



Aeronautics Company – Fort Worth

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REV B
14 Aug 2018

**F-16 Program Interchangeability-Replaceability (I-R) Requirements
For
Coproducers and Suppliers**

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For
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1.0 GENERAL

1.1 Scope

This specification establishes Interchangeability - Replaceability (I-R) Program Plan for all the Suppliers/Coproducers of F- 16 assemblies or components which contain I-R parts.

The purpose of establishing this I-R program is to ensure that all F-16 type versions will be supportable with common spare parts regardless of the source of manufacture of either the airplane or parts.

The program establishes a requirement that designated I-R parts fit any component produced by any manufacturer.

Therefore, it is mandatory that all F- 16 I-R parts coming from any approved source shall mate with adjacent items furnished by any approved manufacturing source. Said parts shall be in the same interchangeable or replaceable status as specified in the prime design contractor's approved working list.

The plan calls for the Suppliers/Coproducers installing any new I-R part to conduct the I-R First Article Demonstration (FAD) and any applicable Quality Conformance Demonstration (QCD). Since the success of these I-R demonstrations will involve the tooling of all Suppliers/Coproducers, Lockheed Martin Aeronautics (LM Aero) will closely monitor these initial checks and coordinate corrective action among the Suppliers/Coproducers when required.

Each affected Supplier/Coproducer shall submit an I-R Plan for approval by the F-16 I-R Board prior to start of production to verify compliance to processes and procedures to be used to implement and sustain an effective plan to assure Interchangeability and Replaceability.

The I-R program, as defined herein, is required to provide the Military Service organizations with the items necessary to support the weapon system for maintainability and serviceability. Such features as ease of accessibility and quick replacement of parts and components are an integral part of the program objectives.

The I-R requirements imposed by the prime contract obligates each Supplier/Coproducer to comply with this specification to guarantee performance to the weapon system requirements.

1.2 Applicable Documents

SPECIFICATIONS:

16PR100 – Interchangeability-Replaceability Working List (IRWL) Preface

16PP272 – Plan for Task Transfer

CBM-4025 – LM Aero Interchangeability and Replaceability Performance Standard

Quality Clause Q2A – Supplier First Article Inspection Requirements

1.3 Definitions

1.3.1 Buyer

For purposes of this document, the term Buyer shall signify an authorized purchasing agent of the Lockheed Martin Corporation.

1.3.2 Supplier/Coproducer

Major producer other than LM Aero participating in the manufacture of the aircraft and/or component parts containing I-R parts.

1.3.3 LM Aero Resident Office (LMRO)

Lockheed Martin previously had in-country organizations named “LMRO - International Technical Assistance” (ITA) with representative employees responsible for administration of Purchase Order requirements for coproduction activity. These LMRO ITA organizations no longer exist under this name, but these functions continue to be performed by LM Aero representatives. Within this document, the terms LMRO and ITA are equivalent to the current LM Aero organizational construct.

1.3.4 LMRO ITA Representative

For all intents and purposes within this document, the term LMRO ITA Representative is synonymous with “I-R Coordinator”, which may or may not be a resident, in-country resource.

1.3.5 SQE Representative

Lockheed Martin Supplier Quality Engineering personnel responsible for administration of Purchase Order requirements for Supplier activity. If not certified as an I-R Coordinator by approval of the F-16 I-R Board, the SQE Representative shall engage and consult with the I-R Board concerning I-R issues.

1.3.6 Controlled Items

The term “controlled item” denotes a part, assembly, subassembly, component, set, segment of the airframe or any other physical element of the aerospace vehicle that is identified by a part number and is controlled in manufacture by means of controlled tools.

1.3.7 Interchangeable-By-Design Item (formerly Interchangeable Category)

Interchangeable-by-design items cover certain equipment, machined parts, etc. which are attached by bolts or screws, readily removable, replaceable by normal maintenance conditions, normally provisioned as spares, and are designed in such a manner that all like parts made within the design tolerances will exchange one for another without alterations of the items themselves or the attaching surfaces of the next assembly.

The primary distinction between an “interchangeable-by-design” part and a “controlled interchangeable” part is the criterion used to control the interchangeable features. The

“interchangeable-by-design” part is controlled by blueprint dimensions, while “controlled interchangeable” parts require control tools to prevent tolerances from adversely affecting interchangeability.

1.3.8 Interchangeability – Replaceability Working List (IRWL) and 16PR100 Preface.

This is an LM Aero report generated by Product Engineering to establish and define the classification of a controlled part. The remarks block on each sheet must be filled in for parts classified as replaceable, giving the type of work to be performed at installation and the estimated time required for such work. Copies of this report will be provided to affected Suppliers/Coproducers. The preface of the 16PR100 states the rules and conditions of what type of item is to be I-R.

1.3.9 Equipment

A part, module, subassembly, component, group, set, or system.

1.3.10 I-R Control Media

Tools used to establish and/or coordinate critical features of production tools that produce controlled I-R items. Control tools are not directly used to manufacture the product. Control tools are not required for “interchangeable-by-design” type I-R items. For clarification, “control tools” as referred to in this specification are additionally defined as follows:

1. Master Control Tooling - Tooling such as master tools and gages used to establish dimensions and features of production tools which control interchangeability, replaceability, and/or coordination points of production parts.
2. Controlled Production Tooling - Special tooling, such as jigs and fixtures, used to establish dimensions and features of production parts, assemblies and components and which control interchangeability, replaceability, and/or coordination points of those production parts, assemblies, and components.
3. Electronic Data – Electronic data used to establish dimensions and features during manufacture of production tools which control interchangeability and/or replaceability, also used during fabrication of production parts for control of I-R features (trim, attach holes, etc.).

1.3.11 I-R First Article Demonstration (FAD)

This is a one-time inspection during installation of each new configuration controlled item to determine the degree of conformance to the I-R requirements. This inspection is only applicable to peculiar I-R items that are not manufactured or installed by LM Aero and may include the installation of a part or assembly received from other manufacturing sources (ref. Q2A). FADs shall include one or more of the following:

1. Installation of two of the Interchangeable parts or assemblies selected at random from stock.

2. Exchange of like Interchangeable parts or assemblies from one aircraft, or component, to another.
3. Complete and successful installation of one randomly selected Replaceable item on any applicable aircraft/component.
4. Verification of the I-R part or assembly to production tooling and an inspection of tooling that establishes the mating interface such as trim lines, hole locations and mating surfaces.
5. In cases where interchangeable features cannot be checked due to the next assembly interface not being available, the inspection will be completed at LM Aero or another Supplier/Coproducer as appropriate. This portion of the task will be documented on the Incomplete Task Log (ITL). The ITL will be initiated to complete the inspection by LM Aero, or by another Supplier/Coproducer (Ref. document 16PP272 - Plan For Task Transfer for additional information).

1.3.12 Quality Conformance Demonstration (QCD) Periodic Recertification

A QCD is an ongoing scheduled installation of:

1. Controlled replaceable items, with interchangeable features (within the limitations of replaceability described in the remarks section of the applicable IRWL sheet) or,
2. The exchange of controlled interchangeable items on or within the physical structure of the aircraft, component, or assembly in order to establish proof of compliance with I-R requirements subsequent to FAD. QCDs shall include one or more of the options in paragraph 1.3.11.

QCDs are performed to assure continuing contractual compliance in accordance with CBM-4025's requirement to conduct Process and Product Reviews.

1.3.13 I-R FAD And QCD Verification Records

Suppliers/Coproducers will provide a form to record the results of each I-R FAD and QCD. When the inspection is successfully completed, this form requires acceptance stamps and signatures of the Supplier/Coproducer, LMRO ITA or SQE, and U.S. Government Quality representative or designated alternate. Copies of this verification record will be furnished to the cognizant LM Aero Buyer. (see Attachment A)

SECTION 2 - Requirements

2.1 General

Suppliers/Coproducers shall establish and maintain an I-R Program in accordance with this specification. (See Attachment B)

2.1.1 Engineering Design Drawings

Engineering design drawings are identified per CBM-4025 with a unique I-R block in the lower right hand corner of the drawing. The applicable part dash number is also shown as well as the level of interchangeability (“controlled”, “interchangeable-by-design item”, “replaceable” or “replaceable spares”). Drawings predating CBM-4025 will retain the

MIL-I-8500 decals. Items previously identified as Interchangeable Category shall also retain that designation.

2.1.2 I-R Parts List

A listing of all I-R parts is shown on the IRWL. “Interchangeable-by-design” items and replaceable spares are also listed.

2.1.3 Interchangeability - Replaceability Conflicts

Should any conflicts arise between the I-R requirements of this specification and other applicable specifications, immediately inform the LMRO, SQE or Buyer for resolution.

2.1.4 I-R Part Mating Structure

Interface structure has the same degree of control as the adjacent I-R part with respect to design, tooling, and SQAR (Supplier Quality Assurance Report) disposition.

2.1.5 Tooling

Suppliers/Coproducers shall provide adequate production tooling for the control of I-R features throughout the manufacturing process.

LM Aero shall provide the necessary Control Tools to assure the physical coordination and maintenance of all other Production Tooling required for Interchangeable compliance throughout the life cycle of the applicable I-R items. This control tooling shall be the sole source for control of the I-R features contained in Supplier/Coproducer manufactured production tooling. All control tools furnished by LM Aero will be shipped, stored and maintained in accordance with TMS-MC-015 (Supplier Tooling Manual).

Production tools which control I-R features of I-R parts and the mating structure I-R features must be clearly identified as I-R tools as required by LM Aero tool design drawings. For example, attach hole pattern and/or perimeter of part color code will be incorporated in production tools, to signify I-R controlled features. Control tools do not require this identification.

The Supplier/Coproducer shall maintain to current engineering releases all tool design for all production tools that contain I-R control features.

2.1.6 Records

Suppliers/Coproducers shall maintain records verifying the compliance of the requirements of this specification. Such records shall be maintained in such a manner to permit a status review by LM Aero and/or the U. S. Government. Records as a minimum shall contain the information shown on Attachment A.

2.1.7 FAD And QCD Plan

The Supplier/Coproducer shall submit to the cognizant Buyer, for approval by the F-16 Program I-R Board, a Master Plan for controlled items to be inspected. This Master Plan

shall fully describe how and when the Supplier/Coproducer will accomplish the FAD and QCD requirements of this specification, and should be provided at least 90 days prior to production start-up.

Upon review by the F-16 Program I-R Board, the Buyer will notify the Supplier/Coproducer of the Master Plan approval, disapproval or conditional approval. If the Master Plan is disapproved or conditionally approved this notification shall include any suggestions or recommendations deemed necessary to make the Master Plan acceptable. Significant revisions to Master Plans shall be submitted to the F-16 Program I-R Board for review and approval as described above.

2.1.8 I-R FAD

I-R FADs are normally accomplished by LM Aero. However, FADs shall be accomplished by Suppliers/Coproducers on peculiar items listed on the IRWL that are not manufactured or installed by LM Aero. The respective LMRO ITA or SQE shall be notified if the I-R classification cannot be accomplished as described in the IRWL.

2.1.9 QCD

QCDs are required to be performed by the Supplier/Coproducer who installs the controlled item. QCDs of each manufactured item listed in the IRWL shall be scheduled on the first production article fabricated by Supplier/Coproducer manufactured tooling. Articles manufactured by the Supplier/Coproducer that are subject to FAD will be scheduled for QCD one year after the successful completion of the FAD. The scheduled effectivity of such QCDs will be established by each installing Supplier/Coproducer as shown on the QCD plan (Ref. Para. 2.1.7).

Verification of the QCD will be formally witnessed by affected Supplier/Coproducer and LMRO/ITA/SQE personnel. U.S. Government Quality Representative or designated alternate participation is encouraged but is optional. This participation will be communicated by the respective U.S. Government representative or alternate.

LM Aero may perform QCDs on all listed I-R items received from Suppliers/Coproducers. If these items have been installed on components which are shipped to LM Aero, they shall be removed and a QCD performed by temporarily installing the part on a like LM Aero component.

The Suppliers/Coproducers shall also perform QCDs on all listed I-R items received from LM Aero or other Suppliers/Coproducers if the mating structure or interface is built by the Suppliers/Coproducers (Ref. Para. 1.3.12).

Additional formal QCDs on the controlled I-R items or interface shall be performed when a part number is changed (where I-R features are affected) or a malfunction occurs which affects interchangeable or replaceable features.

The Suppliers/Coproducers shall complete an I-R FAD and QCD record (reference Paragraph 1.3.11). “Interchangeable-by-design” type I-R items do not require QCDs. However, the Supplier/Coproducer shall assure that interchangeability requirements are maintained. Three copies of the I-R FAD and QCD record, for all items inspected, are to

be sent to the cognizant Buyer and one copy is to accompany the part, if shipped to LM Aero or another Supplier/Coproducer.

2.1.10 I-R Nonconformance

An I-R nonconformance occurs when a controlled I-R item fails to meet the form, fit, or function requirements as defined on the engineering drawing and IRWL. A discrepancy which occurs or becomes apparent during the inspection but does not affect the form, fit, or function requirements shall not constitute an I-R inspection failure. Controlled I-R parts delivered to Suppliers/Coproducers are manufactured from controlled tooling. Conformance to I-R requirements for provided parts can only be evaluated at the installation level, unless specific notification has been coordinated through the F-16 I-R Board.

When a controlled item deviates from the Engineering drawing I-R requirement and the nonconformance cannot be reworked or repaired to the engineering requirements, the Supplier/Coproducer shall provide the Buyer with the following information for processing a request for variance.

1. Description and cause of the discrepancy.
2. Unit number on which the discrepancy exists.
3. Approximate number of man-hours required to replace the part.
4. Component/Aircraft number on which the original requirement will be regained.

NOTE 1

Should an I-R discrepancy occur where the installing Supplier/Coproducer conducting the inspection did not manufacture the part or mating structure, notify the LMRO, ITA, SQE, or Buyer for resolution. When the Supplier/Coproducer made either the part or the mating structure, the Supplier/Coproducer shall be responsible for resolving the discrepancy (with LMRO or SQE assistance if required) and providing the information for the four items listed above.

NOTE 2

In cases where Controlled Interchangeable parts foul, achieve less than minimum gap or extend beyond aircraft 'lines' or contours, the Supplier/Coproducer may submit a SQAR to LM Aero MRB (Material Review Board) for coordinated disposition to allow minor material removal from a Controlled Interchangeable part. This repair option is provided only on exterior doors, covers and panels where a fixed skin cannot be trimmed or otherwise altered to repair the discrepancy. The SQAR will require approval from the F-16 I-R Board (authority to perform minor perimeter alteration is granted in CBM-4025).

The Supplier/Coproducer shall obtain instructions from the LMRO, SQE, or Buyer before performing any further work which causes these same deviations on additional items and before installing or shipping items which deviate from the I-R requirements.

2.1.11 Periodic Recertification

"LOCKHEED MARTIN PROPRIETARY INFORMATION". USE OR DISCLOSURE OF DATA CONTAINED HEREIN IS SUBJECT TO THE RESTRICTIONS ON THE TITLE PAGE OF THIS DOCUMENT.

The Supplier/Coproducer will perform an “in process” QCD of all listed IRWL items during the life cycle of the procurement contract. The frequency of the QCDs will be on an annual basis, except as noted below, and accomplished by the affected Supplier/Coproducers and an LMRO-ITA or SQE representative. Adequate records shall be maintained at the Supplier’s/Coproducer’s facility (see attachment A). Copies shall be forwarded to the cognizant Buyer.

The frequency of QCDs can be adjusted based upon the manufacturing maturity and types of nonconformances experienced by the Supplier/Coproducer. The Supplier/Coproducer with an LMRO ITA or SQE representative has the option to evaluate the available part information to determine whether the scheduled interval should be extended. Consideration to extend the demonstration interval will be based upon (but not limited to) part complexity, tooling issues and part quality history. The Supplier/Coproducer has the option to develop and submit to the cognizant Buyer an I-R Master Plan addendum for administering QCD extension.

Upon review by the F-16 I-R Board, the Buyer will notify the Supplier/Coproducer of the addendum approval, conditional approval or disapproval. If the addendum is conditionally approved or disapproved, this notification shall include suggestions or recommendations deemed necessary to make the addendum acceptable. When the Master Plan addendum is approved, the LMRO ITA or SQE representative will approve parts eligible for QCD extension.

2.2 Quality Assurance

The Supplier/Coproducer shall assure that the requirements of this specification are complied with and I-R inspections are accomplished satisfactorily to the established schedules. Special tooling used in the fabrication and inspection of interchangeable parts shall be periodically reinspected for accuracy and verified by direct coordination for continued conformance to established features of the applicable control tools in accordance with TMS-MC-015.

I-R items failing to meet engineering drawing requirements (gap, mismatch, hole alignment, etc.) at installation shall be rejected and documented on a SQAR by the Supplier/Coproducer and shall refer the discrepancies to the responsible MRB for disposition. The Supplier/Coproducer shall investigate, provide corrective action and verify the achievement and effectiveness of the corrective action.

The Supplier/Coproducer shall ensure that I-R QCDs are documented and processed in accordance with the requirements of Paragraph 2.1.10 of this specification.

The Supplier/Coproducer shall administer the I-R FAD and QCD record form and contact the LMRO ITA or SQE and responsible Government Representative at least five (5) days prior to scheduled I-R inspections.

The Supplier/Coproducer and the LMRO-ITA/SQE shall witness I-R inspections and verify acceptable performance by annotating the I-R record form with acceptance stamps and signatures. The Government Representative shall be requested to witness.

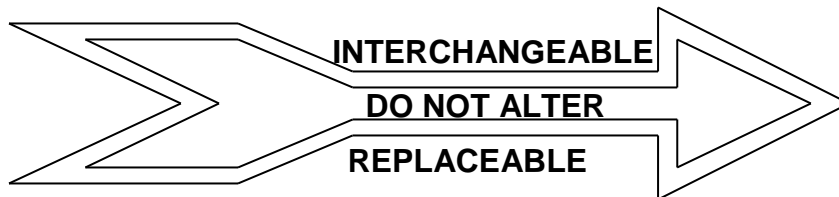
2.3 I-R Identification

Suppliers/Coproductors shall rubber stamp I-R parts with an I-R identification stamp per Figure 1 below. I-R parts also require rubber stamping with the LM Aero design activity code number 81755 and the Supplier's/Coproducter's manufacturer's code number. These stamps will be placed near the part number.

FIGURE 1

EXAMPLE

DETAIL PART	ASSEMBLY.
81755/16B5503-3	81755 ASSY. 16E2549-5



ATTACHMENT A

Recommended sample for a Record of FAD/QCD accomplishment

- Aircraft type/version and serial number
- Tool name
- Tool number
- Control tool number (when applicable)
- Part and dash number
- FAD or QCD
- Acceptance stamps if successful
- SQAR number if unsuccessful
- Disposition of FAD/QCD

ATTACHMENT B

Recommended minimum information for an I-R Program

- FAD/QCD planning and schedule
- Production tooling concept
- Final Production tool designs for approval
- Tooling Periodic Inspection concept