**Preparing an AS9102B  
First Article Inspection Report (FAIR)  
from QIF 3.0 XML Instance Files**

*May 27, 2021*

# Introduction

This usage guide describes how to use QIF 3.0 XML instance files for filling out Form 1 and Form 3 of an AS9102B First Article Inspection Report (FAIR). AS9102 Forms 1 and 3 were considered in the design of QIF. Form 2 is outside the scope of QIF 3.0, so this guide does not deal with it. This guide assumes you have copies of the forms and have studied the instructions for the forms.

The most recent previous version of this guide was for QIF 2.1 and AS9102B and was dated March 10, 2016. Revision B of AS9102 was first published in October 2014. It is a product of SAE International and is an “Aerospace Standard”.

Information for filling out a FAIR may be extracted from a QIF 3.0 XML QIFDocument instance file. The instance file must conform to the QIFDocument.xsd information model. A possible workflow is shown in Figure 1. Many QIF data items are optional; extracting information for a FAIR report from a QIF instance file will work only if the needed data items have been included in the instance file.

FAIR

Generator

FAIR

Generator

FAI Form

AS9102B

QIFDocument  
file with plan

Model

DME

Planner

QIFDocument  
file with results

Figure 1. Possible FAIR workflow using QIFDocument instance files

## QIF Terminology

This guide uses the following terms in the specialized senses shown. These are defined the same way in the text of the QIF 3.0 standard.

### actual component

a physical instance of a component.

### assembly

the design of an assembly. (A physical instance of an assembly is called an actual component.)

### assembly path

a sequence of the ids of components showing where in an assembly design a specific instance of a part design or a subassembly design is located. Assembly paths themselves have ids.

### component

an instance of the design of a part or assembly located in its parent’s space.

### part

the design of a part. (A physical instance of a part is called an actual component.)

## Guide Terminology

This guide makes statements referring to data objects and how to find them. For example:

Find the ActualComponent *AC* with id 4 in  
 QIFDocument/Results/ActualComponentSets/ActualComponentSet/ActualComponent.

To see what this means, consider the following skeletal XML QIF 3.0 Document file.

< QIFDocument ...>

…

<Results>

...

<ActualComponentSets n=”1”>

<ActualComponentSet n=”1”>

<ActualComponent id=”4”>

<SerialNumber>317</SerialNumber>

<Status>

<InspectionStatusEnum>PASS</InspectionStatusEnum>

</Status>

<AsmPathId>3</AsmPathId>

</ActualComponent>

</ActualComponentSet>

</ActualComponentSets>

</Results>

…

</QIFDocument>

*AC* is the thing represented by the text:

<ActualComponent id=”4”>

<SerialNumber>317</SerialNumber>

<Status>

<InspectionStatusEnum>PASS</InspectionStatusEnum>

</Status>

<AsmPathId>3</AsmPathId>

</ActualComponent>

which may be found by going through successive levels of enclosure by the tags

<QIFDocument>,<Results>,<ActualComponentSets>,<ActualComponentSet >,<ActualComponent>.

Another way of looking at it, if you are familiar with xpaths, is that *AC* is the thing with id 4 at the end of the xpath

QIFDocument/Results/ActualComponentSets/ActualComponentSet/ActualComponent.

Some information is in XML attributes rather than in XML elements. For example, the name of a Part in QIF 3.0 is its “label” attribute. An XML attribute name is denoted in this guide (and in xpaths) by putting @ before the XML attribute name. So, for example, the name of a Part is denoted in this guide by Part/@label. To help distinguish XML elements from XML attributes, QIF starts all element names with an upper case letter and starts all attribute names with a lower case letter.

QIF 3.0 includes user defined attributes. These are XML elements! They are always found in an XML element named Attributes.

QIF 3.0 enables references from one QIF Document (*DocA*) to objects in another QIF document (*DocE*). *DocE* is given a local id in the QIFDocument/ExternalQIFReferences of *DocA*. When in the process of preparing a FAIR from *DocA* an id *I* is referenced that is expected to identify an object of a particular type (a feature nominal, for example) but actually identifies an object in the ExternalQIFReferences of *DocA*, *DocE* must be consulted. The id of the object in *DocE* is the id found in *I*/@xid. The object in *DocE* so identified should be of the expected type. The instructions in this guide for finding things assume that all information is in a single QIF document. The instructions will work if the information is in more than one QIF document by using the method just described for resolving references using QIF ids.

# Form 1

In this section of this document and in section 4, AS9102B field numbers correspond to the second section number numeral. For example, *Part Number* is AS9102B field number 1 and is covered in section 2.1. In addition, the font characteristics of Appendix B of AS9102B are used with the section headings, namely:

* **Bold** (non-italic) means the field is required.
* ***Bold*** italic means the field is conditionally required.
* Plain (neither bold nor italic) means the field is completely optional.

## Part Number

**If there is a Results section in the QIF file:**For a part -  
    1. Find the ActualComponent, *AC*, for which the FAIR is being prepared, in  
    QIFDocument/Results/ActualComponentSets/ActualComponentSet/ActualComponent;  
 the serial number might identify it.  
    2. In QIFDocument/Product/AsmPaths, find the AsmPath *AsP* whose id is the  
 AsmPathId of *AC*.  
 3. In QIFDocument/Product/ComponentSet, find the Component *C* whose id is  
 the last id in the ComponentIds of *AsP*.  
 4. In QIFDocument/Product/PartSet, find the Part *P* whose id is the Part/Id of *C*.  
    5. Enter *P*/ModelNumber in field 1 of the FAIR form 1.  
  
For an assembly -  
    The first three steps are the same as for a part (shown just above).  
    4. In QIFDocument/Product/AssemblySet, find the Assembly *A* whose id is the  
 Assembly/Id of *C*.  
    5. Enter *A*/ModelNumber in field 1 of the FAIR form 1.  
 **If there is no Results section:**  
 The model number is an element of the Part or Assembly design, which is available in the  
 Product section. Obviously, if you already know the model number you do not need to hunt  
 for it in the data. The following assumes you know the QPId or the description and version of  
 the part or assembly and need to find the model number.

For a part -  
    In QIFDocument/Product/PartSet, find the Part *P* whose Attributes/AttributeQPId or  
 Header/Description and Version match the ones you are looking for.  
    Enter the ModelNumber of *P* in field 1 of the FAIR form1.   
  
 For an assembly -  
    In QIFDocument/Product/AssemblySet, find the Assembly *A* whose  
 Attributes/AttributeQPId or Header/Description and Version match the ones  
 you are looking for.  
    Enter the ModelNumber of *A* in field 1 of the FAIR form1.

## Part Name

Using the same Part *P* or Assembly *A* as in section 2.1, enter *P/*@label or *A*/@label in field 2.

## *Serial Number*

Using the same ActualComponent *AC* as in section 2.1, enter *AC*/SerialNumber in field 3. This applies only if there is a Results section. Otherwise, the serial number is not available.

## *FAIR Number*

**If there is a Results section:** Using the same ActualComponent *AC* as in section 2.1, let *T* be *AC*/Traceability.  
 Enter *T*/ReportNumber in field 4.

**If there is no Results section (or if ReportNumber is not found there):**  
 In QIFDocument/Product/ComponentSet, find the Component *C* for which a FAIR is  
 being prepared, and let *T* be *C*/Traceability.  
 Enter *T*/ReportNumber in field 4.

Note that finding *C* in this case requires knowing both (1) the Part or Assembly design you  
 want and (2) the location in the product of that design. Components of the same design in  
 different locations may have different report numbers.

## *Part Revision Level*

If the part or assembly has not been revised, enter “N/C” or “No Change” in field 5. Otherwise, using the same Part *P* or Assembly *A* as in section 2.1, enter *P*/Version or *A*/Version in field 5.

## *Drawing Number*

Identifying information for either a drawing or a DPD data set is allowed in this field. If you have both, choose whichever of the following two methods you prefer.

**If there is one or more PrintedDrawing for a part or assembly:**  
 Using the same Part *P* or Assembly *A* as in section 2.1, find *P*/DefinitionExternal

or *A*/DefinitionExternal. Call that *DE*. Pick a PrintedDrawing element *PrD* of *DE.*  If there is more than one PrintedDrawing,  
 pick the one you think is most appropriate.

Enter *PrD*/DrawingNumber in field 6.  
 **If there is a non-QIF DigitalDrawing or DigitalModel for a part or assembly:**

For a DigitalDrawing (e.g., a PDF file with a drawing in it) or DigitalModel:

Using the same Part *P* or Assembly *A* as in section 2.1, find *P*/DefinitionExternal

or *A*/DefinitionExternal. Call that *DE*. Pick a DigitalDrawing *DiD* or DigitalModel element *DiM* of *DE.*  If there is more than  
 one DigitalDrawing or DigitalModel, pick the one you think is most appropriate.

Enter (*DiD or DiM*)/File/(Name and Version) in field 6.

**If there is a QIF model for a part or assembly:**

QIF provides a required QPId to identify the instance file. QIF allows optional header information in a Product and in a Part or Assembly inside a Product. Use the most specific information provided.

For a QPId, enter QIFDocument/QPId in field 6.

For a Product Header, enter QIFDocument/Product/Header/File/(Name and Version) in field 6.

For a Part or Assembly:

Using the same Part *P* or Assembly *A* as in section 2.1, find *P*/Header/File

or *A*/Header/File. Call that *Fi*.

Enter *Fi*/(Name and Version) in field 6.

## *Drawing Revision Level*

If the drawing or model from section 2.6 has not been revised, enter “N/C” or “No Change” in field 7.

Otherwise, if QIFDocument/QPId was used in section 2.6, enter QIFDocument/Version/TimeCreated in field 7.

Otherwise, using the same object *O* (*PrD*, *DiD*, *DiM*, or *Fi* ) as in section 2.6, enter *O*/Version in field 7.

## *Additional Changes*

If the product is represented as a QIF ActualComponent, find the ActualComponent *AC* as in section 2.1. If *AC* has AdditionalChanges, enter *AC*/AdditionalChanges in field 8.

Otherwise, if there is a PrintedDrawing for the product, using the same *PrD* as in section 2.6, enter *PrD*/AdditionalChanges in field 8.

## Manufacturing Process Reference

Using the same Traceability *T* as in section 2.4, find *MP*, the  
 ManufacturingProcessTraceability in QIFDocument/ManufacturingProcessTraceabilities  
 whose id is *T*/ManufacturingProcessId.  
If *MP* provides detailed information about the manufacturing process, reference *MP* itself   
 by putting QIFDocument *QPId number* ManufacturingProcess *id number* in field 9.  
If *MP* does not provide detailed information but there is a reference in *MP*/Description,  
 enter the reference from *MP*/Description in field 9.

## Organization Name

Let *IT* be QIFDocument/Results/InspectionTraceability  
 if it exists. Otherwise, let *IT* be QIFDocument/PreInspectionTraceability.

Enter *IT*/InspectingOrganization/Name in field 10.

## Supplier Code

Using the same InspectionTraceability *IT* as in section 2.10, enter *IT*/SupplierCode in field 11.

## P. O. Number

Using the same InspectionTraceability *IT* as in section 2.10, enter *IT*/PurchaseOrderNumber in field 12.

## Detail part or an assembly FAI

Using the same InspectionTraceability *IT* as in section 2.10, in Field 13 check the box that matches *IT*/InspectionScope.

## Full or partial FAI

This field has four subfields. If the FAI is Full, check the Full box and do not enter anything in the other subfields.

**Full / Partial** – Using the same InspectionTraceability *IT* as in section 2.10, if *IT*/InspectionMode is FAI\_Full, check the Full FAI box; if *IT*/InspectionMode is FAI\_Partial, check the Partial FAI box.

**Baseline Part Number (if partial)** – Enter the previous part number (including the version) for which this FAI was performed.

**Reason for Partial FAI (if partial)** – Using the same Traceability *IT* as in section 2.10, enter *IT*/PartialInspection/ReasonForPartialInspection in field 14.

## *Part Number*

*Items 15-18 are to be filled in only if the thing in item 1 is an assembly. One line of the AS9102B form should be filled in for each component of the assembly. Each line has entries for items 15-18. Since item 17 is a serial number, the instructions here assume that there is a Results section in the QIFDocument.*

Let *AC* be the ActualComponent from section 2.1 and let *AllPaths* be  
 QIFDocument/Product/AsmPaths.

Find the AsmPath *ACPath* in *AllPaths* whose id is *AC*/AsmPathId.

Search through *AllPaths* and collect in *SubPaths* all the AsmPaths that are one item longer  
 than *ACPath* and are identical to *ACPath* except for that one item at the end. *SubPaths*  
 contains the paths to the components of *AC*.

For each AsmPath *SP* in *SubPaths*, in QIFDocument/Product/ComponentSet find the  
 Component, *C*, whose id is the last item in *SP*.

For each *SP*/*C* pair found in the preceding step, do the following.

In QIFDocument/Product/PartSet, find either the Part *P* whose id is the Part/Id of *C* or the assembly *A* whose id is the Assembly/Id of *C*.

If *P* is found, enter *P*/ModelNumber in the proper row of field 15.

If *A* is found, enter *A*/ModelNumber in the proper row of field 15.

## *Part Name*

Using the same Part *P* or Assembly *A* as in section 2.15, enter *P*/@label or *A*/@label in the proper row of field 16.

## *Part Serial Number*

In QIFDocument/Results/ActualComponentSets/ActualComponentSet, find the  
 ActualComponent *ACc* whose AsmPathId is the id of the *SP* from section 2.15.  
Enter *ACc*/SerialNumber in the proper row of field 17.

## *FAI Report Number*

Using the same ActualComponent *ACc* as in section 2.17, enter *ACc*/Traceability/ReportNumber   
 in the proper row of field 18.

## Signature

Enter in field 19 the printed name of the person who has authority to approve this FAIR. Also enter the hand-written or electronic signature of the named person in this field.

Using the same InspectionTraceability *IT* as in section 2.10, if *IT* is an InspectionTraceabilityType, ideally this will be the person identified by *IT*/ReportPreparer/Name.

FAI Complete / FAI Not Complete

If all characteristics reported on the form conform to their requirements, check the FAI Complete box. Otherwise, check the FAI Not Complete box.

## Date (for preparer signature)

Enter in field 20 the date on which the signature of section 2.19 was entered.

## Reviewed By

This field is optional.

Enter in field 21 the printed name of a person who has authority to review and approve this FAIR. Also enter the hand-written or electronic signature of the named person in this field.

## Reviewed by Date

This field is optional but should be competed if field 21 is used.

Enter in field 22 the date on which the signature of section 2.21 was entered.

## Customer Approval

Out of scope for QIF

## Date

Out of scope for QIF

# Form 2

Out of scope for QIF

# Form 3

## Part Number

Same as for Form 1 item 1. See section 2.1.

## Part Name

Same as for Form 1 item 2. See section 2.2.

## *Serial Number*

Same as for Form 1 item 3. See section 2.3.

## *FAI Report*

Same as for Form 1 item 4. See section 2.4.

## Characteristic No

Find the characteristic item *CI* for which you are filling in a line of Form 3 in  
QIFDocument/Characteristics/CharacteristicItems.  
Enter *CI*/Name in the proper row of form 3 field 5.

## *Reference Location*

Using the same characteristic item *CI* as in section 4.5, look for *CI*/LocationOnDrawing. If that exists, exactly one of the following three possibilities will apply:

### *CI*/LocationOnDrawing/DrawingId exists

If *CI*/LocationOnDrawing has a DrawingId, find the PrintedDrawing *PrD* or DigitalDrawing *DiD* with that DrawingId. Enter into the proper row of form 3 field 6:  
Either

*PrD*/DrawingNumber (for a PrintedDrawing) or

*DiD*/File/Name and *DiD*/File/Version (for a DigitalDrawing),  
*CI*/LocationOnDrawing/SheetNumber,  
*CI*/LocationOnDrawing/DrawingZone.

### *CI*/LocationOnDrawing/ModelId exists

If *CI*/LocationOnDrawing has a ModelId, that will be the QIF id of a Digital Model *DM* in a DefinitionExternal. In this case, find the DefinitionExternal *DE* with that id for the part or assembly in the Product section of the QIF file and the DigitalModel *DM* in *DE*. Enter into the proper row of form 3 field 6:

*DM*/File/Name and *DM*/File/Version.

### *CI*/ViewId Exists

If *CI*/LocationOnDrawing has a ViewId, which is the id of a view in the QIF file. Enter the ViewId in the proper row of form 3 field 6.

## Characteristic Designator

Using the same characteristic item *CI* as in section 4.5, enter *CI*/CharacteristicDesignator/Criticality/(LevelEnum or OtherLevel) in the proper row of field 7. If the optional *CI*/CharacteristicDesignator/Criticality/(AreaEnum or OtherArea) is given, enter it also.

## Requirement

Using the same characteristic item *CI* as in section 4.5, find the CharacteristicNominal *CN*   
 whose id is *CI*/CharacteristicNominalId in  
 QIFDocument/Characteristics/CharacteristicNominals.  
Enter as much information about *CN* as is needed in the proper row of field 8. It will usually be necessary to obtain some information from the characteristic definition whose id is *CN*/CharacteristicDefinitionId, which will be found in QIFDocument/Characteristics/CharacteristicDefinitions.

## Results

*This assumes there is a Results section in the data.*

Using the same characteristic item *CI* as in section 4.5, find the characteristic measurement *CM*  whose CharacteristicItemId is the id of *CI* in  
 QIFDocument/Results/MeasurementResultsSet/ MeasurementResults/

MeasuredCharacteristics/CharacteristicMeasurements.

Enter as much information about *CM* as is needed in the proper row of field 9. Follow the instructions for Form 3 item 9 in AS9102B.

## *Designed Tooling*

Using the same characteristic measurement *CM* as in section 4.9, for each *CM*/MeasurementDeviceIds/Id,  
 find the measurement device with that id in  
 QIFDocument/MeasurementResources/MeasurementDevices.  
Enter as much information about the device as is needed in the proper row of field 10.

Also, since item 10 asks that NC inspection programs be included, let *MR* be the MeasurementResults in which *CM* is found. If there is a *MR*/InspectionTraceability/InspectionSoftwareItems/DMESoftware, then for each id in the DMESoftware, find the software *SW* with that id in QIFDocument/SoftwareDefinitions and enter identifying information from *SW* in the proper row of field 10.

## *Non-conformance Number*

Using the same characteristic measurement *CM* as in section 4.9, enter *CM*/NonConformanceDesignator in the proper row of field 11.

## Signature

Enter in field 12 the printed name of the person who has authority to approve this FAIR. Also enter the hand-written or electronic signature of the named person in this field.

Using the same InspectionTraceability *IT* as in section 2.10, if *IT* is an InspectionTraceabilityType, ideally this will be the person identified by *IT*/ReportPreparer/Name.

## Date

Enter in field 13 the date on which the signature of section 4.12 was entered.

## Additional Data / Comments

Enter in field 14 any additional data or comments you may wish to make, or as required by your organization or the customer.