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FIRST ARTICLE INSPECTION

PRO-147 Issue 2

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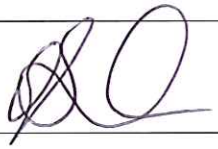
Signed:		**Authority:**	**Managing Director**

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INTRODUCTION

1 Purpose

This procedure details the controls that are used to provide a clear and comprehensive inspection report of a component part or final assembly that demonstrates its conformity to the drawing or specification. It also demonstrates that the specifications are correctly understood, capability to manufacture the product to these specifications, product verified and results recorded.

2 Scope

This procedure covers the conduct of a full First Article Inspection (FAI) or partial FAI also known as a delta FAI.

An FAI is not required for Commercial Off-The-Shelf (COTS) products including standard catalogue hardware or carpet kits where the production process remains the same.

3 Related Documents

- BS EN 9100
- BS EN 9102
- Percival Aviation Quality Manual MPA 1Q
- PRO-136 Concessions and Production Permits
- FOR-144 First Article Inspection Report Form 1 – Part Number Accountability
- FOR-145 First Article Inspection Report Form 2 – Product Accountability
- FOR-146 First Article Inspection Report Form 3 – Characteristic Accountability
- REG-163 First Article Inspection Index.
- PRO-132 Occurrence Reporting

4 Responsibilities

4.1 Inspector

The person carrying out an FAI will be the designated “FAI Inspector” who is responsible for carrying out an FAI when required using calibrated measuring equipment / gauges.

4.2 Production Engineer

The Production Engineer will identify the requirement for an FAI with a unique operation on the product’s Engineering Control Document (ECD) in the circumstances detailed in section 6.5 a, c, d, e, g & h.

4.3 Production or Operations Manager (Production Management):

a. The Production Management will notify the requirement for an FAI to Buyer in the circumstances detailed in section 6.5 f.

b. Present work cards marked for FAI to the person carrying out an FAI for the FAI stage inspection to be stamped onto the work card.

4.4 Sales co-ordinators:

a. The Sales co-ordinators will notify the requirement for an FAI on the Commercial Notes section of the MRP System, in the circumstances detailed in section 6.5 b & i.

5 Definition and Accomplishment of an FAI:

5.1 An FAI is a complete, independent and documented physical and functional inspection process to verify that prescribed production methods have produced an acceptable item as specified by the approved design data.

5.2 With the exception of commercial items and carpet kits, an FAI for a new product must be performed on one representative of the first batch of one or more parts manufactured from the planned process to be used for future production of the same parts.

5.3 The FAI Forms referenced in this procedure are partially coloured, however the use of black and white copied forms is acceptable.

5.4 Continuation sheets may be used where necessary or rows added to forms when completed electronically. Continuation sheets will be page numbered in sequence with the FAI forms used.

5.5 The results of inspection of numerical design characteristics shall be expressed in quantitative terms using the same units of measurement as in the approved design data. The use of attribute data is permitted if no inspection technique resulting in variable data is feasible and where the design characteristic does not specify numerical limits e.g. break all sharp edges.

5.6 FAI Forms may be completed electronically or legibly by hand in permanent ink.

5.7 Reports produced for samples for customer approval and prototype parts, either of which are built using different methods or personnel from those intended for future production, shall not be considered to be FAI reports.

6 The Requirement for an FAI

6.1 A First Article Inspection Report shall be carried out on a new production part prior to completion of the first production batch or supply of any of the same parts to a customer.

Note:

Commercial items and carpet kits are excluded from the above requirement. Whilst one carpet will be different from the next, the manufacturing process is simple, stable and proven. It also uses free issue material that is received with burn certificates.

Product may be released prior to completion of an FAI on the authority of the Managing Director. It is accepted that such products may need to be recalled depending on the outcome of the FAI completion. It is the responsibility of everyone in Percival Aviation to follow the Occurrence Reporting procedure, PRO-132 in the event of identification of a non-conforming product that affects safety and airworthiness.

6.2 A First Article Inspection Report shall be repeated where there has been a gap in production of two years or more.

6.3 A delta FAI (i.e. a partial FAI) shall be carried out if there is a change to a product or assembly that partially invalidates the associated full FAI, e.g. as a result of rework, change in assembly method, a minor material or design change.

6.4 A delta FAI shall be carried out only if there is a current full FAI in place for the part or assembly.

6.5 A full or delta FAI shall be carried out as the result of:

a. First Production of the part new to PAL.

b. A customer request.

c. Design of the parts has significantly changed or modified affecting fit, form or function of the part.

d. A change to the programme on a numerically controlled machine or translation to another media, which can potentially affect fit, form or function of the part.

e. A natural or man-made event, which may adversely affect the manufacturing process.

f. Sub-Contract manufactured parts are sourced from a new or alternative supplier.

g. Existing parts that are manufactured using significantly different processes or tooling.

h. When a part has undergone a significant material change.

i. A lapse in production for two years.

THE FAI PROCESS

7 Conducting a Full FAI

7.1 FAIs will be conducted by a designated trained and authorised person, referred to as an FAI Inspector, who will be independent of the manufacture of the item being inspected.

7.2 The FAI Inspector will complete the First Article Inspection Report (FAIR) which comprises of FOR-144 (FAI Form 1), FOR-145 (FAI Form 2) and FOR-146 (FAI Form 3) as appropriate.

Note: For guidance on the completion of the FAI form boxes refer to Appendix 1.

7.3 The FAI Report Number (FAI Form 1, box 4) will be taken from REG-163, First Article Inspection Index, at the same time as the index entry is completed. The index is located in the First Article Inspection folder on the Documents (J) drive, Quality Management Folder.

7.4 The FAI Inspector will:

a. Make sure the “Date In” on the work card has been filled in with the date the part and work card was submitted for FAI.

b. Review manufacturing process documentation such as work cards to make sure that all operations are completed as planned.

c. Review material certification, such as raw material certificates for completeness and correct material composition. Review Certificates of Conformance for correct identification, certification and completeness. If the FAI is for internal purposes, include the location of these documents in the Comments box of FOR-145. If the FAI is for a customer, these documents have to be included as part of the FAI.

d. Review referenced supporting documentation such as flammability test reports for completeness and correct results.

e. Verify that documents requiring in house special processes (welding and painting) and approved subcontractor special processes such as anodising, plating, etc call up the correct specifications on Work Cards, Purchase Orders, Advice Notes, etc which is in-line with the approved design data.

f. Measure, inspect or assess the achieved design or performance characteristic of the first article component, or assembly and record these alongside the appropriate requirement recorded on the relevant FAI form.

g. Verify that all characteristic requirements have been met.

h. Verify that any key characteristic requirements have been met, as applicable

i. Verify that any part specific gauges and/or tooling are qualified and traceable.

j. Review any non-conformance documentation for completeness and filled in correctly.

k. The report reference number shall be recorded on to the production work card.

Note:

1. The assembly level FAI shall be performed on those characteristics specified on the assembly drawing.
2. The FAI will not be complete until all the required applicable documents are available.
3. Percival Aviation manufactures products for the cabin interiors of aircraft. Many of the products are reproduced under new part numbers to enable the parts to be customer specific. For example, an attendant seat place may be identical in every way but PAL chose to roll the part number so that the cover material can be changed. In such cases the Design Department will annotate the product drawing to show that the part is dimensionally the same as another part. Another example being a Wash Basin Door Assembly is identical in every way but the part number changes for different customers.
4. Only the Design Department are permitted to annotate drawings in this way and it shall only be done when the part is dimensionally the same but renumbered for cosmetic changes only or the same part but renumbered for different customers.
5. If the drawing contains a note on the lines of “This drawing is dimensionally the same as drawing DHPXXXXX”, the FAI Inspector will check that a complete dimensional report (on a form FOR-146 or similar) is available on file for drawing DHPXXXXX. If a current dimensional report is available then the FAI Inspector will add a note in Box 14 of form FOR-144 for the new part, to the effect that “This item is dimensionally the same as part number DHPXXXXX. Refer to FAI XYZ for further reference”. A delta FAI will then be carried out on the new part if required to take into account changes such as material covering.
6. If a dimensional report is not available for DHPXXXXX, a complete FAI will be carried out as per this procedure.
7. If the drawing contains a note on the lines of “This drawing is the same as drawing DHPYYYYY”, the FAI Inspector will check that a complete First Article Inspection Report (on a form FOR-144, FOR-145, FOR-146 or similar) is available on file for drawing DHPYYYYY. If a current First Article Inspection Report is available then the FAI Inspector will add a note in Box 14 of form FOR-144 for the new part, to the effect that “This item is same as part number DHPYYYYY. Refer to FAI ABC for further reference”.
8. If a First Article Inspection Report is not available for DHPYYYYY, a complete FAI will be carried out as per this procedure.

7.5 On completion of the inspection activities, verify that every design characteristic requirement is accounted for, uniquely identified on the drawing and has inspection results traceable to the same unique identifier on the respective FAI Forms.

7.6 Once all characteristics have been recorded the achieved results are assessed against the design requirements and the outcome is indicated as follows:

a. Dimensions and characteristics that are found to be within the design requirements, including the allowed tolerances, shall be shown to be a “Pass” in the “Pass/Fail” column of the report.

b. Dimensions and characteristics that are found to be outside of the design requirements, including the allowed tolerances, shall be shown to be un-acceptable by the recording of a “Fail” in the “Pass/Fail” column of the report.

7.7 The part or assembly is to be quarantined if any deviations from the requirements, outside of the allowed tolerances, are recorded on the FAI.

7.8 Results outside of approved design data will be recorded on a Concession Production Permit form (FOR-307 or equivalent design authority form or customer form). The formal consideration of a concession will result in the application being accepted or rejected.

7.9 Rejected concessions will be referred back to the Operations Manager to decide in conjunction with the Design Authority, Customer, Quality Department and others where necessary, if the part can be re-manufactured in accordance with the existing approved design data using the same process OR alternate process of manufacture to correct the errors OR consider changing approved design data if the manufacture of the product to the existing approved design data is proving to be very difficult. For example to re-design the part to permit larger tolerances in specific areas and allow the part to be manufactured using the established manufacturing process.

7.10 Accepted Concessions can be referred to the Design Authority or Customer for the part, sub-assembly or assembly to consider changing approved design data.

7.11 Delays in the timely completion and closure of an FAI shall be communicated to the Sales Manager/Managing Director by the Production Management, so that the customer can be advised if delivery dates will not be met.

7.12 On completion of the FAI, the completed forms will be passed to Quality Department for review and sign off.

8 Delta FAI (Partial FAI)

8.1 The process for a delta FAI shall be the same as for a full FAI, with the exception that the range of checks carried out shall be limited to address differences between the new configuration and the full FAI configuration.

8.2 When a delta FAI is performed only the affected fields in the FAI forms need to be completed.

8.3 The report reference number shall be recorded on to the production work card.

8.4 Delta FAI requirements may also be satisfied using a previously approved FAI carried out on identical characteristics of similar parts produced using same manufacturing process and NC programmes. The previous FAI will be referenced in Box 14 on the FAI Form 1.

8.5 The part or assembly is to be quarantined if any deviations from the requirements, outside of the allowed tolerances, are recorded on the FAI.

8.6 Results outside of approved design data will be recorded on a Concession Production Permit form (FOR-307 or equivalent design authority form or customer form). The formal consideration of a concession will result in the application being accepted or rejected

8.7 Rejected concessions will be referred back to the Operations Manager to decide in conjunction with the Design Authority, Customer, Quality Department and others where necessary, if the part can be re-manufactured in accordance with the existing approved design data using the same process OR alternate process of manufacture to correct the errors OR consider changing approved design data if the manufacture of the product to the existing approved design data is proving to be very difficult. For example to re-design the part to permit larger tolerances in specific areas and allow the part to be manufactured using the established manufacturing process.

8.8 Accepted Concessions can be referred to the Design Authority or Customer for the part, sub-assembly or assembly to consider changing approved design data.

8.9 Delays in the timely completion and closure of an FAI shall be communicated to the Sales Manager/Managing Director by the Production Management, so that the customer can be advised if delivery dates will not be met.

9 Reviewing an FAI and Closure

9.1 The Quality Department will verify that all FAI forms are completed to the necessary extent, Work Card, Annotated Drawing, Concessions Production Permits, as required are present. This constitutes a FAIR.

9.2 Verify that all supporting test and raw material certification documents are available and may be included as part of the FAIR documentation, shall be included if the FAIR is required by the customer. If the FAI is for internal purposes, include the location of these documents in the Comments box of FOR-145.

9.3 FAIRs with associated non-conformances will be closed when all associated concessions affecting parts have been signed off and corrective actions implemented. Copies of concessions will form part of the FAIR.

9.4 Upon successful completion of an FAI with or without non-conformances, make sure all necessary signature and date boxes on the FAI Form FOR-144, FOR-145 & FOR-146 are completed.

9.5 The “Date Out” is filled in with the respective date on the work card. The “Date In” and “Date Out” are used for KPI calculation.

9.6 The completed FAIR will then be scanned and saved into the appropriate FAI folder in Quality Management/First Article Inspection folder on the Documents (J) drive. The work card is forwarded to production and rest of the documentation can be disposed of.

9.7 Rest of the information on the REG-163, First Article Inspection Index is completed.

10 Sub-Contract FAI's

10.1 FAI on a new production part or an existing production part new to the subcontractor, the production management shall clearly identify the requirement for an FAI on the sub-contract documentation. They will also confirm with the subcontractor their ability to carry out the FAI to BS EN 9102/AS9102 and where they are unable to comply, the sub-contractor shall be required to produce a FAIR using the PAL procedure and PAL FAI forms.

10.2 Any deviation from approved design data shall be referred to the Design Authority or Customer (via PAL) on a Concession Production Permit form for acceptance or rejection.

10.3 Rejected concessions will be referred to the PAL Operations Manager to decide on the next steps in conjunction with the Design Authority or Customer for the part and Quality Department. The process will be the same as for a PAL manufactured part.

10.4 The completed FAI will be supplied to the Quality Department for review. The list of documents / parts to be provided are:

a. The production standard FAI part.

b. Completed FAI Forms.

c. A copy of the approved drawing or design information.

d. Manufacturing Work Card

e. A copy of all the raw material certification and applicable test certification.

f. Certificate of Conformity from the supplier.

g. A copy of applicable approved concessions and/or production permits.

10.5 Alternatively PAL may choose to carry out the FAI for sub-contractor produced parts. In these cases the inspection shall be completed and approved prior to the supplied parts being accepted at goods inwards. The sub-contractor will be required to provide raw material certification, applicable test certification and any other documentation required to complete the FAIR. Un-satisfactory parts shall be rejected back to the supplier using Supplier Rejection note, FOR-216 in accordance with Control of Non-Conforming Product, PRO-213 for correction and/or replacement.

10.6 Product may be released to production or despatched to customer, prior to review of an FAI on the authority of the Managing Director. It is accepted that such products may need to be recalled depending on the outcome of the FAI completion. It is the responsibility of everyone in Percival Aviation to follow the Occurrence Reporting procedure, PRO-132 in the event of identification of a non-conforming product that affects safety and airworthiness.

APPENDIX 1 – GUIDANCE TO COMPLETION OF FAI FORMS

Fields in FAI Forms are numerically identified. Completion of fields is either:

Required (R) – Mandatory information

Conditionally Required (CR) – Must be completed when applicable

Optional (O) – Complete with information that could be of use such as reference data

Complete fields in accordance with the above and as detailed in the instructions below:

Form-144, FAI Form 1 – Part Number Accountability

1. (R) Part number – Number of the Part (FAI Part)
2. (R) Part Name: Name of the part as shown on the drawing
3. (R) Serial Num OR Batch Num OR Sales Order Num
4. (R) FAI Report Number: Reference number that identifies the FAI. This may be an internal report number.
5. (CR) Part Revision Level: For PAL part revision is the same as the drawing revision of the part being first article inspected.
6. (R) Drawing Number: Drawing number associated with the FAI part.
7. (R) Drawing Revision Level: The revision level of the engineering drawing.
8. (R) Manufacturing Process Reference: A reference number that provides traceability to the manufacturing record of the FAI part (e.g., router number, manufacturing plan number, etc.).
9. (CR) Additional Changes: Provide 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.).
10. (R) Organization Name: Name of the organization performing this FAI.
11. (O) P.O. Number: Enter customer purchase order number, if applicable or required.
12. (R) Detail part FAI or an Assembly FAI: Check as appropriate.
13. (R) Full FAI or Partial FAI: Check as appropriate. For a partial or delta 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, etc.
14. (CR) Comments: To accommodate statements detailed in section 7.4, Notes 5 & 7 of this procedure. Also to include any other comments, if required.
15. (R) Part Number: Detail or sub-assembly part numbers used to manufacture the FAI part.

16. (R) Part Name: Corresponding part name as shown on the drawing.
17. (R) Serial Num OR Batch Num OR Works Order Num – Information of the part used to manufacture the FAI part.
18. (O) FAI Report Number: Corresponding FAI report number for the detail or sub-assembly part number. If the parts/assemblies detailed in Box 15 are "Off the shelf" items, mention "N/A – Standard Part". **Note:** If the detail or sub-assembly part is manufactured to PAL or PAL's customer drawing, then FAI report number must be present in this box.
19. (R) Compiled By: Print name + Signature of the person who prepared this form. Also check appropriate box if this FAI is complete or incomplete. Incomplete if the organization hasn't closed all non-conformances affecting the part and hasn't implemented the corrective actions. Incomplete if a detail or sub-assembly FAI that is required is not present. Incomplete if FAI Form 3, has "Unable to Measure" against the Results column or dimensions measured using "Reference Only" Equipment.
20. (R) Date: Date when this form was prepared.
21. (R) Reviewed By: Print Name + Signature of the person from the organization who approved the FAI report.
22. (R) Date: Date when the FAI report was approved.
23. (O) Customer Approval: The field is used by the customer to record approval, if required.
24. (O) Date: Date Customer approved this FAI Form.

FOR-145, FAI Form 2 – Product Accountability

1. (R) Part Number: Number of the part (FAI Part).
2. (R) Part Name: Name of the part as shown on the drawing.
3. (R) Serial Num OR Batch Num OR Sales Order Num
4. (R) FAI Report Number: Reference number that identifies the FAI. This may be an internal report number.
5. (R) Material or Process Name: Enter the name of material or process.
6. (CR) Specification number: Enter material or process specifications number, class and material form. Include all "Make From" materials that are incorporated into the FAI part. For raw materials, include all materials that are incorporated into the FAI part, and standard catalogue hardware; but do not include processing materials.
7. (R) Special Process Supplier Code: Customer given supplier code of the organization performing special process(es) or supplying material, as applicable.

8. (CR) Certificate of Conformance Number or Release Note Number: Unique Number of the certificate. If no number unique present on the certificate, quote the Despatch Note Num or any other unique reference number relating to the batch of parts used.
9. (O) Comments: As applicable
10. (R) Compiled By: Print Name + Signature of the person who prepared this form.
11. (R) Date: Date when this form was completed.

FOR-146, FAI Form 3 – Characteristic Accountability

1. (R) Part Number: Number of the part (FAI Part).
2. (R) Part Name: Name of the part as shown on the drawing.
3. (R) Serial Num OR Batch Num OR Sales Order Num
4. (R) FAI Report Number: Reference number that identifies the FAI. This may be an internal report number.
5. (R) Characteristic Number: Unique assigned number for each design characteristic.
6. (R) Reference Location: Location of the design characteristic (e.g., drawing grid reference (page number and section), specification, etc.).
7. Requirement and Tolerance: Specified Requirement for the design characteristic (e.g., drawing dimensional characteristics with nominal and tolerances included, drawing notes, specification requirements, etc.).
8. (R) Results: List measurement(s) obtained for the design characteristics.
    a. For multiple characteristics list each characteristic as individual values. If a characteristic is found to be nonconforming then that characteristic must be listed separately with the measured value noted.
    b. If a design requirement requires verification testing, then the actual results will be recorded on the form. If a laboratory report or certificate of test is included in the FAIR, 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.
    c. For processes that require verification per design characteristic, include statement of compliance (e.g., certification of compliance, verification indicator such as “Pass”, etc.).
    d. For part marking, ensure that marking is legible, correct in content and size and properly located, per applicable specification.
9. (R) Pass / Fail: Enter “Pass” if the results are conforming to the requirement and tolerance, otherwise.

10. (CR) Non-Conformance Number: Record a non-conformance document reference number if the characteristic is found to be non-conforming.
11. (CR) Designed Tooling / Equipment used: If a specially designed tooling is used as a media of inspection, record the tool identification number or any calibrated equipment used to verify the design characteristic.
12. (CR) Equipment number: Unique equipment number of the tool, measuring equipment, etc.
13. (CR) Calibration expiry date: Expiry date of calibration for the measuring equipment.
14. (R) Compiled By: Print Name + Signature of the person who prepared this form.
15. (R) Date: Date when this form was completed.

Amendment Record

DATE	DESCRIPTION	NEW ISSUE
04/11/2016	Initial Issue of the procedure	1
20/02/2017	Updated procedure in line with current working practice	2