown in Appendix A – Sample AS9102 FAIR Forms. Form 1 has the following fields:

1. Part Number: The part number of the FAI part/assembly as indicated on the design drawing. In most cases this will be the Orbital part number (including the suffix i.e. AA). If the FAIR is conducted on embedded customer design drawings (i.e. build to print projects), use the customer part number. In this instance it is recommended to also include the Orbital part number in brackets for enhanced traceability. If unsure which part number to use, contact Orbital component engineer responsible for the part.

2. Part Name: The name of the FAI part/assembly as indicated on the design drawing. In most cases this will be the Orbital part name. If the FAIR is conducted on embedded customer design drawings (i.e. build to print projects), use the customer part name.

3. Serial/Lot Number: For serialised parts, the serial number is entered. For batched parts, a batch or lot number is entered if available. If no batch or lot number is available, mark N/A

4. FAI Report Number: The title of the FAIR. The file name of the FAIR must mirror this field. The naming convention for Orbital UAV FAIRs is as below:

Part Number	FAIR Report Revision	FAIR Report Number
29-12834AB	2	29-12834AB Rev02 FAIR

NOTE: The entries for fields 1-4 are common to all three forms in the FAIR and must be filled out identically on all three forms.

5. Part Revision Level: The revision of the part the FAIR is being conducted on. For Orbital part numbers, this is the double letter suffix on the part number i.e. AA. For Insitu part numbers, this is the drawing revision.

6. Drawing Number: The drawing number of the design drawing of the FAIR part/assembly

7. Drawing Revision Level: The revision of the design drawing of the FAIR part/assembly

8. Additional Changes: List any changes to the part/assembly that are not reflected in the part/drawing revision with the appropriate reference number (process/tooling changes etc.). This will only be applicable to repeated FAIRs, for first time FAIRS enter N/A. For a repeat FAIR that has no additional changes, enter No Changes.

9. Manufacturing Process Reference (WO#): Provide any reference numbers available that provide traceability to the manufacturing record of the FAI part/assembly. This may be work order numbers, job traveller numbers, tooling numbers, welding records etc.

10. Organization Name: The name of the organisation conducting the FAIR

11. Supplier Code: A unique number given to the supplier by the customer. For parts produced by Orbital Balcatta, this code is Z1L24. For parts produced by Orbital Hood River, this code is 83H79. For parts supplied to Orbital, this is the Vendor ID cage code. If the vendor does not have a cage code, enter the Supplier codes from Orbital's Epicor Database.

12. P.O. Number: The purchase order the part has been made to

13. Detail FAI/Assembly FAI: Indication whether the FAIR is on a detail part or an assembly. Mark the appropriate box with an X. If unsure, any item is considered an assembly if the design drawing includes a BOM, otherwise it is considered a detail part.

14. Full FAI/Partial FAI: Indication of whether the FAIR is a full or partial FAIR. Mark the appropriate section with an X. For a partial FAIR, in the Baseline Part Number field provide the previous part number including the revision level that this partial FAIR is supplementing. Also include the reason for the partial FAIR in the Reason for Partial FAI section.

NOTE: Fields 15-18 are only required for assembly FAIRs. For Detail FAIRs, these fields must be marked with N/A.

15. Part Number: Part number of each part in the BOM on the assembly drawing

16. Part Name: Name of each part in the BOM on the assembly drawing

17. Part Serial Number: Serial number of each part in the BOM on the assembly drawing, if applicable. If part is not serialised, mark N/A

18. FAI Report Number: The FAIR Report Number for each part in the assembly according to the Orbital naming convention. For COTS/VICD parts, enter the packing slip or goods receipt note number to provide traceability that the correct part has been procured.

NOTE: Assembly FAIRs must not be a combination of the FAI for all parts in the assembly in one report. Assembly FAIRs must only assess the characteristics on the assembly drawing and must reference the individual FAIRs for the parts in that assembly.

Between Fields 18 and 19, there is a section on the form to mark if the FAIR is complete or not complete. In the situation where a problem has been encountered in the FAIR or a non-conformance has been found, mark this section FAI Not Complete. Then proceed as instructed in Section 8.3. If the FAIR has been filled out with no issues, mark this section FAI Complete.

19. Report Completed By: Signature of the person who completed Form 1 of the FAIR. If multiple people contributed, include all names. Electronic signatures are acceptable.

20. Date: Date when field 19 was entered

21. Report Reviewed By: Signature of the person who reviewed and approved the FAIR. Electronic signatures are acceptable. Cannot be anyone who was involved in completing the FAIR. For FAIRs submitted to Orbital by a supplier, Orbital personnel must sign this field.

22. Date: Date when field 21 was entered

23. Customer Approval and Stamp: Name of customer representative and stamp, if requested by the customer. If not requested, mark N/A

24. Date: Date when field 23 was entered. If field 23 was not entered, mark N/A

7.2   Form 2

Form 2 is used to identify any materials, special processes, or functional testing that is defined as a design characteristic. An example of Form 2 is shown in Appendix A – Sample AS9102 FAIR Forms. Form 2 has the following fields:

NOTE: The entries for fields 1-4 are common to all three forms in the FAIR. The entries in fields 1-4 on Form 2 should be identical to Form 1.

5.   Material or Process Name: Name of required material or special process as specified on design drawing

6. Specification Number & Revision No.: Provide additional information on the material or process such as:

   - Material specifications and material form including allowable alternatives

   - Special process specifications including class where applicable, and any allowable alternatives

   - If the part is a modified standard COTS part, list the original part details

7. Code: Enter any code that is specified by the customer for the material or process. For Orbital FAIRs this is usually not applicable, and N/A should be entered

8. Supplier: Enter the supplier name, supplier code (if available), and address of the party that verified the correct material or process was provided. For example, with a part material, the material supplier should be listed, rather than the vendor who received the material and then manufactured the part.

9. Customer Approval Verification: Indicate if the special process or material source is approved by the customer. Enter yes if approved, no if approval is still required, or N/A if approval is not required. This is rarely a requirement on Orbital FAIRs. An example of when customer approval may be required is use of an alternate material or coating.

10. Certificate of Conformance Number: The reference number or name of the certificate relevant to the material or special process. This is usually a certificate of conformance but may include process completion certificate, raw material test report, COTS item compliance report, material traceability report, etc.

11. Functional Test Procedure Number: Where a functional test is identified as a design characteristic, list the test procedure name or number. If no testing is required, enter N/A.

12. Acceptance Report Number: List the number or name of the certificate that indicates the part has met the functional test requirements. If no testing is required, enter N/A.

13. Comments: List any additional comments regarding materials or special processes. If none, enter N/A.

14. Prepared By: Signature of the person who prepared Form 2. If multiple people filled out or reviewed the form, list all names in this field. Electronic signatures are acceptable. A name entered in this field indicates that all applicable materials, processes, and functional tests are accounted for, meet requirements, and are properly documented.

15. Date: The date when Field 14 was entered.

7.3   Form 3

Form 3 is used to record the results of an inspection of the part design characteristics. Any non-conformances found in this inspection are also listed in this form. An example of Form 3 is shown in Appendix A – Sample AS9102 FAIR Forms. Form 3 has the following fields:

NOTE: The entries for fields 1-4 are common to all three forms in the FAIR. The entries in fields 1-4 on Form 2 should be identical to Form 1.

5. Char No.: This is the unique number assigned to each design feature to be inspected. This is equivalent to the balloon numbers of the features on the balloon drawing. If Orbital provide the FAIR template, this field will be prepopulated.

6. Reference Location: Location of each design characteristic on the balloon drawing with reference to the drawing grid (where present). Reference must include sheet/page number as well as the grid reference. If Orbital provide the FAIR template, this field will be prepopulated.

7. Characteristic Designator: The entry in this field is dependent on the type of characteristic. For Notes and Flag Notes, enter Note or Flag Note respectively in this field. For basic or reference dimensions, enter Basic or Reference respectively. For dimensions and geometric tolerances, enter the classification of the characteristic as per the drawing (major, critical, key characteristic, etc.) otherwise minor. If Orbital provide a supplier the FAIR template, this field will be prepopulated.

8. Requirement: The requirement specified on the drawing for that design feature (dimension, note, geometric tolerance, etc.). Include the nominal value **and** the tolerance. If Orbital provide the FAIR template, this field will be prepopulated.

    8a. UoM: The unit of measurement for this feature. For features with no units, enter N/A. If Orbital provide the FAIR template, this field will be prepopulated.

    8b. Upper Limit: The upper limit of acceptable measurement for the characteristic. If characteristic is no numerical, enter N/A. If Orbital provide the FAIR template, this field will be prepopulated.

    8c. Lower Limit: The lower limit of acceptable measurement for the characteristic. If characteristic is no numerical, enter N/A. If Orbital provide the FAIR template, this field will be prepopulated.

9. Results: List the measurement or observation taken for this design characteristic. Measurements must be recorded in the units specified on the drawing. When qualified tooling is used rather than a measurement (i.e. go/no-go gauge), record results as a Pass or Fail. For characteristics verified by visual acceptance or acknowledgement of a specification, indicate this by entering "Accept" in this field. For reference dimensions, enter "Reference Only". For basic dimensions, enter "Basic Dimension".

NOTE: Measurement data is _**not**_ required for Basic and Reference dimensions. N/A must be entered in these fields in lieu of measurement data.

10. Designed Tooling: List the tool used for measurement/testing, including a unique identification number and any other relevant information. If a characteristic required visual acceptance, enter "Visual" in this field.

11. Non-Conformance Number: If a characteristic is non-conforming, list the NC number for this characteristic. Each issue with the part will require its own NC number. Multiple non-conforming characteristics may have been caused by a single issue. In

this case the same NC number can be used for multiple characteristics. However, different issues cannot be combined in one NC number. Where the characteristic is conforming, enter N/A.

12. Prepared By: Signature of the person who prepared Form 3. If multiple people filled out or reviewed the form, list all names in this field. Electronic signatures are acceptable. A name entered in this field indicates that all applicable design characteristics are accounted for and meet requirements.

13. Date: The date when Field 12 was entered

14. Notes: Enter any other relevant information. Where tooling was used, indicate the calibration information and date in this field. Any documentation or reports that are relevant to the measurement or inspection of the characteristic are to be referenced in this field. If no further information is required, enter N/A

8   Special Cases

8.1   Completing a Partial FAIR

A part or assembly that has had a full FAIR completed but has recently experienced a change listed in Section 6 may require a partial FAIR to be completed. This partial FAIR need only verify the aspects of the part or manufacturing process that have changed from the previous FAIR conducted.

To make it clear which parts of the FAIR are applicable to the changes, Orbital will highlight sections that need to be entered in the partial FAIR.

For all partial FAIRs, Field 14 of Form 1 must be marked Partial FAI and the baseline part number and revision of the superseded part must be included. The reason for the Partial FAIR must also be documented in Field 14.

8.2   Non-Applicable Fields

Where the AS9102 FAIR template contains fields that are not applicable to the FAIR being completed, the field must be filled out with "N/A". This indicates that the field has been considered for the FAIR and not deemed necessary. This is good practice to ensure no part of the FAIR is inadvertently missed.

8.3   Non-Conformance Found in FAIR

In the case that a non-conformance is found during a FAIR (either in material/process/testing or characteristic inspection) the following steps should be taken.

Record the non-conformance in the relevant form. For material, process, or functional test non-conformances (Form 2), list the details in the comments section (Field 13). For measured or inspected non-conformances (Form 3), enter the non-conforming result in Field 9 and enter details in the Notes section (Field 14). In all cases include the non-conformance number in the FAIR.

In Form 1, the field "FAI not Complete" should be ticked. Form 1 should still be signed in Field 19. Do not stop a FAIR once a non-conformance has been found. Complete the rest of the FAIR to ensure any other non-conformances are found and captured.

For the non-conformance(s) found, follow the non-conformance procedure as defined in the Supplier Quality Requirements. Once any required corrections have been made to the part, a partial FAIR must be completed on a new FAIR document to supplement the incomplete full FAIR. Only once this has been done is the FAIR considered complete.

8.4   Characteristic Cannot be Measured

Occasionally a part or assembly may have one or more characteristics that cannot be measured or verified in the final product. In these cases, the characteristics should be verified during manufacture or assembly when access is adequate. This must be done when subsequent processing cannot affect the characteristic.

8.5   Automated Inspection Tooling

When automated measurement tooling is used to produce an inspection report, this may be attached to the FAIR in lieu of entering the results under the following circumstances:

- The characteristic numbers are clearly linked in the inspection report

- Results in the report are clearly traceable to the characteristic numbers

- The results are directly comparable to the design characteristics

- The report is attached to the rear of the FAIR

- Calibration status/information is supplied

8.6   Alternates Used in Production

8.6.1   Alternate Material or Special Process

When the design characteristics specify an alternative material or special process is acceptable, it is not always clear if a new FAIR is required. In almost all cases, a new FAIR will be required. However, if it is deemed that the use of an alternate does not have the potential to affect the form, fit or function of a part, then a new FAIR is not required. In this case, a rationale should be documented and communicated to the customer.

8.6.2   Alternate Supplier for Special Process

Changing suppliers for special processes provides the potential to affect fit, form or function. This means that a new partial FAIR must be completed for the affected features/processes.

Appendix A – Sample AS9102 FAIR Forms

Form 1 Orbital Template

First Article Inspection Report
Form 1: Part Number Accountability

1. Part Number	2. Part Name		3. *Serial/Lot Number*	4. FAI Report Number
5. Part Revision Level	*6. Drawing Number*		*7. Drawing revision level*	*8. Additional Changes*
9. Manufacturing Process Reference (WO#)	10. Organization Name		11. Supplier Code	12. P.O. Number

13. Detail FAI	14. Full FAI	*Baseline Part Number including revision level*
	Partial FAI	
Assembly FAI	*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	16. Part Name	17. Part Serial Number	18. FAI Report Number

1) Signature indicates that all characteristics are accounted for; meet drawing requirements or are properly documented for disposition.

2) Also indicate if the FAI is complete per Section 5.4:   FAI complete   ☐   FAI not Complete   ☑

19. Report Completed By:	20. Date
21. Report Reviewed by (Quality Representative):	22. Date
23. Customer Approval and Stamp (if applicable):	24. Date

FAI Status: ☐ FAI Acceptable   ☐ FAI Pending   ☐ FAI Rejected

Form 2 Orbital Template

First Article Inspection Report					
Form 2: Product Accountability - Raw Material, Specifications & Special Process(es) and Functional Testing					
1. Part Number	**2 Part Name**		**3. Serial / Lot Number**		4. FAI Report Number
5. Material or Process Name	**6. Specification Number & Revision No.**	7. Code	**8. Supplier**	**9. Customer Approval Verification** (Yes/No/NA)	**10. Certificate of Conformance number**
11. Functional Test Procedure Number		**12. Acceptance report number, if applicable**			
13. Comments					
14. Prepared By			**15. Date**		

Form 3 Orbital Template

First Article Inspection Report										
Form 3: Characteristic Accountability, Verification and Compatibility Evaluation										
1. Part Number		**2. Part Name**						**3. Serial/Lot Number**		4. FAI Report
Characteristic Accountability							**Inspection / Test Results**			**Other Fields**
5. Char No.	**6. Reference Location**	**7. Characteristic Designator**	**8. Requirement**	8a. UoM	8b. Upper Limit	8c. Lower Limit	**9. Results**	**10. Designed Tooling**	**11. Non-Conformance Number**	14. Notes
The signature indicates that all characteristics are accounted for; meet drawing requirements or are properly documented for disposition.										
12. Prepared By								**13. Date**		