# L-3 ES Quality Assurance Provisions (QAPs) Revised January 10, 2005

NOTE: All Quality Assurance/Control Systems data and documentation called out on the purchase order must be placed with the parts/components inside the shipping container/package. Failure to comply fully with the provisions/requirements may adversely affect the Supplier Quality Rating and can result in the return of the complete shipment at your expense.

**QAP Description** 

## 1 QUALITY ASSURANCE/CONTROL SYSTEMS

### 1A QUALITY PROGRAMS REQUIREMENT (MIL-Q-9858)

Revised March 13, 2002 (minor changes, no change in content)

The subject commodity shall be manufactured and controlled by a supplier who has been audited/approved by L-3 Communications Electronic Systems Inc. (L-3 ES) for compliance to MIL-Q-9858 "Quality Program Requirements". MIL-Q-9858 was cancelled without replacement as of October 1, 1996. Preference will be given to suppliers who are registered to the current requirements of ISO 9001. "Quality Systems - Model for Quality Assurance in Design/Development Production, Installation and Servicing".
Reference: L-3 Communications Electronic Systems Inc. Supplier Quality Directory (L-3 ES SQD).

### 1C INSPECTION SYSTEMS REQUIREMENT (MIL-I-45208)

Revised March 13, 2002 (minor changes, no change in content)

The subject commodity shall be manufactured and controlled by a supplier who has been audited/approved by L-3 ES for compliance to MIL-I-45208 "Inspection System Requirements". MIL-I-45208 was cancelled without replacement as of October 1, 1996. Preference will be given to suppliers who are registered to the current requirements of ISO 9002. "Quality Systems-Model for Quality Assurance in Production and Installation".
Reference: L-3 ES SQD.

### 1F CALIBRATION SYSTEM (ISO 10012, ISO 17025, ANSI Z540-1)

Revised February 21, 2002 (ISO 17025 added)

Measuring and testing equipment used in the performance of verifying the compliance of this commodity with the PO and specification requirements, shall be subject to a calibration system that conforms to the current requirements of the applicable calibration system.

### 1H QUALITY CONTROL REQUIREMENT (DESIGN AUTHORITY)

Revised March 13, 2002 (clarified that manufacturer shall be listed in the L-3 ES SQD)

This commodity shall be manufactured and controlled by a manufacturer who has been audited/approved by the applicable design authority. In addition, to being listed in the applicable specification/drawing/AVPL, the manufacturer shall be listed in the L-3 ES SQD.

### 1J QUALIFIED PRODUCT LIST (QPL)/QUALIFIED MANUFACTURERS LIST (QML)

Revised March 14, 2002 (QML added)

This commodity shall be manufactured and controlled by a supplier who has been qualified by the U.S. Government and is currently listed in the applicable QPL and/or QML.

### 1K SOFTWARE QUALITY ASSURANCE PROGRAM REQUIREMENT (DOD-STD-2168)

Revised February 21, 2002 (MIL-S-52779 replaced by DOD-STD-2168)

The software requirements of the subject order shall be in accordance with a software quality assurance system that conforms to DOD-STD-2168.
Reference: L-3 ES SQD.

NOTE: All Quality Assurance/Control Systems data and documentation called out on the purchase order must be placed with the parts/components inside the shipping container/package. Failure to comply fully with the provisions/requirements may adversely affect the Supplier Quality Rating and can result in the return of the complete shipment at your expense.

**QAP Description** 

**1M ELECTROSTATIC DISCHARGE CONTROL PROGRAM FOR PROTECTION OF ELECTRICAL, ELECTRONIC PARTS, ASSEMBLIES AND EQUIPMENT (MIL-STD-1686/MIL-HDBK-263, ANSI/ESD S20.20)**

Revised February 21, 2002 (ANSI/ESD S20.20 added)

The supplier shall establish and implement an electrostatic discharge control program for any activity that designs, tests, inspects, services, manufactures, processes, assembles, installs, packages, labels or otherwise handles electrical or electronic parts susceptible to damage caused by static electricity in accordance with the applicable ESD program.

**1R QUALITY SYSTEMS (ISO 9001)**

Revised March 13, 2002 (certified by an accredited registrar added)

This commodity shall be manufactured and controlled by a supplier who has been audited/approved by L-3 ES and/or certified by an accredited registrar to the current requirements of ISO 9001. "Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation and Servicing".
Reference: L-3 ES SQD.

**1V PROCUREMENT TO NON-RELEASED DOCUMENTATION (L-3 ES INTERNAL USE ONLY)**

Revised March 13, 2002 (minor changes, no change in content)

This commodity is being procured to non-released documentation (Data Records). Upon receipt at L-3 ES; Supplier Quality Assurance (SQA) shall inspect/test the commodity to released documentation. Otherwise the commodity shall be held in SQA until released documentation is available.
In urgent circumstances, the commodity may be inspected/tested to non-released documentation and/or allowed to proceed to production in a controlled manner per established Company Procedures to ensure a positive recall.

**1W PROCUREMENT FROM UNAPPROVED SUPPLIER (L-3 ES INTERNAL USE ONLY)**

Revised April 30, 2002 (minor changes, no change in content)

This commodity is being procured from an unapproved source and shall be held in SQA until the supplier/product has been evaluated/approved by Engineering and/or SQE as applicable.
For the purpose of evaluation, the commodity may be allowed to proceed to production in a controlled manner with positive recall per established Company Procedures.

**1Y QUALITY SYSTEMS (SAE AS9100)**

Issued March 13, 2002.

This commodity shall be manufactured and controlled by a supplier who has been audited/approved by L-3 ES and/or certified by an accredited registrar to the current requirements of SAE AS9100. "Quality Management Systems-Aerospace".
Reference: L-3 ES SQD.

**1Z CUSTOMER FURNISHED MATERIAL**

Issued July 10, 2002

L-3 ES shall maintain traceability, verify, protect and safeguard property provided for use or incorporation into product. If any customer property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained. This does not absolve the customer from supplying compliant material.

## 2 SOURCE INSPECTION

### 2A GOVERNMENT SOURCE INSPECTION.

Government source inspection is required prior to shipment from the supplier's plant. Upon receipt of this purchase order (PO), the supplier must promptly notify the government quality assurance representative who normally services this supplier's plant and supply this representative with a copy of this PO so that appropriate planning for inspection can be accomplished.

### 2B L-3 COMMUNICATIONS ELECTRONIC SYSTEMS INC. SOURCE INSPECTION

Revised June 20, 2002 (minor changes, no change in content)

All applicable items covered by this PO are subject to the successful completion of inspection at the manufacturer's plant, witnessed by L-3 ES. The manufacturer/supplier shall furnish, at no additional cost, the necessary facilities and equipment, and perform tests as required by L-3 ES, to demonstrate conformance to the PO and referenced documents. Evidence of completion of source inspection shall accompany each shipment.

To arrange for source inspection, the supplier shall give L-3 ES's procurement department five (5) working days prior notification that the product is ready for source inspection. The supplier shall be notified by L-3 ES within the granted five (5) working days whether to ship or hold for source inspection. If source inspection is waived, a written statement shall accompany the subject shipment to that effect along with the date and name of the person, at L-3 ES, authorizing shipment.

### 2C L-3 COMMUNICATIONS ELECTRONIC SYSTEMS INC. PRE-SEAL/IN-PROCESS VISUAL SOURCE INSPECTION

Revised June 20, 2002 ("In-process" added to title. Also minor changes, no change in content)

All applicable items covered by this PO are subject to the pre-seal/in-process source inspection at the manufacturer's plant, witnessed by L-3 ES personnel. The manufacturer/supplier shall furnish, at no additional cost, the necessary facilities and equipment, and perform tests as required by L-3 ES, to demonstrate conformance to the PO and referenced documents. Evidence of completion of source inspection shall accompany each shipment.

To arrange for source inspection, the supplier shall give L-3 ES's procurement department five (5) working days prior notification that the product is ready for source inspection. The supplier shall be notified by L-3 ES within the granted five (5) working days whether to ship or hold for source inspection. If source inspection is waived, a written statement shall accompany the subject shipment to that effect along with the date and name of the person, at L-3 ES, authorizing shipment.

### 2D L-3 COMMUNICATIONS ELECTRONIC SYSTEMS INC. CUSTOMER SOURCE INSPECTION

Revised July 5, 2002 (L-3 Communications Electronic Systems Inc. added to title. Also minor changes, no change in content)

All applicable items covered by this PO are subject to the successful completion of inspection at the manufacturer's plant, witnessed by L-3 ES's customer. The manufacturer/supplier shall furnish, at no additional cost, the necessary facilities and equipment, and perform tests as required by L-3 ES's customer, to demonstrate conformance to the PO and referenced documents. Evidence of completion of source inspection shall accompany each shipment.

To arrange for source inspection, the supplier shall give L-3 ES's procurement department five (5) working days prior notification that the product is ready for source inspection. The supplier shall be notified by L-3 ES within the granted five (5) working days whether to ship or hold for source inspection. If source inspection is waived, a written statement shall accompany the subject shipment to that effect along with the date and name of the person, at L-3 ES, authorizing shipment.

**2F L-3 COMMUNICATIONS ELECTRONIC SYSTEMS INC. OWNED TOOLING**

Revised July 5, 2002 (Northrop Grumman Canada Corporation added to the title)
Revised January 7, 2005 (Changed Northrop Grumman Canada Corporation to L-3 Communications Electronic Systems Inc.)

The supplier is responsible for the protection, calibration, maintenance and care, other than normal wear, of all L-3 ES tooling and equipment in their possession. The tooling must be permanently marked with the part number, tool number and the phrase "Property of L-3 Communications Electronic Systems Inc.". Said tooling or equipment shall be subject to periodic inspection upon notice and shall be returned in an acceptable condition upon demand or notice.

**2G L-3 COMMUNICATIONS ELECTRONIC SYSTEMS INC. SUPPLIED MATERIAL**

Revised July 5, 2002 (Northrop Grumman Canada Corporation added to the title)
Revised January 7, 2005 (Changed Northrop Grumman Canada Corporation to L-3 Communications Electronic Systems Inc.)

All L-3 ES supplied material shall be supplied free issue and will have been approved by L-3 ES Quality Assurance Department. L-3 ES assumes responsibility for all material supplied except where damage is caused by the vendor due to mishandling or negligence while in the vendor's possession. A release note must accompany each shipment and shall include a statement to the effect that all components used in the manufacture of these assemblies were supplied by L-3 ES.

**2H L-3 COMMUNICATIONS ELECTRONIC SYSTEMS INC. SUPPLIER PARTNERSHIP PROGRAM**

Revised June 20, 2002 (minor changes, no change in content)

This product is procured from a supplier who has entered into a formal relationship with L-3 ES and whose quality performance currently meets one of the three established quality levels of our Supplier Partnership Program. L-3 ES will verify/process product from our suppliers in accordance with established procedures.

**2J CASTING DROP SHIPMENT**

Revised July 5, 2002 (minor changes, no change to content)

All castings, designated on the PO for drop shipment to a third party, shall be inspected/tested by a supplier representative to criteria agreed upon with L-3 ES. All applicable certifications/test data shall be shipped to L-3 ES and the castings shipped to the destination designated on the L-3 ES PO.

## 3 CERTIFICATIONS

**3A CERTIFICATE OF CONFORMANCE (MIL AND/OR DESIGN AUTHORITY CONTROLLED PRODUCT)**

Revised May 21, 2002 (raw material date codes/lot numbers to be documented on C of C when QAP 3C and/or QAP 3J are imposed)
Revised July 10, 2002 (note added to address material/process/procedure changes)
Revised June 02, 2004 (added Note 2 referencing subcontracted activities)

MANUFACTURERS - A Certificate of Conformance (C of C) referencing the L-3 ES PO, part number and lot identification, where applicable, shall be supplied with each shipment of the subject item. The certification shall be signed by an authorized representative and shall state that all materials and processes to produce the subject product/service as described on the PO conforms to the PO, specification and drawing requirements.

In instances where QAP 3C and/or QAP 3J are specified on the subject PO, the manufacturer shall, in addition, document on the C of C date codes/lot numbers of the raw materials used to produce the applicable item(s). See Notes 1 and 2 below.

NOTE: All Quality Assurance/Control Systems data and documentation called out on the purchase order must be placed with the parts/components inside the shipping container/package. Failure to comply fully with the provisions/requirements may adversely affect the Supplier Quality Rating and can result in the return of the complete shipment at your expense.



DISTRIBUTORS – The distributor shall supply with each shipment a copy of the original manufacturer's certification as described above. In addition, the distributor shall supply their certification referencing the L-3 ES PO number. In addition, a statement where applicable shall include the manufacturer's "Reference Qualification Number" as listed in the current Qualified Product List (QPL)/Qualified Manufacturers List (QML) and that the distributor is an authorized supplier for the subject manufacturer.
In case(s) where there is no QPL requirement, the certification shall specify the manufacturer's Commercial and Government (CAGE) number.

Note 1: L-3 ES piece part approval is granted on materials, processes and procedures established at time of initial procurement. Where a material, process or procedure change is incorporated by the supplier that may affect product quality, L-3 ES procurement shall be notified.

Note 2: Subcontracted activities shall be performed by a designated design authority approved, government approved and/or L-3 ES approved source.

Reference: L-3 ES SQD.

## 3B SPECIAL PROCESS CERTIFICATION

Revised March 14, 2002 (clarified authorized sources for processes)

Certification shall be issued with each shipment stating that all special processes. Such as but not limited to, metal to metal bonding, plating, anodizing, painting, finish/coating, chemical conversion, heat treating, non-destructive testing and destructive testing to demonstrate compliance with the requirement of the drawings, specifications and/or PO. And was accomplished by a designated design authority, government approved and/or L-3 ES approved source. Reference: L-3 ES SQD.
The certificate shall include the signature of an authorized representative of the supplier. In the event that the supplier must subcontract any or all of the above requirements, the same conditions will be applied to the subcontractors who shall produce written certification that all specification requirements have been fully complied with. The responsibility for collecting and issuing subcontractor certificates for each L-3 ES shipment is that of the supplier designated on the PO.

## 3C TRACEABILITY - RAW MATERIALS

Revised March 13, 2002 (minor changes, no change in content)

Certification is required for the subject commodity with each shipment against this PO. The certification shall be signed by an authorized representative of the supplier and must read substantially as follows: "Raw materials are traceable to physical/chemical test reports or inspection records at the point of manufacture. This data indicates conformance to all applicable PO requirements, referenced specifications or special requirements. Said reports and/or records show relevance to specific shipments against the referenced PO, and originals or true copies thereof are available for review by L-3 ES upon request."

## 3D MEASURING and TEST EQUIPMENT CERTIFICATION

Measuring and testing equipment used in the performance of this order shall be calibrated in accordance with the applicable system per QAP 1F. A certificate shall be supplied showing accuracy measured in terms of a standard that has been certified by the National Institute of Standards and Technology of USA or the National Research Council of Canada. The certificate shall include measured data and identification numbers of standards used.

**3E SPECIAL TEST CERTIFICATION**

Revised March 21, 2002 (minor changes, no change in content)

This commodity requires the performance of one or more special tests as indicated on this PO. The supplier shall furnish with each shipment a special test certification indicating that in fact all required tests have been performed. The test certification shall include:

1. The part number and designation.
2. The quantity of parts in this shipment.
3. The PO number of this shipment
4. The serial number of each part (if applicable)
5. The type and/or description of the test(s)
6. The specification number of drawing note to which each test is performed.

This certificate shall be signed by an authorized representative and shall include the name and address of the supplier.

**3F MERCURY EXCLUSION**

Revised March 21, 2002 (minor changes, no change in content)

The supplies furnished under this PO shall contain no metallic mercury or mercury compounds. And shall be free from mercury contamination (i.e. during the manufacturing process, tests or inspections, the supplies offered shall not have come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing only a single boundary of containment.) A single boundary of containment is one that is not backed by a second seal or barrier to prevent contamination in the event of rupture of the primary seal or barrier). Mercury contamination of the supplies shall be cause for rejection of the material. The supplier shall furnish a signed certificate of conformance with each shipment.

**3G MATERIAL EQUIVALENCY/SUBSTITUTION**

Revised March 21, 2002 (minor changes, no change in content)

When a supplier uses an equivalent or substitute material that is permissible per the applicable drawing/specification, the supplier shall state on the Certificate of Conformance the material specification/type selected with proper justification.

**3H CERTIFICATE OF CONFORMANCE (COMMERCIAL OFF THE SHELF [COTS], NON MILITARY, NON DESIGN AUTHORITY, VENDOR CONTROLLED PRODUCT)**

Revised March 14, 2002 (application/requirements of QAP more clearly defined)

A Certificate of Conformance referencing the L-3 ES PO, part number, and lot identification, where applicable; shall be supplied by the distributor and/or the manufacturer with each shipment of the subject item. The certificate shall be signed by an authorized representative and shall state that the subject product/service conforms to the PO, specification and drawing requirements.

**3J ORGANIC FINISH CERTIFICATION**

Revised March 21, 2002 (minor changes, no change in content)

A certification shall be issued with each shipment and shall state that all processes demonstrate compliance with the requirements of the drawings, specifications or PO and was accomplished by a designated design authority, government and/or L-3 ES approved source. Reference L-3 ES SQD. Additionally, the current Chemical Agent Resistant Coating (CARC) Process Certification (form # GMD 4707-1) shall be issued, accompanied by supporting original manufacturer's certificates for paint and primer. The certificates shall include the signatures of authorized representatives of each supplier. In the event that the supplier must sub-contract any or all of the above requirements, then the same conditions shall be applied to the sub-contractors who shall produce written certification that all specification requirements have been fully complied with. The responsibility for collecting and issuing subcontractor certificates for each L-3 ES shipment is that of the vendor designated on the PO.

## 3K DISTRIBUTORS (SUPPLIER PARTNERSHIP PROGRAM [SPP] - REF QAP 2H)

Issued May 21, 2002
Revised August 14, 2002 (note added that distributor must be authorized)

The SPP distributor shall supply a copy of the distributor's Certificate of Compliance referencing the L-3 ES PO, part number, manufacturer's identification and lot identification, where applicable. The SPP distributor in the case of Mil and/or Design Authority Controlled Product has the option to supply the original manufacturer's C of C with the shipment. Or to retain the subject C of C at the distributor's facility in such a manner that it shall be readily available to L-3 ES upon request for a minimum of five years.

Note: The distributor must be authorized by the manufacturer to distribute the subject product, otherwise QAP 3A applies.

## 3L ALUMINUM PRETREATMENT PROCESS CERTIFICATION (CHROMIUM FREE PROCESS)

Issued May 1, 2002

Parts shall be pre-treated with either Henkel Alodine 5200 or Alodine 5700 per manufacturers recommended process. Minimum coating weights shall be 50mg/sq ft for Alodine 5200 and 8 mg/sq ft for Alodine 5700. Certification shall be issued with each shipment identifying the material used and stating that the required pre-treatment process was accomplished by a design authority designated, government approved and/or L-3 ES approved source. Reference L-3 ES SQD.

The certificate shall include the signature of an authorized representative of the supplier. In the event that the supplier must subcontract any or all of the above requirements, the same conditions will be applied to the subcontractors who shall produce written certification that all specification requirements have been fully complied with. The responsibility for collecting and issuing subcontractor certificates for each L-3 ES shipment is that of the supplier designated on the PO.

Note: Where the drawing specifies Chemical Conversion Coating per MIL-C-5541, is shall be replaced with this Chromium Free Process.

## 3M SPECIAL PROCESS CERTIFICATION (CHROMIUM FREE)

Issued July 11, 2002.

All special processes, including but not limited to, anodizing and painting, shall be performed using chromium free processes/materials. Chemical conversion coating per MIL-C-5541, when specified, shall be Class 3 only and is exempt from the chromium restriction. If there is a Class conflict with the drawing, the Class 3 requirement of this QAP shall take precedence.

All product manufactured with no trace of chromium shall be identified with a red letter "T" following the part identification number per MIL-STD-130. Any product manufactured containing trace elements of chromium (e.g. MIL-C-5541 Class 3) shall be identified with a black letter "H" following the part identification number per MIL-STD-130.

**A special process certification shall be issued with each order identifying the chromium status of the product. The certificate shall include the signature of an authorized representative of the supplier. In the event that the supplier must subcontract any or all of the above requirements, the same conditions will be applied to the subcontractors who shall produce written certification that all specification requirements have been fully complied with. The responsibility for collecting and issuing subcontractor certificates for each L-3 ES shipment is that of the supplier designated on the PO.**

### 3N CERTIFICATE OF CONFORMANCE (NON MIL AND/OR NON DESIGN AUTHORITY CONTROLLED PRODUCT)

Issued June 2, 2004

Where Commercial Off The Shelf (COTS), Non Military, Non Design Authority and/or Vendor Controlled Product are incorporated into the procured assemblies a Certificate of Conformance(s) shall be supplied per QAP 3H.

## 4 TEST REPORTS

### 4A CERTIFICATE OF ANALYSIS/PHYSICAL AND CHEMICAL TEST REPORT

Revised March 13, 2002 (minor changes, no change in content)

Certificate(s) of analysis/physical and chemical test report(s) shall be furnished covering material on the subject PO. The document/report shall show evidence of full compliance with all applicable specifications and referenced standards.

### 4B REWORK REPORT

The supplier shall provide a complete description of the rework required to return the nonconformance to full compliance with the requirements of the procurement specification. If any component replacement is required, a complete list of replacement components shall be included with full traceability as to part number, lot number or date code and the name of the component manufacturer.

### 4C REPAIR REPORT

The supplier shall provide a complete description of the repair required to return the item to the operational requirement. If component replacement is required, a complete list of replacement components shall be included with full traceability as to part number, lot number or date code and the name of the component manufacturer. All repairs shall be in accordance with **L-3 ES** quality engineering approval.

### 4D FAILURE ANALYSIS

The supplier shall provide a failure analysis report which shall include as a minimum: a description of failure mode, the cause of failure, corrective action implemented to preclude recurrence of the failure, corrective action effectivity by date code, lot number or serial number and reference the non-conformance report (NCR).

### 4E FIRST ARTICLE INSPECTION/TEST REPORT (FAIR)

Revised March 13, 2002 (clarification of specific requirements)
Revised June 19, 2002 (clarified drawing note requirements)
Revised June 02, 2004 (clarified FAIR requirements for assemblies)

The supplier shall select, identify (non-permanently) and inspect one (1) representative piece, unless otherwise specified in the PO, from the first production lot to be submitted against this order. In case of assemblies, the following FAIR requirements also applies to custom (source controlled) components that may be incorporated within the assemblies. The applicable parameters shall be documented on a First Article Inspection/Test Report (L-3 ES or supplier equivalent) and included with the first shipment.
The FAIR shall document as a minimum the part number, revision, all PO requirements, drawing notes (applicable drawing notes are to be specifically addressed and recorded within the body of the FAIR document), the required parameters and tolerances along with the measured actual values where applicable.

In addition to the above requirements, the following shall apply to the designated commodities.

Electrical and Electro-Mechanical Components/Assemblies:
The FAIR data shall comprise of all Group A/B and/or specification and drawing data/dimensions/screening data in accordance with the applicable specification/drawing.

Mechanical Components/Assemblies:
The FAIR data shall include all supporting documentation including the original manufacturer's raw material certifications, specifications, hardware certifications etc. Where specified, the FAIR shall document measurements using Geometric Dimensioning and Tolerancing.

Note: Some commodities may pertain to both of the preceding categories and are to be addressed accordingly.

**4F QUALIFICATION TEST REPORT**

A qualification test report shall accompany the first shipment of this commodity. The qualification test report shall contain as a minimum:

1. Part number and revision of the commodity qualified.
2. Qualification test performed
3. The test equipment on which the tests were performed
4. The test equipment calibration status
5. The specification to which the tests were performed
6. The test conditions
7. The sample size submitted for each test
8. The number of test failures for each sample
9. The name of the laboratory or facility where the tests were performed
10. The signature, names and title of the authorized representative of the laboratory or facility.

**4G PRODUCT QUALITY FLOW PLAN**

Revised May 17, 2002 (minor changes, no change in content)

The supplier shall prepare and submit to L-3 ES SQE, all applicable requirements of a "Product Quality Flow Plan". Unless otherwise specified the "Product Quality Flow Plan", together with the applicable copies of the following:

1. Inspection/Quality Instructions
2. Acceptance Test Procedure
3. Manufacturing traveller/flow diagram shall be submitted prior to the initial shipment of material to L-3 ES.

Note: The Inspection/Quality Instruction/Acceptance Test Procedure and Manufacturers traveller need only be submitted once per requesting facility for a specific part number, unless revisions or changes have occurred to the previous submittals.

**4J RADIOGRAPHIC INSPECTION REPORT**

The supplier shall furnish x-ray film and laboratory reports for this commodity with each shipment against this PO. The x-ray film and laboratory report shall represent the lot ordered and shall be so identified.

**4K PERIODIC VALIDATION OF RAW MATERIAL (REF: AS9100)**

Issued January 22, 2003

Where test reports or raw material certification testing are utilized by your company to verify purchased product, you must ensure that the data in those reports is acceptable per the applicable specifications.

NOTE: All Quality Assurance/Control Systems data and documentation called out on the purchase order must be placed with the parts/components inside the shipping container/package. Failure to comply fully with the provisions/requirements may adversely affect the Supplier Quality Rating and can result in the return of the complete shipment at your expense.



As a minimum, once per calendar year, the quantitative chemical and physical properties from at least 3 samples of raw materials (sheet, bar, tube, billet, shot or other raw material) shall be validated to verify conformity to specification and comparison with test reports/certifications. This analysis/evaluation may be performed by yourself (if you have internal resources), an independent accredited lab or one approved by L-3 ES. The validation shall be a continuous process encompassing raw materials from all manufacturers utilized in L-3 ES end product.

A copy of all independent or internal raw material validations must be kept on file for L-3 ES auditing purposes with a copy mailed to L-3 ES SQE for review. Any raw material deviation from the specification requirements and/or exhibiting significant variation from the test reports must be reported immediately to L-3 ES SQE for action.

Note: This is a system requirement for raw material validation not a requirement for each individual piece part.

## 5 TEST DATA

### 5A GROUP A TEST DATA/INSPECTION DATA (ATTRIBUTES)

Revised May 27, 2002 (minor changes, no change in content)

Group A and/or specification test/inspection attributes test data and required screening data in accordance with the applicable specification shall be furnished with each shipment against this PO. The test data shall bear the approval signature of an authorized representative of the supplier.

### 5B GROUP A TEST DATA (VARIABLES)

Revised May 27, 2002 (minor changes, no change in content)

Group A test data (read and record) in accordance with the applicable specifications for each lot code shall be furnished with each shipment against the subject PO. The test data shall bear the approval signature of an authorized representative of the supplier.

### 5C GROUP A TEST DATA (CERTIFICATION)

Revised May 27, 2002 (three year retention changed to five years)

A Certificate of Compliance bearing the signature of an authorized representative of the supplier and referencing the L-3 ES PO, part number and lot identification (where applicable) shall be furnished with each shipment. Group A test data shall be retained in such a manner that it shall be readily available to L-3 ES upon request for a minimum of five years.

### 5D GROUP B TEST DATA (VARIABLES)

Revised May 27, 2002 (minor changes, no change in content)
Revised June 02, 2004 (added variables in header)

Group B test data in accordance with the applicable specifications for each lot code shall be furnished with each shipment against the subject PO. The test data shall bear the approval signature of an authorized representative of the supplier.

### 5E GROUP B TEST DATA (CERTIFICATION)

Revised May 27, 2002 (three year retention changed to five years)
Revised June 02, 2004 (added variables in header)

A Certificate of Compliance bearing the signature of an authorized representative of the supplier and referencing the L-3 ES PO, part number and lot identification (where applicable) shall be furnished with each shipment. Group B test data shall be retained in such a manner that it shall be readily available to L-3 ES upon request for a minimum of five years.

**5F GROUP C TEST DATA (VARIABLES)**

Revised May 27, 2002 (minor changes, no change in content)

Group C test data in accordance with the applicable specification shall be furnished with the first shipment against the PO for each lot code in the shipment. The test data shall bear the signature of an authorized representative of the supplier.

**5G GROUP C TEST DATA (CERTIFICATION)**

Revised May 27, 2002 (three year retention changed to five years)
Revised June 02, 2004 (added variables in header)

A C of C bearing the signature of an authorized representative of the supplier and referencing the L-3 ES PO, part number and lot identification (where applicable) shall be furnished with each shipment. Group C test data shall be retained in such a manner that it shall be readily available to L-3 ES upon request for a minimum of five years.

**5H GROUP D TEST DATA (VARIABLES)**

Revised May 27, 2002 (minor changes, no change in content)
Revised June 02, 2004 (added variables in header)

Group D test data in accordance with the applicable specification shall be furnished with the first shipment against the PO for each lot code in the shipment. The test data shall bear the signature of an authorized representative of the supplier.

**5J GROUP D TEST DATA (CERTIFICATION)**

Revised May 27, 2002 (three year retention changed to five years)

A C of C bearing the signature of an authorized representative of the supplier and referencing the L-3 ES PO, part number and lot identification (where applicable) shall be furnished with each shipment. Group D test data shall be retained in such a manner that it shall be readily available to L-3 ES upon request for a minimum of five years.

**5K GEAR TEST DATA**

Revised June 4, 2002 ("should include" changed to "shall include")

All gears on this PO require documentary evidence of conformance to all specification requirements. This shall include a continuous recorded (red lined) chart of the total composite error (after the final surface finish) with a minimum of one complete revolution with an indication of "start" and "stop".

**5L TEST/INSPECTION DATA (READ AND RECORD)**

Revised June 4, 2002 (minor changes, no change in content)
Revised June 2, 2004 (note 5 clarified to define “each” component)

Inspection measurements and/or electrical test results reflecting the requirements of the applicable specification shall be recorded. The test/inspection data pertinent to each shipment of this commodity against this PO shall be included with the shipment. The data shall as a minimum include:

1. Part number and revision
2. L-3 ES's PO number
3. Supplier's test procedure number and revision

4. Parameters tested or inspected
5. 100% functional/electrical test results of each component unless otherwise specified
6. Date of test completion
7. Evidence of test acceptance by authorized supplier's representative

**5M MECHANICAL/ELECTRICAL INSPECTION DATA (READ AND RECORD)**

Issued June 11, 2002.
Revised June 2, 2004 (note 5 clarified to define "each" component)

Mechanical Inspection and Electrical Inspection measurements, where applicable, reflecting the requirements of the specification shall be recorded. The Inspection data pertinent to each shipment of the subject commodity against this PO shall be included with the shipment. The data shall as a minimum include:

1. Part number and revision
2. L-3 ES's PO number
3. Supplier's test procedure number and revision, if applicable
4. Parameters tested or inspected
5. 100% mechanical*/electrical results of each component unless otherwise specified within the PO
6. Date of test completion
7. Evidence of test acceptance by authorized supplier's representative.

* Where specified, the data shall document measurements using Geometric Dimensioning and Tolerancing.

## 6 WORKMANSHIP

**6A ELECTRO-MECHANICAL ASSEMBLIES**

Revised June 11, 2002 (Mil-STD-454 cancelled, preferred is ANSI/IPC J-STD-001)

This commodity shall be manufactured and delivered in compliance with the workmanship requirements of MIL-STD-454 (Requirements 5 and 9), unless otherwise specified in the PO.
Note: Preferred requirement is compliance with ANSI/IPC J-STD-001.

**6B CASTINGS**

Revised June 11, 2002 (Mil-A-21180 replaced by SAE-AMS-A-21180)

The material on the subject PO, as applicable, unless otherwise specified shall conform to the requirements of the Litton Systems Inc., spec 990137 "Requirements for Castings" (ferrous and nonferrous castings) or SAE-AMS-A-21180 "Aluminum-Alloy Castings, High Strength"

**6E PREPARATION and SOLDERING OF ELECTRICAL CONNECTIONS (MIL-STD-2000)**

Revised June 4, 2002 (removed following: "Note: Preferred requirement is compliance with ANSI/IPC J-STD-001")

Electronic equipment/assemblies supplied against this PO shall meet the requirements of MIL-STD-2000 or the requirements of ANSI/IPC J-STD-001 to the extent specified on the PO.

**6F PREPARATION and SOLDERING OF ELECTRICAL CONNECTIONS (MIL-STD-2000A)**

Revised June 4, 2002 (removed following: "Note: Preferred requirement is compliance with ANSI/IPC J-STD-001")

Electronic equipment/assemblies supplied against this PO shall meet the requirements of MIL-STD-2000A or the requirements of ANSI/IPC J-STD-001 to the extent specified on the PO.

**6G PREPARATION and SOLDERING OF ELECTRICAL CONNECTIONS (ANSI/IPC J-STD-001)**

Electronic equipment/assemblies supplied against this PO shall meet the requirements of ANSI/IPC J-STD-001. Classification level will be understood to be Class 3 unless otherwise specified in the PO.

## 7 CONTROLS/SPECIAL TESTS

**7A MATERIAL SHELF LIFE**

Revised February 15, 2002 ("or date of expiry" is no longer an option. QAP now specifies "and date of expiry")

Materials with a limited shelf life shall be supplied with an accompanying effective date of manufacture and date of expiry. At the time of receipt at L-3 ES, the material shall have at least 75% of the shelf life remaining.

**7B AGE and DATE CODE CONTROL**

Revised May 1, 2002 (minor changes, no change in content)

The supplier shall deliver to L-3 ES only those parts manufactured or re-inspected within the 40 months period prior to date of shipment. A date code lot marking on each individual part or on the packaging for those parts too small to be marked shall evidence this. (e.g. semi-conductor dice).

DATE CODE IDENTIFICATION

The supplier shall identify on his QPL certification(s), Certificate of Conformance or packing slip the part number and specific quantity of each date code lot and sub-lot shipped in response to the L-3 ES PO. If the parts have been re-inspected to meet the 40-month criteria then the date code of the re-inspection shall be recorded on the applicable Certificate of Conformance.

Note: No shipment of an individual part number shall contain more than three (3) different date codes. If vendor is unable to meet this requirement, then the vendor shall notify the L-3 ES

**7D PRINTED CIRCUIT BOARDS (IPC-6012)**

Printed Circuit boards shall be fabricated as per IPC-6012 specification and shall meet the performance requirements of Class 3 (high reliability) of this specification.

**7E FLEX PRINTS (IPC-6013)**

Flex Prints shall be fabricated as per IPC-6013 specification and shall meet the performance requirements of Class 3 (high reliability) of this specification.

**7H CARBURIZING, NITRIDING, OR OTHER HARDENING PROCESSES**

A representative coupon of minimum 15mm diameter or thickness and length equivalent to the thickness of the material to be hardened shall be cut from the same piece of stock as the supplied item. The traceable coupon shall be processed in an identical manner at the same time as the supplied item. The coupon and documentation certifying the grinding allowance after hardening shall be furnished to L-3 ES with the supplied item.

NOTE: All Quality Assurance/Control Systems data and documentation called out on the purchase order must be placed with the parts/components inside the shipping container/package. Failure to comply fully with the provisions/requirements may adversely affect the Supplier Quality Rating and can result in the return of the complete shipment at your expense.

**QAP Description** 

**7K SUPPLIER/SUBCONTRACTOR SPECIAL PROCESS CONTROL**

The supplier /subcontractor shall establish and maintain control of all special processes, such as but not limited to, metal to metal bonding, plating, anodizing, painting, finish/coating, chemical conversion, heat treating, non-destructive testing, and destructive testing. These form part of the manufacturing/inspection operations, or required safety precautions, equipment, essential processing environments and personnel qualifications shall be in accordance with the contract or established procedures and be subject to approval or certification to the satisfaction of the purchaser.

**7L INSPECTION/TESTING SAMPLING REQUIREMENT (MACHINED/FABRICATED PARTS)**

The supplier shall perform sample inspection/testing in accordance with the applicable specification/drawing for each lot/shipment against this PO. When the specification/drawing does not specify the sampling plan the supplier shall as a minimum inspect/test all parameters/characteristics to an AQL 1.0, normal level II inspection, and single sampling plan, per ANSI/ASQC Z1.4-1993 (current revision).

The supplier may utilize a reduced inspection/test-sampling plan if the requirements of ANSI/ASQC Z1.4-1993 (current revision) are fulfilled and/or when the records or inherent characteristics of the product indicate that a reduction in inspection/testing can be achieved without jeopardizing product quality.

**7M CONTROL OF MOISTURE SENSITIVE, PLASTIC ENCAPSULATED ELECTRONIC DEVICES**

Revised October 2001 (IPC/JEDEC J-STD-033 introduced)

The supplier must classify and package components in accordance with IPC/JEDEC J-STD-033. All discrete packages must be labeled in accordance with IPC/JEDEC J-STD-033.

**7N SHELF LIFE FOR PRINTED CIRCUIT BOARDS**

Revised June 12, 2002 (minor changes, no change in content)

Printed circuit boards as received at L-3 ES, shall have a minimum remaining balance of six months shelf life for tin-lead plated fused boards and three months for hot air solder coated boards.
The shelf life for tin-lead plated fused boards has been established as nine months and for solder coated boards as four months, from the date of manufacture recorded on the board.

**7P PRINTED CIRCUIT BOARD ELECTRICAL TEST**

Printed circuit boards shall be 100% electrically tested as per IPC-ET-652 against the Net List (if provided by LSC), otherwise the part shall be tested against a known good board (Golden board). The parameters of the test shall be as follows:

1. Circuit continuity shall be tested using a test voltage of 150-250 VDC. There shall be no open circuit whose resistance exceeds 10 ohms.
2. Circuit shorts shall be tested using a test voltage of 150-250 VDC. The resistance between mutually isolated conductor to be > 10 megohms.

Acceptable printed circuit boards shall be identified by the testing facility with a unique acceptance stamp in any suitable place that will not be covered by a component. Acceptable printed circuit boards whose available area are physically too small to mark with a stamp, shall have the test certification indicating acceptance. The subject part number and date code accompanying each lot and shall have a white epoxy ink dot placed next to vendor source identification by the manufacturer. Lot results for all printed circuit boards shall accompany each shipment to L-3 ES.

**7Q PIND TEST**

The supplier shall perform particle impact noise detection (PIND) test on each component in accordance with the following applicable specifications. MIL-STD-750, Method 2052 (semiconductors) or MIL-STD-883, Method 2020 (microcircuits) Condition B, pre and co-shock levels of 1000 g, vibration level 10g at 60 Hz, dwell time 4 seconds at 60 Hz. Test results shall be furnished with each shipment.

**7R NONDESTRUCTIVE BOND PULL TEST REQUIREMENTS - SEMICONDUCTORS**

Revised June 20, 2002 (removed specific references to wirebond pull test force of 10 grams)

Nondestructive wirebond pull test is to be performed on each device (100%) in accordance with MIL-STD-883, Test Method 2023. With each shipment the supplier shall provide Northrop Grumman Canada documentation indicating the failure modes for the failed bonds and attribute summary of the nondestructive bond pull test results.

**7S SOLDERABILITY TEST**

Each shipment shall meet the solderability requirements of MIL-STD-202, Method 208, MIL-STD-750, Method 2026, or MIL-STD-883, Method 2003 as applicable or the solderability requirements of ANSI/IPC J-STD-002.
Note: Preferred requirement is compliance with ANSI/IPC J-STD-002.

**7T SOLDERABILITY REQUIREMENT**

All solderable terminals/leads of each part shall be hot solder dip (HSD) coated with QQ-S-571, Sn60 or Sn63 solder (or ANSI/IPC J-STD-006, Sn60Pb40Sb.4A or Sn63Pb37Sb.4A solder). Each shipment shall meet the solderability requirements of MIL-STD-202, Method 208, MIL-STD-750, Method 2026, or MIL-STD-883, Method 2003 as applicable or the solderability requirements of ANSI/IPC J-STD-002.
Note: Preferred requirement is compliance with ANSI/IPC J-STD-002 and 006.

**7V SPECIAL TEST REQUIREMENT (PRESSURE)**

Pressure tests are to be performed on this commodity in accordance with the requirements of the applicable drawings or specifications as indicated on this PO. Special test certification (QAP 3E) shall accompany each shipment.

**7W SPECIAL TEST REQUIREMENT (SEAL)**

All parts shall be seal test 100% in accordance with the applicable method specified on the PO or in the procurement specification. Special test certification (QAP 3E) shall accompany each shipment.

**7Y RUBBER CURE DATE**

The Certificate of Conformance and the individual packaging shall specify the cure date of each item in the shipment.

## 8 IDENTIFICATION and MARKING REQUIREMENTS

**8A METHOD, LEGIBILITY and PERMANENCY**

Revised June 11, 2002 (Mil-Std-130 recorded as governing specification)

The supplier shall be responsible for identifying and marking each part. Unless otherwise specified on the subject PO or referenced specification/drawing, the identification and marking shall be fully compliant with the current issue of MIL-STD-130.

**8B SERIALIZATION**

The supplier shall identify each individual unit/item supplied to L-3 ES with a unique serial number. The serial number shall be applied by means that will ensure legibility and permanency without affecting the fit, form or function of the item so identified. Where method or location of serialization is in doubt, L-3 ES SQE must be consulted. The serial numbers shall be sequential and shall not be repeated within a specific part number.

**8C WIRE/TUBING/SLEEVING**

Revised June 11, 2002 (AMS and SAE specifications added)

Each spool/reel/coil on the subject PO must be legibly and permanently identified with label or tag per the applicable specification or with the following information:

1. Manufacturers name and part number
2. L-3 ES part number (where applicable)
3. L-3 ES PO number
4. Quantity
5. Gauge (AWG) and description
6. MIL/AMS/SAE or other Specification and Type (where applicable)
7. Cure date and lot number (where applicable).

**8E DIE IDENTIFICATION**

The supplier shall identify intimate packaging of die (waffle packs etc.) with the lot number traceable to the original manufacturer (depositions/diffusions) and explanation of such, as well as the configuration revision of product supplied. The supplier shall also supply diagram of the die, indicating overall dimensions and location/identification of bonding pads.

## 9 PACKAGING

**9A STATIC SENSITIVE MATERIALS**

All materials, components or assemblies susceptible to being degraded, damaged or destroyed by electrostatic charges (Reference: MIL-STD-1686, Table II and MIL-HDBK-263, Table IV) shall be intimately packaged in sealed ESD protective containers that will protect contents from triboelectric charging, direct contact with charged objects and electrostatic fields. Protection shall be provided to prevent physical damage and to maintain leads and terminals in the manufactured condition under handling and transportation environments. Materials used for intimate packaging shall be non-corrosive and non-static generating. Conductive shunting foam, bars or clips shall be applied on electrical connectors to short all connector pins and the connector shell together. Intermediate packaging shall be clearly labeled or marked to indicate that the contents are subject to damage or degradation by electrostatic discharge. (Ref. MIL-STD-129).

Note: The packaging of the material shall not in any way affect solderability of the part.

**9B PROTECTION AGAINST ENVIRONMENTAL AGENTS and CONDITIONS**

Unless otherwise specified on the drawing, specification or the PO the following requirements are mandatory:

1. Prior to packaging, material shall be clean (free from foreign matter). Critical functioning or close tolerance surfaces shall be cleaned to ensure removal of corrosion, soil, grease, residues and fingerprints, perspiration or other acid and alkali residues.
2. Material not inherently resistant to corrosion shall be inhibited with a suitable medium.
3. Material shall be packaged to the extent necessary to provide protection from the hazards of contamination and physical damage encountered in general handling, shelf storage and issue.

**9C BEARINGS**

Bearings shall be packaged individually in a plastic bag or box in accordance with QAP 9B. Packaged bearing pairs/sets, must be kept together in suitable intermediate packaging. All the intermediate package must be clearly marked with L-3 ES part number and revision (where applicable).

**9D BERYLLIUM PACKAGING**

If not specified on applicable specification, each part shall be enclosed in an individual heat-sealed poly coated mylar, nylon, or polyethylene bag and the package labeled essentially as follows, color **RED**:

**WARNING: BERYLLIUM PRODUCT**
**Hazardous dust or vapors produced by machining, filing, welding, grinding or chemical etching.**

Each bagged part shall be further packaged as necessary to prevent physical damage (through shock, vibration, handling, abrasion, scratching etc.) Beryllium dust content shall not exceed two (2) micrograms per units' package.

**9E TAPE AND REEL PACKAGING**

Revised January 25, 2002. (Halifax and Toronto facility requirements specified)
Revised September 7, 2003 (Toronto facility requirements deleted)

Components shall be packaged on tape and reel per the current specification ANSI/EIA-481, appropriate for the component. PLCC or SOIC integrated circuits in quantities of less than 1000 components may be supplied in tubes, if appropriate. Matrix trays shall be used for quad flat pack components.

**9F LIFE TIME PROCUREMENT**

Revised May 1, 2002 (minor changes, no change in content)
Revised June 02, 2004 (added last sentence L-3 ES incoming inspection shall identify the product per Engineering Guideline No. 93960.)

Due to product obsolescence, L-3 ES is making a Lifetime Buy to support program(s) life expectancy. If specified, the supplier shall fulfil the special preservation/packaging requirements as stipulated in the body of the PO. L-3 ES incoming inspection shall alert store to package the product per Engineering Guideline No. 93960.

## 10 NOTES:

**XX** For L-3 ES internal use only.